

**5ESS[®] Switch
Corrective Maintenance
Procedures**

5E15 and Later Software Releases

235-105-220
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Acknowledgment

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1. INTRODUCTION

1.1 PURPOSE

This is the 235-105-220, *Corrective Maintenance Procedures*. The procedures in this information product are used to perform corrective maintenance on the hardware and software of the 5ESS[®] switch.

Other 5ESS switch documentation may also be used with this information product to perform some corrective maintenance tasks. In particular, the 235-105-110, *System Maintenance Requirements and Tools*, provides descriptive information needed to make the most effective use of this information product.

This information product is used by operating telephone company personnel who are trained to perform corrective maintenance on any 5ESS switch with 5E15-5E19.1 software releases. It may also be used to support technical training.

1.2 GENERAL

1.2.1 REASONS FOR UPDATE

The document has been modified for R36:

- Table Diagnostic Phase Descriptions for the MCTSI SM-2000 [A1-86](#) is updated for R36.

1.2.2 CUSTOMER COLLABORATION

The CM2 Advanced Maintenance Procedures section was collaboratively developed with representatives of the Reliability Review Forum (RRF). Alcatel-Lucent would like to acknowledge the contributions of the RRF member companies; BellSouth, SBC and Qwest.

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1.2.4 SUPPORTED SOFTWARE RELEASES

In accordance with the 5ESS Switch Software Support Policy, the 5E14 software release is rated Discontinued Availability as of September 1, 2004. The information supporting 5E14 and earlier software releases is being removed over time, instead of concurrently, from all documentation. If you support offices that use a software release before 5E15 and you need the information that is being removed, keep the earlier copy of the CD-ROM.

1.2.5 TERMINOLOGY

1.2.5.1 Communication Module Name Change

The term Communication Module (CM) has been changed to the Global Messaging Server (GMS), representing the new portfolio name of this particular module. The current names of the specific types of the GMS (the CM2 or CM3) have not been changed. Where the CM name has been used in a generic way within this information product, the name will be changed to GMS. Where the specific version of GMS (CM2 or CM3) is being described or mentioned, the name will not be changed. However, the GMS name may be added to the description in certain places as a reminder of the change, and that the particular version is a part of the overall portfolio. The following list provides some examples of how you may see these names used together:

- Global Messaging Server (formerly Communication Module)
- GMS (formerly CM)
- Global Messaging Server-CM2
- GMS-CM2
- Global Messaging Server-CM3
- GMS-CM3.

These name changes will be made over time as other technical changes are required. Also, these changes may not be reflected in all software interfaces (input and output messages, master control center screens, and recent change and verify screens). Where the information product references these areas, the names are used as they are within the software interface.

1.2.5.2 Bellcore/Telcordia Name Change

As of March 18, 1999, Bellcore officially changed its name to Telcordia Technologies. Not all pages of this information product will be reissued to reflect this change; instead, the pages will be reissued over time, as technical and other changes are required. Customers on standing order for this information product may see that, on previous-issue pages, the Bellcore name is still exclusively used.

Customers receiving new orders for this information product will see the Telcordia Technologies name used as appropriate throughout the information product, and the Bellcore name used only to identify items that were produced under the Bellcore name. Exceptions may exist in software influenced elements such as input and output messages, master control center screens, and recent change and verify screens. These elements will not be changed in this information product until such time as they are changed in the software code. Information product updates will not be made specifically to remove historical references to Bellcore.

1.2.5.3 5ESS-2000 Switch Name Change

This 5ESS switch information product may have references to the 5ESS switch, the 5ESS-2000 switch, and the 5ESS AnyMedia[®] switch. The official name of the product has been changed back to the 5ESS switch. The information product will not be totally reissued to change these references. Instead, the changes will be made over time, as technical changes to the information product are required. In the interim, assume that any reference to the 5ESS-2000 switch or the 5ESS AnyMedia switch is also applicable to the 5ESS switch. This name change may not have been carried forward

into software-influenced items such as input and output messages, master control center screens, and recent change/verify screens.

1.3 ORGANIZATION

This information product is divided into the following sections:

- **SECTION 1 – INTRODUCTION:** This section has information about this information product.
- **SECTION 2 – 5ESS Switch Surveillance – Start Here:** This section has procedures for examining the switch for manual actions to take.
- **SECTION 3 – ADMINISTRATIVE MODULE MAINTENANCE:** This section has procedures for maintenance of Administrative Module (3B21D) equipment.
- **SECTION 4 – COMMON NETWORK INTERFACE RING MAINTENANCE:** This section has procedures for maintenance of Common Network Interface (CNI) ring equipment.
- **SECTION 5 – COMMUNICATION MODULE MAINTENANCE:** This section has procedures for maintenance of Communication Module equipment. Included is the Quad Link Packet Switch (QLPS).
- **SECTION 6 – COMMUNICATION MODULE ADVANCED MAINTENANCE:** This section has advanced procedures for maintenance of Communication Module Model 2 equipment.
- **SECTION 7 – SWITCHING MODULE MAINTENANCE:** This section has procedures for maintenance of Switching Module and Switching Module – 2000 equipment.
- **SECTION 8 – MISCELLANEOUS MAINTENANCE PROCEDURES:** This section has procedures for maintenance of Switching Module and Switching Module – 2000 equipment.
- **SECTION 9 – ANALOG AND DIGITAL LINE TESTS:** This section has line maintenance procedures that can be performed on analog or digital line units.
- **SECTION 10 – ANALOG LINE TESTS:** This section has line maintenance procedures that can be performed on analog line units.
- **SECTION 11 – DIGITAL LINE TESTS:** This section has line maintenance procedures that can be performed on digital line units.
- **SECTION 12 – ANALOG AND DIGITAL TRUNK TESTS:** This section has line maintenance procedures that can be performed on analog or digital trunk units.
- **SECTION 13 – TRACING CALLS:** This section has procedures to perform the utility call trace function.
- **SECTION 14 – POWER DISTRIBUTION AND FUSE ALARM MAINTENANCE:** This section has procedures related to the power and fuse equipment.
- **SECTION 15 – FAN REPLACEMENT:** This section has procedures for replacing fans and fan alarm circuits.
- **SECTION 16 – OFFICE DEPENDENT DATA - MAINTENANCE:** This section has procedures for office dependent data (ODD).

- **SECTION 17 - TEST EQUIPMENT CALIBRATION:** This section has calibrating procedures and/or maintenance procedures for the test equipment used for the *5ESS* switch.
- **APPENDIX 1 - DIAGNOSTIC PHASE DESCRIPTIONS:** This appendix has supporting information in the form of Diagnostic Phase Descriptions tables.
- **GLOSSARY:** This section includes a listing of abbreviations and acronyms and their significant meanings.

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1.7 REFERENCES

The Compact Digital Exchange (CDX) and the Very Compact Digital Exchange (VCDX) are switching systems based on the 5ESS switch. This information product is a standard 5ESS switch document that is also applicable to the CDX and VCDX switching systems. Information applicable only to ASM, CDX, VCDX, or Distinctive Remote Module (DRM) may be found in the following information products:

- 235-120-010, *Compact Digital Exchange (CDX) Reference Guide*
- 235-120-020, *Compact Digital Exchange (CDX) User's Guide*
- 235-120-120, *Very Compact Digital Exchange (VCDX) User's Guide*
- 235-200-145, **5ESS Switch OneLink Manager™** *Administrative Services Module User's Guide*
- 235-200-150, *Distinctive Remote Module (DRM) User's Guide*.

When appropriate, this information product has references to the applicable CDX or VCDX information products.

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2. 5ESS® SWITCH SURVEILLANCE — START HERE

Purpose

If system reliability and service objectives are to be maintained, prompt maintenance is required under all conditions. Use the procedures of this section to determine a course of action for maintaining the 5ESS switch.

Automated Maintenance Activities

The 5ESS® switch employs many software and hardware mechanisms to automatically detect faults. Some examples are self-checking circuitry, routine exercise (including diagnostics) of duplicated hardware units, dynamic data audits, software defensive checks (asserts), and end-to-end interprocessor connectivity checks. When a potential problem is detected, it is reported in an output message and an alarm is generated. The alarm level (critical, major, or minor) indicates the severity of the problem.

When an automatically-scheduled diagnostic fails, the following occurs:

- The appropriate alarm is activated.
- The affected unit (or service group) is left out of service (OOS).
- A diagnostic (DGN) Some Tests Fail (STF) message is printed. The DGN STF printout includes a SUSPECTED FAULTY EQUIPMENT list to aid in trouble resolution and repair.

Keep a Maintenance Log

A log should be kept of all maintenance problems encountered with the 5ESS switch. This log should include the date, time, and nature of the fault(s), any associated Receive-Only Printer (ROP) messages and Master Control Center (MCC) video terminal display pages, and any corrective actions taken.

References

If a reference is made to the use of a POKE command, access to the appropriate display pages on the video terminal located at the Master Control Center (MCC) is assumed. If the MCC terminal is not available, the appropriate DGN Input/Output (I/O) messages may also be used. These I/O messages are documented in 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

2.1 5ESS SWITCH MAINTENANCE CHECKLIST

OVERVIEW

The *5ESS*® maintenance checklist contains the following types of tasks:

- A. CONTINUOUS CHECKS/MONITORING
- B. DAILY CHECKS
- C. SCHEDULED TASKS.

Within the checklist, a brief statement is given on the item(s) to check, how to check, and how to clear a problem if corrective maintenance is required. Also included is a reference to the appropriate procedure and information product to be used when performing the corrective maintenance. It is extremely important that all these checks and the scheduled routine preventive maintenance tasks (outlined in 235-105-210, *Routine Operations and Maintenance Procedures*) be done on a timely basis. If the checks in Table 2.1-1 and the Equipment Test List (ETL) are performed properly, the service provided by the *5ESS* switch will be of the highest performance and quality.

PROCEDURE

1. Use the following checklist to determine what maintenance activities should be performed and when they should be performed.

Table 2.1-1 — 5ESS Switch – Maintenance Checklist

CHK ^a	ITEM(s) FOR CHECK	HOW TO CHECK	HOW TO CLEAR
A. CONTINUOUS CHECKS/MONITORING			
1	Critical alarm	Audible and/or visual alarms are present. Observe the STATUS area at the top of the Master Control Center (MCC) display to determine the alarm level (critical, major, or minor) and affected functional area. For additional information, scan the receive-only printer (ROP) for alarmed output messages.	Use Procedure 2.2, Isolate Faults At MCC Video Terminal, to perform an immediate analysis of the problem and, if repairs are necessary, initiate them without delay. For most critical failures, analysis and recovery procedures are located in the 235-105-250, <i>System Recovery</i> . Some examples of critical failures include administrative module (AM) and switching module (SM) initializations, loss of communication to an SM, and craft interface lockout. If automatic system recovery actions are in progress, allow time for them to complete before attempting manual intervention.
2	Major alarm	Audible and/or visual alarms are present. Observe the STATUS area at the top of the MCC display to determine the alarm level (critical, major, or minor) and affected functional area. For additional information, scan the ROP for alarmed output messages.	Use Procedure 2.2, Isolate Faults At MCC Video Terminal, to perform an immediate analysis of the problem. If repairs are necessary, schedule them as soon as possible (in an hour or so). An example of a problem causing a major alarm is a simplex failure of a critical duplicated unit such as a communication module processor (CMP) or module controller time slot interchanger (MCTSI).
3	Minor alarm	Audible and/or visual alarms are present. Observe the STATUS area at the top of the MCC display to determine the alarm level (critical, major, or minor) and affected functional area. For additional information, scan the ROP for alarmed output messages.	Use Procedure 2.2, Isolate Faults At MCC Video Terminal, to analyze the problem and perform any needed repairs. This action may be deferred for several hours, but minor alarm conditions must be resolved on at least a daily basis.
B. DAILY CHECKS			

See note(s) at end of table.

Table 2.1-1 — 5ESS Switch – Maintenance Checklist (Contd)

CHK ^a	ITEM(s) FOR CHECK	HOW TO CHECK	HOW TO CLEAR
1	Excessive Administrative Module (AM), Switching Module (SM/SM-2000), Communication Module Processor (CMP), or Common Network Interface (CNI) Initializations	Use OMS5 Daily Report or scan the receive-only printer (ROP) printouts for INIT... output messages associated with the AM, SM/SM-2000, CMP, CNI, module controller time slot interchanger (MCTSI) or quad-link packet switch gateway processor (QGP). Also scan the ROP for processor recovery messages (PRMs).	Use 235-600-750, <i>Output Messages</i> , and/or 235-600-601, <i>Processor Recovery Messages</i> , to analyze the INIT (and related) output messages and/or PRMs. The severity of recovery actions taken during an initialization varies depending on the initialization level (usually identified by the LVL= field in the output messages). Low-level initializations take recovery actions such as “return-to-point-of-interrupt” (RPI) or “single-process-purge” (SPP). Examples of recovery actions taken during high-level initializations include “full process initialization” (FPI), “selective initialization” (SI), and “full initialization” (FI). Refer to 235-105-250, <i>System Recovery</i> , for a detailed description of initialization levels. Determine and correct the cause (or “trigger”) of the initialization (if not already corrected by automatic initialization recovery actions). Problems that result in low-level initializations must be resolved promptly to avoid escalation to more severe recovery actions.
2	Excessive interrupts	Use OMS5 Daily Report or scan the ROP printouts for REPT... output messages.	Use Procedure 8.2, Clear Trouble Causing Excessive Interrupts.
3	Grid fabric failures	Use OMS5 Daily Report or scan ROP printouts for TST GRID ...STF or TST GRIDBD ...STF output messages.	Use Procedure 7.12, Clear LU Grid Exercise Test Failure.
4	Equipment, out-of-service (OOS)	Equipment that is OOS is reflected on the MCC display pages and reported in the OMS5 Daily Report. In addition, some output messages that report the status of OOS units include OP OOS , OP CFGSTAT , and OP QNETSTAT . The corresponding input messages can be used to manually check equipment status. Refer to 235-600-700, <i>Input Messages</i> , and 235-600-750, <i>Output Messages</i> , for additional information.	For OOS communication module (CM) units, use Procedure 5.1 to resolve the problem and restore the units to service. For other OOS units/circuits that have failed diagnostics obtain the diagnostic output messages from the ROP and then use Procedure 2.3, Determine Location of Fault in AM, CNI, CM, or SM/SM-2000 Equipment.
5	Lines, OOS	Use OMS5 Daily Report or enter OP:LIST,LINES ; OOS and check resulting output message.	For each OOS line, use Procedure 9.1, Analyze and Resolve OOS Line List Entries.
6	Trunks, OOS	Use OMS5 Daily Report or enter OP:LIST,TRUNKS ; OOS and check resulting output message.	For each OOS trunk, use Procedure 12.2, Analyze and Resolve OOS Trunk List Entries.
7	Excessive Machine Detected Interoffice (MDII) reports	Use OMS5 Daily Report, the RC/V view, or scan the ROP printouts for REPT: MDII... output messages.	Use ROP printouts to identify a specific trunk or Trunk Unit (TU) equipment. For trunk testing, use Procedure 12.1, Perform Trunk Maintenance.

See note(s) at end of table.

Table 2.1-1 — 5ESS Switch – Maintenance Checklist (Contd)

CHK ^a	ITEM(s) FOR CHECK	HOW TO CHECK	HOW TO CLEAR
8	Excessive call failure reports (operational, per-call test, or call cutoff)	Use OMS5 Daily Report or scan the ROP printouts for REPT ... output messages.	Using 235-600-750, <i>Output Messages</i> , correlate the reports for specific circuits to be removed and repaired (if this has not already been done). For REPT ALINK problems, use Procedure 7.9, Clear A-LINK Failure in Line Unit. For REPT BLINK (or LUCHAN) problems, use Procedure 7.10, Clear B-LINK or LUCHAN Failure in Line Unit Grid. For REPT LEN (or PCTF) problems, use Procedure 7.13, Clear LEN Failure in Line Unit Grid. For call cutoffs, the input message ALW:SCORPT, TRC... may be helpful.
9	Data base relation REORG failures	Use OMS5 Daily Report or scan the ROP printouts for REORG NEEDED... or CANCELLED...	Use Procedure 16.7, Perform Manual Reorganization of Hashed Relations With Access Editor.
10	Excessive Asserts or Defensive Check Failures (DCF's)	Use OMS5 Daily Report or scan the ROP printouts for REPT output messages. Note that some DCF's (or "asserts") are also reported by INIT... output messages.	Use 235-600-500, <i>Asserts Manual</i> , and 235-600-750, <i>Output Messages</i> , to analyze DCF output messages. Resolve these problems promptly, since escalation to more severe automatic recovery actions may result from repeated DCF's.
11	Excessive audit reports	Use OMS5 Daily Report or scan the ROP printouts for AUD... output messages.	Use 235-600-400, <i>Audits Manual</i> , for possible resolution. If unable to resolve, seek technical assistance .
12	ODD Backup failures	Use OMS5 Daily Report or scan the ROP printouts for BKUP ODD, NRODD RODD=X (or AM or CMP) ABORTED output messages.	Try to do the backup again. If it still fails, some data base audits (OPNDC, TRNDC, or MEMMAN) and a CLR:TRN may clear the problem. If an assert message (in DAYLOG file) is involved, use 235-600-500, <i>Asserts Manual</i> . If unable to resolve, seek technical assistance .
13	Manual inhibits of automatic checks and functions	When a normal system function is inhibited, the MCC display reflects this off-normal condition. Some of the input messages that can be used to check for inhibits are: OP:BREVC, OP:ERRCHK, OP:HDWCHK, OP:OFFNORM, and OP:REXINH.	Unless there is a valid reason for the function to be inhibited, clear each inhibit using the appropriate ALW:... input message. If the function is inhibited due to a problem, resolve that problem before clearing the inhibit.
14	Excessive ALE hourly alerts	Use OMS5 Daily Report or scan the ROP printouts for REPT ALE HOURLY ALERT.	For each line reported, use Procedure 11.2, Automatic Line Evaluation of a Digital Subscriber Line.
15	Excessive ALE daily alerts	Use OMS5 Daily Report or scan the ROP printouts for REPT ALE DAILY ALERT.	For each line reported, use Procedure 11.2, Automatic Line Evaluation of a Digital Subscriber Line.
C. SCHEDULED TASKS			
–	All scheduled routine maintenance tasks	Per the equipment test list (ETL) in 235-105-210, <i>Routine Operations and Maintenance Procedures</i> .	Each 5ESS switch may have variations of the ETL due to specific hardware and software configurations.

See note(s) at end of table.

Table 2.1-1 — 5ESS Switch – Maintenance Checklist (Contd)

Note(s):

- a. The OMS5 program is recommended as a time-saver in doing the daily checks 1-15. The OMS5 program can run in the Switching Control Center System (SCCS) and the Total Network Management (TNM) environments. Refer to 235-105-119, **5ESS** *Switch Maintenance Guide - Utilizing OMS5-SCC*, or 235-105-130, **5ESS** *Switch Maintenance Guide - Utilizing OMS5-TNM*, as appropriate.

2.2 ISOLATE FAULTS DISPLAYED AT THE MCC VIDEO TERMINAL

OVERVIEW

This procedure is used to analyze an office alarm to determine the alarm state, access the appropriate Master Control Center (MCC) display pages, and interpret the indications being displayed.

When the MCC video terminal is brought on-line from an off-line state, the identification line, the status summary indicators, the emergency action (EA) page, and the input command entry area are displayed. The status summary indicators are shown on the second and third lines of all MCC displays, regardless of the page being displayed. These indicators (described in Table 2.2-1) report the overall system state and point to display pages containing additional information needed to analyze alarms.

PROCEDURE

1. **Caution:** *Service interruptions may occur when using the menu commands associated with the EMERGENCY ACTION PAGE. Several of these commands can interrupt service or prevent recovery when they are not used for their intended purposes. To avoid unnecessary service interruptions, use extreme care when entering commands on the EA page, and only use those commands that are needed to troubleshoot office problems.*

Note: At an Administrative Services Module (ASM) terminal, to access the Emergency Action Interface (EAI), refer to 235-200-145, 5ESS® *Switch OneLink Manager*™ *Administrative Services Module User's Guide*. See the Chapter titled "Using the ASM Release 6.0 GUI," Procedure "Cut Through (Control/Display, MML, RTR Shell, RC/V, Remote MCC, Remote EAI, Remote Console, Command Window) To A Switching Component Via Drop Down Menu," **or**, open a telnet window on the ASM console and enter the **dsrmtelai** command.

At the MCC, is the SYS EMER (system emergency) status summary indicator highlighted?

If **YES**, continue with the next step. (Emergency action is required.)

If **NO**, go to Step 4.

2. If the EMERGENCY ACTION PAGE is not already displayed on the MCC video terminal, press the "EA DISP" function key to display it. Continue with the next step.
3. Observe the indicators on the EA display. The indicators are described in 235-105-110. Use the appropriate procedure in 235-105-250, *System Recovery*, to determine and perform the required recovery actions.
4. If the EMERGENCY ACTION PAGE is displayed at the MCC, press the "NORM DISP" function key to leave the EMERGENCY ACTION PAGE. Continue with the next step.
5. Determine the severity of the problem by listening to the audible alarm or observing the alarm level indicators in the MCC status summary area. The indicator corresponding to the alarm level (CRITICAL, MAJOR, or MINOR) should be backlighted. Record *all* backlighted status summary indicators.

6. When an alarm occurs, the related MCC status summary indicator flashes until the alarm is retired. Are any of the status summary indicators flashing?

If **YES**, use Table 2.2-1 to record the MCC display page associated with *each* flashing status summary indicator. Continue with the next step.

If **NO**, go to Step 9.
7. Press the “ALM RLS” function key to retire any new alarms. This step silences the audible alarm, clears the exit pilot lamps, clears the alarm level indicators in the status summary area, and stops the other status summary indicators from flashing.
8. Display each of the MCC page(s) identified in Step 6 by entering the page number(s) (one at a time) at the command prompt.

Observe each page to determine whether it indicates the location of any faults that may have generated alarms. Each MCC display page is described in detail in 235-105-110, *System Maintenance Requirements and Tools*.

If a backlighted indicator on an MCC page indicates that additional information about an off-normal condition is located on another page, enter the command to display that other page. Continue to do this until all problems reflected on the MCC pages have been located and analyzed.

Go to Step 10.
9. If a status summary indicator associated with a display page in Table 2.2-1 was backlighted but **not** flashing, the corresponding alarm had already been retired, but the problem may still exist.

If such problems exist and have not already been analyzed, repeat Step 8 starting with the appropriate MCC display pages identified in Table 2.2-1.
10. Did the MCC display pages indicate any possible source(s) of the alarm(s)?

If **YES**, go to Procedure 2.3 to correlate information obtained from MCC display page analysis (such as alarm levels and off-normal conditions) with other available data.

If **NO**, the problem that caused the alarm may have been transient, or may have been corrected by automatic recovery actions before the MCC was accessed. Go to Procedure 2.3 to attempt to locate the fault using other methods.

Table 2.2-1 — MCC Status Summary Indicators

SYSTEM STATUS SUMMARY INDICATORS	INDICATIONS	ASSOCIATED DISPLAY PAGE
SYS EMER	This indicator is turned on when the peripheral controller recognizes system insanity or a problem with communication between the MCC and administrative module (AM).	EAI
CRITICAL	This indicator is turned on when a critical alarm condition is detected.	–
MAJOR	This indicator is turned on when a major alarm condition is detected.	–
MINOR	This indicator is turned on when a minor alarm condition is detected.	–
BLDG/PWR	This indicator is turned on when a building or power alarm is detected.	105
GLB FUNC	This indicator is turned on when a global function abnormality is detected.	106
CKT LIM	This indicator is turned on when the trunk OOS limit (automatic maintenance limit) is exceeded or a primary rate interface (PRI) D-channel outage is detected.	107
SYS NORM	This indicator is normally on. It is turned off when an abnormal system condition is detected.	–
OVERLOAD	This indicator is turned on when a processor detects a real-time and/or resource overload and overload controls are activated.	109
SYS INH	This indicator is turned on when any system function is inhibited.	110
AM	This indicator is turned on when an AM abnormality is detected.	111/112
AM PERPH	This indicator is turned on when AM peripheral unit abnormality is detected.	111/112
OS LINKS	This indicator is turned on when an operational support system data link problem is detected.	113
SM	This indicator is turned on when a problem in the switching module is detected.	114

Table 2.2-1 — MCC Status Summary Indicators (Contd)

SYSTEM STATUS SUMMARY INDICATORS	INDICATIONS	ASSOCIATED DISPLAY PAGE
CM	This indicator is turned on when a problem in the communication module (CM) is detected.	115
MISC	This indicator is turned on to indicate a frame or cabinet fuse alarm and other miscellaneous alarms.	116

2.3 DETERMINE LOCATION OF FAULT IN AM, CNI, CM, OR SM/SM-2000 EQUIPMENT

OVERVIEW

This procedure is used to determine the unit/circuit that has caused a Critical, Major, or Minor office alarm. The Master Control Center (MCC) display pages, output messages on the Receive-Only Printer (ROP), and other trouble indications are used in an effort to isolate the fault to a specific hardware circuit or functional area. The faulty circuit may be associated with the Administrative Module (AM), Common Network Interface (CNI), Communications Module (CM), or a Switching Module/Switching Module-2000 (SM/SM-2000).

If multiple faults are found, the problem having the highest alarm level (also known as the “priority of action”) should be addressed first. The alarm level associated with a specific problem is reported in the first field of the corresponding output message on the ROP as shown in Table 2.3-1.

Table 2.3-1 — Priority of Action Codes for Alarmed Output Messages

OUTPUT MESSAGE INDICATION	ALARM LEVEL	IMPORTANCE OF MESSAGE
*C	Critical	Critical trouble. Immediate analysis is required.
**	Major	Major trouble. Immediate analysis is required.
*	Minor	Minor trouble. Eventual analysis is required.

PROCEDURE

1. Use the alarm level in the output messages to prioritize corrective action (see procedure overview). **Work on the most important problem first.**
2. Analyze alarmed output messages from the ROP to obtain additional information about each problem. Other output messages that refer to the same unit or contain the same event number may also be relevant in trouble-shooting problems. All output messages are described in the 235-600-750, *Output Messages*. Note that the output message manual pages may recommend corrective actions.
3. If the source of trouble has been identified, go to Step 6 to initiate corrective actions.
4. If the source of trouble still has not been identified, observe the light-emitting diode (LED) at the top of the front of each application hardware cabinet. This *red* LED lights when a cabinet fuse blows. If this has occurred, lift up the cabinet bezel to determine the specific cause of the fuse alarm.
5. If the source of trouble still has not been identified, observe the control/display (CD) circuit pack(s) (where equipped). If the “ALM” LED is lit, a power fault has been detected on the unit. If the “OOS” LED is lit, the unit is out-of-service. Additional information about C/D packs can be found in 235-105-110, *System Maintenance Requirements and Tools*.
6. Was any indication of the alarm source found?
If **YES**, continue with the next step.

- If **NO**, go to Step [14](#).
7. Does the off-normal condition associated with the alarm still exist [for example, an out-of-service (OOS) hardware unit/circuit]?
- If **YES**, continue with the next step.
- If **NO**, go to Step [13](#).
8. Based on initial analysis of the problem (using MCC displays, ROP output messages, and other trouble indications), select one of the following methods (if applicable) to aid in correcting the fault:
- If an Administrative Module (AM) or Switching Module/Switching Module-2000 (SM/SM-2000) initialization is occurring, and the affected processor is not able to recover independently, refer to 235-105-250, *System Recovery*, to initiate the required manual recovery actions.
 - If an SM/SM-2000 has lost communication with the AM, or has lost all connectivity through the Quad-Link Packet Switch (QLPS) networks, and automatic attempts to restore communication are not successful, refer to 235-105-250, *System Recovery*, to initiate the required manual recovery actions.
 - If a fuse or power alarm was detected, fix the problem using Procedure [14.6](#), Respond to Fuse/Power Alarm Failure.
 - If a fault has left Communication Module (CM) units out-of-service (OOS), repair and restore the OOS CM hardware unit(s) using Procedure [5.1](#), Verify CM Diagnostic Failure Pattern is Consistent.
 - If a fault has left AM hardware OOS, and the faulty unit has failed diagnostics, repair and restore the OOS hardware using Procedure [3.1](#), Verify AM Diagnostic Failure Pattern is Consistent.
 - For problems related to the Common Network Interface (CNI) ring, refer to Procedure [4.1](#), Verify CNI Ring Failure Pattern is Consistent.
 - If a fault has left SM/SM-2000 hardware OOS, and the faulty unit has failed diagnostics, repair and restore the OOS hardware using Procedure [7.1](#), Verify SM Diagnostic Failure Pattern is Consistent.
 - If a line unit (LU) grid exercise test failed, resolve the problem using Procedure [7.12](#), Clear LU Grid Exercise Test Failure. For other line maintenance problems, refer to Procedure [9.2](#), Line Maintenance.
 - For trunk maintenance problems (such as OOS trunks or **REPT MDII** output messages), refer to Procedure [12.1](#), Trunk Maintenance.
 - If the alarm/fault is associated with the External Sanity Monitor (ESM), resolve the problem using Procedure [8.3](#), Resolve Alarm Associated With External Sanity Monitor Fault.
 - For problems related to the Small Computer System Interface (SCSI) disks, refer to Procedure [3.8](#), Troubleshoot Small Computer System Interface (SCSI) Disk Unit Package (DUP).

9. If none of the methods listed in the previous step are applicable, analyze the output message(s) associated with the alarm/fault, and perform any corrective actions recommended by the manual page(s) in the 235-600-750, *Output Messages*.
10. Was the problem resolved successfully?
If **YES**, continue with the next step.
If **NO**, go to Step 12.
11. If there are additional off-normal conditions, return to Step 8 to resolve them.
Note: If *no* off-normal conditions exist, only the SYS NORM status summary indicator should be backlighted.
Go to Step 15.
12. Collect all available data and **seek technical assistance**.
13. The problem that caused the alarm may have been transient, or it may have been corrected by automatic recovery actions. If the problem continues to occur (and cause alarms) periodically, and the trouble still clears before corrective action is taken, refer to Procedure 8.2, Analyze and Clear Trouble Causing Excessive Interrupts.
14. Since there is no indication of any alarm source, refer to Procedure 8.1, Clear Stuck/False Alarm Condition, to resolve a potential problem with invalid alarms.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

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3. ADMINISTRATIVE MODULE MAINTENANCE

Purpose

Use the following AM procedures to analyze the trouble, replace any circuit packs, and restore the unit/circuit to service.

Before You Before

First use Procedure [2.3](#) to locate the unit/circuit that is failing and to determine which MCC pages to use to clear the trouble.

3.1 VERIFY AM DIAGNOSTIC FAILURE PATTERN IS CONSISTENT

OVERVIEW

This procedure is used to determine if an AM hardware trouble causing a diagnostic failure in the 5ESS[®] switch is consistent or intermittent.

PROCEDURE

To determine if the AM failure pattern is *consistent* or *intermittent*, perform the following:

1. Obtain the original diagnostic failure (DGN STF) printout with the SUSPECTED FAULTY EQUIPMENT list generated by system diagnostics.
2. Determine if there is also a power alarm or fuse alarm active at the failing unit. If so, use Procedure 14.6, Respond to Fuse/Power Alarm Failure, to clear the power problem in the unit.
3. **Caution:** *The use of unconditional removals or manual override power downs is NOT recommended (unless the office or affected SM/SM-2000 is in min-mode operation), because call processing may be detrimentally affected. The failure or denial of conditional removals usually indicates that the mate side hardware must be repaired first.*

If the unit is not already removed from service, use the **REMOVE** poke command (on appropriate display page) or **RMV** input message (from 235-600-700, *Input Messages*). Then use the **DIAGNOSE** poke command or **DGN** input message to diagnose the unit/circuit and get a second STF printout and SUSPECTED FAULTY EQUIPMENT list.

4. Compare the two diagnostic failure printouts.

Note: When comparing the diagnostic printouts to determine a failure pattern, be sure to examine the phase (PH), segment (SEG), test (TEST), and mismatch (MM) numbers.

If the diagnostic fails and the STF output message (PH, SEG, TEST, and MM) numbers are the same as the original failure, go to Procedure 3.2, Clear Trouble in the AM.

If the diagnostic fails and the failure is inconsistent/intermittent, determine the dominant pattern. Then go to Procedure 3.2.

If the diagnostic fails and there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list. Then go to Procedure 3.2.

If the diagnostic passes, diagnose the unit/circuit at least two more times. If the diagnostic continues to pass, record this incident and the failure pattern for future reference. Continue with the next step.

5. Use the **RESTORE** poke command or **RST** input message to restore the unit to service.

3.2 CLEAR TROUBLE IN THE AM

OVERVIEW

This procedure is used to clear an AM hardware trouble causing a diagnostic failure in the 5ESS[®] Switch.

Appendix A1, Diagnostic Phase Descriptions, contains the diagnostic phase descriptive information for all hardware (units/circuits) of the 5ESS switch.

PROCEDURE

To clear trouble in the AM, perform the following:

1. Check the first or next pack on the SUSPECTED FAULTY EQUIPMENT list.
 - (a) If entries on SUSPECTED FAULTY EQUIPMENT list have been exhausted, go to Step 6.
 - (b) If this pack is a Small Computer System Interface (SCSI) disk unit/pack, use Procedure 3.8, Troubleshoot Small Computer System Interface Disk Unit Package (DUP), to clear the problem.
 - (c) If this pack is a Digital Audio Tape (DAT) drive, use Procedure 3.16 to clear the problem.
 - (d) If a Note number appears in the last column on the SUSPECTED FAULTY EQUIPMENT list, obtain the text for the Note before replacing this pack to see what precautions or additional procedures are recommended. The text for the Note can be obtained by entering the **OP:TLPNOTE=n** command, where **n** is the Note number.

If this pack is owned by the unit being diagnosed, continue with Step 2.
 - (e) **Note:** Diagnostics associated with some units may execute **interface tests**. This may cause the TLP listing to include suspected packs that are **not** owned by the unit being diagnosed.

If this pack is owned by the unit being diagnosed, continue with Step 2.
 - (f) If this pack is owned by another unit, remove and diagnose the other unit.

Note 1: A “forced switch” may be required before the other “on-line/active” unit/circuit can be removed. This may interrupt call processing; therefore, it is best to wait for a low-traffic period and **seek technical assistance**.

Note 2: If a “forced switch” of the AM Control Unit (CU) is required, special precautions are required to ensure the appropriate initialization level of the OOS CU to the active state. An RTR level 4 is always required if the side to be forced active has been previously powered down. **Seek technical assistance** with 3B Customer Technical Support for appropriate procedures for forcing active an OOS CU.
 - (g) If the diagnostic for the other circuit is STF, choose which diagnostic (and SUSPECTED FAULTY EQUIPMENT list) to continue working (it is usually best to work the circuit that is highest in the control hierarchy).
2. Use Procedure 3.12 to replace the suspected circuit pack.

Note: The replacement pack vintage must be equal to or greater than the minimum code and series specified in the SUSPECTED FAULTY EQUIPMENT list printout (per “DGN” pages in 235-600-750, *Output Messages*). For example, when code “TN1077” minimum series “5” is printed, the replacement pack could

- be either a TN1077 Series 5 (or later), or TN1077B (any series), or TN1077C (any series), etc. The microcode number (for example, MC5D045A1) is printed for “microcoded” packs. In all cases, the replacement pack vintage must be *equal to or greater* than that printed. For example, when code “MC5D045A3D” minimum issue “2” is printed, the replacement pack could be either an MC5D045A3D Issue 2 (or later), an MC5D045A4D (any issue), or an MC5D045A3E (any issue), etc.
3. Determine whether the pack replacement cleared the failure.
 - (a) Diagnose the circuit.

Note 1: You can save time by running only one phase (that was failing previously) of the diagnostic using the PH option in the DGN input request.

Note 2: When working an intermittent/inconsistent failure, several runs of the diagnostic/phase may be required to know if the pack replacement has cleared the problem.
 - (b) If the diagnostic result is all tests passed (ATP), go to Step 4.
 - (c) If identical STF is outputted (PH, SEG, TEST, and MM), return original pack to the unit and go to Step 1 to examine the next pack on the SUSPECTED FAULTY EQUIPMENT list. If different STF is outputted, diagnose the circuit again.
 1. If a repeat of the previous dominant failure occurs, return the original pack to the unit and go to Step 2 to replace the next pack on the list.
 2. If the dominant failure is now different from the original failure, the spare pack is probably faulty (for example, wrong series); try another spare pack (Step 2).
 4. Verify that the failure follows the suspected faulty pack.
 - (a) Swap the original (suspected faulty) pack with the spare pack inserted in Step 2 and diagnose the circuit again.
 - (b) If the diagnostic failure returns with the suspected faulty pack reinserted, replace this faulty pack and go to Step 5.
 - (c) If the diagnostic failure does not return with the suspected faulty pack reinserted, the problem is apparently cleared with no faulty pack identified. Record this incident and the failure pattern for future reference. Then go to Step 5.
 5. Request a RESTORE of the unit/circuit to service.
 - (a) If the restore diagnosis is STF, the problem is not cleared. Return to Step 1.
 - (b) Perform a conditional restore on **both** the **original** unit and any unit(s) associated with the suspected/replaced circuit pack. If the restore diagnosis fails on the **interface** unit, treat it as a **different** problem, starting at Procedure 3.1.
 - (c) If the restore diagnosis is ATP, go to Step 7.
 6. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, replace (one at a time) any power converter packs (for example, 495FB) in the unit that supplies power to packs on the SUSPECTED FAULTY EQUIPMENT list. (Low voltage from a power converter can cause other packs to misbehave.)

Note: If the problem has not been cleared at this point, make a judgment on which of the following is the appropriate alternative, depending on the situation.

- Inspect the backplane for open or short circuits in the wiring, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects. If such defects are found *and* can be repaired, complete those repairs, and then return to Procedure 3.1.
 - **Seek technical assistance**, particularly if the trouble is in a critical duplex unit such as the Control Unit (CU) or Communications Module Processor (CMP).
 - Replace (one at a time) the remaining packs in the unit not previously tried.
 - Replace (one at a time) the packs in adjacent unit(s) with interfaces to the failing unit.
 - Perform a multiple-pack swap with another unit that diagnoses ATP and can be removed from service. If the problem moves with the packs, return half of the packs, etc., until the faulty pack is isolated. If the problem does not move with the packs, check for possible cable or wiring problems. **Multiple-pack swaps must be done carefully to avoid creating additional problems.**
 - Consult the failing diagnostic's program listing (if available). Use the diagnostic phase descriptive tables in Appendix A1, Diagnostic Phase Descriptions, as an aid in locating the desired PR. The prologue for the diagnostic phase and descriptions and code associated with the failing segment and test may give insight as to what is being tested and which control/data paths are being used.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.3 RESTORE LOCKED-UP VIDEO TERMINAL

OVERVIEW

This procedure is used to restore a video terminal that does not respond to keystrokes. To perform this procedure, you must understand terminal configurations at the 5ESS[®] switch and the remote Switching Control Center (SCC). You should also know how to use the Master Control Center (MCC) video terminal to locate the display pages that are used to restore the locked-up video terminal.

PROCEDURE

1. Identify the teletypewriter (TTY) member number of the locked-up terminal. Here, the TTY member number and the video terminal number are synonymous. The video terminal number is probably indicated at the top of the status indicator on the MCC or Supplementary Trunk and Line Work Station (STLWS).
2. Locate another operational video terminal that is assigned to the same 5ESS switch as the locked-up video terminal.
3. At the operational video terminal, enter the command as follows to restore the faulty video terminal to service.

Note: At least one Input/Output Processor (IOP) and one Teletypewriter Controller (TTYC) must be in-service before the TTY can be restored.

RST: TTY=a[,UCL];

Where: a = TTY member number (0-255).

Response: A PF entry (on the same line as the input message), followed by a RST TTY output message.

4. Do both the RST TTY output message and the video terminal being restored indicate restoration? For successful restoration, the RST TTY output message should contain the TTY member number (0-255), followed by the word **COMPLETED**. The restored video terminal should display a **CFTSHL TERMINAL IN SERVICE** output message.

If *both* of these conditions exist, go to Step 8.

If these two conditions do *not* exist, continue with the next step.

5. Identify the TTYC that is assigned to the locked-up terminal and identify other terminals that are using this TTYC. Refer to 235-600-3XX (Where XX = Currently-supported software release) for details concerning TTY Terminal Specifications in base Equipment Configuration Data (ECD).
6. **Caution: Notify personnel that the other terminals using the same TTYC will be out of service (OOS) when the TTYC is being restored. Do not use these terminals until the locked-up terminal and the TTYC have been restored to service.**

Observing the **Caution**, at the operational video terminal, enter the command as follows to restore the TTYC assigned to the locked-up terminal.

Note: The UCL option only works if one of the TTYs assigned to the TTYC is OOS.

enter **RST: TTYC= a [,UCL];**

Where: a = TTYC member number (0-255).

Response: A **PF** entry (on the same line as the input message), followed by a **RST TTYC** output message. Successful restoration is indicated when the **RST TTYC** output message contains the TTYC member number (0-255), followed by the word **COMPLETED**. The restored video terminal should display a **CFTSHL TERMINAL IN SERVICE** output message. If these two conditions do not exist, observe the following **Caution** and Note and continue with the next step.

Caution: *During a craft initialization, all interaction with the 5ESS switch is lost; input messages and poke commands cannot be entered. A craft initialization takes about 10 to 15 minutes to complete.*

Note: Craft initialization is performed *only* when the **RST** input messages (**RST:TTY** and **RST:TTYC**) fail to restore the locked-up terminal. To perform craft initialization, the video terminal at the MCC must be operational.

7. Refer to 235-105-250, *System Recovery Manual*, for craft interface recovery procedures.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.4 CLEAR NONDIAGNOSABLE CU MEMORY ERRORS

OVERVIEW

This procedure is used to clear an intermittent memory fault in the Control Unit (CU) Main Store Controller (MASC) of the Administrative Module (AM). Typically, the intermittent memory fault causes "REPT CU ERROR INTERRUPT" reports when the affected CU side is active (ACT) or that side of the CU cannot be restored due to the memory errors. However, the fault is so infrequent that it cannot be detected by the normal CU MASC diagnostics.

PROCEDURE

1. Collect the associated "REPT CU ERROR INTERRUPT" printouts. On the affected MASC (0 or 1), input the **OP:MEMERRS** message to obtain a printout of selected "MEMLOG" entries for specific dates. For the input message format, refer to 235-600-700, *Input Messages*.
2. Determine which MASC (0 or 1), which memory pack (TN28, TN56, etc.), and which memory slot (0, 1, 2, etc.) in the CU is probably causing the problem. A guide for this is in 235-600-750, *Output Messages*, "REPT CU" output message page. Refer to the following:
 - Procedure 3.5 – Analyze REPT:CU MEMLOG File Entries
 - Procedure 3.6 – Analyze REPT:CU Error Interrupt Handler Log File (ERLOG) Entries
 - Procedure 3.7 – Analyze Postmortem Dump.
3. On the affected MASC (0 or 1), execute the special CU MASC diagnostic demand phases 33, 34, 36, 40, 41, 93, and 95 (with TLP option) several times to determine the consistency of the failure. For the diagnostic (DGN) input message format, refer to 235-600-700, *Input Messages*. Additional information about these demand diagnostic phases can be found in Appendix A1, Diagnostic Phase Descriptions.
4. Perform one of the following:
 - If the diagnostic's result is all tests passed (ATP), replace the suspected faulty memory pack (as determined in Step 2), repeat Step 3, and verify that the diagnostics demand phases (listed in Step 3) completes ATP.
 - If the diagnostic result is not ATP, using the SUSPECTED FAULTY EQUIPMENT LIST generated in Step 3, replace the suspected faulty memory pack, and verify that the failing diagnostic phase (if any) now runs consistently ATP.
5. Use the **RST** poke command or the **RST:CU [0,1]** input message to restore the applicable MASC (0 or 1).
6. Verify that the applicable MASC restored successfully (no hashsum failure after memory update) as follows:
 - If the applicable MASC *restores successfully*, hold the interrupt and diagnostic printouts and the suspected faulty memory pack for a few days to verify that the memory errors have cleared. When the memory errors have been cleared, attach the interrupt and diagnostic printouts to the faulty memory pack and return the pack to the appropriate repair center. Go to Step 7.

- If the applicable MASC *does not* restore successfully, hold the interrupt and diagnostic printouts and the suspected faulty memory pack and ***seek technical assistance*** to clear the problem. Go to Step 7.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.5 ANALYZE REPT:CU MEMLOG FILE ENTRIES

OVERVIEW

This procedure is used to analyze memory failure data in the MEMLOG file to determine the faulty memory pack. The MEMLOG file contains the **REPT:CU** supplementary data particular to memory failures.

Note: The **OP:MEMERRS** command is useful. Refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*, for details.

PROCEDURE

1. Extract the supplemental data for the error from the log file by executing the **OP:LOG** command on the MEMLOG log file with the KW (keyword) parameter. Pass the sequence number indicated in the **REPT:CU** output message as the argument to the KW parameter. For detailed information regarding use of this command, refer to 235-600-700, *Input Messages*.
2. Check the first line of the log file entry to determine the type of memory problem. The error message will be one of the following:
 - a. REPT NONCORRECTABLE PARITY ERROR ON MEMORY REFERENCE *d* (X'8)
 - b. REPT MEMORY PARITY FAILURE *d* (X'14)
 - c. REPT OTHER STORE REFRESH PARITY ERROR *d* (X'D)
 - d. REPT OTHER STORE READ PARITY ERROR *d* (X'E)
 - e. REPT OTHER STORE HARDWARE ERROR *d* (X'C)
 - f. REPT MY STORE C DURING DMA *d* (X'21).

Note: The *d* in each of the error messages is the sequence number indicated in the **REPT:CU** output message. The numbers in parentheses at the end of each message represent the error interrupt type numbers (in hexadecimal) from the **REPT:CU** message. These do not print out in the log file entry. They appear only in the **REPT:CU** message and are shown here for reference purposes only.

3. Interpret the error message(s) as follows: A NONCORRECTABLE PARITY ERROR indicates that a location in memory has encountered a double-bit error. This error type is the most likely to damage running programs. Error messages **a**, **b**, **c**, and **d** from Step 2 indicate a memory array if there is correlation between the errors, for example, the same failing location. If errors **a-d** occur in several memory arrays or if the error is type **e**, the main store controller is the probable cause. Isolated, uncorrelated events usually do not require action, but records should be kept of the occurrences.
4. Examine the register information. Many error reports have physical addresses supplied. If supplied, you may refer directly to Table 3.5-1, 3.5-2, 3.5-3, or 3.5-4 instead of continuing with this procedure. Although the trapped address register and the main store controller error registers (ER) are printed for both controllers, **examine only the information for the faulty unit**. To determine the unit on which the error occurred, check the FAULTY UNIT designation in the MEMLOG file entry.
5. Convert the trapped address register to get the faulty address and identify the faulty memory array slot as follows:

- (a) For systems that have *at most* 16 Mbytes of main memory, continue with the next step.
 - (b) For systems that have the extended main memory (EMM) feature, go to Step 9.
 - (c) For systems that have the very large main memory (VLMM) feature, go to Step 12.
6. For systems that have 16 Mbytes or less of main memory, a conversion of the trapped address register is necessary because the address bits in this register do not yield a contiguous address. The bit layout is as follows:

0100 0000 0111 1111 1111 1111 1100

The bit layout shows one bit (second leftmost bit) separated by 0s from the lower twenty-three bits. The conversion process is performed to shift the second leftmost bit seven positions to the right so that the twenty-four bits of the address are contiguous. Continue as follows to convert the trapped address register:

- (a) Observe the leftmost digit of the trapped address register. If this digit is 0, 1, 2, 3, 8, 9, A, or B, the address range is LOW. This means that the high-order address bit is not asserted. Otherwise, the address range is HIGH, high-order address bit asserted.
- (b) Replace the leftmost two digits of the trapped address register with zeros.
- (c) Look at the third leftmost digit of the trapped address register. If this digit is 7 or less, then it should not be changed. Otherwise, it should be converted as follows:

Present Value	New Value
8	0
9	1
A	2
B	3
C	4
D	5
E	6
F	7

The reason for this conversion is that the third leftmost digit has only three bits of value. The most significant bit of this nibble is not part of the address; hence, it is discarded.

7. Use Table 3.5-1, 3.5-2, 3.5-3, or 3.5-4, depending on the type of memory array (TN14, TN28, TN56, or TN2012), to locate the faulty memory array slot. Refer to the following examples:

Trapped Address	Register	Range	Faulty Address
183FFFCC		LOW	3FFFCC
583FFFCC		HIGH	3FFFCC
19C14568		LOW	414568
D9C14568		HIGH	414568

- **TN14 Memory Arrays:** Use Table 3.5-1 to locate the faulty memory array slot for TN14 memory arrays. A fully equipped main memory requires the use of two memory controllers (0 and 1). The LOW and HIGH address ranges mean MASC0 (controller 0) and MASC1 (controller 1), respectively. Each controller in this case supports only address ranges of 000000-7FFFFC. The combined capacity of both controllers is 16 Mbytes (8 Mbytes each). Some examples for TN14 memory arrays are as follows:

Range	Faulty Address	Slot	Controller	Table Used
LOW	3FFFCC	7	0	3.5-1
HIGH	3FFFCC	7	1	3.5-1
LOW	414568	8	0	3.5-1
HIGH	414568	8	1	3.5-1

- **TN28 and TN56 Memory Arrays:** There is only one memory controller capable of addressing the full 16 Mbyte address range for TN28 and TN56 arrays. In this case, the HIGH/LOW address range designation no longer means MASC0 and MASC1. It should be incorporated into a full 24-bit address. This is done by adding 800000 to the converted address if the address range was found to be HIGH. After this addition, use Table 3.5-2 or 3.5-3 to locate the faulty memory array slot for TN28 or TN56 memory arrays, respectively. Some examples for TN28 memory arrays are as follows:

Range	Faulty Address	Slot	Table Used
LOW	3FFFCC	3	3.5-2
HIGH	BFFFCC	11	3.5-2
LOW	414568	4	3.5-2
HIGH	C14568	12	3.5-2

Some examples for TN56 memory arrays are as follows:

Range	Faulty Address	Slot	Table Used
LOW	3FFFCC	1	3.5-3
LOW	414568	2	3.5-3
HIGH	C14568	6	3.5-3

- **TN2012 Memory Arrays:** The memory controller 1 (MASC1) is not associated with these arrays. The trapped address range with these arrays can range from 0x0 to 0x1FFFFFFC for a 32 Mbyte system in Release 1 and from 0x0 to 0x3FFFFFFC for a 64 Mbyte system in Release 6. Any system equipped with more than 32 Mbytes of memory must have TN2012 arrays (4 Mbytes/array)

installed. If the system is running on Release 1, go to Step 9. If the system is running on Release 6, go to Step 12.

8. Go to Step 14.
9. For systems that are equipped with more than 16 Mbytes of memory (Release 1 only), a conversion of the trapped address register is necessary because the address bits in this register do not yield a contiguous address. The bit layout is as follows:

1100 0000 0111 1111 1111 1111 1111 1100

The bit layout shows two bits (leftmost two bits) separated by 0s from the lower twenty-three bits. The conversion process is performed to shift the leftmost two bits seven positions to the right so that the twenty-five bits of the address are contiguous. Continue as follows to convert the trapped address register:

- (a) Observe the third leftmost digit of the trapped address register. If the value of this digit is 7 or less, then it should not be changed. Otherwise, it should be converted as follows:

Present Value	New Value
8	0
9	1
A	2
B	3
C	4
D	5
E	6
F	7

The purpose of this conversion is to eliminate the high-order bit of the third leftmost nibble, since this bit is not part of the address.

- (b) Observe the leftmost digit of the trapped address register. The two most significant bits of this nibble are the two most significant bits of the address. These bits must be extracted and concatenated with the low three significant bits of the third leftmost significant digit of the trapped address register. Extract the three bits of address from the leftmost nibble of the trapped address register using the following:

Leftmost Nibble	Converted Value
0	0
1	0
2	0
3	0
4	8
5	8
6	8
7	8
8	10
9	10
A	10
B	10
C	18
D	18
E	18
F	18

- (c) Continuing the address conversion, perform a simple hexadecimal addition of the results of the two previous substeps. As a check, ensure that the result of Substep 9(a) is a value between 0 and 7 and the result of Substep 9(b) is 0, 8, 10, or 18. After the addition, the resulting value has a range of 0-1F hexadecimal.
- (d) Incorporate the result of the addition into the trapped address. To do this, the three most significant nibbles of the trapped address register are set to 0 and the addition result becomes the most significant five bits of the trapped address. The resulting trapped address can now be used to determine the memory array slot that contains the failing location.
10. For systems equipped with TN56 boards and no more than 16 Mbytes of memory, use Table 3.5-3 to determine the slot number. For systems equipped with the TN2012 boards, use Table 3.5-4 to determine the slot number. Refer to the following examples:
- A system equipped with more than 16 Mbytes of main memory cannot use memory arrays smaller than the TN56 (2 Mbytes each). Only one memory controller is required for the entire maximum memory size of 32 Mbytes. For this reason, the only conversion table that is used is Table 3.5-3. The last addressable word of such a configuration is 0X1FFFFC.

Faulty Address	Converted Address	Slot (Decimal)	Table Used
3F312345	0312344	1	3.5-3
4F312345	0B12344	5	3.5-3
4F812345	0812344	4	3.5-3
8F312345	1312344	9	3.5-3
9F312345	1312344	9	3.5-3
DF312345	1B12344	13	3.5-3
FF012345	1812344	12	3.5-3

- This is the same example as previous except that TN2012 arrays (4 Mbytes each) are assumed. For the TN2012 arrays, use Table 3.5-4 to determine the slot number of the faulty array. The last addressable word of such a configuration is 0X1FFFFFC.

Faulty Address	Converted Address	Slot (Decimal)	Table Used
3F312345	0312344	0	3.5-4
4F312345	0B12344	2	3.5-4
4F812345	0812344	2	3.5-4
8F312345	1312344	4	3.5-4
9F312345	1312344	4	3.5-4
DF312345	1B12344	6	3.5-4
FF012345	1812344	6	3.5-4

- Go to Step 14.
- Convert the trapped address register and the memory error register 2 (MER2) to a trapped address. Use Table 3.5-4 to determine the faulty memory array slot. For Release 6, both registers must be used to determine the trapped address. Continue as follows:
 - The trapped address bits 2-22 are in the trapped address register bits 2-22. The trapped address bit 23 is located in the trapped address register bit 30. The trapped address bit 24 is located in the trapped address register bit 31. The trapped address bit 25 is located in the MER2 bit 23. Concatenating these bits in the proper order yields the trapped address that must be used with Table 3.5-4 to determine the faulty array slot number. The last two bits of the trapped address are always zero since the trapped address is a *word* address.
 - The bit layout of the trapped address bits in the registers, where the address bits are indicated by an x and the nonaddress bits are indicated by zeroes, is as follows:

	3	2	2	2	1	1			
Bit #:	1	8	4	0	6	2	8	4	0
TAR:	xx00	0000	0xxx	xxxx	xxxx	xxxx	xxxx	xxxx	xx00
MER2:	0000	0000	x000	0000	0000	0000	0000	0000	0000

- (c) The trapped address must be formed (converted) by concatenating the noncontiguous address bits as follows:

	3	2	2	1	1				
Bit #:	1	8	4	0	6	2	8	4	0
TA:	0000	00xx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xx00

13. The trapped address conversion is completed when the trapped address register bits 30 and 31, and the MER2 bit 23 are correctly concatenated with the trapped address register bits 2-22. Use Table 3.5-4 to determine the faulty slot number for the TN2012 array. Some examples of the trapped address conversion are as follows:

TAR Value	MER2 Value	Converted Address	Slot (Decimal)	Table Used
3F312345	1289abcd	2312344	8	3.5-4
3F312345	1249abcd	0312344	0	3.5-4
4F312345	1200abcd	0B12344	10	3.5-4
4F312345	1259abcd	0B12344	2	3.5-4
DF512345	12A9abcd	3D12344	15	3.5-4
DF512345	1279abcd	1D12344	7	3.5-4
9F812345	12B9abcd	3012344	12	3.5-4
9FF12345	12C9abcd	3712344	13	3.5-4

14. At this point, the location of the memory array shown in the MEMLOG file has been identified. A single occurrence of a fault does not imply that a particular memory array is faulty. Diagnostics should be run on the main memory to verify that a hard failure (always fails) exists before a memory array is replaced. If a hard failure exists, the memory array should be replaced. Even though an error report message indicates a fault, if memory diagnostics do not reveal a problem, the memory array should not be immediately replaced. A better approach is to swap the array with another under the same controller (noting the array positions). If the same array fails in its new position, it should then be replaced. If the failures continue in the same position as before the swap, the problem is probably with the controller. In this case, consider swapping or replacing the suspect controller.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 3.5-1 — Address Conversion Table (TN14 Memory Array)

CONVERTED ADDRESS	RANGE	FAULTY SLOT	CONTROLLER
000000 - 07FFFC	LOW	0	0
080000 - 0FFFFC	LOW	1	0
100000 - 17FFFC	LOW	2	0
180000 - 1FFFFC	LOW	3	0
200000 - 27FFFC	LOW	4	0
280000 - 2FFFFC	LOW	5	0
300000 - 37FFFC	LOW	6	0
380000 - 3FFFFC	LOW	7	0
400000 - 47FFFC	LOW	8	0
480000 - 4FFFFC	LOW	9	0
500000 - 57FFFC	LOW	10	0
580000 - 5FFFFC	LOW	11	0
600000 - 67FFFC	LOW	12	0
680000 - 6FFFFC	LOW	13	0
700000 - 77FFFC	LOW	14	0
780000 - 7FFFFC	LOW	15	0
000000 - 07FFFC	HIGH	0	1
080000 - 0FFFFC	HIGH	1	1
100000 - 17FFFC	HIGH	2	1
180000 - 1FFFFC	HIGH	3	1
200000 - 27FFFC	HIGH	4	1
280000 - 2FFFFC	HIGH	5	1
300000 - 37FFFC	HIGH	6	1
380000 - 3FFFFC	HIGH	7	1
400000 - 47FFFC	HIGH	8	1
480000 - 4FFFFC	HIGH	9	1
500000 - 57FFFC	HIGH	10	1
580000 - 5FFFFC	HIGH	11	1
600000 - 67FFFC	HIGH	12	1
680000 - 6FFFFC	HIGH	13	1
700000 - 77FFFC	HIGH	14	1
780000 - 7FFFFC	HIGH	15	1

Table 3.5-2 — Address Conversion Table (TN28 Memory Array)

CONVERTED ADDRESS	FAULTY SLOT
000000 - 0FFFFC	0
100000 - 1FFFFC	1
200000 - 2FFFFC	2
300000 - 3FFFFC	3
400000 - 4FFFFC	4
500000 - 5FFFFC	5
600000 - 6FFFFC	6
700000 - 7FFFFC	7
800000 - 8FFFFC	8
900000 - 9FFFFC	9
A00000 - AFFFFC	10
B00000 - BFFFFC	11
C00000 - CFFFFC	12
D00000 - DFFFFC	13
E00000 - EFFFFC	14
F00000 - FFFFFC	15

Table 3.5-3 — Address Conversion Table (TN56 Memory Array)

CONVERTED ADDRESS	FAULTY SLOT
000000 - 1FFFFC	0
200000 - 3FFFFC	1
400000 - 5FFFFC	2
600000 - 7FFFFC	3
800000 - 9FFFFC	4
A00000 - BFFFFC	5
C00000 - DFFFFC	6
E00000 - FFFFFC	7
1000000 - 11FFFFC	8
1200000 - 13FFFFC	9
1400000 - 15FFFFC	10
1600000 - 17FFFFC	11
1800000 - 19FFFFC	12
1A00000 - 1BFFFFC	13
1C00000 - 1DFFFFC	14
1E00000 - 1FFFFFC	15

Table 3.5-4 — Address Conversion Table (TN2012 Memory Array)

CONVERTED ADDRESS	FAULTY SLOT
000000 - 3FFFFC	0
400000 - 7FFFFC	1
800000 - BFFFFC	2
C00000 - FFFFFC	3
1000000 - 13FFFFC	4
1400000 - 17FFFFC	5
1800000 - 1BFFFFC	6
1C00000 - 1FFFFFC	7
2000000 - 23FFFFC	8
2400000 - 27FFFFC	9
2800000 - 2BFFFFC	10
2C00000 - 2FFFFFC	11
3000000 - 33FFFFC	12
3400000 - 37FFFFC	13
3800000 - 3BFFFFC	14
3C00000 - 3FFFFFC	15

3.6 ANALYZE REPT:CU ERROR INTERRUPT HANDLER LOG FILE ENTRIES

OVERVIEW

This procedure is used to analyze errors recorded in an error log file. The Error Interrupt Handler (EIH) log file (ERLOG) contains a history of all error interrupts handled by the EIH that are not associated with the main memory. Among the errors handled are input/output (I/O) errors, direct memory access (DMA) errors, other Control Unit (CU) hardware errors, and software errors.

The Interrupt Source (IS) register contains three bits of information. This information is summarized as follows:

IS BIT FAULT CLASSIFICATION

- 0 On-line hardware
- 1 Off-line hardware
- 2 On-line software.

Depending on which of these bits is asserted, the EIH gains control of the computer at a predetermined error-handling routine. The locations of the error handling routines are placed in the interrupt vector table on a system initialization or on completion of a CU restore (bit 1 only).

In most instances when an error occurs, a message is printed on the Receive-Only Printer (ROP) providing details about the error. In addition, this message is written to a log file (ERLOG). Having a log file of messages serves two purposes:

- a. If the message is lost and never printed on the ROP, it is preserved in the log file.
- b. Having a file containing the error messages allows one to access more than one message at a time.

For specific details relating to input and output messages, refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

PROCEDURE

1. At the Master Control Center (MCC) video terminal, extract the supplemental data for the error from the log file by entering the following:

OP:LOG:ERLOG,KW=d;

Where: d = identification flag shown in the **REPT:CU** output message.

Note: The messages in ERLOG are not of a set format. Different errors require different information to be printed. Hardware errors produce messages where the contents of various hardware registers are provided. Software errors on the other hand provide the saved state of the process involved in the error. There are different approaches to using each type of message to determine the source of the problem. The following applies to all types of EIH-reported errors including those in MEMLOG.

2. Classify the error as either a hardware or software error. To accomplish this, look at the **REPT:CU** message. Refer to 235-600-750, *Output Messages*, for details.

- Obtain a brief description of the error from Table 3.6-1. Included in the table is the classification of the error (hardware, software, or main memory). Also listed are actions to take when a particular error occurs.

Note: In many cases, the resolution of a problem requires analysis of several log files, PRMs, and other system output; the error entry by itself may not be enough. To effectively analyze a problem, the system output (ROP) should be collected for a period of time after the system has recovered. The intent here is to preserve system error message sequence and continuity. This is sometimes vital to the resolution of a problem.

Note: Interrupt type numbers in Table 3.6-1 are in hexadecimal and are those numbers that appear in the REPT:CU output message.

- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 3.6-1 — Error Interrupt Handler Faults

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' 8	A my store error C	On-line hardware	A non-correctable parity error has occurred on the currently running CU.	If the processors switched as a result of the error, run diagnostics on the processor encountering the fault.
X' B	Invalid maintenance channel order	Off-line hardware	Maintenance channel is faulty or maintenance channel protocol has been violated.	If the error occurs repeatedly, run diagnostics on the off-line processor. If no problem is found, run diagnostics on the on-line processor.
X' C	Restore hardware error	Off-line hardware	The memory controller of the off-line processor encountered a store error A condition.	This error indicates a problem with the controller hardware, not the memory. The implicated controller should be diagnosed and replaced if found to be faulty.
X' D	Other store correctable memory failure	Off-line hardware	A correctable parity error (other store D) occurred in the mate processor. This type of error can only occur if the mate processor is in the standby state.	Run diagnostics if the mate processor is removed from a standby state.

Table 3.6-1 — Error Interrupt Handler Faults (Contd)

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' E	Other store noncorrectable memory failure	Off-line hardware	A noncorrectable memory error (other store C) occurred in the mate processor. This type of error can only occur if the mate processor is in the standby state.	Run diagnostics if the mate processor is removed from a standby state.
X' F	Other store time-out error	Off-line hardware	The memory controller of the mate processor did not respond to an access.	Check the update cables on both processors and run diagnostics on the off-line processor.
X' 10	I/O channel error	On-line hardware	The faulty unit encountered a fatal error condition. The channel status and channel address are provided.	Examine the channel status register layout to determine the error type and the appropriate action to be taken.
X' 11	3/6 main channel I/O response error	On-line hardware	More than one channel responded to an I/O address.	Run diagnostics on the processor encountering the fault.
X' 12	3/6 main channel sequencing error	On-line hardware	More than one I/O pulse point was active in the command to the channel.	Run diagnostics on the processor encountering the fault.
X' 13	Parity divert error	On-line hardware	A named unit returned a word with bad parity when the instruction expected good parity.	Run diagnostics.
X' 14	On-line correctable memory failure	On-line hardware	A correctable memory failure occurred in the on-line processor (my store D).	If the processor encountering the fault is removed, run diagnostics on it.
X' 15	Protection violation	Software	A program tried to execute from a segment that did not have execute permission or tried to write into a segment that did not have write permission.	Forward the software log entry information to your technical assistance organization.
X' 16	Virtual address out-of-range (VORA)	Software	A program attempted to access memory with virtual address values exceeding 64 megabytes.	Forward the software log entry information to your technical assistance organization.

Table 3.6-1 — Error Interrupt Handler Faults (Contd)

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' 17	Out-of-range memory reference	Software	A program tried to access unequipped memory.	Forward the software log entry information to your technical assistance organization.
X' 18	Out-of-range memory reference (other store)	Software	The off-line main memory considered the address to be out of range while the on-line memory did not. This usually indicates a problem with the off-line main memory.	Check and, if necessary, replace the fuses in the off-line memory. Run diagnostics on off-line memory.
X' 19	Privileged instruction violation	Software	The program tried to execute one of the special instructions without a corresponding privilege bit set in the PSW.	Forward the software log entry information to your technical assistance organization.
X' 1A	Bad alignment on memory reference	Software	The program executed an instruction and used the wrong type of address (for example, the execution of full-word instruction with a half-word address.)	Forward the software log entry information to your technical assistance organization.
X' 1B	Illegal operand	Software	One of the operands specified in an instruction is invalid for the particular opcode.	Forward the software log entry information to your technical assistance organization.
X' 1C	Illegal instruction	Software	The data in the instruction buffer did not correspond to a valid instruction.	Forward the software log entry information to your technical assistance organization.
X' 1D	Illegal stack switch	Software	The program attempted to switch to a private stack or attempted to switch to the kernel stack when it was already running on the kernel stack.	Forward the software log entry information to your technical assistance organization.

Table 3.6-1 — Error Interrupt Handler Faults (Contd)

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' 1E	Spurious intercept	Software	The EIH was entered and did not find an error set.	If possible, the processors should be switched so that the faulty CU can be diagnosed. In any case, forward the results of the diagnostic and ERROR log to the responsible engineer through the technical assistance organization.
X' 20	My store A during DMA	On-line hardware	The DMA controller (DMAC) encountered a fatal main memory problem during a DMA transfer.	Run diagnostics on the unit indicated in the MEMLOG entry.
X' 21	My store B during DMA	On-line hardware	The DMAC used an out-of-range address.	Run diagnostics on the unit indicated in the MEMLOG entry.
X' 22	DMA detected non-correctable parity failure	On-line hardware	Noncorrectable memory error (my store C) occurred in the on-line processor during DMA.	If the processors switched as a result of the error, run diagnostics on the processor encountering the fault.
X' 25	Bad parity on DIO bus	On-line hardware	The DMAC received bad parity from the named CHANNEL ADDRESS device on data destined for the main memory during a DMA transfer.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 26	Bad parity on DMA read	On-line hardware	The DMAC detected bad parity on its internal bus. This can be caused by a DMAC failure or a request from a device that has not had its DMAC RAM block initialized.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 29	DIO ready failure	On-line hardware	The named channel did not return a READY signal to the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2A	DIO-ASW failure	On-line hardware	The named channel did not return all-seems-well to the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.

Table 3.6-1 — Error Interrupt Handler Faults (Contd)

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' 2B	DIO acknowledge failure	On-line hardware	Either more than one or no channel responded to the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2C	CCIO data parity failure	On-line hardware	The command received by the DMAC on a PIO operation had bad parity.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2D	CCIO-command error	On-line hardware	A second programmed I/O order was sent to the DMAC before the first one was completed.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2E	DMA-ROM parity failure	On-line hardware	Bad parity was detected in the DMAC read-only memory. This can be caused by other fatal errors occurring in the DMAC.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 2F	DMA-address error	On-line hardware	During the virtual to physical address translation, the DMAC found that the requested I/O access was not permitted to physical memory; or during the data transfer, the data would have been written beyond the end of a segment.	Run diagnostics on the unit indicated in the ERLOG entry.
X' 30	DMA-channel request error	On-line hardware	A device on a DMA channel requested service but the DMAC RAM block for the device did not have its valid bit set, or a channel on the DMAC requested service but no device on that channel had a request pending.	Run diagnostics on the unit indicated in the ERLOG entry.

Table 3.6-1 — Error Interrupt Handler Faults (Contd)

INTERRUPT TYPE	FAULT	FAULT TYPE	DESCRIPTION	ACTION TO BE TAKEN
X' 32	Spurious interrupt	On-line hardware	EIH was dispatched to handle an error, but no error bit in the error registers was set.	Run diagnostics on the CU in which the error occurred and forward the ERLOG and ROP output to the responsible engineer.

3.7 ANALYZE POSTMORTEM DUMP

OVERVIEW

This procedure is used to analyze a postmortem dump. After a system initialization, a postmortem dump output message is generated. This message contains critical register and system data that was collected at the time the system reset occurred. The data provided in each entry consists of most of the critical hardware registers from both Control Units (CU) and Central Processing Units (CPU) and some nonhardware-type information dealing with the past and present configuration of the system.

There are two types of postmortem dumps: manual and automatic. In either case, the output is the same. Automatic postmortem dumps are labeled either POSTMORTEM DUMP or MAINTENANCE INTERRUPT. Each type is placed in the log file PMLOG. In the case of a **REPT CU MAINTENANCE INTERRUPT d** message, the sequence number **d** can be used in the **OP:LOG** command to extract the entry from PMLOG. For the postmortem case, the sequence number is embedded in the **DD PRM** message issued during processor initialization. Refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, as applicable.

PROCEDURE

1. At the Maintenance Control Center (MCC) terminal, generate a printout of the dump by entering the following:

OP:PMLOG,LG=PMLOG;

Note: Use keyword (KW) or TIME and DATE ranges to select entries.

2. Analyze the INITIALIZATION MESSAGE section of the dump to determine the source of the initialization.

- (a) If the SOURCE designation is shown as "m," no further analysis is necessary; however, Step 3 may be performed, if desired. Otherwise, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
- (b) If the SOURCE designation is shown as "s," go to Step 4.
- (c) If the SOURCE designation is shown as "h," go to Step 7.

Note: The INITIALIZATION MESSAGE also indicates which CU was on-line, the faulty CU, the *UNIX*¹ RTR operating system initialization level, and the application initialization level. Follow local practices for using this information.

3. Analyze the Emergency Action Interface (EAI) buffer (eaipar). The buffer describes the EAI input parameter buffer for inputting manual requests to UNIX RTR operating system software from the craft interface terminal. The single bit defined for the parameters under EAI BUFFER can be found in the system header file <fltrcv/phymem.h>. All parameters are from the previous manual initialization except the APPL PAR and the EAINEW BIT in the CONFIGURATION field. The APPL PAR is from the current manual request. The EAINEW BIT is set by the boot programs on the current manual request and is reset by the Application Integrity Monitor (AIM) when it has reacted to

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the manual initialization or at the end of the initialization interval by the Error Interrupt Handler (EIH).

Note: If this step was performed with a SOURCE designation of “m,” **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4. Analyze the REQUESTED INITIALIZATION PARAMETERS section of the dump and forward the information to your technical assistance organization. This section repeats the source, UNIX RTR operating system initialization level, and application initialization level information presented in the initialization message. In addition, a panic code, the phase options, and the utility identification (ID) are given. The single bit defined for PHASE OPTIONS is in the system header file <fltrcv/rparm.h>. Use the information obtained to determine the process that invoked the phase operating system trap (OST) and the problem that it encountered as follows:
 - (a) Locate the utility ID value in Table 3.7-1. The process name is in parentheses below the ID value.
 - (b) For the appropriate utility ID, locate the panic code in Table 3.7-1. The problem is identified in the column to the right of the panic code.
5. Check for acceptable values. The BOOT DEVICE fields indicate the previous and current active boot devices. Acceptable values for these fields are as follows:
 - 0 (boot device 0)
 - 1 (boot device 1)
 - b (both boot devices).
6. If the source of the fault was software (see Step 1), forward the information in the postmortem dump to your technical assistance organization. If the source was “m,” disregard the GENERAL REGISTERS information.
7. Analyze the FAULTY CU REGISTERS section of the dump. Although the saved state information is mainly of interest if the source is “h,” the system status register (SSR) and error register (ER) may also be of interest on software-requested initializations. Refer to local practices for using the saved state information. See Table 3.7-2 for the saved state information registers.
8. If an error is not obvious, each timer register may be checked for a sanity time-out. The timer registers are normal counters (active 1) and are periodically reset. The registers are printed for each side relative to the current configuration; therefore, the off-line timer may be checked for a stop-and-switch (SAS) error. The sanity time-out bits are bits 6 and 7 in the timer register. Bit 6 going active produces an SAS error, while bit 7 going active causes a maintenance reset function (MRF) on that side. If the processor is not active (SSR bit 16 = 0), then bit 6 going active does not cause an SAS error.
9. If the ER in the microcode save state registers section indicates that a MYSERA or a my store time-out occurred (bit 6 = 0 or bit 7 = 0, respectively), the MAIN STORE REGISTERS provide additional information about the error. Follow local practices for using this information. See Table 3.7-3 for the definitions of the main store register acronyms.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 3.7-1 — Postmortem Dump Process/Problem Identification

UTILITY ID	PANIC CODE	DESCRIPTION
00000000 Kernel Boot (KBOOT)	1	Kboot cannot create a system process.
	2	Bad kernel process dispatcher control table (DCT) pointer.
	3	Bad kernel process, process control block (PCB) segment.
	4	Bad segment case.
	5	Bad supervisor process DCT pointer.
	6	Bad supervisor process PCB segment.
	7	Cannot send message to process manager.
	8	Cannot send message to file manager.
	9	Cannot send "pcreate" message.
	A	Bad boot segment ID.
	B	Bad kernel message segment ID.
	C	Bad kernel DCT segment ID.
	D	Bad kernel interrupt stack segment ID.
	E	Bad port table segment ID.
	F	Bad process ID.
	10	Cannot create protected application segment (PAS).
	11	Cannot fill in segment table entry.
	12	PAS is too large.
	13	Cannot create a PUB LIB work segment.
	14	Boot process segment list full.
	15	Boot process segment list overlay.
	16	Invalid root directory block.
17	No boot shared library.	
18	Invalid boot shared library inode.	
19	Cannot allocate boot shared library segment.	
1A	Disk read time-out.	
1B	DMA system generation (SYSGEN) failure.	
1C	Disk read failure.	
1D	Cannot apply segment name.	
1E	Boot time data base is missing.	
1F	Could not allocate a whole descriptor block segment.	
20	Not enough swappable memory.	
21	Could not allocate a PAS segment for a boot process because there are no PAS segments.	
22	Kernel process control block (KPCB) of a boot process does not have enough entries to accommodate either PAS or equipment configuration data base (ECD) segments.	

Table 3.7-1 — Postmortem Dump Process/Problem Identification (Contd)

UTILITY ID	PANIC CODE	DESCRIPTION
00000001 Memory Manager (MMGR)	6E	Function to make space on disk failed.
	6F	Invalid return code from function to load segments.
	70	Failed reclaiming swap space.
	71	Unable to retry failed I/O.
	72	Message drained out of sequence.
	74	Ran out of entries describing free swap space on the swap device (HDBs).
	75	Unexpected fault.
	7F	Swap space damaged.
00000002 Capability Manager (CMGR)	80	Capability manager unexpected fault.
00000003 Utility Manager (UMGR)	50	Utility manager unexpected fault.
00000004 File Manager (FMGR)	1	No buffer segment.
	2	Could not read root superblock.
	4	Could not read root inode.
	5	Cannot allocate initialization message to SIM.
	6	Could not connect to ECD.
	7	Stack switch failure.
	8	Bad mount table.
	9	Illegal block device.
	C	Mount point not found in mount table.
	D	Bad inode disk address.
	10	Too many nontask faults.
	11	Too many task faults.
	12	Too many kfault faults.
00000009 (SCHEDULER)	37	I/O error loading essential/no-term process.
	38	SCHEDULER unexpected fault.
	3A	SCHEDULER received a second software fault in the monitored interval.

Table 3.7-1 — Postmortem Dump Process/Problem Identification (Contd)

UTILITY ID	PANIC CODE	DESCRIPTION
0000000A (Kernel)	1	Excess number of illegal interrupts.
	2	Bad segment descriptor entry pointer.
	3	Faulting kernel.
	4	Unexpected interrupt.
	5	Unattached process during interrupt.
	6	Dispatching to a nonkernel process.
	7	Bad segment descriptor entry pointer.
	8	Faulting kernel.
	9	Null DCT pointer.
	10	Invalid branch to zero.
	11	Nonidentifiable kernel fault.
	12	Special process fault.
	13	Fault while handling supervisor OST.
	14	Fault while handling channel OST.
	15	Fault while handling kernel process OST.
	16	Fault in kernel audit.
	1D	Null DCT pointer.
00000025 (KDAPDRVR)	40	KDAP driver special process unexpected fault.
0000008C Little Boot (LBOOT)	1	Bus Interface Controller (BIC) for the boot Disk File Controller (DFC) initialization failed.
	4	Peripheral Interface Controller (PIC) for the boot DFC initialization failed.
	5	Failed to find the big boot file entry in the disk volume table of contents (VTOC).
	7	Failed to initialize the DMAC RAM.
	A	Failed to find an entry in the disk VTOC.
	B	Disk job timed out.
	10	Disk job failed.
	20	Page table initialization routine called with an invalid parameter.
	21	Channel error during I/O SYSGEN command to disk.
	22	Disk job failed.
0000008D Processor Init (PINIT)	2	Enabled hardware checks with an error source present.
	8	A UNIX RTR operating system LEVEL 3 phase is called because the up-to-date off-line memory is not accessible after a CU stop-and-switch (SAS).
	9	Memory copy failed after a SAS.

Table 3.7-1 — Postmortem Dump Process/Problem Identification (Contd)

UTILITY ID	PANIC CODE	DESCRIPTION
0000008E Big Boot (BBOOT)	1	Failed to initialize the BIC for the boot DFC.
	2	Failed to initialize the PIC for the boot DFC.
	3	Failed to initialize the PIC for the boot DFC.
	4	Failed to find the disk VTOC entry for the file being loaded.
	5	Failed to find the boot file or a boot time data base (BTDB).
	6	Failed to find the boot file or a BTDB.
	7	Memory copy failed after an SAS.
	9	Boot file data on disk is no good.
	A	Failed to access BTPARM record from incore ECD.
	10	Boot ECD on disk is no good.
	20	Page table initialization routine called with an invalid parameter.
	21	Channel error during a programmed I/O SYSGEN command to disk.
	22	Disk job failed.
	31	ECD: MASC 0 UCB not found for one or both CUs.
	32	ECD: MASC 0 UCB has unknown memory array type for one or both CUs.
	33	ECD: MASC 1 UCB has unknown memory array type for one or both CUs.
	53	Boot image format invalid for release.
63	Disk job timed out.	
000000C0 IOP Driver (IODRV)	1	Encountered a fault while handling a fault.
	2	Excessive software faults.
	3	Excessive unrecoverable errors while processing a fault.
	4	Excessive unrecoverable errors while processing a fault where IOPs were affected but not implicated.
	A	User requested via the EAI page on MCRT a UNIX RTR operating system LEVEL 0 application level 0 initialization.

Table 3.7-1 — Postmortem Dump Process/Problem Identification (Contd)

UTILITY ID	PANIC CODE	DESCRIPTION
000000C1 Disk Driver (DKDRV)	1	CONFIG failed a "rptrerr" call – deljob.c.
	2	CONFIG failed a "rptrerr" call – jobrsp.c.
	3	Message buffer allocation failed – kevent.c.
	4	Disk driver software fault detected – kfault.c.
	5	CONFIG failed a "rptrerr" call – kfault.c.
	6	Limp mode initialization failed – jobrsp.c.
	7	Limp mode initialization failed – deljob.c.
	8	Limp mode initialization failed – kfault.c.
	9	CONFIG failed a "rptrerr" call – kfault.c.
	A	Limp mode initialization failed – kfault.c.
	B	Limp mode enable interrupt failed – kfault.c.
	C	CONFIG failed a "rptrerr" call – kfault.c.
	D	Limp mode initialization failed – kfault.c.
	E	Nested faults have been detected – kfault.c.
	F	Fault rate is excessive – kfault.c.
	00000083 Error Interrupt Handler (PCPEIH)	2
10		Channel error.
4D		Boot disk (MHD) or SCSI bus (SBUS) off-line or unavailable.
51		ECD audit failure.
55		Hard switch called with CU forced off-line.
7E		ECD audit found errors in UCB of device type DMA, DSCH, or SCH.
C4		Fault FLT_CMA remove request.
C5		Fault FLT_CMB remove request.
C6		Fault FLT_CMC remove request.
C7		Fault FLT_CMD remove request.
C8		Fault FLT_CMAN manual remove request.
C9		Fault FLT_UCLRMV unconditional remove.
E1		ECD access failure.
E2		Zero transfer vector encountered.
E4	ECD audit found errors in UCB data for which EIH is responsible.	
E5	A hard switch was called due to a reconfiguration request from CONFIG.	
E6	A hard switch was called due to a disk limp mode request from CONFIG.	
00000085 Processor Audit (PCPAUD)	1	Executing the fault entry too many times. A phase is called to protect a kernel stack overflow.
	2	Executing the event entry too many times. A phase is called to protect a kernel stack overflow.

Table 3.7-1 — Postmortem Dump Process/Problem Identification (Contd)

UTILITY ID	PANIC CODE	DESCRIPTION
00000187 System Integrity Monitor (SIM)	1	Initialization failure.
	4	Audit recovery.
	9	Message buffer overload.
	B	Critical message buffer overload.
	C	Unrecognized faults.
	C8	Application sanity failure.
00000026 Kernel Level Disk LLA Process (KLLA)	1	Too many kfault faults.
	2	Too many task faults.
	3	Too many nontask faults.
	4	Stack switch failure.

Table 3.7-2 — Postmortem Dump Faulty CU Registers

REGISTER	DESCRIPTION
CDR	CCIO bus data register (channel data register).
ER	Error register.
HSR	Hardware status register.
IB	Instruction buffer. Contains the first half-word of the current instruction at the time of the MRF.
IM	Interrupt mask register. This register is active low (that is, a 0 indicates that the function is asserted). Therefore, any bit that is 0 allows the corresponding interrupt in the source register IS.
IS	Interrupt source register.
PA	Program address at time of initialization. For software requested initializations, this is the address of the PHASE OST and not the address where the problem was detected.
PPR	Pulse point register.
PSW	Processor status word. The processor modes are as follows: <ol style="list-style-type: none"> 1. 00 – Kernel mode 2. 01 – Kernel process 3. 10 – Supervisor process/user process (Release 1 only) 4. 11 – User process. <p>The processor mode (bits 30 and 31), with the execution level (bits 24 - 27), can often be used to determine which process was active at the time of the initialization.</p>
SAR	Store address register. This register is only meaningful if a main store problem is suspected.
SCR	Store control register. This register is meaningful only if a main store problem is suspected.
SDR	Store data register. This register is significant only if a main memory problem is suspected.
SIR	Store instruction register. Contains the remainder of the current instruction or the next instruction.
SSR	System status register. Information to check includes whether cache was enabled (bit 13), hardware checks were blocked (bit 23), interrupts were blocked (bit 18), or sanity timer was inhibited (bit 11).
TMR	Timer register. Bits 6 and 7 indicate on- and off-line sanity timer time-out. If the source is “h” and no other errors are present, the timer probably indicates a sanity time-out.
UER	Microinterrupt error register.
UER1	Microinterrupt error register 1.

Table 3.7-3 — Main Store (Memory) Register Acronyms

ACRONYM	DESCRIPTION
ER01	Main store controller 0, error register 1
ER02	Main store controller 0, error register 2
ER11	Main store controller 1, error register 1
ER12	Main store controller 1, error register 2
TAR0	Trapped address register 0
TAR1	Trapped address register 1

3.8 TROUBLESHOOT SMALL COMPUTER SYSTEM INTERFACE DISK UNIT PACKAGE

OVERVIEW

This procedure is used to troubleshoot a Small Computer System Interface (SCSI) Disk Unit Package (DUP).

PROCEDURE

1. Is the OFF lamp lighted?
If **YES**, continue with the next step.
If **NO**, go to Step 16.
2. Is the ALM lamp lighted?
If **YES**, continue with the next step.
If **NO**, go to Step 9.
3. Press the "OFF" and "MOR" switches simultaneously.
4. Does the ALM lamp stay lighted?
If **YES**, continue with the next step.
If **NO**, go to Step 40.
5. Remove the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
6. Replace the Power Switch (CGG1) using Procedure 3.15, Replace Small Computer System Interface Disk Unit Package Subunits.
7. Reinstall the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. Operate the "ACO/T" switch.
10. Does the ALM lamp light?
If **YES**, continue with the next step.
If **NO**, go back to Step 5.
11. Release the "ACO/T" switch.
12. Press the "ON" switch.
13. Does the OFF lamp stay lighted?
If **YES**, go back to Step 5.
If **NO**, continue with the next step.
14. Diagnose the Moving Head Disk (MHD) as follows:
 - (a) Ensure that the standby MHD has been verified.
 - (b) Enter the **DGN:MHD=x:RAW,DEX**; input message, where x = MHD number.
 - (c) If not all tests passed (ATP), clear the diagnostic fault per local policy.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16. Is the ALM lamp lighted?
If **YES**, continue with the next step.
If **NO**, go to Step 23.
17. Is the out-of-service (OOS) lamp lighted?
If **YES**, continue with the next step.
If **NO**, go to Step 19.
18. Press the "OFF" switch and go to Step 20.
19. Press the "OFF" and "MOR" switches simultaneously.
20. Does the OFF lamp light?
If **YES**, continue with the next step.
If **NO**, go back to Step 5.
21. Press the "ON" switch.
22. Does the OFF lamp stay lighted?
If **YES**, go back to Step 5.
If **NO**, go back to Step 14.
23. Operate the "ACO/T" switch.
24. Do all lamps light?
If **YES**, go to Step 36.
If **NO**, continue with the next step.
25. Are all lamps off?
If **YES**, continue with the next step.
If **NO**, go back to Step 5.
26. At the Power Distribution Unit (PDU), check for a blown fuse for this DUP location. Refer to Figure 3.8-1 for fuse locations.
27. Is the -48 V fuse blown?
If **YES**, continue with the next step.
If **NO**, go to Step 34.
28. Remove the blown indicator fuse and the load fuse.
29. At the rear of the DUP, remove the ED-3T053-15, G1-G16 cable and check for a short circuit between the -48 V and the -48 RTN pins on the cable plug.
30. Was a short circuit found?
If **YES**, continue with the next step.
If **NO**, go to Step 40.
31. Replace the faulty power cable between the PDU and the DUP.
32. Insert good fuses in the PDU.
33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

34. At the rear of the DUP, remove the ED-3T053-15, G1-G16 cable and measure -48 V DC on the plug between the -48 V and -48 RTN pins.
35. Was -48 V DC present?
If **YES**, go to Step 40.
If **NO**, go to Step 31.
36. Remove the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
37. Replace the Disk Module using Procedure 3.15, Replace Small Computer System Interface Disk Unit Package Subunits.
38. Reinstall the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
39. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
40. Has the Power Supply (CGG1), Power Switch (CGG2), Fan and Fan Cable, and Disk Module been replaced during this maintenance session?
If **YES**, continue with the next step.
If **NO**, go to Step 44.
41. Remove the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
42. Install a new DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
43. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
44. Remove the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
45. Replace the following items not previously replaced in this DUP one at a time and in the order listed (Refer to Procedure 3.15, Replace Small Computer System Interface Disk Unit Package Subunits.):
 - (a) Power Supply (CGG1)
 - (b) Power Switch (CGG2)
 - (c) Fan and Fan Cable
 - (d) Disk Module.
46. Reinstall the DUP using Procedure 3.14, Remove and/or Install Small Computer System Interface Disk Unit Package.
47. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

NEW SHIP OR GROWTH CONVERSION			NEW SHIP OR CONVERSION GROWTH						
LOAD/ LOCATION	LOAD/ LOCATION	LABEL	LABEL						
MHD 16/ 006-045	MHD 0/ 006-045	Disk 6-045 74B/70F 3A/.25A (F4/F4A)	(LEFT FUSE BLOCK)				MHD 8/ 015-045	MHD 24/ 015-045	
MHD 18/ 024-045	MHD 2/ 024-045	Disk 24-045 74B/70F 3A/.25A (F3/F3A)					MHD 10/ 032-045	MHD 26/ 032-045	
MHD 20/ 011-045	MHD 4/ 011-045	Disk 11-045 74B/70F 3A/.25A (F2/F2A)					MHD 19-045 70F/74B .25A/3A (F6A/F6)	MHD 14/ 019-045	MHD 28/ 019-045
MHD 22/ 028-045	MHD 6/ 028-045	Disk 28-045 74B/70F 3A/.25A (F1/F1A)					MHD 36-045 70F/74B .25A/3A (F5A/F5)	MHD 12/ 036-045	MHD 30/ 036-045
DFC 2/ 062-016	DFC 0/ 056-016*	DFC 0/2 Pwr Supp 74D/70F 10A/.25A (F12/F12A)*					(CENTER FUSE BLOCK)		
DFC 2/ 062-024	DFC 0/ 056-024*	DFC 0/2 Pwr Switch 70C/72A 3A/Dum (F11/F11A)*					FAN 1/ 047-104*	FAN 1/ 053-104	
FAN 0/ 053-016	FAN 0/ 047-016*	Fan Ctl 0 70C/72A 3A/Dum (F10/F10A)*					DFC 1/3 Pwr Switch 72A/70C Dum/3A (F14A/F14)*	DFC 1/ 056-104*	DFC 3/ 062-112
FAN 0/ 053-038	FAN 0/ 047-038*	Fan 0 - A & B 74C/70F 5A/.25A (F9/F9A)*					DFC 1/3 Pwr Supp 70F/74D .25A/5A (F13A/F13)*	DFC 1/ 056-112*	DFC 3/ 062-104
MHD 31/ 036-134	MHD 13/ 036-134	Disk 36-134 74B/70F 3A/.25A (F20/F20A)	(RIGHT FUSE BLOCK)				MHD 7/ 028-134	MHD 23/ 028-134	
MHD 29/ 019-134	MHD 15/ 019-134	Disk 19-134 74B/70F 3A/.25A (F19/F19A)					MHD 5/ 011-134	MHD 21/ 011-134	
MHD 27/ 032-134	MHD 11/ 032-134	Disk 32-134 74B/70F 3A/.25A (F18/F18A)					Disk 24-134 70F/74B .25A/3A (F22A/F22)	MHD 3/ 024-134	MHD 19/ 024-134
MHD 25/ 015-134	MHD 9/ 015-134	Disk 15-134 74B/70F 3A/.25A (F17/F17A)					Disk 6-134 70F/74B .25A/3A (F21A/F21)	MHD 1/ 006-134	MHD 17/ 006-134

* Used in optional growth or conversion cabinet configuration

Figure 3.8-1 — SCSI Disk Cabinet Fuse Assignments

3.9 CLEAR ASM PROBLEMS

OVERVIEW

The information for this procedure is now provided in 235-200-145, **5ESS**[®] *Switch OneLink Manager*[™] *Administrative Services Module User's Guide*.

PROCEDURE

1. For Administrative Services Module (ASM) maintenance, refer to 235-200-145.
2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.10 ANALYZE CRC MISMATCHES (STORED/CALCULATED)

OVERVIEW

This procedure is used to analyze CRC mismatches (stored/calculated).

The following *input* message:

```
S334-1441938 70-01-01 19:56:45 001399 MAINT J10.0 APP
VFY:FILE,FLIST="/no5text/bkup/CRCfile"; PF
```

Has generated the following *output* error message:

```
S334-1441938 70-01-01 19:58:54 001413 MAINT J10.0 APP
M VFY FILE VERIFICATION FAILURE ON FILE /no5text/prc/okp
STORED CRC VALUE = f2c2 afcc CALCULATED CRC VALUE = f2c2 afda
S334-1441938 70-01-01 19:58:54 001414 MAINT J10.0 APP
M VFY FILE COMPLETED
XXX FILES VERIFIED
1 ERRORS
```

PROCEDURE

1. Is there any software update that is in a “temporary” state via the poke “9104,sum” on the 1950 page:

```
S63E-458913 70-01-01 20:18:06 001639 MAINT J10.0 APP
upd:display,sum; PF
```

```
S63D-3145886 70-01-01 20:18:28 001640 UTIL J10.0 APP
UPD DISPLAY SUM
```

LAST OFFICIAL BWM: BWM92-0098 STATE: OFFICIAL

LAST CRAFT BWM: NONE

TEMPORARY BWM: NONE

ACTIVE CRAFT BWM: NONE

```
S63E-458913 70-01-01 20:18:29 001641 MAINT J10.0 APP
UPD DISPLAY COMPLETED
```

This means that there is no SU in any temporary state.

Note: State would be SOAK IN PROGRESS, not OFFICIAL. A TMP or CFT SU would show up as APPLY COMPLETED.

The following is an example of an SU that is *not* in the OFFICIAL state:

```
S63D-262303 70-01-01 20:01:09 001442 UTIL J10.0 APP
UPD DISPLAY SUM
```

LAST OFFICIAL BWM: BWM92-0058 STATE: APPLY / SOAK IN-PROGRESS

LAST CRAFT BWM: CFT92-0026 STATE: OFFICIAL

TEMPORARY BWM: NONE

ACTIVE CRAFT BWM: NONE

2. If you received output that stated that an SU was in a temporary state, that SU should be examined for updates to the product that is failing the CRC check. If there is an update to that product in this SU, then the VFY:FILE command

should be run again after that SU is either made OFFICIAL or backed out. If the SU does **not** contain updates to this product, then continue with the next step.

3. If applicable, compare the disk version of the file with the working version in incore memory using the compare-disk-to-core command (/bin/cmpr -f in *UNIX*¹ shell):

```
S2C4-3145874 70-01-01 20:03:03 001471 MAINT J10.0 APP
M cmpr:disk,core,fn="/no5text/prc/okp"; PF
```

```
S2C4-3145874 70-01-01 20:03:29 001483 MAINT J10.0 APP
M CMPR DISK CORE COMPLETED
```

```
S10B-131235 70-01-01 20:03:29 001484 MAINT J10.0 APP
M DISK AND CORE ARE EQUAL FOR /no5text/prc/okp
```

If disk and core are **not equal**, determine which one is correct and correct the other one. Since you already have a CRC error, the disk is probably bad and the incore good. In this case, obtain a backup copy of the disk file and replace the suspected corrupt version. After replacement, some type of process initialization may be necessary to make disk and core equal again. To determine this, **seek technical assistance**.

4. If disk and core *are equal*, run file system audits on the file system where the CRC mismatched file is located, as well as on the rest of the critical file systems, to determine if the *5ESS*[®] switch disk images are free of corruption.

```
S324-1769630 70-01-01 20:05:35 001522 MAINT J10.0 APP
M aud:fslink=2,ins="/dev/no5text",ncg; PF
```

```
S325-327791 70-01-01 20:05:42 001524 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 2 /dev/no5text COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED
```

```
S324-262305 70-01-01 20:06:34 001538 MAINT J10.0 APP
M aud:fsblk=2,ins="/dev/no5text",ncg; PF
```

```
S325-327791 70-01-01 20:06:40 001541 AUDL J10.0 APP
M AUD ENV=RTR FSBLK 2 /dev/no5text COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED
```

Perhaps "ichk's" should also be run from *UNIX* shell:

```
# /etc/ichk -n /dev/no5text
```

```
/dev/no5text1 0 3601
```

```
(NO WRITE)
```

```
Phase 1 - Check Blocks
```

```
Phase 3 - Check Pathnames
```

```
Phase 4 - Check Connectivity
```

```
Phase 5 - Check Reference Counts
```

```
2498 files 118140 blocks 21373 free
```

1. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.

5. Run audits on /dev/root, /dev/db, and /dev/etc to measure the disk integrity of the major file systems of the 5ESS switch.

S324-2359454 70-01-01 20:08:54 001569 MAINT J10.0 APP
M aud:fslink=1,ins="/dev/root",ncg; PF

S325-327791 70-01-01 20:09:00 001570 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 1 /dev/root COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED

S324-2556062 70-01-01 20:09:20 001571 MAINT J10.0 APP
M aud:fslink=1,ins="/dev/etc",ncg; PF

S325-327791 70-01-01 20:09:20 001572 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 1 /dev/etc COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED

S324-2687134 70-01-01 20:09:41 001575 MAINT J10.0 APP
M aud:fslink=1,ins="/dev/db",ncg; PF

S325-327791 70-01-01 20:09:43 001576 AUDL J10.0 APP
M AUD ENV=RTR FSLINK 1 /dev/db COMPLETED
0 ERRORS FOUND
0 ERRORS CORRECTED

6. Verify that the error is still present by entering the "VFY:FILE" command again; if possible, just on the one file that failed before:

S334-2752670 70-01-01 20:10:16 001577 MAINT J10.0 APP
M VFY:FILE,FN="/no5text/prc/okp g"; PF

S334-2752670 70-01-01 20:10:16 001578 MAINT J10.0 APP
M VFY FILE STARTED

S334-2752670 70-01-01 20:12:30 001589 MAINT J10.0 APP
M VFY FILE VERIFICATION FAILURE ON FILE /no5text/prc/okp
STORED CRC VALUE = f2c2 afcc CALCULATED CRC VALUE = f2c2 afda

S334-2752670 70-01-01 20:12:30 001590 MAINT J10.0 APP
M VFY FILE COMPLETED
1 FILES VERIFIED
1 ERRORS

7. If the error still persists, then some information may need to be gathered to assist Technical Support in determining what to do next. Suggestions might be to dump the PMLOG and DKDRVLOG to look for any recent errors/initializations that might lead us to suspect the disk version of the file being bad.

S214-2818206 70-01-01 20:14:38 001613 MAINT J10.0 APP
M op:log,lg=pmllog; PF

S214-2818206 70-01-01 20:14:38 001614 UTIL J10.0 APP
M OP LOG PMLOG STARTED SEGMENT 1

70-01-01 17:59
REPT PMSLOT

POSTMORTEM DUMP H'7
TIME OF POSTMORT: 70-01-01 17:54:08

INITIALIZATION MESSAGE
UNIX RTR LEVEL: 4 APPLICATION LEVEL: 1

REQUESTED INITIALIZATION PARAMETERS
SOURCE: PANIC CODE: 0
UNIX RTR LEVEL: 0 APPLICATION LEVEL: 0
PHASE OPTIONS: 0
UTILITY ID: 00000000

.
.
.

S214-2818206 70-01-01 20:14:38 001616 UTIL J10.0 APP
M OP LOG PMLOG COMPLETED SEGMENT 3

S214-2883742 70-01-01 20:15:07 001618 MAINT J10.0 APP
M op:log.lg=dkdrvlog; PF

S214-2883742 70-01-01 20:15:07 001619 UTIL J10.0 APP
M OP LOG DKDRVLOG COMPLETED SEGMENT 1

70-01-01 17:58
REPT DFC 0 AUTO PUMP STARTED

70-01-01 17:58
REPT DFC 0 AUTO PUMP COMPLETED

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DKDRV INFO CODE H'265

70-01-01 17:58
REPT DFC 1 AUTO PUMP STARTED

70-01-01 17:58
REPT DFC 1 AUTO PUMP COMPLETED

At this point, it must be decided whether the site has made enough checks to determine if the disk file is good or not. If the file is updated via file replacement when it is touched by an SU, then the sum and byte values for the file could be compared with the same file from another office at the identical SU level for another check of sanity. But this test is not valid for files (such as okp) that are updated via function replacement.

If there is any doubt as to the sanity of the file or the rest of the *5ESS* switch, seek technical assistance. Otherwise, if the site believes that the file is okay and the CRC value is incorrect, it may recalculate and store a new CRC value via the gen option of the VFY:FILE command:

```
S334-3080350 70-01-01 20:15:51 001624 MAINT J10.0 APP  
M VFY:FILE,FN="/no5text/prc/okp g",gen; PF
```

```
S334-3080350 70-01-01 20:15:51 001625 MAINT J10.0 APP  
M VFY FILE STARTED
```

```
S334-3080350 70-01-01 20:18:06 001638 MAINT J10.0 APP  
M VFY FILE COMPLETED
```

8. Running VFY:FILE again now yields no error.

```
S334-3211422 70-01-01 20:18:33 001642 MAINT J10.0 APP  
M VFY:FILE,FN="/no5text/prc/okp g"; PF
```

```
S334-3211422 70-01-01 20:18:33 001643 MAINT J10.0 APP  
M VFY FILE STARTED
```

```
S334-3211422 70-01-01 20:20:45 001652 MAINT J10.0 APP  
M VFY FILE COMPLETED
```

```
1 FILES VERIFIED  
0 ERRORS
```

9. The VFY:FILE error has now been corrected or enough data gathered so that a call for further technical assistance can be made.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.11 CORRECT UPD:HSCHK AUDIT ERRORS

OVERVIEW

This procedure is used to correct hash-sum errors reported by the UPD:HSCHK program. The HSCHK program is an integrity check program that verifies the consistency of the disk and core images for hash-sum protected products. There are two major checks that are performed. The first check verifies the disk image by calculating the hash-sums over the entire image and comparing them with the associated hash-sum file. The second check compares the disk hash-sums with the core hash-sums. The HSCHK program can be invoked manually or can be scheduled via cron to run daily on all text products that have associated hash-sum files.

For errors involving mismatches between the files on disk, this procedure directs the craft to **seek technical assistance** for correction procedures as this type of error requires further analysis to determine the appropriate correction mechanism. For errors involving mismatches between the disk and core hash-sums, this procedure corrects the mismatch by either repumping the affected processor (for CMP or large SM/SM-2000 errors) or using SM/SM-2000 utilities to overwrite the inconsistent text and hash-sum core images.

Note: Errors involving the CMP/SM/SM-2000 files on disk require correction of the files on the disk. Depending on the severity of the error, the repair procedure may involve correction of the existing files using the **edobj** tool, replacement of all text files from backup tape, or replacement via tape of individual text files from another site that is at the same SU level.

For all SM configurations (Basic, Standard, Loaded, and Global), replacing the *smtxt/IM.out* file requires the replacement of the associated *IMhs.out* file and the *SMcnfg.out* and *SMcnfghs.out* files.

For the SM-2000 configuration, replacing the *sm2ktxt.out* file requires the replacement of the associated *IMhs.out* file and the *SMcnfg.out* and *SMcnfghs.out* files.

For analysis and correction of disk-type errors, **seek technical assistance**.

PROCEDURE

1. **Caution: Do not perform office backups to tape or scheduled SM/SM-2000 pumps until this trouble is resolved.**

Does the failing output message from UPD:HSCHK indicate an error (FOUND a DISK HASH SUM ERRORS output phrase) for the CMP/SM/SM-2000 images on disk?

If **YES**, **Seek technical assistance**.

If **NO**, continue with the next step.

2. Does the failing output message from UPD:HSCHK indicate a system error (UPD HSCHK SYSERR ...) while executing the HSCHK program?

If **YES**, **seek technical assistance** to resolve problem with the HSCHK program.

If **NO**, continue with the next step.

Note: At this point, the type of failure is a problem with a mismatch between the CMP/SM/SM-2000 text files on disk and the CMP/SM/SM-2000 text in core (DISK TO CORE HASH SUM MISMATCH output phrase).

3. **Note:** The rest of this procedure corrects the core image of text so it matches the copy on disk. The core text image mismatches can be corrected with:
- Utility commands – This is the recommended method for limited mismatches of less than 128 bytes in an SM/SM-2000.
 - Repumps of the SM/SM-2000 text from disk – This is the recommended method for either SM/SM-2000 mismatches of more than 128 bytes or for mismatches in the CMP.

Does the failing output message from UPD:HSCHK indicate either a mismatch in the CMPs or an SM/SM-2000 mismatch that totals more than 128 bytes mismatching for the affected configuration and target combination?

If **YES**, go to **Step 17**.

If **NO**, continue with the next step.

4. Depending on the software release, use Figure 3.11-1 and the failing output message from HSCHK, to:
- Determine the list of affected SM/SM-2000s. This is field “k.”
 - Determine the number of words of mismatched data printed. This is indicated by the DISK fields (“i”, up to 5 words) and CORE fields (“j”, up to 5 words).

```
UPD HSCHK REPORT IN PROGRESS

TARGET          - a
TEXT FILE       - b
HASH SUM FILE   - b

DISK TO CORE HASH SUM MISMATCH:
TEXT VADDR      = d          HASH VADDR      = d
TEXT PADDR      = d          HASH PADDR      = d
TEXT SMPADDR    = d          HASH SMPADDR    = d

CALCULATED HASH VALUES      STORED HASH VALUES
DISK      = e                DISK      = e
INCORE    = e                INCORE    = e

TEXT FILE SECTION - f
HASH FILE SECTION - f

TEXT MISMATCH ADDR RANGE: g - h
[NOTE: HASH SUMS MISMATCH ONLY - NO TEXT MISMATCH]

[DISK:  i          i          i          i          i ]
[CORE:  j          j          j          j          j ]

AFFECTED SM/CMP(S) :
k

[THERE WERE 1 ADDRESS RANGES WHERE MISMATCHES OCCURRED.]
[USE THE 'OUTFILE' OPTION FOR A COMPLETE LIST OF ERRORS]

UPD HSCHK COMPLETED WITH ERRORS
```

Figure 3.11-1 — UPD HSCHK Disk to Core Mismatch Output Message

5. Type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where: a = SM/SM-2000 number selected from affected SM/SM-2000 list.
b = the physical address of the text mismatch as indicated by the TEXT MISMATCH ADDR RANGE start value (“g”) in the UPD HSCHK output message.

c = the disk contents for the physical address as specified in the first DISK field ("i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

6. If the DISK field contains *two or more* hex data words and the DISK data word specified is different from the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where: a = the SM/SM-2000 number.
b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message *plus h'4*.
c = the disk contents for the physical address as specified in the *second* word of the DISK field (*second* "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

7. If the DISK field contains *three or more* hex data words and the DISK data word specified is different from the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where: a = the SM/SM-2000 number.
b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message *plus h'8*.
c = the disk contents for the physical address as specified in the *third* word of the DISK field (*third* "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

8. If the DISK field contains *four or more* hex data words and the DISK data word specified is different from the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where: a = the SM/SM-2000 number.
b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message *plus h'C*.
c = the disk contents for the physical address as specified in the *fourth* word of the DISK field (*fourth* "i") of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

9. If the DISK field contains *five* hex data words and the DISK data word specified is different from the CORE data word specified, then type in message:

LOAD:UT,SM=a,ADDR=H'b,SIZE=4,L=4,VAL=H'c;

Where: a = the SM/SM-2000 number.
b = the physical address of the text mismatch as calculated from the TEXT MISMATCH ADDR RANGE start value ("g") in the UPD HSCHK output message *plus h'10*.
c = the disk contents for the physical address as specified in the *fifth*

word of the DISK field (*fifth "i"*) of the UPD HSCHK output message.

Response: LOAD UT SM a COMPLETED

10. Type in message:

UPD:HSCHK,SM=a,CORE;

Where: a = the SM/SM-2000 number.

Response: UPD HSCHK REPORT IN PROGRESS
DISK TO CORE HASH SUM MISMATCH:
TEXT MISMATCH ADDR RANGE: g - h
[NOTE: HASH SUMS MISMATCH ONLY – NO TEXT MISMATCH]
[DISK: i i i i]
[CORE: j j j j]
AFFECTED SM/CMP(S):
k

11. Was HASH SUMS MISMATCH ONLY – NO TEXT MISMATCH phrase printed in the UPD HSCHK output message?

If **YES**, continue with the next step.

If **NO**, more data to overwrite, repeat from Step 4 with the new mismatch address and data.

12. **Note:** The core image of text has been overwritten to agree with the disk image. The STORED CORE HASH SUM value is now overwritten to agree with the STORED DISK HASH SUM value.

13. Type in message:

LOAD:UT,SM=a,ADDR=H'b,L=2,SIZE=2,VAL=H'c;

Where: a = the SM/SM-2000 number.
b = the address given in the HASH FILE ADDRESS PHYSICAL field of the UPD HSCHK output message.
c = the hash value given in the STORED DISK HASH SUM field of the UPD HSCHK REPORT output message.

Response: LOAD UT SM a COMPLETED

14. Type in message:

UPD:HSCHK,SM=a,CORE;

Where: a = the SM/SM-2000 number.
b = the affected TARGET.

Response: UPD HSCHK REPORT IN PROGRESS
DISK TO CORE HASH SUM MISMATCH:
TEXT MISMATCH ADDR RANGE: g - h
UPD HSCHK COMPLETED WITH ERRORS
OR
UPD HSCHK COMPLETED

15. **Note:** Steps 13 and 14 updated the stored hash value for a single 2-kilobyte block of text. If there was only one mismatch range then UPD HSCHK should complete

- without errors. If errors occur, repeat Steps 13 and 14 to update other mismatch ranges in the same SM/SM-2000.
- Did UPD HSCHK complete without errors?
- If **YES**, continue with the next step.
- If **NO**, repeat from Step 4 with the new TEXT MISMATCH ADDR RANGE value.
16. Have all affected SM/SM-2000s in the original failing HSCHK output message been corrected?
- If **YES**, continue with Step 27.
- If **NO**, repeat from Step 4 with the next affected SM/SM-2000 number.
17. **Note:** At this point, it has been decided to correct the core mismatch using a repump of the core image from disk.
- Is the mismatch for the CMPs?
- If **YES**, continue with the next step.
- If **NO**, continue with Step 24.
18. Repump the standby CMP. Enter Poke 923 on Page 1851, or type in message:
RST:CMP=a-0,STBY;
- Where: a = MSGS side number of Standby CMP.
- Response: On Page 1851, **MATE STAT** display becomes **POSTINIT**.
19. Soft switch CMPs. Type in message:
SW:CMP=0-0;
- Response: **SW CMP 0-0 COMPLETED**
20. Repump the other CMP. Enter Poke 923 on Page 1851, or type in message:
RST:CMP=b-0,STBY;
- Where: b = MSGS side number (0/1) of the other CMP (mate of "a").
- Response: **MATE STAT** display becomes **POSTINIT**.
21. Type in message:
UPD:HSCHK,TARGET=CMP,CORE
- Response: **UPD HSCHK COMPLETED**
22. Type in message:
UPD:HSCHK,TARGET=MSGH,CORE
- Response: **UPD HSCHK COMPLETVED**
23. Does UPD HSCHK report any errors for Steps 21 or 22?
- If **YES**, seek technical assistance.
- If **NO**, continue with Step 27.
24. **Note:** At this point, the core mismatch involves SM/SM-2000s or peripheral targets in an SM/SM-2000 configuration and it has been decided to clear the problem with a repump of the affected SM/SM-2000s. Refer to 235-105-250,

- System Recovery Manual*, and use the off-line pump procedure to repump the affected SM/SM-2000 or SM/SM-2000s during a low traffic period.
25. After the affected SM/SM-2000s have been repumped, type in message:
UPD:HSCHK,SM=a,CORE;
Where: a = the SM/SM-2000 number.
Response: UPD HSCHK COMPLETED
26. Does UPD HSCHK report any errors?
If **YES**, seek technical assistance.
If **NO**, continue with the next step.
27. **Note:** At this point, the original problem has been corrected. A HSCHK with the ALL option is performed to update the HSCHK status on the Miscellaneous Status page (116).
Type in message:
UPD:HSCHK,ALL;
Response: UPD HSCHK COMPLETED
28. Does UPD HSCHK report any errors?
If **YES**, seek technical assistance.
If **NO**, continue with the next step.
29. **STOP, YOU HAVE COMPLETED THIS PROCEDURE.**

3.12 REPLACING AM CIRCUIT PACKS

OVERVIEW

This is a general procedure for replacing AM circuit packs. If you need to replace any of the following, refer to the referenced procedure.

Note: Before starting this procedure, read the general requirements for handling and care of circuit packs outlined in 235-105-110, *System Maintenance Requirements and Tools*.

- To replace the Scanner and Signal Distributor (SCSD) circuit pack, refer to Procedure 3.13.
- To replace the SCSI Disk Unit Package (DUP), refer to Procedure 3.14.
- To replace the SCSI DUP sub-units, refer to Procedure 3.15.
- To replace the DAT drive, refer to Procedure 3.16.
- To replace the SCSI MHD UN375 circuit pack, refer to Procedure 3.17.

PROCEDURE

1. Make sure the circuit pack is out of service (OOS) by removing the unit or sub-unit from service.

Caution: *Be sure you understand the impact of removing the unit or sub-unit from service.*

Check the section in Procedure 3.18 that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are OOS.

2. Any unit in the AM must be powered down before a circuit pack or cable can be replaced in that unit. Perform the steps in Procedure 3.18 that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are powered down.
3. Replace the circuit pack and/or cabling.
4. For units or sub-units that required powering down, follow the corresponding steps in Procedure 3.18 to power the unit or sub-unit up.
5. Follow the corresponding steps in Procedure 3.18 to restore the unit(s) or sub-unit(s) to service.

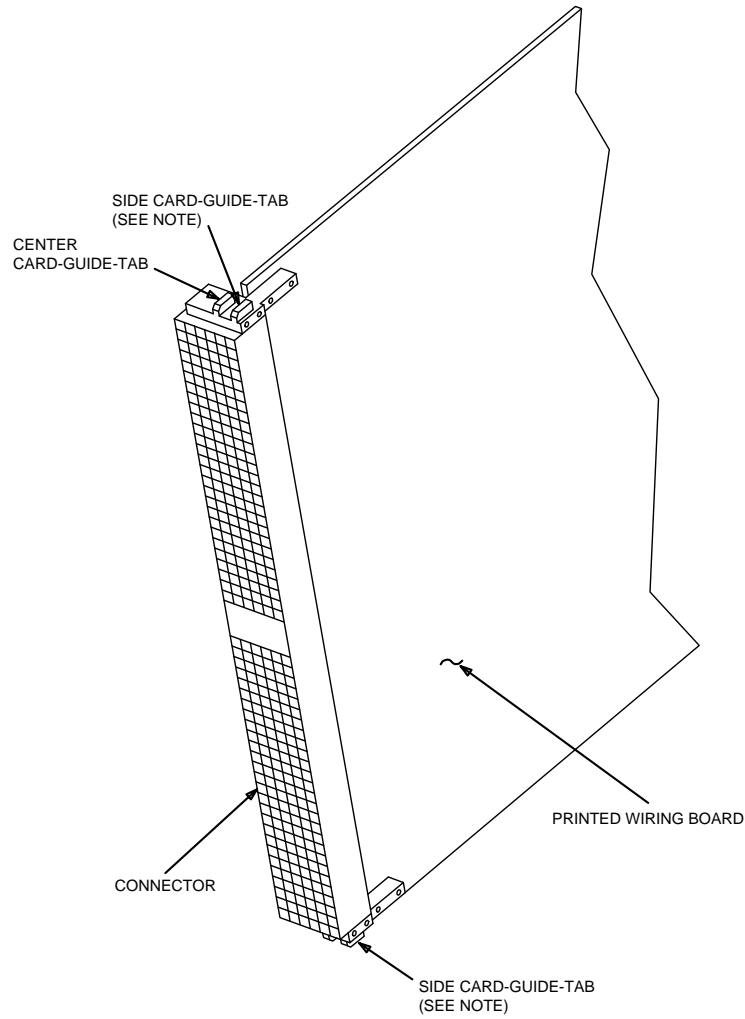
3.13 REPLACE SCANNER AND SIGNAL DISTRIBUTOR UN33B CIRCUIT PACK

OVERVIEW

This procedure is used to replace the Scanner and Signal Distributor (SCSD) UN33B circuit pack.

PROCEDURE

1. If the Input/Output Processor (IOP) is not already removed from service, at the MCC terminal, type:
RMV:IOP=a;
Where: a = member number of IOP.
2. On the **TN6** at location 29-162, press the **OFF** switch.
3. Remove the **UN33B** circuit pack from the shelf.
4. Does the replacement **UN33B** have two card guide tabs on the top and bottom of the connector (Figure 3.13-1) that do not allow it to be inserted into the apparatus housing?
If **YES**, continue with the next step.
If **NO**, go to Step 6.
5. Remove the **SIDE** card guide tabs (both top and bottom) by following the instructions provided with Figure 3.13-1, using a small fine cut mill file or equivalent.
Caution: Do not allow filings to enter the connector.
6. Install the **UN33B** replacement circuit pack.
7. On the **TN6** at location 29-162, press the **ON** switch.
8. At the MCC terminal, type:
RST:IOP=a;
Where: a = member number of IOP.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**



NOTE: Remove the side card guide tabs (both top and bottom) on older versions of circuit packs before inserting into a new apparatus housing equipped with the reduced-cost card guides. The side card guide tabs may be removed by filing the tabs flush with the top of the connector.

tpa 816255/01

Figure 3.13-1 — Replacing the UN33B Circuit Pack

3.14 REPLACE SCSI DISK UNIT PACKAGE

OVERVIEW

This procedure is used to remove/install a Small Computer System Interface (SCSI) Disk Unit Package (DUP).

Caution 1: *Wear a properly grounded wrist strap throughout this procedure.*

Caution 2: *When replacing a DUP, an incorrect ID SELECTOR microswitch setting may cause disk access problems.*

PROCEDURE

1. Continue as follows:
 - (a) To REMOVE the SCSI DUP, continue with the next step.
 - (b) To INSTALL the SCSI DUP, go to Step 14.
2. Observing **Caution 2** in the OVERVIEW, at the front of the DUP, record and save the setting of the DUP "ID SELECTOR" microswitch.
3. Refer to Table 3.14-1 and determine the SCSI bus number for the location of the DUP being removed.

Table 3.14-1 — DUP Bus Assignments

NEW SYSTEM CABINET		GROWTH SYSTEM CABINET		CONVERSION CABINET	
TAPE DRIVE KS-23113		DFC 2	DFC 3	DFC 0	DFC 1
		COOLING UNIT		COOLING UNIT	
Upper left 4 DUPs on SCSI Bus 2 DFC 0	Upper right 4 DUPs on SCSI Bus 3 DFC 1	Upper left 4 DUPs on SCSI Bus 6 DFC 2	Upper right 4 DUPs on SCSI Bus 7 DFC 3	Upper left 4 DUPs on SCSI Bus 2 DFC 0	Upper right 4 DUPs on SCSI Bus 3 DFC 1
Lower left 4 DUPs on SCSI Bus 0 DFC 0	Lower right 4 DUPs on SCSI Bus 1 DFC 1	Lower left 4 DUPs on SCSI Bus 4 DFC 2	Lower right 4 DUPs on SCSI Bus 5 DFC 3	Lower left 4 DUPs on SCSI Bus 0 DFC 0	Lower right 4 DUPs on SCSI Bus 1 DFC 1

4. At the terminal, enter the **RMV:SBUS=a** input message (where a = SCSI bus number) and wait for the **RMV COMPLETE** output message.

Note: All DUPs on that bus are be removed from service.
5. At the front of the DUP, press the "OFF" switch. Allow 60 seconds for the disk to spin down.
6. At the Power Distribution Unit (PDU) at the top of the cabinet, remove the indicator fuse and then the load fuse for this DUP. Refer to Figure 3.8-1 for fuse locations.

7. Referring to Figure 3.14-1, at the rear of the DUP, remove all cables from the following connectors:
- SCSI Bus
 - 48 V DC
 - SCAN/SD.

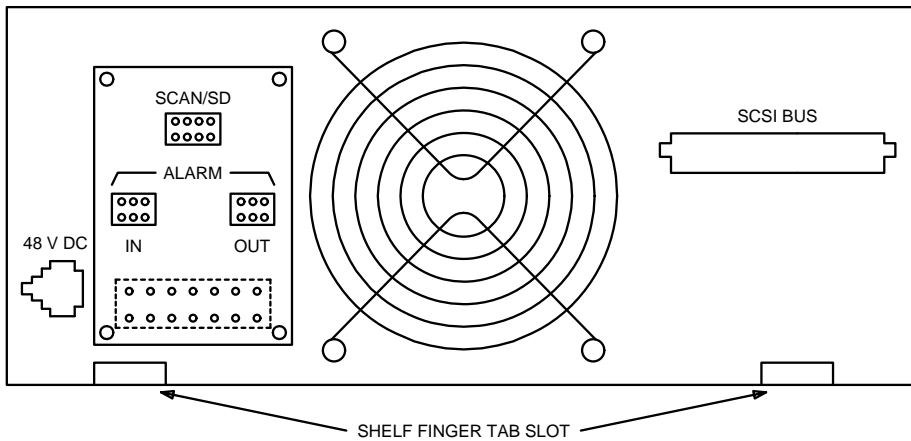


Figure 3.14-1 — Disk Unit Package - Rear View

8. Referring to Figure 3.14-2, at the front of the DUP, remove three screws that hold the retaining bracket to the shelf.
9. Remove the retaining bracket from the finger slots in both DUPs on this shelf.
10. From the rear of the cabinet, slide the DUP forward to clear the finger tabs from the shelf at the rear of the DUP.
11. At the front of the cabinet, remove the DUP from the shelf.
12. Section 3.15 contains the procedure to change the disk module in the DUP and if the disk module in the DUP unit just removed from the SCSI disk cabinet needs to be replaced.
13. **STOP. YOU HAVE COMPLETED THE REMOVAL PORTION OF THIS PROCEDURE.**

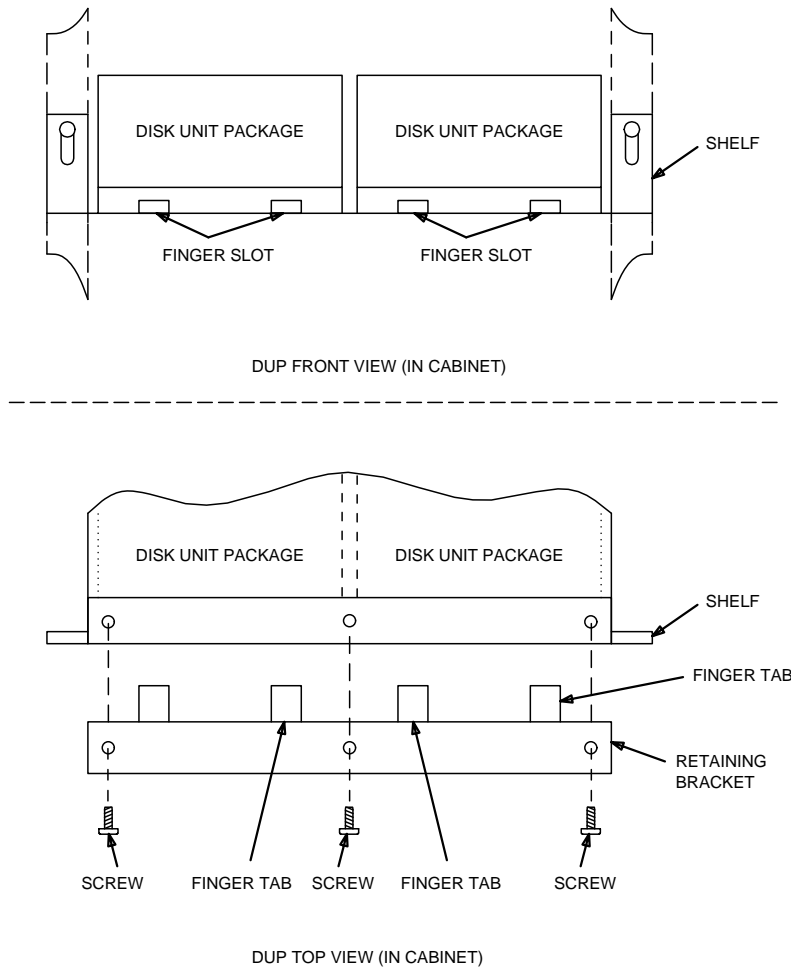


Figure 3.14-2 — Disk Unit Package Shelf Arrangement

14. At SCSI disk cabinet, place the DUP on the shelf and slide to the rear to engage the shelf tabs.
15. Referring to Figure 3.14-2, at the front of the cabinet, engage the retaining bracket tabs in both DUPs and install three screws.
16. Referring to Figure 3.14-1, at the rear of the DUP, install all cables to connectors as follows:
 - SCAN/SD
 - 48 V DC
 - SCSI Bus.
17. On the DUP front panel, set the “RST/ROS” switch to the “ROS” position.
18. At the PDU, insert the load fuse and then the indicator fuse. Refer to Figure 3.8-1 for fuse locations.
19. **Caution: When replacing a DUP, an incorrect ID SELECTOR microswitch setting may cause disk access problems.**

- Set the Moving Head Disk (MHD) ID SELECTOR microswitch to the same number recorded for the DUP removed from this location. If that number is unknown or in doubt, see Table 3.14-2.
20. At the DUP, press the "ON" switch and wait 60 seconds for the disk to spin up to speed.
 21. Referring to Table 3.14-2, find the bus number for the DUP being replaced. Restore the SCSI bus to service by entering the **RST:SBUS=a,CONT** input command, where a = SCSI bus number.
 22. Enter the following to determine the capacity of the new disk drive:
OP:MHD=x:INFO where x is the MHD number.
Response: The output of this message includes "Equipage Size." The values under DRIVE and UCB must match.
 23. Do the values obtained in Step 22 match?
If **YES**, then go to Step 29.
If **NO**, then continue with the next step.
 24. Enter the following to remove the controlling SBUS from service: **RMV:SBUS=x** where x = the SBUS restored in Step 21.
 25. Enter the following to update the Equipment Configuration Data base (ECD) for the new MHD: **EXC:ENVIR:UPROC, FN="/no5text/bkup/chgmhdecd", ARGs=x-y**, where x = MHD number and y = the capacity of x (332, 600, or 1000).
 26. Enter the following to determine the capacity of the new disk drive:
OP:MHD=x:INFO where x is the MHD number.
Response: The output of this message includes "Equipage Size." The values under DRIVE and UCB must match.
 27. Verify that the values under DRIVE and UCB are identical. If they are *not* identical, **seek technical assistance**.
 28. Referring to Table 3.14-2, find the bus number for the DUP being replaced. Restore the SCSI bus to service by entering the **RST:SBUS=a,CONT** input command, where a = SCSI bus number.
 29. Enter the following input command for all MHDs (except the installing MHD):
RST:MHD=a where a = MHD equipped under SBUS restored in the previous step. Wait for **RST COMPLETED** message.
 30. Enter the input command **INIT:MHD=x:VFY** where x = the installing MHD, and wait for **INIT MHD x COMPLETED** output message.
 31. Restore the installing MHD to service by setting the "ROS/RST" switch to the "RST" position at the SCSI unit's power switch.
 32. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 3.14-2 — MHD Bus and ID SELECTOR Assignments

NEW SCSI SYSTEM OR CONVERSION SYSTEM				GROWTH SCSI SYSTEM			
DFC	SCSI BUS	MHD ^a	ID SELECTOR	DFC	SCSI BUS	MHD ^a	ID SELECTOR
0	0	0	0	2	4	16	0
0	0	4	1	2	4	20	1
0	0	8	2	2	4	24	2
0	0	14	3	2	4	28	3
0	2	2	0	2	6	18	0
0	2	6	1	2	6	22	1
0	2	10	2	2	6	26	2
0	2	12	3	2	6	30	3
1	1	1	0	3	5	17	0
1	1	5	1	3	5	21	1
1	1	9	2	3	5	25	2
1	1	15	3	3	5	29	3
1	3	3	0	3	7	19	0
1	3	7	1	3	7	23	1
1	3	11	2	3	7	27	2
1	3	13	3	3	7	31	3
Note(s):							
a. Application dependent.							

3.15 REPLACE SCSI DISK UNIT PACKAGE SUBUNITS

OVERVIEW

This procedure is used to replace Small Computer System Interface (SCSI) Disk Unit Package (DUP) Subunits.

Caution 1: *Wear a properly grounded wrist strap throughout this procedure. Electrostatic Discharge may damage the disk module.*

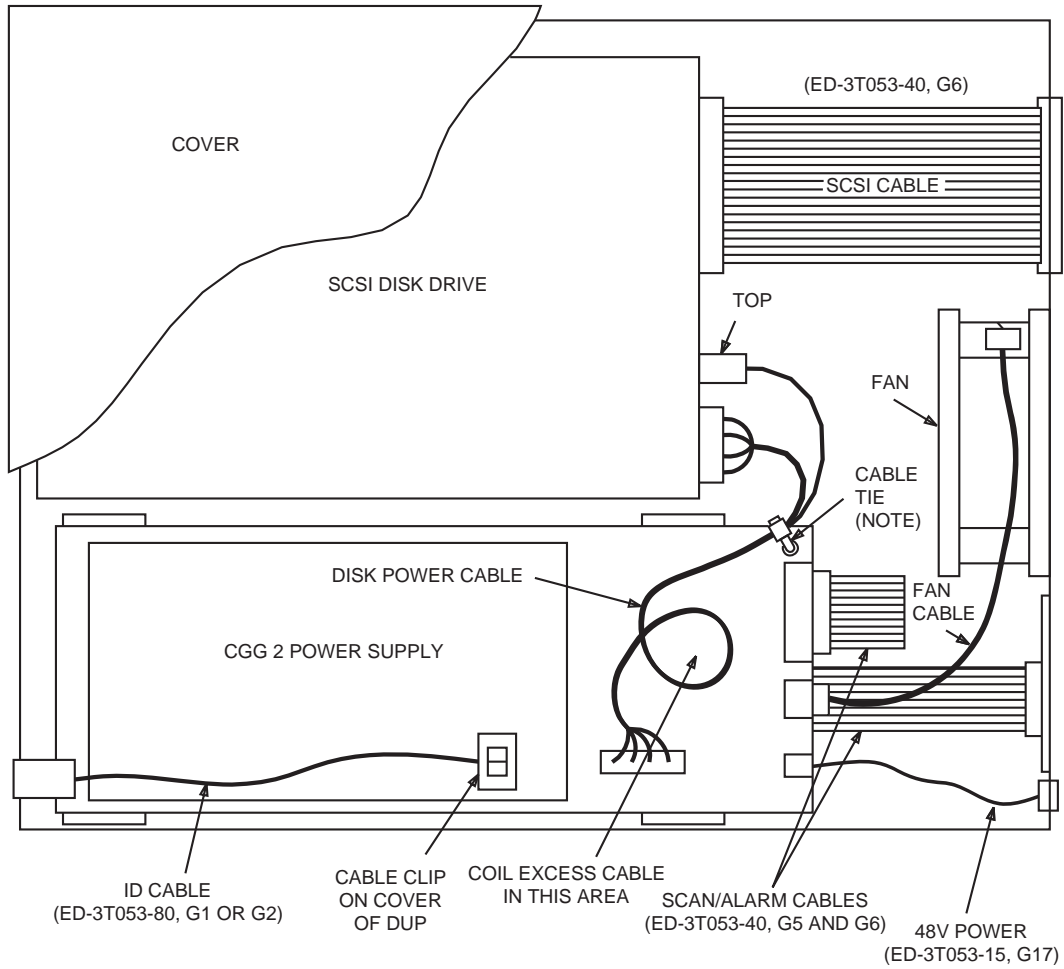
Caution 2: *Touching exposed circuit elements may damage circuits.*

PROCEDURE

1. Remove two screws from each side and one screw from the top (rear center) of DUP.
2. Slide cover assembly forward to clear switches and gently lift from DUP chassis. There is a cable tie restraining the ID cable to the CGG2 power supply board when a 5 1/4-inch SCSI disk is present. This cable tie restrains the ID cable and power cable from being damaged when removing the cover and keeps them away from the fan (See Figure 3.15-1). If the cover will be completely removed from the DUP, the cable tie must be cut. When a 3 1/2-inch SCSI disk is present, the ID selector cable may be unplugged from the mounted disk module assembly (See Figure 3.15-2).
3. To replace:
 - (a) Disk module, continue with the next step.
 - (b) Power Supply (CGG2), go to Step 11.
 - (c) Power Switch (CGG1), go to Step 16.
 - (d) Fan, go to Step 27.
4. To replace the disk module, disconnect the cabling as follows from the rear of the disk module:
 - SCSI bus cable ED-3T053-40, G6
 - Disk power cable from DC power
 - ID selector switch cable ED-3T053-80, G1 or G2.

The following figures are provided as a guide to aid in disconnecting the cable:

- Figure 3.15-3, KS23483,L13 Disk Drive Cable Connection – Rear View
- Figure 3.15-4, KS23483,L21 Disk Drive Cable Connection – Rear View
- Figure 3.15-5, KS23841,L15 Disk Drive Cable Connection – Rear View
- Figure 3.15-6, KS23841,L17 Disk Drive Cable Connection – Rear View
- Figure 3.15-7, KS23908,L20 Disk Drive Cable Connection – Front and Rear View
- Figure 3.15-8, KS23908,L21 Disk Drive Cable and Jumper Connections – Front and Rear View
- Figure 3.15-9, KS23908,L30 Disk Drive Cable and Jumper Connections – Front and Rear View.



NOTE: Disk Power Cable and ID Cable must be restrained using a cable tie through a hole on CGG 2 Power Supply board to keep cables away from the front of the fan and avoid cable damage to the ID Cable when removing the cover. Internal cable connections may vary depending on the SCSI disk drive.

Figure 3.15-1 — Top View of DUP (Showing Internal Cabling)

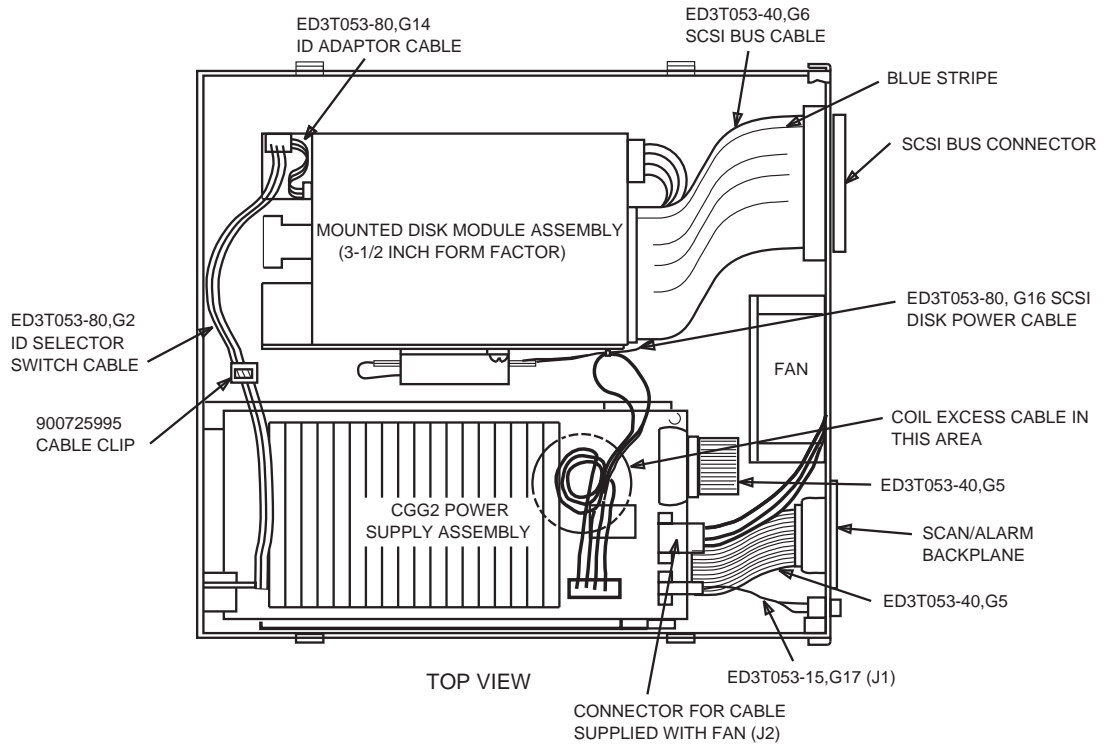
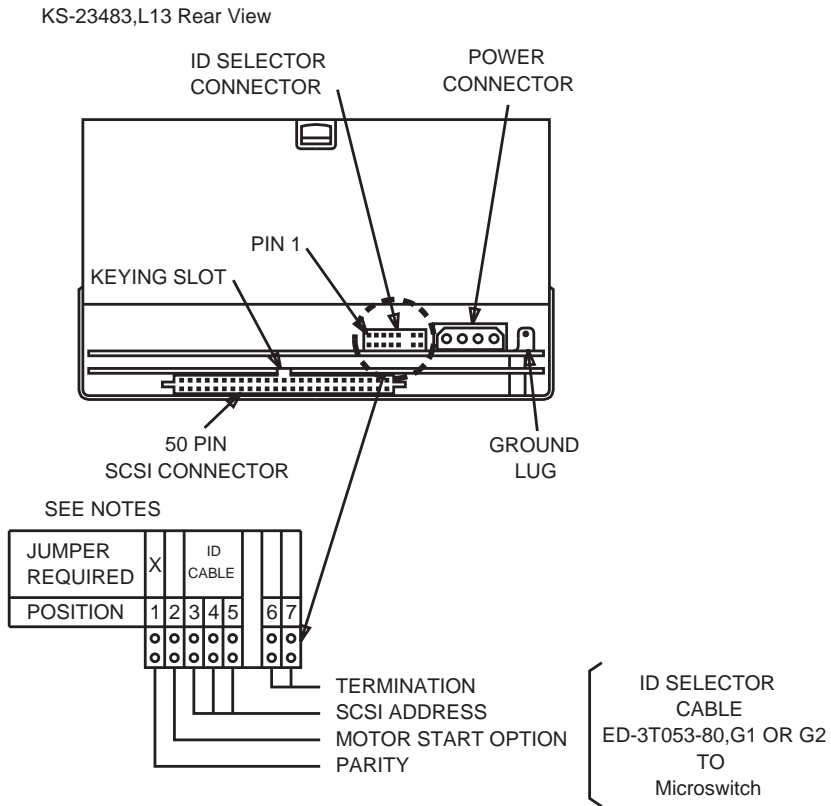


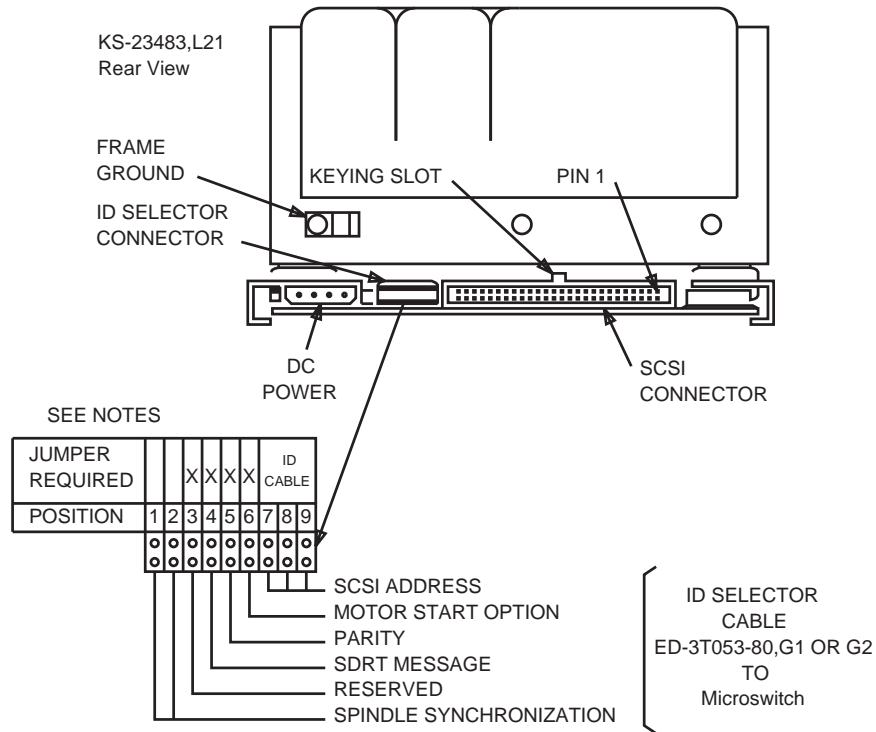
Figure 3.15-2 — Top View of DUP Equipped with a 3 1/2-inch SCSI Disk (KS-23908,L20) Showing Internal Cabling



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

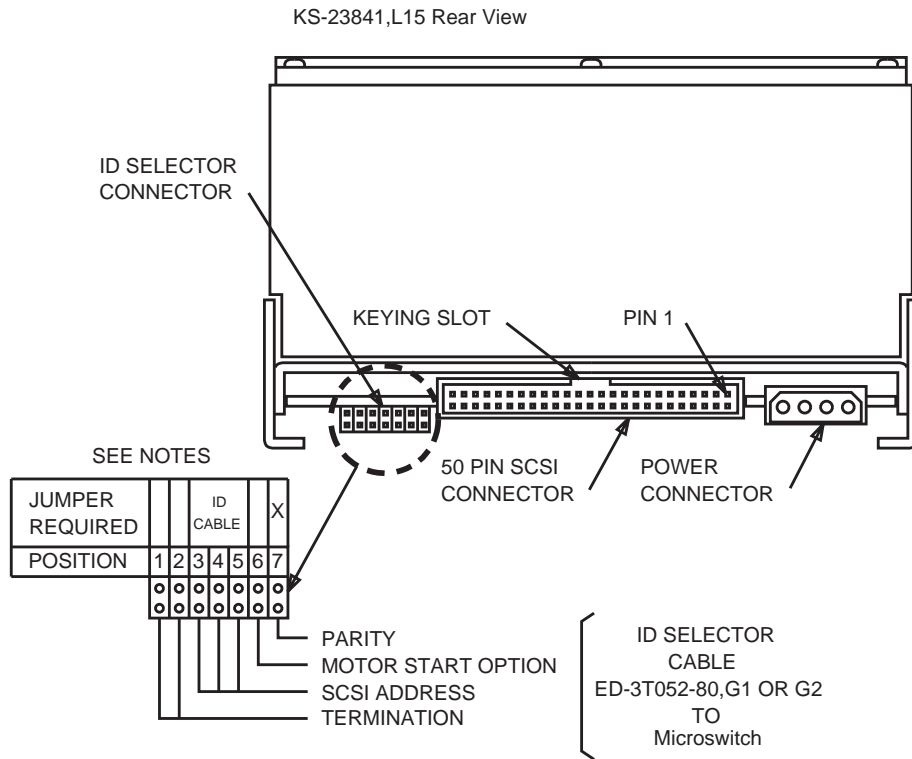
Figure 3.15-3 — KS23483,L13 Disk Drive Cable Connection – Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

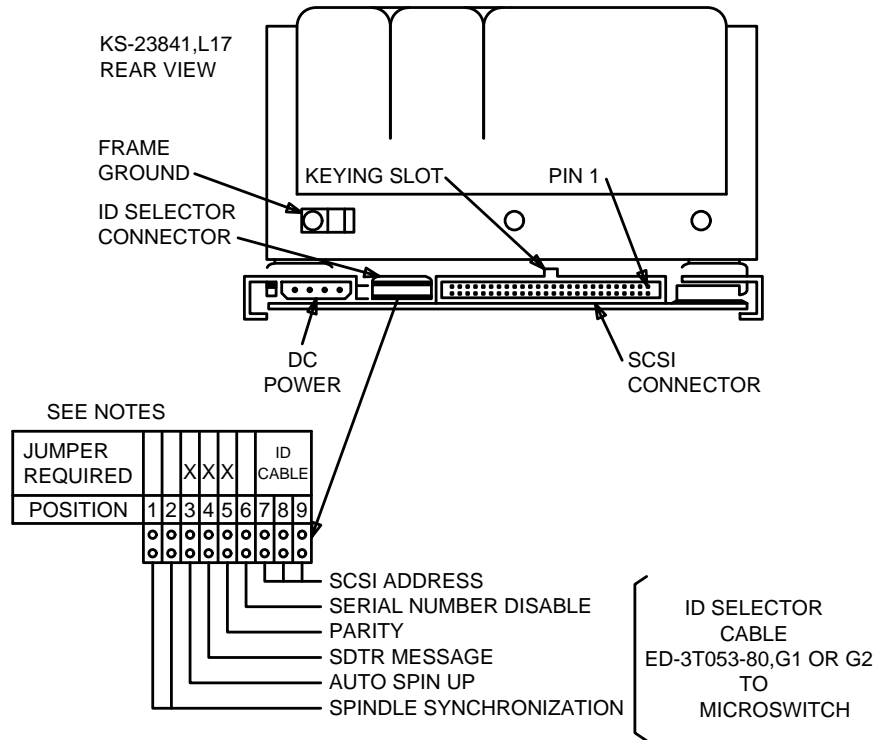
Figure 3.15-4 — KS23483,L21 Disk Drive Cable Connection – Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

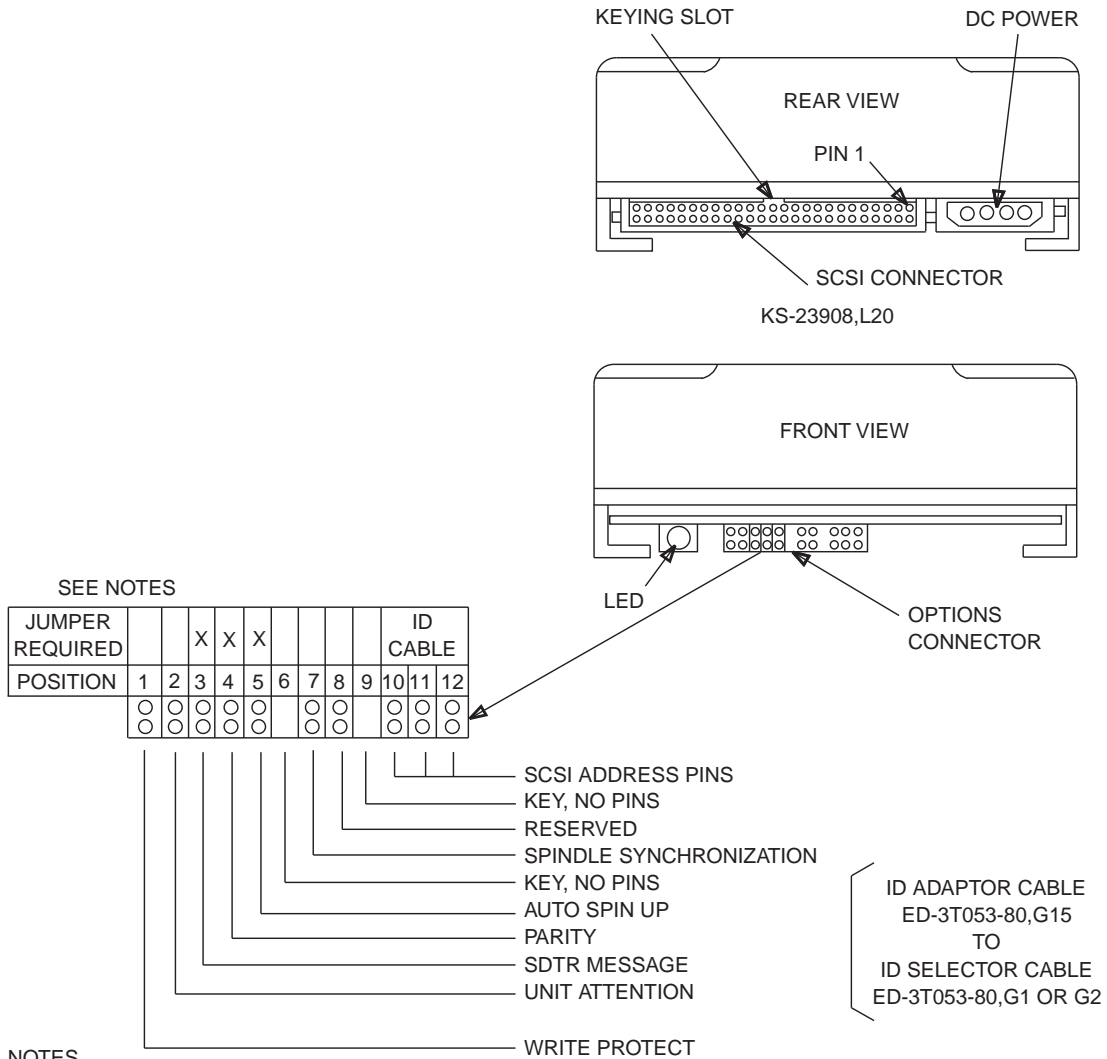
Figure 3.15-5 — KS23841,L15 Disk Drive Cable Connection – Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID select cable in the indicated position. Observe proper orientation of the selector cable plug.

Figure 3.15-6 — KS23841,L17 Disk Drive Cable Connection – Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID Adaptor cable in the indicated position.
 Observe proper orientation of the cable plug.

Figure 3.15-7 — KS23908,L20 Disk Drive Cable Connection – Front and Rear View

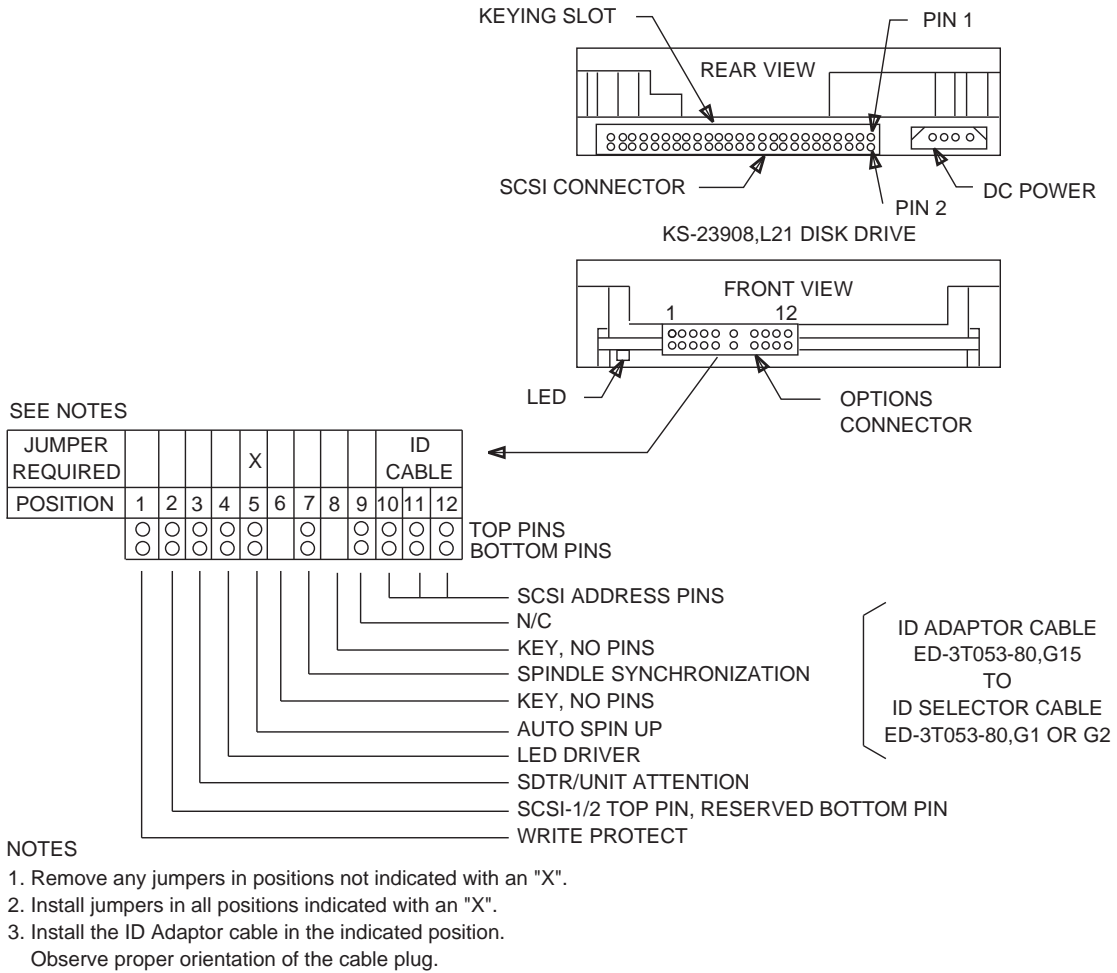
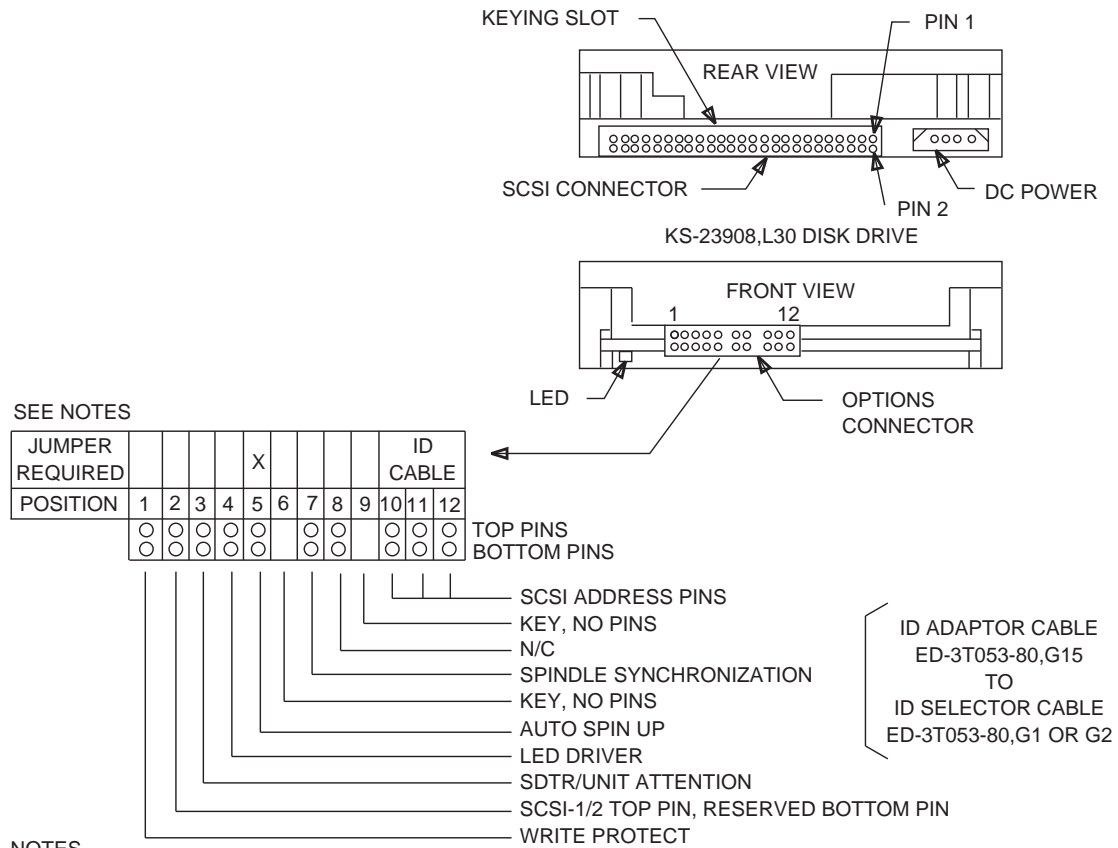


Figure 3.15-8 — KS23908, L21 Disk Drive Cable and Jumper Connections – Front and Rear View



NOTES

1. Remove any jumpers in positions not indicated with an "X".
2. Install jumpers in all positions indicated with an "X".
3. Install the ID Adaptor cable in the indicated position.
 Observe proper orientation of the cable plug.

Figure 3.15-9 — KS23908,L30 Disk Drive Cable and Jumper Connections – Front and Rear View

5. Referring to Figure 3.15-10, from underneath the DUP chassis, release the locking tab and push the disk module mounting assembly back (to the rear of the DUP) to disengage the mounting tabs. Remove the Disk Module with the mounting assembly.
6. Making sure that the disk module does not drop, remove two screws from each side of the mounting assembly, then remove the 5 1/4-inch disk module.

Note: When replacing a 3 1/2-inch disk module, do not remove disk from the disk module mounting assembly. The entire mounted disk assembly is replaced.

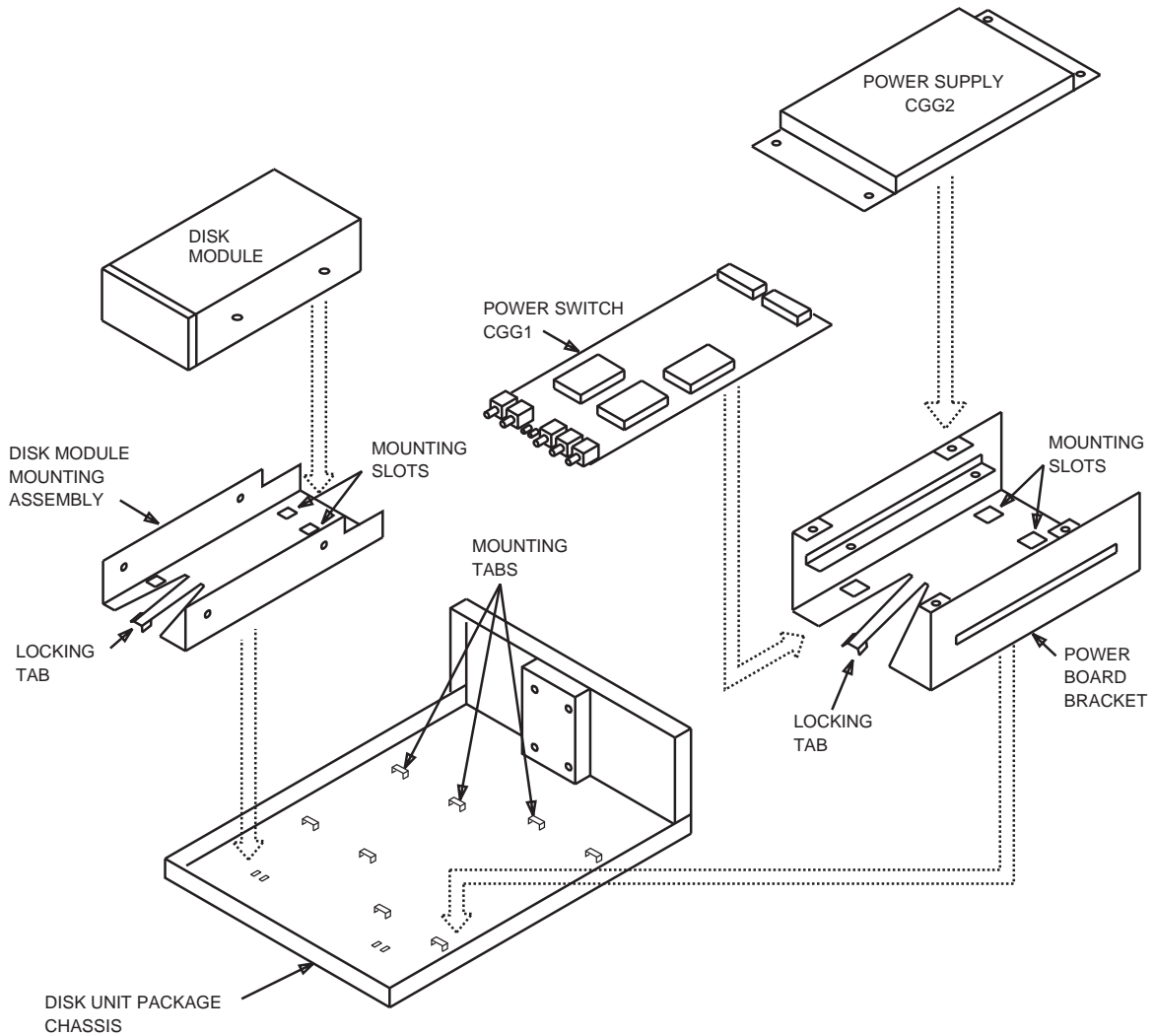


Figure 3.15-10 — Disk Unit Package – Exploded View

7. Install the new 5 1/4-inch disk module into the disk module mounting assembly and replace the two screws on each side. For a 3 1/2-inch disk module, replace the entire mounted disk module assembly.
8. Slide the disk module mounting assembly onto the DUP chassis so the tabs are engaged. Ensure that the locking tab is also engaged.
9. Connect the cabling as follows at the rear of the disk module:
 - SCSI bus cable ED-3T053-40, G6
 - Disk power cable to DC power.

The following figures are provided as a guide to aid in connecting the cable:

- Figure 3.15-3, KS23483,L13 Disk Drive Cable Connection – Rear View
- Figure 3.15-4, KS23483,L21 Disk Drive Cable Connection – Rear View
- Figure 3.15-5, KS23841,L15 Disk Drive Cable Connection – Rear View

- Figure 3.15-6, KS23841,L17 Disk Drive Cable Connection – Rear View
 - Figure 3.15-7, KS23908,L20 Disk Drive Cable Connection – Front and Rear View
 - Figure 3.15-8, KS23908,L21 Disk Drive Cable and Jumper Connections – Front and Rear View
 - Figure 3.15-9, KS23908,L30 Disk Drive Cable and Jumper Connections – Front and Rear View.
10. Go to Step 31 and install the DUP cover.
 11. To replace the Power Supply (CGG2), remove the following cables from connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
 12. Referring to Figure 3.15-10, remove the four screws holding the Power Supply (CGG2) to the power board bracket.
 13. Place the new Power Supply on the power board bracket and replace the four screws.
 14. Install the following cables to the connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
 15. Go to Step 31 and install DUP cover.
 16. To replace the Power Switch (CGG1), at the Power Supply, remove the following cables from connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
 17. At the Power Switch, remove the scan/alarm cable ED-3T053-40, G5 and G6 from the Power Switch connector.
 18. Referring to Figure 3.15-10, from underneath the DUP chassis, release the locking tab and push the power board bracket back (to the rear of the DUP) to disengage the mounting tabs. Remove the power board bracket from the DUP chassis.
 19. Remove the four screws holding the Power Supply (CGG2) to the power board bracket and remove the Power Supply.

20. Remove the four screws holding the Power Switch (CGG1) to the power board bracket and slide the Power Switch out of the bracket.
21. Slide the replacement Power Switch (CGG1) into the power board bracket and secure with four screws.
22. Mount the Power Supply (CGG2) on the power board bracket and secure with four screws.
23. Slide the power board bracket with both units mounted onto the chassis to engage the mounting tabs. Ensure that the locking tab is also engaged.
24. At the Power Switch, install the scan/alarm cable ED-3T053-40, G5 and G6 to the Power Switch connector.
25. At the Power Supply (CGG2), install the following cables to the connectors on the Power Supply:
 - Cable ED-3T053-40, G5 to Power Switch
 - Disk power cable to disk module
 - Fan power cable to fan
 - -48 V input power cable ED-3T053-15, G17.
26. Go to Step 31 and install the DUP cover.
27. To replace the fan, at the Power Supply (CGG2), remove the fan power cable at J2.
28. At the rear of the DUP chassis, remove the four screws and finger guard. Remove the fan from inside the chassis.
29. Install the new fan and replace the finger guard with four screws.
30. Install the fan power cable to J2 on the Power Supply (CGG2).
31. To install the DUP cover, hold the cover over the chassis and connect the ID SELECTOR cable to the disk module. When a 5 1/4-inch SCSI disk module is present, the ID cable must be restrained to the CGG2 power supply board using a small cable tie, keeping the cable away from the fan. (See Figures 3.15-1 and 3.15-2.) Route the fan cable away from the chassis screw tab and fan to avoid pinching. Place the cover over the DUP chassis.

The following figures are provided as a guide to aid in connecting the ID SELECTOR cable:

- Figure 3.15-3, KS23483,L13 Disk Drive Cable Connection – Rear View
- Figure 3.15-4, KS23483,L21 Disk Drive Cable Connection – Rear View
- Figure 3.15-5, KS23841,L15 Disk Drive Cable Connection – Rear View
- Figure 3.15-6, KS23841,L17 Disk Drive Cable Connection – Rear View
- Figure 3.15-7, KS23908,L20 Disk Drive Cable Connection – Front and Rear View
- Figure 3.15-8, KS23908,L21 Disk Drive Cable and Jumper Connections – Front and Rear View

- Figure [3.15-9](#), KS23908,L30 Disk Drive Cable and Jumper Connections – Front and Rear View.
32. Replace the two screws on each side and one screw from top (rear center) of the DUP.
 33. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.16 REPLACE DAT DRIVE

OVERVIEW

Caution: *This procedure cannot be used to replace a UN376, UN376B, UN376C, or UN376E DAT drive circuit pack with a UN376F DAT drive circuit pack. To replace a UN376, UN376B, UN376C, or UN376E with a UN376F, refer to Procedure 3.25.*

This procedure is used to replace a UN376 series Digital Audio Tape (DAT) drive circuit pack . The UN376 series DAT drive circuit pack should be replaced if it has been identified as defective during a diagnostic test or if persistent read/write failures occur.

This procedure supports UN376 series Digital Audio Tape (DAT) drive circuit pack replacements shown in Table 3.16-1 :

Table 3.16-1 — UN376 Series DAT Drive Circuit Pack Replacements

Defective Circuit Pack	Replacement Circuit Pack
UN376	UN376, UN376B, UN376C, or UN376E
UN376B	UN376, UN376B, UN376C, or UN376E
UN376C	UN376, UN376B, UN376C, or UN376E
UN376E	UN376, UN376B, UN376C, or UN376E
UN376F	UN376F

The UN376 series DAT drive circuit pack is connected to a Small Computer System Interface (SCSI) bus. The SCSI bus (SBUS) must be removed from service before removing or inserting the UN376 series DAT drive circuit pack. Removing the SBUS will remove all of the moving head disk (MHD) and MT units that are controlled by the SBUS.

UN376 Series DAT Drive Circuit Pack Identification and Option Switch Settings

The DAT drive format, Lucent product specification, and DAT drive manufacturer and model for each UN376 series DAT drive circuit pack supported on the 3B21D computer are identified in Table 3.16-2. Table 3.16-3 shows the UN376 series DAT drive circuit pack attributes including DAT drive firmware revisions displayed by the OP:MT:INFO command.

Table 3.16-2 — UN376 Circuit Packs

Circuit Pack Code	Product Specification	Comcodes: Circuit Pack and Drive	DAT Drive Format	DAT Drive Model
UN376, UN376B	NCR006-3503341	107053498, 107065344; Drive = NA for both	DDS-1	HP C1534
UN376B	KS-24367,L1	107065344, 407771260	DDS-2	HP C1539
UN376C	NCR006-3300608	107748410, 407545243	DDS-2	HP C1533
UN376C	KS-24367,L1	107748410, 407771260	DDS-2	HP C1539
UN376E	KS-24367,L1	108003005, 407771260	DDS-2	HP C1539
UN376E	KS-24650,L1	108003005, 408661379	DDS-3	HP C1537
UN376F	KS-24773,L1	109161141, 702047440	DAT72	HP C7438A

Table 3.16-3 — UN376 DAT Drive Identification

Circuit Pack Code	DAT Drive Format	Product Identification	Firmware Revisions
UN376, UN376B	DDS-1	NCR006-3503341	9 09, 1109
UN376B	DDS-2	GIS006-3300608	A612, A703, A708, A801, A907
UN376C	DDS-2	GIS006-3300608 (Product Spec.: NCR006-3300608)	9503, 9608
UN376C	DDS-2	GIS006-3300608 (Product Spec.: KS-24367,L1)	A612, A703, A708, A801, A907
UN376E	DDS-2	GIS006-3300608	A612, A703, A708, A801, A907
UN376E	DDS-3	GIS006-3300608	L005
UN376F	DAT72	C7438A	ZP5A, ZP76

UN376 Circuit Pack Option Switch Settings

There is a set of configuration option switches on the underside of the UN376, UN376B, UN376C, and UN376E DAT drive. The UN376F DAT drive does not provide configuration option switches. The option switches are used to configure data compression and media recognition functionality for the DAT drive.

The option switch settings are dependent on the type of UN376, UN376B, UN376C, and UN376E DAT drive. After identifying the DAT drive as described in the "UN376 Series DAT Drive Circuit Pack Identification" section of this chapter, use the following tables to determine the correct switch settings.

Refer to Table 3.16-4 for UN376 or UN376B DDS-1 DAT drive option switch settings.

Table 3.16-4 — DDS-1 DAT Drive (UN376 or UN376B)

Switch	Setting
1	OFF
2	OFF
3	ON
4	ON
5	ON
6	ON
7	OFF
8	OFF

Refer to Table 3.16-5 for UN376B, UN376C or UN376E DDS-2 DAT drive option switch settings.

Table 3.16-5 — DDS-2 DAT Drive (UN376B, UN376C or UN376E)

Switch	Setting
1	OFF
2	ON
3	ON
4	ON
5	ON
6	ON
7	ON
8	ON

Table 3.16-6 provides UN376E DDS-3 DAT drive option switch settings:

Table 3.16-6 — DDS-3 DAT Drive (UN376E)

Switch	Setting
1	OFF
2	ON
3	ON
4	OFF
5	ON
6	OFF
7	ON
8	ON

PROCEDURE

1. At the Master Control Center (MCC), to obtain the attributes and identify the SBUS controlling the defective MT), type and enter:

OP:MT=a:INFO;

Where: a = Tape drive number (for example, 0).

Response: The output message lists the SBUS with the corresponding configured DAT drive, and, if accessible, the DAT drive attributes. Refer to Table 3.16-2 and Table 3.16-3 in this procedure.

2. Using Tables 3.16-1, 3.16-2, and 3.16-3, determine if a valid replacement UN376 series DAT drive circuit pack is available. If a valid replacement is not available, stop and seek technical support. If a valid replacement is available, continue with the next step.
3. **Note:** Each MHD and MT controlled by the SBUS will also be removed from service in this Step.

To remove the SBUS identified in Step 1 from service, enter:

RMV:SBUS=a;

Where: a = SBUS unit number (for example, 0).

Response: RMV SBUS a COMPLETED message is output.

4. Remove the DAT drive from the 3B21D frame by pulling out the latch on the faulty UN376 series DAT drive circuit pack.
5. Set the device ID toggle switch of the replacement UN376 series DAT drive circuit pack to **the same setting as the original pack**. For an example, refer to Figure 3.16-1.

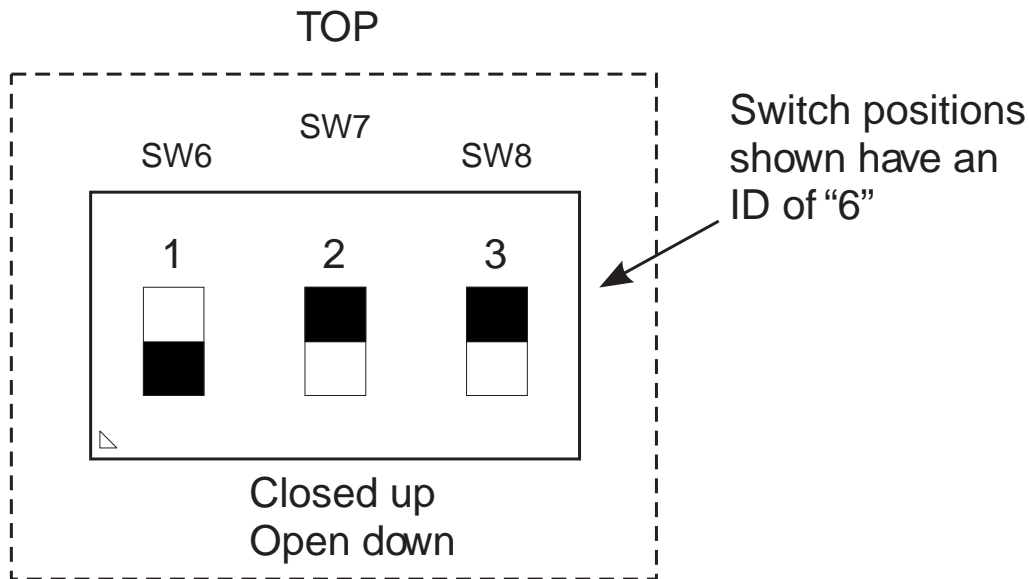


Figure 3.16-1 — DAT Drive SCSI Device Switch Positions

6. Set the option switches on the replacement UN376 series DAT drive circuit pack by doing the following:
 - Check the switch settings and, if necessary, set the option switch settings on the replacement UN376 series DAT drive circuit pack using the following Tables (in the Tables, ON = option switch in the up position; OFF = option switch in the down position):
 - For **UN376**, use Table 3.16-4.
 - For **UN376B**, if the bar code label on the right side of the cable connector on the back of the DAT drive shows:
 - C1534-xxxxx (or NCR006-3503341) DAT, then use Table 3.16-4
 - C1539-xxxxx (or KS-24367 L1) DAT, then use Table 3.16-5.
 - For **UN376C**, use Table 3.16-5.
 - For **UN376E**, if the bar code label on the right side of the cable connector on the back of the DAT drive shows:
 - C1537-xxxxx (or KS-24650 L1) DAT, then use Table 3.16-6
 - C1539-xxxxx (or KS-24367 L1) DAT, then use Table 3.16-5.
 - Note:** The option switches are located on the underside of the DAT drive.
 - For **UN376F**, this Step is not applicable.
7. **Caution:** Before inserting the circuit pack, set the ACO-T switch on the faceplate of the UN376 series DAT drive circuit pack to the Right (OFF) position.

8. Insert the replacement UN376 series DAT drive circuit pack into the empty slot where the faulty UN376 series DAT drive circuit pack was removed, and seat the pack in the backplane.

9. To restore the SBUS removed in Step 3 with the controller-only option, type and enter:

RST:SBUS=a :CONT;

Where: a = SBUS unit number (for example, 0).

Response: **RST SBUS a COMPLETED**

10. To restore the replacement MT, type and enter:

RST:MT= a;

Where: a = MT unit number (for example, 0).

Response: **RST MT a COMPLETED**

If the MT does not restore to service, stop and seek technical support.

11. To obtain the replacement MT attributes, type and enter:

OP:MT=a:INFO;

Where: a = MT unit number (for example, 0).

Response: The output message lists the replacement DAT drive attributes.

If the DAT drive format, Lucent product identification, and DAT drive firmware revision are not displayed in this Step, stop and seek technical support.

12. Using Tables 3.16-2 and 3.16-3, determine if the replacement UN376 series DAT drive circuit pack is valid. If the replacement DAT drive is not identified in Tables 3.16-2 and 3.16-3, stop and seek technical support.

13. **Caution: DO NOT force the cartridge into the drive. A cartridge can be incorrectly inserted and become jammed, requiring vendor repair.**

Note: Tape cartridge loading, unloading, and ejection operations normally take several minutes to complete. Be patient and let the onboard SCSI operating system complete its task.

Set the Write-Protect tab on the rear of a Tape Cassette to the closed (Write) position.

Gently insert the cassette with the Write-Protect Tab Window on the cartridge oriented OUT and UP.

Continue pushing the tape cartridge into the tape drive until the end with the Write-Protect Switch is flush with the tape drive front panel. The tape drive is auto-loading and will then pull the tape cartridge the remainder of the way into the drive.

14. At the MCC terminal, enter:

DGN:MT=x;

Where: x = the number of the MT brought on-line.

This step runs the non-demand phase diagnostics on the tape drive. Successful diagnostic completion yields the following response:

Response: **DGN MT xATP MESSAGE COMPLETE**

15. Was **ATP** printed in the response message in the previous Step?

If YES, continue with next Step.

If NO, seek technical assistance.

16. At the MCC terminal, enter:

DGN:MT=x:PH=90,TLP;

Where: x = the MT being tested.

This Step verifies read/write of blocked data to tape. Successful completion of this Step yields the following response:

Response: **DGN MT x ATP MESSAGE COMPLETE**

17. Was **ATP** printed in the response message in the previous step?

If YES, continue with next Step.

If NO, was the tape write-protected? If YES, go back to Step 13. If NO, seek technical assistance.

18. Press the UNLOAD button on the upper-right of the circuit pack faceplate.

Response: The unload sequence is started. The tape is rewound to the BOT, unthreaded from the drive mechanism, and ejected.

Set the Write-Protect tab on the rear of the Tape Cassette to the open (Protected) position.

Gently insert the cassette with the Write-Protect Tab Window on the cartridge oriented OUT and UP.

19. At the MCC terminal, enter:

DGN:MT=x:PH=91,TLP;

Where: x = the MT being tested.

This Step verifies the write protection mechanism of the tape drive. Successful completion of this Step yields the following response:

Response: **DGN MT x ATP MESSAGE COMPLETE**

Table 3.16-7 — UN375 Series Circuit Packs

Circuit Pack No.	Product Identification	Physical Memory Capacity
UN375D	KS23908L30	2GB
UN375E	KS23908L41	4GB
UN375F	KS23908L50	9GB
UN375F	ATLAS IV 9 WLS	9GB
UN375G	ST373207LW	73GB

20. Was **ATP** printed in the response message in the previous step?

If YES, continue with next Step.

If NO, was the tape write-enabled? If YES, go back to Step 18. If NO, seek technical assistance.

21. Unload the DAT tape from the DAT drive.

Note: Each MHD and MT controlled by the SBUS will also be restored to service in this Step.

22. To restore all devices controlled by the SBUS, type and enter:

RST:SBUS=a;

Where: a = SBUS unit number (for example, 0).

Response: **RST SBUS a COMPLETED**
DGN MHD b COMPLETED ATP MESSAGE IN PROGRESS
RST MHD b COMPLETED
DGN MT c COMPLETED ATP MESSAGE IN PROGRESS
RST MT c COMPLETED

Where: a = SBUS unit number.
b = MHD unit number.
c = MT unit number.

23. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.17 REPLACE SCSI MHD CIRCUIT PACK (UN375) – 3B21D PROCESSOR

Admonishments

Note: This procedure can be used for all versions of the UN375 circuit pack. All versions should be exchangeable with each other, providing that the required storage capacity is available.

PROCEDURE

1. Refer to Figure 3.17-1 to determine the appropriate SBUS numbers for the affected drive.

T/DC 0		SDC 0	
TAPE DRIVE 0		SCSI DFC 0	SCSI DFC 1
		FAN UNIT	
5	7		
		2	3
4	6	14	15
		0	1

Figure 3.17-1 — SCSI/SMD Configuration (3B21D)

2. At the MCC, remove the SBUS controlling the affected disk drive circuit pack from service by typing and entering:

RMV:SBUS=x;

Response: **RMV SBUS x TASK n MESSAGE STARTED**
RMV MHD y COMPLETED (Repeated for each MHD on SBUSx)
RMV MT z COMPLETED (Repeated for each magnetic tape drive, if any)
RMV SBUS x COMPLETED
OOS LED lights on all drives controlled by SBUSx

Where: n = task number.
x = number of the SBUS controlling the affected disk drive circuit pack.
y = MHD numbers associated with SBUSx.
z = magnetic tape (MT) drive(s) associated with SBUSx, if any.

3. Spin down the affected MHD circuit pack controlled by SBUSx by toggling the **ST/ON/OFF** switch to **OFF**.
Response: **OFF** and **OOS** LEDs light
4. Remove the affected MHD circuit pack.
5. Set the ID on the replacement UN375 MHD circuit pack to the same value as the original UN375 MHD circuit pack being replaced.
6. Install the replacement MHD circuit pack. Make sure the circuit pack latch is secured.
Response: **OFF** and **OOS** LEDs light
7. At the power switch of the replaced MHD circuit pack, make sure the **ROS/RST** switch is in the **RST** position.
8. Spin up the affected MHD circuit pack by operating the **ST/ON/OFF** switch to **ON** and momentarily actuating the switch to the **ST** (start) position.
Response: At the MHD power switch, the **OFF** LED flashes and goes off. The **OOS** LED remains lit.
9. At the MCC, enter: **RST:SBUS=x,CONT;**
Response: **RST SBUS x TASK n Message STARTED**
RMV SBUS x STOPPED H'5
RST SBUS x IN PROGRESS
RST SBUS x COMPLETED

Where: x = number of the SBUS controlling the affected drive.
n = task number.
10. Display the drive attributes at the MCC or STLWS, enter message:
OP:MHD=x,INFO;
Where: x = number of the replaced MHD.
Response: **The MHD attributes are displayed.**
The supported UN375 Series Circuit Packs are listed in table [3.17-1](#)

Table 3.17-1 — UN375 Series Circuit Packs

Circuit Pack Code	Product Identification	Physical Size	Firmware Revisions
UN375, UN375B	KS23908L20	1GB	0BC4
UN375C	KS23908L21	1GB	4315, 5011, 5194
UN375D	KS23908L30	2GB	5293
UN375E	KS23908L41	4GB	LYX4
UN375F	KS23908L50	9GB	0707
UN375F	ATLAS IV 9 WLS	9GB	0808
UN375G	ST373207LW	73GB	0002

11. At the MCC, enter: **INIT:MHD=y:VFY;**

Where: y = number of the replaced MHD.

Response: **INIT MHD y STARTED**
 ..
 ..
INIT MHD y IN PROGRESS
 ..
 ..
INIT MHD y COMPLETED

12. If the replaced MHD is a software backup disk (MHD 14 or MHD 15), enter:

EXC:ENVIR:UPROC, FN="/etc/rcvtoc", ARGs=y;

Where: y = 14 or 15.

Response: **EXC ENVIR UPROC /etc/rcvtoc COMPLETED**
vcp: disk copy completed
vcp: disk copy completed
/etc/rcvtoc VTOC READ AND COMPARE SUCCESSFUL

Note: In the following step, if the affected drive is a system disk (MHD 0 or MHD 1), restore it first.

13. At MCC, to restore all drives on SBUSx, enter:

RST:MHD=y; (Repeat for each MHD circuit pack.)

Response: **RST MHD y TASK n MESSAGE STARTED**
OOS LED goes off
RMV MHD y STOPPED H'5
DGN MHD y COMPLETED ATP MESSAGE IN PROGRESS
RST MHD y IN PROGRESS
 ..
 ..
RST MHD y COMPLETED
DGN MHD y ATP MESSAGE COMPLETE

Where: n = task number.
 x = number of the SBUS controlling the affected drive.
 y = MHD numbers associated with SBUSx.

14. At MCC, to restore magnetic tape drives (if any) on SBUSx, type and enter:

RST:MT=z; (Repeat for each MT.)

Response: **RST MT z TASK n MESSAGE STARTED**
OOS LED goes off
RMV MT z STOPPED H'5
DGN MT z COMPLETED ATP MESSAGE IN PROGRESS
DGN MT z ATP MESSAGE COMPLETE
RST MT z IN PROGRESS
RST MT z COMPLETED

Where: n = task number.
x = number of the SBUS controlling the affected drive.
z = MT drives associated with SBUSx.

15. To obtain the MHD defect table listing at the MCC, enter:

DUMP:MHD=y,DEFECT;

Where: y = MHD number.

Response: **DUMP MHD y DEFECT TABLE STARTED**
COMBINED (GROWN) DEFECT TABLE
0 DEFECTS
CYL HEAD SECT
DUMP MHD y DEFECT TABLE COMPLETED
SCSI DEFECT COUNT CHECK COMPLETED

16. Are all MHDs that were removed from service now restored to service?

If **NO**, continue restoration on remaining drives until complete. If any drive fails to restore, replace the corresponding UN375 circuit pack.

If **YES**, continue with the next step.

17. Why was the UN375 MHD replaced?

- If the original unit was defective, continue with the next step.
- If the unit was replaced to increase the size of the disk on the UN375 MHD, in preparation for a retrofit, refer to the appropriate 235-106-1xx, *Software Release Retrofit Procedures*, for instructions to update the Equipment Configuration Data (ECD) information. *After you have updated the ECD information*, continue with the next step.

18. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3.18 AM POWER-UP/POWER-DOWN INTRODUCTION

OVERVIEW

The 3B21D Administrative Module (AM) is a duplex module with units that must be powered down *before* circuit packs or cables are removed from them. See Figure [3.18-1](#).

Growth Unit 1																				
008	018	028	038	052	060	065	075	080	088	094	102	110	118	130	138	146	162	178	188	
053	KLW 128 MM	EX 0	EX 1	KLW 31 CC	410 AA	TN 1821	KBN 15		410 AA	UN 582		UN 582	UN 582	UN 582	UN 582 PC	UN 375 MHD 15 or UN 582 PC	UN 375 MHD 01	UN 580 DFC PS	410 AA PWR E	
					PWR A	CU PS	DMA 0	PWR D	PC	PC	PC	COM 2	COM 3							
049					050	060	065	080	088	094	102	110	118	130	138	146	154	170	178	188
045					UN 379	410 AA	KBN 10		TN 1820	410 AA	UN 583 Or UN 597 MTTY	UN 933	UN 933	UN 933	UN 933	UN 933	UN 933	UN 933	UN 375 MHD 03	UN 377 PSSD
					UC	PWR B	IOP		IOP PS	PWR C	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	COM 0	COM 1
008	018	028	038	052	060	065	075	080	088	094	102	110	118	130	138	146	162	178	188	
028	KLW 128 MM	EX 0	EX 1	KLW 31 CC	410 AA	TN 1821	KBN 15		410 AA	UN 582	UN 582	UN 582	UN 582	UN 582	UN 582 PC	UN 375 MHD 14 or UN 582 PC	UN 375 MHD 00	UN 580 DFC PS	410 AA PWR E	
					PWR A	CU PS	DMA 0	PWR D	PC	PC	PC	PC	COM 2	COM 3						
024					050	060	065	080	088	094	102	110	118	130	138	146	154	170	178	188
019					UN 379	410 AA	KBN 10		TN 1820	410 AA	UN 583 Or UN 597 MTTY	UN 933	UN 933	UN 933	UN 933	UN 933	UN 933	UN 933	UN 375 MHD 02	UN 376 DAT
					UC	PWR B	IOP		IOP PS	PWR C	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	SC/ SD	COM 0	COM 1
Growth Unit 0																				



Figure 3.18-1 — 3B21D Administrative Module

This rest of the procedures in this section are used to power down the sub-units in the AM. **Before using these procedures, start with 235-105-220, Procedure 3.1 to do the following:**

1. Identify the unit to be serviced.
2. Properly remove and/or isolate a unit from service.
3. Locate the unit and verify that it is out-of-service.

Note: If a circuit pack needs replacing, refer to 235-105-220, Procedure 3.12 before replacing a circuit pack.

PROCEDURE

1. For **AM** power-up/power-down procedures, go to one of the following procedures:
 - Control Unit (CU), Procedure 3.19
 - Input-Output Processor (IOP), Procedure 3.20
 - Disk File Controller (DFC), Procedure 3.21
 - Moving Head Disk (MHD), Procedure 3.22
 - Digital Audio Tape (DAT), Procedure 3.23
 - Port Switch and Scanner Distributor Buffer (PSSDB), Procedure 3.24.

3.19 CU POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Control Unit (CU) power is controlled by the TN1821 Control Unit Power Switch (CUPS) circuit pack.

PROCEDURE

1. To power down CU 0:
 - a. Go to MCC Page 111 and verify that CU 0 is OOS. If CU0 is not OOS, verify that CU1 is active (if necessary, perform switch), and remove CU 0 from service.
 - b. Locate the CU 0 TN1821 CUPS pack at EQL 028-060.
 - c. Verify that the OOS light is illuminated.
 - d. Toggle the ST/ON/OFF switch to the "OFF" position.
2. To power up CU 0:
 - a. Locate the CU 0 TN1821 CUPS pack at EQL 028-060.
 - b. Verify that the OOS light is illuminated.
 - c. Verify that the ROS/RST switch is in the "RST" position.
 - d. Toggle the ST/ON/OFF switch to the "ST" position. After about 30 seconds, the Request in Progress (RQIP) light will illuminate.
 - e. Go to MCC Page 111 and verify that diagnostics are being run on CU 0. If diagnostics are being run, CU 0 box will be red with a "DGN."
 - f. Verify that CU 0 is restored to the "STBY" State.
3. To power down CU 1:
 - a. Go to MCC Page 111 and verify that CU 1 is OOS. If CU1 is not OOS, verify that CU0 is active (if necessary, perform switch), and remove CU 1 from service.
 - b. Locate the CU 1 TN1821 CUPS pack at EQL 053-060.
 - c. Verify that the OOS light is illuminated.
 - d. Toggle the ST/ON/OFF switch to the "OFF" position.
4. To power up CU 1:
 - a. Locate the CU 1 TN1821 CUPS pack at EQL 053-060.
 - b. Verify that the OOS light is illuminated.
 - c. Verify that the ROS/RST switch is in the "RST" position.
 - d. Toggle the ST/ON/OFF switch to the "ST" position. After about 30 seconds, the Request in Progress (RQIP) light will illuminate.
 - e. Go to MCC Page 111 and verify that diagnostics are being run on CU 1. If diagnostics are being run, CU 1 box will be red with a "DGN."
 - f. Verify that CU 1 is restored to the "STBY" State.

3.20 IOP POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Input/Output Processor (IOP) power is controlled by the TN1820 Input/Output Processor Power Switch (IOPPS) circuit pack.

PROCEDURE

1. To power down IOP 0:
 - a. Go to MCC Page 111 and verify that IOP 0 is OOS. If IOP 0 is OOS, go to Step **d**. Otherwise, continue with the next step.
 - b. If IOP 0 is not OOS, verify that the MTTY and ROP are connected to IOP 1. If they are not, perform a switch on the MTTY and/or ROP.
 - c. Remove IOP 0 from service.
 - d. Locate the IOP 0 TN1820 IOPPS pack at EQL 019-080.
 - e. Verify that the OOS light is illuminated.
 - f. Toggle the ST/ON/OFF switch to the "OFF" position.
2. To power up IOP 0:
 - a. Locate the IOP 0 TN1820 IOPPS pack at EQL 019-080.
 - b. Verify that the OOS light is illuminated.
 - c. Verify that the ROS/RST switch is in the "RST" position.
 - d. Toggle the ST/ON/OFF switch to the "ST" position. After about 30 seconds, the Request in Progress (RQIP) light will illuminate.
 - e. Go to MCC Page 111 and verify that diagnostics are being run on IOP 0. If diagnostics are being run, IOP 0 box will be red with a "DGN."
 - f. Verify that IOP 0 is restored to the Active (ACT) State.
3. To power down IOP 1:
 - a. Go to MCC Page 111 and verify that IOP 1 is OOS. If IOP 1 is OOS, go to Step **d**. Otherwise, continue with the next step.
 - b. If IOP 1 is not OOS, verify that the MTTY and ROP are connected to IOP 0. If they are not, perform a switch on the MTTY and/or ROP.
 - c. Remove IOP 1 from service.
 - d. Locate the IOP 1 TN1820 IOPPS pack at EQL 045-080.
 - e. Verify that the OOS light is illuminated.
 - f. Toggle the ST/ON/OFF switch to the "OFF" position.
4. To power up IOP 1:
 - a. Locate the IOP 1 TN1820 IOPPS pack at EQL 045-080.
 - b. Verify that the OOS light is illuminated.
 - c. Verify that the ROS/RST switch is in the "RST" position.

- d. Toggle the ST/ON/OFF switch to the “ST” position. After about 30 seconds, the Request in Progress (RQIP) light will illuminate.
- e. Go to MCC Page 111 and verify that diagnostics are being run on IOP 1. If diagnostics are being run, IOP 1 box will be red with a “DGN.”
- f. Verify that IOP 1 is restored to the “ACT” state.

3.21 DFC POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Disk File Controller (DFC) power is controlled by the UN580 Disk File Controller Power Switch (DFCPS) circuit pack.

Power-Down Impact Assessment: Before powering down the DFC, analyze the impact it will have in the office. To see the impact of removing power to the DFC, go to MCC Page 123. Locate the DFC to be powered down. Each MHD that is removed from service and powered down takes 40 minutes to restore. If DFC 0 is powered down, all the even-numbered subtending units are removed from service. If DFC 1 is powered down, all the odd-numbered subtending units are removed from service. Note that powering off the DFC does not remove power to the Moving Head Disks (MHDs) or Digital Audio Tape (DAT). Separate power procedures exist for these units.

PROCEDURE

1. To power down DFC 0:
 - a. Go to MCC Page 111 and verify that DFC 0 is OOS. If DFC 0 is not OOS, verify that DFC 1 is active, and remove DFC 0 from service.
 - b. Locate the DFC 0 Power Switch UN580 circuit pack at EQL 028-178.
 - c. Verify that the OOS light is illuminated.
 - d. Toggle the ST/ON/OFF switch to the "OFF" position.
2. To power up DFC 0:
 - a. Locate the DFC 0 Power Switch UN580 circuit pack at EQL 028-178.
 - b. Verify that the OOS light is illuminated.
 - c. Verify that the ROS/RST switch is in the "RST" position.
 - d. Toggle the ST/ON/OFF switch to the "ST" position. After about ten seconds, the Request in Progress (RQIP) light will illuminate.
 - e. Go to MCC Page 111 and verify that diagnostics are being run on DFC 0.
 - f. Verify that DFC 0 is restored to the "ACT" State.
 - g. Go to MCC Page 123 and verify that diagnostics are being run on all subtending units. Each MHD takes 40 minutes to restore.
 - h. Verify that all DFC 0 subtending units restore to the ACT state.
3. To power down DFC 1:
 - a. Go to MCC Page 111 and verify that DFC 1 is OOS. If DFC 1 is not OOS, verify that DFC 0 is active, and remove DFC 1 from service.
 - b. Locate the DFC 1 Power Switch UN580 circuit pack at EQL 053-178.
 - c. Verify that the OOS light is illuminated.
 - d. Toggle the ST/ON/OFF switch to the "OFF" position.
4. To power up DFC 1:
 - a. Locate the DFC 1 Power Switch UN580 circuit pack at EQL 053-178.
 - b. Verify that the OOS light is illuminated.

- c. Verify that the ROS/RST switch is in the "RST" position.
- d. Toggle the ST/ON/OFF switch to the "ST" position. After about ten seconds, the Request in Progress (RQIP) light will illuminate.
- e. Go to MCC Page 111 and verify that diagnostics are being run on DFC 1.
- f. Verify that DFC 1 is restored to the "ACT" State.
- g. Go to MCC Page 123 and verify that diagnostics are being run on all subtending units. Each MHD takes 40 minutes to restore.
- h. Verify that all DFC 1 subtending units restore to the ACT state.

3.22 MHD POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Moving Head Disk (MHD) power is controlled by the UN375 circuit pack.

Power-removal impact assessment: Each MHD that is removed from service and powered down takes 40 minutes to restore.

PROCEDURE

1. To power down a MHD:
 - a. Identify the MHD to be powered off.
 - b. Go to MCC Page 123 and verify that the MHD is OOS. If it is not, remove the MHD from service.
 - c. Locate the proper MHD at the AM frame. Make sure the OOS LED is illuminated.
 - d. Toggle the ST/ON/OFF switch to the “off” position.
 - e. Verify that the “OFF” LED is illuminated.
2. To power up a MHD:
 - a. Identify the MHD to be powered up.
 - b. Locate the proper MHD at the AM frame. Make sure the OOS LED is illuminated.
 - c. Toggle the ST/ON/OFF switch to the “ST” position.
 - d. Go to MCC Page 123 and verify that the MHD begins to restore. The MHD will take 40 minutes to complete the restore.
 - e. Verify that the MHD restores to the “ACT” state.

3.23 DAT REMOVE/RESTORE PROCEDURES

OVERVIEW

The UN376 Digital Audio Tape (DAT) does not have a power controller. On MCC Page 123, the DAT is called the MT for Magnetic Tape.

PROCEDURE

1. The DAT does not have to be powered down. To remove it from service:
 - a. Toggle the ROS/RST switch to the "ROS" position.
 - b. On MCC Page 123, verify that the MT is in the OOS state.
2. The DAT does not have to be powered up. To restore it to service:
 - a. Toggle the ROS/RST switch to the "RST" position.
 - b. On MCC Page 123, verify that the MT is restoring to the ACT state.

3.24 PSSDB POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

The UN377 PSSDB does not have a power controller.

PROCEDURE

1. No action is required.

3.25 UN376, UN376B, UN376C, or UN376E to UN376F DAT Drive Circuit Pack Conversion

OVERVIEW

Caution: *The UN376F DAT drive circuit pack will not read or write 30, 60, or 90 meter DDS-1 or 120 meter DDS-2 tape cartridges. The drive will automatically eject these unsupported tape cartridges.*

The UN376F DAT drive circuit pack will read and write 125 meter DDS-3, 150 meter DDS-4, and 170 meter DAT72 tape cartridges.

Note 1: The UN376F DAT72 circuit pack requires the ECD UCB record mv value to be set to 0x7. The ECD mv value 0x7 indicates that the office is equipped with a DAT72 drive. The ECD mv value is used when 5ESS Switch generic retrofit tapes are created for an office.

Note 2: When software generic tapes are created for a retrofit and the office is equipped with a DAT72, the tapes must be DDS-3 (125 meter), DDS-4 (150 meter), or DAT72 (170 meter) format. DDS-1 or DDS-2 format tapes will not work in the DAT72 drive.

Note 3: The DAT72 drive will function correctly without the ECD mv change. However, a generic retrofit will fail if the incorrect DAT tape format is used.

This procedure is used to convert a UN376, UN376B, UN376C, or UN376E digital audio tape (DAT) drive circuit pack to a UN376F DAT drive circuit pack.

Prerequisites

The following initial conditions must exist in the system before starting this procedure:

- The RTR operating system must contain the software to support the UN376F DAT drive circuit pack. This software is provided in 5e16.2 and later software releases.
- All 3B21D computer moving head disks (MHDs) must be active (ACT).
- No software update activity, growth procedures, or other conversion procedures should be taking place while performing this procedure.

Required Tools and Equipment

The following parts are required for this procedure:

- R4987 - Antistatic wrist strap
- R5158, Det. 2 - Static-free bags
- DDS-3 125 meter, DDS-4 150 meter, or DAT72 170 meter cartridge tape.

Admonishments

Note: In order to protect against electrostatic discharge (ESD), a properly grounded antistatic wrist strap (R4987) must be worn and connected when handling circuit packs. Circuit packs must also be placed in static-free bags (R5158, Det. 2).

PROCEDURE

1. Inhibit diagnostics and wait for any diagnostics in the deferred maintenance queue (DMQ) to complete before continuing with Step 2.

- (a) If the maintenance terminal (MTTY) cursor is not at the message mode < prompt, press the CMD/MSG function key.
 - (b) To inhibit automatic maintenance requests, type and enter:
INH:DMQ:SRC=ALL;
Response: The system displays INH DMQ COMPLETED
At the receive-only printer (ROP), the following message will periodically be output: REPT DMQ INHIBIT ALL ACTIVE
 - (c) To obtain a list of all DMQ requests, type and enter:
OP:DMQ;
Response: The output message shows INHIBIT SOURCES marked as ALL.
Running or queued diagnostic requests are listed.
The system displays OP DMQ COMPLETED
 - (d) Wait for any running or queued diagnostic requests in the DMQ to complete before continuing with Step 2.
2. At the MTTY, display the disk file controller (DFC) status page.
 - (a) a. Access the system display pages by pressing the NORM/DISP function key.
 - (b) b. If the cursor is not at the command mode CMD< prompt, press the CMD/MSG function key.
 - (c) c. Enter poke number 123 to display the DFC Status Page.
 3. From the DFC Status Page, determine the unit number of the magnetic tape (MT) unit representing the DAT drive being replaced and the unit number of the SBUS that the MT is configured under.
 4. Remove the SBUS identified from DFC Status Page.
 - (a) a. If the MTTY cursor is not at the message mode < prompt, press the CMD/MSG function key.
 - (b) b. Remove the SBUS from service by entering the following input command. Type and enter: **RMV:SBUS=a**; Where: a = unit number of the SBUS.
Response: The SBUS and all subunits configured under the SBUS are removed from service. The system displays RMV SBUS a COMPLETED
 5. Invoke recent change and verify (RC/V) to access the incore equipment configuration database (ECD).
 - (a) If the MTTY or supplementary trunk-line work station (STLWS) terminal cursor is not at the command mode CMD< prompt, press the CMD/MSG function key.
 - (b) At the MTTY or STLWS, enter the RCV/ECD command poke 199 to invoke RC/V.
Response: The system displays the "RCV ECD Parameter Info" form.
Cursor at 1.database_name:

- (c) Type and enter: incore
Response: Cursor at 2.reviewonly:
 - (d) Type and enter: n
Response: Cursor at 3.journaling:
 - (e) Type and enter: *
Response: The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form.
Cursor at Enter Form Name:
6. Set the ECD MT unit control block (UCB) record for the UN376, UN376B, UN376C, or UN376E DAT drive circuit pack to the un-equipped (UNEQIP) major state.
- (a) At the "UNIX RTR RCV (ODIN) - Data Entry" form Enter Form Name: prompt, type and enter: trbegin
Response: The system displays "Transaction Begin" form. Cursor at 1.tr_name:TRBEGIN
 - (b) Enter CARRIAGE RETURN
Response: Cursor at Enter Execute, Change, Substitute, Validate, or Print:
 - (c) Type and enter: e
Response: The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
 - (d) Type and enter: ucb
Response: The system displays "Enter Database Operation". Cursor at I=Insert, R=Review, U=Update, D=Delete:
 - (e) Type and enter: u
Response: The system displays "ucb" form. Cursor at 1.k_complex_name:
 - (f) Enter CARRIAGE RETURN.
Response: Cursor at 2.k_complex_number:
 - (g) Enter CARRIAGE RETURN.
Response: Cursor at 3.k_unit_name:
 - (h) Type and enter: MT
Response: Cursor at 4.k_unit_number:
 - (i) Type and enter the MT unit number obtained from DFC Status Page.
Response: The system displays the MT ucb form. Cursor at Enter Update, Change, Substitute, Validate, screen#, or Print:
 - (j) Make note of the MT SCSI device ID value from field 13.internal_device:
 - (k) Type and enter: c
Response: Cursor at Change field:

- (l) Type and enter: 21
Response: Cursor at 21.major_status:
 - (m) Type and enter: UNEQIP
Response: Cursor at Change field:
 - (n) Enter CARRIAGE RETURN.
Response: Cursor at Enter Update, Change, Substitute, Validate, screen#, or Print:
 - (o) Type and enter: u
Response: The system displays FORM UPDATED.
Cursor at 1.k_complex_name:
 - (p) Type and enter: <
Response: The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
 - (q) Type and enter: trend
Response: The system displays "Transaction End" form.
Cursor at 1.tr_name:TREND
 - (r) Enter CARRIAGE RETURN.
Response: Cursor at 2.dis_cf_checks:
 - (s) **Note:** Do not exit the RCV ECD session.
Type and enter: *
Response: The system displays "executing...". The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
7. Determine the equipment location of the UN376, UN376B, UN376C, or UN376E DAT drive circuit pack in the 3B21D frame.
 8. Pull the UN376, UN376B, UN376C, or UN376E DAT drive circuit pack latch out to unseat the circuit pack from the backplane and slide the circuit pack out of the 3B21D frame.
 9. Set the SCSI device ID of the UN376F DAT drive circuit pack to the SCSI device ID value obtained in Step 6(j).
 10. Set the ACO-T switch on the faceplate of the UN376F DAT drive circuit pack to the right
 11. Set the ROS/RST switch on the faceplate of the UN376F DAT drive circuit pack to the RST position.
 12. Slide the UN376F DAT drive circuit pack into the 3B21D frame slot that the DAT drive was removed from.
 13. Push the circuit pack forward to make contact with the backplane. Then push the circuit pack latch forward to lock the pack into the frame.
 14. Set the ECD MT UCB record to the growth (GROW) major state and set the maintenance version (mv) field to identify the UN376F DAT drive circuit pack.

- (a) At the "UNIX RTR RCV (ODIN) - Data Entry" form Enter Form Name:
prompt, type and enter: trbegin
Response: The system displays "Transaction Begin" form. Cursor at
1.tr_name:TRBEGIN
- (b) Enter CARRIAGE RETURN
- (c) Type and enter: e
Response: The system displays FORM EXECUTED. The system displays
the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at
Enter Form Name:
- (d) Type and enter: ucb
Response: The system displays "Enter Database Operation". Cursor at
I=Insert, R=Review, U=Update, D=Delete:
- (e) Type and enter: u
Response: The system displays "ucb" form. Cursor at 1.k_complex_name:
- (f) Enter CARRIAGE RETURN.
Response: Cursor at 2.k_complex_number:
- (g) Enter CARRIAGE RETURN.
Response: Cursor at 3.k_unit_name:
- (h) Type and enter: MT
Response: Cursor at 4.k_unit_number:
- (i) Type and enter the MT unit number.
Response: The system displays the MT ucb form. Cursor at Enter Update,
Change, Substitute, Validate, screen#, or Print:
- (j) Type and enter: c
- (k) Type and enter: 21
Response: Cursor at 21.major_status:
- (l) Type and enter: GROW
Response: Cursor at Change field:
- (m) Type and enter: 27
Response: Cursor at 27.mv:
- (n) Type and enter: 0x7
Response: Cursor at Change field:
- (o) Enter CARRIAGE RETURN.
- (p) Type and enter: u
Response: The system displays FORM UPDATED. Cursor at
1.k_complex_name:
- (q) Type and enter: <

- (r) Type and enter: trend
Response: The system displays "Transaction End" form. Cursor at 1.tr_name:TREND
 - (s) Enter CARRIAGE RETURN.
 - (t) **Note:** Do not exit the RCV ECD session.
Type and enter: *
Response: The system displays "executing..." The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
15. Restore the SBUS identified in Step 3 with the controller only option.
- (a) If the MTTY cursor is not at the message mode < prompt, press the CMD/MSG function key.
 - (b) Restore the SBUS to service by entering the following input command. Type and enter: RST:SBUS=a:CONT;
Where: a = number of the SBUS
Response: The system displays RST SBUS a COMPLETED
16. Diagnose the UN376F DAT drive circuit pack.
- (a) If the MTTY cursor is not at the message mode < prompt, press the CMD/MSG function key.
 - (b) Diagnose the MT by entering the following input command. Type and enter: DGN:MT=a;
Where: a = unit number of the MT
Response: The system displays DGN MT a ATP MESSAGE COMPLETED
17. If the MT diagnostics were all tests pass (ATP) continue with next Step. Otherwise stop and seek technical support.
18. Set the ECD MT UCB record to the out-of-service (OOS) major state.
- (a) At the "UNIX RTR RCV (ODIN) - Data Entry" form Enter Form Name: prompt, type and enter: trbegin
Response: The system displays "Transaction Begin" form. Cursor at 1.tr_name:TRBEGIN
 - (b) Enter CARRIAGE RETURN.
 - (c) Type and enter: e
Response: The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
 - (d) Type and enter: ucb
Response: The system displays "Enter Database Operation". Cursor at I=Insert, R=Review, U=Update, D=Delete:
 - (e) Type and enter: u
Response: The system displays "ucb" form. Cursor at 1.k_complex_name:

- (f) Enter CARRIAGE RETURN.
Response: Cursor at 2.k_complex_number:
 - (g) Enter CARRIAGE RETURN.
Response: Cursor at 3.k_unit_name:
 - (h) Type and enter: MT
Response: Cursor at 4.k_unit_number:
 - (i) Type and enter the MT unit number.
Response: The system displays the MT ucb form. Cursor at Enter Update, Change, Substitute, Validate, screen#, or Print:
 - (j) Type and enter: c
Response: Cursor at Change field:
 - (k) Type and enter: 21
Response: Cursor at 21.major_status:
 - (l) Type and enter: OOS
Response: Cursor at Change field:
 - (m) Enter CARRIAGE RETURN.
 - (n) Type and enter: u
Response: The system displays FORM UPDATED. Cursor at 1.k_complex_name:
 - (o) Type and enter: <
Response: The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
 - (p) Type and enter: trend
Response: The system displays "Transaction End" form. Cursor at 1.tr_name: TREND
 - (q) Enter CARRIAGE RETURN.
 - (r) **Note:** Do not exit the RCV ECD session.
Type and enter: *
Response: The system displays "executing..." The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form.
Cursor at Enter Form Name:
19. Activate and exit RCV ECD.
- (a) At the "UNIX RTR RCV (ODIN) - Data Entry" form Enter Form Name: prompt, type and enter: activate
Response: The system displays "Copy Incore ECD To Root ECD" form.
Cursor at 1.copy_inc_to_disk:YES
 - (b) Enter CARRIAGE RETURN.

- (c) Type and enter: e
Response: The system displays "executing..." The system displays FORM EXECUTED. The system displays the "UNIX RTR RCV (ODIN) - Data Entry" form. Cursor at Enter Form Name:
- (d) Enter CARRIAGE RETURN.
Response: RCV ECD session ends.
20. Restore all devices on the SBUS identified in Step 3.
- (a) If the MTTY cursor is not at the message mode < prompt, press the CMD/MSG function key.
- (b) Restore the SBUS to service by entering the following input command. All devices under the SBUS will be diagnosed and restored to service. Type and enter: RST:SBUS=a;
Where: a = unit number of the SBUS .
Response: The system displays RST SBUS a COMPLETED All MHD and MT units configured under the SBUS are diagnosed and restored to service.
21. Wait for all MHD and MT units configured under the SBUS to be restored to the ACT state.
22. Load a write enabled DDS3 125 meter, DDS4 150 meter, or DAT72 170 meter cartridge tape into the UN376F DAT drive circuit pack. Refer to 235-105-210 manual, procedure titled, "Load a Cartridge Tape in a SCSI DAT Drive".
23. At the MTTY, enter the following input command to write a file named *cudiagc* to the DAT tape. MT unit. Type and enter:
COPY:TAPE:OUT,TD="/dev/mtxx",FN="cudiagc",BSDIR="/diag/dgnc";
Where: xx = the MT unit special device filename number (for example, /dev/mt00).
Response: COPY TAPE OUT COMPLETED (number of blocks)
24. At the MTTY, enter the following input command to read the file from the DAT tape. Type and enter: **COPY:TAPE:IN,TD="/dev/mtxx",BSDIR="/tmp";**
Where: xx = the MT unit special device filename number (for example, /dev/mt00).
Response: COPY TAPE IN COMPLETED (number of blocks)
25. At the MTTY, enter the following input command to obtain the checksum of the files written to and read from the DAT tape. Type and enter:
OP:STATUS:SUM,FN="/diag/dgnc/cudiagc";
OP:STATUS:SUM,FN="/tmp/cudiagc";
Response: OP STATUS SUM COMPLETED a b /diag/dgnc/cudiagc
OP STATUS SUM COMPLETED a b /tmp/cudiagc
Where: a = 16-bit decimal checksum of file
b = decimal number of blocks.
- If the checksum and block values are not identical for each file, stop and seek technical support.

26. Unload the DAT cartridge tape from the MT SPU. Refer to 235-105-210 manual, procedure titled, "Remove a Cartridge Tape from a SCSI DAT Drive".
27. Allow automatic maintenance requests.
 - (a) If the MTTY cursor is not at the message mode < prompt, press the CMD/MSG function key.
 - (b) Allow automatic maintenance requests by entering the following input command. Type and enter: **ALW:DMQ:SRC=ALL;**
Response: The system displays ALW DMQ ENABLED ALL
28. Create a full set of office backup tapes.
Refer to the 235-105-210, Routine Operations and Maintenance Procedures manual, chapter titled "Make Full Office Backup Tape"; or chapter titled, "Schedule Backup To Tape Using Automated System Backup Feature".
29. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Corrective Maintenance Procedures

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4. COMMON NETWORK INTERFACE RING MAINTENANCE

Purpose

Use the following CNI Ring procedures to analyze the trouble, replace any circuit packs, and restore the unit/circuit to service.

Before You Before

First use Procedure [2.3](#) to locate the unit/circuit that is failing and to determine which MCC pages to use to clear the trouble.

4.1 VERIFY CNI RING DIAGNOSTIC FAILURE PATTERN IS CONSISTENT

OVERVIEW

This procedure is used to determine if a CNI Ring hardware trouble causing a diagnostic failure in the 5ESS[®] switch is consistent or intermittent.

PROCEDURE

To determine if the CNI Ring failure pattern is *consistent* or *intermittent*, perform the following:

1. Obtain the original diagnostic failure (DGN STF) printout with the SUSPECTED FAULTY EQUIPMENT list generated by system diagnostics.
2. Determine if there is also a power alarm or fuse alarm active at the failing unit. If so, use Procedure 14.6, Respond to Fuse/Power Alarm Failure, to clear the power problem in the unit.
3. **Caution:** *The use of unconditional removals or manual override power downs is NOT recommended (unless the office or affected SM/SM-2000 is in min-mode operation), because call processing may be detrimentally affected. The failure or denial of conditional removals usually indicates that the mate side hardware must be repaired first.*

If the unit is not already removed from service, use the **REMOVE** poke command (on appropriate display page) or **RMV** input message (from 235-600-700, *Input Messages*).

Then use the **DIAGNOSE** poke command or **DGN** to diagnose the unit/circuit and get a second STF printout and SUSPECTED FAULTY EQUIPMENT list.

4. Compare the two diagnostic failure printouts.

Note: When comparing the diagnostic printouts to determine a failure pattern, be sure to examine the phase (PH), segment (SEG), test (TEST), and mismatch (MM) numbers.

If the diagnostic fails and the STF output message (PH, SEG, TEST, and MM) numbers are the same as the original failure, go to Procedure 4.2, Clear Trouble in the CNI Ring.

If the diagnostic fails and the failure is inconsistent/intermittent, determine the dominant pattern. Then go to Procedure 4.2.

If the diagnostic fails and there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list. Then go to Procedure 4.2.

If the diagnostic passes, diagnose the unit/circuit at least two more times. If the diagnostic continues to pass, record this incident and the failure pattern for future reference. Continue with the next step.

5. Use the **RESTORE** poke command or **RST** input message to restore the unit to service.

4.2 CLEAR TROUBLE IN THE CNI RING

OVERVIEW

This procedure is used to clear a CNI Ring hardware trouble causing a diagnostic failure in the 5ESS[®] Switch.

Appendix A1, Diagnostic Phase Descriptions, contains the diagnostic phase descriptive information for all hardware (units/circuits) of the 5ESS switch.

PROCEDURE

To clear trouble in the CNI Ring, perform the following:

1. Examine the first or next pack on the SUSPECTED FAULTY EQUIPMENT list.
 - (a) If entries on SUSPECTED FAULTY EQUIPMENT list have been exhausted, go to Step 6.
 - (b) If a Note number appears in the last column on the SUSPECTED FAULTY EQUIPMENT list, obtain the text for the Note before replacing the pack to see what precautions or additional procedures are recommended. The text for the Note can be obtained by entering the **OP:TLPNOTE=n** command, where **n** is the Note number.

If this pack is owned by the unit being diagnosed, continue with Step 2.
 - (c) **Note:** Diagnostics associated with some units may execute **interface tests**. This may cause the TLP listing to include suspected packs that are **not** owned by the unit being diagnosed.

If this pack is owned by the unit being diagnosed, continue with Step 2.
 - (d) If this pack is owned by another unit, remove and diagnose the other unit.
Note: A “forced switch” may be required before the other “on-line/active” unit/circuit can be removed. This may interrupt call processing; therefore, it is best to wait for a low-traffic period and **seek technical assistance**.
 - (e) If the diagnostic for the other circuit is STF, choose which diagnostic (and SUSPECTED FAULTY EQUIPMENT list) to continue working (it is usually best to work the circuit that is highest in the control hierarchy).
2. Use Procedure 4.3 to replace the suspected circuit pack.

Note: The replacement pack vintage must be equal to or greater than the minimum code and series specified in the SUSPECTED FAULTY EQUIPMENT list printout (per “DGN” pages in 235-600-750, *Output Messages*). For example, when code “TN1077” minimum series “5” is printed, the replacement pack could be either a TN1077 Series 5 (or later), or TN1077B (any series), or TN1077C (any series), etc. The microcode number (for example, MC5D045A1) is printed for “microcoded” packs. In all cases, the replacement pack vintage must be *equal to or greater* than that printed. For example, when code “MC5D045A3D” minimum issue “2” is printed, the replacement pack could be either an MC5D045A3D Issue 2 (or later), an MC5D045A4D (any issue), or an MC5D045A3E (any issue), etc.

3. Determine whether the pack replacement cleared the failure.

- (a) Diagnose the circuit.

Note 1: You can save time by running only one phase (that was failing previously) of the diagnostic using the PH option in the DGN input request.

Note 2: When working an intermittent/inconsistent failure, several runs of the diagnostic/phase may be required to know if the pack replacement has cleared the problem.

- (b) If the diagnostic result is all tests passed (ATP), go to Step 4.
 - (c) If identical STF is outputted (PH, SEG, TEST, and MM), return original pack to the unit and go Step 1 to examine the next pack on the SUSPECTED FAULTY EQUIPMENT list. If different STF is outputted, diagnose the circuit again.
 1. If a repeat of the previous dominant failure occurs, return the original pack to the unit and go to Step 1 to examine the next pack on the list.
 2. If the dominant failure is now different from the original failure, the spare pack is probably faulty (for example, wrong series); try another spare pack (Step 2).
4. Verify that the failure follows the suspected faulty pack.
- (a) Swap the original (suspected faulty) pack with the spare pack inserted in Step 2 and diagnose the circuit again.
 - (b) If the diagnostic failure returns with the suspected faulty pack reinserted, replace this faulty pack and go to Step 5.
 - (c) If the diagnostic failure does not return with the suspected faulty pack reinserted, the problem is apparently cleared with no faulty pack identified. Record this incident and the failure pattern for future reference; go to Step 5.
5. Request a RESTORE of the unit/circuit to service.
- (a) If the restore diagnosis is STF, the problem is not cleared. Return to Step 1.
 - (b) Perform a conditional restore on **both** the **original** unit and any unit(s) associated with the suspected/replaced circuit pack. If the restore diagnosis fails on the **interface unit**, treat it as a **different** problem, starting at Procedure 4.1.
 - (c) If the restore diagnosis is ATP, go to Step 7.
6. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, replace (one at a time) any power converter packs (for example, 495FB) in the unit that supplies power to packs on the SUSPECTED FAULTY EQUIPMENT list. (Low voltage from a power converter can cause other packs to misbehave.)

Note: If the problem has not been cleared at this point, make a judgment on which of the following is the appropriate alternative, depending on the situation.

- Inspect the backplane for open or short circuits in the wiring, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects. If such defects are found *and* can be repaired, complete those repairs, and then return to Procedure 4.1.
- **Seek technical assistance**, particularly if the trouble is in a critical duplex unit.
- Replace (one at a time) the remaining packs in the unit not previously tried.

- Replace (one at a time) the packs in adjacent unit(s) with interfaces to the failing unit.
 - Perform a multiple-pack swap with another unit that diagnoses ATP and can be removed from service. If the problem moves with the packs, return half of the packs, etc., until the faulty pack is isolated. If the problem does not move with the packs, check for possible cable or wiring problems. ***Multiple-pack swaps must be done carefully to avoid creating additional problems.***
 - Consult the failing diagnostic's program listing (if available). Use the diagnostic phase descriptive tables in Appendix [A1](#), Diagnostic Phase Descriptions, as an aid in locating the desired PR. The prologue for the diagnostic phase and descriptions and code associated with the failing segment and test may give insight as to what is being tested and which control/data paths are being used.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.3 REPLACING CNI RING CIRCUIT PACKS

OVERVIEW

This is a general procedure for replacing CNI Ring circuit packs. If you need to replace any of the following circuit packs, refer to the referenced procedure.

Note: Before starting any of these procedures, read the general requirements for handling and care of circuit packs outlined in 235-105-110, *System Maintenance Requirements and Tools*.

- To replace a CNI Power Pack 495FA — Procedure [4.4](#)
- To replace a CNI IRN2 Power Pack 410AA Series — Procedure [4.5](#)
- To replace a CNI Ring Circuit Pack — Procedure [4.6](#)
- To replace a CNI IRN2 Ring Circuit Pack — Procedure [4.7](#)
- To replace a CNI Ring DFA Circuit Pack and Modem — Procedure [4.8](#)
- To replace a CNI BAT Board — Procedure [4.9](#)

PROCEDURE

1. Make sure the circuit pack is out of service (OOS) by removing the unit or sub-unit from service.

Caution: *Be sure you understand the impact of removing the unit or sub-unit from service.*

Check the section in Procedure [4.10](#) that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are OOS.

2. Replace the circuit pack and/or cabling.
3. Follow the corresponding steps in Procedure [4.10](#) to restore the unit(s) or sub-unit(s) to service.

4.4 REPLACE SSI CNI POWER PACK 495FA

OVERVIEW

This procedure is used to replace the Common Network Interface (CNI) power pack 495FA. The CNI cabinet uses two 495FA power converters per shelf. These converters supply power to the node(s) on their half of the shelf. Therefore, each node has its own converter, except LN-5, which gets its power from both shelf converters.

A 495F power converter can fail for four main reasons:

- The power pack itself is faulty.
- A frame fuse in the ring cabinet has blown, powering down the converter.
- A bus fuse in the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) has blown, which causes multiple converters to go out of service (OOS).
- A circuit pack supplied by the power converter has its power short-circuited to ground.

It is rare for more than one node to drop out when a power converter fails. Any additional nodes going OOS are restored by Automatic Ring Recovery (ARR) software. Only the node(s) associated with the faulty power converter should fail to be restored to service.

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, for details.

PROCEDURE

1. Allow the ARR software to restore all nodes possible. Use the **OP:DMQ** command to view ARR's restore requests.

Note: The ARR software also attempts to restore the node(s) associated with the faulty power converter. However, ARR does not attempt to restore the same node after three previous attempts have failed.

2. At the Master Control Center (MCC), view Page 118 to verify that the PWR ALM indicator is backlit red.

If the indicator is *not* backlit, then the problem is more likely to be a circuit pack in the node. Refer to Procedure 4.6, Replace CNI Ring Circuit Pack, to recover the node.

If the indicator *is* backlit, continue with the next step.

3. Attempt to clear the PWR ALM using command **ALW:ALM,CNI,PWR;**

If the alarm clears, go to Step 21 to restore the nodes to service.

If the indicator is still backlit, continue with the next step.

4. To prevent the ARR software from attempting to recover nodes while the power converter is being replaced, inhibit it using command **INH:DMQ:SRC=ARR;**
5. At the MCC, view Page 1520 and determine if any of the nodes in the ring are isolated (ISO). See Note.

If at least one node is isolated, go to Step 12.

If no nodes are isolated, continue with the next step.

Note: The PWR ALM indicator is driven by a relay in the 495FA power converter. Any converter closing its relay sets off the alarm. This relay can falsely trigger an alarm if the CNI frame was not properly powered when first installed. In this case, the ALM light on the front of the power converter is not lighted because the converter is still supplying the +5 V DC to the node(s). Therefore, this converter must be replaced to prevent future false alarms.

6. At the back of the CNI ring cabinet, pull the alarm scan lead (labeled CVPAA or CVPAB) off each converter until the alarm clears. You must start with the bottom shelf first and work your way up each side of the cabinet. Refer to MCC Page 118.
7. Replace the last scan lead removed and verify that the PWR ALM indicator backlights again.
8. Identify the node that receives power from that converter.
If the converter is on the three-node shelf (LN-6, LN-5, LN-4), LN-5 must be removed (if equipped) along with the other node identified.
If the converter is not powering a node, then it can be replaced without affecting the ring.
9. If the node(s) identified are SS7 and are active (ACT), then remove their signaling links with the command **CHG:SLK=xx-y,MOOS**; where *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
10. If the node(s) identified are ACT, then remove them from service using one of the following:
 - For link nodes (LN) and direct link nodes (DLN), use command **RMV:LNxx=y**;
 - For a Ring Peripheral Controller Node (RPCN), use command **RMV:RPCNxx=0**;In both commands, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
11. Using one of the identified nodes, configure the ring to isolate them from the ACT ring segment using one of the following:
 - For LNs and DLNs, use command **CFR:RING,LNxx=y,EXCLUDE**;
 - For an RPCN, use command **CFR:RING,RPCNxx=0,EXCLUDE**;In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
12. Verify on the Receive-Only Printer (ROP) that the node(s) that were not restored have POWER as a possible problem listed on the Trouble Locating Procedure (TLP) listing.
If POWER is not on the list, the node has a bad circuit pack. Refer to Procedure 4.6, Replace CNI Ring Circuit Pack.
If POWER is on the TLP list, continue with the next step.
13. At the ring node cabinet, verify that every OOS node has an associated power converter with its ALM light ON. (If the light is OFF, then the fuse must be replaced with the power converter in Step 15).

14. Unseat ALL circuit packs from node(s) affected by the faulty power converter.
15. Remove the faulty converter from the frame. If the converter's fuse was blown, replace it *first*, then install the new power converter.
16. At the front of the newly installed converter, using a voltmeter, verify that the converter is supplying +5 V DC.
17. At the MCC, refer to Page 118 and verify that the PWR ALM has cleared.
Note: If this was not the only power converter that needed replacing, the alarm still exists until all power converters are operational.
18. Reseat all packs powered by the replaced converter.
Note: Watch the power converter ALM light as each pack is replaced. If after a circuit pack is installed the power converter re-alarms, then that circuit pack may be short-circuiting the converter. The converter may need to be replaced again (if it was damaged) as well as the circuit pack in the node.
19. Diagnose the OOS node(s) running all phases with one of the following:
 - For LNs and DLNs, use command **DGN:LNxx=y,RAW,TLP;**
 - For an RPCN, use command **DGN:RPCNxx=0,RAW,TLP;**In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
20. If any node circuit pack failed diagnostics in Step 19, replace it and repeat the step.
21. Restore all nodes unconditionally using one of the following:
 - For LNs and DLNs, use command **RST:LNxx=y,UCL;**
 - For an RPCN, use command **RST:RPCNxx=0,UCL;**In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
22. If the node(s) restored are SS7 and their signaling links are in the manual OOS (MOOS) state, then restore the links using command **CHG:SLK=xx-y,IS;** where *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
Note: Each link drops into the OOS state for up to three minutes until the link can synchronize with the far end.
23. All ring nodes should now be restored and the ring should have no isolated nodes. At this point, allow the ARR software to execute for future node problems using command **ALW:DMQ,SRC=ARR;**
24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.5 REPLACE CNI IRN2 POWER PACK 410AA SERIES

OVERVIEW

This procedure is used to replace the Common Network Interface (CNI) power pack for Integrated Ring Node-2 (IRN2) vintage Rings. The CNI uses two 410AA series power converters per shelf. These converters supply power to the node(s) on their half of the shelf only. Therefore, each node in the CNI cabinet receives power from only one 410AA converter.

This procedure addresses replacement of a power converter for the following conditions:

- Power converter has powered down leaving its red **OOS** light lit.
- Replacement of power converter that is still operational (that is, **OOS** light is off).

This procedure does not cover replacement of the fuse that supplies the power converters. To replace a blown fuse and restore the Ring, use Procedure 14.8, *Replace Common Network Interface IRN2 MMFU Fuse*.

If a reference in this procedure is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages* for details.

PROCEDURE

1. Using the following table as a guide, identify which nodes the converter powers.

Table 4.5-1 — Nodes Powered by Converters

Shelf	410AA	← Powered by	Powered by →	410AA
6	61-008	LN34-1 — LN34-4	LN34-5 — LN34-8	61-178
5	53-008	LN33-1 — LN33-4	LN33-5 — LN33-8	53-178
4	44-008	RPCN32-1, LN32-1	DLN32-2, LN32-3, LN32-4	44-178
2	27-008	LN02-1 — LN02-4	LN02-5 — LN02-8	27-178
1	19-008	LN01-1 — LN01-4	LN01-5 — LN01-8	19-178
0	10-008	RPCN00-0, LN00-1	DLN00-2, LN00-3, LN00-4	10-178

2. If the power converter to be replaced is currently operational and the node(s) it powers are still in-service, continue with the next step. Otherwise, skip to Step 9.
3. For each SS7 node powered by the 410AA, remove the signaling link from service using the **CHG:SLK=xx-y,MOOS;** command, where xx is the group number (00, 01, 02, 32, 33, or 34) and y is the member number (1-8).
4. For each SS7 node powered by the 410AA, remove the node from service using the **RMV:LNxx=y;** command.
5. If a DLN needs to be removed (DLN00-2 or DLN32-2) from service, use the **RMV:LNxx=2;** command.
6. If an RPCN needs to be removed (RPCN00-0 or RPCN32-0) from service, use the **RMV:RPCNxx=0;** command.
7. Configure the Ring to exclude the nodes using:
 - If an SS7 or DLN node must be isolated: **CFR:RING,LNxx=y,EXCLUDE;**
 - If only an RPCN is isolated: **CFR:RING,RPCNxx=0,EXCLUDE;**

- Note:** You only need to use one **CFR:RING** command to isolate all the nodes removed from service.
8. At the front of the Ring cabinet, verify that the red **NT** light is lit for all nodes powered by the 410AA. If all nodes do not have the **NT** light lit, then the Ring reconfiguration failed and will have to be done again.
 9. Unseat all circuit packs associated with the 410AA to be replaced.
 10. Remove the 410AA.
 11. Install the replacement 410AA.
 12. Verify +5V voltage using a voltmeter on the test points provided on the 410AA faceplate.
 13. Reseat all circuit packs unseated at Step 9.
Watch the replacement 410AA to verify it does not power off when the packs are reseated. When the power supply powers down when a particular pack is inserted, the pack is shorting the backplane. If this happens, do the following:
 - a. Unseat all the circuit packs as in Step 9.
 - b. Clear the 410AA **OOS** alarm by unseating the board.
 - c. Get a replacement circuit pack for the one that caused the problem.
 - d. Continue at Step 11 with powering up the circuit packs.
 14. Restore the nodes back to service one at a time with full diagnostics using the following commands:
 - For an RPCN: **RST:RPCNxx=0,RAW,TLP;**
 - For an SS7 or DLN node: **RST:LNxx=y,RAW,TLP;**
 - For an SS7 node: **CHG:SLK=xx-y,IS;**Where xx is the group number (00, 01, 02, 32, 33, or 34) and y is the member number (1-8).
 15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.6 REPLACE SSI RING CIRCUIT PACK

OVERVIEW

This procedure is used to replace Small-Scale Interface (SSI) circuit packs. It is not used for the replacement of power converters that are used in the same frame. For power converter replacement, see Procedure 4.4, Replace SSI CNI Power Pack 495FA.

Each node in the SSI ring uses a combination of circuit packs to allow it to function. Many circuit packs are common among the nodes, but certain packs (LI, RIO, RI1, and IFB) are not interchangeable.

There are three versions of the Link Interface (LI) pack, the *encrypted*, *non-encrypted*, and *encryption-removed* formats. ***It is critical that the microcode on the replacement pack is checked against the original.*** Use the following table as a guide:

Link Interface Format	Existing Microcode	Replacement Microcodes
Non-Encrypted (TN916)	MC3F003A1	MC3F003A1 or MC3F030A1
	MC3F030A1	MC3F030A1
Encrypted (TN917 ATT Only)	MC3F022A1	MC3F022A1 or MC3F029A1
	MC3F029A1	MC3F029A1
Encryption Removed (TN917 ATT Only)	MC3F032A1	MC3F032A1 or MC3F030A1

The Ring Interface (RI) packs (RIO and RI1) are not backward compatible. Only replace the faulty pack with one having the same or greater pack code. For example, a UN123C can replace a UN123A, but the opposite is not true.

There are two types of Padded Interframe Buffer (IFB-P) packs for the SSI ring. The TN915 or TN1803 packs are used for the Ring Peripheral Controller Node (RPCN) and the highest Link Node (LN) in each group. The TN915 and TN1803 packs are not interchangeable. ECD must be modified to support the change.

There is only one Interframe Buffer (IFB) used on the SSI. The TN918 buffer pack is only used in offices equipped with Direct Link Nodes (DLN) and is placed in both LN-1 and the DLN.

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, for details.

Note: This procedure assumes that only one node in the ring has dropped from service. For multiple node outages, repeat the procedure for each out-of-service (OOS) node.

PROCEDURE

1. Allow the Automatic Ring Recovery (ARR) software to restore the faulty node if possible. Use the **OP:DMQ** command to view ARR's restore requests.

Note: The ARR software does not attempt to restore the same node after a maximum of three attempts have failed.

2. At the Master Control Center (MCC), view Page 118 to verify that the PWR ALM indicator is **not** backlit red. If the indicator is backlit, then the problem is more likely to be a power converter. Refer to Procedure 4.4, Replace SSI CNI Power Pack 495FA, to recover the node.

3. To prevent the ARR software from attempting to recover nodes while circuit packs are being replaced, inhibit it using command **INH:DMQ:SRC=ARR;**
4. At the MCC, view Page 1520 to determine if the OOS node in the ring is isolated.
 - (a) If the OOS node is *not* isolated, continue with the next step.
 - (b) If the OOS node *is* isolated, go to Step 6.
5. Configure the ring to isolate the OOS node from the active (ACT) ring segment using one of the following:
 - For LNs and DLNs, use command **CFR:RING,LN_{xx}=y,EXCLUDE;**
 - For an RPCN, use command **CFR:RING,RPCN_{xx}=0,EXCLUDE;**

In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
6. Look at the Receive-Only Printer (ROP) Trouble Locating Procedure (TLP) to see what pack(s) have been identified as faulty.

Note: In the following steps, only replace one pack at a time.
7. **Caution:** *When inserting or removing circuit packs, be careful, since most circuit packs require considerable force to insert or remove. Inspect the circuit pack edge connector and the backplane connector for bent or missing pins.*

Remove the faulty pack from the frame and install an appropriate replacement.

Note: Before pulling the circuit pack, make sure that packs have both the Ring Quarantine (RQ) and No Token (NT) lights illuminated. If the lights are not on, go back to Step 5 and remove the node from the ACT ring segment.
8. Diagnose the OOS node running all phases using one of the following:
 - For LNs and DLNs, use command **DGN:LN_{xx}=y,RAW,TLP;**
 - For an RPCN, use command **DGN:RPCN_{xx}=0,RAW,TLP;**

In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
9. If the diagnostics again fail listing the pack just replaced, the original pack is good and can be used again. Look at the TLP listing again and choose the next circuit pack down on the list and return to Step 6.
10. Restore the node unconditionally using one of the following:
 - For LNs and DLNs, use command **RST:LN_{xx}=y,UCL;**
 - For an RPCN, use command **RST:RPCN_{xx}=0,UCL;**

In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
11. All nodes in the ring should now be ACT. If other nodes in the ring are OOS, go back to Step 4 and restore these nodes.
12. At this point, allow the ARR software to execute for future node problems using command **ALW:DMQ,SRC=ARR;**
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.7 REPLACE IRN2 RING CIRCUIT PACK

OVERVIEW

This procedure is used to replace Common Network Interface (CNI) Integrated Ring Node-2 (IRN2) circuit packs. It is **not** used for the replacement of 410AA power converters that are used in the same frame. For power converter replacement, refer to Procedure 4.5, *Replace Common Network Interface IRN2 Power Pack 410AA*.

Several versions of the SS7 Link Interface (LI) pack (TN916) exist. Only the MC3F030A1 microcoded pack is supported on the IRN2 ring. Before replacing a Link Interface, verify that the new board has a MC3F030A1 microcode and not an older code (for example, MC3F003A1).

The node processor board used for the IRN2 Rings can be either a UN304 or a UN337B circuit pack. The UN304 and UN337B can be used interchangeably on all 5E14 and later offices. However, **only** the UN304 can be used only on 5E13 and earlier offices. No ECD changes are required with either pack. Note that a UN337 pack should **not** be used in any switch office; the UN337 **must** have at least a B suffix.

There are two types of Interframe Buffer (IFB) circuit packs for the IRN2 CNI Ring: TN1803 and TN1803B. These packs are also interchangeable. While several series of the TN1803B have been issued, use only series 2:5 or later. Any series of the TN1803 may be used.

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages* for details.

Note: This procedure assumes that only one node in the ring has dropped from service. For multiple node outages, repeat the procedure for each out-of-service (OOS) node.

PROCEDURE

1. Allow the Automatic Ring Recovery (ARR) software to restore the faulty node, if possible. Use the **OP:DMQ** command to view the ARR restore requests.
Note: The ARR software does **not** attempt to restore the same node after a maximum of three attempts have failed.
2. At the master control center (MCC), view Page 118 to verify that the PWR ALM indicator is not backlit red. If the indicator is backlit, then the problem is more likely to be a power converter. Use Procedure 4.5, *Replace Common Network Interface IRN2 Power Pack 410AA*, for replacing a 410AA to recover the node.
3. To prevent the ARR software from attempting to recover nodes while circuit packs are being replaced, inhibit it using the **INH:DMQ:SRC=ARR;** command.
4. At the MCC, view Page 1520 to determine if the OOS node in the ring is isolated.
 - If the OOS node is **not** isolated, continue with the next step.
 - If the OOS node **is** isolated, go to Step 6.
5. Configure the ring to isolate the OOS node from the active (ACT) ring segment using one of the following:
 - For LNs and DLNs, use the **CFR:RING,LNxx=y,EXCLUDE;** command.

- For an RPCN, use the **CFR:RING,RPCN_{xx}=0,EXCLUDE;** command.

In both cases, xx indicates the ring group (00, 01, 02, 32, 33 or 34) and y is any node member number (1-8).

6. Look at the receive-only printer (ROP) Trouble Locating Procedure (TLP) to see what pack(s) have been identified as faulty.

Note: In the following steps, only replace one pack at a time.

7. Verify that the NT light on the UN304/UN337B circuit pack is lit before replacing any of the nodes circuit packs.

Caution: *When inserting or removing circuit packs, be careful, since most circuit packs require considerable force to insert or remove. Inspect the circuit pack edge connector and the backplane connector for bent or missing pins.*

- If the NT light is **not** lit but the RQ light is lit, then the configuration attempt failed; repeat Step 5.
- If the NT light **is** lit, remove the faulty pack from the frame and install an appropriate replacement.

8. Diagnose the OOS node running all phases using one of the following:

- For LNs and DLNs, use the **DGN:LN_{xx}=y,RAW,TLP;** command.
- For an RPCN, use the **DGN:RPCN_{xx}=0,RAW,TLP;** command.

In both cases, xx indicates the ring group (00, 01, 02, 32, 33 or 34) and y is any node member number (1-8).

9. If the diagnostics again fail listing the pack just replaced, the original pack is good and can be used again. Look at the TLP listing again, choose the next circuit pack on the list, and repeat Step 5.

10. Restore the node unconditionally using one of the following:

- For LNs and DLNs, use the **RST:LN_{xx}=y,UCL;** command.
- For a RPCN, use the **RST:RPCN_{xx}=0,UCL;** command.

In both cases, xx indicates the ring group (00, 01, 02, 32, 33 or 34) and y is any node member number (1-8).

11. All nodes in the ring should now be active (ACT). If other nodes in the ring are OOS, go back to Step 4 to restore these nodes.

12. At this point, allow the ARR software to execute for future node problems using the **ALW:DMQ,SRC=ARR;** command.

13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.8 REPLACE CNI DFA CIRCUIT PACK AND DATASET

OVERVIEW

This procedure is used to replace the TF10B, TF9, or 2556A Dataset in the COMMON NETWORK INTERFACE (CNI) DIGITAL FACILITY ACCESS (DFA) cabinet when diagnostic phase 48 fails on the transmission side of the Link Interface.

The DFA cabinet converts the RS449 protocol to V.35 via the TF9 circuit pack. This signal is then fed into the Digital Service Unit (DSU) or dataset. The dataset then sends out a 56K DDS signal to the transmission facilities. The TF10B circuit pack powers the dataset. When there is a problem with the connection from the Link Interface (LI) to the dataset, diagnostic phase 48 fails.

Diagnostic phase 48 does a loop-around test using the dataset's built-in self-loop feature. It sends a prearranged signal to the dataset and expects to receive the signal back on the incoming side. This test continues for about 30 seconds.

If the node is failing any other diagnostic phase other than 48, use Procedure 4.6, Replace CNI Ring Circuit Pack. If the Signaling Link is not staying up, but the node passes diagnostics **seek technical assistance**.

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, for details.

Note: This procedure assumes that only one node has failed diagnostics. For multiple node outages, repeat the procedure for each failing node.

PROCEDURE

1. Allow Automatic Ring Recovery (ARR) software to restore faulty node if possible. Use the **OP:DMQ** command to view ARR's restore requests.
Note: ARR does not attempt to restore the same node after a maximum of three attempts have failed.
2. At the Master Control Center (MCC), view Page 118 to see if the PWR ALM indicator is backlit red.
If the PWR ALM indicator is backlit red, continue with the next step.
If not, then continue with Step 6.
3. Find the blown fuse in the DFA cabinet and locate the TF9 or TF10B circuit pack that it feeds. Unseat the TF9/TF10B.
4. Replace the blown fuse with the same type fuse.
5. Reseat the TF9/TF10B previously unseated.
6. Restore the node to service using command **RST:LNxx=y,RAW,TLP**
7. If phase 48 fails, then continue with the next step.
If the test does not fail go to Step 17.
8. At this point, it is not known which hardware is the cause of the failure; the TF9 or dataset. However, the TF9 has a higher failure rate than the dataset.
9. Locate the TF9 associated with failing node and replace it.
10. Restore the node to service using command **RST:LNxx=y,RAW,TLP**

11. If phase 48 fails, then continue with the next step.
If the test does not fail go to Step 17.
12. Locate the dataset associated with failing node. Remove the DDS, V.35 and power connectors. Be careful when removing the power connector, it is attached using a plastic clip. The clip must be pulled back before the connector can be removed.
13. Remove the old dataset and lay it next to the replacement. Set the replacement Dual In-line Package (DIP) switch and jumpers identically to the old dataset settings. There is a total of 12 switches per DSU; 1 DIP switch and 11 strap plug/jumpers (3 near the back of the DSU, 7 on the side and 1 on the front).
14. Install replacement dataset and connect DDS, V.35, and power.
15. Restore the node to service using command RST:LNxx=y,RAW,TLP
16. If phase 48 fails, **seek technical assistance.**
17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.9 REPLACE CNI BAT BOARD

OVERVIEW

This procedure is used to replace the Backplane Attached Terminator (BAT) dataset when diagnostic phase 48 fails on the transmission side of the Link Interface (LI).

Note: If the node is passing diagnostics but the link will not restore, see if the Local-Loop (LL) light is lit on the BAT board. This problem exists when a LI pack fails to release the loop lead on the BAT card and can only be fixed by replacing the TN916 circuit pack. Use the Common Network Interface (CNI) circuit pack replacement procedure for your Ring (that is, SSI or IRN2) to replace the LI card.

The BAT dataset replaces the DFA cabinet that had been used on SSI and the early IRN2 Rings. Instead of being in a separate cabinet, the BAT board is attached to the back of the LI card it serves. This eliminates cabling and power issues that existed with the old Digital Facility Access (DFA) frame.

Diagnostic phase 48 does a loop-a-round test using the dataset's built-in self-loop feature. It sends a prearranged signal to the dataset and expects to receive the signal back on the incoming side. This test continues for about 30 seconds.

If the Signaling Link is going in and out of service and the node passes diagnostics, **seek technical assistance.**

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages* for details.

Note: This procedure assumes that only one node has failed diagnostics. **For multiple node failures, repeat the procedure for each failing node.**

PROCEDURE

1. Allow Automatic Ring Recovery (ARR) software to restore the faulty node if possible. Use the **OP:DMQ** command to view the ARR restore requests.
Note: ARR does not attempt to restore the same node after a maximum of three attempts have failed.
2. At the Master Control Center (MCC), view Page 1520 with poke 400 to see if the failed node is in the isolated (ISO) segment.
If the node is not ISO, then isolate it from the active ring using the **CFR:RING,LNxx=y,EXCLUDE;** command.
Where xx is the group number (00, 01, 02, 32, 33, or 34) and y is the member number (1-8).
3. At the front of the Ring cabinet, verify that the red **NT** light on the TN922(SS1) or UN304/UN337B(IRN2) is lit. If the light is not lit, then the configuration failed and must be repeated.
4. At the front of the Ring cabinet, unseat the TN916 associated with the failing node.
5. At the back of the cabinet, loosen the retaining clip from the top and bottom (if present) of the BAT board being replaced.
6. Remove the modular TELCO cable connected to the BAT board.

7. Remove the BAT board.
8. ***Before inserting the new BAT board, check the dip switches on the faceplate.*** Typically, all the switches will be set to the left. If the old BAT board has different settings, then set the replacement BAT switches to match.
9. Install the replacement BAT board.
10. The BAT will go through a self-test when it first receives power from the backplane. Repeat the self-test by simultaneously holding the **SELECT** and **START/STOP** buttons until all lights flash **five** times. Then, release.
11. Look for the following results:
 - The lights fan out in a Christmas tree fashion from the red **NS** light several times.
 - The yellow **TP** light will then be lit for several seconds while a self-loop test is executed.
 - The **TP** light will extinguish.
 - The **NS** light will light.
 - If the red **ERR** light is lit after the **TP** is turned off, then either the replacement BAT is defective, or there is a problem on the backplane unit. Try another BAT board first; if that fails, ***seek technical assistance.***
12. Connect the modular TELCO cable to the replacement BAT board.
13. Verify that the **NS** light is extinguished and the green **CD** light is lit. This indicates that the BAT is seeing clocking from the other end of the cable.
14. Tighten the retaining clip(s) for the replacement BAT.
15. At the front of the cabinet, reseal the TN916 circuit pack.
16. At the MCC, restore the node to service using the **RST:LNxx=y,RAW,TLP;** command, where xx is the group number (00, 01, 02, 32, 33, or 34), and y is the member number (1-8).
17. The node should complete diagnostics All Tests Pass (ATP) and restore to service. If the node restores but the link fails to go into service, then ***seek technical assistance.***
18. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

4.10 CNI RING REMOVE/RESTORE INTRODUCTION

OVERVIEW

The Common Network Interface (CNI) Ring units **do not** have to be powered down to work on them. They **do** need to be removed from service. The rest of the procedures in this section are used to remove and restore the CNI nodes located in the Integrated Ring Node Model 2 (IRN2) ring node cabinet and the Small-Scale Integration (SSI) cabinet.

Before using these procedures, start with 235-105-220, Procedure 4.1 to do the following:

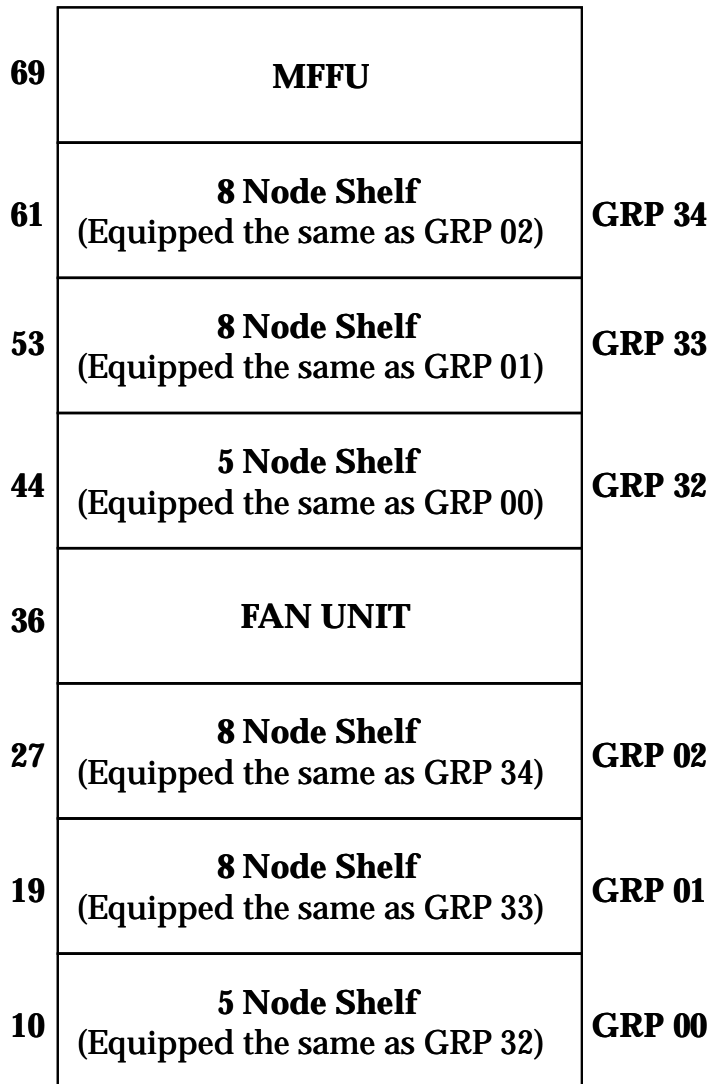
1. Identify the unit to be serviced.
2. Properly remove and/or isolate a unit from service.
3. Locate the unit and verify that it is out-of-service.

Note: If a circuit pack needs replacing, refer to 235-105-220, Procedure 4.3 before replacing a circuit pack.

There are no power switches on any of the units or nodes in the Integrated Ring Node-2 (IRN2) cabinet. The 1520 Ring Node Status page is a dynamic display of the CNI nodes, groups, and members. Before performing this procedure, you must understand this MCC page. For a detailed description of this page, refer to 235-105-110, *System Maintenance Requirements and Tools*.

If the 1520 page shows that a DLN, LN, or RPCN is out-of-service *and* isolated from the ring, then its circuit packs can be removed and replaced while power is on.

Figure 4.10-1 shows the cabinet layout. Figure 4.10-2 shows the 5-node shelf layout. Figure 4.10-3 shows the 8-node shelf layout.



Ring Node Cabinet (IRN2)

Figure 4.10-1 — CNI IRN2 Ring Node Cabinet

5 Node Shelf

(*)=GRP# 00 [VEQL 10] & 32 [VEQL 44]

P W R	I F B	RPCN (*) 0				LN (*) 1		DLN (*) 2				LN (*) 3		LN (*) 4		I F B	P W R				
		008	016	024	034	042	050	058	068	076	084	094	102	110	118			126	136	144	152
4 1 0 A A	T N 1 8 0 3	I R N 2 **	B L A N K	T N 9 1 4	T N 6 9 B	I R N 2 **	B L A N K	T N 9 1 6	I R N 2 **	B L A N K	T N 1 6 3 0 B	T N 9 1 4	T N 6 9 B	I R N 2 **	B L A N K	T N 9 1 6	I R N 2 **	T N 9 1 6	T N 9 1 6	T N 1 8 0 3 ***	4 1 0 A A

** = IRN2 can be either a UN304 or UN337B
*** = IFB is not needed if the next shelf up is equipped

Figure 4.10-2 — CNI IRN2 5-Node Shelf

8 Node Shelf

(*)=GRP# 01 [VEQL 19] & 33 [VEQL 53] and 02 [VEQL 27] & 34 [VEQL 61]

P W R	I F B	LN (*) 1	LN (*) 2	LN (*) 3	LN (*) 4	LN (*) 5	LN (*) 6	LN (*) 7	LN (*) 8	I F B	P W R											
		008	016	024	034	042	052	060	070			078	090	098	108	116	126	134	144	152	162	170
4 1 0 A A	B L A N K	I R N 2 **	T N 9 1 6	I R N 2 **	T N 9 1 6	I R N 2 **	T N 9 1 6	I R N 2 **	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 9 1 6	T N 1 8 0 3 ***	4 1 0 A A

** = IRN2 can be either a UN304 or UN337B
*** = IFB is not needed if the next shelf up is equipped

Figure 4.10-3 — CNI IRN2 8-Node Shelf

PROCEDURE

1. The IRN2 nodes can be removed, restored, and configured with Procedure 4.11.
2. The SSI nodes can be removed, restored, and configured with Procedure 4.12

4.11 REMOVE AND RESTORE CNI IRN2 NODES

OVERVIEW

There are no power switches on any of the units or nodes in the Integrated Ring Node Model 2 (IRN2) cabinet. The 1520 Ring Node Status page is a dynamic display of the CNI nodes, groups, and members. Before performing this procedure, you must understand this MCC page. For a detailed description of this page, refer to 235-105-110, *System Maintenance Requirements and Tools*.

If the 1520 page shows that a DLN, LN, or RPCN is out-of-service *and* isolated from the ring, then its circuit packs can be removed and replaced while power is on.

Figure 4.10-1 shows the cabinet layout. Figure 4.10-2 shows the 5-node shelf layout. Figure 4.10-3 shows the 8-node shelf layout.

PROCEDURE

1. Remove the Ring Peripheral Control Node (RPCN):
 - a. At the maintenance terminal, enter the poke command on MCC Page 1520 or the input message (RMV:RPCNa=0;) to remove the Ring Peripheral Control Node (RPCN) from service.

Where: a = Ring node group number (00 or 32).
 - b. Verify that the RPCN is *OOS* on MCC Page 1520.
2. Restore the RPCN:
 - a. Before beginning the restore, verify that the *MAJOR STATE* of the RPCN is *OOS* on MCC Page 1520.
 - b. At the maintenance terminal, enter the poke command on MCC Page 1520 or the input message (RST:RPCNa=0,RAW,TLP;) to conditionally restore the RPCN to service.

Where: a = Ring node group number (00 or 32).
 - c. Verify that the *MAJOR STATE* of the RPCN is *ACT* on MCC Page 1520.
3. Remove the Direct Link Node/DLN-30:

Note: For 5E15 and later software releases (SRs), the DLN (SSI CNI) is not supported. Before the 5E15 or later SR can be retrofitted, one of the following actions must be performed:

 - Degrow the DLN (SSI RPCN and LNs are still supported)
 - Convert all nodes to the IRN2 CNI hardware configuration (RPCN, DLN30, LNs).

The Direct Link Node/DLN-30 (DLN30) is LN00/32, 02.

 - a. At the maintenance terminal, enter the poke command on MCC Page 1520 or the input message (RMV:LNa=2;) to remove the LN from service.

Where: a = Ring node group number (00 or 32).
 - b. Verify that the LN is *OOS* on MCC Page 1520.
4. Restore the DLN/DLN30:

Note: The DLN/DLN30 is LN00/32, 02.

- a. Before beginning the restore, verify that the *MAJOR STATE* of the LN is *OOS* on MCC Page 1520.
 - b. At the maintenance terminal, enter the poke command on MCC Page 1520 or the input message (RST:LNa=2, RAW, TLP;) to conditionally restore the LN to service.
Where: a = Ring node group number (00 or 32).
 - c. Verify that the *MAJOR STATE* of the LN is *ACT* on MCC Page 1520.
5. Remove a Link Node:
- a. At the maintenance terminal, enter the poke command on MCC Page 1520 or the input message (RMV:LNa=b;) to remove the Link Node (LN) from service.
Where: a = Ring node group number (00, 01, 02, 32, 33, or 34)
b = Node position/member/name number (1-8).
 - b. Verify that the LN is *OOS* on MCC Page 1520.
6. Restore a Link Node:
- a. Before beginning the restore, verify that the *MAJOR STATE* of the LN is *OOS* on MCC Page 1520.
 - b. At the maintenance terminal, enter the poke command on MCC Page 1520 or the input message (RST:LNa=b, RAW, TLP;) to conditionally restore the LN to service.
Where: a = Ring node group number (00, 01, 02, 32, 33, or 34)
b = Node position/member/name number (1-8).
 - c. Verify that the *MAJOR STATE* of the LN is *ACT* on MCC Page 1520.

4.12 REMOVE AND RESTORE CNI SSI NODES

OVERVIEW

There are no power switches on any of the units or nodes in the Small-Scale Integration (SSI) ring node cabinet. The 1520 Ring Node Status page is a dynamic display of the CNI nodes, groups, and members. Before performing this procedure, you must understand this MCC page. For a detailed description of this page, refer to 235-105-110, *System Maintenance Requirements and Tools*.

If the 1520 page shows that a DLN, LN, or RPCN is out-of-service *and* isolated from the ring, then its circuit packs can be removed and replaced while power is on. However, also verify that the LED on a circuit pack having either RING QUARANTINE (RQ) or NO TOKEN (NT) indicator is on. If the LED is *not* on, then the node has not been properly isolated from the ACT ring segment.

Figure 4.12-1 shows the cabinet layout. Figure 4.12-2 and Figure 4.12-3 show the 2-node shelf layout. Figure 4.12-4 shows the 3-node shelf layout.

PROCEDURE

1. To remove a Ring Peripheral Control Node (RPCN) — see IRN2 Procedure 4.11.
2. To restore a RPCN — see IRN2 Procedure 4.11.
3. **Note:** For 5E15 and later software releases (SRs), the DLN (SSI CNI) is not supported. Before the 5E15 or later SR can be retrofitted, one of the following actions must be performed:
 - Degrow the DLN (SSI RPCN and LNs are still supported)
 - Convert all nodes to the IRN2 CNI hardware configuration (RPCN, DLN30, LNs).To remove a Direct Link Node/Direct Link Node30 (DLN/DLN30) — see IRN2 Procedure 4.11.
4. To restore a Direct Link Node/Direct Link Node30 (DLN/DLN30) — see IRN2 Procedure 4.11.
5. Remove a Link Node:
 - a. At maintenance terminal, enter the poke command on MCC page 1520 or the input message (RMV:LN**a**=**b**;) to remove the LN from service.
Where: **a** = Ring node group number (00 or 32)
 b = Node position/member/name number [1, 2 (DLN not equipped), 3, 4, 5 or 6].
 - b. Verify the LN is *OOS* on MCC page 1520.
6. Restore a Link Node:
 - a. Before beginning the restore, verify the *MAJOR STATE* of the LN is *OOS* on MCC Page 1520.
 - b. At the maintenance terminal, enter the poke command to restore the RPCN conditional on MCC page 1520 or the input message (RST:LN**a**=**b**;) to restore the LN to service.
Where: **a** = Ring node group number (00 or 32)

b = Node position/member/name number [1, 2 (DLN not equipped), 3, 4, 5 or 6].

- c. Verify the *MAJOR STATE* of the LN is *ACT* on MCC page 1520.
- d. If the LN *RING POSITION* on the 1520 page is *ISO* (isolated) the following message will include the node in the active ring:

CFR:RING, LNa=b: INCLUDE;

Where: a = Ring node group number (00 or 32)
 b = Node position/member/name number [1, 2 (DLN not equipped), 3, 4, 5 or 6].

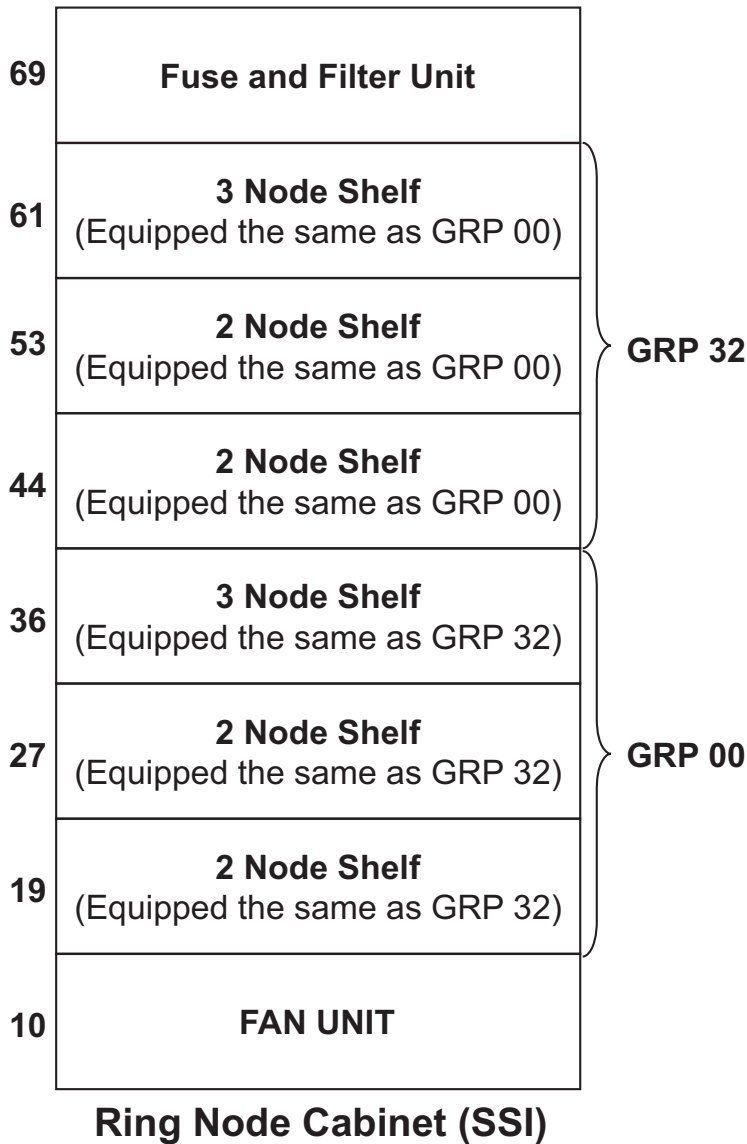


Figure 4.12-1 — CNI SSI Ring Node Cabinet

2 Node Shelf With DLN
(*)=GRP# 00 [VEQL 28] & 32 [VEQL 53]

P W R	I F R B	DLN (*) 2								B L A N K	LN (*) 3					I F B	P W R
		018	026	034	042	050	058	068	078		086	118	126	134	142		
4	T	T	T	B	U	U	T	T		T	B	T	U	U	I	4	
9	N	N	N	L	N	N	N	N		N	L	N	N	N	F	9	
5	9	9	1	A	1	1	9	6		9	A	9	1	1	5		
F	1	2	3	N	2	2	1	9		2	N	1	2	2	B		
A	8	2	4	K	2	3	4	B		2	K	6	2	3	**		
	***		0														

** = IFB can be TN915 or TN1803 and is not needed if the next shelf up is equipped
*** = TN918 only needed if LN(00/32)-1 is equipped

Figure 4.12-2 — CNI SSI 2-Node Shelf (DLN shelf)

2 Node Shelf With RPCN
(*)=GRP# 00 [VEQL 19] & 32 [VEQL 45]

P W R	I F R B	RPCN (*) 0								B L A N K	LN (*) 1					I F B	P W R
		018	026	034	042	050	058	068	078		086	118	126	134	142		
4	T	T	B	B	U	U	T	T		T	B	T	U	U	I	4	
9	N	N	L	L	N	N	N	N		N	L	N	N	N	F	9	
5	9	9	A	A	1	1	9	6		9	A	9	1	1	5		
F	1	2	N	N	2	2	1	9		2	N	1	2	2	B		
A	8	2	K	K	2	3	4	B		2	K	6	2	3	***		

** = IFB can be a TN915 or TN1803
*** = TN915/TN1803 if last node in GRP. TN918 if DLN is equipped. Otherwise, blank.

Figure 4.12-3 — CNI SSI 2-Node Shelf (RPCN shelf)

3 Node Shelf

(*)=GRP# 00 [VEQL 37] & 32 [VEQL 62]

P W R	I F B	LN (*) 6						LN (*) 5					LN (*) 4					I F B	P W R
		018	026	034	042	050	058	068	076	084	092	100	110	118	126	134	142		
4	9	T	B	T	U	U	T	B	T	U	U	T	B	T	U	U	B	4	9
5	I	N	L	N	N	N	N	L	N	N	N	N	L	N	N	N	L	5	5
F	F	9	A	9	1	2	2	A	9	1	2	2	A	9	1	2	A	F	F
A	B	2	N	1	2	3	2	N	1	2	3	2	N	1	2	3	N	A	A
	**	2	K	6	2			K	6				K	6			K		

** = IFB can be either a TN915 or TN1803

Figure 4.12-4 — CNI SSI 3-Node Shelf

Corrective Maintenance Procedures

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5. COMMUNICATIONS MODULE MAINTENANCE

Caution: *The use of unconditional removals or manual override power downs is NOT recommended (unless the office or affected SM/SM-2000 is in min-mode operation), because call processing may be detrimentally affected. The failure or denial of conditional removals usually indicates that mate side hardware must be repaired first.*

Note: *For CM2*, if the unit to be diagnosed is an Office Network and Timing Complex Common (ONTCCOM), MI, NC, TMS, or QLPS, the diagnostic may be stopped because a STBY “helper FPC” is not available. Either the OOS FPC must be repaired first, or, if the OOS FPC and its parent MSCU hardware is thought to be fault-free, an option **helper=x** (where **x** is the MSGS side associated with the OOS FPC) attempts to use that FPC as a “helper.” If the unit to be diagnosed is a QLPS, the parent ONTCCOM must also be removed as a “helper unit.” This request could be denied for a variety of reasons, all implicitly referring to problems with other hardware, which must be resolved first. (Typical hardware units implicated are an OOS/DGR mate ONTCCOM, OOS QLPSs on the mate ONTCCOM, OOS QGPs, or CLNKs/MMPs.) Also, these diagnostics cause the Office Network and Timing Complex (ONTC) to be simplexed. This may cause stable calls to be dropped if the mate ONTC is degraded. Therefore, it may be best to wait for a low-traffic period. Tables 5.1-1 and 5.1-2 list the input messages and command pokes that are used to diagnose/restore **CM2** units.

For CM3, the FPC is no longer a helper unit of the ONTCCOM, and the ONTCCOM and FPC are no longer helper units for the QLPS. In CM2 offices, input commands can be used to diagnose the NC and TMS components of the ONTCCOM, as well as the ONTCCOM as a whole. In CM3 offices, the NC and TMS cannot be diagnosed individually, only as part of the ONTCCOM diagnostic. **For 5E16.2 and later**, all CM3 TMS functionality except for the TMS controller is tested as part of the TMSFP diagnostic. Both CM2 and CM3 support separate diagnostics for the QLPS, NLI, and DLI sub-units of the ONTC. Tables 5.1-3 and 5.1-4 list the input messages and command pokes that are used to diagnose/restore **CM3** units.

The following tables provide more information for CM3.

CM3 for 5E16.1 and Earlier	
Board Replaced	Relevant Diagnostics
TMSF	ONTCCOM
	QLPS
	NLI/DLI (for those NLIs/DLIs associated with the board that was replaced)
TMSX	ONTCCOM
	NLI/DLI (for those NLIs/DLIs associated with the board that was replaced)

CM3 for 5E16.2 and Later	
Board Replaced	Relevant Diagnostics
TMSF	TMSFP (for which a board was replaced)
	QLPS (if TMSF associated with TMSFP 0)
	NLI/DLI (for those NLIs/DLIs associated with the board that was replaced)
TMSX	TMSFP (for which a board was replaced)

CM3 for 5E16.2 and Later	
Board Replaced	Relevant Diagnostics
	NLI/DLI (for those NLIs/DLIs associated with the board that was replaced)

5.1 VERIFY CM DIAGNOSTIC FAILURE PATTERN IS CONSISTENT

OVERVIEW

This procedure is used to determine if a CM hardware trouble causing a diagnostic failure in the 5ESS[®] switch is consistent or intermittent.

PROCEDURE

To determine if the CM failure pattern is *consistent* or *intermittent*, perform the following:

1. Obtain the original diagnostic failure (DGN STF) printout with the SUSPECTED FAULTY EQUIPMENT list generated by system diagnostics.
2. Determine if there is also a power alarm or fuse alarm active at the failing unit. If so, use Procedure 14.6, Respond to Fuse/Power Alarm Failure, to clear the power problem in the unit.
3. If the unit is not already removed from service, use the **REMOVE** poke command (on appropriate display page) or **RMV** input message (from 235-600-700, *Input Messages*) to remove the unit from service.
4. Then use the **DIAGNOSE** poke command or **DGN** input message to diagnose the unit/circuit and get a second STF printout and SUSPECTED FAULTY EQUIPMENT list.

Caution 1: *If repair of a forced unavailable MSCU or ONTCCOM is required, diagnose the unit, but do not attempt to restore it after repair is complete.*

Caution 2: *For CM2, if an ONTCCOM or QLPS is to be repaired and an FPC is OOS, but thought to be fault-free, that FPC can be used as a helper unit for the diagnostic. If a CM2 QLPS is to be repaired and its parent ONTCCOM is OOS or UNAV, but thought to be fault-free, the QLPS can be diagnosed but must not be restored after repair is complete.*

Diagnostics associated with some units may execute **interface tests**. This may cause the TLP listing to include suspected packs that are *not* owned by the unit being diagnosed. Some examples include a DLI/NLI diagnostic implicating a TMS pack (when TMSLNK phases are executed) or a QLPS diagnostic implicating a QGP (CM2) or MSGS (CM3), when QGL phases are executed. When this happens, it is important that conditional restores be scheduled for **both** the **original** unit and unit(s) associated with the suspected/replaced circuit pack. If the restore diagnosis fails on the **interface unit**, treat it as a **different** problem, starting at Step 1.

Note: A “forced switch” may be required before the other “on-line/active” unit/circuit can be removed. This may interrupt call processing; therefore, it is best to wait for a low-traffic period and **seek technical assistance**.

Tables 5.1-1 and 5.1-2 list the input messages and command pokes that are used to diagnose/restore **CM2** units. Tables 5.1-3 and 5.1-4 list the input messages and command pokes that are used to diagnose/restore **CM3** units.

5. Compare the two diagnostic failure printouts.

Note: When comparing the diagnostic printouts to determine a failure pattern, be sure to examine the phase (PH), segment (SEG), test (TEST), and mismatch (MM) numbers.

If the diagnostic fails and the STF output message (PH, SEG, TEST, and MM) numbers are the same as the original failure, go to Procedure 5.2, Clear Trouble in the CM.

If the diagnostic fails and the failure is inconsistent/intermittent, determine the dominant pattern. Then go to Procedure 5.2.

If the diagnostic fails and there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list. Then go to Procedure 5.2.

If the diagnostic fails for a DLI or NLI associated with an ORM or EXM TMS link, refer to Procedure 5.17.

If the diagnostic passes, diagnose the unit/circuit at least two more times. If the diagnostic continues to pass, record this incident and the failure pattern for future reference. Continue with the next step.

6. Use the **RESTORE** poke command or **RST** input message to restore the unit to service.

Table 5.1-1 — Input Messages or Command Pokes for Diagnosing and Restoring (In One Step) CM2 Units for Each Software Release

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
RST:MSG=0;	1240	300	ALL
RST:MSG=1;	1250	301	
RST:MSCU=0;	1240	310	ALL
RST:MSCU=1;	1250	311	
RST:FPC=0;	1241	340	ALL
RST:FPC=1;	1251	341	
RST:PPC=0;	1241	350	ALL
RST:PPC=1;	1251	351	
RST:CMP=0-XX; XX = CMP number	1241 CMP range 00-00	3XX	ALL
RST:CMP=1-XX; XX = CMP number	1251 CMP range 00-00	3XX	
RST:QGP=0-Y; Y=QGP number	1241 QGP range 0-1	370Y	ALL
RST:QGP=1-Y; Y=QGP number	1251 QGP range 0-1	371Y	
RST:MMP=0-XX; XX = MMP number	1242 MMP range 00-23	3XX	ALL
RST:MMP=0-XX; XX = MMP number	1243 MMP range 24-47	3XX	
RST:MMP=1-XX; XX = MMP number	1252 MMP range 00-23	3XX	
RST:MMP=1-XX; XX = MMP number	1253 MMP range 24-47	3XX	
RST:ONTCCOM=0;	1209	310	ALL
RST:ONTCCOM=1;	1209	311	
RST:QLPS=0-Y; Y=QLPS number	1209 QLPS range 0-1	320Y	ALL
RST:QLPS=1-Y; Y=QLPS number	1209 QLPS range 0-1	321Y	
RST:DLI=X-0; X=SM number	1200,X SM range 1-192	300	ALL
RST:DLI=X-1; X=SM number	1200,X SM range 1-192	301	
RST:NLI=X-YY-0; X=SM number YY=NLI number	1200,X SM range 1-192 NLI range 00-23	30YY	ALL
RST:NLI=X-YY-1;	1200,X	31YY	

Table 5.1-1 — Input Messages or Command Pokes for Diagnosing and Restoring (In One Step) CM2 Units for Each Software Release (Contd)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
X=SM number YY=NLI number	SM range 1-192 NLI range 00-23		

Table 5.1-2 — Input Messages or Command Pokes for Diagnosing and Restoring (CM2) (In Two Steps)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
DGN:MSGS=0,RAW,TLP; RST:MSGS=0,UCL;	1240 1240	530 300,UCL	ALL
DGN:MSGS=1,RAW,TLP; RST:MSGS=1,UCL;	1250 1250	531 301,UCL	
DGN:MSCU=0,RAW,TLP; RST:MSCU=0,UCL;	1240 1240	560 310,UCL	ALL
DGN:MSCU=1,RAW,TLP; RST:MSCU=1,UCL;	1250 1250	561 311,UCL	
DGN:FPC=0,RAW,TLP; RST:FPC=0,UCL;	1241 1241	540 340,UCL	ALL
DGN:FPC=1,RAW,TLP; RST:FPC=1,UCL;	1251 1251	541 341,UCL	
DGN:PPC=0,RAW,TLP; RST:PPC=0,UCL;	1241 1241	550 350,UCL	ALL
DGN:PPC=1,RAW,TLP; RST:PPC=1,UCL;	1251 1251	551 351,UCL	
DGN:CMP=0-XX,RAW,TLP; RST:CMP=0-XX,UCL; XX = CMP number	1241 1241 CMP range 00-00	5XX 3XX,UCL	ALL
DGN:CMP=1-XX,RAW,TLP; RST:CMP=1-XX,UCL; XX = CMP number	1251 1251 CMP range 00-00	5XX 3XX,UCL	
DGN:QGP=0-Y,RAW,TLP; RST:QGP=0-Y,UCL; Y=QGP number	1241 1241 QGP range 0-1	570Y 370Y,UCL	ALL
DGN:QGP=1-Y,RAW,TLP; RST:QGP=1-Y,UCL; Y=QGP number	1251 1251 QGP range 0-1	571Y 371Y,UCL	
DGN:MMP=0-XX,RAW,TLP; RST:MMP=0-XX,UCL; XX = MMP number	1242 1242 MMP range 00-23	5XX 3XX,UCL	ALL
DGN:MMP=1-XX,RAW,TLP;	1243	5XX	

Table 5.1-2 — Input Messages or Command Pokes for Diagnosing and Restoring (CM2) (In Two Steps) (Contd)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
RST:MMP=0-XX,UCL; XX = MMP number DGN:MMP=1-XX,RAW,TLP; RST:MMP=1-XX,UCL; XX = MMP number DGN:MMP=1-XX,RAW,TLP; RST:MMP=1-XX,UCL; XX = MMP number	1243 MMP range 24-47 1252 1252 MMP range 00-23 1253 1253 MMP range 24-47	3XX,UCL 5XX 3XX,UCL 5XX 3XX,UCL	
DGN:ONTCCOM=0,RAW,TLP; RST:ONTCCOM=0,UCL; DGN:ONTCCOM=1,RAW,TLP; RST:ONTCCOM=1,UCL;	1209 1209 1209 1209	510 310,UCL 511 311,UCL	ALL
DGN:NC=0,RAW,TLP; RST:ONTCCOM=0,UCL; DGN:NC=1,RAW,TLP; RST:ONTCCOM=1,UCL;	1210 1210 1210 1210	520 300,UCL 521 301,UCL	ALL
DGN:TMS=0,RAW,TLP; RST:ONTCCOM=0,UCL; DGN:TMS=1,RAW,TLP; RST:ONTCCOM=1,UCL;	1220 1220 1220 1220	510 300,UCL 511 301,UCL	ALL
DGN:DLI=X-0,RAW,TLP; RST:DLI=X-0,UCL; X = SM number DGN:DLI=X-1,RAW,TLP; RST:DLI=X-1,UCL; X = SM number	1200,X 1200,X SM range 1-192 1200,X 1200,X SM range 1-192	500 300,UCL 501 301,UCL	ALL
DGN:NLI=X-YY-0,RAW,TLP; RST:NLI=X-YY-0,UCL; X=SM number YY=NLI number DGN:NLI=X-YY-1,RAW,TLP; RST:NLI=X-YY-1,UCL; X=SM number YY=NLI number	1200,X SM range 1-192 NLI range 0-23 1200,X SM range 1-192 NLI range 0-23	50YY 30YY,UCL 51YY 31YY,UCL	ALL

Table 5.1-3 — Input Messages or Command Pokes for Diagnosing and Restoring (In One Step) CM3 Units for Each Software Release (CM3 Initially Offered with Software Release 5E15)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
RST:MSG=0; ^a	1240	300	ALL
RST:MSG=1; ^a	1250	301	
RST:ONTCCOM=0;	1209	310	Prior to 5E16.2
RST:ONTCCOM=1;	1209	311	
The ONTCCOM diagnostic covers the NCC, NCOSC, TMSF, and TMSX boards.			
RST:ONTCCOM=0;	1209	310	5E16.2 and Later
RST:ONTCCOM=1;	1209	311	
The ONTCCOM diagnostic covers the NCC and NCOSC boards.			
RST:QLPS=0-Y; Y=QLPS number	1209 QLPS range 0-1	320Y	Prior to 5E16.2
RST:QLPS=1-Y; Y=QLPS number	1209 QLPS range 0-1	321Y	
RST:QLPS=0-Y; Y=QLPS number	1214 QLPS range 0-1	300Y	5E16.2 and Later
RST:QLPS=1-Y; Y=QLPS number	1214 QLPS range 0-1	301Y	
RST:DLI=X-0; X=SM number	1200,X SM range 1-192	300	ALL
RST:DLI=X-1; X=SM number	1200,X SM range 1-192	301	
RST:NLI=X-YY-0; X=SM number YY=NLI number	1200,X SM range 1-192 NLI range 00-23	30YY	ALL
RST:NLI=X-YY-1; X=SM number YY=NLI number	1200,X SM range 1-192 NLI range 00-23	31YY	

See note(s) at end of table.

Table 5.1-3 — Input Messages or Command Pokes for Diagnosing and Restoring (In One Step) CM3 Units for Each Software Release (CM3 Initially Offered with Software Release 5E15) (Contd)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
RST:ONTC=0;	1209	300	ALL
RST:ONTC=1;	1209	301	
[RST:ONTC includes the ONTCCOM, TMSFP (5E16.2 and Later), NLI/DLI, and QLPS]			
RST:TMSFP=0-Y; Y=TMSFP number	1212 (TMSFP range 0-3)	300Y	5E16.2 and Later
RST:TMSFP=1-Y; Y=TMSFP number	1212 (TMSFP range 0-3)	301Y	
<p>Note(s):</p> <p>a. MSGS sub-units (MSCU, FPC, CMP, MMP, QGP, PPC, ENETWK) are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, their diagnostic tests are only run as part of the MSGS diagnostic). An FPC/CMP/MMP/QGP/PPC conditional restore will perform operational tests prior to restoring the unit to service. To diagnose/restore an out-of-service MSCU or ENETWK, use the MSGS conditional restore command.</p>			

Table 5.1-4 — Input Messages or Command Pokes for Diagnosing and Restoring (In Two Steps) for CM3 (CM3 Initially Offered with Software Release 5E15)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
DGN:MSG=0,RAW,TLP; ^a RST:MSG=0,UCL;	1240 1240	500 300,UCL	ALL
DGN:MSG=1,RAW,TLP; ^a RST:MSG=1,UCL;	1250 1250	501 301,UCL	
DGN:ONTCCOM=0,RAW,TLP; RST:ONTCCOM=0,UCL;	1209 1209	510 310,UCL	Prior to 5E16.2
DGN:ONTCCOM=1,RAW,TLP; RST:ONTCCOM=1,UCL;	1209 1209	511 311,UCL	
The ONTCCOM diagnostic covers the NCC, NCOSC, TMSF, and TMSX boards.			
DGN:ONTCCOM=0,RAW,TLP; RST:ONTCCOM=0,UCL;	1209 1209	510 310,UCL	5E16.2 and Later
DGN:ONTCCOM=1,RAW,TLP; RST:ONTCCOM=1,UCL;	1209 1209	511 311,UCL	
The ONTCCOM diagnostic covers the NCC and NCOSC boards.			
DGN:QLPS=0-Y,RAW,TLP; RST:QLPS=0-Y,UCL;	1209 1209	520Y 320Y, UCL	Prior to 5E16.2
Y=QLPSNW (0 or 1)			
DGN:QLPS=1-Y,RAW,TLP; RST:QLPS=1-Y,UCL;	1209 1209	521Y 321Y, UCL	
Y=QLPSNW (0 or 1)			
DGN:QLPS=0-Y,RAW,TLP; RST:QLPS=0-Y,UCL ; Y=QLPSNW (0 or 1)	1214 1214	500Y 300Y, UCL	5E16.2 and Later
DGN:QLPS=1-Y,RAW,TLP RST:QLPS=1-Y,UCL; Y=QLPSNW (0 or 1)	1214 1214	501Y 301Y, UCL	
RST:ONTC=0; RST:ONTC=1;	1209 1209	300 301	ALL
[RST:ONTC includes the ONTCCOM, TMSFP (5E16.2 and Later), NLI/DLI, and QLPS.] ^b			
DGN:DLI=X-0,RAW,TLP;	1200,X	500	ALL

See note(s) at end of table.

Table 5.1-4 — Input Messages or Command Pokes for Diagnosing and Restoring (In Two Steps) for CM3 (CM3 Initially Offered with Software Release 5E15) (Contd)

INPUT MESSAGE	CORRESPONDING MCC DISPLAY PAGE	POKE COMMAND	SOFTWARE RELEASE RANGE
RST:DLI=X-0,UCL; X = SM number	1200,X SM range 1-192	300,UCL	
DGN:DLI=X-1,RAW,TLP; RST:DLI=X-1,UCL; X = SM number	1200,X 1200,X SM range 1-192	501 301,UCL	
DGN:TMSFP=0-Y,RAW,TLP; RST:TMSFP=0-Y,UCL; Y=TMSFP number	1212 (TMSFP range 0-3)	510Y 310Y,UCL	5E16.2 and Later
DGN:TMSFP=1-Y,RAW,TLP; RST:TMSFP=1-Y,UCL; Y=TMSFP number	1212 (TMSFP range 0-3)	511Y 311Y,UCL	
DGN:NLI=X-YY-0,RAW,TLP; RST:NLI=X-YY-0,UCL; X=SM number YY=NLI number	1200,X SM range 1-192 NLI range 0-23	50YY 30YY,UCL	ALL
DGN:NLI=X-YY-1,RAW,TLP; RST:NLI=X-YY-1,UCL; X=SM number YY=NLI number	1200,X SM range 1-192 NLI range 0-23	51YY 31YY,UCL	
<p>Note(s):</p> <p>a. MSGS sub-units (MSCU, FPC, CMP, MMP, QGP, PPC, ENETWK) are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, their diagnostic tests are only run as part of the MSGS diagnostic). An FPC/CMP/MMP/QGP/PPC conditional restore will perform operational tests prior to restoring the unit to service. To diagnose/restore an out-of-service MSCU or ENETWK, use the MSGS conditional restore command.</p> <p>b. There is no two-step sequence to diagnose and then unconditionally restore the entire ONTC. The conditional RST:ONTC command will cause the ONTCCOM, TMSFPs (5E16.2 and later), NLI/DLIs, and QLPSs to be diagnosed and those that pass diagnostics will be restored to service.</p>			

5.2 CLEAR TROUBLE IN THE CM

OVERVIEW

This is a simplified procedure for clearing a CM hardware trouble causing a diagnostic failure in the 5ESS[®] Switch. For a detailed CM trouble-clearing procedure, refer to Procedure 5.3.

Appendix A1, Diagnostic Phase Descriptions, contains the diagnostic phase descriptive information for all hardware (units/circuits) of the 5ESS switch.

PROCEDURE

To clear trouble in the CM, perform the following:

1. Examine the next pack on the SUSPECTED FAULTY EQUIPMENT list.
 - (a) If entries on SUSPECTED FAULTY EQUIPMENT list have been exhausted, go to Step 6.
 - (b) If a Note number appears in the last column on the SUSPECTED FAULTY EQUIPMENT list, obtain the text for the Note before replacing the pack to see what precautions or additional procedures are recommended. The text for the Note can be obtained by entering the **OP:TLPNOTE=n** command, where **n** is the Note number.
 - (c) **Note:** Diagnostics associated with some units may execute **interface tests**. This may cause the TLP listing to include suspected packs that are **not** owned by the unit being diagnosed. Some examples include a DLI/NLI diagnostic implicating a TMS pack (when TMSLNK phases are executed) or a QLPS diagnostic implicating a QGP (CM2) or MSGS (CM3), when QGL phases are executed.

If this pack is owned by the unit being diagnosed, continue to Step 2.
 - (d) If the pack is owned by another unit, remove and diagnose the other unit.
Note: A “forced switch” may be required before the other “on-line/active” unit/circuit can be removed. This may interrupt call processing; therefore, it is best to wait for a low-traffic period and **seek technical assistance**.
 - (e) If the diagnostic for the other circuit is STF, choose which diagnostic (and SUSPECTED FAULTY EQUIPMENT list) to continue working (it is usually best to work the circuit that is highest in the control hierarchy).
2. Use Procedure 5.24 to replace the suspected circuit pack.
Note: The replacement pack vintage must be equal to or greater than the minimum code and series specified in the SUSPECTED FAULTY EQUIPMENT list printout (per “DGN” pages in 235-600-750, *Output Messages*). For example, when code “TN1077” minimum series “5” is printed, the replacement pack could be either a TN1077 Series 5 (or later), or TN1077B (any series), or TN1077C (any series), etc. The microcode number (for example, MC5D045A1) is printed for “microcoded” packs. In all cases, the replacement pack vintage must be *equal to or greater* than that printed. For example, when code “MC5D045A3D” minimum issue “2” is printed, the replacement pack could be either an MC5D045A3D Issue 2 (or later), an MC5D045A4D (any issue), or an MC5D045A3E (any issue), etc.
3. Determine whether the pack replacement cleared the failure.

- (a) Diagnose the circuit.

Note 1: You can save time by running only one phase (that was failing previously) of the diagnostic using the PH option in the DGN input request.

Note 2: When working an intermittent/inconsistent failure, several runs of the diagnostic/phase may be required to know if the pack replacement has cleared the problem.

- (b) If the diagnostic result is all tests passed (ATP), go to Step 4.
- (c) If identical STF is outputted (PH, SEG, TEST, and MM), return original pack to the unit and go to Step 1 to examine the next pack on the SUSPECTED FAULTY EQUIPMENT list. If different STF is outputted, diagnose the circuit again.
1. If a repeat of the previous dominant failure occurs, return the original pack to the unit and go to Step 1 to examine the next pack on the list.
 2. If the dominant failure is now different from the original failure, the spare pack is probably faulty (for example, wrong series); try another spare pack (Step 2).

4. Verify that the failure follows the suspected faulty pack.

- (a) Swap the original (suspected faulty) pack with the spare pack inserted in Step 2 and diagnose the circuit again.
- (b) If the diagnostic failure returns with the suspected faulty pack reinserted, replace this faulty pack and go to Step 5.
- (c) If the diagnostic failure does not return with the suspected faulty pack reinserted, the problem is apparently cleared with no faulty pack identified. Record this incident and the failure pattern for future reference; go to Step 5.

5. **Caution 1:** *If repair of a forced unavailable MSCU or ONTCCOM was required, do not attempt to restore it after repair is complete.*

Caution 2: *For CM2, if an ONTCCOM or QLPS was repaired and an FPC is OOS, but thought to be fault-free, that FPC can be used as a helper unit for the restore command. If a CM2 QLPS was repaired and its parent ONTCCOM is OOS or UNAV, but thought to be fault-free, the QLPS must not be restored after repair is complete.*

Request a RESTORE of the unit/circuit to service.

Tables 5.1-1 and 5.1-2 list the input messages and command pokes that are used to diagnose/restore **CM2** units. Tables 5.1-3 and 5.1-4 list the input messages and command pokes that are used to diagnose/restore **CM3** units.

- (a) If the restore diagnosis is STF, the problem is not cleared. Return to Step 1.
- (b) Perform a conditional restore on **both** the **original** unit and any unit(s) associated with the suspected/replaced circuit pack. If the restore diagnosis fails on the **interface unit**, treat it as a **different** problem, starting at Procedure 5.1.
- (c) If the restore diagnosis is ATP, go to Step 7.

6. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, replace (one at a time) any power converter packs (for example, 495FB) in the unit that supplies power to packs on the SUSPECTED FAULTY EQUIPMENT list. (Low voltage from a power converter can cause other packs to misbehave.)

Note: If the problem has not been cleared at this point, make a judgment on which of the following is the appropriate alternative, depending on the situation.

- Inspect the backplane for open or short circuits in the wiring, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects. If such defects are found *and* can be repaired, complete those repairs, and then return to Procedure 5.1.
 - **Seek technical assistance**, particularly if the trouble is in a critical duplex unit such as the MSGS, MSCU, FPC, or ONTCCOM.
 - Replace (one at a time) the remaining packs in the unit not previously tried.
 - Replace (one at a time) the packs in adjacent unit(s) with interfaces to the failing unit.
 - Perform a multiple-pack swap with another unit that diagnoses ATP and can be removed from service. If the problem moves with the packs, return half of the packs, etc., until the faulty pack is isolated. If the problem does not move with the packs, check for possible cable or wiring problems. **Multiple-pack swaps must be done carefully to avoid creating additional problems.**
 - Consult the failing diagnostic's program listing (if available). Use the diagnostic phase descriptive tables in Appendix A1, Diagnostic Phase Descriptions, as an aid in locating the desired PR. The prologue for the diagnostic phase and descriptions and code associated with the failing segment and test may give insight as to what is being tested and which control/data paths are being used.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.3 ANALYZE CM PROBLEMS

OVERVIEW

This procedure is used to analyze non-critical off-normal conditions in the communication module (CM). When such faults occur, maintenance software automatically attempts to either recover from the failure or re-configure the CM hardware to minimize the effect on system operation. If the problem cannot be corrected, units may be left out-of-service (OOS) or in some other off-normal condition that requires craft intervention. Under some circumstances, the craft may have removed a unit or inhibited interrupts while the system was operating under different conditions, and now it may be appropriate to return those units to full service.

For critical problems, refer to 235-105-250, *System Recovery*. Examples of critical problems are:

- Escalations to rolling AM/CM initializations. These are usually due to a duplex failure of critical CM hardware.
- SM/SM-2000s become totally isolated from the administrative module (AM)
- SM/SM-2000s lose all connectivity to the Quad Link Packet Switch (QLPS) networks or QLPS gateway processors (QGP).

Note: The SM/SM-2000 has a status of ISOLATED, COMM LOST, STNDALONE, INIT ISOL, QLPS ISOL, QLNK LOST, or CLNK LOST displayed on the Master Control Center (MCC), or critically-alarmed **REPT SM ISOL** output messages printed on the receive-only printer (ROP).

PROCEDURE

1. This procedure is a roadmap for analyzing CM problems identified by various sources/techniques. The following three strategies are used to analyze the CM problems:

- Analysis using REPT TRBL messages
- Analysis using master control center (MCC) indicators
- Analysis using OFF-NORMAL status.

Section 5.3.4, "*Clear Communication Module Problems*," is then used to clear all problems in specific units in the CM.

In all cases, the craft is referred to step-by-step procedures to clear specific problems.

For each of the described strategies to identify problems, a suggested sequence of resolution/repair is implied, based on the importance of units to system operation or parent/child relationships of the hardware. If another order of repair is used, the individual procedure may still be successful, or specific instructions are provided to make necessary diversions (for example, parent hardware must be recovered before the child can be made operational).

5.3.1 ANALYSIS USING REPT TRBL MESSAGES

OVERVIEW

The first strategy is concerned with CM unit errors/faults that are detected by fault recovery. If an error/fault is addressed by fault recovery, a **REPT TRBL** output message

is produced. If the message is *not* alarmed, recovery is ongoing and immediate repair is not necessary (failure of that recovery results in another REPT TRBL message, which is alarmed). Within the REPT TRBL messages, **unit types/error classes** should be identifiable by specific phrases. The following steps point to appropriate problem-clearing procedures, based on unit type/class. If multiple REPT TRBL messages implicate different unit types/classes, follow the implied order of the following steps to resolve the problems.

Note 1: The alarm level (critical, major, or minor) of individual messages may be just cause to alter this preferred sequence of repair.

Note 2: Since REPT TRBL messages only indicate a problem has occurred at some time in the past, and these problems are being addressed by fault recovery, it is possible that the faulty unit(s) may have been recovered automatically. Thus, it is possible to enter repair procedures, only to find all units of the type/class implicated are now returned to service.

This strategy is based on detected faults/errors; it does not consider any manually removed or forced units, which may be important to restoring full service when taking into account the effects of new faults that have occurred. Although this strategy is a valid approach to the repair of CM hardware, it is suggested that one of the two remaining strategies be used as a backup to ensure all manually removed or inhibited units are identified, and to guard against the loss of REPT TRBL messages.

PROCEDURE

1. Order the **unit types/classes**, derived from the REPT TRBL messages, to line up with the list in Section 5.3.4, "*Clear Communication Module Problems.*"

Note: If REPT TRBL output messages are produced while repairing other units, new items may be added to the list, or the process may be restarted at any time.

2. If a message switch control unit (**MSCU**) is identified, go to Procedure 5.4.
Otherwise, continue with the next step.
3. If a foundation peripheral controller (**FPC**) is identified, go to Procedure 5.4.
Otherwise, continue with the next step.
4. If an office network timing complex common (ONTCCOM) is identified *and* an **error type** in the REPT TRBL message is either **ONTC CRITICAL** or **SECONDARY IMPLICATION OF ONTC**, go to Procedure 5.5.
Otherwise, continue with the next step.
5. If a communication module processor (**CMP**) is identified, go to Procedure 5.4.
Otherwise, continue with the next step.
6. If a quad link packet switch gateway processor (**QGP**) is identified, go to Procedure 5.10.
Otherwise, continue with the next step.
7. If a module message processor (**MMP**) is identified, go to Procedure 5.4.
Otherwise, continue with the next step.
8. If a **QLPS** is identified, go to Procedure 5.11.
Otherwise, continue with the next step.

9. If a network clock reference (**NCREF**), network clock cross-couple (**XC**) (*CM2 Only*), oscillator cross-couple (**OSCXC**) (*CM2 Only*), or the network clock oscillator (**NCOSC**) is identified (a phrase **NC REFERENCE CONFIGURE** or **NC OSCILLATOR RECOVERY** appears in the REPT TRBL message), go to Procedure [5.6](#).

Otherwise, continue with the next step.
10. If an **ONTCCOM TMS** is identified *and* the **error type** in the REPT TRBL message is **ONTC NON-CRITICAL**, perform the following additional checks:

For **CM2** and **CM3** prior to **5E16.2**: on MCC Page **115**, if any of the **1221-1228** or **1231-1238** indicators are backlighted (indicating faulty NLIs, DLIs, or TMSLNKs), go to Procedure [5.7](#). If not, the problem may have been transient and/or may have been resolved by fault recovery software. In this case, go to Step [18](#).

For **CM3** in **5E16.2** and later: on MCC Page **115**, if either the **ONTC 0 TMSFP 1212** or **ONTC 1 TMSFP 1212** indicator is backlighted, go to Procedure [5.20](#). If not, the problem may have been transient and/or may have been resolved by fault recovery. In the case, go to Step [18](#).

Otherwise, continue with the next step.
11. If a network link interface (**NLI**) is identified, go to Procedure [5.8](#).

Otherwise, continue with the next step.
12. If a dual link interface (**DLI**) is identified, go to Procedure [5.7](#).

Otherwise, continue with the next step.
13. If a quad-link packet switch gateway link (**QGL**) or QLPS gateway processor pipe (**QGP QPIPE**) is identified, go to Procedure [5.12](#).

Otherwise, continue with the next step.
14. If a message handler QLPS pipe (**MH QPIPE**) is identified, go to Procedure [5.14](#).

Otherwise, continue with the next step.
15. If a QLPS communication link (**QLNK**) or inter-SM QLPS communication link (**ISMQLNK**) is identified, go to Procedure [5.15](#).

Otherwise, continue with the next step.
16. If a communication link (**CLNK**) is identified, go to Procedure [5.9](#).

Otherwise, continue with the next step.
17. If a pump peripheral controller (**PPC**) is identified, go to Procedure [5.4](#).

Otherwise, continue with the next step.
18. If *new* REPT TRBL messages have occurred, return to Step [1](#).

If *no* new REPT TRBL messages have occurred, go to Step [19](#).

Note: If the phrase **QGP DUPLEX FAIL** or **QGP QUADRUPLEX FAIL** (*CM2 Only*) is present in a *critically*-alarmed REPT TRBL output message, repair the MSCUs first, followed by QGPs (Steps [2](#) and [6](#)), before attempting to repair other

units. Similarly, identification of the phrase **QLPS QUAD FAILED** should result in the repair of MSCUs, FPCs, ONTCCOMs, and QLPSs first, in that order (Steps 2, 3, 4, and 8).

If an MMP is identified in a critically-alarmed REPT TRBL output message, this is an indication that all MMPs serving a group of SMs have been lost. While SM-2000s normally use the QLPS networks for communication, Classic SM communication and SM pump functionality require CLNKs, which pass through the MMPs. Thus, while the loss of a set of MMPs is only critical if those MMPs serve at least one Classic SM, this condition should still be given higher priority than other non-critical conditions. Repair MSCUs first, followed by any MMPs in the OOS-AUTI-DFRIP state (using Steps 2 and 7) before attempting to repair other units.

19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.3.2 ANALYSIS USING MCC INDICATORS

OVERVIEW

A second strategy is to use the MCC to track CM problems. Go to the **115 – Communication Module Summary** page and look for off-normal (backlighted) indicators. Indicators can be off-normal due to manually removed or forced units, when hardware checks are manually inhibited, or due to fault recovery. Indicators are *not* backlighted if a unit is OOS due to parent hardware problems (family-of-equipment outage).

For any backlighted indicators found, examine the following steps and look for matches. For every match found, bring up the designated MCC page, and if the indicated supplementary conditions are met, perform the referenced procedures.

PROCEDURE

1. For **CM2**, if a **1240** or **1250** indicator is backlighted, repair **MSCUs** using Procedure 5.4.

Otherwise, continue with the next step.

For **CM3**, if a **1240** or **1250** indicator is backlighted, note which MSGS subunit needs repair as indicated on MCC Page **1240** or **1250** and repair using Procedure 5.4.

Otherwise, go to Step 3.
2. If a **1241** or **1251** indicator is backlighted, perform the following tests:

If **both** **1241** and **1251** indicators are backlighted, go to each MCC page and note the QGP status. If **all** **QGPs** are OOS or unavailable (UNAV), repair **at least one** **QGP** using Procedure 5.10.

If, on the identified MCC page, an **FPC** is OOS or UNAV or has interrupts inhibited, repair using Procedure 5.4.

Otherwise, continue with the next step.
3. If a **1209** indicator is backlighted and MCC Page **1209** shows that an **ONTCCOM** is OOS or UNAV or has interrupts inhibited, repair using Procedure 5.5.

Otherwise, continue with the next step.

4. For **CM2** and **CM3** prior to **5E16.2**, if a **1209** indicator is backlighted, and MCC Page **1209** shows that all QLPSs are OOS, repair at least one QLPS using Procedure [5.11](#).

For **CM3** in **5E16.2** and later, if the **ONTC 0 QLPS 1214** or **ONTC 1 QLPS 1214** indicator is backlighted, and MCC Page **1214** shows that all QLPSs are OOS, repair at least one QLPS using Procedure [5.11](#).

Otherwise, continue with the next step.
5. For **CM2**, if a **1241** or **1251** indicator is backlighted, perform the following tests:

If on the identified MCC page, a **CMP** is OOS or UNAV or has interrupts inhibited, repair using Procedure [5.4](#).

If on the identified MCC page, a **QGP** is OOS or UNAV or has interrupts inhibited, repair using Procedure [5.10](#).

Otherwise, continue with the next step.
6. For **CM2**, if a **1242-1243** or **1252-1253** indicator is backlighted, repair **MMPs** using Procedure [5.4](#).

Otherwise, continue with the next step.
7. For **CM2** and **CM3** prior to **5E16.2**, if a **1209** indicator is backlighted, and MCC Page **1209** shows that any QLPS is OOS, repair using Procedure [5.11](#).

For **CM3** in **5E16.2** and later, if the **ONTC 0 QLPS 1214** or **ONTC 1 QLPS 1214** indicator is backlighted, and MCC Page **1214** shows that any QLPS is OOS, repair using Procedure [5.11](#).

Otherwise, continue with the next step.
8. If a **1210** indicator is backlighted, repair **NC XCs (CM2 only)**, **NCREFs**, **OSCxCs (CM2 only)**, or **NCOSCs** using Procedure [5.6](#).

Otherwise, continue with the next step.
9. For **CM2** and **CM3** prior to **5E16.2**, if a **1221-1228** or **1231-1238** indicator is backlighted, repair **TMSLNks** (or their parent **NLIs** or **DLIs**) using Procedure [5.7](#).

For **CM3** in **5E16.2** and later, if the **ONTC 0 TMSFP 1212** or **ONTC 1 TMSFP 1212** indicator is backlighted, repair using Procedure [5.20](#).
10. If a **1380** or **1381** indicator is backlighted, perform the following tests:

If on the identified MCC page, a **QTMSLNK** is OOS, go to Procedure [5.13](#).

If, on the identified MCC page, a **QGL** is OOS or the **QGP QPIPE OOS** indicator is backlighted, go to Procedure [5.12](#).

If, on the identified MCC page, the **QPIPE/QLNK OFFNORMAL** indicator is backlighted **and** an execution of the **OP:QNETSTAT,NOFE** command indicates a **MH QPIPE** is OOS, go to Procedure [5.14](#).

If, on the identified MCC page, the **QPIPE/QLNK OFFNORMAL** indicator is backlighted **and** an execution of the **OP:QNETSTAT,NOFE** command indicates a **QLNK** or **ISMQLNK** is OOS, go to Procedure [5.15](#).

Otherwise, continue with the next step.

11. If a **CLNKS 1260** indicator is backlighted, repair **CLNKs** using Procedure [5.9](#).
Otherwise, continue with the next step.
12. For **CM2**, if a **1241** or **1251** indicator is backlighted *and* a **PPC** on the MCC Page is OOS or UNAV or has interrupts inhibited, repair using Procedure [5.4](#).
Otherwise, continue with the next step.
For **CM3**, continue with the next step.
13. If MCC Page **115** *still* has off-normal indicators, return to Step [1](#).
If MCC Page **115** has *no* off-normal indicators, continue with the next step.
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.3.3 ANALYSIS USING OFF-NORMAL STATUS

OVERVIEW

The third strategy is to analyze CM problems using off-normal reports associated with CM entities. Note that these reports may be requested manually and are produced automatically on an hourly basis. The manual request input messages are as follows:

- **OP:CFGSTAT,CM,OOS,UNAV,NOGRO,NOFE** produces a listing of all OOS or UNAV hardware units and communication links (CLNKs) that are *not* OOS due to parent hardware outages or CM hardware growth occurring in the office.
- **OP:OFFNORM,CM** indicates all in-service CM hardware that have hardware checks *inhibited* (either automatically or manually).
- **OP:QNETSTAT,NOFE** produces a listing of all OOS QGP QPIPEs, MH QPIPEs, QLNKs, and ISMQLNKs that *cannot* be attributed to parent hardware failures.
- **OP:ENETSTAT,ENTWK** produces a listing of all MSENLNK and MSENPIPE states along with the MSCU parent states.

Once a list of valid off-normal CM units is produced, examine the following steps and look for matches.

PROCEDURE

1. Order the **unit types** to line up with the following list.
Note: The status requests used to start this analysis process may be reexecuted at any time; this process can then be restarted.
2. If an off-normal **MSCU** is identified, go to Procedure [5.4](#).
Otherwise, continue with the next step.
3. If an off-normal **FPC** is identified, go to Procedure [5.4](#).
Otherwise, continue with the next step.
4. If an off-normal **ONTCCOM** is identified, go to Procedure [5.5](#).
Otherwise, continue with the next step.
5. If an off-normal **CMP** is identified, go to Procedure [5.4](#).
Otherwise, continue with the next step.
6. If an off-normal **QGP** is identified, go to Procedure [5.10](#).

- Otherwise, continue with the next step.
7. If an off-normal **MMP** is identified, go to Procedure 5.4.
Otherwise, continue with the next step.
 8. If an off-normal **QLPS** is identified, go to Procedure 5.11.
Otherwise, continue with the next step.
 9. If an off-normal **NC XC (CM2 Only)**, **NCREf**, **OSCXC (CM2 Only)**, or **NCOSC** is identified, go to Procedure 5.6.
Otherwise, continue with the next step.
 10. For CM3 in 5E16.2 and later, if an offnormal **TMSFP** is identified, go to Procedure 5.20.
 11. If an off-normal **TMSLNK** or **DLI** is identified, go to Procedure 5.7.
Otherwise, continue with the next step.
 12. If an off-normal **NLI** is identified, go to Procedure 5.8.
Otherwise, continue with the next step.
 13. If an off-normal **QTMSLNK** is identified, go to Procedure 5.13.
Otherwise, continue with the next step.
 14. If an off-normal **QGL** or **QGP QPIPE** is identified, go to Procedure 5.12.
Otherwise, continue with the next step.
 15. If an off-normal **MH QPIPE** is identified, go to Procedure 5.14.
Otherwise, continue with the next step.
 16. If an off-normal **QLNK** or **ISMQLNK** is identified, go to Procedure 5.15.
Otherwise, continue with the next step.
 17. If an off-normal **CLNK** is identified, go to Procedure 5.9.
Otherwise, continue with the next step.
 18. If an off-normal **PPC** is identified, go to Procedure 5.4.
Otherwise, reexecute the cited status requests, and, if any off-normal units are found, return to Step 1.
 19. For **CM3** only (5E22.1 and later), if an off-normal MSGS **ENETWK (MSENLNK or MSENPIPE)** is identified, go to 5.4
If no off-normal units are found, go to Step 20.

Note: For CM2, if **all QGPs** or their parent **MSCUs** appear in the list in any combination (duplex/quadruplex failed QGPs), repair off-normal MSCUs first, followed by QGPs (Steps 2 and 6), before attempting to repair other units. Similarly, if **all QLPSs** or their parent **ONTCCOMs** appear on the list in any combination (quadruplex failed QLPSs), repair the OOS/UNAV MSCUs, FPCs, ONTCCOMs, and QLPSs first (Steps 2, 3, 4, and 8), in that order.

If any MMPs have an OOS-AUTO-DFRIP (duplex failure recovery in progress) state, this is an indication that all MMPs serving a group of SMs have been lost.

While SM-2000s normally use the QLPS networks for communication, Classic SM communication and SM pump functionality require CLNKs, which pass through the MMPs. Thus, while the loss of a set of MMPs is only critical if those MMPs serve at least one Classic SM, this condition should still be given higher priority than other non-critical conditions. Repair MSCUs first, followed by any MMPs in the OOS-AUTO-DFRIP state (using Steps 2 and 7) before attempting to repair other units.

20. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

5.3.4 CLEAR COMMUNICATION MODULE PROBLEMS

OVERVIEW

The following procedures are used to clear problems in the communication module (CM) *except those units directly associated with the QLPS network*. For QLPS problems, see Procedure 5.3.5.

PROCEDURE

1. To clear problems in the MSCU, FPC, CMP, MMP, PPC, or ENETWK, see Procedure 5.4.
2. To clear problems in the ONTCCOM, see Procedure 5.5.
3. To clear problems in the NC XC (CM2 only), OSCXC (CM2 only), NCREF, or the NCOSC, see Procedure 5.6.
4. For CM3 in 5E16.2 and later, to clear problems in the TMSFP, see Procedure 5.20.
5. To clear problems in the TMSLNK, see Procedure 5.7.
6. To clear problems in the dual-link interface (DLI), see Procedure 5.7.
7. To clear problems in the network link interface (NLI), see Procedure 5.8.
8. To clear problems in the CLNK, see Procedure 5.9.
9. If this procedure *failed* to restore CM hardware units to an operational or normal state, it is possible to re-initialize the entire CM *without* re-initializing the AM. This feature is called **CM-only initialization** and is available as a secured feature. This feature can be invoked *only* by an input message at the MCC or STLWS. The command syntax is as follows:

CAUTION: Seek technical assistance before using these commands, as they WILL result in switch downtime. Inappropriate use of these commands may result in additional downtime and/or degraded service. Refer to 235-600-700, Input Messages, and 235-105-250, System Recovery Manual, for more information about CM-only initialization.

- a. To perform a full initialization and optionally force the MSGS or ONTC to side 0 or 1, enter:

```
INIT:CM,FI[,ONTC=0|1][,MSGS=0|1]
```

- b. To perform a selective initialization that preserves the active stable inter-SM calls, enter:

```
INIT:CM,SI
```

Note: MSGS and ONTC forces cannot be applied with this command.

10. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

5.3.5 CLEAR QUAD-LINK PACKET SWITCH NETWORK PROBLEMS

OVERVIEW

If the parent hardware is OOS, perform the procedures to diagnose and restore those units. **To clear problems in the QLPS network, see the procedures after Figure 5.3-2 at the end of "BACKGROUND INFORMATION."** For other CM equipment units, see Procedure 5.3.4.

If the **QLNK(s)/MH QPIPE OOS** indicator, the SM-2000 status phrase indicators for QPIPE/QLNKs, or the **QPIPE OOS** indicator for QGP QPIPEs is/are continuously displayed, the QGP QPIPEs, MH QPIPEs, QLNKs, or ISMQLNKs are *not* successfully restored by independent recovery. In this case, request the OP:QNETSTAT output report from the 1380 - QLPS NETWORK 0 STATUS page, or the 1381 - QLPS NETWORK 1 STATUS page, using the **940** and **941** menu commands.

Note: This report indicates the state of the MH QPIPEs, QGP QPIPEs, QLNKs, and ISMQLNKs for the associated QLPS network.

BACKGROUND INFORMATION

Note: References in this section to DLN are for CM2 only. CM3 does not support DLN(s).

The QLPS network is an overlay network that provides a high bandwidth, low latency transport mechanism for operating system for distributed switching (OSDS) messages. QLPS network functionality can be optionally equipped in an office with CM2, but is always present for CM3. Message transport is provided between two SM-2000s or between an SM-2000 and an existing switching module (SM) and the administrative module (AM), communication module processor (CMP), FPC, and direct link node (DLN).

The QLPS message transport between the message handler [MH (SM-2000)] and the QLPS gateway processor (QGP) endpoints requires the availability of QLPS logical links through the QLPS networks. In addition, the QLPS networks provide QLPS communication links (QLNKs), interswitching module QLPS communication links (ISMQLNKs), and QLPS pipes (QPIPEs). This section describes each of these entities and their relationships.

If QGPs are equipped, there are eight equipped QLNKs between the AM and each SM-2000, four QLNKs per network, two active and two standby. Each QLNK represents a different physical communication path between the AM and an SM-2000. Note that all messages to the AM/CMP/FPC/DLN must go through the QGPs to access the MSCU using the QLPS network.

The QLPS network provides four logical links for routing messages between the AM and an SM-2000. Under normal (fault-free) conditions, each logical link is assigned to a separate active QLNK.

When messages are sent between processors, the messages are distributed across the logical links for both networks to provide automatic load balancing between active QLPS network paths.

The QLPS network provides one logical link for routing messages between the CMP and an SM-2000. Under normal (fault-free) conditions, this logical link is assigned to an active QLNK on the MSGS side with the ACT CMP.

The QLPS network provides one logical links for routing messages between the FPC and an SM-2000. Under normal (fault-free) conditions, this logical link is assigned to an active QLNK on the MSGS side with the ACT FPC.

The QLPS network provides two logical link for routing messages between the DLN and an SM-2000. Under normal (fault-free) conditions, each logical link is assigned to an active QLNK on each MSGS side.

Between each pair of QLPS equipped SM-2000s, there are two equipped ISMQLNKs with one per network. Each ISMQLNK represents a different physical communication path between the SM-2000s. The QLPS networks also provide two logical links between every pair of SM-2000s. These logical links are dynamically assigned to active ISMQLNKs by way of routing tables. Messages between SM-2000s are distributed across the logical links for both QLPS networks to once again provide automatic load balancing. If, due to fault conditions, the ISMQLNKs become unavailable, communication between the two SM-2000s can use two QLNKs to communicate.

To establish communication with another endpoint on a QLPS network, an MH or QGP must first establish connectivity with the active QLPS for that network. The QPIPE is a logical entity representing the capability of a QLPS endpoint to establish connectivity with the active QLPS for a network. The QPIPE between a QGP and a QLPS is called a QGP QPIPE and is supported by the QGL hardware. The QPIPE between an SM-2000 and a QLPS is called an MH QPIPE and is supported by the QTMSLNK/TMSLNK/NLI/MH hardware. Before two endpoints can establish communication between them, the endpoints must both have an active QPIPE on the same network. If an endpoint does not have an active QPIPE on a network, the endpoint cannot establish communication to any other endpoint on that network. Therefore, the QPIPE is a logical parent of both the QLNK and ISMQLNK. The relationships between the QLNKs and QPIPEs for QLPS Network 0 for a dual QGP exchange configuration are shown in Figure 5.3-1. The relationships between ISMQLNKs and QPIPEs for Network 0 are shown in Figure 5.3-2.

When an SM-2000 experiences loss of connectivity with a QLPS network due to an MH QPIPE, QLNK, or ISMQLNK trouble, an appropriate SM-2000 status phrase (Table 5.3-1) is shown on the SM status pages displayed on the master control center (MCC) terminal. The status phrase may be displayed if the QPIPE/QLNK/ISMQLNK problems are associated with OOS hardware or the hardware may be in-service.

Off-normal summary indicators are displayed on the 1380/1381 - QLPS NETWORK 0/1 STATUS pages. These indicators may be displayed if the QPIPE/QLNK/ISMQLNK problems are associated with OOS hardware or the hardware may be in-service. Loss of connectivity due to a QGP QPIPE is displayed on 1380/1381 pages. The QGP QPIPE status of QPIPE OOS is only displayed when a QPIPE problem is associated with in-service QGL hardware. The QPIPE OOS indicator is not displayed when the parent QGL hardware is OOS, since a QPIPE loss of connectivity would be expected in this case.

The QLPS networks provide independent recovery capability for all QGP QPIPEs, MH QPIPEs, QLNKs, and ISMQLNKs as long as the hardware associated with these units is in-service.

Table 5.3-1 — SM-2000 Status Phrases for MH QPIPES, QLNKS, and ISMQLNKS

STATUS PHRASE	COLOR OF PHRASE/BOX	DESCRIPTION
QLPS ISOL	Red/White	SM-2000 lost MH QPIPES to the active QLPS for both networks.
QPIPE OOS	Black/Cyan	SM-2000 lost MH QPIPE to the active QLPS for one network.
QLNK LOST	Black/Cyan	SM-2000 lost all QLNKS (if QGPs are equipped) or ISMQLNKS (if QGPs are not equipped).
QLNKOFFN	Black/Cyan	SM-2000 lost some but not all QLNKS or ISMQLNKS for one or both networks.

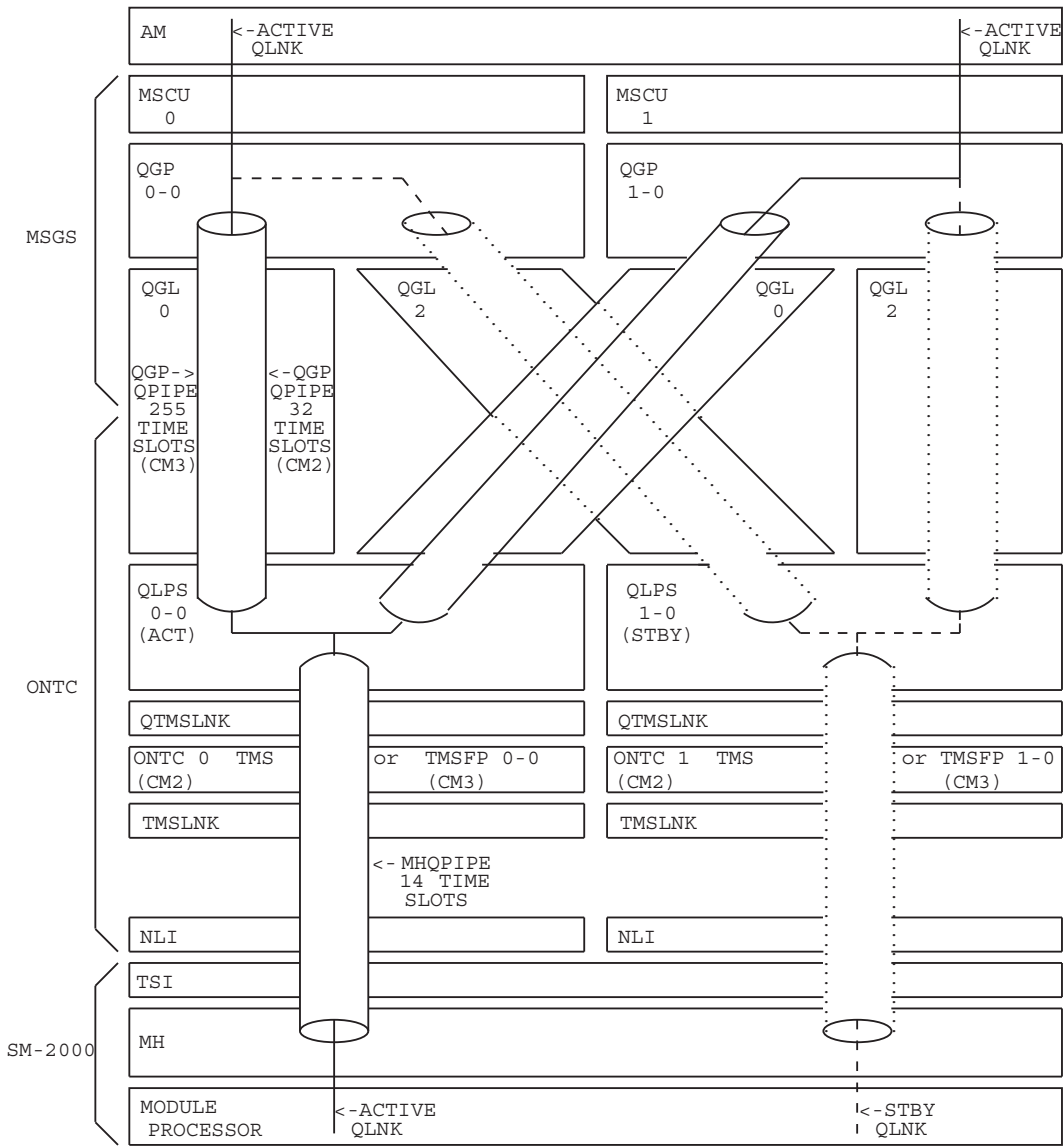


Figure 5.3-1 — QLNK and QPIPE Relationships for QLPS Network 0 (QGP Configuration 2)

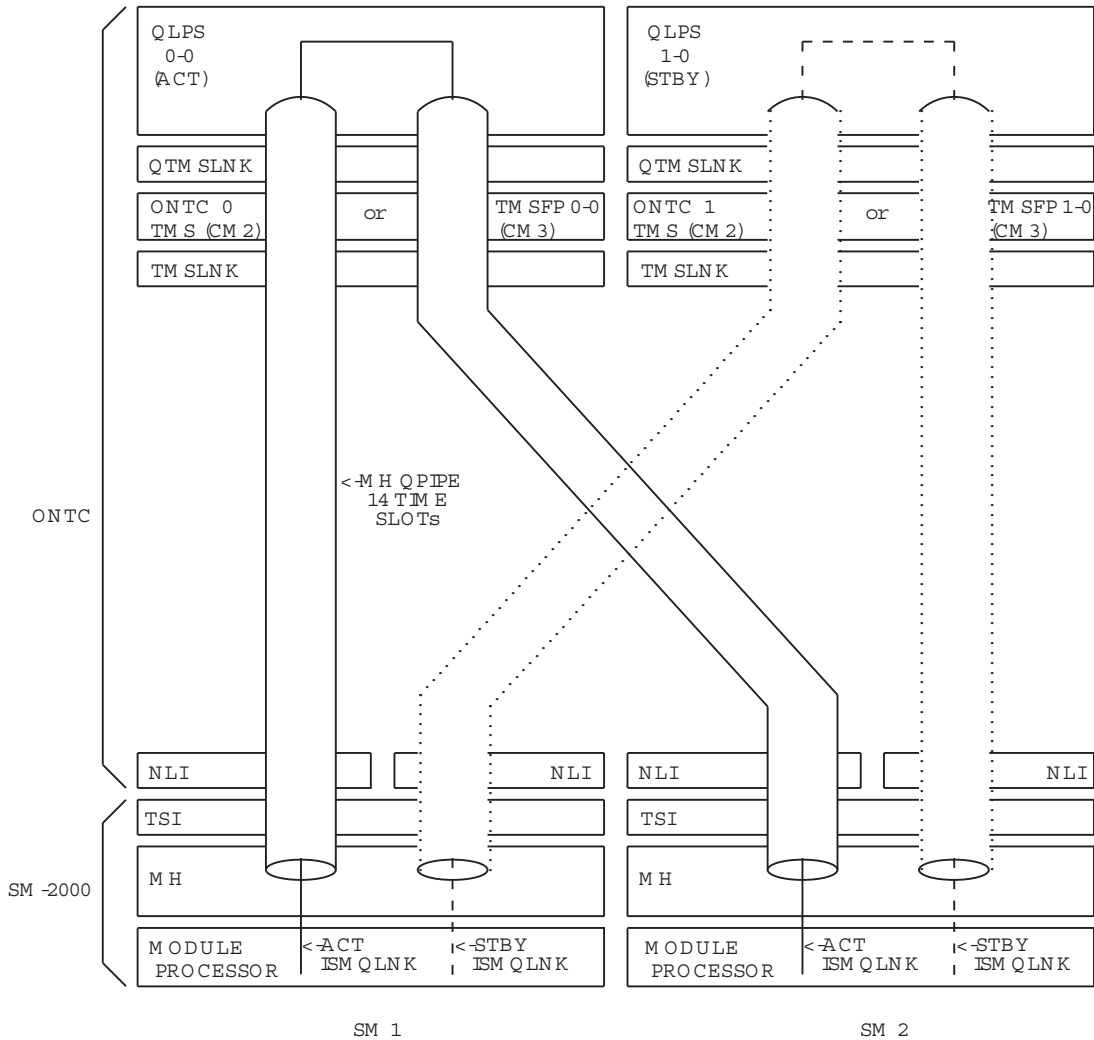


Figure 5.3-2 — ISMQLNKs and QPIPE Relationships for QLPS Network 0 (QGP Independent)

PROCEDURE

1. The following procedures are used to clear problems in the QLPS network.
 - To Clear Quad-Link Packet Switch Gateway Processor Problems, refer to Procedure 5.10.
 - To Clear Quad-Link Packet Switch Problems, see Procedure 5.11.
 - To Correct QGL and QGP QPIPE Problems, see Procedure 5.12.
 - To Correct QTMSLNK Problems, see Procedure 5.13.
 - To Correct MH QPIPE Problems, see Procedure 5.14.
 - To Clear QLNK or ISMQLNK Troubles, see Procedure 5.15.
 - To Replace TRCU3 Fuse Alarm Module, see Procedure 5.19.

5.4 CLEAR MESSAGE SWITCH PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in the message switch (MSGS). Specifically, the following units are covered:

- Message switch control unit (MSCU)
- Foundation peripheral controller (FPC)
- Pump peripheral controller (PPC)
- Communication module processor (CMP)
- Module message processor (MMP)
- Quad-link gateway processor (QGP) (Refer to Procedure 5.10)
- Message Switch Ethernet (MSGS ENETWK)

Caution: For CM2, to avoid damage to the equipment when removing and replacing a circuit pack, power down the community in which the pack to be replaced resides. Use the power control switch on the control and display pack (for example, SN516) for the affected unit. It should be noted that some diagnostics execute "interface tests," and it is possible that the suspect pack does NOT belong to the unit being diagnosed.

For CM2, before powering down a service group/community, you must manually remove all units on that power supply. While some units such as CMPs or DLIs have their own power supply, other units share power supplies. For example, the FPC and the PPC share a power supply, as do up to four MMPs or two QGPs. Another example, the replacement of a minor fabric board in the TMS or a QLPS requires that the entire parent ONTCCOM be removed from service first. The easiest way to ensure all the right units are removed from service is to toggle the RST/ROS switch on the corresponding control and display pack to the ROS (request OOS) position.

For CM3, replacing the MSGS board or ONTC-related boards (NCC, TMSF, TMSX, NCOSC, or the optical data transceiver paddleboards) does NOT require a power-down and power-up of the associated shelf or cabinet. Each board will power-up automatically when it is re-inserted. Once the fuse is inserted at the MFFU, the packs can be removed/inserted hot. There is no SN516 for CM3.

For CM2 and CM3, the use of unconditional removals or manual override power downs is NOT recommended (unless the office is in AM/CM min mode operation), because call processing may be affected. The failure of conditional removals usually indicates mate hardware should be repaired first.

PROCEDURE

1. Based on the off-normal (backlighted) boxes on the 115 MCC page, bring up the MCC page specified by the off-normal indicator and transition to the step indicated in the following list (if several of the following designated boxes are backlighted, take action in the order of the listing).

For CM3 (for 5E22.1 and later), if FUSE ALARM is backlit use (Procedure 3.5.4 - POWER-DOWN AND POWER-UP ONTCCOM (CM2/CM3) AND MSGS (CM3)

- UNITS and Procedure 3.6 - REPLACE BLOWN FFU OR MFFU FUSES)** within the 235-105-250, *System Recovery* manual, to correct the power problem.
For CM2 or CM3, if Box 1240 or 1250 is off-normal, then continue with Step 2.
For CM2, if Box 1241 or 1251 is off-normal, go to Step 21.
For CM2, if Box 1242-3 or 1252-3 is off-normal, go to Step 55.
Otherwise, return to Procedure 5.3 to reevaluate the status of other CM units.
2. Is the MSCU in an out-of-service (OOS) or unavailable (UNAV) state?
If **YES**, then go to Step 6.
If **NO**, then continue with Step 3.
 3. Are hardware checks inhibited on the MSCU?
If **YES**, then continue with Step 4.
If **NO**, then go to Step 19 for CM2 or Step 21 for CM3.
 4. Use MCC **poke 91x** or the **op:cfgstat:mscu=x** command (where x = MSGS side) to determine if hardware checks were manually or automatically inhibited.
Note: The MSCU hardware checks are inhibited automatically (INH-AUTO) after an automatic AM/CM hardware initialization has escalated.
 5. If it is determined that MSCU hardware checks can be allowed, use **poke 71x** or the **alw:hdwchk,mscu=x** command (where x = MSGS side), and then return to Step 2.
If the decision is made to leave hardware checks inhibited, return to Procedure 5.3 to reevaluate status of other CM units.
 6. Output the MSCU hardware state to the ROP using MCC **poke 91x** or the **op:cfgstat,mscu=x** command (where x = MSGS side).
If the state is OOS-MAN-RMV, then continue with Step 7.
If the state is OOS-AUTO-RMV, then go to Step 15.
If the state is OOS-MAN-DGN, then go to Step 11.
If the state is OOS-AUTO-DGN, then go to Step 11.
If the state is OOS-MAN-EX (CM2-only), then go to Step 11.
If the state is OOS-MAN-REX, then go to Step 11.
If the state is OOS-AUTO-REX, then go to Step 11.
If the state is OOS-MAN-TEMP (CM2-only), then go to Step 16.
If the state is OOS-MAN-FLT, then go to Step 9.
If the state is OOS-AUTO-FLT, then go to Step 9.
If the state is OOS-AUTO-TBLA, then go to Step 12.
If the state is OOS-AUTO-PWRALM, then go to Step 13.
If the state is UNAV-MAN-PWROFF, then go to Step 14.
If the state is UNAV-FRCD-RMV, then go to Step 18.
If the state is UNAV-FRCD-PWROFF, then go to Step 14.
If the state is UNAV-FRCD-DGN, then go to Step 11.
If the state is UNAV-FRCD-EX (CM2-only), then go to Step 11.
If the state is UNAV-FRCD-TEMP (CM2-only), then go to Step 16.
If the state is UNAV-FRCD-FLT, then go to Step 17.
If the state is UNAV-FRCD-PWRALM, then go to Step 13.
If the state is any other, contact next level of technical support.

7. **Caution: All CM3 hardware is APR-compliant. Once an APR-compliant CM pack is inserted and/or power is supplied, it is usually necessary to perform a manual action (a restore or CM initialization) to bring the affected unit(s) into service. However, system software can bring such units into service automatically in order to maintain essential functionality if critical faults occur.**

Restore the MSCU that was removed using MCC **poke 31x** or the **rst:mscu=x** command (where x = MSCU side) (for CM2) or restore MSGS using **poke 30x** or **rst:msgs=x** (where x=msgs side) (0 or 1) for CM3.

8. Did the MSCU (for CM2) or MSGS (for CM3) restore successfully?
If **YES**, then return to Step 1.
If **NO**, then return to Step 6.
9. For CM2, the MSCU is faulty. For CM3, the MSGS is faulty. Find the most recently printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue to the next step.
10. Did Procedure 5.2 result in the successful restoration of the MSCU for CM2 or MSGS for CM3?
If **YES**, then return to Step 1.
If **NO**, then return to Procedure 5.3 to evaluate other CM units.
11. The MSCU for CM2 or MSGS for CM3 is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 1.
12. The MSCU is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
13. For CM2, the MSCU has lost power independently. Refer to power repair guidelines in Procedure 14.6. Once the problem is resolved, return to Step 1.
For CM3, the MSGS has lost power independently. Refer to the MSGS power-up procedure in Procedure 5.27.
14. For CM2, the MSCU has been manually powered off. Power up the MSCU at the corresponding control and display pack, and then return to Step 6.
For CM3, refer to MSGS power-up procedure in Procedure 5.27.
15. The MSCU has been automatically removed for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP via the **op:dmq,cm** command.
If the MSCU is not in queue, then return to Step 7.
If the MSCU is in queue, wait for diagnostics to complete, then return to Step 1.
16. The MSCU is being used as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the MSCU state changes. Once the diagnostic completes, return to Step 1.
17. For CM2, the MSCU is faulty. For CM3, the forced unavailable MSGS is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit (execute only diagnostics, and make no attempt to restore the unit). When the repair is complete, return to Step 1.

18. The MSCU has been forced unavailable. To clear the force, use the clear force **poke 402** or the **clr:frc,mscu** command, and then return to Step 6.
19. On MCC Page 1240 or 1250, is the indicator for community 0-1 or 8-9 backlighted?
If **YES**, then continue with Step 20.
If **NO**, then go to Step 53.
20. For CM2, go to MCC Display Page 1241 or 1251.
For CM3, go to MCC Display Page 1240 or 1250.
21. For CM2 on MCC Display Page 1241 or 1251, is the CMP in an OOS, UNAV, or INIT state?
For CM3 on MCC Display Page 1240 or 1250, is the CMP in an OOS, UNAV, or INIT state?
If **YES**, then go to Step 25.
If **NO**, then continue with Step 22.
22. Are CMP hardware checks inhibited?
If **YES**, then continue with Step 23.
If **NO**, then go to Step 36.
23. Use MCC **poke 9yy** on MCC Display Page 1241 or 1251 (for CM2) or **poke 960/961** on MCC Display Page 1240 or 1250 (for CM3) or the **op:cfgstat,cmp=x-yy** command (where x = MSGS side and yy = CMP number) to determine if hardware checks were manually or automatically inhibited.
Note: The CMP hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization or CMP duplex-fail recovery has escalated.
24. If it is determined that CMP hardware checks can be allowed, use **poke 7yy** on MCC Display Page 1241 or 1251 (for CM2) or **poke 760/761** on MCC Display Page 1240 or 1250 (for CM3) or the **alw:hdwchk,cmp=x-yy** command (for CM2 and CM3) (where x = MSGS side and yy = CMP number), and then return to Step 21.
If the decision is made to leave hardware checks inhibited, return to Procedure 5.3 to reevaluate status of other CM units.
25. Output the CMP hardware state to the ROP using MCC **poke 9yy** on MCC Display Page 1241 or 1251 (for CM2) or **poke 960/961** on MCC Display Page 1240 or 1250 (for CM3) or the **op:cfgstat,cmp=x-yy** command (where x = MSGS side and yy = CMP number).
If the state is OOS-MAN-RMV, then continue with Step 26.
If the state is OOS-DACT-RMV, then continue with Step 26.
If the state is OOS-AUTO-RMV, then go to Step 34.
If the state is OOS-MAN-DGN (CM2-only), then go to Step 30.
If the state is OOS-AUTO-DGN (CM2-only), then go to Step 30.
If the state is OOS-MAN-EX (CM2-only), then go to Step 30.
If the state is OOS-MAN-REX (CM2-only), then go to Step 30.
If the state is OOS-AUTO-REX (CM2-only), then go to Step 30.
If the state is OOS-MAN-FLT (CM2-only), then go to Step 28.

If the state is OOS-AUTO-FLT (CM2-only), then go to Step 28.
If the state is OOS-AUTO-PWRALM, then go to Step 32.
If the state is OOS-AUTO-TBLA, then go to Step 31.
If the state is OOS-MAN-FE, then go to Step 35.
If the state is OOS-AUTO-FE, then go to Step 35.
If the state is UNAV-MAN-PWROFF (CM2-only), then go to Step 33.
If the state is INIT-NULL-NULL, then see note.
If the state is INIT-DACT-NULL, then see note.

Note: The INIT-NULL-NULL and INIT-DACT-NULL states are transient, used while the CMP is being initialized. Allow the recovery to complete, and return to Step 21.

26. Restore the CMP that was removed using MCC **poke 3yy** on MCC Display Page 1241 or 1251 (for CM2) or **poke 360/361** on MCC Display Page 1240 or 1250 (for CM3) or the **rst:cmp=x-yy** command (where x = MSGS side and yy = CMP number).
27. Did the CMP restore successfully?
If **YES**, then return to Step 22.
If **NO**, then go to Step 25.
28. The CMP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue to the next step.
29. Did Procedure 5.2 result in the successful restoration of the CMP?
If **YES**, then return to Step 22.
If **NO**, then return to Procedure 5.3 to evaluate other CM units.
30. The CMP is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 21.
31. The CMP is in a trouble analysis state (repeated fault recovery removals).
For CM2, diagnostics have not been able to locate the trouble. **Seek technical assistance** according to local procedure.
For CM3, attempt to conditionally restore the MSGS using the MCC **poke 30x** or the **rst:msgsg= x** command (where x = MSGS side 0 or 1) to ensure that a diagnostic is run that might detect faulty hardware. If the attempt to conditionally restore the MSGS is denied, then you will either need to:
 - Resolve the issue that is causing the MSGS restore to be denied. A reason must be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

 - Attempt to conditionally restore the MSGS sub-unit using the MCC **poke 360/361** (CMP) or **330/331** (FPC) or **350/351** (PPC) or **320/321** (QGP) or **34x** (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests

associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally restore the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

32. The CMP has lost power independently. Use Procedure 14.6 to replace any blown fuses. Then refer to Procedure 5.25.2 (CM2), Procedure 5.26.4 (CM2C), or Procedure 5.27 (CM3) to power up the CMP. Once the problem is resolved, return to Step 21.
33. The CMP has been manually powered off. Power up the CMP community using Procedure 5.25.2 (CM2), Procedure 5.26.4 (CM2C), or Procedure 5.27 (CM3) to power up the CMP. Then return to Step 25.
34. For CM2 the CMP has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP by using the `op:dmq,cm` command.

If the CMP is not in the queue, then return to Step 26.

If the CMP is in the queue, wait for diagnostics to complete, and then return to Step 21.

For CM3, attempt to conditionally restore the MSGS using the MCC `poke 30x` or the `rst:msgsx= x` command [where x = MSGS switch (0,1)] to ensure that a diagnostic is run which might detect faulty hardware. If the attempt to conditionally restore the MSGS is denied, then you will either need to:

- Resolve the issue that is causing the MSGS restore to be denied. A reason should be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

- Attempt to conditionally restore the MSGS sub-unit using the MCC `poke 360/361` (CMP) or `330/331` (FPC) or `350/351` (PPC) or `320/321` (QGP) or `34x` (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally restore the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

35. The CMP is in the OOS family of equipment (OOSF) state, indicating the CMP's parent MSCU is OOS or UNAV. Go back to Step 1.

36. For CM2, on MCC Display Page 1241 or 1251 is the FPC (or PPC) in an OOS or UNAV state?

For CM3, on MCC Display Page 1240 or 1250 is the FPC (or PPC) in an OOS state?

If **YES**, then go to Step 40.

If **NO**, then continue with Step 37.

37. Are FPC (or PPC) hardware checks inhibited?

If **YES**, then continue with Step 38.

If **NO**, then go to Step 52.

38. Use MCC **poke 94x** (or **poke 95x**) (for CM2 on MCC Display Page 1241 or 1251) or MCC **poke 930/931** or **poke 950/951** (for CM3 on MCC Display Page 1240 or 1250), or the **op:cfgstat,fpc=x** (or **op:cfgstat,ppc=x**) command (where x = MSGS side), to determine if hardware checks were manually or automatically inhibited.

Note: The FPC/PPC hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated.

39. If it is determined that FPC (or PPC) hardware checks can be allowed, then use **poke 74x** (or **poke 75x**) (for CM2) on MCC display Page 1241 or 1251 or MCC **poke 730/731** (or **poke 750/751**) for CM3 on MCC display Page 1240 or 1250, or the **alw:hdwchk,fpc=x** (or **alw:hdwchk,ppc=x**) command (where x = MSGS side), and return to Step 36.

If the decision is made to leave hardware checks inhibited, return to Procedure 5.3 to reevaluate status of other CM units.

40. Output the FPC (or PPC) hardware state to the ROP using MCC **poke 94x** (or **95x**), (for CM2) on MCC Display Page 1241 or 1251 (or MCC **poke 930/931** or **poke 950/951**) for CM3 on MCC Display Page 1240 or 1250, or the **op:cfgstat,fpc=x** (or **op:cfgstat,ppc=x**) command (where x = MSGS side).

If the state is OOS-MAN-RMV, then continue with Step 41.

If the state is OOS-AUTO-RMV, then go to Step 49.

If the state is OOS-MAN-DGN (CM2-only), then go to Step 45.

If the state is OOS-AUTO-DGN (CM2-only), then go to Step 45.

If the state is OOS-MAN-EX (CM2-only), then go to Step 45.

If the state is OOS-MAN-REX (CM2-only), then go to Step 45.

If the state is OOS-AUTO-REX (CM2-only), then go to Step 45.

If the state is OOS-MAN-TEMP (CM2-only), then go to Step 51.
If the state is OOS-AUTO-TEMP (CM2-only), then go to Step 51.
If the state is OOS-MAN-FLT (CM2-only), then go to Step 43.
If the state is OOS-AUTO-FLT (CM2-only), then go to Step 43.
If the state is OOS-AUTO-PWRALM (CM2-only), then go to Step 47.
If the state is OOS-AUTO-TBLA, then go to Step 46.
If the state is OOS-MAN-FE, then go to Step 50.
If the state is OOS-AUTO-FE, then go to Step 50.
If the state is UNAV-MAN-PWROFF (CM2-only), then go to Step 48.

41. Restore the FPC (or PPC), that was removed, by using MCC **poke 34x** (or **poke 35x**) for CM2 on MCC Display Page 1241 or 1251 or MCC **poke 330/331** (or **poke 350/351**) for CM3 on MCC Display Page 1240 or 1250, or the **rst:fpc=x** (or **rst:ppc=x**) command (where x = MSGS side).
42. Did the FPC (or PPC) restore successfully?
If **YES**, then go to Step [37](#).
If **NO**, then go to Step [40](#).
43. The FPC or PPC is faulty. Find the most recent printed TLP list on the ROP, use Procedure [5.2](#) to repair the unit, and then continue to the next step.
44. Did Procedure [5.2](#) result in the successful restoral of the FPC or PPC?
If **YES**, then return to Step [37](#).
If **NO**, then return to Procedure [5.3](#) to evaluate the status of other CM units.
45. The FPC (or PPC) is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step [36](#).
46. The FPC or PPC is in a trouble analysis state (repeated fault recovery removals).
For CM2, diagnostics have not been able to locate the trouble. **Seek technical assistance** according to local procedure.
For CM3, attempt to conditionally restore the MSGS using the MCC **poke 30x** or the **rst:msgsx= x** command (where x = MSGS side 0 or 1) to ensure that a diagnostic is run that might detect faulty hardware. If the attempt to conditionally restore the MSGS is denied, then you will either need to:
 - Resolve the issue that is causing the MSGS restore to be denied. A reason must be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

 - Attempt to conditionally restore the MSGS sub-unit using the MCC **poke 360/361** (CMP) or **330/331** (FPC) or **350/351** (PPC) or **320/321** (QGP) or **34x** (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally restore the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

47. The combined FPC/PPC community has lost power independently. Refer to power guidelines in Procedure 14.6. Then refer to Procedure 5.25.10 (CM2 FPC) or Procedure 5.25.8 (CM2 PPC), Procedure 5.26.4 (CM2C), or Procedure 5.27 (CM3) to power up the FPC/PPC. Once the problem is resolved, return to Step 36.
48. The combined FPC/PPC community has been manually powered off. Refer to Procedure 5.25.10 (CM2 FPC) or Procedure 5.25.8 (CM2 PPC), Procedure 5.26.4 (CM2C), or Procedure 5.27 (CM3) to power up the FPC/PPC. Then return to Step 40.
49. For CM2 the FPC (or PPC) has been automatically removed by fault recovery for the purpose of running diagnostics. Output the diagnostic queue to the ROP via the `op:dmq,cm` command.

If the FPC (or PPC) is not on the queue, return to Step 41.

If the FPC (or PPC) is on the queue, wait for the diagnostics to complete, and then return to Step 36.

For CM3, attempt to conditionally restore the MSGS using the MCC `poke 30x` or the `rst:msg= x` command [where x = MSGS switch (0,1)] to ensure that a diagnostic is run which might detect faulty hardware. If the attempt to conditionally restore the MSGS is denied, then you will either need to:

- Resolve the issue that is causing the MSGS restore to be denied. A reason should be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

- Attempt to conditionally restore the MSGS sub-unit using the MCC `poke 360/361` (CMP) or `330/331` (FPC) or `350/351` (PPC) or `320/321` (QGP) or `34x` (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally restore the MSGS. If a conditional restore of the MSGS sub-unit

fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

50. The FPC or PPC is in the OOS family of equipment (OOSF) state, which implies its parent MSCU is OOS or UNAV. Go to Step 1.
51. The FPC or PPC is being used as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the FPC/PPC state will change. Once the diagnostic completes, return to Step 36.
52. For CM2, on MCC Display Page 1241 or 1251, are any QGPs OOS or UNAV, or are QGP interrupts inhibited?
For CM3, on MCC Display Page 1240 or 1250, is the QGP in an OOS state?
If **YES**, then go to Procedure 5.10.
If **NO**, then continue with Step 53 for CM2 or Step 55 for CM3.
53. On MCC Display Page 1240 or 1250, is the community 2-7 or 10-15 indicator backlighted?
If **YES**, then continue with Step 54.
If **NO**, then go to Procedure 5.3 - Repair Failures in a CM Unit, found in the 235-105-250, *System Recovery* manual.
54. Go to MSGS Community display page that is backlighted.
MSGS 0 - Communities 2-7 - use MCC **poke 1242**.
MSGS 0 - Communities 10-15 - use MCC **poke 1243**.
MSGS 1 - Communities 2-7 - use MCC **poke 1252**.
MSGS 1 - Communities 10-15 - use MCC **poke 1253**.
55. For CM2 on MCC Display Page 1242/1243 or MCC Display Page 1252/1253, are there any MMPs in an OOS or UNAV state?
For CM3, on MCC Display Page 1240 or 1250, are there MMPs in an OOS state?
If **YES**, then go to Step 59.
If **NO**, then continue with the next step.
56. Are any MMP hardware checks inhibited?
If **YES**, then continue with Step 57.
If **NO**, then go to Step 74.
57. Use MCC **poke 9yy** (for CM2 on MCC Display Page 1242/1243 or MCC Display Page 1252/1253) or **poke 94yy** (for CM3 on MCC display Page 1240 or 1250) or the **op:cfgstat,mmp=x-yy** command (where x = MSGS side and yy = MMP number) to determine if hardware checks were manually or automatically inhibited.

Note: The MMP hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated or during duplex/quadruplex fail recovery.

58. If it is determined that MMP hardware checks can be allowed, use **poke 7yy** (for CM2 on MCC Display Page 1242/1243 or MCC Display Page 1252/1253) or **poke 74yy** (for CM3 on MCC Display Page 1240 or 1250) or the **alw:hdwchk,mmp=x-yy** command (where x = MSGS side and y = MMP number), and then return to Step 55.

If the decision is made to leave hardware checks inhibited, return to Procedure 5.3 to reevaluate status of other CM units.

59. Output the MMP hardware state to the ROP using MCC **poke 9yy** (for CM2 on MCC Display Page 1242/1243 or MCC Display Page 1252/1253) or **poke 94yy** (for CM3 on MCC Display Page 1240 or 1250) or the **op:cfgstat,mmp=x-yy** command (where x = MSGS side and yy = MMP number).

If the state is OOS-MAN-RMV, then continue with Step 60.
If the state is OOS-AUTO-RMV, then go to Step 68.
If the state is OOS-MAN-DGN (CM2-only), then go to Step 64.
If the state is OOS-AUTO-DGN (CM2-only), then go to Step 64.
If the state is OOS-MAN-EX (CM2-only), then go to Step 64.
If the state is OOS-MAN-REX (CM2-only), then go to Step 64.
If the state is OOS-AUTO-REX (CM2-only), then go to Step 64.
If the state is OOS-MAN-FLT (CM2-only), then go to Step 62.
If the state is OOS-AUTO-FLT (CM2-only), then go to Step 62.
If the state is OOS-AUTO-PWRALM (CM2-only), then go to Step 66.
If the state is OOS-AUTO-TBLA, then go to Step 65.
If the state is OOS-UNEQ-NULL, then go to Step 69.
If the state is OOS-GROW-XXX (CM2-only), then go to Step 70.
If the state is OOS-MAN-FE, then go to Step 71.
If the state is OOS-AUTO-FE, then go to Step 71.
If the state is OOS-MAN-TEMP (CM2-only), then go to Step 72.
If the state is OOS-AUTO-TEMP (CM2-only), then go to Step 72.
If the state is OOS-MAN-MIP, then go to Step 73.
If the state is OOS-AUTO-MIP, then go to Step 73.
If the state is OOS-AUTO-DFRIP, then see note and go to Step 60.
If the state is UNAV-MAN-PWROFF (CM2-only), then go to Step 67.

Note: The OOS-AUTO-DFRIP state only occurs when a group of MMPs serving the same SM cannot be restored (periodic restoral attempts will occur, but generally escalation to an AM/CM initialization is avoided). Generally, hardware is faulty, but craft intervention is necessary to diagnose/repair the unit (a restore request results in a diagnostic failure and a stable OOS-MAN-FLT state, suitable for further analysis).

60. Restore the MMP that was removed using the MCC **poke 3yy** (for CM2 on MCC Display Page 1242/1243 or MCC Display Page 1252/1253) or **poke 34yy** (for CM3 on MCC Display Page 1240 or 1250) or the **rst:mmp=x-yy** command (where x = MSGS side and yy = MMP number).
61. Did the MMP restore successfully?
If **YES**, then go to Step 56.
If **NO**, then go to Step 59.
62. The MMP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue to the next step.

63. Did Procedure 5.2 result in the successful restoral of the MMP?

If **YES**, then return to Step 56.

If **NO**, then return to Procedure 5.3 to evaluate other CM units.

64. The MMP is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 55.

65. The MMP is in a trouble analysis state (repeated fault recovery removals).

For CM2, diagnostics have not been able to locate the trouble. **Seek technical assistance** according to local procedure.

For CM3, attempt to conditionally restore the MSGS using the MCC **poke 30x** or the **rst:msgsx= x** command (where x = MSGS side 0 or 1) to ensure that a diagnostic is run that might detect faulty hardware. If the attempt to conditionally restore the MSGS is denied, then you will either need to:

- Resolve the issue that is causing the MSGS restore to be denied. A reason must be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

- Attempt to conditionally restore the MSGS sub-unit using the MCC **poke 360/361** (CMP) or **330/331** (FPC) or **350/351** (PPC) or **320/321** (QGP) or **34x** (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally restore the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

66. The MMP community has lost power independently. Refer to the power guidelines in Procedure 14.6. Then refer to Procedure 5.25.6 (CM2), Procedure 5.26.4 (CM2C), or Procedure 5.27 (CM3) to power up the MMP. Once the problem is resolved, return to Step 55.

67. The MMP community has been manually powered off. Refer to Procedure 5.25.6 (CM2), Procedure 5.26.4 (CM2C), or Procedure 5.27 (CM3) to power up the MMP. Then return to Step 55.

68. For CM2, the MMP has been automatically removed by fault recovery for the purpose of executing diagnostics. Output the diagnostic queue to the ROP via the **op:dmq,cm** command.

If the MMP is not on the queue, then return to Step 60.

If the MMP is on the queue, wait for the diagnostics to complete, and then return to Step 55.

For CM3, attempt to conditionally restore the MSGS using the MCC **poke 30x** or the **rst:msgsx= x** command [where x = MSGS switch (0,1)] to ensure that a diagnostic is run which might detect faulty hardware. If the attempt to conditionally restore the MSGS is denied, then you will either need to:

- Resolve the issue that is causing the MSGS restore to be denied. A reason should be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

- Attempt to conditionally restore the MSGS sub-unit using the MCC poke **360/361** (CMP) or **330/331** (FPC) or **350/351** (PPC) or **320/321** (QGP) or **34x** (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally restore the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

69. The MMP is unequipped. No further action can be performed. Go to Step 53.
70. The MMP is in a growth state. Refer to the MMP growth procedures (see 235-105-231, *Hardware Change Procedures–Growth* or 235-105-331, *Hardware Change Procedures–Degrowth*), and then return to Step 53.
71. The MMP is in the OOS family of equipment (OOSF) state, which indicates the parent MSCU is OOS or UNAV. Go to Step 1.
72. The MMP is being used as a "helper unit" to execute diagnostic tests for other hardware. When the diagnostic testing is complete, the MMP state will change. Once the diagnostic completes, return to Step 53.
73. The MMP is being pumped/restarted (maintenance in progress), which should only take several seconds to complete. After a short wait, return to Step 53.

74. For CM3 (5E22.1 and later) on MCC Pages 1240 and 1250 an off normal MSGS Ethernet state can be displayed as either **ETHERNET NETWORK X ISOLATED**, **ETHERNET NETWORK X OFFNORMAL** (where X is the Ethernet Network) (0 or 1) or **ETHERNET NETWORKS ISOLATED** (for both networks). Are there any off normal Ethernet states indicated?

If **YES**, then go to Step 75.

If **NO**, then the MSGS Recovery procedure is completed.

75. **Warning: The MSGS Ethernet recovery procedure may result in the MSGS being placed in an OOS-MAN-RMV state unless all of the faulty hardware is replaced during the procedure. Before proceeding, ensure you have sufficient replacement hardware for MSGS Ethernet equipment on this MSGS side.**

The MSGS Ethernet Network (ENETWK) sub-unit can only be diagnosed as part of the MSGS in CM3 offices. It can only be run if the mate MSGS is in-service. See the overview in **Procedure 5.3 - Repair Failures in a CM Unit** within the 235-105-250, *System Recovery* manual, for additional background information about MSGS diagnostics. Continue with the next step.

76. For CM3 on MCC Page 115, is either FUSE ALARM for SIDE 0 or SIDE 1 backlit?

If **YES**, then continue with **Procedure 3.4.2 - GPDF FUSE REPLACEMENT** and **Procedure 3.5 - POWER-UP 5ESS® SWITCH APPLICATION HARDWARE UNITS** within the 235-105-250, *System Recovery* manual.

If **NO**, then continue with the next step.

77. Check the mate MSCU/MSGS state to determine if the unit is ACT. For Page 1240, refer to page 1250. For Page 1250, refer to page 1240. Are both MSCUs ACT?

If **YES**, then continue with the next step.

If **NO**, then return to Step 2 to recover the mate MSGS unit(s).

78. Set and clear isolation on the ENETWK using **set:isol,enetwk=x** command (where x = ETHERNET network) (0 or 1). Wait for the set:isol completion ROP report. Input **clr:isol,enetwk=x** command (where x = ETHERNET network) (0 or 1) to clear ENETWORK isolation. Wait for clr:isol completion ROP report before continuing.

79. Output the MSGS ENETWK hardware status to the ROP using **op:enetstat,entwk=x** command (where x = ETHERNET network) to determine the status of the MSCUs, the MSGS Ethernet pipes and the MSGS Ethernet links.

The following list should be handled progressively in order from the first OOS state to the last in the list.

If MSENLNK state is **OOS,FE**, then go to Step 81.

If MSENPIPE state is **OOS,UNEQ**, then go to Step 82.

If MSENPIPE state is **OOS,AUTO,FE**, then go to Step 82.

If MSENPIPE state is **OOS,MAN,FE**, then go to Step 82.

If MSENPIPE state is **OOS,MAN,RMV,ISOL**, then go to Step 82.

- If MSENLNK state is **OOS,UNEQ**, then go to Step [82](#).
- If MSENLNK state is **OOS,MAN,RMV,ISOL**, then go to Step [82](#).
- If MSENPIPE state is **OOS,AUTO,MIP**, then go to Step [80](#).
- If MSENPIPE state is **OOS,AUTO,RMV**, then go to Step [84](#).
- If MSENPIPE state is **OOS,AUTO,FLT**, then go to Step [84](#).
- If MSENLNK state is **OOS,MIP**, then go to Step [84](#).
- If MSENLNK state is **OOS,RMV**, then go to Step [84](#).
- If MSENLNK state is **OOS,FLT**, then go to Step [84](#).
- If the MSENLNK or MSENPIPE in any other **OOS** or **INIT** state, then go to Step [82](#).
80. The MSENPIPE is undergoing an initialization. Wait for the initialization complete message on the ROP. When the initialization completes, return to Step [73](#).
81. The MSENLNK is OOS family equipment. This condition is only valid if the MSENPIPE is not ACT. Is the MSENPIPE state ACT?
- If **YES**, then continue to the next step.
- If **NO**, then continue to Step [83](#).
82. Execute the Ethernet network pipe and Ethernet network link audits using **aud:enpipe,env=smkp** and **aud:enlnk,env=smkp** to correct any data inconsistencies.
83. Output the MSGS ENETWK hardware status to the ROP using **op:enetstat,entwk=x** command (where x = ETHERNET network) to determine the status of the MSCUs, the MSGS Ethernet pipes and the MSGS Ethernet links. Are all of the MSENPIPEs and MSENLNKs ACT?
- If **YES**, then the recovery is complete.
- If **NO**, then continue to the next step.
84. The MSGS ENETWK hardware is faulty or has been removed. Remove and conditionally restore the MSGS, running diagnostics to determine the faulty hardware. Use either MCC poke 20x or the **rmv:msgsx=x** command (where x = MSCU side) (0 or 1) to remove. Then conditionally restore the MSGS using poke 30x or **rst:msgsx=x** (where x=msgsx side) (0 or 1). Did the MSGS restore successfully?
- If **YES**, then continue to Step [86](#).
- If **NO**, then continue to the next step.
85. Did the MSGS diagnostics Phase 11 fail?
- If **YES**, then follow the repair TLPNOTE instructions for hardware replacement in **Procedure 5.3 - Repair Failures in a CM Unit** within the 235-105-250, *System Recovery* manual, using the Continue to the next step once the repair is complete.
- If **NO**, then continue with Step [2](#) to recover the MSGS.
86. Output the MSGS ENETWK hardware status to the ROP using **op:enetstat,entwk=x** command (where x = ETHERNET network)(0 or 1) to

determine the status of the MSCUs, the Ethernet links and Ethernet pipes. Are all of MSENPIPEs and MSENLNKs ACT?

If **YES**, then the recovery is complete.

If **NO**, the associated ENETWK cannot be conditionally restored. ***Seek technical assistance*** according to local procedures.

5.5 CLEAR ONTC PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in the Office Network and Timing Complex (ONTC).

The following ONTC sub-units can be diagnosed separately: ONTC Common (ONTCCOM), TMSFP (CM3 in 5E16.2 and later), QLPS, and NLI/DLI. For CM2 only, separate commands also exist to diagnose the MI, NC, and TMS components of the ONTCCOM. For CM2, the ONTCCOM diagnostic required the use of an FPC as a helper unit. No helper units are required for CM3. Refer to the overview in Procedure 5.2 for additional background information about ONTC diagnostics.

PROCEDURE

1. Go to MCC Page **1209** to display the status of both ONTCCOMs.
2. Is an ONTCCOM in an OOS or UNAV state?
If **YES**, go to Step 7.
If **NO**, continue with the next step.
3. Are hardware checks inhibited on an ONTC?
If **YES**, go to Step 5.
If **NO**, continue with the next step.
4. For CM2 and CM3 prior to 5E16.2: are any QLPSs in an OOS state?
Note: For CM3 in 5E16.2 and later, the QLPS indicators were moved from MCC page **1209** to MCC page **1214**.
If **YES**, go to Procedure 5.11.
If **NO**, return to Procedure 5.3 to evaluate other CM units.
5. Use MCC **poke 91x** or the **op:cfgstat,ontccom=x** command (where x = ONTC side) to determine if hardware checks were manually or automatically inhibited.
Note: ONTC hardware checks are inhibited automatically only after an automatic AM/CM hardware initialization has escalated.
6. If it is determined that ONTC hardware checks can be allowed, use **poke 70x** or the **alw:hdwchk,ontc=x** command (where x = ONTC side), and then return to Step 2.
If the decision is made to leave hardware checks inhibited, then return to Procedure 5.3 to reevaluate the status of other CM units.
7. Output the ONTCCOM hardware state to the ROP using MCC **poke 91x** or the **op:cfgstat,ontccom=x** command (where x = ONTC side).
If the state is OOS-MAN-RMV, continue with Step 8.
If the state is OOS-AUTO-RMV, go to Step 10.
If the state is OOS-AUTO-DGN, go to Step 13.
If the state is OOS-MAN-DGN, go to Step 13.
If the state is OOS-MAN-EX (CM2-only), go to Step 13.
If the state is OOS-AUTO-REX, go to Step 13.
If the state is OOS-MAN-REX, go to Step 13.
If the state is OOS-MAN-TEMP (CM2-only), go to Step 19.
If the state is OOS-AUTO-TEMP (CM2-only), go to Step 19.
If the state is OOS-AUTO-FLT, go to Step 11.

If the state is OOS-MAN-FLT, go to Step 11.
If the state is OOS-AUTO-PWRALM, go to Step 15.
If the state is OOS-AUTO-TBLA, go to Step 14.
If the state is OOS-AUTO-DFRIP, see the following Note.
If the state is UNAV-MAN-PWROFF, go to Step 16.
If the state is UNAV-FRCD-RMV, go to Step 17.
If the state is UNAV-FRCD-DGN, go to Step 13.
If the state is UNAV-FRCD-EX (CM2-only), go to Step 13.
If the state is UNAV-FRCD-FLT, go to Step 18.
If the state is UNAV-FRCD-PWROFF, go to Step 16.
If the state is UNAV-FRCD-PWRALM, go to Step 15.

Note: The OOS-AUTO-DFRIP state only occurs when both ONTCCOMs cannot be restored. If system software checks are allowed, take no action, as the failure of fault recovery to restore one of the ONTCCOMs will result in escalation to an AM/CM initialization. If software checks are inhibited, escalation to an initialization will not occur; the ONTCCOM should be restored in the next step.

8. Restore the ONTCCOM that was removed using MCC **poke 31x** or the **rst:ontccom=x** command (where x = ONTCCOM side).
9. Did the ONTCCOM restore to an active (ACT) or degraded (DGR) state?

If **YES**, return to Step 3.

If **NO**, return to Step 7.

Note: For CM2, if an FPC is OOS/UNAV, it cannot be used as a “helper unit” for the ONTCCOM diagnostic. Return to Procedure 5.4 to repair the FPC before continuing.

10. The ONTCCOM has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP using the **op:dmq,cm** command.

If the ONTCCOM is not on the queue, return to Step 8.

If the ONTCCOM is on the queue, wait for diagnostics to complete, return to Step 2.
11. The ONTCCOM is faulty. Find the most recently printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue with the next step.
12. Did Procedure 5.2 result in the successful restoral of the ONTCCOM?

If **YES**, then return to Step 3.

If **NO**, then return to Procedure 5.3 to evaluate other CM units.
13. The ONTCCOM is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 2.
14. The ONTCCOM is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
15. The ONTCCOM or one of its shelf units has lost power independently. Refer to power repair guidelines in Procedure 5.25.14. Once the problem is resolved, return to Step 2.

For CM3, you will see a “power alarm” state if the fuse is pulled (or fails) and a “power off” state if the pack is pulled.

16. The ONTCCOM or one of its shelf units has been manually powered off. Power up the ONTCCOM or shelf unit as indicated in the power repair guidelines in Procedure 5.25.14. Once the problem is resolved, return to Step 2.

For CM3, you will see a "power alarm" state if the fuse is pulled (or fails) and a "power off" state if the pack is pulled.
17. The ONTCCOM was forced unavailable. To clear the forced unavailable state, use MCC **poke 402** or the **clr:frc,ontccom** command, and return to Step 2.
18. The forced unavailable ONTCCOM is faulty. Find the most recent printed TLP list on the ROP, and use Procedure 5.2 to repair the unit (execute only diagnostics, and make no attempt to restore the unit). When the repair is complete, return to Step 2.
19. For CM2, the ONTCCOM is being used as a "helper unit" to execute diagnostics tests for other hardware. When the diagnostic testing is complete, the ONTCCOM state will change. Once the diagnostic completes, return to Step 2.

5.6 CLEAR NETWORK CLOCK PROBLEMS

OVERVIEW

This procedure is used to analyze and clear noncritical problems in the network clock (NC). The following units are covered:

- Network clock cross-couples (NC XC) (CM2 Only)
- Network clock references (NC REF)
- Oscillator cross-couples (OSCXC) (CM2 Only)
- Network clock oscillator (NCOSC).

Note: In this procedure, CM2 supports NC2, and CM3 supports NC3.

PROCEDURE

1. On MCC Display Page **115**, the NC (CM2) or NC (CM3) 0/1 is indicated to be off-normal. Go to the **1210** page.

Note: If any network clock oscillator or external reference is off-normal, this box is backlighted. For CM2, if a network clock cross-couple or oscillator cross-couple is off-normal, this box is backlighted. In CM3 offices, network clock and oscillator cross-couples exist but are not configurable units.

For **CM2** offices, continue with the next step.

For **CM3** offices, go to Step **14**.

2. Is a NC cross couple (XC) in an OOS state?

If **YES**, then continue with the next step.

If **NO**, then go to Step **10**.

Note: For CM3, there is no NC XC configurable unit. There is no state or display.

3. At the **1210** page, dump the status of the NC XCs, which are indicated to be off-normal, by using MCC **poke 91x** or the **op:cfgstat,ncref,xc=x** command (where x = NC XC number).

If the state is OOS-MAN-RMV, then continue with the next step.

If the state is OOS-AUTO-FE, then go to Step 6.

If the state is OOS-MAN-FE, then go to Step 6.

If the state is OOS-AUTO-FLT, then go to Step 7.

If the state is OOS-AUTO-TBLA, then go to Step 7.

4. The NC XC has been manually removed and can be restored by using MCC **poke 31x** or the **rst:ncref,xc=x** command (where x = NC XC number).

5. Did the NC XC restore successfully?

If **YES**, then go to Step **10**.

If **NO**, then go to Step **7**.

6. The NC XC is in an OOS family of equipment (OOSF) state, which implies the parent ONTCCOM is OOS/UNAV. Return to Procedure **5.5** of this section.
7. The NC XC is faulty. Diagnose the "slave" NC unit (the NC pointed to by the XC line on the MCC page), using Procedure **5.2** to repair the unit, and then continue with the next step.

8. Did Procedure 5.2 result in the successful restoration of the ONTCCOM?
If YES, then continue with the next step.
If NO, then return to Procedure 5.3 to evaluate other CM units.
9. Did the NC XC restore successfully?
If YES, then continue with the next step.
If NO, then **seek technical assistance** according to local procedure.
10. Is the "SEE PAGE 1211" box backlighted?
If YES, bring up MCC Page 1211 and then continue with the next step.
If NO, then return to Procedure 5.3 and evaluate the status of other CM units.
11. (NC2 only) Is a network clock oscillator cross-couple (OSCXC) in an OOS state?
If YES, then continue with the next step.
If NO, then go to Step 21.
12. (NC2 only) Restore the OOS OSCXC by using poke 34x or the `rst:oscxc=x` command (where x = OSCXC number).
13. (NC2 only) Did the OSCXC restore successfully?
If YES, then return to Step 11.
If NO, then continue with the next step.
14. Is a network clock oscillator (NCOSC) in an OOS or UNAV state?
If YES, then continue with the next step.
If NO, then go to Step 21.
15. Output the status of the NCOSC to the ROP by using poke 93x (CM2, MCC page 1211) or 92x (CM3, MCC page 1210) or the `op:cfgstat,ncosc=x` command (where x = NCOSC side).
If the state is OOS-MAN-WMUP, then continue with Step 16.
If the state is OOS-AUTO-WMUP, then continue with Step 16.
If the state is UNAV-FRCD-WMUP, then continue with Step 16.
If the state is OOS-AUTO-PWRALM, then go to Step 17.
If the state is UNAV-MAN-PWROFF, then go to Step 17.
If the state is UNAV-FRCD-NULL, then go to Step 18.
If any other OOS state, then go to Step 19.
16. No action can be performed currently. Wait for the warm-up period to complete. This could take up to an hour for a medium-stability NC2 NCOSC, up to 16 hours for a high-stability NC2 NCOSC, or up to 90 minutes for a high-stability NC3 NCOSC. Once the warm-up period is complete, return to the beginning of this procedure to re-evaluate network clock status.
17. The NCOSC has either lost power independently or has been manually powered off. Refer to the power repair guidelines in Procedure 14.6. Once the problem is resolved, return to Step 15.
18. The NCOSC has been forced unavailable. To clear the force, use the `clr:frc,ncosc` command, and then return to Step 15.

19. Restore the NCOSC using poke **33x** (CM2, MCC page **1211**) or **32x** (CM3, MCC page **1210**) or the **rst:ncosc=x** command (where x = NCOSC side).
20. Did the NCOSC restore to an in-service (ACT or STBY) state?
If **YES**, then return to the beginning of this procedure to re-evaluate network clock status.
If **NO**, then **seek technical assistance** according to local procedure.
21. For NC3 only, is the "SEE PAGE 1211" box backlighted?
If **YES**, bring up MCC Page **1211** and then continue with the next step.
If **NO**, then return to Procedure **5.3** to evaluate the status of other CM units.
22. Is an NC reference backlighted?
If **YES**, then continue with the next step.
If **NO**, then return to Procedure **5.3** to evaluate the status of other CM units.
23. The source used as a timing reference may be faulty. Gather any **REPT NC** messages on the ROP (looking for potential problems, such as reference jitter, out-of-frame problems, phase-lock loop problems, etc.), and decode them according to the 235-600-750, *Output Manual*. For NC3 there may also be relevant data in the REPT:ONTC-FD-NC output message (which prints as REPT ONTC=X FAULT DATA). Work with transmission personnel (using any gathered data and local carrier group alarms) to ensure the synchronization source is fault-free. When the problems are identified/corrected, continue with the next step.
24. Attempt to restore an NC reference, which is OOS, by using the **poke 32x** (for CM2), **poke 30x [,type = y]** (for CM3), or the **rst:ncref,refx [,type =y]** command (where x =the OOS NC reference number, refx = the OOS NC reference number, and y = NC reference type).
25. Did the NC reference restore successfully?
If **YES**, then go to Step **22**.
If **NO**, then **seek technical assistance** according to local procedure.

5.7 CLEAR DLI/TMSLNK PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in a Switching Module (SM) Dual-Link Interface (DLI) and its associated time multiplexed switch links (TMSLNKs). It is typically used for TMSLNK problems when it is not yet known whether the TMSLNKs are associated with DLIs or network link interfaces (NLIs).

For DLI/NLI failures associated with ORM or EXM TMS links, refer to Procedure [5.17](#).

PROCEDURE

1. If a specific DLI will be repaired, go to master control center (MCC) Page **1200,x** (DLI summary, where x = SM number), and then go to Step [9](#).

Otherwise, for CM2 or CM3 prior to 5E16.2, enter the MCC page number inside the TMS link (TMSLNK) box that is off-normal (backlighted) on MCC page **115** to display the TMSLNK status MCC page.

TMSLNK MCC pages for ONTC side 0: **1221–1228**

TMSLNK MCC pages for ONTC side 1: **1231–1238**.

For CM3 in 5E16.2 and later, this procedure is normally entered from Procedure [5.20](#) (CLEAR TROUBLE IN TMSFP). That procedure selected a TMSFP with out-of-service NLIs, DLIs, or TMSLNKs for further analysis, and then used MCC page **1220,x** (where x = TMSFP number) to identify a TMSLNK status MCC page containing detailed information about the off-normal condition. That MCC page should currently be displayed.

TMSLNK MCC pages for ONTC side 0: **1221,x–1228,x**

TMSLNK MCC pages for ONTC side 1: **1231,x–1238,x**
(where x=TMSFP number).

2. On the TMSLNK status MCC page, locate OOS TMSLNK(s) and select an SM/SM-2000 to be analyzed. If there are no OOS TMSLNKs, return to the calling procedure to look for other off-normal conditions.

Note: There may be cases when there are OOS TMSLNKs on both ONTC sides. When this occurs, work on resolving the problems on the ONTC side that is in the degraded minor (DGR-MIN) state first.

3. After choosing an SM/SM-2000 to analyze, enter **1201,1,x** (where x = SM/SM-2000 number). On that page, note whether it displays an SM served by **DLIs**, or an SM-2000 served by **NLIs**, and then return to the original 1221-1228 or 1231-1238 page used in the previous step.

If **DLI**, continue with the next step

If **NLI**, go to Procedure [5.8](#) to evaluate this **SM-2000**.

4. Is the SM summary box, associated with a pair of TMSLNKs, backlighted (indicating the parent DLI is OOS)?

If **YES**, then go to Step [7](#).

If **NO**, then continue with the next step.

5. For CM2 or CM3 prior to 5E16.2, restore the TMSLNK using poke **3yyy** or the **rst:tmslnk=x-yyy** command (where x = ONTC side and yyy = TMSLNK number).

- For CM3 in 5E16.2 and later, restore the TMSLNK using poke **31zzz** or the **rst:tmslnk=x-y-zzz** command (where x = ONTC side, y = TMSFP number, and zzz = TMSLNK number). Note that the TMSFP number is always 0 for SMs/DLIs.
6. Did the TMSLNK restore successfully?
If **YES**, then go to Step [2](#).
If **NO**, then continue with the next step.
 7. TMSLNK(s) may be removed from service due to problems in parent circuits. Enter poke **1201,1,x** (where x = SM number) and note the state of the TMSFP (CM3, 5E16.2 and later), and ONTCCOM associated with the OOS TMSLNK(s).
If the ONTCCOM is OOS/UNAV, then use Procedure [5.5](#) to resolve the problem.
If the TMSFP is OOS, use Procedure [5.20](#) to resolve the problem.
Otherwise, continue with the next step.
 8. Is the associated DLI OOS?
If **YES**, continue with the next step.
If **NO**, go to Step [20](#).
 9. Output the hardware status to the ROP using poke **90y** or the **op:cfgstat,dli=x-y** command (where x = SM number and y = ONTC side).
If OOS-MAN-RMV, continue with Step 10.
If OOS-AUTO-RMV, go to Step 12.
If OOS-AUTO-DGN, go to Step 15.
If OOS-MAN-DGN, go to Step 15.
If OOS-MAN-EX, go to Step 15.
If OOS-AUTO-REX, go to Step 15.
If OOS-MAN-REX, go to Step 15.
If OOS-AUTO-FLT, go to Step 13.
If OOS-MAN-FLT, go to Step 13.
If OOS-AUTO-PWRALM, go to Step 17.
If OOS-AUTO-TBLA, go to Step 16.
If OOS-MAN-FE, go to Step 19.
If OOS-AUTO-FE, go to Step 19.
If UNAV-MAN-PWROFF, go to Step 18.
 10. Restore the DLI that was removed using MCC poke **30x** or the **rst:dli=x-y** command (where x = SM number and y = ONTC side).
 11. Did the DLI restore successfully?
If **YES**, return to Procedure [5.3](#) to evaluate other units.
If **NO**, return to Step [9](#).
 12. The DLI was automatically removed by fault recovery for the purpose of running diagnostics. Output the diagnostic queue to the ROP via the **op:dmq,cm** command.
If the DLI is not on the queue, return to Step [10](#).
If the DLI is on the queue, wait for diagnostics to complete, return to Step [8](#).
Note: A DLI cannot be diagnosed if the SM has lost communication with the AM. If the SM status is COMM LOST, INIT ISOL, STNDALONE, or ISOLATED, refer to 235-105-250, *System Recovery*, Procedure "ESTABLISH COMMUNICATION WITH ISOLATED SM/SM-2000," to resolve the problem.

13. The DLI is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue with the next step.
Note: For the DLI diagnostic, segments 6 and 11 of phase 11 test the host TRCU3 and segments 2 and 3 of phase 9 test the remote TRCU3. If either of these segments are indicated for a DLI diagnostic failure, go to Procedure 5.18.
14. Did Procedure 5.2 result in the successful restore of the DLI?
If **YES**, return to Step 2.
If **NO**, return to Procedure 5.3 to evaluate other units.
15. The DLI is currently being diagnosed, or exercised (either manually or routinely). When diagnostics/routine exercise completes, or an interactive manual exercise session is stopped, return to Step 8.
16. The DLI is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
17. The DLI has lost power independently (possibly a blown fuse). Refer to power repair guidelines in Procedure 14.6. Once the problem is resolved, return to Step 2.
18. The DLI has been manually powered down (powered off). Power up the DLI at the corresponding control and display (C/D) pack, and then return to Step 9.
19. For CM2 or CM3 prior to 5E16.2, as the DLI's parent ONTCCOM is OOS or UNAV, refer to Procedure 5.5 to repair the parent ONTCCOM.
For CM3 in 5E16.2 and later, as the DLI's parent TMSFP is OOS, refer to Procedure 5.20 to repair that parent TMSFP.
20. Diagnose/restore the DLI with the OOS TMSLNK using Procedure 5.2, and then continue with the next step.
21. Did Procedure 5.2 result in the successful restore of the DLI?
Note: For the DLI diagnostic, segments 6 and 11 of phase 11 test the host TRCU3 and segments 2 and 3 of phase 9 test the remote TRCU3. If either of these segments are indicated for a DLI diagnostic failure, go to Procedure 5.18.
If **YES**, continue with the next step.
If **NO**, return to Procedure 5.3 to evaluate other units.
22. Did the child TMSLNK restore successfully?
If **YES**, continue with the next step.
If **NO**, **seek technical assistance** according to local procedure.
23. Are any TMSLNK boxes still indicating an off-normal condition?
If **YES**, return to Step 2.
If **NO**, return to Procedure 5.3 to evaluate other units.
24. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.8 CLEAR NLI/TMSLNK PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in an SM-2000 network link interface (NLI) and its associated time multiplexed switch links (TMSLNKs).

For NLI failures associated with ORM or EXM TMS links, refer to Procedure 5.17.

PROCEDURE

1. If a specific **NLI** will be repaired, go to MCC Page **1200,x** (NLI summary), where **x** = SM-2000 number, and then go to Step 8.

Otherwise, for CM2 or CM3 prior to 5E16.2, enter the MCC page number inside the TMS link (TMSLNK) box that is off-normal (backlighted) on MCC page **115** to display the TMSLNK status MCC page.

TMSLNK MCC pages for ONTC side 0: **1221–1228**

TMSLNK MCC pages for ONTC side 1: **1231–1238**.

For CM3 in 5E16.2 and later, this procedure is normally entered via Procedure 5.20 (CLEAR TROUBLE IN TMSFP) and Procedure 5.7 (CLEAR DLI/TMSLNK PROBLEMS). Those procedures selected a TMSFP with out-of-service NLIs, DLIs, or TMSLNKs for further analysis, and then used MCC page **1220,x** (where **x** = TMSFP number) to identify a TMSLNK status MCC page containing detailed information about the off-normal condition. That MCC page should currently be displayed.

TMSLNK MCC pages for ONTC side 0: **1221,x–1228,x**

TMSLNK MCC pages for ONTC side 1: **1231,x–1238,x** (where **x**=TMSFP number).

2. On the TMSLNK status MCC page, locate OOS TMSLNK(s) and select an SM/SM-2000 to be analyzed. If there are no OOS TMSLNKs, return to the calling procedure to look for other off-normal conditions.

Note: There may be cases when there are OOS TMSLNKs on both ONTC sides. When this occurs, work on resolving the problems on the ONTC side that is in the degraded minor (DGR-MIN) state first.

3. After choosing an SM/SM-2000 to analyze, enter **1201,1,x** (where **x** = SM/SM-2000 number). On that page, note whether it displays an SM served by **DLIs**, or an SM-2000 served by **NLIs**, and then return to the original 1221-1228 or 1231-1238 page used in the previous step.

If **NLI**, continue with the next step.

If **DLI**, go to Procedure 5.7 to evaluate *this SM*.

4. Is the SM summary box backlighted (indicating an NLI is OOS)?

If **YES**, then enter poke **1200,x** (where **x**= SM-2000 number), and go to Step 7.

If **NO**, then continue with the next step.

5. For CM2 or CM3 prior to 5E16.2, restore the TMSLNK using poke **3yyy** or the **rst:tmslnk=x-yyy** command (where **x** = ONTC side and **yyy** = TMSLNK number).

- For CM3 in 5E16.2 and later, restore the TMSLNK using poke **31zzz** or the **rst:tmslnk=x-y-zzz** command (where x = ONTC side, y = TMSFP number, and zzz = TMSLNK number).
6. Did the TMSLNK restore successfully?
If **YES**, then go to Step **2**.
If **NO**, then continue with the next step.
 7. TMSLNK(s) may be removed from service due to problems in parent circuits. On MCC page **1200,x** (where x = SM-2000 number), note the MCC page number in the "SEE PAGE" column of the row containing an OOS NLI. Enter the appropriate poke to display that MCC page and note the state of the TMSFP (CM3, 5E16.2 and later), and ONTCCOM associated with the OOS NLI(s) and/or TMSLNK(s).
If the ONTCCOM is OOS/UNAV, use Procedure **5.5** to resolve the problem.
If the TMSFP is OOS, use Procedure **5.20** to resolve the problem.
Otherwise, continue with the next step.
 8. Is the associated NLI OOS?
If **YES**, continue with the next step.
If **NO**, go to Step **18**.
 9. Output the NLI hardware status to the ROP using poke **9zyy** or the **op:cfgstat,nli=x-yy-z** command (where x = SM-2000 number, yy = NLI number, and z = ONTC side).
If the state is OOS-MAN-RMV, continue with Step 11.
If the state is OOS-AUTO-RMV, go to Step 13.
If the state is OOS-AUTO-DGN, go to Step 16.
If the state is OOS-MAN-DGN, go to Step 16.
If the state is OOS-MAN-EX, go to Step 16.
If the state is OOS-AUTO-REX, go to Step 16.
If the state is OOS-MAN-REX, go to Step 16.
If the state is OOS-AUTO-FLT, go to Step 14.
If the state is OOS-MAN-FLT, go to Step 14.
If the state is OOS-AUTO-TBLA, go to Step 17.
If the state is OOS-MAN-FE, go to Step 18.
If the state is OOS-AUTO-FE, go to Step 18.
 10. Restore the NLI that was removed using MCC poke **3zyy** or the **rst:nli=x-yy-z** command (where x = SM-2000 number, yy = NLI number, and z = ONTC side).
 11. Did the NLI restore successfully?
Note: An NLI cannot be diagnosed if the SM-2000 has lost communication with the AM. If the SM-2000 status is COMM LOST, INIT ISOL, STNDALONE, or ISOLATED, refer to 235-105-250, *System Recovery*, Procedure "ESTABLISH COMMUNICATION WITH ISOLATED SM/SM-2000," to resolve the problem.
If **YES**, return to Procedure **5.3** to reevaluate other CM units.
If **NO**, return to Step **9**.
 12. The NLI has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP using the **op:dmq,cm** command.

- If the NLI is not on the queue, return to Step 10.
- If the NLI is on the queue, wait for the diagnostics to complete, return to Step 8.
13. The NLI is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue with the next step.
Note: For the NLI diagnostic, segment 30 of phase 2 tests the host TRCU3 and segment 20 of phase 2 tests the remote TRCU3. If either of these segments is indicated for a NLI diagnostic failure, go to Procedure 5.18.
 14. Did Procedure 5.2 result in the successful restoral of the NLI?
If **YES**, return to Step 2.
If **NO**, return to Procedure 5.3 to evaluate other CM units.
 15. The NLI is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes, or an interactive manual exercise session is stopped, return to Step 8.
 16. The NLI is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
 17. For CM2 or CM3 prior to 5E16.2, as the NLI's parent ONTCCOM is OOS or UNAV, refer to Procedure 5.5 to repair the parent ONTCCOM.
For CM3 in 5E16.2 and later, if the NLI's parent TMSFP is OOS, refer to Procedure 5.20 to repair the parent TMSFP.
 18. Diagnose/restore the NLI with the OOS TMSLNK using Procedure 5.2, and then continue with the next step.
 19. Did Procedure 5.2 result in the successful restoral of the NLI?
Note: For the NLI diagnostic, segment 30 of phase 2 tests the host TRCU3 and segment 20 of phase 2 tests the remote TRCU3. If either of these segments is indicated for a NLI diagnostic failure, go to Procedure 5.18.
If **YES**, continue with the next step.
If **NO**, return to Procedure 5.3 to evaluate other CM units.
 20. Did the child TMSLNK restore successfully?
If **YES**, continue with the next step.
If **NO**, **seek technical assistance** according to local procedure.
 21. Are any TMSLNK boxes still indicating an off-normal condition?
If **YES**, return to Step 2.
If **NO**, return to Procedure 5.3 to evaluate other CM units.
 22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.9 CLEAR CLNK PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in Communication Links (CLNKs).

PROCEDURE

1. If CLNKs on a *specific* SM/SM-2000 are to be recovered, enter **poke 1900,x** (where x = SM/SM-2000 number), and go to Step 3.

Otherwise go to the CLNK MAP display page, by entering **poke 1260**, and continue with the next step.
2. Go to the MCC page for the SM/SM-2000 that is indicating CLNKs OFF-NORMAL, by entering **poke 1900,x** (where x = SM/SM-2000 number).
3. If any CLNK is OOS (except due to OOS parent hardware), restore that CLNK using **poke 3yyy** or the **rst:clnk=x-y-y-y** command (where x = SM/SM-2000 number and y-y-y = the CLNK to be restored).

Note: If there are any other CM units out of service, repair those OOS units before attempting to restore CLNKs.
4. Did the CLNK restore successfully?

If **YES**, return to Procedure 5.3 to evaluate other CM units.
If **NO**, seek technical assistance according to local procedure.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.10 CLEAR QGP PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in a quad-link packet switch gateway processor (QGP).

PROCEDURE

1. For CM2 on MCC Pages **1241**, **1251**, **1380**, or **1381**, are any QGPs in an OOS or UNAV state?

For CM3 on MCC Pages **1240**, **1250**, **1380**, or **1381**, are any QGPs in an OOS or UNAV state?

If **YES**, then go to Step **5**.

If **NO**, then continue with the next step.

2. Are there any QGPs with hardware checks inhibited?

If **YES**, then continue with the next step.

If **NO**, then return to Procedure **5.4**.

3. On MCC Pages **1380** or **1381** use MCC **poke 97xy** or the **op:cfgstat,qgp=x-y** command (where x = MSGS side and y = QGP number) to determine if hardware checks were manually or automatically inhibited.

Note: The QGP hardware checks are inhibited automatically after an automatic AM/CM hardware initialization has escalated or as a result of duplex/quadruplex failed QGP recovery.

4. If it is determined that QGP hardware checks can be allowed, use **poke 77xy** or the **alw:hdwchk,qgp=x-y** command (where x = MSGS side and y = QGP number), and then return to Step **1**.

If the decision is made to leave hardware checks inhibited, return to Procedure **5.3** to reevaluate status of other CM units.

5. Output the QGP hardware state to the ROP using MCC **poke 97xy** or the **op:cfgstat,qgp=x-y** command (where x = MSGS side and y = QGP number).

If state is OOS-MAN-RMV, then continue with Step 6.

If state is OOS-AUTO-RMV, then go to Step 18.

If state is OOS-MAN-DGN (CM2-only), then go to Step 10.

If state is OOS-AUTO-DGN (CM2-only), then go to Step 10.

If state is OOS-MAN-EX (CM2-only), then go to Step 10.

If state is OOS-MAN-REX (CM2-only), then go to Step 10.

If state is OOS-AUTO-REX (CM2-only), then go to Step 10.

If state is OOS-MAN-FLT (CM2-only), then go to Step 8.

If state is OOS-AUTO-FLT (CM2-only), then go to Step 8.

If state is OOS-AUTO-DFRIP, then see note and go to Step 6.

If state is OOS-AUTO-PWRALM (CM2-only), then go to Step 12.

If state is OOS-AUTO-TBLA, then go to Step 11.

If state is OOS-UNEQ-NULL, then go to Step 14.

If state is OOS-GROW-XXX (CM2-only), then go to Step 15.

If state is OOS-MAN-FE, then go to Step 16.

If state is OOS-AUTO-FE, then go to Step 16.

If state is OOS-MAN-MIP, then go to Step 17.

If state is OOS-AUTO-MIP, then go to Step 17.

If state is UNAV-MAN-PWROFF (CM2-only), then go to Step 13.

Note: For CM2 only, the OOS-AUTO-DFRIP state only occurs when no QGPs can be restored (periodic restoral attempts occur, but generally escalation to an

- AM/CM initialization is avoided). Usually, hardware is faulty, and craft intervention is necessary to diagnose/repair the unit. A restore request results in a diagnostic failure, followed by a stable OOS-MAN-FLT state, further analysis can then be performed.
6. Restore the QGP that was removed using MCC **poke 37yy** or the **rst:qgp=x-y** command (where x = MSGS side and y = QGP number).
 7. Did the QGP restore successfully?
If **YES**, then go to Step 1.
If **NO**, then go to Step 5.
 8. The QGP is faulty. For CM2 only, find the most recent printed TLP list on the ROP. For CM3, refer to the latest MSGS diagnostic, and find the most recent suspected faulty equipment list. Use Procedure 5.2 to repair the unit, and then continue with the next step.
 9. Did Procedure 5.2 result in the successful restoration of the QGP?
If **YES**, then return to Step 1.
If **NO**, then return to Procedure 5.3 to evaluate the status of other CM hardware.
 10. The QGP is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 1.
 11. The QGP is in a trouble analysis state (repeated fault recovery removals).
For CM2, diagnostics have not been able to locate the trouble. **Seek technical assistance** according to local procedure.
For CM3, attempt to conditionally restore the MSGS using the MCC **poke 30x** or the **rst:msgsx= x** command (where x = MSGS side 0 or 1) to ensure that a diagnostic is run that might detect faulty hardware. If the attempt to conditionally remove the MSGS is denied, then you will either need to:
 - Resolve the issue that is causing the MSGS remove to be denied. A reason must be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU)

or

 - Attempt to conditionally restore the MSGS sub-unit using the MCC **poke 360/361** (CMP) or **330/331** (FPC) or **350/351** (PPC) or **320/321** (QGP) or **34x** (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to

conditionally remove the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then **seek technical assistance** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then **seek technical assistance** according to local procedures.

12. The QGP has lost power independently. Refer to power repair guidelines in Procedure 14.6. Once the problem is resolved, return to Step 1.
13. The QGP has been manually powered off. Power up the QGP at the corresponding control and display pack, and then return to Step 5.
14. The QGP is unequipped. No further action can be performed, go back to Step 1 and investigate other QGPs.
15. The QGP is in a growth state. Refer to QGP growth procedure (see 235-105-231, *Hardware Change Procedures–Growth* or 235-105-331, *Hardware Change Procedures–Degrowth*), and then return to Step 1 to investigate other QGPs.
16. The QGP is in the OOS family of equipment (OOSF) state. This means that the QGP's parent MSCU is OOS or UNAV. Return to Procedure 5.4.
17. The QGP is being pumped/restarted (maintenance in progress), which only takes seconds to complete. After a short wait, return to Step 1.
18. For CM2, the QGP has been automatically removed by fault recovery for the purpose of executing diagnostics. Output the diagnostic queue to the ROP via the **op:dmq,cm** command.

If the QGP is *not* on the queue, then return to Step 6.

If the QGP *is* on the queue, wait for the diagnostics to complete, and then return to Step 1.

For CM3, attempt to conditionally restore the MSGS using the MCC **poke 30x** or the **rst:msgsz= x** command (where x = MSGS side 0 or 1) to ensure that a diagnostic is run that might detect faulty hardware. If the attempt to conditionally remove the MSGS is denied, then you will either need to:

- Resolve the issue that is causing the MSGS remove to be denied. A reason must be provided in response to the denied MSGS CDL RST command. Some reasons imply that manual action is required (for example, to repair/restore an OOS mate MSCU or sub-unit). In other cases, the reason for denial may be transient (for example, CLNKs are being re-mapped onto the mate MSCU).

or

- Attempt to conditionally restore the MSGS sub-unit using the MCC poke **360/361** (CMP) or **330/331** (FPC) or **350/351** (PPC) or **320/321** (QGP) or **34x** (MMP, where x = MMP number) or the appropriate MSGS sub-unit RST command. The MSGS sub-units are normally tested by the MSGS diagnostic and do not have their own individual diagnostics (that is, the diagnostic tests associated with them are only run as part of the MSGS diagnostic). However, operational tests are performed as part of an MSGS sub-unit conditional restore.

If the initial problem was transient, an MSGS sub-unit restore may return the system to normal operation. If it was not, the problem may occur again. Thus, this option isn't preferred, but may help in cases where it isn't possible to conditionally remove the MSGS. If a conditional restore of the MSGS sub-unit fails to bring it back into service, and the associated MSGS cannot be conditionally restored, then ***seek technical assistance*** according to local procedures.

Finally, if an MSGS diagnostic is run and ATP, and the MSGS sub-unit still ends up in an OOS state, then ***seek technical assistance*** according to local procedures.

5.11 CLEAR QLPS PROBLEMS

OVERVIEW

This procedure is used to analyze and clear problems in a quad-link packet switch (QLPS). The following ONTC sub-units can be diagnosed separately: ONTCCOM, TMSFP (CM3 in 5E16.2 and later), QLPS, and NLI/DLI. For CM2 only, separate commands also exist to diagnose the MI, NC, and TMS components of the ONTCCOM. For CM2, the QLPS diagnostic required the use of an ONTCCOM and FPC as helper units. No helper units are required for CM3. For CM3 the QLPS diagnostic can only be run if the associated ONTCCOM and, for 5E16.2 and later, parent TMSFP are in-service.

PROCEDURE

1. If this procedure was invoked due to a QLPS network off-normal indication observed on MCC Page **115**, enter the MCC page poke associated with the off-normal (backlighted) **QLPS NETWK** indicator.

If this procedure was invoked due to an out-of-service QLPS status observed on MCC Page **1214** (CM3, 5E16.2 and later), enter the MCC page poke associated with the QLPS network for which there is an out-of-service QLPS.

For **QLPS network 0**, enter **poke 1380**.

For **QLPS network 1**, enter **poke 1381**.
2. Is either QGP in an OOS or UNAV state, or have hardware checks inhibited?
If **YES**, return to Procedure **5.10**.
If **NO**, continue with the next step.
3. Is either QLPS in an OOS state?
If **YES**, continue with the next step.
If **NO**, return to Procedure **5.3** to reevaluate the status of other CM hardware units.
4. Output the QLPS hardware status to the ROP by entering **poke 92xy** or by using the **op:cfgstat,qlps=x-y** command (where x = ONTC side and y = QLPS network).

If state is OOS-MAN-RMV, continue with Step 5.
If state is OOS-AUTO-RMV, go to Step 10.
If state is OOS-MAN-DGN, go to Step 8.
If state is OOS-AUTO-DGN, go to Step 8.
If state is OOS-MAN-EX (CM2-only), go to Step 8.
If state is OOS-MAN-REX, go to Step 8.
If state is OOS-AUTO-REX, go to Step 8.
If state is OOS-AUTO-FLT, go to Step 6.
If state is OOS-MAN-FLT, go to Step 6.
If state is OOS-AUTO-TBLA, go to Step 9.
If state is OOS-AUTO-FE, go to Step 11.
If state is OOS-MAN-FE, go to Step 11.
If state is OOS-UNEQ-NULL (CM2-only), go to Step 12.
If state is OOS-GROW-XXX (CM2-only), go to Step 12.
5. Conditionally restore the QLPS that was removed by entering **poke 32xy** or by using the **rst:qlps=x-y** command (where x = ONTC side and y = QLPS network).

For CM2, if the **conditional** restore request is denied because the necessary helper units (ONTCCOM and FPC) are not available, restore the QLPS unconditionally by entering **poke 32xy,ucl** or using the **rst:qlps=x-y,ucl** command.

This may be necessary in cases where it is known in advance that the parent ONTCCOM cannot be removed as a helper unit for the diagnostic execution.

Once the restore is completed, return to Step 3.

6. The QLPS is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue with the next step.
7. Did Procedure 5.2 result in the QLPS being successfully restored to the active or standby state?

If **YES**, return to Step 3.

If **NO**, return to Procedure 5.3 to evaluate other CM units.

Note: In CM2, if the parent ONTCCOM is OOS/UNAV, the QLPS diagnostic may ATP and the QLPS will be left in an OOS family-of-equipment state.

8. The QLPS is currently being diagnosed or exercised (either manually or routinely). When diagnostics/routine exercise completes or an interactive manual exercise session is stopped, return to Step 1.
9. The QLPS is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
10. The QLPS has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP using the **op:dmq,cm** command.

If the QLPS is on the queue, wait for diagnostics to complete, and then return to Step 1.

If the QLPS is not on the queue, see the following note:

Note: It is possible for the QLPS to validly remain in an OOS-AUTO-RMV state for a long period of time.

In CM2 offices, this can occur because the necessary helper units (ONTCCOM and FPC) are not available to support QLPS diagnostic execution. There are many reasons why helper units may not be available, all of which relate to problems (or transient off-normal conditions) with other hardware that must be resolved. Attempt to conditionally restore the QLPS by entering poke **32xy** or by using the **rst:qlps=x-y** command (where x = ONTC side and y = QLPS network). If this request is denied, return to Procedure 5.3 to evaluate the status of other CM units.

In CM3 offices, the QLPS diagnostic can only be run when the associated ONTCCOM and TMSFP (5E16.2 and later) are in-service. If the parent ONTCCOM (prior to 5E16.2) is out-of-service, use Procedure 5.5 to resolve the problem. If the parent TMSFP (5E16.2 and later) is out-of-service, use procedure 5.20 to resolve the problem. Otherwise, attempt to conditionally restore the QLPS by entering poke **32xy** or by using the **rst:qlps=x-y** command (where x = ONTC side and y = QLPS network). Then return to Step 3.

11. For CM2 and CM3 (prior to 5E16.2), the QLPS's parent ONTCCOM is in an OOS or UNAV state. Use Procedure 5.5 to resolve the problem.

For CM3 in 5E16.2 and later, the QLPS's parent TMSFP is OOS. Use Procedure 5.20 to resolve the problem.

12. The QLPS is unequipped or in a growth state (both of these states could only occur in midst of a growth procedure). For CM3, the QLPS is always equipped. Refer to the QLPS growth/degrowth procedures (see 235-105-231, *Hardware Change Procedures–Growth* or 235-105-331, *Hardware Change Procedures–Degrowth*), and then return to Procedure [5.3](#) to reevaluate other CM units.

5.12 CLEAR QGL AND QGP QPIPE PROBLEMS

OVERVIEW

This procedure is used in offices where QGPs are equipped in the QLPS network. A QGL physically connects a QGP to a QLPS. Each equipped QGL is associated with a logical QGP QPIPE. A QGP QPIPE (with an active parent QGL) is considered active if a loopback test has verified that frames can successfully be transported to/from the associated active QLPS from the QGP. A QGP QPIPE to a standby QLPS is assumed to be capable of supporting message transport if all parent hardware is in-service (the loopback test is not performed), unless the QGP QPIPE was removed from service due to errors that occurred while the parent QLPS was active (before a QLPS switch).

This procedure will attempt to fix all QGL/QGP QPIPE problems and may be entered for any of the following reasons:

- An OP QNETSTAT off-normal report shows QGP QPIPE(s) OOS.
- An OP CFGSTAT CM off-normal report shows QGL(s) OOS.
- A REPT TRBL QGL or REPT TRBL QGPQPIPE message appears on the ROP.
- MCC Page 115/1380/1381 is off-normal due to OOS QGLs or QGP QPIPEs.

The hardware parameters for a QGP QPIPE are identified as QGP QPIPE = a-b-c-d. The hardware parameters for a QGL are identified as QGL = a-b-e.

Where: a = MSGS side (0-1)
 b = QGP number (0 or 1)
 c = QLPS network (0 or 1)
 d = Office network and timing complex (ONTC) side (0 or 1)
 e = QGL number (0-3).

The QGL number is the decimal equivalent of the ONTC side and QLPS network number when treated as a binary number. That is, QGL X-X-0 connects to ONTC side 0, QLPS network 0 (0 0->0) and QGL X-X-3 connects to ONTC side 1 QLPS network 1 (1 1->3).

The following hardware must be in-service before starting this procedure. If necessary, repair any OOS units.

- All MSCUs
- All QGPs
- All office network and timing complex commons (ONTCCOMs)
- TMSFP 0 on both ONTC sides (CM3 in 5E16.2 and Later)

Note: For CM3 in 5E16.2 and later, QLPS units are children of TMSFP 0, not the ONTCCOM.

- All QLPSs
- All QTMSLNKs.

Hardware checks should be allowed on all QGPs and ONTCs.

Note: While QGP and/or ONTC hardware checks are inhibited, faults that would normally cause a QGP/QGL/ONTCCOM/TMSFP(CM3-5E16.2&later)/QLPS/QTMSLNK to be removed from service may be masked. Such faults, if they exist, may affect the capability of in-service hardware to support message traffic. If hardware checks were

manually inhibited in an effort to keep hardware in-service, it may be beneficial to leave the hardware checks inhibited. However, this might make it difficult to determine the cause of a communication problem. It would be best to fix the reason that the hardware checks were inhibited, and allow the hardware checks, before executing this procedure.

Wait about one minute after each recovery step is completed to allow the system to stabilize.

PROCEDURE

1. At the master control center (MCC) terminal, enter **1380** menu command.
Response: The 1380 - QLPS NETWORK 0 STATUS page is displayed.
2. Are any QGLs OOS family of equipment (**OOSF**)?
Note: For CM3, the QGL is a child of the QLPS, not the QTMSLNK.
If **YES**, then restore the parent (MSCU / QGP / ONTCCOM / TMSFP (CM3-5E16.2 and later) / QLPS / QTMSLNK) hardware using Procedure 5.3. Then continue with this procedure if the QGL remains OOS (not due to family of equipment).
If **NO**, then continue with the next step.
3. Are there any OOS QGLs connected to the ACTIVE QLPS?
If **YES**, continue with the next step.
If **NO**, go to Step 6.
4. To restore the OOS QGL, enter **33abe** menu command.
Where: a = MSGS side
b = QGP number
e = QGL number.
5. Has an attempt been made to restore all OOS QGLs connected to the ACTIVE QLPS?
If **YES**, continue with the next step.
If **NO**, return to Step 4 for other OOS QGL.
6. Are there any OOS QGLs connected to the STBY QLPS?
If **YES**, continue with the next step.
If **NO**, go to Step 11.
7. To conditionally switch the QLPS units in the network, type and enter **42c** menu command.
Where: c = QLPS network number.
Note: The QLPS switch may be denied if overall connectivity for all endpoints is adversely affected.
8. Did the QLPSs in the network switch and stay switched?
If **YES**, return to Steps 3-5 for each OOS QGL connected to the new ACT QLPS, and then go to Step 11.
If **NO**, continue with the next step.

9. Are QGP or ONTC hardware checks inhibited?
If **YES**, continue with the next step.
If **NO**, return to Steps 2-5 for the OOS QGLs connected to the STBY QLPS, and then go to Step 11.
10. Can Hardware checks be allowed?
If **YES**, allow hardware checks, repeat Steps 2-5 for the OOS QGLs connected to the STBY QLPS.
If **NO**, continue with the next step.
11. Are any **QPIPE OOS** indicators on?
If **YES**, continue with the next step.
If **NO**, go to Step 16.
12. For each OOS QGP QPIPE on an ACT QGL, type and enter **33abe** menu command to restore the parent QGL.
Where: a = MSGS side
 b = QGP number
 e = QGL number
13. Are there any OOS QGP QPIPEs on a STBY QGL?
If **YES**, continue with the next step.
If **NO**, continue with Step 16.
14. To conditionally switch the QLPS units in the network, type and enter **42c** menu command.
Where: c = QLPS network number.
Note: The QLPS switch may be denied if overall connectivity for all endpoints is adversely affected.
15. Did the QLPSs in the network switch and stay switched?
If **YES**, return to Step 12 for each OOS QGP QPIPE connected to the new active QLPS. Then continue with the next step.
If **NO**, then continue with the next step.
16. Are any QGLs or QGP QPIPEs **OOS** for this network?
If **YES**, continue with the next step.
If **NO**, go to Step 22.
17. Are any OOS QGL(s) or QGP QPIPE(s) associated with the STBY QLPS?
If **YES**, continue with the next step.
If **NO**, continue with Step 19.
18. To conditionally restore the STBY QLPS, type and enter **32dc** menu command.
Where: d = ONTC side
 c = QLPS network of QLPS to be restored.

Note: The QLPS conditional restore may be denied if overall connectivity for all endpoints is adversely affected. For CM2, the conditional restore may also be denied due to unavailable “helper units” (FPC/ONTCCOM).

If the QLPS diagnostic yields STF results, then repair the QLPS according to Procedure 5.11 before continuing this procedure.

19. Are there any OOS QGL(s) or QGP QPIPE(s) associated with the other (originally active) QLPS in the network?

If **YES**, return to Step 18 for the other QLPS, and then continue with the next step.

If **NO**, continue with the next step.

20. Are there any OOS QGL(s) or QGP QPIPE(s)?

If **YES**, continue with the next step.

If **NO**, go to Step 22.

21. Conditionally remove and restore all QGPs that have OOS QGL(s) and/or OOS QGP QPIPE(s) associated with the QGP by entering **27ab** and **37ab** menu commands.

Where: a = MSGS side
 b = QGP number.

Note 1: The QGP conditional remove may be denied if overall connectivity for all endpoints is adversely affected. In this case, continue with the next step.

Note 2: If the QGP diagnostic fails (CM2 only) or the QGP fails to restore, repair the QGP according to Procedure 5.10 and then continue with this procedure.

22. Has this procedure been attempted for both QLPS networks?

If **YES**, continue with the next step.

If **NO**, return to Steps 2-21 for the other QLPS network (MCC Page 1381), and then continue with the next step.

23. Were any of the attempts to switch or conditionally remove/restore units denied?

If **YES**, continue with the next step.

If **NO**, continue with Step 25.

24. To request the status of the QLPS networks, enter input command:
OP:QNETSTAT,OOS

25. Are any MH QPIPEs, in either network, **OOS**?

If **YES**, attempt repair of all MH QPIPEs using Procedure 5.14. Then re-start this procedure.

If **NO**, continue with the next step.

26. Are any QGL(s) or QGP QPIPE(s) OOS for either QLPS Network?

If **YES**, collect all available data and **seek technical assistance**.

Note: Additional data that is likely to be helpful in resolving this problem includes REPT TRBL, REPT POST MORTEM, and assert/audit output messages printed on the ROP.

If **NO**, STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Return to Procedure [5.3](#).

5.13 CLEAR QTMSLNK PROBLEMS

OVERVIEW

This procedure is used to clear QTMSLNK problems.

A QTMSLNK physically connects a QLPS to the TMS. Each QLPS has four for 5e22.1 and earlier, six for 5e23.1 and later QTMSLNKs, and these QTMSLNKs support the MH and QPH QPIPEs, and, for CM2, the QGLs.

This procedure may be entered for any of the following reasons:

- An OP CFGSTAT CM off-normal report shows QTMSLNK(s) OOS.
- A REPT TRBL QTMSLNK message appears on the ROP.
- MCC Page 115/1380/1381 is off-normal due to OOS QTMSLNKs.

The hardware parameters for a QTMSLNK are QTMSLNK = a-b-c.

Where: a = Office network and timing complex (ONTC) side (0 or 1).
 b = QLPS network (0 or 1).
 c = QTMSLNK number (5E23.1 and later 0 – 5) (5E22.1 and earlier 0 – 3).

The following hardware must be in-service before starting this procedure. If necessary, repair any OOS units.

- All office network and timing complex commons (ONTCCOMs)
- TMSFP 0 on both ONTC sides (CM3 in 5E16.2 and Later)
Note: For CM3 in 5E16.2 and later, QLPS units are children of TMSFP 0, not the ONTCCOM.
- All QLPSs.

Hardware checks should be allowed on all ONTCs.

Note: While ONTC hardware checks are inhibited, faults that would normally cause an ONTCCOM/TMSFP(CM3-5E16.2&later)/QLPS/QTMSLNK/TMSLNK/NLI to be removed from service may be masked. Such faults, if they exist, may affect the capability of in-service hardware to support message traffic. If hardware checks were manually inhibited in an effort to keep hardware in-service, it may be beneficial to leave the hardware checks inhibited. However, this might make it difficult to determine the cause of a communication problem. It would be best to fix the reason that the hardware checks were inhibited, and allow the hardware checks before executing this procedure.

Wait about one minute after each recovery step is completed to allow the system to stabilize.

PROCEDURE

1. At the master control center (MCC) terminal, enter **1380** menu command.
Response: The 1380 – QLPS NETWORK 0 STATUS page is displayed.
2. Are any QTMSLNKs OOS family of equipment (**OOSF**)?
If **YES**, restore the parent (ONTCCOM / TMSFP (CM3-5E16.2 and later) /QLPS) hardware using Procedure 5.3. Then continue with this procedure if the QTMSLNK remains OOS (not due to family of equipment).

- If **NO**, then continue with the next step.
3. Are there any OOS QTMSLNKs connected to the ACTIVE QLPS?
If **YES**, continue with the next step.
If **NO**, go to Step 6.
 4. To restore the OOS QTMSLNK on the ACT QLPS, type and enter **31abc** menu command.
Where: a = ONTC side.
 b = QLPS network.
 c = QTMSLNK number.
 5. Has an attempt been made to restore all OOS QTMSLNKs connected to the ACTIVE QLPS?
If **YES**, continue with the next step.
If **NO**, return to Step 4 for all other OOS QTMSLNKs to the ACT QLPS.
 6. Are there any OOS QTMSLNKs to the STBY QLPS?
If **YES**, continue with the next step.
If **NO**, go to Step 11.
 7. To conditionally switch the QLPS units in the network, type and enter **42b** menu command.
Where: b = QLPS network.
Note: The QLPS switch may be denied if overall connectivity for all endpoints is adversely affected.
 8. Did the QLPSs in the network switch?
If **YES**, return to Steps 3-5 for each OOS QTMSLNK associated with the new ACT QLPS. Then go to Step 11.
If **NO**, then continue with the next step.
 9. Are ONTC hardware checks inhibited?
If **YES**, continue with the next step.
If **NO**, return to Steps 3-5 for the OOS QTMSLNKs to the STBY QLPS. Then go to Step 11.
 10. Can hardware checks be allowed?
If **YES**, allow hardware checks, return to Steps 2-5 for the OOS QTMSLNKs to the STBY QLPS.
Note: QTMSLNKs may be restored with hardware checks inhibited; however, QGL/QGPQPIPE/MH and QPH QPIPE errors may be reported if QTMSLNK hardware is bad.

For CM3, QGLs and QGP QPIPES are children of the QLPS, not the QTMSLNK, and are not normally affected by QTMSLNK faults.

If **NO**, continue with the next step.
 11. Conditionally restore all QLPSs that have OOS QTMSLNK(s) associated with the QLPS; enter **32ab** menu command (Starting with the STBY QLPS).

Where: a = ONTC side.
b = QLPS network.

Note: The QLPS conditional restore may be denied if overall connectivity for all endpoints is adversely affected. For CM2, the conditional restore may also be denied due to unavailable helper units (FPC/ONTCCOM).

If the QLPS diagnostic yields STF results, repair the QLPS according to Procedure 5.11 before continuing this procedure.

12. Has this procedure been attempted for both QLPS networks?

If **YES**, continue with the next step.

If **NO**, return to Step 2 for the other QLPS network (MCC Page 1381), and continue with the next step.

13. Were any of the attempts to switch or conditionally restore units denied?

If **YES**, go to Step 15.

If **NO**, continue with the next step.

14. Are any QTMSLNK(s) **OOS** for either QLPS network?

If **YES**, collect all available data and **seek technical assistance**.

Note: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

15. To request the status of the QLPS networks, type and enter input command:
OP:QNETSTAT,OOS

16. Are any QGP QPIPEs or MH QPIPEs, in either network, **OOS** (including family of equipment)?

If **YES**, attempt repair of all QGP QPIPEs using Procedure 5.12. Attempt to repair all MH QPIPEs using Procedure 5.14. Then restart this procedure.

If **NO**, then return to Step 14.

5.14 CLEAR MH QPIPE PROBLEMS

OVERVIEW

This procedure is used to clear all MH QPIPE problems for a single SM-2000.

An MH QPIPE is a path between an SM-2000's MH(0) and a specific QLPS unit, when the SM-2000 is in the QLPS network. Physically, it passes from the MH to one of the SM-2000's primary NLIs, over a TMSLNK in to the TMS, and then through a QTMSLNK to the QLPS. From the SM-2000 perspective, an MH QPIPE is considered to be active if a loopback test has verified that frames can successfully be transported to/from the active QLPS of the network. An MH QPIPE to a standby QLPS is assumed to be capable of supporting message transport if all parent hardware is in-service (the loopback test is not performed), unless that MH QPIPE was removed from service due to errors that occurred while the parent QLPS was active (before a QLPS switch).

This procedure may be entered for any of the following reasons:

- An OP QNETSTAT off-normal report shows MH QPIPE(s) OOS.
- An OP SYSSTAT off-normal report shows an SM-2000 with a status phrase of QPIPE_OOS (or any other MCC page where the SM status phrase is displayed).
- A REPT TRBL MH QPIPE message appears on the ROP.
- MCC Page 115/1380/1381 is off-normal due to OOS MH QPIPEs on a active QLPS.

Note: The off-normal indicator is for OOS QLNKs/ISMQLNKs/QPIPEs. In order to determine that the off-normal indication is due to MH QPIPEs, the **OP:QNETSTAT**; command must be used. The indicator is not lighted for OOS MH QPIPEs to STBY QLPSs (as this is not service-affecting) and this case must be determined using **OP:QNETSTAT**.

The identification parameter for an MH QPIPE in messages, identify the supporting hardware for the MH QPIPE as follows: MH QPIPE = a-b-c-d

- a = SM-2000 number.
- b = Active MCTSI side.
- c = QLPS network.
- d = ONTC side.

The following hardware must be in-service before starting this procedure. If necessary, repair any OOS units.

- All ONTCCOMs
- TMSFP 0 on both ONTC sides (CM3 in 5E16.2 and Later)

Note: For CM3 in 5E16.2 and later, QLPS units are children of TMSFP 0, not the ONTCCOM.

- All QLPSs
- All QTMSLNKs
- All Primary NLIs (for that SM-2000).
- All TMSLNKs on primary NLIs (for that SM-2000).

Hardware checks should be allowed on all ONTCs.

Note: While ONTC hardware checks are inhibited, faults that would normally cause an ONTCCOM/TMSFP(CM3-5E16.2&later)/QLPS/QTMSLNK/NLI/TMSLNK to be removed from service may be masked. Such faults, if they exist, may affect the capability of in-service hardware to support message traffic. If hardware checks were manually inhibited in an effort to keep hardware in-service, it may be beneficial to leave the hardware checks inhibited. However, this might make it difficult to determine the cause of a communication problem. It would be best to fix the reason that the hardware checks were inhibited, and allow the hardware checks, before executing this procedure.

Wait about one minute after each recovery step is completed to allow the system to stabilize.

PROCEDURE

1. At the master control center (MCC) terminal, to request the SM-2000 off-normal status, enter input command:

OP:SYSSTAT,SM=a;

Where: a = SM-2000 number.

Response: At the receive-only printer (ROP), the SM-2000 status report is printed.

2. In the OP SYSSTAT output message, are any of the SM-2000 off-normal condition status phrases **QLPS_ISOL** or **QLNK_LOST**?

If **YES**, execute the procedure to establish QLPS communication with an SM-2000 in the 235-105-250, *System Recovery*, manual.

If **NO**, continue with the next step.

3. To request the maintenance status of the MH QPIPEs for the SM-2000, enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where: a = SM-2000 number.

4. Is the state of any MH QPIPE for either network listed as OOS family of equipment (**OOS FE**)?

If **YES**, restore the parent (TMSFP (CM3-5E16.2 and later) / QLPS / QTMSLNK / NLI / TMSLNK) hardware of any MH QPIPE that is OOS family of equipment using Procedure 5.3.

Then continue with this procedure if any MH QPIPE remains OOS (not due to family of equipment).

If **NO**, then continue with the next step.

5. Is the maintenance state of any MH QPIPE for either network listed as **OOS NEARFLT** or **OOS NEARLBK**?

If **YES**, continue with the next step.

If **NO**, go to Step 15.

6. Enter **1190**, a menu command.

- Where: a = SM-2000 number.
Response: The 1190-SM a-MCTSI page is displayed.
7. Is either MCTSI side OOS or Forced unavailable?
If **YES**, continue with the next step.
If **NO**, go to Step 11.
8. Restore the OOS MCTSI. After clearing any force (unless there is a good reason to retain the force), and, if necessary, powering unit up, enter **30X** menu command.
Where: X = MCTSI number.
Response: Wait for the OOS MCTSI to be conditionally restored to ACTIVE.
Note: If conditional restore fails, execute the procedure to repair the MCTSI.
9. To request the status of the MH QPIPEs for this SM-2000, type and enter input command:
OP:QNETSTAT,SRCSM=a,OOS;
Where: a = SM-2000 number.
10. Is the state of any MH QPIPE for either network still listed as **OOS NEARFLT** or **OOS NEARLBK**?
If **YES**, continue with the next step.
If **NO**, continue with Step 15.
11. Does this SM-2000 have duplex MCTSI (ACT/STBY)?
If **YES**, continue with the next step.
If **NO**, repair OOS MCTSI before continuing with Step 13.
12. To switch the MCTSI sides, enter **403** menu command.
Response: The STBY MCTSI side becomes the ACT side.
13. To request the status of the MH QPIPEs for this SM-2000, enter input command:
OP:QNETSTAT,SRCSM=a,OOS;
Where: a = SM-2000 number.
14. Is the state of any MH QPIPE for either network still listed as **OOS NEARFLT** or **OOS NEARLBK**?
If **YES**, collect all available data and **seek technical assistance**.
Note: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.
If **NO**, continue with the next step. It may be desirable to conditionally restore the currently STBY MCTSI to look for latent faults.

15. Is the state of any MH QPIPE for either network listed as **OOS FARFLT** or **OOS FARLBK** or **OOS FAR**?

If **YES**, choose a QLPS network to work on that has an OOS MH QPIPE, and continue with the next step.

Note: Repeat Steps 15-32 for both QLPS networks.

If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16. Enter the **1380** (for QLPS network 0) or **1381** (for QLPS network 1) menu command.

Response: The specified MCC page is displayed.

17. To request the status of the MH QPIPEs for the SM-2000 on this network, enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where: a = SM-2000 number.
c = QLPS network number.

18. Is either MHPIPE to the SM-2000 on this QLPS network **OOS FARFLT** or **OOS FARLBK**?

If **YES**, continue with the next step.

If **NO**, go to Step [21](#).

19. To switch ACT and STBY QLPS units, enter **42c** menu command.

Where: c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

Note: The QLPS switch may be denied if overall connectivity from all end points are adversely affected. The switch may also be denied if the QLPSs are not ACT/STBY. If this is the case, restore the OOS QLPS, and repeat this step. If switch is denied due to other reasons, go to Step [23](#).

20. To request the status of the MH QPIPEs for the SM-2000 on this network, enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where: a = SM-2000 number.
c = QLPS network number.

21. Is either MH QPIPE to the SM-2000 on this QLPS network **OOS FAR**?

If **YES**, continue with the next step.

If **NO**, go to Step [23](#).

22. To switch ACT and STBY QLPS units, enter **42c** menu command.

Where: c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

Note: The QLPS switch may be denied if overall connectivity from all end points are adversely affected.

23. To request the status of the MH QPIPEs for the SM-2000 on this network, enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where: a = SM-2000 number.
c = QLPS network number.

24. Are there any **OOS-FAR**, **OOS-FARLBK**, or **OOS-FARFLT** MH QPIPEs?

If **YES**, continue with the next step.

If **NO**, return to Step 15 for the other QLPS network.

25. To conditionally restore each QLPS in the network that has an OOS MH QPIPE associated with it, enter **32dc** menu command.

Where: d = ONTC side.
c = QLPS network.

Note: The QLPS conditional restore may be denied if overall connectivity for all endpoints is adversely affected. For CM2, the conditional restore may also be denied due to unavailable helper units (FPC/ONTCCOM).

If the QLPS diagnostic yields STF results, repair the QLPS according to Procedure 5.11 before continuing this procedure.

26. To switch ACT and STBY QLPS units, enter **42c** menu command.

Where: c = QLPS network number.

Response: The QLPSs switch ACT and STBY status.

Note: The QLPS switch may be denied if overall connectivity from all endpoints are adversely affected.

27. To request the status of the MH QPIPEs for the SM-2000 on this network, enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where: a = SM-2000 number.
c = QLPS network number.

28. Is the state of any MH QPIPE for this network listed as **OOS FARFLT** or **OOS FARLBK** or **OOS FAR**?

If **YES**, continue with the next step.

If **NO**, return to Step 15 for the other QLPS network.

29. Enter **1201,1,a** menu command.

Where: a = SM-2000 number.

Response: The MCC 1201 – SM a – DLI/NLI/TMSLNK SET 1 page is displayed.

30. Use **OP:QNETSTAT, MHQPIPE=a-b-c-d;** to obtain the parent NLI of the OOS MH QPIPE.

Where: a = SM-2000 number.
b = Active MCTSI side.
c = QLPS network.
d = ONTC side.

Then conditionally restore the parent NLI of the OOS MH QPIPE on that ONTC for the SM-2000 in sequence, enter **3dXX** menu command.

Where: d = ONTC side.
XX = NLI number (00 or 01).

Response: The NLIs are conditionally restored. If any NLI fails to restore, repair it using Procedure 5.8.

Note: The NLI conditional restores may be denied for service-affecting reasons.

31. To request the status of the MH QPIPEs for the SM-2000 on this network, enter input command:

OP:QNETSTAT,SRCSM=a,QLPSNW=c,OOS;

Where: a = SM-2000 number.
c = QLPS network number.

32. Is the state of any MH QPIPE for this network listed as **OOS FARFLT** or **OOS FARLBK** or **OOS FAR**?

If **YES**, collect all available data and **seek technical assistance**. This procedure may be concurrently executed on the remaining OOS MH QPIPEs while seeking support.

Note: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

If **NO**, repeat Step 15 for the other QLPS network; then return to the calling procedure after executing procedure for both QLPS networks.

5.15 CLEAR QLNK OR ISMQLNK PROBLEMS

OVERVIEW

This procedure is used to clear QLNK/ISMQLNK problems for a single SM-2000.

A QLPS communication path between the AM and an SM-2000 is referred to as a QLPS communication link (QLNK). If QGPs and MH QPIPEs are equipped, eight physical QLNKs (four per network) exist between the AM and an SM-2000. In a fault-free environment, there will be four active QLNKs (which pass through an active QLPS, two active QLNKs per network) and four standby QLNKs. When faults occur or parent hardware is removed from service, an SM-2000 may have fewer than four active QLNKs. Message traffic is distributed across the active QLNKs by dynamically mapping QLPS logical links over the set of active physical QLNKs. The number of logical links used varies depending on the processor that the message is going to. Communication between the AM and an SM-2000 use four logical links. Communication between an SM-2000 and the CMP or FPC uses one logical link. Communication between an SM-2000 and another SM (non-SM-2000 or SM-2000 not in QLPS network) or DLN uses two logical links.

A QLPS communication path between two SM-2000s is called an inter-SM QLPS communication link (ISMQLNK). There are two ISMQLNKs (one per network using the active QLPS) between each pair of QLPS equipped SM-2000s. Message traffic from one SM-2000 to another is normally distributed across the available ISMQLNKs. If both ISMQLNKs are OOS, the messages are routed over QLNKs (if available) or CLNKs (if QLNKs are not available).

If all supporting hardware of a QLNK or ISMQLNK is in-service, and the parent (QGP/MH) QPIPEs are active, the QGP and/or SM-2000 will automatically invoke a link establishment protocol to verify that round-trip message transport is possible. If so, they enable routing through the QLNK/ISMQLNK, and it is then considered to be active. When faults occur in a QLPS network, the AM and SM-2000s can initiate recovery actions to correct the problem or minimize its effect on system operation.

This procedure may be entered for any of the following reasons:

- An OP QNETSTAT off-normal report shows QLNKs or ISMQLNKs in the OOS or INIT states.
- A REPT TRBL QLNK or REPT TRBL ISMQLNK message appears on the ROP.
- MCC Page 115/1380/1381 is off-normal due to OOS QLNK(s)/ISMQLNK(s) through the active QLPS.

Note: The off-normal indicator is for QLNKs/ISMQLNKs/MH QPIPEs. In order to determine that the off-normal indication is due to QLNKs or ISMQLNKs, the **OP:QNETSTAT** command must be used. The indicator is not lighted for OOS QLNKs/ISMQLNKs to STBY QLPSs (as this is not service-affecting) and this case must be determined using **OP:QNETSTAT**.

- An OP SYSSTAT lists an SM-2000 with a status phrase of QLNK OFFN (or MCC pages where SM status phrases are displayed).

The hardware parameters for QLNK messages are identified as follows:
QLNK=a-b-c-d-e-f.

The hardware parameters for ISMQLNK messages are identified as follows:
ISMQLNK=a-b-c-d-g-h.

Where: a = SM-2000 number.
b = ACTIVE MCTSI side.
c = QLPS network.
d = ONTC side.
e = QGP number.
f = MSGS side.
g = Far-end SM-2000 number.
h = Far-end SM-2000's ACTIVE MCTSI side.

The following parents must be in-service before starting this procedure. If necessary, repair any OOS units.

- All QGP QPIPEs for relevant SM-2000
- All MH QPIPEs for relevant SM-2000.

Hardware checks should be allowed on all QGPs and ONTCs.

Wait about one minute after each recovery attempt to allow the system to stabilize.

PROCEDURE

1. To request the SM-2000 off-normal status, enter input command:
OP:SYSSTAT,SM=a;
Where: a = SM-2000 number.
Response: The SM-2000 off-normal status report is printed at the ROP.
2. Are any of the SM-2000 status phrases **QLNK LOST** or **QLPS ISOL**?
If **YES**, go to the 235-105-250, *System Recovery*, manual and execute the procedure to restore QLPS communication to an SM-2000.
If **NO**, continue with the next step.
3. Are any of the SM-2000 status phrases **QLNK OFFN**?
If **YES**, continue with the next step.
If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
4. To request the status of the QLNKs and ISMQLNKs for this SM-2000, enter input command:
OP:QNETSTAT,SRCSM=a,OOS;
Where: a = SM-2000 number.
5. Are any QLNKs or ISMQLNKs OOS family of equipment (**OOS FE**)?
If **YES**, repair the QGP QPIPEs (for QLNK) and MH QPIPEs (for QLNK and ISMQLNK) that are related to this QLNK or ISMQLNK.
Note: Use **OP:QNETSTAT,[ISMQLNK/QLNK]** to determine the parent hardware to restore. Then follow Procedure 5.3 to do the repair.
If **NO**, continue with the next step.
6. Wait two minutes to allow for independent recovery.
7. To request the status of the QLNKs and ISMQLNKs for this SM-2000, enter input command:
OP:QNETSTAT,SRCSM=a,OOS;

- Where: a = SM-2000 number.
8. Are any QLTKs or ISMQLTKs **OOS**?
If **YES**, continue with the next step.
If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. At the MCC terminal, to display the QLTK network associated with the OOS QLTK(s) or OOS ISMQLTK(s), enter **138c** menu command.
Where: c = The QLTK network (0 or 1) associated with OOS QLTK(s) or ISMQLTK(s).
Response: The 138c - QLTK NETWORK 0 STATUS page or the NETWORK 1 STATUS page is displayed.
10. Enter **42c** menu command to switch the ACT and STBY QLTK units.
Where: c = QLTK network number.
Response: The QLTKs switch ACT and STBY status.
Note: The QLTK switch may be denied if overall connectivity for all end points are adversely affected. The switch will also be denied if the QLTKs in this network are not ACT/STBY. If this is the case then restore/repair the OOS QLTK and repeat this step.
11. To request the status of the QLTKs and ISMQLTKs for this SM-2000, enter input command:
OP:QNETSTAT,SRCSM=a,OOS;
Where: a = SM-2000 number.
12. Is the state of the ISMQLTK(s) for either network listed as **OOS** or **INIT**?
If **YES**, continue with the next step.
If **NO**, go to Step [14](#).
13. Is the ISMQLTK **OOS** or **INIT** due to the other SM-2000?
Use **OP:SYSSTAT,ALL** to determine if the destination SM-2000 has one of the following status phrases:
- **INITIALIZING**
 - **ISOLATED**
 - **COMM LOST**
 - **QLTK ISOL**
 - **MAN ISOL**
 - **QMAN ISOL**
 - **MH DGRD.**
- If **YES**, the ISMQLTK is OOS due to problems on the other SM-2000. These problems must be cleared before the ISMQLTK can be brought back in-service.
If **NO**, go to Step [18](#).
14. Is the state of the QLTK(s) for either network listed as **OOS** or **INIT**?
If **YES**, continue with the next step.

If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

15. Conditionally remove and restore the parent QGP for the OOS QLNK by entering the **27fe** and **37fe** menu commands.

Where: f = MSGS side of QGP.
e = QGP number.

Note 1: The QGP conditional remove may be denied if overall connectivity for all endpoints is adversely affected. In this case, continue with the next step.

Note 2: If the QGP diagnostic fails (CM2 only) or the QGP fails to restore, repair the QGP according to Procedure [5.10](#), and then continue with this procedure.

16. To request the status of the QLNKs/ISMQLNKs for this SM-2000, enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where: a = SM-2000 number.

17. Is the state of the QLNKs/ISMQLNKs for either network listed as **OOS L2**?

If **YES**, continue with the next step.

If **NO**, go to Step [19](#).

18. Wait 15 minutes to allow for deferred independent recovery to occur.

19. To request the status of the QLNKs/ISMQLNKs for this SM-2000, enter input command:

OP:QNETSTAT,SRCSM=a,OOS;

Where: a = SM-2000 number.

20. Is the state of any QLNKs/ISMQLNKs for either network listed as **OOS** or **INIT**?

If **YES**, collect all available data and **seek technical assistance**.

Note: Additional data that is likely to be helpful in resolving this problem includes **REPT TRBL**, **REPT POST MORTEM**, and assert/audit output messages printed on the ROP.

If **NO**, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Return to the calling procedure.

5.16 RECOVER FROM RC_BACKOUT CONDITION ON MATE CMP

OVERVIEW

This procedure is used to recover from an RC-BACKOUT condition on the mate CMP.

If a back-out of recent change has occurred, the following message is printed on the ROP:

```
OP SYSSTAT SUMMARY LAST RECORD
CMP 1-0 M: BACKOUT-RC BKUP_FAIL
```

PROCEDURE

1. Use the **REMOVE** poke command or the **RMV** input message to remove the mate CMP from service.
2. Perform a backup of the ODD (office dependent data) for the CMP with the following command:
BKUP:ODD:CMP=0
3. After ODD backup completes, use the **RESTORE** poke command or the **RST** input message to return the CMP to service.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.17 ORM/EXM Troubleshooting

OVERVIEW

The purpose of this procedure is to isolate and clear ORM TMS link troubles. The key to successful ORM troubleshooting is to segment the trouble and isolate the defective hardware. This is accomplished through loop-back testing and replacing hardware.

ORM TMS link troubles can be found in any piece of hardware in the path from the switch to the remote. This includes the TRCU, the CM, the SM, the transmission equipment circuit boards, coax cables, coax connectors, 5ESS Ground Window barrel connectors, DSX jacks, DSX coax jumpers, optic fibers, 1A Transceivers, and DLIs or NLIs.

Caution: *In an Optically Remote Module (ORM) application, there may be a special concern when repairing the Time Multiplexed Switch (TMS), ORM DLI, or TRCU. Normally, the TRCU's are directly connected through optic fibers, and no special precautions are required. However, some operating companies have installed high-speed transmission systems that multiplex several TMS TRCU to ORM TRCU signals. A special concern may exist when the separate transmission system includes "Protection Switching" capabilities. Repair activities that result in the loss of the DS3 signal from the TRCU at either end can cause the transmission system to perform a Protection Switch. The Protection Switch introduces a short break in all signals that are multiplexed onto the transmission system. It may be desirable to take appropriate actions that prevent the Protection Switch from occurring before the repair activity on the TMS, TRCU, or ORM DLIs is performed. The actions needed to prevent a Protection Switch depend on the type of transmission system installed and local procedures.*

When to Use

Frequency Use these procedures when the following conditions exist:

- Failing DLI or NLI diagnostics
- DLI or NLI interrupts.

Duration In general, if the equipment troubles are at both ends of the circuit, the trouble can be isolated within a day. Depending on the amount of hardware in the isolated segment, it will then take anywhere from one more day to several days to find the defective equipment.

Before You Begin To effectively troubleshoot the ORM/EXM, collect the following data:

- Is this a dual fabric or single fabric TMS?
- Determine the EQL of the TMS Link in the CM.
- Determine the location of the TMS link termination on the TRCU.
- Determine if this is TRCU Model 2 or Model 3.
- If the TRCU is a Model 2, determine the following DSX terminations:
 - Host switch DSX assignment
 - Host transmission DSX assignment
 - ORM transmission DSX assignment

— ORM DSX assignment.

- If the TRCU is a Model 3, determine the transmission equipment assignments.

The following test equipment is used in the following procedures:

- ST Type 2 Optic Coupler C2000A-3 for ODL50 NCT Fiber
- BNC Type Coax Coupler for TRCU2-E

PROCEDURE

1. Based on the following table, go to the appropriate procedure to isolate and clear the trouble:

Table 5.17-1 — ORM/EXM Trouble Clearing Procedures

Symptom	Go To
DLI diagnostic Phase 11 or NLI diagnostic Phase 2 fails with TRCU Model 2	Procedure 5.17.1
NLI diagnostic Phase 2 fails with TRCU Model 3	Procedure 5.17.2
TMS diagnostic Phase 15 fails	Procedure 5.17.3
DLI or NLI interrupts are present	Procedure 5.17.4

2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.17.1 DLI/E-NLI Failing Diagnostics; TRCU Model 2

PROCEDURE

1. Isolate trouble in the host or remote:
 - (a) Loop the host transmission DSX location (that is, toward the remote).
 - (b) Run DLI/NLI diagnostics.
 - If diagnostics fail, the trouble is outside of the host switch, skip to Step 2.
 - If diagnostics pass, continue with Step 1(c).
 - (c) At the host end, use a BNC type Coax Coupler to loop the coax cables on the rear of the TRCU2 back toward the transmission equipment.
 - (d) Run DLI or NLI diagnostics.
 - If diagnostics fail, the trouble is between the TRCU2 coax and the host transmission DSX. The defective hardware may be:
 - Coax cable from the TRCU2 to the 5ESS Ground Window
 - Coax cable from the 5ESS Ground Window to the host switch DSX panel
 - Host switch DSX jack
 - Coax jumper between the host switch DSX and the host transmission DSX.
 - If diagnostics pass, the trouble is between the CM and the TRCU2. The defective hardware may be:
 - TRCU2 high speed circuit board
 - TRCU2 low speed circuit board
 - TRCU2 backplane/foreplane shorted pin(s)
 - ED5D663-30 G1 coax pigtailed between the TRCU2-E backplane and the AKM3 circuit board
 - TRCU2 backplane
 - TMS.
 - Note:** If the TMS is failing diagnostic Phase 15, refer to Procedure 5.17.3.
2. Isolate trouble to the transmission equipment or remote:
 - (a) Loop the ORM DSX location (that is, toward the remote).
 - (b) Run DLI or NLI diagnostics.
 - If diagnostics fail, the trouble is in the remote hardware. Skip to Step 3.
 - If diagnostics pass, the trouble is between the host transmission DSX and the ORM DSX. The defective hardware may be:
 - Host transmission DSX jack
 - Coax cable between the host transmission DSX and the transmission equipment

- Transmission high speed or low speed circuit boards

Note: Switch the high speed circuit board to the other side of the “Ring” to determine if the high speed circuit boards are defective. Switch the low speed circuit boards to protect, one end at a time, to determine if the low speed circuit boards are defective.

- Coax cable between Transmission Equipment and ORM Transmission DSX
- ORM Transmission DSX jack
- Coax jumper between ORM transmission DSX and ORM DSX.

3. The trouble lies between the ORM DLI/NLI and the ORM DSX. Do the following to isolate the trouble:
 - (a) Using a BNC type Coax Coupler, loop the coax connectors in the rear of the E-TRCU2.
 - (b) Run DLI or NLI diagnostics.
 - (c) If diagnostics pass, the trouble is between the ORM E-TRCU2 coax and the ORM DSX. The defective hardware may be:
 - ORM DSX jack
 - Coax cable between the ORM DSX and the ORM Ground Window
 - Ground Window barrel connector
 - Coax cable between the ORM Ground Window and the E-TRCU2.
 - (d) If diagnostics fail, the trouble is between the DLI and the E-TRCU2. The defective hardware may be:
 - DLI or NLI
 - TSIU backplane/foreplane shorted pin(s)
 - E-TRCU high speed circuit board
 - E-TRCU low speed circuit board
 - E-TRCU2 backplane/foreplane shorted pin(s)
 - Orange electrical cable between the DLI/NLI and the E-TRCU2
 - Coax pigtails between the TRCU2-E and the AKM3.

5.17.2 NLI Failing Diagnostics; TRCU Model 3

PROCEDURE

1. Isolate trouble in the host or remote:
 - (a) Loop the host LGX location toward the EXM.
 - (b) Run NLI diagnostics.
 - If diagnostics fail, the trouble is outside of the host switch. Skip to Step [2](#).
 - If diagnostics pass, the trouble is in the host switch between the CM and the LGX. The defective hardware may be:
 - TRCU3 high speed circuit board
 - Optic fiber between the TRCU3 and the LGX (this can be checked by switching to protect)
 - TRCU3 low speed circuit board
 - Optic fiber between the CM and the TRCU3
 - TRCU3 backplane/foreplane shorted pin(s)
 - If the TMS is failing diagnostic Phase 15, refer to Procedure [5.17.3](#).
2. Isolate trouble in the transmission equipment or EXM.
 - (a) Loop the EXM LGX toward the EXM.
 - (b) Run NLI diagnostics.
 - If diagnostics fail, the trouble is in the EXM hardware. Skip to Step [3](#).
 - If diagnostics pass, the trouble is between the host LGX and the ORM LGX. The defective hardware may be:
 - Optic fiber between the host LGX and the host transmission equipment
 - Transmission high speed or low speed circuit boards

Note: Switch the high speed circuit board to the other side of the “Ring” to determine if the high speed circuit boards are defective. Switch the low speed circuit boards to protect, one end at a time, to determine if the low speed circuit boards are defective.

 - Optic fiber between the EXM transmission equipment and the EXM LGX.
3. Isolate trouble in the EXM equipment using the standard SM trouble clearing procedures of Section [7](#).

5.17.3 TMS Failing Diagnostic Phase 15

PROCEDURE

1. TMS diagnostic Phase 15 tests the path to the host TRCU2 or TRCU3 only. The trouble is between the CM and the TRCU.
2. The possible defective hardware is:
 - TN888/TN1681
 - TMS 1A Transceiver or NLI BKF2
 - Optic fiber.

5.17.4 TMS Asynchronous Errors, DLI Interrupts, or NLI Interrupts

PROCEDURE

1. These types of troubles are difficult to troubleshoot. The principle is the same as Procedures [5.17.1](#) and [5.17.2](#) except that there are no failing diagnostics. So loop-back testing is not available.
2. Start where the trouble is pointing.
 - For DLI/NLI interrupts, start at the ORM and replace or swap equipment until the errors reappear, move, or disappear completely.
 - For TMS asynchronous errors, analyze the TMS Post Mortem Dump to troubleshoot the problem.

The only difference is that there is more equipment between the CM and the SM.

5.18 CLEAR TRCU3 PROBLEMS

OVERVIEW

This procedure is used to clear transmission rate converter unit - model 3 (TRCU3) [for communication module 2 (CM2) and CM3] problems.

The TRCU3 provides the same capability as the transmission rate converter unit - model 2 (TRCU2) to remote an extended switching module-2000 (EXM-2000) or an optically remoted module (ORM). In addition, the TRCU3 converts the network control and timing (NCT)/network control and timing - model 2 (NCT2) signals into synchronous optical network (SONET) synchronous transport signal - Level 1 (STS-1) signals. These electrical STS-1 signals are multiplexed into optical carrier - level 3 (OC-3) signal or optical carrier level 12 (OC-12) signal for transmission to the remote or host office. Figure 5.18-1 shows the TRCU3 shelf layout.

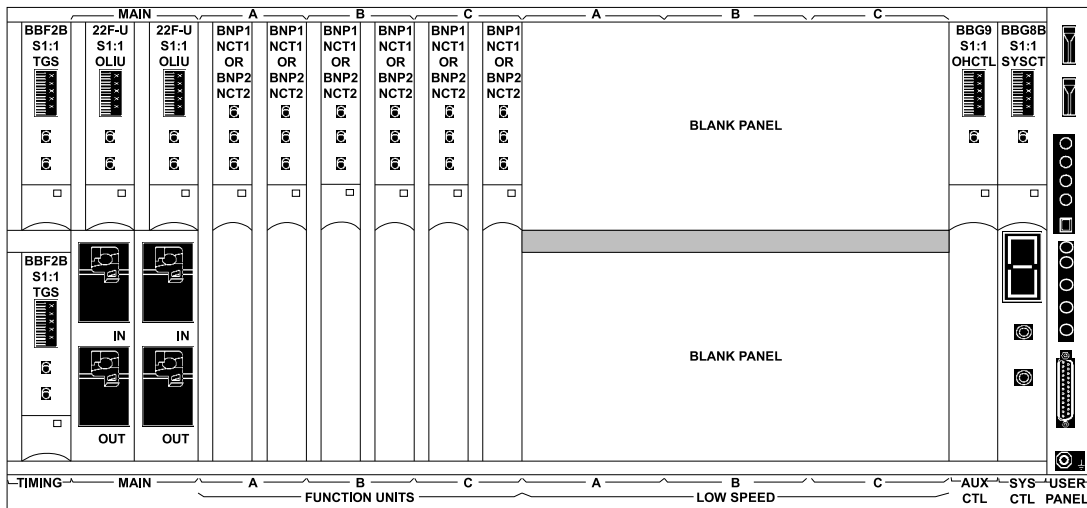


Figure 5.18-1 — TRCU3 Shelf

Table 5.18-1 contains a list of corrective maintenance procedures for the TRCU3 shelf. All the procedures listed are contained in the DDM-2000 OC-3 Multiplexer Release 13.0, *User/Service Manual (TARP)*, 363-206-285. Provided in this section are the Network Control and Timing Interface Unit (NCTIU) Repair Procedure 5.18.1, the Network Link Interface (NLI)/Dual-Link Interface (DLI) Fault Procedure 5.18.2, and the Fuse Alarm Module (CM-2601A) Replacement Procedures 5.19. It is possible that the NCTIU fault is caused by something else on the shelf. If the NCTIU repair and fault sequences fail to clear the fault, a DDM procedure could be used.

Note 1: Before replacing any BNP/BNP2 circuit pack, the 5ESS[®] circuit to the circuit pack needs to be out of service (OOS). The OOS light on the BNP/BNP2 circuit pack is lighted when the 5ESS circuit is OOS. The OOS light is controlled by messages sent from the 5ESS on the NCT/NCT2 link. If both sides of the 5ESS circuit are OOS, the lamp may not be lighted because the message to light the circuit cannot reach the TRCU3 shelf.

Note 2: For CM2/CM3, references to DLIs/NLIs are applicable.

Table 5.18-1 — TRCU3 Corrective Maintenance Procedures Table

Title	Procedure Number
Clear Critical (CR) Alarm	TAP-101
Clear Major (MJ) Alarm	TAP-102
Clear Multiple Failure	TAP-103
Clear Power Minor (PMN) Alarm	TAP-104
Clear Trouble Report	TAP-105
Isolate and Clear Failure	TAP-106
Clear Obscure Failure Condition	TAP-108
Clear Abnormal (ABN) Indication	TAP-109
Clear Flashing FAULT LED Indication	TAP-110
Clear Minor (MN) Alarm	TAP-112
Clear Obscure Minor (MN) Alarm	TAP-113
Clear LED Test Trouble	TAP-115
Clear NE ACTY Alarm Only	TAP-117
Clear OLIU or Fiber Trouble Path Protected Ring	TAP-119
Clear STS/VT AIS Alarm Conditions	TAP-120
Clear Brownout Condition Flashing L in FE ID Display	TAP-121
Connect Optical Loop	DLP-505
Perform LED Test	DLP-509
Set Circuit Pack Options	DLP-513
Perform Optical Fiber Connections and Verification of Optical Facility	DLP-514
Perform End-to-End OC-3 Optical Line Test	DLP-515
Check Local Office Alarms	DLP-516
Test Protection Switching Function	DLP-519
Connect CIT and Establish Session	DLP-521
Establish Remote Login	DLP-522
Replace Circuit Pack	DLP-523
Condition and Connect Modems to Establish Communication from Remote CIT Location	DLP-526
Clean Optical Fibers, Connectors, and Lightguide Buildouts	DLP-527
Perform OC-3s (STS-3s) Transmission Test	DLP-544
DDM-2000 Receiver Sensitivity Test	DLP-547
Replace DDM-2000 OC-3 Shelf User Panel Out of Service	DLP-551
Remove -48 V DC User Panel Fuse	DLP-555
Provision STS-1 Path Trace	DLP-563

PROCEDURE

1. Use the procedures listed in Table 5.18-1 and those contained in this section to clear problems that may occur with the TRCU3 unit.

5.18.1 NCTIU REPAIR PROCEDURE

OVERVIEW

This subprocedure is used to repair the NCTIU.

PROCEDURE

1. Is the **FAULT** LED on the suspect BNP function group pack lighted?
If **YES**, go to Step 9.
If **NO**, continue with the next step.
2. Does the identified BNP pack correspond to the BNP pack indicated in the alarm message?
If **YES**, go to Step 4.
If **NO**, continue with the next step.
3. Locate the BNP pack identified in the alarm message and return to Step 1.
4. Perform an LED test by pressing the alarm cutoff (ACO) button on the User Panel on the TRCU3 shelf.
5. Did all LEDs (**OOS**, **FAULT**, and **ACTIVE**) on suspect BNP pack light momentarily?
Note: This pack may still not be the pack that was reported.
If **YES**, continue with the next step.
If **NO**, go to Step 14.
6. At the Craft Interface Terminal (CIT), enter the following command:

rtrv-alm-all

For example:

```
In progress ...

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1
M rtrv-alm: COMPLD
/* Active Alarms and Status Report
=====
Alarm      Source   Date   Time   SRV   Description
Level      Address  Detected
=====
Critical  fn-a-1   04-23  11:41:25  SA   NCT2 CP failed
-----
Minor     fn-a-2   04-22  23:45:30  nsa  NCT2 CP failed
Minor     fn-b-1   04-22  22:00:43  nsa  NCT CP failed
*/
;
```

Note: The Source Address field contains the function pair with the faulty NCTIU.

7. Was the alarm properly routed by the operation system (OS).
If **YES**, go to Step 14.

If **NO**, continue with the next step.

8. Request the OS to refer the problem to the proper location. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
9. Release the latch on the suspect BNP pack, but do **not** disengage the pack from the backplane connector (refer to the following Note).

Note: Releasing the latch of the suspect BNP without disengaging the circuit pack will make the TRCU3 shelf think that the pack has been pulled, but traffic will not be affected.

10. Wait 30 seconds.
11. Push the latch back in.
12. Wait 30 seconds.
13. Does **FAULT** lamp go out?

If **YES**, go to Step 50.

If **NO**, continue with the next step.

14. Is BNP **OOS** lamp lighted?

If **YES**, go to Step 23.

If **NO**, continue with the next step.

15. Connect a CIT to the User Panel circuit pack on the TRCU3 shelf and establish a CIT session using the following procedures that corresponds to the location of the **FAULT**. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0, *User/Service Manual (TARP)*, 363-206-285. Refer to the following Note.

Note: The CIT session is used to determine the faulty NLI/DLI function pair.

If **TRCU3 shelf is local**, perform DLP-521.

If **TRCU3 shelf is remote**, perform DLP-522.

16. At the CIT, enter the following command:

rtrv-alm-all

For example:

In progress ...

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1

M rtrv-alm: COMPLD

/* Active Alarms and Status Report

```
=====
Alarm      Source   Date Time SRV  Description
Level      Address  Detected
=====
Critical fn-a-1  04-23 11:41:25 SA  NCT2 CP failed
-----
Minor      fn-a-2  04-22 23:45:30 nsa NCT2 CP failed
Minor      fn-b-1  04-22 22:00:43 nsa NCT CP failed
*/
;
```

Note: The Source Address field contains the function pair with the faulty NCTIU.

17. At the CIT, enter the following command:

rtrv-nct:fn-x

Where: x = Function pair with the faulty NCTIU.

For example:

```

-----
In progress...

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1
M rtrv-nct: fn-b COMPLD
/* NCT Provisioning Report
=====
Line      CTS      CTS      TCTS      Mode
Address  Enabled
=====
fn-a          yes      18       249      remote
-----
    
```

18. Observe and record the transmission control time slot (TCTS) number.

Note: The TCTS number is 249 in the previous example response.

19. At the master control center (MCC) [or trunk and line work station (TLWS)] terminal, enter the following command:

OP:TRCU:TCTS=x

Where: x = TCTS number.

Note: The output of this command is either one or two messages. (TCTS numbers are even or odd so there may be more than one match.) The output will contain the 5ESS[®] switch circuits (NLI/DLI) using the TCTS plus the office dependent data (ODD) information of the TRCUPATH and TRCU remark (TRCURMK). The remark may also be used to help locate the TRCU3 in question.

You can use the AISLE, BAY, and VERTPOS to help locate the TRCU. Side 0 fiber is attached to **fn-x-1** BNP circuit packs, and side 1 fiber is attached to **fn-x-2** circuit packs.

20. At the MCC (or TLWS), remove the NLI/DLI circuit from service by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	RMV:DLI=a-b Where: a = SM number. b = office network and timing complex (ONTC) side.
NLI (CM2/CM3)	RMV:NLI=a-b-c Where: a = SM number. b = NLI number. c = ONTC side.

For example:

```

S570-75 98-04-22 15:50:16 002469 ONTC N42 ic4.0-eaiu
M OP TRCU
TRCP=192-1          CTS=18          TCTS=249
                   NLI=192-1-0     NLI=192-1-1
HOST REMARK:
REMOTE REMARK:
TYPE                HOST TRCU      REMOTE TRCU
                   TRCU3          TRCU3
NUM                 4              7
CKT                 1              1
CLI                 H' 0          H' 0
AISLE               0004          0004
BAY                 0              0
VERTPOS            0              15
  
```

Note: The DLI removes the even and the odd circuit on the specified side, resulting in two circuit packs OOS LEDs being lighted. You may also use the remove pokes on the 1201 page.

Requirement: The OOS LED on the BNP circuit pack lights. This will ensure that the proper circuit has been removed.

21. Was NLI/DLI circuit successfully removed from service?

If **YES**, go to Step 23.

If **NO**, continue with the next step.

22. 5ESS switch action is required (refer to the following Note):

Note: If the remove fails, a failure reason is given with the output report. This gives a clue as to what 5ESS switch action needs to occur. It could be that other circuits are OOS, Communication Links (CLNKs) need more time to remap, or numerous other reasons.

23. Remove the suspect BNP circuit pack and insert a new one.

24. Is **FAULT** LED on replacement BNP pack lighted?

If **YES**, continue with the next step.

If **NO**, go to Step 50.

25. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI (CM2/CM3)	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

26. What occurs?

If **ATP**, go to Step 31.

If conditional all tests passed (**CATP**), continue with the next step.

If some tests failed (**STF**), go to the NLI Fault Procedure (5.18.2).

27. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?

If **YES**, continue with the next step.

If **NO**, seek technical assistance.

Note: There should be diagnostic (DGN) messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.

28. Can the unavailable resources be recovered?

If **YES**, continue with the next step.

If **NO**, seek technical assistance.

29. Recover the unavailable resources or wait until unavailable resources have been recovered.

30. Repeat from Step 25.

31. Is **FAULT** LED on BNP pack lighted?

If **YES**, continue with the next step (see Note).

If **NO**, go to Step 50.

Note: The **FAULT** may be in the mate circuit pack.

32. At the MCC (or TLWS), restore the OOS circuit unconditionally by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	RST:DLI=a-b,UCL Where: a = SM number. b = ONTC side.
NLI (CM2/CM3)	RST:NLI=a-b-c,UCL Where: a = SM number. b = NLI number. c = ONTC side.

33. Did the unit stay in service?

If **YES**, continue with the next step.

If **NO**, perform normal NLI/DLI fault procedures. Refer to Procedure 5.7 (for DLI) or Procedure 5.8 (for NLI).

34. At the MCC (or TLWS), remove the NLI/DLI on the mate side from service by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	RMV:DLI=a-b Where: a = SM number. b = ONTC side.
NLI (CM2/CM3)	RMV:NLI=a-b-c Where: a = SM number. b = NLI number. c = ONTC side.

35. Was NLI/DLI circuit successfully removed from service?
 If **YES**, go to Step 37.
 If **NO**, continue with the next step.
36. 5ESS switch action is required (refer to the following Note):
Note: If the remove fails, a failure reason is given with the output report. This gives a clue as to what 5ESS switch action needs to occur. It could be that other circuits are OOS, communication links (CLNKs) need more time to remap, or numerous other reasons.
37. Is **FAULT** LED on BNP pack lighted?
 If **YES**, continue with the next step.
 If **NO**, go to Step 39.
38. **Seek technical assistance.**
 Problem may be in backplane.
39. Is **OOS** LED on BNP pack lighted?
 If **YES**, continue with the next step.
 If **NO**, refer to the following Note.
Note: Before replacing any BNP/BNP2 circuit pack, the 5ESS switch circuit to the circuit pack needs to be OOS. The **OOS** light on the BNP/BNP2 circuit pack is lighted when the 5ESS switch circuit is OOS. The **OOS** light is controlled by messages sent from the 5ESS switch on the NCT/NCT2 link. If both sides of the 5ESS switch circuit are OOS, the lamp may not be lighted because the message to light the circuit cannot reach the TRCU3 shelf. Also, there is a possibility of a bad circuit pack. Refer to Procedure 5.18.2.
40. Remove the suspect mate BNP circuit pack and insert a new one.
41. Did **FAULT** LED extinguish on BNP/BNP2 circuit pack just replaced?
 If **YES**, continue with the next step.
 If **NO**, the new circuit pack is faulty; try another pack. If the problem persists, **seek technical assistance.**
42. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI (CM2/CM3)	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

43. What occurs?
 If **ATP**, go to Step 48.
 If **CATP**, continue with the next step.
 If **STF**, go to the NLI Fault Procedure (refer to Procedure 5.18.2).
44. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?
 If **YES**, continue with the next step.
 If **NO**, seek technical assistance.
Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.
45. Can the unavailable resources be recovered?
 If **YES**, continue with the next step.
 If **NO**, seek technical assistance.
46. Recover the unavailable resources, or wait until unavailable resources have been recovered.
47. Repeat from Step 42.
48. Is **FAULT** LED on original BNP pack lighted?
 If **YES**, continue with the next step.
 If **NO**, go to Step 50.
49. **Seek technical assistance.** The problem is in the backplane.
50. At the MCC (or TLWS), perform diagnostics on both link interface circuits as follows:

If	Then
MCC Page Display Mode	Use MCC 1201 page.
Message Function Mode - DLI (CM2/CM3)	Enter: DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
Message Function Mode - NLI (CM2/CM3)	Enter: DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

51. What occurs?
 - If **ATP** for both circuits, go to Step 56.
 - If **CATP** for either or both circuits, continue with the next step.
 - If **STF** for either or both circuits, go to the NLI/DLI Fault Procedure (5.18.2).
52. Are there any resources that were unavailable to run a diagnostic phase that was skipped (see Note)?
 - If **YES**, continue with the next step.
 - If **NO**, seek technical assistance.

Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.
53. Can the unavailable resources be recovered?
 - If **YES**, continue with the next step.
 - If **NO**, seek technical assistance.
54. Recover the unavailable resources, or wait until unavailable resources have been recovered.
55. Repeat from Step 50.
56. Have diagnostics been performed with each NCTIU active?
 - If **YES**, go to Step 59.
 - If **NO**, continue with the next step.
57. At the CIT connected to the TRCU3 shelf, switch NCTIUs by typing and entering:
 - switch-fn:fn-x:pri>manual;**
 - Where: x = Function pair to be switched.
58. Repeat from Step 50 for active mate NCTIU.
59. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.18.2 NLI/DLI FAULT PROCEDURE

OVERVIEW

Note: For CM2/CM3, references to DLIs/NLIs are applicable.

This subprocedure assumes that there are no other *5ESS*[®] switch faults that would cause NLI/DLI circuits to be OOS. This includes time multiplexed switch links (TMSLNKs), NLI/DLIs, module controller and time slot interchangers (MCTSI) as well as connect fibers. Section 5.7 provides procedures to analyze and clear problems in an SM dual-link interface (DLI) and its associated TMSLNKs. Section 5.8 provides procedures to analyze and clear problems in an SM-2000 NLI and its associated TMSLNKs. **Do not seek technical assistance until all circuits making up the NLI/DLI have been eliminated.**

If the **FAULT** lamp is lighted on the suspect BNP pack, execute the NCTIU Repair Procedure (5.18.1).

PROCEDURE

1. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI (CM2/CM3)	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

2. What occurs?
 - If **ATP**, go to Step 55.
 - If **CATP**, continue with the next step.
 - If **STF**, go to Step 7 (see Note).
 - Note:** Phase 2 of an NLI diagnostic and phases 9 and 11 of a DLI diagnostic test the TRCU3 shelf.
3. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?
 - If **YES**, continue with the next step.
 - If **NO**, **seek technical assistance.**
 - Note:** There should be DGN messages indicating what resources of the *5ESS* switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.
4. Can the unavailable resources be recovered?
 - If **YES**, continue with the next step.
 - If **NO**, **seek technical assistance.**

5. Recover the unavailable resources, or wait until unavailable resources have been recovered.
6. Repeat from Step 1.
7. Determine if the problem is in the host or a remote TRCU3 location. Refer to the following Note.

Note: For NLI diagnostics, segment 30 of phase 2 indicates a host TRCU3 failure, while segment 20 of phase 2 indicates a remote TRCU3 failure. Segment 40 of the NLI diagnostic is the SM to TMS loop test. If segments 20 and 30 pass and this one fails, then the fibers may be hooked up incorrectly. It may possibly also be a TMS or transceiver failure.

For DLI diagnostics, segment 6 of phase 11 and segment 11 of phase 11 indicate a host TRCU3 failure, and segment 2 of phase 9 and segment 3 of phase 9 indicate a remote TRCU3 failure. Segments 5 and 10 of phase 11 of the DLI diagnostic is the SM to TMS loop test. If the host and remote segments of the DLI diagnostic pass and these segments fail, then the fibers may be hooked up incorrectly. There may also be a TMS or transceiver failure.

In addition, the TLP diagnostic executes the trouble location procedure at the conclusion of the diagnostic. This procedure generates a list of suspected faulty circuit packs that can also be used to determine whether the problem is in the host or remote location.

8. Is there a CIT session established at the TRCU3 shelf?

If **YES**, go to Step 10.

If **NO**, continue with the next step.

9. Connect a CIT and establish a session using the following procedure that corresponds to the location of the **FAULT**. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0, *User/Service Manual (TARP)*, 363-206-285.

If **TRCU3 shelf is local**, perform DLP-521.

If **TRCU3 shelf is remote**, perform DLP-522.

10. At the CIT, enter the following command:

rtrv-nct:fn-x

Where: x = Function pair with the faulty NCTIU.

For example:

In progress...

REMOTE8 98-04-23 17:48:51 DDM-2000 OC-3, R13.5.1

M rtrv-nct: fn-b COMPLD

/* NCT Provisioning Report

Line Address	CTS Enabled	CTS	TCTS	Mode
fn-a	yes	19	249	remote

11. Observe and record the TCTS number.

Note: The TCTS number would be 249 in the previous example.

12. At the MCC (or TLWS), enter the following command:

OP:TRCU:TRCP=a-PATH

Where: a = SM number.

PATH = the path shown in the TRCP box on the MCC 1201 page.

Note: This would be best performed from the 1201 MCC Page with the 5ESS switch circuit, which has been removed by fault recovery. On MCC Page 1201, use MCC poke command 95xx, where xx=TRCU path shown on the page. This output will give the correct TCTS that should be provisioned.

13. Was NCT provisioning correct for both host and remote TRCU3s?

If **YES**, go to Step 21.

If **NO**, continue with the next step.

14. At the CIT, correct NCT provisioning by typing and entering the following command:

set-nct:fn-x;

Where: x = Function pair with the faulty NCT provisioning.

15. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI (CM2/CM3)	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

16. What occurs?

If **ATP**, go to Step 55.

If **CATP**, continue with the next step.

If **STF**, go to Step 21.

17. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?

If **YES**, continue with the next step.

If **NO**, seek technical assistance.

Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.

18. Can the unavailable resources be recovered?

If **YES**, continue with the next step.

If **NO**, seek technical assistance.

19. Recover the unavailable resources, or wait until unavailable resources have been recovered.
20. Repeat from Step 15.
21. Replace the BNP board.
22. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI (CM2/CM3)	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

23. What occurs?
 If **ATP**, go to Step 55.
 If **CATP**, continue with the next step.
 If **STF**, go to Step 28 (see Note).
Note: The mate NCTIU is possibly at fault.
24. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?
 If **YES**, continue with the next step.
 If **NO**, seek technical assistance.
Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.
25. Can the unavailable resources be recovered?
 If **YES**, continue with the next step.
 If **NO**, seek technical assistance.
26. Recover the unavailable resources, or wait until unavailable resources have been recovered.
27. Repeat from Step 22.
28. At the MCC (or TLWS), enter the following command to force the NCTIU mate inactive (see Note):
SET:FRC,TRCU3=a-b-c,d
 Where: a = SM number.
 b = NLI or DLI number.
 c = Active ONTC side.
 d = HOST (for host TRCU3 problems) or REMOTE.

Note: DLI 0 is for the EVEN circuit, and DLI 1 is for the ODD circuit. This command will make the mate NCTIU faulty.

29. Does **FAULT** LED on mate NCTIU light?
 - If **YES**, go to Step 37.
 - If **NO**, continue with the next step.
30. Has office network timing complex common (ONTCCOM) sides been removed and restored?
 - If **YES**, go to Step 36.
 - If **NO**, continue with the next step.
31. At the MCC (or TLWS), enter the following command to remove ONTCCOM side 0:

RMV:ONTCCOM=0
32. Was ONTCCOM side 0 successfully removed?
 - If **YES**, go to Step 34.
 - If **NO**, continue with the next step.
33. *5ESS* switch action is required (see Note):

Note: If the remove fails, a failure reason is given with the output report. This gives a clue to what *5ESS* switch action needs to occur. It could be that other circuits are OOS, CLNKs need more time to remap, or numerous other reasons.
34. At the MCC (or TLWS), enter the following command to restore ONTCCOM side 0:

RST:ONTCCOM=0,ucl
35. Have both ONTCCOM sides been removed and restored?
 - If **YES**, repeat from Step 28.
 - If **NO**, repeat from Step 31 for the remaining ONTCCOM side (1).
36. **Seek technical assistance.**
37. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

38. What occurs?
 - If **ATP**, go to Step 44.
 - If **CATP**, continue with the next step.

If **STF**, go to Step 43.

39. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?

If **YES**, continue with the next step.

If **NO**, seek technical assistance.

Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.

40. Can the unavailable resources be recovered?

If **YES**, continue with the next step.

If **NO**, seek technical assistance.

41. Recover the unavailable resources, or wait until unavailable resources have been recovered.

42. Repeat from Step 37.

43. At the MCC (or TLWS), restore the DLI/NLI unconditionally by typing and entering the following command (see Note):

If	Enter:
DLI (CM2/CM3)	RST:DLI=a-b,UCL Where: a = SM number. b = ONTC side.
NLI (CM2/CM3)	RST:NLI=a-b-c,UCL Where: a = SM number. b = NLI number. c = ONTC side.

Note: Either other parts of the NLI/DLI is faulty (refer to NLI/DLI maintenance), new BNP circuit pack is bad, or the problem is in the TRCU3 backplane. If the problem is in the backplane, seek technical assistance.

44. At the MCC (or TLWS), remove the mate NLI/DLI circuit from service by typing and entering the following command (see Note):

If	Enter:
DLI (CM2/CM3)	RMV:DLI=a-b Where: a = SM number. b = ONTC mate side.
NLI (CM2/CM3)	RMV:NLI=a-b-c Where: a = SM number. b = NLI number. c = ONTC mate side.

Note: The DLI removes the even and the odd circuit on the specified side, resulting in two circuit packs OOS LEDs being lighted. You may also use the remove pokes on the 1201 page.

45. Remove the suspect mate BNP circuit pack and insert a new one.
46. At the MCC (or TLWS), enter the following command to clear NCTIU fault (see Note):

CLR:FRC,TRCU3=a-b-c,d

Where: a = SM number.
 b = NLI or DLI number.
 c = Active ONTC side.
 d = HOST for host TRCU3 problems or REMOTE for remote TRCU3 problems.

Note: DLI 0 is for the EVEN circuit, and DLI 1 is for the ODD circuit. This command should restore the mate NCTIU side.

47. Did NCTIU **FAULT** lamp go out?
 If **YES**, continue with the next step.
 If **NO**, go to the NCTIU Repair Procedure (5.18.1). See Note.

Note: The new pack is possibly faulty.

48. Diagnose the NLI or DLI by typing and entering the following command:

If	Enter:
DLI (CM2/CM3)	DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
NLI (CM2/CM3)	DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

49. What occurs?
 If **ATP**, go to Step 55.
 If **CATP**, continue with the next step.
 If **STF**, go to Step 54.
50. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?
 If **YES**, continue with the next step.
 If **NO**, seek technical assistance.
Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.
51. Can the unavailable resources be recovered?
 If **YES**, continue with the next step.
 If **NO**, seek technical assistance.
52. Recover the unavailable resources, or wait until unavailable resources have been recovered.

53. Repeat from Step 48.
54. **Seek technical assistance.** The 5ESS switch NLI/DLI repair is required (see Note).

Note: Either other parts of the NLI are faulty (refer to NLI maintenance), the new BNP circuit pack is bad, or the problem is in the TRCU3 backplane. If the problem is in the backplane, **seek technical assistance.**

55. At the MCC (or TLWS), perform diagnostics on both link interface circuits as follows:

If	Then
MCC Page Display Mode	Use MCC 1201 Page.
Message Function Mode - DLI (CM2/CM3)	Enter: DGN:DLI=a-b,TLP,RAW; Where: a = SM number. b = ONTC side that the DLI is on.
Message Function Mode - NLI (CM2/CM3)	Enter: DGN:NLI=a-b-c,TLP,RAW; Where: a = SM number. b = NLI number. c = ONTC side number.

56. What occurs?
 If **ATP** for both circuits, go to Step 61.
 If **CATP** for either/or both circuits, continue with the next step.
 If **STF** for either/or both circuits, go to the NLI/DLI Fault Procedure (5.18.2).
57. Are there any resources that were unavailable to run a diagnostic phase that was skipped (refer to the following Note)?
 If **YES**, continue with the next step.
 If **NO**, **seek technical assistance.**
Note: There should be DGN messages indicating what resources of the 5ESS switch are unavailable to run a phase that was skipped. Those resources must be recovered before continuing.
58. Can the unavailable resources be recovered?
 If **YES**, continue with the next step.
 If **NO**, **seek technical assistance.**
59. Recover the unavailable resources, or wait until unavailable resources have been recovered.
60. Repeat from Step 55.
61. Have diagnostics been performed with each NCTIU active?
 If **YES**, go to Step 64.

If **NO**, continue with the next step.

62. At the CIT connected to the TRCU3 shelf, switch NCTIUs by typing and entering the following:

switch-fn:fn-x:pri=manual;

Where: x = Function pair to be switched.

63. Repeat from Step [55](#) for the active mate NCTIU.
64. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.19 REPLACE TRCU3 FUSE ALARM MODULE (CM-2601A)

OVERVIEW

These procedures are used to replace a TRCU3 fuse alarm module (CM-2601A).

The CM-2601A circuit board is disposable; it should **not** be returned to the factory for repair. When ordering, the reference number is J5D003EF-1, List 6.

This procedure is divided into the following four sections:

- Removing a CM-2601A Circuit Board ([5.19.1](#))
- Installing a CM-2601A Circuit Board ([5.19.2](#))
- Removing Two CM-2601A Circuit Boards ([5.19.3](#))
- Installing Two CM-2601A Circuit Boards ([5.19.4](#)).

CLEAR MINOR, MAJOR ALARM, and FE ACTY

Identify if minor or major alarm is caused by CM-2601A circuit board. Refer to the following Note.

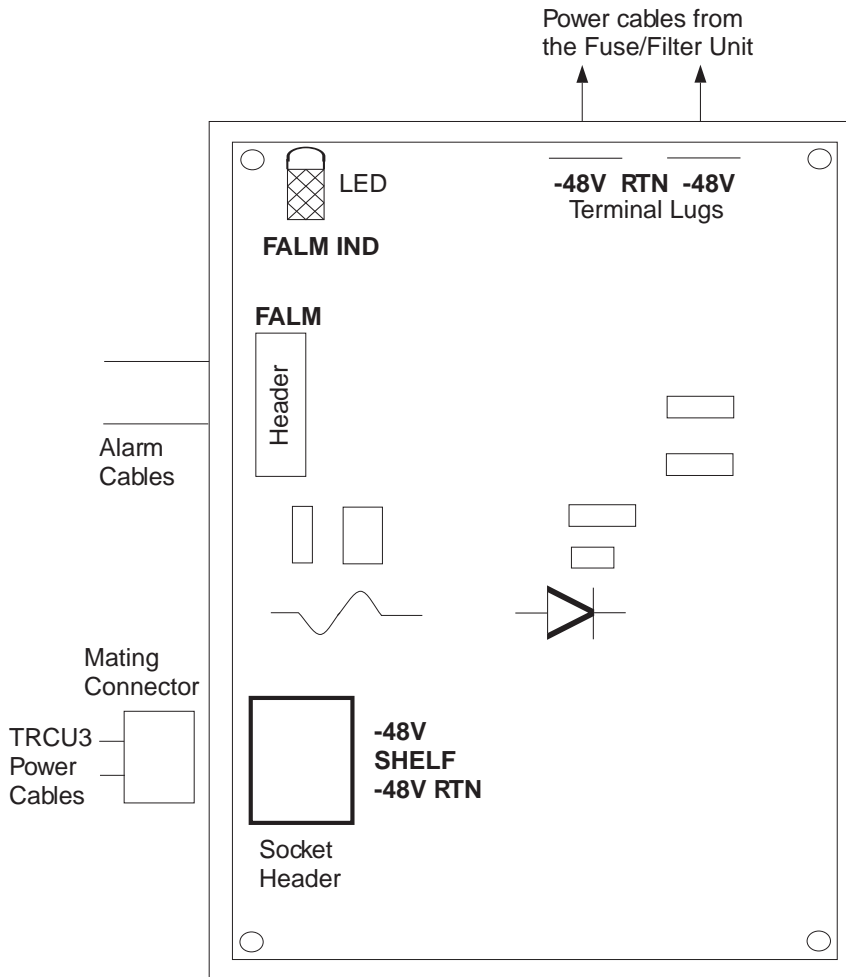
Note: Alarm failures could be caused by duplex failure in the NCT links. FE ACTY alarm will be reported by other nodes on the ring or from the host/remote TRCU3 unit.

Visually inspect the two CM-2601A circuit board at the rear of the TRCU3 shelf.

If one of the LEDs on CM-2601A circuit board is lighted, go to and execute Sections [5.19.1](#) and [5.19.2](#).

If the LED on both CM-2601A circuit boards are lighted, go to and execute Sections [5.19.3](#) and [5.19.4](#).

Refer to Figure [5.19-1](#).



Note: The terms in bold print are the labels printed on the CM-2601A circuit board.

Figure 5.19-1 — Top View of the CM-2601A Circuit Board

PROCEDURE

5.19.1 REMOVING A CM-2601A CIRCUIT BOARD

Note: Use a standard flathead screwdriver to perform the following steps when removing a CM-2601A circuit board.

1. Connect a CIT to the User Panel circuit pack on the TRCU3 shelf and establish a CIT session using the following procedures that corresponds to the location of the fault. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0, *User/Service Manual (TARP)*, 363-206-285.

If TRCU3 shelf is local, perform DLP-521.

If TRCU3 shelf is remote, perform DLP-522.

2. At the TRCU3 CIT, verify which CM-2601A fuse is blown by typing and entering the following command:

rtrv-alm-all

If		Then
Alarm Level	Source Address	-48 V Power/Fuse Bus
MINOR	env-8	A
MINOR	env-3	B

Response: The **MN** and **NE ACTY** LEDs will turn on at the User Panel of a host TRCU3 shelf. If the alarm is from a remote TRCU3 shelf location, the **FE ACTY** LED will turn on.

3. Visually inspect the CM-2601A circuit board at the rear of the TRCU3 shelf.
4. Is the LED on the CM-2601A board lighted?
If **YES**, go to Step 6.
If **NO**, continue with the next step.
5. **Seek technical assistance.**
6. Mark the faulty circuit board on the backplane of the TRCU3 unit.
7. At the front of the TRCU3 unit, locate the -48 V power fuse associated with the faulty CM-2601A board.
8. Disengage the -48 V power fuse (FA or FB) associated with the faulty CM-2601A board (Figure 5.19-1). **Carefully remember the fuse location.**
9. At the User Panel on the TRCU3 shelf, visually check that the power LED for the faulty CM-2601A circuit board is off (Power FA or FB LED).
10. At the TRCU3 CIT, verify that the -48 V power fuse failed by typing and entering the following command:

rtrv-alm-all

Source Address	Description
env-8	-48 V Power/Fuse FA for the TRCU3 failed
env-3	-48 V Power/Fuse FB for the TRCU3 failed

Note: It is now safe to remove the cables and the CM-2601A from TRCU3 unit.

11. **Danger: -48 V is present on the adjacent CM-2601A circuit board and in the backplane.**

At the rear of the TRCU3 shelf, unplug the power cables from the terminal lugs located at the top of the CM-2601A board.

12. Unplug the power cables from the socket header located at the bottom left corner of the CM-2601A board.

Note: The socket connector is locked in place with the mating connector. To unlock the socket connector, press both sides and pull.

13. Unplug alarm cables from FALM header located at the top left side of the CM-2601A board. Notice the orientation of the FALM connector to the FALM header.

14. Carefully remember the position of the CM-2601A board. The LED should always be positioned to the top left corner of the unit.
15. Using a flathead screwdriver, unscrew the four mounting screws located at each corner of the CM-2601A board. Screws should be saved for the new CM-2601A board. See Note.

Note: The CM-2601A board has been properly removed. The new CM-2601A board can now be installed.

16. **STOP. YOU HAVE COMPLETED THE PROCEDURE TO REMOVE A CM-2601A CIRCUIT BOARD.**

5.19.2 INSTALLING A CM-2601A CIRCUIT BOARD

Note: Use the following steps when installing a CM-2601A circuit board.

1. Plug the alarm cables into the FALM header located at the top left side of the CM-2601A board.
2. Plug the TRCU3 power cables mating connector to the -48 V/SHELF/-48 V RTN header, which is located at the bottom left corner of the CM-2601A board.

Note: The mating connectors and the socket header is keyed to be plugged in only one way.

3. Plug the power cables from the Fuse/Filter Unit to the CM-2601A board -48 V RTN -48 V terminal lugs of the CM-2601A board.
4. Install the -48 V power fuse for the new CM-2601A circuit board.
5. Are both **PWR ON** LEDs (**A** and **B**) lighted?

If **YES**, go to Step 8.

If **NO**, continue with the next step.

6. Is replacement fuse good?

If **YES**, seek technical assistance.

If **NO**, continue with the next step.

7. Replace fuse and repeat from Step 5.
8. At the TRCU3 CIT, verify that all alarms have been cleared by typing and entering the following command:

```
rtrv-alm-all
```

Response: There are no active alarms or status conditions.

9. **STOP. YOU HAVE COMPLETED THE PROCEDURE TO INSTALL A CM-2601A CIRCUIT BOARD.**

5.19.3 REMOVING TWO CM-2601A CIRCUIT BOARDS

Note: Use a standard flathead screwdriver to perform the following steps when removing a CM-2601A circuit board.

1. Connect a CIT to the User Panel circuit pack on the TRCU3 shelf and establish a CIT session using the following procedures that corresponds to the location of the

- fault. The procedures are located in the DDM-2000 OC-3 Multiplexer Release 13.0, *User/Service Manual (TARP)*, 363-206-285.
- If **TRCU3 shelf is local**, perform DLP-521.
- If **TRCU3 shelf is remote**, perform DLP-522.
2. Visually inspect the CM-2601A circuit board at the rear of the TRCU3 shelf.
 3. Is the LED on the CM-2601A board lighted?
If **YES**, go to Step 5.
If **NO**, continue with the next step.
 4. **Seek technical assistance.**
 5. At the front of the TRCU3 unit, locate the -48 V power fuse associated with the faulty CM-2601A board.
 6. Disengage the -48 V power fuse (FA or FB) associated with the faulty CM-2601A board (see Figure 5.19-1). **Carefully remember the fuse location.**
 7. At the User Panel on the TRCU3 shelf, visually check that the power LED for the faulty CM-2601A circuit board is off (Power FA or FB LEDs).
Note: Refer to Steps 8-12 for removing the faulty CM-2601A board from side A.
 8. **Danger: -48 V is present on the adjacent CM-2601A circuit board and in the backplane.**
At the rear of the TRCU3 shelf, unplug the power cables from the terminal lugs located at the top of the CM-2601A board.
 9. Unplug the power cables from the socket header located at the bottom left corner of the CM-2601A board.
Note: The socket connector is locked in place with the mating connector. To unlock the socket connector, press both sides and pull.
 10. Unplug alarm cables from FALM header located at the top left side of the CM-2601A board. Notice the orientation of the FALM connector to the FALM header.
 11. Carefully remember the position of the CM-2601A board. The LED should always be positioned to the top left corner of the unit.
 12. Using a flathead screwdriver, unscrew the four mounting screws located at each corner of the CM-2601A board. Screws should be saved for the new CM-2601A board.
Note: Refer to Step 13 for removing the faulty CM-2601A board from side B.
 13. Repeat Step 8-12 for the CM-2601A board side B. See Note.
Note: The CM-2601A boards has been properly removed. The new CM-2601A boards can now be installed.
 14. **STOP. YOU HAVE COMPLETED THE PROCEDURE TO REMOVE TWO CM-2601A CIRCUIT BOARDS.**

5.19.4 INSTALLING TWO CM-2601A CIRCUIT BOARDS

Note: Use the following steps when installing two CM-2601A circuit boards. Refer to Steps 1-3 for installing the CM-2601A circuit board for side A

1. Plug the alarm cables into the FALM header located at the top left side of the CM-2601A board.
2. Plug the TRCU3 power cables mating connector to the -48 V/SHELF/-48 V RTN header, that is located at the bottom left corner of the CM-2601A board (see Note).

Note: The mating connectors and the socket header is keyed to be plugged in only one way.

3. Plug the power cables from the Fuse/Filter Unit to the CM-2601A board -48 V RTN -48 V terminal lugs of the CM-2601A board (see Note).

Note: Refer to Step 4 for installing the CM-2601A circuit board for side B.

4. Repeat Steps 1-3 for CM-2601A circuit board side B.
5. Install the -48 V power fuse for the new CM-2601A circuit board.
6. Are both **PWR ON** LEDs (**A** and **B**) lighted?

If **YES**, go to Step 9.

If **NO**, continue with the next step.

7. Is replacement fuse good?

If **YES**, seek technical assistance.

If **NO**, continue with the next step.

8. Replace fuse and repeat from Step 6.
9. At the TRCU3 CIT, verify that all alarms have been cleared by typing and entering the following command:

```
rtrv-alm-all
```

Response: There are no active alarms or status conditions.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.20 CLEAR TROUBLE IN TMSFP

OVERVIEW

This procedure is used to restore a TMS Fabric Pair (TMSFP) to an active (ACT) state in response to the following:

- REPT TRBL output messages
- Off-normal status indications for TMSFP
- MCC page indicators.

The TMSFP diagnostic can only be run if the parent ONTCCOM is in-service. The following ONTC sub-units can be diagnosed separately in CM3 offices:

- ONTCCOM
- TMSFP
- QLPS
- NLI/DLI.

Related documentation:

- 235-600-700, *Input Messages* manual
- 235-600-750, *Output Messages* manual.

Note 1: This procedure only applies to 5E16.2 and later.

Note 2: Before you begin, these procedures require the use of the MCC (master control center) terminal and RC/V (recent change/verify) terminal at the master control center or trunk-line work station. The TMSFP must also be in an off-normal state (DGRD or OOS).

PROCEDURE

1. Enter poke **1212** to display the **TMS FABRIC PAIR STATUS** MCC page.
2. Is any TMSFP in an out-of-service (OOS) state?

If **YES**, select an OOS TMSFP and continue with the next step.

If **NO**, go to Step 14.

Note: TMSFP-related off-normal conditions may exist on both ONTC sides. If this is the case, start work on resolving problems on the ONTC side that is in the degraded minor (DGR-MIN) state.

3. Output the hardware status of the OOS TMSFP to the ROP by entering poke **90xy** or by using the **op:cfgstat,tmsfp=x-y** command (where x = ONTC side and y = TMSFP number).

If state is OOS-MAN-RMV, continue with Step 4.
If state is OOS-AUTO-RMV, go to Step 6.
If state is OOS-MAN-DGN, go to Step 7.
If state is OOS-AUTO-DGN, go to Step 7.
If state is OOS-MAN-REX, go to Step 7.
If state is OOS-AUTO-REX, go to Step 7.
If state is OOS-MAN-FLT, go to Step 8.
If state is OOS-AUTO-FLT, go to Step 8.
If state is OOS-AUTO-TBLA, go to Step 10.
If state is OOS-MAN-FE, go to Step 11.
If state is OOS-AUTO-FE, go to Step 11.

If state is OOS-UNEQ-NULL, go to Step 12.
If state is OOS-GROW-XXX, go to Step 13.

4. The TMSFP was manually removed. Restore it using MCC poke **30xy** or the **rst:tmsfp=x-y** command (where x = ONTC side and y = TMSFP number).
5. Did the TMSFP restore to either an active (ACT) or degraded (DGR) state?
If **YES**, then return to Step 2.
If **NO**, then return to Step 3.
6. The TMSFP has been automatically removed by fault recovery for the purpose of running diagnostics. Output the CM diagnostic queue to the ROP via the **op:dmq,cm** command.
If the TMSFP is on the queue, wait for diagnostics to complete and then return to Step 2.
If the TMSFP is *not* on the queue: The TMSFP diagnostic can only be run when the parent ONTCCOM is in-service. If the parent ONTCCOM is OOS, it is possible for a TMSFP to remain in the OOS-AUTO-RMV state indefinitely. If the parent ONTCCOM is out-of-service, use Procedure 5.5 to resolve the problem. Otherwise, attempt to conditionally restore the TMSFP by using poke **30xy** or the **rst:tmsfp=x-y** command (where x = ONTC side and y = TMSFP number). Now return to Step 5.
7. The TMSFP is currently being diagnosed or exercised (either manually or routinely). When diagnostics or routine exercise completes, return to Step 2.
8. The TMSFP is faulty. Find the most recent printed TLP list on the ROP, use Procedure 5.2 to repair the unit, and then continue with the next step.
9. Did Procedure 5.2 result in the TMSFP being successfully restored to either the active (ACT) or degraded (DGR) state?
If **YES**, then return to Step 2.
If **NO**, then **seek technical assistance** according to local procedure.
10. The TMSFP is in a trouble analysis state (repeated fault recovery removals, but diagnostics pass). **Seek technical assistance** according to local procedure.
11. The TMSFP's parent ONTCCOM is in an OOS state. Use Procedure 5.5 to resolve the problem.
12. The TMSFP is not equipped. If CM3 TMS shelf growth or degrowth is in progress, refer to the TMS shelf growth/degrowth procedures. Otherwise, return to Procedure 5.3 to evaluate the status of other CM units.
13. The TMSFP is in a growth state. Refer to the TMS shelf growth/degrowth procedures. Note that a TMSFP is considered operational (and will no longer be in a growth state) once the CMU2 shelf (shelf 0) has been made operational.
14. Is any TMSFP in a degraded (DGR) state, or is the **TMSLNK 120,y** indicator (where y = TMSFP number) associated with any TMSFP backlighted?
If **YES**, select a DGR TMSFP and continue with the next step.
If **NO**, return to Procedure 5.3 to evaluate the status of other CM units.

- Note:** TMSFP-related off-normal conditions may exist on both ONTC sides. If this is the case, start work on resolving problems on the ONTC side that is in the degraded minor (DGR-MIN) state.
15. Enter poke **1220,y** (where y = TMSFP number) to display the **TMSFP Y TMSLINK SUMMARY** MCC page.
 16. Are any TMSLNK rows associated with the selected TMSFP backlighted?
If **YES**, continue with the next step.
If **NO**, re-poke MCC page **1212** and return to step 14.
 17. Enter the backlighted poke command to display one of the TMSLNK status pages associated with the selected TMSFP. For example, **1233,2** will display the MCC page containing the status of TMSLNKs 126-189 for TMSFP 1-2 (ONTC side 1, TMSFP number 2).
 18. Use Procedure [5.7](#) to resolve problems with out-of-service network link interfaces (NLIs), dual link interfaces (DLIs), or TMSLNKs.
 19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.21 PRODUCE TLP FROM FAULT RECOVERY DATA

OVERVIEW

This procedure provides an E-bus Trouble Locating Procedure (TLP) for the CM2 Time-Multiplexed Switch (TMS). Fault recovery (FR) data (that is, historical ROP information) is used during the running of TMS diagnostics to help identify an intermittent E-bus hardware defect.

Note: This is also known as the Fault Analysis Trouble Locating Procedure (FATLP).

The FR data, known as FADATA, is queued up for use in only a single TMS diagnostic run. Therefore, the FATLP tool must be invoked prior to running TMS diagnostics each time you want to use FADATA in the running of the TMS diagnostics.

PROCEDURE

1. **Caution:** *This procedure involves the running of TMS diagnostics. The ONTCCOM will be simplexed during these diagnostics. Therefore, this is a maintenance window activity.*

To invoke the FATLP tool, do one of the following:

- On the STLWS, enter `RCV:MENU:FATLP;`
- On an RC/V channel:
 - From the MML shell, enter: `RCV:MENU:FATLP;` or
 - From the *UNIX*¹ shell and # prompt, enter: `fatlp`

Response:

PF

WELCOME TO THE FAULT ANALYSIS TLP TOOL

- (1) To turn off daily recurrence FADATA output message.
- (2) To review/select an active FADATA for TLP.
- (3) To log repaired equipments for an active FADATA.
- (4) To print all active FADATA.
- (5) To print all archived FADATA.

Please enter your selection: (! to go back, h for Help, q to quit)

2. Select one of the following:
 - To change the status of the FADATA output message, select "1". This toggles the status between off and on. If on, the daily 6:00AM message is output to the ROP. In this case, you are notified of the FADATA count each morning. If off, the daily message is not output to the ROP.
 - To review and/or select an active FADATA for use in a TMS diagnostic, select "2". Then go to Step 3.
 - To log repairs for an active FADATA, select "3". This allows you to record any repairs that were made for an active FADATA (for example, circuit packs replaced, cables inspected, and backplane pins checked).
 - To output all active FADATA to the ROP, select "4". There may be as many as 50 active FADATA entries at any one time.

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- To output all archived FADATA to the ROP, select "5". There may be as many as 100 archived FADATA entries at any one time.
3. **Caution: Once you make an FADATA selection, this request is set up for the next TMS diagnostic run. So it is very important than you immediately run the TMS diagnostic PH12 or PH14. Otherwise, the next time periodic TMS diagnostics are run, PH 12 will fail as the result of the FATLP request.**

After selecting "2", the following is printed:

```
< 2
The following shows the FADATA last happened time stamps:
(1) 03-06-26 06:39
```

To select an active FADATA, please enter the number that corresponds to the active FADATA that you want to select.
To page down for more FADATA, enter RETURN.
To page up, enter u.
(! to go back, h for Help, q to quit)

4. The above printout will show a list of active FADATA. From the list, select the corresponding number you wish to use in your diagnostic request.

Response:

```
< 1
The following shows the selected FADATA:
First happened at: 03-06-26 06:39
Last happened at: 03-06-26 06:39
Last selected at:
Repaired equipments:
Error count: 2
```

```
TMS=1 links information:
00000000 00000000 00000000 05000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

```
Do you want to select this FADATA?
Enter y or n:
```

5. If you just wanted to view this FADATA, select "n". If you want this FADATA to be used the next time TMS diagnostics are run, select "y" and continue with the next step.
6. **Caution: The following message will simplex the ONTCCOM and should only be entered during the maintenance window.**

Enter the message DGN:TMS=a, PH=b, RAW, UCL, TLP

Where: a = TMS number
b = Phase number (use 12 to produce the circuit pack TLP; use 14 to produce the E-bus TLP).

Response: From a phase 12 failure you should get a TLP listing of possible faulty circuit packs. From a phase 14 failure you should get a listing of E-bus cables to inspect.

7. Perform the necessary maintenance activity to try to correct the fault. After you replace a circuit pack or repair the cabling, you will need to wait a day or more to see if the intermittent fault appears again in the FADATA output message. If it does not reappear, the repair may have fixed the problem. If it does reappear,

go back to Step [2](#) and go through the steps again to attempt additional repairs.

5.22 FORCED ONTC RECONFIGURATION

OVERVIEW

This procedure is used to force the ONTCCOM to reconfigure the ONTC.

Situations exist in offices where technical support needs to reconfigure the out-of-service ONTC side to the Active state in order to replace the faulty hardware. There could be a prolonged service interruption if the ONTC force does not result in a seamless reconfiguration. This procedure allows for the ONTC force, as well as the recovery backwards to minimize downtime.

Use this procedure to reconfigure the failing ONTC side to the active major state and the ONTC that is currently active to the out-of-service unavailable state. This procedure assumes that the person who executes this procedure is familiar with the 5ESS[®] switch corrective maintenance fundamentals, principles, and practices.

Caution 1: *Do not use this procedure until a hardware reliability assessment has been performed on the CM. This means that you should have already inspected the ONTC backplane for improperly seated cables, bent pins, and other potential backplane problems. If necessary, seek technical support.*

Caution 2: *This procedure may affect service. The level of impact is based on whether the ONTC that is forced makes a seamless transition to the Active-Forced state. Use this procedure only as a last resort.*

Caution 3: *Reconfiguring an ONTC side that fails diagnostics could result in a disruption of service for all subscribers. This procedure should only be used during the off-hour maintenance window as set forth by the operating company (usually between 00:00 and 06:00 hours).*

PROCEDURE

1. Output the status of the system to the receive-only printer (ROP).
 - `op:sysstat,ucl`
 - `op:cfgstat,ontc=x`
 - `op:cfgstat:msgs=1`
 - `op:cfgstat,msgs=0`
 - `op:cfgstat,sm=1&&192,oos,nofe`
2. Compile a list of the out-of-service units
3. Use MCC/TLWS pages 1261-1264 to verify that there are at least two C-links active to each SM.
4. Are there two Clinks active to each SM?
 - If **Yes**, continue with the next step.
 - If **No**, the SMs that do not have at least two C-Links active are at a higher risk of becoming isolated during the execution of this procedure. If it is essential to go forward with this procedure, continue with the next step. If not, resolve the C-link issue before continuing.

5. Prepare to force the failing ONTC side to the in-service active state.
 - Make sure you have a known good set of NC replacement packs that are the likeness of the packs that are currently installed (same hardware vintage and/or microcode).
 - Position the packs in front of the CM bay where the packs will be installed. Be prepared to insert them.
 - Form a plan for making test calls.
 - Secure a copy of the EAI boot parameters needed to clear the ONTC force.
 - Be prepared to decode any AM Processor Recovery Messages (PRMs).
6. Inhibit AM hardware and software checks.
 - At the command prompt, enter: **inh:hdwchk**
 - At the command prompt, enter: **inh:sftchk**.
7. Use the following command to force the failing ONTC to the In-service Active state.

At the command prompt, enter: **set:frc,ontccom=x** (where "x" = ONTC side that is failing).
8. Was the failing ONTC successfully reconfigured to the In-service Forced-Active state?

If **Yes**, go to Step 10.

If **No**, continue with the next step.
9. Is the AM initializing?

If **Yes**, continue with the next step.

If **No**, the force did not take. Seek technical support.
10. Using the following substeps, replace the targeted ONTC packs with known good packs.
 - a. Power down the CMCU.
 - b. Replace the targeted packs.
 - c. Power up the CMCU.
11. Is the AM initializing?

If **Yes**, there is a good chance that the problem is on the ONTC side that is failing diagnostics. Continue with the next step.

If **No**, the ONTC has been reconfigured, the packs have been replaced. Go to Step 14.
12. Use the following substeps to clear the ONTC force and then to initialize the AM back onto the ONTC side that was active before this procedure.
 - a. Clear all EAI boot parameters:

On the MCC EAI display page, enter poke: **14**.

- b. Force the online CU active:
On the MCC EAI display page, enter poke: **12**.
 - c. Select a primary Disk:
On the MCC EAI display page, enter poke: **20**.
 - d. Select the Application Parameter, then pass the parameter that clears ONTC force.
On the MCC EAI display page, enter poke: **42**.
On the MCC EAI display page, enter poke: **Z**.
 - e. Enter the EAI poke to initiate an AM level 3 initialization. See Note.
On the MCC EAI display page, enter poke: **53**.

Note: You have just initialized the AM. Support personnel must monitor the AM processor recovery messages to determine if the AM has repeatedly failed to complete its initialization cycle. Continue with the next step.
13. Did the AM complete its initialization cycle and return to the in-service active state? Is the AM 111 page displayed?
- If **Yes**, Continue with the next step.
- If **No**, the AM has repeatedly failed to recovery even after the ONTC force has been cleared. Analyze the processor recovery messages; the problem could be with the pack that was inserted. If necessary, seek technical support.
14. View the SM status pages (141-144). Are there any SMs in the *Isolated*, *Initialization Pending*, or *Communications Lost* state?
- If **Yes**, one or more SMs are not providing service. Use the applicable procedure to restore service.
- If **No**, continue with the next step.
15. If you have reached this step, you have used the forced active command to reconfigure the ONTC and have replaced the targeted pack with a known good pack. Perform a call processing status check.
- Make test calls (inter-module, intra-module, ccs7, etc.).
16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.23 CLEAR NONDIAGNOSABLE CMP MEMORY ERRORS

OVERVIEW

This procedure is used to clear an intermittent Communication Module Processor (CMP) memory fault. The fault symptom is usually several interrupt reports (for example, REPT CMP HWLVL CORR-BIT ERROR) when the affected CMP is active (ACT) or an attempt to restore the CMP produces a REPT CMP HASHSUM FAILURE printout. However, the fault is so “soft” that it is not detected by the normal phases of the CMP diagnostic.

PROCEDURE

1. Collect the associated REPT CMP error/interrupt printouts.
2. On the affected CMP, execute the CMP diagnostic demand phase 11 (with TLP option) at least three times to determine if the fault can be detected by more exhaustive memory tests in this phase. Refer to 235-600-700, *Input Messages*, for the DGN input message format.
3. If the phase 11 result is consistently all tests passed (ATP), then go to Step 5. Otherwise, continue with the next step.
4. Using the SUSPECTED FAULTY EQUIPMENT LIST from the phase 11 failure, determine which pack is probably causing the failure and go to Step 6.
5. Using the REPT CMP printouts collected in Step 1, determine which CMP board is probably causing the problem as follows:
 - (a) The TN1369 (or TN1871) memory board is probably faulty if the failing address (from the FAILING-ADDR=x part of the error/interrupt printout) is greater than or equal to 0x34000000 (hexadecimal) or if the printouts indicate one or more of the following errors:
 - MEM-BOARD-INIT-FAIL
 - EXT-BOARD-BUS-ERR
 - EXT-BOARD-ADDR-PARITY-ERR
 - EXT-BOARD-DATA-PARITY-ERR
 - EXT-BOARD-NON-CORR-MEM-ERR-ON-ACCESS.
 - (b) The TN1368 (or TN1800) core board is probably faulty if the failing address is in one of the core board’s memory ranges as follows:
 - 0x0b000000 - 0x0bffffff (DDRAM)
 - 0x0c000000 – 0x0c0fffff (DSRAM)
 - 0x18000000 - 0x180fffff (IP LSRAM)
 - 0x1c000000 - 0x1c0fffff (AP LSRAM).
6. Replace the suspect pack and verify that phase 11 of the CMP diagnostic now runs consistently ATP (at least three times). If the diagnosis is not consistently ATP, go to Step 9.
7. Using the RESTORE poke or the RST:CMP input message, request restoral of the affected CMP.

8. If the affected CMP restored successfully (including no hashsum failure after memory update), hold the suspect board (and printouts) for a few days, verify that the intermittent memory errors have been cleared, and attach the printouts to the board when it is returned to the repair center.
9. If the pack replacement has not cleared the intermittent memory errors, and if replacement of the other CMP pack has not yet been done, return to Step 6 and replace the pack not previously replaced.
10. If the problem has not been cleared by replacing both the TN1368 and TN1369, retain the original packs and printouts and ***seek technical assistance***.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5.24 REPLACING CM CIRCUIT PACKS

OVERVIEW

This is a general procedure for replacing CM circuit packs. If you need to replace an optical data transceiver paddleboard on any of the optically connected CM units, refer to Procedure [8.10](#).

Note: Before starting this procedure, read the general requirements for handling and care of circuit packs outlined in 235-105-110, *System Maintenance Requirements and Tools*.

PROCEDURE

1. Make sure the circuit pack is out of service (OOS) by removing the unit or sub-unit from service.

Caution: *Be sure you understand the impact of removing the unit or sub-unit from service.*

Check the section in Procedure [5.25](#) (CM2), Procedure [5.26](#) (CM2C), or Procedure [5.27](#) (CM3) that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are OOS.

2. Any unit in the CM2 and CM2C must be powered down before a circuit pack or cable can be replaced in that unit. Perform the steps in Procedure [5.25](#) (CM2) or Procedure [5.26](#) (CM2C) that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are powered down.
3. Replace the circuit pack and/or cabling.
4. For units or sub-units that required powering down, follow the corresponding steps in Procedure [5.25](#) (CM2) or Procedure [5.26](#) (CM2C) to power the unit or sub-unit up.
5. Follow the corresponding steps in Procedure [5.25](#) (CM2), Procedure [5.26](#) (CM2C), or Procedure [5.27](#) (CM3) to restore the unit(s) or sub-unit(s) to service.

5.25 CM2 POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Purpose

The following procedures are used to power-down and power-up **CM2** units and sub-units.

Note: Make sure you are servicing the correct unit. Some units have diagnostics that perform “interface tests,” which verify communication between the diagnosed unit and other units. These tests may find “other units” at fault. So, a circuit pack listed on the FAULTY EQUIPMENT LIST may NOT belong to the diagnosed unit.

See Figure 5.25-1 for the location of the CM2 units in the CM2 cabinets.

Prerequisites

Before using these procedures, start with 235-105-220, Procedure 5.3 to do the following:

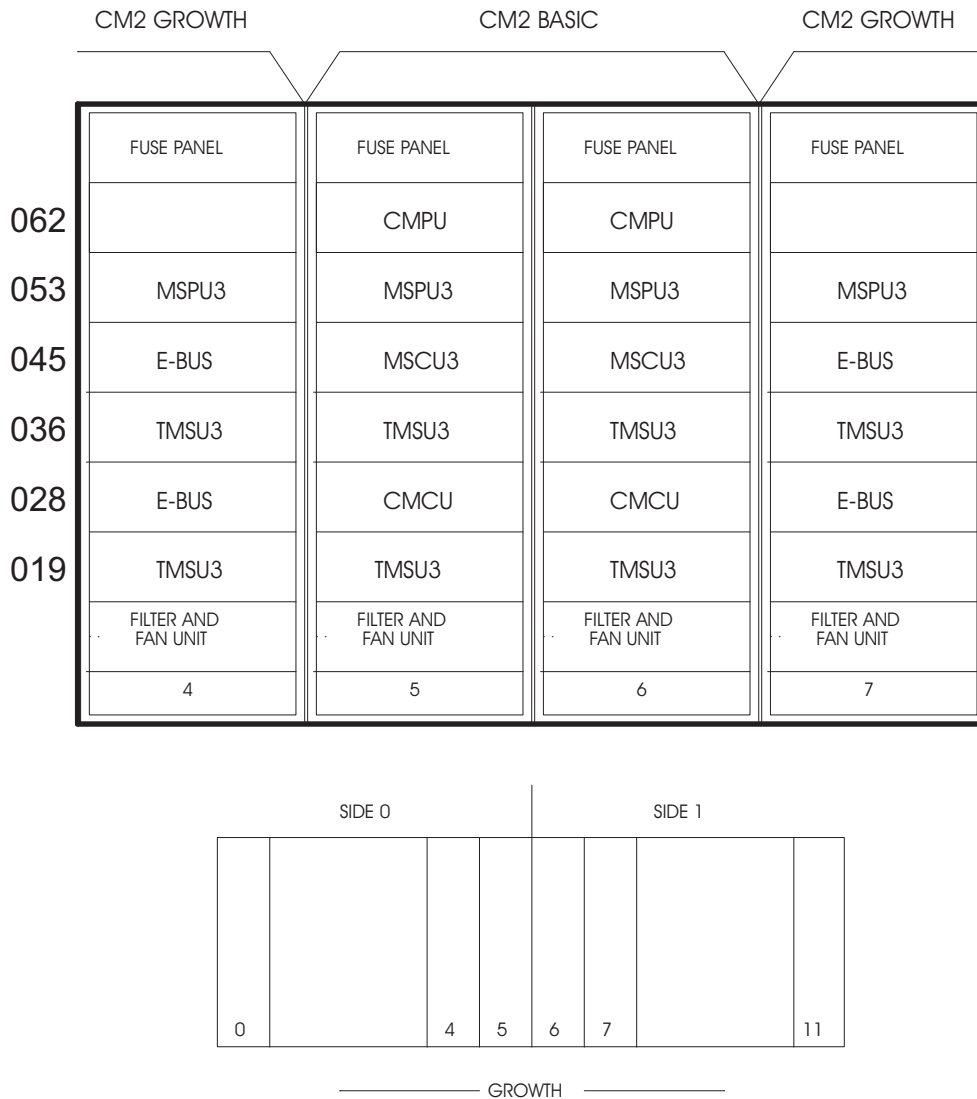
1. Identify the unit to be serviced.
2. Properly remove and/or isolate a unit from service.
3. Locate the unit and verify that it is out-of-service.

Caution: Before removing power, verify that the unit or sub-unit that requires a power-down is out-of-service (OOS).

Note: With this or any CM unit, the easiest way to ensure all the right units are removed from service is to toggle the RST/ROS switch on the corresponding control and display (C/D) pack to the ROS (request OOS) position.

Precautions

Caution: The use of unconditional removals or manual override power downs is NOT recommended because call processing may be affected. If a conditional removal doesn't work, it usually means that the unit's mate hardware should be repaired first.



AM_02.DRW-5

Figure 5.25-1 — CM2 Cabinet

Note: If a circuit pack needs replacing, refer to 235-105-220, Procedure 5.24 before replacing a circuit pack.

The CM2 Message Switch is made up of these three units:

- The Communication Module Processor Unit (CMPU) is located in bays 5 and 6 only at vertical EQL 062. See Figure 5.25-2 for circuit pack codes and EQLs. The CMPU has two functional groups: the Communication Module Processor (CMP) and the QLPS Gateway Processor (QGP).
- The Message Switch Peripheral Unit (MSPU) is located in all equipped CM2 bays at vertical EQL 053. See Figure 5.25-3 for circuit pack codes and EQLs. The MSPU has one functional group: Module Message Processor (MMP).

- The Message Switch Control Unit (MSCU) is located in bays 5 and 6 only at vertical EQL 045. See Figures 5.25-4 (MSCU2) and 5.25-5 (MSCU3) for circuit pack codes and EQLs. The MSCU has three functional groups: Peripheral Pump Controller (PPC), Foundation Peripheral Controller (FPC), and Message Switch Controller (MSC).

The CM2 ONTC is made up of these elements:

- The ONTC Common (ONTCCOM) is made up of these units:

Note: All units in the ONTCCOM and QLPS with the exception of the Network Clock Oscillator (NC OSC — TN1284 or TN1286) are powered down the same way. Any removal of a circuit pack in the ONTCCOM or QLPS requires that the entire ONTCCOM be removed from service and powered down. To power down the NC OSC, refer to Procedure 5.25.15.

- Time Multiplexed Switch Unit (TMSU). Located in all equipped CM2 bays at vertical EQLs 019 and 036. See Figure 5.25-6, TMSU2 (Single Fabric), and Figure 5.25-7, TMSU3 (Single Fabric), for circuit pack codes and EQLs. For a dual fabric configuration (this may be a TMSU2 or TMSU3), see Figure 5.25-8, TMSU3 (Dual Fabric).
- Communication Module Control Unit (CMCU). Located in CM2 bays 5 and 6 only at vertical EQL 028. See Figure A for the CMCU circuit pack codes and EQLs.
- E-Bus. Located in all equipped CM2 expansion bays at vertical EQL 028 or 045.
- The Quad Link Packet Switch (QLPS) (TN1682) and QLI2 (TN1681) are physically located on the TMSU shelves at vertical EQL.
- Dual Link Interface (DLI) and Network Link Interface (NLI).

Note: The NC OSC (TN1284 or TN1286) that physically resides on the CMCU will not be removed from service or powered down when the ONTCCOM is removed from service or powered down. To power down the NC OSC, refer to Procedure 5.25.15.

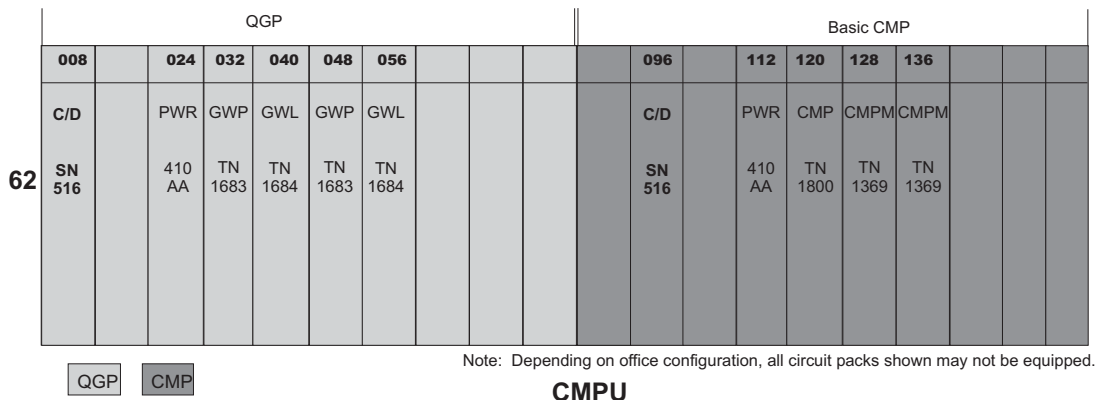


Figure 5.25-2 — Communication Module Processor Unit

MMP										Equipped with Dual MMP									
008	024	032	040	048	056	064	072	080	088	096	112	120	128	136	144	152	160	168	178
C/D	PWR	MSPP	MIBC	MSPP	MIBC	MSPP	MIBC	MSPP	MIBC	C/D	PWR	MSPP	MIBC	MSPP	MIBC	MSPP	MIBC	MSPP	MIBC
53	SN 516	495 FB	TN 856B	TN 870	TN 856B	TN 870	TN 856B	TN 870	TN 856B	SN 516	495 FB	TN 856B	TN 870	TN 856B	TN 870	TN 856B	TN 870	TN 856B	TN 870

Note: Depending on office configuration, all circuit packs shown may not be equipped.

MMP

Dual
MMP

MSPU3

Figure 5.25-3 — Message Switch Peripheral Unit-3

Power Control FPC and PPC		PPC		FPC		Power Control MSC			Message Switch Control							
008	024	032	040	048	056	066	082	090	106	120	134	146	156	170	178	
C/D	PWR	MSPP	PPC	MSPP	FPC	C/D	PWR	IOMI	IOMI	IOMI	IOMI	PIC2	PCMS	BIC	DD-SBS	
45	SN 516	495 FB	TN 856B	TN 886	TN 856B	UN 173	SN 516	495 FB	UN 25B	UN 25B	UN 25B	UN 25B	UN 178	UN 199	TN 70B	TN 69B
								SM 1-32	SM 33-96	SM 97-128	SM 129-192					

Note: Depending on office configuration, all circuit packs shown may not be equipped.

PPC and FPC

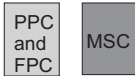
MSC

MSCU2

Figure 5.25-4 — Message Switch Control Unit-2

		Power Control FPC and PPC		PPC		FPC		Power Control MSC		Message Switch Control									
		008	024	032	040	048	056	066	082	090		106	120	134	146	155		170	178
45	C/D	PWR	MSPP	PPC	MSPP	FPC	C/D	PWR				IOMI B	IOMI C	IOMI D		IOP2/ MSC			
	SN 516	495 FB	TN 856C	TN 886	TN 856C	UN 173	SN 516	495 FB				UN 25B	UN 25B	UN 25B		KBN 10			
												SM 33-96	SM 97-128	SM 129-192					

Note: Depending on office configuration, all circuit packs shown may not be equipped.



MSCU3

Figure 5.25-5 — Message Switch Control Unit-3

		008	024	032	040	048	056	064	072	080	088	096	104	112	121	131	143		163	173
36 or 19	C/D	PWR	QLI	QLI	QLI	QLI	QLI	QLI	QLI	QLI	QLI	PWR	PWR	SUB	FAB	FAB	FAB		FC	FC
	SN 516	410 CA	TN 888	TN 888	TN 888	TN 888	TN 888	TN 888	TN 888	TN 888	TN 888	410 AA	410 AA	UN 182	KBN4	KBN4	KBN4		KBN2	KBN2
											or FLI TN 883									

Note: Depending on office configuration, all circuit packs shown may not be equipped.

TMSU2 (Single Fabric)

Figure 5.25-6 — Time-Multiplexed Switch Unit-2 — Single Fabric

		008	024	032	040	048	056	064	072	080	088	096	104	112	121	131	143		163	173
36 or 19	C/D	PWR	QLI	QLI	QLI	QLI	QLI	QLI	QLI	QLI	QLI	PWR	PWR	SUB		FAB				
	SN 516	410 CA	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	410 AA	410 AA	UN 182		KBN5				
											or FLI TN 883									

Note: Depending on office configuration, all circuit packs shown may not be equipped.

*May be equipped with either TN1681 (QLI2) or TN1682 (QLPS) with QGP provided.
TN1682 cannot be installed in 080 or 088 of the first 2 units.

TMSU3 (Single Fabric)

Figure 5.25-7 — Time-Multiplexed Switch Unit-3 — Single Fabric

	008	024	032	040	048	056	064	072	080	088	096	104	112	121	131	143		163	173
36	C/D	PWR	QLI	QLI	QLI	QLI	QLI	QLI	QLI	QLI	PWR	PWR	SUB		FAB				
	SN 516	410 CA	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888* or FLI TN 883	410 AA	410 AA	UN 182		KBN5				

	008	024	032	040	048	056	064	072	080	088	096	104	112	121	131	143		163	173
19	C/D	PWR	QLI	QLI	QLI	QLI	QLI	QLI	QLI	QLI	PWR	PWR	SUB		FAB				
	SN 516	410 CA	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888*	TN 888* or FLI TN 883	410 AA	410 AA	UN 182		KBN5				

Note: Depending on office configuration, all circuit packs shown may not be equipped.
 TMSU3s are equipped in duplication of each shelf when dual fabric is used.

*May be equipped with either TN1681 (QLI2) or TN1682 (QLPS) with QGP provided.
 TN1682 cannot be installed in 080 or 088 of the first 2 units.

TMSU3 (Dual Fabric)

Figure 5.25-8 — Time-Multiplexed Switch Unit-3 — Dual Fabric

PROCEDURE

5.25.1 Power Down the CMP

1. Identify the CM2 cabinet that contains the unit. Record the cabinet number “x.” If the cabinet number is 5, the cabinet is on side 0. If the cabinet number is 6, the cabinet is on side 1. Refer to Figure 5.25-2.
2. Check the following to verify that the Communication Module Processor (CMP) that requires maintenance is removed from service.
 - a. At the MCC, go to the 1241 Page to check on MSGS 0 or the 1251 page for MSGS 1. Verify that the CMP is highlighted and displays OOS.
 If the CMP is not OOS, enter the applicable REMOVE CMP poke.
 - b. At the CM equipment bays, find the MSCU shelf and the associated C/D pack at location x62-096 (where x = cabinet number). Verify that the associated OOS lamp is ON.
3. At the power control switch on the C/D pack, power down the CMP (press the OFF button).

5.25.2 Power Up the CMP

Refer to Figure 5.25-2.

1. At the power control switch on the C/D pack at location x62-096 (where x = cabinet number), power up the CMP (press the ON or ST button).
2. At the MCC on the 1241 or 1251 page, restore the CMP to service.

5.25.3 Power Down the QLPS Gateway Processor

Refer to Figure 5.25-2.

1. Identify the CM2 cabinet that contains the unit. Record the cabinet number "x." If the cabinet number is 5, the cabinet is on side 0. If the cabinet number is 6, the cabinet is on side 1.
2. Check the following to verify that the Quad Link Packet Switch (QLPS) Gateway Processor (QGP) that requires maintenance is removed from service.
 - a. At the MCC, go to the 1241 page to check on MSGS 0 or the 1251 page for MSGS 1. Verify that the QGP is highlighted and displays OOS.
If the QGP is not OOS, enter the applicable REMOVE QGP poke.
 - b. At the CM equipment bays, find the MSCU shelf and the associated C/D pack at location x62-008 (where x = cabinet number). Verify that the associated OOS lamp is ON.
3. At the power control switch on the C/D pack at location x62-008 (where x = cabinet number), power down the QGPs (press the OFF button).

5.25.4 Power Up the QLPS Gateway Processor

Refer to Figure 5.25-2.

1. At the power control switch on the C/D pack at location x62-008 (where x = cabinet number), power up the affected QGPs (press the ON or ST button).
2. At the MCC on the 1241 or 1251 page, restore the QGPs to service.

5.25.5 Power Down the MMP

If the office is equipped with single Module Message Processors (MMPs), each MSPU houses one MMP in each community. If the office is equipped with dual MMPs, each MSPU houses two MMPs in each community. Single or dual MMP offices can be determined by looking at the hardware or the 1242/1252 MCC Pages. Refer to Figure 5.25-3.

1. Identify the CM2 cabinet that contains the unit. Record the cabinet number "x." If the cabinet number is 0, 1, 2, 3, 4, or 5, the cabinet is on side 0. If the cabinet number is 6, 7, 8, 9, 10, or 11, the cabinet is on side 1.
2. Check the following to verify that the MMP that requires maintenance is removed from service:
 - a. At the MCC, go to the 1242 or 1243 page to check on MSGS 0 or the 1252 or 1253 page for MSGS 1. Verify that the MMP is highlighted and displays OOS.
If the MMP is not OOS, enter the applicable REMOVE MMP poke.

- b. At the CM equipment bays, find the MSPU shelf and the associated C/D pack (for example, SN516). Verify the associated OOS lamp is ON.
3. At the power control switch on the C/D pack, power down the MMPs (press the OFF button).

5.25.6 Power Up the MMP

Refer to Figure 5.25-3.

1. At the power control switch on the C/D pack, power up the affected MMP (press the ON or ST button).
2. At the MCC on the 1242, 1243, 1252, or 1253 page, restore the MMP to service.

5.25.7 Power Down the PPC

Refer to Figures 5.25-4 (MSCU2) and 5.25-5 (MSCU3).

1. Identify the CM2 cabinet that contains the Pump Peripheral Controller (PPC) unit. Record the cabinet number "x." If the cabinet number is 5, the cabinet is on side 0. If the cabinet number is 6 or 11, the cabinet is on side 1.
2. Check the following to verify that the PPC that requires maintenance is removed from service:
 - a. At the MCC, go to the 1241 Page to check on MSGS 0 or the 1251 page for MSGS 1. Verify that the PPC is highlighted and displays OOS.

Before removing it, if the PPC is ACT, switch PPCs to make the PPC STBY. If the PPC is not OOS, remove the PPC from service.

Remove from service the associated FPC. *Before removing it, if the FPC is ACT, switch FPCs to make the FPC STBY.*
 - b. At the CM equipment bays, find the MSCU shelf and the associated C/D pack at location x45-008 (where x = cabinet number). Verify that the associated OOS lamp is ON.
3. At the power control switch on the C/D pack, power down the PPC and FPC (press the OFF button).

5.25.8 Power Up the PPC

Refer to Figures 5.25-4 (MSCU2) and 5.25-5 (MSCU3).

1. At the power control switch on the C/D pack at location x45-008 (where x = cabinet number), power up the affected PPC and FPC (press the ON or ST button).
2. At the MCC on the 1241 or 1251 page, first restore the PPC to service.
3. After the PPC is restored to service, then restore the FPC to service.

5.25.9 Power Down the FPC

1. Identify the CM2 cabinet that contains the Foundation Peripheral Controller (FPC) unit. Record the cabinet number "x." If the cabinet number is 5, the cabinet is on side 0. If the cabinet number is 6, the cabinet is on side 1.
2. Check the following to verify that the FPC that requires maintenance is removed from service:
 - a. At the MCC, go to the 1241 Page to check on MSGS 0 or the 1251 page for MSGS 1. Verify that the FPC is highlighted and displays OOS.
 - b. If the FPC is not OOS, remove the FPC from service.

Remove from service the associated PPC. Refer to Figures 5.25-4 (MSCU2) and 5.25-5 (MSCU3).
 - c. At the CM equipment bays, find the MSCU shelf and the associated C/D pack at location x45-008 (where x = cabinet number). Verify that the associated OOS lamp is ON.
3. *Before* removing it, if the PPC is ACT, switch PPCs to make the PPC STBY.
4. At the power control switch on the C/D pack, power down the FPC and PPC (press the OFF button).

5.25.10 Power Up the FPC

Refer to Figures 5.25-4 (MSCU2) and 5.25-5 (MSCU3).

1. At the power control switch on the C/D pack at location x45-008 (where x = cabinet number), power up the affected FPC and PPC (press the ON or ST button).
2. At the MCC on the 1241 or 1251 page, first restore the FPC to service.
3. After the FPC is restore to service, then restore the PPC to service.

5.25.11 Power Down the MSC

Refer to Figures 5.25-4 (Message Switch Control Unit-2) and 5.25-5 (MSCU3).

1. Identify the CM2 cabinet that contains the unit. Record the cabinet number "x." If the cabinet number is 5, the cabinet is on side 0. If the cabinet number is 6, the cabinet is on side 1.
2. Check the following to verify that the MSC side that requires maintenance is removed from service:
 1. At the MCC, go to the 1240 Page to check on MSGS 0 or the 1250 page for MSGS 1. Verify that the MSC side is highlighted and displays OOS.
 2. If the MSC side is not OOS, enter the applicable REMOVE MSC poke.
 3. At the CM equipment bays, find the MSC shelf and the associated C/D pack at location x45-066 (where x = cabinet number). Verify that the associated OOS lamp is ON.
3. At the power control switch on the C/D pack, power down the MSC (press the OFF button).

5.25.12 Power Up the MSC

Refer to Figures 5.25-4 (MSCU2) and 5.25-5 (MSCU3).

1. At the power control switch on the C/D pack at location x45-066 (where x = cabinet number), power up the affected MSC side (press the ON or ST button).
2. At the MCC on the 1240 page for MCS side 0 or on the 1250 page for MSCU side 1, restore the MSC side to service.

5.25.13 Power Down the ONTCCOM and QLPS (Not Including the NC OSC)

Refer to Figure 5.25-1 for bay and shelf layout.

Caution: Do not use this procedure to pull the NC OSC circuit packs (TN1284 or TN1286). If an NC OSC circuit pack is pulled before the NS OSC is removed from service, an office outage will occur.

1. Identify the CM2 side to be powered down.
 - a. If the cabinet number is 0 to 5, power down Side 0.
 - b. If the cabinet number is 6 to 11, power down Side 1.
 - c. Record the side number.
2. Verify that the ONTCCOM is removed from service.
 - a. At the MCC, go to the 1209 page and verify that the ONTCCOM is OOS.
 - b. If the ONTCCOM is not OOS, remove it from service.
3. Determine if the office is equipped with the Automatic Power Recovery (APR) feature.
 - a. Check the TMSU units in each cabinet at vertical EQLs 019 and 036.
 - b. If an SN516 is present at horizontal EQL 008, the office is not equipped with APR.
 - c. If there is no SN516 present at horizontal EQL 008, the office is equipped with APR.
4. If the office is equipped with APR:
 - a. Verify the OOS lamps are ON at the CMCU SN516 circuit packs.
 - b. Power off the SN516 at EQL x28-008 at the CMCU (where x = cabinet 5 for Side 0 and cabinet 6 for Side 1). This will power off the CMCU and all TMSU shelves equipped on the specified side.
5. If the office is not equipped with APR:
 - a. Determine if the CM2 has single or dual fabric. If bay 4 or 7 has one EBUS shelf, the CM2 has single fabric. If bay 4 or 7 has two EBUS shelves, the CM2 has dual fabric.
 - b. For single fabric offices, determine how many TMSU shelves are present on the side being powered down.
 - c. For dual fabric offices, determine how many CM2 cabinets are present in the office.

- d. Verify the OOS lamps are ON at the CMCU and TMSU SN516 circuit packs.
- e. Select Table 5.25-1 or Table 5.25-2. Choose the column in the table that fits the office equipage.
- f. In the order specified in the table, press the OFF button on the SN516 at EQL xxx-008 where xxx = the cabinet and shelf EQL from the power sequence table.

Table 5.25-1 — Single Fabric ONTCCOM Power Sequence

ONTCCOM		Power Down/Power Up Sequence by Number of TMSU Shelves Equipped					
Shelf EQLs		1 Shelf	2 Shelves	3 Shelves	4 Shelves	5 Shelves	6 Shelves
Side 0	Side 1						
528	628	1st	1st	1st	1st	1st	1st
536	636	2nd	2nd	2nd	2nd	2nd	2nd
519	619		3rd	4th	5th	6th	7th
436	736			3rd	3rd	3rd	3rd
419	719				4th	5th	6th
336	836					4th	4th
319	819						5th

Table 5.25-2 — Dual Fabric ONTCCOM Power Sequence

ONTCCOM Shelf EQLs		Power Down/Power Up Sequence by Number of CM2 Cabinets in the Office					
Side 0	Side 1	2 Cabinets	4 Cabinets	6 Cabinets	8 Cabinets	10 Cabinets	12 Cabinets
528	628	1st	1st	1st	1st	1st	1st
536	636	2nd	2nd	2nd	2nd	2nd	2nd
519	619	3rd	3rd	3rd	3rd	3rd	3rd
436	736		4th	6th	8th	10th	12th
419	719		5th	7th	9th	11th	13th
336	836			4th	4th	4th	4th
319	819			5th	5th	5th	5th
236	936				6th	8th	10th
219	919				7th	9th	11th
136	1036					6th	6th
119	1019					7th	7th
036	1136						8th
019	1119						9th

5.25.14 Power Up the ONTCCOM and QLPS (Not Including the NC OSC)

See Figure 5.25-1 for bay and shelf layout.

1. Identify the CM2 side to be powered up.
 - a. If the cabinet number is 0 to 5, power up Side 0.
 - b. If the cabinet number is 6 to 11, power up Side 1.
 - c. Record the side number.
2. Determine if the office is equipped with the Automatic Power Recovery (APR) feature.
 - a. Check the TMSU units in each cabinet at vertical EQLs 019 and 036.
 - b. If an SN516 is present at horizontal EQL 008, the office is not equipped with APR.
 - c. If there is no SN516 present at horizontal EQL 008, the office is equipped with APR.
3. If the office is equipped with APR:
 - a. Verify the OOS lamps are ON at the CMCU SN516 circuit packs.
 - b. Power on the SN516 at EQL x28-008 at the CMCU (where x = cabinet 5 for Side 0 and cabinet 6 for Side 1). This will power on the CMCU and all TMSU shelves equipped on the specified side.

4. If the office is not equipped with APR:
 - a. Determine if the CM2 has single or dual fabric. If bay 4 or 7 has one EBUS shelf, the CM2 has single fabric. If bay 4 or 7 has two EBUS shelves, the CM2 has dual fabric.
 - b. For single fabric offices, determine how many TMSU shelves are present on the side being powered up.
 - c. For dual fabric offices, determine how many CM2 cabinets are present in the office.
 - d. Verify the OOS lamps are ON at the CMCU and TMSU SN516 circuit packs.
 - e. Select Table 5.25-1 or Table 5.25-2. Choose the column in the table that fits the office equipage.
 - f. In the order specified in the table, press the ON button on the SN516 at EQL xxx-008 where xxx = the cabinet and shelf EQL from the power sequence table.
5. Restore the ONTCCOM:
 - a. At the MCC, go to the 1209 page.
 - b. Restore the ONTCCOM to service.

5.25.15 Power Down the NC OSC

See Figure 5.25-1 for bay and shelf layout.

1. Identify the CM2 side to be powered down.
 - a. If the cabinet number is 0 to 5, power down Side 0.
 - b. If the cabinet number is 6 to 11, power down Side 1.
 - c. Record the side number.
2. Verify that the ONTCCOM is removed from service:
 - a. At the MCC, go to the 1209 page to verify that the ONTCCOM is OOS.
 - b. If the ONTCCOM is not OOS, remove the ONTCCOM from service.
3. Verify that the NC OSC is removed from service.
 - a. At the MCC, go to the 1211 page to verify that the NC OSC is OOS.
 - b. If the NC OSC is not OOS, remove the NC OSC from service.

Caution: Failure to remove the NC OSC from service before pulling the NC OSC circuit pack (TN1284 or TN1286) will result in a total office outage!
4. Refer to the previous caution. Remove the NC OSC circuit pack (TN1284 or TN1286). Power to this circuit pack is not controlled by the unit Control/Display power pack (SN516C), but is controlled by the NC OSC circuit pack itself when it is removed.

5.25.16 Power Up the NC OSC

See Figure 5.25-1 for bay and shelf layout.

1. Identify the CM2 side to be powered up.
 - a. If the cabinet number is 0 to 5, power up Side 0.
 - b. If the cabinet number is 6 to 11, power up Side 1.
 - c. Record the side number.
2. Replace the NC OSC circuit pack (TN1284 or TN1286). Power to this circuit pack is not controlled by the unit Control/Display power pack (SN516C), but is controlled by the NC OSC circuit pack itself when it is replaced.
3. Restore the ONTCCOM to service:
 - a. At the MCC, go to the 1209 page.
 - b. Restore the ONTCCOM to service.
4. Restore the NC OSC to service.
 - a. At the MCC, go to the 1211 page.
 - b. Restore the NC OSC to service.

5.25.17 Power Down/Power Up the DLI

The Dual Link Interface (DLI) is functionally a part of the CM, but physically, it resides in an SM cabinet.

1. Identify the unit type of the SM and go to the power-up or power-down DLI section under the SM section.

5.25.18 Remove/Restore the Network Link Interface

The Network Link Interface (NLI) does **not** require power-down nor subsequent power-up. Just verify that the NLI is removed from service.

1. Check the following to verify that the NLI that requires maintenance is removed from service:
 - At the MCC, go to the 1200 page. Verify that the NLI is highlighted and displays OOS.
 - If the NLI is not OOS, enter the applicable REMOVE NLI poke.
2. To restore the NLI to service, at the MCC on the 1200 page, enter the applicable RESTORE NLI poke.

5.26 CM2C POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Purpose

The procedures in this section are used to power down and power up a **CM2C** unit or sub-unit. The power groups have changed with the CM2C. To remove power from any MSCU, MSPU, or ONTC sub-unit, the entire Communications Module Unit (CMU) shelf must be powered down.

Note: Make sure you are servicing the correct unit. Some units have diagnostics that perform “interface tests,” which verify communication between the diagnosed unit and other units. These tests may find “other units” at fault. So, a circuit pack listed on the FAULTY EQUIPMENT LIST may NOT belong to the diagnosed unit.

See Figure [5.26-1](#) for the location of the CM2C units in the CM2C cabinet.

	Power Control	MSC	MMP				FPC/PPC				ONTCCOM							
	008	***	033	044	052	060	068	074	082	090	098	122	132	144	152	160	168	176
53 Side 1	C/D	PWR	IOP/ MSC	MSPP	MIBC	MSPP	MIBC	FPC	MSPP	PPC	MSPP	OSC	OSC	DPLL				DMI
	SN 516	410 AA	KBN 10	TN 856C	TN 870	TN 856C	TN 870	UN 173	TN 856C	TN 886	TN 856C	TN 1286B or 1284B or 1274B	TN 1286B or 1284B or 1274B	TN 1276	TN 1813	TN 1812	TN 1830	UN 187
45 Side 0	C/D	PWR	IOP/ MSC	MSPP	MIBC	MSPP	MIBC	FPC	MSPP	PPC	MSPP	OSC	OSC	DPLL				DMI
	SN 516	410 AA	KBN 10	TN 856C	TN 870	TN 856C	TN 870	UN 173	TN 856C	TN 886	TN 856C	TN 1286B or 1284B or 1274B	TN 1286B or 1284B or 1274B	TN 1276	TN 1813	TN 1812	TN 1830	UN 187

Note: Depending on office configuration, all circuit packs shown may not be equipped.

Side 1 Side 0

Figure 5.26-1 — CM2C Cabinet

Figure 5.26-2 shows the CPU for the Compact Digital Exchange (CDX).

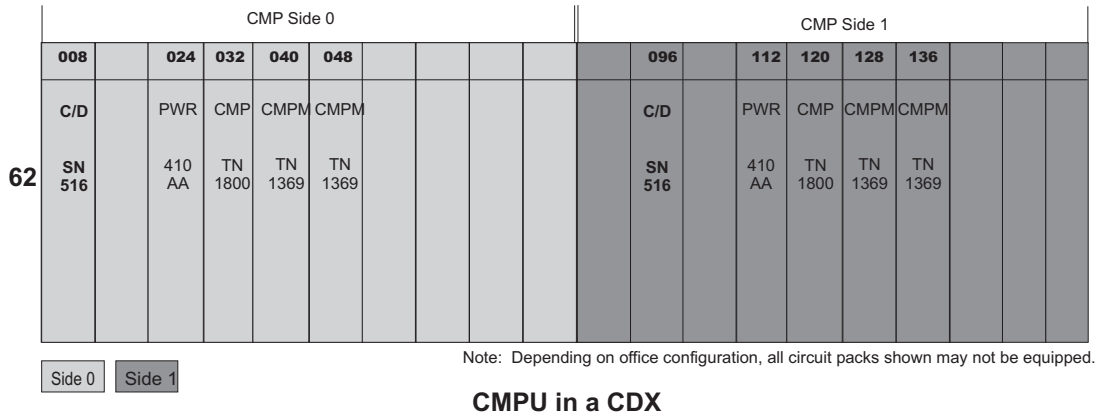


Figure 5.26-2 — CM2C CMPU Circuit Pack Configuration

Prerequisites

Caution: Before removing power, verify that the unit or sub-unit that requires a power-down is out-of-service (OOS).

Note: With this or any CM unit, the easiest way to ensure all the right units are removed from service is to toggle the RST/ROS switch on the corresponding control and display (C/D) pack to the ROS (request OOS) position.

Precautions

Caution: *The use of unconditional removals or manual override power downs is NOT recommended because call processing may be affected. If a conditional removal doesn't work, it usually means that the unit's mate hardware should be repaired first.*

PROCEDURE

5.26.1 Power Down the Communications Module Unit Shelf

1. To perform maintenance on the Communications Module Unit (CMU) shelf, do the following to remove from service all units on the CMU shelf:
 - a. At the MCC, go to the 1240 page for MSGS 0 or the 1250 page for MSGS 1.
Enter the applicable REMOVE MSCU poke.
 - b. At the MCC, go to the 1241 page for MSGS 0 or the 1251 page for MSGS 1.
Enter the applicable REMOVE FPC, PPC, CMP, and QGP pokes.
 - c. At the MCC, go to the 1242 or 1243 page for MSGS 0 or the 1252 or 1253 page for MSGS 1.
Enter the applicable REMOVE MMP pokes.
 - d. At the MCC, go to the 1210 page for the MI and NC.
Enter the applicable REMOVE ONTCCOM poke.
Note: Removing the ONTCCOM from service removes from service the associated TMS (refer to the 1220 page).
 - e. At the MCC, go to the 1220 page to check on the TMS. Verify that the TMS is highlighted and displays OOS.
 - f. At the MCC, go to the 1200 page.
Enter the applicable REMOVE DLI or NLI poke.
 - g. At the CM equipment bays, find the CMU shelf and the associated C/D pack (for example, SN516). Verify that the associated OOS lamps are ON.
2. At the power control switch on the C/D pack, power down the CMU shelf (press the OFF button).

5.26.2 Power Up the CMU Shelf

1. At the power control switch on the C/D pack, power up the CMU shelf (press the ON or ST button).
2. Do the following to restore the CMUs units to service:
 - a. At the MCC, go to the 1240 page for MSGS 0 or the 1250 page for MSGS 1.
Enter the applicable RESTORE MSCU poke.
 - b. At the MCC, go to the 1241 page for MSGS 0 or the 1251 page for MSGS 1.
Enter the applicable RESTORE FPC, PPC, CMP, and QGP pokes.
 - c. At the MCC, go to the 1242 or 1243 page for MSGS 0 or the 1252 or 1253 page for MSGS 1.

Enter the applicable RESTORE MMP pokes.

- d. At the CM equipment bays, find the CMU shelf and the associated C/D pack (for example, SN516). Verify that the associated OOS lamps are ON.
- e. At the MCC, go to the 1210 page for the MI and NC.

Enter the applicable RESTORE ONTCCOM poke.

Note: Restoring the ONTCCOM restores to service the associated MI, NC, TMS.

- f. At the MCC, go to the 1220 page to check on the TMS. Verify that the TMS is ACT.

If the TMS is OOS, enter the applicable RESTORE TMS poke.

- g. At the MCC, go to the 1200 page.

Enter the applicable RESTORE DLI or NLI poke.

5.26.3 Power Down a Faulty CM2C Unit

1. At the MCC, go to the appropriate MCC Page to verify that the CMU unit is highlighted and displays OOS.

If the unit is not OOS, enter the applicable REMOVE poke.

2. Follow Procedure [5.26.1](#) to remove the active (ACT) CMU units from service.
3. At the power control switch on the C/D pack, power down the CMU shelf (press the OFF button).

5.26.4 Power Up a CM2C Unit

1. At the power control switch on the C/D pack, power up the CMU shelf (press the ON or ST button).
2. See Procedure [5.26.2](#) to restore the previously active CMU units to service.
3. The unit is now ready for diagnostics and returning to service.

5.27 CM3 REMOVE/RESTORE PROCEDURES

OVERVIEW

Purpose

The Communication Module, Model 3 (CM3) does not require that a unit be powered down or powered up. But, it is important that the unit or circuit be out-of-service (OOS) *before* maintenance is performed (for example, packs changed). The procedures in this section are used for the removal and the restoral of peripheral CM3 subunits. The following is a list of the subunits:

- Message Switch (MSGS)
- Office Network and Timing Complex (ONTCCOM)
- Oscillator (OSC).

Figure 5.27-1 shows the CM3 cabinet. Figure 5.27-2 shows the Communications Module Unit Model 2 (CMU2) in the CM3 base cabinet. Figure 5.27-3 shows the CMU2 in the CM3 growth cabinet. Figure 5.27-4 shows the TMSU4.

Depending on the exchange's software level, the components of the ONTC differ.

- **5E15 and 5E16(1) CM3**

In 5E15 and 5E16(1), the CM3 ONTC is made up of the:

- ONTC Common (ONTCCOM)
 - Message Link Interface (MLI)
 - Network Clock Controller (NCC)
 - Time Multiplexed Switch (TMS).
- Dual Link Interface (DLI)/Network Link Interface (NLI)
- Quad Link Packet Switch.

- **5E16(2) CM3**

In 5E16(2), the CM3 ONTC is made up of the:

- ONTC Common (ONTCCOM)
 - Message Link Interface (MLI)
 - Network Clock Controller (NCC).
- Time Multiplexed Switch Fabric Pair (TMSFP)
- Dual Link Interface (DLI)/Network Link Interface (NLI)
- Quad Link Packet Switch.

The ONTC is made of these circuit packs:

- CMU2: 1 MMC101 NCC and 2 MMC100 TMS Foundation (TMSF) circuit packs.
 - Note:** Additional CM3 cabinets do not have the MMC101 NCC circuit pack.
- TMSU4: 2 TMS expansion (TMSX) circuit packs.
- DLI: 982TRC and 982TSC

— NLI: BKD1 or BKD11.

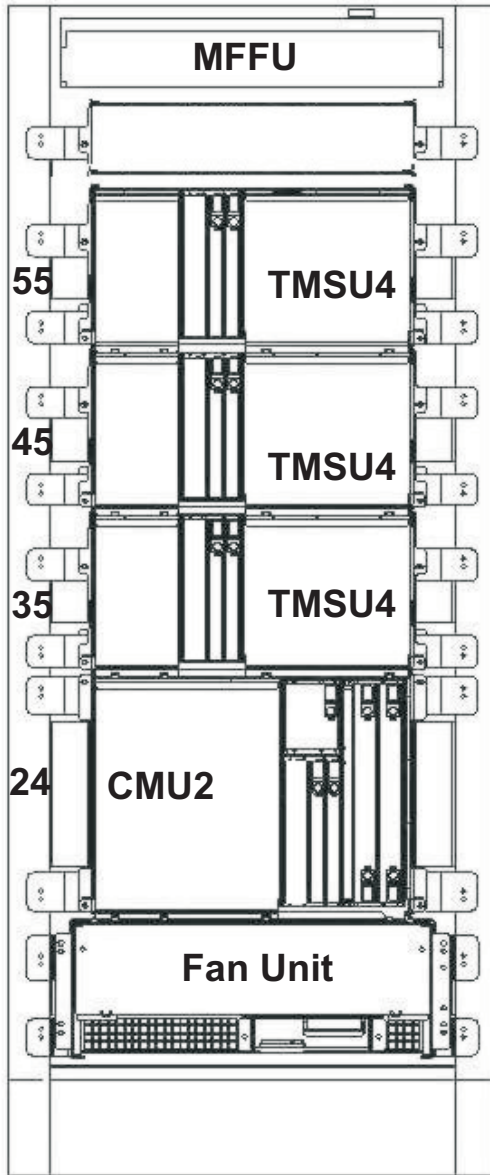


Figure 5.27-1 — CM3 Cabinet

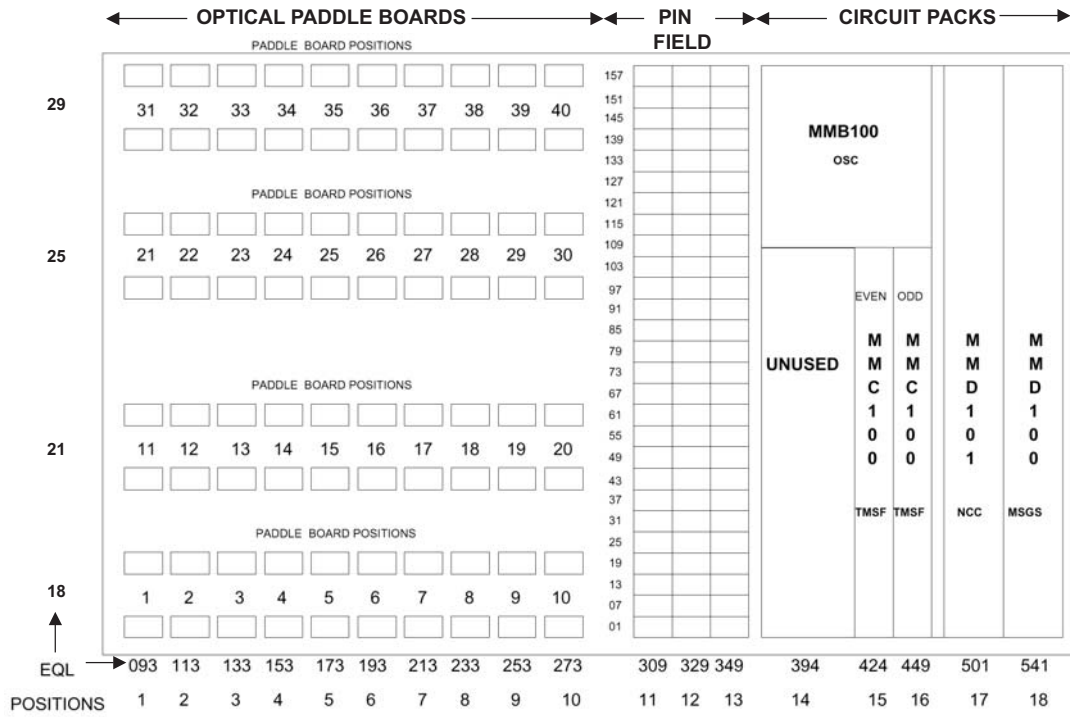


Figure 5.27-2 — CM3 Base Cabinet Circuit Pack Configuration

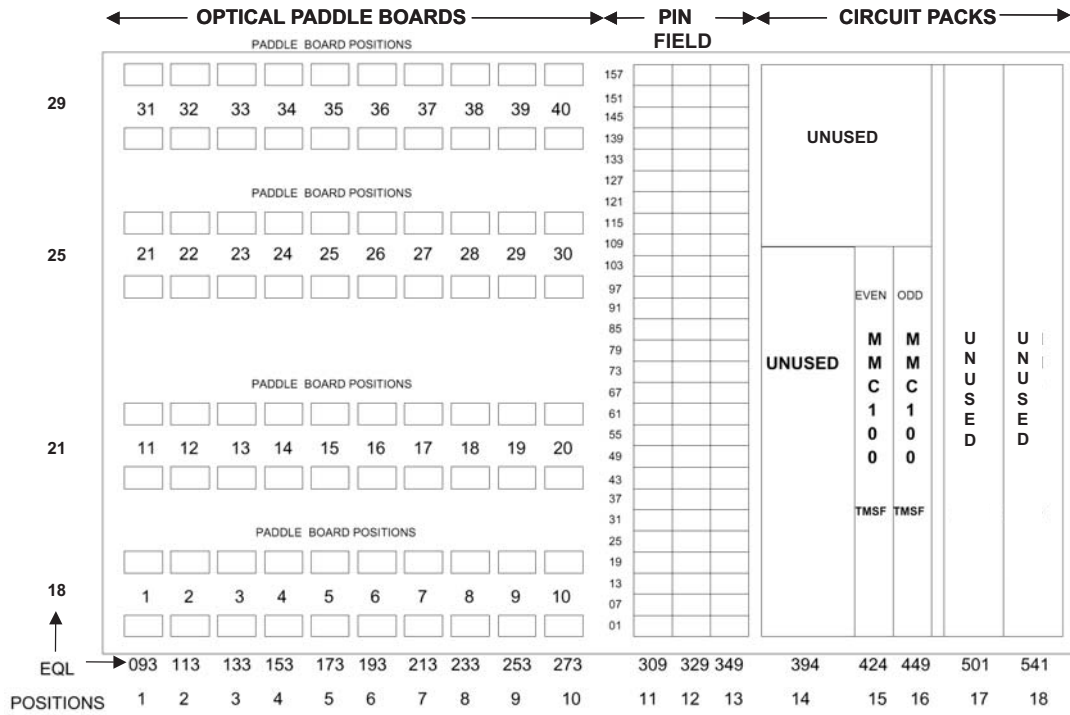


Figure 5.27-3 — CM3 Growth Cabinet Circuit Pack Configuration

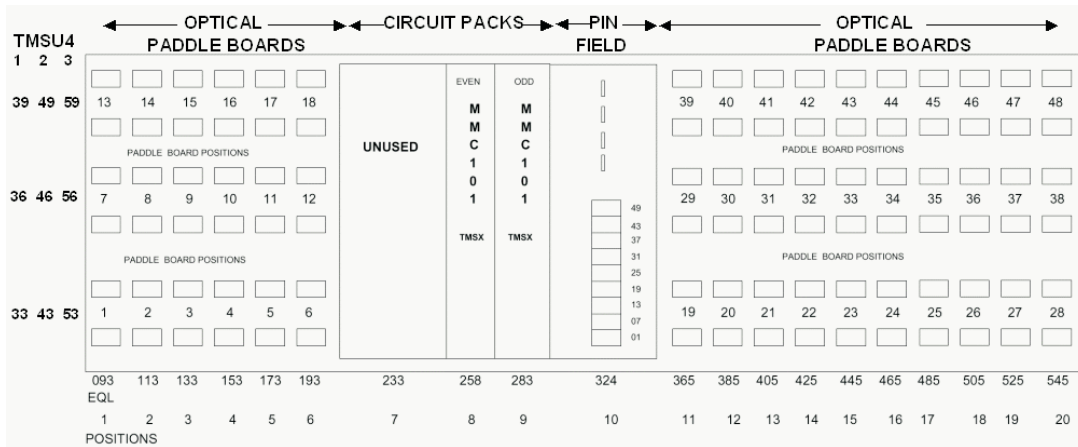


Figure 5.27-4 — CM3 TMSU4 Circuit Pack Configuration

Precautions

Caution: All CM3 hardware is APR-compliant. Once an APR-compliant CM circuit pack is inserted and/or power is supplied, it is usually necessary to perform a manual action (a restore or CM initialization) to bring the affected unit(s) into service. However, system software can bring such units into service automatically to maintain essential functionality if critical faults occur.

Caution: The use of unconditional removals or manual override power downs is NOT recommended because call processing may be affected. If a conditional removal doesn't work, it usually means that the unit's mate hardware should be repaired first.

Caution: *Make sure work is done on the correct side! Side 0 of the CM3 is on the equipment aisle, and Side 1 of the CM3 is on the wiring aisle.*

PROCEDURE

5.27.1 Remove the CM3 MSGS on Side 0

The CM3 combines all Message Switch functionality onto one circuit pack. These functions are the Message Switch Controller, Foundation Peripheral Controller (FPC), Pump Peripheral Controller (PPC), Communication Module Processor (CMP), Module Message Processor (MMP), and Quad-Link Packet Switch Network Gateway Processor (QGP). The MMD-100 circuit pack at EQL 24-541 performs these functions.

1. At the maintenance terminal, go to MCC page 1240.
2. Enter the poke command 200 or the input message (**RMV:MSGS=0**) to remove MSGS 0 from service.

Note: If CMP 0 was Active, a softswitch of the CMPs will occur *before* the MSGS is removed. MCC page 1850 will display the status of the softswitch.

3. Verify that the MSGS 0 is OOS on MCC Page 1240.

Note: The MMD100 MSGS circuit pack has a LED (Yellow) that illuminates when the board is OOS.

5.27.2 Restore the CM3 MSGS on Side 0

1. At the maintenance terminal, go to MCC page 1240.
2. Enter the poke command 300 or the input message (**RST:MSGS=0**) to restore MSGS 0 to service.

Note: CMP 0 will initialize. MCC page 1851 will display the status of the initialization.

3. Verify that the MSGS 0 is ACT on MCC Page 1240.

Note: The MMD100 MSGS circuit pack has a LED (Yellow) that will go out when the board is ACT.

5.27.3 Remove the CM3 MSGS on Side 1

1. At the maintenance terminal, go to MCC page 1250.
2. Enter the poke command 201 or the input message (**RMV:MSGS=1**) to remove MSGS 1 from service.

Note: If CMP 1 was Active, a softswitch of the CMPs will occur *before* the MSGS is removed. MCC page 1850 will display the status of the softswitch.

3. Verify that the MSGS 1 is OOS on MCC Page 1250.

Note: The MMD100 MSGS circuit pack has a LED (Yellow) that illuminates when the board is OOS.

5.27.4 Restore the CM3 MSGS on Side 1

1. At the maintenance terminal, go to MCC page 1250.

2. Enter the poke command 301 or the input message (**RST:MSGs=1**) to restore MSGS 1 to service.

Note: CMP 1 will initialize. MCC page 1851 will display the status of the initialization.

3. Verify that the MSGS 1 is ACT on MCC Page 1250.

Note: The MMD100 MSGS circuit pack has a LED (Yellow) that will go out when the board is ACT.

5.27.5 Remove the CM3 ONTC on Side 0

Removing ONTC 0 will remove the ONTCCOM, QLPS and the DLI/NLI on all the SMs on side 0. All TMS links on side 0 will be removed for every CM3 cabinet in the office. If the office has multiple cabinets, and maintenance (i.e. pack change) needs be performed in only one of them, refer to the remove and restore TMSFP procedures starting at Procedure [5.27.13](#).

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 200 or the input message (**RMV:ONTC=0**) to remove ONTC 0 from service.
3. Verify that ONTC 0 is OOS on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that illuminates when the board is OOS.

5.27.6 Restore the CM3 ONTC on Side 0

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 300 or the input message (**RST:ONTC=0**) to restore ONTC 0 to service.
3. Verify that ONTC 0 is ACT on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that will go out when the board is ACT.

5.27.7 Remove the CM3 ONTC on Side 1

Removing ONTC 1 will remove the ONTCCOM, QLPS and the DLI/NLI on all the SMs on side 1. All TMS links on side 1 will be removed for every CM3 cabinet in the office. If office has multiple cabinets, and maintenance (i.e. pack change) needs be performed in only one of them, refer to the remove and restore TMSFP procedures starting at Procedure [5.27.13](#).

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 201 or the input message (**RMV:ONTC=1**) to remove ONTC 1 from service.
3. Verify that ONTC 1 is OOS on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that illuminates when the board is OOS.

5.27.8 Restore the CM3 ONTC on Side 1

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 301 or the input message (**RST:ONTC=1**) to restore ONTC 1 to service.
3. Verify that ONTC 1 is ACT on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that will go out when the board is ACT.

5.27.9 Remove the CM3 ONTCCOM on Side 0

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 210 or the input message (**RMV:ONTCCOM=0**) to remove ONTCCOM 0 from service.
3. Verify that ONTCCOM 0 is OOS on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that illuminates when the board is OOS.

5.27.10 Restore the CM3 ONTCCOM on Side 0

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 310 or the input message (**RST:ONTCCOM=0**) to restore ONTCCOM 0 to service.
3. Verify that ONTCCOM 0 is ACT on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that will go out when the board is ACT.

5.27.11 Remove the CM3 ONTCCOM on Side 1

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 211 or the input message (**RMV:ONTCCOM=1**) to remove ONTCCOM 1 from service.
3. Verify that ONTC 1 is OOS on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that illuminates when the board is OOS.

5.27.12 Restore the CM3 ONTCCOM on Side 1

1. At the maintenance terminal, go to MCC page 1209.
2. Enter the poke command 311 or the input message (**RST:ONTCCOM=1**) to restore ONTC 1 to service.
3. Verify that ONTCCOM 1 is ACT on MCC Page 1209.

Note: The MMD101 NCC, both MMC100 TMSFs, and all MMC101 TMSX circuit packs have a LED (Yellow) that will go out when the board is ACT.

5.27.13 Remove TMSFP [5E16(2) only] on ONTC 0

A CM3 in 5E16(2) may have up to 4 cabinets. Each cabinet has 1 even and 1 odd TMS fabric. The fabric pairs are called TMSFPs. It is possible to have 1, 2, 3, or 4 TMSFPs per side. **Preparation:** Identify the CM3 side (0 or 1) and identify the TMSFP number (0, 1, 2, or 3).

1. At the maintenance terminal, go to MCC page 1212.
2. Enter the poke command 210Y or the input message (RMV:TMSFP=0-Y) to remove TMSFP 0-Y from service. Y = TMSFP #
3. Verify that TMSFP 0-Y is OOS on MCC Page 1212.

Note: Both MMC100 TMSFs, and all MMC101 TMSX circuit packs in the cabinet have a LED (Yellow) that illuminates when the board is OOS. Y = TMSFP #.

5.27.14 Restore TMSFP [5E16(2) only] on ONTC 0

1. At the maintenance terminal, go to MCC page 1212.
2. Enter the poke command 310Y or the input message (RST:TMSFP=0-Y) to restore TMSFP 0-Y to service. Y = TMSFP #
3. Verify that TMSFP 0-Y is ACT on MCC Page 1212.

Note: Both MMC100 TMSFs, and all MMC101 TMSX circuit packs in the cabinet have a LED (Yellow) that goes out when the board is ACT. Y = TMSFP #.

5.27.15 Remove TMSFP [5E16(2) only] on ONTC 1

1. At the maintenance terminal, go to MCC page 1212.
2. Enter the poke command 211Y or the input message (RMV:TMSFP=1-Y) to remove TMSFP 1-Y from service. Where Y = TMSFP #
3. Verify that TMSFP 1-Y is OOS on MCC Page 1212.

Note: Both MMC100 TMSFs, and all MMC101 TMSX circuit packs in the cabinet have a LED (Yellow) that illuminates when the board is OOS. Y = TMSFP #.

5.27.16 Restore TMSFP [5E16(2) only] on ONTC 1

1. At the maintenance terminal, go to MCC page 1212.
2. Enter the poke command 311Y or the input message (RST:TMSFP=1-Y) to restore TMSFP 1-Y to service. Y = TMSFP #
3. Verify that TMSFP 1-Y is ACT on MCC Page 1212.

Note: Both MMC100 TMSFs, and all MMC101 TMSX circuit packs in the cabinet have a LED (Yellow) that goes out when the board is ACT. Y = TMSFP #.

5.27.17 Remove the CM3 OSC on Side 0

1. At the maintenance terminal, go to MCC page 1210.

2. Enter the poke command 220 or the input message (**RMV:NCOSC=0**) to remove NCOSC 0 from service.
3. Verify that NCOSC 0 is OOS on MCC Page 1210.
Note: The MMB100 circuit pack has a LED (Yellow) that illuminates when the board is OOS.

5.27.18 Restore the CM3 OSC on Side 0

1. At the maintenance terminal, go to MCC page 1210.
2. Enter the poke command 320 or the input message (**RST:NCOSC=0**) to restore NCOSC 0 to service.
3. Verify that NCOSC 0 is ACT on MCC Page 1210.
Note: The MMB100 circuit pack has a LED (Yellow) that goes out when the board is ACT.

5.27.19 Remove the CM3 OSC on Side 1

1. At the maintenance terminal, go to MCC page 1210.
2. Enter the poke command 221 or the input message (**RMV:NCOSC=1**) to remove NCOSC 1 from service.
3. Verify that NCOSC 1 is OOS on MCC Page 1210.
Note: The MMB100 circuit pack has a LED (Yellow) that illuminates when the board is OOS.

5.27.20 Restore the CM3 OSC on Side 1

1. At the maintenance terminal, go to MCC page 1210.
2. Enter the poke command 321 or the input message (**RST:NCOSC=1**) to restore NCOSC 1 to service.
3. Verify that NCOSC 1 is ACT on MCC Page 1210.
Note: The MMB100 circuit pack has a LED (Yellow) that goes out when the board is ACT.

5.27.21 Power-Down/Power-Up the DLI

The DLI is functionally a part of the CM, but physically, it resides in an SM cabinet.

1. Identify the unit type of the SM and go to the power-up or power-down DLI section under the SM section.

5.27.22 Remove and Restore the NLI

The NLI does not require power-down nor subsequent power-up. Just verify that the NLI is removed from service.

1. Check the following to verify that the NLI that requires maintenance is removed from service:
 - At the MCC, go to the 1200 page. Verify that the NLI is highlighted and displays OOS.
 - If the NLI is not OOS, enter the applicable REMOVE NLI poke.
2. To restore the NLI to service, at the MCC on the 1200 page, enter the applicable RESTORE NLI poke.

Corrective Maintenance Procedures

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6. COMMUNICATIONS MODULE ADVANCED MAINTENANCE

The following procedures apply to the Communications Module, Module 2 (CM2). When the procedures of Chapter 5 do not clear the trouble in the CM2, the following procedures may help solve the problem.

Note: This section was derived from actual customer experiences. Your switch and the steps required to solve CM2 faults may be different.

6.1 TMS EQUIPMENT TROUBLE CLEARING

OVERVIEW

This procedure is for troubleshooting a failing TMS and/or the TMS is experiencing massive TMS asynchronous errors.

Before You Begin Review the following information before you begin.

When to use

When TMS link asynchronous errors are reported in a TMS Post Mortem Dump. See Procedure [6.2](#)

Required Information

The CM complex is a difficult hardware unit to troubleshoot. The best way to start is to break down the troubleshooting into three basic categories:

- Pin
- Pack
- Path

There may be multiple simultaneous troubles giving the impression of one larger trouble or one trouble emulating many troubles. Always pick the worst trouble, for example, failing diagnostics, and follow this procedure.

The following is a “Quick Fix Checklist” showing a high-level troubleshooting hierarchy.

Table 6.1-1 — TMS Equipment Troubleshooting Quick Fix

Quick Fix
TMS Equipment Troubleshooting
1. Check the temperature of the CM control bays
2. Check any Recent CM, growth, Maintenance, BWM activity
3. Audit Backplane
4. Audit Foreplane
5. Replace TLP circuit board
6. Swap/Replace TMSU and EBUS circuit boards
7. Swap/Replace CMCU circuit boards
8. Swap/Replace EBUS
9. Swap/Replace backplane

PROCEDURE

To clear trouble caused by a failing TMS or TMS experiencing massive TMS asynchronous errors`.

1. If the TMS is experiencing massive TMS Link asynchronous errors per the TMS Post Mortem Dump, go to Step 3.

Exhibit 6.1-1 — Post Mortem Dump

Example:

```
REPT TMS=1 POST MORTEM DUMP
PAGE 1 OF 2
ERROR SUMMARIES
23 db00020000 fb01000000

TMSLNKS AFFECTED
55555555 55555555 55555555 55555554 55555555 55555555 55555555 55555555
00000000 00000004 55555555 55555555 00014000 00000000 00000000 00000000
```

- Note:** TMS link asynchronous errors will be referred to as “ TMS asynchronous errors” or “TMS async errors”.
2. If the TMS is failing diagnostics, filter for TMS Link Post Mortem Dumps before the TMS failure. This will provide a starting point and, in some cases, a TMS path.
Note 1: See Procedure 6.2, TMS Post Mortem Dump Analysis for breakdown information.
Note 2: TMS diagnostics has a tendency to lead the troubleshooter in the wrong direction. TLP lists will always point the troubleshooter to the CMCU when in fact the CMCU is rarely the trouble. TMS Link Post Mortems gives the correct location of the problem to focus troubleshooting.
Note 3: If a TLP note says to run Phase 14, this phase does not accurately point to the correct trouble location.
 3. Determine the temperature of the CM control cabinets.
 - (a) Check the temperature of bays 5 and 6 by opening the blue fuse cover panel and placing a thermometer in front of the fuse panel.

- (b) If the temperature is above 98 degrees, call building services and have them contact the air conditioning contractor to redo, replace, or open the duct work. It is critical to have cold air blowing down in front of or behind CM bays 5 and 6.
 - (c) Ensure that cold air is blowing straight down from the ducts between the bays in the aisle so that the fans in the bottom of the bays can draw in the cold air and push the heated air out of the top of the bays. It is counter-productive to blow the cold air into the top of the bays.
4. Check the filters and replace if necessary.
Note: Reduced airflow causes the temperature to rise and more dust to collect on the circuit board components.
5. Determine if there have been any recent CM growth work by the vendor.
 - (a) If **yes**, and it is still in warranty, contact the vendor and have an installer return if needed.
 - (b) If **no**, continue with the Step 6.
6. Remove affected ONTCCOM side from service and power down the TMS. See the ONTCCOM power sequence.
7. Determine if there been any recent CM maintenance activity or a recent BWM installed.
 - (a) No, skip to Step 8.
 - (b) If a BWM was installed and no hardware growth or maintenance has taken place, back out the BWM and retest the ONTCCOM.
 - (c) Determine if transceivers have been replaced on the rear of the CM.
 - Check to make certain that no pins were crushed under the replaced transceiver.
 - If this is where the current trouble is pointing, reinsert the original transceiver(s).
 - (d) If circuit packs have been changed trying to repair the current trouble, the originals should be reinserted into the CM.
8. Perform a thorough backplane audit.
Note: In the event of massive TMS asynchronous errors and/or diagnostic failures, the backplane audit must be performed for every shelf in the problem side of the CM. Once a full backplane audit is completed in a particular office, this step does not have to be done for future troubles barring any future growth work.
9. Determine if an audit been performed in recent months or if growth work has been done to the CM.
 - (a) Yes, go to Step 10.
 - (b) Check for bent shorted pins (one or more pins bent into each other).
Note: Check each column of pins including in-between cables. Remove all doors from the trouble side of the CM.

- (c) Check empty 127C connectors that are pushed down to far and shorting pins against the stainless steel latch.
 - 1. There are empty 127C connectors between the EBUS cables – these must be checked.
 - 2. Empty 127C connectors may be removed from the “inside” CM bays to prevent future troubles.
 - (d) Check for loose or not fully seated cables – especially EBUS cables.
 - (e) Check for any type of debris across pins. If found, it can be cleaned with a can of compressed air.
 - 1. Dirt bridging pins together is quite conductive when combined with high humidity.
 - 2. Human hair wrapped around pins is conductive.
 - (f) Check that all quiet ground leads are on. See CM Grounding Drawing in CM2 section of the 235-100-200, Hardware Description.
 - (g) Remove any “extra” transceivers plugged in the shelves that are not translated.
 - (h) Check for pins bent under 127C connectors.
 - (i) Check for pins bent out from under a cable connector (especially around transceivers).
 - (j) Check for loose alarm leads behind shelf 68.
 - (k) If the slack “loop” for the QLPS Network cables bent at 180 degrees, cut stitches and expand into graceful loops.
 - (l) Check for unsoldered EBUS cable splines on the EBUS paddleboards.
 - (m) Check that the CMCU Terminator board at EQL 28-116-500 is fully seated.
10. Perform a thorough foreplane audit.

Note: In the event of massive TMS asynchronous errors and/or diagnostic failures, the foreplane audit needs to be performed for every shelf in the problem side of the CM. Once a full foreplane audit is completed in a particular office, this step will not have to be done for future troubles barring any future growth work.

11. Determine if an audit has been performed in recent months or if growth work has been done to the CM.
- If **yes**, skip to Step 12.
 - If **no**, continue with Step 11(a).

Note: The methodology for checking the foreplane is simplified for dual fabric offices. Remove all doors from the troubled side. Spread out a long sheet of anti-static bubblewrap on the floor in front of the CM side under audit. Remove the circuit boards from all ODD TMSU shelves (EQL 19) and lay on the bubblewrap. Follow Step 11(a) and then move all circuit boards from all EVEN TMSU shelves (EQL 36) into TMSU shelves 19. Follow Steps 11(a) and then move all circuit boards from the floor into shelf 36. Repeat for the EBUS shelves.

If the CM is single fabric, each shelf of circuit boards will have to be removed, the foreplane checked, and the same boards must be reinserted into the shelf.

- (a) Check the TMSU and EBUS foreplanes.
 1. Check for bent/crushed pins.
 2. Check for bent/crushed guide pins.
 3. Check for deflected pins from under circuit boards.
 4. Check for debris lying on pins.
 5. Determine if one pin be deflected into another circuit board spline with another pin.
 6. Check for "extra" QLI boards (TN888, TN1681) plugged into untranslated slots.

Note: If a QLI is plugged into a unequipped/growth slot, it can cause noise on the bus and/or fail Phase 3.
 - (b) Check the CMCU foreplane.
 1. Remove all circuit boards except for the Network Clock.

Warning: DO NOT remove the clock oscillator circuit board in slot 28-48. This can cause a total office outage. See CMCU circuit board layout in the 235-100-200.
 2. Check for bent/crushed pins.
 3. Check for bent/crushed guide pins.
 4. Check for deflected pins from under circuit boards.
 5. Check for debris lying on pins.
 6. Ensure no pin is deflected into another circuit board spline with another pin.
12. Check the failure status or check for asynchronous errors.
- (a) If troubleshooting massive TMS asynchronous errors:
 1. Power up the ONTCCOM and restore the ONTCCOM to service and make the troubled side active MAJOR.
 2. If massive TMS asynchronous errors are still present, go to Step13.
 3. If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - (b) If the TMS is failing diagnostics, perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 1. If diagnostics pass (ATP), restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 2. If any TMS Post Mortems are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve the trouble.
 3. If TMS diagnostics fail, continue with Step13.

13. Check circuit board series. Determine if there any missing/outstanding Change Notices (CNs) associated with the TMS circuit boards.

Note 1: As circuit boards are replaced, the original circuit board should be put back if it does not repair the trouble. This will keep from introducing marginal boards into the CM and further complicating the troubleshooting process. This will also reduce costs.

Note 2: When changing circuit boards, push in the boards until the latch starts to close on its own. Then push the latch to the lock position. If resistance is encountered, check the foreplane pins.

Note 3: Typically a transceiver will NOT fail TMS diagnostics. TMS Post Mortem Dumps and/or DLI diagnostics will pick up any faults in the transceivers. As such, the transceivers will be ignored in this section. After successful ATP of the TMS, TMS Post Mortem Dumps should be filtered to resolve any non-diagnosable faults.

- (a) The TN884C should be Series 7:12 or higher and the KBN5 should be Series 10 or higher.
 - (b) If any board was replaced after working a Change Notice, perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - (c) If diagnostics pass (ATP), restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - (d) If massive TMS asynchronous errors are still present, go to Step 14.
 - (e) If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve the trouble.
 - (f) If TMS diagnostics fail, continue.
14. Check TLP circuit boards.
- (a) Swap identical TLP circuit boards with another shelf.
 - (b) Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 1. If the trouble moves, determine the defective board and replace.
 2. Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step 3.
 - If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve the trouble.
 - If the failure does not move, continue.
 3. One-of-a-kind circuit boards (CMCU) on the TLP list will have to be ordered and replaced.
 4. Perform manual diagnostics on the TMS after TLP board replacement . Enter **DGN:TMS=[x]**;

5. If diagnostics pass (ATP), restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step 14(c).
 - If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve the trouble.
- (c) Determine if the CM2 is dual or single fabric via RCV 17.12.
 1. For single fabric, skip to Step 14(f).
 2. For dual fabric, continue with the following step 14(d).
- (d) Isolate a faulty TMS circuit board – dual fabric:
 1. Swap all TMSU circuit boards from the complaining TMSU shelf with another TMSU shelf in the same bay. See the board layouts in the CM2 section of the 235-100-200, Hardware Description.

Note: This includes all three power boards (two 410AA, one 410CA). These boards could be emitting noise onto the EBUS, thus causing the trouble.
 2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 3. If the trouble moves to the other shelf, isolate the defective board(s), and replace.

If the failure does not move, skip to Step 5.
 4. Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step 14(e).
 - If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 5. Roll all TMSU circuit boards from Shelf 36 with every TMSU circuit board in Shelf 19 in every bay.
 6. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If the trouble moves to the other shelf, isolate the defective board(s), and replace. Then restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step 14(e)

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If the failure does not move, skip to Step 14(e).

- (e) Isolate a faulty EBUS circuit board – dual fabric:
1. Swap all EBUS circuit boards from the complaining ODD or EVEN BUS with the other EBUS shelf in the same bay. See the CM2 section of the 235-100-200, Hardware Description for circuit board layouts.
 2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If the trouble moves to the other shelf, isolate the defective board(s), and replace. Then restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step 3.

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If the trouble does not move, continue with step 3.
 3. Roll all EBUS circuit boards from Shelf 45 with every EBU circuit board in Shelf 28 in every bay except for the control bay 5 or 6.
 4. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**.
 - If the trouble moves to the other shelf, isolate the defective board(s), and replace. Then restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step 14(h).

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If the failure does not move, go to Step 14(h).
- (f) Isolate a faulty TMS circuit board – single fabric:
1. Swap all similar TMSU circuit boards with another shelf in another bay. See the CM2 section of 235-100-200, Hardware Description for circuit board layouts.

Note: This includes all three power boards (two 410AA, one 410CA). These boards could be emitting noise onto the EBUS, thus causing the trouble.
 2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**.
 - If the trouble moves to the other shelf, isolate the defective board(s) and replace. Then restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step 3.

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If the failure does not move, continue with Step 3.

3. The QLI boards will not likely match board for board. In this instance, replace QLI boards until the trouble moves or all boards in the shelf have been swapped with known good boards.
 - If the trouble moves to another shelf, isolate the defective board and replace. Then restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step [14\(g\)](#).

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
 - If the failure does not move, continue Step [14\(g\)](#).
- (g) Isolate a faulty EBUS circuit board – single fabric:
 1. For CM configurations without EBUS units, skip to Step [14\(h\)](#).
 2. Swap similar EBU circuit boards with another shelf in another bay. See the CM2 Section of the 235–100–200, Hardware Description for circuit board layouts.
 3. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If the trouble moves to the other shelf, isolate the defective board(s) and replace. Then restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step [4](#).

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
 - If the failure does not move, continue.
 4. Order one-of-a-kind EBU circuit boards and replace.
 5. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**.
 - If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step [14\(h\)](#).

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
 - If TMS diagnostics fail, continue with Step [14\(h\)](#).
- (h) Replace CMCU circuit boards:
 1. Replace any circuit board that has not been replaced in the CMCU excluding the clock boards.

Warning: *DO NOT remove the clock oscillator circuit board, in slot 28-48. This can cause a total office outage. See the CM2 section of the 235-100-200, Hardware manual for the CMCU circuit board layout.*

2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive TMS asynchronous errors are still present, go to Step 15.

If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.

- If TMS diagnostics fail, continue with Step 15.

15. Isolate a faulty EBUS cable:

Caution: *Seek assistance from the next level of technical support for EBUS cable troubleshooting.*

Note 1: All circuit board trouble should have been eliminated before proceeding.

Note 2: As cables are removed, check underneath the cable for possible crushed pins.

Note 3: Pre-1998 offices that have bays beyond the first three bays per side can have EBUS troubles due to the white EBUS standoff retaining clips. These clips were shortened due to resistance on the EBUS when adding shelves beyond the third bay. The pre-1998 bays have the longer standoff retainers. This could be the trouble if TMS asynchronous errors are floating through one entire TMS side. Replace the standoffs with the new shorter type. Spare short retainers can be found if the office has post-1998 CM bays. If it is difficult to find the new replacements, it is possible to cut the longer retainers down to match the new types. Do **not** put the paddleboard back onto the pins without the retainers.

- (a) Use the TMS Post Mortem Dumps from Step 1 or Step 2. for the following:
 1. For single fabric, skip to Step 15(c) and compare the asynchronous error pattern with the Step 15(c) descriptions.
 2. For dual fabric, continue and compare the asynchronous error pattern with the Step 15(b) descriptions.
- (b) For dual fabric, make the following comparisons:
 1. See EBUS Section for EBUS Equipment Locations.
 2. Compare the TMS Post Mortems found in Step 1 or 2. Determine if the asynchronous errors are across all of the EVEN TMS BUS links. If this is the case, the trouble is probably in the cables across Shelf 45. The most likely suspects are the cables between the bays (interbay cabling) or loop EBUS cables in the last bay. Go to Step 15(d).

Exhibit 6.1-2 — TMS Post Mortem, Example 1

```
TMSLNKS AFFECTED
55555555 55555555 55555555 55555554 55555555 55555555 55555555 55555555
00000000 00000004 55555555 55555555 00014000 00000000 00000000 00000000
```

3. Compare the TMS Post Mortems found in Step 1 or 2. Determine if the asynchronous errors are across all of the ODD TMS BUS links. If this is the case, the trouble is probably in the cables across Shelf 28. The most likely suspects are the cables between the bays (interbay cabling) or loop EBUS cables in the last bay. Go to Step 15(d).

Exhibit 6.1-3 — TMS Post Mortem, Example 2

```
TMSLNKS AFFECTED
2AAAAAAAA AAAAAAAAA 8088AAAA AAAAAAAAA 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

4. Compare the TMS Post Mortems found in Step 1 or 2. Determine if the asynchronous errors are only on one shelf. If this is the case, the trouble is probably an EBUS cable from the TMS shelf to the EBUS shelf (intrabay cabling). Go to Step 15(e).

Exhibit 6.1-4 — TMS Post Mortem, Example 3

```
TMSLNKS AFFECTED
40000000 00000000 00000000 00000000 00000000 00000000 15555555 55555555
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

5. Compare the TMS Post Mortems found in Step 1 or 2. Determine if the asynchronous errors are only on links associated with one or two QLI boards on a shelf. If this is the case, the trouble is probably an intrabay cable or from a “source” TMS link(s). Go to Step 15(e).
 - See the TMS Post Mortem Dump Analysis section for source link analysis.
 - The “source” link will give an EBUS path through the ONTC.

Exhibit 6.1-5 — TMS Post Mortem, Example 4

```
TMSLNKS AFFECTED
00000000 00000000 00000000 00000000 00000000 00000000 002A8000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

(c) Single Fabric

1. See the EBUS section for EBUS equipment locations.
2. Compare the TMS Post Mortems found in Step 1 or 2. Determine if the asynchronous errors are across all of the TMS BUS links. If this is the case, the trouble is probably cables between the bays (interbay cabling) or loop EBUS cables in the last bay. Go to Step 15(d).
3. Compare the TMS Post Mortems found in Step 1 or 2. Determine if the asynchronous errors are only on links associated with one or two QLI boards on a shelf. If this is the case, the trouble is probably an intrabay

cable or from a “source” TMS link(s). Go to Step 15(e).

- See Procedure 6.2, TMS Post Mortem Dump Analysis for source link analysis.
 - The “source” link will give an EBUS path through the ONTC.
- (d) Isolate a faulty interbay EBUS cable (that is, an EBUS cable that runs from bay to bay). For dual fabric, perform the following:
1. Roll interbay cables between Shelf 45 and Shelf 28.
 2. See the EBUS section for cable locations and group numbers.
 3. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 4. If the failure disappears, perform the following:
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step 15(f).
 - If isolated and/or scattered asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 5. If the failure moves to the other shelf, isolate the defective cable(s), order new cables(s), and replace.
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step 15(f).
 - If isolated and/or scattered TMS asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 6. If the failure does not move, go to Step 15(f).

For single fabric, perform the following:

1. Roll similar cables from another bay if possible; if not, order cables. See the EBUS section for cable locations and group numbers.
2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
3. If the failure disappears, perform the following:
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step 15(f).
 - If isolated and/or scattered asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.

4. If the failure moves to the other shelf, isolate the defective cable(s), order new cables(s), and replace. Then perform the following:
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive TMS asynchronous errors are still present, go to Step [15\(f\)](#).
 - If isolated and/or scattered asynchronous errors are found, follow Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
 5. If the failure does not move, go to Step [15\(f\)](#).
- (e) Isolate a faulty intrabay EBUS cable (that is, a cable that runs from an EBU shelf to a TMS shelf within the same bay). For dual fabric, perform the following:
1. Roll Shelf 19 to 28 intrabay cables with Shelf 36 to 45. Cables to roll: Receive Data, Transmit Data, and Mux Control.
 - See the EBUS section for cable locations and group numbers.
 2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 3. If the failure disappears, perform the following:
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, go to Step [15\(f\)](#).
 - If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
 4. If the failure moves to the other shelf, isolate the defective cable(s), order new cables(s), and replace.
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, go to Step [15\(f\)](#).
 - If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
 5. If the failure does not move, go to Step [15\(f\)](#).

For single fabric, perform the following:

1. Roll similar cables from another bay if possible; if not, order cables. See the EBUS section for cable locations and group numbers.
2. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
3. If the failure disappears, perform the following:
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, go to Step [15\(f\)](#).

- If isolated and/or scattered asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
4. If the failure moves to the other shelf, isolate the defective cable(s), order new cables(s), and replace.
 - Restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, go to Step 15(f).
 - If isolated and/or scattered asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 5. If the failure does not move, continue with Step 15(f).
- (f) Isolate a faulty CMCU control EBUS cable:
1. Order all CMCU control cables. See the EBUS section for cable locations and group numbers.
 2. Replace one CMCU Control EBUS cable.
 3. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 4. If the diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, continue replacing CMCU control EBUS cables until all are replaced. When all CMCU Control EBUS cables have been tried, go to Step 15(g).
 - If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 5. If the TMS fails, continue replacing CMCU control cables until all are replaced.
 6. When all CMCU EBUS cables have been replaced, go to Step 15(g).
- (g) Isolate a faulty miscellaneous EBUS cable (MUX control, etc.):
1. If all data transmit, receive cables, and CMCU control EBUS cables have been replaced and/or moved and this does not repair or move the trouble, then all miscellaneous EBUS cables will have to be rolled in the entire TMS side.
 2. See the EBUS section for cable locations and group numbers.
16. Backplane Shelf Replacement:
- Caution: Seek assistance from the next level of technical support for backplane troubleshooting.**
- (a) If the trouble is affecting all TMS links over the entire EBUS, skip to Step 16(h).
If the trouble is isolated to one TMS shelf, continue.

- (b) For a TMSU Backplane, perform the following:
1. Remove all TMSU cables, except power leads and check for bent pins under cable paddleboards and/or under 127C connectors, or for any debris that might be hidden behind the cabling.
 - If any defect is found, correct and reconnect all cabling; otherwise, skip to Step 16(c) .
 - Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step 16(c).

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If TMS diagnostics fail, continue.
- (c) Remove the fuses from the troubled TMSU shelf and remove remaining power leads.
1. For single fabric, skip to Step 3.
For dual fabric, continue.
 2. For a dual fabric TMSU backplane, perform the following:
 - Remove the fuses and remove all cables from a good TMSU shelf in the affected bay.
 - Reconnect all cabling and install the fuses.
 - Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step 16(d).

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If TMS diagnostics fail, go to Step 16(d).
 3. For a single fabric TMSU backplane, perform the following:
 - Swap circuit boards between the troubled TMSU shelf and a known good TMSU shelf.
 - Remove all fuses and remove all cables from a known good TMSU shelf.
 - Swap TMSU shelves.
 - Reconnect all cabling and install the fuses.
 - Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;

- If diagnostics ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step 16(d).

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.

- If TMS diagnostics fail, continue.

(d) EBUS Backplane:

1. Remove all EBUS shelf cables associated with the trouble in the TMS shelf, except power leads and check for bent pins under cable paddleboards and/or under 127C connectors, or for any debris that might be hidden behind the cabling.

- If any defect is found, correct and reconnect all cabling; otherwise, skip to Step 16(c)

- Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;

- If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step 16(c)

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.

- If TMS diagnostics fail, continue.

2. Remove the fuses from the EBUS shelf and remove remaining power leads. For single fabric, skip to Step 1. For dual fabric, perform the following:

1. Remove fuses and remove cabling from a good EBUS shelf in the affected bay.

2. Swap EBUS shelves 28 and 45.

3. Reconnect all cabling and install the fuses.

4. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;

5. If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step 16(e).

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.

6. If TMS diagnostics fail, go to Step 16(e).

For a single fabric EBUS backplane, perform the following:

1. Remove the fuses and remove cabling from a known good EBUS shelf.

2. Swap circuit boards between the defective EBUS shelf and the known good EBUS shelf.
3. Swap EBUS shelves.
4. Reconnect all cabling and install the fuses.
5. Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
6. If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step [16\(e\)](#).

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.

7. If TMS diagnostics fail, continue.

(e) CMCU Backplane

1. Remove all EBUS CMCU shelf cables, except for power and Network Clock leads.
 - Check for bent pins under cable paddleboards and/or under 127C connectors or for any debris that might be hidden behind the cabling.
 - Remove the CMCU terminator board at EQL 28-116-500 and check underneath for bent pins. If the CMCU has the longer white retainers, remove them and replace with shorter retainers (these can be found in the newer cabinets).
 - If any defect is found, correct and reconnect all cabling; otherwise, skip to Step [13](#).
 - Perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 - If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.

If massive asynchronous errors are still present, go to Step [13](#).

If isolated and/or scattered asynchronous errors are found, follow the instructions in Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.

- If TMS diagnostics fail, continue with Step [16\(f\)](#).

(f) Order and replace the terminator at EQL28-116-500.

1. After replacement, perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
2. If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, go to Step [16\(g\)](#).
 - If isolated and/or scattered asynchronous errors are found, follow Procedure [6.2](#), TMS Link Post Mortem Dump Analysis to resolve.
3. If TMS diagnostics fail, continue with Step [16\(g\)](#).

- (g) Replace the CMCU backplane:
1. Order a new or used CMCU backplane.
 2. Remove the Network Clock Oscillator from service.
 3. Remove the fuses from the CMCU Shelf.
 4. Remove the Network Clock leads and power leads from the rear of CMCU. See the CM2 section of the 235-100-200, Hardware Description for clock lead locations.
 5. Replace the backplane and perform manual diagnostics on the TMS. Enter **DGN:TMS=[x]**;
 6. If diagnostics pass ATP, restore the ONTCCOM to active MAJOR and monitor for TMS Post Mortems.
 - If massive asynchronous errors are still present, start over at Step 1; there is probably another trouble and/or something was missed.
 - If isolated and/or scattered asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.If diagnostics fail, continue with Step 16(h).
- (h) If the trouble is affecting all TMS links in the entire EBUS (dual fabric ODD bus or EVEN bus, or single fabric bus) and is not isolated to one shelf, perform the following:
1. Follow Steps 16(e) through 16(g) and return here.
 - If massive asynchronous errors are still present, start over at Step 1; there is probably another trouble and/or something was missed.
 - If isolated and/or scattered asynchronous errors are found, follow Procedure 6.2, TMS Link Post Mortem Dump Analysis to resolve.
 - If TMS diagnostics fail, start over at Step 1; there is probably another trouble and/or something was missed.

17. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

6.2 TMS POST MORTEM DUMP ANALYSIS

OVERVIEW

This procedure is used to analyse a TMS post mortem dump.

Before You Begin Review the following information.

When to use

When TMS link asynchronous errors are reported in a TMS Post Mortem Dump.

Required Information

TMS link asynchronous errors are reported by the 5ESS® switch in a TMS Post Mortem Dump. This message prints in two parts and contains several subsections. An example follows:

Exhibit 6.2-1 — Example TMS Post Mortem Dump (1 of 2)

```
REPT TMS=0 POST MORTEM DUMP  EVENT=231234
PAGE 1 OF 2

ERROR SUMMARIES
24 db00040000 fb00020000

TMSLNKS AFFECTED*
00000000 00000008 80000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

SHELF SUMMARIES
e90000000e e90000001e e90000002e e90401003e e90000004e
e90000005e e90000006e e90000007e e90000008e e90000009e
e9000000ae e9000000be e9000000ce e9000000de e9000000ee
e9000000fe

REPT TMS=0 POST MORTEM DUMP  EVENT=231234
PAGE 2 OF 2

ERROR SUMMARIES
24 db00040000 fb00020000

QLI, FAB, OR FAB CONTROLLER ESR
50003a30 5000ba30**

QLPS BOARDS AND QTMSLNKS
```

Exhibit 6.2-1 — Example TMS Post Mortem Dump (2 of 2)

- * The “Detecting Link” is found in the TMSLNK AFFECTED section of the Post Mortem Dump.
- ** The “Sourcing Link” (if indeed there is one) will be found in the QLI, FAB, OR FAB CONTROLLER ESR section of the Post Mortem Dump.

For effective post mortem analysis, the data path that is taken through the CM2 hardware is essential. Please refer to the CM Data Path figure in the CM2 section of the 235-100-200, Hardware Description. The data traveling from the SM to the CM2 is received on the Link Interface Receiver (LIR) and transmitted to the UN182 through the EBUS to another QLI via the KBN5. The data is then sent to another SM by the

Quad Link Transmitter (QLT). The distinction here lies in where the interrupt was received. If the bad data was received by the LIR then the trouble is on the path to the SM and not through the CM2. If the bad data was received on the QLT then the trouble is in the CM2.

One further explanation is needed here. If the error is detected by the QLT, then the detecting link is at the far end of the CM data path and called the Detecting Link. When the QLT detects the error, the source link that is causing the error can be found by breaking down the "w" QLT Sourcing Link in Page 2 of 2 of the Post Mortem Dump

If the LIR detects the error, as opposed to the QLT, there is no source link. The "w" in the Page 2 of 2 QLI, FAB, or FAB Controller ESR break-down reflects what type of error was received. The break-down of "w" for LIR errors is not needed for effective TMS link troubleshooting. For the source link to report to the Post Mortem, a TN884C, Series 7:12 or higher must be utilized. The TN884C is located in the CMCU at EQL x28-130.

Follow the steps in this procedure by moving the board(s), instead of replacing them, to identify the defective circuit board. When replacing circuit boards (in the case of one-of-a-kind boards), the original circuit board should be put back if it does not repair the trouble. This prevents introducing marginal boards into the CM and further complicating the troubleshooting process.

The following is a "Quick Fix Checklist" showing a high-level troubleshooting hierarchy.

Table 6.2-1 — TMS Post Mortem Quick Fix

TMS Post Mortem Quick Fix	
Phantom Links	<ul style="list-style-type: none"> • QLPS TN1684 Pack • Shorted Pin • Dynamic Memory Corruption
LIR - Classic SM	<ul style="list-style-type: none"> • DLI Board - TN1077 • SM Transceiver - 982 • CM2 Transceiver - 982TT • CM2 QLI - TN883, TN888 • Lightguide Fibers
LIR - SM2K	<ul style="list-style-type: none"> • NLI - BKD1 • Slice Board - KLU1 • CM2 Tranceiver - BKF1 • CM2 QLI - TN1681 • Lightguide Fibers
QLT - Bit 6 & 7 not set	<ul style="list-style-type: none"> • Detecting QLI - TN883, TN888, TN1681 • KBN 4 or 5 on Detecting Shelf • EBUS Packs on associated Detecting EBU shelf • EBUS Cable on associated Detecting EBU shelf
QLT - Bit 6 & 7 set	<ul style="list-style-type: none"> • Source QLI - TN883, TN888, TN1681 • UN182 on Source Shelf • EBUS Packs in path from Source to Detecting TMS link • KBN 4 or 5 on Detecting Shelf • EBUS Cable in path from Source to Detecting TMS link
Niether LIR or QLT	<ul style="list-style-type: none"> • KBN 4 or 5 on Detecting Shelf • EBUS Packs on associated Detecting EBU shelf • EBUS Cable on associated Detecting EBU shelf
Detecting Link pointing to many different source links	<ul style="list-style-type: none"> • Detecting QLI - TN883, TN888, TN1681 • KBN 4 or 5 on Detecting Shelf • EBUS Packs on associated Detecting EBU shelf • EBUS Cable on associated Detecting EBU shelf

Table 6.2-1 — TMS Post Mortem Quick Fix (Contd)

TMS Post Mortem Quick Fix	
QLT, "w" is FF	<ul style="list-style-type: none">• TN883• EBUS Packs on associated Detecting EBU shelf• EBUS Cable on associated Detecting EBU shelf

PROCEDURE

To analyse a post motem dump, perform the following:

1. Make sure that all TMS links are in service and then run a filter for several days to get a trouble pattern.
 - (a) If experiencing massive TMS asynchronous errors per the TMS Post Mortem Dump, follow Procedure 6.1, TMS Equipment Troubleshooting.

Exhibit 6.2-2 — Post Mortem Dump

```
REPT TMS=1 POST MORTEM DUMP
PAGE 1 OF 2
ERROR SUMMARIES
23 db00020000 fb01000000
```

```
TMSLNKS AFFECTED
55555555 55555555 55555555 55555554 55555555 55555555 55555555 55555555
00000000 00000004 55555555 55555555 00014000 00000000 00000000 00000000
```

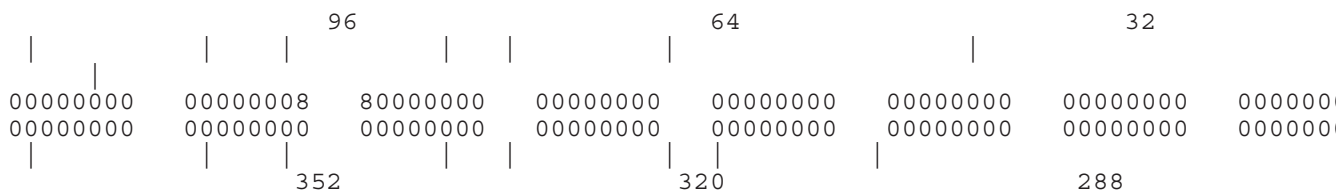
2. Check for TN884C Series 7:12 or higher circuit boards in the CMCU at 28-130 bays 5 and 6. This series is required to capture the source link if there is one.
 - Exchange this pack with the new series if needed.
3. If experiencing Phantom Link TMS asynchronous errors, do the following:
 - (a) Check RC/V 17.19 view for QLPS links. If the phantom links are really QLPS links (QTMSLNKs), see the QLPS Trouble Shooting section, Step 2.
 - (b) If the Phantom Links are NOT the QLPS links (QTMSLNKs), follow Procedure 6.3, Phantom Link Troubleshooting.
4. Determine the Detecting TMS link(s).
 - (a) Find the set hex bytes in the TMSLNKS Affected section of the Post Mortem Dump.
 - (b) Determine the Detecting TMS link(s) from Table 6.2-2 or break down by hand as follows:

Table 6.2-2 — HEX to Binary Conversion Table

Hex to Binary Conversion Table	
HEX	BINARY
0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

1. To read the TMSLNKS AFFECTED section of this message, go to the middle of the first line and start reading from left to right.
2. The first byte to the left indicates TMS links 0-3, the second byte links 4-7, so that the last byte to the left indicates links 124-127.
3. The next 128 TMS links are read right to left on the right hand side of the middle of the line. Start at the far right 128-131 through 252-255.

Exhibit 6.2-3 — TMSLNKS AFFECTED



4. Convert the h'88 into bits = 1000 1000, the count starts right to left at 60 to 67. In this example, TMS links 63 and 67 are "detecting" the errors.
5. Determine source link(s).
 - (a) Find the QLI, FAB, OR FAB CONTROLLER ESR section on page 2 or 2 of Post Mortem Dump
 - (b) Break down word(s) as follows:

Note: See Hex to Binary Conversion, Table 6.2-2

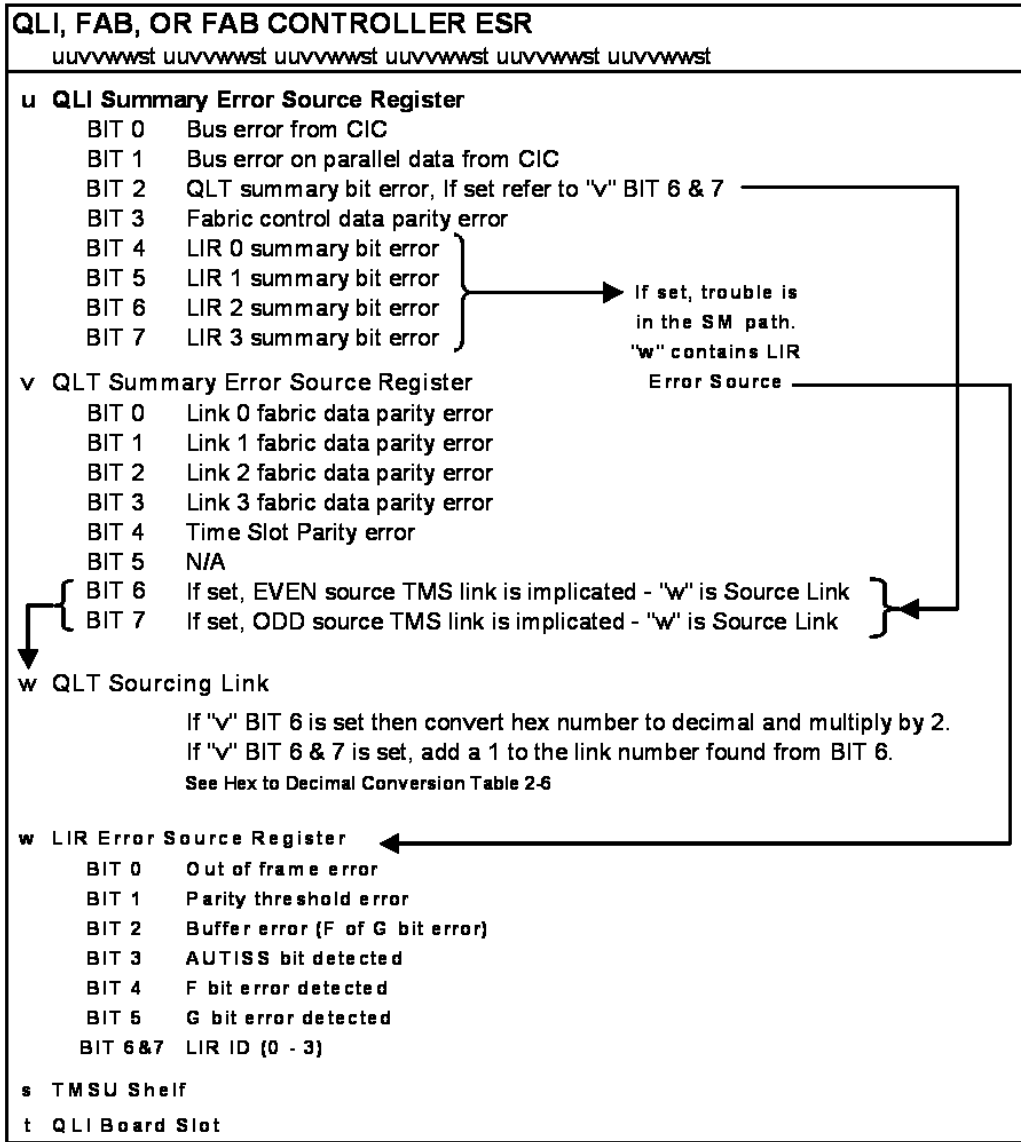


Figure 6.2-1 — QLI, FAB, or FAB Controller ESR

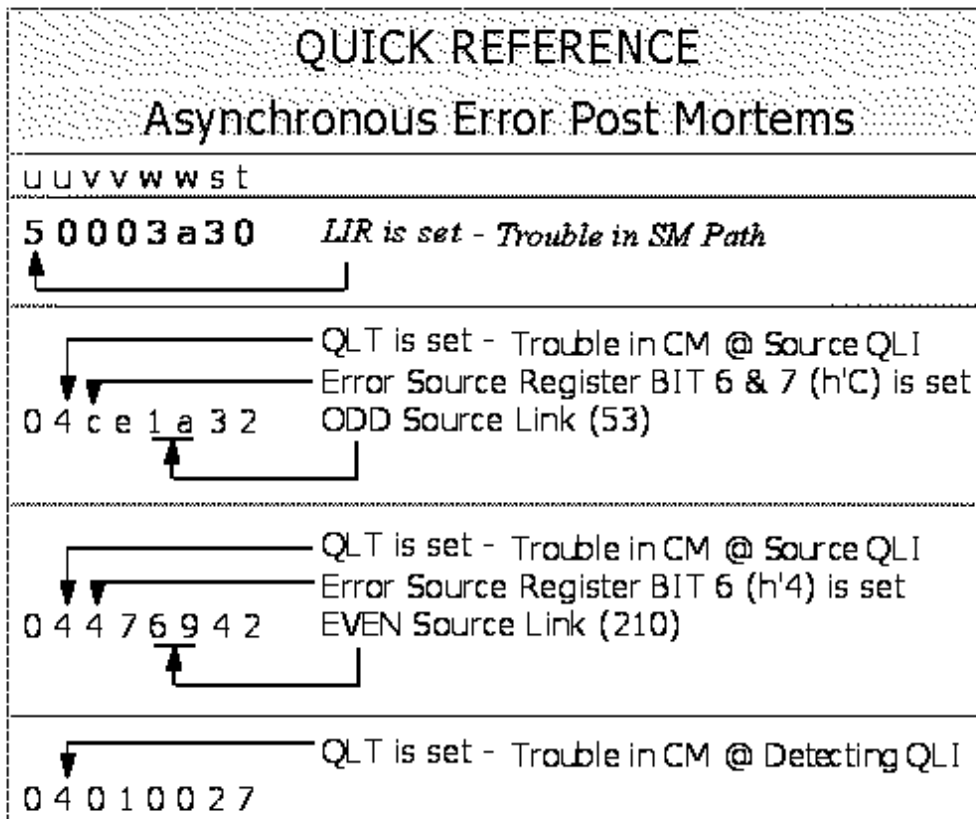


Figure 6.2-2 — Quick Reference — Asynchronous Error Post Mortems

6. Determine defective hardware by the LIR or QLT Registers:
 - (a) LIR “u” BITS 4-7 are set. See Step 7.
 - (b) QLT “u” BIT 2 is set. See Step 8.
 - (c) Neither LIR or QLT is set. See Step 9
7. If the LIR is set (“u” bits 4-7), the trouble is in the path back to the SM.

Note: The SM Path is the DLI, SM transceiver, fiber, CM transceiver, and TN888/TN1681.

Exhibit 6.2-4 — LIR

REPT TMS=0 POST MORTEM DUMP EVENT=231234
PAGE 1 OF 2

ERROR SUMMARIES

24 db00040000 fb00020000

TMSLNKS AFFECTED

00000000 00000000 80000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000

Link 63 - Detecting Link

SHELF SUMMARIES

e90000000e e90000001e e90000002e e90401003e e90000004e
e90000005e e90000006e e90000007e e90000008e e90000009e
e9000000ae e9000000be e9000000ce e9000000de e9000000ee
e9000000fe

REPT TMS=0 POST MORTEM DUMP EVENT=231234
PAGE 2 OF 2

ERROR SUMMARIES

24 db00040000 fb00020000

QLI, FAB, OR FAB CONTROLLER ESR
50003a30 5000ba30

Breakdown

u 5 = 0101 LIR 0 & 2 are set - trouble points back to SM
See Figures 2-11, 2-12 and 2-13
u 0 = 0000
v 0 = 0000
v 0 = 0000
w 3 = 0011 F& G Bit Error Detected
w a = 1010 Parity Threshold Error & AUTISS bit detected
st 30 = Shelf 3 board 0

Link 63 is detecting an error on the LIR (Link Interface Receiver). This means that t

Resolution

Defective DLI TN1077E board

- (a) Determine if the CM2 is dual or single fabric via RC?V 17.12 view.
- (b) If this is an SM-2000, go to Step 7(j). If not, continue with the next step.
- (c) If this is an SM, replace the DLI circuit pack.
- (d) Remove the affected DLI side from service. Enter **RMV:DLI=d-c**;

Where: d = SM
c = side

- (e) Diagnose the DLI circuit pack. Enter **DGN:DLI=d-c**;

Where: d = SM
 c = side

1. If the DLI diagnostics fail, follow Procedure [6.7](#), DLI Troubleshooting to resolve.
2. If the DLI diagnostics pass, continue with the next step.
3. Power down the DLI.
4. Replace the DLI (TN1077) and restore to service. Enter **RST:DLI=d-c**:

Where: d = SM
 c = side

If asynchronous errors are still present, continue.

- (f) Replace the transceiver at the rear of the SM.

1. Remove the DLI from service and power down.
2. If the trouble link is EVEN, replace the upper "A" link transceiver.
If the trouble link is ODD, replace the lower "B" link transceiver.
3. Replace the 982T[x] at the rear of the SM. See figures in the CM2 section of the 235-100-200 Hardware Description.
4. Power the DLI on and restore to service. If asynchronous errors are still present, continue with the next step.

- (g) Replace the CM2 transceiver.

1. Remove the affected ONTCCOM side from service and power the TMS off.
2. There will be four fibers (two whites and two blues). It will be beneficial to mark the fibers with a pen to make sure they will be reinstalled into the correct location on the new transceiver. Pay particular attention to the removal of the old transceiver. Unlatch the transceiver from the blue 127C retainer — do not pull the blue 127C connector out with the can.
3. Replace the CM2 transceiver. See figure [6.2-3](#) or [6.2-5](#)

CM2 TMS LINK & QLI Location Table DUAL FABRIC

1 of 2

SHELF	EQL	SLOTS								Port	Pin	EQL	
0	536 + 636	88*	80	72	64	56	48	40	32				
		2	6	14	22	30	38	46	54	A			
		4	8	16	24	32	40	48	56	B	132		
		-	-	-	-	-	-	-	-	-			
		0	10	18	26	34	42	50	58	A			
x	12	20	28	36	44	52	60	B	100				
1	519 + 619	88*	80	72	64	56	48	40	32				
		3	7	15	23	31	39	47	55	A			
		5	9	17	25	33	41	49	57	B	132		
		-	-	-	-	-	-	-	-	-			
		1	11	19	27	35	43	51	59	A			
x	13	21	29	37	45	53	61	B	100				
2	436 + 736	88	80	72	64	56	48	40	32				
		62	70	78	86	94	102	110	118	A			
		64	72	80	88	96	104	112	120	B	132		
		-	-	-	-	-	-	-	-	-			
		66	74	82	90	98	106	114	122	A			
68	76	84	92	100	108	116	124	B	100				
3	419 + 719	88	80	72	64	56	48	40	32				
		63	71	79	87	95	103	111	119	A			
		65	73	81	89	97	105	113	121	B	132		
		-	-	-	-	-	-	-	-	-			
		67	75	83	91	99	107	115	123	A			
69	77	85	93	101	109	117	125	B	100				
4	336 + 836	88	80	72	64	56	48	40	32				
		126	134	142	150	158	166	174	182	A			
		128	136	144	152	160	168	176	184	B	132		
		-	-	-	-	-	-	-	-	-			
		130	138	146	154	162	170	178	186	A			
132	140	148	156	164	172	180	188	B	100				
5	319 + 819	88	80	72	64	56	48	40	32				
		127	135	143	151	159	167	175	183	A			
		129	137	145	153	161	169	177	185	B	132		
		-	-	-	-	-	-	-	-	-			
		131	139	147	155	163	171	179	187	A			
133	141	149	157	165	173	181	189	B	100				
Shelf Slot No.		0	1	2	3	4	5	6	7				

* 0111883

Figure 6.2-3 — CM2 TMS Link & QLI Location Table Dual Fabric (0-5)

CM2 TMS LINK & QLI Location Table
DUAL FABRIC - CM2 2 of 2

SHELF	EQL	SLOTS								Port	Pin	EQL
6	236 + 936	88	80	72	64	56	48	40	32			
		190	198	206	214	222	230	238	246	A		
		192	200	208	216	224	232	240	248	B	132	
		-	-	-	-	-	-	-	-			
		194	202	210	218	226	234	242	250	A		
196	204	212	220	228	236	244	252	B	100			
7	219 + 919	88	80	72	64	56	48	40	32			
		191	199	207	215	223	231	239	247	A		
		193	201	209	217	225	233	241	249	B	132	
		-	-	-	-	-	-	-	-			
		195	203	211	219	227	235	243	251	A		
197	205	213	221	229	237	245	253	B	100			
8	136 + 1036	88	80	72	64	56	48	40	32			
		254	262	270	278	286	294	302	310	A		
		256	264	272	280	288	296	304	312	B	132	
		-	-	-	-	-	-	-	-			
		258	266	274	282	290	298	306	314	A		
260	268	276	284	292	300	308	316	B	100			
9	119 + 1019	88	80	72	64	56	48	40	32			
		255	263	271	279	287	295	303	311	A		
		257	265	273	281	289	297	305	313	B	132	
		-	-	-	-	-	-	-	-			
		259	267	275	283	291	299	307	315	A		
261	269	277	285	293	301	309	317	B	100			
10	036 + 1136	88	80	72	64	56	48	40	32			
		318	326	334	342	350	358	366	374	A		
		320	328	336	344	352	360	368	376	B	132	
		-	-	-	-	-	-	-	-			
		322	330	338	346	354	362	370	378	A		
324	332	340	348	356	364	372	380	B	100			
11	019 + 1119	88	80	72	64	56	48	40	32			
		319	327	335	343	351	359	367	375	A		
		321	329	337	345	353	361	369	377	B	132	
		-	-	-	-	-	-	-	-			
		323	331	339	347	355	363	371	379	A		
325	333	341	349	357	365	373	381	B	100			
Shelf Slot No.		0	1	2	3	4	5	6	7			

Figure 6.2-4 — CM2 TMS Link & QLI Location Table Dual Fabric (6–11)

CM2 TMS LINK & QLI Location Table SINGLE FABRIC

1 of 1

SHELF	EQL	SLOTS								Port	Pin	EQL	
0	536 + 636	88*	80	72	64	56	48	40	32				
		2	4	8	12	16	20	24	28	A			
		3	5	9	13	17	21	25	29	B	132		
		-	-	-	-	-	-	-	-	-	-		
		0	6	10	14	18	22	26	30	A			
1	7	11	15	19	23	27	31	B	100				
1	519 + 619	88*	80	72	64	56	48	40	32				
		32	34	38	42	46	50	54	58	A			
		33	35	39	43	47	51	55	59	B	132		
		-	-	-	-	-	-	-	-	-	-		
		x	36	40	44	48	52	56	60	A			
x	37	41	45	49	53	57	61	B	100				
2	436 + 736	88	80	72	64	56	48	40	32				
		62	66	70	74	78	82	86	90	A			
		63	67	71	75	79	83	87	91	B	132		
		-	-	-	-	-	-	-	-	-	-		
		64	68	72	76	80	84	88	92	A			
65	69	73	77	81	85	89	93	B	100				
3	419 + 719	88	80	72	64	56	48	40	32				
		94	98	102	106	110	114	118	122	A			
		95	99	103	107	111	115	119	123	B	132		
		-	-	-	-	-	-	-	-	-	-		
		96	100	104	108	112	116	120	124	A			
97	101	105	109	113	117	121	125	B	100				
4	336 + 836	88	80	72	64	56	48	40	32				
		126	130	134	138	142	146	150	154	A			
		127	131	135	139	143	147	151	155	B	132		
		-	-	-	-	-	-	-	-	-	-		
		128	132	136	140	144	148	152	156	A			
129	133	137	141	145	149	153	157	B	100				
5	319 + 819	88	80	72	64	56	48	40	32				
		158	162	166	170	174	178	182	186	A			
		159	163	167	171	175	179	183	187	B	132		
		-	-	-	-	-	-	-	-	-	-		
		160	164	168	172	176	180	184	188	A			
161	165	169	173	177	181	185	189	B	100				
Shelf Slot No.		0	1	2	3	4	5	6	7				

Figure 6.2-5 — CM2 TMS Link & QLI Location Table Single Fabric (0–5)

4. Restore the ONTCCOM to service and make the affected side active “MAJOR.” If asynchronous errors are still present, continue with the following step.
 - (h) Replace the CM2 Detecting QLI.
 1. Remove the affected ONTCCOM side from service and power the TMS off.
 2. Replace the Detecting QLI. See Table 6.2-3 or Table 6.2-5 for circuit board locations.

Note: If the Detecting QLI is a TN888, make sure the new replacement is a 5:19.

3. Power the ONTCCOM up, restore it to service, and make the trouble side active "MAJOR." If asynchronous errors are still present, continue with the following step.

(i) Check lightguide fibers from the SM to the CM2.

1. Determine the transceiver location from figures in the CM2 section of the 235-100-200 Hardware Description.

2.

Danger: Do NOT look directly into the laser light!

Remove the receive side from the SM and look for the red laser light; if the light is strong, the fiber is good. Reconnect the fiber to the transceiver.

3. Remove the receive side from the CM2 transceiver. See Table 6.2-3 or Table 6.2-5 for circuit board locations.

4. If the light is strong, the fiber is good. Reconnect the fiber to the transceiver.

5. If needed, replace defective fiber.

(j) Verify this unit is an SM-2000.

1. Replace the NLI BKD1 transceiver.

- Determine the location of the NLI circuit pack. For an SM-2000 Model 4, use the "SM-2000 NLI Transceiver (BKD1) Locations" table in the Replacing NLI procedure. The SM-2000 Model 5 has flexible assignments. Refer to the chart located on the back door of SM.

- Replace the NLI BKD1 and restore to service.

2. Replace the slice board (KLU1) in the TSIU4 shelf.

- Remove the MCTU from service and power the MCTSI off.

- Replace the KLU1 circuit board.

3. Replace the CM2 transceiver. In the case of an SM-2000, the QLI2 is only one board for two TMS links located at PIN 100.

- Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.

- There are four fibers (two whites and two blues). It is beneficial to mark the fibers with a pen to make sure they are reinstalled into the correct location on the new transceiver. Pay particular attention to the removal of the old transceiver. Unlatch the transceiver from the blue 127C retainer - do not pull the blue 127C connector out with the can.

- Replace the CM2 transceiver. See Table 6.2-3 or Table 6.2-5 for circuit board locations.

- Restore the ONTCCOM to service and make the trouble side active “MAJOR.” If asynchronous errors are still present, continue with the following step.
4. Replace the CM2 source QLI.
 - Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 - Replace the Detecting QLI. See Table 6.2-3 or Table 6.2-5 for circuit board locations.
 - Power the ONTCCOM up, restore it to service, and make the troubled side active “MAJOR.”
 - If asynchronous errors are still present, continue with the following step.
 5. Follow Step 7(i) for lightguide check and possible replacement.
 6. **Stop.** The LIR section is completed for an SM-2000.
8. If the QLT is set (“u” bit 2), trouble is in the CM2.
- (a) Determine if the CM is dual or single fabric via RC/V 17.12 view.
 - (b) Determine if bits 6 or 6 & 7 in “v” are set.
 1. If bits are set, see Step 8(d).
 2. If bits are not set, continue with the following step.
 - (c) If bits “v” 6 or 6 & 7 are not set, then the trouble is in the “detecting” shelf. See the 235-100-200 Hardware Description for a figure showing the data path.

Exhibit 6.2-5 — QLT - Bit 6 or 7 not set

```
S570-840040624 02-02-05 00:10:14 831871 ONTCMON WFHLPEE
REPT TMS=0 POST MORTEM DUMP EVENT=10692
PAGE 1 OF 2
ERROR SUMMARIES
23 db00020000 fb02000000
```

```
TMSLNKS AFFECTED
00400000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

Link 118 - Detecting Link

```
SHELF SUMMARIES
e90000000e e90000001e e90480002e e90000003e e90000004e
e90000005e e90000006e e90000007e e90000008e e90000009e
e9000000ae e9000000be e9000000ce e9000000de e9000000ee
e9000000fe
```

```
S570-840040624 02-02-05 00:10:18 831875 ONTCMON WFHLPEE
REPT TMS=0 POST MORTEM DUMP EVENT=10692
PAGE 2 OF 2
ERROR SUMMARIES
23 db00020000 fb02000000
```

QLI, FAB, OR FAB CONTROLLER ESR
04010027

Breakdown

u 0 = 0000
u 4 = 0100 Bit 2 is set - QLT detected the error.
v 0 = 0000 Bit 6 & 7 are not set and "w" is not set.
v 1 = 0001
w 00 = 0000

Link 118 is detecting an error on QLI port 2 from the KBN board. No Source link is re

Resolution

Defective KBN 4 on the detecting shelf

1. Replace the "detecting" QLI TN888/TN1681.
 - Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 - Replace the Detecting QLI. See Table 6.2-3 or Table 6.2-5 for circuit board locations.

Note: If the Detecting QLI is a TN888, make sure the new replacement is a 5:19.

- Power the ONTCCOM up, restore it to service, and make the troubled side active "MAJOR."
 - If asynchronous errors are still present, continue with the following step.
2. See the CM2 section of the 235-100-200 Hardware Description for KBN4 or KBN5 board locations.
 - Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 - Replace the KBN4 or KBN5 on the detecting shelf.

Note: If this is a TMSU Model 2, then there will be 1 to 3 KBN4's depending on the configuration. Each KBN4 will have to be replaced because the source TMS link is unknown. The quickest way to do this is to roll the KBN4 boards (all three) to another shelf and see if the asynchronous errors move. Roll back each board individually until the defective board is located.
 - Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 - If asynchronous errors are still present, continue with the following step.
 3. If replacing the KBN board did not correct the failure, trouble may be in the EBUS cables from the TMSU to the EBU shelf.

Follow Procedure 6.1, TMS Troubleshooting.

Note: If an EBUS cable is the offending hardware, the TMS should be failing diagnostics.

4. **Stop**, this section is complete.

(d) If bits "v" 6 or 6 & 7 are set, then find the "sourcing" link per "w".

Exhibit 6.2-6 — QLT Bits 6 and 7 are set

```
S570-840040624 02-02-05 23:29:34 870859 ONTCMON WFHLPEE
REPT TMS=0 POST MORTEM DUMP EVENT=21305
PAGE 1 OF 2
ERROR SUMMARIES
23 db00040000 fb00020000
```

```
TMSLNKS AFFECTED
00000180 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

Link 103 and 104 - Detecting Links

```
SHELF SUMMARIES
e90000000e e90000001e e90000002e e90440003e e90000004e
e90000005e e90000006e e90000007e e90000008e e90000009e
e9000000ae e9000000be e9000000ce e9000000de e9000000ee
e9000000fe
```

```
S570-840040624 02-02-05 23:29:38 870863 ONTCMON WFHLPEE
REPT TMS=0 POST MORTEM DUMP EVENT=21305
PAGE 2 OF 2
ERROR SUMMARIES
23 db00040000 fb00020000
```

```
QLI, FAB, OR FAB CONTROLLER ESR
04cela32
```

Breakdown

```
u 0 = 0000
u 4 = 0100 Bit 2 is set - QLT detected error
See figures 4-1, 2-11, 2-12, and 2-13
See Chart 4-1
v c = 1100 Bit 6 is set, "w" gives source TMS Link.
    Bit 7 is set, "w" is an odd TMS Link.
v e = 1110
Bit 1,2,3 are set - Link 1,2,3 fabric data parity error.
w 1a = Convert to decimal (26) then multiply by 2 (52) then
add 1 to make odd link (53) [(26 x 2)+ 1 = 53]
```

This means that TMS Link 53 is trying to communicate with TMS Links 103 & 104. The pa

Resolution

Defective source QLI TN888 board

1. If the source link "w" is FF, see Step 11.

2. If the detecting link stays constant and points to many different source links, see Step 10.
3. If both the detecting link and source link are constant, continue with the following step.
4. Replace the "source" QLI board TN888/TN1681.
 - Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 - Replace the source QLI. See Table 6.2-3 or Table 6.2-5 for circuit board locations.

Note: If the Detecting QLI is a TN888, make sure the new replacement is a 5:19.

- Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 - If asynchronous errors are still present, continue with the following step.
5. Replace the UN182 on the source shelf. See the CM2 section of the 235-100-200, Hardware Description for board locations.
 - Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 - Replace the UN182 on the source shelf. See the shelf layout in the CM2 section of the 235-100-200, Hardware Description.
 - Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 - If asynchronous errors are still present, continue with the following step.
 6. Check the EBUS boards in the path from the source QLI to the detecting QLI.
 - Roll all boards on the EBU shelf to another EBU shelf. See the shelf layout in the CM2 section of the 235-100-200, Hardware Description.

Note: Rolling all EBU boards is the quickest method for eliminating the EBU's as the trouble source. The troubleshooter can determine the exact Transmit Data Fabric Bus, 0, 1, or 2, that the source link is riding and roll only those boards. See KBN4 and EBUS Hardware Descriptions for details.
 - If the trouble moves, move boards individually until the trouble is isolated.
 7. See the shelf layout in the CM2 section of the 235-100-200, Hardware Description for the location of the KBN 4 or KBN5.
 - Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 - Replace the KBN4 or KBN5 on the detecting shelf.

Note: If this is a TMSU Model 2, then there will be 1 to 3 KBN4's depending on the configuration. Determine the Transmit Data Fabric Bus 0, 1, or 2. See the KBN4 fabric board layout in the Hardware Descriptions Manual. Roll only the KBN4 board associated with the correct Fab Bus to another shelf and see if the asynchronous error moves with the board.

- Restore the ONTCCOM to service and make the troubled side active "MAJOR." If asynchronous errors are still present, continue.

8. If the KBN board did not correct the problem, trouble may be in the EBUS cables from the TMSU to the EBU shelf. Follow Procedure 6.1, TMS Troubleshooting.

Note: If an EBUS cable is the offending hardware, the TMS should be failing diagnostics.

9. **Stop**, this section is complete.

9. If neither LIR nor QLT is set, the trouble is in the CM2.

Exhibit 6.2-7 — Neither LIR nor QLT

```
S570-1323172034 02-01-18 01:14:01 612503 ONTCMON cnc37he
REPT TMS=0 POST MORTEM DUMP EVENT=8392
PAGE 1 OF 2
ERROR SUMMARIES
23 db00020000 fb04000000
```

```
TMSLNKS AFFECTED
40000000 00000000 00000000 00000000 00000000 00000000 15555555 55555555
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

Links 126 through 188 - Detecting Links

```
SHELF SUMMARIES
e90000000e e90000001e e90000002e e90000003e e90000004e
e90000005e e90000006e e90000007e e90000008e e90000009e
e9000000ae e9000000be e9000000ce e9000000de e9000000ee
e9000000fe
```

```
S570-1323172034 02-01-18 01:14:05 612504 ONTCMON cnc37he
REPT TMS=0 POST MORTEM DUMP EVENT=8392
PAGE 2 OF 2
ERROR SUMMARIES
23 db00020000 fb04000000
```

```
QLI, FAB, OR FAB CONTROLLER ESR
0000004E
```

Breakdown

Every link on shelf 4 is "detecting" errors. The first suspect board is the KBN5 or 4

Resolution

Defective KBN5 Board

- (a) Replace the KBN4 or KBN5 on the detecting shelf. See the CM2 section of the 235-100-200, Hardware Descriptions for board locations.
 1. Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 2. Replace the KBN4 or KBN5 on the detecting shelf.

Note: If this is a TMSU Model 2, then there will be 1 to 3 KBN4's depending on the configuration. Each KBN4 will have to be replaced because the source TMS link is unknown. The quickest way to do this is to roll the KBN4 boards (all three) to another shelf and see if the asynchronous errors move. Roll back each board individually until the defective board is located.
 3. Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 4. If asynchronous errors are still present, continue.
 - (b) If the KBN board did not correct the problem, the trouble may be in the inter- and intra-bay EBUS cables or could be a shorted pin. Follow Procedure 6.1, TMS Equipment Troubleshooting.

Note: If an EBUS cable is the offending part, the TMS should be failing diagnostics.
 - (c) **Stop**, this section is complete.
10. If the "detecting" TMS link stays constant but points to many different "source" TMS links, then proceed as follows:
- (a) Replace the "detecting" QLI board (TN888/TN1681).
 1. Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 2. Replace the detecting QLI. See Table 6.2-3 or Table 6.2-5 for circuit board locations.

Note: If the detecting QLI is a TN888, make sure the new replacement is a 5:19.
 3. Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 4. If asynchronous errors are still present, continue with the following step.
 - (b) Replace the detecting QLI's CM2 transceiver at the rear of the TMSU.
 1. Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 2. There are four fibers (two whites and two blues). It is beneficial to mark the fibers with a pen to make sure they will be reinstalled into the correct location on the new transceiver. Pay particular attention to the removal of the old transceiver. Unlatch the transceiver from the blue 127C retainer - do not pull the blue 127C retainer out with the can.

3. Replace the CM2 transceiver. See Table 6.2-3 or Table 6.2-5 for circuit board locations.
 4. Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 5. If asynchronous errors are still present, continue with the following step.
- (c) See the CM2 section of the 235-100-200, Hardware Descriptions for KBN4 or KBN5 board locations.
1. Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 2. Replace the KBN4 or KBN5 on the detecting shelf.
Note: If this is a TMSU Model 2, then there will be 1 to 3 KBN4's depending on the configuration. Determine the Transmit Data Fabric Bus 0, 1, or 2. See the KBN4 fabric board layout in the Hardware Descriptions Manual. Roll only the KBN4 board associated with the correct Fab Bus to another shelf and see if the asynchronous error moves with the board. If the source links are across all of the Fab Buses, then all three will have to be rolled.
 3. Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 4. If asynchronous errors are still present, continue with the following step.
- (d) If the KBN board did not correct the problem, the trouble may be in the EBUS cables from the TMSU to the EBU shelf or could be a shorted pin. Follow Procedure 6.1, TMS Equipment Troubleshooting.
Note: If an EBUS cable is the offending hardware, the TMS should be failing diagnostics.
- (e) **Stop**, this section is complete.
11. If "w" is FF, then the source link is the FLI TN883 circuit board.
- (a) Single Fabric:
1. Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence
 2. Replace the FLI TN883 at EQL x36-088. See Table 6.2-5 for circuit board locations.
Note: Single Fabric configurations have a TN883 board located in Shelf 19 due to shelf slot compatibility. Only two ports are used for this board: TMS links 32 and 33. The other two ports are unused. The FLI circuit, TMS links 0 and 1, is only used on Shelf 36.
 3. Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 4. If asynchronous errors are still present, continue with the following step.

5. If the TN883 board did not correct the problem, the trouble may be in the inter- and intra-bay EBUS cables or could be a shorted pin. Follow Procedure 6.1, TMS Equipment Troubleshooting.
12. Dual Fabric:
1. Remove the affected ONTCCOM side from service and power the TMS off. See the ONTCCOM power sequence.
 2. If the detecting link is EVEN, replace the source FLI TN883 board at EQL x36-088.
 3. If the detecting link is ODD, replace the source FLI TN883 board at EQL x19-088.

Note: In Dual Fabric configurations, the FLI function is split between Shelf 36 and 19: FLI Link 0 is on Shelf 36 and FLI Link 1 is on Shelf 19.

See Table 6.2-3 for circuit board locations.
 4. Restore the ONTCCOM to service and make the troubled side active "MAJOR."
 5. If asynchronous errors are still present, continue with the following step.
 6. If the TN883 board did not correct the problem, the trouble may be in the inter- and intra-bay EBUS cables or could be a shorted pin. Follow Procedure 6.1, TMS Equipment Troubleshooting.
13. If this procedure did not correct the asynchronous errors, follow Procedure 6.1, TMS Equipment Troubleshooting.
14. Watch the ROP for additional TMS Post Mortems. If any are encountered, start this procedure over.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.3 PHANTOM TMS LINK TROUBLESHOOTING

OVERVIEW

This procedure is for eliminating phantom TMS links.

Before You Begin Review the following information.

When to use

If the phantom links are floating around at random and/or are fixed to one set of phantom links that are NOT corrected using Procedure 6.6, QLPS Troubleshooting section.

PROCEDURE

1. If the phantom links are floating around at random and/or are fixed to one set of phantom links that are NOT the QLPS links, follow Procedure 6.6, QLPS Troubleshooting.
 - (a) If this does not correct the problem, continue with the following step.
2. Determine if the same phantom links are on both sides of the ONTC.
 - (a) If **yes**, contact the next level of technical support for assistance. The trouble is a dynamic memory problem in the CMP.
 - (b) If **No**, continue with the following step.
3. Check for hardware plugged into TMSU shelves that is not translated.
 - (a) TN888, TN1681, transceiver on rear
 - (b) Make sure that in a TMSU Model 3 there are no KBN4's or KBN2's inserted into any TMSU shelf.
4. Check the foreplane and backplane.
 - (a) Remove the boards located on the TMSU and EBU shelves where the phantom links would be located.
 - (b) Check for bent foreplane pins on the TMSU and EBU shelves.
 - (c) Check for shorted pins on the backplane of the TMSU and EBU shelves that the phantom links would be located.

Note: See Procedure 6.1, TMS Equipment Troubleshooting, backplane audit, for a complete list of possible defects.
 - (d) If no defects are found, check the backplane and foreplane of the entire complaining side of the ONTC complex.
5. If dual fabric, roll all boards in the TMSU and EBU shelves that would contain the phantom links to other shelves.
6. Replace the TN884C in the CMCU at Bay 6 or 5 Shelf 28, Slot 130.
7. After the trouble is cleared, watch the ROP for additional TMS link asynchronous errors.
 - If any other TMS asynchronous errors are encountered, return to Procedure 6.2, TMS Post Mortem Dump Analysis.
8. If this procedure did not correct the phantom asynchronous errors, contact the next level of technical support for assistance.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.4 E-BIT TIME OUTS

OVERVIEW

This procedure is for eliminating E-BIT time outs

Before You Begin Review the following information.

Criticality These messages are indicating service affecting conditions — resolve immediately.

E-BIT Time Outs are PTRACE errors. These errors mean that the switch was unable to find continuity on a time slot to the SM. The E-BIT time out errors will cause massive TMS Post Mortem errors and will cause the affected TMS links to fail.

Exhibit 6.4-1 — Sample E-Bit time Out Error

```
S570-131140 02-01-02 09:27:02 437185 TRCEMON ktokrge
REPT PTRACE: PHtimeout.c AT LINE 147 PCRID 17
Term E-BIT timeout case: facility=N/A,port=0XF0,cos=0X1A,
custat=0X9,ts=0X68,othermod=0,term_type=1,pathstate=1
```

PROCEDURE

1. Collect TMS Post Mortem Dumps.
2. Remove the affected ONTCCOM from service. Enter **RMV:ONTCCOM = [x]**;
3. For remote SMs (that is, RSM or ORM), check the umbilical to the remote.
4. For local SMs, check for lightguide continuity between the CM2 and the affected SM(s).

Note: The most common cause for E-Bit timeouts is reversed fibers between TMS links. This comes in a variety of forms: swapped transmits or receives between two SM's, receives or transmits swapped between ODD and EVEN links, swapped fibers between SM-2000 NLI's, swapped pairs, etc.

- (a) ***Danger: Do NOT look directly into the laser light!***

To check continuity of fibers, remove the receive end from the SM side of either the A or B link and check for the red laser light or measure with a light meter. It should measure -16db, +/-2db.

- (b) Remove the other side of the fiber at the CM end (see figures in the CM2 section of the 235-100-200, Hardware Description, and Table 6.2-3 or 6.2-5). The SM end should now be absent of light. If not, find the other end and install the fiber in the correct location.

- (c) ***Danger: Do NOT look directly into the laser light!***

Remove the receive end from the CM side of either the ODD or EVEN link and check for the red laser light or measure with a light meter. It should measure -16db, +/-2db.

- (d) Remove the other side of the fiber at the SM end (see figures in the CM2 section of the 235-100-200, Hardware Description, and Table 6.2-3 or 6.2-5). The CM end should now be absent of light. If not, find the other end and install the fiber in the correct location.

- (e) If the fibers check out, continue with the following step.
- 5. Perform manual diagnostics on the ONTCCOM. Enter **DGN:TMS=[x]**;
 - (a) If the TMS diagnostics result in ATP, follow Procedure [6.2](#), TMS Post Mortem Dump Analysis.
 - (b) If the TMS diagnostics fail, follow Procedure [6.1](#), TMS Troubleshooting.
- 6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.5 CLEAR TIME SLOT MISMATCHES

OVERVIEW

This procedure is for eliminating time slot mismatches.

Before You Begin Review the following information.

Criticality These messages are indicating service affecting conditions — resolve immediately.

A time slot mismatch occurs when a call is attempted between SM's and a path through the TMS cannot be obtained. This is usually indicative of duplex ONTC troubles, lack of time slots due to multiple CLNK troubles, or a DLI/NLI trouble.

PROCEDURE

1. Filter the last 30 minute Traffic Report, Section 4, SAD (System Access Delay).

- (a) Find the SM with the highest TSMM (Time Slot Mismatch) peg count. This is the SM causing the trouble.

Exhibit 6.5-1 — 30 minute Traffic Report, Section 4

```
S570-196677 02-07-31 09:04:41 020080 TRFM OFORPHE
OP TRFC30 SAD
TIME 08:59:31
```

SECTION 4: SYSTEM ACCESS DELAY

PROC	DTDPC	DTDSC	TDAD	TDASC	REORD	BLKOV	TSMM
1	0	548	0	0	83	0	102
2	0	924	0	0	119	0	163
3	0	618	0	0	124	0	143
~~							~~
~~							~~
25	0	482	0	0	77	0	103
26	0	2082	0	0	1477	0	12745
27	0	1054	0	0	193	0	230
28	0	778	0	0	168	0	180
29	0	557	0	0	88	0	123

2. Determine if any of the CM hardware is Out Of Service (OOS).

- (a) If **No**, skip to Step 3.
- (b) If **Yes**, continue with the following substep.
- (c) Run diagnostics on the OOS equipment.
- (d) If the diagnostics fail, follow Procedure 6.1, TMS Equipment Troubleshooting.
- (e) If diagnostics pass ATP, restore to service and monitor for TSMM's.
- If TSMM's are still present, continue.

3. Monitor the ROP for either of the following errors:

- (a) For TMS Post Mortems, follow Procedure 6.2, TMS Post Mortem Dump Analysis.

- (b) For MMP MSKP errors, follow Procedure [6.12](#), Clearing MI or DMI Diagnostic Failures.
- 4. Determine if there has there been any recent growth or maintenance work performed on the trouble SM recently.
- 5. Go to MCC page 1209, ONTC status, and do the following:
 - (a) Note the active MAJOR ONTC.
 - (b) Switch ONTCs.
 - (c) Monitor for TSMM's, they should now be clear.
 - (d) Remove the troubled DLI from service and run diagnostics.
 - (e) If the DLI diagnostics fail, replace circuit boards using the TLP and diagnose again.
 - (f) If the DLI diagnostics continue to fail, replace all MCTSI circuit boards with another SM.
 - (g) Check SM backplane and foreplane for any defects.
- 6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.6 QLPS TROUBLESHOOTING

OVERVIEW

This procedure is used to clear QLPS trouble.

Before You Begin Review the following information before you begin.

Required Information

Become familiar with the Phase 3 example.

The virtual links are identified in the CM2 section of the 235-100-200 Hardware Manual.

Following is a “Quick Fix Checklist” showing a high level troubleshooting hierarchy.

Table 6.6-1 — TMS Equipment Troubleshooting Quick Fix

Quick Fix
QLPS Troubleshooting
1. Check TN1682
2. Check Tn1684
3. Check Q-Pipe cables (QGP Bus)
4. Audit Backplane (refer to Procedure 6.1, TMS Equipment Troubleshooting)

PROCEDURE

To clear trouble in the QLPS, perform the following:

1. Determine if the TMS is experiencing phantom TMS link asynchronous errors.
 - (a) If **No**, skip to Step 3.
 - (b) If **Yes**, continue with the following Step 1(c).
 - (c) Remove QGP 0-0 (MSGs side 0) from service using the 1241 MCC page or by entering **RMV:QGP=0-0**;
Note: It is possible for a site not to have any QGPs equipped.
 - (d) Power cycle the SN516 at EQL 562-008 to power down QGP 0-0. See the CM2 section of the 235-100-200, Hardware Description for circuit board locations.
 - (e) Monitor the ROP for phantom TMS link asynchronous errors.
 - (f) If phantom asynchronous errors cease, skip to Step 1(o).
 - (g) If phantom asynchronous errors are still evident, restore QGP 0-0 to service and repeat Steps 1(c) through 1(g) for QGP 0-1, if equipped.
 - (h) If phantom asynchronous errors are still evident, restore QGP 0-1 to service and continue.
 - (i) Remove QGP 1-0 (MSGs side 1) from service using the 1251 MCC page or by entering **RMV:QGP=1-0**;
 - (j) Power cycle the SN516 at EQL 662-008 to power down QGP 0-1. See the CM2 section of the 235-100-200, Hardware Description for circuit board locations.

- (k) Monitor the ROP for phantom TMS link asynchronous errors.
 - (l) If phantom async errors cease, skip to Step 1(o).
 - (m) If phantom async errors are still evident, restore QGP 1-0 to service and repeat Steps 1(i) through 1(l) for QGP 1-1 if equipped.
 - (n) If phantom asynchronous errors are still evident after removing all QGPs, return to Procedure 6.3, Phantom TMS Link Troubleshooting.
 - (o) Replace the QGP circuit board:
 1. Replace the TN1684 circuit board at EQL x62-040 or 056.
 2. Power up the QGP and restore to service.
 3. Monitor the ROP for phantom link asynchronous errors.
 4. If phantom asynchronous errors are still evident, return to Procedure 6.3, Phantom TMS Link Troubleshooting.
2. From the 17.19 RC view determine if the TMS is experiencing phantom TMSLNK link asynchronous errors that are really QLPS links (QTMSLNKs).
- Note:** These errors are referred to as “QLPS asynchronous errors” or “QLPS async errors”.
- If **No**, skip to Step 3.
 - If **Yes**, continue with the following step.
- (a) Run diagnostics on the QLPS Network that is associated with the troubled QLPS links.
 1. If diagnostics fail (STF), skip to Step 3.
 2. If diagnostics pass (ATP), continue with the following step.
 - (b) Remove the affected ONTCCOM side from service and power down the TMS. See the ONTCCOM power sequence.
 - (c) Replace the TN1682 that is associated with the complaining QLPS links.

Note: To find the QLPS TN1682 board location, determine if the office is single or dual fabric per RCV 17.12 and locate the complaining link number in Figure 6.2-3 or Figure 6.2-5.
 - (d) Power up the ONTCCOM, restore the ONTCCOM to service, and make the trouble side active “MAJOR.”

If QLPS asynchronous errors are still present, continue with the following step.
 - (e) Check for QGPs as the root cause.
 1. Remove QGP 0-0 (MSG side 0) from service.
 2. Power cycle the SN516 at EQL 562-008 to power down QGP 0-0. See the CM2 section of the 235-100-200, Hardware Description for circuit board locations.
 3. Monitor the ROP for QLPS asynchronous errors.
 4. If QLPS asynchronous errors cease, skip to Step 12.

5. If QLPS asynchronous errors are still evident, continue with the following step.
 6. Restore QGP 0-0 to service.
 7. Remove QGP 1-0 (MSG5 side 1) from service.
 8. Power cycle the SN516 at EQL 662-008 to power down QGP 0-1. See the CM2 section of the 235-100-200, Hardware Description for circuit board locations.
 9. Monitor the ROP for QLPS asynchronous errors.
 10. If QLPS asynchronous errors cease, skip to Step 12.
 11. If QLPS asynchronous errors are still evident, skip to Step 4.
 12. Replace the QGP TN1684 circuit board at EQL x62-040.
 13. Power up the QGP and restore to service.
 14. Monitor the ROP for QLPS asynchronous errors.
 15. If QLPS asynchronous errors are still present, replace the TN1683 QGP circuit board:
 - Remove the troubled QGP from service.
 - Power cycle the SN516 at EQL [x]62-008 to power down the QGP.
 - Replace the TN1683 circuit board at EQL x62-032.
 - Power up the QGP and restore to service.
 - Monitor the ROP for QLPS Asynchronous Errors.
 - If QLPS async errors are still present, skip to Step 4.
3. Determine if the QLPS is failing diagnostics.
- (a) If **No**, skip to Step 6.
 - (b) If **Yes**, continue with the following step.
 - (c) Use the following to replace circuit boards on the TLP list. Start with the first pack on the list. If that does not fix the problem, go to the next pack on the list.
 1. Remove the affected ONTCCOM or QGP side from service and power down the equipment.
 - For TMS power down, see the ONTCCOM power sequence.
 - For QGP power down, press the OFF button on the SN516 circuit board at EQL [x]62-008. See the CM2 section of the 235-100-200, Hardware Description for circuit board locations.
 2. Replace required circuit boards.
 3. Perform manual diagnostics on the QLPS after TLP board replacement.
 - If diagnostics pass (ATP), restore the ONTCCOM to active MAJOR and monitor for TMS asynchronous errors.If any QLPS asynchronous errors are present, follow Step 2.

If any TMSLNK asynchronous errors are found, follow the TMS Link Post Mortem Dump Analysis section to resolve them.

- If QLPS diagnostics fail, continue with the following step.
4. Replace any other QLPS circuit board that is not on the TLP list.
 - Follow Steps 1 through 4 for non-TLP board(s) replacement and return.
 - If QLPS diagnostics fail, continue with the following step.
 4. Check the QLPS cabling.
 - (a) Remove the affected ONTCCOM side from service and power down the TMS. See the ONTCCOM power sequence.
 - (b) Check the Q-Pipe cables (QGP Bus cables).

Note: The Q-Pipes are physical cables that run from the TN1682 circuit board in the TMS to the TN1684 circuit board in the MSGS.

1. For QGP cable end locations, see Figure 6.6-1 and Figure 6.6-2.

Single QGP (Processor 32) Dual Fabric REAR VIEW

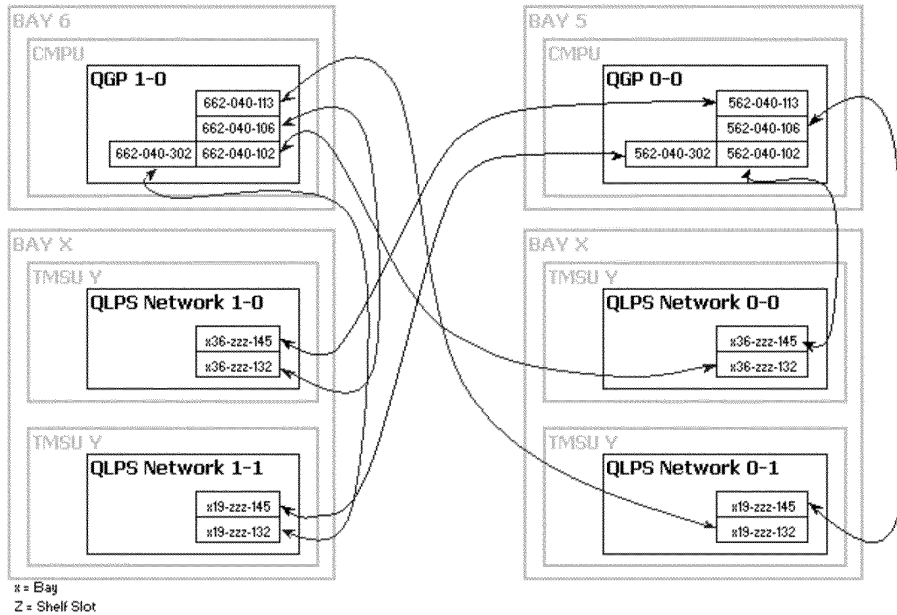


Figure 6.6-1 — QGL Cabling between MSGS and TMS (Single QGP) (1 of 2)

SINGLE QGP QGL						
MSCU	QGP	QGL	EQL	TMS	QLPS	EQL
0	0	0	562-040-102	0	0	x36-zzz-145
		1	562-040-106	0	1	x19-zzz-145
		2	562-040-113	1	0	x36-zzz-145
		3	562-040-302	1	1	x19-zzz-145
MSCU	QGP	EQL		TMS	QLPS	EQL
1	0	0	662-040-102	0	0	x36-zzz-132
		1	662-040-113	0	1	x19-zzz-132
		2	662-040-106	1	0	x36-zzz-132
		3	662-040-302	1	1	x19-zzz-132

Figure 6.6-1 — QGL Cabling between MSGS and TMS (Single QGP) (2 of 2)

Dual QGP (Processor 32 & 33) Dual Fabric REAR VIEW

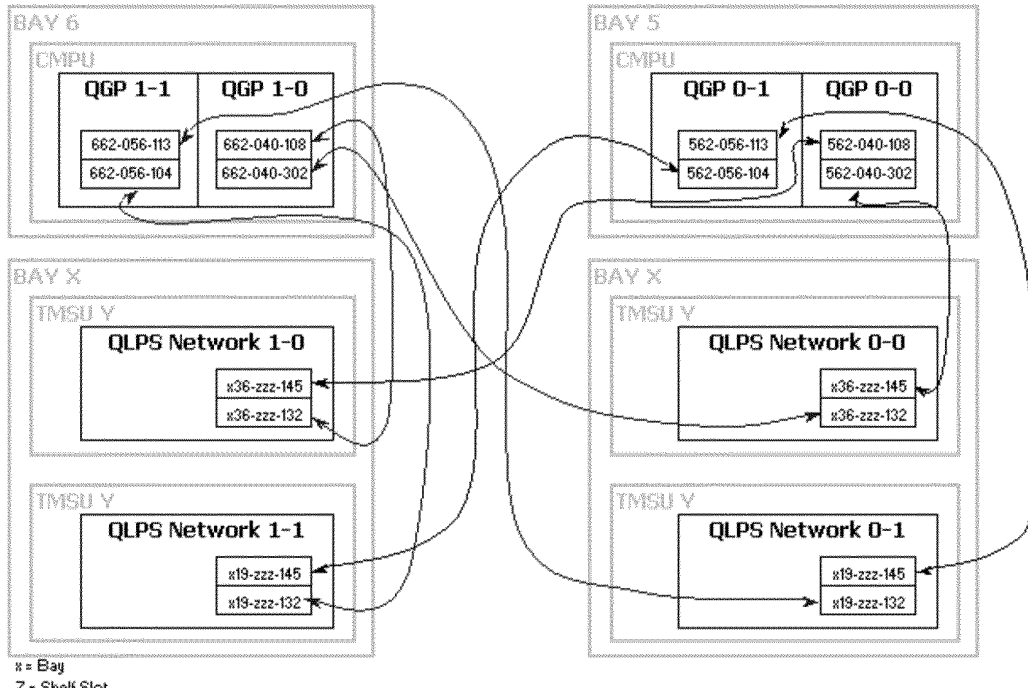


Figure 6.6-2 — QGL Cabling between MSGS and TMS (Dual QGP) (1 of 2)

DUAL QGP QGL						
MSCU	QGP	EQL		TMS	QLPS	EQL
0	0	0	562-040-302	0	0	x36-zzz-145
		2	562-040-108	1	0	x36-zzz-145
	1	1	562-056-104	0	1	x19-zzz-145
		3	562-056-113	1	1	x19-zzz-145
MSCU	QGP	EQL		TMS	QLPS	EQL
1	0	0	662-040-302	0	0	x36-zzz-132
		2	662-040-108	1	0	x36-zzz-132
	1	1	662-056-113	0	1	x19-zzz-132
		3	662-056-104	1	1	x19-zzz-132

Figure 6.6-2 — QGL Cabling between MSGS and TMS (Dual QGP) (2 of 2)

2. For QLPS cable end locations:
 - Determine if office is single or dual fabric via RCV 17.12.
 - Find the QLPS links per RCV 17.19.
 - Find the QLPS links in Figure 6.2-3 or Figure 6.2-5.
3. Determine if the cables are plugged all the way into the 127C connector.

4. Determine if the slack "loop" for the QLPS Network cables is bent at 180 degrees.
 - If they are, cut stitches and expand into graceful loops.
5. Perform a continuity check on the cables associated with the troubled QLPS link. If any trouble is found, correct, and run QLPS diagnostics below.
6. If no trouble is found with the cables, skip to Step 5.
7. Run QLPS diagnostics.
 - If diagnostics pass (ATP), restore the ONTCCOM to active MAJOR and monitor for TMS asynchronous errors.
 - If QLPS asynchronous errors are still present, go to Step 5.
 - If no QLPS asynchronous errors are found, monitor for TMSLNK asynchronous errors. If found, follow the TMS Link Post Mortem Dump Analysis section.
 - If QLPS diagnostics fail, continue with the following step.
5. Check the TMS. This could be the root cause of the QLPS trouble.
 - (a) Follow Procedure 6.1, TMS Equipment Troubleshooting for QLPS trouble resolution.
6. Determine if the QLPS is experiencing QGL errors.
 - (a) If **No**, skip to Step 7
 - (b) If **Yes**, continue with the following step.

Exhibit 6.6-1 — Example QGL Diagnostic Output

```
S570-11141257 03-02-05 11:47:53 272021 MSGS V3 BAT75EE
* REPT TRBL, REMOVE QGL=1-0-0, EVENT=44037
  ERROR=QGL FAULT TIME=11:47:34.1
  RECOVERY ACTIONS:
    REMOVE QGL=1-0-0
S570-11141257 03-02-05 11:47:57 272022 MSGS V3 BAT75EE
* REPT TRBL, REMOVE QGL=1-0-1, EVENT=44047
  ERROR=QGL FAULT TIME=11:47:37.3
  RECOVERY ACTIONS:
    REMOVE QGL=1-0-1
```

- (c) Determine if the QLPSS is dual or single fabric.
- (d) Determine if there are single or dual MMP's.
- (e) Analyze which QGL links are faulty.
 - If there is only one faulty QGL link, start at the QLPS TN1682 to which the QGL link terminates.
 - If two QGLs are faulty, see if the links are split between QLPS Networks. If they are, then the TN1684 in the QGP is defective.
 - If two QGLs from one QLPS Network are faulty, then the TN1682 is faulty.

- (f) If the circuit board replacement(s) does not correct the trouble, check the cable and backplane.
- 7. STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.7 CLEARING DLI DIAGNOSTIC FAILURES

OVERVIEW

This procedure is used to clear DLI DIAGNOSTIC FAILURE trouble.

Before You Begin Review the following information before you begin.

Required Information

The two DLIs in an SM operate in a master/slave relationship. The side of the ONTC that is currently MAJOR is the master DLI that forwards PCM data to the ACTIVE MCTSI.

The TMS to SM path layout is identified in the CM2 section of the 235-100-200 Hardware Manual.

The following is a “Quick Fix Checklist” showing a high-level troubleshooting hierarchy.

Table 6.7-1 — DLI Diagnostic Failure Troubleshooting Quick Fix

Quick Fix
DLI Diagnostic Failure Troubleshooting
1. MCTU Model and Fabric Type
2. TLP Board Replacement
3. Optic Fiber and Backplane Replacement
4. Phase Segment Analysis
5. MCTSI Board Swap
6. Power Bus Noise
7. Cabling Check and Possible Replacement
8. Backplane Check and Possible Replacement

PROCEDURE

To clear a DLI diagnostic failure, perform the following procedure.

1. Determine if the MCTSI is an MCTU2 (SMP20), an MCTU1 (SMP23), or an MCTU3.
 - (a) The MCTU type can be found on the 18.1 RCV page:

MCTU1	SMPU3 SMP23 Version 3, CDMX, Motorola 68020 microprocessor
MCTU2	SMPU4 SMP20 Motorola 68020 microprocessor
MCTU3	No SMP value; Motorola 68LC040 microprocessor
2. Determine if the TMS fabric type is dual or single
 - (a) The TMS fabric type is found on the 17.12 RCV page.
 - (b) Determine which TMS link is associated with the faulty DLI. Refer to the 1201 MCC page.
 - (c) Determine the physical location of the TMS link. Refer to Procedure 6.1, TMS Troubleshooting, Figure 6.2-3 and Figure 6.2-5.

3. Replace the circuit boards implicated by the failing diagnostic's TLP list. Start by replacing the first pack on the list. If that does not fix the problem, go on to the next pack on the list.
 - (a) If a 1A Transceiver is to be replaced, refer to Procedure 6.10, Replace 1A Transceivers.
 - (b) If the TLP list implicates a QLI (TN883,TN888) in the TMSU, the ONTCCOM must be removed from service and powered down per the power sequence.
 - (c) If the TLP list implicates the TN1077, skip to Step 4.
 - (d) If the TLP list implicates an MCTSI board(s), skip to Step 5.
 - (e) After all TLP circuit boards have been replaced/swapped, continue at Step 6.
4. To replace the TN1077 DLI circuit board, perform the following:
 - (a) Remove the affected DLI side from service. Enter **RMV:DLI=d-c**;
Where: c = side
 d = SM.
 - (b) Press the OFF button on the face of the TN1077 circuit board to power down the DLI off.

MCTU1 DLI	036-084 Side 0
	036-098 Side 1
MCTU2 DLI	019-156 Side 0
	028-156 Side 1
MCTU3 DLI	036-084 Side 0
	036-176 Side 1
 - (c) Remove the TN1077 DLI circuit board by pulling down and then out on the latch.

Insert the new TN1077 board and push it with your index finger until the latch starts to close. Then push the latch into its locked position. If any resistance is encountered, remove the board and check the foreplane pins.
 - (d) Press the ON button on the face of the TN1077 circuit board to power up the DLI.
 - (e) Restore the DLI to service. Enter **RST:DLI=d-c**;
Where: c = side
 d = SM.
 - (f) If the DLI continues to fail, replace the next board on the TLP list.
Return to Step 3.
5. To replace the MCTSI circuit boards, perform the following.
 - (a) Remove the correct MCTSI side from service. Enter **RMV:MCTSI=d-c**;
Where: c = side
 d = SM.

- (b) Press the OFF button on the face of the UN516 or SN516 Control/Display circuit board.

MCTU1 036-016 Side 0
036-172 Side 1
MCTU2 019-026 Side 0
028-026 Side 1
MCTU3 036-014 Side 0
036-106 Side 1

- (c) Remove the MTCSI circuit board by pulling down and then out on the latch.

Insert the new board and push it with your index finger until the latch starts to close. Then push the latch into its locked position. If any resistance is encountered, remove the board and check the foreplane pins.

- (d) Press the ON button on the face of the UN516 or SN516 circuit board.

- (e) Restore to service. Enter **RST:DLI=d-c;**

Where: c = side
d = SM.

- (f) If the DLI fails, replace the next board on the TLP list.

Return to Step 3.

- 6. To inspect the optic fiber, perform the following:

- (a) Inspect both ends of the optic fibers (A or B link) for correct termination. Determine if the fiber connector is locked/seated into the 1A Transceiver.
- (b) Clean both ends of the optic fibers.
- (c) Determine if the correct TMS transmit fiber is connected to the correct DLI 1A Transceiver receive port. Determine if the correct TMS receive fiber is connected to the correct DLI 1A Transceiver transmit port.

Refer to the TMS to SM Path figures in the CM2 section of the 235-100-200 Hardware Description Manual for correct terminations.

1. If the optic fibers appear to be reversed or a faulty fiber is suspect, the following procedure will correct the trouble.
- 2.

Danger: Do NOT look directly into the laser light!

To check continuity of fibers, remove the receive end from the SM side of either the A or B link and check for the red laser light or measure with a light meter. It should be around -16db, +/-2db.

3. Remove the other side of the fiber at the CM end. Refer to the CM2 section of the 235-100-200 Hardware Description Manual, and Figure 6.2-3 or Figure 6.2-5. The SM end should now be absent of light. If not, find the other end and reterminate the fiber in the correct location.

- 4.

Danger: Do NOT look directly into the laser light!

Remove the receive end from the CM side of either the ODD or EVEN link and check for the red laser light or measure with a light meter. It should be around -16db , $\pm 2\text{db}$.

5. Remove the other side of the fiber at the SM end. Refer to the CM2 section of the 235-100-200 Hardware Description Manual, and Figure 6.2-3 or Figure 6.2-5). The CM end should now be absent of light. If not, find the other end and reterminate the fiber in the correct location.
6. If the fibers check out, continue with the following step.
7. Perform an audit of the backplane and foreplane:
 - (a) An inspection for electrically shorted pins of the entire MCTU backplane and foreplane should be performed. In addition, the TMSU that is associated with the faulty DLI should be inspected. A number of DLI failures have been corrected with a simple backplane/foreplane audit.

Note: The types of defects found in the backplane and foreplane are located in Procedure 6.1, TMS Equipment Troubleshooting, Steps 8 and 9.
 - (b) If shorted pins were found and corrected, run diagnostics on the faulty DLI.
 1. If the DLI diagnostics now result in ATP, restore the DLI to service.
 2. If the DLI diagnostics fail, continue at Step 8.
 - (c) If no defects were found, continue with the following step.
8. Look up the failing DLI diagnostic phase and segment in the Diagnostic Phase Descriptions of this section and follow the "Possible Fault" suggestions for non-TLP circuit boards and SM path hardware.
 - (a) The exception to this is Phase 10. Follow all suggestions for Phase 10.
 - (b) If the phase segment's "possible fault" suggestions do not correct the fault, continue with the next step.
9. Switch MCTSI sides and repeat the DLI diagnostics. If the DLI diagnostics result in ATP on the other MCTSI side, the trouble is between the original ACT MCTSI and the failing DLI (remember that the DLI is cross-coupled to both sides of the MCTSI).
 - (a) Move all MCTSI packs (including power boards) to another SM one side at a time.
 - If the DLI is failing both MCTSI sides, move both MCTSI sides.
 - If the DLI is failing only on one MCTSI side, move the affected side only.
10. There have been several instances that the trouble was caused by noise on the power bus.
 - (a) Refer to Procedure 6.9, Clear Power Bus Noise Trouble.
 - (b) If no noise was found on the power bus, continue with the next step.
11. The problem could be in the ribbon cabling from the DLI to the MCTSI. Or the problem could be the backplane, especially if the DLI is failing to both MCTSI's.

Caution: *Seek the next level of technical support.*

See cabling and backplane Figures 6.7-1- through 6.7-7.

Note: If the problem has been isolated to a particular A or B link (the DLI and link hardware has been swapped or replaced) and the DLI is failing to only one MCTSI, see the following for lead locations.

Cross-couple Ribbon Cable Pins and Backplane Leads from DLI to MCTSI

MCTU2							
LEAD DESIG (SMP20)	FUNCTION	Cross-Connect Cable	PIN	CONT 0 SLOT	PIN	DLI 0 or 1 SLOT	PIN
00ADLIR	DATA LEAD, A LINK, DLI 0	152	042	088	042	156	152
10ADLIR	DATA LEAD, A LINK, DLI 1	152	038	088	242	156	156
00ADPAR	PARITY LEAD, A LINK, DLI 0	153	042	088	142	156	151
10ADPAR	PARITY LEAD, A LINK, DLI 1	153	038	088	342	156	155
00ACPI	CPI LEAD, A LINK, DLI 0	152	050	026	043	156	236
00BCPI	CPI LEAD, B LINK, DLI 0	153	050	026	039	156	235
10ACPI	CPI LEAD, A LINK, DLI 1	152	056	026	243	156	238
10BCPI	CPI LEAD, B LINK, DLI 1	153	056	026	343	156	237
00BDLIR	DATA LEAD, B LINK, DLI 0	152	040	088	040	156	132
10BDLIR	DATA LEAD, B LINK, DLI 1	152	036	088	240	156	136
00BPAR	PARITY LEAD, B LINK, DLI 0	153	040	088	140	156	032
10BPAR	PARITY LEAD, B LINK, DLI 1	153	036	088	340	156	135

DLI 0 = 019-156
DLI 1 = 020-156

Figure 6.7-1 — Cross-Couple Ribbon Cable Pins and Backplane Leads from DLI to MCTSI (MCTU2)

DLI Cross-Connect Ribbon Cable

MCTU2		
Shelf 19 (side 0)		Shelf 28 (side 1)
153-045	TO	153-045
153-032	TO	153-032
153-013	TO	153-013
153-000	TO	153-000

Figure 6.7-2 — DLI Cross-Connect Ribbon Cable (MCTU2)

DIP SWITCH LEADS TO DLI - "A" LINK

MCTU2				
LEAD DESIG (SMP20)	FUNCTION	DLI 156 PIN	DPS 154 PIN	DPS 155
yAMAEN	MSG add enable, A Link	056	055	N/A
yAMA0	MSG add bit 0, A Link	055	054	SW1
yAMA1	MSG add bit 1, A Link	054	053	SW2
yAMA2	MSG add bit 2, A Link	053	052	SW3
yAMA3	MSG add bit 3, A Link	052	051	SW4
yAMA4	MSG add bit 4, A Link	051	050	SW5
yAMA5	MSG add bit 5, A Link	050	049	SW6
yAMA6	MSG add bit 6, A Link	049	048	SW7
yAMA7	MSG add bit 7, A Link	048	047	SW8

y = DLI 0 or 1
DLI 0 = 019-156
DLI 1 = 028-156

DPS = Dip Switch
add = address

Figure 6.7-3 — DIP Switch Leads to DLI — "A" Link (MCTU2)

DIP SWITCH LEADS TO DLI - "B" LINK

MCTU2				
LEAD DESIG (SMP20)	FUNCTION	DLI 156 PIN	DPS 154 PIN	DPS 155
yBMAEN	MSG add enable, B Link	045	042	N/A
yBMA0	MSG add bit 0, B Link	044	041	SW1
yBMA1	MSG add bit 1, B Link	043	040	SW2
yBMA2	MSG add bit 2, B Link	042	039	SW3
yBMA3	MSG add bit 3, B Link	041	038	SW4
yBMA4	MSG add bit 4, B Link	040	037	SW5
yBMA5	MSG add bit 5, B Link	039	036	SW6
yBMA6	MSG add bit 6, B Link	038	035	SW7
yBMA7	MSG add bit 7, B Link	037	034	SW8

y = DLI 0 or 1
 DLI 0 = 019-156
 DLI 1 = 028-156

DPS = Dip Switch
 add = address

Figure 6.7-4 — DIP Switch Leads to DLI — "B" Link (MCTU2)

Backplane Leads from DLI to MCTSI

MCTU1								
LEAD DESIG (SMP23)	FUNCTION	CONT 0 SLOT	CONT 1 SLOT	PIN	DLI 0 SLOT	PIN	DLI 1 SLOT	PIN
00ADLIR	DATA LEAD, A LINK, DLI 0	064	120	256	084	152	098	152
10ADLIR	DATA LEAD, A LINK, DLI 1	064	120	056	242	156	098	156
00ADPAR	PARITY LEAD, A LINK, DLI 0	064	120	022	142	151	098	151
10ADPAR	PARITY LEAD, A LINK, DLI 1	064	120	021	342	155	098	155
00ACPI	CPI LEAD, A LINK, DLI 0	064	120	345	043	236	098	236
00BCPI	CPI LEAD, B LINK, DLI 0	064	120	245	039	235	098	235
10ACPI	CPI LEAD, A LINK, DLI 1	064	120	145	243	238	098	238
10BCPI	CPI LEAD, B LINK, DLI 1	064	120	045	343	237	098	237
00BDLIR	DATA LEAD, B LINK, DLI 0	064	120	156	040	132	098	132
10BDLIR	DATA LEAD, B LINK, DLI 1	064	120	055	240	136	098	136
00BPAR	PARITY LEAD, B LINK, DLI 0	064	120	018	140	032	098	032
10BPAR	PARITY LEAD, B LINK, DLI 1	064	120	017	340	135	098	135

NOTE: x = MCTSI 0 or 1

Figure 6.7-5 — Backplane Leads from DLI to MCTSI (MCTU1)

DIP SWITCH LEADS TO DLI - "A" LINK

MCTU1							
LEAD DESIG (SMP23)	FUNCTION	DLI 0 084 PIN	DPS 082 PIN	DPS 083	DLI 1 098 PIN	DPS 096 PIN	DPS 097
yAMAEN	MSG add enable, A Link	056	055	N/A	056	055	N/A
yAMA0	MSG add bit 0, A Link	055	054	SW1	055	054	SW1
yAMA1	MSG add bit 1, A Link	054	053	SW2	054	053	SW2
yAMA2	MSG add bit 2, A Link	053	052	SW3	053	052	SW3
yAMA3	MSG add bit 3, A Link	052	051	SW4	052	051	SW4
yAMA4	MSG add bit 4, A Link	051	050	SW5	051	050	SW5
yAMA5	MSG add bit 5, A Link	050	049	SW6	050	049	SW6
yAMA6	MSG add bit 6, A Link	049	048	SW7	049	048	SW7
yAMA7	MSG add bit 7, A Link	048	047	SW8	048	047	SW8

y = DLI 0 or 1

DPS = Dip Switch
 add = address

Figure 6.7-6 — DIP Switch Leads to DLI — "A" Link (MCTU1)

DIP SWITCH LEADS TO DLI - "B" LINK

MCTU1							
LEAD DESIG (SMP23)	FUNCTION	DLI 0 084 PIN	DPS 082 PIN	DPS 083	DLI 1 098 PIN	DPS 096 PIN	DPS 097
yBMAEN	MSG add enable, B Link	045	042	N/A	045	042	N/A
yBMA0	MSG add bit 0, B Link	044	041	SW1	044	041	SW1
yBMA1	MSG add bit 1, B Link	043	040	SW2	043	040	SW2
yBMA2	MSG add bit 2, B Link	042	039	SW3	042	039	SW3
yBMA3	MSG add bit 3, B Link	041	038	SW4	041	038	SW4
yBMA4	MSG add bit 4, B Link	040	037	SW5	040	037	SW5
yBMA5	MSG add bit 5, B Link	039	036	SW6	039	036	SW6
yBMA6	MSG add bit 6, B Link	038	035	SW7	038	035	SW7
yBMA7	MSG add bit 7, B Link	037	034	SW8	037	034	SW8

y = DLI 0 or 1

DPS = Dip Switch
add = address

Figure 6.7-7 — DIP Switch Leads to DLI — "B" Link (MCTU1)

- (a) Inhibit hardware and software checks in the faulty SM.
 - (b) Remove from service the MCTSI side that is associated with the faulty DLI.
 - (c) Remove the DLI cross-couple ribbon cable.
 - (d) Using a voltmeter in the OHM setting, check each backplane trace for an open or for resistance.
 - (e) If the backplane tests pass, swap or replace ribbon cables.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.8 CLEARING DLI INTERRUPTS

OVERVIEW

This procedure is used to clear DLI INTERRUPT trouble.

Before You Begin Review the following information.

Required Information

The following is a “Quick Fix Checklist” showing a high-level troubleshooting hierarchy.

Table 6.8-1 — DLI INTERRUPT Troubleshooting Quick Fix

Quick Fix
DLI INTERRUPT Troubleshooting
1. Check TMS ASYNC ERRORS
2. MCTU Model and TMS Fabric Type
3. DLI Interrupt Analysis
4. Optic Fiber and Backplane Replacement
5. Replace Suspected Faulty Circuit Board
6. Power Bus Noise
7. Cabling Check and Possible Replacement
8. Backplane Check and Possible Replacement

PROCEDURE

To clear a DLI diagnostic failure, perform the following:

- Determine if the affected TMS links are reporting an asynchronous error.
 - If they are, refer to Procedure 6.2, TMS Post Mortem Dump Analysis to resolve the problem.
If the post mortem dump analysis does not resolve the issue, continue with the following steps.
 - If they are not, continue with the following steps.
- Determine if the MCTSI is an MCTU2 (SMP20), an MCTU1 (SMP23), or an MCTU3. The MCTU type can be found on the RC/V 18.1 view.

MCTU1	SMPU3 SMP23 Version 3, CDMX, Motorola 68020 microprocessor
MCTU2	SMPU4 SMP20 Motorola 68020 microprocessor
MCTU3	No SMP value; Motorola 68LC040 microprocessor

- Determine if the TMS fabric type is dual or single
 - The TMS fabric type is found on the RC/V 17.12 view.
 - Determine which TMS link is associated with the faulty DLI. Refer to MCC page 1201.
 - Determine the physical location of the TMS link. Refer to Procedure 6.1, TMS Troubleshooting, Figure 6.2-3 and Figure 6.2-5.
- A DLI interrupt will give the type of trouble and link A or B in plain English. See Example 6.8-1.

Exhibit 6.8-1 — DLI Interrupt

```
S570-393364 03-01-16 04:01:36 025116 INT_MON OFOVIDE
REPT SM=11,1,ACT HWLVL=0 SWLVL=RPI EVENT=21305 COMPLETED
DLI1 CONTIN-B-OOF-ERROR
```

Continuity Out-of-Frame Error on the B-Link

```
HW-ERR FAIL-ADDR=H'0 ROM-UNK DATA-BUS=H'0 TIME=0:47.5
PROCESS:BG=64,0,RPI CM=NONE, FG=NONE,, NORMAL
ORIG-HW-STATUS: LINK_1A: ACT LINK_1B: ACT
FINAL-HW-STATUS: LINK_1A: ACT LINK_1B: OOS
PREVIOUS TYPE/COUNT: 121 0
SHADOW TYPE/COUNT: 72 150994944
AUX DATA: H'0 H'200 H'0 H'0
ESCALATION-COUNTS: H'20001 H'0 H'0 H'0
```

```
S570-393364 03-01-16 04:01:44 025123 INT_MON OFOVIDE
REPT SM=11 HARDWARE CONTEXT BASIC LSM EVENT=21305
68020-REGISTERS: SSP=H'22bfc PC=H'5ccb7e SR=H'4
USP=H'127ebe FP=H'127ed0 A5=H'c1d6e0 A4=H'c15738
A0=H'223a4c A1=H'10c4bc0 A2=H'127f3e A3=H'10cfd70
D0=H'10 D1=H'70 D2=H'f D3=H'0
D4=H'345 D5=H'1 D6=H'0 D7=H'1
PIC-REGISTERS: HI MED LOW
IRR: H'2 H'80 H'82
IMR: H'c0 H'3f H'c0
ISR: H'2 H'0 H'0
```

```
S570-393364 03-01-16 04:01:52 025126 INT_MON OFOVIDE
REPT SM=11 DLI HW REGS EVENT=21305
ALCTL=H'82 BLCTL=H'82 ERR1 =H'40 ERR2 =H'88
LCMDR=H'2 DLSCR=H'33 MSK1 =H'0 MSK2 =H'0
AMTSR=H'52 BMTSR=H'53 ALCTR=H'9 BLCTR=H'6
LMODE=H'0 CKSR=H'33 BTEEDR=H'89
```

This example states that SM 11's MCTSI is receiving Out-of-Frame, Receive Parity, and Buffer Errors on the B-Link (TMS Link 23). Based upon the Error Source Register Layout, one should first change the DLI TN1077, then change the transceivers for the B-Link, then check the optic fibers, and lastly change the TN1086 Signal Processor.

Sample Resolution In one instance, this error turned out to be a defective 982TT TMS Transceiver. The process took three steps:

- a. The TN1077 was swapped with a TN1077 in another SM and monitored for DLI interrupts.
- b. The 982TSA was swapped with a 982TSA in another SM and monitored for DLI interrupts.
- c. The 982TT was replaced (a spare was available) and monitored for interrupts.

In general, DLI Interrupts are troubles in the TMS to SM path. The SM path consists of the following:

- DLI TN1077 circuit board
- DLI 1A Transceiver (982TS* or 982TR*)
- Optic fibers; transmit or receive
- TMS 1A Transceiver (982TT*).

In some cases, the suspect board(s) will lie within the MCTSI. The MCTSI boards consist of the TN1086 Signal Processor and the Core boards for all MCTU models.

Take the ERR1 and ERR2 Error Source Registers from the DLI interrupt and break down per the DLI Error Source Register Layout Figure [6.8-1](#). · See the DLI INTERRUPT Example [6.8-1](#)

DLI ERROR SOURCE REGISTER LAYOUT

ESR1 (ERR1)						NOTE
BIT	ERROR	SM PATH	Possible Fault			
			MCTU2	MCTU3	MCTU1	
0	REC PARITY LINK A	TN1077, LINK A				1
1	XMT PARITY LINK A	TN1077, LINK A	TN1086,UN517 (CORE SUP), Cable, BP	TN1086,KBN20/21/22	TN1086, CORE*	1,3,5
2	LINK A OUT OF FRAME	TN1077, LINK A	TN1086	TN1086	TN1086, CORE*	1
3	ADDRESS PARITY ERROR	TN1077	CORE: (UN516,UN518,UN517), Cable, BP	KBN20/21/22	CORE*	3,5
4	REC PARITY LINK B	TN1077, LINK B			CORE*	1
5	XMT PARITY LINK B	TN1077, LINK B	TN1086,UN517 (CORE SUP), Cable, BP	TN1086,KBN20/21/22	TN1086, CORE*	1,3,5
6	LINK B OUT OF FRAME	TN1077, LINK B	TN1086	TN1086	TN1086, CORE*	1
7	PHASE LOCKED LOOP SLIP	TN1077	TN1086	TN1086	TN1086, CORE*	2

1. A or B Link = DLI Transceiver, TMS Transceiver, and Optic Fiber
2. Switch controllers, if PLL slips do not occur, suspect TN1086 in interrupting controller. If occurring both sides, suspect interrupting DLI or NCLK in CMCU. See PLL LEADS Table 7-2.
3. "Cable" is the ribbon cable from the DLI to the MCTSI. See DLI Cross-Connect Ribbon Cable Table
- * For MCTU1 version 3 - CDMX, the Core boards consists of the TN1423, TN1533, TN872, TN874, TN1408

ESR2 (ERR2)						NOTE
BIT	ERROR	SM PATH	Possible Fault			
			MCTU2	MCTU3	MCTU1	
0	LINK A CLOCK	TN1077, LINK A	TN1086, BP	TN1086	TN1086, CORE*	1,4,6
1	LINK B CLOCK	TN1077, LINK B	TN1086, BP	TN1086	TN1086, CORE*	1,4,6
2	LINK A BUFF ERROR	TN1077, LINK A	TN1086	TN1086	CORE*	1
3	LINK B BUFF ERROR	TN1077, LINK B	TN1086	TN1086	CORE*	1
4	MSG T/S XMT PARITY A	TN1077, LINK A	TN1086,UN517 (CORE SUP), Cable, BP	TN1086,KBN20/21/22	TN1086, CORE*	1,4,5
5	MSG T/S XMT PARITY B	TN1077, LINK B	TN1086,UN517 (CORE SUP), Cable, BP	TN1086,KBN20/21/22	TN1086, CORE*	1,4,5
6	MSG T/S REC PARITY A	TN1077, LINK A	TN1086,UN517 (CORE SUP), Cable, BP	TN1086,KBN20/21/22	CORE*	1,5
7	MSG T/S REC PARITY B	TN1077, LINK B	TN1086,UN517 (CORE SUP), Cable, BP	TN1086,KBN20/21/22	CORE*	1,5

4. Suspect TN1086 in mate MCTSI.
5. BP = Backplane
6. See PLL LEADS Table 7-2 for possible fault.

Figure 6.8-1 — DLI Error Source Register Layout

Note: The Error Source Registers (ERR1 & ERR2) can display multiple errors. If this is the case, all "possible faults" must be pursued to resolve the trouble, starting with the TN1077 and then SM path hardware.

5. Inspect the optic fiber.
 - (a) Inspect both ends of the optic fibers (A or B link) for correct termination. Determine if the fiber connector is locked/seated into the 1A Transceiver.
 - (b) Clean both ends of the optic fibers.

- (c) Determine if the correct TMS transmit fiber is connected to the correct DLI 1A Transceiver receive port. Then determine if the correct TMS receive fiber is connected to the correct DLI 1A Transceiver transmit port.

Refer to the TMS to SM Path figures in the CM2 section of the 235-100-200, Hardware Description for correct terminations. If the optic fibers appear to be reversed or a faulty fiber is suspect, the following procedure should correct the trouble.

1.

Danger: Do NOT look directly into the laser light!

To check the continuity of fibers, remove the receive end from the SM side of either the A or B link and check for the red laser light or measure with a light meter. The meter should be around -16db, +/-2db).

2. Remove the other side of the fiber at the CM end. Refer to the CM2 section of the 235-100-200 Hardware Description Manual , and Figure 6.2-3 or Figure 6.2-5. The SM end should now be absent of light. If not, find the other end and reterminate the fiber in the correct location.

3.

Danger: Do NOT look directly into the laser light!

Remove the receive end from the CM side of either the ODD or EVEN link and check for the red laser light or measure with a light meter (should be around -16db, +/-2db).

4. Remove the other side of the fiber at the SM end (see the CM2 section of the 235-100-200 Hardware description manual , and 6.2-3 or 6.2-5). The CM end should now be absent of light. If not, find the other end and reterminate the fiber in the correct location.

5. If the fibers check out, continue with the following step.

6. Perform an audit of the backplane and foreplane.
- (a) An inspection for electrically shorted pins of the entire MCTU backplane and foreplane should be performed. In addition, the TMSU associated with the faulty DLI should be inspected. A number of DLI failures have been corrected with a simple backplane/foreplane audit.
 - (b) The types of defects found in the backplane and foreplane are located in Procedure 6.1, TMS Equipment Troubleshooting, Steps 8 and 9.
 - (c) If shorted pins were found and corrected, run diagnostics on the faulty DLI.
 - 1. If the DLI diagnostics result in ATP, restore the DLI to service.
 - 2. If the DLI diagnostics fail, continue at Step7.
 - (d) If no defects were found, continue with the following step.
7. Replace circuit boards per the "possible fault" indicators in the DLI Error Source Register Layout of Figure 6.8-1.

Note: Be sure to follow any indicated notes. For example, you may have to switch MCTSI sides and replace mate MCTSI circuit boards.

- (a) To replace NCT Link hardware, perform one of the following:
- Procedure 6.10, Replace 1A Transceivers
 - Procedure 6.11, Replace NLIs.
- (b) To replace a QLI (TN883,TN888) in the TMSU, the ONTCCOM must be removed from service and powered down per the power sequence.
- (c) To replace a TN1077 DLI circuit board, perform the following:
1. Remove the affected DLI side from service. Enter **RMV:DLI=d-c;**
Where: c = side
 d = SM
 2. Press the OFF button on the face of the TN1077 circuit board to power down the DLI.

MCTU1 DLI	036-084 Side 0
	036-098 Side 1
MCTU2 DLI	019-156 Side 0
	028-156 Side 1
MCTU3 DLI	036-084 Side 0
	036-176 Side 1

3. Remove the TN1077 DLI circuit board.

Insert the new board and push the board with your index finger until the latch starts to close. Then push the latch into its locked position. If any resistance is encountered, remove the board and check the foreplane pins.
 4. Press the ON button on the face of the TN1077 circuit board to power up the DLI.
 5. Restore the DLI to service. Enter **RST:DLI=d-c;**
Where: c = side
 d = SM
 6. If the DLI diagnostics continue to fail, continue with the next step.
- (d) To replace an MCTSI circuit board, perform the following:
1. Remove the correct MCTSI side from service. Enter **RMV:MCTSI=d-c;**
Where: c = side
 d = SM
 2. Press the OFF button on the face of the UN516 or SN516 Control/Display circuit board.

MCTU1	036-016 Side 0
	036-172 Side 1
MCTU2	019-026 Side 0
	028-026 Side 1
MCTU3	036-014 Side 0
	036-106 Side 1

3. Remove the MCTSI circuit board.

Insert the new board and push the board with your index finger until the latch starts to close. Then push the latch into its locked position. If any resistance is encountered, remove the board and check the foreplane pins.

4. Press the ON button on the face of the UN516 or SN516 circuit board.
5. Restore the DLI to service. Enter **RST:DLI=d-c**;

Where: c = side
 d = SM

6. If the DLI diagnostics fail, replace the next possible faulty circuit board. If the next board is in the MCTSI, repeat Step 7(d).
8. There have been several instances that the trouble was caused by noise on the power bus.
 - (a) Refer to Procedure 6.9, Clear Power Bus Noise Trouble.
 - (b) If no noise was found on the power bus, continue with the next step.
9. The problem could be in the ribbon cabling from the DLI to the MCTSI. Or the problem could be in the backplane, especially if the DLI is failing to both MCTSI's.

Caution: Seek the next level of technical support.

See Cabling and Backplane Figures 6.7-1- and 6.7-7.

- (a) Inhibit hardware and software checks in the faulty SM.
 - (b) Remove from service the MCTSI side that is associated with the faulty DLI.
 - (c) Remove the DLI cross-couple ribbon cable.
 - (d) Using a voltmeter in the OHM setting, check each backplane trace for an open or for resistance.
 - (e) If the backplane tests pass, swap or replace ribbon cables.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.9 CLEAR POWER BUS NOISE TROUBLE

OVERVIEW

This procedure is used to clear Power Bus Noise trouble.

Before You Begin Review the following information.

When to use

A DLI is failing diagnostics and/or an alarm power LED is on or flickering

Required Information

In some cases, a DLI failure is the result of excessive noise between the -48v RTN and frame ground power bus. The symptoms vary. The DLI could be failing several different phases and could possibly pass diagnostics intermittently. In addition, the DLI power LED could be lit or flickering. In some of the DLI phase failures, TLP Note 99 is given to alert the troubleshooter of this condition, but this step should be completed regardless of the TLP note.

Noise generated on a power bus is usually the result of a faulty DLTU DFI board: TN1611, ANN3, or ANN5. But the noise could be generated anywhere along the path of the power bus.

The trouble is affected by temperature and humidity leading to intermittent trouble based on the season or conditions in the central office.

PROCEDURE

To clear Power Bus noise trouble, perform the following:

1. Check the power bus with a voltmeter set to the AC setting.
 - (a) Place the leads of the voltmeter on the -48V RTN power lug directly behind the DLI circuit pack and frame ground.
 - (b) If noise is not found on the power bus, return to Procedure 6.7, Clearing DLI Diagnostic Failures, Step 10.
 - (c) If noise is found on the power bus, continue with the following step.

Note: The noise should be a "ripple" effect and should be between 1-15 volts peak-to-peak. To verify if the noise is present on the bus, check another SM's power bus that is supplied by a completely different power supply, preferably from another GPDF or PCFD.

2. Identify the power bus (Ax or Bx) that feeds the faulty DLI. The bus information can be found on the fuse block in the FFU at EQL 69.
 - (a) Locate the DLI fuse in the FFU (EQL 69).
 - (b) Find the Bus number (that is, -48VA1) stenciled on the fuse block.
3. Locate and identify all DLTU DFI packs fed from the same bus that feeds the faulty DLI.

SD-5D201-01, Note 311C contains specific details on power bus distribution for the DLTU or RSM FIU.

4. To isolate a faulty DLTU DFI board, perform the following:

Warning: Removal of DLTU DFI circuit boards is service affecting. This should be performed during the maintenance window and customers affected should be notified per local practices.

- (a) Remove one identified DLTU DFI board from service and physically unseat the pack from the DLTU shelf.
 - (b) Run diagnostics on the faulty DLI or check the power bus with the voltmeter.
 - (c) Repeat this procedure for all remaining DFI boards on the identified power bus.
5. If the DFI boards failed to resolve the faulty DLI, identify other equipment supplied by the same power bus feeding the DLI. The fuse or fuse holder, the filter, a power converter or another circuit board may be the source of the trouble.
- (a) Identify all units being fed on the noisy bus.
 - (b) Remove from service all equipment powered by the identified noisy bus.
 - (c) Unseat all power converters for identified peripheral units. This includes the DLTU's and the faulty DLI.
 - (d) Test for noise on the faulty power bus with the voltmeter.
 1. If the noise is now absent, the noise was being generated in one of the powered down units.
 2. Reinsert each power converter in each unit one at a time until the noise returns.
 3. Identify the noisy power converter or application circuit pack and replace.
 4. Go to Step 6(b).
 - (e) If noise is still present, continue with the following step.
 - (f) Remove the fuses for all equipment on the identified faulty power bus including the DLTU(s) and the faulty DLI. This tests for a defective fuse, fuse holder, or fuse block.
 - (g) Test for noise on the faulty power bus with the voltmeter.
 1. If the noise is now absent, the noise is caused by a faulty fuse or fuse holder.
 2. Reinsert each fuse, one fuse at a time and monitor the bus for noise.
 3. Identify the noisy fuse or fuse holder and replace.
 4. Go to Step 6(c).
 - (h) If noise is still present, continue with the following step.
 - (i) Remove the GPDF/PCFD 20 AMP bus fuse for the faulty bus feed. This will test for a defective SM FFU power bus filter. The filters are the huge blue capacitors located in the SM FFU (EQL 69) behind the fuse blocks.

- (j) Check for noise on the SM FFU filter for the faulty bus.
 - 1. If the noise is now absent, the filter in the SM bay or the power feeder is defective. Since the faulty power feeder is defused at the GPDF/PCFD, using the voltmeter in the OHM setting, check for resistance between the -48V and ground lead.
 - 2. If a short is not found, visually inspect the cable run from the GPDF or PCFD to the SM in question to determine that the cable is not crushed to frame ground. If no trouble is found with the power cables, the SM FFU filter is defective.

Note: On one occasion, the power feeder cables were crushed in the corner of the cable rack causing a very slight short to frame ground; not enough to blow the fuse, but enough to cause the noise problem.

- 3. The Fuse Filter Unit will need to be replaced by Lucent Technologies. Contact your local SCM (Switch Capacity Manager) for replacement. While waiting for the replacement, the equipment must be restore to service (except for the DLI). Refer to Step 6.
- (k) If noise is still present on the power bus, go to the rear of the GPDF or PCFD and locate the faulty power feeder battery and ground.

- 1. Ensure both cables are tight.
 - 2. If the -48V battery is loose, tighten with an insulated nut driver (see warning).

Danger: *The GPDF/PCFD bus is charged; DO NOT attempt to tightened the -48 volt power feeder without an understanding of proper power maintenance procedures. This could result in serious injury. Contact the local power group for assistance.*

- 3. If the ground cable is loose, tighten with a flat head screw driver.
 - 4. Go to Step 6.
- (l) If both battery and ground power feeders were tight, contact the local power group for resolution. The noise is in the GPDF/PCFD filter or from the main power plant. While waiting for power resolution, the 5ESS® Switch equipment must be restored to service (except for the DLI). Refer to Step 6.

Note: If noise was found in the GPDF/PCFD or main power plant, one would expect that this trouble would be observed in multiple SMs and not isolated to one SM.

6. Restore all equipment to service.

- (a) Reinsert the GPDF/PCFD 20 AMP fuse.

Note 1: For power-up of a PCFD bus, use the capacitor charger located in the PCFD control panel. Insert the charger into the indicator fuse position and lock. Press the charge button. When the LED extinguishes, insert the 20 AMP fuse while holding the charge button down. Remove charger probe and insert indicator fuse.

Note 2: For a GPDF type power bay, there is not a capacitor charger. Just insert the fuse and beware of sparks – this is normal.

- (b) Reinsert fuses in the SM FFU for all powered down equipment.
 - (c) Insert power converters for all powered down equipment.
 - (d) Insert all application circuit boards if any were left removed.
 - (e) Restore all DLTU DFI's to service unconditionally (UCL).
 - (f) Restore any other peripheral equipment to service.
 - (g) Restore the DLI to service.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Note: From TLP Note 99: If replacement of boards on the TLP does not clear the problem, it could be caused by a defective DFI circuit pack (ANN3B, ANN5) located in the DLTU shelf. The defective DFI pack generates noise on the -48v power bus that feeds it, causing problems with other sensitive hardware fed from that same bus.

Excessive AC noise and ripple between -48V RTN and FRAME GRND indicates a defective DFI pack. These voltages can be observed with an oscilloscope and will be in the approximate range of 1-15 Volts Peak-to-Peak.

6.10 REPLACE 1A TRANSCEIVERS

OVERVIEW

This procedure is used to replace 1A transceivers.

Before You Begin Review the following information.

Required Information

There are various types of 1A Transceivers used at the CM2 and SM. For convention sake, the transceivers at the CM2 will be referred to as "TMS transceivers." The transceivers located at the SM's will be referred to as "DLI transceivers".

TMS Transceivers TMS transceivers are designated as 982FH, 982TH, and 982TT*. The "TT*" type transceivers are the latest generation for Classic SMs. The asterisk denotes that there are several types of these, with the "TTC" being the latest model. The original TMSU transceivers, the 982FH and TH, have a "screw-on" connector and requires that the optic fiber be the same. Special attention must be given to matching the correct transceivers. The "TT*" type transceivers use the "twist-lock" ST-type connectors. TMSU transceivers have two receivers and two transmitters that terminate two optic fiber pairs (that is, NCT links).

DLI Transceivers The most recent DLI transceivers are the 982TRC/982TSC pair. DLI transceivers have one receiver and one transmitter that terminate one optic fiber pair (NCT Link). DLI transceivers come in two flavors. One type, the 982TRC, is for the EVEN TMS link (that is, the A link) and is located in the upper position on the backplane behind the DLI. The other type, the 982TSC, is for the ODD TMS Link (that is, the B link) and is located in the lower position on the backplane behind the DLI. The EQL positions are as follows:

DLI 1A Transceivers			
MCTU1	DLI 0	036-084-332	982TRC
	DLI 0	036-084-300	982TSC
	DLI 1	036-098-332	982TRC
	DLI 1	036-098-300	982TSC
MCTU2	DLI 0	019-156-332	982TRC
	DLI 0	019-156-300	982TSC
	DLI 1	028-156-332	982TRC
	DLI 1	028-156-300	982TSC
MCTU3	DLI 0	028-084-332	982TRC
	DLI 0	028-084-300	982TSC
	DLI 1	028-176-332	982TRC
	DLI 1	028-176-300	982TSC

Only the 982TTC, 982TRC, and the 982TSC are still in production. If an exact replacement cannot be obtained, the 982TTC, TRC, or TSC must be used. If the old optic fiber is the "screw-on" type, then new optic fiber and all three transceivers must be ordered and replaced.

PROCEDURE

1. To replace the TMS transceiver, see Step 3.
2. Replace the DLI transceiver as follows:
 - (a) At the SM, each DLI has two NCT links connected to two transceivers, one EVEN TMS link, and one ODD TMS link. The DLI is functionally associated with the ONTC and not the SM, which means when a DLI or its associated 1A Transceiver needs to be replaced, there is no need to remove

and power down the MCTSI of the SM. Only the DLI (TN1077) must be removed from service and powered down. The power switch is located directly on the TN1077 board.

- (b) Remove the DLI from service with the MCC page 1190 or use the MML command. Enter **RMV:DLI=d-c;**

Where: d = SM
 c = side

- (c) Verify that the DLI is OOS.

Press the OFF button on the face of the TN1077 circuit board to power down the DLI.

MCTU2 DLI 019-156 Side 0
 028-156 Side 1
MCTU1 DLI 036-084 Side 0
 036-100 Side 1

- (d) Unseat the TN1077 DLI board.

- (e) There are two different 1A Transceivers located behind each DLI in the SM; one for the "A" link and one for the "B" link. Each link requires a different type of transceiver.

1. Determine if the transceiver needing to be replaced is for the "A" link or the "B" link.
2. Make sure that the new 1A Transceiver is exactly the same as the one being replaced.

Note: The transceiver may be a screw-on or a twist-lock "TS" type optic fiber connector. The same type of 1A Transceiver must be used as a replacement.

3. The transceiver must be unlatched from the 127C connector (blue berg connector) by unlatching the top portion with a spudger and cocking the transceiver out of the top of the 127C. Unlatch the bottom portion of the 127C with a spudger and slowly pull the transceiver out.
4. Replace the transceiver and reconnect the optic fibers.
5. Press the ON button on the face of the TN1077 circuit board to power up the DLI.
6. Restore the DLI to service with the MCC page 1190 or use the MMP command. Enter **RST:DLI=d-c;**

Where: d = SM
 c = side

3. At the TMSU, the 1A Transceivers require that the ONTCCOM be OOS and powered down.

- (a) Remove the ONTCCOM from service. Enter **RMV:ONTCCOM=c;**

Where: c = side

- (b) Verify that the TMSU's and CMCU OOS LEDs are on for the entire ONTCCOM.
- (c) Perform the ONTCCOM power-down sequence.
- (d) Determine if the TMS is dual fabric or single fabric.
- (e) There are two transceivers associated with each QLI (TN888) board. Determine which TMS link is associated with the transceiver replacement and refer to the TMS link and QLI Location table in Procedure 6.1, TMS Troubleshooting.
- (f) Determine the defective TMS link and follow Figure 6.2-3 or Figure 6.2-5, TMS Link and QLI Locations to find the TN888 pack slot number. Then look to the far right of the TMS link. This will give the exact transceiver location 100 or 132 for replacement.
- (g) There will be four optic fibers (two whites and two blues) terminated onto the transceiver. It is extremely beneficial to mark the fiber's location with a pen to make sure it will be reinstalled into the correct port on the new transceiver.
- (h) The transceiver should be unlatched from the 127C connector (blue berg connector) by unlatching the top portion with a spudger and cocking the transceiver out of the top of the 127C. Unlatch the bottom portion of the 127C with a spudger and slowly pull the transceiver out.
- (i) If the 127C is mistakenly removed with the transceiver, install the 127C back onto the correct two columns of pins WITHOUT bending or crushing any pins.
- (j) Reconnect the four optic fibers to the transceiver.
- (k) Restore power to the ONTCCOM per the power up sequence.
- (l) Restore the ONTCCOM to service. Enter **RST:ONTCCOM=c;**

Where: c = side

4. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

6.11 REPLACE AN NLI

OVERVIEW

Replacing an NLI can clear a Power Bus Noise Trouble failure.

PROCEDURE

To replace an NLI, perform the following procedure.

1. For SM-2000 BKD1, SM-XC BKXL1 or BKXL2 NLI's, the NLI does NOT have to be powered down. However, the NLI must be in the OOS state before pulling the board. If not done already, remove the NLI from service.
2. At the rear of the NLI, record the location where the transmit and receive fibers terminate. For an SM-XC BKXL1, one cable is used for both Transmit and Receive.
3. For an SM-XC SMU6 note the position of the switches on the BKXL1 or BKXL2. When set for PLI mode, both switches on the BKXL1 or BKXL2 must be in the up position.
When set for NLI mode, both switches on the BKXL1 or BKXL2 must be in the down position.

See Figure 6.11-1.

4. Replace the NLI and set the switches correctly on BKXL1 and BKXL2 paddleboards per Figure 6.11-1.

Note: Figure 6.11-2 shows the rear of the SM-XC SMU6. Figure 6.11-3 contains the NLI EQL assignments on the rear of the SM-2000 SMPU Model 4 – TSIU Model 4. A new SMPU 5 -TSIU Model 4-2 has engineerable NLI assignments except for the primary links. The primary links are assigned as shown in Figure 6.11-3.

5. For CM2 TMSU BKF1 NLI's, the ONTCCOM must be removed from service. The CMCU and all equipped TMSU's must be powered down. Since the BKF1 so closely resembles the 982TT*, follow Procedure 6.10, Replacing 1A Transceivers, Step 3.
6. For CM3 MMA2 and MMA3 paddleboards, the ONTC must be removed from service. Follow Subprocedure 8.10.1, Replace CM2/CM2C/CM3 ODT to replace a CM3 Paddleboards.

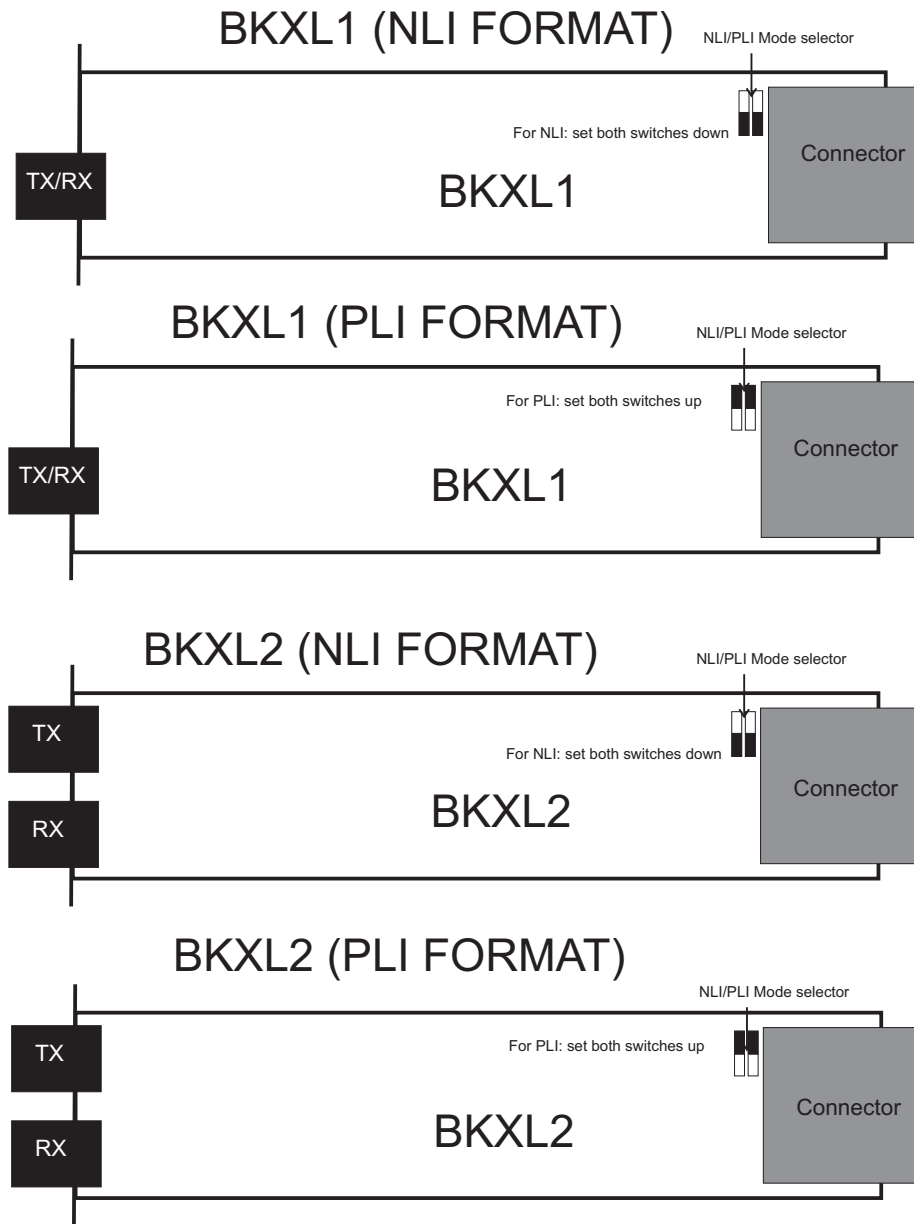


Figure 6.11-1 — SM-XC BKXL1 and BKL2 Format

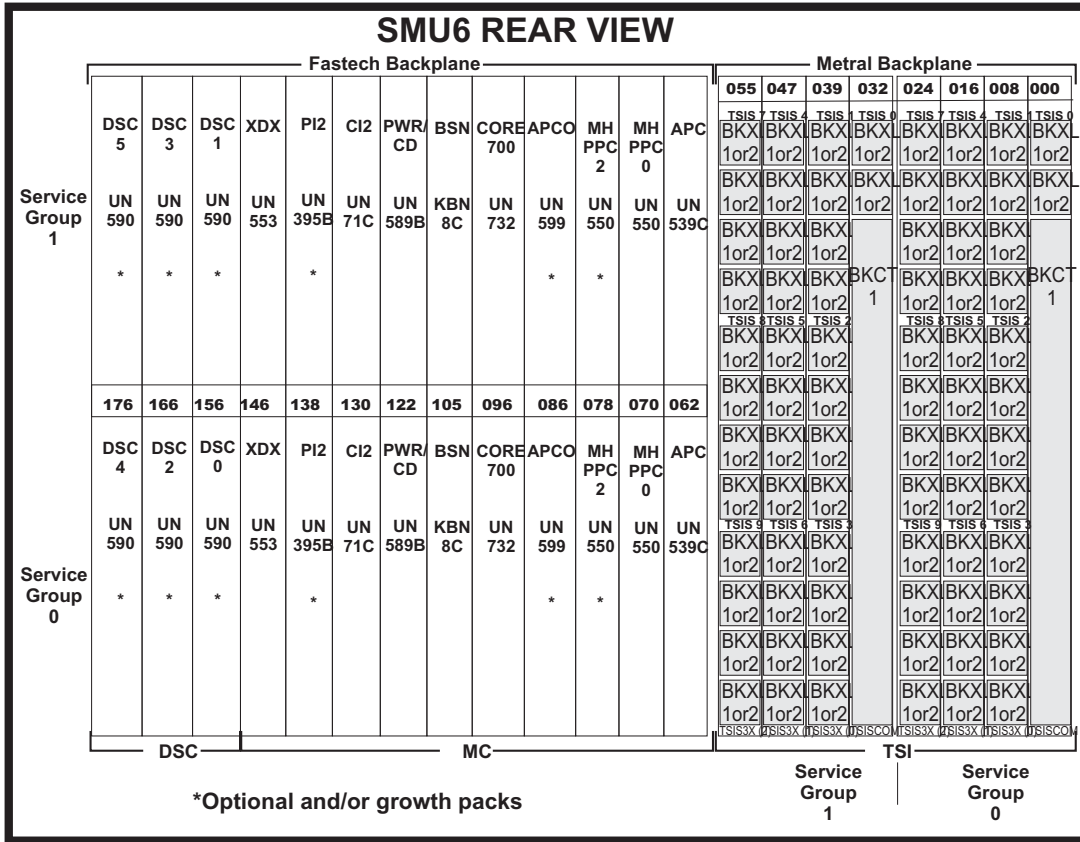


Figure 6.11-2 — SM-XC SMU6 Locations

SM2K NLI Transceiver (BKD1) Locations							
NLI Side 0	Shelf	Slot	NLI Side 1	Shelf	Slot	TSI BOARD	TSI PORT
x-0-0*	51	18	x-0-1*	51	106	0	2
x-1-0*	55	18	x-1-1*	55	106	0	3
x-2-0	43	26	x-2-1	43	114	1	0
x-3-0	47	26	x-3-1	47	114	1	1
x-4-0	43	34	x-4-1	43	122	2	0
x-5-0	47	34	x-5-1	47	122	2	1
x-6-0	43	42	x-6-1	43	130	3	0
x-7-0	47	42	x-7-1	47	130	3	1
x-8-0	43	50	x-8-1	43	138	4	0
x-9-0	47	50	x-9-1	47	138	4	1
x-10-0	43	60	x-10-1	43	148	5	0
x-11-0	47	60	x-11-1	47	148	5	1
x-12-0	43	68	x-12-1	43	156	6	0
x-13-0	47	68	x-13-1	47	156	6	1
x-14-0	43	76	x-14-1	43	164	7	0
x-15-0	47	76	x-15-1	47	164	7	1
x-16-0	43	84	x-16-1	43	172	8	0
x-17-0	47	84	x-17-1	47	172	8	1

* NLI 0 & 1 per side are Primary Links
 NLI Assignments are found on the 18.16 RCV view

Figure 6.11-3 — SM-2000 NLI Transceiver (BKD1) Locations

7. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

6.12 CLEARING MI OR DMI DIAGNOSTIC FAILURES

OVERVIEW

This procedure is used to clear MI or DMI diagnostic Failures.

PROCEDURE

To clear trouble in the MI or DMI, perform the following:

1. Determine if the TMS is single or dual fabric.
2. If this is a dual fabric TMS, determine if DMI A or B is failing.
3. Perform a Backplane and Foreplane Audit. Refer to Procedure 6.1, TMS Equipment Trouble Clearing for the audit.

Note: This trouble can be a bent, shorted pin on any TMSU shelf.

4. Switch FPCs and rerun diagnostics.
 - (a) If the DMI/MI continues to fail, skip to Step 5.
 - (b) If the DMI/MI now passes, the FPC is faulty or the CDAL cable to the CMCU is faulty.
 1. Replace the UN173 circuit board at EQL x45-056.
 2. Replace the TN856C circuit board at EQL x45-048.

Note: The CDAL cable is the interface between the DMI and the FPC. This cable is tested in Phase 1 of DMI diagnostics between the DMI (UN187) and the "standby" FPC (UN173).

3. Check or replace the CDAL cable:

CMCU 0	CDAL 0 528-162-532 to FPC 0 545-056-545
	CDAL 1 528-162-332 to FPC 1 545-056-513
CMCU 1	CDAL 0 628-162-532 to FPC 0 645-056-545
	CDAL 1 628-162-332 to FPC 1 645-056-513

5. Replace the TLP circuit boards. Start with the first pack on the list. If replacing that pack does not fix the problem, move on to the next pack in the list.
6. Replace the following circuit boards if they are NOT on the TLP list for the failing TMS side.
 - UN187 at EQL x28-162
 - UN186 at EQL x28-154 or 170
 - TN1034 at EQL x28-146 or 178.
7. Replace or swap the TN883 circuit boards between TMSU shelf 0 and 1.
8. Check or replace the orange DITC (DMI Interface Cable).

Single Fabric	x28-154-145 to x36-088-103
Dual Fabric	x28-154-145 to x36-088-103
	x28-170-145 to x19-088-103

9. Unseat all QLI TN888 or TN1681 circuit boards and run diagnostics
10. If diagnostics pass, the trouble is a faulty 1A Transceiver or crushed pin under a 1A Transceiver.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

6.13 MI FAILURE EXAMPLE

OVERVIEW

Exhibit 6.13-1 — MI Failure Example Diagnostic Output

```
S570-327831 02-07-09 05:50:59 448218 ONTCMON HAM772E_3B21
A OP STATUS MI 0 REGS EVENT=106
  MI OPERATIONAL REGISTERS
  00000000 00000000 FFFFFFFF 0000FF00 00000001 FFFFFFFF 480000FF 0000FFFF
  FFFF0CFE

dgn:mi=0,raw,tlp; PF

S570-72 02-07-11 15:45:52 008938 SM HAM772E_3B21
M DGN MI=0 STF PH 1 SEG 1 TEST 17 MM H'4
  EXP H'4 MASK H'4 ACTL H'11

S570-72 02-07-11 15:45:55 008941 SM HAM772E_3B21
M DGN MI=0 STOPPED STF PH 1

S570-72 02-07-11 15:45:59 008943 SM HAM772E_3B21
M DGN MI=0 STOPPED STF

S570-72 02-07-11 15:46:02 008945 SM HAM772E_3B21
M DGN MI=0 SUSPECTED FAULTY EQUIPMENT FIRST RECORD
  AISLE  MODULE  CABINET  CODE  FORM  EQL  TYPE  NOTE
  0102  CM  CM2 6 53630  MC5D039A1  1  45-056  HPR  36
  0102  CM  CM2 6 0  MC5D078A1  2  45-048  HPR
  0102  CM  CM2 5 0  UN187  1  28-162  ---
  0102  CM  CM2 5 0  UN186  1  28-154  ---
  0102  CM  CM2 5 53630  410AA2  1  28-088  ---  86
  0102  CM  CM2 5 0  495KA  5  28-024  ---
  0102  CM  CM2 5 0  495MA  4  28-104  ---
  0102  CM  CM2 5 0  TN881  1  28-112  HPR
  0102  CM  CM2 5 53630  KBN2  6  36-163  HPR
```

PROCEDURE

This particular MI failure was resolved in the following manner.

1. All circuit boards on the TLP were replaced.
2. The FPC's were switched.
3. All QLI TN888 circuit boards in CM Bay 5, TMSU Shelf 36 were unseated.

Results: The MI passed diagnostics.

4. The backplane of TMSU 36 was inspected.

Results: A bent pin was found under the 1A Transceiver at 536-032-011.

5. The 1A Transceiver was removed, the pin was straightened, and the 1A Transceiver was reinserted.
6. All QLI's were reinserted. The MI diagnostics passed all phases.

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Exhibit 7.14.7-1 — Example Response (Correct Hashsum Error) 7.14.7-1

**Exhibit 7.14.7-2 — 2KB of SM/SM-2000 Memory (NOHASHERR vs.
hashsum error) 7.14.7-2**

7. SWITCHING MODULE MAINTENANCE

Purpose

Use the following SM procedures to analyze the trouble, replace any circuit packs, and restore the unit/circuit to service.

Before You Before

First use Procedure [2.3](#) to locate the unit/circuit that is failing and to determine which MCC pages to use to clear the trouble.

7.1 VERIFY SM DIAGNOSTIC FAILURE PATTERN IS CONSISTENT

OVERVIEW

This procedure is used to determine if an SM hardware trouble causing a diagnostic failure in the 5ESS[®] switch is consistent or intermittent.

PROCEDURE

To determine if the SM failure pattern is *consistent* or *intermittent*, perform the following:

1. Obtain the original diagnostic failure (DGN STF) printout with the SUSPECTED FAULTY EQUIPMENT list generated by system diagnostics.
2. Determine if there is also a power alarm or fuse alarm active at the failing unit. If so, use Procedure 14.6, Respond to Fuse/Power Alarm Failure, to clear the power problem in the unit.
3. **Caution:** *The use of unconditional removals or manual override power downs is NOT recommended (unless the office or affected SM/SM-2000 is in min-mode operation), because call processing may be detrimentally affected. The failure or denial of conditional removals usually indicates that mate side hardware must be repaired first.*

If the unit is not already removed from service, use the **REMOVE** poke command (on appropriate display page) or **RMV** input message (from 235-600-700, *Input Messages*)

Then use the **DIAGNOSE** poke command or **DGN** input message to diagnose the unit/circuit and get a second STF printout and SUSPECTED FAULTY EQUIPMENT list.

4. Compare the two diagnostic failure printouts.

Note: When comparing the diagnostic printouts to determine a failure pattern, be sure to examine the phase (PH), segment (SEG), test (TEST), and mismatch (MM) numbers.

If the diagnostic fails and the STF output message (PH, SEG, TEST, and MM) numbers are the same as the original failure, go to Procedure 7.2, Clear Trouble in the SM or SM-2000.

If the diagnostic fails and the failure is inconsistent/intermittent, determine the dominant pattern. Then go to Procedure 7.2.

If the diagnostic fails and there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list. Then go to Procedure 7.2.

If the diagnostic fails with **LU TST:GRID** or **TST:GRIDBD** and intermittent behavior is suspected, use Procedure 7.11, Test a Specific Line Unit Grid Path, to execute repeated tests on the specific failed path.

If the diagnostic passes, diagnose the unit/circuit at least two more times. If the diagnostic continues to pass, record this incident and the failure pattern for future reference. Continue with the next step.

5. If the diagnostic passes, diagnose the unit/circuit at least two more times. If the diagnostic continues to pass, go to Step 6.

If the

6. Use the **RESTORE** poke command or **RST** input message to restore the unit to service.

7.2 CLEAR TROUBLE IN THE SM OR SM-2000

OVERVIEW

With the exception of some of the diagnostic tests for line units (LUs) and Module Controller and Time Slot Interchangers (MCTSI), **this procedure is considered the standard repair procedure for all SM and SM-2000 hardware** (units/circuits) of the 5ESS[®] switch. For additional diagnostic procedures, refer to the following:

- Clear Diagnostic Failure in MCTSI — Procedure 7.3.
- ISLU, U_DSL, BRI, and PSU Troubleshooting — Procedure 7.4.
- Clear Diagnostic Failure in PLTU — Procedure 7.5.
- Clear Diagnostic Failure in PLTU OIU — Procedure 7.6.
- Clear Diagnostic Failure in OFI — Procedure 7.7.
- Clear Trouble in the LU — Introduction — Procedure 7.8.

Appendix A1, Diagnostic Phase Descriptions, contains the diagnostic phase descriptive information (in the form of tables) for all hardware (units/circuits) of the 5ESS switch.

PROCEDURE

To clear trouble in the SM or SM-2000, perform the following:

1. Examine the first or next pack on the SUSPECTED FAULTY EQUIPMENT list.
 - (a) If entries on SUSPECTED FAULTY EQUIPMENT list have been exhausted, go to Step 6.
 - (b) If a Note number appears in the last column on the SUSPECTED FAULTY EQUIPMENT list, obtain the text for the Note before replacing the pack to see what precautions or additional procedures are recommended. The text for the Note can be obtained by entering the **OP:TLPNOTE=n** command, where **n** is the Note number.
 - (c) **Note:** Diagnostics associated with some units may execute **interface tests**. This may cause the TLP listing to include suspected packs that are **not** owned by the unit being diagnosed.
If this pack is owned by the unit being diagnosed, continue to Step 2.
 - (d) If this pack is owned by another unit, remove and diagnose the other unit.
Note: A “forced switch” may be required before the other “on-line/active” unit/circuit can be removed. This may interrupt call processing; therefore, it is best to wait for a low-traffic period and **seek technical assistance**.
 - (e) If the diagnostic for the other circuit is STF, choose which diagnostic (and SUSPECTED FAULTY EQUIPMENT list) to continue working (it is usually best to work the circuit that is highest in the control hierarchy).
2. Use Procedure 7.16 to replace the suspected circuit pack.

Note: The replacement pack vintage must be equal to or greater than the minimum code and series specified in the SUSPECTED FAULTY EQUIPMENT list printout (per “DGN” pages in 235-600-750, *Output Messages*). For example, when code “TN1077” minimum series “5” is printed, the replacement pack could be either a TN1077 Series 5 (or later), or TN1077B (any series), or TN1077C (any

- series), etc. The microcode number (for example, MC5D045A1) is printed for “microcoded” packs. In all cases, the replacement pack vintage must be *equal to or greater* than that printed. For example, when code “MC5D045A3D” minimum issue “2” is printed, the replacement pack could be either an MC5D045A3D Issue 2 (or later), an MC5D045A4D (any issue), or an MC5D045A3E (any issue), etc.
3. Determine whether the pack replacement cleared the failure.
 - (a) Diagnose the circuit.

Note 1: You can save time by running only one phase (that was failing previously) of the diagnostic using the PH option in the DGN input request.

Note 2: When working an intermittent/inconsistent failure, several runs of the diagnostic/phase may be required to know if the pack replacement has cleared the problem.

Note 3: (5E18.1 and later releases) When diagnosing a packet switch unit common (PSUCOM) associated with a packet switch unit version 2 enhanced (PSU2e), after a packet fanout (PF3) or control fanout (CF3) board has been replaced, it is possible that resident images may have to be upgraded from SMP-resident optional data regions (ODRs). If such an upgrade is required, it will occur automatically before diagnostic phase execution actually begins; progress of such an event (if it is required) will be produced on the ROP, as detailed in the DGN PSUCOM output message (see 235-600-750 Output Message Manual).
 - (b) If the diagnostic result is all tests passed (ATP), go to Step 4.
 - (c) If identical STF is outputted (PH, SEG, TEST, and MM), return original pack to the unit and go to Step 1 to examine the next pack on the SUSPECTED FAULTY EQUIPMENT list). If different STF is outputted, diagnose the circuit again.
 1. If a repeat of the previous dominant failure occurs, return the original pack to the unit and go to Step 1 to examine the next pack on the list.
 2. If the dominant failure is now different from the original failure, the spare pack is probably faulty (for example, wrong series); try another spare pack (Step 2).
 4. Verify that the failure follows the suspected faulty pack.
 - (a) Swap the original (suspected faulty) pack with the spare pack inserted in Step 2 and diagnose the circuit again.
 - (b) If the diagnostic failure returns with the suspected faulty pack reinserted, replace this faulty pack and go to Step 5.
 - (c) If the diagnostic failure does not return with the suspected faulty pack reinserted, the problem is apparently cleared with no faulty pack identified. Record this incident and the failure pattern for future reference; go to Step 5.
 5. Request a RESTORE of the unit/circuit to service.
 - (a) If the restore diagnosis is STF, the problem is not cleared. Return to Step 1.
 - (b) If the circuit restored is an LU GRID or GRIDBD, go to Step 7.

- (c) Perform a conditional restore on **both** the **original** unit and any unit(s) associated with the suspected/replaced circuit pack. If the restore diagnosis fails on the **interface unit**, treat it as a **different** problem, starting at Procedure 7.1.
 - (d) If the restore diagnosis is ATP, go to Step 8.
6. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, replace (one at a time) any power converter packs (for example, 495FB) in the unit that supplies power to packs on the SUSPECTED FAULTY EQUIPMENT list. (Low voltage from a power converter can cause other packs to misbehave.)

Note 1: If an LU is found with multiple grids OOS, with strings of GDXGRID power alarms associated with the OOS gridboard, replace the OOS gridboards before attempting to restore the LU.

Note 2: If the problem has not been cleared at this point, make a judgment on which of the following is the appropriate alternative, depending on the situation.

 - Inspect the backplane for open or short circuits in the wiring, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects. If such defects are found *and* can be repaired, complete those repairs, and then return to Procedure 7.1.
 - **Seek technical assistance**, particularly if the trouble is in a critical duplex unit such as the MCTSI or PSUCOMs associated with a PSU supporting the office CCS signaling platform.
 - Replace (one at a time) the remaining packs in the unit not previously tried.
 - Replace (one at a time) the packs in adjacent unit(s) with interfaces to the failing unit.
 - Perform a multiple-pack swap with another unit that diagnoses ATP and can be removed from service. If the problem moves with the packs, return half of the packs, etc., until the faulty pack is isolated. If the problem does not move with the packs, check for possible cable or wiring problems. **Multiple-pack swaps must be done carefully to avoid creating additional problems.**
 - Consult the failing diagnostic's program listing (if available). Use the diagnostic phase descriptive tables in Appendix A1, Diagnostic Phase Descriptions, as an aid in locating the desired PR. The prologue for the diagnostic phase and descriptions and code associated with the failing segment and test may give insight as to what is being tested and which control/data paths are being used.
7. Verify the in-service grid exercise tests as a final check of LU GRID or GRIDBD.
 - (a) Use the **RST:LINE** input message to restore any LINE previously placed OOS due to the grid trouble.
 - (b) Check the results of the grid exercise test on the GRID or GRIDBD.
 - (c) If the grid test fails (STF), perform Procedure 7.12, Clear Line Unit Grid Exercise Test Failure.
 - (d) If the grid test passes (ATP), continue with the next step.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.3 CLEAR DIAGNOSTIC FAILURE IN MCTSI

OVERVIEW

This procedure is used to clear a hardware trouble causing a Module Controller and Time Slot Interchanger (MCTSI) diagnostic failure in the SM/SM-2000.

When an automatically-scheduled (by fault recovery or routine exercise) diagnostic fails, the appropriate alarm is activated, the affected unit (or service group) is left Out-Of-Service (OOS), and a Diagnose (DGN) Some Tests Fail (STF) message is printed. The DGN STF output includes a SUSPECTED FAULTY EQUIPMENT list to aid in trouble resolution and repair.

Note 1: Before performing this procedure, the craft must be aware of the general requirements for the care and handling of circuit packs as outlined in 235-105-110, *System Maintenance Requirements and Tools*.

Note 2: Section 4, Diagnostic Test Supporting Information, contains the diagnostic phase descriptive information (in the form of tables) for all hardware (units/circuits) of the SM/SM-2000.

Note 3: After all OOS packs on the SUSPECTED FAULTY EQUIPMENT list have been tested, wait until off-peak hours to test the ONL packs.

Consult the failing diagnostic's program listing (if available). Use the diagnostic phase descriptive tables in Section 4 as an aid in locating the appropriate on-line list. The prologue for the diagnostic phase and descriptions and code associated with the failing segment and test may give insight into what is being tested and which control/data paths are being used.

PROCEDURE

1. **Identifying the failure:** Prepare for the analysis of MCTSI diagnostic failures.

- (a) On 1280,X page (where: X = SM), record the REX DGN start hours and minutes.

If REX is running, to **STOP** REX, enter:
(MML) **STP:REX,SM=X**; (where: X = SM).

Note: This is to prevent REX from interfering with the procedure.

- (b) **Inhibit REX.**

On 1800,X page (where: X = SM), enter:
(Poke) **602**
OR
(MML) **INH:REX,SM=X**; (where: X=SM).

2. **Caution:** *Before continuing this procedure, review recent activities performed in this SM/SM-2000, for example: recent memory growth, hardware upgrades, CN applications, etc. If any new circuit packs were installed in this SM/SM-2000, carefully inspect both the inside and outside of the backplane for bent pins and/or broken pins.*

Determine whether the failure pattern is *consistent* or *intermittent*.

- (a) Obtain the original diagnostic failure (DGN STF) Receive-Only Printer (ROP) output with the SUSPECTED FAULTY EQUIPMENT list generated by system diagnostics.

- (b) Determine if there is a power alarm or fuse alarm active at the failing unit. If so, use Procedure 14.6, Respond to Fuse/Power Alarm Failure, to clear the power problem in the unit.
- (c) On MCC Page 1190, **DIAGNOSE** the OOS side and get a second STF ROP output with SUSPECTED FAULTY EQUIPMENT list. To diagnose the MCTSI, enter either:
(Poke) 50X (where: X = OOS side),
or (MML) DGN:MCTSI=X-Y,RAW,TLP; (where: X = SM, Y = OOS side),
OR
To diagnose the BTSR *where applicable*, enter:
(Poke) 502
or (MML) DGN:BTSR=X,RAW,TLP; (where: X = SM).
- (d) Compare the two diagnostic failure ROP output reports obtained from Substeps 2(a) and 2(c).
Note: When comparing the diagnostic ROP output reports to determine a failure pattern, be sure to examine the phase (PH), segment (SEG), test (TEST), and mismatch (MM) values.
- (e) If the diagnostic fails and the STF output message (PH, SEG, TEST, and MM) numbers are the same as the original failure, go to Step 3.
- (f) If the diagnostic passes, repeat diagnostics two more times. To diagnose the MCTSI, from MCC Page 1190, enter either:
(Poke) 50X,RPT=2 (where: X = OOS side),
or (MML) DGN:MCTSI=X-Y,RAW,TLP,RPT=2; (where: X = SM, Y = OOS side),
OR
To diagnose the BTSR, where applicable, enter:
(Poke) 502,RPT=2,
or (MML) DGN:BTSR=X,RAW,TLP,RPT=2; (where: X = SM).
If diagnostic ATP, go to Substep 2(i).
- (g) If the failure is intermittent, run either all diagnostics or specific failing diagnostic phases with the RPT flag set. Go to Step 3.
Note: To diagnose Phase Y only for MCTSI, from MCC Page 1190, type and enter:
(Poke) 50X,PH=Y,RPT=Z where X = Side, Y = Phase, and Z = Number of iterations,
OR
(MML) DGN:MCTSI=X-W,RAW,TLP,PH=Y,RPT=Z; where W = Side, X = SM, Y = Phase, and Z = Number of iterations.
- (h) If there is more than one failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list. Go to Step 3.
- (i) If the unit/circuit is no longer failing, record this incident and the failure pattern for future reference, and go to Step 7.

3. Replacing the pack:

Note: If replacing the B TSR pack (TN878/TN1418), go to Substep 3(e).

Caution: Before replacing a circuit pack or backside paddleboard in an SM/SM-2000 MCTSI, Dual-Link Interface (DLI), Remote Link Interface (RLI), or Network Link Interface (NLI), remove power to the unit.

Observing the **Caution**, replace the suspected circuit pack.

- (a) Locate the unit's Power Control and Display Pack on the MCTSI/DLI/RLI. See Table 7.3-1.

Table 7.3-1 — Power Control and Display Pack

Unit Type	Pack Type	Pack Code	MCTSI 0 EQL
MCTU	Control & Display	SN412	008 ^a
MCTU	Control & Display	SN516	016 ^a
MCTU	DLI/RLI	TN1077	084
MCTU2	Control & Display	UN516	026
MCTU2	DLI/RLI	TN1077	156
MCTU3	Control & Display	TN1424	014
MCTU3	DLI/RLI	TN1077	084
MCTU4	Control & Display	SN516B	028
MCTU5	Control & Display	UN589	014
Note(s):			
a. Control and Display Pack is part of the TSI.			

- (b) Verify that the correct MCTSI/DLI/RLI is OOS by checking that the OOS LED on the Control and Display Pack is ON. Power down the unit using only the OFF button. [DO NOT USE the Manual Over-Ride (MOR) SWITCH.] For NLI, see **Note**.

Note: If you are replacing a fiber optic coupler on Classic SMs, power down and unplug the associated DLI pack. The SM-2000 NLI is an exception to the previous **Caution**. NLI paddleboards, which connect to the rear of the backplane, are constructed to withstand removal or replacement while power is ON. Repair of an *even* NLI on an EXM-2000 requires the corresponding *odd* NLI be removed from service before the pack is replaced (due to timing coupling at the TRCU1 and TRCU2).

- (c) Replace pack listed on the SUSPECTED FAULTY EQUIPMENT list.

Note: The replacement pack vintage must be equal to or greater than the minimum code and series specified in the SUSPECTED FAULTY EQUIPMENT list. For example, when code "TN1077" minimum series "5" is printed, the replacement pack could be either a TN1077 Series 5 (or later series), or TN1077B (any series), or TN1077C (any series), etc. The microcode number (for example, MC5D045A1) is printed for "microcoded" packs. In all cases, the replacement pack vintage must be equal to or greater than that printed. For example, when code "MC5D045A3D" minimum issue "2" is printed, the replacement pack could be either an MC5D045A3D Issue 2 (or later issue), or an MC5D045A4D (any issue) or an MC5D045A3E (any issue), etc. If there is a question if the replacement pack is compatible, refer to 235-700-125, *Circuit Pack Compatibility Guide*.

- (d) Power up the unit and go to Step 4 following only the MCTSI commands.
- (e) **When replacing a TN878 or a TN1418 board in an MCTU to resolve a Bootstrapper (BTSR) diagnostic failure, perform the following steps to avoid causing MCTSI hardware errors:**

To resolve a Bootstrapper failure, MCTSI 0 must be STBY and MCTSI 1 must be ACT. (*If the MCTSI is not duplex, seek technical assistance.*) Verify this condition by checking that the second from the top LED on the TN872/TN1617 is ON for the STBY side (MCTSI 0) and the top LED is ON for the ACT side (MCTSI 1).

Note: MCTSI 1 must be **soaked ACT for 30 minutes** before removing MCTSI 0 from service. During soak, monitor ROP for errors. If MCTSI Side 1 is experiencing problems such as INTERRUPTS, **stop and seek technical assistance.**

- (f) **Remove** MCTSI 0 from service.
On 1190,X page (where: X = SM), enter:
(Poke) **200**
OR
(MML) **RMV:MCTSI=X-0;** (where: X = SM).
- (g) Locate MCTSI 0's Power Control and Display using Table 7.3-1.
- (h) Power down MCTSI 0 using only the OFF button located on MCTSI 0s Control and Display Pack. **DO NOT USE the MOR SWITCH.**
Note: MCTSI 0 must be powered down since the BTSR is powered from Bus 0.
- (i) Replace the TN878 or the TN1418. The replacement board must be the same type as the removed board (for example, a TN1418 replaces a TN1418 only).
- (j) Power on MCTSI 0.
- (k) On MCC Page 1190, **RESTORE MCTSI 0 to STBY**, enter:
(Poke) **300,STBY**
OR
(MML) **RST:MCTSI=X-0,STBY;** (where: X = SM).
- (l) Go to Step 4, following only the Bootstrapper (BTSR) commands.

4. **Diagnosing the pack:** Check to see if the pack replacement cleared the failure.

- (a) On MCC Page 1190, **DIAGNOSE** the OOS side and verify that all tests passed (ATP). To diagnose the MCTSI, enter either:
(Poke) **50X** (where: X = OOS side),
or (MML) **DGN:MCTSI=X-Y,RAW,TLP;** (where: X = SM, Y = OOS side),
OR
To diagnose the BTSR, where applicable, enter:
(Poke) **502,**
or (MML) **DGN:BTSR=X,RAW,TLP;** (where: X = SM).

Note 1: We recommend running full diagnostics; however, time can be saved by running only one phase (that was failing previously) of the diagnostic using the PH option in the DGN input request. For example, to

diagnose Phase Y only, from the MCC Page 1190, enter:

(Poke) **50X,PH=Y** (where X = Side and Y = Phase),

or (MML) **DGN:MCTSI=X-W,RAW,TLP,PH=Y**; (where W = Side, X = SM, and Y = Phase).

Note 2: When working an intermittent failure, several runs of the diagnostic/phase may be required to determine if the pack replacement has cleared the problem.

For example, to execute all phases of the MCTSI diagnostics, type and enter:

(Poke) **50X,RPT=Y** (where X = Side and Y = Number of iterations),

or (MML) **DGN:MCTSI=X-W,RAW,TLP,RPT=Z**; (where W = Side, X = SM, and Z = Number of iterations).

To execute a particular phase of the MCTSI diagnostics, enter:

(Poke) **50X, RPT=Y, PH=Z** (where X = Side, Y = Number of iterations, and Z = Phase number),

or (MML) **DGN:MCTSI=X-W,RAW,TLP,PH=Y,RPT=Z**; (where W = Side, X = SM, Y = Phase, and Z = Number of iterations).

- (b) If the diagnostic result is all tests passed (ATP), go to Step 6.
 - (c) If identical STF occurs (PH, SEG, TEST, and MM), return original pack to the unit and continue with the next pack on the SUSPECTED FAULTY EQUIPMENT list. Go to Step 5.
 - (d) If the dominant failure is now different from the original failure, the spare pack is probably faulty (or wrong series, etc.); try another spare pack. Return to Step 3.
5. **Continuing to identify failure:** Examine the next pack on the SUSPECTED FAULTY EQUIPMENT list.
- (a) If a Note number appears in the last column on the SUSPECTED FAULTY EQUIPMENT list, obtain the text for the Note before replacing the pack to see what precautions or additional procedures are recommended. The text for the Note can be obtained by entering the **OP:TLPNOTE=n** command, where **n** is the Note number.
 - (b) If the next pack is in the OOS side under test, return to Step 3.
 - (c) If the next pack on the SUSPECTED FAULTY EQUIPMENT list is located on the ACT side (ONL side), exhaust all OOS side packs and then continue with the next substep.
 - (d) If all entries on the SUSPECTED FAULTY EQUIPMENT list from the OOS side have been exhausted, visually inspect the backplane for wiring open or short circuits, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects. Additionally, visually inspect for broken pins in the connector of the circuit pack. If such defects are found and can be repaired, complete those repairs, and return to Step 2. When OOS side passes visual inspection, go to Step 8.
6. **Verify pack is faulty:** Verify that the original failure follows the suspected faulty pack.
- (a) Swap the original (suspected faulty) pack with the spare pack inserted in Step 3 and diagnose the circuit again.

- (b) If the diagnostic failure returns with the suspected faulty pack reinserted, replace this faulty pack, hold the **OP:TAG** output printed on the ROP, and then continue with the next step.
 - (c) If the diagnostic failure does not return with the suspected faulty pack reinserted, the original problem may be due to heat, dust, etc. Re-install the spare pack and record that the diagnostic failure on the bad pack was un-reproducible. Record this incident and the failure pattern for future reference, and continue with the next step.
7. **Restore to service:** Request a **RESTORE** of the unit/circuit to service.
- (a) On MCC Page 1190, **RESTORE** the OOS side. To diagnose and restore the MCTSI to STBY, enter:
(Poke) **30X,STBY** (where: X = OOS side),
or (MML) **RST:MCTSI=X-Y,STBY**; (where: X = SM, Y = OOS side),
OR
To diagnose and **RESTORE** the BTSR, where applicable, enter:
(Poke) **302**
or (MML) **RST:BTSR=X**; (where: X = SM).
 - (b) If diagnostics fails during restoral, either the problem has not been cleared or a new problem has occurred. Collect the associated ROP and return to Step 2.
 - (c) If diagnostics ATP but the restore aborted, at Master Control Center (MCC) Page 1800, **INHIBIT BREVC**, **SET VERBOSE**, and **RESTORE** the unit, enter:
(Poke) **609** (*INHIBIT BREVC*)
OR
(MML) **INH:BREVC,SM=X**; (where: X = SM)
(Poke) **412** (*SET VERBOSE*)
OR
(MML) **SET:PERPH,SM=X,VERBOSE**; (where: X = SM)
(Poke) **30X,STBY** (where: X = OOS side) to diagnose and **RESTORE** the MCTSI to STBY
OR
(MML) **RST:MCTSI=X-Y,STBY**; (where: X = SM, Y = OOS side).
If restore aborts again, collect the associated ROP and **seek technical assistance**. Go to Step 11.
 - (d) If **RESTORE** completes, then return the ROP printout with the faulty circuit pack to the repair facility.
 - (e) *If Brevity Control was inhibited*, then **allow BREVC**.
On the 1800,X Page (where: X = SM), enter:
(Poke) **709**
OR
(MML) **ALW:BREVC,SM=X**; (where: X = SM).
 - (f) *If Verbose was set*, then **clear Verbose**.
On the 1800,X Page (where: X = SM), enter:
(Poke) **512**

OR

(MML) **CLR:PERPH,SM=X,VERBOSE;** (where: X = SM).

Note: Allow REX at least 15 minutes after the REX start time recorded in Step 1 of this procedure. If the REX start time recorded was 23 hours and 30 minutes, do not execute the 702 poke before 23:45 on MCC Page 1800.

(g) **Allow Rex.**

On the 1800,X Page (where: X = SM), enter:

(Poke) **702**

OR

(MML) **ALW:REX,SM=X;** (where: X = SM).

(h) Go to Step 11.

8. **Caution: Perform this step during off-peak hours.**

Faulty pack(s) on the on-line (ONL) side: All OOS packs on the SUSPECTED FAULTY EQUIPMENT list have been exhausted; continue with the ONL packs.

(a) On MCC Page 1800, **INHIBIT** software checks. Enter:

(Poke) **604**

OR

(MML) **INH:SFTCHK,SM=X;** (where: X = SM).

Wait for SFTCHK box to become backlighted. Then, on MCC Page 1800, **INHIBIT** hardware checks. Enter:

(Poke) **608**

OR

(MML) **INH:HDWCHK,SM=X;** (where: X = SM). See Note.

Wait for the **INH HDWCHK SM=X Completed** message to print. See Note.

Note: Be patient, inhibiting hardware checks may take a few minutes. Be aware, inhibiting hardware checks may disable CACHE memory and degrade SM/SM-2000 performance. Once the inhibit hardware checks completed message has printed, continue with the next substep.

(b) On MCC Page 1190, request an unconditional (UCL) **RESTORE** of the OOS side to STBY. Enter:

(Poke) **30X,UCL,STBY** (where: X = OOS side)

OR

(MML) **RST:MCTSI=X-Y,UCL,STBY;** (where: X = SM, Y = OOS side).

On the ROP, watch for a **RST MCTSI=a,bCOMPLETED** message to print, where: a = MCTSI, b = Side.

Soak unit for five minutes and check the ROP for errors. If errors are seen, go to Step 10; otherwise, continue.

(c) On MCC Page 1190, **SWITCH** the MCTSI. Enter:

(Poke) **403**

OR

(MML) **SW:MCTSI=X;** (where: X = SM).

Soak side ACT for 30 minutes and check the ROP for errors. If errors are seen, go to Step 10; otherwise, continue.

- (d) On MCC Page 1190, **REMOVE** the STBY side from service, enter:
(Poke) **20X** (where: X = STBY side)
OR
(MML) **RMV:MCTSI=X-Y**; (where: X = SM, Y = STBY side).
- (e) On MCC Page 1190, **DIAGNOSE** the OOS side. Enter:
(Poke) **50X** (where: X = OOS side) to diagnose the MCTSI
OR
(MML) **DGN:MCTSI=X-Y,RAW,TLP**; to diagnose the MCTSI (where: X = SM, Y = OOS side).
- Did diagnostics ATP?
If **NO**, return to Step 2.
If **YES**, replace all original on-line (ONL) packs from the previous SUSPECTED FAULTY EQUIPMENT list and continue.
- (f) On MCC Page 1190, **RESTORE** the OOS side. Enter:
(Poke) **30X,STBY** (where: X = OOS side) to diagnose and **restore** the MCTSI to STBY
OR
(MML) **RST:MCTSI=X-Y,STBY**; to diagnose and **restore** the MCTSI to STBY (where: X = SM, Y = OOS side).
- Did the side restore successfully?
If **NO**, probably one of the ONL packs replaced is defective.
If the failure is due to a diagnostic failure, return to Step 2.
If not, go to Step 10.
If YES, soak side for five minutes.
- (g) On MCC Page 1190, **SWITCH** the MCTSI. Enter:
(Poke) **403**
OR
(MML) **SW:MCTSI=X**; (where: X = SM).
- (h) On MCC Page 1800, **ALLOW** hardware checks. Enter:
(Poke) **708**
OR
(MML) **ALW:HDWCHK,SM=X**; (where: X = SM).
- Wait for the **ALW HDWCHK SM=X COMPLETED** message to print.
- (i) On MCC Page 1800, **ALLOW** software checks. Enter:
(Poke) **704**
OR
(MML) **ALW:SFTCHK,SM=X**; (where: X = SM).
- Soak side for 30 minutes.**
- (j) On MCC Page 1190, **DIAGNOSE** the STBY side of the MCTSI. Enter:
(Poke) **50X** (where: X = OOS side)
OR
(MML) **DGN:MCTSI=X-Y,RAW,TLP**; (where: X = SM, Y = OOS side).

Did diagnostics ATP?

If **NO**, continue with the next step.

If **YES**, record that this pack is from ONL side, then return pack and associated ROP to the appropriate repair center. Return to Step 7.

9. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, continue as follows:

Note: The diagnostics associated with some units may execute interface tests. This may cause the TLP listing to include suspect packs that are not owned by the unit being diagnosed. Some examples include a DLI/NLI diagnostic implicating a TMS pack (when TMSLNK phases are executed). When this happens, it is important that conditional restores be scheduled for both the original unit and the parent of the suspect/replaced circuit pack. If the restore diagnosis fails on the interface unit, treat it as a different problem, and return to Step 2.

- (a) Replace one at a time any remaining packs in the OOS side that are not on the SUSPECTED FAULTY EQUIPMENT list. Return to Step 4 until all OOS side packs have been replaced; otherwise, continue.

Note: If the pack that clears the diagnostic fault was not on the SUSPECTED FAULTY EQUIPMENT list, contact Customer Technical Support (CTS), 866-582-3688 (866LUCENT8) or 630-224-4672, to determine if the pack is needed. If it is needed, return the ROP and circuit pack to CTS.

- (b) Perform a multiple-pack swap with another unit that diagnoses ATP and can be removed from service. If the problem moves with the packs, return half of the packs, etc., until the faulty pack is isolated. If the problem does not move with the packs, check for possible cable or wiring problems. Multiple-pack swaps must be done carefully to avoid creating additional problems. Return to Step 6.

Note: Before inserting all packs, visually inspect backplane for wiring open or short circuits, bent pins, loose optical transceivers/NLI packs, loose/broken electrical/optical cables, or other physical defects. Additionally, visually inspect for broken pins in the connector of the circuit pack. If such defects are found and can be repaired, complete those repairs, and return to Step 2.

10. Collect the associated ROP and **seek technical assistance**.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

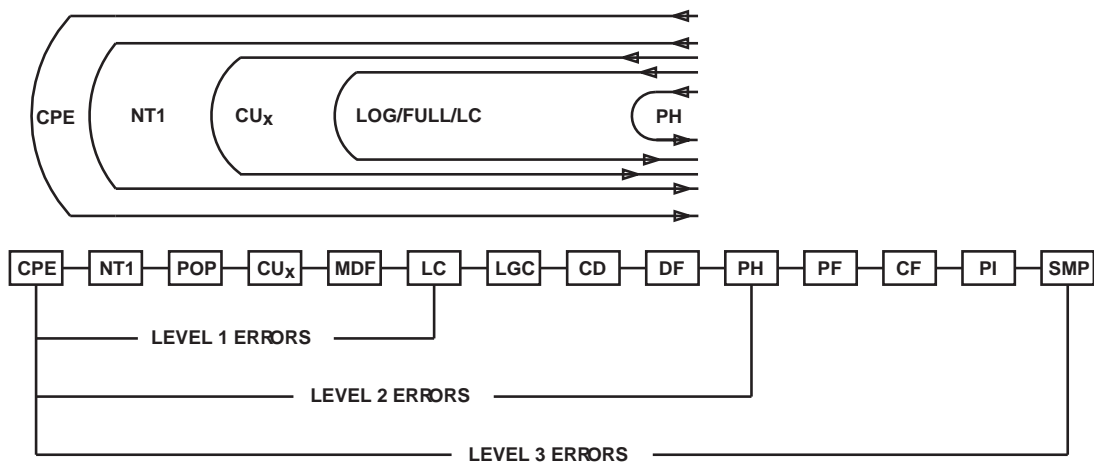
7.4 ISLU, U-DSL, BRI, AND PSU TROUBLESHOOTING

OVERVIEW

This procedure uses diagrams for troubleshooting the Integrated Services Line Unit (ISLU), U-interface Digital Subscriber Line (U-DSL), Basic Rate Interface (BRI), and Packet Switch Unit (PSU).

PROCEDURE

1. Within Figure 7.4-1, Graphic 1 shows the loopback points.
2. Graphic 2 provides the start of the troubleshooting analysis. Start by displaying the line status. Then answer the questions and follow the corresponding path.



CPE	CUSTOMER PREMISES EQUIPMENT	CD	COMMON DATA
NT1	NETWORK TERMINATION 1	DF	DATA FANOUT
POP	POINT OF PRESENCE/DEMARC	PH	PROTOCOL HANDLER
CU _x	BRITE CHANNEL UNIT	PF	PACKET FANOUT
MDF	MAIN DISTRIBUTION FRAME	CF	CONTROL FANOUT
LC	LINE CARD	PI	PACKET INTERFACE
LGC	LINE GROUP CONTROLLER	SMP	SWITCHING MODULE PROCESSOR

TST : DSL TERM =

CPE	LOOPS BACK ONE B-CHANNEL AT CPE.
NT1	ALL CHANNELS LOOPED BACK TO THE SWITCH AT NT1.
CU _x	LOOPBACK AT CU _x (x=1,2,...,6).
LC	LOOPS BACK AT LC.
PH	PACKET CHANNELS TESTED ONLY. LOOPED BACK TO THE PH.

Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (1 of 24)

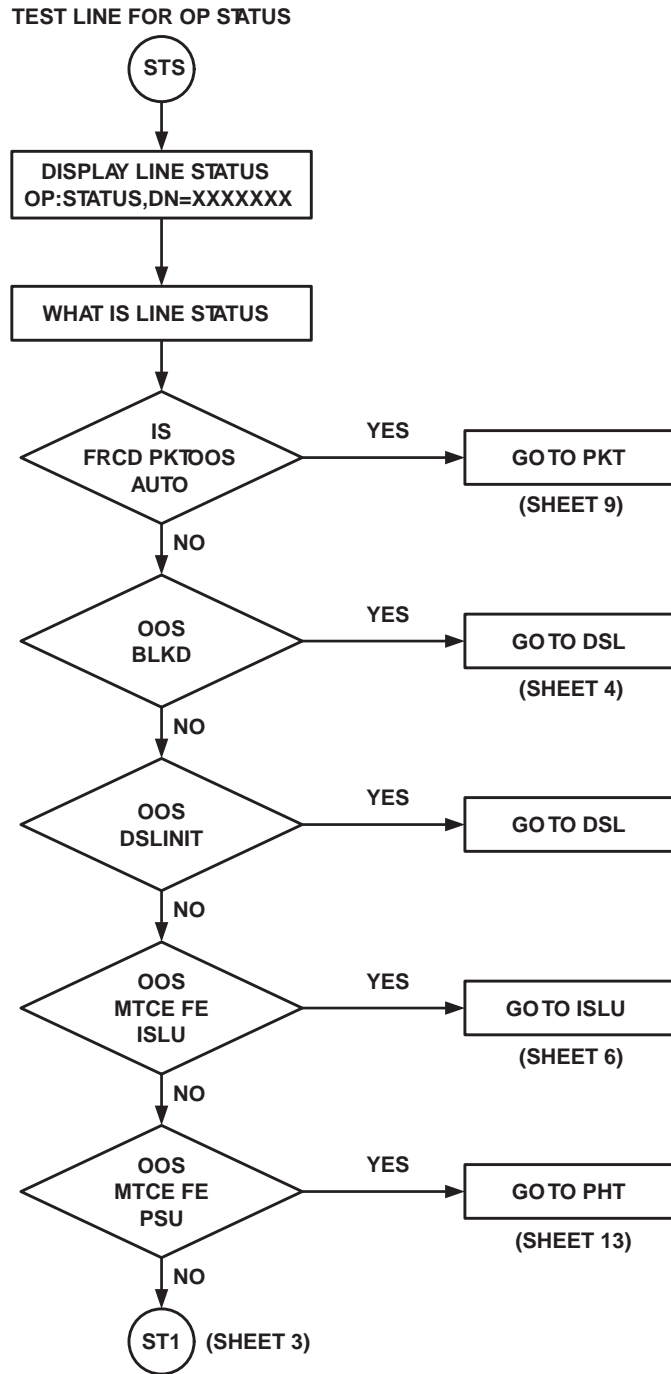


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (2 of 24)

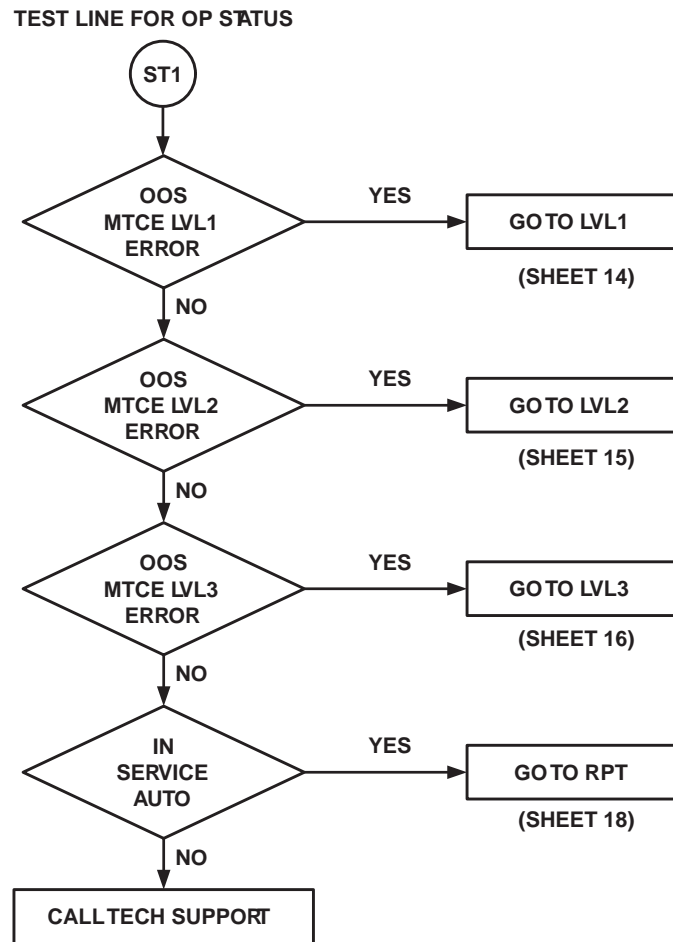
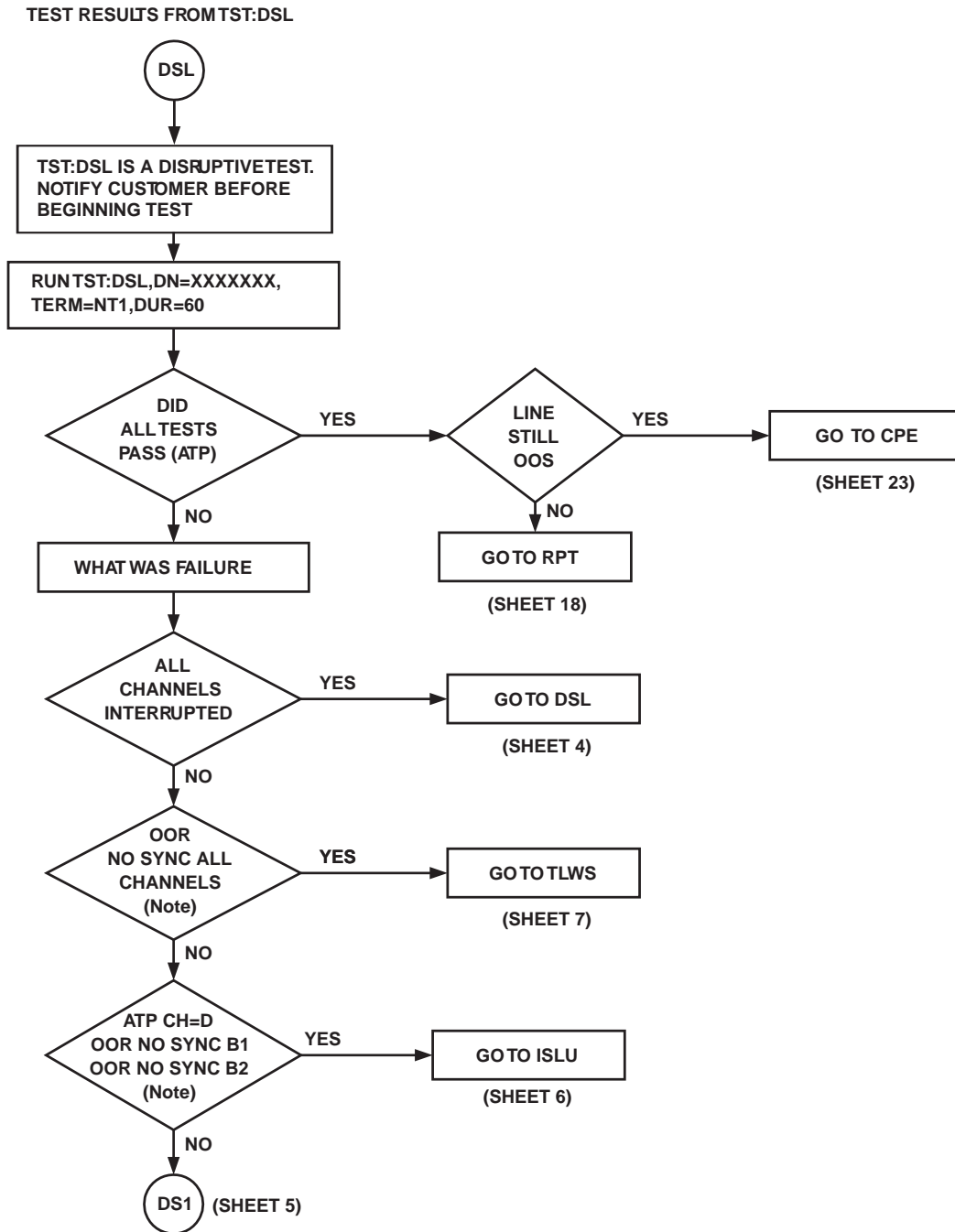


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (3 of 24)



Note: OOR NO SYNC IS THE SAME AS FAULT IN LOOP OR PATH.

Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (4 of 24)

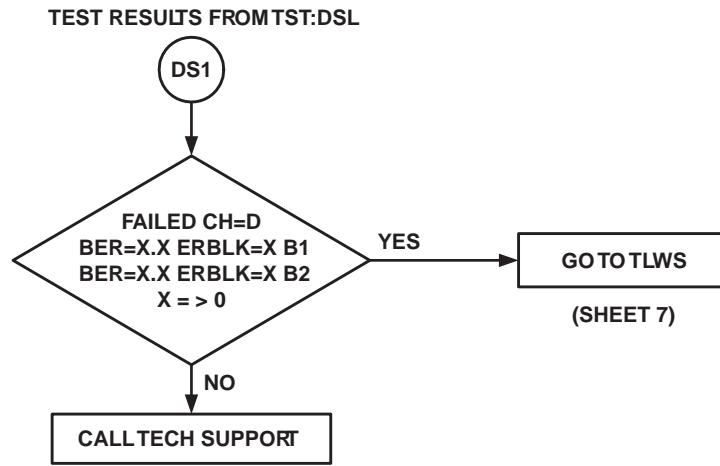


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (5 of 24)

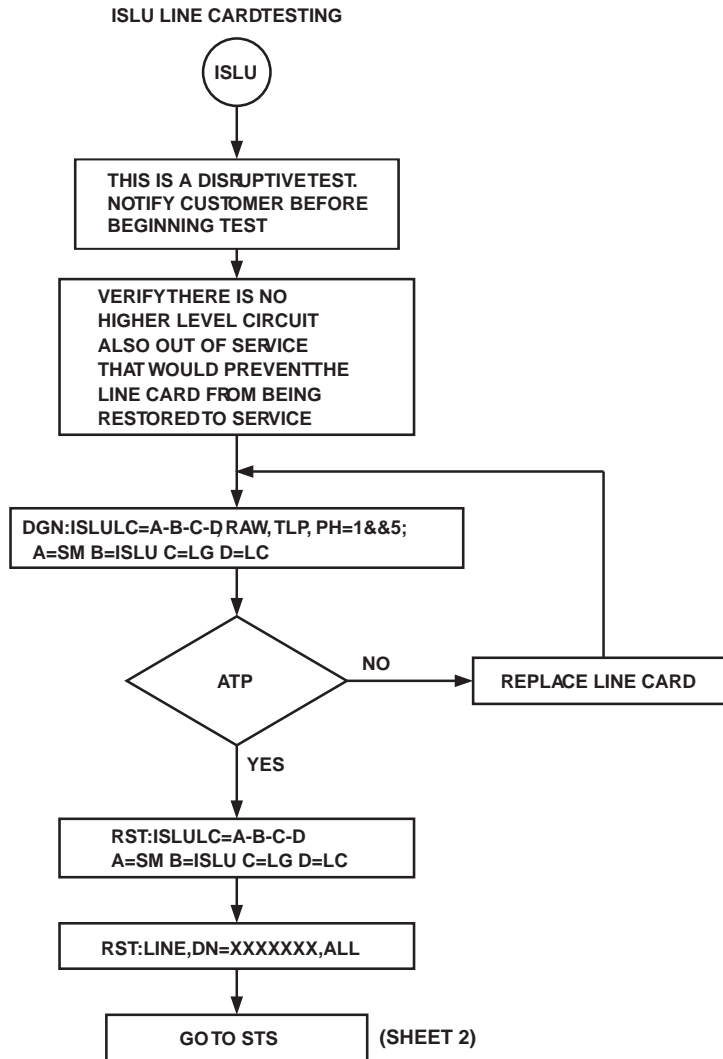


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (6 of 24)

TRUNK AND LINEWORK STATION

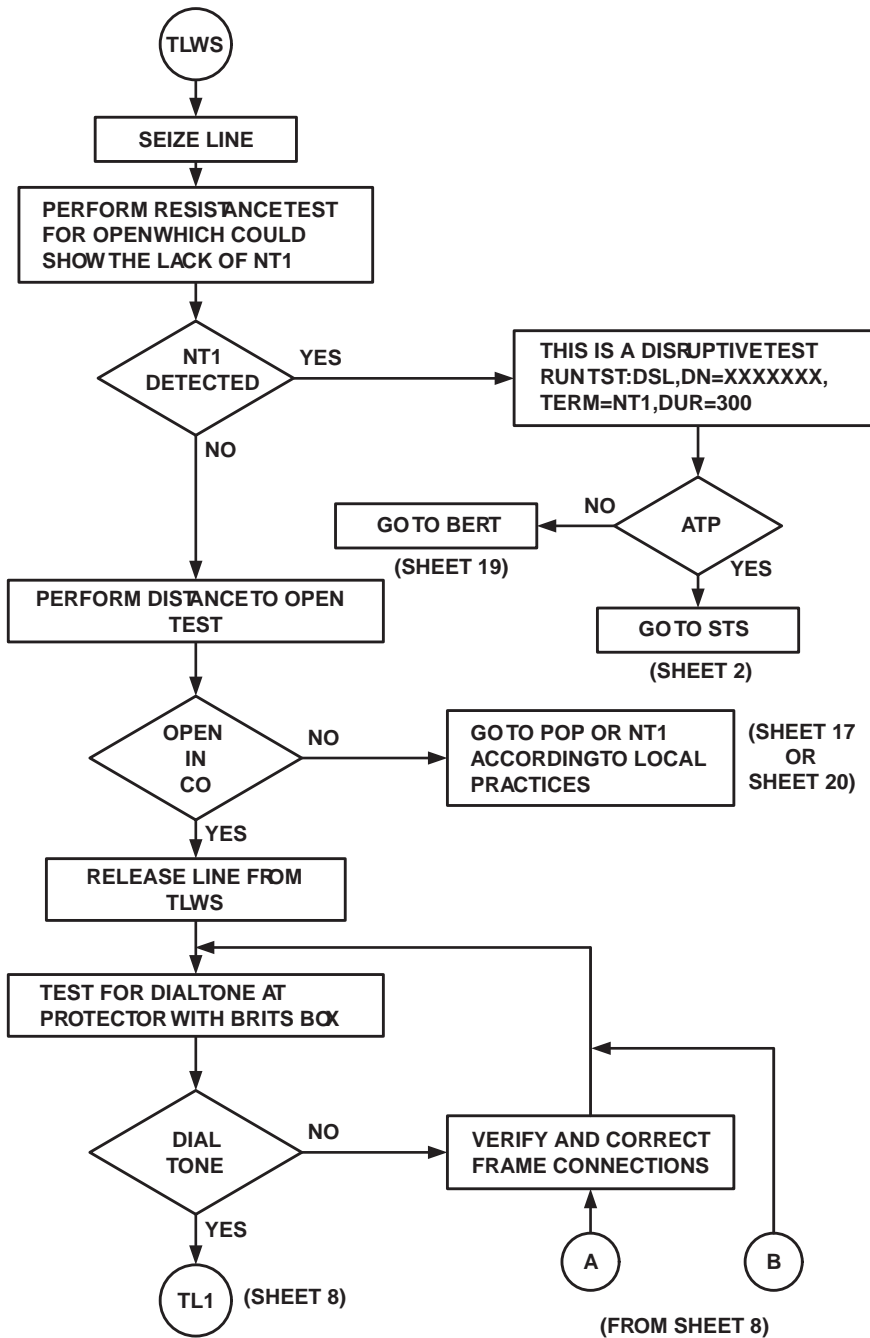
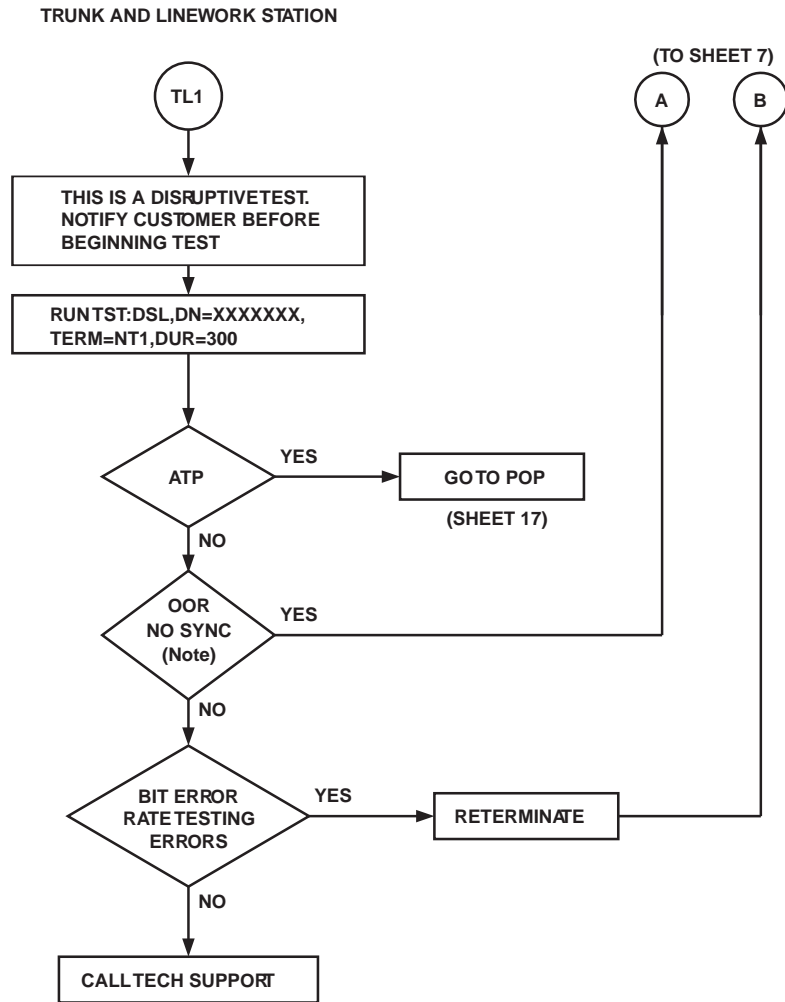


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (7 of 24)



Note: OOR NO SYNC IS THE SAME AS FAULT IN LOOP OR PATH.

Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (8 of 24)

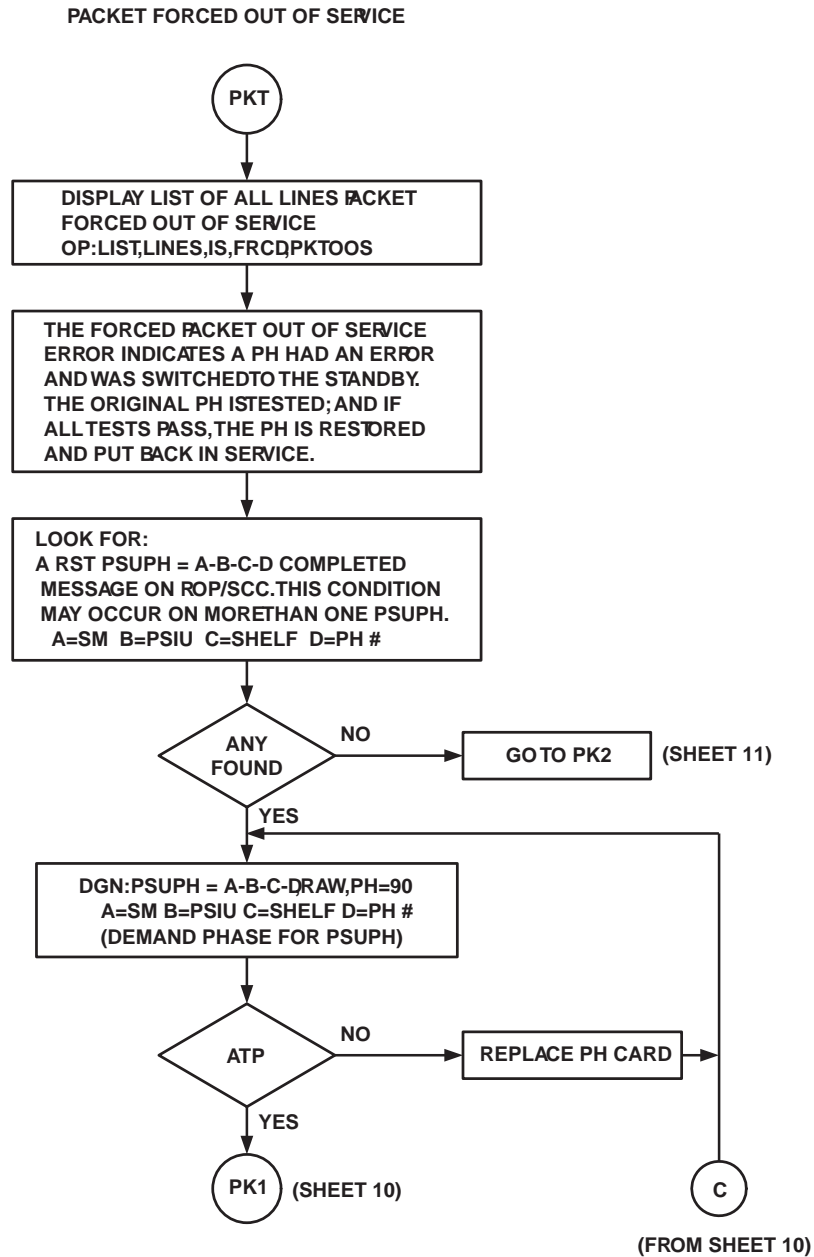


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (9 of 24)

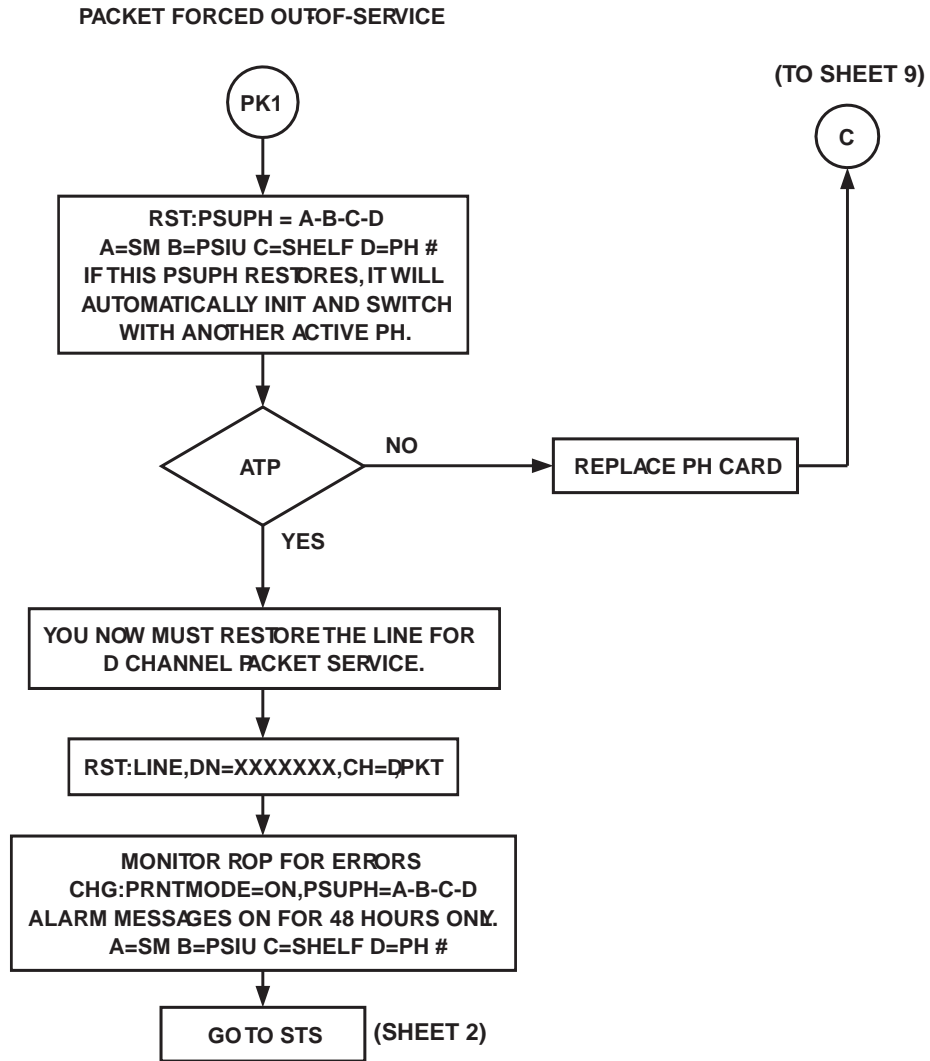


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (10 of 24)

PROTOCOL HANDLER TESTING



OP:CONVDN=XXXXXXX

DSLGM XY Z
X = SM/SM-2000
Y = PROTOCOL HANDLER (GROUP) NUMBER (0-79)
Z = CHANNEL ON PH (MEMBER) NUMBER (0-127)

CONVERSION OF PH (GROUP) NUMBER TO SHELF AND CHANNEL GROUP NUMBER
SHELF PH GROUP NUMBER TO CHANNEL GROUP NUMBER

4	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
3	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
2	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
1	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #
0	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	PH GRP #
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	CHAN GRP #

THE CHART GIVES THE SHELF AND THE CHANNEL GRP NUMBER TO USE TO DETERMINE THE PH NUMBER.

AT THE MCC/TLWS, ENTER THE FOLLOWING POKE COMMANDS:
1186,XX XX=SM/SM-2000
118X X=SHELF
THIS SHOWS THE SM/SM-2000 AND ALL SHELVES EQUIPPED.

USING THE CHANNEL GRP NUMBER FROM CHART AND THE 118X VIEW, ASSOCIATE THE CHANNEL GRP NUMBER WITH A PHYSICAL PSUPH PACK.



(SHEET 12)

Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (11 of 24)

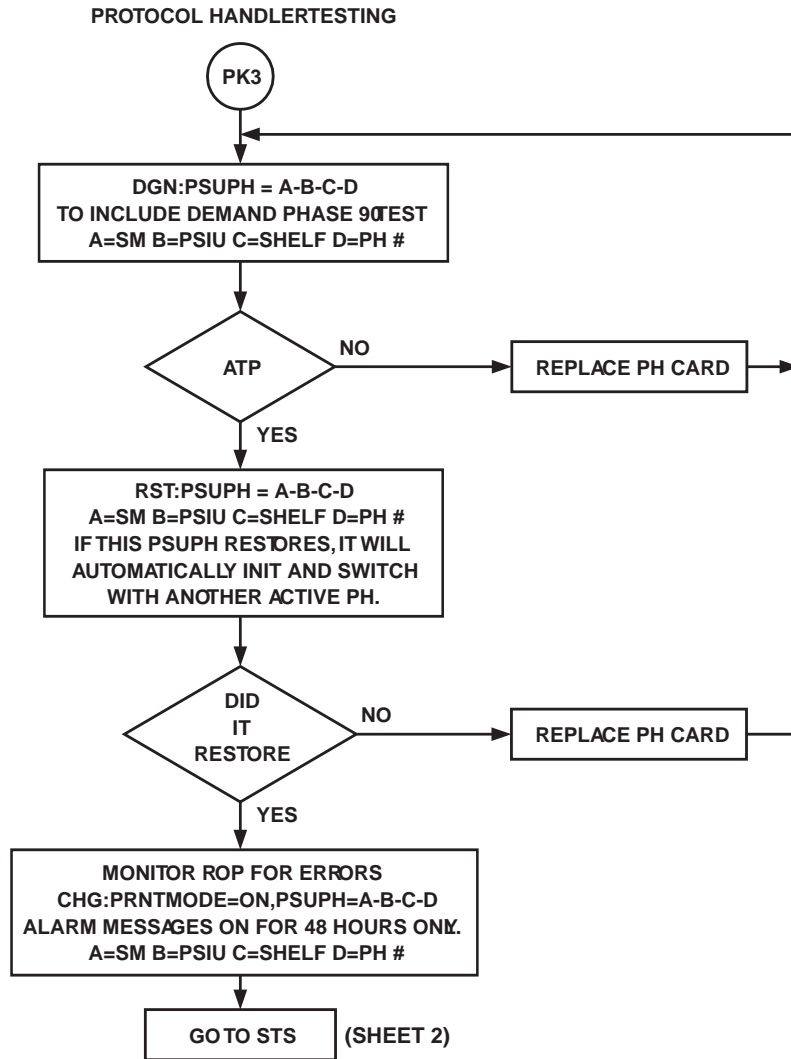


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (12 of 24)

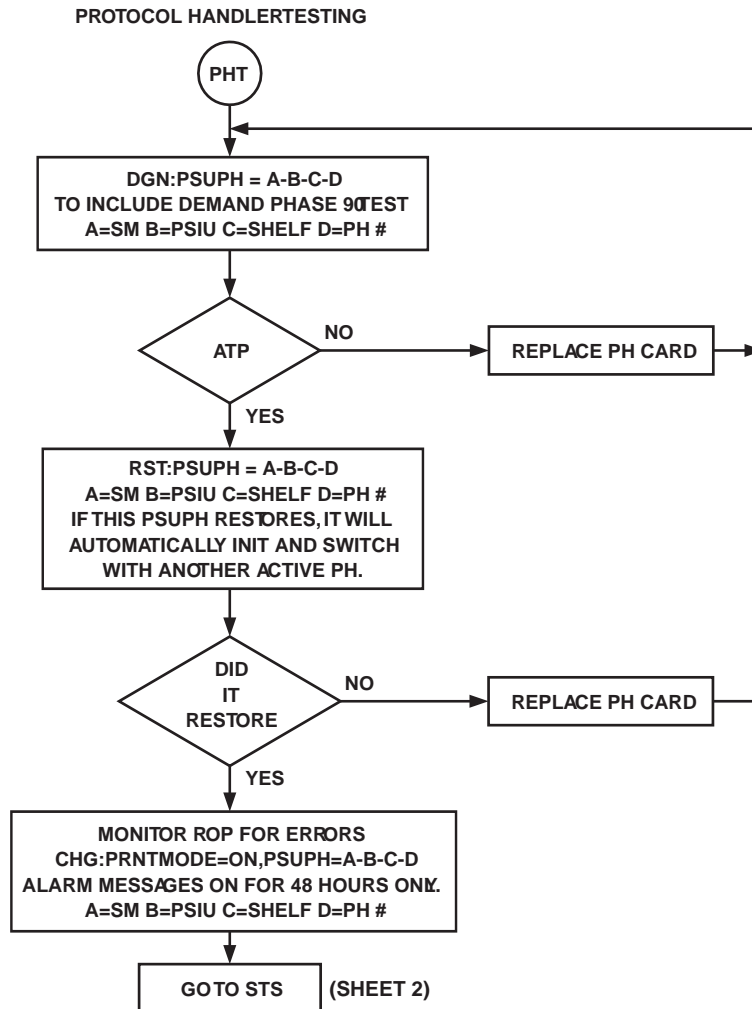


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (13 of 24)

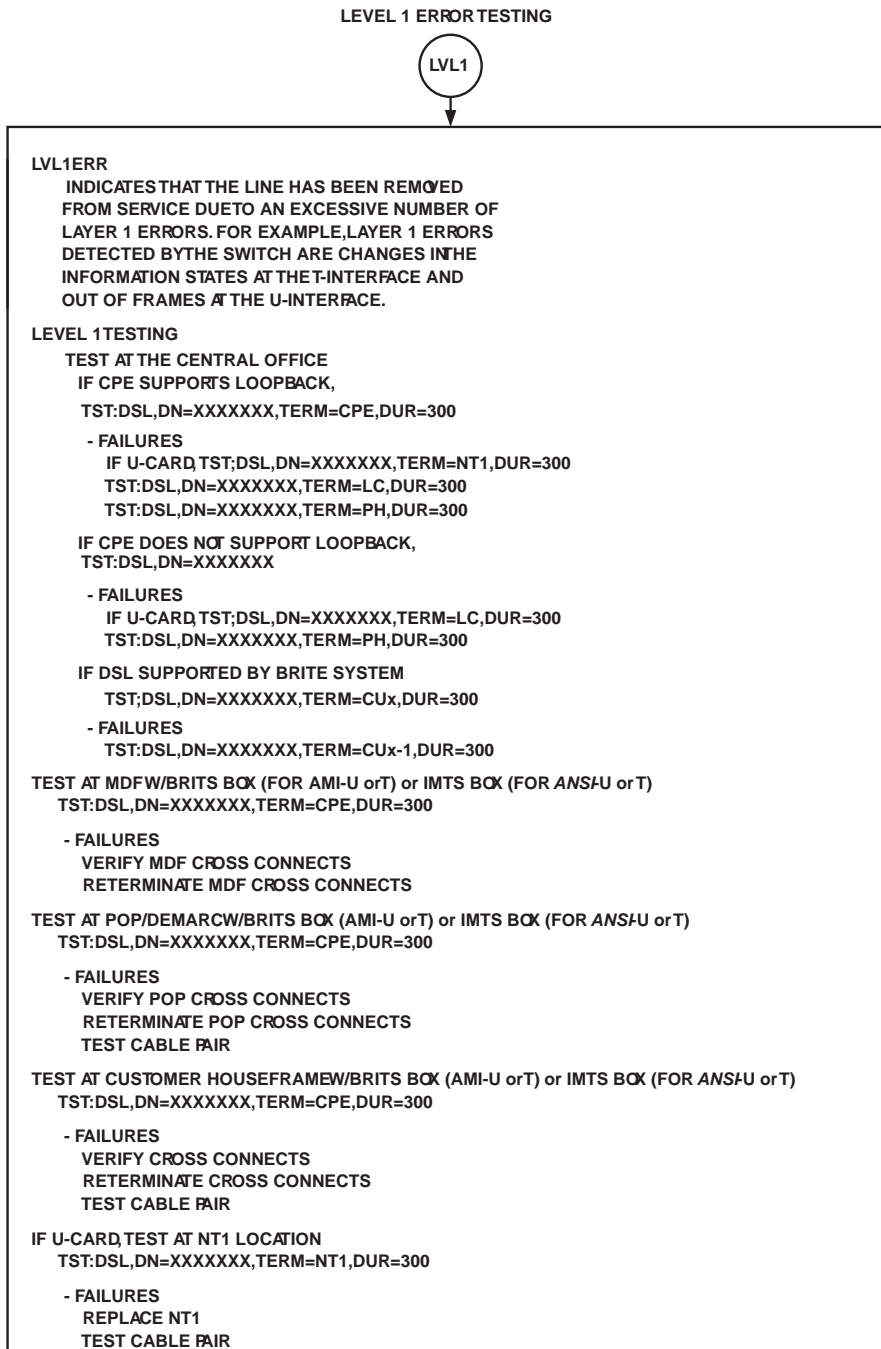


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (14 of 24)

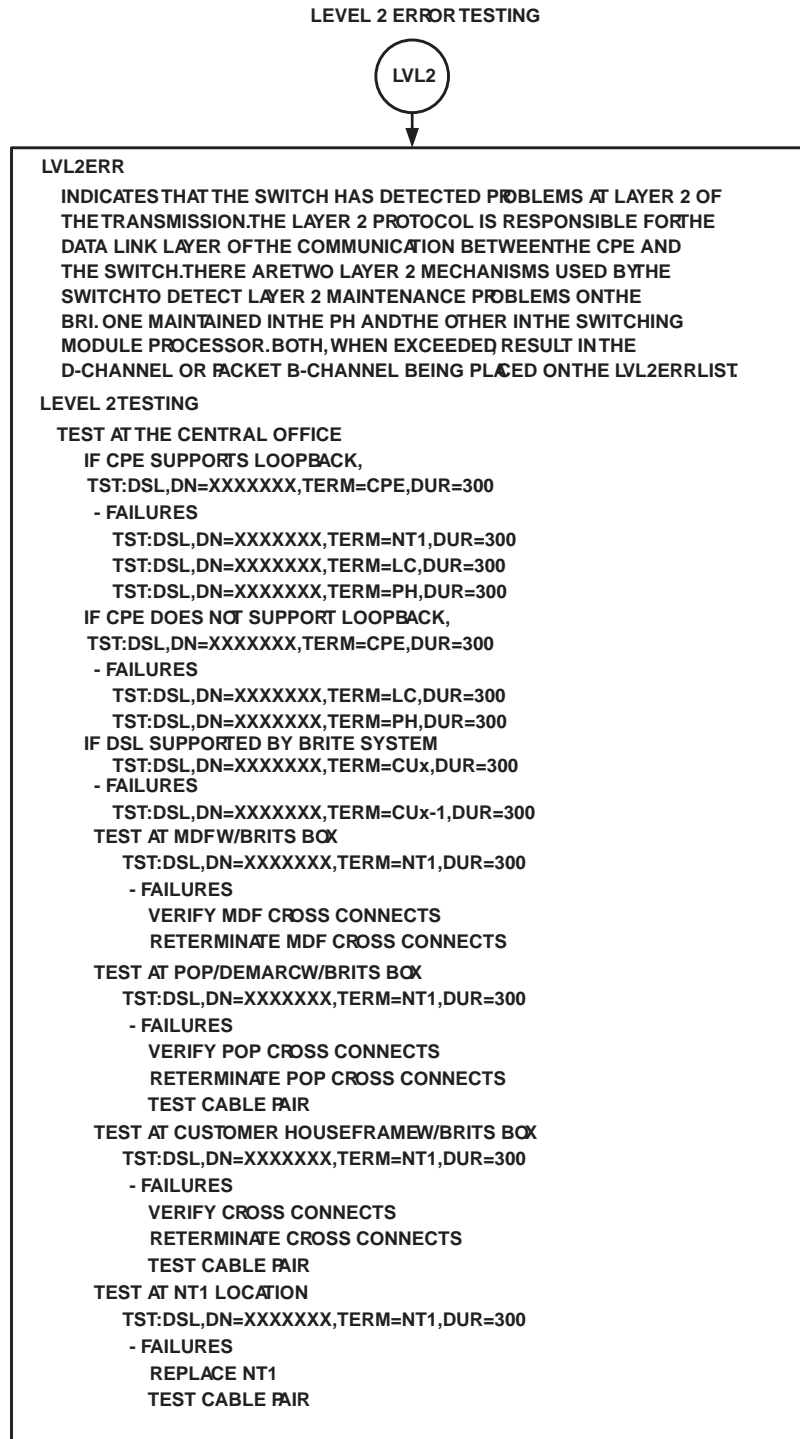


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (15 of 24)

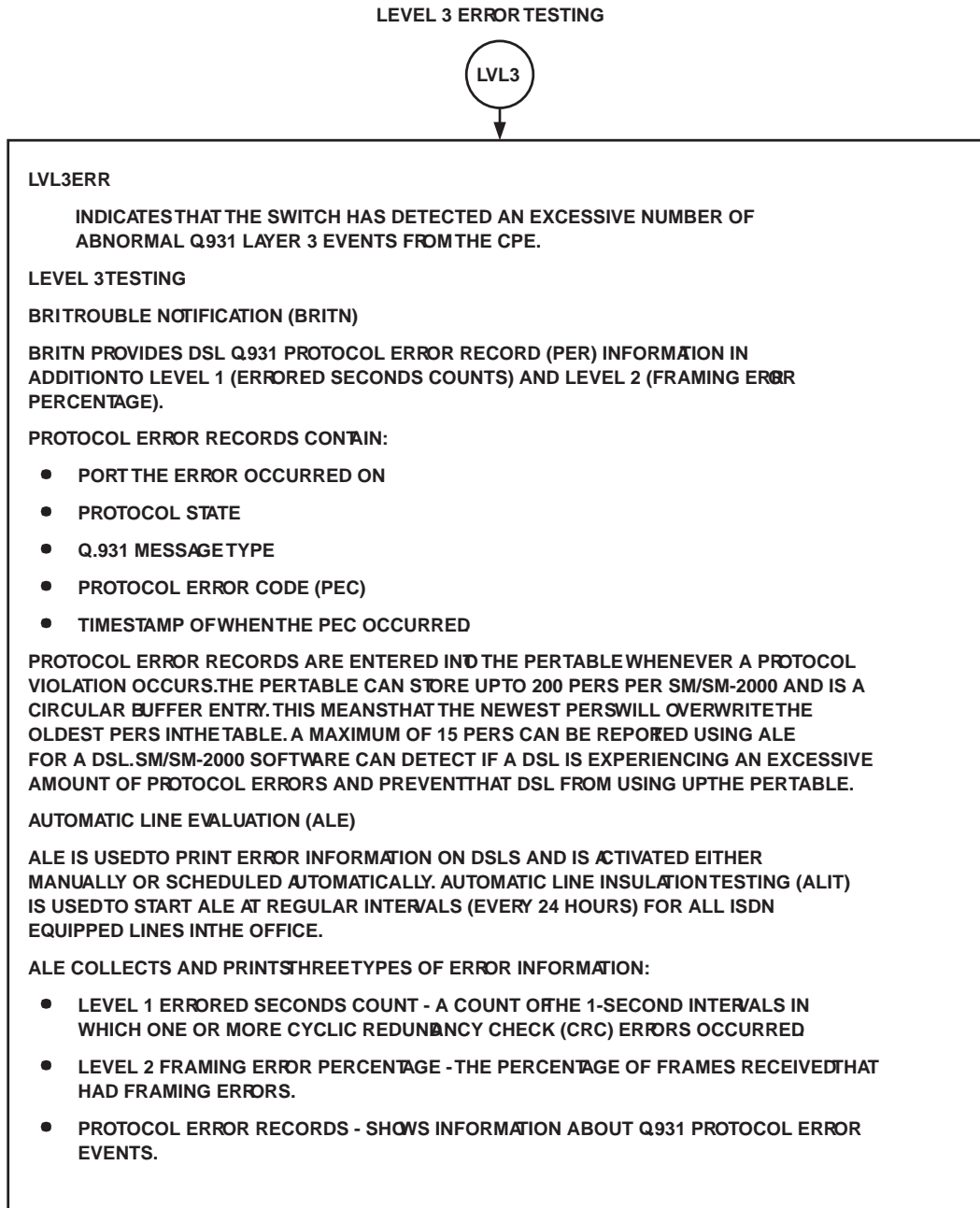


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (16 of 24)

TESTING AT THE POINT OF PRESENCE/DEMARC

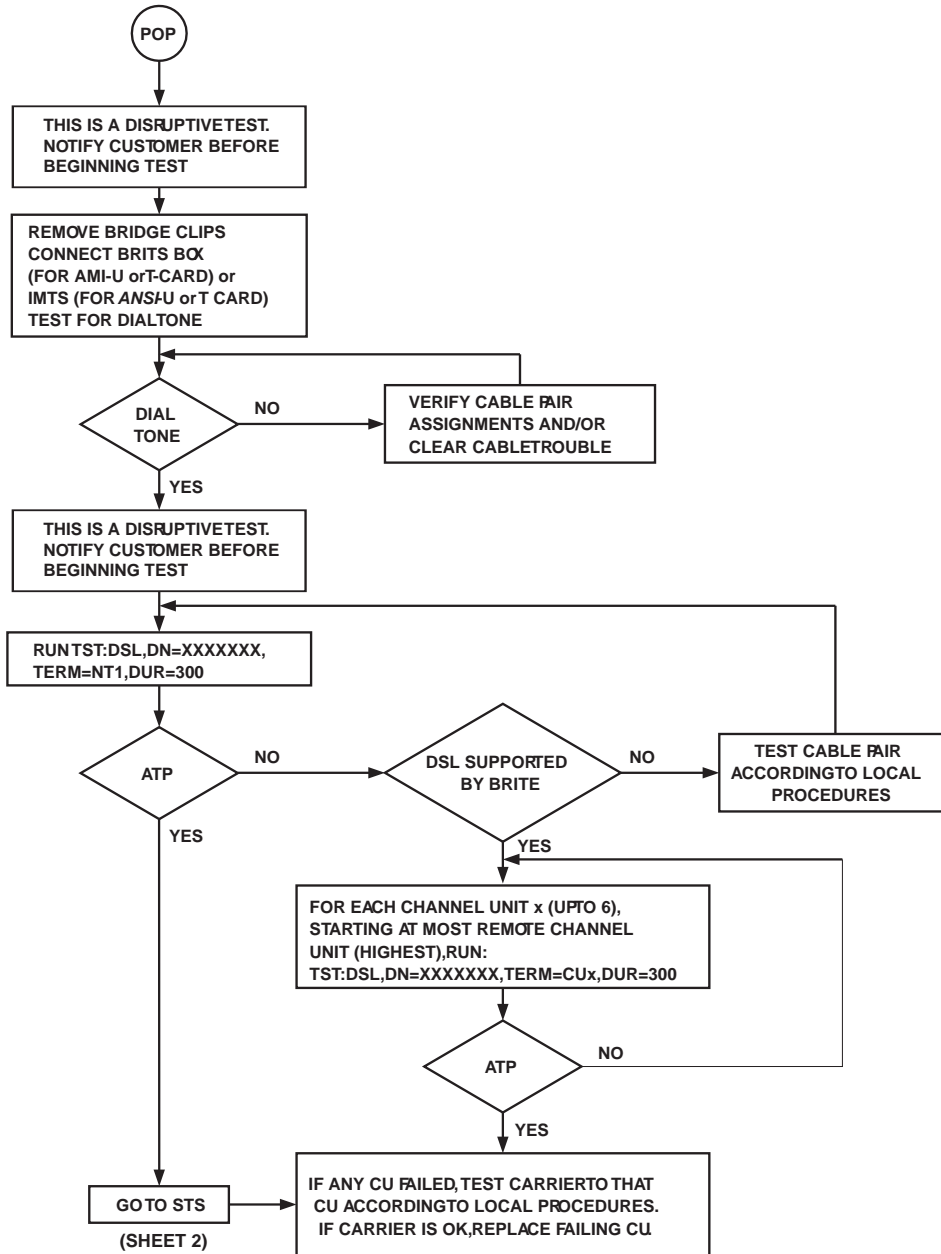


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (17 of 24)

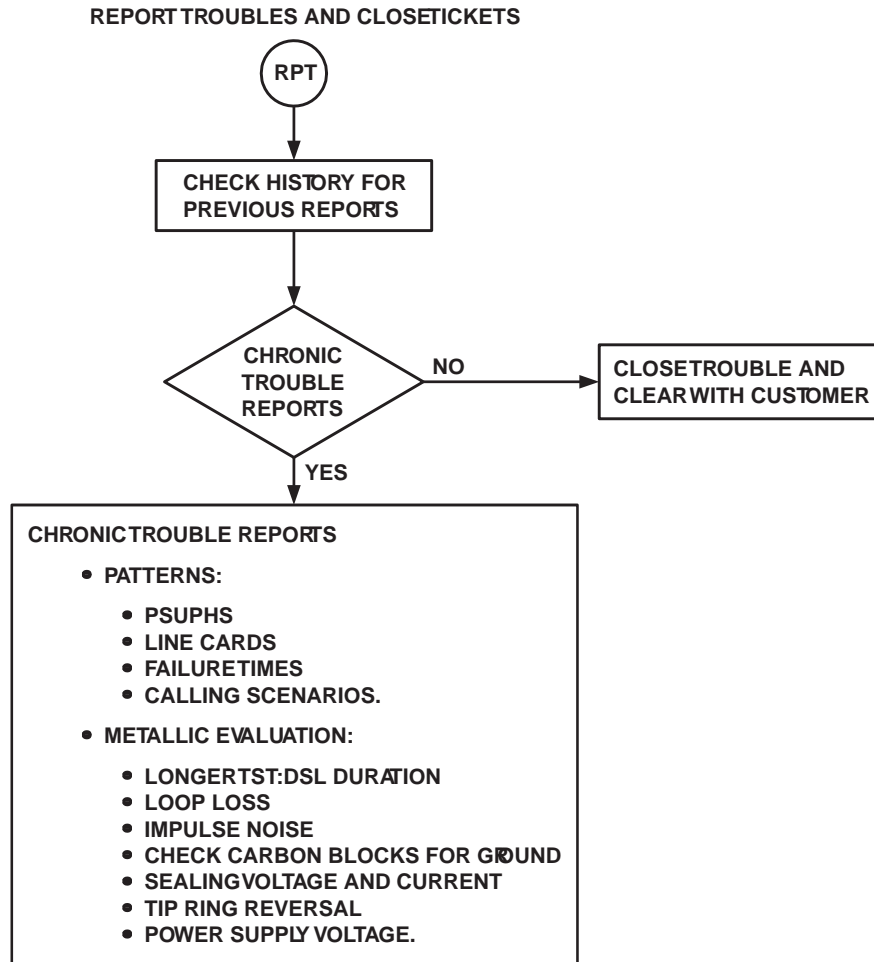


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (18 of 24)

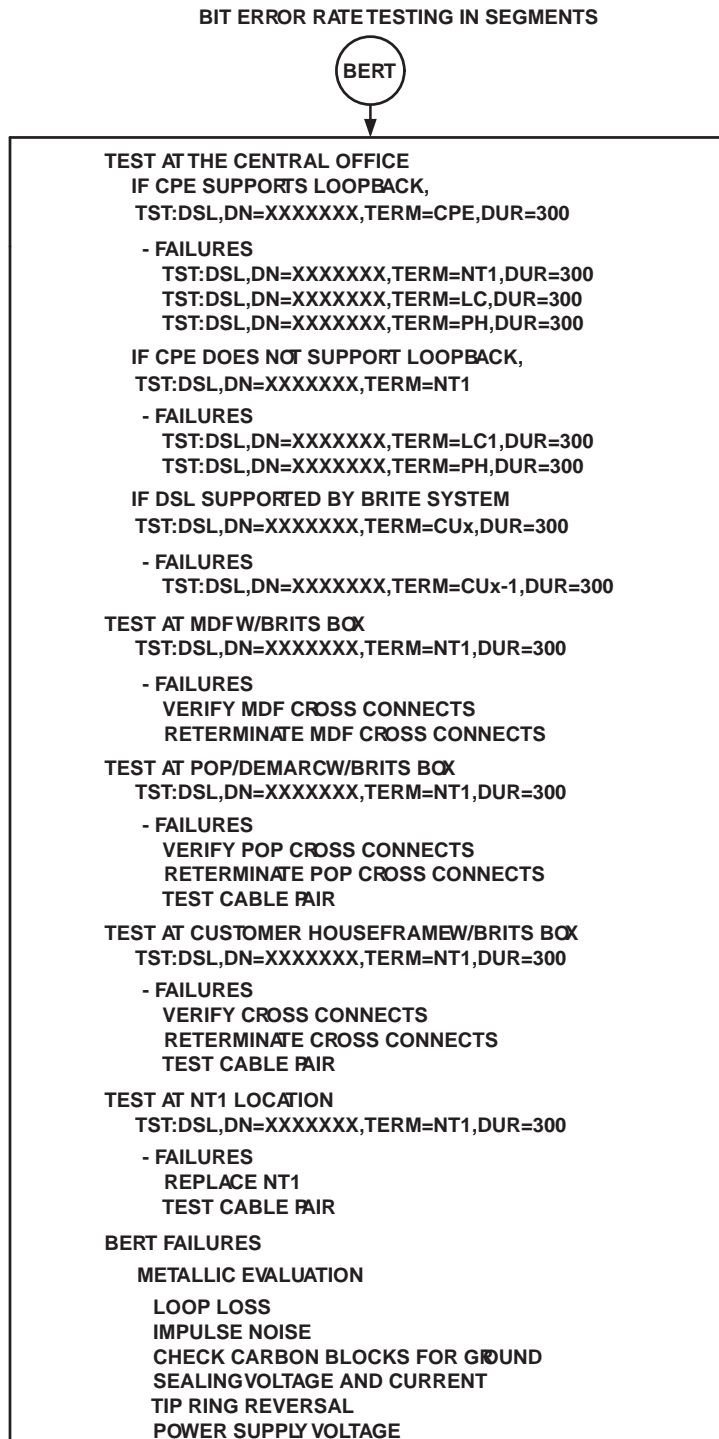


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (19 of 24)

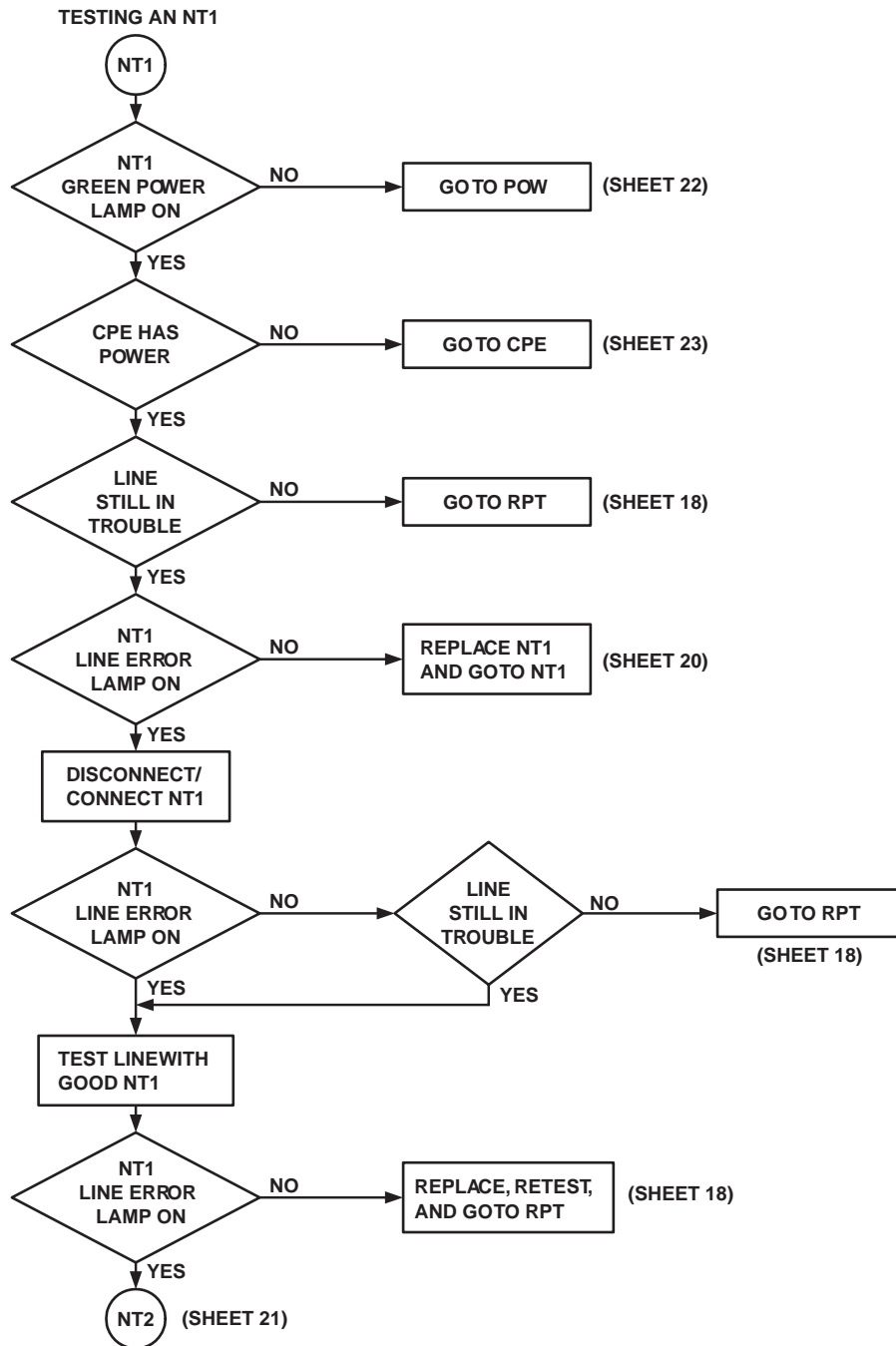


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (20 of 24)

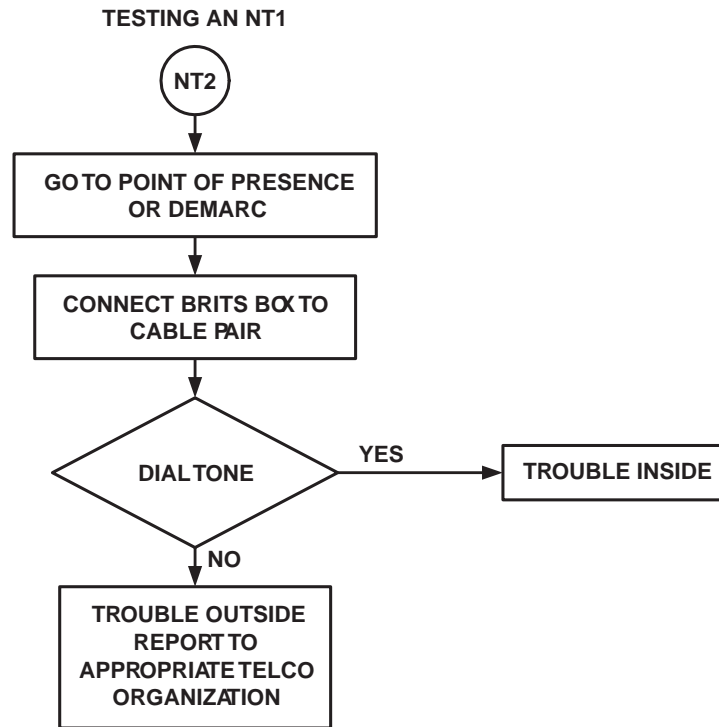


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (21 of 24)

POWER CHECK AND CONNECTION

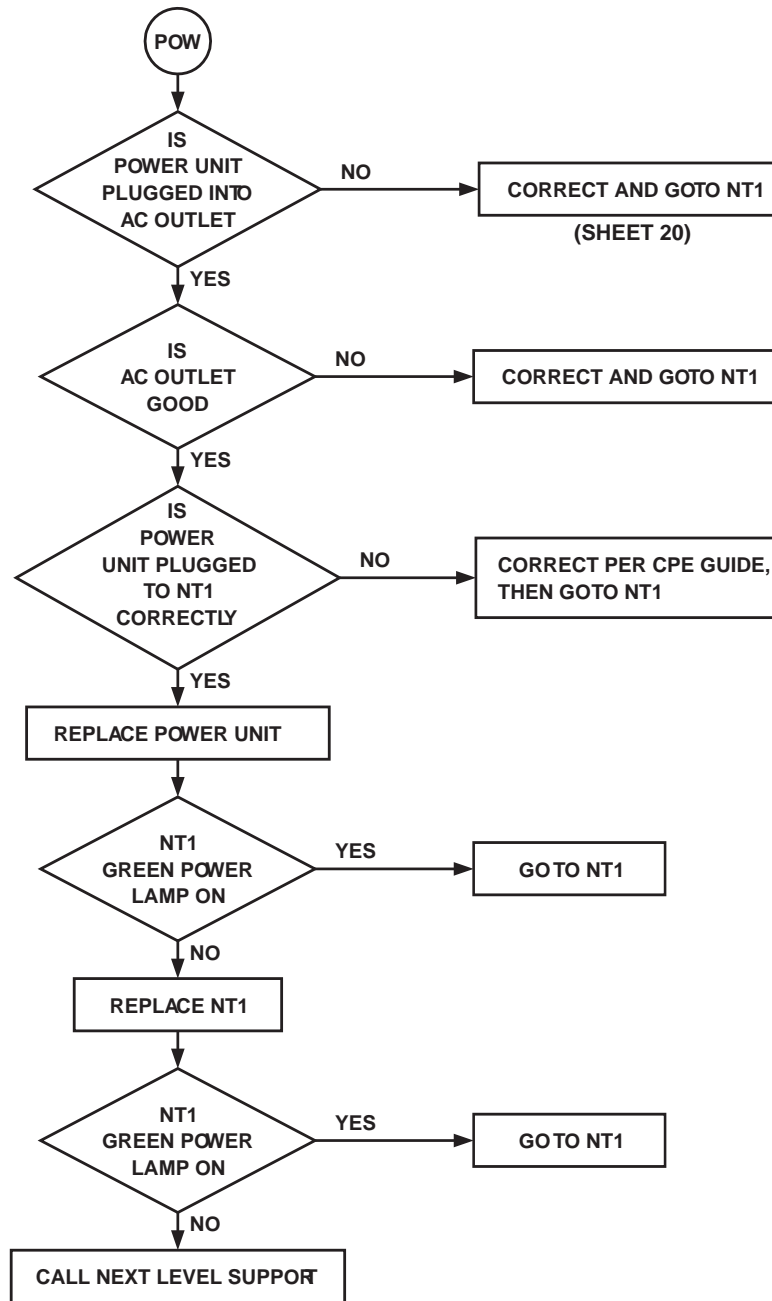


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (22 of 24)

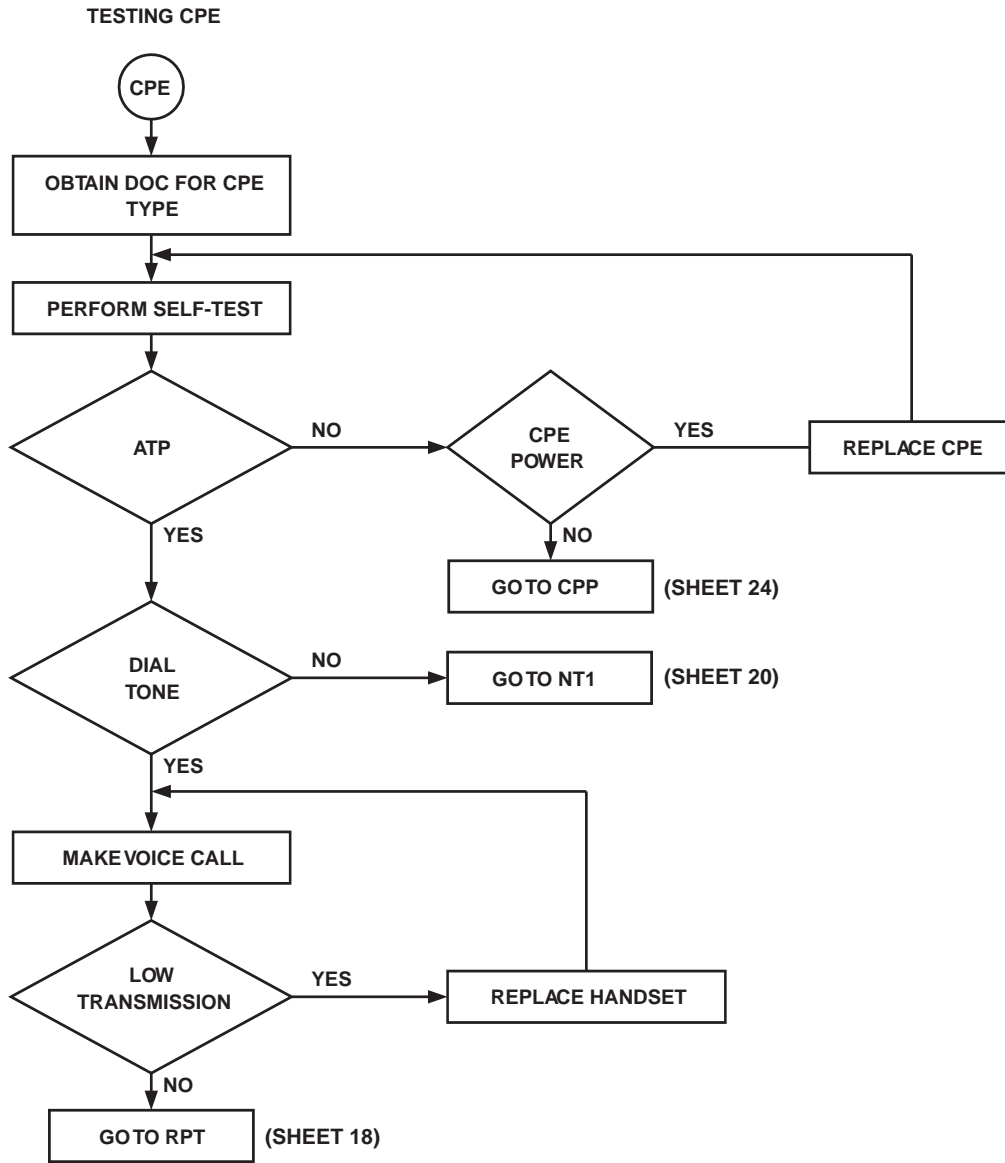


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (23 of 24)

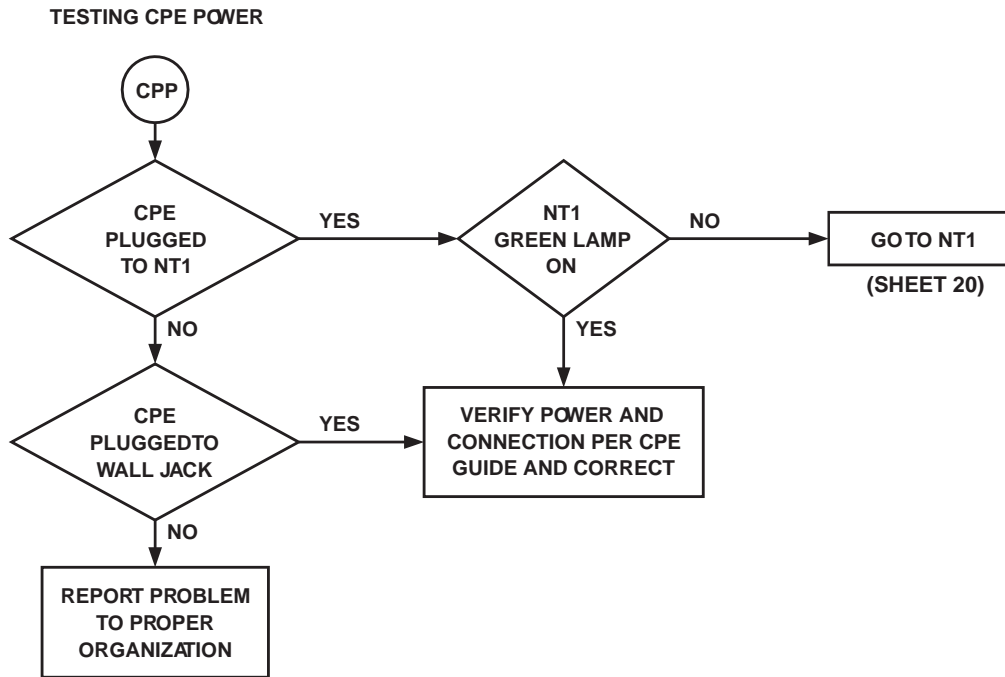


Figure 7.4-1 — ISLU U-DSL BRI Troubleshooting Diagram (24 of 24)

7.5 CLEAR DIAGNOSTIC FAILURE IN PERIPHERAL CONTROL AND TIMING LINE AND TRUNK UNIT – PLTU

OVERVIEW

This procedure is used to diagnose troubles and restore PLTUs (peripheral control and timing line and trunk units). In many cases, to correct a problem with a hardware unit, one or more circuit packs must be replaced.

Caution: *Any time you handle circuit packs, wear an Electrostatic Discharge wrist strap.*

For a description of any commands or reports mentioned in the procedure, refer to 235-600-700, *Input Messages* or 235-600-750, *Output Messages*.

Diagnose and Clear Trouble in a PLTU (Non-OIU)

The screen display in Figure 7.5-1 shows an example of a diagnostic PLTLK failure. A listing of diagnostic phases and their descriptions for PCTFI (PLTU) is shown below in Table A1-106.

```
+++ -SA- 97-02-02 02:28:49 SMCONFG 3305 #000543
M ORIGINATING COMMAND # = 000001.0094
DGN PLTLK=50-28-1-0 SUSPECTED FAULTY EQUIPMENT LAST RECORD
AISLE MODULE CABINET CODE FORM EQL TYPE NOTE
Line 1 --> 0402 SM 50 SMC 0 BKD10 BACK 1 55-034 ----- 121
Line 2 --> 402 SM 50 SMC 0 93-010 PROVND
Line 3 --> 0402 SM 50 SMC 0 KLU1 1 49-034 ONLINE
END OF REPORT #000543 ++-
```

Note:
One to three circuit packs can be listed on the TLP (trouble locating procedure).
Line 1: The PLI paddleboard (BKD10). The TLP states BACK because it is located on the backplane.
Line 2: The paddleboard at the FAR END is called the PCT-PB. The type is PROVND because the EQL is provisioned on recent change EPCTP View.
Line 3: The PLI paddleboard interfaces with the TSI slice (KLU1).

Figure 7.5-1 — Diagnostic PLTLK Failure – PLTU Example

Note: The PLTLK diagnose command removes and diagnoses a specified PLTLK. This circuit remains OOS (out of service) and the ports are denied service, regardless of the result of the diagnostic, until an RST (restore) is requested.

PROCEDURE

1. At the MCC terminal, enter input command:

DGN:PLTLK=a-b-c-d[,PH=e[&f]][,PRT=[g]][,GROW][,TLOP][,UCL];

Where:

- a = SM
- b = PLTU (PCT line and trunk unit) number
- c = PCTFI (PCT facility interface) number
- d = Side number
- e = Start phase of the range of diagnostic phases to be performed
- f = End phase of the range of diagnostic phases to be performed
- g = The number of times the test will be completed.

Response: The DGN PLTLK Diagnose Report is printed at the ROP.

- Using the SUSPECTED FAULTY EQUIPMENT list, replace the first or the next ordered list of circuit packs where a fault might be located.

Reference: Procedure 7.2, Clear Trouble in the SM and SM-2000.

- Perform diagnostics again by repeating Step 1.
- Is the diagnostic response ATP (all tests passed)?

If **Yes**, continue with the next step.

If **No**, begin with Step 1.

- At the MCC terminal, enter input command:

RST:PLTLK=a-b-c-d[,UCL][,STBY][,ALL];

Where: a = SM
 b = PCTU number
 c = PCTFI number
 d = Side number.

Response: The RST PLTLK Restore Report is printed at the ROP.

- Did the **RST:PLTLK** successfully complete?

If **Yes**, continue with Step 7.

If **No**, **Seek technical assistance.**

- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.6 CLEAR DIAGNOSTIC FAILURE IN PERIPHERAL CONTROL AND TIMING LINE AND TRUNK UNIT – OIU

OVERVIEW

This procedure is used to diagnose troubles and restore PLTUs (peripheral control and timing line and trunk units). In many cases, to correct a problem with a hardware unit, one or more circuit packs must be replaced.

Caution: *Any time you handle circuit packs, wear an Electrostatic Discharge wrist strap.*

For a description of any commands or reports mentioned in the procedure, refer to 235-600-700, *Input Messages* or 235-600-750, *Output Messages*.

Diagnose and Clear Trouble in an OIU

The screen display in Figure 7.6-1 shows an example of a diagnostic PLTLK failure. A listing of diagnostic phases and their descriptions for OIU is shown in Table A1-102.

```
+++ NLlt UPR app 99-12-03 02:28:49 SMCONFG 3305 #001449>

      A  DGN PLTLK=1-5-0-1 SUSPECTED FAULTY EQUIPMENT LAST RECORD
        AISLE MODULE CABINET CODE          FORM EQL      TYPE      NOTE
Line 1 --> 0402 SM 1 LTP 1 LPA930          23-014-F -----
Line 2 --> 0402 SM 1 SMC 0 BKD10 BACK      1 55-148 -----
Line 3 --> 0402 SM 1 SMC 0 KLU1B          1 49-060 HELPER
        END OF REPORT #001449 ++-
```

Note:
One to three circuit packs can be listed on the TLP (trouble locating procedure).
Line 2: The PLI paddleboard (BKD10). The TLP states BACK because it is located on the backplane.
Line 3: The PLI paddleboard interfaces with the TSI slice (KLU1B).

Figure 7.6-1 — Diagnostic PLTLK Failure – OIU Example

Note 1: The PLTLK diagnose command removes and diagnoses a specified PLTLK. This circuit remains OOS (out of service) and the ports are denied service, regardless of the result of the diagnostic, until an RST (restore) is requested.

Note 2: On an OIU, PCTFI 0 must be specified; all equipped PLTLKs on a specific side will be removed.

Note 3: On an OIU, a switch of the PLTLKs generates transient errors on the facilities.

PROCEDURE

1. At the MCC terminal, enter input command:

```
DGN:PLTLK=a-b-c-d[,PH=e[&&f]][,PRT[=g]][,GROW][,TLOP][,UCL];
```

Where:

- a = SM
- b = PLTU (PCT line and trunk unit) number
- c = PCTFI (PCT facility interface) number
- d = Side number
- e = Start phase of the range of diagnostic phases to be performed

f = End phase of the range of diagnostic phases to be performed
g = The number of times the test will be completed.

Response: The DGN PLTLK Diagnose Report is printed at the ROP.

- Using the SUSPECTED FAULTY EQUIPMENT list, replace the first or the next ordered list of circuit packs where a fault might be located.

Reference: Procedure 7.2, Clear Trouble in the SM and SM-2000.

- Perform diagnostics again by repeating Step 1.
- Is the diagnostic response ATP (all tests passed)?

If **Yes**, continue with the next step.

If **No**, begin with Step 1.

- At the MCC terminal, enter input command:

RST:PLTLK=a-b-c-d[,UCL][,STBY][,ALL];

Where: a = SM
 b = PCTU number
 c = PCTFI number (see **Note**).
 d = Side number.

Note: On an OIU, PCTFI 0 must be specified; all equipped PLTLKs on a specified side will be restored.

Response: The RST PLTLK Restore Report is printed at the ROP.

- Did the **RST:PLTLK** successfully complete?
If **Yes**, continue with Step 7.
If **No**, **Seek technical assistance**.
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.7 CLEAR DIAGNOSTIC FAILURE IN AN OFI

OVERVIEW

This procedure is used to diagnose troubles and restore OFIs (optical facility interfaces). In many cases, to correct a problem with a hardware unit, one or more circuit packs must be replaced.

Caution: *Any time you handle circuit packs, wear an Electrostatic Discharge wrist strap.*

For a description of any commands or reports mentioned in the procedure, refer to 235-600-700, *Input Messages* or 235-600-750, *Output Messages*.

Note: The OFI diagnose command removes and diagnoses a specified OFI. This circuit remains OOS (out of service) and the ports are denied service, regardless of the result of the diagnostic, until an RST (restore) is requested.

PROCEDURE

1. At the MCC terminal, enter input command:

```
DGN:OFI=a-b-c-d[,PH=e[&&f]][,RPT=[g]][,GROW][,TLP][,UCL];
```

Where:

- a = SM
- b = OIU (optical interface unit) number
- c = Protection group number
- d = Side number
- e = Start phase of the range of diagnostic phases to be performed
- f = End phase of the range of diagnostic phases to be performed
- g = The number of times the test will be completed.

Response: The DGN OFI Diagnose Report is printed at the ROP.

2. **Caution:** *DO NOT pull OFI boards that are carrying traffic. Before pulling an OFI board, be sure the OOS LED is ON. For OIU-IP, if the LED is not ON, packets could be lost.*

Using the SUSPECTED FAULTY EQUIPMENT list, replace the first or the next ordered list of circuit packs where a fault might be located.

Reference: Procedure 7.2, Clear Trouble in the SM and SM-2000.

3. Perform diagnostics again by repeating Step 1.
4. Is the diagnostic response ATP (all tests passed)?

If **Yes**, continue with the next step.

If **No**, begin with Step 1.

5. At the MCC terminal, enter input command:

```
RST:OFI=a-b-c-d[,UCL];
```

Where:

- a = SM
- b = OFI number
- c = Protection group number.
- d = Side number.

Response: The RST OFI Restore Report is printed at the ROP.

6. Did the **RST:OFI** successfully complete?
If **Yes**, continue with Step **7**.
If **No**, **Seek technical assistance**.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.8 CLEAR TROUBLE IN THE LU — INTRODUCTION

OVERVIEW

The DEGRADED GRID feature allows an LU gridboard to be placed in the degraded state when a grid exercise fails (with **TST:_STF** output message), or when an A-Link is (automatically or manually) removed and placed in the OOS state. A gridboard in the degraded state appears on both the switching module/switching module-2000 (SM/SM-2000) active (ACT) and SM/SM-2000 OOS **OP:CFGSTAT** lists. The gridboard can be restored to the ACT state using the **RST** command.

The LU2 (J5D004AC-1) and LU3 (J5D004AD-1) are similar LUs. There are several places in these procedures where LU1 (J5D004AB-1) and LU2 are referenced, but LU3 is not. In these cases, the LU3 has the same procedures/descriptions as the LU2. For example, line unit high-level service circuit (LUHLSC) diagnostic phase descriptions (Table [A1-82](#)) are applicable to both LU2 and LU3. Similarly, any reference to TN838 grids also apply to the TN1048 and TN1058 grid packs.

PROCEDURE

1. To clear a A-Link failure in a Line Unit, refer to Procedure [7.9](#).
2. To clear a B-Link or LUCHAN failure in Line Unit grid, refer to Procedure [7.10](#).
3. To test a specific Line Unit grid path, refer to Procedure [7.11](#).
4. To clear a Line Unit grid exercise test failure, refer to Procedure [7.12](#).
5. To clear an LEN failure in a Line Unit grid, refer to Procedure [7.13](#).

7.9 CLEAR A-LINK FAILURE IN LINE UNIT

OVERVIEW

This procedure is used to clear an A-LINK failure in a Line Unit (LU).

PROCEDURE

1. Using Figures 7.9-1 and 7.9-2 for J5D004AB-1 or Figure 7.9-3 for J5D004AC-1, determine which grids are associated with the failing A-LINK.
2. At the Master Control Center (MCC) video terminal, enter a request to restore the A-LINK (so that it can be tested in the next step).
3. At the MCC video terminal, use the **TEST** poke to run the in-service test or the **TST:LEN** command of Procedure 7.11, Test a Specific Line Unit Grid Path, on each associated grid.
 - (a) If grids are all tests passed (ATP), go to Step 4.
 - (b) If grids are not ATP, try Procedure 7.12, Clear Line Unit Grid Exercise Test Failure, to clear the trouble.
 - (c) If Procedure 7.12 is unsuccessful, then continue with the next step.
4. Using Sheet D3 of the Circuit Pack Schematic (CPS) for the first stage grid pack (TN338 in J5D004AB-1 or TN838 in J5D004AC-1), determine the backplane pins and wires associated with the A-LINK.
5. Check the backplane for wiring short circuits, breaks, bent pins, etc.
6. If the trouble cannot be found, enter a request to remove the A-LINK from service and ***seek technical assistance***.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

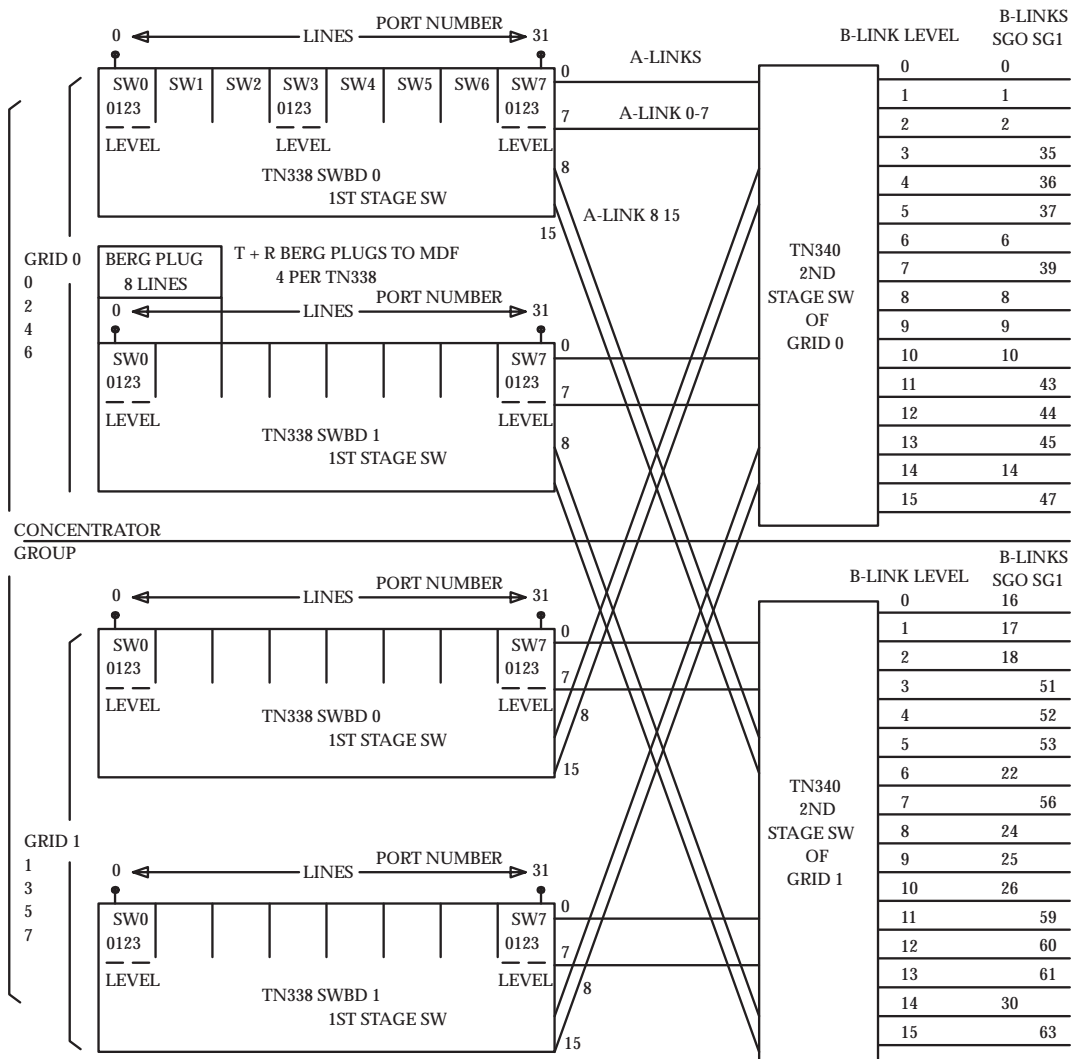


Figure 7.9-1 — J5D004AB-1 Line Unit Concentrator Group

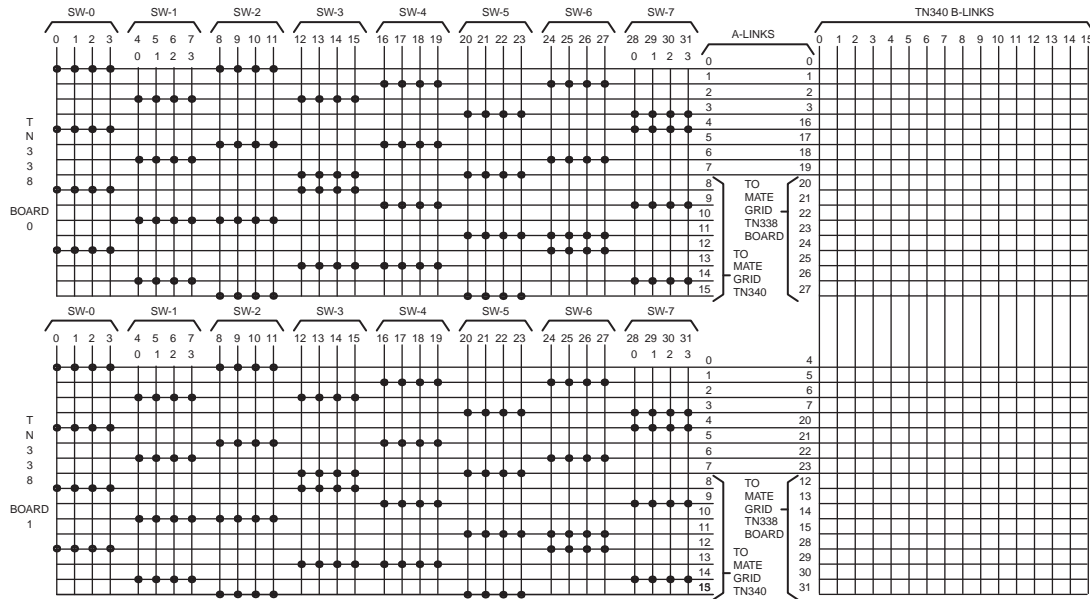


Figure 7.9-2 — J5D004AB-1 Line Unit Switch Grid

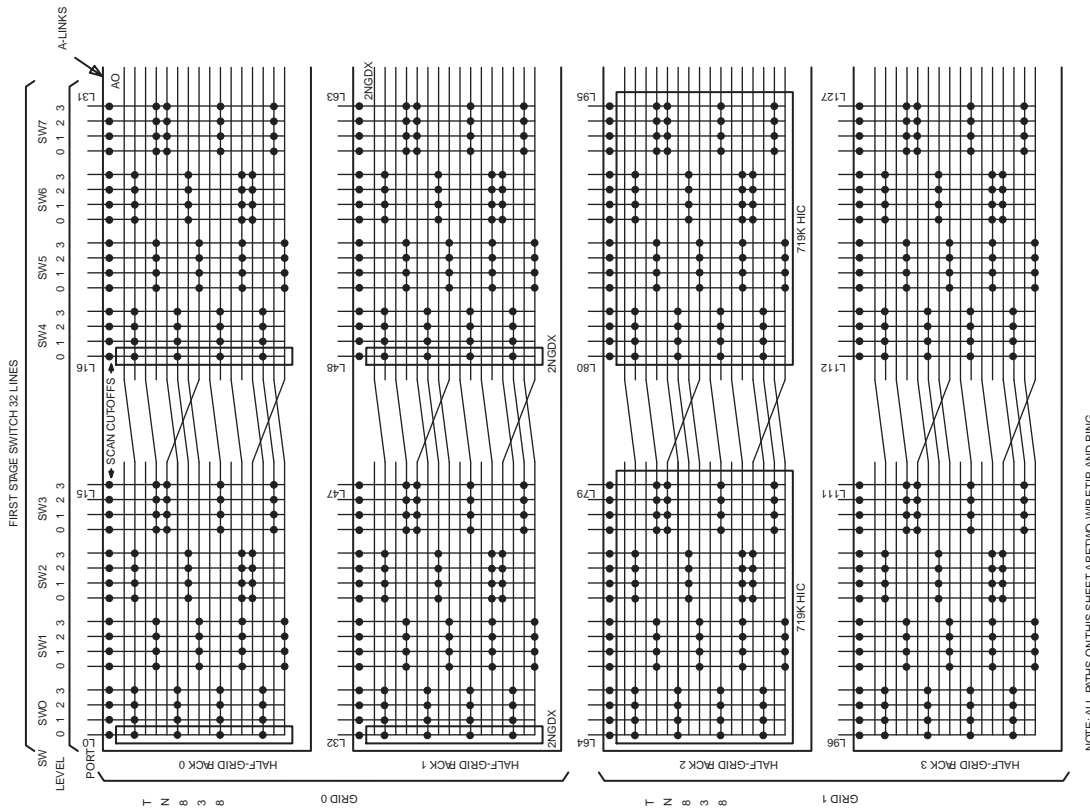


Figure 7.9-3 — J5D004AC-1 Line Unit Concentrator Group (1 of 2)

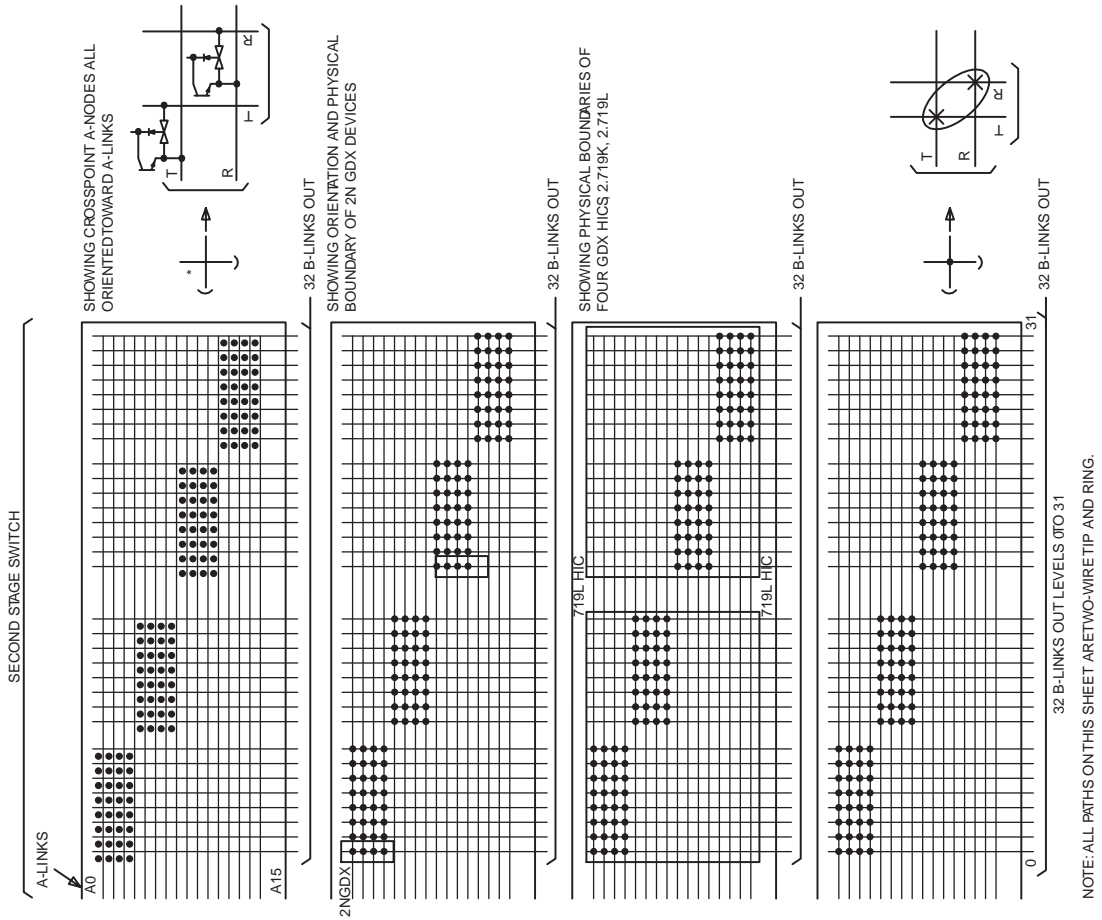


Figure 7.9-3 — J5D004AC-1 Line Unit Concentrator Group (2 of 2)

7.10 CLEAR B-LINK OR LUCHAN FAILURE IN LINE UNIT GRID

OVERVIEW

This procedure is used to clear a B-LINK or line unit channel circuit (LUCHAN) failure in a line unit (LU) grid.

PROCEDURE

1. If working a B-LINK failure, determine which LUCHAN is associated with the B-LINK using Figure 7.10-1 for J5D004AB-1, Figure 7.10-2 for J5D004AC-1, or Figure 7.10-3 for J5D004AD-1.
2. Diagnose the LUCHAN circuit.
 - (a) If the diagnosis is all tests passed (ATP), go to Step 3.
 - (b) If the diagnosis is not ATP, try using Procedure 7.2, Clear Trouble in the SM and SM-2000, and the LUCHAN diagnostic to clear the trouble.
 - (c) If the previous step does not clear the trouble, continue with the next step.
3. Diagnose the GDXACC circuit (SG 0 or 1) associated with the LUCHAN.
 - (a) If the diagnosis is ATP, go to Step 4.
 - (b) If the diagnosis is not ATP, try using Procedure 7.2, Clear Trouble in the SM and SM-2000, and the GDXACC diagnostic to clear the trouble.
 - (c) If the previous step does not clear the trouble, continue with the next step.
4. If this procedure is entered with a LUCHAN failure, determine the associated B-LINK and grid circuit packs using Figure 7.10-1 for J5D004AB-1, Figure 7.10-2 for J5D004AC-1, or Figure 7.10-3 for J5D004AD-1.
5. Use the **TEST** poke to run in-service grid exercise tests on GRID or GRIDBD (not previously tested).
 - (a) If grid test is ATP, go to Step 6.
 - (b) If grid test is not ATP, try Procedure 7.9, Clear A-Link Failure in Line Unit, and Procedure 7.12, Clear Line Unit Grid Exercise Test Failure.
 - (c) If the previous step did not clear the trouble, continue with the next step.
6. Use sheet D3 of the Circuit Pack Schematic (CPS) for the grid pack (either TN340 or TN838) to determine the backplane pins associated with the B-LINK.
7. Check the backplane for wiring short circuits, breaks, bent pins, etc.
8. If the trouble has not cleared, **seek technical assistance**.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

MODEL 1 LINE UNIT SERVICE GROUP 0
 LINE UNIT CHANNEL-D-B-LINK-TO-GRID ASSIGNMENT

TN340 B-LINK LEVEL	CONCENTRATOR GROUP 0							B-LINK	GDXACC	TN335 BOARD CHAN	
	GRID GRID		CG1		CG2		CG3				
	0	1	G2	G3	G4	G5	G6	G7			
0	X		X						0	↑	0-0
1	X				X				1		1-0
2	X						X		2		2-0
3			X		X				3		3-0
4			X				X		4		0-1
5					X		X		5		1-1
6	X				X				6	T	2-1
7			X				X		7	N	3-1
										3	
8	X		X						8	3	0-2
9	X				X				9	2	1-2
10	X						X		10		2-2
11			X		X				11		3-2
12			X				X		12		0-3
13					X		X		13		1-3
14	X				X				14		2-3
15			X				X		15	↓	3-3
0	X		X						16	↑	0-4
1	X				X				17		1-4
2	X						X		18		2-4
3			X		X				19		3-4
4			X				X		20		0-5
5					X		X		21		1-5
6	X				X				22	T	2-5
7			X				X		23	N	3-5
										3	
8	X		X						24	3	0-6
9	X				X				25	1	1-6
10	X						X		26		2-6
11			X		X				27		3-6
12			X				X		28		0-7
13					X		X		29		1-7
14	X				X				30		2-7
15			X				X		31	↓	3-7

≡≡≡ A-LINKS

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE GRID B-LINK INPUT LEVEL FROM THE B-LINKS OF THE GDXACC OF SG0. ONE B-LINK HAS MULTIPLE CONNECTIONS TO TWO GRIDS.

Figure 7.10-1 — J5D004AB-1 Line Unit Channel-to-B-LINK-to-Grid Assignment (1 of 2)

MODEL 1 LINE UNIT SERVICE GROUP 1
LINE UNIT CHANNEL-TO-B-LINK-TO-GRID ASSIGNMENT

TN340 B-LINK LEVEL	CONCENTRATOR GROUP 0							B-LINK	GDXACC	BOARD CHAN	TN335
	GRID 0		GRID 1		CG1		CG2				
			G2	G3	G4	G5	G6	G7			
0					≡		≡		0/32	↑	0-0
1				≡					1/33		1-0
2				*		*		*	2/34		2-0
3		≡						*	3/35		3-0
4		*				*			4/36		0-1
5		*		*					5/37		1-1
6				*				*	6/38	T	2-1
7		*			*				7/39	N	3-1
										3	
8					*		*		8/40	3	0-2
9				*			*		9/41	2	1-2
10				*		*			10/42		2-2
11		*						*	11/43		3-2
12		*			*				12/44		0-3
13		*		*					13/45		1-3
14				*				*	14/46		2-3
15		*			*				15/47	↓	3-3
0					≡	*	≡	*	16/48	↑	0-4
1				≡	*			*	17/49		1-4
2				*		*			18/50		2-4
3		≡	*					*	19/51		3-4
4		*				*			20/52		0-5
5		*		*					21/53		1-5
6				*				*	22/54	T	2-5
7		*			*				23/55	N	3-5
										3	
8					*		*		24/56	3	0-6
9				*			*		25/57	1	1-6
10				*		*			26/58		2-6
11		*						*	27/59		3-6
12		*			*				28/60		0-7
13		*		*					29/61		1-7
14				*				*	30/62		2-7
15		*			*				31/63	↓	3-7

≡ A-LINKS

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE GRID B-LINK INPUT LEVEL FROM THE B-LINKS OF THE GDXACC OF SG1. ONE B-LINK HAS MULTIPLE CONNECTIONS TO TWO GRIDS.

Figure 7.10-1 — J5D004AB-1 Line Unit Channel-to-B-LINK-to-Grid Assignment (2 of 2)

MODEL 2 LINE UNIT SERVICE GROUP 0
 LINE UNIT CHANNEL-TO-B-LINK-TO-GRID ASSIGNMENT

TN838 B-LINK LEVEL	GRID														B-LINK	TN335			
	0		1		2		3		4		5		6			7		B O A R D	C H A N N E L
	HG 0	HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	HG 11	HG 12	HG 13		HG 14	HG 15		
0	*		*		*		*		*		*		*		*		0	0-0	
1		*	*			*		*		*		*		*		*	1	1-0	
2	*			*	*			*	*			*	*			*	2	2-0	
3		*		*		*	*		*		*		*	*	*		3	3-0	
4	*		*		*		*	*		*		*		*	*	*	4	0-1	
5		*	*		*		*		*	*		*		*	*	*	5	1-1	
6	*			*	*	*		*		*		*	*	*	*	*	6	2-1	
7		*		*	*		*		*		*	*	*		*	*	7	3-1	
8		*		*	*	*		*	*		*	*	*	*	*	*	8	0-2	
9	*			*	*	*		*	*		*	*	*	*	*	*	9	1-2	
10		*	*		*	*		*	*		*	*	*	*	*	*	10	2-2	
11	*		*		*		*	*		*	*	*	*	*	*	*	11	3-2	
12		*		*	*	*		*	*		*	*	*	*	*	*	12	0-3	
13	*			*	*	*		*	*		*	*	*	*	*	*	13	1-3	
14		*	*		*	*		*	*		*	*	*	*	*	*	14	2-3	
15	*		*		*	*	*		*	*		*	*	*	*	*	15	3-3	
16		*	*		*	*	*		*	*		*	*	*	*	*	16	0-4	
17	*		*		*	*	*		*	*		*	*	*	*	*	17	1-4	
18		*		*	*	*	*		*	*		*	*	*	*	*	18	2-4	
19	*		*		*	*	*	*		*	*	*	*	*	*	*	19	3-4	
20		*	*		*	*	*	*		*	*	*	*	*	*	*	20	0-5	
21	*		*		*	*	*	*	*		*	*	*	*	*	*	21	1-5	
22		*		*	*	*	*	*		*	*	*	*	*	*	*	22	2-5	
23	*		*	*	*	*	*	*	*		*	*	*	*	*	*	23	3-5	
24	*		*	*	*	*	*	*	*	*		*	*	*	*	*	24	0-6	
25		*	*	*	*	*	*	*	*	*		*	*	*	*	*	25	1-6	
26	*		*	*	*	*	*	*	*	*	*		*	*	*	*	26	2-6	
27		*	*	*	*	*	*	*	*	*	*	*		*	*	*	27	3-6	
28	*		*	*	*	*	*	*	*	*	*	*	*		*	*	28	0-7	
29		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	29	1-7	
30	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	30	2-7	
31		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	31	3-7	

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL FROM THE SG0 B-LINKS OF THE GDXACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 8 HALF-GRIDS

Figure 7.10-2 — J5D004AC-1 Line Unit Channel-to-B-LINK-to-Grid Assignment (1 of 2)

MODEL 2 LINE UNIT SERVICE GROUP 1
LINE UNIT CHANNEL-TO-B-LINK-TO-GRID ASSIGNMENT

TN838 B-LINK LEVEL	GRID														B-LINK	TN335			
	0		1		2		3		4		5		6			7		B-BOARD	CHANNEL
	HG 0	HG 1	HG 2	HG 3	HG 4	HG 5	HG 6	HG 7	HG 8	HG 9	HG 10	HG 11	HG 12	HG 13		HG 14	HG 15		
0		*		*		*		*		*		*		*		*	0	0-0	
1	*			*	*		*	*		*		*	*		*		1	1-0	
2		*	*		*	*		*	*		*	*		*	*		2	2-0	
3	*		*		*	*		*	*		*	*		*	*		3	3-0	
4		*		*	*		*	*		*	*		*	*		*	4	0-1	
5	*			*	*		*	*		*	*		*	*		*	5	1-1	
6		*	*		*	*		*	*		*	*		*	*		6	2-1	
7	*		*		*	*		*	*		*	*		*	*		7	3-1	
8	*		*		*	*		*	*		*	*		*	*		8	0-2	
9		*	*		*	*		*	*		*	*		*	*		9	1-2	
10	*			*	*		*	*		*	*		*	*		*	10	2-2	
11		*		*	*		*	*		*	*		*	*		*	11	3-2	
12	*		*		*	*		*	*		*	*		*	*		12	0-3	
13		*	*		*	*		*	*		*	*		*	*		13	1-3	
14	*		*		*	*		*	*		*	*		*	*		14	2-3	
15		*	*		*	*		*	*		*	*		*	*		15	3-3	
16	*		*		*	*		*	*		*	*		*	*		16	0-4	
17		*	*		*	*		*	*		*	*		*	*		17	1-4	
18	*		*		*	*		*	*		*	*		*	*		18	2-4	
19		*	*		*	*		*	*		*	*		*	*		19	3-4	
20	*		*		*	*		*	*		*	*		*	*		20	0-5	
21		*	*		*	*		*	*		*	*		*	*		21	1-5	
22	*		*		*	*		*	*		*	*		*	*		22	2-5	
23		*	*		*	*		*	*		*	*		*	*		23	3-5	
24	*		*		*	*		*	*		*	*		*	*		24	0-6	
25	*		*		*	*		*	*		*	*		*	*		25	1-6	
26		*	*		*	*		*	*		*	*		*	*		26	2-6	
27	*		*		*	*		*	*		*	*		*	*		27	3-6	
28		*	*		*	*		*	*		*	*		*	*		28	0-7	
29	*		*		*	*		*	*		*	*		*	*		29	1-7	
30		*	*		*	*		*	*		*	*		*	*		30	2-7	
31	*		*		*	*		*	*		*	*		*	*		31	3-7	

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL FROM THE SG1 B-LINKS OF THE GDACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 8 HALF-GRIDS

Figure 7.10-2 — J5D004AC-1 Line Unit Channel-to-B-LINK-to-Grid Assignment (2 of 2)

MODEL 3 LINE UNIT SERVICE GROUP 0
 LINE UNIT CHANNEL-T-D-B-LINK-TO-GRID ASSIGNMENT

GRID BLINK LEVEL	GRID 0		GRID 1		GRID 2		GRID 3		GRID 4		GRID 5		GRID 6		GRID 7		GRID 8		GRID 9		B- L I N K	TN335	
	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG		B O A R D	C H A N N
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19			
0	*		*		*		*		*		*		*		*		*		*		0	0-0	
1		*	*			*		*		*		*		*		*		*		*		1	1-0
2	*			*	*			*	*			*	*		*	*		*	*		2	2-0	
3		*		*		*	*		*	*		*	*		*	*		*	*		3	3-0	
4	*		*		*		*	*		*	*		*	*		*	*		*	*	4	0-1	
5		*	*		*		*	*		*	*		*	*		*	*		*	*	5	1-1	
6	*		*		*	*	*		*	*		*	*	*	*	*		*	*	*	6	2-1	
7		*		*	*		*	*		*	*	*	*	*	*	*	*	*	*	*	7	3-1	
8	*		*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	8	0-2	
9	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	9	1-2	
10		*	*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	10	2-2	
11	*		*		*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	11	3-2	
12	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	12	0-3	
13	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	13	1-3	
14	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	14	2-3	
15	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	15	3-3	
16	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	16	0-4	
17	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	17	1-4	
18	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	18	2-4	
19	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	19	3-4	
20	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	20	0-5	
21	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	21	1-5	
22	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	22	2-5	
23	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	23	3-5	
24	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	24	0-6	
25	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	25	1-6	
26	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	26	2-6	
27	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	27	3-6	
28	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	28	0-7	
29	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	29	1-7	
30	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	30	2-7	
31	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	31	3-7	

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL(S) FROM THE SG0 B-LINKS OF THE GDACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 10 HALF-GRIDS

Figure 7.10-3 — J5D004AD-1 Line Unit Channel-to-B-LINK-to-Grid Assignment (1 of 2)

MODEL 3 LINE UNIT SERVICE GROUP 1
LINE UNIT CHANNEL-TO-B-LINK-TO-GRID ASSIGNMENT

GRID BLINK LEVEL	GRID 0		GRID 1		GRID 2		GRID 3		GRID 4		GRID 5		GRID 6		GRID 7		GRID 8		GRID 9		B- L I N K	TN335	
	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG	HG		B O A R D	C H A N N E L
0	*		*		*		*		*		*		*		*		*		*		0	0-0	
1	*		*	*			*	*			*	*			*	*			*	*	1	1-0	
2	*	*	*		*	*			*	*			*	*			*	*			2	2-0	
3	*		*		*		*	*			*	*			*	*			*	*	3	3-0	
4	*		*	*			*	*			*	*			*	*			*	*	4	0-1	
5	*		*		*		*	*			*	*			*	*			*	*	5	1-1	
6	*	*		*			*	*	*			*	*			*	*		*	*	6	2-1	
7	*		*		*	*			*	*			*	*			*	*		*	7	3-1	
8	*		*		*		*	*			*	*			*	*			*	*	8	0-2	
9	*	*			*		*	*	*			*	*			*	*		*	*	9	1-2	
10	*		*	*			*	*			*	*			*	*			*	*	10	2-2	
11	*		*		*	*			*	*			*	*			*	*		*	11	3-2	
12	*		*		*		*	*			*	*			*	*			*	*	12	0-3	
13	*	*		*			*	*			*	*			*	*			*	*	13	1-3	
14	*		*		*	*			*	*			*	*			*	*		*	14	2-3	
15	*		*	*			*	*			*	*			*	*			*	*	15	3-3	
16	*		*		*		*	*	*			*	*			*	*		*	*	16	0-4	
17	*		*	*			*	*	*			*	*			*	*		*	*	17	1-4	
18	*		*		*	*			*	*			*	*			*	*		*	18	2-4	
19	*	*		*			*	*			*	*			*	*			*	*	19	3-4	
20	*		*	*			*	*	*			*	*			*	*		*	*	20	0-5	
21	*		*		*		*	*	*			*	*			*	*		*	*	21	1-5	
22	*		*		*		*	*	*			*	*			*	*		*	*	22	2-5	
23	*	*		*	*			*	*			*	*			*	*		*	*	23	3-5	
24	*	*		*			*	*	*			*	*			*	*		*	*	24	0-6	
25	*		*		*		*	*	*			*	*			*	*		*	*	25	1-6	
26	*		*	*			*	*	*			*	*			*	*		*	*	26	2-6	
27	*		*		*	*			*	*			*	*			*	*		*	27	3-6	
28	*	*		*	*		*	*	*			*	*			*	*		*	*	28	0-7	
29	*		*		*	*			*	*			*	*			*	*		*	29	1-7	
30	*		*	*	*	*			*	*	*			*	*			*	*	*	30	2-7	
31	*		*	*			*	*	*	*			*	*			*	*	*	*	31	3-7	

NOTE: THE (X) INDICATES A HARDWIRE CONNECTION TO THE HALF-GRID B-LINK INPUT LEVEL(S) FROM THE SG1 B-LINKS OF THE GDACC. ONE B-LINK HAS MULTIPLE CONNECTIONS TO 10 HALF-GRIDS

Figure 7.10-3 — J5D004AD-1 Line Unit Channel-to-B-LINK-to-Grid Assignment
(2 of 2)

7.11 TEST A SPECIFIC LINE UNIT GRID PATH

OVERVIEW

This procedure is used to test a Line Unit (LU) grid path using the LU Path Exerciser (LUPEX). Similar to the Fabric Exerciser (FABEX), it can be used for failure verification and tracking intermittent failures in a grid. In addition to being much faster, LUPEX can perform tests either individually or as a group, test a specific path, or select a specific High-Level Service Circuit (HLSC). For details, refer to **TST:LEN** in 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*.

Caution: *While LUPEX is running, the seized line equipment number (LEN) and all equipment specified by the input message will be out of service (OOS).*

Note: Don't use an HLSC that is known to fail diagnostics to perform this test. Also, the execution of this test using the **RAW** and **UCL** options with the maximum repeat (RPT) value may generate in excess of 1000 Receive-Only Printer (ROP) messages. This could delay the more critical output messages.

PROCEDURE

1. Using the results from the FABEX test **TST:GRID[BD] Some Tests Fail (STF)** output message, determine the path input parameters. Refer to the following tables for the values needed for the LU model being tested.
 - Table 7.11-1, B-Links Accessible to A-Links for LU J5D004AB1-1
 - Table 7.11-2, B-Link Number to Channel Number Cross Reference for LUs J5D004(AB1-1) (AC1-1) (AD-1)
 - Table 7.11-3, B-Links Accessible to A-Links for LUs J5D004(AC1-1) (AD-1)
 - Table 7.11-4, A-Links Accessible to Each LEN Switch for LUs J5D004(AB1-1) (AC1-1) (AD-1) (AN-1)
 - Table 7.11-5, B-Link (Service Group and Number) for B-Link Output Level in LU J5D004AB1-1
 - Table 7.11-6, B-Link Service Group for B-Link Output Level – Grid and GridBd in LUs J5D004(AC1-1) (AD-1).
2. Observing the previous **Caution**, at the Master Control Center (MCC) video terminal, enter the **TST:LEN** command to perform the test on the desired grid.
 - (a) If the grid is All Tests Passed (ATP), use the **TST:LEN** command with the RPT (repeat) option to repeat the test.

If the grid is ATP *again*, go to Step 3.
 - (b) If the grid is STF, perform one of the following procedures, as appropriate:
 - Procedure 7.9, Clear A-Link Failure in Line Unit
 - Procedure 7.10, Clear B-Link or LUCHAN Failure in Line Unit Grid
 - Procedure 7.12, Clear Line Unit Grid Exercise Test Failure
 - Procedure 7.13, Clear LEN Failure in Line Unit Grid.
3. If the trouble cannot be located, **seek technical assistance**.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.11-1 — B-Links Accessible to A-Links for LU J5D004AB1-1

A-LINK RANGE		B-LINK RANGE	
LEN	GRID-GRIDBD-A-LINK	B-LINK	GRID-OUTPUT LEVEL
FROM	TO	FROM	TO
0-0-00	0-0-03	0-00	0-07
0-0-04	0-0-07	0-08	0-15
0-0-08	0-0-11	1-00	1-07
0-0-12	0-0-15	1-08	1-15
0-1-00	0-1-03	0-00	0-07
0-1-04	0-1-07	0-08	0-15
0-1-08	0-1-11	1-00	1-07
0-1-12	0-1-15	1-08	1-15
1-0-00	1-0-03	1-00	1-07
1-0-04	1-0-07	1-08	1-15
1-0-08	1-0-11	0-00	0-07
1-0-12	1-0-15	0-08	0-15
1-1-00	1-1-03	1-00	1-07
1-1-04	1-1-07	1-08	1-15
1-1-08	1-1-11	0-00	0-07
1-1-12	1-1-15	0-08	0-15
2-0-00	2-0-03	2-00	2-07
2-0-04	2-0-07	2-08	2-15
2-0-08	2-0-11	3-00	3-07
2-0-12	2-0-15	3-08	3-15
2-1-00	2-1-03	2-00	2-07
2-1-04	2-1-07	2-08	2-15
2-1-08	2-1-11	3-00	3-07
2-1-12	2-1-15	3-08	3-15
3-0-00	3-0-03	3-00	3-07
3-0-04	3-0-07	3-08	3-15
3-0-08	3-0-11	2-00	2-07
3-0-12	3-0-15	2-08	2-15
3-1-00	3-1-03	3-00	3-07
3-1-04	3-1-07	3-08	3-15
3-1-08	3-1-11	2-00	2-07
3-1-12	3-1-15	2-08	2-15
4-0-00	4-0-03	4-00	4-07
4-0-04	4-0-07	4-08	4-15
4-0-08	4-0-11	5-00	5-07
4-0-12	4-0-15	5-08	5-15
4-1-00	4-1-03	4-00	4-07

Table 7.11-1 — B-Links Accessible to A-Links for LU J5D004AB1-1 (Contd)

A-LINK RANGE		B-LINK RANGE	
LEN	GRID-GRIDBD-A-LINK	B-LINK	GRID-OUTPUT LEVEL
FROM	TO	FROM	TO
4-1-04	4-1-07	4-08	4-15
4-1-08	4-1-11	5-00	5-07
4-1-12	4-1-15	5-08	5-15
5-0-00	5-0-03	5-00	5-07
5-0-04	5-0-07	5-08	5-15
5-0-08	5-0-11	4-00	4-07
5-0-12	5-0-15	4-08	4-15
5-1-00	5-1-03	5-00	5-07
5-1-04	5-1-07	5-08	5-15
5-1-08	5-1-11	4-00	4-07
5-1-12	5-1-15	4-08	4-15
6-0-00	6-0-03	6-00	6-07
6-0-04	6-0-07	6-08	6-15
6-0-08	6-0-11	7-00	7-07
6-0-12	6-0-15	7-08	7-15
6-1-00	6-1-03	6-00	6-07
6-1-04	6-1-07	6-08	6-15
6-1-08	6-1-11	7-00	7-07
6-1-12	6-1-15	7-08	7-15
7-0-00	7-0-03	7-00	7-07
7-0-04	7-0-07	7-08	7-15
7-0-08	7-0-11	6-00	6-07
7-0-12	7-0-15	6-08	6-15
7-1-00	7-1-03	7-00	7-07
7-1-04	7-1-07	7-08	7-15
7-1-08	7-1-11	6-00	6-07
7-1-12	7-1-15	6-08	6-15

Table 7.11-2 — B-Link Number to Channel Number Cross Reference for LUs
 J5D004(AB1-1) (AC1-1) (AD-1)

B-LINK NUMBER SG-B-LINK	CHANNEL NUMBER SG-CHBD-CHAN	B-LINK NUMBER SG-B-LINK	CHANNEL NUMBER SG-CHBD-CHAN
0-0	0-0-0	1-0	1-0-0
0-1	0-1-0	1-1	1-1-0
0-2	0-2-0	1-2	1-2-0
0-3	0-3-0	1-3	1-3-0
0-4	0-0-1	1-4	1-0-1
0-5	0-1-1	1-5	1-1-1
0-6	0-2-1	1-6	1-2-1
0-7	0-3-1	1-7	1-3-1
0-8	0-0-2	1-8	1-0-2
0-9	0-1-2	1-9	1-1-2
0-10	0-2-2	1-10	1-2-2
0-11	0-3-2	1-11	1-3-2
0-12	0-0-3	1-12	1-0-3
0-13	0-1-3	1-13	1-1-3
0-14	0-2-3	1-14	1-2-3
0-15	0-3-3	1-15	1-3-3
0-16	0-0-4	1-16	1-0-4
0-17	0-1-4	1-17	1-1-4
0-18	0-2-4	1-18	1-2-4
0-19	0-3-4	1-19	1-3-4
0-20	0-0-5	1-20	1-0-5
0-21	0-1-5	1-21	1-1-5
0-22	0-2-5	1-22	1-2-5
0-23	0-3-5	1-23	1-3-5
0-24	0-0-6	1-24	1-0-6
0-25	0-1-6	1-25	1-1-6
0-26	0-2-6	1-26	1-2-6
0-27	0-3-6	1-27	1-3-6
0-28	0-0-7	1-28	1-0-7
0-29	0-1-7	1-29	1-1-7
0-30	0-2-7	1-30	1-2-7
0-31	0-3-7	1-31	1-3-7

Table 7.11-3 — B-Links Accessible to A-Links for LUs J5D004(AC1-1) (AD-1)

A-LINK OUTPUT RANGE		B-LINK OUTPUT RANGE	
FROM	TO	FROM	TO
0	3	0	7
4	7	8	15
8	11	16	23
12	15	24	31

Table 7.11-4 — A-Links Accessible to Each LEN Switch for LUs J5D004(AB1-1) (AC1-1) (AD-1) (AN-1)

LEN SWITCH	ACCESSIBLE A-LINKS			
0	0	4	8	12
1	2	6	10	14
2	0	5	10	15
3	2	7	8	13
4	1	5	9	13
5	3	7	11	15
6	1	6	11	12
7	3	4	9	14

Table 7.11-5 — B-Link (Service Group and Number) for B-Link Output Level in LU J5D004AB1-1

B-LINK OUTPUT LEVEL	GRID (OF B-LINK OUTPUT LEVEL)							
	0	1	2	3	4	5	6	7
0	0-00	0-16	0-00	0-16	1-00	1-16	1-00	1-16
1	0-01	0-17	1-01	1-17	0-01	0-17	1-01	1-17
2	0-02	0-18	1-02	1-18	1-02	1-18	0-02	0-18
3	1-03	1-19	0-03	0-19	0-03	0-19	1-03	1-19
4	1-04	1-20	0-04	0-20	1-04	1-20	0-04	0-20
5	1-05	1-21	1-05	1-21	0-05	0-21	0-05	0-21
6	0-06	0-22	1-06	1-22	0-06	0-22	1-06	1-22
7	1-07	1-23	0-07	0-23	1-07	1-23	0-07	0-23
8	0-08	0-24	0-08	0-24	1-08	1-24	1-08	1-24
9	0-09	0-25	1-09	1-25	0-09	0-25	1-09	1-25
10	0-10	0-26	1-10	1-26	1-10	1-26	0-10	0-26
11	1-11	1-27	0-11	0-27	0-11	0-27	1-11	1-27
12	1-12	1-28	0-12	0-28	1-12	1-28	0-12	0-28
13	1-13	1-29	1-13	1-29	0-13	0-29	0-13	0-29
14	0-14	0-30	1-14	1-30	0-14	0-30	1-14	1-30
15	1-15	1-31	0-15	0-31	1-15	1-31	0-15	0-31

Table 7.11-6 — B-Link Service Group for B-Link Output Level - Grid and GridBd in LUs J5D004(AC1-1) (AD-1)

B-LINK OUTPUT LEVEL	B-LINK SERVICE GROUP GRID/GRID BOARD									
	0 0	1 1	2 2	3 3	4 4	5 5	6 6	7 7	8 8	9 9
	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1
0	0 1	0 1	0 1	0 1	0 1	0 1	0 1	0 1	1 0	1 0
1	1 0	0 1	1 0	1 0	1 0	0 1	1 0	1 0	1 0	0 1
2	0 1	1 0	0 1	1 0	0 1	1 0	0 1	1 0	0 1	0 1
3	1 0	1 0	1 0	0 1	1 0	1 0	1 0	0 1	0 1	1 0
4	0 1	0 1	1 0	1 0	0 1	0 1	1 0	1 0	1 0	0 1
5	1 0	0 1	0 1	0 1	1 0	0 1	0 1	0 1	1 0	1 0
6	0 1	1 0	1 0	0 1	0 1	1 0	1 0	0 1	0 1	1 0
7	1 0	1 0	0 1	1 0	1 0	1 0	0 1	1 0	0 1	0 1
8	1 0	1 0	1 0	1 0	1 0	1 0	0 1	0 1	0 1	1 0
9	0 1	1 0	0 1	0 1	0 1	1 0	1 0	1 0	0 1	0 1
10	1 0	0 1	1 0	0 1	1 0	0 1	0 1	1 0	1 0	0 1
11	0 1	0 1	0 1	1 0	0 1	0 1	1 0	0 1	1 0	1 0
12	1 0	1 0	0 1	0 1	1 0	1 0	1 0	1 0	0 1	0 1
13	0 1	1 0	1 0	1 0	0 1	1 0	0 1	0 1	0 1	1 0
14	1 0	0 1	0 1	1 0	1 0	0 1	1 0	0 1	1 0	1 0
15	0 1	0 1	1 0	0 1	0 1	0 1	0 1	1 0	1 0	0 1
16	1 0	0 1	0 1	0 1	0 1	1 0	1 0	1 0	0 1	0 1
17	0 1	0 1	1 0	1 0	1 0	1 0	0 1	0 1	0 1	1 0
18	1 0	1 0	0 1	1 0	0 1	0 1	1 0	0 1	1 0	1 0
19	0 1	1 0	1 0	0 1	1 0	0 1	0 1	1 0	1 0	0 1
20	1 0	0 1	1 0	1 0	0 1	1 0	0 1	0 1	0 1	1 0
21	0 1	0 1	0 1	0 1	1 0	1 0	1 0	1 0	0 1	0 1
22	1 0	1 0	1 0	0 1	0 1	0 1	0 1	1 0	1 0	0 1
23	0 1	1 0	0 1	1 0	1 0	0 1	1 0	0 1	1 0	1 0
24	0 1	1 0	1 0	1 0	1 0	0 1	1 0	1 0	1 0	0 1
25	1 0	1 0	0 1	0 1	0 1	0 1	0 1	0 1	1 0	1 0
26	0 1	0 1	1 0	0 1	1 0	1 0	1 0	0 1	0 1	1 0
27	1 0	0 1	0 1	1 0	0 1	1 0	0 1	1 0	0 1	0 1
28	0 1	1 0	0 1	0 1	1 0	0 1	0 1	0 1	1 0	1 0
29	1 0	1 0	1 0	1 0	0 1	0 1	1 0	1 0	1 0	0 1
30	0 1	0 1	0 1	1 0	1 0	1 0	0 1	1 0	0 1	0 1
31	1 0	0 1	1 0	0 1	0 1	1 0	1 0	0 1	0 1	1 0

7.12 CLEAR LINE UNIT GRID EXERCISE TEST FAILURE

OVERVIEW

This procedure is used to clear a Line Unit (LU) Grid Exercise test failure. For fail types and related test execution dependencies, refer to Table 7.12-1.

Table 7.12-1 reflects the basic and typical usage of the Fabric Exerciser (FABEX). The effect of options such as **UCL** or **RAW** are not considered. The purpose of the data is to provide the fundamental execution of the FABEX. The final completion code in multi-phase requests is that of the most severe phase completion code. The grid state will be "DGR" on final completion code of Some Tests Fail (STF).

PROCEDURE

1. Determine if the failure pattern is consistent as follows:
 - (a) Use the **TEST** poke (or **TST** input message) to run an in-service grid exercise test again and get a SUSPECTED FAULTY EQUIPMENT list.
Note: When comparing SUSPECTED FAULTY EQUIPMENT lists to determine a failure pattern, examine the phase number, segment number, test number, and mismatch number.
 - (b) If the grid test fails and the STF output message is the same as the original failure, go to Step 2.
 - (c) If the grid test does not fail, run an in-service grid test again at least twice.
Note: If intermittent behavior is suspected, Procedure 7.11, Test a Specific Line Unit Grid Path, may be used to execute repeated tests on the specific path that failed.
 - (d) If the failure is inconsistent or intermittent, try to determine the dominant failure pattern and use the associated SUSPECTED FAULTY EQUIPMENT list.
 - (e) If there is no dominant failure, construct a combined SUSPECTED FAULTY EQUIPMENT list with common circuit packs at the top of the list.
 - (f) If the unit/circuit is no longer failing, record this incident and the failure pattern for future reference, and go to Step 6.
2. Examine the STF output message.
Note: If the FAIL_TYPE is either FALSE CROSS, POWER CROSS, or FOREIGN POTENTIAL, use Procedure 9.2, Line Maintenance, on the indicated line equipment number (LEN) before attempting LU circuit pack replacements.
3. Examine the circuit packs on the SUSPECTED FAULTY EQUIPMENT list as follows:
 - (a) If a pack in another circuit (not another grid pack) is listed [for example, Line Unit High-Level Service Circuit (LUHLSC)], remove and diagnose that circuit.
 - (b) If the other circuit's diagnosis is STF, use the associated SUSPECTED FAULTY EQUIPMENT list and Procedure 7.2, Clear Trouble in the SM and SM-2000, to clear the diagnostic failure.
 - (c) If the other circuit's diagnosis is not STF, continue with the next step.

4. **Caution: Removing a grid interrupts service to either 32 or 64 customers, depending on the LU model. Before continuing, refer to local practices.**

Remove and diagnose the grid under test.

- (a) Use the **DIAGNOSE** poke to remove and diagnose the grid.
 - (b) If the grid diagnosis is STF, use the associated SUSPECTED FAULTY EQUIPMENT list and Procedure 7.2, Clear Trouble in the SM and SM-2000, to clear the diagnostic failure.
 - (c) If the grid diagnosis is not STF, select the first pack on the grid test failure SUSPECTED FAULTY EQUIPMENT list as the first suspect pack and continue with the next step.
5. **Caution: Do not replace a TN340 without first pulling the two TN338s in the same LU GRID. Do not replace a TN332 or TN832 without first pulling the TN331 or TN831, respectively, in the same LU GDXACC. See Procedure 7.21, Perform Sequential Removal and Insertion of LU Circuit Packs.**

Replace the suspect circuit pack with a spare.

6. Determine whether the circuit pack replacement cleared the failure:
- (a) Use the **RESTORE** poke to request diagnosis and restoral of the grid.
 - (b) If restore diagnosis is STF, the spare circuit pack is probably faulty; try another spare pack (Step 5).
 - (c) If the grid diagnosis is ATP and the grid is restored, use the **TEST** poke to run in-service grid exercise test and analyze per the following:
 1. If the grid test result is ATP, the problem has apparently been cleared. Go to Step 8.
 2. If the grid test failed, but the STF output message is different, the spare pack is probably faulty; try another spare pack (Step 5).
 3. If the grid test failed with same STF output message as the original failure, return the original pack to the grid, select the next pack on the SUSPECTED FAULTY EQUIPMENT list, and return to Step 5.
 4. If the SUSPECTED FAULTY EQUIPMENT list has been exhausted, continue with the next step.
7. When the SUSPECTED FAULTY EQUIPMENT list has been exhausted, determine which of the following is the appropriate alternative, depending on the situation:
- Replace other circuit packs in the grid not previously tried.
 - If the grid exercise test STF output message indicates a specific failing A-LINK, B-LINK, or LEN, then go to:
 - Clear A-Link Failure in Line Unit – Procedure 7.9.
 - Clear B-Link or LUCHAN Failure in Line Unit Grid – Procedure 7.10.
 - Clear LEN Failure in Line Unit Grid – Procedure 7.13.

- If the grid test result is inconsistent, it may be due to a faulty LUHLSC. Try removing (one at a time) each LUHLSC and running the grid test.
- If the grid test runs consistently ATP with an LUHLSC removed, then that LUHLSC pack is probably faulty.
- If suggested actions have not been successful, **seek technical assistance.**

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.12-1 — Response of FAB to Failures and Other Encountered Conditions

FAILURE TYPE	TYPE	ROP PRINTS	FAB STOPS	COMPL. CODE IF FAILS IN ^a			
				(P)	PH 1	PH 2	PH 3
A-Link Busy	Auto	No	No	N/A	b	c	b
	Man	No	No	N/A	b	c	b
B-Link Busy	Auto	No	No	N/A	b	b	c
	Man	No	No	N/A	b	b	c
Control To Grid	Auto	Yes	Yes	STF	N/A	N/A	N/A
	Man	Yes	Yes	STF	N/A	N/A	N/A
False Cross	Auto	Yes	No	N/A	STF	STF	STF
	Man	Yes	No	N/A	STF	STF	STF
Foreign Potential	Auto	No	No	N/A	CATP	CATP	CATP
	Man	Yes	No	N/A	CATP	CATP	CATP
Latch Read	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Off-Hook Recognition	Auto	No	No	N/A	N/A	N/A	N/A
	Man	Yes	No	N/A	CATP	N/A	N/A
Open X-Pt	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Power Alarm	Auto	Yes	Yes	STF	N/A	N/A	N/A
	Man	Yes	Yes	STF	N/A	N/A	N/A
Power Cross	Auto	Yes	No	N/A	STF	STF	STF
	Man	Yes	No	N/A	STF	STF	STF
Resource (Before Test State)	Auto	Yes	Yes	NTR	NTR	CATP	CATP
	Man	Yes	Yes	NTR	NTR	CATP	CATP
Resource (During PH Tests)	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Scanner Ckt	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
Shorted X-Pt	Auto	Yes	Yes	N/A	STF	STF	STF
	Man	Yes	Yes	N/A	STF	STF	STF
V+ Low	Auto	Yes	Yes	STF	STF	STF	STF
	Man	Yes	Yes	STF	STF	STF	STF

See note(s) at end of table.

Table 7.12-1 — Response of FAB to Failures and Other Encountered Conditions
 (Contd)

FAILURE TYPE	TYPE	ROP PRINTS	FAB STOPS	COMPL. CODE IF FAILS IN ^a			
				(P)	PH 1	PH 2	PH 3
V+ Restored	Auto	Yes	Yes	STF	STF	STF	STF
	Man	Yes	Yes	STF	STF	STF	STF
X-Pt Left On (AUD Option)	Auto	Yes	No	N/A	STF	STF	STF
	Man	Yes	No	N/A	STF	STF	STF
Bad Data On Request	Auto	No	Yes	NTR	N/A	N/A	N/A
	Man	Yes	Yes	NTR	N/A	N/A	N/A
Can't Send Message	Auto	No	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Data Base Error	Auto	No	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Early Termination	Auto	Yes	Yes	N/A	NTR	CATP	CATP
	Man	Yes	Yes	N/A	NTR	CATP	CATP
Release Failed	Auto	No	Yes	N/A	CATP	CATP	CATP
	Man	Yes	Yes	N/A	CATP	CATP	CATP
Timeout	Auto	No	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Seized Resource Unavailable	Auto	No	Yes	N/A	CATP	CATP	CATP
	Man	Yes	Yes	N/A	CATP	CATP	CATP
Stopped By Request	Auto	^a	Yes	NTR	CATP	CATP	CATP
	Man	Yes	Yes	NTR	CATP	CATP	CATP
Note(s): a. Prints only if STF occurred in a test phase. • (P) = Fails in pre-phase inits/resource seizure. • CATP = Conditional all tests pass. • N/A = Not applicable. • NTR = No tests run. • STF = Some tests fail. b. Only if all associated ports/links are busy, changes ATP to CATP. c. Changes ATP to CATP.							

7.13 CLEAR LEN FAILURE IN LINE UNIT GRID

OVERVIEW

This procedure is used to clear a line equipment number (LEN) failure in a line unit (LU) grid.

PROCEDURE

1. At the Master Control Center (MCC) video terminal, use the **TEST** poke or the **TST:LEN** command (refer to Procedure 7.11, Test a Specific Line Unit Grid Path), to run the in-service grid exercise test on the grid.
 - (a) If the grid test is all tests passed (ATP), go to Step 2.
 - (b) If the grid test is not ATP, try using Procedure 7.12, Clear Line Unit Grid Exercise Test Failure, and the grid exercise test to clear the trouble.
 - (c) If use of Procedure 7.12 is unsuccessful, continue with the next step.
2. At the Main Distributing Frame (MDF), take measurements on the line tip and ring pair associated with the LEN to check for a power cross or short circuit on the line. If any problem is found, clear it per local practice.
3. If the trouble has not cleared, use Sheet D3 of the Circuit Pack Schematic (CPS) for the first stage grid pack (TN338 for J5D004AB-1 or TN838 for J5D004AC-1) to determine the backplane pins and wires associated with the LEN.
4. Check the backplane for wiring short circuits, breaks, bent pins, etc.
5. If the trouble cannot be found, ***seek technical assistance***.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.14 CORRECT HASH ERRORS ON THE ACTIVE SIDE OF AN SM/SM-2000

OVERVIEW

This procedure is used to correct ROUTINE HASHSUM CHECK ERRORS on the ACTIVE SIDE of a switching module *without* resorting to an initialization of the switching module. This procedure is *not* for correcting hash errors in ODD memory area.

Use this procedure to correct hash errors that occur during routine operations, but *not* to correct hashsum errors that are the result of an SM/SM-2000 initialization or pump.

Caution: *Verify that the hash errors are not the result of manual craft activities such as:*

Repeated software update activities over the period of a few hours that could possibly circumvent the existing software mechanism, which normally prevents hashsum errors from being reported during software update activity. The craft should verify that hashsum errors persist in the absence of such activities for at least two hours.

Deliberate memory overwrites using Generic Utilities that do not update the hashsums for the region of memory overwritten. Before restoring the memory to its original value, the craft should verify that the overwrite is no longer desired.

PROCEDURE

1. Verify hashsum error exist. Refer to Subprocedure [7.14.1](#).
2. Verify hashsum error still exist. Refer to Subprocedure [7.14.2](#).
3. Dump SM/SM-2000 memory map. Refer to Subprocedure [7.14.3](#).
4. Verify memory region of hashsum error. Refer to Subprocedure [7.14.4](#).
5. Check if the address is part of the redundant control ODD range. Refer to Subprocedure [7.14.5](#).
6. Check if the address is part of the critical information data range. Refer to Subprocedure [7.14.6](#).
7. Correct hashsum error within the *.tv*, *.data*, or *.text* memory region. Refer to Subprocedure [7.14.7](#).
8. Check the stored hashsum values. Refer to Subprocedure [7.14.8](#).
9. Correct hashsum error within a peripheral image. Refer to Subprocedure [7.14.9](#).
10. Verify that all hashsums have been cleared. Refer to Subprocedure [7.14.11](#).
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.14.1 Verify Hashsum Error Exists

PROCEDURE

1. Verify that the SM/SM-2000 indicates a hashsum error. In the message mode, enter:

OP:SYSSTAT, SM=a,UCL;

Where: a = SM number with hashsum error.

Exhibit 7.14.1-1 — Example Response (Hashsum Error)

```
OP SYSSTAT SUMMARY                LAST RECORD
K LSM 5,0: BACKOUT-RC INHIBITS-PUMP CLKN_OFFN MATE_OOD CKT_OOS
K ORM a,1: HASH_ERR E911_CRIT INHIBITS-MSG CLNK_OFFN DSL_MAJOR
```

2. Is the response an ODDHSHERR?
If **YES**, *seek technical assistance* for further analysis to resolve ODD hashsum errors. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
If **NO**, continue with next step.
3. Is the response a D/C_HASH (Disc to core hashsum) mismatch?
If **YES**, go to Procedure [3.11](#), Analyze and Correct UPD:HSCCHK Audit Errors.
If **NO**, continue with next step.
4. If the response is NORMAL (No hash error), HASH_ERR, or HASH_ERROR, continue with next step.
5. Turn on all message classes and check the ROP for any hardware problems. In the message mode, enter:
CHG:LPS,MSGCLS=ALL,PRINT=ON;
6. Continue with Subprocedure [7.14.2](#)

7.14.2 Verify Hashsum Error Still Exists

PROCEDURE

1. Check that the hashsum error(s) still exist. In the message mode, enter:

EXC:UT:SM=a,CALL,FUNC="SMmtacthash";

Where: a = SM number with hashsum error.

Exhibit 7.14.2-1 — Example Response (Hashsum Error Still Exists)

```
REPT UT SM=a SYMBOLIC LOOK-UP IP - WAIT FOR COMPLETION REPORT
REPT UT SM=a SYMBOLIC LOOK-UP COMPLETED
EXC UT SM=a COMPLETED
SYMIDX=dd CALL SMmtacthash RETVAL retv
```

Where: a = SM number with hashsum error.
dd = Symbol index number of the specified function.

Note: The symbolic lookup messages/reports may not be printed if the lookup has been done recently; therefore, the messages/reports are not shown in the remainder of this procedure.

2. Look at the value for *retv*, specifically the lower two bytes. If *retv=h'xxxxffff'* (where the x's are don't care digits) then a hashsum error still exist, and the ROP shows the failing ranges in the following format:

```
REPT SM=a HASHSUM FAILURE ACTIVE SIDE y
      FAILING ADDRESS RANGES
      s1                e1
      s2                e2
      .                .
      .                .
```

Where: a = SM with hashsum error.
y = SM side (0 or 1).
s1 = Starting address of bad range 1.
e1 = Ending address of bad range 1.
s2 = Starting address of bad range 2.
e2 = Ending address of bad range 2.

Note: Only the first 25 ranges of the hashsum error are reported. If there are more than 25 ranges of the hashsum, the problem is difficult to correct. **Seek technical assistance** to correct the problem.

3. Does a hashsum error still exist?

If **YES**, continue with the next step.

If **NO**, STOP. YOU HAVE COMPLETED THIS PROCEDURE.

4. Determine if there are generic utilities breakpoints set in the SM/SM-2000. In the message mode, enter:

OP:UT,UTIL,SM=a;

Where: a = SM/SM-2000 number with hashsum error.

5. Are there breakpoints set?

If **YES**, continue with the next step.

- If **NO**, go to Subprocedure [7.14.3](#)
6. Clear breakpoints in the SM/SM-2000. In the message mode, type and enter:
CLR:UT,UTIL,SM=a;
Where: a = SM/SM-2000 number.
 7. Verify if the hashsum error(s) still exist. In the message mode enter:
EXC:UT:SM=a,CALL,FUNC="SMmtacthash";
Where: a = SM/SM-2000 number with hashsum error.
 8. Does a hashsum error still exist?
If **YES**, go to Subprocedure [7.14.3](#).
If **NO**, no hashsum error found. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.14.3 Dump Switching Module Memory Map

PROCEDURE

1. Dump the map of variable sections of the SM/SM-2000 memory. In the message mode, enter:

DUMP:SMMAP,SM=a;

Where: a = SM/SM-2000 number.

Note: This map is used to determine if this procedure can correct the problem. Different memory ranges have different properties. Exhibit 7.14.3-1 is an **example** of an SMMAP-DUMP.

Exhibit 7.14.3-1 — SM Memory Map

```
DUMP SMMAP SM=a
MSG 1 OF 3
```

IMAGE	TYPE	START ADDR	END ADDR	STATUS
	UODD	H' 447c000	H' 616bfff	NORMAL
	NRODD	H' 616c000	H' 643ffff	NORMAL
	RODD	H' 6440000	H' 660bfff	NORMAL
	RTBM	H' 660c000	H' 665afff	NORMAL
	SABM	H' 665b000	H' 6713fff	NORMAL
	SPARE MEM	H' 6714000	H' c697fff	NORMAL
LDSF	HASHSUM	H' c698000	H' c6987ff	NORMAL
LDSF	IMAGE	H' c698800	H' c6ca7ff	NORMAL
DSC3	HASHSUM	H' c6ca800	H' c6cafff	NORMAL
DSC3	IMAGE	H' c6cb000	H' c6fcfff	NORMAL
GDSF	HASHSUM	H' c6fd000	H' c6fd7ff	NORMAL
GDSF	IMAGE	H' c6fd800	H' c7587ff	NORMAL
SAS	HASHSUM	H' c758800	H' c758fff	NORMAL
SAS	IMAGE	H' c759000	H' c78b7ff	NORMAL
HSAS	HASHSUM	H' c78b800	H' c78bfff	NORMAL
HSAS	IMAGE	H' c78c000	H' c7c2fff	NORMAL
PH22S	HASHSUM	H' c7c3000	H' c7c37ff	NORMAL
PH22S	IMAGE	H' c7c3800	H' c8e37ff	NORMAL

```
DUMP SMMAP SM=a
MSG 2 OF 3
```

IMAGE	TYPE	START ADDR	END ADDR	STATUS
IP22S	HASHSUM	H' c8e3800	H' c8e3fff	NORMAL
IP22S	IMAGE	H' c8e4000	H' c914fff	NORMAL
PH4ACCAP	HASHSUM	H' c915000	H' c9157ff	NORMAL
PH4ACCAP	IMAGE	H' c915800	H' ca3a7ff	NORMAL
PH4ISDNIP	HASHSUM	H' ca3a800	H' ca3afff	NORMAL
PH4ISDNIP	IMAGE	H' ca3b000	H' ca6bfff	NORMAL
PH3C	HASHSUM	H' ca6c000	H' ca6c7ff	NORMAL
PH3C	IMAGE	H' ca6c800	H' cba07ff	NORMAL
OIOP	HASHSUM	H' cba0800	H' cba0fff	NORMAL
OIOP	IMAGE	H' cba1000	H' cbd1fff	NORMAL
DNUSCC	HASHSUM	H' cbd2000	H' cbd27ff	NORMAL
DNUSCC	IMAGE	H' cbd2800	H' cc817ff	NORMAL
DNUSTMX	HASHSUM	H' cc81800	H' cc81fff	NORMAL
DNUSTMX	IMAGE	H' cc82000	H' ccd97ff	NORMAL
PI2	HASHSUM	H' ccd9800	H' ccd9fff	NORMAL
PI2	IMAGE	H' ccda000	H' cd49fff	NORMAL
SCCP	HASHSUM	H' cd4a000	H' cd4a7ff	NORMAL
SCCP	IMAGE	H' cd4a800	H' cf4a7ff	NORMAL

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DUMP SMMAP SM=a

MSG 3 OF 3

IMAGE	TYPE	START ADDR	END ADDR	STATUS
ICR	HASHSUM	H' cf4a800	H' cf4afff	NORMAL
ICR	IMAGE	H' cf4b000	H' cfa2fff	NORMAL
OGR	HASHSUM	H' cfa3000	H' cfa37ff	NORMAL
OGR	IMAGE	H' cfa3800	H' cfffffff	NORMAL

Where: a = SM/SM-2000 number.

2. Continue with Subprocedure [7.14.4](#)

7.14.4 Verify Memory Region of Hashsum Error

PROCEDURE

1. For each reported memory range start and end address [(s1,e1), (s2,e2), etc.), record the memory region of the hashsum error address.

Note: The SMMAP and the ODD bounds change infrequently; therefore, dumps of the SMMAP are only needed per error analysis and not per range analysis.

2. Check the DUMP SMMAP output for the image type.

3. **Note:** Limit the Recent Change activity while in ODD hashsum error to prevent hashsums from being updated for a block of memory in error.

Is the address range in ODD (image type UODD, NRODD, or RODD)?

If **YES**, **Seek technical assistance** for further analysis to resolve an ODD hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with the next step.

4. Examine the DUMP SMMAP output for a range type "IMAGE" and determine if a peripheral image is in hashsum error.

5. Is the address range in a peripheral image?

If **YES**, go to Subprocedure [7.14.10](#).

If **NO**, continue with next step.

6. Dump Glocoddsa and Glocoddea to determine if the failing address range is part of the control ODD. In the message mode, enter:

DUMP:UT:SM=a,GVAR="Glocoddsa",L=4;

Response: **DUMP UT SM=a SYMIDX=dd GVAR Glocoddsa glocoddsa**

Where: a = SM/SM-2000 number.
dd = Symbol index number of this global variable. The symbol index can be determined for this processor by using the DUMP:UT:SYMID input message.
glocoddsa = Hexadecimal value of the global variable (Glocoddsa) control ODD starting address.

DUMP:UT:SM=a,GVAR="Glocoddea",L=4;

Response: **DUMP UT SM=a SYMIDX=dd GVAR Glocoddea glocoddea**

Where: a = SM/SM-2000 number.
dd = Symbol index number of this global variable. The symbol index can be determined for this processor by using the DUMP:UT:SYMID input message.
glocoddea = Hexadecimal value of the global variable (Glocoddea) control ODD ending address.

7. Is the failing address range within the control ODD range [starting address (glocoddsa) and ending address (glocoddea)]?

If **YES**, **Seek technical assistance** for further analysis to resolve an ODD hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Subprocedure [7.14.5](#).

7.14.5 Check if Address is Part of the Redundant Control ODD Range

PROCEDURE

1. Determine if the failing address range is part of the redundant control ODD range [starting address (glrcodsa) and ending address (glrcodea)]. In the message mode, enter:

DUMP:UT:SM=a,GVAR="Glrcodsa",L=4;

Response: **DUMP UT SM=a SYMIDX=dd GVAR Glrcodsa glrcodsa**

Where: a = SM/SM-2000 number.
dd = Symbol index number of this global variable. The symbol index can be determined for this processor by using the DUMP:UT:SYMID input message.
glrcodsa = Hexadecimal value of the global variable (Glrcodsa) redundant control ODD starting address.

DUMP:UT:SM=a,GVAR="Glrcodea",L=4;

Response: **DUMP UT SM=a SYMIDX=dd GVAR Glrcodea glrcodea**

Where: a = SM/SM-2000 number.
dd = Symbol index number of this global variable. The symbol index can be determined for this processor by using the DUMP:UT:SYMID input message.
glrcodea = Hexidecimal value of the global variable (Glrcodea) redundant control ODD ending address.

2. Is the failing address range within the redundant control ODD range [starting address (glrcodsa) and ending address (glrcodea)]?

If **YES**, ***Seek technical assistance*** for further analysis to resolve an ODD hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with Subprocedure [7.14.6](#).

7.14.6 Check if Address is Part of the Critical Information Data Range

PROCEDURE

1. Determine if the failing address range is part of the critical information data range [starting address (glcrisa) and ending address (glcriea)]. In the message mode, enter:

DUMP:UT:SM=a,GVAR="Glcrisa",L=4;

Response: **DUMP UT SM=a SYMIDX=dd GVAR Glcrisa glcrisa**

Where: a = SM/SM-2000 number.
dd = Symbol index number of this global variable. The symbol index can be determined for this processor by using the DUMP:UT:SYMID input message.
glcrisa = Hexadecimal value of the global variable (Glcrisa) critical information data starting address.

DUMP:UT:SM=a,GVAR="Glcriea",L=4;

Response: **DUMP UT SM=a SYMIDX=dd GVAR Glcriea glcriea**

Where: a = SM/SM-2000 number.
dd = Symbol index number of this global variable. The symbol index can be determined for this processor by using the DUMP:UT:SYMID input message.
glcriea = Hexadecimal value of the global variable (Glcriea) critical information data ending address.

2. Is the failing address range within the critical information data range [starting address (glcrisa) and ending address (glcriea)]?

If **YES**, ***Seek technical assistance***, for further analysis to resolve a critical information data hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, failing address range is in a **.tv**, **.data**, or **.text** range, continue with Subprocedure [7.14.7](#).

7.14.7 Correct Hashsum Error Within the .tv, .data, or .text Memory Region

PROCEDURE

1. Find another SM/SM-2000 of the same configuration as the SM/SM-2000 with hashsum errors. In the message mode, enter:

OP:SYSSTAT,SM=1&&192,UCL;

Exhibit 7.14.7-1 — Example Response (Correct Hashsum Error)

```
OP  SYSSTAT  SUMMARY                                LAST RECORD
L  ORM   1,1:  HASH_ERR
L  ORM   2,1:  NORMAL
S  LSM   3,1:  NORMAL
S  LSM   4,1:  NORMAL
S  HSM  20,0:  NORMAL
S  RSM  47,1:  CKT_OOS CGA
L  RSM  48,1:  NORMAL
K  LSM  77,0:  CKT_OOS CGA
K  ORM192,0:  INHIBITS-HW-SW MATE_OOD CKT_OOS
```

The resulting printout indicates in the leftmost column the configuration of each SM/SM-2000 in the office. Current configurations are:

B	Basic
S	Standard
L	Loaded
G	Signaling
K	SM-2000

2. Was a NONHASHERR SM/SM-2000 (that is, an SM/SM-2000 with NO hashsum error) of the same configuration as the SM/SM-2000 with hashsum errors found from the ROP printout?

If **YES**, continue with next step.

If **NO**, perform the *off-line pump for verification of SM/SM-2000 files on disk* procedure in the 235-105-250, *System Recovery Manual*. **Seek technical assistance**, for further analysis to resolve a hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

3. **Note:** The hashsum error report on the ROP specifies the start and end address of regions of memory containing hash errors. The smallest reported region is a 2-KB block of memory and adjacent 2-KB blocks are normally reported as a single region. Therefore the reported region size can vary depending on the number of errors and where they reside within the 2-KB address alignment of memory. The 3 least significant digits of the start address are either 000 or 800. The 3 least significant digits of the end address are either 7FF or FFF.

Dump and compare a 2-KB block of memory in a NONHASHERR SM/SM-2000 with a 2-KB block of memory in the SM/SM-2000 with a hashsum error. The following is an **example** using a 2-KB address range of 0x01B6C000-0x01B6C7FF. For this example, enter:

DUMP:UT:SM=z,ADDR=h'01B6C000,L=2048;

Where: z = number of NOHASHERR SM/SM-2000.

DUMP:UT:SM=a,ADDR=h'01B6C000,L=2048;

Where: a = number of SM/SM-2000 with hashsum error.

Exhibit 7.14.7-2 — 2KB of SM/SM-2000 Memory (NOHASHERR vs. hashsum error)

NOHASHERR RESPONSE:

```
DUMP UT SM=z ADDR=h'01B6C000
aaaaaaaa bbbbbbbb cccccccc dddddddd eeeeeeee ffffffff gggggggg hhhhhhhh
iiiiiiii jjjjjjjj kkkkkkkk llllllll mmmmmmmm nnnnnnnn oooooooooo pppppppp
qqqqqqqq rrrrrrrr ssssssss tttttttt uuuuuuuu vvvvvvvv wwwwwwww xxxxxxxx
yyyyyyyy zzzzzzzz qe qe qe rfrfrfrf sgsgsgsg thththth uiuiuiui vjv jv jv
.
.
.
.
```

HASHSUM ERROR RESPONSE:

```
DUMP UT SM=a ADDR=h'01B6C000
AAAAAAAA BBBB BBBB CCCCCCCC DDDDDDDD EEEEEEEE FFFFFFFF GGGGGGGG HHHHHHHH
IIIIIIII JJJJJJJJ KKKKKKKK LLLLLLLL MMMMMMMM NNNNNNNN OOOOOOOO PPPPPPPP
QQQQQQQQ RRRRRRRR SSSSSSSS TTTTTTTT UUUUUUUU VVVVVVVV WWWWWWWW XXXXXXXX
YYYYYYYY ZZZZZZZZ QE QE QE RFRFRFRF SGSGSGSG THTHTHTH UIUIUIUI VJVJVJVJ
.
.
.
.
```

4. Visually compare the ROP of the 2-KB block reporting a hashsum error to the same 2-KB block in the NOHASHERR SM/SM-2000.
5. Are there differences between the NOHASHERR SM/SM-2000 and the SM/SM-2000 with hashsum errors?

If **YES**, note the differences and continue with the next step.

If **NO**, go to Subprocedure [7.14.8](#)

6. Calculate the address of the data at the location where the data is different. Refer to [Exhibit 7.14.7-2](#). If on the 2-KB block starting at address h'01B6C000, there is a difference in the "TTTTTTTT/ttttttt" position, then the starting address of the 4-byte block associated with that position is h'01B6C04C. Refer to the following computation:

Computing the starting address of the 4 bytes

--

“TTTTTTTT/ttttttt” is the 20th (decimal) 4-byte block of these 2048 bytes (refer to Exhibit 7.14.7-2).

Therefore the starting address is calculated in the following steps:

- a. $20 - 1$ (decimal) = 19
- b. convert 19 (decimal) into hex = h'13
- c. $h'13 * (\text{multiplication}) h'4 = h'4c$
- d. $h'4c + (\text{addition}) h'01B6C000 = h'01B6C04C$

7. Use the Generic Utilities to correct (overwrite) the data at the calculated address.

Caution: *This command overwrites memory and if typed incorrectly, may cause additional errors and potentially an SM initialization. Also, remember that the UT dumps are in hexadecimal, therefore the address and value given the load command needs the hexadecimal qualifier (h').*

For this example, in the message mode, enter:

LOAD:UT:SM=a,ADDR=h'01B6C04C,L=4,SIZE=4,VAL=h'ttttttt;

Where: a = SM/SM-2000 number with hashsum error.
ttttttt = data from the NOHASHERR SM/SM-2000.

Response: **LOAD UT SM=a ADDR=h'01b6C04C COMPLETED**

Where: a = SM number with hashsum error.

8. Is this the last correction or the only 4 bytes needing correction in this 2-KB block?

If **YES**, continue with next step.

If **NO**, repeat this subprocedure from Step 4 to correct all other differences noted in the SM/SM-2000 utility dumps.

9. **Note:** The load command can write more than 4 consecutive bytes at a time, and if more than 4 bytes mismatch, write more bytes to ensure that all values change together. For example, to perform a 12-byte write, type and enter:

LOAD:UT:SM=a,ADDR=h'01B6C04C,L=12,SIZE=4,VAL=h'ttttttt-h'uuuuuuuu-h'vvvvvvvvv;

Are there any other 2-KB blocks of memory needing correction for this SM/SM-2000?

If **YES**, go to Subprocedure 7.14.4

If **NO**, go to Subprocedure 7.14.11

7.14.8 Check the Stored Hashsum Values

PROCEDURE

1. **Note:** If there is no difference between the data from the HASHERR SM/SM-2000 and the data from the NOHASHERR SM/SM-2000 for this 2-KB range, then the stored hashsum value must be wrong.

Verify if there is a difference in the stored hashsum between the 2 SM/SM-2000(s). For the NOHASHERR SM/SM-2000, in the message mode, type and enter:

```
EXC:UT:SM=z,CALL,FUNC="SMhsh_blk",ARG=2,PARM=h'xxxx -h'yyyy;
```

```
DUMP:UT:SM=z,UVAR=10,L=32,INDIR=1;
```

Where: z = SM number with NOHASHERR.
xxxx = upper 4 digits of start address.
yyyy = lower 4 digits of start address.

Response: DUMP UT SM=z UVAR=10 COMPLETED

```
aaaaaaaa bbbb0000 ccccccc dddd0000 eeeeffff gggghhhh iiiijjjj kkkkl111
```

2. For the HASHERR SM, in the message mode, enter:

```
EXC:UT:SM=a,CALL,FUNC=SMhsh_BLK",ARG=2,PARM=h'xxxx-h'yyyy;
```

```
DUMP:UT:SM=z,UVAR=10,L=32,INDIR=1;
```

Where: a = SM number with HASHERR.
xxxx = upper 4 digits of start address.
yyyy = lower 4 digits of start address.

Response: DUMP UT SM=a UVAR=10 COMPLETED

```
AAAAAAAA BBBB0000 CCCCCCC DDDD0000 EEEFFFFFF GGGGHHHH IIIIJJJJ KKKLLLLL
```

3. Compare the stored hashsum value in the data dumps.
4. **Note:** EEEE-LLLL represent checksums for successive 256-byte blocks and can be compared against eeee-llll to narrow down the mismatch.

Is the "DDDD" data equal to the "dddd" data?

If **YES**, go to Subprocedure [7.14.7 Step 3](#).

If **NO**, go to [7.14.9](#).

7.14.9 Correct the Stored Hashsum Value

PROCEDURE

1. Correct the corrupted stored hashsum value for the HASHERR in the SM/SM-2000. In the message mode, enter:

LOAD:UT:SM=a,ADDR=h'CCCCCCCC,L=2,SIZE=2,VAL=H'dddd;

Response: LOAD UT SM=a ADDR=h'CCCCCCCC COMPLETED

Where: a = SM number with HASHERR.
CCCCCCCC = address of the corrupted value in the SM/SM-2000 with HASHERR (should match ccccccc).
dddd = hexadecimal value from SM/SM-2000 with NOHASHERR.

2. Are there other 2-KB blocks of memory needing correction for this SM/SM-2000?

If **YES**, go to Subprocedure [7.14.4](#)

If **NO**, go to Subprocedure [7.14.11](#)

7.14.10 Correct Hashsum Error Within a Peripheral Image

OVERVIEW

Repumping the peripheral images without disrupting call processing or tearing down calls can correct hashsum errors within the peripheral images stored in the memory of the SM/SM-2000.

Consult the **ST:NIPMP** manual page in the 235-600-700, *Input Message Manual* to determine which images are pumped for each peripheral hardware unit specified with the **ST:NIPMP** command.

PROCEDURE

1. When the peripheral hardware unit of the peripheral image with the hashsum error has been determined, request a noninterfering pump. In the message mode, enter:

ST:NIPMP,ODRID=c,SM=a,UCL;

Where: a = SM/SM-2000 number.
 c = the peripheral hardware unit type given in the DUMP:SMMAP.

Note: The pump could take several minutes depending on the size of the images pumped. A completion message prints when the pump terminates. If an image is already loaded, repump the image with an unconditional option. Failure indications are in the termination message of the NIPMP.

2. Did the NIPMP complete successfully?

If **YES**, repumping should have corrected the hashsum error within the peripheral image. To verify if the hashsum error is cleared, go to Subprocedure [7.14.11](#).

If **NO**, **Seek technical assistance**, for further analysis to resolve a NIPMP failure and hashsum error in a peripheral image. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.14.11 Verify That All Hashsum Errors Have Been Cleared

OVERVIEW

After correcting all the mismatches found in all the 2-KB memory ranges that were reported for the SM/SM-2000 in hashsum error, the hashsum error indication should be retired.

PROCEDURE

1. Retire the hashsum indication. In the message mode, enter:

EXC:UT:SM=a,CALL,FUNC="SMmtacthash";

Where: a = SM number with hashsum error.

Response: EXC UT SM=a COMPLETED

SYMIDX=dd CALL SMmtacthash RETVAL retvalx

Note: If retvalx=h'xxxxffff (where the x's are don't care digits) then HASHSUM ERROR still exists and the ROP will show the failing ranges.

2. Is this hashsum error cleared (that is, "retvalx" is NOT equal to h'xxxxffff and the SMmtacthash output did not contain the failing address range for this error)?

If **YES**, You have successfully cleared the error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

If **NO**, continue with next step.

3. **Note:** If the hashsum error persists (that is, retvalx is NOT equal to h'xxxxffff) repeat Subprocedure 7.14.4 through Subprocedure 7.14.11 to correct any previously reported hashsum errors that were missed or any new errors that just occurred.

Is this the first attempt to clear the error?

If **YES**, for any new or missed errors, go to Subprocedure 7.14.4 or return to the Subprocedure that referred you to here. For example,

- Subprocedure 7.14.7, Correct Hashsum Error Within the .tv, .data, or .text Memory Region
- Subprocedure 7.14.8, Check the Stored Hashsum Values
- Subprocedure 7.14.10, Correct Hashsum Error Within a Peripheral Image.

and retry to clear the error.

If **NO**, continue with next step.

4. Is this the second attempt to clear the error?

If **YES**, continue with the next step.

If **NO**, **Seek technical assistance**, for further analysis to resolve a hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

5. Is the SM/SM-2000 duplex?

If **YES**, switch the MCTSI (**SW:MCTSI**) and return to the subprocedure that referred you here.

- Subprocedure 7.14.7, Correct Hashsum Error Within the .tv, .data, or .text Memory Region

- Subprocedure [7.14.8](#), Check the Stored Hashsum Values
- Subprocedure [7.14.10](#), Correct Hashsum Error Within a Peripheral Image.

If **NO**, ***Seek technical assistance***, for further analysis to resolve a hashsum error. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.15 CLEAR NON-DIAGNOSABLE SM/SM-2000 MEMORY ERRORS

OVERVIEW

This procedure is used to clear MP (Module Processor) non-diagnosable memory errors (**MP CORR-BIT**, **MP NON-COR-BIT-ERR**, **MP MEM-SYSTEM**, **MP PARITY**). Typically, non-diagnosable Switching Module and Switching Module-2000 (SM/SM-2000) memory-related hardware interrupts are reported as MP-correctable and non-correctable bit errors (*MP CORR-BIT-ERR* and *MP NON-COR-BIT-ERR*), memory system errors (*MEM-SYSTEM-ERR*), or parity errors (*PARITY-ERROR*).

To analyze and clear HASHERR, refer to Procedure 7.14. If a procedure does not exist for the error being diagnosed, *seek technical assistance*.

Caution 1: *Perform the fault-clearing steps during off-peak hours unless otherwise warranted.*

Caution 2: *Read all Notes. They contain important information.*

Note 1: This procedure uses poke or Message Mode (MML) commands to compile the data needed for the fault-clearing steps of this procedure. When trouble shooting a non-diagnosable memory error, be sure to record the error specific information (error event number, affected module processor side memory board register value, failing address and SHOPR register contents). This information could be of high significance over time.

Note 2: This procedure should only be used in response to MP CORR-BIT, MP NON-COR-BIT-ERR, MP MEM-SYSTEM, and MP PARITY-ERROR hardware interrupts. These memory interrupts can be generated by either the active Module Control Time Slot Interchange (MCTSI) side or the mate (standby) MCTSI side. These errors could also occur when an out-of-service MCTSI enters the mate restoral or during MCTSI diagnostics and can result in aborts of either the diagnostics or mate restoral.

Note 3: Throughout this procedure, craft are instructed to perform inhibits. For important information and guidelines on the use of inhibits, refer to the SM/SM-2000 Manual Initializations Section in the 235-105-250, *System Recovery*.

PROCEDURE

1. Prepare to analyze non-diagnosable memory errors.
 - (a) At the MCC or STLWS, display and record the Routine Exerciser (REX) scheduling information for the targeted SM.

On 1280,X page (where: X = SM),
Record the REX DGN start hours and minutes.

If REX is *stopped*, go to Substep 1(b).

If REX is *running*, **STOP** REX. Enter:
(MML) **STP:REX,SM=X**; (where: X = SM).

Note: This is to prevent REX from interfering with the procedure.
 - (b) **INHIBIT REX** by performing **one** of the following:

On 1800,X page (where: X = SM), enter:
(Poke) **602**
OR
(MML) **INH:REX,SM=X**; (where: X = SM).

- (c) **SET VERBOSE** by performing **one** of the following:

On 1800,X page (where: X = SM), enter:

(Poke) 412

OR

(MML) **SET:PERPH,SM=X,VERBOSE;** (where: X = SM).

Note: Setting verbose causes additional data to be printed to the ROP. Return this setting to normal once the data has been captured.

- (d) **INHIBIT BREVC** by performing **one** of the following:

On 1800,X page (where: X = SM), enter:

(Poke) 609

OR

(MML) **INH:BREVC,SM=X;** (where: X = SM).

Note: Inhibiting brevity causes additional data to be printed to the ROP. Return this setting to normal once the data has been captured.

- (e) Back up all existing message classes to allow them to be re-instated later.

(MML) **CHG:LPS,MSGCLS=ALL,TOBKUP;**

- (f) Turn on all message class. This allows all errors and register dumps to be seen on the ROP.

(MML) **CHG:LPS,MSGCLS=ALL,PRINT=ON;**

- (g) Secure the data needed to identify the suspected faulty hardware.

Note: If available, a surveillance system can be used to perform a pattern search of SM error events that are associated with the non-diagnosable error reports. The information can also be captured by manually viewing the ROP, or using the output daylog command to trap on messages with the INT_MON message class. The following list provides some suggestions on the key data field:

1. Search for *MEM-SYSTEM*, *CORR-BIT-ERR*, *NON-COR-BIT-ERR*, or *PARITY-ERROR*.
2. Identify the error event number that captured the interrupt.
3. Search on the error event number (EVENT=xxxxx). This captures all the pertinent information.

2. Using the data collected in Substep 1(g), determine which MCTSI side reported the error by collecting the associated ROP, then continue with Step 3.

Note 1: Record the fault-specific information for every unique error event: the error type and affected MCTSI side; the state of the MCTSI side when the error was reported; the Error Event Number; the Failing Address; the Original and Final Hardware Status; the Contents of the Memory Board Register (MEMBD – For MCTU3, there is no MEMBD register since all memory is on the core board); and the Contents of the Shadow Operations Register (SHOPR – For IMPU2 and MCTU, there is no SHOPR Register). When needed, use Figure 7.15-1, Figure 7.15-2, Figure 7.15-3, and Table 7.15-1 as reference material to identify the key fields needed for the analysis.

Note 2: The essential components needed for analyzing the interrupt data includes the SM number, the SM event number, the error type, and the processor side that is affected. Based on the error type, refer to the appropriate figure:

- Figure 7.15-1 for MP CORR-BIT-ERR
- Figure 7.15-2 for MP MEM-SYSTEM
- Figure 7.15-3 for MP PARITY-ERROR.

Note 3: If needed, refer to 235-600-750, *Output Messages*, for assistance with the figures.

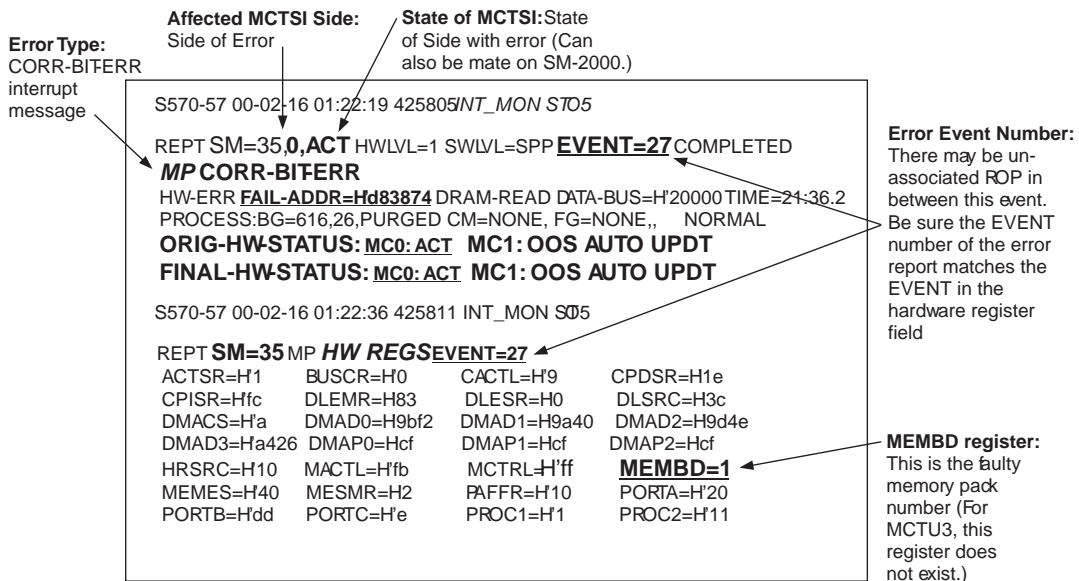


Figure 7.15-1 — MP CORR-BIT Error Example

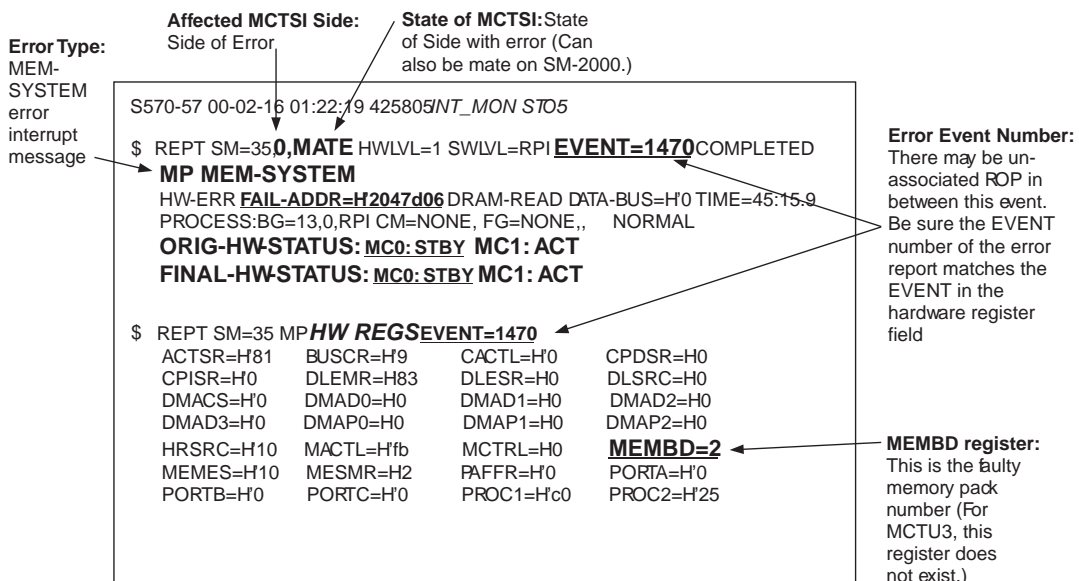


Figure 7.15-2 — MP MEM-SYSTEM Error Example

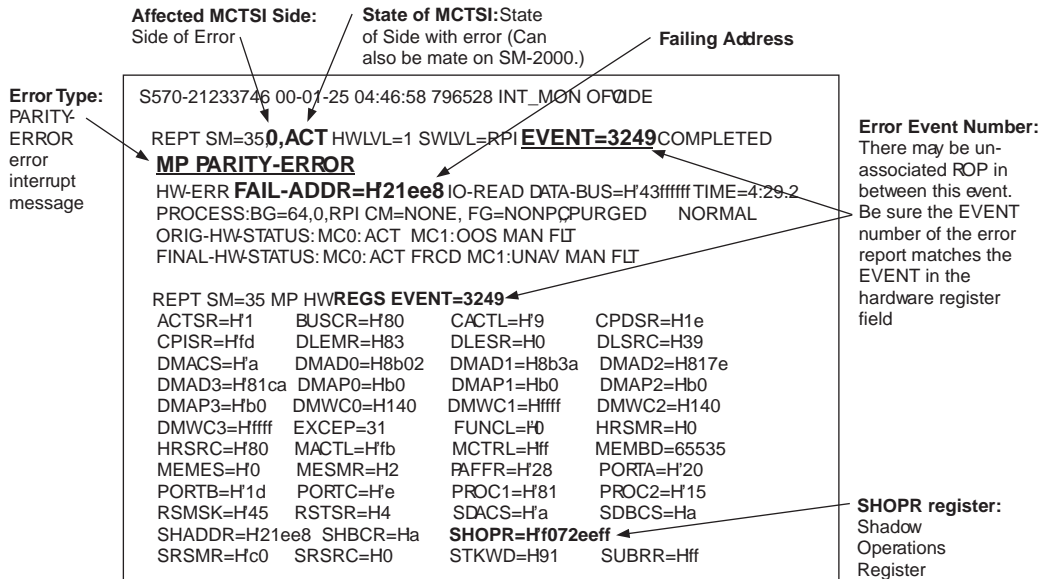


Figure 7.15-3 — MP PARITY-ERROR Example

Table 7.15-1 — Interrupt Messages (Example)

Interrupt Message Reported ^a	Error On Side	Active MCTSI Side
REPT SM=35,0,ACT	0	0
REPT SM=35,0,MATE	0	1
REPT SM=35,1,ACT	1	1
REPT SM=35,1,MATE	1	0

Note(s):

a. For example, if the interrupt message reported on the ROP is **REPT SM=35,0,ACT**, then the error was reported by SM 35 on MCTSI Side 0 and the state of this side was Active.

- Determine the unit type using the Recent Change and Verify (RCV) page 18.1.
 - On 196 page, specify the following options:
 Print Option Y
 Detail Option Y
 Verbose Option Y
 - To access Switch Module in Review Mode, enter:
18.1R
 - Enter the SM number in the SM field.
 - Look at the Unit Type field to get the MCTU software type. Refer to Table 7.15-2 to find the MCTU hardware type.

Table 7.15-2 — Unit Type Translation Table

Unit Type listed in RCV 18.1	Unit Type
SMPU2	IMPU2/TSIU2
SMPU3	MCTU
SMPU4	MCTU2
MCTU3	MCTU3
SM2000	SMPU4
SM2005	SMPU5

- Enter **P** to print the report.
 - Enter **<** to RCV Class Menu.
 - Enter **Q** to quit the RCV view.
4. If diagnosing MP CORR-BIT-ERR, MP NON-COR-BIT-ERR, and MP MEM-SYSTEM errors, continue with Substep 4(a).

If diagnosing MP PARITY-ERROR, go to Substep 4(b).

- (a) Obtain the MEMBD register value captured in Step 2. Go to the appropriate table (Tables 7.15-3 through 7.15-7) based on the Unit Type determined in Step 3 to find the faulty pack EQL. Once the unit position and circuit pack type have been determined, and you are ready to replace the pack, continue with Step 5.
- If unit is IMPU2 (J5D003AY-1), refer to Table 7.15-3.
 - If unit is MCTU (J5D003EC-1), refer to Table 7.15-3.
 - If unit is MCTU2 (J5D003LA-1), refer to Table 7.15-4.
 - If unit is MCTU3 (J5D003LB), refer to Table 7.15-5.
 - If unit is SMPU4 (J5D003NA-1), refer to Table 7.15-6.
 - If unit is SMPU5 (J5D003NG-1), refer to Table 7.15-7.

Note: For the majority of *MP CORR-BIT*, *MP NON-COR-BIT-ERR*, and *MP MEM-SYSTEM* error interrupts, the contents of the MEMBD register reflects the faulty memory pack number or 65533,fffd, or -3 when the faulty memory exists on the core board. If the value shown is 65532, 65534, or 65535, the contents of this register is incorrect and may not be used to determine the correct pack to replace. In rare cases, the error may be received too late to freeze the shadow registers properly. In this case, swap the memory packs with another SM to identify the faulty pack. Be sure that the chosen SM is not exhibiting any memory errors. If this procedure fails to determine the problem, **seek technical assistance**.

Table 7.15-3 — IMPU2 (J5D003AY-1) / MCTU (J5D003EC-1)

MEMBD Register Contents	Interrupt Source Board	MCTSI 0 EQL	MCTSI 1 EQL
65533,fffd, -3	Core Board	076	108
0	MEMBD 0	046	138
1	MEMBD 1	040	144
2	MEMBD 2	034	150
3	MEMBD 3	028	156
4	MEMBD 4	022	162
5	MEMBD 5	MEU 022	MEU 160
6	MEMBD 6	MEU 028	MEU 154
7	MEMBD 7	MEU 034	MEU 148
8	MEMBD 8	MEU 046	MEU 136
9	MEMBD 9	MEU 052	MEU 130
10	MEMBD 10	MEU 058	MEU 124
11	MEMBD 11	MEU 064	MEU 118

Table 7.15-4 — MCTU2 (J5D003LA-1)

MEMBD Register Contents	Interrupt Source Board	MCTSI 0 EQL Lower Level	MCTSI 1 EQL Upper Level
65533,fffd, -3	Core Board	042	042
0	MEMBD 0	050	050
1	MEMBD 1	058	058
2	MEMBD 2	064	064
3	MEMBD 3	070	070
4	MEMBD 4	076	076
5	MEMBD 5	082	082

Table 7.15-5 — MCTU3 (J5D003LB)

MEMBD Register Contents	Interrupt Source Board	MCTSI 0 EQL	MCTSI 1 EQL
N/A	Core Board	021	113

Table 7.15-6 — SMPU4 (J5D003NA-1)

MEMBD Register Contents	Interrupt Source Board	MCTSI 0 EQL Lower Level	MCTSI 1 EQL Upper Level
65533,fffd, -3	Core Board	036	136
0	MEMBD 0	044	044
1	MEMBD 1	052	052
2	MEMBD 2	060	060
3	MEMBD 3	068	068

Table 7.15-7 — SMPU5 (J5D003NG-1)

MEMBD Register Contents	Interrupt Source Board	MCTSI 0 EQL Lower Level	MCTSI 1 EQL Upper Level
65533,fffd, -3	Core Board	032	032
0	MEMBD 0	042	042
1	MEMBD 1	052	052

(b) Obtain the failing address captured in Step 2. Go to the appropriate table (Tables 7.15-8 through 7.15-12) based on the Unit Type determined in Step 3 to find the faulty pack EQL. Once the unit position and circuit pack type have been determined, and you are ready to replace the pack, continue with Step 5.

- If unit is IMPU2 (J5D003AY-1), refer to Table 7.15-8.
- If unit is MCTU (J5D003EC-1), refer to Table 7.15-8.
- If unit is MCTU2 (J5D003LA-1), refer to Table 7.15-9.
- If unit is MCTU3 (J5D003LB), refer to Table 7.15-10.
- If unit is SMPU4 (J5D003NA-1), refer to Table 7.15-11.
- If unit is SMPU5 (J5D003NG-1), refer to Table 7.15-12.

Note: For the majority of *MP PARITY ERROR* error interrupt, the failing address can be used to determine the faulty memory pack. (In some cases, the error can be due to a core board or parity checker on a memory board). In rare cases, the error may be received too late to freeze the shadow registers properly. In this case, swap the memory packs and core pack with other SMs to identify the faulty pack. If this procedure fails to determine the problem, **seek technical assistance**.

Table 7.15-8 — IMPU2 (J5D003AY-1) / MCTU (J5D003EC-1)

MEMORY BOARD ADDRESS RANGE (LOWEST - HIGHEST)						
Memory Board Size	ON CORE EQL: MCTSI 0: 076 MCTSI 1: 108	SLOT 0 EQL: MCTSI 0: 046 MCTSI 1: 138	SLOT 1 EQL: MCTSI 0: 040 MCTSI 1: 144	SLOT 2 EQL: MCTSI 0: 034 MCTSI 1: 150	SLOT 3 EQL: MCTSI 0: 028 MCTSI 1: 156	SLOT 4 EQL: MCTSI 0: 022 MCTSI 1: 162
4MB (TN2012)	----	2000000 - 23FFFFFF	2400000 - 27FFFFFF	2800000 - 2BFFFFFF	2C00000 - 2FFFFFFF	3000000 - 33FFFFFF
CORE BOARD (TN1423)	024000 - 1FFFFFFF	----	----	----	----	----
Note(s): a. Addresses below 0x24000 do not map to dynamic RAM						

Table 7.15-9 — MCTU2 (J5D003LA-1)

5th Nibble ^a	Circuit Pack ^{b,c}	MCTSI 0 Pack EQL	MCTSI 1 Pack EQL
0	Multiple Errors. <i>Seek technical assistance.</i>	---	---
1	UN515 / UN520	042	042
2	UN516	026	026
3	UN517	034	034
4	Memory Board 0	050	050
5	Memory Board 1	058	058
6	Memory Board 2	064	064
7	Memory Board 3	070	070
8	Memory Board 4	076	076
9	Memory Board 5	082	082
C	UN518	088	088
F	No Response Error. <i>Seek technical assistance.</i>	---	---

Note(s):

- From the SHOPR register, obtain the value of the 5th hexadecimal character from the right.
- Use the table to determine the faulty pack. ***Example:*** If the SHOPR register value is H'f0d6ccf7, the 5th nibble would be "6," which corresponds to Memory Board 2.
- This is the minimal acceptable vintage.

Table 7.15-10 — MCTU3 (J5D003LB)

Circuit Pack ^{a,b}	MCTSI 0 Pack EQL	MCTSI 1 Pack EQL
KBN20 (32MB)	021	113
KBN21 (64MB)	021	113
KBN22 (96MB)	021	113

Note(s):

- MCTU3 is configured with either the KBN20, KBN21, or KBN22 core pack. For the MCTU3, all memory is on the core board.
- This is the minimal acceptable vintage.

Table 7.15-11 — SMPU4 (J5D003NA-1)

8th Nibble ^a	Circuit Pack ^{b,c}	MCTSI 0 Pack EQL	MCTSI 1 Pack EQL
0	Multiple Errors. <i>Seek technical assistance.</i>	---	---
1	UN540/UN560/UN594	036	036
2	KBN8	077	077
3	UN539	122	122
5	UN538/UN584	096	096
6	UN538/UN584	104	104
7	UN538/UN584	112	112
8	TN1685/TN1806/TN1816	044	044
9	TN1685/TN1806/TN1816	052	052
A	TN1685/TN1806/TN1816	060	060
B	TN1685/TN1806/TN1816	068	068
E	Mate Access	---	---
F	No Response Error. <i>Seek technical assistance.</i>	---	---

Note(s):

- From the SHOPR register, obtain the value of the 8th hexadecimal character from the right.
- Use the table to determine the faulty pack. Example: If the SHOPR register value is H'0d6ccf7, the 8th nibble would be "f," which corresponds to a "No Response Error."
- This is the minimal acceptable vintage.

Table 7.15-12 — SMPU5 (J5D003NG-1)

8th Nibble ^a	Circuit Pack ^{b,c}	MCTSI 0 Pack EQL	MCTSI 1 Pack EQL
0	Multiple Errors. <i>Seek technical assistance.</i>	---	---
1	UN560/UN588	032	032
2	KBN8B	061	061
3	UN539	106	106
5	UN538/UN584	080	080
6	UN538/UN584	088	088
7	UN538/UN584	096	096
8	TN1685/TN1806/TN1816	042	042
9	TN1685/TN1806/TN1816	052	052
E	Mate Access	---	---
F	No Response Error. <i>Seek technical assistance.</i>	---	---

Note(s):

- From the SHOPR register, obtain the value of the 8th hexadecimal character from the right.
- Use the table to determine the faulty pack. Example: If the SHOPR register value is H'0d6ccf7, the 8th nibble would be "f," which corresponds to a "No Response Error."
- This is the minimal acceptable vintage.

- If you have reached this point in the procedure, the suspected faulty hardware has been identified. Use Table 7.15-13 to determine how to continue.

Table 7.15-13 — Case Action Table

IF FAULTY PACK IS ON	AND OTHER SIDE IS	THEN
OOS Side	ACT	Go to Step 8.
STBY Side	ACT	<p>1. To REMOVE the STBY MCTSI from service: On MCC Page 1190,X (where: X = SM), enter: (Poke) 20X (where: X = STBY side) <i>OR</i> (MML) RMV:MCTSI=X-Y; (where: X = SM, Y= STBY side)</p> <p>2. Go to Step 8.</p>
ACT Side	STBY	<p>1. To SWITCH the MCTSI: On MCC Page 1190,X (where: X = SM), enter: (Poke) 403 <i>OR</i> (MML) SW:MCTSI=X; (where: X = SM)</p> <p>2. To REMOVE faulty (now STBY) MCTSI side from service: On MCC Page 1190, enter: (Poke) 20X (where: X = STBY side) <i>OR</i> (MML) RMV:MCTSI=X-Y; (where: X = SM, Y= STBY side)</p> <p>3. Go to Step 8.</p>
ACT Side	OOS	The active MCTSI side is reporting interrupts. The mate MCTSI is out-of-service. Continue at Step 6.

6. You have reached this step because CORR-BIT, MEM-SYSTEM, NON-COR-BIT-ERR, or PARITY-ERROR errors have been observed on the active MCTSI side, while the mate MCTSI is OOS. Continue with Substep 6(a). The intent is to make the OOS side ACT and remove the side taking the errors.

(a) To **DIAGNOSE** the OOS MCTSI:

On the 1190,X Page (where: X = SM), enter:

(Poke) **50X** (where: X = OOS side)

OR

(MML) **DGN:MCTSI=X-Y,RAW,TLP**; (where: X = SM, Y= OOS side).

Did diagnostics ATP?

If **Yes**, continue at Substep 6(b).

If **No**, there may be multiple faults. Do not remove any packs from the OOS side. **Go to Step 12 (hold all ROP)**.

(b) **INHIBIT** software checks. On the 1800,X page, (where: X = SM), enter:

(Poke) **604**

OR

(MML) **INH:SFTCHK,SM=X**; (where: X = SM).

Wait for SFTCHK box become backlighted.

- (c) **INHIBIT** hardware checks. On the 1800,X page, (where: X = SM), enter:
(Poke) **608**
OR
(MML) **INH:HDWCHK,SM=X**; (where: X = SM).

Wait for **INH HDWCHK SM=X** completed message to print.

Note: Be patient, inhibiting hardware checks may take a few minutes. Be aware, inhibiting hardware checks may disable CACHE memory and degrade SM/SM-2000 performance. Once the inhibit hardware checks completed message has printed, continue with Substep (d).

- (d) Request an unconditional (UCL) **RESTORE** of the mate from the OOS state to Standby.

On the 1190,X Page (where: X = SM), enter:
(Poke) **30X,UCL,STBY** (where X=OOS side)
OR
(MML) **RST:MCTSI=X-Y,UCL,STBY**; (where: X = SM, Y= OOS side).

Note: Once the command has been entered, the MCTSI mate update routine is started. If the restore is successful, a **RST MCTSI=a-b COMPLETED** message is printed (where "a" = SM # and "b" = MCTSI side). Monitor the progress of the restore request, it may take several minutes. Continue with the specific case charted in Table [7.15-14](#).

Table 7.15-14 — Case Action Table

IF	THEN
Restore completes and the SM remains duplex for five minutes. (Soak for 5-minutes). (Faulty side is ACT).	Go to Substep 6(e).
Restore completes, MCTSI switch occurs due to fault recovery. (Side with faulty pack is OOST.)	Go to Step 7.
Restore completes, MCTSI reconfigures due to fault recovery and, immediately fails diagnostics. (Side with faulty pack is OOS.)	Go to Step 8.
Restore fails leaving the faulty side active. (Side with faulty pack is ACT.)	Go to Step 12.

- (e) **SWITCH** the MCTSI, then continue with the specific case in Table 7.15-15.
On the 1190,X Page (where: X = SM), enter:
(Poke) **403**
OR
(MML) **SW:MCTSI=X**; (where: X = SM)

Table 7.15-15 — Case Action Table

IF	THEN
Switch fails leaving faulty side active.	Both sides may have faults, active/standby. Go to Step 12.
Switch completes, but faulty side is OOS. ^a	Go to Step 8.
Switch completes, affected side is now STBY. The MCTSI remains duplex. Let MCTSI soak for 30 minutes . (Faulty side is OOS.)	1. After soak time, check ROP for any errors on ACT side. If errors are seen, go to Step 12 since both sides may have faults; otherwise continue. 2. To REMOVE STBY side from service: On MCC Page 1190,X (where: X =SM), enter: (Poke) 20X (where X = STBY or faulty side.) <i>OR</i> (MML) RMV:MCTSI=X-Y ; (where: X=SM, Y= STBY side.) 3. Go to Step 8.
Note(s): a. If errors were taken on the faulty side, Fault Recovery may place this side in OOST, therefore the DGN may have failed leaving the side OOS. Obtain the SUSPECTED FAULTY EQUIPMENT LIST for other faulty packs.	

7. In this case, the faulty side is OOST. To avoid bringing the faulty side ACT, stop the diagnostics. Enter:
(MML) **STP:MCTSI=b-c**; (where b = SM number and c = OOST side.)

8. In this case, the faulty side is OOS. Continue with Substep 8(a) to replace the pack on the affected side.

Note: The personnel who carry out the circuit replacement task should be aware of the general requirement for the handling and care of circuit packs as outlined in 235-105-110, *System Maintenance Requirements and Tools*.

- (a) Verify that the OOS lamp is "ON" on the affected side.
- (b) Power down the OOS MCTSI side using the OFF switch only.
Do Not use the MOR (manual over-ride) switch.
- (c) Replace the suspected faulty pack (identified in Step 4).
- (d) Power-On the OOS MCTSI side using the ON switch.
- (e) **DIAGNOSE** the OOS MCTSI side.

On the 1190,X Page; enter:

(Poke) 50X (where X = OOS side)

OR

(MML) DGN:MCTSI=X-Y,RAW,TLP; (where: X = SM, Y= OOS side).

- (f) Did the MCTSI pass diagnostics (ATP)?
If **Yes**, continue at Step 9.
If **No**, try another pack or re-install the original pack, or if all fails, go to Step 12. See **Note**.

Note: Don't forget to insert a copy of the error printout into the box that contains the suspected faulty circuit pack.

9. **RESTORE** the MCTSI to the standby state.

On the 1190,X Page (where: X = SM), enter:

(Poke) 30X,STBY (where X = OOS MCTSI).

OR

(MML) RST:MCTSI=X-Y,STBY; (where: X = SM, Y= OOS side).

Note: Once the command has been entered, the MCTSI mate update routine is started. If the restore is successful, an **RST MCTSI=a-b COMPLETED** message is printed (where "a" = SM # and "b" = MCTSI side). Monitor the progress of the restore request, it may take several minutes. Continue at Step 10.

10. Assess the effect of the pack replacement.

- (a) Did the OOS MCTSI side restore and remain standby for a five-minute period without reporting errors?

Note: This substep is used to make a determination on whether the MCTSI side can cycle error-free. The expectation is that support personnel monitor the ROP during this period.

If **Yes**, continue with Substep 10(b).

If **No** and this is the *first or second* attempt at resolving the error, go back to Substep 1(g).

If this is the *third* attempt at resolving the error, go to Step 12.

- (b) **SWITCH** the MCTSI, then allow the side to **soak for 30 minutes**.
On the 1190,X Page (where: X = SM), enter:
(Poke) **403**
OR
(MML) **SW:MCTSI=X**; (where: X = SM).
 - (c) Did the MCTSI side switch complete and remain active for 30 minutes without reporting errors?

If **Yes**, continue with Substep **10(d)**.
If **No** and if this is the *first or second* attempt at resolving the error, go back to Substep **1(g)**.
If this is the *third* attempt at resolving the error, go to Step **12**.
 - (d) If hardware checks were inhibited, **ALLOW** SM hardware checks, wait for the **ALW HDWCHK** completed message, then monitor for errors.
On the 1800,X Page (where: X = SM), enter:
(Poke) **708**
OR
(MML) **ALW:HDWCHK,SM=X**; (where: X = SM).

Wait for the **ALW HDWCHK SM=X COMPLETED** message to print.
Continue with Substep **10(e)**.
 - (e) Have any errors been observed on the active side?

If **Yes**, return to Step **2** and re-evaluate the problem. When warranted, go to Step **12**.
If **No**, continue with Substep **10(f)**.
 - (f) If software checks were inhibited, **ALLOW** SM software checks, wait for the **SFTCHK** box to extinguish, then continue with Step **11**.
On the 1800,X Page (where: X = SM), enter:
(Poke) **704**
OR
(MML) **ALW:SFTCHK,SM=X**; (where: X = SM).
11. If you have reached this point, you have responded to the errors by replacing MCTSI hardware, but due to the intermittent nature of the problem, support personnel should continue to monitor the output for 48 hours. Continue with Substep **11(a)** to allow REX, clear verbose, allow brevity, and to normalize the message classes. If a problem does occur, re-evaluate the problem and, when necessary, go to Step **12**.
- (a) **ALLOW BREVC** by performing one of the following:
On the 1800,X Page (where: X = SM), enter:
(Poke) **709**
OR
(MML) **ALW:BREVC,SM=X**; (where: X = SM).
 - (b) **CLEAR VERBOSE** by performing one of the following:
On the 1800,X Page (where: X = SM), enter:
(Poke) **512**
OR
(MML) **CLR:PERPH,SM=X,VERBOSE**; (where: X = SM).

Note: Allow REX at least 15 minutes after the REX start time recorded in Step 1 of this procedure. If the REX start time recorded was 23 hours and 30 minutes, do not execute the 702 poke before 23:45 on MCC Page 1800.

- (c) **ALLOW REX** by performing one of the following:
On the 1800,X Page (where: X = SM), enter:
(Poke) **702**
OR
(MML) **ALW:REX,SM=X;** (where: X = SM).
 - (d) Return message classes from backup.
(MML) **CHG:LPS,MSGCLS=ALL,FROMBKUP;**
 - (e) Go to Step [13](#).
12. Hold the ROP along with the suspected faulty memory pack, if applicable, and **seek technical assistance** as soon as possible to clear the problem.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.16 REPLACING SM CIRCUIT PACKS

OVERVIEW

This is a general procedure for replacing SM circuit packs. If you need to replace any of the following circuit packs, refer to the referenced procedure.

Note: Before starting any of these procedures, read the general requirements for handling and care of circuit packs outlined in 235-105-110, *System Maintenance Requirements and Tools*.

- To replace a PSU2 PLI paddleboard (KBD2) and/or optical cable, refer to Procedure [7.17](#).
- To replace an AIU, EAIU, or XAIU Line Pack, refer to Procedure [7.18](#).
- Before replacing the TRCU circuit packs, refer to Procedure [7.19](#) to determine switch/strap settings.
- To replace the DNU-S STSX-1 Link Interface (SLI) paddleboard, refer to Procedure [7.20](#).
- To replace LU circuit packs, which require a certain sequence, refer to Procedure [7.21](#).
- To replace the LDT, NLI, PLI, NLI1, COT, CM3 optical transceivers, and COTD paddleboards, refer to Procedure [8.10](#).

PROCEDURE

1. Make sure the circuit pack is out of service (OOS) by removing the unit or sub-unit from service.

Caution: *Be sure you understand the impact of removing the unit or sub-unit from service.*

Check the section in Procedure [7.22](#) that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are OOS.

2. The SM MCTSI and DLI, and the SM-2000 SMPU and TSIU must be powered down before a circuit pack or cable can be replaced in those units. Perform the steps in Procedure [7.22](#) that corresponds to the unit or sub-unit to make sure all the necessary units or sub-units are powered down.
3. Replace the circuit pack and/or cabling.
4. For units or sub-units that required powering down, follow the corresponding steps in Procedure [7.22](#) to power the unit or sub-unit up.
5. Follow the corresponding steps in Procedure [7.22](#) to restore the unit(s) or sub-unit(s) to service.

7.17 REPLACE PSU2 BKD2 AND/OR OPTICAL CABLE

OVERVIEW

This procedure is used to replace the Packet Switch Unit, Model 2 (PSU2) Peripheral Link Interface (PLI) paddleboard — the BKD2 — and/or its optical cabling. The BKD2 is on the backplane of the Module Controller and Time Slot Interchanger (MCTSI) and connects optical cable coming from the PSU2.

Caution: *If this procedure is not followed, SS7 links could be dropped and/or PSU2 clock errors could occur during PLI - BKD2 paddleboard replacement.*

While performing this procedure, if reference is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, for details.

PROCEDURE

1. **Note:** Servicing MCTSI side 1 and PSUCOM side 1 is very similar to side 0.
If a BKD2 needs to be unseated and replaced and/or the fiber needs to be replaced on the backplane of MCTSI Service Group (SG) 0, then side 0 of the PSUCOM in the affected PSU2 must be manually removed from service.
2. At the Master Control Center (MCC) 1190 page or from a UNIX terminal, verify that MCTSI side 0 is out-of-service (OOS). If not OOS, remove MCTSI side 0 from service.
3. Using Procedure [7.22](#), power down MCTSI side 0.
4. At the MCC 1186 page or from a UNIX terminal, remove side 0 of the affected PSUCOM.
Note: If the PSUCOM cannot be manually removed from service, contact your next level of support before unseating the BKD2.
5. Verify that the OOS lamp on the BKD2 is lit.
6. Disconnect the optical cables from the BKD2.
7. Remove the BKD2 and/or cabling that needs replacing.
8. Install the new or existing BKD2 on the backplane of MCTSI side 0.
9. If necessary, attach new cabling to the 982TN at the backplane of the PSUCOM. Then attach the new and existing cables to the new or existing BKD2 of MCTSI side 0.
10. Using Procedure [7.22](#), power up MCTSI side 0.
11. **Note:** MCTSI will CATP phase 87 with PSUCOM OOS
Restore the MCTSI side 0 to service.
12. Restore the PSUCOM side 0 to service. Verify that the OOS lamp on the BKD2 is off.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.18 REPLACE AIU/EAIU/XAIU LINE PACK

OVERVIEW

This procedure is used to replace an Access Interface Unit (AIU), Expanded AIU (EAIU), or Multiplexed AIU (XAIU) line pack. These are the circuit packs that have cables attached at the front.

Warning: Whenever a procedure requires the handling of a circuit pack, always take the necessary steps to prevent electro-static discharge which can damage the pack.

PROCEDURE

1. Use Procedure [7.22](#) to remove the AIU/EAIU/XAIU line pack from service.
2. Unseat the circuit pack and pull the pack part way out.
3. Detach the cabling from the pack, noting the order in which the cablings must be reattached to the new pack. Then remove the pack.
4. Before attaching the cables to the new pack, insert the pack part way in. Once the cables are attached, insert the pack the rest of the way.
5. Use Procedure [7.22](#) to restore the line pack to service.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.19 DETERMINE SWITCH/STRAP SETTINGS FOR TRANSMISSION RATE CONVERTER UNIT CIRCUIT PACKS

OVERVIEW

This procedure is used to determine switch/strap settings for Transmission Rate Converter Unit (TRCU) circuit packs.

When replacing the 16-type Optical Link Interface (OLI) or AKM3 circuit packs, the attenuation switches (or straps) on the replacement pack must be set according to the "NOTE" on the plastic cover panel in front of the TRCU. If the settings have not been marked or if the validity of the markings are in question, the procedure that follows can be used as a quick method of determining proper settings.

PROCEDURE

1. If the TRCU is equipped with an AKM3, continue with the next step.

If the TRCU is equipped with a 16-type OLI, go to Step 3.

2. For a TRCU equipped with an AKM3:

The settings of the option straps on the AKM3 (Figure 7.19-1) are based on the length of cable from the TRCU to the DSX-3 in Table 7.19-1.

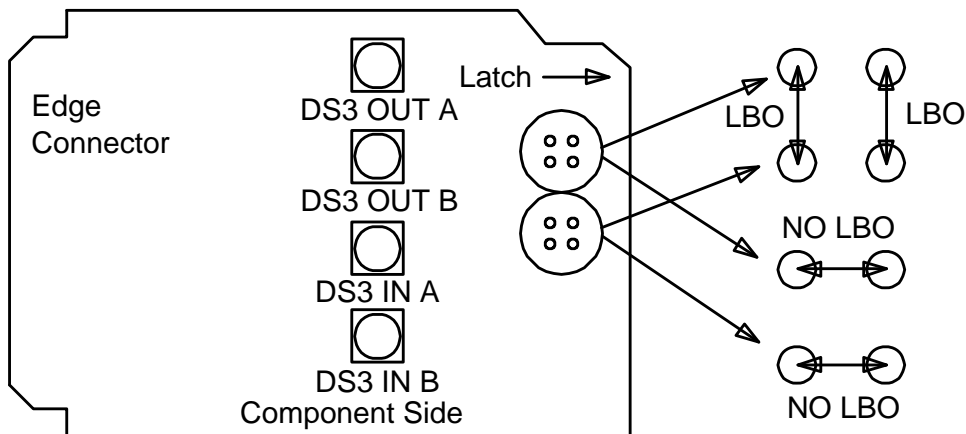


Figure 7.19-1 — Line Build-Out (LBO) Option Straps

Table 7.19-1 — Line Build-Out Selections

CABLE LENGTH (FEET)	PLUG SETTING
0 to 225	LBO
>225 to 400	No LBO

3. For a TRCU equipped with a 16-type OLI:

Obtain an Optical Loss Test Set (OLTS), such as a Lucent Technologies Local Area Network (LAN) Optical Loss Set 938A1. The OLTS must be capable of measuring 35 dB at a wavelength of 1300 nanometers (nm) on single or multimode optic fiber.

Note: Care should be taken to make sure that the connector adapters between the test set's optical ports and the optical fibers are correctly chosen.

4. For each OLI pack, locate the associated optical fibers and measure the end-to-end transmission loss as follows:
 - (a) Measure the host site first and then the remote site when doing the following:
 1. Connect the test set adapter to the yellow cable connector (output).
 2. Read and record the output measurement.
 3. Disconnect the test set adapter from the yellow cable connector and reconnect to the grey cable connector (input).
 4. Read and record the input measurement.
 5. Disconnect the test set adapter from the grey cable connector.
 - (b) Calculate the fiber path transmission loss by subtracting the input reading from its associated output reading.
 - (c) If the loss is within the limits specified in Table 7.19-2, set the transmitter switch properly (Figure 7.19-2) and record the switch setting on the plastic cover panel of the TRCU housing. Table 7.19-2 lists the switch points for the combinations of transmitters and receivers.
 - (d) If the loss is outside the limits specified in Table 7.19-2, check the connector adapters to ensure that they are the correct adapters and are properly connected. Repeat previous measurements if required.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 7.19-2 — Transmitter Switch Facility Loss

TRANSMITTER	RECEIVER	LW	HI
16E or 16F	16E	0 to 9 dB	9 to 17.5 dB
16E or 16F	16F or 16G	0 to 11 dB	11 to 22 dB
16G	16E	7 to 15 dB	15 to 23.5 dB
16G	16F or 16G	7 to 16 dB	16 to 28 dB

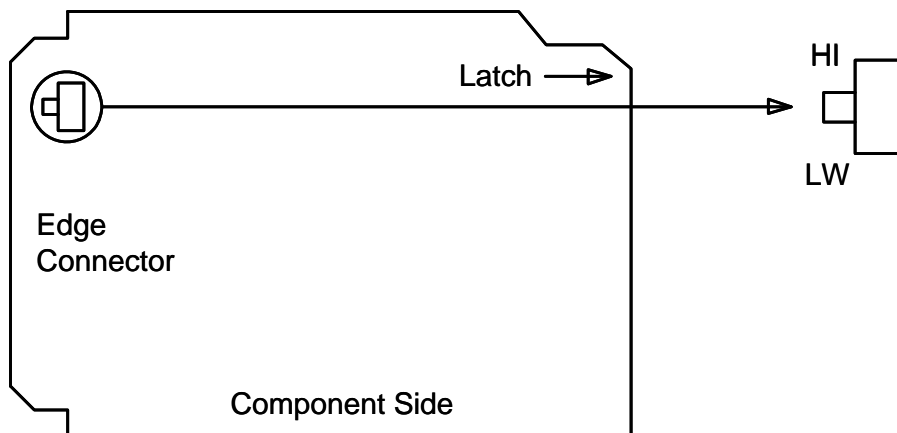


Figure 7.19-2 — Optical Line Interface Unit (OLIU) Option Switches

7.20 REPLACE DNU-S SLI PADDLE BOARD

OVERVIEW

This procedure is used to change the Digital Network Unit-SONET (DNU-S) STSX-1 Link Interface (SLI) paddle board.

PROCEDURE

1. Perform the following *preliminary checks* and **record the outputs**.
 - a. **op:cga,sm=x;**
 - b. **op:cfgstat,sm=x,oos,nofe;**
 - c. **op:sysstat,sm=x,ucl;**
 - d. **op:offnorm,sm=x;**
 - e. **op:list,trunks,oos,sm=x;**
2. Enter the following command: **inh:hdwchk,sm=x;**
3. Enter the following command: **inh:sftchk,sm=x;**
4. Enter the following command: **1510 MCC page, 24XY poke**
(This command removes the EC1STE associated with the SLI being replaced.)
5. Disconnect the coaxial cables from the SLI paddle board being replaced.
6. Pull the defective SLI paddle board.
7. Install the new SLI paddle board.
8. Plug the coaxial cables into the new SLI paddle board.
9. Enter the following: **1510 MCC page, 34XY poke**
This restores the EC1STE.
10. Enter the following command: **alw:sftchk,sm=x;**
11. Enter the following command: **alw:hdwchk,sm=x;**
12. Run diagnostics on the SFI.
13. Perform the following *post-replacement checks* and **compare each output with the recorded output** of the corresponding *preliminary check*.
 - a. **op:cga,sm=x;**
 - b. **op:cfgstat,sm=x,oos,nofe;**
 - c. **op:sysstat,sm=x,ucl;**
 - d. **op:offnorm,sm=x;**
 - e. **op:list,trunks,oos,sm=x;**
14. Are all corresponding outputs the same?
 - If NO, **seek technical assistance.**
 - If YES, follow local practices to determine whether to return the old unit to service.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.21 SEQUENTIAL REMOVAL AND INSERTION OF LINE UNIT CIRCUIT PACKS

OVERVIEW

This procedure is used to properly remove (unseat) and insert (reseat) Line Unit (LU) circuit packs. Unseating all grid and Gated Diode Crosspoints Access (GDXACC) packs is required before -48 V DC is restored if the LU is not equipped for line unit auto power recovery (LUARP). Unseating and reseating in the proper sequence is required to avoid potential damage to certain packs that can occur when other packs are missing or not powered up. For this reason, observe the following **Cautions**. And for personal safety, observe the following **DANGER**.

Danger: *Hazardous voltages are present on LU packs, even after they are removed from the cabinet. Do not touch the exposed components or wiring paths on the pack. When removing or inserting a pack, use the latch and hold the pack at its edges without touching the components or paths.*

Caution 1: *Do not remove any -48 V DC fuse at the LU cabinet or at the Power Control Fuse Distribution (PCFD) or Global Power Distribution Frame (GPDF) or in any other way interrupt the -48 V DC power to the LU packs as a troubleshooting technique.*

Caution 2: *Removal of an entire LU from service should only be done when necessary (that is, rarely). Once power is lost, the system may remove working lines, marking them "OOS, MAN." These lines must be restored via Step 9 to complete this procedure and minimize the interruption of service on those lines connected to the LU.*

PROCEDURE

1. To remove or unseat LU packs:
 - (a) LU Model 1 (J5D004AB):
 1. For the entire LU, perform Steps 3-5.
 2. For a TN340(B) grid pack only, remove the grid from service with the appropriate RMV input message and unseat the two TN338(B)s (first) and then the TN340(B) pack.
 3. For a TN332(B) pack only, remove the GDXACC circuit in the service group (SG) from service with the appropriate RMV input messages and unseat the TN331(B) (first) and then the TN332(B) pack.
 4. **STOP. YOU HAVE COMPLETED THE PACK REMOVAL PORTION OF THIS PROCEDURE.**
 - (b) LU Models 2 (J5D004AC) and 3 (J5D004AD):
 1. For the entire LU, perform Steps 3-5.

Caution: *Do not replace a TN832(B) without first pulling the TN831(B) in the same LU GDXACC.*
 2. For a TN832(B) or TN831(B) pack, remove the GDXACC circuit in the SG from service with the appropriate RMV input message (rmv:gdxacc=a-b-c) and remove the LUCOMC with the appropriate RMV input message (rmv:lucmc=a-b-c). When both the GDXACC and the LUCOMC are OOS then unseat the TN831(B) (first) and then the TN832(B) pack.

3. For both the TN842B and TN843 packs or the UN322 pack for LU3, remove the Line Unit Common Control (LUCOMC) circuit in the SG from service with the appropriate RMV input message (**rmv:lucomc=a-b-c**) and unseat the TN843 (first) and then the TN842B pack or the UN322 pack for LU3.
Note: Some interrupts may occur when unseating the TN843 pack. Allow the system time to recover before unseating the TN842B pack.
 4. **STOP. YOU HAVE COMPLETED THE PACK REMOVAL PORTION OF THIS PROCEDURE.**
2. To insert or reseat LU packs:
 - (a) LU Model 1 (J5D004AB):
 1. For the entire LU, perform Steps 6-8.
 2. For a TN340(B) grid pack only, insert and latch the TN340(B) pack and (last) the TN338(B) packs (one at a time). Unconditionally restore the grid with the appropriate **RST** input messages.
 3. For a TN332(B) pack only, insert and latch the TN332(B) pack and (last) the TN331(B) pack. Restore the packs with the appropriate **RST** input messages.
 4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
 - (b) LU Models 2 (J5D004AC) and 3 (J5D004AD):
 1. For the entire LU, perform Steps 6-8.
 2. For both the TN842B and TN843 packs, insert and latch the TN842B pack and (last) the TN843 pack. Unconditionally restore the packs with the appropriate **RST** input messages.
Caution: Insert the TN832(B) and then insert TN831(B) ensure that the TN831(B) is inserted lasted.
 3. For the TN831(B) and TN832(B) packs, insert and latch the TN832(B) pack and the TN831(B) pack (last). Restore the LUCOMC and then the GDXACC. Conditionally restore the packs with the appropriate **RST** input messages (**rst:lucomc=a-b-c** then **rst:gdxacc=a-b-c**).
 4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
 3. Before removing/unseating any LU packs, verify that the LU's equipment groups [Service Group (SG) 0 and SG 1] and GRIDs (0-7/9) are out of service (OOS). Use of the appropriate **RMV** input messages with the unconditional (UCL) option may be required to remove the entire LU from service.
 4. Depending on which model of LU (1, 2, or 3) is involved, use the appropriate pack remove/unseat procedure per Substeps 4(a) and 4(b) as follows:
 - (a) Circuit Pack Removal Sequence for LU Model 1 (J5D004AB):
 1. For each equipped GRID (GRID 0 - GRID 7), unseat the two TN338(B)s (first) and then the TN340(B) pack.
 2. For each equipment group (SG 0 and SG 1), unseat the TN331(B) (first) and then the TN332(B).

- (b) Circuit Pack Removal Sequence for LU Model 2 (J5D004AC) and LU Model 3 (J5D004AD):
 - 1. For each equipped GRID (GRID 0 - GRID 7/9), unseat the two GRID packs [TN838s, TN1048s, TN1058(B,C)s].
 - 2. For each equipment group (SG 0 and SG 1), unseat the TN831(B) (first) and the TN832(B) (last).
- 5. **STOP. YOU HAVE COMPLETED THE PACK REMOVAL PORTION OF THIS PROCEDURE.**
- 6. Before inserting or reseating the packs in the LU, verify that no fuses are blown for the -48 V DC power to the LU (either at the LU cabinet, the PCFD, or the GPDF).
- 7. **Note:** When inserting the packs (one at a time), be alert to a fuse blowing at the LU cabinet, the PCFD or the GPDF. A blown fuse may be due to a faulty pack being inserted or some other trouble causing excessive current load that should be cleared before continuing with the pack insertion procedure.

Depending on which model of LU (1, 2, or 3) is involved, use the appropriate pack inserting/reseating procedure per Substeps 7(a) and 7(b) as follows. Be alert for a blown fuse:

- (a) Circuit Pack Insertion Sequence for LU Model 1 (J5D004AB):
 - 1. Insert and latch (one at a time, in the order specified) the TN343, TN335(B,C)s, TN333s, TN336(B), TN332(B), and (last) the TN331(B).
 - 2. For each equipped GRID (GRID 0 - GRID 7), insert and latch (one at a time) the TN340(B) pack and (last) the two TN338(B)s.
- (b) Circuit Pack Insertion Sequence for LU Model 2 (J5D004AC), LU Model 3 (J5D004AD):
 - 1. Insert and latch (one at a time, in the order specified) the UN322(B) (LU Model 3) or TN843 and TN842(B) (LU Model 2), TN335(C,E)s, TN844s, TN832(B), and (last) the TN831(B).
 - 2. For each equipped GRID (GRID 0 - GRID 7/9), insert and latch (one at a time) the GRID packs [TN838s, TN1048s, TN1058(B,C)s].
- 8. Unconditionally restore both SGs and all GRIDs of the LU to service, using the appropriate **RESTORE** commands at the Master Control Center (MCC) display pages or via the appropriate **RST** input messages.
- 9. List the OOS lines by entering input message **OP:LIST,LINES,FULL:OOS**. Use the **RST:LINE** input message to restore the OOS lines. Sample test for dial tone.
- 10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.22 SM POWER-UP/POWER-DOWN — INTRODUCTION

OVERVIEW

This rest of the procedures in this section are used to power down units in the SM and SM-2000 that require powering down before performing repairs. For the units that do not require powering down before performing service, procedures are provided to remove these units from service before performing service. **Before using these procedures, start with 235-105-220, Procedure 7.1 to do the following:**

1. Identify the unit to be serviced.
2. Properly remove and/or isolate a unit from service.
3. Locate the unit and verify that it is out-of-service.

Note: If a circuit pack needs replacing, refer to 235-105-220, Procedure 7.16 before replacing a circuit pack.

PROCEDURE

1. For **SM MCTU** power-up/down procedures, go to Procedure 7.23. Sub-units include:

MCTU Model 1 (AY/AT and EC), MCTU Model 2, MCTU Model 3.

For **SM-2000 MCTU** power-up/down procedures, go to Procedure 7.24. Sub-units include:

TSIU4-2/SMPU5, TSIU4/SMPU4, SMU6, and OXU.

For **SM and SM-2000 peripheral unit** power-up/down procedures, go to Procedure 7.25. Sub-units include:

AIU, LU, TU, IDCU, DNU-S, OIU, DLTU, and other miscellaneous units.

7.23 SM MCTU POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

The SM Module Controller And Time Slot Interchanger Unit (MCTU) is a duplex unit that has sub-units that must be powered down *before* packs or cables are removed from it. These subunits are the:

- Module Controller and Time Slot Interchanger (MCTSI)
- Dual Link Interface (DLI).

There are four types of MTCU units. The type of unit can be determined from the designation strip on the unit and from the information in Table 7.23-1. Table 7.23-1 can also be used to identify Control/Display pack information about the unit.

Table 7.23-1 — Control/Display Pack Information

Unit	J-Dwg	Unit Type	Sub-unit (C/D Pack)	Side 0 C/D EQL	Side 1 C/D EQL
MCTU3	J5D003LB-1	MCTU3	MCTSI (TN1424)	Y*-014	Y*-106
			DLI (TN1077)	Y*-084	Y*-176
MCTU2	J5D003LA-1	MCTU2	MCTSI (UN516)	019-026	028-026
			DLI (TN1077)	019-156	028-156
MCTU1	J5D003EC-1	SMPU3	MCTSI (SN516)	036-016	036-172
			DLI (TN1077)	036-084	036-098
MCTU1	J5D003AY/AT	SMPU2	MCTSI (SN516 or SN412)	145-008	145-180
			DLI (SN516 or SN412)	045-076	045-108

*Y = 019, 028, or 045.

The Module Controller and Time Slot Interchange Unit-3 (MCTU3) MCTSI power is controlled by the TN1424 Control Display (C/D) circuit pack. The MCTU3 DLI power is controlled by the TN1077 DLI circuit pack. Use the following procedures to power down or power up the MCTSI or DLI of the MCTU3. See Figure 7.23-1.

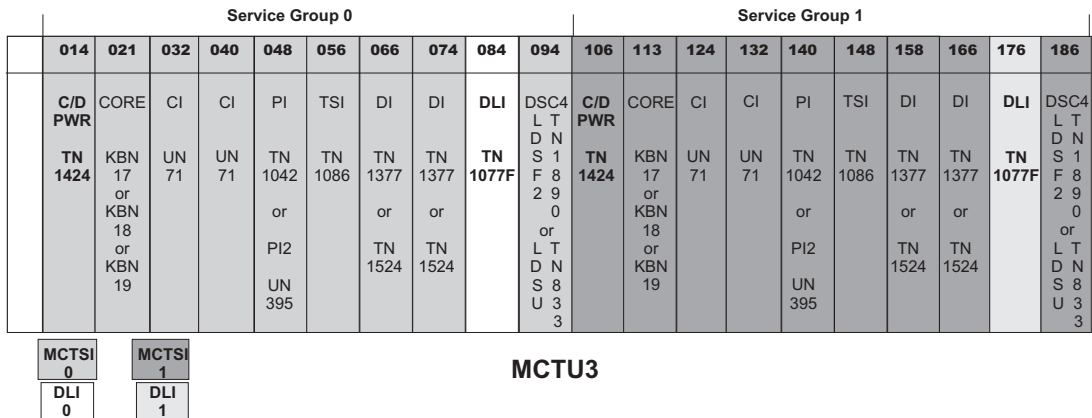


Figure 7.23-1 — Module Controller and Time Slot Interchange Unit-3

The MCTU2 MCTSI power is controlled by the SN516 Control Display (C/D) circuit pack. The MCTU2 DLI power is controlled by the TN1077 DLI circuit pack. Use the following procedures to power down or power up the MCTSI or DLI of the MCTU2. See Figure 7.23-2.

012	026	034	042	050	058	064	070	076	082	088	096	104	112	120	130	138	144	156	168
PWR	C/D	CS	PC	MEM	MEM	MEM	MEM	MEM	MEM	APPL	CI	CI	PI	CSC	DI	DI	TSI	DLI	DSC4
410 AA	UN 516	UN 517C	UN 515B or UN 520	TN 1374 TN 1376 TN 1661 or EIB UN 362	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	UN 518	UN 71B or CI2 UN 71C	UN 71B or CI2 UN 71C	TN 1042 or PI2 UN 395	TN 1838 or TN 1524	TN 1377 or TN 1524	TN 1377 or TN 1524	TN 1086	TN 1077	LT DN S 1 F 8 2 9 0 or LT DN S 8 U 3 3
Service Group 1																			
PWR	C/D	CS	PC	MEM	MEM	MEM	MEM	MEM	MEM	APPL	CI	CI	PI	CSC	DI	DI	TSI	DLI	DSC4
410 AA	UN 516	UN 517C	UN 515B or UN 520	TN 1374 TN 1376 TN 1661 or EIB UN 362	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	TN 1374 TN 1376 TN 1661	UN 518	UN 71B or CI2 UN 71C	UN 71B or CI2 UN 71C	TN 1042 or PI2 UN 395	TN 1838 or TN 1524	TN 1377 or TN 1524	TN 1377 or TN 1524	TN 1086	TN 1077	LT DN S 1 F 8 2 9 0 or LT DN S 8 U 3 3
Service Group 0																			

MCTU2

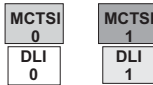


Figure 7.23-2 — Module Controller and Time Slot Interchange Unit-2

The MCTU1 (J5D003EC-1) MCTSI power is controlled by the SN516 Control Display (C/D) circuit pack. The MCTU1 (J5D003EC-1) DLI power is controlled by the TN1077 DLI circuit pack. Use the following procedures to power down or power up the MCTSI or DLI of the MCTU1 (J5D003EC-1).

PROCEDURE

7.23.1 Power Down MCTU3 MCTSI 0

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 0 TN1424 C/D circuit pack at EQL Y-014 (Where Y = 019, 028, or 045).
5. Verify that the OOS light is illuminated on the TN1424 circuit pack.
6. Press the “OFF” button of the TN1424 circuit pack.

7.23.2 Power Up MCTU3 MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 0 TN1424 C/D circuit pack at EQL Y-014 (Where Y = 019, 028, or 045).
4. Verify that the OOS light is illuminated on the TN1424 circuit pack.
5. Press the "ON" button of the TN1424 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 0.
7. Verify that MCTSI 0 restores to the "ACT" state.

7.23.3 Power Down MCTU3 MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 1 TN1424 C/D circuit pack at EQL Y-106 (Where Y= 019, 028, or 045).
5. Verify that the OOS light is illuminated on the TN1424 circuit pack.
6. Press the "OFF" button of the TN1424 circuit pack.

7.23.4 Power Up MCTU3 MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 1 TN1424 C/D circuit pack at EQL Y-106 (Where Y = 019, 028, or 045).
4. Verify that the OOS light is illuminated on the TN1424 circuit pack.
5. Press the "ON" button of the TN1424 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the "ACT" state.

7.23.5 Power Down MCTU3 DLI 0

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 0 is OOS. If DLI 0 is not OOS, verify that DLI 1 is active, and remove DLI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 0 TN1077 C/D circuit pack at EQL Y-084 (Where Y = 019, 028, or 045).
5. Verify that the OOS light is illuminated on the TN1077 circuit pack.

6. Press the “OFF” button of the TN1077 circuit pack.

7.23.6 Power Up MCTU3 DLI 0

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 0 TN1077 C/D circuit pack at EQL Y-084 (Where Y = 019, 028, or 045).
4. Verify that the OOS light is illuminated on the TN1077 circuit pack.
5. Press the “ON” button of the TN1077 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 0.
7. Verify that DLI 0 restores to the “ACT” state.

7.23.7 Power Down MCTU3 DLI 1

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 1 is OOS. If DLI 1 is not OOS, verify that DLI 0 is active, and remove DLI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 1 TN1077 C/D circuit pack at EQL Y-176 (Where Y= 019, 028, or 045).
5. Verify that the OOS light is illuminated on the TN1077 circuit pack.
6. Press the “OFF” button of the TN1077 circuit pack.

7.23.8 Power Up MCTU3 DLI 1

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 1 TN1077 C/D circuit pack at EQL Y-176 (Where Y = 019, 028, or 045).
4. Verify that the OOS light is illuminated on the TN1077 circuit pack.
5. Press the “ON” button of the TN1077 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 1.
7. Verify that DLI 1 restores to the “ACT” state.

7.23.9 Power Down MCTU2 MCTSI 0

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 0 UN516 C/D circuit pack at EQL 019-026

5. Verify that the OOS light is illuminated on the UN516 circuit pack.
6. Press the "OFF" button of the UN516 circuit pack.

7.23.10 Power Up MCTU2 MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 0 UN516 C/D circuit pack at EQL 019-026.
4. Verify that the OOS light is illuminated on the UN516 circuit pack.
5. Press the "ON" button of the UN516 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 0.
7. Verify that MCTSI 0 restores to the "ACT" state.

7.23.11 Power Down MCTU2 MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 1 UN516 C/D circuit pack at EQL 028-026.
5. Verify that the OOS light is illuminated on the UN516 circuit pack.
6. Press the "OFF" button of the UN516 circuit pack.

7.23.12 Power Up MCTU2 MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 1 UN516 C/D circuit pack at EQL 028-026.
4. Verify that the OOS light is illuminated on the UN516 circuit pack.
5. Press the "ON" button of the UN516 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the "ACT" state.

7.23.13 Power Down MCTU2 DLI 0

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 0 is OOS. If DLI 0 is not OOS, verify that DLI 1 is active, and remove DLI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 0 TN1077 C/D circuit pack at EQL 019-156.
5. Verify that the OOS light is illuminated on the TN1077 circuit pack.

6. Press the “OFF” button of the TN1077 circuit pack.

7.23.14 Power Up MCTU2 DLI 0

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 0 TN1077 C/D circuit pack at EQL 019-156.
4. Verify that the OOS light is illuminated on the TN1077 circuit pack.
5. Press the “ON” button of the TN1077 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 0.
7. Verify that DLI 0 restores to the “ACT” state.

7.23.15 Power Down MCTU2 DLI 1

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 1 is OOS. If DLI 1 is not OOS, verify that DLI 0 is active, and remove DLI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 1 TN1077 C/D circuit pack at EQL 028-156.
5. Verify that the OOS light is illuminated on the TN1077 circuit pack.
6. Press the “OFF” button of the TN1077 circuit pack.

7.23.16 Power Up MCTU2 DLI 1

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 1 TN1077 C/D circuit pack at EQL 028-156.
4. Verify that the OOS light is illuminated on the TN1077 circuit pack.
5. Press the “ON” button of the TN1077 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 1.
7. Verify that DLI 1 restores to the “ACT” state.

7.23.17 Power Down MCTU1 (J5D003EC-1) MCTSI 0

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 0 SN516 C/D circuit pack at EQL 036-016
5. Verify that the OOS light is illuminated on the SN516 circuit pack.
6. Press the “OFF” button of the SN516 circuit pack.

7.23.18 Power Up MCTU1 (J5D003EC-1) MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 0 SN516 C/D circuit pack at EQL 036-016
4. Verify that the OOS light is illuminated on the SN516 circuit pack.
5. Press the "ON" button of the SN516 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 0.
7. Verify that MCTSI 0 restores to the "ACT" state.

7.23.19 Power Down MCTU1 (J5D003EC-1) MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 1 SN516 C/D circuit pack at EQL 036-172.
5. Verify that the OOS light is illuminated on the SN516 circuit pack.
6. Press the "OFF" button of the SN516 circuit pack.

7.23.20 Power Up MCTU1 (J5D003EC-1) MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 1 SN516 C/D circuit pack at EQL 036-172.
4. Verify that the OOS light is illuminated on the SN516 circuit pack.
5. Press the "ON" button of the SN516 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the "ACT" state.

7.23.21 Power Down MCTU1 (J5D003EC-1) DLI 0

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 0 is OOS. If DLI 0 is not OOS, verify that DLI 1 is active, and remove DLI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 0 TN1077 C/D circuit pack at EQL 036-084.
5. Verify that the OOS light is illuminated on the TN1077 circuit pack.
6. Press the "OFF" button of the TN1077 circuit pack.

7.23.22 Power Up MCTU1 (J5D003EC-1) DLI 0

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 0 TN1077 C/D circuit pack at EQL 036-084.
4. Verify that the OOS light is illuminated on the TN1077 circuit pack.
5. Press the "ON" button of the TN1077 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 0.
7. Verify that DLI 0 restores to the "ACT" state.

7.23.23 Power Down MCTU1 (J5D003EC-1) DLI 1

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 1 is OOS. If DLI 1 is not OOS, verify that DLI 0 is active, and remove DLI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 1 TN1077 C/D circuit pack at EQL 036-098.
5. Verify that the OOS light is illuminated on the TN1077 circuit pack.
6. Press the "OFF" button of the TN1077 circuit pack.

7.23.24 Power Up MCTU1 (J5D003EC-1) DLI 1

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 1 TN1077 C/D circuit pack at EQL 036-098.
4. Verify that the OOS light is illuminated on the TN1077 circuit pack.
5. Press the "ON" button of the TN1077 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 1.
7. Verify that DLI 1 restores to the "ACT" state.

7.23.25 Power Down MCTU1 (J5D003AY/AT) MCTSI 0

The MCTU1 (J5D003AY/AT) MCTSI power is controlled by the SN516 or SN412 Control Display (C/D) circuit pack. The MCTU1 (J5D003AY/AT) DLI power is controlled by the SN516 or SN412 DLI circuit pack. Use this and the following procedures to power down or power up the MCTSI or DLI of the MCTU1 (J5D003AY/AT).

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 0 SN516 or SN412 C/D circuit pack at EQL 145-008.

5. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
6. Press the "OFF" button of the SN516 or SN412 circuit pack.

7.23.26 Power Up MCTU1 (J5D003AY/AT) MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 0 SN516 or SN412 C/D circuit pack at EQL 145-008.
4. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
5. Press the "ON" button of the SN516 or SN412 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 0.
7. Verify that MCTSI 0 restores to the "ACT" state.

7.23.27 Power Down MCTU1 (J5D003AY/AT) MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 1 SN516 or SN412 C/D circuit pack at EQL 145-180.
5. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
6. Press the "OFF" button of the SN516 or SN412 circuit pack.

7.23.28 Power Up MCTU1 (J5D003AY/AT) MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 1 SN516 or SN412 C/D circuit pack at EQL 145-180.
4. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
5. Press the "ON" button of the SN516 or SN412 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the "ACT" state.

7.23.29 Power Down MCTU1 (J5D003AY/AT) DLI 0

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 0 is OOS. If DLI 0 is not OOS, verify that DLI 1 is active, and remove DLI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 0 SN516 or SN412 C/D circuit pack at EQL 045-076.
5. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.

6. Press the “OFF” button of the SN516 or SN412 circuit pack.

7.23.30 Power Up MCTU1 (J5D003AY/AT) DLI 0

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 0 SN516 or SN412 C/D circuit pack at EQL 045-076.
4. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
5. Press the “ON” button of the SN516 or SN412 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 0.
7. Verify that DLI 0 restores to the “ACT” state.

7.23.31 Power Down MCTU1 (J5D003AY/AT) DLI 1

1. Identify the SM number of the DLI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that DLI 1 is OOS. If DLI 1 is not OOS, verify that DLI 0 is active, and remove DLI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the DLI 1 SN516 or SN412 C/D circuit pack at EQL 045-108.
5. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
6. Press the “OFF” button of the SN516 or SN412 circuit pack.

7.23.32 Power Up MCTU1 (J5D003AY/AT) DLI 1

1. Identify the SM number of the DLI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the DLI 1 SN516 or SN412 C/D circuit pack at EQL 045-108.
4. Verify that the OOS light is illuminated on the SN516 or SN412 circuit pack.
5. Press the “ON” button of the SN516 or SN412 circuit pack.
6. Go to MCC Page 1190,X and restore DLI 1.
7. Verify that DLI 1 restores to the “ACT” state.

7.24 SM-2000 MCTU POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

The SM-2000 Module Controller and Time Slot Interchanger Unit (MCTSI) is made up of duplex units that must be powered down *before* packs or cables are removed from it. The SM-2000 MCTSI is made up of a Switch Module Processor Unit (SMPU) and a Time Slot Interchange Unit (TSIU).

There are three types of SM-2000 MCTSI configurations, the **SMU6**, **SMPU5/TSIU4-2**, and the **SMPU4/TSIU4**. The type of configuration can be determined from the designation strip on the unit or from the information in Table 7.24-1. Table 7.24-2 can also be used to identify Control/Display pack information about the unit.

The SM-2000 may also be equipped with an Optically-Extended Control and Data Unit (OXU).

Table 7.24-1 — Control/Display Pack Information for SMPU5/TSIU4-2 and SMPU4/TSIU4

Unit	J-Dwg	Unit Type	Sub-unit (C/D Pack)	Side 0 C/D EQL	Side 1 C/D EQL
SMPU5	J5D003NG-1	SM2005	MCTSI (UN589)	019-014	028-014
TSIU4-2	J5D003NB-2				
SMPU4	XXXXXXXX	SM2000	MCTSI (SN516)	019-028	028-028
TSIU4	J5D003NB-1				
OXU	XXXXXX	XXXXX	OCDCOM (UN651)	Y*-022	Y*-106

*Y = 19, 28, 36, 45, 53, or 62.

NOTE: NLI paddleboards located behind the TSIU unit can be replaced without powering down the MCTSI. Before replacing the paddleboards, ensure the NLI is out of service.

Table 7.24-2 — Control/Display Pack Information for SMU6

Unit	J-Dwg	Unit Type	Sub-unit (C/D Pack)	Side 0 C/D EQL			Side 1 C/D EQL		
				Top	Middle	Bottom	Top	Middle	Bottom
SMU6	J5D003NK-1	SMU6	MCTSI (UN589)	53-122	36-122	10-122	62-122	45-122	19-122
NOTE: a PSM cabinet will have the bottom SMU only in the cabinet; above it will be an iPS and PSU shelves.									

PROCEDURE

7.24.1 Power Down SMPU5/TSIU4-2 MCTSI 0

See Figure [7.24-1](#).

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.

		Service Group 0								Service Group 1												
		020	038	052	060	068	076	084		106	124	138	146	154	162	170						
Shelf 62	PWR 0		XDX 0	XDX 1	XDX 2	XDX 3	XDX 4	XDX 5		PWR 1	XDX 0	XDX 1	XDX 2	XDX 3	XDX 4	XDX 5						
	486 AA		UN 553	UN 553	UN 553	UN 553	UN 553	UN 553		486 AA	UN 553	UN 553	UN 553	UN 553	UN 553	UN 553						
TSIU4-2	011	017	029	037	045	053	061	069	077	085	093	101	111	119	127	135	143	151	159	167	175	183
	PWR 1	TSI COM 1	TSIS 0	TSIS 1	TSIS 2	TSIS 3	TSIS 4	TSIS 5	TSIS 6	TSIS 7	TSIS 8	TSIS 9	TSIS 0	TSIS 1	TSIS 2	TSIS 3	TSIS 4	TSIS 5	TSIS 6	TSIS 7	TSIS 8	TSIS 9
Shelf 53	486 AA	UM 74C or UM 74D	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1
Service Group 0	PWR 0	TSI COM 0																				
	486 AA	UM 74C or UM 74D																				
		Service Group 0								Service Group 1												
		014	032	042	052	061	072	080	088	096	106	114	122	130	138	146	156	166	176			
Service Group 1	PWR/CD		CORE	MEM	MEM	BSN	APCO	MH	MH	MH	APC	PI2	CI2	CI2	CI2	CI2	DSC4	DSC4	DSC4			
	UN 589		UN 560 or UN 588 or UN 593 or UN 594	TN 1685 or TN 1806	TN 1685 or TN 1806	KBN 8B	UN 599	UN 538 or MH EIB UN 584 or MH PPC UN 550	UN 538 or MH PPC UN 550	UN 538 or MH PPC UN 550	UN 539B	UN 395B	UN 71C	UN 71C	UN 71C	UN 71C	UN 71C	LUN S5 F20	LUN S5 F20	LUN S5 F20		
Shelf 28																						
SMPU5	014	032	042	052	061	072	080	088	096	106	114	122	130	138	146	156	166	176				
	PWR/CD		CORE	MEM	MEM	BSN	APCO	MH	MH	MH	APC	PI2	CI2	CI2	CI2	CI2	DSC4	DSC4	DSC4			
Service Group 0	UN 589		UN 560 or UN 588 or UN 593 or UN 594	TN 1685 or TN 1806	TN 1685 or TN 1806	KBN 8B	UN 599	UN 538 or MH EIB UN 584 or MH PPC UN 550	UN 538 or MH PPC UN 550	UN 538 or MH PPC UN 550	UN 539B	UN 395B	UN 71C	UN 71C	UN 71C	UN 71C	LUN S5 F20	LUN S5 F20	LUN S5 F20			
Shelf 19																						

Figure 7.24-1 — SMPU5/TSIU4-2 MCTSI

- Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
- Locate the SMC cabinet of the SM.

4. Locate the MCTSI 0 UN589 C/D circuit pack at EQL 019-014.
5. Verify that the OOS light is illuminated on the UN589 circuit pack.
6. Press the “OFF” button of the UN589 circuit pack.

7.24.2 Power Up SMPU5/TSIU4-2 MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 0 UN589 C/D circuit pack at EQL 019-014.
4. Verify that the OOS light is illuminated on the UN589 circuit pack.
5. Press the “ON” button of the UN589 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 0.
7. Verify that MCTSI 0 restores to the “ACT” state.

7.24.3 Power Down SMPU5/TSIU4-2 MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 1 UN589 C/D circuit pack at EQL 028-014.
5. Verify that the OOS light is illuminated on the UN589 circuit pack.
6. Press the “OFF” button of the UN589 circuit pack.

7.24.4 Power Up SMPU5/TSIU4-2 MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 1 UN589 C/D circuit pack at EQL 028-014
4. Verify that the OOS light is illuminated on the UN589 circuit pack.
5. Press the “ON” button of the UN589 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the “ACT” state.

7.24.5 Power Down SMPU4/TSIU4 MCTSI 0

See Figure [7.24-2](#).

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the SMC cabinet of the SM.

4. Locate the MCTSI 0 SN516 C/D circuit pack at EQL 019-028.
5. Verify that the OOS light is illuminated on the SN516 circuit pack.
6. Press the "OFF" button of the SN516 circuit pack.

		Service Group 0										Service Group 1									
		012	020	028	036	044	052	060	068	088	108	116	124	132	140	148	156	164	184		
Shelf 62		PWR 0	TSI COM	DX 0	DX 1	DX 2	DX 3	DX 4	DX 5	PWR 1	PWR 0	TSI COM	DX 0	DX 1	DX 2	DX 3	DX 4	DX 5	PWR 1		
		486 AA	UM 74C or UM 74D	UM73	UM73	UM73	UM73	UM73	UM73	486 AA	486 AA	UM 74C or UM 74D	UM73	UM73	UM73	UM73	UM73	UM73	486 AA		
Shelf 53		018	026	034	042	050	060	068	076	084	092	106	114	122	130	138	148	156	164	172	180
		TSIS 0	TSIS 1	TSIS 2	TSIS 3	TSIS 4	TSIS 5	TSIS 6	TSIS 7	TSIS 8	TSIS 9	TSIS 0	TSIS 1	TSIS 2	TSIS 3	TSIS 4	TSIS 5	TSIS 6	TSIS 7	TSIS 8	TSIS 9
		KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1	KLU1
Shelf 28		018	028	036	044	052	060	068	077	086	096	104	112	122	130	138	146	154	162	178	
		PWR	C/D	CORE	MEM	MEM	MEM	MEM	BSN	APCO	MH	MH	MH	APC	PI2	CI2	CI2	CI2	CI2	PWR	
		410 AA	SN 516	UN 560 or UN 588 or UN 593 or UN 594	TN 1685 or TN 1806	TN 1685 or TN 1806	TN 1685 or TN 1806	TN 1685 or TN 1806	KBN 8B	UN 599	UN 538 or MH EIB UN 584 or MH PPC UN 550	UN 538	UN 538	UN 539B	UN 395B	UN 71C	UN 71C	UN 71C	UN 71C	410 AA	
Shelf 19		018	028	036	044	052	060	068	077	086	096	104	112	122	130	138	146	154	162	178	
		PWR	C/D	CORE	MEM	MEM	MEM	MEM	BSN	APCO	MH	MH	MH	APC	PI2	CI2	CI2	CI2	CI2	PWR	
		410 AA	SN 516	UN 560 or UN 588 or UN 593 or UN 594	TN 1685 or TN 1806	TN 1685 or TN 1806	TN 1685 or TN 1806	TN 1685 or TN 1806	KBN 8B	UN 599	UN 538 or MH EIB UN 584 or MH PPC UN 550	UN 538	UN 538	UN 539B	UN 395B	UN 71C	UN 71C	UN 71C	UN 71C	410 AA	

Figure 7.24-2 — SMPU4/TSIU4 MCTSI

7.24.6 Power Up SMPU4/TSIU4 MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 0 SN516 C/D circuit pack at EQL 019-028.
4. Verify that the OOS light is illuminated on the SN516 circuit pack.
5. Press the “ON” button of the SN516 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 0.
7. Verify that MCTSI 0 restores to the “ACT” state.

7.24.7 Power Down SMPU4/TSIU4 MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the MCTSI 1 SN516 C/D circuit pack at EQL 028-028.
5. Verify that the OOS light is illuminated on the SN516 circuit pack.
6. Press the “OFF” button of the SN516 circuit pack.

7.24.8 Power Up SMPU4/TSIU4 MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the MCTSI 1 SN516 C/D circuit pack at EQL 028-028.
4. Verify that the OOS light is illuminated on the SN516 circuit pack.
5. Press the “ON” button of the SN516 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the “ACT” state.

7.24.9 Power Down OXU Side 0

See Figure [7.24-3](#).

1. Identify the SM number that contains the OXU to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the cabinet that contains the OXU.
4. Locate the OXU side 0 UN651 circuit pack at EQL Y-022. Y = 19, 28, 36, 45, 53, or 62.
5. Verify that the OOS light is illuminated on the UN651 circuit pack.

- Press the “OFF” button of the UN651 circuit pack.

016	022	030	038	046	054	062	070	078	086	100	106	114	122	130	138	146	154	162	170
PWR	OCD COM	XDX 0	XDX 1	XDX 2	XDX 3	XDX 4	CI2 0	CI2 1	CI2 2	PWR	OCD COM	XDX 0	XDX 1	XDX 2	XDX 3	XDX 4	CI2 0	CI2 1	CI2 2
414 AA	UN 651	UN 553	UN 553	UN 553	UN 553	UN 553	UN 71C	UN 71C	UN 71C	414 AA	UN 651	UN 553	UN 553	UN 553	UN 553	UN 553	UN 71C	UN 71C	UN 71C
Side 0										Side 1									

Figure 7.24-3 — Optically-Extended Control and Data Unit

7.24.10 Power Up OXU Side 0

- Identify the SM number that contains the OXU to be powered up. X = the SM number.
- Locate the cabinet that contains the OXU.
- Locate the OXU side 0 UN651 circuit pack at EQL Y-022. Y = 19, 28, 36, 45, 53, or 62.
- Verify that the OOS light is illuminated on the UN651 circuit pack.
- Press the “ON” button of the UN651 circuit pack.
- Go to MCC Page 1190,X and restore MCTSI 0.
- Verify that MCTSI 0 restores to the “ACT” state.

7.24.11 Power Down OXU Side 1

- Identify the SM number that contains the OXU to be powered down. X = the SM number.
- Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
- Locate the cabinet that contains the OXU.
- Locate the OXU side 1 UN651 circuit pack at EQL Y-106. Y = 19, 28, 36, 45, 53, or 62.
- Verify that the OOS light is illuminated on the UN651 circuit pack.
- Press the “OFF” button of the UN651 circuit pack.

7.24.12 Power Up OXU Side 1

- Identify the SM number that contains the OXU to be powered up. X = the SM number.

2. Locate the cabinet that contains the OXU.
3. Locate the OXU side 1 UN651 circuit pack at EQL Y-106. Y = 19, 28, 36, 45, 53, or 62.
4. Verify that the OOS light is illuminated on the UN651 circuit pack.
5. Press the "ON" button of the UN651 circuit pack.
6. Go to MCC Page 1190,X and restore MCTSI 1.
7. Verify that MCTSI 1 restores to the "ACT" state.

7.24.13 Power Down SMU6 MCTSI 0

See Figures [7.24-4](#) and [7.24-5](#).

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 0 is OOS. If MCTSI 0 is not OOS, verify that MCTSI 1 is active, and remove MCTSI 0 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the vertical EQL of the SMU6 (side 0 will be 10, 36, or 53).
5. Locate the MCTSI 0 UN589 C/D circuit pack at EQL 10, 36, or 53 -122.
6. Verify that the OOS light is illuminated on the UN589 circuit pack.
7. Press the "OFF" button of the UN589 circuit pack.

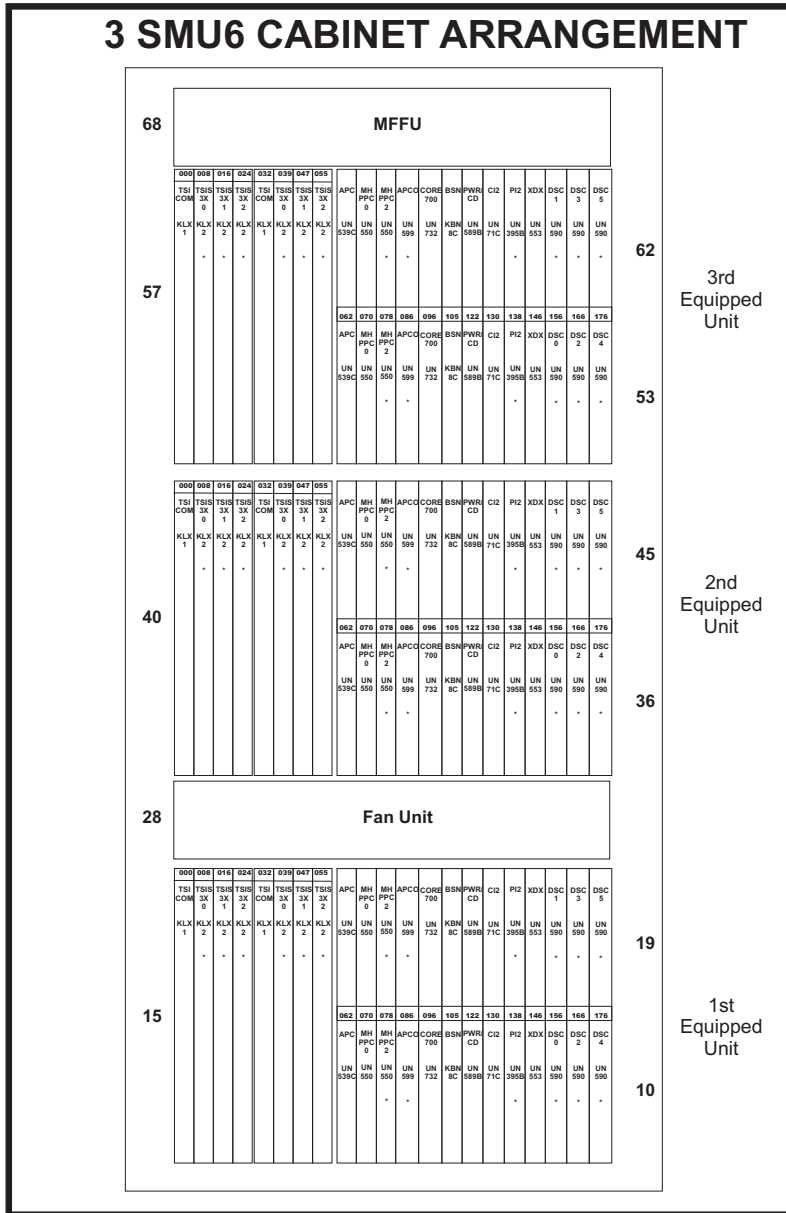


Figure 7.24-4 — SMU6 Configuration

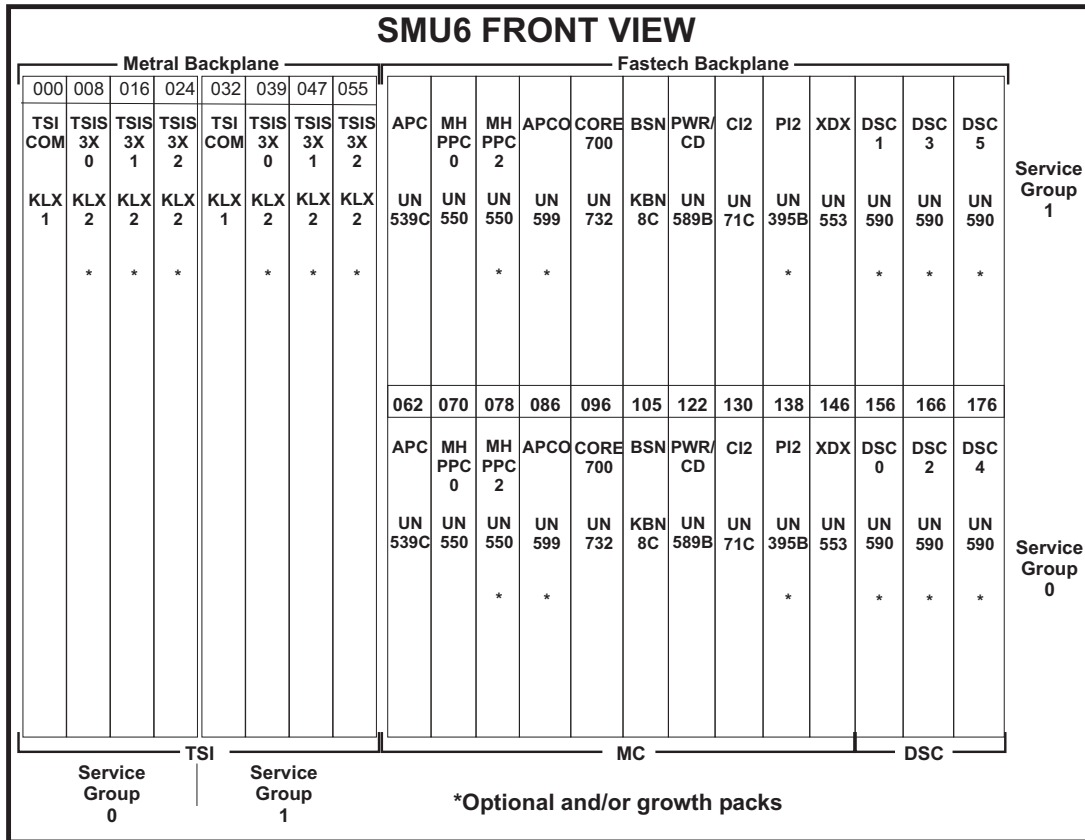


Figure 7.24-5 — SMU6 Front View

7.24.14 Power Up SMU6 MCTSI 0

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the vertical EQL of the SMU6 (side 0 will be 10, 36, or 53).
4. Locate the MCTSI 0 UN589 C/D circuit pack at EQL 10, 36, or 53 -122.
5. Verify that the OOS light is illuminated on the UN589 circuit pack.
6. Press the "ON" button of the UN589 circuit pack.
7. Go to MCC Page 1190,X and restore MCTSI 0.

8. Verify that MCTSI 0 restores to the "ACT" state.

7.24.15 Power Down SMU6 MCTSI 1

1. Identify the SM number of the MCTSI to be powered down. X = the SM number.
2. Go to MCC Page 1190,X and verify that MCTSI 1 is OOS. If MCTSI 1 is not OOS, verify that MCTSI 0 is active, and remove MCTSI 1 from service.
3. Locate the SMC cabinet of the SM.
4. Locate the vertical EQL of the SMU6 (side 1 will be 19, 45, or 62).
5. Locate the MCTSI 1 UN589 C/D circuit pack at EQL 19, 45, or 62-122.
6. Verify that the OOS light is illuminated on the UN589 circuit pack.
7. Press the "OFF" button of the UN589 circuit pack.

7.24.16 Power Up SMU6 MCTSI 1

1. Identify the SM number of the MCTSI to be powered up. X = the SM number.
2. Locate the SMC cabinet of the SM.
3. Locate the vertical EQL of the SMU6 (side 1 will be 19, 45, or 62).
4. Locate the MCTSI 1 UN589 C/D circuit pack at EQL 19, 45, or 62-122.
5. Verify that the OOS light is illuminated on the UN589 circuit pack.
6. Press the "ON" button of the UN589 circuit pack.
7. Go to MCC Page 1190,X and restore MCTSI 1.
8. Verify that MCTSI 1 restores to the "ACT" state.

7.25 SM AND SM-2000 PERIPHERAL UNIT POWER-UP/POWER-DOWN PROCEDURES

OVERVIEW

Switching module peripheral units do not require that the unit be powered down or powered up before maintenance is performed (for example, packs changed). But it is important that the unit or circuit be out-of-service (OOS) *before* maintenance is performed. This section contains the procedures for the removal and the restoral of peripheral units and peripheral unit circuits equipped in switching modules.

Note: Refer to 235-105-110, *System Maintenance Requirement and Tools*, for detailed descriptions of the MCC Pages referenced in this section. Refer to 235-600-700, *Input Messages*, for detailed descriptions of input messages used in this section.

PROCEDURE

7.25.1 Remove LDSU/F

Caution: Before performing the removal, verify that the switching module and the LDSU/F number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1080 or the input message (RMV:LDSU or RMV:LDSF) to remove the LDSU/F from service.
2. Verify that the LDSU/F is OOS on MCC Page 1080.

LDSU/F circuit boards have an LED (Yellow) that indicates (ON) the board is OOS.

7.25.2 Restore LDSU/F

Caution: Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.

1. If the circuit pack or fuse was removed and the circuit pack has an ST button, it will have to be pressed before the circuit pack can be restored.
2. At the maintenance terminal, enter the poke command on MCC Page 1080 or the input message (RST:LDSU or RST:LDSF) to restore the LDSU/F to service.
3. Verify that the LDSU/F is ACT on MCC Page 1080.

LDSU/F circuit boards have an LED (Yellow) that indicates (OFF) the board is ACT.

7.25.3 Remove GDSU/F

Caution: Before performing the removal, verify that the switching module and the GDSU/F number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1100 (GDSU); 1115 (GDSF) or the input message (RMV:GDSU or RMV:GDSF) to remove the GDSU/F from service.
2. Verify that the GDSU/F is OOS on MCC Page 1100 (GDSU); 1115 (GDSF).

GDSU/F circuit boards have an LED (Yellow) that indicates (ON) the board is OOS.

7.25.4 Restore GDSU/F

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. If the circuit pack or fuse was removed and the circuit pack has an ST button, it will have to be pressed before the circuit pack can be restored.
2. At the maintenance terminal, enter the poke command on MCC Page 1100 (GDSU); 1115 (GDSF) or the input message (RST:GDSU or RST:GDSF) to restore the GDSU/F to service.
3. Verify that the GDSU/F is *ACT* on MCC Page 1100 (GDSU); 1115 (GDSF).

GDSU/F circuit boards have an LED (Yellow) that indicates (OFF) the board is ACT.

7.25.5 Remove AIUCOM

Note: This section also applies to the Expansion Access Interface Unit (EAIU) and the Multiplex Access Interface Unit (XAIU).

Caution 1: *Before continuing, review the warnings for the RMV:AIUCOM message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, AIU, and COMDAC number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1320 or the input message (RMV:AIUCOM) to remove the AIUCOM from service.
2. Verify that the AIUCOM is *OOS* on MCC Page 1320.

7.25.6 Restore AIUCOM

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1320 or the input message (RST:AIUCOM) to restore the AIUCOM to service.
2. Verify that the AIUCOM is *ACT* on MCC Page 1320.

7.25.7 Remove AIULP

Caution 1: *Removing this pack will result in the loss of service for up to 32 subscribers. Before removal, verify local practices.*

Caution 2: *Before removal, verify that the switching module, AIU, and LP number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1323 or the input message (RMV:AIULP) to remove the LP from service.

2. Verify that the LP is *OOS* on MCC Page 1323.

7.25.8 Restore AIULP

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1323 or the input message (RST:AIULP) to restore the LP to service.
2. Verify that the LP is *ACT* on MCC Page 1323.

7.25.9 Remove AIURG

In a Front Access Cabinet (FAC), the ring generators can be equipped in one AIU shelf and provide service to the other equipped AIU shelves in this cabinet. The AIU providing the RG service is displayed on the 1320 page.

Caution: *Before removal, verify that the switching module, AIU, and RG number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1322 or the input message (RMV:AIURG) to remove the RG from service.
2. Verify that the RG is *OOS* on MCC Page 1322.

7.25.10 Restore AIURG

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1322 or the input message (RST:AIURG) to restore the RG to service.
2. Verify that the RG is *ACT* on MCC Page 1322.

7.25.11 Remove AIUTSGRP

Caution: *Before removal, verify that the switching module, AIU, and TSGRP number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1321 or the input message (RMV:AIUTSGRP) to remove the TSGRP from service.
2. Verify that the TSGRP is *OOS* on MCC Page 1321.

7.25.12 Restore AIUTSGRP

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1321 or the input message (RST:AIUTSGRP) to restore the TSGRP to service.

2. Verify that the TSGRP is *ACT* on MCC Page 1321.

7.25.13 Remove PDXU

Caution: *Before removal, verify that the switching module, PDXU, and PCTDX (also known as the PDXU side number) on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1330 or the input message (RMV:PDXU) to remove the PDXU side from service.
2. Verify that the PDXU side is *OOS* on MCC Page 1330.

7.25.14 Restore PDXU

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1330 or the input message (RST:PDXU) to restore the PDXU side to service.
2. Verify that the PDXU side is *ACT* on MCC Page 1330.

7.25.15 Remove ISLUCC

Caution 1: *If ISLU power is removed and being restored because of a blown fuse, perform Procedure 7.26.*

Caution 2: *Before continuing, review the warnings for the RMV:ISLUCC message in 235-600-700.*

Caution 3: *Before removal, verify that the switching module, ISLU, SG, and ISLUCC number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1700 or the input message (RMV:ISLUCC) to remove the ISLUCC from service.
2. Verify that the ISLUCC is *OOS* on MCC Page 1700.

7.25.16 Restore ISLUCC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1700 or the input message (RST:ISLUCC) to restore the ISLUCC to service.
2. Verify that the ISLUCC is *ACT* on MCC Page 1700.

7.25.17 Remove ISLUCD

Caution 1: *Before continuing, review the warnings for the RMV:ISLUCD message in 235-600-700.*

Caution 2: Before removal, verify that the switching module, ISLU, SG, and ISLUCD number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1700 or the input message (RMV:ISLUCD) to remove the ISLUCD from service.
2. Verify that the ISLUCD is OOS on MCC Page 1700.

7.25.18 Restore ISLUCD

Caution: Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.

1. At the maintenance terminal, enter the poke command on MCC Page 1700 or the input message (RST:ISLUCD) to restore the ISLUCD to service.
2. Verify that the ISLUCD is ACT on MCC Page 1700.

7.25.19 Remove ISLULBD

Caution 1: Removing this pack will result in the loss of service to multiple subscribers. Before removal, verify local practices.

Caution 2: Before removal, verify that the switching module, ISLU, Line Group (LG), and ISLULBD number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1730 or the input message (RMV:ISLULBD) to remove the ISLULDB from service.
2. Verify that the ISLULBD is OOS on MCC Page 1730.

7.25.20 Restore ISLULBD

Caution: Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.

1. At the maintenance terminal, enter the poke command on MCC Page 1730 or the input message (RST:ISLULBD) to restore the ISLULDB to service.
2. Verify that the ISLULBD is ACT on MCC Page 1730.

7.25.21 Remove ISLUHLSC

Caution: Before removal, verify that the switching module, ISLU, and SG and ISLUHLSC number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1710 or the input message (RMV:ISLUHLSC) to remove the ISLUHLSC from service.
2. Verify that the ISLUHLSC is OOS on MCC Page 1710.

7.25.22 Restore ISLUHLSC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1710 or the input message (RST:ISLUHLSC) to restore the ISLUHLSC to service.
2. Verify that the ISLUHLSC is *ACT* on MCC Page 1710.

7.25.23 Remove ISLURG

Caution: *Before removal, verify that the switching module, ISLU, and SG number on the MCC Page or in the input message are correct for the ILSURG.*

1. At the maintenance terminal, enter the poke command on MCC Page 1710 or the input message (RMV:ISLURG) to remove the ISLURG from service.
2. Verify that the ISLURG is *OOS* on MCC Page 1710.

7.25.24 Restore ISLURG

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1710 or the input message (RST:ISLURG) to restore the ISLURG to service.
2. Verify that the ISLURG is *ACT* on MCC Page 1710.

7.25.25 Remove ISLUMAN

Caution: *Before removal, verify that the switching module, ISLU, SG, and ISLUMAN number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1710 or the input message (RMV:ISLUMAN) to remove the ISLUMAN from service.
2. Verify that the ISLUMAN is *OOS* on MCC Page 1710.

7.25.26 Restore ISLUMAN

1. At the maintenance terminal, enter the poke command on MCC Page 1710 or the input message (RST:ISLUMAN) to restore the ISLUMAN to service.
2. Verify that the ISLUMAN is *ACT* on MCC Page 1710.

7.25.27 Remove LUCOMC

Caution: *If LU power is being restored because of a blown fuse, low power, or the red LED is lit on one or both of the power converters (494 or 495 type boards), perform Procedure 7.26.*

Note: See Figure 7.25-1.

Service Group 1													CONC					4:1	6:1	8:1	10:1	
													GRIDS									
													1	3	5	7	9					
008	016	024	032	034	042	050	058	066	074	084	092	100	108	116	124	132	140	148	156	164	172	178
PWR 494 GB	H L S C 0	H L S C 1	H L S C 2	E M I S H I E L D	C H A N	C H A N	C H A N	C H A N	C O M D A C	A C C E S S L I N	A C C E S S P O W	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	AUX
PWR 494 GB	H L S C 0	H L S C 1	H L S C 2	E M I S H I E L D	C H A N	C H A N	C H A N	C H A N	C O M D A C	A C C E S S L I N	A C C E S S P O W	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	H A L F G R I D 0	H A L F G R I D 1	AUX
													0	2	4	6	8					
													GRIDS									
Service Group 0																						

Figure 7.25-1 — Line Unit

Caution: Before removal, verify that the switching module, LU, and SG number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RMV:LUCOMC) to remove the COMC from service.
2. Verify that the COMC is OOS on MCC Page 1030(SG 0)/1040(SG 1).

7.25.28 Restore LUCOMC

Caution: Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RST:LUCOMC) to restore the COMC to service.
2. Verify that the COMC is ACT on MCC Page 1030(SG 0)/1040(SG 1).

7.25.29 Remove LU GDXACC

Caution: Before removal, verify that the switching module, LU, and SG number on the MCC Page or in the input message are correct.

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RMV:GDXACC) to remove the GDXACC from service.
2. Verify that the GDXACC is *OOS* on MCC Page 1030(SG 0)/1040(SG 1).

7.25.30 Restore LU GDXACC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RST:GDXACC) to restore the GDXACC to service.
2. Verify that the GDXACC is *ACT* on MCC Page 1030(SG 0)/1040(SG 1).

7.25.31 Remove LUHLSC

Caution: *Before removal, verify that the switching module, LU, SG, and HLSC number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RMV:LUHLSC) to remove the HLSC from service.
2. Verify that the HLSC is *OOS* on MCC Page 1030(SG 0)/1040(SG 1).

7.25.32 Restore LUHLSC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RST:LUHLSC) to restore the HLSC to service.
2. Verify that the HLSC is *ACT* on MCC Page 1030(SG 0)/1040(SG 1).

7.25.33 Remove LUCHBD

Caution 1: *Removing this pack decreases the concentration ratio of the LU, which may affect subscriber service. Before removal, verify local practices.*

Caution 2: *Before removal, verify that the switching module, LU, SG, and CHDB number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RMV:LUCHBD) to remove the CHDB from service.
2. Verify that the CHDB is *OOS* on MCC Page 1030(SG 0)/1040(SG 1).

7.25.34 Restore LUCHBD

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1030(SG 0)/1040(SG 1) or the input message (RST:LUCHBD) to restore the CHDB to service.
2. Verify that the CHBD is *ACT* on MCC Page 1030(SG 0)/1040(SG 1).

7.25.35 Remove LU GRIDBD

Caution 1: *Before continuing, review the warnings for the RMV:GRIDBD message in 235-600-700.*

Before removal, verify local practices.

Removing this pack will result in the loss of service for up to 32 subscribers.

Caution 2: *Before removal, verify that the switching module, LU, and GRID number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1020 or the input message (RMV:GRIDBD) to remove the BD from service.
2. Verify that the BD is *OOS* on MCC Page 1020.

7.25.36 Restore LU GRIDBD

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1020 or the input message (RST:GRIDBD) to restore the BD to service.
2. Verify that the BD is *ACT* on MCC Page 1020.

7.25.37 Remove IDCU

Caution 1: *Before continuing, review the information for the RMV:IDCU message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, IDCU, and SG number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1860 or the input message (RMV:IDCU) to remove the IDCU from service.
2. Verify that the IDCU is *OOS* on MCC Page 1860.

7.25.38 Restore IDCU

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1860 or the input message (RST:IDCU) to restore the IDCU to service.
2. Verify that the IDCU is *ACT* on MCC Page 1860.

7.25.39 Remove IDCUELI

Caution 1: *Removing an ELI will affect service and should NOT be done unless you are following an approved procedure, or are requested to do so by a technical support group.*

Caution 2: *Before continuing, review the information for the RMV:IDCU message in 235-600-700. The UCL option has to be used to remove an ELI.*

Caution 3: *Before removal, verify that the switching module, IDCU, and ELI number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter one of the following:

On MCC Page 1860 enter command 20c,UCL;

or;

at user input prompt enter RMV:IDCUELI=a-b-c,UCL;

Where: a = SM number
 b = IDCU number.
 c = ELI number

2. Verify that the ELI is *OOS* on MCC Page 1860.

7.25.40 Restore IDCUELI

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter one of the following:poke command on MCC Page 1860 or the input message (RST:IDCUELI) to restore the IDCU to service.
2. Verify that the ELI is *ACT* on MCC Page 1860.

7.25.41 Remove OIU OFI

Note: For each Optical Interface Unit (OIU), two optical facility interface (OFI) boards are equipped in an AIP (access interface platform) shelf.

Caution 1: *Before continuing, review the information for the RMV:OFI message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, OIU, PG (protection group), and SIDE number on the MCC Page or in the input message are correct.*

1. If required, perform sub-steps a and b to determine the SM and/or the OIU number for the OFI to be removed. If not required, go to Step 2.
 - a. Determine the Host SM number of the AIP shelf and display MCC Page 1440 in this SM.

- b. Determine the SM and/or OIU number for the OFI to be removed.
2. At the maintenance terminal, enter the poke command to display the 1490 page for the OIU and SM that contain the OFI pack to be removed.
3. On MCC Page 1490, enter the poke command or the input message (RMV:OFI) to remove the OFI from service.
4. Verify that the IDCU is *OOS* on MCC Page 1490.

7.25.42 Restore OIU OFI

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. If required, perform sub-steps **a** and **b** below to determine the SM and/or the OIU number for the OFI to be restored. If not required, go to Step **2**.
 - a. Determine the Host SM number of the AIP shelf and display MCC Page 1440 in this SM.
 - b. From the 1440 display determine the SM and/or OIU number.
2. At the maintenance terminal, enter the poke command to display the 1490 page for the OIU and SM that contain the OFI pack to be restored.
3. On MCC Page 1490, enter the poke command or the input message (RST:OFI) to restore the OFI to service.
4. Verify that the OFI is *ACT* on MCC Page 1490.

7.25.43 Remove DNUSCC

Caution 1: *Before continuing, review the information for the RMV:DNUSCC message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, DNU-S, and CC number on the MCC Page or in the input message are correct.*

1. On MCC Page 1510 enter the poke command or the input message (RMV:DNUSCC) to remove the CC from service.
2. Verify that the CC is *OOS* on MCC Page 1510.

7.25.44 Restore DNUSCC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. On MCC Page 1510 enter the poke command or the input message (RST:DNUSCC) to restore the CC from service.
2. Verify that the CC is *ACT* on MCC Page 1510.

7.25.45 Remove DNUSCD

Caution 1: *Before continuing, review the information for the RMV:DNUSCD message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, DNU-S, and CD number on the MCC Page or in the input message are correct.*

1. On MCC Page 1510 enter the poke command or the input message (RMV:DNUSCD) to remove the CD from service.
2. Verify that the CD is *OOS* on MCC Page 1510.

7.25.46 Restore DNUSCD

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. On MCC Page 1510 enter the poke command or the input message (RST:DNUSCD) to restore the CD from service.
2. Verify that the CD is *ACT* on MCC Page 1510.

7.25.47 Remove DNUS TMUX

Caution 1: *Before continuing, review the information for the RMV:TMUX message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, DNU-S, data group, and TMUX number on the MCC Page or in the input message are correct.*

1. **Note:** There is one (1) TMUX spare (TMUX 6) equipped in each data group. To avoid major service interruptions, make sure TMUX 6 is active before removing a TMUX.

On MCC Page 1510 enter the poke command or the input message (RMV:TMUX) to remove the TMUX from service.
2. Verify that the TMUX is *OOS* on MCC Page 1510.

7.25.48 Restore DNUS TMUX

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. On MCC Page 1510 enter the poke command or the input message (RST:TMUX) to restore the TMUX to service.
2. Verify that the TMUX is *ACT* on MCC Page 1510.

7.25.49 Remove DNUS SFI

Caution 1: *Before continuing, review the information for the RMV:SFI message in 235-600-700.*

Caution 2: *Before removal, verify that the switching module, DNU-S, data group, and SFI number on the MCC Page or in the input message are correct.*

1. On MCC Page 1510 enter the poke command or the input message (RMV:SFI) to remove the SFI from service.
2. Verify that the SFI is *OOS* on MCC Page 1510.

7.25.50 Restore DNUS SFI

Caution: *Before continuing, review the information for the RST:SFI message in 235-600-700.*

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. **Note:** SFI must be restored using the “STBY” option with the restore poke command or input message if the mate SFI is *ACT*.
On MCC Page 1510 enter the poke command or the input message (RST:SFI) to restore the TMUX to service.
2. Verify that the SFI is *ACT* on MCC Page 1510.

7.25.51 Remove DFI (DLTU2 Only)

1. Use Table [7.25-1](#) to determine the MCC Page for the DFI to be removed:

Table 7.25-1 — DFI Numbers – MCC Page

DFI Numbers	MCC Page
01-04	1120
05-08	1121
09-10	1122

Caution: *If there is a power problem (fuse or low power) and the power converter is OOS (Red LED lit on board), fix the problem as soon as possible and restore DFIs to service.*

See Figure 7.25-2.

POWER START	DFI CIRCUITS										
	006	022	038	054	070	086	112	128	144	160	176
SN 346B	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612	TN 1611 OR TN 1612
PWR ST	DFI2	DFI2	DFI2	DFI2	DFI2	DFI2	DFI2	DFI2	DFI2	DFI2	DFI2
	1	2	3	4	5		6	7	8	9	10

Figure 7.25-2 — Digital Line and Trunk Unit, Model 2

- Caution 1:** *Before continuing, review the warnings for the RMV:ISLUCD message in 235-600-700.*

Caution 2: *Removing a DFI could affect service. Each DFI in a DLTU2 shelf provides up to 48 trunks. Before continuing, verify local practices.*

Caution 3: *Before removal of the DFI, verify that the switching module, DLTU-2, and DFI number on the MCC Page or in the input message are correct.*

At the maintenance terminal, enter the poke command on MCC Page 1120/1121/1122 or the input message (RMV:DFI) to remove the DFI from service.

- Verify that the DFI is OOS on MCC Page 1120/1121/1122.

7.25.52 Restore DFI (DLTU2 Only)

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

- At the maintenance terminal, enter the poke command on MCC Page 1120/1121/1122 or the input message (RST:DFI) to restore the DFI to service.
- Verify that the DFI is ACT on MCC Page 1120/1121/1122.

7.25.53 Remove Trunk Unit CDI

Caution: *Verify that the switching module, TU, and SG number on the MCC Page or in the input message are correct for the CDI being removed.*

1. At the maintenance terminal, enter the poke command on MCC Page 1050(SG 0)/1060(SG 1) or the input message (RMV:CDI) to remove the CDI from service.
2. Verify that the CDI is *OOS* on MCC Page 1050(SG 0)/1060(SG 1).

7.25.54 Restore Trunk Unit CDI

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1050(SG 0)/1060(SG 1) or the input message (RST:CDI) to remove the CDI from service.
2. Verify that the CDI is *ACT* on MCC Page 1050(SG 0)/1060(SG 1).

7.25.55 Remove Trunk Unit TAC

Caution: *Verify that the switching module, TU, and SG number on the MCC Page or in the input message are correct for the TAC being removed.*

1. At the maintenance terminal, enter the poke command on MCC Page 1050(SG 0)/1060(SG 1) or the input message (RMV:TAC) to remove the CDI from service.
2. Verify that the TAC is *OOS* on MCC Page 1050(SG 0)/1060(SG 1).

7.25.56 Restore Trunk Unit TAC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1050(SG 0)/1060(SG 1) or the input message (RST:TAC) to remove the TAC from service.
2. Verify that the TAC is *ACT* on MCC Page 1050(SG 0)/1060(SG 1).

7.25.57 Remove Trunk Unit TUCHBD

Caution 1: *Removing a TUCHBD removes all trunks (CHDB CKTS) on the board, which may affect service.*

Caution 2: *Before removing the TUCHBD, verify that the switching module, SG, and CHDB number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1050(SG 0)/1060(SG 1) or the input message (RMV:TUCHBD) to remove the CHDB from service.
2. Verify that the CHDB is *OOS* on MCC Page 1050(SG 0)/1060(SG 1).

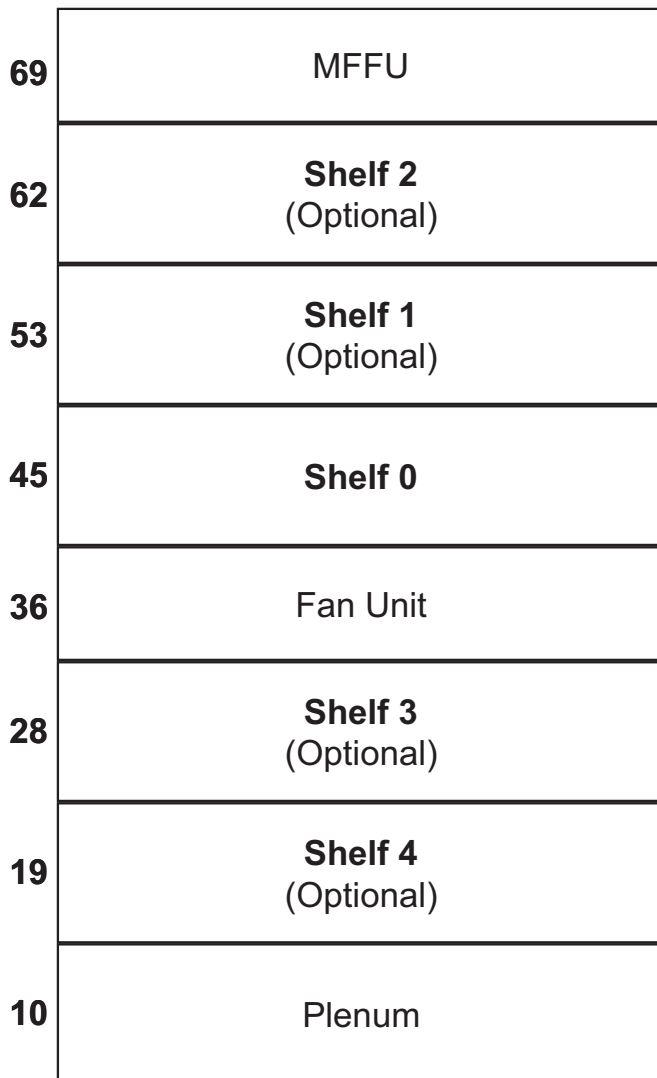
7.25.58 Restore Trunk Unit TUCHBD

Caution: Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.

1. At the maintenance terminal, enter the poke command on MCC Page 1050(SG 0)/1060(SG 1) or the input message (RST:TUCHBD) to remove the CHDB from service.
2. Verify that the CHDB is ACT on MCC Page 1050(SG 0)/1060(SG 1).

7.25.59 Remove PSUCOM

1. See Figures 7.25-3, 7.25-4, and 7.25-5.



PSU2 Cabinet

Figure 7.25-3 — Packet Switch Unit-2 Cabinet

Shelf 0
(VEQL 45)

Protocol Handlers 0 – 7 (PSUPH)								PSU Common Controller (PSUCOM)						Protocol Handlers 8 – 15 (PSUPH)							
								SG 0			SG 1										
006	014	022	030	038	046	054	062	070	078	088	100	110	120	128	136	144	152	160	168	176	184
P H 00	P H 01	P H 02	P H 03	P H 04	P H 05	P H 06	P H 07	C F	P F	D F	D F	P F	C F	P H 08	P H 09	P H 10	P H 11	P H 12	P H 13	P H 14	P H 15

CF – Control Fanout (only equipped in Shelf 0)
PF – Packet Fanout
DF – Data Fanout

Figure 7.25-4 — Packet Switch Unit — Shelf 0

Shelf 1 - 4
(VEQLs 53, 62, 28 and 19)

Protocol Handlers 0 – 7 (PSUPH)								PSU Common Controller (PSUCOM)						Protocol Handlers 8 – 15 (PSUPH)							
								SG 0			SG 1										
006	014	022	030	038	046	054	062	070	078	088	100	110	120	128	136	144	152	160	168	176	184
P H 00	P H 01	P H 02	P H 03	P H 04	P H 05	P H 06	P H 07		P F	D F	D F	P F		P H 08	P H 09	P H 10	P H 11	P H 12	P H 13	P H 14	P H 15

Figure 7.25-5 — Packet Switch Unit — Shelf 1-4

- Caution:** Before removing the PSUCOM, verify that the switching module, PSU, and SG number on the MCC Page or in the input message are correct.

At the maintenance terminal, enter the poke command on MCC Page 1186 or the input message (RMV:PSUCOM) to remove the PSUCOM from service.

- Verify that the PSUCOM is OOS on MCC Page 1186.

7.25.60 Restore PSUCOM

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

Caution: *The PSUCOM normally operates in an ACT/STBY configuration. A successful restoral of the "OOS" PSUCOM will make it Active. If you do NOT want it Active, append ",STBY" to the poke command or input message.*

1. At the maintenance terminal, enter the poke command on MCC Page 1186 or the input message (RST:PSUCOM) to restore the PSUCOM to service.
2. Verify that the PSUCOM is ACT or STBY on MCC Page 1186.

7.25.61 Remove PSUPH

Caution 1: *Before continuing, review the warnings for the RMV:PSUPH message in 235-600-700.*

Caution 2: *If a spare PH is not available, removing a PSUPH can affect service. Before continuing, verify local practices.*

Caution 3: *Before removing the PSUPH, verify that the switching module, PSU, and shelf and PH number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 118X (X = shelf number 0-4) or the input message (RMV:PSUPH) to remove the PSUCOM from service.
2. Verify that the PSUCOM is OOS on MCC Page 118X (X = shelf number 0-4).

7.25.62 Restore PSUPH

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

Caution: *When a PH is successfully restored, and a spare PH (PH TYP) is provisioned, a current "ACT" PH of the same type will change to "STBY" and the restored PH will become "ACT". If you do not want the PH you are restoring to become "ACT," append ",STBY" to the poke command or input message.*

1. At the maintenance terminal, enter the poke command on MCC Page 118X (X = shelf number 0-4) or the input message (RST:PSUPH) to restore the PSUCOM to service.
2. Verify that the PSUCOM is ACT on MCC Page 118X (X = shelf number 0-4).

7.25.63 Remove MSUCOM

Caution: *Verify that the switching module, MSU, and SG number on the MCC Page or in the input message are correct for the MSUCOM being removed.*

Note: The MSU may also be referred to as the MMSU.

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:MSUCOM) to remove the MSUCOM from service.
2. Verify that the MSUCOM is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.64 Restore MSUCOM

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:MSUCOM) to restore the MSUCOM to service.
2. Verify that the MSUCOM is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.65 Remove MSU PROTO

Caution: *Verify that the switching module, MSU, and SG number on the MCC Page or in the input message are correct for the PROTO being removed.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:PROTO) to remove the PROTO from service.
2. Verify that the PROTO is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.66 Restore MSU PROTO

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:PROTO) to restore the PROTO to service.
2. Verify that the PROTO is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.67 Remove MSU MA

Caution: *Verify that the switching module, MSU, SG, and MA board number on the MCC Page or in the input message are correct for the MA being removed.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:MA) to remove the MA from service.
2. Verify that the MA is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.68 Restore MSU MA

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:MA) to restore the MA to service.
2. Verify that the MA is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.69 Remove MSU SCAN

Caution: *Verify that the switching module, MSU, SG, and SCAN board number on the MCC Page or in the input message are correct for the SCAN being removed.*

When a SCAN board is OOS, the scan point assignments on the board are disabled. Restore as soon as possible.

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:SCAN) to remove the SCAN from service.
2. Verify that the SCAN is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.70 Restore MSU SCAN

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:SCAN) to restore the SCAN to service.
2. Verify that the SCAN is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.71 Remove MSU DIST

Caution: *Verify that the switching module, MSU, SG, and DIST board number on the MCC Page or in the input message are correct for the DIST being removed.*

When a DIST board is OOS, the distribute point assignments on the board are disabled. Restore as soon as possible.

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:DIST) to remove the MA from service.
2. Verify that the DIST is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.72 Restore MSU DIST

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:DIST) to restore the DIST to service.
2. Verify that the DIST is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.73 Remove MSU GDXC

Caution: *Verify that the switching module, MSU, SG, and GDXC board number on the MCC Page or in the input message are correct for the GDXC being removed.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:GDXC) to remove the GDXC from service.
2. Verify that the GDXC is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.74 Restore MSU GDXC

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:GDXC) to restore the GDXC to service.
2. Verify that the GDXC is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.75 Remove MSU ALIT

Caution: *Verify that the switching module, MSU, SG, and ALIT board number on the MCC Page or in the input message are correct for the ALIT being removed.*

The ALIT is used for automatic line testing, which is run during off hours. To avoid congestion during line testing, restore the ALIT to service as soon as possible.

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:ALIT) to remove the ALIT from service.
2. Verify that the ALIT is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.76 Restore MSU ALIT

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:ALIT) to restore the ALIT to service.
2. Verify that the ALIT is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.77 Remove MSU SLIM

Caution: *Verify that the switching module, MSU, SG, and ALIT board number on the MCC Page or in the input message are correct for the ALIT being removed.*

The SLIM is used for automatic line testing, which is run during off hours. To avoid congestion during line testing, restore the SLIM to service as soon as possible.

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RMV:SLIM) to remove the SLIM from service.
2. Verify that the SLIM is *OOS* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.78 Restore MSU SLIM

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1130(SG 0)/1140(SG 1) or the input message (RST:SLIM) to restore the SLIM to service.
2. Verify that the SLIM is *ACT* on MCC Page 1130(SG 0)/1140(SG 1).

7.25.79 Remove ISTF

Individual Integrated Services Test Function (ISTF) boards are equipped in a DSU2 shelf.

Caution: *Before removing the ISTF, verify that the switching module and the ISTF number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1110 or the input message (RMV:ISTF) to remove the ISTF from service.
2. Verify that the ISTF is *OOS* on MCC Page 1110 .

7.25.80 Restore ISTF

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1110 or the input message (RST:ISTF) to restore the ISTF to service.
2. Verify that the ISTF is *ACT* on MCC Page 1110 .

7.25.81 Remove RAF/SAS

The Recorded Announcement Function (RAF) and/or Service Announcement System (SAS) boards are equipped in a DSU2 shelf. The boards equipped are the application pack and up to four memory boards that function as one unit. They are removed via MCC poke commands entered at a maintenance terminal.

Caution: *Before removing an RAF/SAS, verify that the switching module and the RAF/SAS number on the MCC Page or in the input message are correct.*

1. At the maintenance terminal, enter the poke command on MCC Page 1110 or the input message (RMV:RAF/SAS) to remove the RAF/SAS from service.
2. Verify that the RAF/SAS is *OOS* on MCC Page 1090 .

7.25.82 Restore RAF/SAS

Caution: *Verify that you are restoring the correct unit or circuit. Before a restoral can make a unit/circuit ACT, it will take the unit out of service and diagnose it.*

1. At the maintenance terminal, enter the poke command on MCC Page 1090 or the input message (RST:RAF/SAS) to restore the RAF/SAS to service.
2. Verify that the RAF/SAS is *ACT* on MCC Page 1090 .

7.26 LU AND ISLU POWERUP

OVERVIEW

This procedure is used to restore power in one or more Line Units (LU). Use this procedure to prevent damage to certain LU circuit packs that can occur from an improper powerup.

Powerup, as used in this procedure, is defined as restoring an LU or service group to service once the red (OFF) light-emitting diodes (LED) are lighted on both service group power converters (494 or 495 type), possibly due to a blown fuse or low-voltage powerdown.

Also included in this section is the power restoral procedure for the Integrated Services Line Unit (ISLU), which is a unit of the Integrated Services Digital Network (ISDN).

Caution: *When restoring power to an LU or ISLU, be sure to return the lines associated with the LU or ISLU back to in-service once the unit is powered up to prevent service interruptions.*

PROCEDURE

1. Depending on the LU model, continue as follows:
 - For **Model 1 LUs**, perform Steps 2-12.
 - For **Model 2, 3, and 4 LUs** *not equipped for Line Unit Auto Power Recovery (LUAPR)*, perform Steps 13-23.
 - For **Model 2, 3, and 4 LUs** *equipped for LUAPR*, perform Steps 18-22.
 - For an **ISLU**, go to Step 24.
2. Verify that the red (OFF) LED is lighted on both service group power converters.
3. Unseat one TN331(B) and one TN332(B) board in that sequence for **each service group**.
4. Unseat two TN338(B) boards and one TN340(B) board in that sequence for **each equipped GRID**.
5. Push the "ST" button on each powered down 495B power converter and observe that the red (OFF) LED goes off.
6. Insert one TN332(B) and one TN331(B) board in that sequence for **each service group**.
7. Insert one TN340(B) and two TN338(B) boards in that sequence for **each equipped GRID**.

Note: Repeat Steps 2, 3, and 4 for each powered-down LU.
8. At the Master Control Center (MCC), bring up either Page 103X,Y (service group 0) or 104X,Y (service group 1), where X = LU number in the switching module/switching module-2000 (SM/SM-2000) and Y = SM/SM-2000 number.
9. Use the **340** poke command to run diagnostics and restore the LU COMC. If a Phase 1, Segment 1, Test 1 failure is obtained, reenter the **340** poke command. In any one SM/SM-2000, only one LU restoral can be run at a time. However, during this same time, another LU in a different SM/SM-2000 can also be restored. Repeat this step until all LU service groups have been restored.

10. At the MCC, bring up Page 102X,Y, where X = LU number in the SM/SM-2000 and Y = SM/SM-2000 number. If any grids are out of service (OOS), diagnose them with a **50X**, where X = grid number. On receiving an all tests passed (ATP) message, restore the grids with a **30X,UCL** poke command.
11. When all grids have been restored and while still on MCC Page 102X,Y, use a **51X,AUD** poke command on all of the restored grids.
12. **STOP. YOU HAVE COMPLETED THE POWERUP PROCEDURE FOR MODEL 1 LINE UNITS.**
13. Verify that the red (OFF) LED is lighted on both service group power converters.
14. Unseat one TN831(B) and one TN832(B) board in that sequence for each service group. If the service group is equipped with BOTH TN831C and TN832C circuit packs, leave them seated.
15. Unseat all the TN838, TN1048, or TN1058(B) grid boards in each service group. TN1058C grid boards do not require unseating for this procedure.
16. Push the "ST" button on each powered down 494 power converter and observe that the red (OFF) LED goes off.
17. Insert one TN832 and one TN831 board in that sequence for each service group.
Note: Repeat Steps 13, 14, and 15 for each powered-down LU.
18. At the MCC, bring up either Page 103X,Y (service group 0) or 104X,Y (service group 1), where X = LU number in the SM/SM-2000, and Y = SM/SM-2000 number.
19. Use the **340** poke command to run diagnostics and restore the LU COMC. If a Phase 1, Segment 1, Test 1 failure is obtained, reenter the **340** poke command. In any one SM/SM-2000, only one LU restoral can be run at a time. However, during this same time, another LU in a different SM/SM-2000 can also be restored. Repeat this step until all LU service groups have been restored.
20. Reseat any grid boards unseated in Step 15 for each service group.
21. At the MCC, bring up Page 102X,Y, where X = LU number in the SM/SM-2000 and Y = SM/SM-2000 number. If any grids are OOS, diagnose them with a **500X** or a **501X**, where X = grid number. On receiving an ATP message, restore the grids with a **300X,UCL** or **301X,UCL** poke command.
22. When all grids have been restored and while the MCC is still on Page 102X,Y, use poke command **502X,AUD** or **503X,AUD** on all restored grids.
23. **STOP. YOU HAVE COMPLETED THE POWERUP PROCEDURE FOR MODELS 2 AND 3 LINE UNITS.**
24. For any ISLU, determine the type of power to be restored:
 - **Caution: Failure to follow this step could interfere with customer service.** For a line group fuse (0-15) in the ISLU equipment cabinet, unseat the corresponding KCD3 Line Group Controller Board before replacement.
 - When replacing a fuse at the Power Control and Fuse Distribution Cabinet (PCFD) that is used to power an ISLU cabinet, go to Step 25.

- When replacing a fuse at the Global Power Distribution Frame (GPDF) that is used to power an ISLU cabinet, go to 30.
 - When replacing a fuse at the Local Power Distribution Cabinet (LPDC) that is used to power an ISLU cabinet, go to Step 29.
25. If the charge circuit at the PCFD is equipped with an ED-83024-30 G1 (2-amp) charge panel, locate the cabinet of the ISLU and continue with the next step.
If equipped with an ED-83024-30, G5 or G6 (15-amp) charge panel, go to Step 27.
26. Open the ISLU fuse panel cover over the unit and remove the fuses in the fuse panel associated with each affected primary bus.
27. At the PCFD, charge up the affected ISLU load fuse as follows:
- (a) Insert the CHG PROBE into the open indicator fuse position and rotate it clockwise to lock it into position.
 - (b) With one hand, press and hold the “CAP CHG TEST” switch, watch the CAP CHG LED come on (RED) and go off; and with the other hand, insert a known good load fuse.
 - (c) Release the “CAP CHG TEST” switch, remove the CHG PROBE, and insert the appropriate indicator fuse.
 - (d) Repeat steps (a), (b), and (c) for all remaining PCFD load fuses assigned to the ISLU cabinet.
28. Reinstall all ISLU fuses (removed in Step 26) and return equipment to its normal operating state.
STOP. YOU HAVE COMPLETED THIS PROCEDURE.
29. Unseat the LPDC fuse holder indicated by the blown indicator fuse.
- (a) Unseat the blown LPDC indicator fuse.
 - (b) Remove the load fuse and replace it with a properly sized load fuse.
 - (c) Insert the good load fuse and holder into the fuse block.
 - (d) Insert a new indicator fuse into the fuse block.
 - (e) Return equipment to its normal operating state.
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
30. Unseat the GPDF fuse holder with the LED active. With the fuse still in the fuse holder, observe the north-to-south relationship the fuse has with the fuse holder.
- (a) Remove the fuse and replace it with a good 25 Amp fuse. Make sure the replacement fuse is inserted in the fuse holder in the same north-to-south direction as the removed defective fuse.
 - (b) Reinsert the fuse holder.
 - (c) Return equipment to its normal operating state.
- STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

7.27 RLI AND FIU POWER UP/ POWER DOWN

OVERVIEW

Perform this procedure to power up or power down a Remote Link Interface (RLI) and Facility Interface Unit (FIU) in a Remote Switching Module (RSM) or Host Switching Module (HSM).

PROCEDURE

7.27.1 Power Up RLI 0 / FI 0 or 1 for an RSM or HSM

1. Identify the SM number of the RLI to be powered up.
2. For an RSM, locate the LTP cabinet of the RSM. For an HSM, locate the SMC cabinet of the HSM.
3. Locate the FIU shelf power pack. For an RSM, the FIU shelf will be in the LTP cabinet. For an HSM, the FIU shelf will be in the SMC.

Note: For FIU Shelf Version 3 (J5D003AP-3) the 494LA will be the power pack. For RLI 0, horizontal EQL for the power pack is 016; for RLI 1, horizontal EQL is 106.

For FIU Shelf Version 3 (J5D003AP-3) the 494LA will be the power pack. For RLI 0, horizontal EQL for the power pack is 016; for RLI 1, horizontal EQL is 106.

4. Verify that the OOS and OFF lights are illuminated on the power pack.
5. Locate the RLI pack. The RLI pack will be a vintage of the TN1077 pack. For an RSM and HSM, the RLI pack will be located in the SMC cabinet.

Note: For an MCTU2 (J5D003LA-1) the RLI pack will be at EQL 19-156 for RLI 0, and at EQL 28-156 for RLI 1.

For an MCTU3 (J5D003LB-1) the RLI pack will be at horizontal EQL 084 for RLI 0, and horizontal EQL 176 for RLI 1.

6. Press the "ON" button on the RLI pack.
7. Go to MCC Page 1190,X where x = the SM number, and restore RLI 0 or RLI 1.
8. Verify that RLI 0 or RLI 1 restores to the "ACT" state.

7.27.2 Power Down RLI 1 / FI 1 for an RSM or HSM

1. Identify the SM number of the RLI to be powered down.
2. Go to MCC Page 1190,X where x = the SM number, and verify that RLI 1 is out-of-service (OOS).
If RLI 1 is not OOS, verify that RLI 0 is active, and remove RLI 1 from service.
3. For an RSM, locate the LTP cabinet of the RSM. For a HSM, locate the SMC cabinet of the HSM.
4. Locate the FIU shelf power pack. For an RSM, the FIU shelf will be in the LTP cabinet. For an HSM, the FIU shelf will be in the SMC.

Note: For FIU Shelf Version 3 (J5D003AP-3), the 494LA will be the power pack. For RLI 1, horizontal EQL is 106.

For FIU Shelf Version 2 (J5D003AP-2), the 495KA will be the power pack. For FI 1, horizontal EQL is 116.

5. Verify that the OOS light is illuminated on the power pack for side 1.
6. Locate the RLI pack. The RLI pack will be a vintage of the TN1077 pack. For an RSM and HSM, the RLI pack will be located in the SMC cabinet.

Note: For an MCTU2 (J5D003LA-1) the EQL 28-156 is for RLI 1.

For an MCTU3 (J5D003LB-1) the RLI pack will be at horizontal EQL 176 for RLI 1.

7. Verify that the OOS light is illuminated on the TN1077 circuit pack for side 1.
8. Press the "OFF" button on the TN1077 circuit pack

7.27.3 Power Down RLI 0 / FI 0 for an RSM or HSM

1. Identify the SM number of the RLI to be powered down.
2. Go to MCC Page 1190,X where X = the SM number, and verify that RLI 0 is OOS.

If RLI 0 is not OOS, verify that RLI 1 is active, and remove RLI 0 from service.

3. For an RSM, locate the LTP cabinet of the RSM. For a HSM, locate the SMC cabinet of the HSM.
4. Locate the FIU shelf power pack. For an RSM, the FIU shelf will be in the LTP cabinet. For an HSM, the FIU shelf will be in the SMC.

Note: For FIU Shelf Version 3 (J5D003AP-3), the 494LA will be the power pack. For RLI 0, horizontal EQL for the power pack is 016.

For FIU Shelf Version 2 (J5D003AP-2), the 495KA will be the power pack. For FI 0, horizontal EQL for the power pack is 026.

5. Verify that the OOS light is illuminated on the power pack for side 0.
6. Locate the RLI pack. The RLI pack will be a vintage of the TN1077 pack. For an RSM and HSM, the RLI pack will be located in the SMC cabinet.

Note: For an MCTU2 (J5D003LA-1) the RLI pack will be at EQL 19-156 for RLI 0.

For an MCTU3 (J5D003LB-1) the RLI pack will be at horizontal EQL 084 for RLI 0.

7. Verify that the OOS light is illuminated on the TN1077 circuit pack for side 0.
8. Press the "OFF" button on the TN1077 circuit pack.

End of procedure.

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8. MISCELLANEOUS MAINTENANCE PROCEDURES

8.1 CLEAR STUCK/FALSE ALARM CONDITION

OVERVIEW

This procedure is used when an alarm has been found to be invalid; that is, when no trouble is found at the indicated source.

Caution: *Be sure there is no trouble before concluding an alarm is not valid.*

PROCEDURE

1. Is an alarm condition indicated at the Maintenance Control Center (MCC)?
If **YES**, then continue with the next step.
If **NO**, then go to Step 6.
2. Are you certain the alarm is not valid?
If **YES**, then continue with the next step.
If **NO**, then **STOP**. Use Procedure 2.2, Isolate Faults Displayed at the MCC Video Terminal, to localize the trouble source, or **seek technical assistance**.
3. Try the following corrective actions to clear the stuck alarm condition at the MCC:
 - (a) Replace the UN33B scan/distribute pack in the Input/Output (IOP) unit.
 - (b) Replace the TN867 pack in the Office Alarm Unit (OAU) in the Miscellaneous Cabinet.
 - (c) Check for stuck contact closure/sensor input to the OAU.
 - (d) **Seek technical assistance**.
4. After clearing the stuck alarm, verify proper operation of the alarm using one of the "Test ____ Office Alarm" procedures, as appropriate, located in 235-105-210, *Routine Operations and Maintenance Procedures*.
5. Go to Step 9.
6. Does pressing the "ALM RLS" key on the MCC keyboard silence the alarm and turn off the alarm lamp at the exit pilot lamp array?
If **YES**, then go to Step 8.
If **NO**, then continue with the next step.
7. Try the following corrective actions to clear the stuck/false audible or visual alarm indication:
 - (a) Replace the TN137 pack in the OAU in the Miscellaneous Cabinet (or the TN934 pack in the Remote Alarm Unit if the alarm is at the remote site).
 - (b) Replace the UN33B in the IOP unit.
 - (c) **Seek technical assistance**.
8. After clearing the stuck alarm, verify proper operation of the alarm using one of the "Test ____ Office Alarm" procedures, as appropriate, located in 235-105-210, *Routine Operations and Maintenance Procedures*.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.2 CLEAR TROUBLE CAUSING EXCESSIVE INTERRUPTS

OVERVIEW

This procedure is used to clear excessive interrupts.

PROCEDURE

1. Scan the interrupt reports and determine which hardware circuit (service group) is implicated. Refer to 235-600-750, *Output Messages*, for assistance.
2. At the Master Control Center (MCC), on the display page, check the status of the implicated circuit. Has it already been removed from service and diagnosed?
If **YES**, continue with the next step.
If **NO**, remove and diagnose the circuit using the **DIAGNOSE** poke command.
3. Did the diagnosis of the circuit get a Some Tests Fail (STF) response?
If **YES**, use Procedure 2.2, *Isolate Faults Displayed at the MCC Video Terminal*, to clear the trouble.
If **NO**, continue with the next step.
4. Repeat the diagnosis of the circuit at least three more times.
5. Did any diagnosis of the circuit yield an STF response?
If **YES**, use Procedure 2.2, *Isolate Faults Displayed at the MCC Video Terminal*, to clear the trouble.
If **NO**, continue with the next step.
6. Using 235-600-750, *Output Messages*, and the interrupt report printouts, determine the type of error source for the interrupt.
7. If the circuit is the Control Unit (CU), Communication Module Processor (CMP), or Module Controller/Time Slot Interchange (MCTSI), determine if the error type is a memory error type covered in one of the following procedures:
 - Procedure 7.15, *Analyze and Clear Nondiagnosable SM/SM-2000 Memory Errors*
 - Procedure 3.4, *Clear Nondiagnosable CU Memory Errors*
 - Procedure 5.23, *Analyze and Clear Nondiagnosable CMP Memory Errors*.If **YES**, use the corresponding procedure to clear the trouble.
If **NO**, continue with the next step.
8. If the circuit is a DLI or NLI, refer to Procedure 5.17. If not, continue with the next step.
9. Can the error type be correlated to a specific circuit pack? (Refer to 235-600-750, *Output Messages*, or, if necessary, **seek technical assistance**.)
If **YES**, continue with the next step.
If **NO**, **seek technical assistance** to work the problem further.
10. Using the diagnostic phase tables in Appendix A1 – Diagnostic Test Supporting Information, determine which specific diagnostic phase(s) has tests for the circuit pack identified and run that phase in repeat mode (use the **RPT** option with the **DGN** input message) at least 20 times.

11. Was there any STF response to the diagnostic phase being run?
If **YES**, use Procedure 2.2, Isolate Faults Displayed at the MCC Video Terminal, to clear the trouble.
If **NO**, continue with the next step.
12. Replace the suspected pack and restore the circuit to service (use the **RESTORE** poke command at the MCC).
13. Does the circuit continue to produce the same pattern of excessive interrupts as before?
If **YES**, remove the circuit from service, put the original pack back in the unit, and ***seek technical assistance***.
If **NO**, continue with the next step.
14. At this point, the pack replacement has apparently cleared the trouble. If this is certain, make sure the **YELLOW TAG** attached to the returned pack makes note of the interrupt error type and that the diagnostic was "all tests passed." Also, put one of the interrupt printouts in the box with the returned pack.
15. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.3 RESOLVE ALARM ASSOCIATED WITH EXTERNAL SANITY MONITOR FAULT

OVERVIEW

This procedure is used to resolve an alarm resulting from an External Sanity Monitor (ESM) circuit failure. An ESM alarm can be enabled or inhibited at the Master Control Center (MCC) video terminal using display Page 116 in a 5ESS[®] switch office or page 1400 in a VCDX switch office. For a pictorial view of these display pages, refer to 235-105-110, *System Maintenance Requirements and Tools*.

PROCEDURE

1. At the MCC video terminal, access display Page 116 or Page 1400 per Procedure 2.2, Isolate Faults Displayed at MCC Video Terminal.
2. If the trouble is associated with an ESM circuit, clear the trouble per Procedure 8.4, Clear Trouble in External Sanity Monitor Unit.
3. If the trouble is associated with an ESM 1000-Hz tone, clear the trouble per Procedure 8.5, Clear External Sanity Monitor 1000-Hz Tone Trouble.
4. If the trouble is associated with an ESM unit test (TST) lamp circuit, clear the trouble per Procedure 8.6, Clear External Sanity Monitor Unit Test Lamp Circuit Trouble.
5. Once the ESM trouble has been cleared, diagnose the distribute point board by entering the following:
DGN: DIST =a-b-c-d,RAW,TLP;
6. If any diagnostic failure occurs, resolve per Procedure 2.1, 5ESS Switch Maintenance Checklist.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.4 CLEAR TROUBLE IN EXTERNAL SANITY MONITOR UNIT

OVERVIEW

This procedure is used to clear a trouble in the External Sanity Monitor (ESM) unit when reported by an alarm at the Master Control Center (MCC) video terminal or Receive-Only Printer (ROP).

The test (TST) switch and its associated circuitry are tested when the switch is operated.

PROCEDURE

1. At the ESM unit, momentarily press the TST key.
Note: There may be a time delay of up to a minute before response occurs.
2. Does a 1000-Hz tone sound?
If **YES**, continue with the next step.
If **NO**, perform Procedure 8.5, Clear External Sanity Monitor 1000-Hz Tone Trouble.
3. Is the TST switch lamp lighted?
If **YES**, continue with the next step.
If **NO**, perform Procedure 8.6, Clear External Sanity Monitor Unit Test Lamp Circuit Trouble.
4. Do all audible alarm units sound?
If **YES**, continue with the next step.
If **NO**, clear the alarm trouble using SD-5D110.
5. At the MCC video terminal, press the "ALM RLS" key.
Response: At the MCC video terminal, **REPT ALM a b c** message is printed.
6. At the ESM unit, is the 1000-Hz tone silenced?
If **YES**, go to Step 10.
If **NO**, continue with the next step.
7. Determine if the associated line is defective per Procedure 9.2, Line Maintenance.
8. Is the associated line defective?
If **YES**, clear the line trouble per Procedure 9.2, Line Maintenance.
If **NO**, continue with the next step.
9. At the MCC video terminal, to diagnose the distribute point board, enter:
DGN: DIST =a-b-c-d,TLP;
Where: a = Switching Module/Switching Module-2000 (001-192)
b = Metallic Service Unit (MSU) (0 or 1)
c = Service Group (SG) (0 or 1)
d = Distribute point board (0-31).
Note: To determine the correct distribute point board, see the RESETDP field on the Recent Change/Verify (RC/V) Class 8 (Office and Misc. Alarms), View 7 (Dial-tone Delay) screen.

10. Is "All Tests Passed" printed in the response message?
If **YES**, restore the distribute point board with the following: **RST:DIST**
=a-b-c-d,UCL;
Note: Variables a, b, c, and d are defined in Step 9. Continue with Step 14.
If **NO**, perform Procedure 14.6, Respond to Fuse/Power Alarm Failure.
11. Are all audible alarms silenced?
If **YES**, continue with Step 13.
If **NO**, clear the alarm trouble using SD-5D110.
12. At the ESM unit, is the TST switch lamp off?
If **YES**, continue with Step 14.
If **NO**, clear the trouble using SD-5D110.
13. At the MCC video terminal, look at display **Page 116** in a *5ESS*[®] switch office or **Page 1400** in a Very Compact Digital Exchange (VCDX) office to verify the state of the ESM alarms. Refer to 235-105-110, *System Maintenance Requirements and Tools*, for the applicable screen.
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.5 CLEAR EXTERNAL SANITY MONITOR 1000-HZ TONE TROUBLE

OVERVIEW

This procedure is used to clear a trouble in the 1000-Hz tone circuit of the External Sanity Monitor (ESM) unit.

PROCEDURE

1. Obtain a volt-ohm-meter (VOM) that has test leads with probes that can be used to momentarily strap across two relay terminals.
2. At the ESM unit, replace the A802 circuit pack.
3. Does a 1000-Hz tone sound?
If **YES**, go to Step 10.
If **NO**, continue with the next step.
4. On the TO relay of the ESM unit, momentarily strap the test lead probe from terminals 10M to 10F (Figure 8.5-1).
5. Did the 1000-Hz tone sound during Step 4?
If **YES**, continue with the next step.
If **NO**, go to Step 9.
Note: The TO relay contacts 10M to 10F did not make contact when the TO relay was operated.
6. Examine the defective TO relay for contacts displaced from the comb grooves, bent contacts, or foreign material (paper, dust, etc.) between contacts. Ensure that foreign materials do not cause obstruction to the relay armature movement.
7. Repair or replace the defective relay.
8. Go to Step 10.
9. Troubleshoot the open-circuit path between the A802 circuit pack, terminal 21, and the TO relay, terminal 10M (Figure 8.5-2).
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

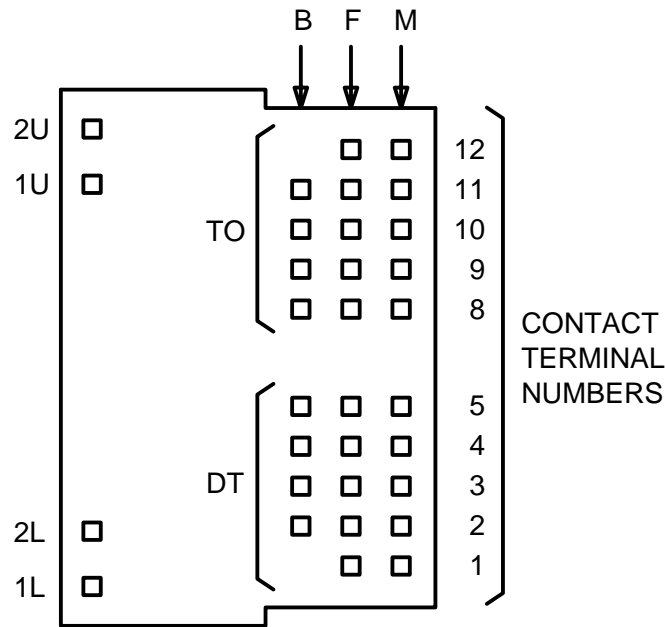


Figure 8.5-1 — Rear View of AK30 Relay Containing DT and TO Relays

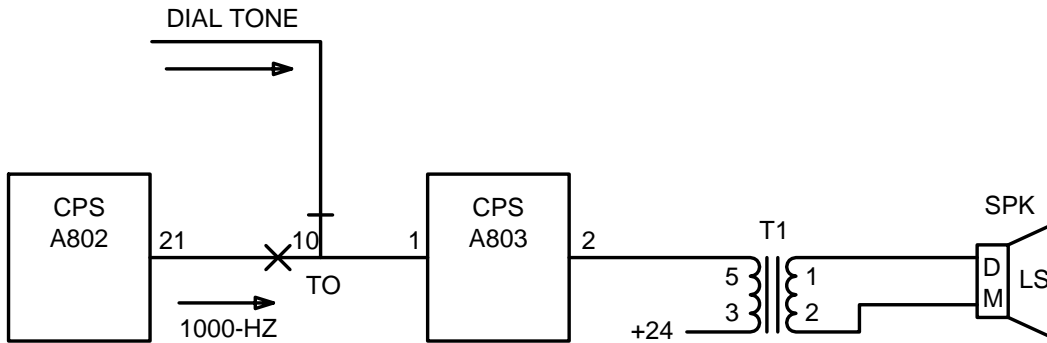


Figure 8.5-2 — Simplified Circuit of SD1A277-01

8.6 CLEAR EXTERNAL SANITY MONITOR UNIT TEST LAMP CIRCUIT TROUBLE

OVERVIEW

This procedure is used to clear a trouble in the External Sanity Monitor (ESM) unit test (TST) lamp circuit.

PROCEDURE

1. On the ESM unit, replace the TST key lamp (K2 type).
2. Is the TST key lamp lighted?
If **YES**, go to Step 14.
If **NO**, continue with the next step.
3. Obtain a volt-ohm-milliammeter (VOM) KS-14510 or equivalent.
4. Set the VOM to measure +24 V DC.
5. On the back of the ESM unit TST key assembly, what is the DC voltage on terminal 6 with respect to frame ground (GND) (Figure 8.6-1)?
If **+24 V DC**, continue with the next step.
If **0 V DC**, go to Step 8.
6. What is the DC voltage on terminal 5 with respect to frame ground?
If **+24 V DC**, continue with the next step.
If **0 V DC**, go to Step 14.
7. Repair or replace the defective lamp socket.
8. Clear the open-circuit trouble between terminal 5 of the TST key assembly and frame ground (Figure 8.6-2).
9. What is the DC voltage on terminal 8 with respect to frame ground?
If **0 V DC**, continue with the next step.
If **+24 V DC**, go to Step 11.
10. Clear the absence of +24 volts on terminal 8 of the TST key assembly and the +24V PT bus (Figure 8.6-2).
11. What is the DC voltage on terminal 9 with respect to frame ground?
If **+24 V DC**, continue with the next step.
If **0 V DC**, go to Step 13.
12. Clear the open-circuit trouble between terminals 9 and 6. (Check for a possible open wire strap across these terminals.)
13. Use the A-313119 drawing to troubleshoot, if needed. The TST key (630A4) has contact trouble between terminals 8 and 9.
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

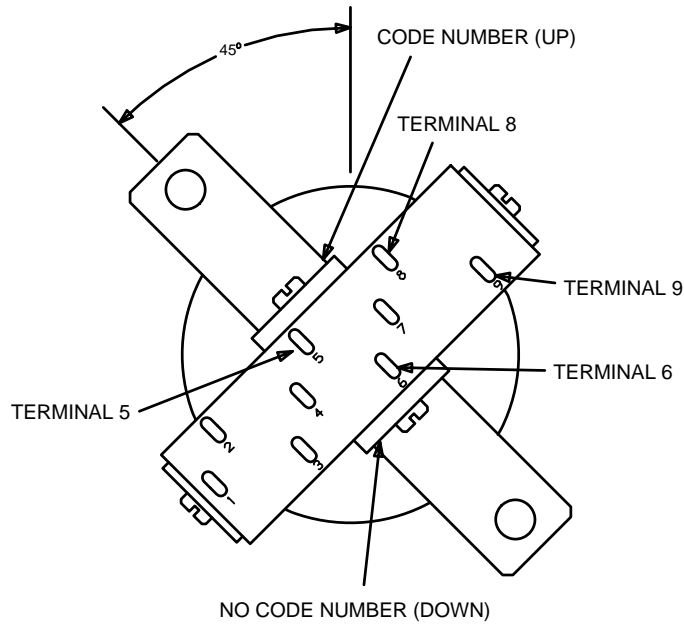


Figure 8.6-1 — Rear View of 630A4 Test Key

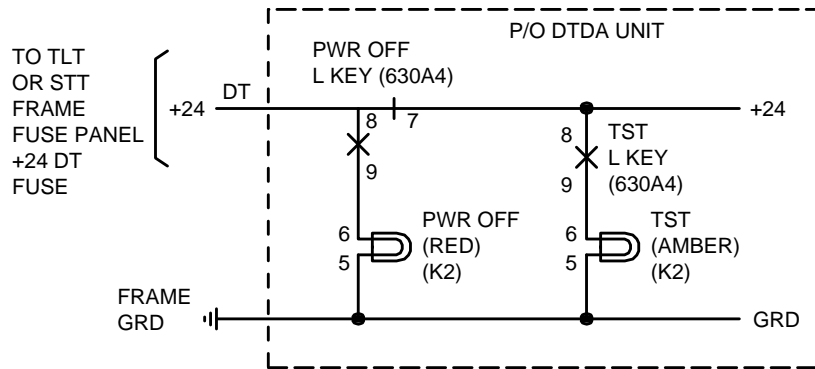


Figure 8.6-2 — Simplified TST Lamp Circuit (SD1A277-01)

8.7 RESOLVE RC/V LOG WARNING ALARM

OVERVIEW

This procedure is used to resolve an RC/V log warning alarm.

A Recent Change/Verify (RC/V) log warning alarm may be a major alarm condition when the "Recent Change" area or the "Customer Originated Recent Change" (CORC) area reaches a specific percentage level of capacity.

The craft is alerted to an RC/V alarm both audibly and visually, plus a **REPT RCV** output message is printed on the Receive-Only Printer (ROP) located at the Master Control Center (MCC).

For details on input or output messages, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*.

PROCEDURE

1. If performing an RC/V activity (for a customer) or a subscribing customer is performing a CORC and an audible alarm is activated, check the MCC video terminal for a MAJOR alarm indication.
2. At the ROP, verify that a **REPT RCV** output message is printed. This message may be in one of three formats:
 - **REPT RCV: RCLOG a PERCENT FULL**
 - **REPT RCV: RC DISABLED, LOG FULL**
 - **REPT RCV: CORC DISABLED, LOG FULL.**
3. At the MCC video terminal, silence the audible alarm by pressing the "ALM RLS" function key. The flashing indicator (MINOR or MAJOR) clears.
4. Stop all on-site and remote site RC/V activity.
5. Enter the following:

```
OP:RCSTAT,{SM=a[&&b]|CMP=c[&&d]|AM|SM=a[&&b],CMP=c[&&d]|  
SM=a[&&b],AM|CMP=c[&&d],AM|SM=a[&&b],CMP=c[&&d],AM};
```

Where: a = SM/SM-2000 number (001-192), or the lower limit of a range of SM/SM-2000s
 b = Upper limit of a range of SM/SM-2000s
 c = CMP number (194-205), or the lower limit of a range of CMPs
 d = Upper limit of a range of CMPs.

Note: If the input message is accepted, an **OP RCSTAT** output message is printed on the ROP.

6. Using the **REPT RCV** output message from Step 2 and the appropriate **OP RCSTAT** output message from Step 5, determine if a Backup Office Dependent Data (BKUP ODD) is required.
 - If the **REPT RCV** output message format is **REPT RCV: RCLOG a PERCENT FULL**, then continue with the next step.
 - If the **REPT RCV** output message format is either **REPT RCV: RC DISABLED, LOG FULL** or **REPT RCV: CORC DISABLED, LOG FULL**, then go to Step 8.
7. If the **REPT RCV** output message format is **REPT RCV: RCLOG a PERCENT FULL**, this represents a major alarm condition and a BKUP ODD should be

performed during normal off-hours for that specific office. The "a" in the format indicates the (%) level of capacity. For the appropriate BKUP ODD procedure, refer to 235-105-210, *Routine Operations and Maintenance Procedures*. Once this procedure is performed, go to Step 9.

8. If the **REPT RCV** output message format is either **REPT RCV: RC DISABLED, LOG FULL** or **REPT RCV: CORC DISABLED, LOG FULL**, this represents a major alarm condition and a BKUP ODD should be performed as early as real-time resources allow. For the BKUP ODD procedure, refer to 235-105-210, *Routine Operations and Maintenance Procedures*. Once this procedure is performed, continue with the next step.
9. Was the BKUP ODD procedure completed successfully?
If **YES**, a **BKUP ODD COMPLETED** output message is printed on the ROP at the MCC and normal RC/V activity can be resumed.
If **NO**, a minor alarm is generated and the next higher level of technical assistance should be requested.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.8 RESOLVE DAYLOG MESSAGE-LOST ALARM

OVERVIEW

This procedure is used to resolve daylog message-lost alarms.

The log file consists of hexadecimal information that is kept for the manufacturer to locate severe software faults. In normal operation, the log file contains all logged information for the day; however, if an entry overwrites another entry that is less than 24 hours old, a minor alarm is generated. Refer to 235-105-210, *Routine Operations and Maintenance*.

PROCEDURE

1. If a **REPT SOP a OUTPUT MESSAGES DISCARDED FOR DAYLOG** (where "a" is the number of output messages) is printed on the ROP located at the MCC, this indicates that a message is lost because of spooler queue overflow for the log file.
2. To prevent continued loss of messages, refer to 235-600-750, *Output Messages*, for details concerning the **REPT SOP** message.
3. If a **REPT SOP DELETING OLDER HALF OF DAYLOG** message is printed on the ROP located at the MCC, this indicates that the "/log/DAYLOG1" file became full and was copied to the "/log/DAYLOG0" file. To save the data, the "/log/DAYLOG0" file should be backed up on tape.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.9 AUTOMATIC CIRCUIT PACK RETURN TAG TOOL

OVERVIEW

The automatic circuit pack Return Tag (RTAG) tool allows maintenance personnel to display and print recent diagnostic and fabric test faults, as well as generate (in an interactive fashion) circuit pack return tags to be used in returning faulty circuit packs to the Lucent Technologies factory for repair. The following procedure shows the basic menu of the tool.

PROCEDURE

1. The return tag tool can be invoked by any of the following three methods:
 - (a) At the *UNIX*¹ system terminal, type in `/usr/bin/rtag` at the prompt.
 - (b) At the trunk line work station (TLWS) terminal, type in `"RCV:MENU:RTAG;"` at the prompt.
 - (c) At the master control center (MCC) terminal, poke Page 194; then select **RTAG**. The users can also invoke the RTAG tool by entering `"RCV:MENU:SCREEN;"` and selecting **RTAG**. On the MCC screen, the following interface menu is first printed:

Depress PF3 key twice to reconnect to the SCREEN process if the Command Message Key (PF3) has been used during this procedure.

What is the desired command?

o) ODBE
a) ACCED
u) UNIX SHELL
c) CNIDBOC
r) RTAG
Q) TO QUIT

Please enter o,a,u,c,r, or Q:

character mappings

\;, \1, \s, \8, \-, \a, \/, \
;, !, \$, &, -, @, ?, \
;

2. After the RTAG tool is invoked, the following interface header is printed:

```
WELCOME TO THE AUTOMATED CIRCUIT PACK RETURN TAG TOOL  
PLEASE FOLLOW THE MENU DRIVEN PROMPTS
```

At any prompt, the following special characters can be entered:
! : To go back to the previous menu.
h : To show the help command.
q : To quit.

Then, the following menu is displayed:

1. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.

Please select one of the following commands:

- (1) Select diagnostic failure(s) by circuit identifier
- (2) Select diagnostic failure(s) by circuit identifier and number
- (3) Select diagnostic failure(s) by date
- (4) Select diagnostic failure(s) by number of last fault(s)
- (5) Select diagnostic failure(s) by all faults
- (6) Generate a circuit pack return tag for update
- (7) Empty the fault data base and/or change password
- (8) Help
- (9) Quit

(a) For selection 1, the following display is shown:

Please enter the circuit identifier
(e.g., MCTSI, MASC, or h for help, or q to quit):

Go to Step 3.

(b) For selection 2, the following display is shown:

Please enter the circuit identifier and number
(e.g., MCTSI=15-1, CU=0 MASC=2, or h for help, or q to quit):

Go to Step 3.

(c) For selection 3, the following display is shown:

Please enter the date
(e.g., mm-dd-yy, or h for help, or q to quit):

Go to Step 3.

(d) For selection 4, the following display is shown:

Please enter the number of last faults to review
(Valid number is 1 - n, or h for help, or q to quit):

Where: n = Number of existing fault entries in the circular data base.

Go to Step 3.

(e) For selection 5, the menu in Step 3 is displayed.

Go to Step 3.

(f) For selection 6, the five questions in Step 4b are asked, then an update tag is printed on the receive only printer (ROP). The menu is redisplayed.

(g) For selection 7, if there is no password (initially), the following is displayed.

Note: This initial condition indicates when the software release is first retrofitted or the data base file is removed by "rm" command from a *UNIX* system terminal.

There is no password.
Please enter a password
(NOTE: The length of the password cannot exceed 6 characters)

Enter the password again:

Otherwise, the following is displayed:

Please enter the password

If the password does not match, the access of this command to empty the data base is denied, and the main menu is redisplayed. If the password matches, then the following is displayed:

```
Do you want to flush the fault database?  
Please enter y for yes, or n for no, or q to quit  
default is no
```

If the answer is "y," the fault data base is flushed. And then, the following is displayed:

```
Do you want to change the password?  
Please enter y for yes, or n for no, or q to quit:
```

If the answer is "y," the following is displayed:

```
Please enter the new password:  
Enter the new password again:
```

and go back to main menu.

- (h) For selection 8, a HELP message is displayed. The menu is redisplayed.
- (i) For selection 9, quit the RTAG user interface.

3. The following menu is displayed:

```
Please select one of the following commands:  
(1) Print the summary of the fault entries on ROP  
(2) Display the summary of the fault entries  
(3) Help  
(4) Quit
```

- (a) For selection 1, the summary of the fault entries that satisfy the selection is first dumped into a temporary file. Then the file is printed on the ROP. The menu is redisplayed.
- (b) For selection 2, the fault entries are displayed as follows:

The following shows the fault entries that satisfy the selected key (YYY):

```
(1) M 04-10-91 12:50 PSUPH=8-0-1-7 STF PH 1 SEG 2 TEST 19 MM H'fa72  
(2) A 03-12-91 01:05 MCTSI=10-0 STF PH 4 SEG 1050 TEST 1 MM H'2  
(3) R 02-01-91 17:56 CU=0 MASC=2 STF PH 13 TEST 3 MM H'2a  
.  
.  
(10) M 10-15-90 03:45 MCTSI=10-0 STF PH 4 SEG 1050 TEST 1 MM H'2  
To display a tag, enter the fault number.
```

```
To page down the fault list, hit the <ENTER> key.  
To page up the fault list, enter u.  
To print the current screen to the ROP, enter p.  
To quit, enter q:
```

Continue with the next step.

- (c) For selection 3, a HELP message is displayed. The menu is redisplayed.
- (d) For selection 4, quit the RTAG user interface.

4. The selected tag is displayed as follows:

MISCELLANEOUS MAINTENANCE PROCEDURES
Procedure 8.9

235-105-220
November 1998

OFFICE BASE: T9997-d7
SOFTWARE RELEASE: 5Exx
REASON FOR RETURN: DEFECT
EQUIPMENT STATUS:
24 HOUR INDICATOR:
SOURCE OF DIAGNOSTIC REQUEST: AUTOMATIC
DATE/TIME FAILED: 03-12-91 01:05
MCTSI=10-0 PH 4 SEG 1050
TEST MM
1 H'2
CIRCUIT PACK CODE:
SERIES:
SERIAL NUMBER:

Note: The previous step shows an unedited tag. Then, the next prompt is as follows:

Please enter the number that corresponds to your selection:

- (1) Print the tag
- (2) Edit the tag
- (3) Select another fault
- (4) Quit

(a) For selection 1, the OP TAG REPORT output message is printed on ROP. This takes the dialogue flow back to Step 3.

(b) For selection 2, the following questions are displayed:

QUESTION 1:
Equipment status (default XXX)?
(1) INSTALLING
(2) PRE-CUT
(3) IN SERVICE
(4) Help
(5) Quit
Please enter the selected number, or <ENTER> for no change:

QUESTION 2:
24 hour indicator (default XXX)?
(1) YES
(2) NO
(3) Help
(4) Quit
Please enter the selected number, or <ENTER> for no change:

QUESTION 3:
Circuit Pack Code (default XXX)
Please enter new circuit pack code,
or <ENTER> for no change, h for help, or q to quit:

QUESTION 4:
Series (default XXX)
Please enter new series,
or <ENTER> for no change, or h for help, or q to quit:

QUESTION 5:
Serial number (default XXX)
Please enter new serial number,
or <ENTER> for no change, or h for help, or q to quit:

Where: **XXX** shows the respective current default data.

After getting all the answers to the five questions, redisplay what the user has entered. Then the following is displayed:

Do you want to save these changes?
Please enter y for yes, or n for no, or q to quit:

This takes the dialogue flow back to Step 4.

- (c) For selection **3**, this takes the dialogue flow back to Step **3**.
 - (d) For selection **4**, quit the RTAG user interface.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.10 REPLACE OPTICAL DATA TRANSCEIVER

OVERVIEW

This procedure is used to replace Lightwave Data Transceiver (LDT), Network Link Interface (NLI), Peripheral Link Interface (PLI), Network Link Interface-1 (NLI1), Communication Module 2 (CM2) Optical Transceiver (COT), CM3 optical transceivers, and Optical Transceiver Digital Network Unit - SONET (COTD) paddleboards in all optically-connected units. This procedure is also used to identify the different vintages of optical transceiver hardware. There are several vintages of optical transceivers, more recently referred to as LDT. For the SM-2000, five new paddleboards are introduced: NLI, PLI, NLI1, COT, and COTD.

The support of optics into the *5ESS*[®] switch is as follows:

- **50 Micron Biconic Threaded Optical Connector:**
 - 982CF/CG, 982WY/TA (SM/CM1), 982FH, 982TH (CM2)
- **62.5 Micron ST-Type Bayonet Twist Lock Optical Connector:**
 - 982TR/TS (SM/CM1), 982TT (CM2)
 - 982TRA/TSA-3 (SM/CM1), 982TT (CM2)
 - 982TRA/TSA-4 or 982TRAA-5/TSAA-5 (SM/CM1), 982TT-7 (CM2)
 - 982TRC/TSC (SM/CM2C), 982TTC (CM2)
 - COTD - 982TN (DNU-S)
 - NLI - BKD1 (SM2K)
 - COT - BKF1 (CM2)
 - PLI - BKD2, BKD10 (SM2K)
 - NLI1 - BKD7 (SM2K) with CM2C unit.
- **62.5 Micron SC Optical Connector:**
 - MMA1/MMA2 (CM3)
- **62.5 MTRJ Optical Connector:**
 - MMA3 (CM3)
 - PLI - BKD10 (SM2K).

Tables 8.10-1 through 8.10-4 give a detail description of where the various optics are used in the *5ESS* switch. The following is a list of figures that describe the various optics with information showing their appropriate units:

- Figure 8.10-4, Lightwave Data Transceivers
- Figures 8.10-5 and 8.10-6, TSIU4 Wiring Side Label Stamping Instructions
- Figure 8.10-7 and 8.10-8, TSIU4-2 Wiring Side Label Stamping Instructions
- Figure 8.10-9, SM-2000 Data Transceivers
- Figure 8.10-10, COT - CM2 Optical Transceiver
- Figure 8.10-11, Optical Transceivers - DNU-S.

There are four basic types of LDT connectors: Biconic, ST-type, SC-type, and MTRJ-type. The physical differences are as follows:

(1) Biconic Optical Connector:

- 50-micron fiber with biconic type connectors as the interface to the optical devices.
- Two separate paddleboards: one for transmit, one for receive.
(Except for the 982TH and 982FH - one combined paddleboard)
- Power sources include -48 and +5 volts except for the 982TH and 982FH, which uses -48, -5, and -2 volts.

(2) "ST" Bayonet Optical Connector:

- LDT Paddleboards:
 - 62.5-micron fiber with ST-type series fiber connectors as the interface to the optical devices.
 - One paddleboard contains both transmit and receive circuits.
 - Power source -48 volts is not used, but is in the pin field that the boards plug into.
 - Power sources include +5 volts except for the 982TT/TTC, which uses -5, and -2 volts.
- NLI/PLI/NLI1/COT/COTD Paddleboards:
 - 62.5-micron fiber with ST-type series fiber connectors as the interface to the optical devices.
 - One paddleboard that contains both transmit and receive circuits.
 - A power converter that requires a power source of -48 volts. A COT uses a power source of -5 and -2 volts. A COTD uses a power source of +5 volts. The COT and COTD do not have power converters.

(3) "SC" Optical Connector:

- MMA1 Optical Paddleboards (see Figure 8.10-12):
 - 62.5-micron fiber with SC-type series fiber connectors as the interface to the optical devices.
 - One paddleboard contains both transmit and receive circuits.
 - MMA1 operates at the NCT1 rate of 32 Mb/s.
- MMA2 Optical Paddleboards (see Figure 8.10-13):
 - 62.5-micron fiber with SC-type series fiber connectors as the interface to the optical devices.
 - One paddleboard that contains both transmit and receive circuits.

- MMA2 operates at the NCT2 rate of 64 Mb/s.

(4) "MTRJ" Optical Connector:

- MMA3 Optical Paddleboards (see Figure 8.10-14):
 - 62.5-micron fiber with MTRJ-type series fiber connectors as the interface to the optical devices.
 - One paddleboard contains both transmit and receive circuits.
 - MMA3 operates at the NCT2 rate of 64 Mb/s.

PROCEDURE

1. Use the following sub-procedures to replace Optical Data Transceiver (ODT) equipment:
 - Subprocedure 8.10.1, Replace CM2/CM2C/CM3 ODT
 - Subprocedure 8.10.2, Replace SM ODT for NLI/PLI
 - Subprocedure 8.10.3, Replace SM ODT for TN877 DLI/RLI ODT
 - Subprocedure 8.10.4, Replace SM ODT for TN1077 or TN1077B/C/D/E/F DLI/RLI ODT
 - Subprocedure 8.10.5, Clean Optical Fiber.

8.10.1 REPLACE CM2/CM2C/CM3 ODT

1. For CM2, remove from service the Office Network and Timing Complex (ONTC) associated with the Optical Data Transceiver to be replaced. At the MCC, enter:
RMV:ONTC=a
Where: a = ONTC side
2. For CM2, verify that the ONTC is in the out of service (OOS) state using Master Control Center (MCC) page 1209.
3. **Caution: Before replacing a circuit pack or backside paddleboard in an SM/SM-2000's Communication Module 2 (CM2) unit (power does not need to be removed from CM3), remove power at the unit as follows:**
 - a. **Locate the unit's power control pack (for example, SN516, 414AA, TN1077, TN5, TN6, etc.).**
 - b. **Verify that the unit is OOS and associated OOS lamp is on.**
 - c. **Remove power from the unit (through the OFF switch).**

Caution: -48 volts are on some pins in the TMS backplane near the ODT connections. When replacing paddleboards, be sure the transceiver is not damaged by improper contact with the -48 volt supply.

Note the exact location of the ODT paddleboard to be replaced and (with fiber cable still connected) unplug the paddleboard.

4. **Caution: Do not kink fiber cables. This damages the cables and causes faulty operation.**

Note: Before performing this step, make certain you record the exact location and order of removal for the fiber cables connected to the ODT paddleboard. You need this information to properly replace the new paddleboard

Note the location of each fiber cable and disconnect the fiber cables from the paddleboard.

- For paddleboards with Biconic Optical Connectors – 982CF/CG, 982WY/TA or 982FH/TH, unscrew the biconic type connector from the paddleboard optical device.
 - For paddleboards with ST-type connectors, release the ST-type connector locking mechanism from the paddleboard optical device.
 - For MMA1 and MMA2 paddleboards, release the SC-type connector locking mechanism from the paddleboard optical device.
 - For MMA3 paddleboards, release the MTRJ-type connector locking mechanism from the paddleboard optical device.
5. Clean Optical Fiber – See Section 8.10.5 for instructions.
 6. **Caution: Make certain the paddleboard is installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins or installed upside down.**

Carefully insert the replacement paddleboard at the correct location in the frame.

7. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.
8. For CM2, restore the OOS ONTC. At the MCC, enter:
RST:ONTC=a
Where: a = ONTC side
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.10.2 REPLACE SM-2000/SM-XC ODT FOR NLI/PLI

1. Remove from service one of the following interfaces associated with the Optical Data Transceiver to be replaced.
 - Network Link Interface (NLI)
 - Peripheral Link Interface (PLI).

For PLI:

Note: There are no remove/restore commands for the PLI. For DNU(s), the PLI(s) follow the parent DNUSCD pack. For a PLI associated with a DNU-S, to remove/restore the PLI, remove/restore the DNUSCD. Refer to MCC Page 1510.

Note: There are no remove/restore commands for the PLI associated with an OIU. For an OIU, the PLI(s) follow the parent OFI pack. For a PLI associated with an OIU, to remove/restore the PLI, remove/restore the OFI. Refer to MCC Page 1490.

For NLI:

At the MCC, enter:

RMV:NLI=x-yy-z, where x = SM-2000 number, yy = NLI number, and z = ONTC side.

2. Verify NLI or PLI is OOS.

For PLI:

Note: PLI(s) are not shown on any MCC Page. For DNU(s), the PLI(s) follow the parent DNUSCD pack. Refer to MCC Page 1510.

Note: PLI(s) are not shown on any MCC Page. For an OIU, the PLI(s) follow the parent OFI pack. Refer to MCC Page 1490.

For NLI:

Verify that the NLI is in the OOS state using MCC Page 1190.

3. The status of the paddleboard lamps should be as follows:

- For the NLI paddleboard, the OOS lamp should be lighted.
- For the PLI paddleboard, the OOS lamp should be lighted.

4. **Caution: NLI paddleboards are constructed to withstand removal/replacement while power remains on. However, repair of an even NLI on an EXM-2000 requires that the corresponding odd NLI be removed from service before the pack is replaced [due to timing coupling at the Transmission Rate Converter Unit (TRCU)].**

Caution: -48 volts are on some pins in the TMS backplane near the ODT connections. When replacing paddleboards, be sure the transceiver is not damaged by contact with the -48 volt supply.

Note the exact location of the optical transceiver paddleboard to be replaced and (with fiber cable still connected) unplug the paddleboard.

5. **Caution: Do not kink fiber cables. This damages the cables and causes faulty operation.**

Note: Make certain you record the exact location and removal order for the fiber cables connected to the Optical Transceiver paddleboard. You need this information to properly replace the new paddleboard.

At the rear of the NLI or PLI, record the location where the transmit and receive fibers terminate. For an SM-XC BKXL1, one cable is used for both Transmit and Receive. Disconnect the fiber cables from the paddleboard..

6. Clean Optical Fiber – See Section 8.10.5 for instructions.

7. **Caution: Make certain the paddleboard is installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins or installed upside down.**

Carefully insert the replacement paddleboard at the correct location in the frame.

8. For an SM-XC SMU6 note the position of the switches on the BKXL1 or BKXL2. When set for PLI mode both switches on the BKXL1 or BKXL2 must be in the up position.

When set for NLI mode both switches on the BKXL1 or BKXL2 must be in the down position.

See Figure 8.10-1.

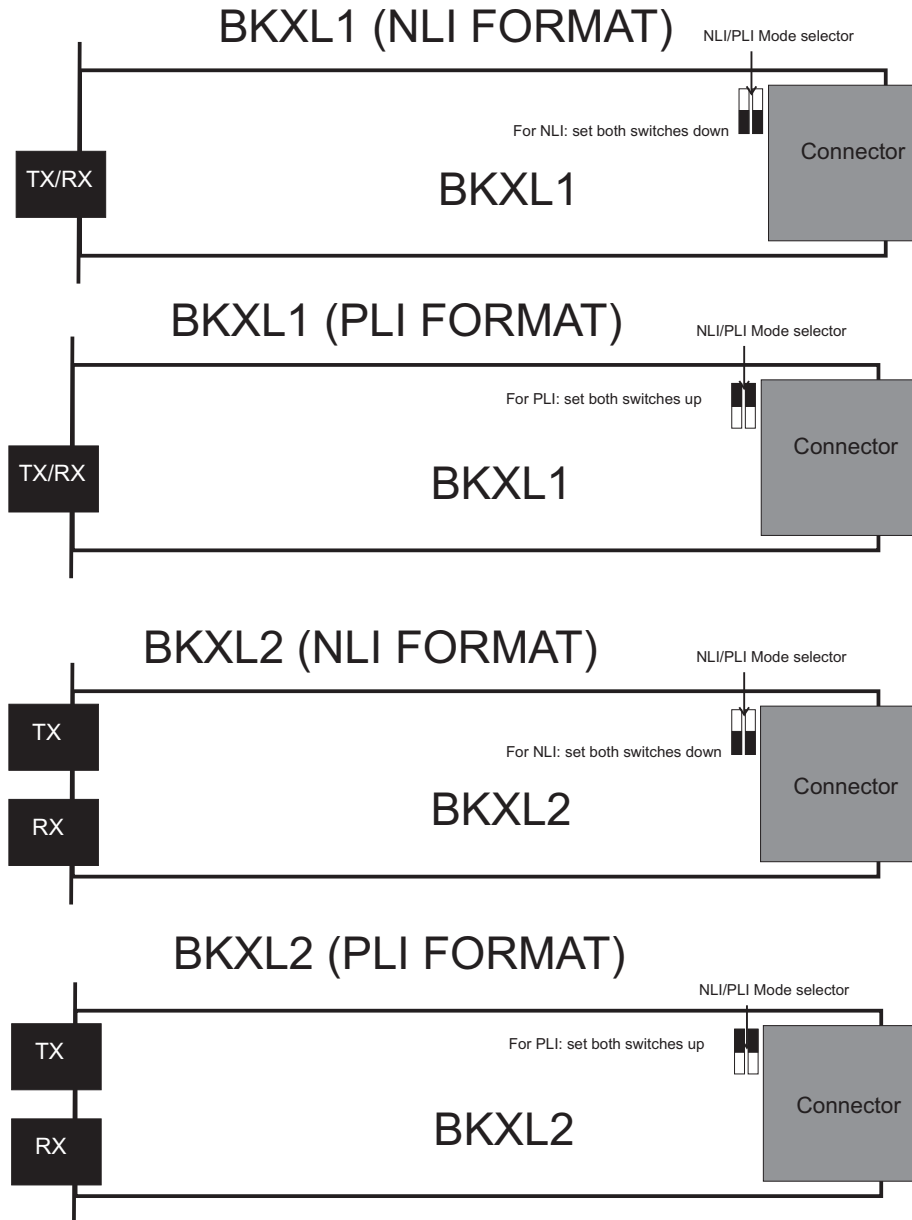


Figure 8.10-1 — SM-XC BKXL1 and BKL2 Format

9. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.

For PLI:

Note: There are no remove/restore commands for the PLI. For DNU(s), the PLI(s) follow the parent DNUSCD pack. For a PLI associated with a DNU-S, to remove/restore the PLI, remove/restore the DNUSCD. Refer to MCC Page 1510.

Note: There are no remove/restore commands for the PLI associated with an OIU. For an OIU, the PLI(s) follow the parent OFI pack. For a PLI associated with an OIU, to remove/restore the PLI, remove/restore the OFI. Refer to MCC Page 1490.

For NLI:

At the MCC, enter:

RST:NLI=x-yy-z, where x = SM-2000 number, yy = NLI number, and z = ONTC side.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.10.3 REPLACE SM ODT FOR TN877 DLI/RLI ODT

OVERVIEW

Note: For DLI/RLI version TN877, this procedure includes additional steps that are required to ensure safe operation and installation of equipment.

PROCEDURE

1. Remove from service the Dual-Link Interface (DLI) or Remote Link Interface (RLI) associated with the ODT to be replaced.

At the MCC, enter:

RMV:DLI=x-y, where x = SM number and y = ONTC side.

2. Verify that the DLI/RLI is in the OOS state using MCC Page 1190.
3. Verify that the OOS light is on for the DLI/RLI that has been taken OOS.
4. **Caution: Before replacing a circuit pack or backside paddleboard in an SM Module Controller and Time Slot Interchange (MCTSI), Dual-Link Interface (DLI), or Remote Link Interface (RLI), remove power at the unit as follows:**

Power down the OOS DLI/RLI by pressing the OFF button on the DLI/RLI power unit circuit pack.

5. Unseat the DLI/RLI circuit pack. It is not necessary to remove the circuit pack completely from the unit.
6. Remove the power fuse from the Fuse Filter Unit (FFU) or the Modular Fuse Filter Unit (MFFU) for the associated DLI/RLI.
7. **Caution: -48 volts are on some pins in the TMS backplane near the ODT connections. When replacing paddleboards, be sure the transceiver is not damaged by contact with the -48 volt supply.**

Note the exact location of the Optical Transceiver paddleboard to be replaced and (with fiber cable still connected) unplug the paddleboard.

8. **Caution: Do not kink fiber cables. This damages the cables and causes faulty operation.**

Note: Make certain you record the exact location and removal order for the fiber cables connected to the Optical Transceiver paddleboard. You need this information to properly replace the new paddleboard.

Note the location of each fiber cable and disconnect the fiber cables from the paddleboard.

- With Biconic Optical Connectors - 982CF/CG, 982WY/TA or 982FH/TH, unscrew the biconic type connector from the paddleboard optical device.
 - For other paddleboards, release the ST-type connector locking mechanism from the paddleboard optical device.
9. Clean Optical Fiber – See Section 8.10.5 for instructions.
 10. **Caution: Make certain the paddleboard is installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins or installed upside down.**

Carefully insert the replacement paddleboard at the correct location in the frame.

11. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.
12. Replace the power fuse for FFU or MFFU.
13. Re-seat the DLI/RLI circuit pack in its original slot.
14. Apply power to the associated DLI/RLI by pressing the ON button on the associated power unit circuit pack.
15. Restore the OOS DLI/RLI associated with the paddleboard replacement.
At the MCC, enter:
RST:DLI=x-y, where x = SM number and y = ONTC side.
16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.10.4 REPLACE SM ODT FOR TN1077 OR TN1077B/C/D/E/F DLI/RLI ODT

OVERVIEW

Note: For DLI/RLI version TN1077, or TN1077B/C/D/E/F, this procedure includes additional steps that are required to ensure safe operation and installation of equipment.

PROCEDURE

1. Remove from service the Dual-Link Interface (DLI) or Remote Link Interface (RLI) associated with the ODT to be replaced.
At the MCC, enter:
RMV:DLI=x-y, where x = SM number and y = ONTC side.
2. Verify that the DLI/RLI is in the OOS state using MCC Page 1190.
3. Verify that the OOS light is on for the DLI/RLI that has been taken OOS.

4. **Caution: Before replacing a circuit pack or backside paddleboard in an SM Module Controller and Time Slot Interchange (MCTSI), Dual-Link Interface (DLI), Remote Link Interface (RLI), or any Administrative Module (AM) or Communication Module (CM) unit, remove power at the unit as follows:**

Power down the OOS DLI/RLI by pressing the OFF button on the DLI/RLI power unit circuit pack.

5. Unseat the DLI/RLI circuit pack. It is not necessary to remove the circuit pack completely from the unit.
6. **Caution: -48 volts are on some pins in the TMS backplane near the ODT connections. When replacing paddleboards, be sure the transceiver is not damaged by contact with the -48 volt supply.**

Note the exact location of the Optical Transceiver Paddleboard to be replaced and (with fiber cable still connected) unplug the paddleboard to be replaced.

7. **Caution: Do not kink fiber cables. This damages the cables and causes faulty operation.**

Note: Make certain you record the exact location and removal order for the fiber cables connected to the Optical Transceiver Paddleboard. You need this information to properly replace the new paddleboard.

Note location of each fiber cable and disconnect fiber cables from paddleboard.

- With Biconic Optical Connectors - 982CF/CG, 982WY/TA, or 982FH/TH, unscrew the biconic type connector from the paddleboard optical device.
- For other paddleboards, release the ST-type connector locking mechanism from the paddleboard optical device.

8. Clean Optical Fiber – See Section 8.10.5 for instructions.
9. **Caution: Make certain the paddleboard is installed in the correct location. The paddleboard can be damaged if it is inserted on the wrong pins or installed upside down.**

Carefully insert the replacement paddleboard at the correct location in the frame.

10. Connect fiber cables to the replacement paddleboard at points identical to the cable connections made at the original paddleboard. These connections should also be made in the same order as when they were removed from the original paddleboard.
11. Re-seat the DLI/RLI circuit pack in its original slot.
12. Apply power to the associated DLI/RLI by pressing the ON button on the associated power unit circuit pack.
13. Restore the OOS DLI/RLI associated with the paddleboard replacement.
- At the MCC, enter:
- RST:DLI=x-y, where x = SM number and y = ONTC side.
14. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

8.10.5 CLEAN OPTICAL FIBER

OVERVIEW

Replacing LDTs involves cleaning the optical fiber. The connector tip and the housing around the glass fiber must be thoroughly cleaned. Cleaning the fiber is done to ensure that signal performance is not affected. Unclean fiber heads can lead to degradation in overall system operation. Below are the materials required and procedures to follow when cleaning optical fiber.

Cleaning Materials

- Canned Air, when cleaning any optical parts always hold canned 3 inches away. Air Can is optional. Optical parts can be left to dry for 30 seconds before placing it back into circuit.
- Cotton Tipped Swabs.
- Wipes Moistened with (Isopropyl alcohol).

PROCEDURE

1. Clean optical tip with a wipe moistened with alcohol and blow dry with canned air.
2. Clean the end and sides of the connector ferrule with wipe moistened with alcohol and blow dry with canned air.
3. For Biconic Type Only: Clean the coupling/buildout by placing a wipe moistened with alcohol over a cotton tipped swab and rotate while placing inside the coupling. Then blow dry with canned air.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 8.10-1 — Lightwave Data Transceiver Vintages and Locations With Biconic Threaded Optical Connection

COMPLEX	UNIT	J-CODE	CKT PACK ^a	LDT TYPE	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
CM1 MSGS	MICU	J5D006AA-1	TN834	982CG	126-113	126-113
				982CF	126-100	126-100
CM1 MSGS	MICU2	J5D006ED-1	TN834	982CF	120-113	120-113
				982CF	120-100	120-100
CM1 TMS	TMCU	J5D001AA-1	TN252	982CG	086-100	086-100
				982CF	086-113	086-113
CM1 TMS	TMSU	J5D001AB-1	TN243	982CG	XXX-145	XXX-145
				982CG	XXX-100	XXX-100
				982CF	XXX-113	XXX-113
				982CF	XXX-132	XXX-132
				982TA ^b	XXX-132	XXX-132
				982W ^b	XXX-100	XXX-100
CM2 TMS	TMSU2	J5D020AD-1	TN883	982FH(1A)	088-145	088-145
				982TH ^b	088-132	088-132
	TMSU3	J5D020AG-1	TN888	982FH(1A)	XXX-145	XXX-145
				982FH(1A)	XXX-113	XXX-113
MISC	TRCU-1	J5D003ED-1	TN1344	982CG	026-145	154-145
				982CG	042-145	170-145
				982CG	066-145	114-145
				982CG	082-145	130-145
				982CF	026-132	154-132
				982CF	042-132	170-132
				982CF	066-132	114-132
				982CF	082-132	130-132
MISC	TRCU-2	J5D003ED-2	TN1345	982CG	022-145	138-145
				982CG	030-145	146-145
				982CG	038-145	154-145
				982CG	046-145	162-145
				982CF	022-132	138-132
				982CF	030-132	146-132
				982CF	038-132	154-132
				982CF	046-132	162-132
SM/RSM	TSIU	J5D003AB-1	TN834	982CG	032-113	132-113
				982CG	056-113	156-113
				982CF	032-100	132-100

See note(s) at end of table.

Table 8.10-1 — Lightwave Data Transceiver Vintages and Locations With Biconic Threaded Optical Connection (Contd)

COMPLEX	UNIT	J-CODE	CKT PACK ^a	LDT TYPE	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
				982CF 982TA ^b 982TA ^b	056-100 032-100 056-100	156-100 132-100 156-100
SM/RSM	MCTU	J5D003EC-1	TN1077	982CG 982CG 982CF 982CF 982TA ^b 982WY ^b	084-345 084-300 084-332 084-313 084-332 084-300	098-345 098-300 098-332 098-313 098-332 098-300
SM/RSM	MCTU	J5D003EC-1	TN1077B, C, D, E, F	982CG 982CG 982CF 982CF 982TA ^b 982WY ^b	084-345 084-300 084-332 084-313 084-332 084-300	098-345 098-300 098-332 098-313 098-332 098-300
SM/RSM	MCTU2	J5D003LA-1	TN1077B, C, D, E, F	982CG 982CG 982CF 982CF 982TA ^b 982WY ^b	156-345 156-300 156-332 156-313 156-332 156-300	156-345 156-300 156-332 156-313 156-332 156-300
RSM	FIU2	J5D003AP-2	TN834	982CG 982CG 982CF 982CF	046-113 076-113 046-100 076-100	136-113 166-113 136-100 166-100
RSM	FIU3	J5D003AP-3	TN1510	982CG 982CG 982CF 982CF	036-345 036-300 036-332 036-313	126-345 126-300 126-332 126-313
Note(s): a. Circuit Pack Code that interfaces directly with the LDT. b. Used for Transmissionless Remote Module (TRM) Applications.						

Table 8.10-2 — Lightwave Data Transceiver Vintages and Locations With Bayonet 'ST' Type Twist Lock Optical Connection

COMPLEX	UNIT	J-CODE	CKT PACK ^a	LDT TYPE/ NAME	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
CM1 MSGS	MICU	J5D006AA-1	TN834	982TRAA-5 982TRC	126-100	126-100
CM1 MSGS	MICU2	J5D006ED-1	TN834	982TRAA-5 982TRC	120-100	120-100
CM1 TMS	TMCU	J5D001AA-1	TN252	982TSAA-5 982TSC	086-100	086-100
CM1 TMS	TMSU	J5D001AB-1	TN243	982TRAA-5 982TRC 982TSAA-5 982TSC	XXX-132 XXX-100	XXX-132 XXX-100
CM2 TMS	TMSU2 TMSU3	J5D020AD-1 J5D020AG-1	TN883 TN888 TN1681	982TT,TTC 982TT,TTC 982TT,TTC BKF1-COT	088-132 XXX-132 XXX-100 XXX-100	088-132 XXX-132 XXX-100 XXX-100
CM2C	CMU	J5D020AJ-1	TN1830	982TSC 982TRC 982TSC 982TRC	160-300 160-332 168-300 168-332	160-300 160-332 168-300 168-332
MISC	TRCU-1	J5D003ED-1	TN1344	982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC	022-132 030-132 038-132 046-132	138-132 146-132 154-132 162-132
MISC	TRCU-2	J5D003ED-2	TN1345	982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC 982TR,TRA, TRAA-5,TRC	026-132 042-132 066-132 082-132	154-132 170-132 114-132 130-132
SM/RSM	TSIU	J5D003AB-1	TN834	982TRAA-5 982TRC 982TRAA-5	032-100 056-100	132-100 156-100

See note(s) at end of table.

Table 8.10-2 — Lightwave Data Transceiver Vintages and Locations With Bayonet
 'ST' Type Twist Lock Optical Connection (Contd)

COMPLEX	UNIT	J-CODE	CKT PACK ^a	LDT TYPE/ NAME	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
				982TRC		
SM/RSM	TSIU	J5D003AT-1	TN877	982TRAA-5 982TRC 982TSAA-5 982TSC	084-332 084-300	100-332 100-300
SM/RSM	MCTU	J5D003EC-1	TN1077	982TRAA-5 982TRC 982TSAA-5 982TSC	084-332 084-300	098-332 098-300
SM/RSM	MCTU	J5D003EC-1	TN1077B, C, D, E, F	982TR,TRA, TRAA-5,TRC 982TS,TSA, TSAA,TSC	084-332 084-300	098-332 098-300
SM/RSM	MCTU2	J5D003LA-1	TN1077B, C, D, E, F	982TR,TRA, TRAA-5,TRC 982TS,TSA TSAA-5,TSC	156-332 156-300	156-332 156-300
SM/RSM	MCTU3	J5D003LB-1	TN1077E, F	982TRC 982TSC	084-332 084-300	176-332 176-300
RSM	FIU2	J5D003AP-2	TN834	982TRAA-5 982TRC 982TRAA-5 982TRC	046-100 076-100	136-100 176-100
RSM	FIU3	J5D003AP-3	TN1510	982TR,TRA, TRAA-5,TRC 982TS,TSA, TSAA-5,TSC	036-332 036-300	126-332 126-300
SM2K	TSIU4	J5D003NB-1	KLU1- TSIS	BKD1- NLI BKD2- PLI BKD7- NLI1	PORT 02-39 PORT 04-39 PORT 02-03	PORT 02-39 PORT 04-39 PORT 02-03

See note(s) at end of table.

Table 8.10-2 — Lightwave Data Transceiver Vintages and Locations With Bayonet 'ST' Type Twist Lock Optical Connection (Contd)

COMPLEX	UNIT	J-CODE	CKT PACK ^a	LDT TYPE/ NAME	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
SM2K	TSIU4-2	J5D003NB-2	KLU1- TSIS	BKD1-	PORT	PORT
				NLI	02-39	02-39
				BKD2-	PORT	PORT
				PLI	04-39	04-39
				BKD7-	PORT	PORT
				NLI1	02-03	02-03
				BKD10 - PLI	PORT 04-39	PORT 04-39
SM2K	DNU-S	J5D003FR-1	KLU3- CD	982TN-	XXX-	XXX-
				COTD	X00X	X00X
				982TN-	XXX-	XXX-
				COTD	X00T ^b	X00T ^b
				982TN-	XXX-	XXX-
				COTD	X32T	X32T
				982TN-	XXX-	XXX-
				COTD	X00B ^b	X00B ^b
				982TN-	XXX-	XXX-
COTD	X32B	X32B				
<p>Note(s):</p> <p>a. Circuit Pack Code that interfaces directly with the LDT.</p> <p>b. 00T/00B = Top Shelf of Unit or Bottom Shelf of Unit.</p>						

Table 8.10-3 — Lightwave Data Transceiver Vintages and Locations With SC-Type Optical Connection

COMPLEX	UNIT	J-CODE	CKT PACK	LDT TYPE/ NAME	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
CM3 TMS	CMU2	J5D020C-1	N/A	MMA1 MMA2	See Figure 8.10-2	
	TMSU4	J5D020C-1	N/A	MMA1 MMA2	See Figure 8.10-3	

Table 8.10-4 — Lightwave Data Transceiver Vintages and Locations With MTRJ-Type Optical Connection

COMPLEX	UNIT	J-CODE	CKT PACK	LDT TYPE/ NAME	SIDE 0 LOCATION (POSITION and PIN)	SIDE 1 LOCATION (POSITION and PIN)
CM3 TMS	CMU2	J5D020C-1	N/A	MMA3	See Figure 8.10-2	
	TMSU4	J5D020C-1	N/A	MMA3	See Figure 8.10-3	

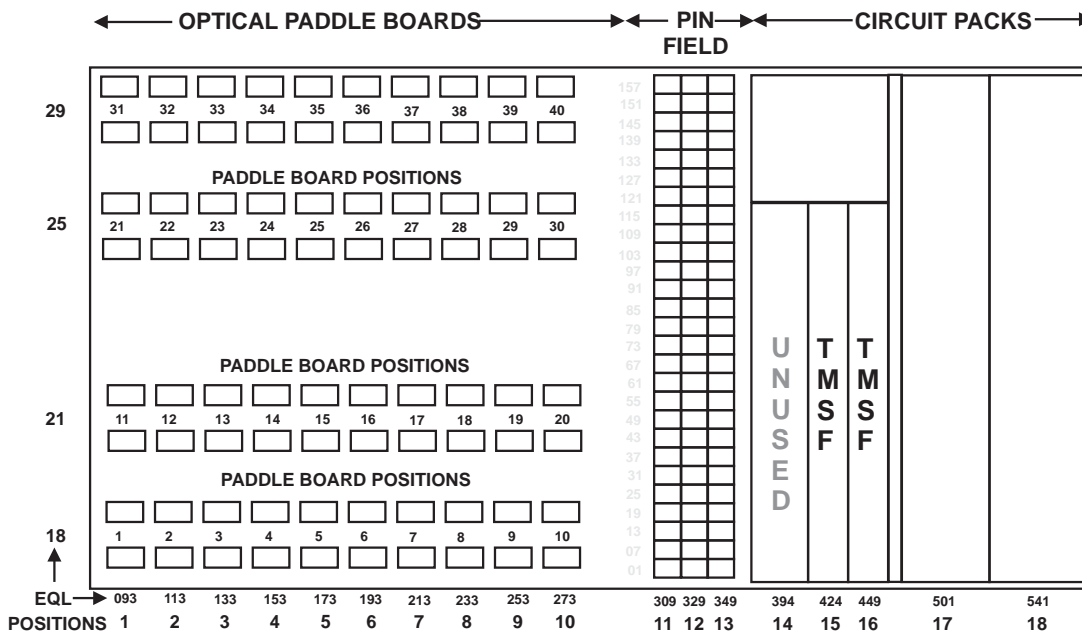


Figure 8.10-2 — CMU2 Optical Paddle Board Layout

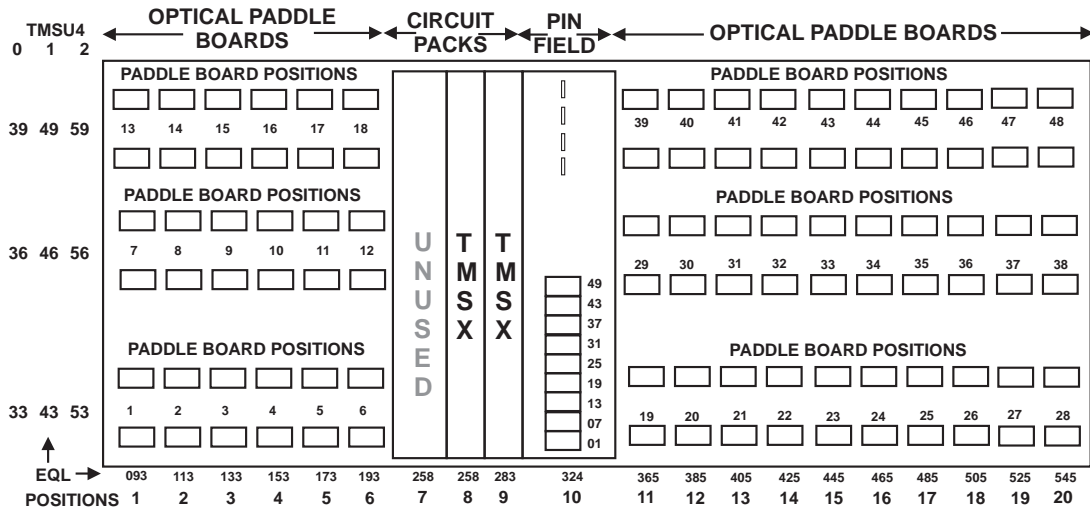
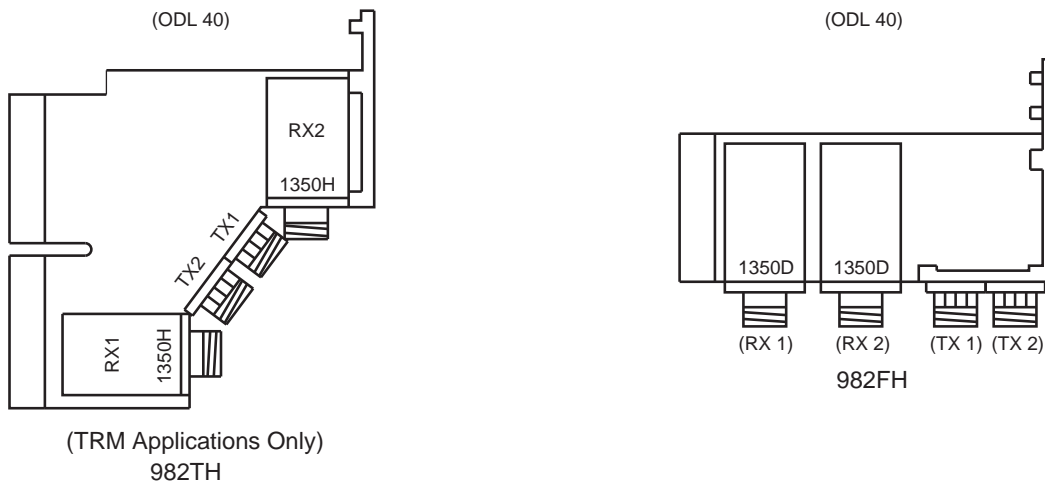


Figure 8.10-3 — TMSU4 Optical Paddle Board Layout



COMPLEX	UNIT
CM2 TMS	TMSU2
CM2 TMS	TMSU3

Figure 8.10-4 — Lightwave Data Transceivers (1 of 8)

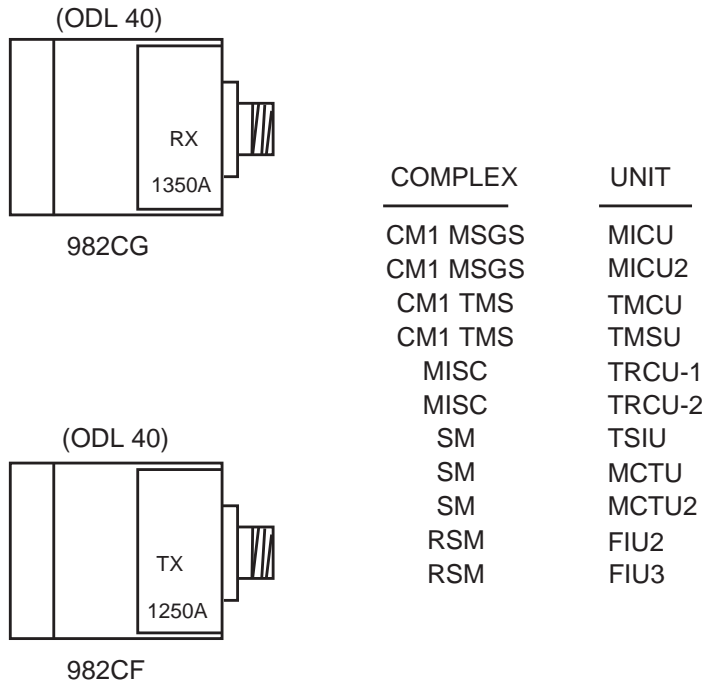


Figure 8.10-4 — Lightwave Data Transceivers (2 of 8)

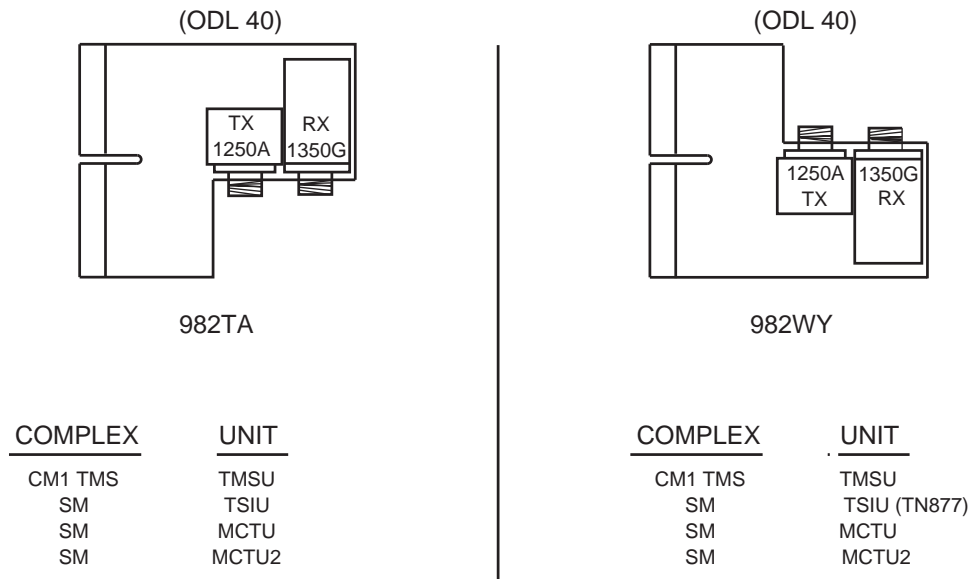
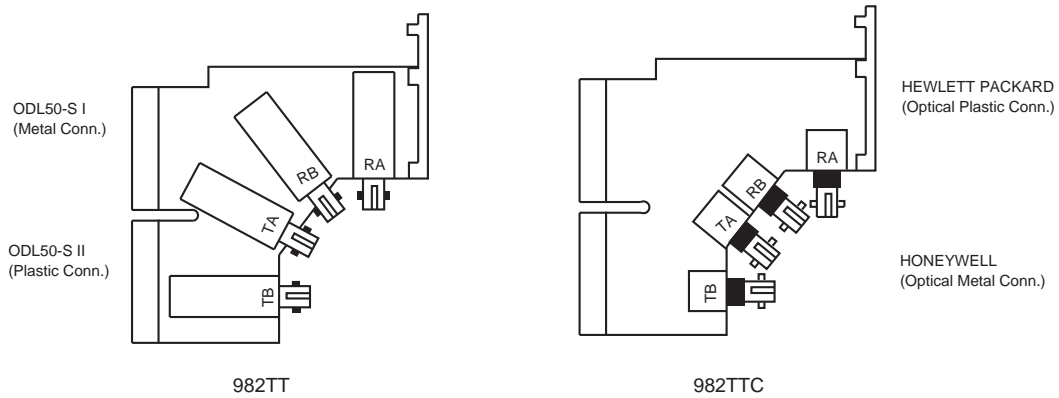
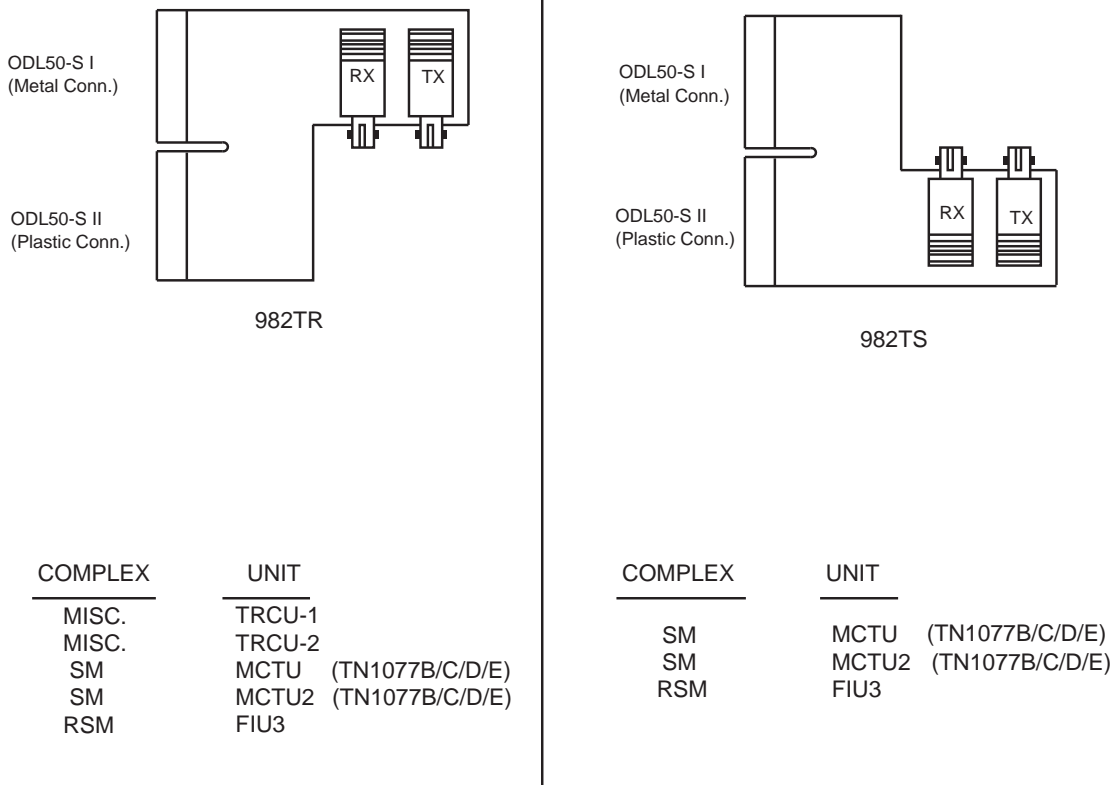


Figure 8.10-4 — Lightwave Data Transceivers (3 of 8)



COMPLEX	UNIT
CM2 TMS	TMSU2
CM2 TMS	TMSU3

Figure 8.10-4 — Lightwave Data Transceivers (4 of 8)



COMPLEX	UNIT
MISC.	TRCU-1
MISC.	TRCU-2
SM	MCTU (TN1077B/C/D/E)
SM	MCTU2 (TN1077B/C/D/E)
RSM	FIU3

COMPLEX	UNIT
SM	MCTU (TN1077B/C/D/E)
SM	MCTU2 (TN1077B/C/D/E)
RSM	FIU3

Figure 8.10-4 — Lightwave Data Transceivers (5 of 8)

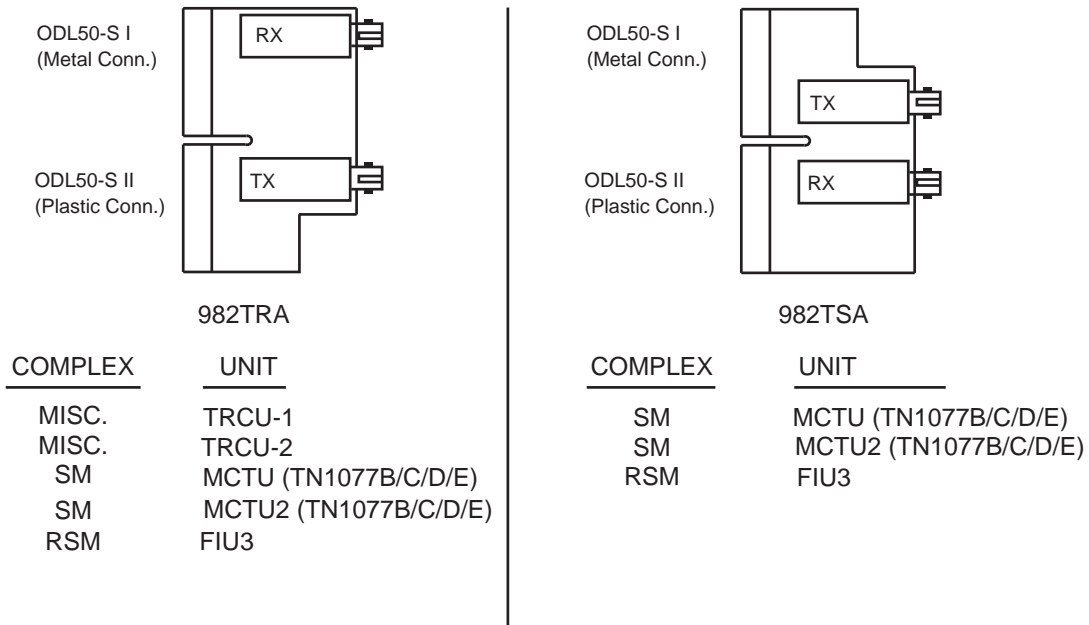


Figure 8.10-4 — Lightwave Data Transceivers (6 of 8)

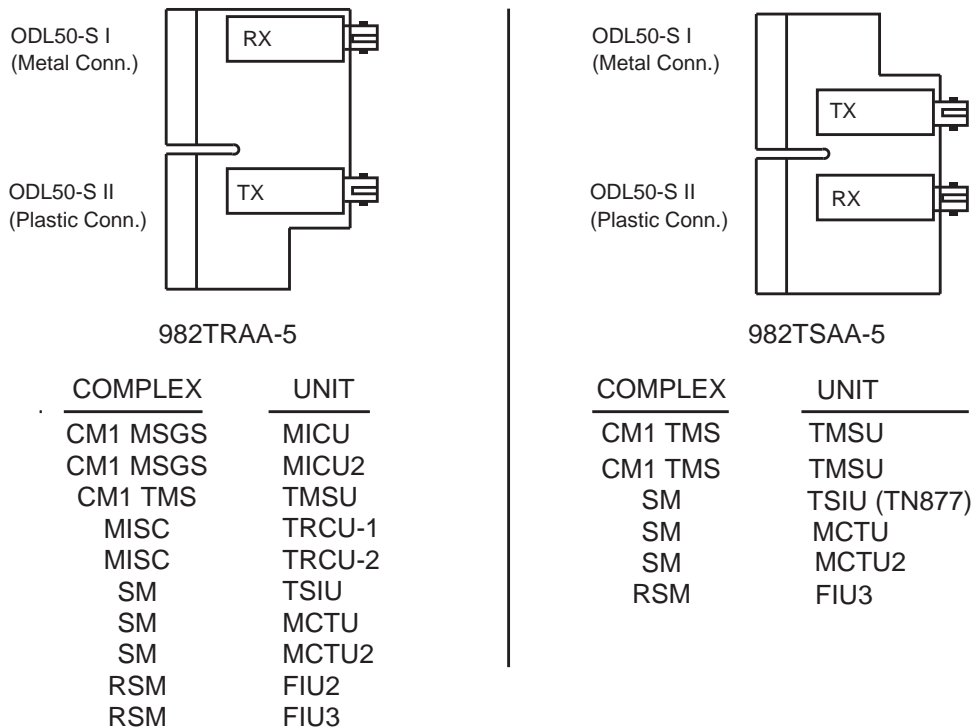


Figure 8.10-4 — Lightwave Data Transceivers (7 of 8)

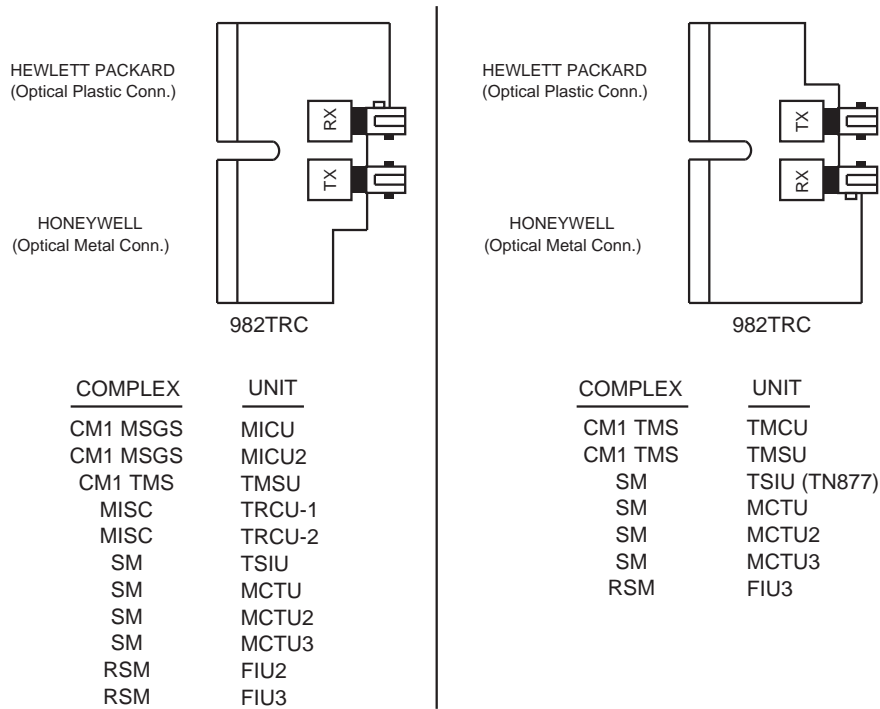


Figure 8.10-4 — Lightwave Data Transceivers (8 of 8)

SIDE 1 SM 003

55	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	
PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07	PORT 03	
180	172	164	156	148	138	130	122	114	106	
51	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	
PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06	PORT 02	
180	172	164	156	148	138	130	122	114	106	
47	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD4
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK		
PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05		
180	172	164	156	148	138	130	122	114	106	
43	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK		
PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04		
180	172	164	156	148	138	130	122	114		

Figure 8.10-5 — TSIU4 Wiring Side Label Stamping Side 1 Instructions

SIDE 0 SM 003

BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 02
PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07	PORT 03	PORT 03
092	084	076	068	060	050	042	034	026	018	018
BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 00
PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06	PORT 02	PORT 02
092	084	076	068	060	050	042	034	026	018	018
BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD4
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 04	
PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05	PORT 05	
092	084	076	068	060	050	042	034	026	018	018
BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 06	
PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04	PORT 04	
092	084	076	068	060	050	042	034	026	018	

Figure 8.10-6 — TSIU4 Wiring Side Label Stamping Side 0 Instructions

SIDE 1 SM 003

55	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	
PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07	PORT 03	
183	175	167	159	151	143	135	127	119	111	
51	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	
PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06	PORT 02	
183	175	167	159	151	143	135	127	119	111	
47	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD4
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK		
PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05	PORT 01	
183	175	167	159	151	143	135	127	119	111	
43	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	
	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK		
PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04		
183	175	167	159	151	143	135	127	119		

Figure 8.10-7 — TSU4-2 Wiring Side Label Stamping Side 1 Instructions

SIDE 0 SM 003

BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 02
PORT 39	PORT 35	PORT 31	PORT 27	PORT 23	PORT 19	PORT 15	PORT 11	PORT 07	PORT 03	
101	093	085	077	069	061	053	045	037	029	
BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD7
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	982YE	982YE	982YE	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 00
PORT 38	PORT 34	PORT 30	PORT 26	PORT 22	PORT 18	PORT 14	PORT 10	PORT 06	PORT 02	
101	093	085	077	069	061	053	045	037	029	
BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD4
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 04
PORT 37	PORT 33	PORT 29	PORT 25	PORT 21	PORT 17	PORT 13	PORT 09	PORT 05	PORT 01	
101	093	085	077	069	061	053	045	037	029	
BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1	BKD1
BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	BKD2	
BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	BKD10	
DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	DX CA	
LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	LINK	NLI LINK 06
PORT 36	PORT 32	PORT 28	PORT 24	PORT 20	PORT 16	PORT 12	PORT 08	PORT 04	PORT 00	
101	093	085	077	069	061	053	045	037	029	

Figure 8.10-8 — TSIU4-2 Wiring Side Label Stamping Side 0 Instructions

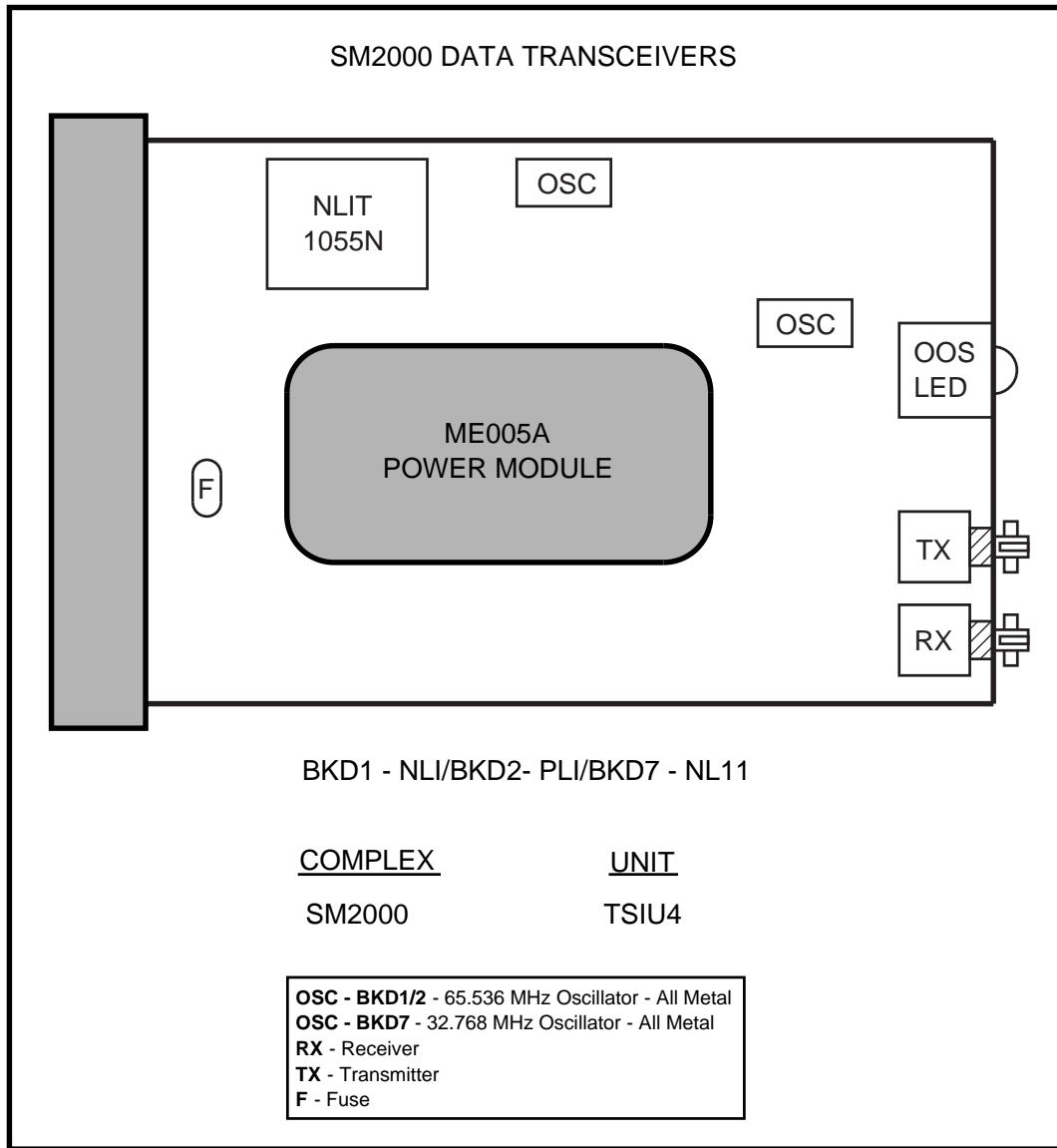
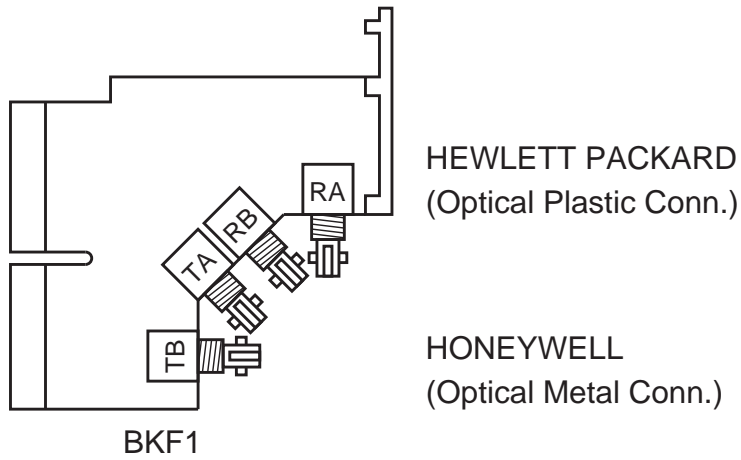
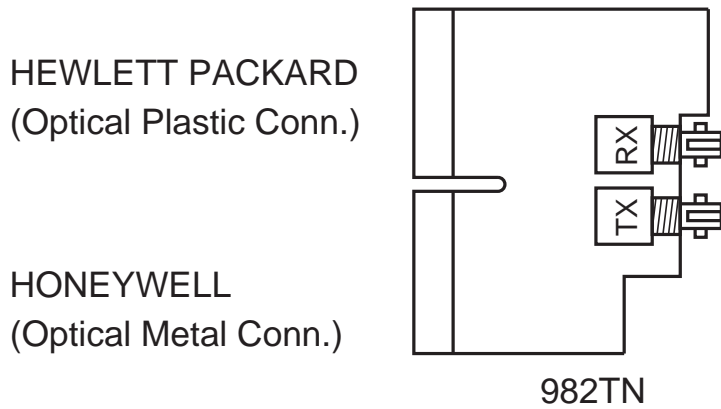


Figure 8.10-9 — SM-2000 Data Transceivers



<u>COMPLEX</u>	<u>UNIT</u>
CM2 TMS	TMSU2
CM2 TMS	TMSU3

Figure 8.10-10 — COT - CM2 Optical Transceiver



<u>COMPLEX</u>	<u>UNIT</u>
SM2K	DNUS

Figure 8.10-11 — Optical Transceivers - DNU-S

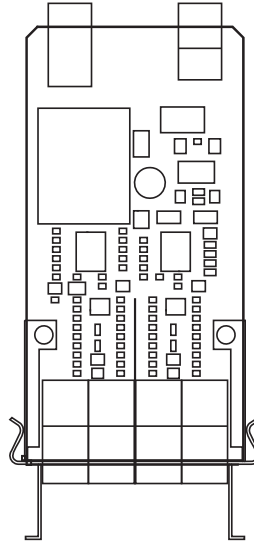


Figure 8.10-12 — MMA1 Optical Paddleboard

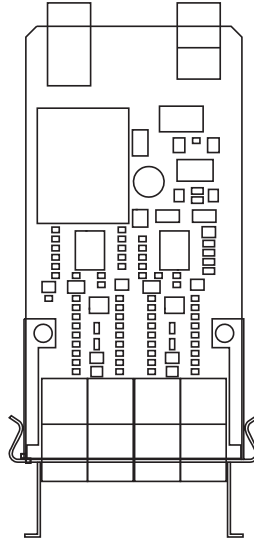


Figure 8.10-13 — MMA2 Optical Paddleboard

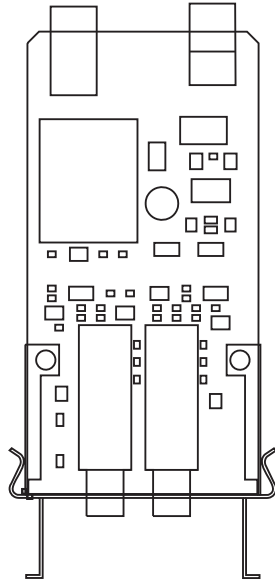


Figure 8.10-14 — MMA3 Optical Paddleboard

Corrective Maintenance Procedures

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9. ANALOG AND DIGITAL LINE TESTS

PURPOSE

The procedures in this section are used to perform maintenance on analog and digital line units. Always start with Procedure [9.2](#).

9.1 ANALYZE AND RESOLVE OUT-OF-SERVICE LINE LIST ENTRIES

OVERVIEW

This procedure is used to analyze and resolve line trouble conditions that are reported by an **OP LIST LINES** output message.

PROCEDURE

1. **Note 1:** In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently-supported *TLWS Job Aids*, 235-105-220JXX (where XX is a currently-supported software release) be used to obtain the appropriate 4-digit poke command number.

Note 2: In this procedure, if reference is made to the use of an input or output message, it is advised that 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, be used to obtain the appropriate format(s) associated with the message.

At the Receive-Only Printer (ROP), obtain any **OP LIST LINES** output message(s).

2. For each out-of-service (OOS) line, identify the following that applies:
 - DN – either the line directory number
 - LEN – the line equipment number
 - SLEN – the subscriber loop carrier LEN
 - LCEN – the line card equipment number
 - ILEN – the integrated digital carrier unit (IDCU) line equipment number
 - INEN – the integrated digital loop carrier (IDLC) networking equipment number
3. From information contained in the **OP LIST LINES** output messages, determine the cause of the line status being OOS.
4. Refer to the OP:LIST Output Manual page and APP:PORT-STATUS appendix in 235-600-750, *Output Messages*, for appropriate recovery procedures.
5. Repeat Steps 3 and 4 for the remaining OOS lines on the OOS lines list.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.2 LINE MAINTENANCE

General

This procedure is used with the currently-supported *TLWS Job Aids, 235-105-220JXX* (where *XX* is a currently-supported software release), to clear line problems reported by the switch, customer complaints, manual line tests, repair service bureau trouble tickets, etc. The types of problems that may be encountered include a noisy line, no dial tone, clicking noises, line drops off, etc.

Note: There are tests that can be performed on an analog line only, tests that can be performed on a digital line only, and tests that can be performed on either an analog or digital line.

Line Per-Call Failure Reports

The **REPT PCTF** output message reports the type of per-call test failure as follows:

- a. Low-Line Resistance (LLR) failure
- b. Line-Security Scan (LSS) failure
- c. Power Cross (PX) failure
- d. Ringing Continuity Failure (RCF)
- e. Restore and Verify Failure (RVF)
- f. Touch-Tone Fraud (TTF) failure
- g. High and Wet Ground (HW GRD) fault.

Automatic Line Insulation Test Reports

The Automatic Line Insulation Testing (ALIT) identifies the different types of line problems as follows:

- a. Foreign Electromotive Force (FEMF)
- b. Short Circuit and Ring to Ground (SRG)
- c. Tip and Ring to Ground (TRG).

Automatic Line Evaluation

The Automatic Line Evaluation (ALE) feature provides continuous, nonservice-affecting monitoring of Digital Subscriber Line (DSL) performance. The ALE detects and records faults at the following:

- a. Layer 1 (U-DSL only)
- b. Layer 2
- c. Layer 3 [Protocol Error Records (PERs)].

Master Control Center (MCC) Video Terminal Display Pages

Line maintenance uses the following MCC video display pages:

160 - TEST POSITION STATUS SUMMARY

160,X - TEST POSITION SUMMARY X, where X = 1, 2, 3, or 4 may be used to gain access to any of the following data:

- **161,X[,Y] - SELECT/DISPLAY TEST POSN X** where X = (1-32) and Y = (1-32)

Where:

TP = One of several Test Positions; each having several display pages

TLWS LOCATION = Trunk and Line Work Station location, where the MCC resides. The TLWS location is central office definable.

DEV = Displays the device location identification of the MCC.

ID = Logical identification of TLWS resources that may be specified with the **Y** option.

LINE/TRUNK DATA = Displays directory number (DN) being tested for lines and trunks.

TEST ACCESS = Displays the type of test connection (for example, metallic, transmission, or AC/DC jacks).

T&M = Displays the status of the talk and monitor (T&M) phone.

Note: The **160** page is not required but is provided to gain access to the **161,X** page. The **161,X** may be entered from other pages (for example, 1000) to gain access to a test position. It is still necessary to return to the **160,X** page to release the test position.

- **201,X – RELEASE TEST POSN X** where **X** = (1-32).

The MCC video display page **161,X – TEST POSITION X** provides poke commands to seize and conduct tests on lines and trunks, and then displays the test results. The task selection screens provided for lines are as follows:

- **4000[,X]** – Allows display of TASK SELECTION – SEIZE LINE/TRUNK/INCOMING CALL screens where **X** = screen number.
X = 4000,1 or 4000,2.
- **5000[,X]** – Allows display of TASK SELECTION – TRANSMISSION screens where **X** = screen number.
X = 5000,1, 5000,2, or 5000,3
- **5200[,X]** – Allows display of TASK SELECTION – SUPERVISION screens where **X** = screen number.
One 5200 screen applies.
- **5400[,X]** – Allows display of TASK SELECTION – AUTOMATIC screen where **X** = screen number.
X = 5400,1, 5400,2, 5400,3, or 5400,4.
- **5600** – Allows display of TASK SELECTION – METALLIC MEASUREMENTS via the Directly Connected Test Unit (DCTU), screens where the following applies:
One 5600 screen applies for analog or digital lines and one 5600 screen applies for coin lines.
- **5700** – Allows display of TASK SELECTION – METALLIC MEASUREMENTS via the Subscriber Line Instrument Measurement (SLIM), screens where the following applies:
One 5700,1 screen applies for analog or digital lines, one 5700,1 screen applies for coin lines, and one 5700,2 screen applies for off-hook tests of lines.

- **5800** – Allows display of TASK SELECTION – JACKS screens where the following applies:
One 5800 screen applies for analog lines, coin lines, or digital lines.
- **8000** – Displays the major test categories.
- **9000[X]** – Allows display of MISCELLANEOUS TLWS COMMANDS screens where the following applies:
X = 9000,1 or 9000,2
One 9000 screen applies for analog lines, coin lines, or digital lines.
Note: Some of the commands that appear on the 9000 screen apply to both lines and trunks, and some of these commands also appear on more than one screen. When identical commands appear on more than one screen, they may be input from the applicable screen being viewed.
- **9200** – Allows display of TASK SELECTION – CPE TESTS screen where one 9200 page applies for digital subscriber lines.
- **9201** – Allows display of TASK SELECTION – CPE USPID TESTS.

All available tests and poke commands may be entered from the task selection pages. The poke commands and their corresponding functions are identified and defined in 235-105-110, *System Maintenance Requirements and Tools*. In addition, the currently-supported *TLWS Job Aids*, 235-105-220JXX (where XX is a currently-supported software release), are also available as a “quick access” reference for poke commands.

Error messages that may occur during the use of the poke commands are defined in 235-600-750, *Output Messages*, Appendix APP:TLWS.

Before You Begin

Note 1: In the procedures referenced by the following steps, poke commands are provided for MCC terminal use in testing at the TLWS facilities. At locations where an MCC terminal is not available, use the appropriate input message provided in 235-600-700, *Input Messages*.

Note 2: Any of the referenced procedures may be performed in any order (as required), regardless of the order listed.

PROCEDURE

1. The procedures referenced in the following substeps apply to either analog or digital lines. To isolate a trouble condition associated with an analog line or digital line, select the appropriate procedure identified in the following substeps. Or refer to Step 2 (analog-only line tests) and Step 3 (digital-only line tests).
 - (a) Calibrating TLWS Measurements – Procedure 17.2.
 - (b) Analyze and Resolve OOS Line List Entries – Procedure 9.1.
 - (c) Analyze and Clear a Line Having a Subscribing Customer Complaint – Procedure 9.3.
 - (d) Perform Metallic Tests on an On-Hook Line Using DCTU – Procedure 9.4.
 - (e) Perform Distance-to-Open Measurement on an On-Hook Line Using DCTU – Procedure 9.5.

- (f) Network Termination (NT1)/Channel Unit (CU) Mismatch Test – Procedure [9.6](#).
 - (g) Perform Tests on a Packet Switching Modem Pool Access Line – Procedure [9.7](#).
 - (h) (R)ISLU Line Card Sparing – Procedure [11.7](#).
 - (i) IDCU TR303 Remote Terminal Provisioning – Procedure [9.8](#).
 - (j) Perform Scheduling of Subscriber Line Instrument Measurement (SLIM) Automatic Tests – Procedure [9.9](#).
 - (k) Perform Metallic Tests on an On-Hook Line Using SLIM – Procedure [9.10](#).
 - (l) Perform Distance-to-Open Measurement on an On-Hook Line Using SLIM – Procedure [9.11](#).
 - (m) Perform Off-Hook Tests Using SLIM – Procedure [9.12](#).
2. The procedures referenced in the following substeps apply to analog lines only. To isolate a trouble condition associated with an analog line, select the appropriate procedure identified in the following substeps.
- (a) Analog Coin Phone Test to Perform Near-to-Far-End Check of Line State (via DCTU) – Procedure [10.1](#).
 - (b) Analog Line Signaling Checks – Procedure [10.3](#).
 - (c) Analog Line Status Check of Busy Line – Procedure [10.4](#).
 - (d) Analog Ringer Count Check on an On-Hook Line Using the DCTU – Procedure [10.2](#).
 - (e) Analog Station Ringer Touch-Tone Test for a Directory Number – Procedure [10.5](#).
 - (f) Analog Station Ringer Touch-Tone Test for an MLHG – Procedure [10.6](#).
 - (g) Analog Coin Phone Test to Perform Near-to-Far-End Check of Line State (via SLIM) – Procedure [10.7](#).
3. The procedures referenced in the following substeps apply to digital lines only. To isolate a trouble condition associated with a digital line, select the appropriate procedure identified in the following substeps.
- (a) Digital Subscriber Line BRI Integrity Tests – Procedure [11.1](#).
 - (b) Automatic Line Evaluation of a Digital Subscriber Line – Procedure [11.2](#).
 - (c) Protocol Monitoring of a Digital Subscriber Line – Procedure [11.3](#).
 - (d) Basic Rate Interface (BRI) Dial-Up Test Line – Procedure [11.4](#).
 - (e) Basic Rate Interface (BRI) Access to the 108 Test Line – Procedure [11.5](#).
 - (f) Basic Rate Interface Verification (BRIV) – Procedure [11.6](#).
 - (g) Analyze TLWS Response for Integrated Digital Carrier Unit (IDCU) Fiber to the Home (FTTH) – Procedure [11.10](#).
 - (h) Embedded Operations Channel/Timeslot Management Channel (EOC/TMC) Protocol Monitoring – Procedure [11.11](#).

- (i) EOC/TMC Automatic Line Evaluation – Procedure [11.12](#).
- (j) EOC/TMC Duplex Failure Restoral – Procedure [11.9](#).

9.3 ANALYZE AND CLEAR A LINE HAVING A SUBSCRIBING CUSTOMER COMPLAINT

OVERVIEW

This procedure is used to troubleshoot lines having a trouble condition such as no dial tone, noise, crosstalk, restricted service, etc. These trouble conditions are normally reported by a subscribing customer report, or may be reported via an output message on the receive-only printer (ROP).

Note 1: If a reference is made to entering a poke command, refer to *TLWS Job Aids*, 235-105-220JXX (where XX is a currently-supported software release), to obtain the appropriate four-digit poke command number.

Note 2: If a reference is made to an input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, and job aids to obtain the appropriate format associated with the message.

Note 3: *One cause of no dial tone is an active process ID.* Use **TRC:UTIL** to see if an active process is on the line [For an ISDN line, check the B-channel(s)]. If an active process is found, use **RMV:LINE,UCL** to clean up the process. Then, use **RST:LINE** to restore service to the line.

PROCEDURE

1. Use the **OP:CONV** input message to verify the consistency of the data base and to obtain the line type.
 - (a) If an error is indicated, using a recent change/verify (RC/V) video terminal, go to the appropriate RC/V view(s) and verify the line attributes by comparing those indicated on the view against those indicated on the trouble ticket. If the attributes are not correct, resolve any conflicts using RC/V and notify the trouble ticket originator of any changes (for example, incorrect assignments).
 - (b) If the line has a line card equipment number (LCEN) and its type is **U** or **T** or an integrated digital carrier unit (IDCU) line equipment number (ILEN) and its type is **U**, the line is an integrated services digital network (ISDN) line. Continue with the next step.
 - (c) If the line has (1) LCEN with type **Z**, (2) ILEN not ISDN type **U**, (3) line equipment number (LEN), or (4) subscriber loop carrier line equipment number (SLEN), go to Step 3.
 - (d) If the line has an IDCU line equipment number (ILEN) and also an ISDN line, continue with the next step.
 - (e) If the line has an ILEN and is configured as an analog line, go to Step 3.
2. Use the **OP:CPE** input message to examine the status of the customer premises equipment (CPE) assigned to a digital subscriber line (DSL). If the status indicates an out-of-service (OOS) condition, follow the recovery procedures outlined on the **OP:CPE Output Messages** page.
3. Use the **OP:STATUS** input message to verify line status. If the line status is out-of-service (OOS), refer to the APP-PORT-STATUS *Output Messages* Appendix pages and attempt to restore the line. If the line status indicates an in-service condition, the **OP:STATUS** input message should provide additional information to troubleshoot the line.

4. If the line is an IDCU line [that is, it has an IDCU line equipment number (ILEN)], then use **EXC:RT,PROV** to refresh the provisioning data in the TR303 remote terminal. Refer to Procedure **9.8**, IDCU TR303 Remote Provisioning.
5. If the line is an ISDN line, perform the following:
 - (a) Use the **EXC:ALE** input message on LEVEL1, LEVEL2, and PER together for use in further analysis. Refer to Procedure **11.2**, Automatic Line Evaluation of a Digital Subscriber Line.
 - (b) If the type of ISDN line is a T-DSL, then continue with Substep (c). Otherwise, perform Procedure **9.4**, Perform Metallic Tests on an On-Hook Line Using DCTU.
 - (c) Perform Procedure **11.1**, Digital Subscriber Line BRI Integrity Tests.
 - (d) If the Protocol Error Record (PER) is repeated, begin an **EXC:PM** input message, which triggers on the repeating PER. Refer to Procedure **11.3**, Protocol Monitoring of a Digital Subscriber Line.
6. If the line is a non-ISDN type **U ILEN** and RC/V view 18.10 screen 4 of 6 titled "Remote Terminal Fiber to the Home Resistor Values" is populated, the line could be fiber to the home (FTTH). Perform the following:
 - (a) At the trunk line work station (TLWS) video terminal, access a TLWS test position (16x) from the TLWS test position summary page (160).
 - (b) Seize the line using the appropriate poke command (4001, DN or 4008, ILEN).
 - (c) From the metallic measurement page (5600), use the poke command (5601) to determine if this line is an FTTH line.
 - (d) If the line is FTTH, go to Procedure **11.10**, Analyze TLWS Response for Integrated Digital Carrier Unit (IDCU) Fiber to the Home (FTTH).
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.4 PERFORM METALLIC TESTS ON AN ON-HOOK LINE USING DCTU

OVERVIEW

This procedure is used to measure the values of the voltage, resistance, and capacitance on an analog or digital line [U-Interface (2-wire) digital subscriber line (U-DSL) only] using the Directly Connected Test Unit (DCTU).

PROCEDURE

1. **Note 1:** If a reference is made to entering a poke command, refer to *TLWS Job Aids*, 235-105-220JXX (where XX is a currently-supported software release), to obtain the appropriate four-digit poke command number.

Note 2: Before beginning this procedure, perform Procedure 17.2, Calibrating TLWS Measurements, if the office has not been calibrated for Trunk and Line Work Station (TLWS) measurements. This can be determined by checking the RESIST field in the Recent Change/Verify (RC/V) office parameter view. If this field is 0, then all measurements are relative to the DCTU instead of the Main Distributing Frame (MDF).

Note 3: With U-type digital subscriber lines (U-DSL), the NT1 contains active circuitry that influences the capacitance values, which are used to determine the distance to open circuit (DTO).

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

At the TLWS video terminal, access a TLWS test position 161,X) from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command 4001,DN.
3. From the metallic measurement page (5600), use the poke command (5601) to get a single measurement of the voltage, resistance, and capacitance.
4. The following tables indicate the results that should be achieved at the TLWS.
 - For an Analog Line on an AIU, see Table 9.4-1.
 - For an Analog Line on an LU, see Table 9.4-2.
 - For an Analog Line on an ISLU Z, see Table 9.4-3.
 - For an Analog Line on a DCLU, see Table 9.4-4.
 - For an Analog Line on an IDCU, see Table 9.4-5.
 - For an Analog Line on a DNU-S, see Table 9.4-6.
 - For a Digital Line on an ISLU U-Card (AMI) NT1 or AMI BRITE CU AHG13, see Table 9.4-7.
 - For a Digital Line on an ISLU/ISLU2 U-DSL (ANSI¹) Lucent Technologies NT1, see Table 9.4-8.
 - For a Digital Line on an ISLU U-DSL (ANSI) BRITE CU AHG18, see Table 9.4-9.

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- For a Digital Line on an IDCU U-DSL (ANSI) Lucent Technologies NT1, see Table 9.4-10.
- For a Digital Line on an AIU U-DSL (ANSI) Lucent Technologies NT1, see Table 9.4-11.
- For a Digital Line on a DNU-S U-DSL (ANSI) Lucent Technologies NT1, see Table 9.4-12.

The voltage (AV=AC voltage and DV=DC voltage) should read “0” in all columns. The Resistance (Ko=kilohms) should read “OPEN” (a resistance value of greater than 3500K is considered open) for all columns with the exception of the U-DSL, which differs because of its NT1 circuitry. The capacitance (in micro-Farads) can range from about 0.12 to 0.225 and should be balanced as explained in the tables.

The resistance and capacitance readings indicated in the tables are typical values for short loop lengths of less than one mile. Readings of 0 or OPEN are not loop length dependent. The tip ground (TG) and ring ground (RG) capacitance values should be balanced (same value). With analog lines, the ringer of the telephone influences the reading as follows:

- (a) For a private line, the ringer is across the tip and ring (T&R) pair; therefore, the TG and RG capacitance values are balanced.
- (b) For a “tip” party, the ringer is connected across the tip and ground; therefore, the TG reading is greater than the RG reading.
- (c) For a “ring” party, the ringer is connected across the ring and ground; therefore, the RG reading is greater than the TG.

The constants used in calculating resistance and distance-to-open (capacitance) are in Tables 9.4-13 and 9.4-14.

5. Release the metallic measurement position by entering the poke command **5990**.
6. Release the line by entering the appropriate poke command **4999**.
7. Access the TLWS test position summary page (160) and release the TLWS test position (**201,X**).
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 9.4-1 — Analog Line (AIU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.080	0.080	0.157

Table 9.4-2 — Analog Line (LU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.042	0.042	0.021

Table 9.4-3 — Analog Line (ISLU Z) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.080	0.080	0.157

Table 9.4-4 — Analog Line (DCLU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.016	0.016	0.058

Table 9.4-5 — Analog Line (IDCU) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.003	0.003	0.003

Table 9.4-6 — Analog Line (DNU-S) Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.003	0.003	0.003

Table 9.4-7 — Digital Line ISLU U-Card (AMI) NT1 or AMI BRITE CU AHG13 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	4-6
μF	0.155	0.155	0.910

Table 9.4-8 — Digital Line - ISLU/ISLU2 U-DSL (ANSI) Lucent Technologies NT1 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	0.4
μF	0.155	0.155	0.997

Table 9.4-9 — Digital Line ISLU U-DSL (ANSI) BRITE CU AHG18 Acceptable Readings (DCTU Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	160 ^a	OPEN	121 ^a
μF	0.155	0.155	0.997

Note(s):

a. For the Digital Line ISLU U-DSL (ANSI) BRITE CU AHG18 values, some versions may have Ko values of TG=OPEN and T&R in the range of 110 to 140.

**Table 9.4-10 — Digital Line IDCU U-DSL (ANSI) Lucent Technologies NT1
Acceptable Readings (DCTU Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	1.9
μF	0.025	0.025	0.940

**Table 9.4-11 — Digital Line AIU U-DSL (ANSI) Acceptable Readings (DCTU
Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	0.4
μF	0.155	0.155	0.997

**Table 9.4-12 — Digital Line DNU-S U-DSL (ANSI) Lucent Technologies NT1
Acceptable Readings (DCTU Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	1.968
μF	0.020	0.021	0.964

Table 9.4-13 — Resistance in Ohms/Mile (DCTU Tests)

CABLE GAUGE	TIP-RING VALUE
19	86.0
22	173.0
24	274.0
26	440.0

Table 9.4-14 — Capacitance in UF/Mile (DCTU Tests)

CABLE GAUGE	TIP-RING VALUE
19	0.0845
22	0.0825
24	0.0815
26	0.0795

9.5 PERFORM DISTANCE-TO-OPEN MEASUREMENT ON AN ON-HOOK LINE USING DCTU

OVERVIEW

This procedure is used to measure the capacitance of an analog line or U-type Digital Subscriber Line (U-DSL), and then calculate the *distance to open circuit* (DTO).

Note 1: This test should be used *only* when a line is suspected of being open.

Note 2: *Any complete connection will give invalid test results.*

PROCEDURE

1. **Caution:** *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

Note 1: If the office has *not* been calibrated for Trunk and Line Work Station (TLWS) measurements, perform Procedure 17.2, Calibrating TLWS Measurements, before beginning this procedure. Calibration can be determined by checking the DISTOPEN field in the Recent Change/Verify (RC/V) office parameter view. If this field is "0," then all measurements are relative to the Directly Connected Test Unit (DCTU) instead of the Main Distributing Frame (MDF).

Note 2: If the office *has* been calibrated and the DTO value is positive, the open circuit is between the MDF and the subscriber. If the DTO value is "0," the open circuit is between the MDF and the office equipment (line appearance).

At the TLWS video terminal, access a TLWS test position (161,X) from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the appropriate poke command (401,DN or 4001,DN).
3. From the metallic measurement page (560 or 5600), use the appropriate poke command (565 or 5605) to measure the capacitance of the tip and ring (T&R) open line. The result is given in terms of feet.
Note: Results may be printed at the Receive-Only Printer (ROP) by entering the appropriate poke command (950 or 9500).
4. Release the metallic measurement position by entering the appropriate poke command (590 or 5990).
5. Release the line by entering the poke command 4999.
6. Access the TLWS test position summary page (160) and release the TLWS test position (201,X).
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.6 NETWORK TERMINATION/CHANNEL UNIT MISMATCH TEST

OVERVIEW

This procedure is used to perform the manual Network Termination (NT1)/Channel Unit (CU) Mismatch Test. This test performs Integrated Services Line Unit (ISLU) NT1, or first Basic Rate Interface Transmission Extension (BRITE) CU mismatch detection for U-Interface Digital Subscriber Lines (U-DSLs).

Note: Mismatch testing is not supported on integrated digital carrier unit (IDCU) digital subscriber lines (DSLs).

Two types of U-DSL technologies exist:

- Alternate Mark Inversion (AMI) U-DSL
- ANS^I U-DSL.

The KCB10 U-Card is used to provide the U-DSL AMI service. The KCB17 ISLU U-Card or MPU2 ISLU2 U-Line Circuit is used to provide the U-DSL ANSI service. A mismatch exists if the Line Card (LC) installed does not match the type of service assigned to the customer at LC provisioning time, or the NT1 or first BRITE CU that is connected to the U-Card/U-Line Circuit does not match the type of service.

The Mismatch Test also detects tip and ring wiring reversals that may be present on an AMI U-DSL line since tip and ring reversals do not permit loop sealing current to flow on AMI U-Cards/U-Line Circuit that are connected to AMI NT1s.

On an hourly basis, the automatic Mismatch Test runs on all U-Cards/U-Line Circuits that have a D-Channel port status indicating that Integrated Services Digital Network (ISDN) layer 1 is not established at the 2-wire U-Interface. Layer 1 may not be established because of a mismatch condition. When the automatic Mismatch Test detects a mismatch, then the D-Channel port status supplementary information is updated to MSMTCH to indicate the mismatch condition, and a summary report is printed on the Receive-Only Printer (ROP) for all U-DSLs that are found with a mismatch condition.

There are several Global Parameters that provide craft control of the automatic Mismatch Test and its report. Switching module/switching module-2000 (SM/SM-2000) global parameters are changed using the **INH:MISMATCH** and **ALW:MISMATCH** input commands. Office global parameters for the automatic Mismatch Test are changed using the Recent Change/Verify (RC/V) Global Parameters view 8.1.

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

PROCEDURE

1. At the Master Control Center (MCC), invoke the on-demand NT1/CU Mismatch Test by performing any of the following:
 - (a) Enter the **TST:DSL** input message with the **MSMTCH** option. Output is printed on the ROP and indicates if a mismatch was detected and the type of LC and NT1/CU found.
 - (b) At the TLWS video terminal, access a TLWS test position (**161,X**) from the TLWS test position summary page (160). Refer to the **Caution** and seize the

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line using poke command **4001,DN**. At the TLWS supervision page (5200), execute command **5212**. Output is displayed at the TLWS screen and indicates if a mismatch was detected and the type of mismatch detected, either LC mismatch or NT1/CU mismatch. To release the line, enter poke command **4999**. Release the TLWS test position (**201,X**) from the TLWS test position summary page (160).

- (c) At the TLWS video terminal, access a TLWS test position (**161,X**) from the TLWS test position summary page (160).
- (d) Refer to the **Caution** and seize the line using poke command **4001,DN**. At the TLWS automatic testing page (5400), execute command **5414**. Output is displayed on the ROP and indicates the type of mismatch detected. Release the TLWS test position from the 160 page by entering poke command **201,X**.

Note: The on-demand NT1/CU Mismatch Test may also be invoked using Phase 4 of the U-Card/U-Line Circuits diagnostic.

- 2. If either an LC or an NT1/CU mismatch condition was detected, the D-Channel port status supplementary information updates to MSMTCH to indicate this condition. The port status for a line may be reported using the **OP:STATUS** input command, or the **OP:LIST,LINES** input command. To correct a mismatch, continue as follows:

- (a) If the Mismatch Test indicates an NT1/CU mismatch, perform metallic loop tests on the U-DSL to distinguish metallic loop faults from NT1/CU mismatch conditions. (Metallic loop tests are accessed through the Metallic testing page 5600 of the TLWS.)
- (b) To confirm the results of the NT1/CU Mismatch Test, especially when an NT1/CU mismatch has been detected, the craft should ascertain the type of NT1 or first BRITE CU connected to the U-DSL. The NT1 or first BRITE CU should match the type of service (either AMI or ANSI) that was assigned to the customer at LC provisioning time. The results of the Mismatch Test show the type of service (either AMI or ANSI) that is assigned to the U-DSL.
- (c) If the Mismatch Test indicates an U-Card mismatch:
 - 1. Remove the mismatched LC from service using the **RMV:ISLULC** input command [the incorrect LC may already be out of service (OOS) due to switch fault recovery actions].
 - 2. Replace the incorrect LC with the correct type of U-Card.
 - 3. Diagnose the correct LC and restore it to service using the **RST:ISLULC** input command.
- (d) If the Mismatch Test indicates an U-Line Circuit mismatch:
 - 1. Remove the mismatched U-Line Circuit from service using the **RMV:ISLULB** input command [the incorrect U-Line Circuit may already be out of service (OOS) due to switch fault recovery actions].
 - 2. Replace the incorrect U-Line Circuit with the correct type of U-Line Circuit.

3. Diagnose the correct U-Line Circuit and restore it to service using the **RST:ISLULB** input command.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.7 PERFORM TESTS ON A PACKET SWITCHING MODEM POOL ACCESS LINE

OVERVIEW

This procedure is used to test a Modem Pool Access Line with the test features provided in the 5ESS[®] switch. A Modem Pool Access Line consists of a Basic Rate Interface (BRI) digital line and an analog line. Manual execution of the tests is required only when a problem with a line has been reported. This procedure is then used to confirm that there is a problem and do further testing to sectionalize the fault.

This procedure is oriented toward the use of the Master Control Center (MCC) or other terminals using the **TST:MP...** input messages and associated output messages. For details associated with formats and parameters, refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

PROCEDURE

1. Identify the Modem Pool Multiline Hunt Group (MLHG) number by entering the **OP:CONV, DN=*a*** input message, where *a* is the directory number (DN) of an analog member of the modem pool group.

Note 1: The Modem Pool MLHG number may also be found by entering the **OP:CONV, LCEN=*b*** input message, where *b* is the equipment number of a Digital Subscriber Line (DSL) member of the modem pool or an analog member's equipment number for an analog member residing on a Z-card. The **OP:CONV, LEN=*c*** input message may also be used, where *c* is the equipment number of an analog member's equipment number for an analog member not residing on a Z-card.

Note 2: If the DN entered is the packet Modem Pool MLHG DN (a DN that a packet user would dial to gain access to the Modem Pool MLHG for the first stage of its two-stage dialing procedures), or a modem access DN (a DN that an analog user would dial to gain access to a modem pool and make a call request to a particular packet service), "MP access DN" is returned and the MLHG is not identified. Refer to the office records (forms 5109 and 5111, which are associated with RC/V view 1.6). Modem pool MLHG information can be retrieved with the analog member's DN or equipment number previously mentioned. The MLHG information may also be found using a DSL member's equipment number on office records 5900, 5900A, and 5901, which are associated with RC/V view 23.2.

2. If the input message is accepted [usually, as evidenced by a printout follows (PF) at the end of the input message], an output message is printed on the Receive-Only Printer (ROP), giving the MLHG information in the format **MLHG=*b-c***, where *b* is the MLHG number, and *c* is the MLHG member.
3. Determine if the equipment is out of service (OOS) by entering the command **OP:STATUS, MLHG=*b-c***. This gives the status of the analog as well as the digital member of the modem pool. The status of the entire modem pool (digital and analog members) can be seen by entering the command **OP:LIST, MLHG=*a***, where *a* is the modem pool MLHG number.
4. If the digital line or analog line is OOS, determine the reason and, if necessary, perform Procedure 7.2, Clear Trouble in the SM and SM-2000.

Note: If the analog line is OOS MTCE DSBLD, this test still works.

5. Request a modem pool test by entering **TST:MP,MPM=b-c**. At least three of the modem pool members (digital and its analog counterpart) should be in-service when this test is done. Repeat this step several times.
Note: This test relies heavily on customer-owned equipment. Settings of Integrated Services Digital Network (ISDN) terminal adapters and analog modems are critical to the success of this test.
6. If testing is passing consistently, **STOP. YOU HAVE COMPLETED THIS PROCEDURE.** Otherwise, continue with the next step.
7. If testing is failing (perhaps intermittently), or the test cannot isolate the faulty MPM, perform Substeps (a) through (e) as follows:
 - (a) The results of a failed modem pool test include two members (*c*, *d*) of the MLHG. Run the test again using one of these members and a different member (*e*), which is known to be good, as follows:
 1. Remove member *d* by entering **RMV:LINE,MLHG=b-d**.
 2. Enter **TST:MP,MPM=b-c,MPMB=b-e**. Repeat several times.
Note: It is a good idea to have an additional in-service member available (possibly member *f*). For example, in the case of testing member *c* against member *e*, if errors are found, the **TST:MP** command looks for another in-service member to test with. Member *d* could not be used with this command since it is OOS, and OOS members cannot be tested unless they are used explicitly in the command mentioned here.
 - (b) If this test is passing consistently, member *d* is the suspected faulty equipment.
 - (c) If this test is failing (perhaps intermittently), or the test cannot isolate the faulty MPM, run the test again as follows:
 1. Remove member *c* by entering **RMV:LINE,MLHG=b-c**.
 2. Enter **TST:MP,MPM=b-db-d,MPMB=b-e**. Repeat several times.
Note: It is a good idea to have an additional in-service member available (possibly member *f*). For example, in the case of testing member *d* against member *e*, if errors are found, the **TST:MP** command looks for another in-service member to test with. Member *c* could not be used with this command since it is OOS, and OOS members cannot be tested unless they are used explicitly in the command mentioned here.
 - (d) If this test is passing consistently, member *c* is the suspected faulty equipment.
 - (e) If the fault still cannot be isolated, the problem is probably associated with the settings of the analog modem or the terminal adapter.
8. When the problem has been cleared, determine whether the digital and analog lines have been restored to service.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.8 IDCU TR303 REMOTE TERMINAL DATA MISMATCH CLEARING PROCEDURE

OVERVIEW

This procedure is used to clear any potential mismatches between the 5ESS[®] switch database and the provisioned data in the TR303 Remote Terminal. Refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*, for details on how to use the input messages described below.

PROCEDURE

1. At the Master Control Center (MCC) enter the **OP:RT,PROV,LRT=sm-idcu-rt** input message to determine if provisioning failure reporting is enabled. If so, continue with the next step. Otherwise, enable provisioning reporting for the RT in question using the **ALW:RT,PROV,REPT,LRT=sm-idcu-rt** input message.
2. At the MCC, enter **EXC:RT,PROV,TYPE=LINE,ILEN=sm-idcu-rt-line** to refresh the provisioned data for that line.
3. If the output message indicates **COMPLETED - NO TASKS PENDING** then the refresh operation was successful. Otherwise, consult the *Output Messages* to determine the meaning of the given result.
4. If the output message indicates a failure, examine the ROP for any occurrences of **REPT,RT,PROV** messages indicating a provisioning failure. This output message can be used to further identify the nature of the failure if it is present. Refer to *Output Messages* for the interpretation of the **REPT:RT,PROV** output message.
5. If provisioning failure reporting was previously disabled, then disable it now using the **INH:RT,PROV,REPT,LRT=sm-idcu-rt** input message.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.9 PERFORM SCHEDULING OF SUBSCRIBER LINE INSTRUMENT MEASUREMENT (SLIM) AUTOMATIC TESTS

OVERVIEW

This procedure is used to define automatic test schedules on a large number of lines. This is done using the recent change (RC) View 14.13, View 14.14, View 14.15, View 14.16, and View 14.17. Lists of line equipment numbers (LENSs) should be defined to run tests on. Different tests are collected in a test set. For every test in a test set, a threshold will be defined in a threshold list. The threshold is a set of values that is compared against the test results. The equipment number list, test set, and threshold list are linked together in a test job. Several test jobs are linked with a time schedule.

The tests in a test set are divided into three groups: voltage, resistance, and capacitance. A test job tests a single group of lines. Up to six test jobs may be included in a test session. A maximum of 30 failed lines are reported from a test job plus up to 30 unavailable lines. The maximum duration of a test session is 23 hours, 59 minutes. After testing all required lines, if any schedule time is left, SLIM (subscriber loop instrument measurement) will retest the lines that were faulty or unavailable. A line is called "unavailable" (for SLIM equipment) when it is conversation busy. A test session can run once, daily, weekly, or monthly. This allows some lines to be tested more frequently than others.

When tests sessions are defined, the status of the different sessions may be checked using the 162 SLIM TESTSESSION STATUS TP page. The valid status values are: SUSPENDED, DONE, IN PROGRESS, SCHEDULED, and DEFINED.

PROCEDURE

- Note:** For all the lines to be tested, SLIM must be allowed (PSLIM=N).

Are the PSLIM parameters already set to N for the required subscriber lines?

If **YES**, go to Step 13.

If **NO**, continue with the next step.
- At the MCC terminal, to access the office dependent data (ODD) RC views, enter **196** menu command.

Response: **CLASS_MENU**
Input **CLASS, CLASS.VIEW, Q, R, V, BMI, BMD, BMR, IM, or N ->**

- Are subscriber line characteristic updates required for SLIM tests?

If **YES**, continue with the next step.

If **NO**, go to Step 13.
- To update View 1.6, enter **1.6u** menu command.

Response: View 1.6 is displayed. The cursor is positioned at the TN field.
- Enter data for the following field:

TN ___ (Telephone number)

Response: The remaining fields are populated.
Enter Update, Change, Validate, or Print:

6. To start the change mode, enter **c**
Response: **Change field:**
7. Enter the PSLIM field number.
8. Enter **n**
Response: **Change field:**
9. Enter **<**
Response: **Enter Update, Change, Validate, or Print:**
10. To update the data, enter **u**
Response: updating ... FORM UPDATED flashes in the upper-right corner of the screen. The cursor returns to the TN field.
11. At this point, to update other subscriber lines, repeat Steps 5-10.
12. Return to the class menu.
13. **Note:** Views 14.13-14.17 are used to set up the SLIM routine mode tests. View 14.13 is used to link several LENSs into one list identified by an equipment number list. This view is considered optional because LENSs also can be specified in the overall test job (View 14.16).
To insert View 14.13, enter **14.13i** menu command.
Response: View 14.13 is displayed. The cursor is positioned at the OE LIST ID field.
14. Enter data for the following fields:
OE LIST ID ___ (equipment number list 1-8)
ENTRY NUMBER ___ ___(entry number 1-60)
START OE _-___ (start/first office equipment number)
Note: The entry number is used to separate the equipment number in a list. For fields requiring no entry, enter an apostrophe (') to blank the field. Once all the fields are completed, the following appears:
Response: **Enter Insert, Change, Validate, or Print:**
15. To insert the data, enter **i**
Response: inserting ... FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the OE LIST ID field.
16. At this point, the technician is already in the insert mode. To insert the other OE LIST ID, repeat Steps 14 and 15.
17. Return to the class menu.
18. **Note:** View 14.14 is used to select insulation resistance and capacitance tests that are run along with the compulsory foreign voltage test. Type and enter **y** or **n** for insulation resistance and capacitance tests. All the tests with **y** are executed.

- To insert View 14.15, enter **14.15i** menu command.
- Response: View 14.15 is displayed. The cursor is positioned at the TEST SET ID field.
19. Enter data for the following field:
TEST SET ID ___ (test set identifier 1-8)
- Note:** For fields requiring no entry, enter an apostrophe (') to blank the field. Once all the fields are completed, the following appears:
- Response: **Enter Insert, Change, Validate, or Print:**
20. To insert the data, enter **i**
- Response: inserting ... FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the TEST SET ID field.
21. At this point, the technician is already in the insert mode. To insert the other TEST SET ID, repeat Steps 19 and 20.
22. Return to the class menu.
23. **Note:** View 14.15 is used to set up the SLIM threshold list identifier. The higher values of insulation resistance are compared against the test results. The upper and lower values of the voltage tests and capacitance test are compared against the test results. The line passes if the test results are between those values. The off-hook tests shown on View 14.15 (Screen 3 of 3) are not used in the routine mode.
- To insert View 14.15, enter **14.15i** menu command.
- Response: View 14.15 (Screen 1 of 4) is displayed. The cursor is positioned at the THRESHOLD LIST ID field.
24. Enter data for the following field:
THRESHOLD LIST ID ___ (threshold list identifier 0-8)
- Note:** For fields requiring no entry, enter an apostrophe (') to blank the field. Once all the fields are completed, the following appears:
- Response: **Enter Insert, Change, Validate, or Print:**
25. To insert the data, enter **i**
- Response: inserting ... FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the THRESHOLD LIST ID field.
26. At this point, the technician is already in the insert mode. To insert the other THRESHOLD LIST ID, repeat Steps 24 and 25.
27. Return to the class menu.
28. **Note:** View 14.16 is used to set up the SLIM job identifier. The job identifier is the way View 14.13, View 14.14, and View 14.15 are linked together.
- To insert View 14.16, enter **14.16i** menu command.
- Response: View 14.16 is displayed. The cursor is positioned at the JOB ID field.
29. Enter data for the following fields:

TEST JOB ID ___ (job identifier 1-240)

TEST SET ID ___ (test set identifier 1-8)

THRESHOLD LIST ID ___ (threshold list identifier 0-8)

Note: If a LEN for testing has one simple upper and lower limit, it may be entered in View 14.16 under the JOB ID field instead of View 14.13 under the OE LIST ID field. For fields requiring no entry, enter an apostrophe (') to blank the field. Once all the fields are completed, the following appears:

Response: **Enter Insert, Change, Validate, or Print:**

30. To insert the data, enter **i**

Response: inserting ... FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the JOB ID field.

31. At this point, the technician is already in the insert mode. To insert the other JOB ID, repeat Steps [29](#) and [30](#).

32. Return to the class menu.

33. **Note:** View 14.17 is used to set up the SLIM test session identifier. A maximum of six jobs are collected to be executed at one time. With the periodicity parameter, the cycle frequency is specified. At the start time, the test session executes automatically. When the start time is defined in one minute of the time, the session starts immediately. If the stop time is a lower value than the start time, it is considered to be the next day.

To insert View 14.17, enter **14.17i** menu command.

Response: View 14.17 is displayed. The cursor is positioned at the TEST SESSION ID field.

34. Enter data for the following fields:

TEST SESSION ID ___ (session identifier 1-40)

TEST JOB1 ___ (test job 1-240)

Note: For fields requiring no entry, enter an apostrophe (') to blank the field. Once all the fields are completed, the following appears:

Response: **Enter Insert, Change, Validate, or Print:**

35. To insert the data, enter **i**

Response: inserting ... FORM INSERTED flashes in the upper-right corner of the screen. The cursor returns to the TEST SESSION ID field.

36. At this point, the technician is already in the insert mode. To insert the other TEST SESSION ID, repeat Step [34](#) and Step [35](#).

37. Exit the RC/V.

38. Is an overview of the SLIM test session status, or a printout of the results of the last run test session required?

If **YES**, then continue with the next step.

If **NO**, then go to Step [44](#).

39. To obtain the test session status, enter **162** menu command.

Response: The 162 - SLIM TESTSESSION STATUS TP page is displayed.

Note: The status of the test sessions is displayed in a table. The status is SUSP, DONE, IP, SCHD, or DEF.

40. Is a printout of the status of a specific test session required?
If **YES**, then continue with the next step.
If **NO**, then go to Step 42.
41. To print the status of a specified test session, enter **941,xx** menu command.
Where: xx = Test session identifier number.
42. Are result reports of the last executed test session required?
If **YES**, then continue with the next step.
If **NO**, then go to Step 44.
43. To print out all the unavailable and the failed lines found in the last test session, a dump from the 3B computer is required. The files that should be dumped are as follows:
 - (a) For latest test session:
 "/slim/TMslx.new"
 - (b) For previous test session:
 "/slim/TMslx.old"Where: x = Test session identifier number.

44. **Note:** Routine mode only uses the ONHIGH thresholds for insulation tests. Only result values over this threshold pass the test.

When the test sessions are not manually aborted or terminated due to an error, the results of the session is automatically printed on the ROP.

Response: **SLIM ROUTINE TESTSESSION RESULTS FILE: TMsla.new**
TESTSESSION ID :a
STARTED AT :yy:mm:dd: hh:mm
TESTJOB IDs :b,,,,c
TESTJOB 1 ID b
STARTED AT :hh:mm
STOPPED AT :hh:mm
DURATION :hh:mm
TESTJOB DEFINITION :
ENTYPE IS L
LEN LIST RANGE : d to e

TEST SET ID:f	THRESHOLD LIST ID:g	
TEST NO./DESCRIPTION	LOW	HIGH
1 AC Tip to ground	0.000 volts	5.000 volts
2 AC Ring to ground	0.000 volts	5.000 volts
.	.	.
10 Tip to Ring	0.010uF	3.000uF
.	.	.
13 AB common to battery	0.010uF	3.000uF

RESULTS:

TOTAL LINES TESTED FOR THIS JOB =h
TOTAL UNAVAILABLE LINES FOR THIS JOB = i

UNAV. LINE REASON UNAV. LINE REASON UNAV. LINE REASON

j ... k o j ... k o j ... k o

TOTAL FAILED LINES FOR THIS JOB = l

FAILED LINE TEST

m ... n p

TESTSESSION ID :a

STOPPED AT :yy:mm:dd hh:mm

DURATION :hh:mm

TESTSESSION STATUS = DONE

Where:

- a = Test session identifier
- b = First test job identifier
- c = Last test job identifier
- d = First LEN of LEN list range
- e = Last LEN of LEN list range
- f = Test set identifier
- g = Threshold list identifier
- h = Total lines tested for job number
- i = Total amount of unavailable lines
- j = First unavailable line (LEN)
- k = Last unavailable line
- l = Total amount of failed lines
- m = First failed line (LEN)
- n = Last failed line (LEN)
- o = Reason for unavailable line:
 - BY = busy
 - CT = congestion
 - ER = general errors; software cannot decide what caused unavailability
 - MS = error in MSU, unusual resource failure, often caused by hardware OOS
 - PT = port problems, no metallic connection to port, PPM failure, unable to activate port
 - TM = other errors outside MSU, possibly resource failure in LU or ISLU.
- p = Test number for failed line.

45. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.10 PERFORM METALLIC TESTS ON AN ON-HOOK LINE USING SLIM

OVERVIEW

This procedure measures the voltage, resistance, and capacitance on an analog or digital line [U-type digital subscriber line (U-DSL) only] using the Subscriber Loop Instrument Measurement (SLIM).

PROCEDURE

1. **Note 1:** In this procedure, if an instructional step makes reference to entering a poke command, it is advised that the currently-supported TLWS Job Aids, 235-105-220JXX (where XX is a currently-supported software release), be used to obtain the appropriate 4-digit poke command number.

Note 2: With digital lines (U-DSL), the NT1 contains active circuitry that influences the capacitance values, which are used to determine the distance to open circuit (DTO).

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command (4001,DN).
3. From the metallic measurement page (5700), use the poke command (5701) to get a single measurement of the voltage, resistance, and capacitance.
4. The following tables indicate the results that should be achieved at the TLWS.
 - For an Analog Line on an AIU, see Table 9.10-1
 - For an Analog Line on an LU, see Table 9.10-2
 - For an Analog Line on an ISLU Z, see Table 9.10-3
 - For an Analog Line on a DCLU, see Table 9.10-4
 - For an Analog Line on an IDCU, see Table 9.10-5
 - For a Digital Line on an ISLU AMI-U NT1 or AMI BRITE CU AHG13, see Table 9.10-6
 - For a Digital Line on an ISLU/ISLU2 U-DSL (ANSI¹) Lucent Technologies NT1, see Table 9.10-7
 - For a Digital Line on an ISLU U-DSL (ANSI) BRITE CU AHG18, see Table 9.10-8
 - For a Digital Line on an IDCU U-DSL (ANSI) Lucent Technologies NT1, see Table 9.10-9.
 - For a Digital Line on an AIU U-DSL (ANSI) Lucent Technologies NT1, see Table 9.10-10

The voltage (AV=AC voltage and DV=DC voltage) should read "0" in all columns.

Note: There is the possibility of a trace voltage reading for analog line units.

1. Registered trademark of American National Standards Institute, Inc.

The Resistance (Ko=kilohms) should read "OPEN" (a resistance value of greater than 3500K is considered open) for all columns with the exception of the U-DSL, which differs because of its NT1 circuitry. The capacitance (in micro-Farads) can range from about 0.12 to 0.225 and should be balanced as explained in the tables.

The resistance and capacitance readings indicated in the tables are typical values for short loop lengths of less than one mile. Readings of 0 or OPEN are not loop length dependent. The tip ground (TG) and ring ground (RG) capacitance values should be balanced (same value). With analog lines, the ringer of the telephone influences the reading as follows:

- (a) For a private line, the ringer is across the tip and ring (T&R) pair; therefore, the TG and RG capacitance values are balanced.
- (b) For a "tip" party, the ringer is connected across the tip and ground; therefore, the TG reading is greater than the RG reading.
- (c) For a "ring" party, the ringer is connected across the ring and ground; therefore, the RG reading is greater than the TG.

The constants used in calculating resistance and distance-to-open (capacitance) are shown in Tables 9.10-11 and 9.10-12.

- 5. Release the metallic measurement position by entering the poke command **5990**.
- 6. Release the line by entering the poke command **4999**.
- 7. Access the TLWS test position summary page (160) and release the TLWS test position [**201,X**].
- 8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 9.10-1 — Analog Line (AIU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	7	7	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	0.010

Table 9.10-2 — Analog Line (LU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	7	7	0
Ko	OPEN	OPEN	OPEN
μF	0.013	0.013	0.022

Table 9.10-3 — Analog Line (ISLU Z) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	0.010

Table 9.10-4 — Analog Line (DCLU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.015	0.015	0.009

Table 9.10-5 — Analog Line (IDCU) Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.015	0.015	0.009

Table 9.10-6 — Digital Line (ISLU AMI-U NT1 or AMI BRITE CU AHG13)
Acceptable Readings (SLIM Tests)

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	1150	OPEN	144
μF	0.030	0.030	0.995

**Table 9.10-7 — Digital Line - ISLU/ISLU2 U-DSL (ANSI) Lucent Technologies NT1
 Acceptable Readings (SLIM Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	1.020

**Table 9.10-8 — Digital Line ISLU U-DSL (ANSI) BRITE CU AHG18 Acceptable
 Readings (SLIM Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	1.020

**Table 9.10-9 — Digital Line IDCU U-DSL (ANSI) Lucent Technologies NT1
 Acceptable Readings (SLIM Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.015	0.015	1.010

**Table 9.10-10 — Digital Line AIU U-DSL (ANSI) Lucent Technologies NT1
 Acceptable Readings (SLIM Tests)**

TEST TYPE	TYPICAL VALUES		
	TG	RG	T&R
AV	0	0	0
DV	0	0	0
Ko	OPEN	OPEN	OPEN
μF	0.030	0.030	1.020

Table 9.10-11 — Resistance in Ohms/Mile (SLIM Tests)

CABLE GAUGE	TIP-RING VALUE
19	86.0
22	173.0
24	274.0
26	440.0

Table 9.10-12 — Capacitance in μ F/Mile (SLIM Tests)

CABLE GAUGE	TIP-RING VALUE
19	0.0845
22	0.0825
24	0.0815
26	0.0795

9.11 PERFORM DISTANCE-TO-OPEN MEASUREMENT ON AN ON-HOOK LINE USING SLIM

OVERVIEW

This procedure is used to measure the capacitance of an analog line or a U-type Digital Subscriber Line (U-DSL) and then calculate the distance to an open circuit (DTO).

Note 1: Use this test only when a line is suspected of being open.

Note 2: Any type of complete connection (short circuit, ground, etc.) will give invalid test results.

PROCEDURE

1. **Note:** If the DTO is positive (and the office has been calibrated), the value indicates that the open is between the Main Distributing Frame (MDF) and the subscriber. If the value is "0," the open is between the MDF and the office equipment (line appearance).

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command (4001, DN).
3. From the metallic measurement page (5700), use the appropriate poke command (5705) to measure the distance-to-open of the tip and ring (T&R) open line. The result are given in terms of feet.
Note: Results may be printed at the Receive-Only Printer (ROP) by entering the appropriate poke command (9500).
4. Release the metallic measurement position by entering the appropriate poke command 5990.
5. Release the line by entering the appropriate poke command 4999.
6. Access the TLWS test position summary page (160) and release the TLWS test position [201,X].
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.12 PERFORM SUBSCRIBER LINE INSTRUMENT MEASUREMENT (SLIM) OFF-HOOK TESTS

OVERVIEW

This procedure is used to test the subscriber telephone set. The off-hook tests, which are accessed by the master control center (MCC) pages, are used to confirm problems detected by the operator mode. Page 5700,2 is used for off-hook tests.

These tests are performed by technicians and only the MCC pages are used; perform these tests at the MCC terminal.

PROCEDURE

1. **Note 1:** In this test, if an instructional step makes reference to entering a poke command, it is advised that the currently supported TLWS Job Aids, 235-105-220J9, J10, or J11, be used to obtain the appropriate 4-digit poke command number.

Note 2: Before beginning this test, perform Procedure 17.2, Calibrating TLWS Measurements, if the office has not been calibrated for Trunk and Line Work Station (TLWS) measurements. This can be determined by checking the DISTOPEN field in the Recent Change/Verify (RC/V) office parameter view. If this field is "0," then all measurements are relative to the Subscriber Loop Instrument Measurement (SLIM) instead of the Main Distributing Frame (MDF).

Note 3: With U-type digital subscriber lines (U-DSL), the NT1 contains active circuitry that influences the capacitance values, which are used to determine the distance to open circuit (DTO).

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the poke command (4001,DN).
3. To select all the off-hook operator mode tests, enter 5700,2 menu command.

Note: Pokes on the 5700,2 page, automatically add the T&M phone to make conversation possible between the operator and the subscriber. Conversation is required for the operator to give instructions to the subscriber (for example, pressing the telephone keys in a certain sequence).

Page 5700,2 also shows whether the subscriber's phone is on-hook or off-hook.

4. **Note:** The status of the selection is displayed in a blue line. A yellow line displays why the selection failed. Also during each test, conversation is temporarily inhibited.
5. From the metallic measurement page (5700), use the poke command (5716) to provide a ringing current to test bell. This test does not return a result.
6. When the subscriber phone rings, take it off-hook.
7. Instruct the subscriber, after they hear dial tone, to dial a digit (2-9 or 0).
Note: On a touch-tone phone the subscriber must press and hold a key for 0.4 seconds.

8. From the metallic measurement page (5700), use the poke command (5712 for rotary dial subscribers or 5714 for touch-tone subscribers), to test the quality of the telephone sets.

Response: Digits being dialed show up on 5700,2 page.

9. Repeat steps 7 and 8 as desired.
10. From the metallic measurement page (5700), use the poke command (5715) to measure loop resistance. See Table [9.10-11](#) for acceptable values.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

9.13 CLEAR A PER-CALL TEST FAILURE

OVERVIEW

This procedure is used to clear a per-call test failure (PCTF) that occurred on a line during call setup.

Before setting up a call, various tests are performed on both the originating and terminating ends of the call. Failures encountered during the call setup tests can result in one of six different PCTFs being reported:

- Low-line resistance (LLR) failure – Before ringing current is applied to the terminating end of a call, the line is tested for any condition that would cause a “ring trip” (false answer). An LLR PCTF indicates that a “ring trip” was detected.
- Line-security scan (LSS) failure – Call originations from two-party lines require that party identification tests be performed to determine whether the ring party or the tip party is originating the call. This test, which checks for tip ground, is performed at two points in the call set-up sequence: once before the application of dial tone, and again after the last digit is collected. If the test results differ, an LSS PCTF is reported.
- Power cross (PX) failure – Before a connection is established to a line (originating and terminating), a power cross test is performed on the line using the High Level Service Circuit (HLSC). This test is used to detect any foreign voltages that would result in a current great enough to damage line circuitry (for example, a scan resistor). If a dangerous voltage is detected, a PX PCTF is reported and the line is placed on the power cross list with the battery and ground removed from the line.
- Ringing continuity failure (RCF) – When ringing a line, a current sensor is used to measure the resulting ringing current. If this measurement is below a set threshold value, an RCF PCTF is reported. The common cause of this type of failure is an unplugged phone or an open cable.
- Restore and verify failure (RVF) – After the terminating end of a call disconnects, a stuck scanner on-hook test is performed on the line to verify that customer originations (off-hooks) can still be detected. This test uses the HLSC to simulate an off-hook condition at the line scanner and verifies that the off-hook is detected. If not, an RVF PCTF is reported.
- Touch-tone fraud (TTF) failure – Call originations using touch-tone dialing results in a check of the calling line’s service subscription to verify that touch-tone dialing is allowed. If a calling line using touch-tone dialing is not provisioned as such, a TTF PCTF is reported.

The **REPT:PCTF** output message and, the **REPT:PCTF-SUM** output message are used to report PCTF occurrences. The **REPT:PCTF** output message reports a single PCTF occurrence on a line in real time (at the time of the occurrence), while the **REPT:PCTF-SUM** message summarizes all PCTFs that have occurred and is outputted automatically on a periodic basis.

The **REPT:PCTF** output identifies a line experiencing a failure by directory number (DN), equipment number, and Multiline Hunt Group (MLHG) number (if applicable). The type of PCTF occurrence as well as any HLSC that may have been involved at the

time of the failure are also indicated in the output. The **REPT:PCTF** messages are assigned the HM_RSB message class, which by default is only directed to the Repair Service Bureau (RSB).

The **REPT:PCTF-SUM** output contains an entry for each line and HLSC that has experienced at least one PCTF since the previous automatically generated PCTF summary. Lines are identified by DN and equipment number and HLSCs by equipment number only. The PCTF occurrences for each line or HLSC are summarized by PCTF type and count (six columns to the right of the summary output indicate the number of times each of the PCTF types was reported on the given line or HLSC).

PROCEDURE

1. Use the **REPT:PCTF** or **REPT:PCTF-SUM** output message to identify the line experiencing the PCTF and the specific PCTF type.
Note: Look for a pattern to the failures listed; for example, look at the line identifiers and HLSCs, if present, for similarities between failures.
2. Is the PCTF that was reported a TTF PCTF?
If **YES**, go to Step 8. There is no corrective maintenance required for a TTF PCTF. It only indicates that touch-tone dialing is being used on a line that is not service provisioned as such. Refer to local guidelines for handling TTF PCTFs.
If **NO**, continue with the next step.
3. To determine if the trouble is an in-office or outside cable problem, perform line maintenance on the line identified in Step 1 as outlined in Procedure 9.2, Perform Line Maintenance.
4. Is the trouble an outside cable problem?
If **YES**, refer the problem to outside plant per local procedure.
If **NO**, continue with the next step.
5. Does the data obtained in Step 1 indicate that an LU HLSC was used?
If **YES**, continue with the next step.
If **NO**, go to Step 8.
6. Diagnose and clear the fault in the LU HLSC per Procedure 7.2, Clear Trouble in the SM and SM-2000.
7. Is the HLSC per-call test failure cleared?
If **YES**, go to Step 8.
If **NO**, seek next higher level of technical assistance.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Corrective Maintenance Procedures

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10. ANALOG LINE TESTS

PURPOSE

Use the procedures of the section to perform tests on analog line units only.

10.1 ANALOG COIN PHONE TEST TO PERFORM NEAR-TO-FAR-END CHECK OF LINE STATE (VIA DCTU)

OVERVIEW

The Directly Connected Test Unit (DCTU) coin phone tests require interaction between two craft, one at the Trunk and Line Work Station (TLWS) and the other at the coin phone being tested. After any of the tests (coin detect, coin collect, coin return, or home totalizer) are completed and the results are displayed, a printout of those results may be obtained using the appropriate poke command.

Note 1: When homing an electronic totalizer, the response is "totalizer already homed," *whether it had been previously homed or not.*

Note 2: *It is important for the craft at the TLWS to verify that the totalizer has been homed.*

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position (161,X) from the TLWS test position summary page (160).
2. Refer to the **Caution** and seize the line using the appropriate poke command (401, DN or 4001, DN).
3. To display the METALLIC MEASUREMENT commands, enter the appropriate poke command (560 or 5600). When the applicable metallic measurement command is entered, the DCTU is automatically connected.
4. The craft at the TLWS can ADD the talk and monitor (T&M) phone to the seized coin line by entering the appropriate poke command (431 or 4301).
5. Using the T&M phone, instruct the far-end craft to hang up the phone and insert a predetermined amount of money (in various coin values).
6. To detect coin, enter the appropriate poke command (568 or 5608).
7. To return coin, enter the appropriate poke command (570 or 5610).
8. To home totalizer, enter the appropriate poke command (567 or 5607).
9. To ring coin phone line, enter the appropriate poke command (522 or 5202).
10. Ensure that all coins are returned.
11. Using the T&M phone, instruct the far-end craft to hang up the phone and insert a predetermined amount of money (in various coin values).
12. To detect coin, enter the appropriate poke command (568 or 5608).
13. To collect coin, enter the appropriate poke command (569 or 5609).
14. To home totalizer, enter the appropriate poke command (567 or 5607).
15. To ring coin phone, enter the appropriate poke command (522 or 5202).
16. Ensure coins are collected.
17. Ensure totalizer homed.

18. If no further tests are to be performed on the coin line, release the line by entering the poke command **4999**.
19. Access the TLWS test position summary page (160) and release the TLWS test position (**201,X**).
20. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10.2 ANALOG RINGER COUNT CHECK OF AN ON-HOOK LINE USING A DCTU

OVERVIEW

This procedure is used to measure the ringing count of a line after first completing a metallic test to determine line resistance. The ringer count test is valid only if the tip and ring (T&R), tip ground (TG), and ring ground (RG) resistances are greater than 150 kilohms.

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position (161,X) from the TLWS test position summary page (160).
2. Refer to the **Caution** and seize the line using the appropriate poke command (401,DN or 4001,DN).
3. To display the METALLIC MEASUREMENT commands, enter the appropriate poke command (560 or 5600).
4. To perform a resistance test, enter the appropriate poke command (563 or 5603).
5. To perform a ringer count check, enter the appropriate poke command (566 or 5606).

Note: Results may be printed at Receive-Only Printer (ROP) by entering the appropriate poke command (950 or 9500).

6. If no further testing will be performed on the line, release the line by entering the poke command 4999.
7. If all TLWS testing is complete, release the TLWS test position by entering poke command 201,X.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10.3 ANALOG LINE SIGNALING CHECKS

OVERVIEW

This procedure applies a ringing tone and a receiver off-hook (ROH) tone to a called line to verify signaling states. A far-end craft is required at the called telephone and a Central Office (CO) craft is required at the Trunk and Line Work Station (TLWS) position.

Caution: When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position (161,X) from the TLWS test position summary page (160).
2. Refer to the ***Caution*** and seize the line using the appropriate poke command (401,DN or 4001,DN).
3. To display the SUPERVISION commands, enter the appropriate poke command (520 or 5200).
4. At the TLWS CO end, the craft ADDS the talk and monitor (T&M) phone, applies **RING** to the seized line, observes screen for an off-hook indication, applies the **ROH** tone, applies the **STOP TEST** command, and audibly verifies with the far-end craft that the ROH was heard.
5. If no further testing will be performed on the line, release the line by entering the poke command **4999**.
6. If all TLWS testing is completed, release the TLWS test position (201,X).
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10.4 ANALOG LINE STATUS CHECK OF BUSY LINE

OVERVIEW

This procedure is used to monitor a busy line by taking the talk and monitor (T&M) phone off-hook to listen for conversation or some type of suspected trouble.

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position (**161,X**) from the TLWS test position summary page (160).
2. Attempt to seize a busy line using the appropriate poke command (**401,DN** or **4001,DN**).
Note: Since a busy line cannot be seized, a **camp-on** situation will occur.
3. To display the MISC TLWS commands, enter the appropriate poke command (**900** or **9000**).
4. Enter the appropriate poke command (**530** or **4600**) to monitor the busy line. The T&M phone should ring.
5. Take T&M phone off-hook and listen for conversation or some other type of suspected trouble. If no suspected trouble exists, continue with the next step.
6. Drop the T&M phone by entering the appropriate poke command (**430** or **4300**).
7. If no further tests are to be performed, release the line by entering the poke command **4999**.
8. If all TLWS testing is complete, release the TLWS test position by entering poke command **201,X**.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

10.5 ANALOG STATION RINGER TOUCH-TONE TEST FOR A DIRECTORY NUMBER

OVERVIEW

In this procedure, the Station Ringer Touch-Tone Test (SRTT) is used to check a directory number (DN) for off-hook and on-hook ground and ringing states.

Note: Excessive background noise may cause a failure indication.

PROCEDURE

1. At station under test, dial **xxx-yyyy**

Where: **xxx** = A 3-digit SRTT test code.
yyyy = A 4-digit DN of line being tested.

Response: **Successful access:** Continuous dial tone should be heard indicating the SRTT test line is connected to the originating DN.

Unsuccessful access:

Busy-tone indicates the dialed DN does not exist in the office records.

Overflow tone indicates the hardware in the switch is busy or a successful connection cannot be made.

2. Is station being tested touch-tone or rotary dial?

If **touch-tone**, continue with the next step.

If **rotary dial**, go to Step 4.

3. Referring to the following Notes, dial the touch-tone digits per Table 10.5-1.

Note 1: Dial tone can be heard throughout the dialing sequence except in the case of the automatic dialer. If the phone is an automatic dialer, the dial tone stops after the first digit is dialed.

Note 2: If the digits are not dialed or a flash is not received in 20 seconds after dial tone is started, a fail tone (one burst of high tone) is returned. Also, 20 seconds of interdigit time is used in checking the time between digits. If timing between any two digits exceeds 20 seconds, reorder tone is returned.

Response: **Successful test:** Double burst of high tone (480 Hz, 500 ms tone separated by 500 ms silent interval) is returned.

Unsuccessful test: Indicated by a single burst of high tone (480 Hz for 500 ms) after a digit that fails. The failure can be, as indicated, a digit dialed out of sequence or a digit that does not meet specifications. If necessary, repeat test.

4. Flash switchhook to start party identification test.

Response: **Individual line:** Steady high tone.

Multiparty tip party line: 60 IPM high tone.

Multiparty ring party line: Steady high tone.

Note: These tones are sent until the tester goes on-hook to request the on-hook ground and ringer tests or times out after three minutes.

5. Place receiver on-hook to start ringer tests.

Response: **Successful test:** Phone rings.

Unsuccessful test: Phone does not ring.

6. Take receiver off-hook.

Response: **Successful test:** Steady high tone is heard.

Unsuccessful test: Tester hears 60 IPM high tone.

7. Tester can flash switchhook to repeat the ground and ringer tests or disconnect (on-hook for more than 1.5 seconds) to terminate testing.

Note: A maximum of three repetitions are allowed. If more than three attempts are made, the call is terminated.

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 10.5-1 — Touch-Tone Pad Dialing Sequences

TYPE OF STATION	DIGITS TO BE DIALED
10-button	1-2-3-4-5-6-7-8-9-0
12-button	4-1-2-3-4-5-6-7-8-9-*0-#
12-button with auto dialer	2-1-2-3-4-5-6-7-8-9-*0-#
16-button	5-1-2-3-A-4-5-6-B-7-8-9-C-*0-#-D

10.6 ANALOG STATION RINGER TOUCH-TONE TEST FOR AN MLHG

OVERVIEW

In this procedure, the Station Ringer Touch-Tone Test (SRTT) is used to check a Multiline Hunt Group (MLHG) for off-hook and on-hook ground and ringing states.

Note: Excessive background noise may lead to a failure indication.

PROCEDURE

1. At the station under test, dial **xxx-yyyy-zzzz**

Where: **xxx** = a 3-digit SRTT test code.
yyyy = a 4-digit MLHG base directory number.
zzzz = a 4-digit terminal number of originating station. (If **zzzz** is not dialed in 5 seconds of **yyyy**, a connection is automatically attempted on the first member of the MLHG.)

Response: **Successful access** - continuous dial tone heard indicating that the SRTT test line is connected to the originating directory number (DN).

Unsuccessful access:

Busy-tone indicates the dialed DN does not exist in the office records.

Overflow tone indicates the hardware in the switch is busy or a successful connection cannot be made.

2. Is station being tested touch-tone or rotary dial?

If **touch-tone**, continue with the next step.

If **rotary dial**, go to Step 5.

3. Referring to the following Notes, dial the touch-tone digits per Table 10.6-1.

Note: Dial tone can be heard throughout the dialing sequence except in the case of the automatic dialer. If the phone is an automatic dialer, the dial tone stops after the first digit is dialed.

Note: If the digits are not dialed or a flash is not received in 20 seconds after dial tone is started, a fail tone (one burst of high tone) is returned. Also, 20 seconds of interdigit time is used in checking the time between digits. If timing between any two digits exceeds 20 seconds, reorder tone is returned.

Response: **Successful test** – double burst of high tone (480 Hz 500 ms tone separated by 500 ms silent interval) is returned.

Unsuccessful test – indicated by a single burst of high tone (480 Hz for 500 ms) after a digit that fails. The failure can be, as indicated, a digit dialed out of sequence or a digit that does not meet specifications.

Note: Dial tone is received again regardless of success or failure of test. If necessary, repeat test.

4. Flash switchhook to start party identification test.

Response: **Individual line** – steady high tone.

Multiparty tip party line – 60 IPM high tone.

Multiparty ring party line – steady high tone.

Note: These tones are sent until the tester goes on-hook to request the on-hook ground and ringer tests or times out after three minutes.

5. Place receiver on-hook to start ringer tests.

Response: **Successful test** – phone rings.

Unsuccessful test – phone does not ring.

6. Take receiver off-hook.

Response: **Successful test** – steady high tone is heard.

Unsuccessful test – tester should hear 60 IPM high tone.

7. Tester can flash switchhook to repeat the ringer tests or disconnect (on-hook for more than 1.5 seconds) to terminate testing.

Note: A maximum of three repetitions are allowed. If more than three attempts are made, the call is terminated.

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 10.6-1 — Touch-Tone Pad Dialing Sequences

TYPE OF STATION	DIGITS TO BE DIALED
10-button	1-2-3-4-5-6-7-8-9-0
12-button	4-1-2-3-4-5-6-7-8-9-*0-#
12-button with auto dialer	2-1-2-3-4-5-6-7-8-9-*0-#
16-button	5-1-2-3-A-4-5-6-B-7-8-9-C-*0-#-D

10.7 ANALOG COIN PHONE TEST TO PERFORM NEAR-TO-FAR-END CHECK OF LINE STATE (VIA SLIM)

OVERVIEW

This procedure is used to perform a near-to-far-end check of the line state via a Subscriber Loop Instrument Measurement (SLIM).

The SLIM coin phone tests require interaction between two craft, one at the Trunk and Line Work Station (TLWS) and the other at the coin phone being tested. After any of the tests (coin detect, coin collect, coin return, or home totalizer) are completed and the results are displayed, a printout of those results may be obtained using the appropriate poke command.

Note 1: When homing an electronic totalizer, the response is "totalizer already homed," *whether it had been previously homed or not.*

Note 2: *It is important for the craft at the TLWS to verify that the totalizer has been homed.*

PROCEDURE

1. **Caution:** *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s).*

At the TLWS video terminal, access a TLWS test position [161,X] from the TLWS test position summary page (160).

2. Refer to the **Caution** and seize the line using the appropriate poke command (4001, DN).
3. To display the METALLIC MEASUREMENT commands, enter the appropriate poke command (5700).
4. The craft at the TLWS can ADD the talk and monitor (T&M) phone to the seized coin line by entering the appropriate poke command (4301).
5. To apply ringing to the coin phone line, enter the appropriate poke command (5202). When an off-hook indication is observed, continue with the next step.
6. Using the T&M phone, instruct the far-end craft to hang up the phone and insert a predetermined amount of money (in various coin values).
7. To detect coin, enter the appropriate poke command (5708).
8. To return coin, enter the appropriate poke command (5710).
9. To home totalizer, enter the appropriate poke command (5707).
10. To ring coin phone line, enter the appropriate poke command (5202).
11. Ensure that all coins are returned.
12. Using the T&M phone, instruct the far-end craft to hang up phone and insert a predetermined amount of money (in various coin values).
13. To detect coin, enter the appropriate poke command (5708).
14. To collect coin, enter the appropriate poke command (5709).
15. To home totalizer, enter the appropriate poke command (5707).
16. To ring coin phone, enter the appropriate poke command (5202).

17. Ensure coins are collected.
18. Ensure totalizer homed.
19. If no further tests are to be performed on the coin line, release the line by entering the appropriate poke command (**4999**).
20. Access the TLWS test position summary page (160) and release the TLWS test position [**201,X**].
21. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Corrective Maintenance Procedures

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11. DIGITAL LINE TESTS

PURPOSE

Use the procedures of the section to perform tests on digital line units only.

11.1 DIGITAL SUBSCRIBER LINE BRI INTEGRITY TESTS

OVERVIEW

This procedure is used to sectionalize (locate) a digital fault. To sectionalize a digital fault, a bit stream of data is transmitted from the 5ESS[®] switch and looped back at various points between the Customer Premises Equipment (CPE) and the switch. *For circuit-switched channels*, the Integrated Services Test Facility (ISTF), the Global Digital Services Function (GDSF), and the ISTF functionality on the GDSF provide the digital bit stream and analysis of the return (Layer 1). *For packet-switched channels*, the Protocol Handler (PH) provides the transmitted data in packet form and the analysis of the return.

The basic concept is to loop back at the furthest point from the switch (the CPE) and then loop back closer and closer to the switch. The point at which no errors are detected defines the boundary of the fault, and it lies between that point and the last loopback point. For example, if the loopback detected errors at the CPE and at the Network Termination 1 (NT1) but not at the Line Termination (LT), then the fault must be between the loopback circuit on the Line Termination and the loopback circuit on the NT1.

This is a step-by-step procedure complete with recommendations of what might cause the fault and some resolutions for these faults.

For additional Basic Rate Interface (BRI) troubleshooting guidance and assistance, see Figure 7.4-1, *ISLU U-DSL BRI Troubleshooting Diagram*.

Note 1: Before performing this procedure, perform Procedure 9.1, Analyze and Resolve OOS Line List Entries.

Note 2: This procedure should be performed as part of Procedure 9.3, Analyze and Clear a Line Having a Subscriber Customer Complaint.

Note 3: While performing this procedure, if reference is made to the use of an input or output message, then it is advised that 235-600-700, *Input Messages*, or 235-600-750, *Output Messages*, be used to obtain the appropriate format(s) associated with the message.

Note 4: The criteria for acceptable test results should be in accordance with local practices and recommendations. In general, the acceptable Bit Error Rate (BER) for a Digital Subscriber Line (DSL) channel intended for data applications should be 1×10^{-8} (0.0000001) or less, while for voice applications 1×10^{-6} (0.000001) or less is satisfactory. For packet channels, the **TST:DSL** command considers that if 98% of the transmitted packets can be received error-free, a PASSING result occurs. For circuit channels, the **TST:DSL** command uses a BER to produce a passing, degraded, or failing result. The BER used is a **TST:DSL** specifiable option (ABER).

Note 5: The **TST:DSL** command with the **SECT** and **V** option can perform a sequence of BER tests to each loopback termination automatically, and may be used in place of manually requesting individual tests. The command starts at the farthest available termination specified. If no termination is specified: (a) For U-DSL (AMI and ANSI¹) interfaces, the default is the NT1; (b) For T interfaces the default is the LT. The **SECT** test continues testing each termination approaching the 5ESS switch until a PASSING result is obtained or all possible terminations have been exhausted. Also,

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the **TST:DSL** command performs a mismatch test if run on an out-of-service (OOS) U-DSL, the U-interface is down at the line card, and a loopback of all channels has been requested at the NT1 or BRI transmission extension (BRITE) CUs. The **SEQ** option can be used to print the passing or failing test results for all terminations. See the **TST:DSL** input command in the 235-600-700, *Input Messages* for additional information on the **SECT** and **SEQ** options.

Note 6: Below are the automatic error counters used for Integrated Services Digital Network (ISDN) lines. Once a counter reaches its minimum threshold, a timer begins. If the maximum threshold is reached before expiration of the timer, the terminal/interface is removed from service. If the threshold is not reached, the counters are reset. There are two counters for both the ISDN interface and the specific ISDN terminal. One exception exists in the software releases for national ISDN. Because no maintenance information message (MIM) exists for national ISDN type terminals, it is not possible to remove separate terminals. In the currently-supported software releases, the terminal counters are applicable to this interface.

For both the interface and terminal, a user counter and an error counter exist. The user counter is incremented whenever a direct end-user action causes an error to occur. An example of this is hitting a feature button that is unassigned. The terminal counter is incremented whenever a terminal causes an error and is not directly related with an end-user action.

Layer 3 Error Counters

	Minimum Threshold	Maximum Threshold
Level 3 User Error Counter per Interface	60	80
Level 3 Error Counter per Interface	21	40
Level 3 User Error Counter per Terminal	20	30
Level 3 Error Counter per Terminal	7	15

Caution: *When the Digital Subscriber Line (DSL) is seized, customers are denied the use of the seized DSL or DSL channel(s). Seizing an individual CPE does not affect other customers on the DSL.*

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position (161,x) from the TLWS test position summary page (160).
2. Gain access to the CPE Summary Status page from a TLWS test position using the poke command **4001,<DN>,CPE|USPID**.
 - (a) Verify that the USPID for each CPE is correct by entering the following at the MCC: **OP:CPE,DN=<DN>**.
Note the valid USPIDs and compare them to the USPIDs on the 9201 page.
 - (b) If the suspected faulty CPE is known, then select that directory number (DN).
 - (c) If the suspected faulty CPE is not known, then test each CPE line that has a fully initializing protocol. If none exist, go to Step 6.

3. Perform an interactive digital loopback to the selected CPE by entering poke command **53xx,56000,ANY**, where **xx** is the CPE number shown on Page 9200, CPE Tests.

Note: The CPE loopback is not supported for standard CPEs. Refer to Procedure 11.5, BRI Access to the 108 Test Line.

4. If, after about 60 seconds, (ELAP field) the test results are acceptable (see Note 4), enter poke command **5999** to halt the test. The path from the switch to the CPE has been verified. If this test fails, go to Step 6.
5. If there remains other testable CPE on the DSL that may be faulty, return to Step 3 and select the next available CPE. If all CPE test results are acceptable, go to Step 12.
6. Refer to the **Caution** and seize the DSL (unless already seized) by entering the poke command **4800**, which causes you to leave the 9200 page.

Access Line Transmission Page 5400,3 and run a loopback test to the NT1 with poke command **5411,NT1,20,56000,ALL,SECT,6,V**. See Note 5 for information on the **SECT** versus **SEQ** options.

Note: For an intermittent problem, a 1-hour noninvasive loopback is recommended (see the TST:DSL 235-600-700, *Input Messages*, manual page).

7. If the NT1 loopback test results are acceptable, the CPE is faulty or the CPE is of the wrong type, then the CPE and related wiring is suspected and should be repaired. Go to Step 15.

If the test results are not acceptable, or the DN is that of a T-DSL, then:

- (a) If not already there, access the Line Transmission Page (5000,3). Refer to the **Caution** and seize the DSL (unless already seized) by entering the poke command **4800**, then run a loopback test to the Line Termination with the poke command **5032,LT,56000,ALL**.
 - (b) Go to Step 13 for any failing channel(s) connected to a PH (that is, it is a D-channel or other packet-switching channel).
8. After about 60 seconds (ELAP field), stop the test with poke command **5999**. If the test results are acceptable (see **Note 4** in Section 11.1), then the equipment beyond the Line Termination is faulty and must be repaired.

If the line is a T-DSL, the CPE or wiring from the Integrated Services Line Unit (ISLU) to the CPE is faulty and must be repaired. Go to Step 15.

If the line is a U-DSL, and the NT1 loopback test failed, then the fault could be a faulty or incorrect NT1, a disconnected or powered-down NT1, or a problem in the 2-wire loop from the Line Termination to the NT1. Go to Step 15.

9. If only packet tests failed, go to Step 11. If all tests fail to this point, release the line by entering the poke command **4999** and diagnose the Line Card by entering the input message **DGN:ISLULC** or **DGN:ISLUCKT**. If the diagnostic fails, follow Procedure 7.2, Clear Trouble in the SM and SM-2000, or consider using Line Card sparing (see 235-105-210, *Routine Operations and Maintenance Procedures*). If the diagnostic passes, go to Step 13.

10. If on-demand B-channel packet-switching (ODB) is supported by the DSL being tested, verify the PH channel assigned to the subscriber service by performing Substeps (a) and (b). Otherwise, go to Step 16.
 - (a) Enter poke commands **9200**, **9201** or **4001,<DN>,CPE** to display the CPE currently active on the DSL.
 - (b) Perform a test of the PH channel by entering poke command **53xx,56000,B1** or **B2,PS**.
11. If, after about 60 seconds, the **53xx,PS** is passing, enter poke command **4999** to halt the test and release the line. The PH channel has been verified. Go to Step 15.
12. Soft switch the PH, and then diagnose the PH by entering the input message **DGN:PSUPH**.
13. If the PH passes all tests and the circuit-switched paths have been verified. Go to Step 15.
14. If a tested PH does not pass any of the described tests, replace the PH board and retest the DSL.
15. Access the TLWS test position summary page (160) and release the TLWS test position (**201,x**).
16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.2 AUTOMATIC LINE EVALUATION OF A DIGITAL SUBSCRIBER LINE

OVERVIEW

The Automatic Line Evaluation (ALE) provides continuous, nonservice-affecting monitoring of Digital Subscriber Line (DSL) performance. It does this by detecting and recording faults at Layers 1 (U-DSL only), 2, and 3. These counts are displayed on the Receive-Only Printer (ROP) once every 24 hours and can be extracted and displayed by manual request via a message. The Protocol Error Records (PERs), which describe all protocol violations detected for a DSL, are temporarily stored in a circular buffer for retrieval by the ALE. The PER of the last violation detected on a DSL that was found to be faulty and was automatically removed due to excessive Layer 3 protocol errors (LVL3ERR) is displayed along with the removal indication on the ROP. The ALE data is displayed automatically on a scheduled basis every 24 hours and manually via the **EXC:ALE** command (refer to 235-600-700, *Input Messages*).

PROCEDURE

1. At the Master Control Center (MCC), obtain the ALE output for a given DSL by entering **EXC:ALE, DN=xxxxxxx, level1, level2, per, print**.

Note: Instead of using the directory number (DN), one of the following commands can be used:

DSLGM=SM#-PH_GROUP#-PH_MEMBER#

or

LCEN=SM#-ISLU#-LG#-LC#

or

ILEN=SM#-IDCU#-RT#-LINE#

or

LCKEN=SM#-ISLU#-LU#-LBD#-LCKT#

Refer to 235-600-700, *Input Messages*, for a complete description of the command options.

2. If the level 1 output indicates that any of the counts have exceeded the count's associated threshold, perform Procedure 11.1, Digital Subscriber Line BRI Integrity Tests.

Note: The level 1 output, which automatically resets every 24 hours, indicates the number of errored seconds, severely errored seconds, and block errors (BE) detected by the line card (LC) or integrated digital carrier unit (IDCU) remote terminal (RT) line termination (channel unit). Counts for IDCUCU RT U-DSL line termination may not be completely reported due to the need to support multiple vendor's RT that may not be able to detect, collect, or report the counts requested. There is no way at this time to know which vendor's RT supports which count sets. Lucent Technologies IDCUCU RT U-DSL currently supports the same counts as an ISLU/ISLU2 ANS¹ U-DSL. For details, refer to the **EXC:ALE-LVL1** output message in 235-600-750, *Output Messages*.

Note: If the subscribing customer has reported a noisy line or excessive data transmission errors, and the level 1 performance monitoring counts (**EXC:ALE-LVL1** output message) indicate little or no cyclic redundancy check (CRC) BE, this could indicate that the level 1 performance monitoring counters

1. Registered trademark of American National Standards Institute, Inc.

- are not working. For U-DSLs (ANSI), use the corrupt CRC test (**TST:DSL, TEST=CRC,V** input message) to verify that the performance monitoring counters count level 1 CRC BE. If the duration of the corrupt CRC test specified is long enough, it should be able to verify that the performance monitoring thresholds trigger a performance monitoring alert (**REPT:ALE-LEVEL1** output message). For Lucent Technologies U-DSLs on IDCU RTs, it is also possible to use the corrupt CRC test (**TST:DSL,TEST=CRC-UP** and **TST:DSL,TEST=CRC-DWN** input messages) (refer to 235-600-700, *Input Messages*, for use of this command) to verify that the PM counters count level 1 CRC BE in both upstream and downstream directions. For details, refer to the appropriate message manual and to Procedure 11.1, Digital Subscriber Line BRI Integrity Tests.
3. If the level 2 output indicates a status of MINOR, MAJOR, CRITICAL, DEFECTIVE, or PROBLEM, perform Procedure 11.1, Digital Subscriber Line BRI Integrity Tests.

Note: The level 2 output, which automatically resets every 24 hours, indicates a qualitative measure of level 2 performance. A status of NORMAL indicates all is well at level 2. A status of NO-INFO indicates that not enough packets were received to make an estimate of the level 2 quality. This usually occurs when there is no CPE plugged into the DSL. For details, refer to the **EXC:ALE-LVL2** output message in 235-600-750, *Output Messages*.
 4. The PERs indicate discreet protocol related events that the 5ESS[®] switch has detected indicating potential problems. They include the message type, call state, and Protocol Error Codes (refer to the **EXC:ALE-PER** output message and the **APP:ALE-PER** Appendix of 235-600-750, *Output Messages*) indicating the nature of the error. Also included is a time stamp, indicating when the error occurred. This should be correlated with any Customer Trouble Reports made on the DSL.

Note: Up to 15 PERs per DSL can be stored in the switching module/switching module-2000 (SM/SM-2000) and printed out by **EXC:ALE** . After 15 PERs have been logged on a given DSL, any additional PERs overwrite the oldest ones in the buffer for that DSL.
 5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.3 PROTOCOL MONITORING OF A DIGITAL SUBSCRIBER LINE

General

The protocol monitoring (PM) feature is used to monitor protocols over digital subscriber lines (DSLs) and digital trunks. The protocols currently supported include the following:

- Link Access Protocol D-channel (LAPD)
- Link Access Protocol - Balanced (LAPB)
- Q.931
- X.25
- X.75
- X.75'
- Time Slot Management Channel (TMC)
- Embedded Operations Channel Convergence Protocol (V.120).

A Protocol Monitoring session consists of three parts:

- *Setup* determines the correct parameters for the session's input command (refer to 235-600-700, *Input Messages*, 235-600-750, *Output Messages*, 235-600-755, *Protocol Error Record Descriptions*, for details).
- *Trigger* includes waiting for or stimulating an event that causes the PM session to end and the collected data to be output.
- *Analysis* is the studying of the output to determine what occurred. Analyzing the output requires detailed knowledge of the monitored protocol, or activation of the Protocol Translation Monitoring Special Feature.

On the execution of the **EXC:PM** input command, protocol events for the specified line are collected and stored in a buffer until the trigger event occurs. The trigger event, which is specified through the input command **TRIGVAL=c** or **PER[=d]**, causes termination of the data collection after all the recording conditions have been met. The collected frames or messages are then output. By choosing to specify an offset input parameter (**OFF=a**), the craft can manipulate whether the trigger is the first event in the buffer, the last, or somewhere in between.

Even though all data for the specified channel is collected, stored, and displayed, the PM input parameters can be manipulated for user or channel triggering on multipoint lines, Protocol Error Record (PER) or message triggering, monitoring one protocol while triggering on another, and for the duration of a PM session.

Multipoint Lines – User or Channel Triggering

Since there can be up to eight users on a multipoint line, the craft can choose between user or channel triggering. Although the PM session collects data for all users on a multipoint line, the focus of the triggering can be narrowed to a single user of the channel by specifying the DN, PKTDN, or MLHG identifier in the input command. The other input identifiers (LCEN, LCKEN, ILEN, PORT, etc.) are assumed to be channel identifiers.

The Terminal Endpoint Identifier (TEI) of each output frame should be examined to determine which frames are for a given user. Before beginning the PM session, the user should execute the **OP:CPE** command on the given line to output a list of TEIs for that line.

PER or Message Triggering

Besides choosing user or line triggering, every PM session (multipoint or point-to-point) must specify a trigger. The two types of triggering (PER and Message) are as follows:

- *PER triggering* causes a PER to detail an error event associated with switch-detected protocol errors. A choice must be made between triggering on any PER or on a specified PER. For a complete list of PERs, refer to the 235-600-755 *Protocol Error Record Descriptions Document*.
- *Message triggering* (TRIGVAL) is used when a PM session will be terminated with the occurrence of a particular frame, packet, or message traveling in a particular direction between the Customer Premises Equipment (CPE) and the switch. For a complete list of messages, refer to the **EXC:PM** input message description in 235-600-700, *Input Messages*.

Monitoring and Triggering

Although the most common use of PM is monitoring and triggering on the protocol specified (**PROT=z**), PM allows the user the option of monitoring one protocol but triggering on another by use of the TRIGLVL input parameter (**TRIGLVL=LEVELx**). Different level triggering can be requested by selecting a TRIGLVL value that differs from the level of the PROTOCOL chosen for monitoring. In this case, the specified TRIGVAL parameter must be of the same protocol level as TRIGLVL.

By using the duration parameter (**DUR=k**), the length of the PM session can be controlled. When the duration timer expires, the collection of data ceases and the outputting of data begins.

The craft uses the Equipment Configuration Data (ECD) base to define the destination of the PM output. The ECD provides a list of possible destinations for each message class. The message class for PM messages is *SPM*. Through the *classdef* relation in the ECD, the craft can select the output's destination.

PROCEDURE

1. Collect the parameters to be used in the PM session. At the minimum, two parameters are required for the command to execute:
 - (a) Line or user identification (**DN=xxxxxxx**, **LCEN=a-b-c-d**, **LCKEN=a-b-c-d-e**, etc.). If DN, PKTDN, or MLHG is used when identifying a multipoint line, then user triggering is selected.
 - (b) PER (for triggering on receipt of a PER) or TRIGVAL (for triggering on a particular frame, packet, or message in a specified direction).

If no other parameters are specified, default values are used. Refer to **EXC:PM** in 235-600-700, *Input Messages*, for a complete list of all input parameters and their default values.
2. At the Master Control Center (MCC), enter the **EXC:PM** command using the parameters gathered in Step 1. Some examples are as follows:

- (a) **EXC:PM,DSLGM=c-d-e,PROT=LAPD,PER;**

The command starts a PM session that monitors the LAPD protocol for DSLGM c-d-e. The session triggers on receipt of any PER for the LAPD protocol. The data is then output.

- (b) **EXC:PM,LCEN=a-b-c-d,PROT=Q931,PER="PORT-OOS",OFF=20;**

This command starts a PM session that monitors the Q.931 protocol for LCEN a-b-c-d. This session triggers on receipt of a PORT-OOS (Port out-of-service) PER. Since the offset parameter is set to 20, twenty frames are collected after the triggering event. The data is outputted after the final twenty frames are collected.

- (c) **EXC:PM,DN=xxxxxxx,
PROT=LAPD,TRIGLVL=LEVEL3,TRIGVAL=INCCALL,PRINT;**

This command starts a PM session that monitors the LAPD protocol for DN xxxxxxx. The session triggers and starts printing segments on the Receive-Only Printer (ROP) when the switch receives a X.25 Incoming Call (INCCALL) packet. The PRINT parameter is needed so the output will be sent to the ROP if the input command is initiated from a location other than the MCC or a Supplemental Trunk and Line Work Station (STLWS). If the command comes from either of these locations, output automatically is sent to the ROP.

- (d) **EXC:PM,eoc=a-b-c-d,prot=V120,triglvl=level7,perx,late**

The command starts a PM session that monitors the V.120 level 3 protocol on the EOC channel. The session terminates when an IDLC (level7) PER is detected. The "xlate" option results in an English translation of the PM output. The output of the PM session can take two forms.

By default a 5ESS[®] switch has the capability to provide a raw hex dump of the protocol exchange that was recorded by the PM session.

Note: This is from a file on the 3B in the /unixa/users/pmtran directory.

The hex output appears on the ROP in messages prefaced by "EXC PM DATA." An example is shown in Figure 11.3-1.

```
M EXC PM DATA SES=3 SEG=14 01/07 11:12:05 TEI=0
80 BYTES OF FRAME NUMBER 14 FRAME LENGTH IS 80 DIR=XMT

08016705 04038090 A2180189 34014070 08C13237 31353631 30952A34 80800103
8B0C3730 382D3937 392D3033 34388001 05930E20 30312D30 37203131 3A313261
6D800102 8C042049 6E498001 14800114
```

Figure 11.3-1 — Example of EXC PM DATA in Hexadecimal Format

Optionally, the raw hex data can be replaced with an English translation of the protocol exchange by turning on Special Features and adding the "xlate" option on either the *exc:pm* or the *stp:pm* command line. The translated output is stored on the 3B under the directory /unixa/users/pmtran. The file name for the output of a PM session is *atf.xxx* where *xxx* represents the PM session number.

Activate Special Feature 32 to obtain the base translation capability and Special Feature 151 to obtain translation of National ISDN (NI-1). Figure 11.3-2 is an example of the translated capability when Special Features #32 and #151 are active.

```
-----  
Event 14 01/07 11:12:05  
08 Q.931 Call Control Message  
67 Call Reference Value Orig 103  
M 05 Message Type SETUP  
I 04 Bearer Capability Length = 3  
80 Coding Standard CCITT  
Info Transfer Cap. Speech  
90 Transfer Mode Circuit  
Transfer Rate 64 kbit/s  
A2 Layer 1 Protocol G.711 u-law  
I 18 Channel Identification Length = 1  
89 Interface ID Implicitly Defined  
Interface Type Basic  
Preferred/Exclusive Exclusive  
D Channel Indicator Not D Channel  
Channel Selection B1  
I 34 Signal Length = 1  
40 Value Alerting On - Pattern 0  
I 70 Called Party Number Length = 8  
C1 Address Type Subscriber Number  
Numbering Plan ISDN/Telephony E.164/E.163  
Number 2715610  
I 95 Shift Locking Codeset 5
```

Figure 11.3-2 — Example of EXC PM DATA in Translated Format (1 of 3)

```
I 2A Standard Display Length = 52  
80 Display Type Normal  
80 Display Tag Blank  
01 Display Element Length = 1  
03 Number of Blanks Appended 3  
8B Display Tag Calling Address  
0C Display Element Length = 12  
Value 708-979-0348  
80 Display Tag Blank  
01 Display Element Length = 1  
05 Number of Blanks Appended 5  
93 Display Tag Date & Time of Day  
0E Display Element Length = 14  
Value 01-07 11:12am  
80 Display Tag Blank  
01 Display Element Length = 1  
02 Number of Blanks Appended 2  
8C Display Tag Reason  
04 Display Element Length = 4  
Value InI  
80 Display Tag Blank  
01 Display Element Length = 1  
14 Number of Blanks Appended 20  
80 Display Tag Blank  
01 Display Element Length = 1  
14 Number of Blanks Appended 20
```

Figure 11.3-2 — Example of EXC PM DATA in Translated Format (2 of 3)

```
Raw Hex Data
0801670504038090A21801893401407008C1323731
35363130952A34808001038B0C3730382D3937392D
30333438800105930E2030312D30372031313A3132
616D8001028C0420496E49800114800114
-----
```

Figure 11.3-2 — Example of EXC PM DATA in Translated Format (3 of 3)

To manually translate the raw hex dump, use the following references:

- **LAPD**
 - 235-900-341 – *National ISDN Basic Rate Interface Specification*
 - 235-900-343 – *Custom ISDN Basic Rate Interface Specification*
 - CCITT Recommendations Q.921 or I.441.
- **LAPB**
 - 235-900-341 – *National ISDN Basic Rate Interface Specification*
 - 235-900-343 – *Custom ISDN Basic Rate Interface Specification*
 - CCITT Recommendation X.25.
- **Q.931**
 - 235-900-341 – *National ISDN Basic Rate Interface Specification*
 - 235-900-342 – *ISDN Primary Rate Interface Specification*
 - 235-900-343 – *Custom ISDN Basic Rate Interface Specification*
 - CCITT Recommendations Q.931 or I.451.
- **X.25**
 - CCITT Recommendation X.25.
- **X.75**
 - 235-900-317 – **5ESS** *Switch Interface Specification to a Packet Switched Public Data Network (X.75)*.
- **X.75'**
 - 235-900-325 – **5ESS** *Switch Interface Specification to a Public Packet Switch Network (X.75')*.

3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.4 BASIC RATE INTERFACE DIAL-UP TEST LINE (BRITL)

OVERVIEW

This procedure is used to test the operation of the Custom Digital Subscriber Line (DSL). The operational test is accomplished by generating a voice origination and conducting digital tests of the B-channels accessible from the Customer Premises Equipment (CPE) on the customer basic rate interface.

Note: The BRITL feature is only available to CPE equipment connected to pre-Standard DSLs or Custom ISDN interfaces. See Procedure 11.8, Basic Rate Interface Verification (BRIV) to test CPE equipment connected to Standard DSLs.

The following operations are supported:

- Verify the line card equipment number (LCEN), the IDCU line equipment number (ILEN), or the ISLU2 line circuit equipment number (LCKEN).
- Verify the primary directory number (PDN).
- Verify the directory numbers (DN) associated with call appearances (CA).
- Verify the features assigned to feature buttons (FB).
- Run Bit Error Rate Tests on either B-channel (similar to the **TST:DSL** input command).

To use the Basic Rate Interface Test Line (BRITL), the test line access code must be defined in the office data base through one or more of the following ways:

- Individualized Dialing Plan (IDP) [Business and Residential Custom Services (BRCS) user only]
- Primary Digit Analysis
- Local Digit Analysis
- Regular Directory Number (7 digits).

Recent Change View 9.13 defines the digit string for BRITL in the IDP group. The following parameters should be used to insert the access code in View 9.13:

IDP GRP	Name of IDP Group (Key)
INC DIGIT	Access Code to be assigned (Key)
STATE	NORMAL
ACTION	BTLUSE (for non-billed BRITL) BBTLUSE (for billed BRITL)
FEATURE	/*

Recent Change View 9.2 defines the digit string for BRITL in the Primary Digit Interpreter Table (PDIT). The following parameters should be used to insert the access code in View 9.2:

PDIT	Primary Digit Interpreter Table (Key)
INC DIGIT	Access code to be assigned (Key)
CALL TYPE	FEATURE
TYPE CI CALL	NONCI
FEATURE	/*
ACTION	BTLUSE (for non-billed BRITL) BBTLUSE (for billed BRITL)
PREFIX	NONE

Recent Change View 9.3 defines the digit string for BRITL in the Local Digit Interpreter Table (LDIT). The following parameters should be used to insert the access code in View 9.3:

LDIT	Local Digit Interpreter Table (Key)
INCOMING DIGITS	Access code to be assigned (Key)
CALL TYPE	BRITL (for non-billed BRITL) BBRITL (for billed BRITL)
TYPE CI CALL	NONCI
NBR OF DIGITS	Number of digits to collect (length of access code).

Recent Change View 1.5 defines the directory number for BRITL. The following parameters should be used to insert the directory number in View 1.5:

TN	Telephone Number
PTY	I
MFRI	N
RAX	Same RAX used on 4.1
LCC	TST
RTI	0
TSTCODE	BRITL (for non-billed BRITL) BBRITL (for billed BRITL)
TRC	N

For additional information on Recent Change views, refer to the appropriate Recent Change/Verify (RC/V) manual. During a BRITL call, the following may be heard:

- Continuous dial tone – waiting for a new command
- One burst of high tone – success
- Two bursts of low tone – failure
- Ringing – indicates a digital test is waiting for test equipment
- Busy – indicates a digital test has aborted
- Silence – indicates a test is running.

When a digital test completes, the success or failure treatment is prefaced by a warning tone (long low tone) indicating that the test is complete and the results are forthcoming.

Multiple call appearances (MCA) subscribers have the capability to display the DN associated with the CA or display the assigned feature. This is accomplished by either pressing the CA button or the FB once dial tone is heard. During a test call, all CA and FB functions are turned off and cannot be used to start a new feature or call. The only way to originate a new call, terminate an incoming call, or activate a feature is to disconnect the test call by hitting the DROP button (going on-hook for all other subscribers), restoring the use of the CA and FB functions.

For PODS [Integrated Services Digital Network (ISDN) equivalent of plain old telephone service (POTS), also known as plain old circuit-switched ISDN call (POCSI)] subscribers, the PDN can be retrieved by dialing the proper code listed in Table 11.4-1.

Note 1: For Alternate Mark Inversion (AMI) - U-card users equipped with Basic Rate Interface Transmission Extension (BRITE) Channel Units (CU), B-channel digital loopback tests originating from BRITLs using any of the CUs as a termination are disallowed. Attempts to run the digital loopback test on any of the CUs will receive failure treatment. However, full digital loopback (2B + D) can still be performed through the **TST:DSL** command interface from the central office (CO).

Note 2: Depending on the CPE, the display for CA verification may be truncated. Some possible display identifiers are as follows:

Pri DN	Primary Directory Number
Sec DN	Secondary Directory Number
MLHG	Multiline Hunt Group
SH	Shared Directory Number/Multiline Hunt Group.

Note 3: The CPE loopback is supported by Feature Package 2.0 and later. This excludes any CPE that does not support voice.

PROCEDURE

1. At the station under test, dial the BRITL access code (DN assigned through RC/V). Continuous dial tone should be heard and a message should be seen on the station set's display indicating successful origination.
2. Enter: (1) the appropriate code to display the LCEN, or ILEN, or LCKEN, or (2) the appropriate code to display the PDN.
3. Set the digital test parameters by dialing one or more of the set parameter codes listed in Table 11.4-1.

Note: If the default parameters are acceptable, this step may be omitted.

4. Run a digital test on channel B1 using the default test parameters by entering the appropriate code from Table 11.4-1.
5. Run a digital test on channel B2 using the default test parameters by entering the appropriate code from Table 11.4-1.

6. If either of the digital tests fail, repeat the test using different loopback terminations (NT1, Line Termination). This should help to isolate the problem.
7. For MCA subscribers, press multiple CA or FB buttons to display the DN or feature assigned to the buttons.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 11.4-1 — BRI Dial Up Test Line Keypad Codes

KEYPAD STRING ^a	ACTION
*11x#	Run BER Test on Channel x With Current Parameters
*120#	Display Current Test Termination
*12x#	Set Test Termination
*130#	Display Current Test Duration
*13x#	Set Test Duration
*140#	Display Current Test Data Rate
*14x#	Set Test Data Rate
*2#	Send Alerting Signal to the CPE
*3#	Print LCEN or ILEN or LCKEN on CPE Display
*4#	Print Primary DN/MLHG on CPE Display
*0#	Repeat Previous Message (Display/Tone)
Note(s):	
a. The valid values for x are defined in Table 11.4-2.	

Table 11.4-2 — BRI Dial Up Test Line Parameters

COMMAND PREFIX				
x	*11x	*12x	*13x	*14x
1	B1	CPE ^a	20 sec ^a	64k Clear
2	B2	NT1	2 min	64k Restricted
3	-	Line Termination	20 min	56k Clear ^a
41	-	BRITE CU1	-	-
42	-	BRITE CU2	-	-
43	-	BRITE CU3	-	-
44	-	BRITE CU4	-	-
45	-	BRITE CU5	-	-
46	-	BRITE CU6	-	-
Note(s):				
a. Default parameters.				

11.5 BASIC RATE INTERFACE (BRI) ACCESS TO THE 108 TEST LINE

OVERVIEW

This procedure is used to measure the integrity of digital data transmitted between the CPE and the 5ESS[®] switch.

The BRI Access to the 108 Test Line (108TL) feature is an optional Bellcore national ISDN feature that provides ISDN BRI 7-digit dialable circuit switched access (voice or data) to a 108-Type Test Line. The 108-Type Test Line provides a capability over the 2-wire or 4-wire Customer Premises Equipment (CPE) interface that accepts binary signals (bits) and loops back received octets (8 bits) from a digital circuit. This provides a noninverting loopback test line capable of looping back a signal up to 64 kbps.

Unlike the Basic Rate Interface Test Line (BRITL), which currently supports the custom BRI interface, the 108TL currently supports the standard BRI interface. Table 11.5-1 shows the differences between BRITL and 108TL.

The operating company craft can be dispatched to correct loop problems during installation/provisioning of the BRI or to a customer complaint.

Test Equipment must include a TR-816 compliant portable test set with a Bit Error Rate (BER) capability.

The craft in the central office has the choice of assigning a 7-digit DN for the 108TL on either of two Recent Change Line Assignment Views, namely view 1.5 or 1.6. The craft uses the same technique as used currently to assign the noninverting loopback for trunk access to the 108TL (Procedure 12.15). For trunk access to the 108TL, the route index is used to identify the ISTF, GDSF or the ISTF functionality on the GDSF (future plans for trunk testing include the TSI for non-inverting loopback) as the source of the loopback. For BRI access, the TSI is used as the source of the loopback. Hence, the route index is ignored. If desired, the craft may assign the same 7-digit number to access the 108TL from a BRI or a trunk (Figure 11.5-1).

5ESS SWITCH			
RECENT CHANGE 1.5			
PBX-DID LINE (LINE ASSIGNMENT)			
*1. TN	9591080	(any DN, 958XXXX or 959XXXX is a Bellcore TR-TSY-0000-275 recommendation)	
24. RAX	XX	(Same RAX used on 4.1)	SPEC TRN _____
25. LCC	TST		COMP LOSS __. _
38. RTI	_____		
	HRI		SCD SCRNING _
55. TSTCODE	NINV		
57. RMK	108 TEST LINE		
58. TRC	N		

Figure 11.5-1 — Recent Change View 1.5

For additional information on recent change views, refer to the appropriate recent change/verify (RC/V) manual.

PROCEDURE

1. Temporarily disconnect the end-user's CPE equipment and replace it with the appropriate test set.

2. At the station under test, dial the 108TL access code (DN assigned through RC/V) from the test set.
 3. If a digital loopback is available, a Call Proceeding message is sent back to the CPE. If the TSI loopback termination is made, the *5ESS* switch sends back to the CPE a Q.931 **CONNECT** message and starts a 20-minute timer.
 4. The craft at the CPE may start testing in any manner that is felt appropriate. Possible tests may be as follows:
 - The transmitting of a pseudo-random test bit pattern over the B-channel path for certain performance measurements (for example, errored seconds, bit errors, etc.)
 - The transmitting of a digital signal to perform a quick continuity check of the BRI path between the CPE and the serving *5ESS* switch.
- Specific testing procedures for the use of the 108TL are determined by the operating company or CPE users.
5. The *5ESS* switch terminates the TSI loopback when a **DISCONNECT** message is received from the CPE or when the 20-minute timer expires. The normal call disconnect sequence is then followed.
 6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 11.5-1 — Differences Between BRITL and 108TL

ITEM	BRITL	108TL
Technologies Supported	Custom BRIs: U-Interface (AMI & 2B1Q) and T-Interface.	Standard BRIs: U-Interface (2B1Q) and T-Interface.
Bearer Capabilities Supported	Originations from CSV.	Originations from CSV and CSD.
64 kbps or 56 kbps Access	64 kbps access may not be available to RISLUs and potentially not available if the path to the ISTF, GDSF or the ISTF functionality on the GDSF is on an RSM “umbilical.” GDSF is allowed on RSMs for ISTF functionality only. 56 kbps is always available.	64 kbps access may not be available to RISLUs. 56 kbps is always available.
User Test Options	Under CPE key pad control: Used by switch to determine (1) the termination to be looped back (CPE, NT, CU, or LC), (2) test duration, and (3) channel (B1 or B2) to test. Note: If the channel to be tested is not the one from which the BRITL call originated, then the channel is tested regardless of the services (CSV, CSD, and Packet) on that channel.	Switch does not accept test options from user. Switch provides: (1) the loopback termination at the TSI, (2) a loopback on the B-channel originating the test request, and (3) a loopback for up to 20 minutes. Note: Channels that support only packet services cannot be tested.
Test Pattern	Sourced from switch.	Sourced from CPE. Typically, the CPE is temporarily replaced with a Portable Test Set (PTS). Refer to Bellcore TR-TSY-000816.
CPE Display	Switch updates CPE display with test results.	Switch does not generate any CPE display. Test results under PTS control. Refer to TR-TSY-000816.
Default Service	Access to BRITL is allowed.	Cannot be assigned to a standard BRI.
Feature Interactions	Handled as an originating call while entering BRITL test options. Handled as a maintenance call while testing the loop.	Handled as a normal call until the 7D 108TL access DN is dialed. From that point on the call is handled as a TM maintenance call.
AMA Records	Billed AMA records are optional.	No AMA records are created.

11.6 BASIC RATE INTERFACE VERIFICATION (BRIV)

OVERVIEW

This procedure is used to perform an operational test of the Standard Digital Subscriber Line (DSL). The operational test is accomplished by generating a circuit switched voice (CSV) origination and circuit switched data (CSD) tests of the B-channels accessible from the Customer Premises Equipment (CPE) on the standard basic rate interface.

Note: The BRIV feature is only available to CPE equipment connected to Standard DSLs. See Procedure 11.4, Basic Rate Interface Dial-Up Test Line (BRITL) to test CPE equipment connected to pre-Standard DSLs or Custom ISDN interfaces.

The following operations are supported:

- Verify the office equipment number (OE).

To use the Basic Rate Interface Verification (BRIV), the test line access code must be defined in the office data base through one or more of the following ways:

- Individualized Dialing Plan (IDP) [Business and Residential Custom Services (BRCS) user only]
- Primary Digit Analysis.
- Local Digit Analysis
- Regular Directory Number (7 digits).

Recent Change View 9.13 defines the digit string for BRIV in the IDP group. The following parameters should be used to insert the access code in View 9.13:

IDP GRP	Name of IDP Group (Key)
INC DIGIT	Access Code to be assigned (Key)
STATE	NORMAL
ACTION	BTLUSE
FEATURE	/*

Recent Change View 9.2 defines the digit string for BRIV in the Primary Digit Interpreter Table (PDIT). The following parameters should be used to insert the access code in View 9.2:

PDIT	Primary Digit Interpreter Table (Key)
INC DIGIT	Access code to be assigned (Key)
CALL TYPE	FEATURE
TYPE CI CALL	NONCI
FEATURE	/*
ACTION	BTLUSE
PREFIX	NONE

Recent Change View 9.3 defines the digit string for BRIV in the Local Digit Interpreter Table (LDIT). The following parameters should be used to insert the access code in View 9.3:

LDIT	Local Digit Interpreter Table (Key)
INCOMING DIGITS	Access code to be assigned (Key)
CALL TYPE	BRITL
TYPE CI CALL	NONCI
NBR OF DIGITS	Number of digits to collect (length of access code).

Recent Change View 1.5 defines the directory number for BRIV. The following parameters should be used to insert the directory number in View 1.5:

TN	Telephone Number
PTY	I
MFRI	N
RAX	Same RAX used on 4.1
LCC	TST
RTI	0
TSTCODE	BRITL
TRC	N

For additional information on Recent Change views, refer to the appropriate Recent Change/Verify (RC/V) manual.

During a BRIV call, the following treatments may be observed:

- Audible Ringing for two seconds, CSV only.
- Message "Connected" is displayed on CPE for one second.
- OE identification value is displayed on CPE.

PROCEDURE

1. At the station under test, dial the BRIV access code (DN assigned through RC/V).
2. Enter the appropriate code to display the PDN and the LCEN, ILEN, or LCKEN.

During a BRIV call, the following treatments may be observed:

- Audible Ringing for two seconds, CSV only.
 - Message "Connected" is displayed on CPE for one second.
 - OE identification value is displayed on CPE.
 - OE is displayed for 60 seconds.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.7 RISLU LINE CARD SPARING

OVERVIEW

This procedure is used to restore service to a subscriber line assigned on a RISLU (Remote Integrated Services Line Unit) that is in an unmanned office or peripheral site. Because LC (line card) sparing uses call processing and maintenance resources, replace the LC that is OOS (out of service) or in a degraded state as soon as possible, and use this LC sparing procedure as a temporary fix only.

Note: This procedure is intended for the Remote Integrated Services Line Unit (RISLU) only, it is *not* intended for an ISLU2. See Procedure 11.8, ISLU2 Line Circuit Sparing Operations for ISLU2 line card sparing.

If Line Card (LC) goes out of service (OOS), the craft may either repair/replace the LC or defer this action to a later time through LC sparing. This is especially convenient for a RISLU. This procedure describes the method for assigning a RISLU spare LC in the STANDBY state to temporarily replace an OOS LC. The method to remove a spare LC and place it back into the STANDBY state is also described. It is assumed that either a spare U-type or Z-type LC will be assigned to replace an OOS LC of the same type.

A maximum of two LCs (Z-type, U-type, or a combination) can be actively spared in a RISLU. Sparing is not intended to be activated indefinitely since it requires resources that are also used by call processing and maintenance activities.

In a RISLU, there are two Metallic Access Network (MAN) buses (0 and 1). Each LC has two line group (LG) bus access inputs to the MANs. Each MAN spare bus half is connected to every other Line Group Controller (LGC) half-group where LCs 0-15 are considered the lower half and 16-31 the upper half. The LC position 15 can only be connected to MAN spare bus 0 and LC position 31 to MAN spare bus 1. Spare Z-type LCs may be assigned to either slots 15 or 31 in any equipped LGCs. However, due to internal LC hardware limitations for MAN access, spare U-type LCs may only be equipped in slot 15. Therefore, sparing operations for U-type LCs are limited to bus 0.

Since sparing requires relay operations by the LC to be spared, some faults may occur that prevent sparing from being successfully completed. Once sparing has been activated, the faulty LC cannot be physically removed from the LGC without affecting customer service. To replace a faulty LC, it must first be unspared using the sparing deactivation procedure.

The faulty LCs to be spared must not be in the same four-line half groups that share a common test bus segment to prevent denying access to other LCs in these groups from the test bus. Since U-type LCs can only be spared on MAN bus 0, only one active spare LC is allowed in each line group 0-7 and 8-15, providing that the faulty and selected designated spare LCs are in the same MAN half and do not require a path that spans MANs. If a U-type LC is spared between lower and upper MAN halves, only one LC can be spared.

PROCEDURE

1. Continue with one of the following:
 - (a) If activating a spare LC, continue with the next step.
 - (b) If deactivating a previously spared LC, go to Step 26.

2. To display the Master Control Center (MCC) page for the Line Group (LG) equipped with the spare LC, enter:
1720,Y,Z,X
Where: Y = RISLU number
Z = LG number (where spare is located)
X = switching module (SM) number (where RISLU is located).
Response: RISLU line group page is displayed.
3. Verify spare LC equipage on 1720 Page.
If sparing Z-type LC:
ISLUC 15 or 31 with TYPE = ZSP
If sparing a U-type LC:
ISLULC 15 with TYPE = AULC
4. At the MCC, diagnose the spare LC to be activated by entering:
51XX
or
DGN:ISLULC=a-b-c-d,raw,tlp
Where: a = SM
b = ISLU number
c = LGC number
d = spare LC number
XX = LC number.
Note: An all tests passed (ATP) condition must be achieved before continuing with the next step. If the sparing option plug is not properly installed, the diagnostics fail.
5. If the spare LC ATPs, restore unconditionally by entering:
31XX,UCL
or
RST:ISLULC=a-b-c-d,UCL
Where: a = SM
b = ISLU number
c = LGC number
d = spare LC number
XX = LC number.
Response: RST:ISLULC a-b-c-d COMPLETED.
6. Is the LC on MCC Page 1720 OOS?
If **YES**, continue with the next step.
If **NO**, enter **21XX** and then continue with the next step.
Where: XX = LC to be spared.
Note: LC must be OOS to be spared.
7. Depending on the type of terminal being used, perform either (a) or (b) as follows:

- (a) If using the MCC, go to Step 10.
 - (b) If using a Recent Change/Verify (RC/V) terminal (the recommended method), continue with the next step.
8. At the RC/V terminal, enter:
RCV:MENU:APPRC,PRINT,VERBOSE;
Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.
9. Go to Step 15.
10. At the MCC, ensure that the terminal is in COMMAND mode.
11. If the RCV PARAMETER INFO page is not already displayed, enter poke command **196**.
Response: RCV PARAMETER INFO page is displayed with cursor at PRINT OPTION.
12. At the MCC, enter command **y**.
Response: Cursor at DETAIL OPTION.
13. At the MCC, enter command **n**.
Response: Cursor at SUMMARY OPTION.
14. At the MCC, enter command **y**.
Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.
15. Enter command **4.23**.
Response: Enter data base operation:
I=Insert, R=Review, D=delete:.
16. Enter **i**.
Response: RECENT CHANGE LINE CARD SPARING page displayed with cursor at FLTY OE attribute as follows:

ATTRIBUTE
*1. FLTY OE _ _____
4. SPR OE _ _____

(* key attribute)
Response: Enter Insert, Change, or Print:
17. Enter the appropriate value for the key attribute FLTY OE, (originating equipment number to which the spare LC will be assigned and spare originating equipment number, if desired) using format **[C][I] aaabccdd**.
Where: C = character representation for a Z-type LC
I = character representation for a U-type LC
aaa = SM
b = ISLU number
cc = LGC number
dd = LC slot number.

- Note:** If not specifying a spare originating equipment number, enter 2 carriage returns.
18. Enter i.
Response: Inserting ... Form Inserted
RECENT CHANGE 4.23 page displayed
Cursor at FLTY OE attribute.
 19. Repeat Steps 17 and 18 for any other spare LC in this RISLU that needs to be spared.
 20. Exit the RECENT CHANGE LINE CARD SPARING VIEW by entering <.
Response: LINES MISCELLANEOUS VIEWS 4.0 page is displayed.
 21. Exit the Recent Change session by entering q.
Response: RCV MENU APPRC COMPLETED
or
RCV - 196 COMPLETED.
 22. Verify the MCC page display for the spare LC by entering 1720,Y,Z,X.
Where: Y = RISLU number
Z = LGC number
X = SM number.
Response: RISLU LGC page is displayed.
 23. Verify from the MCC page displayed that the now activated spare LC displays a state of DSPR and that the spared LC indicates a state of SPR. The box on the lower right-hand side of the MCC page display should have a display indicating "LC xx spr" to "LC xx," where "xx" is the appropriate LC slot numbers.
Note: Depending on the LGC location of the spare LC and the LGC location of the LC to be spared, two LGC pages may have to be displayed.
 24. At the MCC, back up the Office Dependent Data (ODD) by entering BKUP:ODD.
Response: BKUP ODD COMPLETED.
Note: Data base backup takes several minutes to complete.
 25. **STOP. YOU HAVE COMPLETED THE ACTIVATION PORTION OF THIS PROCEDURE.**
 26. Verify the MCC page display for the RISLU spare LC to be deactivated by entering 1720,Y,Z,X.
Where: Y = RISLU number
Z = LGC number (where spare is located)
X = SM number.
Response: RISLU line group page is displayed.
 27. Determine from the MCC page displayed that the spare LC to be deactivated is properly displayed.
Note: If the spare LC to be deactivated is a Z-type, it may be in LC slot 15 or 31. If the spare LC to be deactivated is a U-type, it can only be in LC slot 15.
 28. Depending on the type of terminal being used, perform either (a) or (b) as follows:

- (a) If using the MCC, go to Step 31.
 - (b) If using an RC/V terminal (the recommended method), continue with the next step.
29. At the RC/V terminal, enter:
RCV:MENU:DATA,APPRC,PRINT,SUMMARY;
Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.
30. Go to Step 36.
31. At the MCC, ensure that the terminal is in COMMAND mode.
32. If the RCV PARAMETER INFO page is not already displayed, enter poke command 196.
Response: RCV PARAMETER INFO page is displayed with cursor at PRINT OPTION.
33. At the MCC, enter command y.
Response: Cursor at DETAIL OPTION.
34. At the MCC, enter command n.
Response: Cursor at SUMMARY OPTION.
35. At the MCC, enter command y.
Response: RECENT CHANGE AND VERIFY CLASSES MENU page is displayed.
36. Enter command 4.23.
Response: Enter data base operation:
I=Insert, R=Review, D=delete:.
37. Enter d.
Response: RECENT CHANGE LINE CARD SPARING page displayed with cursor at FLTY OE attribute as follows:

ATTRIBUTE
*1. FLTY OE _ _____

(* key attribute)
Response: Enter Delete, Validate, or Print:
38. Enter the appropriate value for the key attribute FLTY OE, (port number to which the spare LC will be assigned) using format [C][I] aaabccdd.
Where: C = character representation for a Z-type LC
I = character representation for a U-type LC
aaa = SM number
b = ISLU number
cc = LGC number
dd = LC slot number.
Response: The remainder of the form is filled in.

39. Enter **d**.
Response: Deleting ... Form Deleted
RECENT CHANGE 4.23 page displayed
Cursor at FLTY OE attribute.
40. Repeat Steps 38 and 39 for any other spare LC in this RISLU that needs to be unspared.
41. Exit the RECENT CHANGE LINE CARD SPARING VIEW by entering **<**.
Response: LINES MISCELLANEOUS VIEWS 4.0 page is displayed.
42. Exit the Recent Change session by entering **q**.
Response: RCV MENU APPRC COMPLETED
or
RCV - 196 COMPLETED.
43. Verify the MCC LGC page display for the spare LC and for the faulty LC that has been spared by entering **1720,Y,Z,X**.
Where: Y = RISLU number
Z = LGC number
X = SM number
Response: RISLU LGC page is displayed.
44. Verify from the MCC page displayed that the now deactivated spare LC displays a state of STBY and that the faulty spared LC is in the OOS state (this is true if both LCs were in the ACT state before the delete). If the faulty LC was in the OOS state before the delete, then both LCs indicate the OOS state after the delete.
45. Remove the OOS LC that had been spared from the drawer and replace it with a good LC.
46. At the MCC, back up the ODD by entering **BKUP:ODD**.
Response: BKUP ODD COMPLETED.
Note: Data base backup takes several minutes to complete.
47. At the MCC, diagnose the replaced LC by entering:
51XX
or
DGN:ISLULC=a-b-c-d,raw,tlp
Where: a = SM number
b = ISLU number
c = LGC number
d = LC number
XX = LC number.
Note: An ATP condition must be achieved before continuing with the next step.
48. At the MCC, activate the replaced LC to service by entering:
31XX,UCL

or

RST:ISLULC=a-b-c-d,UCL

Where: a = SM number
 b = RISLU number
 c = LGC number
 d = LC number
 XX = LC number.

Response: RST:ISLULC a-b-c-d COMPLETED.

Note: An ATP condition must be achieved before continuing with the next step.

49. Verify that the customer assigned to the replaced LC has service.
50. **STOP. YOU HAVE COMPLETED THE DEACTIVATION PORTION OF THIS PROCEDURE.**

11.8 INTEGRATED SERVICES LINE UNIT MODEL 2 (ISLU2) LINE CIRCUIT SPARING OPERATIONS

ISLU2 Definition

The ISLU2 LCKEN is defined as follows: LCKEN=SM-LU-LG-LBD-LCKT

Where: SM = Switching module number
LU = Line unit number
LG = Line group number
LBD = Line board number
LCKT = Line circuit number

Prerequisite Conditions

1. The faulty LCKT must be OOS; otherwise, the sparing facility cannot be used.
2. The faulty LCKEN must have a port assignment.
3. Up to 4 spare LCKTs are populated and up to 4 spare connections are active simultaneously.
4. Only 1 faulty circuit is spared in a given LG.
5. The faulty circuit is only spared by a LCKT in the same ISLU2.
6. For U-circuits, possible sparing positions are as follows:
LG 0-LBD 0-LCKT 0
LG 7-LBD 3-LCKT 0
LG 8-LBD 0-LCKT 0
LG 15-LBD 3-LCKT 0

PROCEDURE

1. If sparing actions are required because of a subscriber complaint, to find the LCKEN, enter the following:
OP:CONV, DN=a;
Where: a = DN of subscriber
Note: The system can find a faulty LCKT by REX. When REX finds the faulty pack, it is placed in a degraded state and prints the LCKEN. The LCKEN is used later in this procedure.
2. At the MCC terminal, for the SM involved, enter **1730,Y,Z** menu command.
Where: Y = ISLU2 number
Z = LG number (obtained from LCKEN).
3. Check if the faulty LCKT is OOS. If not, to remove the faulty LCKT from service, enter **22X,Y** menu command.
Where: X = LBD number
Y = LCKT number
Note: Camp-on occurs if the customer is using the line. Try again when the line is idle.

11.8.1 Activate Spare Line Circuit

PROCEDURE

1. Select view **4.23** in the insert mode.
2. At the parameters **FAULTY OE** and **SPARE OE** enter the appropriate values.

Reference: Recent Change Manual

3. To insert the data, enter **i**

Response: **inserting ... FORM INSERTED** is displayed

4. Return to the class menu.
5. Verify the subscriber is in-service, enter:

OP:STATUS,DN=a;

Where: a = DN of subscriber

11.8.2 Operation with Spare Connections active

Note: When sparing connections are active, observe the following:

- Requests to diagnose or conditionally remove the following are denied:
 - Spared faulty circuit
 - Line board
 - Line group
 - Designated spare circuit
 - MAN packs supporting the spare connection.
- Requests to unconditionally remove any of the circuits succeeds, and the spare path is automatically taken down. Once this happens, the faulty spare circuit cannot be restored again until the sparing data is removed by the RC/V terminal.
- When a spare connection is active, diagnostics are inhibited on the entire line board associated with the faulty circuit (including other circuits that are not faulty).

PROCEDURE

1. To print a report of all active spare connections in an SM, type and enter:

OP:CFGSTAT,SM=a,SPARE;

Where: a = SM number

11.8.3 Deactivate Spare Connection

PROCEDURE

1. Start up the RC/V menu mode.
2. Select the view 4.23 in the delete mode.
3. At the parameter **FAULTY OE** enter **LCKEN**.
4. To deactivate the sparing connection between the faulty and spare LCKTs, enter **d**

Response: **deleting ... FORM DELETED** is displayed.

5. Return to the class menu.
6. **Caution: Service interruption occurs to other users of the same line board being replaced. Therefore, perform a conditional removal of the line board before replacement.**

To replace and restore to service the line board where the faulty circuit was, follow the hardware installation procedures in the Hardware Change Manual.

7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.9 EOC/TMC DUPLEX FAILURE RESTORAL

OVERVIEW

This procedure is used to restore the Embedded Operations Channel/Time slot Management Channel (EOC/TMC) Derived Data Links (DDLs) after they have duplex failed.

PROCEDURE

1. To determine the state of the EOCs or TMCs, type in at the Master Control Center (MCC) the following command:
OP:CFGSTAT,SM=x,OOS
Refer to 235-600-700, *Input Messages*, for a description of the **OP:CFGSTAT** command.
2. From the output of the **OP:CFGSTAT** command, determine which EOC/TMC to work on.
3. Is the circuit out of service/*removed* (OOS/RMV)?
If **YES**, type in the following command at the MCC: **RST:EOC=a-b-c-d**.
If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, and the 235-600-750, *Output Messages*, for the **RST:EOC** command.
Note: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.
4. Is the circuit out of service/*trouble analysis* (OOS/TBLA)?
If **YES**, type in the following command at the MCC: **RST:EOC=a-b-c-d**.
If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, and the 235-600-750, *Output Messages*, for the **RST:EOC** command.
Note: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.
5. Is the circuit out of service/*family of equipment* (OOS/FE)?
If **YES**, type in the following command at the MCC: **RST:EOC=a-b-c-d**.
If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, and the 235-600-750, *Output Messages*, for the **RST:EOC** command.
Note: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.
6. To determine the Protocol Handler (PH) associated with the EOC/TMC, type in at the MCC the following command:
OP:CONV,EOC=a-b-c-d
Refer to the 235-600-700, *Input Messages*, for the **OP:CONV** command.
7. Display the Remote Terminal (RT) MCC page associated with the EOC/TMC. At the MCC, enter the following poke command:
1880,X,Y
Where: **X** = integrated digital carrier unit (IDCU)
 Y = the RT number.
8. At the MCC, type in the following command:
OP:CFGSTAT,SM=x,OOS.

Perform this command for the switching module/switching module-2000 (SM/SM-2000) associated with the EOC/TMC that is OOS.

9. Is the PH OOS/RMV (removed)?

If **YES**, type in the following command at the MCC: **RST:PSUPH=a-b-c-d**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, for the **RST:PSUPH** command.

10. Is the PH OOS/FE (Family of Equipment)?

If **YES**, type in the following command at the MCC: **RST:PSUCOM=a-b-c**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, for the **RST:PSUCOM** command.

11. Is the Integrated Digital Carrier Unit (IDCU) digital signal level one (DS1) facility (FAC) circuit (IFAC) OOS/RMV (removed)?

If **YES**, type in the following command at the MCC: **RST:IFAC=a-b-c**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, for the **RST:IFAC** command.

Note: Due to potential EMI emissions, all DS1 facilities connected to an IDCU are required to be properly terminated. The DS1s that are connected to a remote terminal or digital cross-connect (DSX) are properly terminated.

Proper termination for an unassigned DS1 can be provided by looping transmit to receive or providing a 100-ohm resistive connection between tip and ring of the transmit line.

12. Is the Electrical Line Interface (ELI) OOS/RMV (removed)?

If **YES**, type in the following command at the MCC: **RST:IDCUELI=a-b-c**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, for the **RST:IDCUELI** command.

13. Is the ELI OOS/FE (Family of Equipment)?

If **YES**, type in the following command at the MCC: **RST:IDCU=a-b-c**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, for the **RST:IDCU** command.

14. Is the circuit OOS/FAF (Facility Failure)?

If **YES**, type in the following command at the MCC: **RST:IFAC=a-b-c**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, for the **RST:IFAC** command.

15. Is the circuit OOS/LVL2ERR (Level 2 Protocol Error)?

If **YES**, type in the following command at the MCC: **RST:EOC=a-b-c-d**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, and the 235-600-750, *Output Messages*, for the **RST:EOC** command.

Note 1: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.

Note 2: The switch attempts to automatically restore the EOC/TMCs in this state every three minutes.

16. Is the circuit OOS/LVL3ERR (Level 3 Protocol Error)?

If **YES**, type in the following command at the MCC: **RST:EOC=a-b-c-d**.

If **NO**, continue with the next step. Refer to the 235-600-700, *Input Messages*, and the 235-600-750, *Output Messages*, for the **RST:EOC** command.

Note 1: If the TMC link is out-of-service, type **RST:TMC=a-b-c-d**.

Note 2: The switch attempts to automatically restore the EOC/TMCs in this state every three minutes.

17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.10 ANALYZE TLWS RESPONSE FOR INTEGRATED DIGITAL CARRIER UNIT FIBER TO THE HOME (FTTH)

OVERVIEW

The only way to identify that an IDCU line is FTTH is to run the TLWS input command 5601. This command determines if the line is FTTH and displays the condition of the fiber. If the line is not FTTH, then 5601 input command displays the voltage, resistance, and capacitance results as it normally does. The 5601 results for FTTH shows the condition of the fiber from the remote terminal (RT) to the distant terminal (DT) and the metallic drop from the DT to the customer's telephone.

Note: The TLWS input commands 5602, 5603, 5604, 5605, 5606, and 5611 do not give meaningful results for an FTTH line. The condition of the fiber beyond the channel unit (CU) in the RT is determined and an equivalent 3 terminal representation is set up in the RT CU. The TLWS 5601 input command is the only TLWS input command that correctly interprets the measured values and provides the information on the status of the FTTH line to the craft.

There is no way to determine if a line is FTTH unless you installed it or have seized the line from the TLWS and executed an input command 5601. There is no data kept in the 5ESS[®] switch to indicate what is past the RT. It is assumed that the following sequence has been executed.

PROCEDURE

1. At the TLWS video terminal, access a TLWS test position (161,x) from the TLWS test position summary page (160).
2. Seize the line using the appropriate poke command (4001, DN or 4008, ILEN).
3. From the metallic measurement page (5600), use the poke command (5601) to get the condition of the FTTH line.
4. Refer to the following list of response messages to determine the condition of the FTTH line:
 - **RT_DT FIBER GOOD, PHASE 1.0 DT**
The fiber is good and no drop test is performed because the Phase 1.0 DT has no capability to perform a metallic drop test from the DT to the customer's telephone.
 - **RT_DT FIBER GOOD & NO DTM**
The fiber is good and the drop test module (DTM) is either not present in the phase 1.5 DT CU (ASJ2) or it is not functioning. This response indicates the use of phase 1.5 RT CUs (that is, AUA404/405) or Phase 2.0 RT CU (that is, AUA406).
 - **RT-DT FIBER GOOD & DROP TEST OK**
The fiber is good and the drop test passed. No errors are detected.
 - **RT-DT FIBER GOOD & NO RINGER**
The fiber is good and there is no ringer connected to the metallic past the DT.
 - **RT-DT FIBER IS GOOD & DROP FAILS (FEMF)**
The fiber is good and the drop test from the DT to the customer's telephone is failing because a possibly hazardous voltage has been detected on the line.

- **RT-DT FIBER GOOD & RECEIVER OFF HOOK**
The fiber is good and the receiver is off-hook on the customer's line.
- **RT-DT FIBER GOOD & HAZARDOUS DT VOLTAGE**
The fiber is good and a hazardous voltage has been detected at the DT. This message is only valid for phase 2.0 FTTH.
- **RT-DT FIBER GOOD, PHASE 1.0 RT**
The fiber is good and the RT contains a phase 1.0 RT channel unit (that is, AUA400/401). The phase 1.0 RT CU can not report the results of a drop test from the DT to the customer's telephone, even if the test is performed.
- **RT-DT FIBER OUT OF FRAME**
The fiber is bad. There is a problem between the RT and the DT.

When testing has been completed, continue with the following steps:

5. Release the metallic measurement position by entering the poke command 5990.
6. Release the line by entering the poke command 4999.
7. Access the TLWS test position summary page (160) and release the TLWS test position (201,x).
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.11 EOC/TMC PROTOCOL MONITORING

OVERVIEW

Protocol Monitoring (PM) allows the monitoring of protocols over Derived Data Links (DDL). Protocols currently supported for the Timeslot Management Channel (TMC) and Embedded Operations Channel (EOC) include Link Access Protocol D-Channel (LAPD), TMC, and V.120. This feature is similar to protocol monitoring for Digital Subscriber Lines (DSL) except a DDL is monitored instead of a single DSL (see Procedure 11.3, Protocol Monitoring of a Digital Subscriber Line).

A PM session consists of three major parts:

- *Setup* determines the correct parameters for the session's input command (refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*, for details).
- *Trigger* includes waiting for the event that causes a PM session to end and the collected data to be output to the receive-only printer (ROP).
- *Analysis* is the studying of the output to determine what occurred over the link. Analyzing the output requires detailed knowledge of the monitored protocol.

On the execution of the **EXC:PM** input command, protocol events for the specified line are collected and stored until the trigger event occurs. The trigger event, which is specified through the input of TRIGVAL=c or PER=[d] on the command line, causes the PM session to stop collecting data after the trigger conditions have been met. By choosing to specify an offset input parameter of OFF=a, the craft can manipulate whether the trigger is the first event in the buffer, the last event, or somewhere in between.

Protocol Error Records (PER) or Message Triggering

The two types of protocol monitoring triggers are as follows:

- A PER trigger causes a PER to detail an error event associated with switch-detected protocol errors. A choice must be made between triggering on any PER for a specific PER. For a complete list of PERs, refer to the ALE-PER Appendix section of 235-600-700, *Input Messages*.
- Message triggering (TRIGVAL=c) is used to terminate a PM session with the occurrence of a particular frame, packet, segment, or message traveling in a particular direction between the 5ESS[®] switch and the Customer Premises Equipment (CPE). For a complete list of messages, refer to the **EXC:PM** input message description in 235-600-700, *Input Messages*.

Monitoring and Triggering

Although the most common use of PM is monitoring and triggering on a specific protocol (PROT=z), PM allows the user the option of monitoring one protocol but triggering on another by the use of TRIGLVL=x in the input command. Different level trigger can be requested by selecting a TRIGLVL value that differs from the level of the protocol being monitored. In this case, the specified TRIGVAL parameter must be of the same protocol level at TRIGLVL. Possible protocol/TRIGLVLs are as follows:

Protocol	Protocol Level	TRIGLVL
LAPD	Level 2	Level 3
TMC	Level 3	Level 2

Protocol	Protocol Level	TRIGLVL
V.120	Level 3	Level 7

By using the duration parameter (DUR=a), the length of a PM session can be controlled. On the expiration of the duration parameter, the PM session stops collecting data and begin to output the data on the ROP.

PROCEDURE

1. Determine the parameters to be used in the PM session input. At the minimum, two parameters are required as follows:
 - (a) Line identification (**EOC=a-b-c-d** or **TMC=a-b-c-d**)
 - (b) PER (for triggering on a PER) or TRIGVAL (for trigger on a frame, packet, segment, or message).

If no other parameters are specified, default values are used. Refer to **EXC:PM** in 235-600-700, *Input Messages*, for a complete list of all input and default values.

2. At the Master Control Center (MCC), enter the **EXC:PM** command using the parameters collected in Step 1.
3. The output of a PM session is a hexadecimal dump of the frames collected. It can be analyzed by comparing the data against the appropriate protocol specification. See Procedure [11.3](#), Protocol Monitoring of a Digital Subscriber Line, for a list of references.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

11.12 EOC/TMC AUTOMATIC LINE EVALUATION

OVERVIEW

Automatic Line Evaluation (ALE) provides nonservice-affecting monitoring of Timeslot Management Channels (TMC) and Embedded Operations Channels (EOC). It does this by detecting and recording faults at Layers 2 and 3. These counts are displayed on the Receive-Only Printer (ROP) once every 24 hours or can be extracted and displayed by a manual request via the **EXC:ALE** input command (refer to 235-600-700, *Input Messages*, for use of this command). This procedure is similar to ALE for digital subscriber lines (DSL) except instead of monitoring a single line, an entire derived data link (DDL) is monitored (refer to Section 11.2 for ALE of a DSL). The Protocol Error Records (PER), which describe all protocol violations detected on a DDL, are temporarily stored in a circular buffer for retrieval by ALE. If a DDL is determined to be faulty due to excessive PERs detected, the DDL automatically switches to its standby side.

PROCEDURE

1. At the Master Control Center (MCC) obtain the ALE output for a given DDL by entering the following command: **EXC:ALE,EOC=a-b-c-d,level2,per,print**

Note 1: Instead of using EOC, the command can also be executed by entering the following command:

TMC=SM#-IDCU#-RT#-PRIMARY_ID#. Refer to 235-600-700, *Input Messages*, for a complete description of the command options.

Note 2: The ALE-Level 1 is not supported for EOC/TMC DDLs.

2. The Level 2 output, which automatically resets every 24 hours, indicates a qualitative measure of Level 2 performance. A status of **NORMAL** indicates all is well at Level 2. A status of **NO-INFO** indicates that not enough packets were received to make an estimate of the Level 2 quality. For more details, refer to the **EXC:ALE-LVL2** output message in 235-600-750, *Output Messages*.
3. PERs indicate that the 5ESS[®] switch has detected potential Level 3 problems. Refer to the **EXC:ALE-PER** output message and the APP:ALE-PER Appendix of 235-600-750, *Output Messages*, for more details.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Corrective Maintenance Procedures

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12. ANALOG AND DIGITAL TRUNK TESTS

PURPOSE

The procedures in this section are used to perform maintenance on the trunk units.
Start with Procedure [12.1](#).

12.1 TRUNK MAINTENANCE

OVERVIEW

This procedure is used to clear trunk problems reported by the switch, customer complaints, manual trunk tests, repair service bureau trouble tickets, etc. Refer to the TLWS Job Aids, 235-105-220XX (where XX is a currently-supported release).

Trunk maintenance uses the following Master Control Center (MCC) video terminal display pages:

160 - TEST POSITION STATUS SUMMARY

160,X - TEST POSITION SUMMARY X where X = 160,1, 160,2, 160,3, or 160,4 may be used to gain access to any of the following data:

- **161,X[,Y] - SELECT/DISPLAY TEST POSN X** where X = (1-32) and Y = (1-32)

Where:

- TP** = One of several test positions; each having several display pages.
- TLWS LOCATION** = Trunk and Line Work Station (TLWS) location where MCC resides. The TLWS location is central office definable.
- DEV** = Displays the device location identification (ID) of the MCC.
- ID** = Logical identification of TLWS resources that may be specified using the Y option.
- LINE/TRUNK DATA** = Displays trunk group (TG) and TG member number being tested for trunks.
- TEST ACCESS** = Displays the type of test connection (for example, metallic, transmission, or AC/DC jacks).
- T&M** = Displays the status of the talk and monitor (T&M) phone.

Note: The **160** page is not required but is provided to gain access to the **161,X** page. The **161,X** may be entered from other pages (for example, 1000) to gain access to a test position. You must return to the **160,X** page to release the test position.

- **201,X - RELEASE TEST POSN X** where X = (1-32).

The MCC video display page 161,X - TEST POSITION X provides poke commands to seize and conduct tests on trunks and then displays the test results. The task selection display screens for trunks are as follows:

- **4000[,X]** - Allows display of TASK SELECTION - SEIZE LINE/TRUNK/INCOMING CALL screens where X = screen number.
X = 4000,1 or 4000,2.
- **5000[,X]** - Allows display of TASK SELECTION - TRANSMISSION screens where X = screen number.
X = 5000,1 or 5000,2.
- **5200[,X]** - Allows display of TASK SELECTION - SUPERVISION screens where the following applies:
Three 5200[,X] screens apply for analog or digital trunks, and X = 5200,1, 5200,2, or 5200,3.
- **5400[,X]** - Allows display of TASK SELECTION - AUTOMATIC screens where X = screen number.
X = 5400,1 or 5400,2 for analog or digital trunks.

- **5600** – Allows display of TASK SELECTION - METALLIC MEASUREMENTS via the Directly Connected Test Unit (DCTU) screens where the following applies:
One 5600 screen applies for analog or digital trunks.
- **5700** – Allows display of TASK SELECTION - METALLIC MEASUREMENTS via the Subscriber Line Instrument Measurement (SLIM), screens where the following applies:
One 5700 screen applies for analog or digital trunks.
- **5800** – Allows display of TASK SELECTION - JACK screens where the following applies:
One 5800 screen applies for analog or digital trunks.
- **8000** – Displays the major test categories.
- **9000[X]** – Allows display of MISCELLANEOUS TLWS COMMANDS screens where the following applies:
X = 9000,1 or 9000,2
One 9000 screen applies for analog or digital trunks.

Note: Some of the commands that appear on the 9000 screen apply to both lines and trunks and some of these commands can appear on more than one screen. If a miscellaneous command appears on more than one screen, it may be entered from the viewed screen where it appears.

All available tests and poke commands may be entered from the task selection pages. The poke commands and their corresponding functions are identified and described in 235-105-110, *System Maintenance Requirements and Tools*. In addition, the currently-supported *TLWS Job Aids*, 235-105-220J9, J10, or J11, are also available as a quick reference for poke commands.

Error messages that may occur during the use of the poke commands are defined in 235-600-750, *Output Messages*, Appendix APP:TLWS.

PROCEDURE

1. **Note 1:** In the following subprocedures, poke commands are provided for MCC terminal use in testing at the TLWS facilities. At locations where an MCC terminal is not available, the appropriate input message provided in 235-600-700, *Input Messages*.

Note 2: Any of the following subprocedures may be performed in any order (as required), regardless of the order listed.

To isolate a trouble condition associated with trunks, select the appropriate subprocedures as follows in Substeps (a) through (q):

- (a) Analyze and Resolve OOS Trunk List Entries – Procedure [12.2](#)
- (b) Test Incoming Trunk Using 101 Test Line – Procedure [12.3](#)
- (c) Verify Trunk Equipment Number of Analog, ILEN, and SLEN Trunks – Procedure [12.4](#)
- (d) Verify Trunk Group and Trunk Group Member Number – Procedure [12.5](#)
- (e) Verify Digital Equipment Number of a Digital Trunk – Procedure [12.6](#)

- (f) Check/Adjust AC Jack Amplifiers in Test Access Unit – Procedure [17.3](#)
 - (g) Exchange Tone With Distant Office Using Portable Test Equipment – Procedure [12.7](#)
 - (h) Measure/Record Noise Between Offices – Procedure [12.8](#)
 - (i) Measure/Record Trunk Transmission Loss – Procedure [12.9](#)
 - (j) Monitor Busy Trunk – Procedure [12.10](#)
 - (k) Perform Metallic Measurements of an Analog Trunk Using DCTU – Procedure [12.11](#)
 - (l) Perform Metallic Measurements of an Analog Trunk Using DC Jacks – Procedure [12.12](#)
 - (m) Perform Operational Test for an In-Service Trunk – Procedure [12.13](#)
 - (n) Remote Protocol Monitoring and Access to ISDN – Procedure [12.14](#)
 - (o) Implement 108-Type Test Line Capabilities of ISTF/GSDF – Procedure [12.15](#)
 - (p) Far-End Loop (FELP) – Procedure [12.16](#)
 - (q) Perform Metallic Measurements of an Analog Trunk Using SLIM – Procedure [12.17](#)
 - (r) Locating Facility-Related Troubles – Procedure [12.18](#)
 - (s) Test OIU-IP Connections – Procedure [12.19](#)
2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.2 ANALYZE AND RESOLVE OOS TRUNK LIST ENTRIES

OVERVIEW

This procedure is used to analyze and resolve trunk trouble conditions that are reported by the **OP LIST TRUNK** out-of-service (OOS) output message(s). Software release dependencies exist for unique office applications; so, refer to 235-600-750, *Output Messages*, for message parameter meanings. Also, refer to office records for specific equipment allocations or assignments.

PROCEDURE

1. At the Receive-Only Printer (ROP), obtain any **OP LIST TRUNK** output message(s).
2. Identify the appropriate assignments printed in the output message(s) from the following:
 - Trunk Group Member Number (TKGMN)
 - Trunk Equipment Number (TEN)
 - Integrated Line Equipment number (ILEN)
 - Digital Equipment Number (DEN)
 - Optical Interface Unit Equipment Number (OIUEN)
 - DNU-S Networking Equipment Number (NEN)
 - *SLC*[®] Line Equipment Number (SLEN)
3. Determine the primary status of the trunk including the:
 - Basic state
 - Qualifier
 - Operational restrictions
 - Supplementary information
 - Mode.
4. From information contained in the **OP LIST - TRUNK** output message(s), determine the cause of the trunk status being OOS.
5. What is the reported cause of the trunk OOS? Perform the following substeps:
 - (a) If **FE**, investigate possible trouble in analog trunk unit per Procedure 7.2, Clear Trouble in the SM and SM-2000.
 - (b) If **HW**, resolve the problem per local procedure.
 - (c) If **DSBLD**, investigate possible software/hardware problems using Procedure 7.2, Clear Trouble in the SM and SM-2000.
 - (d) If **PX**, check the trunk using any of the trunk tests outlined in Procedure 12.1, Trunk Maintenance.
 - (e) If **RAP**, **FAF**, or **LKDO**, investigate the cause reported by the **OP LIST LINE PORT STATUS** field. [Possible error in Recent Change/Verify (RC/V) entries.]

6. Do the test results indicate acceptable operational requirements?
If **YES**, then diagnose the analog trunk unit.
If **NO**, then reassign the TEN per local procedure using RC/V.
7. Resolve bad reports using Procedure [12.1](#), Trunk Maintenance. Save all bad reports for future analysis of error pattern.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.3 TEST INCOMING TRUNK USING 101 TEST LINE

OVERVIEW

This procedure is used to test an incoming trunk with the 101 test line. A 101 test line call can be initiated from a line or from a far-end office by dialing the digits that access the 101 test line in the requesting office.

On receipt of the 101 test line call, the talk and monitor (T&M) phone rings, assuming it is not busy in another conversation or is not off-hook. It can be answered and a normal conversation conducted. (If the T&M phone is hung up, the connection is dropped.) The incoming call can be assigned to any test position available at the Trunk Line Work Station (TLWS) associated with the T&M phone that rings. To assign the call, a test position must be active.

The 101 test line number is *not* the same as the plain old telephone service (POTS) number assigned to the T&M phone. The 101 test number can be obtained from the far-end craft using the RLrt_specri relation in the Office Dependent Data (ODD). For toll trunks, use the PRrt_tmtsc relation.

PROCEDURE

1. Answer the 101 test call at the TLWS with the associated T&M phone.
2. At the TLWS, access a test position by entering poke command **161,X** (display Page 160).

Where: X = test position number 1-32.

3. To seize an incoming trunk associated with the 101 test line call, enter the appropriate poke command (**420** or **4200**).

Note: Once the call is assigned to a test position, it cannot be transferred to another.

4. To display **TRANSMISSION** commands, enter the appropriate poke command (**500,X** or **5000,X**).

Where: X = screen number

5. Once the appropriate task selection screen is displayed, enter the poke command corresponding to the tone you wish to send or measure.

Note: Other frequencies may be sent or measured by simply entering another (corresponding) poke command. It is not necessary to physically stop sending or measuring the current frequency.

6. If no further testing will be performed on the trunk, release the trunk by entering the poke command **4999**.
7. If all TLWS testing is completed, release the test position by entering poke command **201,X** (display Page 160).

Where: X = test position number 1-32.

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.4 VERIFY TRUNK EQUIPMENT NUMBER OF ANALOG, ILEN, AND SLEN TRUNKS

OVERVIEW

This procedure is used to verify the Trunk Equipment Number (TEN), Subscriber Loop Carrier Line Equipment Number (SLEN), or integrated digital carrier unit (IDCU) line equipment number (ILEN) of an analog trunk. In the input message and output response, some of the options are identified with an asterisk (*) instead of a subscript number. In 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*, a subscript number is used. Refer to these manuals for specific details.

Note: Since SLENs and ILENs are not physically located in the office, no physical location information is given.

PROCEDURE

1. Enter the following input message:

OP:CONV,a;

Where: a = TEN=j-f*-g*-h*-i*
 OR
 a = SLEN=j-d*-e*-n*
 OR
 a = ILEN=j-k*-m*-o*

j = switching module/switching module-2000 (SM/SM-2000) number (1-192)

d* = digital carrier line unit (DCLU) number (0-7)

e* = remote terminal (RT) number (1-6)

f* = trunk unit (TU) number (0-7)

g* = service group (SG) number (0 or 1)

h* = channel board number (0-7)

i* = circuit number (0-3)

k* = IDCU number (0-7)

m* = remote terminal (RT) number (1-31)

n* = remote terminal (RT) line number (1-96)

o* = remote terminal (RT) line number (1-2048)

Response: See the **OP CONV** output message in 235-600-750, *Output Messages*.

2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.5 VERIFY TRUNK GROUP AND TRUNK GROUP MEMBER NUMBER

OVERVIEW

This procedure is used to verify the Trunk Group Member Number (TKGMN). For simplicity, in the input message and output response, some of the options are identified with an asterisk (*) instead of a subscript number. In 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*, a subscript number is used. Refer to these manuals for specific details.

Note: Since SLENs and ILENs are not physically located in the office, no physical location information is given.

PROCEDURE

1. Enter the following input message:

OP:CONV,a;

Where: $a = \text{TKGMN} = k^* - l^*$

k^* = trunk group number

l^* = trunk member number.

Response: See the **OP CONV** output message in the 235-600-750, *Output Messages*.

2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.6 VERIFY DEN/NEN/OIUEN OF A DIGITAL TRUNK

OVERVIEW

This procedure is used to verify the Digital Equipment Number (DEN), Networking Equipment Number (NEN), or Optical Interface Unit Equipment Number (OIUEN) of a digital trunk.

For more specific details, see 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

PROCEDURE

1. Enter the appropriate input message:

- For the **DEN**:

OP:CONV,a[,];

Where: a = **DEN** = b-c-d-e
b = Switching module/switching module-2000 (SM/SM-2000) number
c = Digital unit number
d = Digital facility interface (DFI) number
e = Channel number
(If this is a DFI-2, channels 1-24 are associated with facility T1 A and channels 25-48 are associated with facility T1 B. Otherwise, there is only one facility).

- For the **NEN** residing on the Digital Network Unit Synchronous Optical Network (DNU-S):

OP:CONV,a[,];

Where: a = **NEN** = b-c-d-e-f-g-h-i-j
b = Switching module-2000 (SM-2000) number
c = DNU-S number
d = Data group (DG) number
e = SONET termination equipment (STE) number
f = Synchronous transport signal (STS) number
h = Virtual tributary group (VTG) number
i = Virtual tributary member (VTM) number
j = Digital signal level 0 (DS0) number.

- For the **OIUEN** (TDM application only) :

OP:CONV,a[,];

Where: a = **OIUEN** = b-c-d-e-f-g-h-i
b = Switching module-2000 (SM-2000) number
c = Optical Interface Unit (OIU) number
d = OIU Protection group (PG) number
e = OIU Optical Carrier - level 3 (OC3) number
f = OIU Synchronous transport Signal level 1 (STS-1) number
g = OIU VT1.5 group number
h = OIU VT1.5 number
i = Channel number.

Response: See the **OP CONV** output message in the 235-600-750, *Output Messages*.

2. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.7 EXCHANGE TONE WITH DISTANT OFFICE USING PORTABLE TEST EQUIPMENT

OVERVIEW

This procedure is used to exchange a tone with a distant office using portable test equipment.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **161,X** (display Page 160).
Where: X = test position number 1-32.
2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).
Where: X = **GRP,MEM**
3. To display the TLWS jack commands, enter the appropriate poke command (**580** or **5800**).
4. To connect AC1 JACK to the trunk phone, enter the appropriate poke command (**581** or **5801**).
5. Connect the HP3551 transmission test set (or equivalent) to the SEND and RECEIVE jacks of AC1 JACK.
6. Set the HP3551A test set (or equivalent) to SEND.
7. Set the transmission test set terminating impedance to 600 ohms.
8. Using the HP3551 test set (or equivalent), send a 1004-Hz tone at 0 dBm.
9. Ensure that the far-end craft has completed their measurement(s).
10. Turn off the tone at the HP3551A test set (or equivalent).
11. Have the far-end craft send a 1004 Hz signal at 0 dBm.
12. Set the HP3551A test set (or equivalent) to RECEIVE.
13. Turn the volume control *clockwise* to satisfactorily receive the tone level.
14. Read and record the measurement from the distant office.
15. If no further testing will be performed on the trunk, release it by entering the poke command **4999**.
16. If all TLWS testing is completed, release the test position by entering poke command **201,X** (display Page 160).
Where: X = test position number 1-32.
17. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.8 MEASURE/RECORD NOISE BETWEEN OFFICES

OVERVIEW

This procedure is used to measure noise levels between offices using the poke commands on the Trunk and Line Work Station (TLWS) display Page 160.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **161,X** (display Page 160).
Where: X = test position number 1-32.
2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).
Where: X = **GRP, MEM**
3. To identify and outpulse the directory number (DN) of a 100 or 101 test line at the far-end office, enter the appropriate poke command (**441,X** or **4401,X**).
Where: X = Outpulsed Directory Number (OPDN) of 100 or 101 test line at the far-end office.
4. To display the TRANSMISSION commands, enter the appropriate poke command (**500,X** or **5000,X**).
Where: X = screen number.
5. If using a 100 test line, wait for the 1004-Hz tone to stop.
6. To measure (far-to-near) noise, enter the appropriate poke command (**512** or **5102**).
7. Check the circuit layout card of the trunk for limits.
8. If the results are not in local specifications for this type of trunk, repair the trunk using local procedures before continuing.
9. If no further tests are to be performed on the trunk, release it by entering the poke command **4999**.
10. If all TLWS testing is completed, release the test position by entering poke command **201,X** (display Page 160).
Where: X = test position number 1-32.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.9 MEASURE/RECORD TRUNK TRANSMISSION LOSS

OVERVIEW

This procedure is used to measure the trunk transmission loss using the poke commands shown on the Trunk and Line Work Station (TLWS) display pages. Refer to Figure 12.9-1.

PROCEDURE

1. At the master control center (MCC) or TLWS, to select the TEST POSITION STATUS SUMMARY page, enter:
160
Response: The 160 – TEST POSITION STATUS SUMMARY page is displayed.
2. At the MCC Page 160, to access a test position, enter the poke command:
161,X
Where: X = Test position number (1-32).
3. If the trunk is not currently seized, to seize it, enter the poke command:
4102,X
Where: X = **GRP,MEM.**
4. To identify and outpulse the directory number (DN) of a 100 or 101 test line at the far-end office, enter the poke command:
4401,X
Where: X = Outpulsed Directory Number (OPDN) of the 100 or 101 test line at the far-end office.
5. To display the TRANSMISSION commands, enter the poke command:
5000,X
Where: X = screen number.
6. Enter the poke command corresponding to the tone you wish to measure or send.
Note: Other frequencies may be measured by simply entering another (corresponding) command. It is not necessary to physically stop measuring the current frequency.
7. To print results at the Receive-Only Printer (ROP), enter the poke command:
9500
8. If results are not in local specifications for this type of trunk, repair the trunk using local procedures before continuing.
Note: Table 12.9-1 shows the loss inserted for each toll class and trunk type.
9. If no further testing will be performed on the trunk, to release it, enter the poke command:
4999
10. If TLWS testing is complete, to return to the 160 - TEST POSITION SUMMARY STATUS page, enter:

160

11. If all TLWS testing is completed, to release the test position enter the poke command:

201,X

Where: X = Test position number (1-32).

12. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

Table 12.9-1 — Expected Measured Loss for Digital Trunks Between the Switch and Digital Offices

TRUNK	FROM 5ESS [®] SWITCH	TO 5ESS SWITCH	EXPECTED MEASURED LOSS (dB)
Interend-Office, 200 Miles or Less	End-Office	End-Office	3 ^a
Interend-Office, Greater Than 200 Miles	End-Office	End-Office	6
Tandem Connecting	End-Office	Tandem	6
Tandem Connecting	Tandem	End-Office	6
Intertandem	Tandem	Tandem	6

Note(s):
 a. This may be 3 or 6 dB. Refer to local network design.

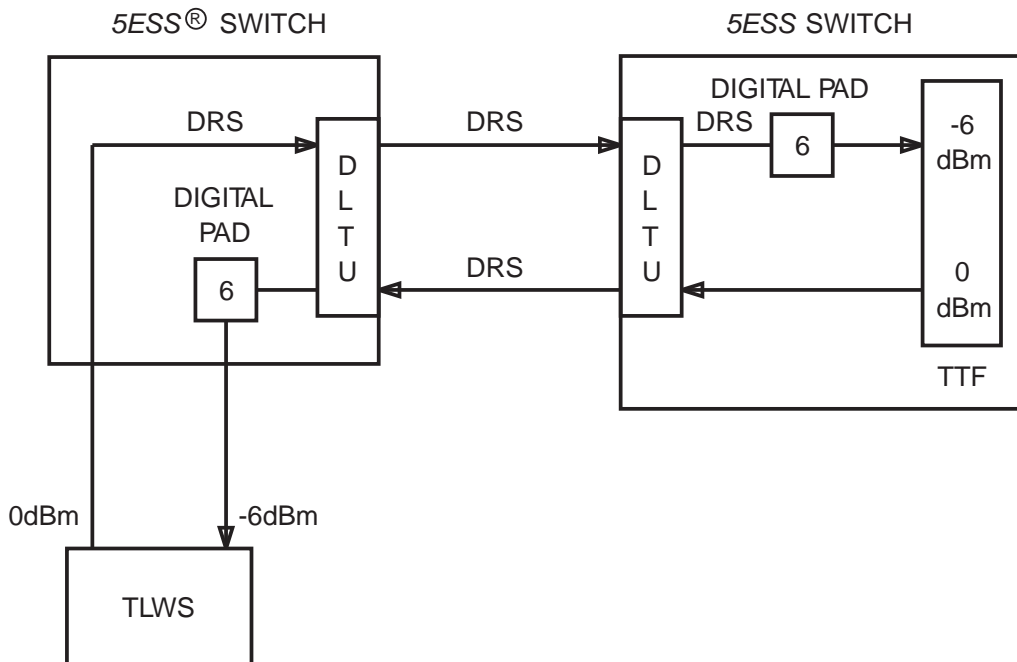


Figure 12.9-1 — Measuring Trunk Transmission Loss From the TLWS

12.10 MONITOR TRUNK

OVERVIEW

This procedure is used to monitor an idle or busy trunk using the poke commands on the trunk and line work station (TLWS) display pages.

PROCEDURE

1. Is the monitored trunk idle?

If **YES**, go to [12.10.1](#).

If **NO**, go to [12.10.2](#).

12.10.1 Monitor Idle Trunk

1. At the master control center (MCC), to select the TEST POSITION STATUS SUMMARY page, enter:

160

Response: The 160 – TEST POSITION STATUS SUMMARY page is displayed.

2. At MCC Page 160, to select an idle test position, enter:

161,X

Where: X = Test position (TP) number (1-32).

Response: The 161 – TEST POSITION page is displayed.

3. At TLWS page 4000,2, to seize a trunk, use the appropriate displayed poke command.

Note: The appropriate poke command depends on available trunk information via office records (for example, trunk group number, trunk group member number, switching module number, trunk unit number, etc.)

4. At TLWS page 5000,2, to connect the talk and monitor (T&M) phone in the desired mode (talk or monitor), enter:

4302 – talk mode

or

4303 – monitor mode

5. When the T&M phone rings, take off-hook.

6. To output pulse test line number, enter:

4401,X

Where: X = Digits for output pulse test number.

7. When test line answers, monitor the trunk for noise and tone/voice quality.

8. If a problem exists, perform corrective procedures.

9. If no further testing will be performed on this trunk, to release the trunk, enter:

4999

10. If TLWS testing is complete, to return to the 160 – TEST POSITION SUMMARY STATUS page, enter:

160

11. To release the TP, enter:

201,X

Where: X = Test position (TP) number (1-32).

12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.10.2 Monitor Busy Trunk

1. If the TLWS page is not displayed, at MCC Page 160, to select a seized trunk test position, enter:

161,X

Where: X = Test position (TP) number (1-32).

Response: The 161 – TEST POSITION page is displayed.

2. At TLWS page 5000,2, to connect the talk and monitor (T&M) phone in the desired mode (talk or monitor), enter:

4302 – talk mode

or

4303 – monitor mode

3. When T&M phone rings, take off-hook and monitor the trunk for noise and tone/voice quality.
4. If a problem exists, perform corrective procedures.
5. If no further testing will be performed on this trunk, to release the trunk, enter:

4999

6. If TLWS testing is complete, to return to the 160 – TEST POSITION SUMMARY STATUS page, enter:

160

7. To release the TP, enter:

201,X

Where: X = Test position (TP) number (1-32).

8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.11 PERFORM METALLIC MEASUREMENTS OF AN ANALOG TRUNK USING DCTU

OVERVIEW

This procedure is used to perform a metallic measurement of an analog trunk using the Directly Connected Test Unit (DCTU).

Note: Only the tip and ring of loop supervision and 2-wire ear and mouth (E&M) trunks can be accessed with the DCTU. The DCTU cannot access 4-wire trunks.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **161,X** (display Page 160).
Where: X = test position number 1-32.
2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).
Where: X = **GRP, MEM**
3. To display the METALLIC measurements, enter the appropriate poke command (**560** or **5600**).
4. Enter the poke command corresponding to the metallic measurement you wish to perform.
Note: Most metallic measurements are updated every few seconds (**561** and **5601** pokes do not update).
5. Results may be printed at the Receive-Only Printer (ROP) by entering the appropriate poke command (**950** or **9500**).
6. Other measurements may be made by simply entering another (corresponding) poke command.
7. If no further testing will be performed on the trunk, release it by entering the poke command **4999**.
8. If all TLWS testing is completed, release the test position by entering poke command **201,X** (display Page 160).
Where: X = test position number 1-32.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.12 PERFORM METALLIC MEASUREMENTS OF AN ANALOG TRUNK USING DC JACKS

OVERVIEW

This procedure is used to perform a measurement on an analog 2-wire trunk using DC jacks via the poke commands on the Trunk and Line Work Station (TLWS) display Page 160.

PROCEDURE

1. At the TLWS, access a test position by entering poke command **161,X** (display Page 160).
Where: X = test position number 1-32.
2. If the trunk is not currently seized, seize it by entering the appropriate poke command (**412,X** or **4102,X**).
Where: X = **GRP, MEM.**
3. To select the DC1 or DC2 JACK, enter the appropriate poke commands (**583** or **5803** and **584** or **5804**).
4. To perform voltage or resistance measurements, connect the multimeter (or equivalent) to the DC1 or DC2 JACK.
5. If no further testing will be performed on the trunk, release it by entering the poke command **4999**.
6. If all TLWS testing is completed, release the test position by entering poke command **201,X** (display Page 160).
Where: X = test position number 1-32.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.13 PERFORM OPERATIONAL TEST FOR AN IN-SERVICE TRUNK

OVERVIEW

This procedure is used to clear a trouble report for an incoming or outgoing in-service trunk. To perform this procedure, the craft should know how to interpret all of the following:

- Customer trouble report
- Repair Service Bureau (RSB) trouble report
- Centralized Automatic Reporting on Trunks (CAROT) trouble report
- Carrier Group Alarm (CGA) **REPT CGA** output message
- Far-end office trouble report
- Engineering and Administrative Data Acquisition System (EADAS) trouble report
- Network Administration Center (NAC) trouble report
- Network Management (NM) trouble report
- Trunk Maintenance Package (TRUMP) at the Switching Control Center (SCC) trouble report.

PROCEDURE

1. Analyze the trouble report or alarm to determine the type of trunk.
 - (a) If "outgoing" or "2-way," continue with the next step.
 - (b) If "incoming," go to Step 38.
2. Obtain the office trunk information (signaling supervision) per the office records.
3. At the Master Control Center (MCC), access an idle Trunk Line Work Station (TLWS) by entering poke command **161,X** (display Page 160).

Where: X = test position number 1-32.

4. Seize the trunk that was identified in the trouble report by entering the appropriate poke command (**412,X** or **4102,X**).

Where: X = **GRP,MEM**

5. Is the message in the test area indicating trunk **SEIZED**?

Note: When the trunk is busy, the system camps on and waits for control as indicated per the output message **CAMPED ON**. If the control of the trunk is not obtained in five minutes, the message **CAMP ON DROPPED** is printed. When the trunk becomes available for testing, the message displayed changes from **CAMPED ON** to **SEIZED**.

If **YES**, go to Step 7.

If **NO**, continue with the next step.

6. Wait and monitor the message displayed in the test area. Has the message changed to **SEIZED**?

If **YES**, continue with the next step.

If **NO**, wait and try again at Step 4.

7. Review the trouble reports (for example, CAROT report). Are any transmission problems identified?
If **YES**, go to Step 27.
If **NO**, continue with the next step.
8. To run diagnostics on the trunk circuit, enter the appropriate poke command (548 or 5408), or the appropriate diagnostic input message (DGN:TEN, DGN:DFI, DGN:OFI or DGN:TMUX and DGN:SFI).
9. From the diagnostic response, perform one of the following:
 - If an ear and mouth (E&M) type circuit is identified, continue with the next step.
 - If circuit other than E&M type identified, go to Step 13.
10. Does the E&M signaling channel board option type (2 or 3) agree with the software definition concerning the E&M signaling for the office?
Note: If the option plug position and software definition do not match, the diagnostic test fails. When the software definition for E&M signaling is set to Type 2, the option plug on the channel board *must be* positioned at Type 2. When the software is set to Type 3, the option plug on the channel board *must be* positioned at Type 3.
If **YES**, go to Step 12.
If **NO**, continue with the next step.
11. Change the option plug on the front of the channel board to match the software definition for E&M signaling.
12. To run diagnostics on the trunk circuit, enter the appropriate poke command (548 or 5408), or the appropriate diagnostic input message (DGN:TEN, DGN:DFI, DGN:OFI or DGN:TMUX and DGN:SFI).
 - (a) If all tests passed (ATP), go to Step 15.
 - (b) If Some Tests Fail (STF), **seek technical assistance.**
13. Change the circuit board (for example, a digital or loop supervision analog circuit).
14. At the TLWS, reseize the trunk using the appropriate poke command (480 or 4800), then go back to Step 12.
15. Restore the trunk (unconditionally) by entering the input message as follows:
RST:TRK, TKGMM=a-b,UCL;
Where: a = trunk group.
b = member number.
Response: **RST TRK** output message.
16. Perform a wink or operational test on the trunk via a poke command or a **TST:TRK** input message.
 - (a) If performing a wink test, at the TLWS, enter the appropriate poke command (520 or 5200,X) followed by the corresponding poke command (525 or 5202).

Where: X = screen number.

- (b) If the operational test is applicable to a 2-way automatic transmission test, enter the input message as follows:

TST:TRK,TKGMN =a-b,TYPE=105;

- (c) If the operational test is applicable for a synchronous test, enter the input message as follows:

TST:TRK,TKGMN=a-b,TYPE=SYNC;

- (d) If the operational test is applicable for a balance (100 type) test, enter the input message as follows:

TST:TRK,TKGMN=a-b,TYPE=100;

Where: a = trunk group number.
b = trunk member number.

Response: **TST TRK** output message.

17. Did the trunk pass the wink or operational test?

If **YES**, continue with the next step.

If **NO**, go to Step 20.

18. Restore the trunk to service via poke command or **RST:TRK** input message by performing one of the following:

- If via a poke command, at the TLWS, enter the appropriate poke command (**300[UCL]** or **3000[UCL]**).
- If via an input message, enter as follows:

RST:TRK,TKGMN=a-b[UCL];

19. Release the TLWS position and TLWS by performing the following:

- (a) Enter poke command **161,X**.
(b) Enter poke command **201,X**.

Where: X = test position number.

20. Check the distribution frame connections and software options associated with the faulty trunk by entering poke command **196** [Recent Change/Verify (RC/V) menu mode].

- (a) Enter a **5.5r** (for review mode) to access the RC/V menu View 5.5.
(b) Enter the trunk group and member number. System responds with a list of options assigned that can be checked.

21. Are the distribution frame connections and options correct?

If **YES**, continue with the next step.

If **NO**, go to Step 23.

22. Refer trouble to far-end office.

23. Fix the identified broken jumpers or correct options.

24. Retest the trunk per the wink/operational test outlined in Step 16.

25. Did trunk pass the wink/operational retest?
If **YES**, go to Step 30.
If **NO**, continue with the next step.
26. **Seek technical assistance.**
27. What is the type of test to be performed?
If **AUTOMATIC**, go to Step 34.
If **MANUAL**, continue with the next step.
28. Perform trunk transmission loss test per Procedure 12.9, Measure/Record Trunk Transmission Loss.
29. Is the transmission loss within the tolerance limits?
If **YES**, continue with the next step.
If **NO**, go to Step 32.
30. Restore the trunk to service via a poke command or **RST:TRK** input message by performing one of the following:
- If via a poke command, at the TLWS, enter the appropriate poke command (**300[UCL]** or **3000[UCL]**).
 - If via an input message, enter as follows:
RST:TRK,TKGMN=a-b[UCL];
31. Release the TLWS position and TLWS by performing the following:
- (a) Enter poke command **161,X**.
 - (b) Enter poke command **201,X**.
- Where: X = test position number.
32. Check and clear noise with distant office per Procedure 12.8, Measure/Record Noise Between Offices.
33. Repeat trunk transmission loss test per Procedure 12.9, Measure/Record Trunk Transmission Loss.
34. Perform a 105TL (105 Test Line) test on the trunk via poke command or input message per the following:
- If via a poke command, at the TLWS, enter the appropriate poke command (**546,105** or **5406,105**).
 - If via an input message, enter as follows:
TST:TRK,TKGMN =a-b,TYPE=105;
- Where: a = trunk group.
b = member number.
- Response: **TST TRK** output message.
35. Are noise/level responses within correct tolerance limits?
If **YES**, go to Step 30.
If **NO**, continue with the next step.

36. Notify the distant office of the level/noise problem(s) and clear per Procedure [12.8](#), Measure/Record Noise Between Offices.
37. Repeat a 105TL (105 Test Line) test on the trunk via poke command or input message per the following:
 - If via a poke command, at the TLWS, enter the appropriate poke command (546,105 or 5406,105).
 - If via an input message, enter as follows:
TST:TRK,TKGMN =a-b,TYPE=105;
Where: a = trunk group.
 b = member number.

Response: **TST TRK** output message.
38. Obtain the office trunk information per the office records.
39. Has this problem been referred from a distant office?
If **YES**, continue with the next step.
If **NO**, go to Step [48](#).
40. What is the trunk type?
If **analog**, go to Step [44](#).
If **digital**, continue with the next step.
41. Does the out-of-service (OOS) list indicate a pattern of failures associated with:
 - (a) The same Digital Facility Interface (DFI) board?
If **YES**, continue with the next step.
If **NO**, go to Step [43](#).
 - (b) The Digital Network Unit – Synchronous Optical Network (DNU-S) hardware circuits?
If **YES**, go to Step [44](#).
If **NO**, go to Step [43](#).
 - (c) The Optical Interface Unit (OIU) hardware?
If **YES**, go to Step [44](#).
If **NO**, go to Step [43](#).
42. Remove all circuits associated with the DFI board from service and replace the faulty DFI board with a new board per local procedure.
43. Reassign the digital circuit per local procedures.
44. Perform diagnostics using the following input messages:
 - (a) For the trunk equipment number (TEN):
DGN:TEN =a-b-c-d-e;
Where: a = switching module/switching module-2000 (SM/SM-2000)
 b = TEN unit number
 c = service group number

d = TEN board number
e = TEN circuit number.

- (b) For the DNU-S digital trunks, refer to the following Note and run diagnostics on the transmission multiplexer (TMUX) and the synchronous transport signal electrical interface (STXS-1) facility interface (SFI):

Note: The TMUX corresponds to the value of the STE-1 in the NEN.

DGN:TMUX =a-b-c-d;

Where: a = SM-2000
b = DNU-S number
c = data group number
d = TMUX number.

and

DGN:SFI =a-b-c-d;

Where: a = SM-2000
b = DNU-S number
c = data group number
d = SFI number.

Reference: **DGN TEN** output message.
DGN TMUX output message.
DGN SFI output message.

- (c) For the Optical Facility Interface Unit, run diagnostics on the Optical Facility Interface (OFI) pack:

DGN:OFI =a-b-c-d;

Where: a = switching module/switching module-2000 (SM/SM-2000)
b = OIU number
c = Protection group number
d = side number.

45. Does the TEN/TMUX/SFI/OFI diagnostic indicate ATP?

If **YES**, go to Step 49.

If **NO**, continue with the next step.

46. **Caution:** *When the software definition for E&M signaling is set to Type 2, the option plug on the channel board must be positioned at Type 2. When the software is set to Type 3, the option plug on the channel board must be positioned at Type 3. If the option plug position and the software definitions do not match, the diagnostic test fails.*

Replace the faulty circuit board.

47. Retest the TEN/TMUX/SFI/OFI by repeating Step 44.

48. How is trouble indicated?

If an OOS message is displayed on an MCC display page, go to Step 40.

If a Machine Detected Interoffice Irregularities (MDII) report is displayed on the Receive-Only Printer (ROP), continue with the next step.

49. Access an idle TLWS test position by entering poke command 16X (display Page 160).

- Where: X = test position number 1-8 or 1-32.
50. Seize the trunk listed on the MDII report by performing the following:
- Enter the appropriate poke command (**400,2** or **4000,2**).
 - Enter the appropriate poke command (**412,X** or **4102,X**).
- Where: X = trunk group and member number.
51. Is the message in the test area indicating trunk **SEIZED**?
- If **YES**, go to Step **53**.
- If **NO**, continue with the next step.
- Note:** When the trunk is busy, the system camps on and waits for control as indicated per the message **CAMPED ON**. If the control of the trunk is not obtained in five minutes, the message **CAMP ON DROPPED** is printed. When the trunk becomes available for testing, the message displayed changes from **CAMPED ON** to **SEIZED**.
52. Wait and monitor the message displayed in the test area. Has the message changed to **SEIZED**?
- If **YES**, continue with the next step.
- If **NO**, wait, and go back to Step **50**.
- Note:** If the trunk cannot be seized, *seek technical assistance*.
53. Based on the MDII report, verify the trunk signaling and/or transmission measurements with the distant office.
- Note:** If the distant office test line numbers are not in the automatic trunk test table, obtain them from the distant office.
- Enter the appropriate poke command (**500,X** or **5000,X**).
- Where: X = screen number.
- Response: Task selection display Page **500,X** or **5000,X** is displayed.
- Once the appropriate display page is displayed, select and enter the appropriate poke command(s).
54. Did the trunk pass the appropriate TLWS test(s) selected?
- If **YES**, go to Step **56**.
- If **NO**, continue with the next step.
55. Refer the trouble to the outside cable group per local procedure.
56. Restore the trunk to service via poke command or **RST:TRK** input message by performing one of the following:
- If via a poke command, at the TLWS, enter the appropriate poke command (**300[,UCL]** or **3000[,UCL]**).
 - If via an input message, enter as follows:
RST:TRK,TKGMN=a-b[,UCL];
57. Release the TLWS position and TLWS by performing the following:

- (a) Enter poke command **161,X**.
- (b) Enter poke command **201,X**.

Where: X = test position number.

58. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

12.14 REMOTE PROTOCOL MONITORING AND ACCESS TO ISDN

OVERVIEW

This procedure is used to test an Integrated Services Digital Network (ISDN) facility to troubleshoot a problem that the customer is experiencing. This procedure is also used to test a newly-provisioned ISDN facility before it is given to the customer.

The Remote Digital Test Access (RDTA) allows the craft located at a Customer Service Center (CSC) the ability to set up an RDTA connection on a customer's ISDN facility. The CSC is the work center where the protocol analysis functions are performed. The 5ESS[®] switch that terminates at the CSC is called the ACCESS SWITCH. A Primary Rate Interface (PRI) or pseudo Basic Rate Interface (BRI) serves as the interface between the CSC and the ACCESS SWITCH. Several originating switches can connect to a common ACCESS SWITCH via a 64-kbps T1 SS7/User Side PRI (or equivalent) trunks. An RDTA connection is made by making a circuit-switched data call between the originating 5ESS switch and the ACCESS SWITCH. Thus, the network through which the RDTA connection is made should support a 64-kbps circuit-switched data call. Two trunk members are required for each monitored channel, one for receive and one for transmit.

The RDTA refers to several types of connections in the originating 5ESS switch that may be set up on an ISDN channel. The connections are supported on PRI, Common Channel Signaling (CCS), and all packet switching trunk interfaces (for example, Internet Protocol, X.75, X.75', and XAT). The three main types of RDTA connections are as follows:

- **Noninterruptive Monitor:** This function allows the CSC craft the ability to non-intrusively access the ISDN interfaces at the 5ESS switch and view the exchanges taking place. Refer to Figure 12.14-1.

For wide-band calls (Fractional DS1/ISDN), this ability is supported as follows:

- Monitoring of a single B-channel of a wide-band call
- Monitoring the D-channel of a wide-band call
- Monitoring of a single data channel of a wide-band call transversing ISDN user part (ISUP) facilities.

Note: Monitoring of a DS0 call on a wideband ISUP or PRI trunk group is transparent to RPA.

- **Interactive Split Access:** In this application, the CSC protocol analysis equipment interacts with the ISDN interface in one of the following ways:
 - *Interactive Duplex Split:* This connection allows the craft at the CSC to break the original path and place the protocol analysis equipment between the customer premises equipment (CPE) and the originating 5ESS switch. Refer to Figure 12.14-2.
 - *Interactive Protocol Handler (PH) Simplex Split:* This connection is similar to the duplex split except the data is exchanged between the PH and the CSC, and not between the CPE and the CSC. Refer to Figure 12.14-3.
 - *Interactive Port Under Test (PUT) Simplex Split:* This connection is similar to the duplex split except the data is exchanged between the CPE and the CSC, and not between the CSC and the PH. Refer to Figure 12.14-4.

Note: Interactive splits (duplex, PH, PUT) continue to be allowed on PRI D-channels even though they may now be part of a PRI group supporting a wideband trunk group(s) or signaling for a wideband call. Interactive splits are **not** allowed on a PRI B-channel or an ISUP trunk member that is part of a wideband call. Interactive splits (duplex and PUT) continue to be supported for DS0 calls on wideband capable PRI and ISUP trunk groups.

- **Direct Test Access Connection (DTAC):** A DTAC sets up a path from an idle port to the CSC. This type of connection allows the craft to have the same ability as the Interactive PUT Simplex Split without the requirement of having an existing path to the PUT. Refer to Figure 12.14-4.

Note: A single or multiple DTAC session(s) is/are allowed on member(s) of wideband PRI and ISUP trunk groups.

This procedure is invoked by the **EXC:RDTA** input message. For details associated with formats and parameters, refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

PROCEDURE

1. Using the Recent Change/Verify (RC/V) views at the ACCESS SWITCH, verify that the output facility is provisioned correctly. Similarly, verify that all the routing data at the originating 5ESS switch and at the access switch is set up correctly for 64-kbps circuit-switched data calls.
2. Connect the protocol analyzer(s) to the output facility at the CSC and set them to the correct data rate (56-kbps, 64-kbps restricted or clear) and protocol (LAPB/LAPD, Q.931/X.25, etc.).
3. Identify the following parameters for the **EXC:RDTA** input message:
 - ISDN trunk interface and BRI interface to be tested
 - Type of RDTA connection (monitor or duplex split, etc.)
 - Output facility directory numbers where RDTA output is required.
4. Enter the **EXC:RDTA** command at the originating switch.

Note: The data exchange output from the 5ESS switch should be remoted to the protocol analyzers at the CSC.
5. Use the **OP:RDTA** input message to verify that the RDTA session is active.
6. Use the **VFY:RDTA** input message connection to verify the RDTA path.
7. If the RDTA session is to stay active for more than 24 hours, use the **UPD:RDTA** input message to update the 24 hour timer to keep the RDTA connection active for another 24 hours.
8. To stop the RDTA session, use the **STP:RDTA** input message. This stops the data exchange from being sent to the protocol analyzers at the CSC.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

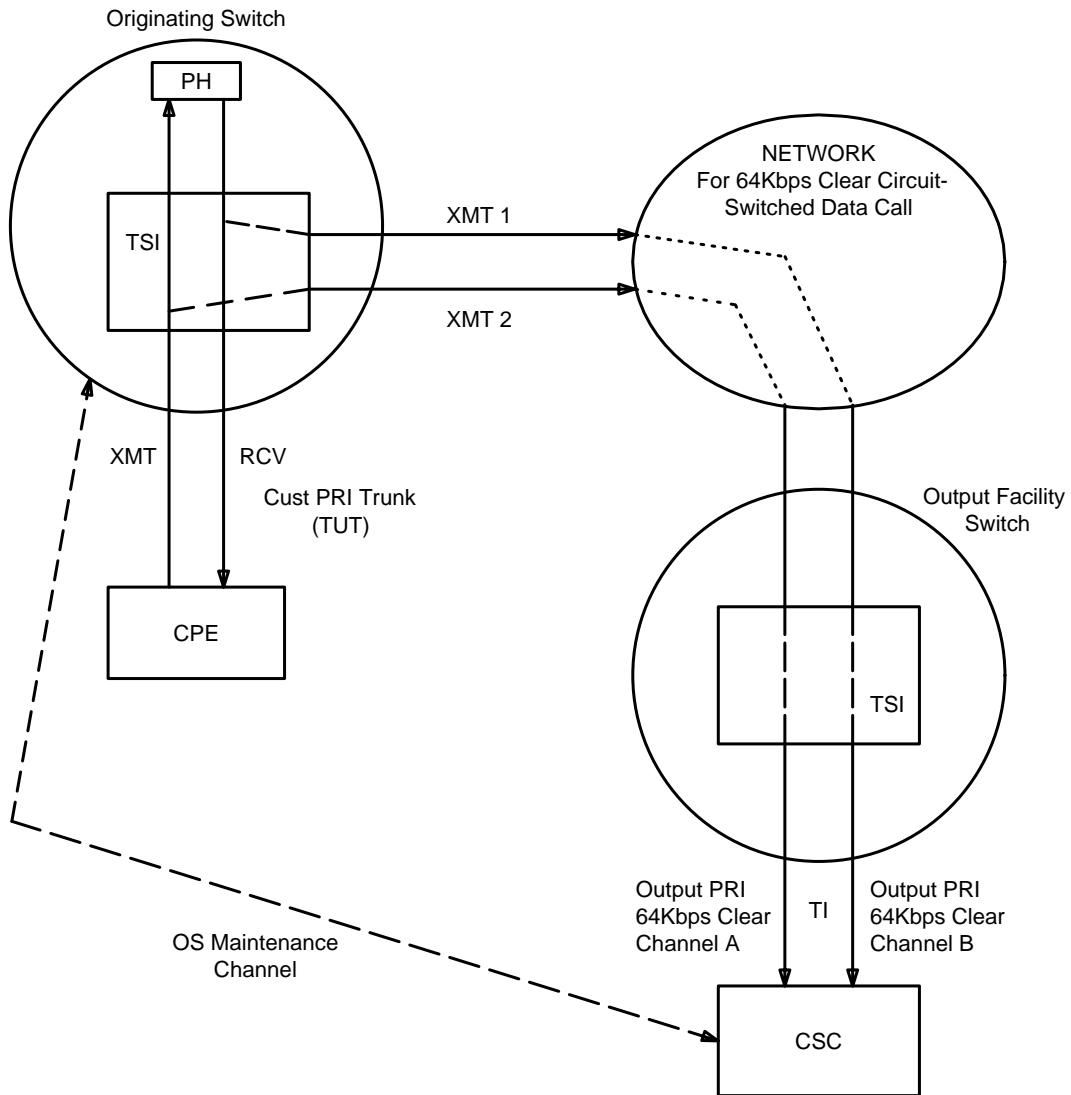


Figure 12.14-1 — RDTA Noninterruptive Monitor

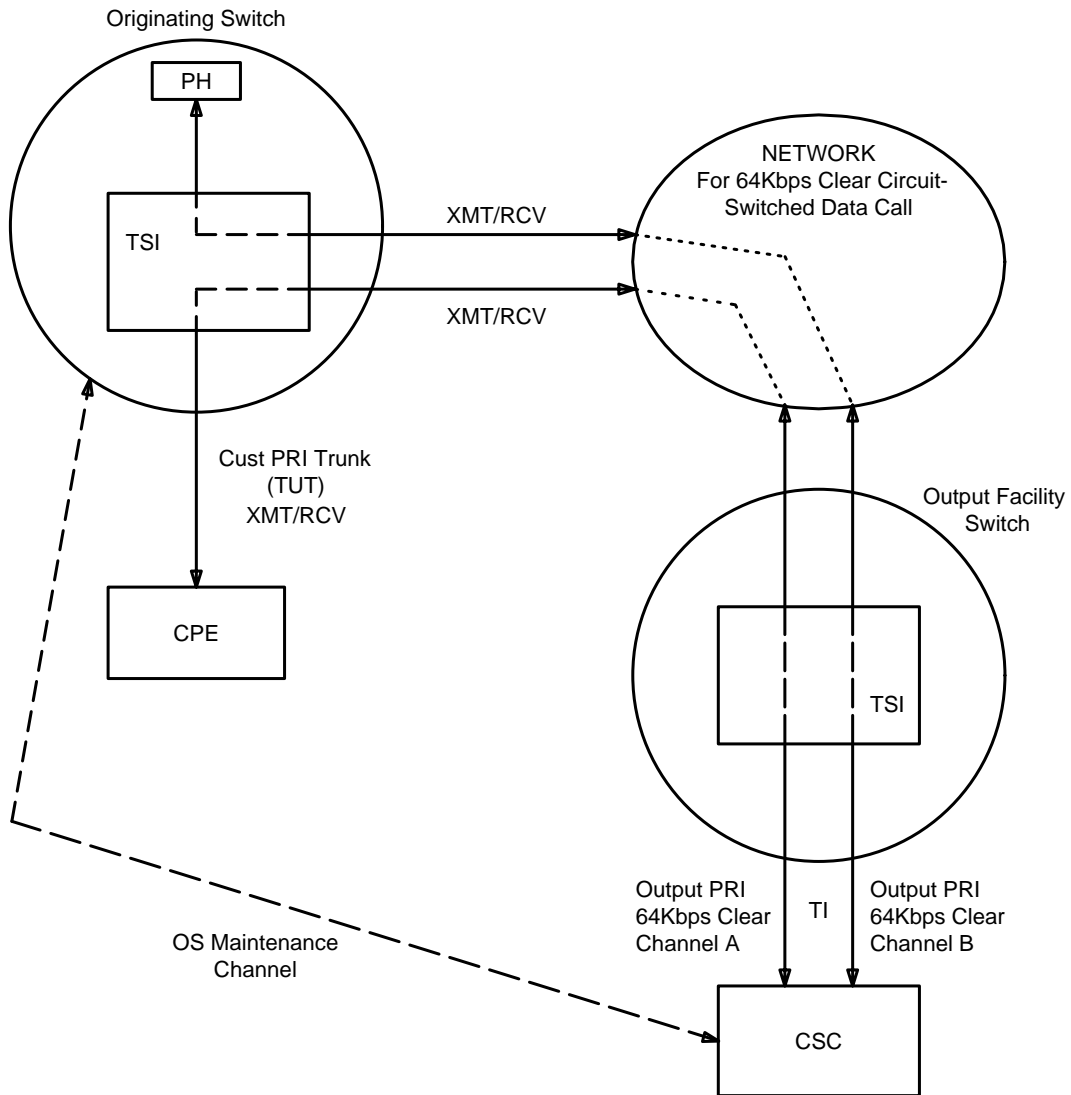


Figure 12.14-2 — RDTA Interactive Duplex Split

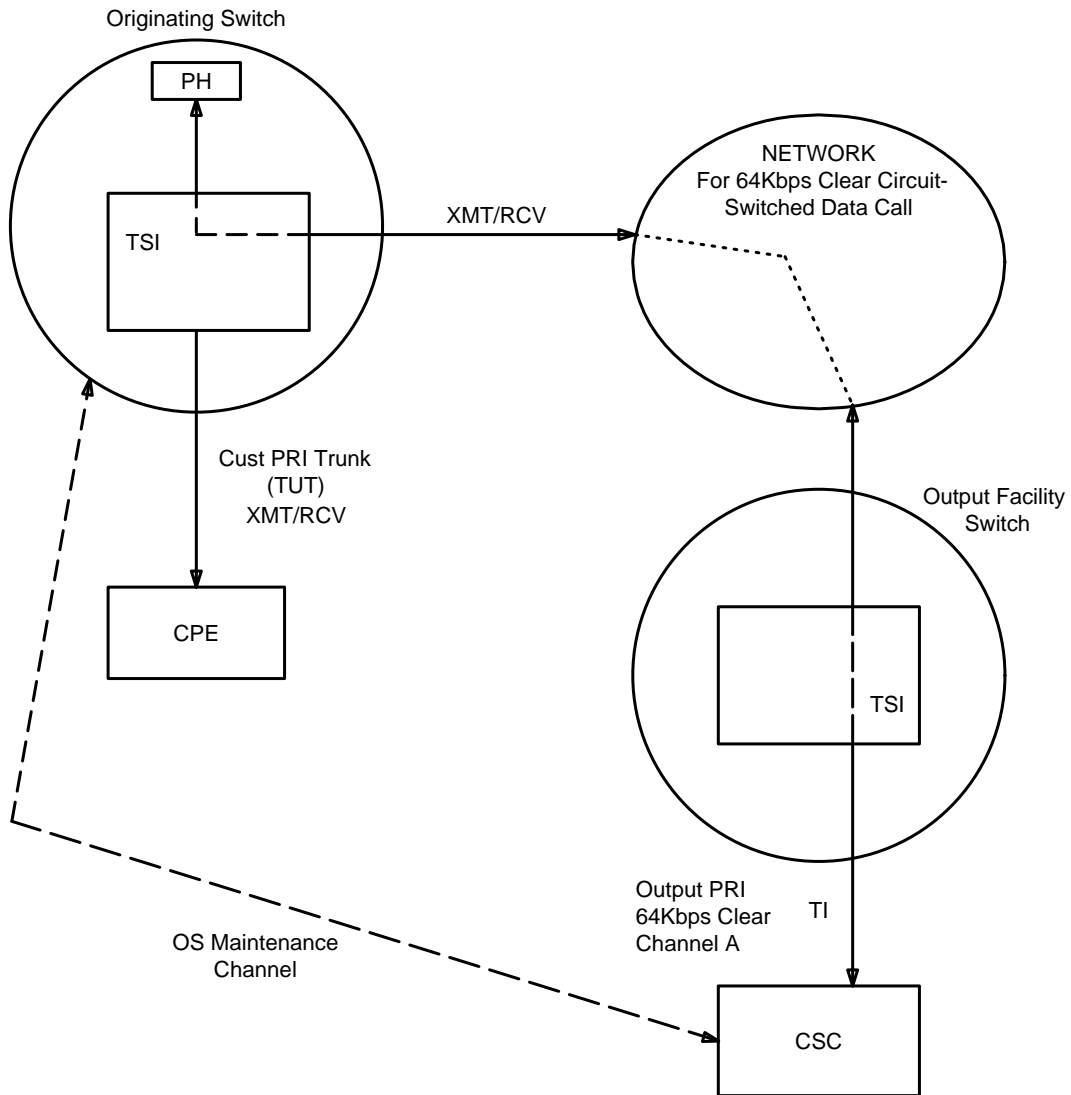


Figure 12.14-3 — RDTA Interactive PH Simplex Split

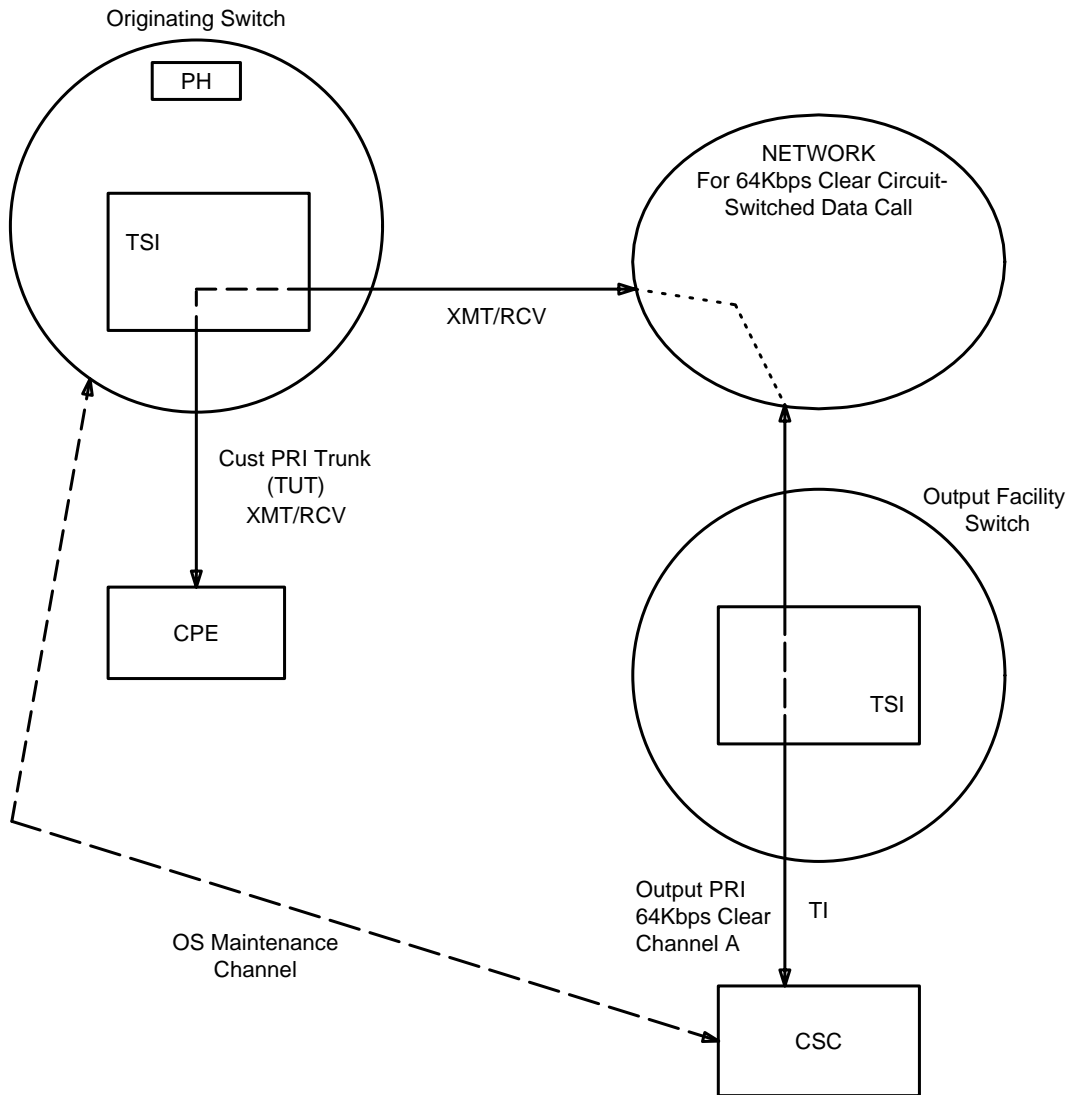


Figure 12.14-4 — RDTA Interactive PUT Simplex Split and DTAC

12.15 IMPLEMENT 108-TYPE TEST LINE CAPABILITIES OF ISTF/GDSF

OVERVIEW

This procedure is used to test digital trunks. The *5ESS*[®] switch provides a digital-circuit loopback and transmit capability for testing.

The ISTF Loopback Function

The digital service unit-2 (DSU2) integrated services test function (ISTF) and the ISTF functionality on the Global Digital Services Function (GDSF) provides a *5ESS* switch peripheral unit for integrated services digital network (ISDN) that supports transmission testing of interoffice digital trunks and basic rate interfaces through the use of a pseudo-random number (PRN) bit pattern. The ISTF is physically located on the DSU2 shelf in “loaded” switching modules and in “basic” switching module/switching module-2000s (SM/SM-2000). Each DSU2 shelf can have up to four ISTF units. Two types of services are provided by the ISTF:

- Transmit pseudo-random number bit pattern
- Digital loopback of the bits received.

The transmit service consists of a *send* side and a *receive* side. The send side generates an 11-bit shift register PRN that has been recommended by the CCITT for digital testing. It expects a far-end device to loop back the bits so the receive side can tell if any bits were altered during transmission. Each ISTF can perform up to three simultaneous transmit services.

The loopback service also consists of a receive side and a send side. It takes the bits from the input channel and places them on the output channel. The service provides two options: *inverting* and *noninverting*. The *noninverting* option copies the bits from the input channel directly to the output channel. The *inverting* option changes the polarity of each bit. For example, an input bit that is a “1” is placed on the output channel as a “0.” Each ISTF unit can perform up to 31 simultaneous loopback services.

The noninverting *5ESS* switch loopback test line for ISDN trunking meets the functional requirements announced in the *ANSI*¹ standard T1.206-1988 (Digital Exchanges and PBXs – Digital Circuit Loopback Test Line). The ANSI standard designates the test line as a 108-type test line.

The *5ESS* switch 108-type test line deviates in one minor detail from the ANSI standard in that time-out is currently fixed at 1 hour (in the event the caller fails to disconnect), whereas the ANSI specification calls for a time-out period that can be set by the operating company.

108-Type Test Line Access

Currently, only 7-digit access is provided. The North American Numbering Plan recommends “959” as the NXX for end-office testing. Bellcore TR-476 recommends 959-1080 as the directory number.

PROCEDURE

1. For ISTF *loopback* function feature implementation, continue with the next step.
For ISTF *transmit* function feature implementation, go to Step 9.

1. Registered trademark of American National Standards Institute, Inc.

- To verify feature implementation, go to Step 14.
2. **ISTF Loopback Feature Implementation:** The recent changes required to implement the inverting and noninverting *loopback* function of this feature are described as follows.
 3. Use recent change view 5.1 (TRUNK GROUP) to define the trunk-group characteristics. The significant attributes and their respective values are as follows:
 - TGN = The loopback trunk group
 - TRK DIR = LTP
 - HUNT TYPE = FIFO
 - TRK CLASS = LTPISTFL
 - RMK = ISTF LOOP
 - INPLS = NOSIGNAL
 - OUTPLS = NOSIGNAL
 - VPA TYPE = NOVPA
 - CCS7 TYPE = RBOC.
 4. Use recent change view 5.5 (TRUNK MEMBER) to define the trunk-member characteristics. The significant attributes and their respective values are as follows:
 - TGN = The loopback trunk group
 - MEMB NBR = 0
 - QTY = 1
 - OE = P XXXXXXXX (where X is the logical port).
 5. Define the fixed route on recent change view 10.1 (FIXED ROUTE). The significant attributes and their respective values are as follows:
 - TRMT = ISTFLB
 - RTI = Route Index of the loopback function.
 6. Use recent change view 10.2 (ROUTE INDEX) to define the route index that points to the trunk group with the ISTFLB function. The significant attributes and their respective values are as follows:
 - RTI = RTI value from RC/V 10.1
 - TGN = The loopback Trunk Group
 - SIG PRO = TRAD.
 7. Use recent change view 1.5 (PBX-DID LINE) to insert the telephone number that is associated with the *noninverting* option. The significant attributes and their respective values are as follows:
 - LCC = TST
 - RTI = RTI value from RC/V 10.1

- TSTCODE = NINV.
8. Use recent change view 1.5 (PBX-DID LINE) to insert the telephone number that is associated with the *inverting* option. The significant attributes and their respective values are as follows:
- LCC = TST
 - RTI = RTI value from RC/V 10.1
 - TSTCODE = INV.
- STOP. YOU HAVE COMPLETED THE ISTF LOOPBACK FUNCTION FEATURE IMPLEMENTATION.**
9. **ISTF Transmit Function Feature Implementation:** The recent changes required to implement the transmit function of this feature are described as follows.
10. Use recent change view 5.1 (TRUNK GROUP) to define the trunk group characteristics. The significant attributes and their respective values are as follows:
- TGN = The transmit trunk group
 - TRK DIR = LTP
 - HUNT TYPE = FIFO
 - TRK CLASS = LTPISTFX
 - RMK = ISTF XMTR
 - INPLS = NOSIGNAL
 - OUTPLS = NOSIGNAL
 - VPA TYPE = NOVPA
 - CCS7 TYPE = RBOC.
11. Use recent change view 5.5 (TRUNK MEMBER) to define the trunk member characteristics. The significant attributes and their respective values are as follows:
- TGN = The transmit trunk group
 - MEMB NBR = 0
 - QTY = 1
 - OE = P XXXXXXXX (where X is the logical port).
12. Define the fixed route on recent change view 10.1 (FIXED ROUTE). The significant attributes and their respective values are as follows:
- TRMT = ISTFXMIT
 - RTI = Route Index of the transmit function.
13. Use recent change view 10.2 (ROUTE INDEX) to define the route index that points to the trunk group with the transmit function. The significant attributes and their respective values are as follows:
- RTI = The RTI value from RC/V 10.1

- TGN = The transmit Trunk Group
- SIG PRO = TRAD.

STOP. YOU HAVE COMPLETED THE ISTF TRANSMIT FUNCTION FEATURE IMPLEMENTATION.

14. **Verifying Feature Implementation:**

If verifying *loopback* operation, continue with the next step.

If verifying *transmit* operation, go to Step 24.

15. *Verifying Loopback Operation:* There are two ways to verify the operation of the ISTF loopback feature. One way is to place an interoffice call to the 108-type test line that has the inverting option; the squelch of the data stream should be clearly audible. A second method is through the use of a trunk and line work station (TLWS) test position at a far-end office.

16. At TLWS, Access Page 160 and seize a TLWS test position.

17. At TLWS, access Page 4000,2 (SEIZE TRUNK/INCOMING CALL).

18. To seize a trunk, at TLWS, enter the following poke:

CMD: **4102,X,Y**

Where: X = GRP (Outgoing trunk group to office with 108-type test-line)
 Y = MEM (Trunk group member).

19. At TLWS, access Page 5000,1 (TRANSMISSION).

20. To specify the digits to outpulse, enter the following poke:

CMD: **4401,X**

Where: X = Directory number of inverting test line.

21. **Note:** Be sure to seize a digital trunk before accessing this page.

At TLWS, access Page 5000,3 (TRANSMISSION).

22. To specify digital trunk loopback testing, enter the following poke:

CMD: **5033,X,Y**

Where: X = LBKINV (Termination type
 Y = BLKSZ (Data block size, 1-64000).

23. The system displays the status of the test session in the lower right-hand corner of the page. The display should resemble the following:

ELAPSED = elapsed time

BLKSZ = data block size (1-64000)

BER = 0.0 E - 0 (see Note)

ERBLK = 0.0 E 0 (see Note).

Note: OOR NO SYNCH implies a failure to connect with the 108-type test line, or a connection to the wrong port of the 108-type test line (that is, you outpulsed the *noninverting* test number but then requested the *inverting* test).

STOP. YOU HAVE COMPLETED THIS PROCEDURE.

24. *Verifying Transmit Operation:*

Note: MCC Page 1110,x, ISTF displays a dynamic count of the number of ISTF services and channels currently available and in use.

To verify the operation of the transmit function, go to Step 16 at a TLWS in the central office where the 108-type test line is being installed.

Currently, digital loopback testing for CCS7 trunks may be invoked *only* from a TLWS. The system currently treats a digital loopback test invoked with the TST:TRK command as an invalid test request. This restriction will be lifted in the near future.

12.16 FAR-END LOOP PROCEDURE

OVERVIEW

This procedure is used to set up a far-end loopback.

TR303 FELP Configuration by TTY Message

There are two options available for using the far-end loop process (FELP) on a TR303 facility: with and without a protection line. When a protection line is available, the looped-back DS1 automatically switches to the protection line to preserve customer service. Without the protection line, the facility to be looped back must be out-of-service (OOS), either manually or automatically, to ensure no live traffic is using the facility.

TR303 FELP Operation Protection Line Switch (PLS) Option

In preparation for a far-end loopback on a facility, the craft can optionally inhibit protection switch release of the facility and inhibit the facility fault count measurements.

Optional FELP TR303 Protection Line Switch Release Inhibit

In a TR303, a DS1 on protection and looped back can be bumped off protection should the active primary DS1 [the DS1 carrying the active time slot management channel (TMC)] need to use the protection line (both due to "soft" or "hard" faults). This could cause calls to be lost on the protected and looped-back facility. To disable the active primary DS1's capability to interrupt the protected looped-back DS1, the protection switch release inhibit can be used.

PROCEDURE

1. On the MCC, enter the following command:

```
INH:RT,FAC=a-b,RELEASE;
```

```
Response:  M REPT RT SID=a LRT=c-d-e MINOR NEAR END  
           FAC b SWITCH RELEASE INHIBIT
```

```
.  
. .  
. .
```

```
M INH RT FAC=a-b RELEASE COMPLETED
```

Where: a = Site ID
b = DS1 facility number (1-28)
c = SM/SM-2000 (1-192)
d = IDCU (0-7)
e = DS1 Facility (0-39).

12.16.1 Optional FELP TR303 Facility Alert (IFAC) Inhibit (not required for FELP without PLS)

1. During a TR303 FELP to UN-FELP transition, the DS1s exhibit a tendency to take facility errors. These errors appear as ROP messages such as the following:

```
M REPT FAC ALERT IFAC=c-d-e NE 15MIN P IFAC=c-d-e ERR3
```

```
CI  EE  THR  SES  THR  UAS  THR  FLS  THR  SS  THR
```

```
XX  XX  XX  XX  XX  XX  XX  XX  XX  XX  XX
```

A minor alarm is given on MCC Page **1880,x,y** and **187x** [where: x =IDCU number (0-7) and y =RT number].

2. The counting of these errors can be inhibited during an FELP with the following input command:

INH:FAC,IFAC=c-d-e;

Response: **M INH FAC IFAC=c-d-e COMPLETED**

12.16.2 Set Far-End Loop Execution with Protection Line Switch Option

1. The far-end loop configuration can be requested by a TTY message. Configuration of a DS1 facility to an FELP is also a pending request for a protection line switch. To request the set of an FELP on a DS1 facility, use following message:

SET:RT,FAC=a-b,FELP;

Response:

```
M REPT RT SID=yy LRT=c-d-e MINOR NEAR END
      FAC b SWITCH RELEASE INHIBITED (optional)
      FAC b FAR END LOOP REQUESTED
```

2. The system responds immediately to these requests with one of the following messages:

```
M SET RT FAC=a-b FELP IN PROGRESS
```

3. Before FELP can be completed, the facility must not be carrying live traffic. The system attempts to do this automatically by switching the facility to the protection line. When the facility has been successfully placed on protection, the following message is printed:

```
M RMV IFAC=c-d-e COMPLETED PROTECTION SWITCH OK
```

Response:

```
FAC b FAR END LOOP REQUESTED
FAC b LINE ON PROTECT ALARM ON
FAC b SWITCH RELEASE INHIBITED (optional)
```

This message indicates which facilities the far-end loop requests are pending on. When the RT responds, the FELP requests the following message to be printed:

```
M REPT RT SID=yy LRT=c-d-e MINOR NEAR END EVENT
      FAC b LINE ON PROTECT ALARM ON
      FAC b FAR END LOOP
      FAC b SWITCH RELEASE INHIBITED (optional)
```

Also, the facilities on MCC Pages **187x** and **1880,x,y** indicate FELP if the facility is both far-end looped and protected. If the facility is not on protect, the FELP status must be determined from the automatic ROP output messages or as a response to a manual **OP:RT,SID=yy;** input command.

12.16.3 TR303 FELP Operation Without Protection Line Switch Option

1. Before requesting the FELP, the facility to be looped must be in the OOS condition. Facilities with the EOC and TMC are not removed. To perform the operation, enter the following input command:

RMV:IFAC=c-d-e;

Response: **M RMV IFAC=c-d-e COMPLETED**

2. If the previous command cannot be performed due to nailups or ISDN lines on the facility, a removal of the facility can be performed unconditionally. To perform the operation, enter the following input command:

Caution: This is possibly a service-affecting command.

RMV:IFAC=c-d-e,UCL;

Response: **M RMV IFAC=c-d-e COMPLETED**

3. The far-end loop can be requested by a TTY message. To request a set of an FELP on a DS1 facility, the following message is used:

SET:RT,FAC=a-b,FELP

4. The system responds immediately to these requests with one of the following messages:

M SET RT FAC=a-b FELP IN PROGRESS

When the RT responds, the FELP requests that the following message be printed:

M REPT RT SID=yy LRT=c-d-e MINOR NEAR END

FAC b FAR END LOOP

Also the facilities on MCC Pages 187x and 1880,x,y indicate FELP if the facility is both far-end looped. The FELP status must be determined from the automatic ROP output messages or as a response to a manual **OP:RT,SID=yy;** input command.

12.16.4 Clear Far-End Loop with Protection Line Switch Option

1. The far-end loop can be cleared using an input command. The command triggers a message to be sent to the RT to request that the far-end loop be removed from the selected facility. To clear the FELP condition, enter the message:

CLR:RT,FAC=a-b,FELP;

Response:

CLR RT FAC=a-b FELP IN PROGRESS

-and-

REPT RT SID=yy LRT=c-d-e MINOR NEAR END

FAC b LINE ON PROTECT ALARM ON

-or optional-

FAC b SWITCH RELEASE INHIBITED

If switch release is INHIBITED, the DS1 is not taken off protection.

When the facility has been successfully taken off the FELP condition, the following message is printed:

M REPT RT SID=yy LRT=c-d-e MINOR NEAR END

FAC b SWITCH RELEASE INHIBITED

12.16.5 Clear FELP without Protection Line Switch Option

OVERVIEW

If the optional protection switch release inhibit or the facility alert counts were inhibited, they should also be cleared.

PROCEDURE

1. To release an FELP on a DS1 facility, enter the message:

CLR:RT,FAC=a-b,FELP

Response:

```
* REPT RT SID=yy LRT=c-d-e MINOR FAR END EVENT
      FAC b LINE ON PROTECT ALARM ON
```

```
M REPT RT SID=yy LRT=c-d-e MINOR FAR END
      FAC b LINE ON PROTECT ALARM ON
```

```
M CLR RT FAC=a-b FELP IN PROGRESS
```

```
RST IFAC=c-d-e COMPLETED
```

```
* REPT RT SID=yy LRT=c-d-e MINOR FAR END EVENT
      FAC b LINE ON PROTECT ALARM OFF
```

2. When the RT responds to the clearing of the FELP, the following message be printed:

Note: This is because the IFAC is still OOS.

```
M REPT RT SID=yy LRT=c-d-e MINOR NEAR END
```

3. To restore the IFAC number, use the following command:

RST:IFAC=c-d-e

Response: **M RST IFAC=c-d-e COMPLETED**

4. The RT responds to the IFAC restoral with the following:

M REPT RT SID=yy LRT=c-d-e ALL OKAY

12.16.6 Release Optional FELP Release Inhibit (After FELP Is Cleared)

OVERVIEW

If the optional protection switch release inhibit or the facility alert counts were inhibited, they should also be cleared.

PROCEDURE

1. To clear the optional protection switch release inhibit, use the following input message:

ALW:RT,FAC=a-b,RELEASE;

Response:

```
* REPT RT SID=yy LRT=c-d-e MINOR FAR END
```

```
FAC b LINE ON PROTECT ALARM ON
```

```
M ALW RT FAC=a-b RELEASE COMPLETED
```

```
RST IFAC=c-d-e COMPLETED PROTECTION UN-SWITCH OK
```

```
* REPT RT SID=yy LRT=c-d-e MINOR FAR END EVENT
```

```
FAC b LINE ON PROTECT ALARM OFF
```

2. To clear the optional alert count inhibit, use the following input message:

ALW:FAC,IFAC=c-d-e;

Response: **M ALW FAC IFAC=c-d-e COMPLETED**

3. The RT responds as follow:

M REPT RT SID=yy LRT=c-d-e ALL OKAY

12.16.7 Optional FELP TR303 Facility Alert (IFAC) Allowed (After FELP is Cleared)

OVERVIEW

If the optional FELP TR303 facility alert is allowed, perform the following:

PROCEDURE

1. To allow IFAC error counting use the following input command.

ALW:FAC,IFAC=c-d-e

Response: **M ALW FAC IFAC=c-d-e COMPLETED**

12.17 PERFORM METALLIC MEASUREMENTS OF AN ANALOG TRUNK USING SLIM

OVERVIEW

This procedure is used to perform metallic measurements on an analog trunk using the Subscriber Loop Instrument Measurement (SLIM).

Note: The SLIM can access *only* the tip and ring of loop supervision and 2-wire ear and mouth (E&M) trunks. The SLIM *cannot access* 4-wire trunks.

PROCEDURE

1. At the TLWS, access a test position by entering the poke command **161,X** (TLWS test position summary display Page 160).

Where: X = test position number 1-32.

2. If the trunk is not currently seized, seize it by entering the poke command **4102,X**.

Where: X = **GRP,MEM**

3. To display the METALLIC measurements, enter the poke command **5600**.
4. Enter the poke command corresponding to the metallic measurement you wish to perform.

Note: Most metallic measurements are updated every few seconds (**5701** pokes do not update).

5. Results may be printed at the Receive-Only Printer (ROP) by entering the poke command **9500**.
6. Other measurements may be made by simply entering another (corresponding) poke command.
7. If no further testing will be performed on the trunk, release it by entering the poke command **4999**.
8. If all TLWS testing is completed, release the test position by entering the poke command **201,X** (TLWS test position summary display Page 160).

Where: X = test position number 1-32.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.18 LOCATING FACILITY-RELATED TROUBLES

OVERVIEW

This procedure is used to locate facility-related troubles and identify the cause when T1/E1 carrier facilities drop out of service. The procedure focuses on the probable causes of failure and how they are related to the trouble.

Decipher CGA Report

When a T1/E1 facility connected to a 5ESS[®] switch observes an error condition, the associated facility is removed from service and the user receives a **CGA** (carrier group alarm) **report** via an output message on the ROP (receive-only printer).

A sample output message is shown as follows:

```
S570-420413474 00-05-05 11:16:55 956200 TM
  REPT CGA FAC=3-4-1-0 AIS TG 700
```

This output message states that facility 3-4-1-0 associated with trunk group 700 is now in an AIS alarm. AIS is typically followed by an additional message indicating what nature of alarm has occurred (that is, red or yellow).

A generic form of the report is: **REPT CGA FAC=a-b-c-d e TG f**

Where:

- a = Switching module number
- b = Digital line and trunk unit number
- c = Digital facility interface board number
- d = Facility number for a DLTU2 (0 or 1)
- e = Facility alarm indicator. [For example, AIS = alarm indication signal, ASC = alarm signal cleared, LAC = Local alarm cleared, LCA = local alarm (red), RAC = Remote alarm cleared, RMA = remote alarm (yellow).]
- f = Trunk group number (For example, 700).

REPT:FAC ALERT Output Message

The **REPT:FAC ALERT** output message, which prints out on the ROP, can be used to determine the cause of the facility dropping from service. The following is an example of that output with the breakdown of the various parts.

```
S570-420413474 00-05-05 11:36:07 956572 PRFM
A REPT FAC ALERT FAC=6-2-7-1 RATE ERR4
  CI    BES    THR    BPV    THR    COFA    THR    CRC6    THR
  *      0      600   50169  65535   10     511    127    65535
  FI    ES     THR    FS     THR    SES     THR    SS     THR
  *      2     1706   147     90     2      90     1     255
```

This message prints out when a facility exceeds either the *15-minute* or the *daily* threshold for errors. It contains a general report on various types of facility-related errors with both the number of errors and the threshold for each category. The rate of bit errors per second for a given facility is determined as follows:

ERR3	More than 1 error per 1,000 bits based on a 480 millisecond interval for D4 and a 1.008 second interval for FE
ERR4	More than 1 error per 10,000 bits based on a 96 millisecond interval
ERR5	More than 1 error per 100,000 bits per 96 millisecond interval
ERR6	More than 1 error per 1,000,000 in a 672 millisecond interval
ERR7	More than 1 error per 10,000,000 per 6.48 second interval.

Sub-field definitions:

BES	Amount of bursty errored seconds
BPV	Number of bi-polar violations
CI	Corruption indicator. When an asterisk is here, it means at least one measurement indicator contains invalid data.
COFA	Continuous out of frame errors
CRC6	Cyclic redundancy check-6 errors
ES	Amount of errored seconds
FI	Failure indicator. An asterisk here means a failure occurred on this facility since the last error report such as a CGA.
FS	Number of failed seconds
SES	Severely errored seconds
SS	Slipped seconds (facility slip count)
THR	Threshold level for each category.

Manually-Requested Error Report

Besides the **CGA** and **FAC:ALERT** reports, the error registers in the DFI (Digital Facility Interface) can be manually dumped to get a real time snapshot of the problem. Also, when the trouble has been cleared, these registers can be set to zero for further monitoring purposes.

To use the **OP:REG** input command to manually request the error report from the DFI, input the command: **OP:REG,DFI=a-b-c;**

Where: a = Switching Module number
 b = Digital Line and Trunk Unit number
 c = Digital Facility Interface circuit board number.

The output of the message is as follows:

```
M   OP REG DFI=4-1-3 FAC 0 COMPLETED
    MC5D223A1 3 MODE FE8Z ALARM ACT
    SLIP=3 OOF=1 BPV=0
    SES=4 ES=4 CRC6=0

    S570-420413474 00-04-27 13:07:25 844416 SM
M   OP REG DFI=4-1-3 FAC 1 COMPLETED
    MC5D223A1 3 MODE FE8Z ALARM ACT
    SLIP=0 OOF=0 BPV=0
    SES=0 ES=0 CRC6=0
```

In the previous example, "facility zero" (FAC 0) has taken an error. The breakdown of the fields is as follows:

ACT	Status of facility (ACT, OOS, STBY)
ALARM	Type of CGA against facility, if any
BPV	Number of bi-polar violations
CRC6	Cyclic redundancy check-6 error count
ES	Number of errored seconds
MCXXXXX	Microcode of the circuit pack physically in the DLTU/DLTU-2
MODE	Type of signaling used on this facility
OOF	Number of out-of frame errors
SES	Number of severely errored seconds
SLIP	Facility slip count.

When the problem is resolved, zero out the registers with the following command:

INIT:REG,DFI=a-b-c;

Where: a = Switching Module number
 b = Digital Line and Trunk Unit number
 c = Digital Facility Interface circuit board number.

Common Trouble-Isolation Steps for T1/E1 Facility Fault

There can be numerous connection points in a T1/E1 facility going from end to end. However, there are some common steps that can be taken to isolate the problem out of the 5ESS switch to help locate the fault.

T1/E1 Carrier Facility Segmentation

If a T1/E1 is reporting numerous RMA (yellow) alarms, you can loop the facility back to the 5ESS at various points to verify that the facility stays framed up without errors. See Subprocedure [12.18.1](#).

Addressing Slips on a T1/E1 Facility

There are a couple of reasons that a facility may be reporting slips either on requesting the error registers with the **OP:REG** command or by looking at the FS number of the **REPT:FAC ALERT** message. A defective DFI board can induce slips into a facility, and a provisioning error for the facility can also cause slips. See Subprocedure [12.18.2](#).

Correcting T1/E1 LCA (Red) Alarms

See Subprocedure [12.18.3](#) to address an alarm that implicates the originating office.

Common Facility Failures Across a DLTU/2/3

If it is observed that there are numerous facility faults across a common DLTU/2/3, see Subprocedure [12.18.4](#).

Fault-Locating with Network Clock References

If slips and other facility-related errors are occurring across multiple switching modules, it may be due to a bad incoming reference to the Network Clock.

Execution of Network Clock Diagnostics

To determine the integrity of the incoming reference, execute diagnostics on the Network Clocks in each Office Network and Timing Complex. See Subprocedure [12.18.5](#).

PROCEDURE

1. To segment the T1/E1 carrier facility, see Subprocedure [12.18.1](#).
2. To address slips on a T1/E1 facility, see Subprocedure [12.18.2](#).
3. To address an alarm that implicates the originating office, see Subprocedure [12.18.3](#).
4. If facility failures are common across a single DLTU/2/3, see Subprocedure [12.18.4](#).
5. To determine the integrity of the incoming reference, see Subprocedure [12.18.5](#).
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

12.18.1 T1/E1 Carrier Facility Segmentation

1. Put a hardware loop in the DSX panel at the furthest point in the facility.
2. Clear the DFI errors registers using the **INIT:REG** input message.
3. Check for further errors using the **OP:REG** input command.
4. If errors persist, move the loop back toward you to the next closer loop point.
5. Repeat Steps 2 and 3 until errors clear.
6. Once errors clear, you have identified the cause of the facility problem. Contact local operating company or owner of that portion of the T1/E1 to correct the problem.

12.18.2 Addressing Slips on a T1/E1 Facility

1. Verify the T1/E1 framing mode in recent change in the *5ESS*[®] switch for the facility in question. Use the 20.4 Recent Change view in the *5ESS* switch to verify the T1 MODE.

Note: If it is provisioned for B8ZS framing, it **must** follow that all the way out to the DFI board at the cell. Any discrepancy at any point along the way will cause slips due to framing mismatch.

12.18.3 Address Alarm That Implicates Originating Office

1. Put in a hardware loop at the DSX panel that is wired to the backplane of the DFI board.
2. If the facility does not frame-up and go active, check the DSX wiring and if that looks okay, replace the DFI board.
3. If the facility does frame-up, check for alarms or issues with the carrier equipment in the local office.

12.18.4 Common Facility Failures Across a DLTU/2/3

1. If using a T1/E1 equalizer board, replace it to ensure it is not causing an issue in the shelf.
2. If there are DFI boards plugged into the shelf that have not yet been provisioned using 5ESS[®] recent change, remove them from the shelf.
Note: The presence of hardware that has not yet been provisioned can cause numerous facility errors.
3. Verify that the shelf power is at the proper levels.

12.18.5 Execution of Network Clock Diagnostics

1. To execute the diagnostics, input the following command into the 5ESS[®] switch.
DGN:NC=x,RAW,TLP,RPT=y;

Where: x = Network Clock side 0 or 1
 y = Number of times to execute the diagnostics.

2. If the diagnostics complete ATP (All Tests Passed), go to Step 6.
If you receive a Network Clock diagnostic failure that points to the synchronizer board in the Network Clock, this is an indication of a potentially bad reference. Go to the 1211 Page on the 5ESS STLWS (Supplementary Trunk and Line Work Station) and switch the Network Clock References using the 42x poke command where "x" equals the standby reference number, 1 or 2.
3. Re-run the Network Clock diagnostic.
4. If the diagnostic fails, change out one circuit pack at a time (from the TLP list) and re-run the Network Clock diagnostic.
Note: If a new circuit pack does not pass the diagnostic, remove it and replace the original circuit pack; change another circuit pack from the TLP list, re-run the diagnostic, etc.
5. After each circuit pack on the TLP list has been replaced one at a time, if the diagnostic failure persists, **seek technical assistance**.
6. If the diagnostics pass and the facility failures are still spread throughout the 5ESS switch, go to the 1211 Page and switch the Network Clock references and determine whether the facility errors stop.
7. Check the ROP for error messages associated with the Network Clock. If any of the following messages are found, **seek technical assistance**.

REPT NC Asynchronous Errors (Network Clock report of a reference problem)
REPT NC-NER (No External Reference found)
REPT NC-REF (Report of frequency tolerance exceeded or reference jitter errors).

12.19 TEST OIU-IP CONNECTIONS

OVERVIEW

This procedure is used to test Optical Interface Unit – Internet Protocol (OIU-IP) connections.

There are several types of network tests and test calls that can be performed on OIU-IP connections. These tests include:

- **Ping Test:** This test is run on the OIU-IP bearer network components to verify whether a known termination IP address can be reached from the OIU-IP hardware, and provide measurements on the time required to receive a response.
- **Loopback:** This test checks the OIU-IP bearer path connections using the DELAY test (which measures round-trip voice latency). The test is performed with a local loopback in the OIU-IP hardware (which verifies bearer path components in this switch only) or with a far-end loopback (which exercises the majority of the OIU-IP functionality to the far-end loopback point).
- **105 Test:** The 105 test provides the 105 measurement options (similar to those provided by the circuit switched TST:TRK test). Since the test will set up a bearer path through the packet network (just like a voice call), the results of the 105 test can indicate the quality of the entire end-to-end connection, including the local 5ESS path, the packet network, and the far-end switch path between the packet network and the actual far-end point.

PROCEDURE

1. Choose the test to perform:
 - To perform an OIU-IP ping test, go to Step 2.
 - To perform an OIU-IP DELAY test, go to Step 5.
 - To perform a 105 test, go to Step 11.
2. For an OIU-IP ping test, determine the IP address of an existing device already connected to the IP bearer network.

You may want to run the ping test to more than a single existing device on the same network to confirm that the OIU-IP hardware has access to the entire network. The OIU-IP device to initiate the ping test is identified by:

- Switching module (SM) number
- OIU number
- Protection group (PG) number
- Selected PG side.

The IP address of the device intended to receive the ping request is identified by its IP address (commonly written **XXX.XXX.XXX.XXX**, but entered via the **EXC:PING MML** command as **IPDEST=XXX-XXX-XXX-XXX**).

If an IP address on the bearer network is unknown, **EXC:PING** provides a “BROADCAST” option which can be used to obtain the IP of the router associated with the OFI (see the **EXC:PING** message in the 235-600-700, *Input Messages* manual for additional details).

Note: Only one EXC:PING is allowed per SM until the processing is complete.

3. Enter the following command to ping a known device on the bearer network from the OIU-IP hardware:

EXC:PING,OFI=a-b-c-d,IPDEST=xxx-xxx-xxx-xxx;

Where: a = SM number
 b = OIU number
 c = PG number
 d = Side number (see Note)
 x = IPDEST number.

Note: The side selected must be the active OC-3c side, or the request will be rejected.

4. Examine the output to determine whether the far-end device responded to the ping request.
 - If you are able to ping all devices (IP Addresses), the ping test is completed.
 - If you are *unable* to ping a known good device in the bearer network, verify that the OIU-IP OC-3c link is installed and connected correctly to its associated edge switch. Then determine whether the OIU-IP OFI can ping the edge switch.
 - If you are able to ping the edge switch directly connected to the OIU-IP, repeat the ping test to other “nearby” IP devices to try to isolate the problem to a particular part of the network.

This completes the Ping test.

5. If OIU-IP DELAY test calls *have* been used before, go to Step 7.
If OIU-IP test calls have *not* been used before, or if there are problems getting OIU-IP test calls to route to associated test equipment, continue with Step 6 to verify route data setup.
6. Routing data to the test equipment must be populated correctly for the test call to locate the test equipment. This step validates that the needed routing data for the DELAY test is populated.
 - a. On RC/V view 10.1, Fixed Route, review the data for the OGTGDSF fixed route type. Verify that it exists and note the associated route index (RTI).
 - b. On RC/V view 10.2, Route Index, review the data for the RTI. Verify that it exists and note the associated trunk group number (TGN).
 - c. On RC/V view 5.1, Trunk Group, review the data for the TGN. Verify that it exists and that the trunk class (TRKCLASS) attribute is OGTGDSF.

Verify that each member of the trunk groups associated with the DELAY test exists on an SM with GDSF test equipment. The DELAY test requires a GDSF to control the test, so any member of this trunk group that exists on an SM that does not have an equipped GDSF, or which has a GDSF not configured to support tone tests, will cause DELAY test attempts to fail (perhaps intermittently). Additionally, the DELAY test OPDN should correspond to the far office 108 test line OPDN.

If the previously described data does not exist as specified, the DELAY test will not execute correctly. The routing data for the OGTGDSF fixed route index must be corrected.

This completes the validation of routing data for an OIU-IP DELAY test call. Go to Step 7.

7. Choose the OIU-IP DELAY test to perform:
 - To perform an OIU-IP near-end (local) DELAY test, go to Step 8.
 - To perform an OIU-IP far-end (end-to-end) DELAY test, go to Step 10.
8. For an OIU-IP near-end (local) DELAY test, identify the OIU-IP hardware to be tested:
 - The OIU-IP protection group, which is identified by:
 - SM number
 - OIU number
 - PG number.
 - To perform the OIU-IP near-end (local) DELAY test, a valid PCT link TimeSlot (PCTTS) must be specified. The specified PCT link number is relative to the OIUPG, with values of 0, 1, or 2.

Note: Each OIU may have from 1 to 3 PCT links equipped. The first PCT link must always be assigned, and unassigned PCT links are not testable. RC/V view 20.28, Optical Facility Interface Pack, can be referenced to identify the number of PCT links equipped for a given OIU pack. Control timeslots (0-47) of relative PCT link 0 are not testable. Also, unassigned PCT timeslots on an assigned PCT link are not testable.

9. For an OIU-IP near-end (local) DELAY test, enter the following command at the MCC or STLWS:

TST:PATH,DELAY[,TMO=n],OIUPG=a-q-r,PCTTS=s-t[,RPT=j][,ROP];

Where:

- a = SM number
- j = Number of times to repeat the test
- n = DELAY threshold time in milliseconds
- q = OIU number
- r = OIU protection group number
- s = Digits to be outputted for the specified test
- t = PCT link number relative to the OIU.

The DELAY test will measure the quality of the looped back transmission path by providing power and noise level measurements and determining if the loopback delay exceeds the amount of delay specified in the input request. If no delay threshold is specified, the default delay threshold of 80 milliseconds will be used.

Analyze the results of the local loopback and determine if the results are acceptable. If the results are unacceptable, verify the provisioning and local connections.

This completes the OIU-IP near-end (local) DELAY test call.

10. For an OIU-IP far-end (end-to-end) DELAY test, enter the following command at the MCC or STLWS:

TST:PATH,DELAY[,TMO=n],[PKTG=o|PKTGMN=o-p],[OIU=a-q|OIUPG=a-q-r],OPDN=s[,RPT=j][,ROP];

Where: a = SM number

j = Number of times to repeat the test
n = DELAY threshold time in milliseconds
o = PKTG number over which to set up the test call
p = Packet group member number
q = OIU number
r = OIU protection group number
s = Digits to be outpulsed for the specified test.

This completes the OIU-IP far-end (end-to-end) DELAY test call.

11. For an outgoing 105 test to a far-end 105 test line over the packet network, enter the following command. The OPDN specified should be the 105 test line DN for the desired far-end office.

**TST:PATH:OG105[,MEAS=v],{PKTG=o|PKTGMN=o-p},{OIU=a-q|OIUPG=a-q-r},OPDN=s
[,RPT=j][,ROP];**

Where: a = SM number
j = Number of times to repeat the test
o = PKTG number over which to set up the test call
p = Packet group member number
q = OIU number
r = OIU protection group number
s = Digits to be outpulsed for the specified test.
v = Specify 105 test type (see Input/Output Messages Manual).

This completes the 105 test call.

12.20 Setting Up and Clearing PSU/SS7 Loopback Termination

OVERVIEW

Purpose: These procedures allow personnel at the *5ESS*[®] switch to set up and tear down the loopback termination toward the Signal Transfer Point (STP) on the Signaling Data Link (SDL) port. This feature gives users the ability to isolate problems in the Packet Switching Unit (PSU)/Signaling System 7 (SS7) network by sending a test pattern (from the STP side, or outside of the *5ESS* switch) when there is a need to validate the SS7 link.

How to test the transmission facilities carrying the SS7 link(s) is contingent on each customer's local procedures.

Note: The deactivated link associated with the SDL port is required to be **manually activated** after testing the link. It can then be used for normal call processing.

Criticality: The procedures for setting up the loopback termination must be followed before users can test the SS7 link and isolate problems in the PSU/SS7 network. The procedures for tearing down the loopback termination and manually reactivating the deactivated link associated with the SDL port must be followed before the link can again be used for normal call processing.

Related Information: Use of this feature is based on the assumption that the user is familiar with, and has knowledge of, the PSU SS7 architecture and Trunk and Line Work Station (TLWS) knowledge. The Signaling Data Link (SDL) port is the port terminated on Digital Line and Trunk Unit (DLTU), Digital Network Unit - SONET (DNU-S), or Optical Interface Unit Equipment Number (OIUEN), which is used to convey the signaling message out from the *5ESS* switch and terminate the physical SS7 link. The other end of the SS7 link inside of the *5ESS* is called the Signaling termination (ST_DLT) port which terminates on ST PH. This ST_DLT port is used by the protocol handler (PH) to process the SS7 signaling.

Since the link has to be deactivated to set the Time Slot Interchanger (TSI) loopback termination on the associated SDL port, the nailup between the SDL port and the ST_DLT port will be broken. The testing pattern will not be sent to the PH but is looped by the TSI after the TSI loopback mode is set. After the link is reactivated, the nailup between the SDL and the ST_DLT port is reestablished.

Before You Begin: These procedures require the use of the TLWS, a mode of the master control center (MCC).

PROCEDURE

12.20.1 Setting the TSI Loop Termination for the SDL Port Using TLWS Pokes

1. *5ESS* personnel will be contacted by telephone regarding the link that is going to be tested by the customer from the STP side.
2. In the office that owns the link that is going to be tested, go to the GSM which that link belongs to by entering **1532,GSM** ;
Response: The 1532 page is displayed.
3. View the member information by entering **1533,linkset** ;
Response: The 1533 page is displayed.

4. Get the SDL port identifier as D for DLTU, N for DNUS and O for OIUEN on the 1533 page.
5. The link is in active (ACT) status in this case. Deactivate it by entering **2XX[UCL]** , UCL is optional.

Where: XX = a valid link set member.

6. Enter poke command **160** to access the TLWS page.

Response: The 160 page is displayed.

7. Enter poke **161,TP[ID]** to seize one test position on the TLWS (TP is from 1 to 32. ID is optional (in fact not useful for the test to set TSI loop) and is from 1 to 16.)

Response: The 161 page is displayed.

8. Based on the identifier of the SDL port, choose the poke to seize the SDL port. Enter **4104,X** (where X= DEN SM,DLTU,DFI,CKT) or **4108,X** (where X=NEN SM, DNUS, DG, STE, STS, VG, VM, DS0) for DLTU/DNUS, and **4113,X** (where X= OIUEN SM, OIU, PG, STE, HVC, VCG, VCM, CH) for OIU.

Response: The 410x page, or the 4113 page, is displayed, giving the correct SDL information. The TLWS screen is updated with information, such as:

- = port status
- = LNKMEM
- = SDL type
- = SEIZED

Note: After the SDL port is seized, the status of the SDL port changes from "IS" to "OOS MTCE DSBLD TEST MAN". Also, after the SDL port is seized, only the following TLWS pokes are valid to operate the SDL port; other pokes are not allowed:

- **5227[DUR=x]** or **5228 #** Set/clear loop request on the SDL port
 - **201,TP #** Release the TP manually or automatically
 - **4999 #** Release the SDL port
 - **9500[LOG] #** Print results
 - **9600[ROP] #** Print TP status
 - **9601[ROP] #** Print all TP status
 - **4800 #** Reseize the same SDL port which can refresh (clear) SM TP
 - **4104,X, 4108,X and 4113,X** to seize other trunk/line/SDL ports.
9. Enter poke **5227[DUR=X]** to set the TSI loop termination for this SDL port. DUR=X is optional and the default is 30 seconds. (Note that "DUR" means the duration for this TSI loop. DUR can equal from 1 to 3600 seconds.)

Response: The LOOPBACK SET information prints on the TLWS screen to indicate that this procedure has successfully been completed.

Note: After the SDL port is set with the TSI loopback termination, the status of the SDL port changes from "OOS MTCE DSBLD TEST MAN" to "OOS MTCE DSBLD TSILP AUTO" automatically.

10. End of procedure.

Note: To clear termination and activate the link using TLWS pokes, refer to Procedure [12.20.4](#).

12.20.2 Setting the TSI Loop Termination for the SDL Port Using Standard MML Commands

Note: Before proceeding with this procedure, the link must be deactivated following Steps 1 through 5 of Procedure [12.20.1](#).

1. To set the TSI loopback using an MML command, enter:
ORD:DLOOP,OPR[=DUR],DEN/NEN/OIUEN=.....; DUR is optional from 1 to 3600 seconds and the default is 30 seconds.

Response: An ORD:DLOOP output message is printed out on the ROP to indicate that the TSI loopback termination is set up. After the loopback termination is set successfully with the ORD:DLOOP command, the status of the SDL port changes from "IS" to "OOS MTCE DSBLD TSILP AUTO" automatically.

2. End of procedure.

Note: To clear termination and activate the link using standard MML commands, refer to Procedure [12.20.5](#).

12.20.3 Setting the TSI Loop Termination for the SDL Port Using TLWS MML Input Commands

Note: Before proceeding with this procedure, the link must be deactivated by following Steps 1 through 5 of Procedure [12.20.1](#).

1. Enter **SET:WSPOS,TP=X,ID=Y;** to seize the TLWS test position.
2. Enter **CONN:WSTRK,TP=X,DEN=../NEN=../OIUEN=...;** to seize the SDL port, where X is the TP seized in Step 1.

Response: The output of CONN WSTRK prints on the ROP.

Note: After the SDL port is seized, the status of the SDL port changes from "IS" to "OOS MTCE DSBLD TEST MAN". The TLWS 410x or 4113 for OIUEN page is not updated, as the SDL port that was seized by pokes is. Only the output message is printed on the ROP and TLWS.

3. Enter **TST:WSSUPV,TP=X,TEST=SETLBK[,DUR=X];** to set the TSI loopback termination for the SDL port, where X is the TP seized in Step 1.

Note: After the SDL port is set with the TSI loopback termination, the status of the SDL port changes from "OOS MTCE DSBLD TEST MAN" to "OOS MTCE DSBLD TSILP AUTO" automatically. (The TLWS 5227 page is not updated as it would be by using poke commands.) Only output of TST:WSSUPV prints on the ROP.

4. End of procedure.

Note: To clear termination and activate the link using TLWS MML input commands, refer to Procedure [12.20.6](#).

12.20.4 Clearing the TSI Loop Termination for the SDL Port Using TLWS Pokes

Note: If the TSI loopback termination was set using TLWS pokes or TLWS MML commands, then it can only be cleared using TLWS pokes or the TLWS MML commands. If the TSI loopback termination was set using the standard ORD:DLOOP MML command, then it can only be cleared using standard MML commands. Also, note that the TSI loopback termination set by the TLWS poke can also be released by TLWS MML commands, but only in the same TLWS; it cannot be released by TLWS MML commands in a different TLWS. The TSI loopback termination could be pre-empted by some maintenance activity that has a higher priority than the TSI loopback job, such as:

- Unconditional remove or restore of an SDL port.
 - Unconditional remove of the circuit where the SDL port is located.
 - Full initialization of the SM, and so on. In such cases, the TSI loopback termination clears automatically. The "LOOPBACK CLEARED" report only prints on the ROP. [The Equipment Configuration Database (ECD) must be correctly set for message class TLWSRSP to print out this message on the ROP and not on the TLWS screen.]
1. The TSI loop termination is released when the duration specified by the loop request is timed out. The "LOOPBACK CLEARED" report prints on TLWS screen as 5228 entered to indicate this, since TLWS still owns that SDL port. If this is the case, continue with Substep (a). If this is not the case, continue with Step 2.
 - (a) Enter poke command **4999** to release the SDL port on the 161 page first.
Response: After the port is released, the status changes from OOS to IS MAN.
 - (b) Release the TLWS test position by entering poke command **201,TP #** on the 160 page.
 - (c) Enter **1533,linkset** ; to go back to the 1533 page.
 - (d) Activate the link by entering **3XX**
Where: XX = a valid link set member.
 - (e) End of procedure.
 2. If the SDL is still in LOOPED status (it will be viewed on the TLWS screen), enter poke **5228** to release the TSI loop on the SDL port.
Response: The "LOOPBACK CLEARED" message prints on the TLWS screen and the SDL port changes back to "SEIZED" from "SUPERVISION". Also the status of the SDL port changes from "OOS MTCE DSBLD TSILP AUTO" to "OOS MTCE DSBLD TEST MAN".
 3. Enter the **4999** poke to release the SDL port.
Response: The SDL port is released as data in the TLWS screen is cleared, also the status of the SDL port changes from "OOS MTCE DSBLD TEST MAN" to "IS MAN".

- Note:** If the SDL port is still set with loopback termination, the loopback termination is cleared with the release of the SDL port by using the 4999 poke command.
4. Enter poke 160.
 5. Enter 201,#TP to release the TP which is used to seize/set/clear TSI loopback termination on the SDL port. Note: This poke clears the TSI loopback termination first if the SDL is under looped status, and it also releases the SDL port automatically.
 6. Enter 1533,linkset ; to go back to the 1533 page.
 7. Activate the link by entering 3XX
Where: XX = a valid link set member.
 8. End of procedure.

12.20.5 Clearing the TSI Loop Termination for the SDL Port Using Standard MML Commands

Refer to the Overview of Procedure [12.20.4](#).

1. The TSI loopback termination is released automatically when the duration specified by the loopback request is timed out. The message prints on the ROP/TLWS to indicate this. If this is the case, this is the end of the procedure. If this is not the case, continue with Step 10.
2. Enter the following command to release the loop:
ORD:DLOOP,RLS,DEN/NEN/OIUEN=.....;
Response: An ORD:DLOOP output message prints out to indicate that the TSI loop termination is cleared. Once the loopback termination is cleared successfully, the status of the SDL port changes from "OOS MTCE DSBLD TSILP AUTO" to "IS MAN" automatically.
3. Enter 1533,linkset ; to go back to the 1533 page.
4. Activate the link by entering 3XX
Where: XX = a valid link set member.
5. End of procedure.

12.20.6 Clearing the TSI Loop Termination for the SDL Port Using TLWS MML Input Commands

Refer to the Overview of Procedure [12.20.4](#).

1. Enter **TST:WSSUPV,TP=X,TEST=CLRLBK;** to release the TSI loopback termination for the SDL seized by TP X.
Response: The "LOOPBACK CLEARED" report prints on the ROP and TLWS.
Note: After the TSI loopback is cleared by 5228 or cleared automatically when DUR is timed out, the status of the SDL port changes from "OOS MTCE DSBLD TSILP AUTO" to "OOS MTCE DSBLD TEST MAN".

2. Enter **DISC:WSPORT,TP=X**; to release the SDL port owned by TP X.

Response: The SDL port release output on the ROP and TLWS.

Note: When the port is released, the status of the SDL port changes from "OOS MTCE DSBLD TEST MAN" to "IS MAN". If the SDL port is still set with loopback termination, the loopback termination clears with the release of the SDL port by using **DISC:WSPORT**.

3. Enter **RLS:WSPOS,TP=X**; to release the Test position.

Note: If the SDL port is still there, and if the TSI loopback is still set, it clears the TSI loopback first. In this case, a "LOOPBACK CLEARED" report is printed on the ROP and TLWS. Or, if there is no TSI loopback, then only the SDL port is released.

4. Enter **1533,linkset** ; to go back to the 1533 page.

5. Activate the link by entering **3XX**

Where: XX = a valid link set member.

6. End of procedure.

12.20.7 Finding the SDL Port Under TSI Loopback Termination

This procedure is performed to find the SDL port that was set for TSI loopback termination, in case this is not known. If the SDL port is owned by TLWS, it can only be cleared using TLWS pokes or the TLWS MML commands. If the TSI loopback was set by the ORD:DLOOP command, it can only be cleared using standard MML commands.

1. Enter the **OP:LIST** command with the proper parameter (SDLS, OOS, MTCE, DSBLD, TSILP) to find the SDL port under the TSI loopback.

Response: A list of SDL ports under the TSI loopback will be printed on the ROP.

Note: The ECD must be correctly set for message class CR_RSP to print out this message on the ROP, not on the TLWS screen.

2. To find which application set this port under the TSI loopback, enter **160,X** (where the X value is 1, 2, 3 or 4) to go to the TLWS summary page to check whether the SDL port is there.

3. Enter **161,X**

(where the X value is the TP number, found on the 160,X page that owned the SDL port.)

Response: The "LNKMEM" value is shown on the screen for the SDL port. "LNKMEM" is also in the OP:LIST report, so the user can compare the "LNKMEM" value to know which application set the TSI loopback termination.

4. If the "LNKMEM" value is there, then the SDL port is owned by TLWS, and can only be cleared using TLWS pokes or the TLWS MML commands. Otherwise, the TSI loop was set by the ORD:DLOOP command, and can only be cleared using standard MML commands.
5. End of procedure.

Corrective Maintenance Procedures

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13. TRACING CALLS

GENERAL

The procedures in this section are used to trace the equipment used by a call. Utility Call Trace is used to trace the facilities used by a failed call. In-Progress Call Trace is used to trace the facilities used by an active call. Nuisance Call Trace is used to trace the facilities used to call a specific line.

13.1 CALL TRACE PROCEDURES

OVERVIEW

This procedure is used as an index to a group of subprocedures covering the following:

- Utility Call Trace
- In-Progress Call Trace
- Nuisance Call Trace.

Note: Nuisance Call Trace includes procedures for Terminating, Interoffice, and Tandem Call Trace.

For Utility Call Trace, all hardware information associated with a traced call is displayed on the master control center (MCC) video terminal display Pages 131-140, 150, and 151.

Note: Utility Call Trace may be initiated using either an input message or a poke command from any Call Trace page.

For general information about Call Trace features, refer to 235-190-115, *Local and Toll System Features*. For specific input/output messages, refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

PROCEDURE

1. To obtain information applicable to Utility Call Trace, perform any of the following procedures as applicable:
 - (a) Determine Hardware and Software Used During Call Processing – Procedure [13.2](#).
 - (b) Obtain Most Recent Software Call Trace Data – Procedure [13.3](#).
 - (c) Analyze Hardware Summary Output Messages – Procedure [13.4](#).
 - (d) Analyze Software Data Output Messages – Procedure [13.5](#).
2. To obtain information applicable to In-Progress Call Trace, perform Procedure [13.6](#), Perform In-Progress Call Trace.
3. To obtain information applicable to Nuisance Call Trace, perform Procedure [13.7](#), Perform Nuisance (Terminating, Tandem/Interoffice) Call Trace.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.2 DETERMINE HARDWARE AND SOFTWARE USED DURING CALL PROCESSING

General

This procedure is used to troubleshoot and resolve hardware problems associated with any calls that fail.

Hardware and Software Configurations

Utility Call Trace provides *5ESS*[®] switch owners with the ability to identify specific hardware and software configurations used during call processing. All hardware (units/circuits) associated with a call may be displayed on the master control center (MCC) video terminal using Display Pages 131-140, 150, and 151. Utility Call Trace can be initiated with either an input message or a poke command (CMD). The applicable poke commands (see MCC Pages 131 and 132) are as follows:

- 401,X TRACE DN (X=Telephone Number) {[,CH=D | B1 | B2] [,PKT] [,SA=SUBADDRESS | ALL] [,CID=CALLID | ALL]}
- 402,X TRACE LEN X (X=SM, LU, GR, BD, SW, LV)
- 403,X TRACE SLEN X (X=SM, DCLU, RT, LINE)
- 404,X TRACE MLHG X (X= GRP, MEM) {[,CH=D | B1 | B2] [,PKT] [,SA=SUBADDRESS | ALL] [,CID=CALLID | ALL]}
- 405,X TRACE LCEN X (X=SM, LU, LG, LC) [,CH=D | B1 | B2] [,PKT]
- 406,X TRACE ILEN X or PUB43801 (X=SM, IDCU, RT | IFAC (plus 51), LINE | DS0) [,CH=D | B1 | B2] [,PKT]
- 407,X TRACE NEN X (X=SM-2000, DNU, DG, STE, STS, VTG, VTM, DS0)
- 408,X TRACE PSUEN X (X=SM, PSU, PSU SHLF, PSU CHGRP, PSU CHMEM)
- 409,X TRACE LCKEN X (X=SM, ILSU, LG, LP, LC) [,CH=D | B1 | B2] [,PKT]
- 410,X TRACE PORT X (X=SM-2000, PORT NAME) [,PKT]
- 411,X TRACE CKT X (X=SM/SM-2000, CKT NAME)
- 412,X TRACE TKGMN X (X= GRP, MEM)
- 413,X TRACE TEN (X=SM/SM-2000, TU, SG, BD, CKT)
- 414,X TRACE DEN (X=SM/SM-2000, DLTU, DFI, CH)
- 415,X TRACE TS X (X=SM-2000, TSDBKEY)
- 416,X TRACE LUCHAN X (X=SM/SM-2000, LU, SG, CHBD, CH-CKTNUM)
- 417,X TRACE BST X (X=OSC, POS) [,CH=D | B1]
- 418,X TRACE OPT X (X=OSC, POS) [,LOOP=1 | 2 | 3] [,CH=D | B1]
- 419,X TRACE RAF X (X=SM/SM-2000, RAF, CH)
- 420,X TRACE SAS X (X=SM/SM-2000, SAS, CH)
- 424,X TRACE INEN X (X=SM, DNU, RDT, LINE) [,CH=D | B1 | B2] [,PKT].
- 426,X TRACE OIUEN X (X=SM, OIU, PG, STE, HVC, LVCGP, LVCMEM, DS0).
- 440,X TRACE PID X (X=PN-SM-UNIQ).

- 450,X TRACE DUMP X (X=[PID=PN-SM-UNIQ], [STRUCTS=TYPE])
- 455,X TRACE OIUUDP X (X=SM,OIU,PG,OC3C,STS3C,UDP).
- 465,X TRACE LTAG X (X=GSMI,PROCGRP,SM,MAPIDX,PROCNO).

Note: The Utility Call Trace poke commands can only be entered on one of the previously listed Utility Call Trace MCC pages.

Data Structures

The dynamic data structures collected during a call trace can be printed on the receive-only printer (ROP) using Procedure 13.3, Obtain Most Recent Software Call Trace Data. These data snapshot structures represent the hardware used by an in-progress call. For troubleshooting purposes, this information is valuable in that the equipment used is identified either immediately before or during the time in which a call failed.

Input/Output Messages

In this procedure and other subprocedures associated with Utility Call Trace, typical input/output messages are presented because software release dependencies may exist for unique office applications. 235-600-700, *Input Messages Manual*, and 235-600-750, *Output Messages Manual*, should be referenced for specific message parameter meanings. Additionally, office records should be referred to for specific equipment allocations or assignments.

PROCEDURE

Note: Appropriate ranges for the commands are on **APP:RANGES** appendix in the Appendixes section of the 235-600-700, *Input Messages Manual*.

1. If call trace is associated with:
 - (a) TRACE DN X, go to Step 2.
 - (b) TRACE LEN X, go to Step 3.
 - (c) TRACE SLEN X, go to Step 4.
 - (d) TRACE MLHG X, go to Step 5.
 - (e) TRACE LCEN X, go to Step 6.
 - (f) TRACE ILEN X, go to Step 7.
 - (g) TRACE NEN X, go to Step 8.
 - (h) TRACE PSUEN X, go to Step 9.
 - (i) TRACE LCKEN X, go to Step 10.
 - (j) TRACE PORT X, go to Step 11.
 - (k) TRACE CKT X, go to Step 12.
 - (l) TRACE TKGMMN X, go to Step 13.
 - (m) TRACE TEN X, go to Step 14.
 - (n) TRACE DEN X, go to Step 15.
 - (o) TRACE TS X, go to Step 16.
 - (p) TRACE LUCHAN X, go to Step 17.

- (q) TRACE BST X, go to Step 18.
 - (r) TRACE OPT X, go to Step 19.
 - (s) TRACE RAF X, go to Step 20.
 - (t) TRACE SAS X, go to Step 21.
 - (u) TRACE INEN X, go to Step 22.
 - (v) TRACE OIUEN X, go to Step 23.
 - (w) TRACE PID X, go to Step 24.
 - (x) TRACE OIUUDP X, go to Step 25.
 - (y) TRACE LTAG X, go to Step 26.
2. At the MCC video terminal, to trace a call using **DN X**, enter one of the following:

- **TRC:UTIL:DN=a** {[,CH=b][,PKT] | [,SA=c] | [,CID=d]};
- If via a poke CMD, enter **CMD 401,a** {[,CH=b][,PKT] | [,SA=c] | [,CID=d]}.

Where: a = Directory number (DN) (up to 15 digits) of line to be traced
b = Channel type [D (default), B1, or B2]
c = Subaddress number (0-15) or ALL
d = Call ID (0-31) or ALL.

Response: If printout follows (PF) followed by event tag is printed, go to Step 27; otherwise, go to Step 28.

3. At the MCC video terminal, to trace a call using **LEN X**, enter one of the following:

- **TRC:UTIL:LEN=a-b-c-d-e-f**;
- If via a poke CMD, enter **CMD 402,a,b,c,d,e,f**.

Where: a = Switching module/switching module-2000 (SM/SM-2000) number
b = Line Unit (LU) number
c = Grid number
d = Switch board number (LU1, LU2, LU3).
e = Switch number
f = Level number.

Response: If PF followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

4. At the MCC video terminal, to trace a call using **SLEN X**, enter one of the following:

- **TRC:UTIL:SLEN=a-b-c-d**;
- If via a poke CMD, enter **CMD 403,a,b,c,d**.

Where: a = SM/SM-2000 number
b = Digital Carrier Line Unit (DCLU) number
c = Remote terminal number
d = Line number.

Response: If PF followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

5. At the MCC video terminal, to trace a call using **MLHG X**, enter one of the following:

- **TRC:UTIL:MLHG=a-b** {[,CH=c][,PKT] | [,SA=d] | [,CID=e]};
- If via a poke CMD, enter **CMD 404,a,b** {[,CH c][,PKT] | [,SA d] | [,CID=e]}.

Where: a = Group number
b = Member number
c = Channel type identifier [D (default), B1, or B2]
d = Subaddress number (0-15) or ALL
e = Call ID (0-31) or ALL.

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

6. At the MCC video terminal, to trace a call using **LCEN X**, enter one of the following:

- **TRC:UTIL:LCEN=a-b-c-d** [,CH=e][,PKT]
- If via a poke CMD, enter **CMD 405,a,b,c,d** [,CH=e][,PKT].

Where: a = SM/SM-2000 number
b = LU number
c = Line group number
d = Line card number
e = Channel type identifier [D (default), B1, or B2].

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

7. At the MCC video terminal, to trace a call using **ILEN X**, enter one of the following:

- **TRC:UTIL:ILEN=a-b-c-d[,CH=e]** [,PKT]
- If via a poke CMD, enter **CMD 406,a,b,c,d** [,CH=e][,PKT] .

Where: a = SM/SM-2000 number
b = IDCU number
c = Remote terminal number or DS1 serving PUB - 43801 number
d = RT line number or DS0 serving PUB - 43801 number.
e = Channel type identifier [D (default), B1, or B2].

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

8. At the MCC video terminal, to trace a call using **NEN X**, enter one of the following:

- **TRC:UTIL:NEN=a-b-c-d-e-g-h-i**;
- If via poke CMD, enter **CMD 407,a,b,c,d,e,g,h,i**.

Where: a = SM/SM-2000 number
b = DNU-S number
c = Data group (DG) number
d = SONET termination equipment (STE) number
e = Synchronous transport signal (STS) number
g = VT group (VTG) number
h = VT member (VTM) number

i = Digital signal level 0 (DS0) number.

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

9. At the MCC video terminal, to trace a call using **PSUEN X**, enter one of the following:

- **TRC:UTIL:PSUEN=a-b-c-d-e;**
- If via poke CMD, enter **CMD 408,a,b,c,d,e.**

Where: a = SM/SM-2000 number
b = Packet switching unit (PSU) unit number
c = PSU shelf number
d = PSU channel group number
e = PSU channel group member number

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

10. At the MCC video terminal, to trace a call using **LCKEN X**, enter one of the following:

- **TRC:UTIL:LCKEN=a-b-c-d-e;**
- If via poke CMD, enter **CMD 409,a,b,c,d,e.**

Where: a = SM/SM-2000 number
b = Line Unit number
c = Line Group number
d = Line Pack number
e = Line Circuit number

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

11. At the MCC video terminal, to trace a call using **PORT X**, enter one of the following:

- **TRC:UTIL:PORT=a-b [,PKT];**
- If via a poke CMD, enter **CMD 410,a,b [,PKT].**

Where: a = SM/SM-2000 number
b = Global name of port to be traced (use H'b)

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

12. At the MCC video terminal, to trace a call using **CKT X**, enter one of the following:

- **TRC:UTIL:CKT=a-b;**
- If via a poke CMD, enter **CMD 411,a,b .**

Where: a = SM/SM-2000 number
b = Circuit name to be traced (key of CDBCOM)

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

13. At the MCC video terminal, to trace a call using **TKGMN X**, enter one of the following:
 - **TRC:UTIL:TKGMN=a-b;**
 - If via a poke CMD, enter **CMD 412,a,b .**Where: a = Trunk group number
 b = Member number.

Response: If **PF** followed by an event tag is printed, go to Step [27](#); otherwise, go to Step [28](#).
14. At the MCC video terminal, to trace a call using **TEN X**, enter one of the following:
 - **TRC:UTIL:TEN=a-b-c-d-e;**
 - If via a poke CMD, enter **CMD 413,a,b,c,d,e .**Where: a = SM/SM-2000 number
 b = Trunk unit (TU) number
 c = Service group number
 d = Channel board number
 e = Circuit number.

Response: If **PF** followed by an event tag is printed, go to Step [27](#); otherwise, go to Step [28](#).
15. At the MCC video terminal, to trace a call using **DEN X**, enter one of the following:
 - **TRC:UTIL:DEN=a-b-c-d;**
 - If via a poke CMD, enter **CMD 414,a,b,c,d .**Where: a = SM/SM-2000 number
 b = Digital Line and Trunk Unit (DLTU) number
 c = Digital Facilities Interface (DFI) number
 d = Channel number.

Response: If **PF** followed by an event tag is printed, go to Step [27](#); otherwise, go to Step [28](#).
16. At the MCC video terminal, to trace a call using **TS X**, enter one of the following:
 - **TRC:UTIL:TS=a-b;**
 - If via a poke CMD, enter **CMD 415a,b .**Where: a = SM/SM-2000 number
 b = Key of source time slot data block to be traced.

Response: If **PF** followed by an event tag is printed, go to Step [27](#); otherwise, go to Step [28](#).
17. At the MCC video terminal, to trace a call using **LUCHAN X**, enter one of the following:
 - **TRC:UTIL:LUCHAN=a-b-c-d-e;**
 - If via a poke CMD, enter **CMD 416,a,b,c,d,e .**Where: a = SM/SM-2000 number

b = LU number
c = Service group number
d = Channel board number
e = Channel circuit number.

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

18. At the MCC video terminal, to trace a call using **BST X**, enter one of the following:

- **TRC:UTIL:BST=a-b [,CH=c];**
- If via a poke CMD, enter **CMD 417,a,b [,CH=c].**

Where: a = Operator service center number where the traced directory assistance (DA) operator position resides
b = Relative position number of the Basic Services Terminal (BST) operator position in the operator service center
c = Channel type identifier [D (default) or B1].

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

19. At the MCC video terminal, to trace a call using **OPT X**, enter one of the following:

- **TRC:UTIL:OPT=a-b [,LOOP=c][,CH=d];**
- If via a poke CMD, enter **CMD 418,a,b [,LOOP=c][,CH=d].**

Where: a = Operator service center number for the Operator Services Position System (OSPS) office where the traced T/A position resides
b = Relative position number of the Operator Position Terminal (OPT) operator position in the operator service center
c = OPT operator call loop number (defaults to active loop) Enter zero to trace the active loop.
d = Channel type identifier [D (default) or B1].

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

20. At the MCC video terminal, to trace a call using **RAF X**, enter one of the following:

- **TRC:UTIL:RAF=a-b-c;**
- If via a poke CMD, enter **CMD 419,a,b,c.**

Where: a = SM/SM-2000 number
b = Recorded Announcement Facility (RAF) unit number
c = RAF channel number.

Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

21. At the MCC video terminal, to trace a call using **SAS X**, enter one of the following:

- **TRC:UTIL:SAS=a-b-c;**
- If via a poke CMD, enter **CMD 420,a,b,c.**

- Where: a = SM/SM-2000 number
b = Service Announcement System (SAS) unit number (0-7)
c = SAS channel number (0-31).
- Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.
22. At the MCC video terminal, to trace a call using **INEN X**, enter one of the following:
- **TRC:UTIL:INEN=a-b-c-d [,CH=e][,PKT];**
 - If via poke CMD, enter **CMD 408,a,b,c,d [,CH=e][,PKT]**.
- Where: a = SM/SM-2000 number
b = DNU-S number
c = Remote terminal number
d = Line number
e = Channel type identifier [D (default), B1, or B2].
- Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.
23. At the MCC video terminal, to trace a call using **OIUEN X**, enter one of the following:
- **TRC:UTIL:OIUEN=a-b-c-d-e-f-g-h;**
 - If via poke CMD, enter **CMD 426,a,b,c,d,e,g,h**.
- Where: a = SM/SM-2000 number
b = OIU number
c = Protection group (PG) number
d = OIU Optical Carrier - level 3 (OC3) number
e = OIU Synchronous Transport Signal level 1 (STS1) number
f = OIU VT1.5 group number
g = OIU VT1.5 member number
h = channel number.
- Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.
24. At the MCC video terminal, to trace a call using **PID X**, enter one of the following:
- **TRC:UTIL:PID=a-b-c;**
 - If via a poke CMD, enter **CMD 440,a,b,c**.
- Where: a = Process number of PID to trace
b = SM/SM-2000 number of PID to trace
c = Uniqueness number of PID to trace.
- Response: If **PF** followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.
25. At the MCC video terminal, to trace a call using **OIUUDP X**, enter one of the following:
- **TRC:UTIL:OIUUDP=a-b-c-d-e-f;**
 - If via poke CMD, enter **CMD 455,a,b,c,d,e,f**.

Where: a = SM-2000 number
b = Optical Interface Unit (OIU) number
c = Protection group (PG) number
d = Optical Carrier - level 3 Concatenated (OC3c) number
e = Synchronous Transport Signal - level 3 Concatenated (STS3C) number
f = User Datagram Protocol (source or destination).

Response: If PF followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

26. At the MCC video terminal, to trace a call using LTAG X, enter one of the following:

Note: The LTAG in MCC trace pokes, or the TRC:UTIL input messages does not correspond to traditional physical hardware as other trace commands. The LTAG value can be derived by several methods. For example, it can be determined through means of ROP output, a circuit-based call trace that connects to a SIPT packet group, or by using an ethernet packet monitor.

- TRC:UTIL:LTAG=a-b-c-d-e;
- If via poke CMD, enter CMD 465,a,b,c,d,e.

Where: a = Session Initiation Protocol (SIP) Global SM Index (GSMI)
b = Session Initiation Protocol (SIP) Processor Group (PROCGRP)
c = Switching Module (SM) number
d = Session Initiation Protocol (SIP) Map Tag Index (MAPIDX)
e = Session Initiation Protocol (SIP) Terminal Process Number (PROCNO).

Response: If PF followed by an event tag is printed, go to Step 27; otherwise, go to Step 28.

27. Identify the system response printed on the ROP. To analyze hardware summary output messages, refer to Procedure 13.4. To analyze software data output messages, refer to Procedure 13.5. If data dumps are desired, refer to Procedure 13.3, Obtain Most Recent Software Call Trace Data. Go to Step 28.
28. The trace request was not accepted. This is most likely because of an error in the request. Refer to the TRC:UTIL input manual page in the 235-600-700, *Input Messages*, and check the syntax of the request; then repeat the procedure.
29. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.3 OBTAIN MOST RECENT SOFTWARE CALL TRACE DATA

OVERVIEW

This procedure is used to obtain the most recent software call trace data. After a Utility Call Trace has been run, the **OP:TRC** input message is used to request a printout of the most recent software trace data. The resulting output messages contain hexadecimal dumps of data representing the traced call.

Note: The Utility Call Trace must be completed *before* requesting software call trace data.

PROCEDURE

1. At the master control center (MCC) video terminal, to dump trace data, enter one of the following:

- **OP:TRC: [,PID=a-b-c][,STRUCTS=d];**
- If via a poke command (CMD), enter **CMD 450 [,PID=a-b-c][,STRUCTS=d].**

Where: a = Process number of the process identification (PID)
 b = Switching Module/Switching Module-2000 (SM/SM-2000) number of the PID
 c = Uniqueness number of the PID
 d = Data structures to be printed.

Note: Refer to the **OP:TRC** input manual page in the 235-600-700, *Input Messages*, for a complete list of the data structures that can be requested.

2. At the MCC video terminal, what is the response in the output message? Refer to the following:

- If printout follows (**PF**), the requested trace data is printed out as a series of **OP:TRC** output messages. All output messages have the same given event tag. The data printed reflects the most recent trace data collected. If a visual display is needed, go to Step 3.
- If no good process identification (**NG PID**), there is no data for the given PID. Other responses could be no data collected or internal error. Refer to **OP:TRC** input manual page in 235-600-700, *Input Messages*. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Note: When call processing involves complex use of circuits, lines, and/or trunks throughout the 5ESS[®] switch, MCC Display Pages 131-140, 150, and 151 are available for display. This availability is indicated on Display Page 131.

3. To select the appropriate MCC video terminal display page, enter the following:
CMD 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 150, and 151

4. Analyze each parameter indicated in the output message to identify equipment associated with the corresponding call trace output message. Refer to Procedure 13.5, *Analyze Software Data Output Messages*, for analyzing data dumps.

5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.4 ANALYZE HARDWARE SUMMARY OUTPUT MESSAGES

OVERVIEW

This procedure describes the different hardware summary output messages associated with Utility Call Trace. Typical summary output messages are presented for Utility Call Trace procedures because software release dependencies may exist for unique office applications. Refer to 235-600-750, *Output Messages*, for specific message parameter meanings. Refer to office records for specific equipment allocations or use.

PROCEDURE

1. The following hardware summary output messages are associated with Utility Call Trace:
 - (a) **TRC:UTIL-4WLN** – Describes a 4-wire line (4WLN) connection
 - (b) **TRC:UTIL-CONF** – Describes a connection to a conference circuit
 - (c) **TRC:UTIL-FAILED** – Used to report a failure or error that occurred during Utility Call Trace
 - (d) **TRC:UTIL-HSM** – Describes the host switching module (HSM) portion for a Utility Call Trace of a call involving both an HSM and a remote switching module (RSM)
 - (e) **TRC:UTIL-IDLE** – Reports the status of an idle port, time slot, process, or circuit
 - (f) **TRC:UTIL-LINE** – Describes a line connection from the directory number (DN) or multiline hunt group (MLHG) and member through the line unit
 - (g) **TRC:UTIL-LINK** – Describes an application processor (AP) data link (DL)
 - (h) **TRC:UTIL-MBTP** – Describes a monitoring bridge terminal process connection
 - (i) **TRC:UTIL-TRK** – Describes a trunk (TRK), intermodule trunk (IMT), recorded announcement facility (RAF), or service announcement system (SAS) connection.
2. For the appropriate hardware message listed, analyze the equipment usage by referring to 235-600-750, *Output Messages*.
3. To select the appropriate master control center (MCC) video terminal display page, enter the following command (CMD): **CMD 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 150, and 151.**
4. Observe the appropriate display page for the desired circuit or unit operational status.
5. Formulate an equipment list from the output message parameters to investigate any trouble conditions indicated or suspected equipment failures.
6. Use the output messages and indicators identified in the following to isolate the source of trouble:
 - (a) MCC video terminal page display
 - (b) Diagnostic test output messages having suspected faulty equipment list responses

- (c) Interrupt failure output messages
 - (d) Indicators on control and display circuit packs
 - (e) Any **REPT** output message(s) for the appropriate circuit or unit.
7. At the MCC video terminal (for the applicable unit or circuit), enter the appropriate input message or poke command to remove from, diagnose, or restore to service when isolating the source of trouble.
 8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.5 ANALYZE SOFTWARE DATA OUTPUT MESSAGES

OVERVIEW

This procedure describes the different software data output messages associated with Utility Call Trace. Typical output messages are presented for Utility Call Trace procedures to accommodate the different software release dependencies used in the various office applications. Refer to 235-600-750, *Output Messages*, for specific message parameter meanings. Refer to *Dynamic Data Manuals* to decode hexadecimal data dumps.

PROCEDURE

1. To analyze the output message, refer to **OP:TRC-EVENT** in the 235-600-750, *Output Messages*.
 - (a) **OP:TRC-ACCS** – Dumps the automated calling card service data block (ACCSDB) and the calling card query data block (QRYDB) for OSPS
 - (b) **OP:TRC-ALCB** – Dumps the access line control block (ALCB) for a packet call
 - (c) **OP:TRC-APB** – Dumps the associated process block (APB) for OSPS
 - (d) **OP:TRC-B-CHAN** – Dumps the B-channel data for a packet call
 - (e) **OP:TRC-BST** – Dumps the directory assistance (DA) operator position data block (POSDB) and the supplementary protocol block (SPB) for OSPS
 - (f) **OP:TRC-CHAN** – Dumps the data describing the peripheral time slot (channel) and related data structures linking it to a process
 - (g) **OP:TRC-CKT** – Dumps the data blocks describing circuits allocated to the traced call connection
 - (h) **OP:TRC-CLDB** – Dumps the call leg data block (CLDB)
 - (i) **OP:TRC-COIN** – Dumps the toll and assistance (T/A) automated coin data block (COINOT) for OSPS
 - (j) **OP:TRC-CR** – Dumps the call record (CR) that is associated with the printing of the originating end of each call
 - (k) **OP:TRC-D-CHAN** – Dumps the D-channel data for an ISDN call
 - (l) **OP:TRC-DISP** – Dumps the data blocks associated with the ISDN terminal display feature
 - (m) **OP:TRC-EIS** – Dumps the external information system data blocks for OSPS.
 - (n) **OP:TRC-HLSC** - Dumps the high-level service circuit (HLSC) that is collected for line connections only
 - (o) **OP:TRC-ISDN** – Dumps the data blocks associated with an ISDN call
 - (p) **OP:TRC-ISDN2** – Dumps additional data blocks associated with an ISDN call
 - (q) **OP:TRC-LCN** – Dumps the logical channel control block (LCCB) associated with a specified logical channel number (LCN) for a packet call

- (r) **OP:TRC-LOOP** – Dumps the DA operator position call loop data block (LOOPDB) for OSPS
 - (s) **OP:TRC-MDB** – Dumps the model data block (MDB)
 - (t) **OP:TRC-NTWK** – Dumps the data structures that describe the network path
 - (u) **OP:TRC-PKL2DATA** – Dumps the packet level 2 data structures for a packet call
 - (v) **OP:TRC-PROC** – Dumps the data describing a process and port, and is normally used for internal debugging
 - (w) **OP:TRC-SHDN** – Describes the data blocks that are associated with a shared directory number (SHDN) or multiline hunt group (MLHG) member number call
 - (x) **OP:TRC-SRVOT** – Dumps the call and service-related data for an OSPS Listing Service call.
 - (y) **OP:TRC-SUM** – Dumps the summary information for a packet call
 - (z) **OP:TRC-T-CHAN** – Dumps the data describing the X.75 or X.75' trunk channel (T-CHAN) switching module/switching module-2000 (SM/SM-2000)
 - (aa) **OP:TRC-TALOOOP** – Dumps the T/A operator position call loop data blocks (TALOOOPDB), up to 3 loops, for OSPS
 - (ab) **OP:TRC-TEILA** – Dumps the terminal endpoint identifier linkage area(s) (TEILA) for an ISDN call
 - (ac) **OP:TRC-OPT** – Dumps the T/A operator position data block (TAPOSDB), the QRYDB, and the SPB for OSPS.
2. To decode the hexadecimal data dumps included in the software data messages, refer to the desired relation in the appropriate *Dynamic Data Manual*. Use the relation layouts to find and analyze the desired field in the hexadecimal data dump.
 3. If necessary, ***seek technical assistance***.
 4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.6 PERFORM IN-PROGRESS CALL TRACE

OVERVIEW

This procedure is used to perform an In-Progress Call Trace, which can be initiated with the directory number (DN), the multiline hunt group (MLHG), or the trunk group and member (TKGMN) of the line to be traced.

For information on specific input/output messages, refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

PROCEDURE

1. At the master control center (MCC), enter the following:

```
TRC:IPCT:{DN=a|MLHG=b-c|TKGMN=d-e|PID=f-g-h}[HARDHOLD][END=i];
```

Where:

- a = DN of the line to be traced
- b = Group number of the MLHG of the line to be traced
- c = Member number of the MLHG of the line to be traced
- d = Trunk group number of the trunk to be traced
- e = Member number of the trunk to be traced
- f = Process number of PID to be traced
- g = SM/SM-2000 number of PID to be traced
- h = Uniqueness number of PID to be traced
- i = End trace flag.

2. Depending on the acknowledgment, do one of the following:
 - If not accessible (NA) or repeat later (RL), repeat Step 1.
 - If printout follows (PF), continue with Step 3.
 - If any other acknowledgment, ***seek technical assistance***.
3. Receive and interpret the resulting TRC IPCT output message.
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

13.7 PERFORM NUISANCE (TERMINATING, TANDEM/INTEROFFICE) CALL TRACE OVERVIEW

This procedure is used to do the following:

- Perform Terminating Call Trace
- Perform Tandem/Interoffice Call Trace.

Terminating Call Trace causes the receive-only printer (ROP) to print out a message indicating the date, time, and calling party for a specific directory number (DN) or multiline hunt group (MLHG) member. However, unless the office is equipped with a primary rate interface (PRI) or a common channel signaling 7 (CCS7) trunk, the calling party is shown as a trunk on non-intra-office calls. Offices equipped with a PRI or CCS7 trunk show the calling party's DN.

Tandem/Interoffice Call Trace identifies nuisance calls from other offices by creating a calling line identification (CLID) list that compares the routing DN with DNs on the CLID. If a match occurs, it is printed on the ROP.

Private Branch Exchange Direct Inward Dialing (PBX DID) lines with hundreds group routing can be traced using Interoffice Call Trace or by the special Terminating Call Trace procedure described as follows.

For information on specific input/output messages, refer to 235-600-700, *Input Messages*, and 235-600-750, *Output Messages*.

Note: Overuse of this feature may cause loss of ROP messages by overloading message queues. Exercise discretion when assigning this feature.

PROCEDURE

1. Select and perform one of the following:
 - **Terminating Call Trace:** Continue with the next step.
 - **Tandem/Interoffice Call Trace:** Go to Step 11.
2. To enable or disable Terminating Call Trace at the master control center (MCC), enter recent change/verify (RC/V) by entering the following:
RCV:MENU,APPRC;
3. Select and perform one of the following:
 - **Terminating Call Trace on a PBX DID Line with Hundreds Group Routing:** Go to Step 7.
 - **Terminating Call Trace on Other Lines:** Continue with the next step.
4. To enable Terminating Call Trace, select and perform the appropriate options:
 - For an analog DN, enter view 1.6 and set **TRC** to "Y."
 - For a digital DN, enter RC/V view 23.2 and set **TRC** to "Y."
 - For a specific MLHG member, enter RC/V view 3.2 and set **TRC** to "Y."
 - For a specific MLHG, enter RC/V view 3.5 and set **GROUP TRC** to "Y."
5. To disable the Terminating Call Trace, repeat the previous step and reset the call trace flag to "N."

6. **STOP. YOU HAVE COMPLETED THE TERMINATING CALL TRACE ON A LINE.**
7. To enable Terminating Call Trace on a PBX DID line with hundreds group routing, perform the following:
 - (a) Update RC/V view 4.14 to assign a circuit routing module to the hundreds group. Do this by updating RC/V view 4.14 to **RMTYPE=C** , then specify a switching module/switching module-2000 (SM/SM-2000) number.
 - (b) A line class code (LCC) with **TERM TREATMENT=RI** is needed. If one does not exist, insert one in RC/V view 4.1.
 - (c) Insert RC/V view 1.5 for line to be traced. Apply LCC defined in Substep (b). Use routing index (RTI) from RC/V view 4.14 and set **TRC=Y**. This assigns the one DN to its own RTI, while the rest of the hundreds group continues to be routed by the hundreds route index (HRI).
8. To remove Nuisance Call Trace set **TRC=N** in RC/V view 1.5.
9. To return the individual line to hundreds group routing, delete RC/V view 1.5 for the individual line.
10. **STOP. YOU HAVE COMPLETED THE TERMINATING CALL TRACE ON A PBX DID LINE.**
11. To enable Tandem/Interoffice Call Trace, enter the following at the MCC:
TRC:CLID,ADD,DN=a;
Where: a = DN of the line to be added to the CLID.
Note: This is the DN used by routing. It is not necessarily the dialed DN.
12. Verify that the DN just entered is in the CLID listing. Display the CLID by entering the following:
OP:CLID;
13. To disable Tandem/Interoffice Call Trace, remove the DN from the CLID by entering the following:
TRC:CLID,DEL,DN=a;
Where: a = DN of the line to be deleted from the CLID.
14. To verify that the DN just removed is no longer on the CLID list, repeat Step 12.
15. **STOP. YOU HAVE COMPLETED THE TANDEM/INTEROFFICE CALL TRACE.**

Corrective Maintenance Procedures

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14. POWER DISTRIBUTION AND FUSE ALARM MAINTENANCE

PURPOSE

The procedures in this section are used to perform maintenance on the following:

- Power Control Fuse Distribution (PCFD)
- Global Power Distribution Frame (GPDF)
- Local Power Distribution Cabinet (LPDC)
- High Current LPDC (LPDC HC)
- AM, CM, SM, and MISC cabinet power and fuses.

14.1 RESOLVE POWER PROBLEM AT PCFD, GPDF, LPDC, LPDC HC, OR POWER PLANT

OVERVIEW

This procedure should only be needed when a fuse blows at the Power Control Fuse Distribution (PCFD), Global Power Distribution Frame (GPDF), Local Power Distribution Cabinet (LPDC), or High Current LPDC (LPDC HC), or when there is an interruption in one or more of the primary -48 V DC power plant buses to the power distribution frame. These should be rare events since local power converters and fusing at the individual units should isolate most power problems to a single unit.

This procedure is used in the application and verification of -48 V DC power from the -48 V DC power plant to the PCFD, GPDF, LPDC, or LPDC HC that is used with the 5ESS[®] switch equipment.

Warning: *When a GPDF, LPDC, or LPDC HC load fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing GPDF, LPDC, or LPDC HC fuses, follow all safety precautions.*

- *Wear safety glasses.*
- *Make sure all personnel are clear of the front and back of the unit.*
- *Use a fuse holder.*
- *Do not stand directly in front of the fuse block when inserting a fuse.*
- *Quickly insert the fuse into the base to reduce arcing.*

Caution 1: *Perform the following procedures to avoid blowing a good fuse due to heavy in-rush current when replacing a blown fuse at the PCFD, or restoring a -48 V circuit breaker at the power plant, and to prevent damage to certain Line Unit (LU) packs. Otherwise, the special capacitive load charging procedures will fail.*

Caution 2: *If an Integrated Services Line Unit (ISLU) is powered by the primary bus, perform the following procedures before restoring -48 V DC power at the power plant or replacing a blown fuse at the PCFD. Otherwise, the special capacitive load charging procedures will fail.*

PROCEDURE

1. At the power distribution frame, determine the severity of the power outage, and use the appropriate procedure(s) as indicated in the following steps.
2. If one or more of the eight primary power buses (designated as A1, B1, A2, B2, A3, B3, A4, B4) are non-operational [for example, all filter fuse light-emitting diodes (LED) are ON], use Procedure 14.2, Restore Primary Power Bus(es) at Power Control Fuse Distribution, Global Power Distribution Frame, Local Power Distribution Cabinet, or High Current Local Power Distribution Cabinet to restore each bus that is down.

Note: If several power buses are down, restore power to the Administrative Module (AM) *first* and make sure Control Unit (CU) recovery is started, then restore power to the Communications Module (CM) and make sure at least one side of the Office Network and Timing Complex (ONTC) is restored to service, and then, restore the SM/SM-2000s.

3. If only one filter fuse is blown, use Procedure [14.3](#), Replace Blown Filter Fuse at Power Control Fuse Distribution, Global Power Distribution Frame, Local Power Distribution Cabinet, or High Current Local Power Distribution Cabinet to replace the filter fuse.
4. If only one load bus is down (for example, the load fuse is blown), use Procedure [14.4](#), Replace Load and Indicator Fuses at Power Control Fuse Distribution or Global Power Distribution Frame for restoral.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.2 RESTORE PRIMARY POWER BUS(ES) AT PCFD, GPDF, LPDC, OR LPDC HC OVERVIEW

This procedure is used when one or more of the primary power buses (A1, B1, A2, B2, A3, B3, A4, or B4) from the -48 V DC power plant to the Power Control Fuse Distribution (PCFD), Global Power Distribution Frame (GPDF), Local Power Distribution Cabinet (LPDC), or High Current Local Power Distribution Cabinet (LPDC HC) must be restored. Simply closing an open circuit breaker or replacing a blown fuse is not appropriate.

Warning: *When a GPDF, LPDC, or LPDC HC load fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing GPDF, LPDC, or LPDC HC fuses, follow all safety precautions.*

- ***Wear safety glasses.***
- ***Make sure all personnel are clear of the front and back of the unit.***
- ***Use a fuse holder.***
- ***Do not stand directly in front of the fuse block when inserting a fuse.***
- ***Quickly insert the fuse into the base to reduce arcing.***

Caution 1: *This procedure must be carefully followed to prevent the blowing of a good fuse due to heavy in-rush current when replacing a blown fuse at the PCFD or restoring a -48 V DC to filter circuits and to avoid potential damage to certain circuits in the system. Otherwise, the special capacitive load charging procedures will fail.*

Caution 2: *This procedure must be followed to restore the -48 V DC power at the power plant if an Integrated Services Line Unit (ISLU) is powered by the primary bus. Otherwise, the special capacitive load charging procedures will fail.*

Note 1: For the PCFD only, this procedure is written assuming that the charge circuit (CHG CKT) is operational and no fault occurs during execution of the procedure. (The GPDF, LPDC, and LPDC HC are not equipped with a charge circuit.) For detailed information for performing a routine maintenance check on the charge circuit assembly, refer to 235-105-210, *Routine Operations and Maintenance Procedures*.

Note 2: If all or several primary power buses are down, this procedure should be repeated for each bus that is down as follows:

- a. Restore power to the Administrative Module (AM) first and make sure that Control Unit (CU) recovery is started.
- b. Restore power to the Communications Module (CM) and make sure at least one side of the Office Network and Timing Complex (ONTC) is restored to service.
- c. Restore the Switching Modules/Switching Module-2000s (SM/SM-2000s).

Automatic system recovery action should normally recover basic AM, CM, and SM/SM-2000 services on power restoral. 235-105-250, *System Recovery Manual*, provides procedures to check system recovery progress and, if necessary, initiate manual action.

PROCEDURE

1. **Caution: Always unseat the TN831(B) [or TN331(B)] packs before unseating the associated TN832(B) [or TN332(B)] packs; and in Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) packs.**

Determine if any Line Units (LU) that are not equipped for Line Unit Auto Power Recovery (LUAPR) are powered by any primary power bus to be restored. If so, observe the previous **Caution** and unseat the TN831(B) [or TN331(B)] packs, the TN832(B) [or TN332(B)] packs, and all TN838, TN1048 or TN1058(B) grid packs in each LU. The TN1058C grid packs and/or the TN831C and TN832C access packs do not require unseating for this procedure. This action prevents any possible damage to the LU packs when power is restored.

2. Determine if any ISLUs are powered by any primary buses to be restored. If so, determine what type of charge panel the PCFD or GPDF is equipped with.

If equipped with an ED-83024-30, G5 or G6 (15 amp), go to Step 3.

If equipped with an ED-83024-30 G1 (2-amp) charge panel, perform the following:

- (a) Locate the cabinet of the ISLU.
 - (b) Open the ISLU fuse panel cover over the unit and remove the fuses in the fuse panel associated with each affected primary power bus.
3. If any Moving Head Disks (MHD) in the AM are powered by the primary power bus to be restored, release the "START" switch and turn off (open) the "MAIN" circuit breaker switch on each affected MHD's power supply (beside the disk drive). This action prevents any possible damage to the disk packs when power is restored.
 4. **Caution: Even though the GPDF, LPDC, and LPDC HC are compatible with Automatic Power Recovery (APR), the GPDF, LPDC, and LPDC HC fuses should be unseated when restoring power to a GPDF, LPDC, or LPDC HC power bus. Otherwise, battery plant damage may occur. If a GPDF, LPDC, or LPDC HC fuse powers a unit/circuit that is not APR-compliant, the non-APR compliant units/circuits must be conditioned for in-rush current before power is restored.**

If the affected bus provides -48V power to a CNI Ring Node (RN) cabinet or to an LU that is not equipped with all TN1058C grids, then perform the appropriate practice. Prepare the RN circuits for the return of -48V power by unseating the affected RN circuit packs and power packs. Prepare the non-APR compatible LUs for the return of -48V power by unseating the TN831 and TN9332 GDXACC packs and all grids in the affected LU.

Perform *one* of the following:

- At the PCFD load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove (first) the 24 indicator fuses (designated as FA1-FA24), the 24 load fuses (designated as F1-F24), and the associated 3 filter fuses (no designation).

- At the GPDF load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove the 24 load fuses the 24 load fuses and the associated 2 filter capacitor fuses.
 - At the LPDC load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove (first) the 24 indicator fuses (designated as 1-24), then the 24 load fuses, and the associated 2 filter capacitor fuses.
 - At the LPDC HC load panel, for each primary power bus (designated as A1, B1, A2, B2, A3, B3, A4, or B4) to be restored, remove (first) the 4 indicator fuses (designated as 1-4), then the 4 load fuses, and the associated 2 filter capacitor fuses.
 - Determine which GPDF, LPDC, or LPDC HC power bus(es) is without -48 V power and associate the affected bus(es) with its power plant circuit. If the affected bus provides -48 V power to a CNI Ring Node (RN) cabinet or to an LU that is not equipped with all TN1058C grids, then perform the appropriate practice. Prepare the RN circuits for the return of -48V power by unseating the affected RN circuit packs and power unit packs. Prepare the non-APR-compatible LUs for the return of -48 volt power by unseating the TN831 and TN832 gdxacc packs and all grids in the affected LU.
5. At the -48 V power plant circuit breaker panel, position the appropriate circuit breaker to the "ON" position for each primary power bus to be restored. Then continue with the next step for PCFD or Step 10 for GPDF, LPDC, or LPDC HC.
 6. At the PCFD (on the control panel), pull outward on the CHG PROBE and insert the probe into the first open filter fuse position (filter fuse was removed in Step 4). Push the "CAP CHG TEST" switch and verify that the CAP CHG light-emitting diode (LED) comes on (RED) and goes off. Remove the CHG PROBE and quickly (in six seconds) insert the filter fuse.
 7. For the other filter fuse positions (removed in Step 4), repeat the previous step for all primary power buses being restored.
 8. At the PCFD, charge up the first load distribution bus for the first primary power bus to be restored as follows:
 - (a) Insert the CHG PROBE into the first open indicator fuse position (FA1) for the first load fuse (F1) and rotate it clockwise to lock it in position.
 - (b) With one hand, press and hold the "CAP CHG TEST" switch, watch the CAP CHG LED come on (RED) and go off; and with the other hand, insert the load fuse (F1).
 - (c) Release the "CAP CHG TEST" switch, remove the CHG PROBE, and insert the appropriate indicator fuse (FA1).
 9. For each primary bus being restored, repeat the previous step for the remaining load distribution buses.
 10. Perform the applicable substeps:
 - (a) At the GPDF panel, insert all GPDF load fuses removed in Step 4.
 - (b) At the LPDC or LPDC HC panel, insert all LPDC or LPDC HC load fuses removed in Step 4. Next insert all LPDC or LPDC HC indicator fuses.

- (c) Reinstall any ISLU fuses that were removed in Step 2 and return equipment to its normal state.
11. Restore power to any MHD that was turned off (in Step 3) by performing the following:
 - (a) On the MHD's power supply (beside the disk drive), close (turn-on) the "MAIN" circuit breaker.
 - (b) On the MHD's power control/display panel (below the disk drive), press the "ON" switch and verify that the OFF LED goes off.
 - (c) On the MHD's power control/display panel (below the disk drive), press the "START" switch and verify that the START LED is flashing (green). Wait until this LED stops flashing before continuing.
 - (d) On the MHD's power control/display panel (below the disk drive), move the "ROS/RST" switch to the RST position.
 12. Restore power to all units [push the "ON" switch on unit power control pack or push the "ST" (start) switch on the service group power converters]. Model 2 or 3 LUs equipped for LUAPR do not require manual power converter operation.
 13. **Caution: Always reseal the TN832(B) [or TN332(B)] before reseating the associated TN831(B) (or TN331(B)); and in Model 1 LU grids, always reseal the TN340(B) pack before reseating either TN338(B) pack.**
If any LU packs were unsealed in Step 1, observe the **Caution** and reseal them.
 14. Unconditionally restore all units to service using the appropriate **RESTORE** commands on the Master Control Center (MCC) display pages or via the appropriate **RST** input messages.
 15. At the PCFD, verify that all the applicable indicator fuses are installed.
 16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.3 REPLACE BLOWN FILTER FUSE AT PCFD, GPDF, LPDC, OR LPDC HC

OVERVIEW

This procedure is used when one of the filter fuses for a primary power bus (A1, B1, A2, B2, A3, B3, A4, or B4) at the Power Control Fuse Distribution (PCFD), Global Power Distribution Frame (GPDF), Local Power Distribution Cabinet (LPDC), or High Current Local Power Distribution Cabinet (LPDC HC) has blown, but power to the units has not been interrupted on the associated 24 load-distribution buses. Simply replacing the blown fuse with a good fuse is not sufficient for the PCFD, however, it could be all that is needed for the GPDF, LPDC, or LPDC HC. Capacitor charging is required to prevent blowing a good fuse with heavy in-rush current on the PCFD.

PROCEDURE

1. This procedure is divided into the following sections:
 - (a) Procedure [14.3.1](#) – Replace Blown Filter Fuse at PCFD.
 - (b) Procedure [14.3.2](#) – Replace Blown Filter Fuse at GPDF.
 - (c) Procedure [14.3.4](#) – Replace Blown Filter Fuse, Alarm Board Power Fuse, or Charging Resistor Fuse at LPDC or LPDC HC.

14.3.1 REPLACE BLOWN FILTER FUSE AT PCFD

PROCEDURE

1. At the PCFD (on the control panel), locate the cabinet alarm light, the visual panel alarm light, and the fuse indicating light.
2. Determine what is powered by the blown fuse using the Fuse Assignment Table. Using the MCC, determine if the unit has power.

If **YES**, replace indicator fuse only. This should remove the visual alarm and the indicator fuse remains normal. If unsuccessful, **seek technical assistance**.

If **NO**, remove the indicator fuse first, then remove the blown fuse.

3. Obtain a replacement 20-amp (KS-19780, L6) filter fuse and place it into the fuse cap.
4. At the PCFD (on the control panel), perform the following:
 - (a) Pull outward on the CHG PROBE and insert, turn, and lock the probe into the open filter fuse position.

Note: The replacement filter fuse must be inserted into position in six seconds or the capacitor charge will be depleted. If this occurs, then the "CAP CHG TEST" must be performed again.

- (b) Push and hold the "CAP CHG TEST" switch and watch the CAP CHG light-emitting diode (LED) light (RED) and go OFF.

Note: If the filter capacitor does not charge up in 30 seconds, the yellow LOAD FAULT LED lights, indicating that the charger is shut off (and remains off for the next 30 seconds). If this happens (and the procedure for capacitor charging was followed correctly), then there is some trouble (perhaps a short-circuited filter capacitor) causing excessive current load on that fuse that must be cleared. If unable to resolve, **seek technical assistance**.

- (c) Remove the CHG PROBE and quickly (in six seconds) insert the replacement 20-amp filter fuse. Replace CHG PROBE into proper position and replace the indicator fuse.
5. Observe that the visual panel alarm indicator is OFF and indicator fuse remains normal.

If **YES**, you have successfully replaced a blown filter fuse.

If **NO**, repeat replacement procedure, Step 2. If unsuccessful, **seek technical assistance**.

6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.3.2 REPLACE BLOWN FILTER FUSE AT GPDF

OVERVIEW

Warning: *When a GPDF fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing GPDF fuses, follow all safety precautions.*

- ***Wear safety glasses.***
- ***Make sure all personnel are clear of the front and back of the unit.***
- ***Use a fuse holder.***
- ***Do not stand directly in front of the fuse block when inserting a fuse.***
- ***Quickly insert the fuse into the base to reduce arcing.***

Note: If one or more filter fuse alarm LEDs are active (FF1-FF4) on a GPDF power bus, the mostly likely cause is a tripped/opened power plant circuit. See Procedure [14.2](#).

PROCEDURE

1. ***Caution: Removing a fuse holder while the corresponding equipment is still in service has caused service disruptions and can lead to an outage.***

There have been occasions where the GPDF fuse holder or alarm card fails and causes a false alarm. An internal fault within a GPDF load fuse holder causes its LED and a major alarm LED on the GPDF Alarm Panel to light falsely even though the load fuse has not blown. A defective filter capacitor fuse holder also lights its LED, but causes a minor alarm. In both cases, power to the functional units still exists. For this reason, if you see a blown GPDF load fuse indication on the ROP, such as:

```
S570-149291158 03-08-20 12:09:54 509635 BPSC WXYZCA11DS0  
** REPT ALM BPSC 34 FS PDF0
```

with the GPDF LEDs lit, use the ROP or MCC to check the status of the downstream unit.

Note: If necessary, use the fuse assignment chart in the GPDF to determine the downstream equipment.

2. Do one of the following:
 - If the downstream unit is out-of-service and fails power diagnostic phases, then the fuse is probably blown. Continue with Step [3](#).
 - If the unit is in-service, then there is probably a false GPDF alarm. Refer to Procedure [14.3.3](#).
3. Unseat the GPDF fuse holder that has the active LED. With the fuse still in the holder, observe the north-to-south relationship the fuse has with the holder.
4. Remove and replace the fuse with a good 25-amp fuse making sure the fuse is inserted the same way that was observed in Step [3](#).
5. Reinsert the fuse holder.

If the LED remains lighted, observe the Caution below.

Caution: If the LED does not go OFF, the fuse just inserted or fuse holder may be defective or there is a problem at the application hardware cabinet level. Replace the fuse. If the problem persists, replace the fuse holder with Procedure [14.3.3](#).

6. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

14.3.3 RESOLVE FALSE ALARM AT GPDF/LPDC

OVERVIEW

This procedure should only be used when a Global Power Distribution Frame (GPDF) or Local Power Distribution Cabinet (LPDC) is reporting a fuse alarm and yet power remains on for the functional units involved. This is an indication that the GPDF/LPDC fuse holder or alarm card is faulty.

PROCEDURE

1. At the GPDF/LPDC, pull the alarm cable off of the alarm card at the top of the bay.
 - If the LED turns off, then the problem is a fuse/fuse holder in the panel indicated. Go to Step 4.
 - If the LED remains on, then the problem is a faulty alarm card. Continue with Step 2.
2. Taking ESD precautions, replace the alarm card. Then reattach the alarm cable. The LED's should turn off.
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
- 4.

Note: If the panel with the false alarm is a Local Power Distribution Cabinet (LPDC), escalate to Technical Support and **STOP. YOU HAVE COMPLETED THIS PROCEDURE.** If the panel with the false alarm is a Global Power Distribution Frame (GPDF), go to step 5.

5. Test the GPDF fuse holder:
 - a. Insert a test probe with a non-conductive handle (see an example in Figure 14.3.3-1) into the small square hole in the middle of the GPDF fuse holder just under the LED. Do not insert the test probe in the elongated horizontal hole at the bottom of the fuse holder. This hole is used to see if there is a fuse inside the fuse holder.
 - b. If not already lit, verify that the fuse holder LED lights. On the GPDF alarm panel there should also be a lit major alarm LED (for Fxx load fuses) or lit minor alarm LED (for FFxx filter fuses).
 - c. Remove the test probe from the filter fuse.
 - d. If the fuse holder and alarm panel LEDs are no longer lit, the fuse is still good. No further action is necessary.
 - e. If the LEDs are still lit, then the fuse should be replaced during the maintenance window or during the customer's release time. The downstream equipment must be out-of-service and powered down before replacing a load fuse. The downstream equipment does **not** have to be out-of-service to replace a filter fuse. Continue with the next step.



Figure 14.3.3-1 — GPDF Test Probe

6. If these actions fail to clear the problem, then contact the next level of support for assistance.

Note: A GPDF can also develop an internal fault within a Fuse Socket Module or the Alarm Module. This can cause an Alarm Panel LED to light with no corresponding equipment power-loss and no fuse holder LED indication. Report this type of failure to the next level of technical support.

14.3.4 REPLACE BLOWN CAPACITOR FUSE, ALARM BOARD POWER FUSE, OR CHARGING RESISTOR FUSE AT LPDC OR LPDC HC

OVERVIEW

Warning: *When a LPDC or LPDC HC capacitor fuse is inserted, arcing may occur; creating sparks at the front and back of the fuse block. When replacing LPDC or LPDC HC fuses, follow all safety precautions.*

- ***Wear safety glasses.***
- ***Make sure all personnel are clear of the front and back of the unit.***
- ***Use a fuse holder.***
- ***Do not stand directly in front of the fuse block when inserting a fuse.***
- ***Quickly insert the fuse into the base to reduce the amount of arcing.***

PROCEDURE

1. Is the blown fuse a LPDC or LPDC HC capacitor fuse?

If Yes, continue with Step 2.

If No, go to Step 5.

2. Remove the LPDC or LPDC HC capacitor fuse and replace it with the same value.
3. Reinsert the fuse holder.

If the LED remains lighted, observe the Caution below.

Caution: If the LED does not go OFF, the fuse just inserted may be defective, or there is a problem at the application hardware cabinet level. Replace the fuse a second time. If the problem persists, refer to Procedure 14.6.

4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
5. Remove the LPDC or LPDC HC alarm board power fuse or charging resistor fuse.
6. Replace the defective fuse with a good GMT-3 type fuse.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.4 REPLACE BLOWN LOAD FUSES AT PCFD, GPDF, LPDC OR LPDC HC

Overview

This procedure is used to replace a blown Power Control Fuse Distribution (PCFD) load fuse, Global Power Distribution Frame (GPDF) load fuse, Local Power Distribution Cabinet (LPDC) load fuse, and High Current Local Power Distribution Cabinet (LPDC HC) load fuse that powers down-stream equipment in the applicable hardware cabinets. The PCFD, LPDC, and LPDC HC are equipped with load and pilot fuses where the GPDF is only equipped with a load fuses.

Warning: *When a GPDF, LPDC, or LPDC HC load fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing GPDF, LPDC, or LPDC HC fuses, follow all safety precautions.*

- *Wear safety glasses.*
- *Make sure all personnel are clear of the front and back of the unit.*
- *Use a fuse holder.*
- *Do not stand directly in front of the fuse block when inserting a fuse.*
- *Quickly insert the fuse into the base to reduce arcing.*

Caution 1: *Perform this procedure to prevent the blowing of a good fuse due to heavy in-rush current when applying -48 V DC power to load distribution buses and to avoid potential damage to certain circuits in the system. Otherwise, the special capacitive load charging procedures will fail.*

Caution 2: *Perform this procedure before replacing a blown fuse at the PDF if an Integrated Services Line Unit (ISLU) is powered by the primary bus. Otherwise, the special capacitive load charging procedures will fail.*

Note: For the PCFD, this procedure is written assuming that the charge circuit (CHG CKT) is operational and that no fault occurs during execution of the procedure. (The GPDF, LPDC, and LPDC HC are not equipped with a charge circuit.) For detailed information applicable to a routine maintenance check of the charge circuit assembly, refer to 235-105-210, *Routine Operations and Maintenance*.

PROCEDURE

1. This procedure is divided into the following sections to properly explain the differences between the PCFD, GPDF, LPDC and LPDC HC:
 - (a) Procedure [14.4.1](#) – Replace Blown Load and Indicator Fuses at PCFD
 - (b) Procedure [14.4.2](#) – Replace Blown Load Fuses at GPDF
 - (c) Procedure [14.4.3](#) – Replace Blown Load Fuses at LPDC or LPDC HC.

14.4.1 REPLACE BLOWN LOAD AND INDICATOR FUSES AT PCFD

PROCEDURE

1. **Caution:** Always unseat the TN831(B) [or TN331(B)] pack before unseating the associated TN832(B) [or TN332(B)] pack; and in Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) pack.

Determine if any Line Units (LU) that are not equipped for Line Unit Auto Power Recovery (LUAPR) are powered by any primary power bus to be restored. If so, observe the **Caution** and unseat the TN831(B) [or TN331(B)] packs, The TN832(B) [or TN332(B)] packs, and all TN838, TN1048 or TN1058(B) grid packs in each LU. The TN1058C grid packs and/or the TN831C and TN832C access packs do not require unseating for this procedure.

2. Determine if any ISLUs are powered by the load fuse to be replaced. If so, determine what type of charge panel the PCFD is equipped with.

If equipped with an ED-83024-30, G5 or G6 (15-amp) charge panel, go to Step 3.

If equipped with an ED-83024-30 G1 (2-amp) charge panel, continue with the following:

- (a) Locate the cabinet of the ISLU.
 - (b) Open the ISLU fuse panel cover over the unit and remove the fuses in the fuse panel associated with the PCFD load fuse.
3. If a Moving Head Disk (MHD) in the Administrative Module (AM) is powered by the load fuse to be replaced, release the "START" switch and turn off the "MAIN" circuit breaker switch on the affected MHD's power supply (beside the disk drive).
 4. Determine what is powered by the blown fuse using the Fuse Assignment Table. Using the MCC, does the unit have power?

If **YES**, replace indicator fuse only. This should remove the visual alarm and the indicator fuse will remain normal. If unsuccessful, **seek technical assistance**.

If **NO**, first remove the indicator fuse then the blown fuse.

5. At the PCFD (on the control panel), perform the following:

- (a) Pull outward on the CHG PROBE, insert it into the open indicator fuse position, and rotate it to lock it in.
- (b) With one hand, press and hold the "CAP CHG TEST" switch, watch the CAP CHG light-emitting diode (LED) light (RED) and go off; and with the other hand, insert the load fuse.

Note: If the load bus does not charge up in 30 seconds, the yellow LOAD FAULT LED lights, indicating that the charger is shut off (and remains off for the next 30 seconds). If this happens and the procedure for capacitive load charging was followed correctly, the trouble causing the excessive load on that load bus must be cleared before the load bus can be restored. If unable to resolve, **seek technical assistance**.

- (c) Release the "CAP CHG TEST" switch, remove the CHG PROBE, and insert the indicator fuse.

6. Reinstall any ISLU fuses that were removed in Step 2.
7. Restore power to any MHD that was turned off in Step 3 by performing the following:
 - (a) On the MHD's power supply (at side of disk drive), close (turn on) the "MAIN" circuit breaker (near top of faceplate).
 - (b) On the MHD's power control/display panel (below the disk drive), press the "ON" switch and verify that the OFF LED goes off.
 - (c) On the MHD's power control/display panel (below the disk drive), press the "START" switch and verify that the START LED (green) starts flashing. Wait until this LED stops flashing before continuing.
 - (d) To request diagnosis and restoral of the MHD to service (on the MHD's control/display panel), move the "ROS/RST" switch to the "RST" position.
8. Restore power at all units and service groups [push "ON" switch on unit power control packs or push "ST" (start) switch on service group power converters].
9. **Caution: Always reseal the TN832(B) [or TN332(B)] pack before re-seating the TN831(B) [or TN331(B)] pack; and in Model 1 LU grids, always reseal the TN340(B) pack before reseating either TN338(B) pack.**
If any LU packs were unsealed in Step 1, observe **Caution** and reseal them.
10. Unconditionally restore all units to service using the appropriate **RESTORE** commands on the Master Control Center (MCC) display pages or via the appropriate **RST** input messages.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.4.2 REPLACE BLOWN LOAD FUSES AT GPDF

OVERVIEW

This procedure is used to replace a blown GPDF load or filter fuse.

Warning: *When a GPDF load fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing GPDF fuses, follow all safety precautions.*

- *Wear safety glasses.*
- *Make sure all personnel are clear of the front and back of the unit.*
- *Use a fuse holder.*
- *Do not stand directly in front of the fuse block when inserting a fuse.*
- *Quickly insert the fuse into the base to reduce arcing.*

Note: If one or more filter fuse alarm LEDs are active (FF1-FF4) on a GPDF power bus, the probable cause is a tripped/opened power plant circuit.

Caution: *DO NOT replace a blown fuse that powers a unit until that unit has been conditioned for the return of power. For 3B21D units, this conditioning will be specific to the unit powered by the fuse being replaced.*

PROCEDURE

1. **Caution:** *Removing a fuse holder while the corresponding equipment is still in service has caused service disruptions and can lead to an outage.*

There have been occasions where the GPDF fuse holder or alarm card fails and causes a false alarm. An internal fault within a GPDF load fuse holder causes its LED and a major alarm LED on the GPDF Alarm Panel to light falsely even though the load fuse has not blown. A defective filter capacitor fuse holder also lights its LED, but causes a minor alarm. In both cases, power to the functional units still exists. For this reason, if you see a blown GPDF load fuse indication on the ROP, such as:

```
S570-149291158 03-08-20 12:09:54 509635 BPSC WXYZCA11DS0  
** REPT ALM BPSC 34 FS PDF0
```

with the GPDF LEDs lit, use the ROP or MCC to check the status of the downstream unit.

Note: If necessary, use the fuse assignment chart in the GPDF to determine the downstream equipment.

2. Do one of the following:
 - If the downstream unit is out-of-service and fails power diagnostic phases, then the fuse is probably blown. Continue with Step 3.
 - If the unit is in-service, then there is probably a false GPDF alarm. Refer to Procedure [14.3.3](#).
3. Unseat the GPDF fuse holder that has the active LED. With the fuse still in the holder, observe the north-to-south relationship the fuse has with the holder.
4. Remove and replace the fuse with a good 25-amp fuse making sure the fuse is inserted the same way that was observed in Step 3.

5. Reinsert the fuse holder.

If the LED remains lighted, observe the Caution below.

Caution: If the LED does not go OFF, the fuse just inserted or fuse holder may be defective or there is a problem at the application hardware cabinet level. Replace the fuse. If the problem persists, replace the fuse holder with Procedure 14.3.3.

6. Once -48 V power has been restored, the units without the APR backplane options must be powered up. Go to the affected units and perform the following:
 - Units with SN516 controllers, press the **ON** button.
 - Units with power converters, press the **ST** button.
7. Once the units have been powered up, return the affected units to the operational state.
8. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.4.3 REPLACE BLOWN LOAD AND INDICATOR FUSES AT LPDC OR LPDC HC OVERVIEW

Use this section to replace a blown LPDC or LPDC HC load and indicator fuse.

Warning: *When an LPDC or LPDC HC load fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing LPDC or LPDC HC fuses, follow all safety precautions.*

- **Wear safety glasses.**
- **Make sure all personnel are clear of the front and back of the unit.**
- **Use a fuse holder.**
- **Do not stand directly in front of the fuse block when inserting a fuse.**
- **Quickly insert the fuse into the base to reduce arcing.**

PROCEDURE

1. Unseat the LPDC or LPDC HC fuse holder indicated by the blown indicator fuse.
2. Unseat the blown LPDC or LPDC HC indicator fuse.
3. Remove the load fuse and replace it with the properly sized load fuse.
4. Insert the good load fuse and holder into the fuse block.
5. Insert a new indicator fuse into the fuse block.
6. Reinsert the fuse connector.

If the indicator fuse does **not** blow, continue with the next step.

If the indicator fuse blows, observe the Caution below.

Caution: *If the indicator fuse blows, the LPDC or LPDC HC load fuse just inserted may be defective, or there is a problem at the application hardware cabinet level. Replace the fuse a second time. If the problem persists, refer to Procedure [14.6](#).*

7. Once -48 V power has been restored, the units without the APR backplane options must be powered up. Go to the affected units and perform the following:
 - Units with SN516 controllers, press the **ON** button.
 - Units with power converters, press the **ST** button.
8. Once the units have been powered up, return the affected units to the operational state.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.5 REMOVE -48 V DC POWER AT PCFD, GPDF, LPDC, LPDC HC, OR POWER PLANT

OVERVIEW

This procedure is used when it is necessary to remove -48 V DC power from a power bus at the Power Control Fuse Distribution (PCFD), Global Power Distribution Frame (GPDF), Local Power Distribution Cabinet (LPDC), High Current Local Power Distribution Cabinet (LPDC HC), or at the power plant. This should rarely be required, but if needed, observe these **Cautions**.

Caution 1: *Removal of power to operating line/trunk units causes interruption of service to those lines/trunks. Removal of power from both sides of the duplicated control units causes a complete Local/Remote Switching Module or a total system outage.*

Caution 2: *Power can be removed from units/circuits without causing component damage, but damage may occur due to in-rush current. The appropriate power-up procedure, either Procedure 14.2, Restore Primary Power Bus(es) at PCFD, GPDF, LPDC, or LPDC HC or Procedure 14.4, Replace Load and Indicator Fuses at PCFD, GPDF, LPDC, or LPDC HC must be followed closely to avoid damage to certain circuits.*

Note: When only removing power from one power bus side (A1 but not B1), the units/circuits that are powered by bus to be shut down must be downgraded to the OOS state, then powered down. Failure to downgrade the unit/circuits to OOS may result in operational problems and processor initializations.

PROCEDURE

1. At the MCC/STLWS display terminal, downgrade the units/circuits on the power bus(es) to be shut down to the out-of-service (OOS) state.
2. **Caution:** *Always unseat the TN831(B) [or TN332(B)] pack before unseating the associated TN832(B) [or TN332(B)] pack; and in the Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) pack.*

For each Line Unit (LU) not equipped for Line Unit Auto Power Recovery (LUAPR) on the power bus to be shut down, observe **Caution** and unseat the TN831(B) [or TN331(B)] pack, the TN832(B) [or TN332(B)] and all TN838, TN1048, or TN1058(B) grid packs in each LU. The TN1058C grid packs and/or the TN831C and TN832C access packs do not require unseating for this procedure.

3. For each ISLU/RISLU, if the power bus to be shut down is in a GPDF cabinet, or if the PCFD cabinet is equipped with an ED82950-30 G2 (15-amp) charge circuit, then power down the ISLU/RISLU by unseating the ISLU power converter. If the PCFD is equipped with an ED82950-30 G1 (2-amp) charge circuit, then unseat the ISLU power converters and unseat the ISLU cabinet fuses.
4. If the PSU is equipped with non-B or non-C suffixed Protocol Handler circuit packs, unseat them [such as, TN1081 (MC5D115A1), TN1366 (MC5D100A1), or TN1367 (MC5D146A1)].
5. If the PCFD power bus to be shut down powers a CNI Ring Node (RN) cabinet, unseat all the packs and the power converter(s) that are powered by the bus to be shut down.

6. For each Moving Head Disk (MHD) on the power bus to be shut down, remove power from the MHDs by performing the following:
 - For the **SMD-340** MHDs:
 - Release the MHD **START** button.
 - Press the **OFF** switch on the MHD control/display panel.
 - Turn off the **MAIN** circuit breaker switch on the MHD power supply (beside the disk drive).
 - For the **SCSI-DUP** MHDs:
 - Press the **OFF** button on the SCSI-DUP.
7. For each 3B21D SCSI MHD and Digital Audio Tape (DAT) on the power bus to be shut down, press the **OFF** button on the SCSI MHD and DFC faceplate (MHD = UN375; DFC = UN373 or UN580; DAT = UN376).
8. For *each* PCFD, GPDF, LPDC, or LPDC HC power bus (A1, A2, A3, B1, B2, etc.) to be shut down, perform the following:

Caution: The units that are powered by the power bus to be shut down must be OOS. If they are not, hardware interrupts are reported.

- (a) If the panel powers a unit/circuit that is not APR-compliant (such as the CNI Ring Node cabinet or an LU that is not equipped with all TN1058C grids), unit circuit packs must be unseated before power is removed.
- (b) At the PCFD power bus(es) to be shut down, unseat the 24 indicator fuses (FA1-FA24) first, then the 24 load fuses (F1-F24), then the filter fuses.
- (c) At the GPDF power bus(es) to be shut down, unseat the 24 load fuses.
- (d) At the LPDC power bus(es) to be shut down, unseat the 24 indicator fuses first, then the 24 load fuses.
- (e) At the LPDC HC power bus(es) to be shut down, unseat the 4 indicator fuses first, then the 4 load fuses.
- (f) **Caution: The power plant circuit (circuit breaker or fuse) should have stamping that indicates the PCFD number and power bus it powers (that is, PCFD 00 - A2). Do not open a power plant circuit that does not identify the PCFD, GPDF, LPDC, or LPDC HC power bus it feeds.**

At the office power plant (in power/battery room), identify the power plant circuit (circuit breaker or fuse) that supplies power to the PCFD power bus to be shut down. Then remove power from the associated PCFD power bus(es) by opening the PCFD circuit.

If this section has been completed, -48 volt power has been removed from the targeted PCFD, GPDF, LPDC, or LPDC HC power bus(es). For assistance with system recovery decisions, refer to 235-105-250, *System Recovery* manual.

9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.6 RESPOND TO FUNCTIONAL UNIT FUSE/POWER ALARM FAILURE

OVERVIEW

This procedure is used to respond to a power alarm or fuse alarm (FA/PWR ALM) in one of the functional unit cabinets. This procedure addresses the two most common causes of power failures:

- A power converter/unit in a functional unit shuts down due to an internal fault in the power converter/unit.
- A fault on a pack in a functional unit causes excessive current drain resulting in a power converter/unit shutdown or a fuse failure.

Warning: *When a Global Power Distribution Frame (GPDF), Local Power Distribution Cabinet (LPDC), or High Current Local Power Distribution Cabinet (LPDC HC) load fuse is inserted, arcing may occur, creating sparks at the front and back of the fuse block. When replacing GPDF, HPDC, or LPDC HC fuses, follow all safety precautions.*

- **Wear safety glasses.**
- **Make sure all personnel are clear of the front and back of the unit.**
- **Use a fuse holder.**
- **Do not stand directly in front of the fuse block when inserting a fuse.**
- **Quickly insert the fuse into the base to reduce arcing.**

Caution: *Review Notes 1-7 before performing this procedure.*

Caution: *If an SMU6 is found to be powered down due to a power alarm, check if the ALARM LED on any of the KLX1/KLX2/KLX2B circuit packs is lit, and if so, do not attempt to restore power but to remove/replace the pack and return for repair.*

Note 1: Other causes of power failures such as cables connected to wrong pins or damage to the backplane may require expert assistance. If this type problem exists and the trouble cannot be resolved, **seek technical assistance.**

Note 2: Regardless of the trouble cleared, special procedures should be used in restoring -48 V DC power at the power plant or at the Power Control Fuse Distribution (PCFD), GPDF, LPDC, or LPDC HC. These procedures are required to avoid damaging good fuses and potentially damaging certain Line Unit (LU) packs.

Note 3: The phrase “unit having a power control pack” refers to a Control Unit (CU), Disk File Controller (DFC), Input/Output Processor (IOP), CM2 Message Switch Control Unit (MSCU), CM2 Message Switch Peripheral Unit (MSPU), CM2 Communication Module Processor Unit (CMPU), CM2 Office Network and Timing Complex (ONTC), Dual-Link Interface/Remote Link Interface (DLI/RLI), Module Controller/Time Slot Interchange (MCTSI), or other unit (service group) having a “power control pack” such as the TN3B, TN5B, TN6B, SN412, SN516, TN1077, 495JA, or other pack having power switches (ON, OFF, RST) and lamps (OFF, OOS, ALM) on its faceplate. The lamps are light-emitting diodes (LEDs).

Note 4: When there is an instruction to “unseat,” “reseat,” or “replace” a power converter/unit pack or any other pack in a unit having a power control pack (Note 3), always first power down the unit (by pressing the OFF switch on its faceplate). After doing the unseat/reseat operation, determine whether the power problem has cleared

by attempting to power up the unit (by pressing the ON switch and observing whether the OFF and ALM lamps extinguish and remain extinguished).

Note 5: The condition “if power can be brought up” means the unit or service group can be powered up. For a unit having a power control pack (Note 3), this means the OFF and ALM lamps remain extinguished after momentarily pressing the ON switch on the power control pack. For other service groups, this means the OFF lamp remains extinguished after momentarily pressing the ST switch on the power converter/unit pack of the service group.

Note 6: The 5ESS[®] switch application hardware cabinets are equipped with either a J5D003AU-2, BJ-2, BT-1, FM-1 Fuse Filter Unit (FFU), or a J5D003FJ-1 Modular Fuse Filter Unit (MFFU). The cabinets are also equipped with a cabinet fuse alarm light-emitting diode (LED) on the front bezel (outside top) of the cabinet. The LED illuminates when a cabinet fuse fails. If the cabinet LED illuminates, lift up the bezel to determine the effect of the cabinet fuse alarm.

Note 7: The MFFU has an LED next to each fuse position on an MFFU fuse block. The LEDs on the MFFU fuse block can detect the loss of the incoming -48 volts from the PCFD, GPDF, or LPDC, or when a fuse has cleared (opened) in the MFFU fuse position it is monitoring. When there is a cabinet fuse alarm, and there is more than one LED on an MFFU fuse block illuminated, there is a good chance that there is an upstream power problem (PCFD, GPDF, LPDC, or power plant). The FFU can not detect the loss of upstream power. If PCF, GPDF, or LPDC power is lost to a cabinet equipped with an FFU, the cabinet fuse alarm LED does not illuminate. See Table 14.6-1 for MFFU fuse replacement information and Table 14.6-2 for FFU fuse replacement information.

Note 8: For CM3, once the fuse is inserted at the MFFU, the packs can be removed/inserted hot. The MSGS (MSCU, CMP, FPC, PPC, QGP, and MMP) has a fuse; the network clock and control (NCC; part of ONTCCOM) and the OSC share a fuse; the even and odd TMSF and TMSX packs on each shelf share a fuse.

PROCEDURE

1. Locate the cabinet and unit (or service group) having the FA or PWR ALM failure. This may be indicated by the FA or PWR ALM indicator located on top front of cabinet. If needed, refer to Procedure 2.2, Isolate Faults Displayed at MCC Video Terminal.
2. If the power failure is at the -48 V power plant, the PCFD, GPDF, LPDC, or LPDC HC, refer to the POWER section in 235-105-250, *System Recovery*
3. If the problem is associated with an Lucent Technologies 3B21D Small Computer System Interface (SCSI) disk unit, perform Procedure 3.8, Troubleshoot Small Computer System Interface (SCSI) Disk Unit Package (DUP), to clear the problem.
4. If the problem is associated with the Common Network Interface (CNI) Ring Node Cabinet, perform Procedure 4.4
5. Open the fuse panel cover over the unit. If there is a blown fuse (there should be one if an FA has been reported), go to Step 11.

6. **Caution:** Before pulling a power converter in an LU service group, always unseat the TN831(B) [or TN331(B)] and TN832(B) [or TN332(B)] packs in that order. If the replacement power converter powers up, then these packs can be resealed in the reverse order. There is no specific order to unseat the packs in a Model 3 LU.

If only one power converter/unit pack is shut down (its OFF LED is lighted), try replacing that pack.

If power can now be brought up (Note 5), go to Step 20.

7. If the unit has a power control pack (Note 3), try replacing that pack. If power can now be brought up, go to Step 20.
8. **Note:** The following **Caution** applies only to LU circuit packs. For all other circuit packs, skip the **Caution** and perform the step action.

Caution: When unseating packs in an operational LU service group, always unseat the TN831(B) [or TN331(B)] pack before unseating the TN832(B) [or TN332(B)] pack. There is no specific order to unseat the packs in a Model 3 LU.

Unseat (observing power pack instructions in Note 4) all circuit packs other than the power converter/unit pack(s) in the service group. Verify that the power converter/unit pack(s) come up.

9. **Note:** The following **Caution** applies only to LU circuit packs. For all other circuit packs, skip the **Caution** and perform the step action.

Caution: When reseating packs in an operational LU service group, always reseat the TN832(B) [or TN332(B)] pack before reseating the TN831(B) [or TN331(B)] pack. There is no specific order to unseat the packs in a Model 3 LU.

Reseat (Note 4) the circuit packs one at a time, observing which one causes the power converter/unit to shut down, and replace that faulty pack with a spare.

10. If the problem has been cleared, go to Step 20. Otherwise, **seek technical assistance.**
11. **Caution:** In a Model 1 LU (J5D004AB) grid, always unseat the two TN338 packs before unseating/removing the TN340 pack. There is no specific order to unseat the packs in a Model 3 LU.

If the blown fuse is one that supplies -48 V to an LU GRID, unseat the grid packs.

12. **Caution:** Always unseat the TN831(B) [or TN331(B)] packs before unseating the associated TN832(B) [or TN332(B)] packs; and in Model 1 LU grids always unseat the two TN338(B)s before unseating the TN340(B) packs. There is no specific order to unseat the packs in a Model 3 LU.

If the blown fuse is one that supplies -48 V to a group of LU packs that includes the TN831(B) and TN832(B) packs [or TN331(B) and TN332(B) packs in Model 1 LU], unseat these packs.

13. If the blown fuse is an *indicator fuse* for a covered *load fuse*, remove *both* fuses. **Do not install a new indicator fuse yet.**

14. Unseat all packs in the out-of-service (OOS) unit or service group, including the power converter(s) in the unit that is powered by the *load fuse*.
15. Replace the *load fuse* with one of the same type and rating.
16. If the replacement fuse fails, measure the voltage at the designated location with the blown fuse installed to ensure that the proper voltage is present. Other possible problems could be bent pins, damage to the backplane, or cable connections (or misplaced cables) causing a possible short circuit (expert assistance may also be appropriate).
17. If the replacement fuse does not fail, reseal (one at a time) the power control pack (if there is one) and each power converter pulled previously (in Step 14), watching to see if one causes the *load fuse* to fail. If it does, try a replacement power control or converter pack (after replacing the blown fuse again).
18. **Note:** The following *Caution* applies only to LU circuit packs. **For all other circuit packs**, skip the *Caution* and perform the step action.

Caution: *Always reseal the TN832(B) [or TN332(B)] before resealing the associated TN831(B) (or TN331(B)); and in Model 1 LU grids, always reseal the TN340(B) pack before resealing either TN338(B) pack. There is no specific order to unseat the packs in a Model 3 LU.*

Reinsert the pulled packs (one at a time), observing whether reinsertion causes the new fuse to fail. If it does, try a replacement/spare pack (after replacing the blown fuse again).

19. If a Lucent Technologies 3B20D/3B21D Computer Unit [CU, DFC, IOP, or Moving Head Disk (MHD)] problem causing a -48 V load fuse to fail has been cleared, install the new indicator fuse.
20. Ensure that all packs are inserted, there are no blown fuses, and the unit is powered up (power converters ON). Request diagnosis and restoral of the unit using the appropriate **RESTORE** commands located on the appropriate display pages located at the Master Control Center (MCC) or the **RST** input messages. If the diagnosis and restore fails, use Procedure 2.2, Isolate Faults Displayed at MCC Video Terminal, to resolve the diagnostic failure.
21. If an LU GRID or GRIDBD has been restored, use the **RST LINE** input message to restore any line previously placed OOS due to the GRID/GRIDBD trouble.
22. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 14.6-1 — J5D003FJ-1 MFFU Fuse Replacement Information

PART NUMBER	<i>UL</i> ^a ELECTRICAL EQUIPMENT INFORMATION ^b	ORDERING DESCRIPTION ^c
WP-91768 L104	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747501 (S) 406663971 (B) Description: FUSE, MINIATURE, FAST-ACTING 0.50 A, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-92458 L2	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406747519 (S) 406599308 (B) Description: FUSE, VERY FAST-ACTING 1.25 A, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L107	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747527 (S) 406708545 (B) Description: FUSE, MINIATURE, FAST-ACTING 2.00 A, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.

See note(s) at end of table.

Table 14.6-1 — J5D003FJ-1 MFFU Fuse Replacement Information (Contd)

PART NUMBER	UL ^a ELECTRICAL EQUIPMENT INFORMATION ^b	ORDERING DESCRIPTION ^c
WP-91768 L108	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747535 (S) 406693895 (B) Description: FUSE, MINIATURE, FAST-ACTING 3.00 A, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L110	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747543 (S) 406693887 (B) Description: FUSE, MINIATURE, FAST-ACTING 5.00 A, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.
WP-91768 L112	Category: JDYX File # E10480 Marking: 1	COMCODE: 406747550 (S) 406693903 (B) Description: FUSE, MINIATURE, FAST-ACTING 7.00 A, 125 V AC/DC 10,000 A Interrupt Approval: UL Listed Supplier: Lucent Technologies/Littelfuse, Inc.

See note(s) at end of table.

Table 14.6-1 — J5D003FJ-1 MFFU Fuse Replacement Information (Contd)

PART NUMBER	UL ^a ELECTRICAL EQUIPMENT INFORMATION ^b	ORDERING DESCRIPTION ^c
<p>WP-92458 L11</p>	<p>Category: JFHR2 File # E71611 Marking: 1</p>	<p>COMCODE: 406747568 (S) 406599324 (B) Description: FUSE, VERY FAST-ACTING 10.0 A, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.</p>
<p>WP-92458 L12</p>	<p>Category: JFHR2 File # E71611 Marking: 1</p>	<p>COMCODE: 406747576 (S) 406599332 (B) Description: FUSE, VERY FAST-ACTING 12.0 A, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.</p>
<p>WP-92458</p>	<p>Category: JFHR2</p>	<p>COMCODE: 406808469 (S) 406599357 (B)</p>
<p>L13</p>	<p>File # E71611 Marking: 1</p>	<p>Description: FUSE, VERY FAST-ACTING 15.0 A, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.</p>

See note(s) at end of table.

Table 14.6-1 — J5D003FJ-1 MFFU Fuse Replacement Information (Contd)

PART NUMBER	<i>UL</i> ^a ELECTRICAL EQUIPMENT INFORMATION ^b	ORDERING DESCRIPTION ^c
WP-92458 L14	Category: JFHR2 File # E71611 Marking: 1	COMCODE: 406808477 (S) 406759050 (B) Description: FUSE, VERY FAST-ACTING 20.0 A, 65 V AC/DC 1,000 A Interrupt Approval: UL Recognized Supplier: Lucent Technologies/Littelfuse, Inc.
Note(s): a. Registered trademark of Underwriters Laboratories, Inc. b. Company name or trade name and catalog, series, type, model, or code designation. c. Comcodes are shown for single (S) and bulk (B).		

Table 14.6-2 — Fuse Replacement Information

PART NUMBER	UL ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION
70A	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 100203322 Description: FUSE, MINIATURE, ALARM, 1.33 A, 125 V AC or DC (White) Approval: UL Recognized Supplier: Lucent Technologies
70B	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747527 Description: FUSE, FAST ACTING, ALARM, 2.0 A, 125 V AC or DC (Orange) Approval: UL Recognized Supplier: Lucent Technologies
70C	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747535 Description: FUSE, FAST ACTING, ALARM, 3.0 A, 125 V AC or DC (Blue) Approval: UL Recognized Supplier: Lucent Technologies
70D	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747543 Description: FUSE, FAST ACTING, ALARM, 5.0 A, 125 V AC or DC (Green/Black) Approval: UL Recognized Supplier: Lucent Technologies
70F	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 100203371 Description: FUSE, MINIATURE, ALARM, 0.25 A, 125 V AC or DC (Violet) Approval: UL Recognized Supplier: Lucent Technologies

See note(s) at end of table.

Table 14.6-2 — Fuse Replacement Information (Contd)

PART NUMBER	UL ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION
70G	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747501 Description: FUSE, FAST ACTING, 0.5 A, 125 V AC or DC (Red) Approval: UL Recognized Supplier: Lucent Technologies
70H	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 100203397 Description: FUSE, MINIATURE, ALARM, 0.75 A, 125 V AC or DC (Brown) Approval: UL Recognized Supplier: Lucent Technologies
74A	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747519 Description: FUSE, VERY FAST ACTING 1.25 A, 125 V AC or DC Approval: UL Recognized Supplier: Lucent Technologies
74B	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 102630308 Description: FUSE, MISCELLANEOUS, 3.0 A, 125 V AC or DC Approval: UL Recognized Supplier: Lucent Technologies
74C	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 102630316 Description: FUSE, MISCELLANEOUS, 5.0 amp, 125 V AC or DC Approval: UL Recognized Supplier: Lucent Technologies

See note(s) at end of table.

Table 14.6-2 — Fuse Replacement Information (Contd)

PART NUMBER	UL ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION
74D	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747568 Description: FUSE, VERY FAST ACTING, 10.0 A, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
74E	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406808469 Description: FUSE, MISCELLANEOUS, 15.0 A, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
74F	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406808477 Description: FUSE, VERY FAST ACTING, 20.0 A, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
74J	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 103228425 Description: FUSE, MISCELLANEOUS, 7.5 A, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
-	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747550 Description: FUSE, FAST ACTING, 7.0 A, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies

See note(s) at end of table.

Table 14.6-2 — Fuse Replacement Information (Contd)

PART NUMBER	UL ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION
-	Category: JDYX2 File # E86695 Marking: 1	COMCODE: 406747576 Description: FUSE, VERY FAST ACTING, 12.0 A, 60 V DC Approval: UL Recognized Supplier: Lucent Technologies
251 002	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403871973 Description: FUSE, SUBMINIATURE, 2.0 A, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
251 005	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403832538 Description: FUSE, SUBMINIATURE, 5.0 A, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
25101.5	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403871965 Description: FUSE, SUBMINIATURE, 1.5 A, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
255 003	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 405432410 Description: FUSE, SUBMINIATURE, 3.0 A, 125 V AC or DC Approval: UL Recognized Supplier: LITTELFUSE, Inc.

See note(s) at end of table.

Table 14.6-2 — Fuse Replacement Information (Contd)

PART NUMBER	<i>UL</i> ELECTRICAL EQUIPMENT INFORMATION ^a	ORDERING DESCRIPTION
315	Category: JDYX2 File # E10480 Marking: 1	COMCODE: 403424583 Description: FUSE, MINIATURE, 0.5 A, 250 V AC Approval: UL Recognized Supplier: LITTELFUSE, Inc.
315.500	Category: JDYX File # E10480 Marking: 1	COMCODE: 402928089 Description: FUSE, MINIATURE, 0.5 A, 250 V AC Approval: UL Listed Supplier: LITTELFUSE, Inc.
315.750	Category: JDYX File # E10480 Marking: 1	COMCODE: 404073405 Description: FUSE, MINIATURE, 0.75 A, 250 V AC Approval: UL Listed Supplier: LITTELFUSE, Inc.
KS-19780 L26	Category: JDYX2 File # E39265 Marking: 1	COMCODE: 405171703 Description: FUSE, 30 A, 130 V AC Approval: UL Recognized Supplier: SAN-O Industrial Corp.
WP90192 L16H	Category: JDYX File # E39265 Marking: 1	COMCODE: 403797798 Description: FUSE, 2 A, 250 V AC Approval: UL Listed Supplier: SAN-O Industrial Corp.
Note(s): a. Company name or trade name and catalog, series, type, model, or code designation.		

14.7 REPLACE CNI RING FUSE

OVERVIEW

This procedure is used to replace Common Network Interface (CNI) ring fuses in the J3F011C-1 cabinet.

PROCEDURE

- To prevent the Automatic Ring Recovery (ARR) software from attempting to recover the node while the power converter fuse is being replaced, inhibit it using command **INH:DMQ:SRC=ARR**. In addition, if affected the node is not out-of-service (OOS), then, put the node in a manual out-of-service (MOOS) state using the command **CHG:SLK=xx-y,MOOS**.
- Caution: When inserting or removing circuit packs, be careful, since most circuit packs require considerable force to insert or remove. Inspect the circuit pack edge connector and the backplane connector for bent or missing pins.**

Completely unseat all the circuit packs including the 495FA power converter associated with the node requiring the fuse replacement in the CNI Ring Node Cabinet (RN 00/32).

Note: If the converter is on the three node shelf (LN-6, LN-5, LN-4), the circuit packs associated with LN-5 also have to be unseated.

- Remove the fuse from the fuse block. Insert the replacement fuse. For fuse replacements associated with the top row of the fuse block (M—), use the 70G (0.5-amp) monitor fuse. For fuse replacements associated with the second to the top row of the fuse block (000, 001, 031, 110, 111, 220, 221, 230, 231, 201, 340, 341, 050, or 051), use the 74D (10-amp) buffer fuse.

Use the following illustrations to correlate the affected node from the MCC 118 Page to the associated fuse in the RNC.

	Power Buses for Cabinet with Only 2 Link Nodes		Power Buses for Cabinet with More than 2 Link Nodes
5		5	LN32-6 LN32-4 M50/050 M51/051
4		4	DLN32-2 LN32-3 M40/340 M41/341
3	RPCN32-0 LN32-1 M30/230 M31/031	3	RPCN32-0 LN32-1 M30/230 M31/231
2		2	LN00-6 LN00-4 M20/220 M21/221
1		1	DLN00-2 LN00-3 M10/110 M11/111
0	RPCN00-0 LN00-1 M00/000 M01/201	0	RPCN00-0 LN00-1 M00/000 M01/001

- Reinsert the 495FA power converter. At the front of the power converter, using a voltmeter, verify that the converter is supplying +5 V DC.

5. At the MCC, refer to Page 118 and verify that the FUSE ALM and PWR ALM has cleared.
Note: If this was not the only power converter fuse that needs replacing, the alarm still exists until all power converters are operational.
6. Reseat the remaining circuit packs in the node.
Note: Watch the power converter ALM light as each pack is replaced. If after a circuit pack is installed the power converter re-alarms, then that circuit pack may be short-circuiting the converter. The converter may need to be replaced (if it was damaged) as well as the circuit pack in the node.
7. Diagnose the OOS node running all phases with one of the following:
 - For LNs and DLNs, use command **DGN:LNxx=y,RAW,TLP**.
 - For an RPCN, use command **DGN:RPCNxx=0,RAW,TLP**.In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
8. If any node circuit pack failed diagnostics in Step 7, reseat and/or replace it and repeat Step 7.
9. Restore the node unconditionally only after diagnostics have ATP'd in Step 7, using one of the following:
 - For LNs and DLNs, use command **RST:LNxx=y,UCL**.
 - For an RPCN, use command **RST:RPCNxx=0,UCL**.In both cases, *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
10. If the node restored is SS7 and its signaling link is in the manual OOS (MOOS) state, then restore the link using command **CHG:SLK=xx-y,IS**, where *xx* is ring group 00 or 32 and *y* is any node member number 1-6.
Note: Each link drops into the OOS state for up to three minutes until the link can synchronize with the far end.
11. All ring nodes should now be restored and the ring should have no isolated nodes. At this point, allow the ARR software to execute for future node problems using command **ALW:DMQ,SRC=ARR**.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.8 REPLACE IRN2 MFFU FUSE

OVERVIEW

This procedure is used to replace a blown power fuse in the Common Network Interface (CNI) Integrated Ring Node-2 (IRN2) vintage Ring.

If a reference in this procedure is made to a specific input or output message, refer to 235-600-700, *Input Messages*, or 235-600-750, *Output Messages* for details.

PROCEDURE

- Using the following table as a guide, identify the fuse and nodes that the converter powers.

Table 14.8-1 — Fuses and Nodes Powered by Converters

Shelf	Fuse	410AA	← Powered by	Powered by →	410AA	Fuse
6	560	61-008	LN34-1 — LN34-4	LN34-5 — LN34-8	61-178	061
5	450	53-008	LN33-1 — LN33-4	LN33-5 — LN33-8	53-178	551
4	340	44-008	RPCN32-1, LN32-1	DLN32-2, LN32-3, LN32-4	44-178	441
2	220	27-008	LN02-1 — LN02-4	LN02-5 — LN02-8	27-178	321
1	110	19-008	LN01-1 — LN01-4	LN01-5 — LN01-8	19-178	211
0	000	10-008	RPCN00-0, LN00-1	DLN00-2, LN00-3, LN00-4	10-178	101

- At the ring cabinet MMFU, verify that the red fuse light is lit for the fuse to be replaced. If the fuse light is not lit, then the up-stream fuse may also be blown and will need to be replaced before the CNI fuse is replaced.
- Verify that the **OOS** light on the 410AA is dimly lit. (This occurs because of the alarm current passing through the 410AA. You may have to cup your hands over the light to see if it is dimly lit.) If dimly lit, continue at Step 4.

If the light is brightly lit rather than dimly lit, the fuse is good and you should be using Procedure 4.5, *Replace Common Network Interface IRN2 Power Pack 410AA* for replacing a 410AA.
- Unseat all circuit packs associated with the 410AA affected by the blown fuse.
- Remove the 410AA.
- Install the replacement fuse.
- Reseat the 410AA.
- Verify +5V voltage using a voltmeter on the test points provided on the 410AA faceplate.
- Reseat all circuit packs that were unseated at Step 4. Watch the replacement 410AA to verify it does not power down when the packs are reseated. If the power supply powers down when a particular pack is inserted, that pack is shorting the backplane. If this happens, do the following:
 - Unseat all the circuit packs as in Step 4.
 - Clear the 410AA **OOS** alarm by unseating the board.
 - Obtain a replacement circuit pack for the one that caused the problem.
 - Continue at Step 7 with powering up the circuit packs.

10. Restore the nodes back to service one at a time with full diagnostics using:

- For an RPCN: **RST:RPCNxx=0,RAW,TLP**
- For an SS7 or DLN node: **RST:LNxx=y,RAW,TLP**

In both cases, **xx** is the group number (00, 01, 02, 32, 33 or 34) and **y** is the member number (1-8).

11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.9 REPLACE SD-5D190-01 MFFU 9824AD or 9824BD ALARM CARD

OVERVIEW

Use the following procedure to replace an SD-5D190-01 MFFU 9824AD or 9824BD alarm card. To replace the MFFU alarm card holder, refer to Procedure 14.10.

Caution: *In this procedure, the SM is placed in the SIMPLEX mode. Otherwise, the SM may initialize when the new 9824AD or 9824BD card is inserted.*

PROCEDURE

1. If the MCTSI is not already out-of-service, remove the STBY MCTSI (side 0 or 1) from service. To do this, do one of the following:
 - Go to MCC page 1190,X and enter input command 20Y where X is the SM number and Y is the standby MCTSI side.
 - Enter MML input message RMV:MCTSI=x-y; where x is the SM number and y is the standby MCTSI side.

Response: The output message Response: RMV MCTSI=x-y COMPLETED is printed at the ROP.

On MCC page 1190, X, the standby MCTSI side shows OOS (backlit in red) and the other side shows ACT.

2. Using Procedure 7.23 (SM) or Procedure 7.24 (SM-2000), power down the out-of-service MCTSI.

Response: The yellow OOS lamp and red POWER lamp on the MCTSI control and display circuit pack turn on.

The MCC page 1190,X shows one side of the MCTSI as UNVP and the other side as ACTF.

3. **Caution:** *To avoid damaging the equipment from electro-static discharge, use an anti-static wrist strap.*
4. At the SMC cabinet, do one of the following:
 - For an SM SMC cabinet, flip up the plastic bezel at the top of the cabinet to expose the fuses and the alarm card.
 - For the SM-2000 SMC cabinet, open the cabinet doors and flip down the metal fuse-label panel to expose the fuses and alarm card. Then slightly lift the panel and carefully pull it away from the cabinet.
5. To replace the MFFU alarm card, do the following:
 - a. Place a small sheet of cardboard underneath the alarm card being replaced to prevent objects from dropping onto the lower mounting.
 - b. Below the alarm card, loosen (do not remove) the alarm card retainer screw by applying a 3/4-turn.
 - c. Slide the alarm card holder to the left to align the bottom edge of the alarm card with the guide slots.
 - d.

Caution: *Do not use pliers to remove the alarm card.*

Take special care to remove the suspected faulty alarm card from the alarm card holder. Be careful to only remove the alarm card from the alarm card holder.

- e. Carefully insert the new alarm card into the alarm card holder. Make sure the alarm card pins are inserted into the backplane 9824AF connector without bending any pins.
 - f. Slide the alarm card holder to the right to lock the alarm card(s) into the slot.
 - g. Hold the alarm card holder to the right while tightening its screw.
 - h. Remove the protective cardboard from underneath the alarm card.
6. For an SM-2000 SMC cabinet, reinstall the fuse-label panel.
 7. Power up the MCTSI side by using Procedure [7.23](#) (SM) or Procedure [7.24](#) (SM-2000).

Response: The red POWER lamp on the MCTSI control and display circuit pack goes off. The MCC 1190 shows one MCTSI side as OOS and the other as ACT.

8. Diagnose the OOS MCTSI side for all phases. To do this, do one of the following:
 - Go to MCC page 1190,X and enter input command `50Y,ph=1&&99` where X is the SM number and Y is the OOS MCTSI side.
 - Enter MML input message `DGN:MCTSI=x-y,RAW,TLP;PH=1&&99`; where x is the SM number and y is the OOS MCTSI side.

Response: The output message Response: DGN MCTSI=x-y COMPLETED is printed at the ROP.

9. Restore the OOS MCTSI side to standby. To do this, do one of the following:
 - Go to MCC page 1190,X and enter input command `30Y,stby` where X is the SM number and Y is the standby MCTSI side.
 - Enter MML input message `RST:MCTSI=x-y,STBY`; where x is the SM number and y is the OOS MCTSI side.

Response: The output message Response: RST MCTSI=x-y COMPLETED is printed at the ROP.

On MCC page 1190, X, the OOS MCTSI side shows STBY and the other side shows ACT.

10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.10 REPLACE SD-5D190-01 MFFU ALARM CARD HOLDER

OVERVIEW

Use the following procedure to replace the alarm card holder in the SD-5D190-01 MFFU. This procedure is designed to be used with the SM-2000 SMC cabinet. To replace just an alarm card in either the SM or SM-2000, refer to Procedure 14.9.

Caution: *In this procedure, the SM will be placed in the SIMPLEX mode. Otherwise, the SM may initialize when the MFFU alarm card is inserted.*

PROCEDURE

1. Remove the STBY MCTSI (side 0 or 1) from service. To do this, do one of the following:
 - Go to MCC page 1190,X and enter input command 20Y where X is the SM number and Y is the standby MCTSI side.
 - Enter MML input message RMV:MCTSI=x-y; where x is the SM number and y is the standby MCTSI side.

Response: The output message Response: RMV MCTSI=x-y COMPLETED is printed at the ROP.

On MCC page 1190, X, the standby MCTSI side shows OOS (backlit in red) and the other side shows ACT.

2. At the affected SMC cabinet, open the doors and flip down the metal fuse-label panel. Then slightly lift the panel and carefully pull it away from the cabinet.
3. Power down the OOS side of the MCTSI by using Procedure 7.24.

Response: The yellow OOS lamp and red POWER lamp on the MCTSI control and display circuit pack turn on.
The MCC page 1190,X shows one side of the MCTSI as UNVP and the other side as ACTF.
4. **Caution:** *To avoid damaging the equipment from electro-static discharge, wear an anti-static wrist strap.*
5. **IMPORTANT:** On the MFFU at the rear EQL 68-100, label all cables attached to the rear of the MFFU alarm card holder. And note the location where each cable attaches to the alarm card holder.
6. On the MFFU at the front EQL 68-100, remove the tiny retainer screw.
7. While holding the tiny retainer, remove the alarm card holder and alarm cards as a unit.
8. Slide the alarm card retainer to the left and pull out the alarm cards.
9. There are four tabs bent over in the alarm card holder to retain the interface (that is, backplane) cards. Bend these tabs back and remove the interface cards.
10. Insert the interface cards into the new alarm card holder. Bend the four tabs to retain the interface cards.

Note: Leave the alarm cards out at this point.
11. Insert the alarm card holder with interface cards into the switch frame.

12. Recable the alarm card holder using the disassembly notes from Step 5. Take the usual precautions when attaching the cables.
13. Verify the all the cabling is correct and verify that the SM is still in simplex mode. Then insert the alarm cards.
14. Power up the MCTSI side by using Procedure 7.24.
Response: The red POWER lamp on the MCTSI control and display circuit pack goes off. The MCC 1190 shows one MCTSI side as OOS and the other as ACT.
15. Diagnose the OOS MCTSI side for all phases. To do this, do one of the following:
 - Go to MCC page 1190,X and enter input command 50Y,ph=1&&99 where Y is the OOS MCTSI side.
 - Enter MML input message DGN:MCTSI=x-y,RAW,TLP,PH=1&&99; where x is the SM number and y is the OOS MCTSI side.Response: The output message Response: DGN MCTSI=x-y COMPLETED is printed at the ROP.
16. Restore the OOS MCTSI side to standby. To do this, do one of the following:
 - Go to MCC page 1190,X and enter input command 30Y,stby where Y is the standby MCTSI side.
 - Enter MML input message RST:MCTSI=x-y,STBY; where x is the SM number and y is the OOS MCTSI side.Response: The output message Response: RST MCTSI=x-y COMPLETED is printed at the ROP.
On MCC page 1190, X, the OOS MCTSI side shows STBY and the other side shows ACT.
17. In the front of the MFFU, screw the alarm card holder screw back into position and slide the screw holder to the right.
18. Insert and close the fuse-label panel.
19. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

14.11 REPLACE ALARM STATUS UNIT CIRCUIT MODULES

OVERVIEW

This procedure is used to safely replace each circuit module used in the Alarm Status Unit/Alarm Status Unit 2 (ASU/ASU2). The ASU/ASU2 is located at the top of a 6-foot 5ESS[®] switch frame on products that require the alarm feature. Each ASU can have a Stand-Alone Monitor (SAM), an Alarm Status Circuit (ASC), or both. There are two types of ASC and four types of SAM circuits (two on the ASU and two on the ASU2). Figure 14.11-1 illustrates the two types of units and panel layouts.

PROCEDURE

1. To replace a SAM circuit, go to Step 13.
To replace an ASC circuit, continue with the next step.
2. Enter Page 1160 on the master control center (MCC).
3. Enter a Poke 300 command to diagnose the ASC circuit (note failure, if any).
4. Enter a Poke 200 command to remove the ASC from service.
5. **Caution 1: ALWAYS USE AN ELECTROSTATIC DISCHARGE (ESD) GROUND STRAP.**
Caution 2: Take care not to accidentally press any panel buttons.
On the switching module/switching module-2000 (SM/SM-2000) ASU unit, raise the ASU panel by rotating the unit up to access the cabling and circuits.
6. Check the position of the cable connectors by referencing the ASU/ASU2 (Figure 14.11-1) panel layout diagram, which is located in the SAM replacement section (Step 13) of this procedure.
7. Remove the -48 volt plug (J5/J6 or J3) from the ASC noting the position before removing.
8. Note the positions of the I/O connectors (J1/J2, J3/J4, or J1, J2) and then remove them.
9. Remove and replace the circuit module.
Note: The ASU and ASU2 circuit modules are not interchangeable.
10. Reconnect the I/O connectors.
11. Reconnect the -48 volt plug.
12. Enter a Poke 300 command to diagnose the ASC circuit (make sure no new failures have occurred or the initial failure has cleared).
13. **Caution 1: ALWAYS USE AN ESD GROUND STRAP.**
Caution 2: Take care not to accidentally press any panel buttons.
Caution 3: When dealing with the SAM, be sure not to press the CIK buttons. If you do, they will initialize the SM/SM-2000.
On the SM/SM-2000 ASU unit, raise the ASU panel by rotating the unit up to access the cabling and circuits.
14. From a duplex SM/SM-2000, verify that Side 0 is standby. If not, enter a Poke 403 command from the 1190 page of the MCC.

15. Remove Side 0 from service by entering a Poke **201** command.
16. Power down Side 0.
17. Remove the *Berg*¹ Connector on the backplane at EQL (Table [14.11-1](#)).
18. Power up Side 0.
19. Restore Side 0 by entering a Poke **300** command.
20. Remove Side 1 from service by entering a Poke **201** command.
21. Power down Side 1.
22. Remove the *Berg* Connector on the backplane at EQL (Table [14.11-1](#)).
23. Power up Side 1.
24. Restore Side 1 by entering a Poke **301** command.
25. Remove the power connector from the SAM circuit module.
26. Remove the signal connector from the SAM circuit module.
27. Replace circuit module by removing old module and installing new module.
28. Install the signal connector to the SAM circuit module.
29. Install the power connector to the SAM circuit module.
30. Switch sides so that Side 1 is active. (Enter Poke **403** to make Side 1 active.)
31. Remove Side 0 from service by entering a Poke **201** command.
32. Power down Side 0.
33. Install the *Berg* Connector on the backplane at EQL (Table [14.11-1](#)).
34. Power up Side 0.
35. Restore Side 0 by entering a Poke **300** command.
36. Remove Side 1 from service by entering a Poke **201** command.
37. Power down Side 1.
38. Install the *Berg* Connector on the backplane at EQL (Table [14.11-1](#)).
39. Power up Side 1.
40. Restore Side 1 by entering a Poke **301** command.
41. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

1. *Berg* is a registered trademark of FCI Americas Technology, Inc.

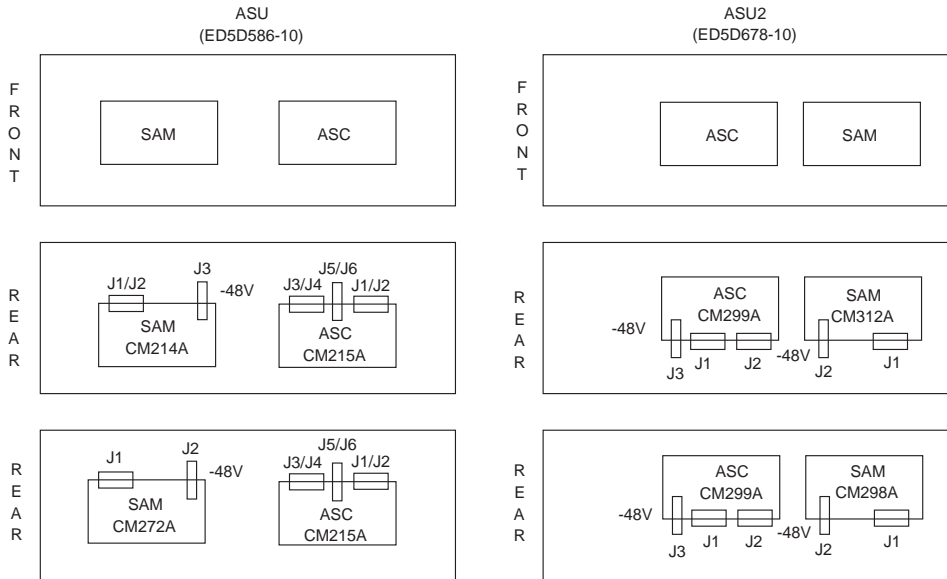


Figure 14.11-1 — ASU/ASU2 Panel Layout Diagram

Table 14.11-1 — Berg Connector Location

UNIT	ASU		EQL (EQUIPMENT LOCATION)	ASU2	
	CM214	CM272A		CM312A	CM298A
MCTU J5D003EC (SMP1,12,23)	X		128-088-032(0) 128-088-045(1)	X	
IMPU J5D003AY (SMP1,12,23)	X		128-088-032(0) 128-088-045(1)	X	
MCTU2 J5D003LA (SMP20)		X	119-033-021(0) 128-033-021(1)		X
MCTU3 J5D003LB			004-119-019(0) 004-119-019(1)	X	X

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15. FAN MAINTENANCE PROCEDURES

GENERAL

The procedures in this section are used to perform maintenance on fan equipment.

15.1 FAN REPLACEMENT

OVERVIEW

This procedure is used to replace the fans in the switching module/switching module-2000 (SM/SM-2000), the communication module (CM) bay, the Common Network Interface (CNI), the integrated services line unit (ISLU) drawer, and the fan alarm boards in the SM/SM-2000 and CM bay. Complete 5ESS[®] switch replacement fan ordering information is provided in Table 15.1-1.

Six main types of fan assemblies are used in the SM/SM-2000 and CM bays. They are as follows:

- **J5D003BE-X(1-2):** A 3-fan assembly found in general use throughout the 5ESS switch bay configurations. It is mounted in the bottom of a bay, and access to the filter is from the front of the bay. (See Figure 15.2-1.) The replacement fan for these fan units can be ordered as comcode number 845622042, and thermostatically-controlled replacement fans for these fan units can be ordered as comcode number 846937506.
- **J5D003BN-X(1-2):** A 6-fan assembly provided to accommodate the addition of Packet Switch Units (PSU) and the Module Controller and Time Slot Interchanger Unit Model 2 (MCTU2). It is mounted in the bottom shelf position of a bay, and access to the filter is from the front of the bay. (See Figure 15.2-2.) The replacement fan for the J5D003BN-1 fan unit can be ordered as comcode number 846166015 and the thermostatically controlled replacement fan can be ordered as comcode number 846943256. The replacement fan for the J5D003BN-2 fan unit can be ordered as comcode number 846365641, and the thermostatically-controlled replacement fan can be ordered as comcode number 846968691.
- **J5D004AH-1/AK-1:** A 3-fan assembly mounted in each ISLU drawer to cool the contents of the drawer. It is provided to supplement the 6-fan assembly in the bay. Access to the filter is from the rear of the drawer unit. There are two versions of this assembly:
 - **AH-1** — *June 1989 and earlier* version requires access from *underneath* the drawer to replace a fan. (See Figure 15.3-1.)
 - **AK-1** — *July 1989 and later* version provides access from the *top* of the drawer to replace a fan. (See Figure 15.3-2.)

The replacement fan for the J5D004AH-1/AK-1 fan unit can be ordered as comcode number 405189416.

- **J5D003BW-1:** A 6-fan assembly that mounts in the top shelf position of an SM/SM-2000 bay containing PSUs. It is an exhaust fan unit required to supplement the standard by fan assemblies when more than 3 PSUs are mounted in the bay. There is no filter with this fan assembly. (See Figure 15.2-3.) The replacement fan for the J5D003BW-1 fan unit can be ordered as comcode number 846365641.
- **J5D003FH-X(1-2):** A 6-fan, bidirectional fan assembly provided for 3B21D, CNI, SM-2000, and ISLU2 that is mounted in the middle of a bay. The replacement fan for the J5D003FH-1 fan unit can be ordered as comcode number 846968691, and the replacement fan for the J5D003FH-2 fan unit can be ordered as comcode number 406611186.

Note: The J5D003FH-2 fan unit is typically found in many SMs. The fan circuit board design has been revised in newer boards to improve cost and performance. The KS23884L1F is such a board. Despite an appearance that differs from earlier boards, it mounts identically, meaning there is no need for any additional items when upgrading to the KS23884L1F.

- **J5D003FT-1:** A 3-fan assembly used as a standalone or with an additional J5D003FT-1 assembly to create a 6-fan assembly. This unit is a platform fan unit that may be used in CM3, AIU, XAIU, and QADSL. The replacement fan for the J5D003FT-1 fan unit can be ordered as comcode number 406611186.

Note: One UAF280 air filter (comcode 407554484) is used for a single J5D003FT fan unit. When two fan units are used, two air filters are required.

Fans run continuously as long as they are fused. Fuses located in the fuse/filter panel may be removed to power down fan assemblies, except for the ISLU drawer fans. Details for fusing and alarming assignments are shown on the office ED-5D651-15.

Fan malfunctions are indicated by a message printout at the Master Control Center (MCC), a MAJOR audible alarm, and LEDs on the fan unit as seen from the rear of the bay and at the top of the bay as seen from the front. Also, each ISLU drawer has an alarm circuit pack (256A) mounted on the rear of the ISLU fan unit. An LED on this circuit pack lights to identify a defective fan.

Be aware that unplugging a fan's connector wires does **not** result in an alarm condition. Fan alarm circuits require a connection to the alarm module to provide alarms. Separate test capabilities are provided for the fan alarm modules. Fan alarm circuits are normally open and close only as a result of a fan malfunction.

It is not necessary to power down a fan unit to replace a filter except in the ISLU drawers.

Caution: DO NOT REMOVE FUSES TO POWER DOWN A FAN UNIT. The RESET button or the RESET/TEST switch or the TEST button on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.

Detailed procedures for filter replacement are found in 235-105-210, *Routine Operations and Maintenance Procedures*.

PROCEDURE

1. Depending on the type of fan to be replaced, perform one of the following procedures:
 - For the J5D003BE-X(1-2), J5D003BN-X(1-2), J5D003BW-1, J5D003FH-X(1-2), or J5D003FT-1 fan assembly, perform Procedure [15.2](#), Replace SM/SM-2000 and CM Bay Fans.
 - For fan assembly J5D004AH-1/AK-1, perform Procedure [15.3](#), Replace ISLU LGC Fans.
2. If a 256A Fan Unit Alarm Board has malfunctioned, perform Procedure [15.4](#).
3. If an SM/SM-2000 Fan Unit Alarm Board has malfunctioned, perform Procedure [15.5](#).
4. If a KS23884 Fan Unit Alarm Board has malfunctioned, perform Procedure [15.6](#).
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 15.1-1 — 5ESS Switch Replacement Fan Ordering Information

UNIT ^b	REPLACEMENT LIST NUMBER	SCHEMATIC	DESCRIPTION	REPLACEMENT FAN COMCODE ^b	KS-SPEC	CONNECTOR TYPE	COMMENT
J5D003BE-1	L101	SD5D019-01	3-Fan Unit Model 1	845622042	KS22501 L3A	Fast On	5-Wire ^d
J5D003BE-1	L103	SD5D019-01	3-Fan Unit Model 1	846937506	KS23912 L1A		^e
J5D003BE-1	L100	SD5D019-01	3-Fan Unit Model 1	845622028	KS22501 L3	Fast On	3+2 wire ^d
J5D003BE-1	L102	SD5D019-01	3-Fan Unit Model 1	846969301	KS23912 L1		^e
J5D003BE-2	L100	SD5D019-02	3-Fan Unit Model 2	845622042	KS22501 L3A	Fast On	5-Wire ^d
J5D003BE-2	L101	SD5D019-02	3-Fan Unit Model 2	846937506	KS23912 L1A		^e
J5D003BN-1	L100	SD5D081-01	6-Fan Unit Model 1	846166015	KS22501 L3	Amp ^a	3+2-Wire ^d
J5D003BN-1	L101	SD5D081-01	6-Fan Unit Model 1	846943256	KS23912 L1		^e
J5D003BN-2	L100	SD5D081-02	6-Fan Unit Model 2	846365641	KS22501 L3A	Amp	5-Wire ^d
J5D003BN-2	L101	SD5D081-02	6-Fan Unit Model 2	846968691	KS23912 L1A		^e
J5D003BW-1	L100	SD5D162-01	Exhaust 6-Fan Unit	846365641	KS22501 L3A	Amp	5-Wire ^d
J5D003BW-1	L101	SD5D162-01	Exhaust 6-Fan Unit	846968691	KS23912 L1A		^e
J5D003FH-1	L100	SD5D168-01	Bidirectional 6-Fan Unit	846968691	KS23912 L1A	Amp	Thermo version
J5D003FH-1	L101	SD5D168-01	Bidirectional 6-Fan Unit	846967883	KS23912 L5		Nonlatching
J5D003FH-2	L100	SD5D168-02	6-Fan Bidirectional Model 2	406611186	KS23912 L2	Amp	4-Wire
J5D003FT-1	L100	SD5D168-02	3 or 6-Fan platform unit	406611186	KS23912L2	Amp	4-Wire
J5D004AH/K-1	L100		ISLU Drawer Fan Unit	405189416	KS23398 L2		
J3T027AB-1			SCSI Disks ^c	405995923	—		

Note(s):

- a. Amp is a trademark of Amp, Inc.
- b. Use the replacement fan comcode or J-code replacement list number to order replacement fans for 5ESS switch fan units. This number denotes the fan assembled with the proper connectors. If the replacement fan comcode number for different units is the same, the fan assembly with connector is identical. All replacement fans can be the thermo version, which adjusts fan speed with temperature, and can be mixed with full speed fans in the same fan unit.
- c. Do not replace the SCSI disk drive fans in the field; replace the whole SCSI disk unit and repair it remotely at an approved service center.
- d. Discontinued Availability
- e. Replace with Thermo version

15.2 REPLACE SM/SM-2000, CNI, AND CM BAY FANS

OVERVIEW

This procedure is used to replace the fans in the switching module/switching module-2000 (SM/SM-2000), Common Network Interface (CNI), and communication module (CM) bay. The procedure is the same for all SM/SM-2000, CNI, and CM bay fan units. The following fan units are covered:

- J5D003BE-X(1-2) – Figure 15.2-1
- J5D003BN-XC(1-2) – Figure 15.2-2
- J5D003BW-1 – Figure 15.2-3
- J5D003FH-X(1-2)
- J5D003FT-1.

Caution 1: *Manually unplugging a fan unit does not result in an alarm condition. Fan alarm circuits require a connection to the alarm module to provide alarms. Therefore, when replacing a fan, if the connector is not seated properly, the fan may not operate and no alarm indication will be given.*

Caution 2: *Do not remove fuses to simulate fan alarms. The RESET button on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.*

PROCEDURE

1. Determine the location of the unit with the defective fan.
2. At the fuse/filter panel, remove the fuse associated with the defective fan.
Caution: *On newer fan units, the defective fan may begin to spin backwards from the pressure of the other operating fans.*
3. Unplug the connector that connects the fan to the wiring harness.
4. This is used for the J5D003BE-1 and early version of the J5D003BE-2 fan units that have three screws holding the alarm board; otherwise, go to the next step. Remove the bottom two screws holding the alarm board. You may have to remove connectors J5 and J6 that are in line with the center screw. Loosen the top screw so the alarm board may be moved out of the way when removing the fan later.
5. Do not remove the finger guard separately. Remove the defective fan by unscrewing the two screws that hold it in place and removing the screws, finger guard and fan together as one assembly. Set the assembly on the floor and wait until the fan stops spinning.
6. Mount the finger guard and screws to the replacement fan. Mount the assembly to the fan unit using the locator holes and mounting screws.
7. This is used for the J5D003BE-1 and early version of the J5D003BE-2 fan units only; otherwise, continue with the next step. Move the board back and replace the two screws. Tighten top screw and replace the two connectors, if removed.
8. Referring to **Caution 1** in the Overview, reconnect the fan connector to the wiring harness. Ensure that the connector is properly seated and there is no evidence of breaks in the wires.

9. At the fuse/filter panel, replace the fuse associated with the defective fan.
10. Press the fan reset button and ensure that the fans are running by physically looking at them and observing that no fan alarm LEDs are lighted.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

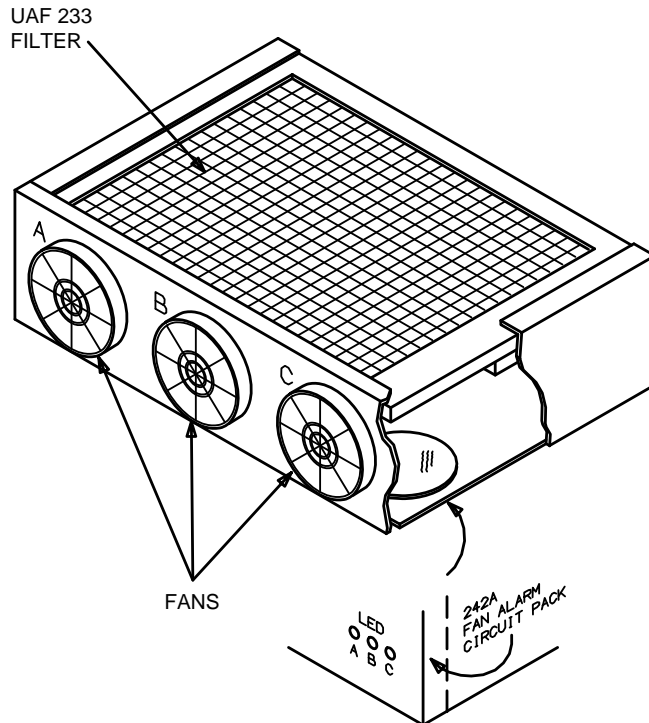


Figure 15.2-1 — Fan Type J5D003BE-X(1-2)

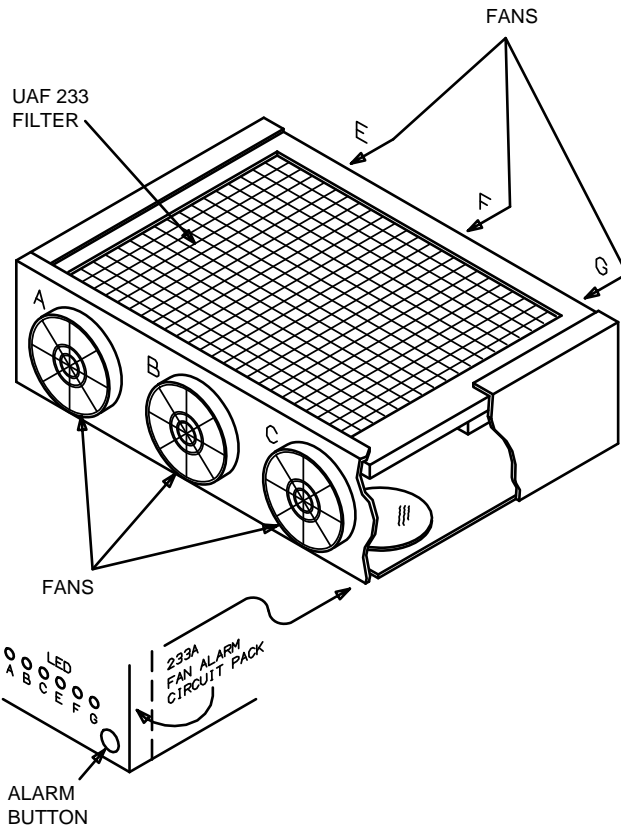


Figure 15.2-2 — Fan Type J5D003BN-XC(1-2)

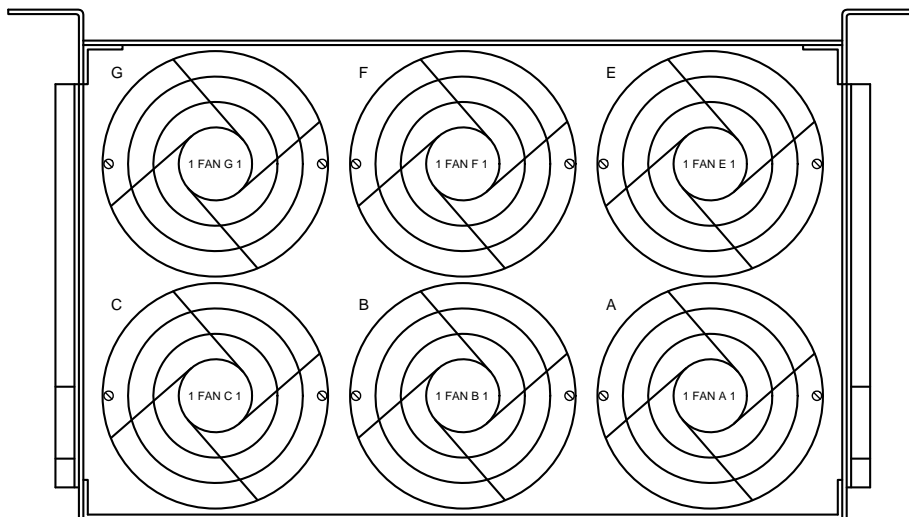


Figure 15.2-3 — Fan Type J5D003BW-1 (Top View)

15.3 REPLACE ISLU LGC FANS

OVERVIEW

This procedure is used to replace the Integrated Services Line Unit (ISLU) Line Group Controller (LGC) fans.

Each ISLU LGC has a 3-fan assembly (J5D004AH-1 or J5D004AK-1) that is used to cool the contents of the ISLU drawer. These fans are in addition to the fan units located in the bottom of the cabinets. When a fan fails, a major alarm sounds and a message is printed on the Receive-Only Printer (ROP).

The Fan Alarm circuit board (256A) is mounted on the back of the fan assembly. There are three light-emitting diodes (LEDs) on this board that are related to each fan. The top LED is associated with fan "C," the middle, fan "B," and the bottom, fan "A." When an LED is lighted, it indicates that the associated fan is not operating and requires maintenance.

There are two versions of the fan assembly. The earlier version was manufactured before June 1989 and is illustrated in Figure 15.3-1. The later version is illustrated in Figure 15.3-2.

Caution 1: *Manually powering down a fan unit does not result in an alarm condition. Fan alarm circuits are normally open and close only as a result of a fan malfunction. Therefore, when replacing a fan, if the connector is not seated properly, the fan may not operate and no alarm indication will be given.*

Caution 2: *Fans in ISLU LGC drawers share fuses with line groups in the drawers. DO NOT REMOVE FUSES TO POWER DOWN A FAN UNIT. Do not remove fuses to simulate fan alarms. The RESET button or the RESET/TEST switch on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.*

PROCEDURE

1. Go to the back of the appropriate cabinet and locate the fan unit with the bad fan. An LED is lighted for the bad fan (A, B, or C).
2. Disconnect the top cable assembly that is connected to the 256A Fan Alarm circuit board.
3. Remove the UAF235 air filter.

Note: If the air filter needs replacement, it may be replaced at this time. Do not under any circumstances clean the filter and reuse it. Refer to the air filter replacement procedures that are located in 235-105-210, *Routine Operations and Maintenance Procedures*.

4. Unlock the fan unit by pulling out on the push/pull locking mechanism located in the upper left quadrant of the rear of the unit.
5. Remove the fan unit.
6. Replace the defective fan by removing the four mounting screws and disconnecting the connector to the wiring harness. Refer to either Figure 15.3-1 or Figure 15.3-2, whichever is applicable.
7. Referring to **Caution 1** in the Overview, ensure that the connector to the wiring harness is properly seated and there is no evidence of breaks in the wires.

8. Reinsert the fan unit into the bottom of the ISLU LGC drawer.
9. Lock the fan unit into place by pushing in on the push/pull locking mechanism.
10. Reinstall the UAF235 air filter.
11. Reconnect the upper connector on the 256A Fan Alarm circuit board.
12. Ensure that the fans are running by going around to the front of the cabinet, pulling out the ISLU drawer, and looking at the fans from the bottom of the drawer.
13. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

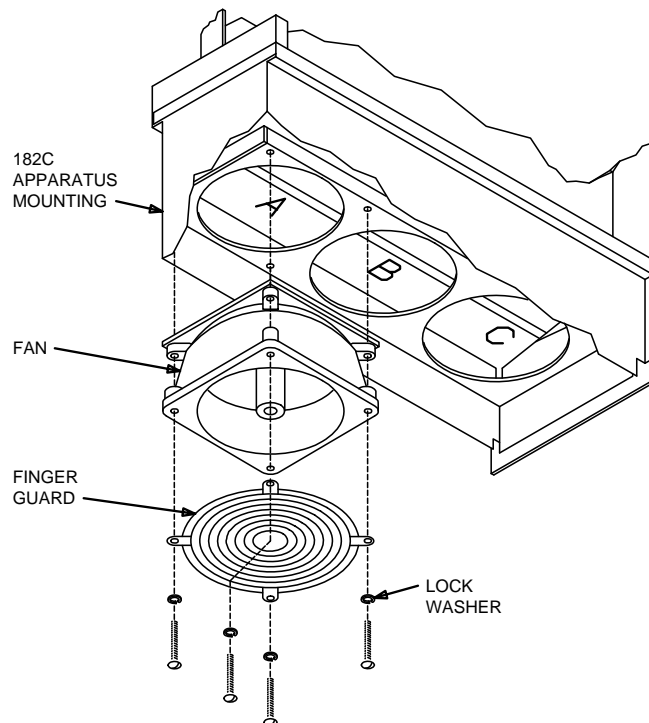


Figure 15.3-1 — J5D004AH-1 Fan (June 1989 and Earlier)

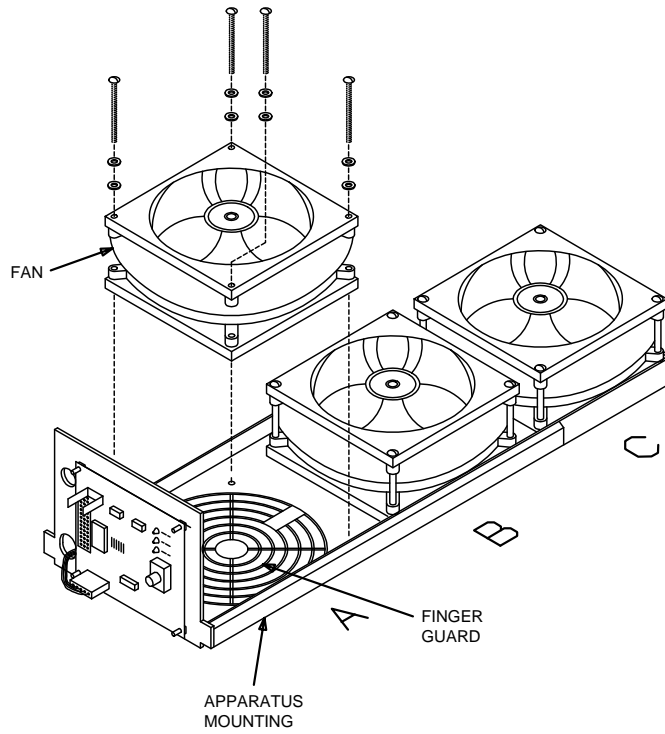


Figure 15.3-2 — J5D004AK-1 Fan (July 1989 and Later)

15.4 REPLACE 256A FAN ALARM CIRCUIT PACK

OVERVIEW

This procedure is used to replace a 256A fan alarm circuit pack in an Integrated Services Line Unit (ISLU) drawer. The 256A circuit pack is mounted on the back of the 3-fan assembly (J5D004AK-1). Before performing the 256A circuit replacement procedure, read the following Cautions.

Caution 1: *Manually powering down a fan unit does not result in an alarm condition. Fan alarm circuits are normally open and close only as a result of a fan malfunction. Therefore, when replacing the 256A circuit pack, if the connector is not seated properly, the fan may not operate and no alarm indication will be given.*

Caution 2: *Fans in ISLU LGC drawers share fuses with line groups in the drawers. DO NOT REMOVE FUSES TO POWER DOWN A FAN UNIT. Do not remove fuses to simulate fan alarms. The RESET button or the RESET/TEST switch on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.*

PROCEDURE

1. Go to the back of the appropriate cabinet and locate the fan unit with the bad 256A circuit pack. Refer to Figure 15.4-1
2. Disconnect the upper cable assembly that is connected to the 256A fan alarm circuit board.
3. Disconnect the lower cable assembly that is connected to the 256A fan alarm circuit board.
4. Remove the 4 screws that hold the circuit pack in place, and then remove the circuit pack.
5. Install the new 256A circuit pack and reinstall the screws removed in Step 4.
6. Reconnect the lower cable assembly and the upper cable assembly.
7. Referring to **Caution 1** in the Overview, ensure that the connector to the wiring harness is properly seated and there is no evidence of breaks in the wires.
8. At the front of the cabinet, pull out the ISLU drawer and ensure that the fans are running.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

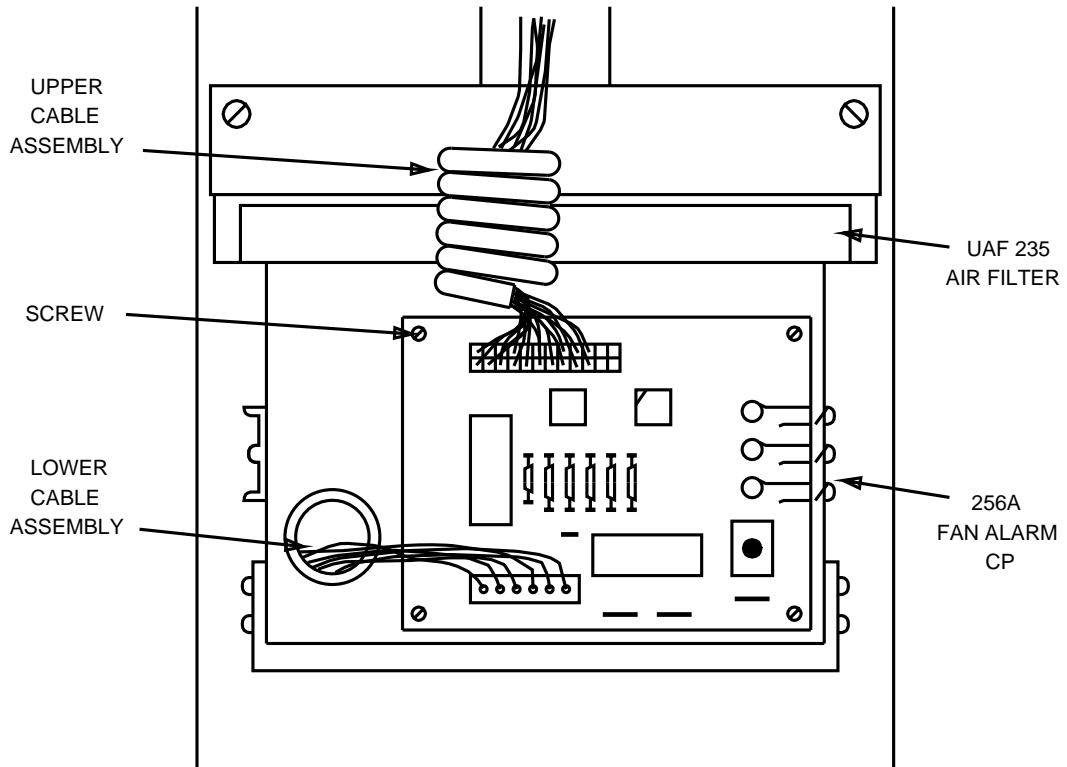


Figure 15.4-1 — 256A Alarm Circuit Pack for ISLU Fans

15.5 REPAIR SM/SM-2000 FAN UNIT CM242A OR CM233A ALARM BOARD FAILURE

OVERVIEW

This procedure is used in response to an alarm board failure (CM242A in a 3-fan unit or a CM233A in a 6-fan unit) in the Switching Module/Switching Module-2000 (SM/SM-2000) bay.

Caution: *Do not remove fuses to simulate fan alarms. The RESET button on the fan unit power control board is used to simulate a fan failure that results in system alarm responses.*

PROCEDURE

1. Determine which type of Fan Unit Alarm Board is to be replaced:
If replacing the 3-Fan Unit Alarm Board (CM242A), go to Step 2. The CM242A can be identified with the following stampings: ED5D195-10 G2; ED5D195-10 G5.
If replacing the 6-Fan Unit Alarm Board (CM233A, KS23884L3 or KS23884L3A), go to Step 8. The CM233A can be identified with the following stampings: ED5D195-10 G3, ED5D195-10 G6, ED5D195-10 G7.
2. Remove the fuse marked "Fan Alarm Board."
3. On the CM242A board, disconnect (as required) cables from connectors J0-J9.
Note 1: If you have the old version of the CM242A board (that is, wire wrap connected), obtain conversion kit ED5D670-30 and convert the alarm board and cables to a connectorized alarm board.
Note 2: The CM242A is no longer available and cannot be ordered. If the CM242A is defective and a spare exists in the office, you may continue with this procedure. If no spare exists, a J5D003FH-2 fan unit with three fans blowing upward is required. All the additional equipment that is specific for each installation, including a final assembly kit, a guide kit, and one air filter are also needed. If the existing fan unit uses air filter Number 407277193, it can be used in the new fan unit if it is clean or can be cleaned with a vacuum. This is an installation procedure and should be performed by a Lucent installer.
4. Remove and replace the CM242A board.
5. Reinstall cables to connectors J0-J9 as appropriate.
6. Reinstall the fuse previously removed in Step 2.
7. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**
8. Remove the fuses marked "Fan A" and Fan C".
9. On the CM233A, KS23884L3 or KS23884L3A board, disconnect (as required) cables from connectors J1 – J8.
10. Remove and replace the alarm board.
11. **Caution:** *Connectors J1 – J8 are not numerical sequence on this board.*
Refer to Figure 15.5-1 and replace cables J1 – J8 as appropriate.
12. Reinstall the fuses removed in Step 8.

13. STOP. YOU HAVE COMPLETED THIS PROCEDURE.

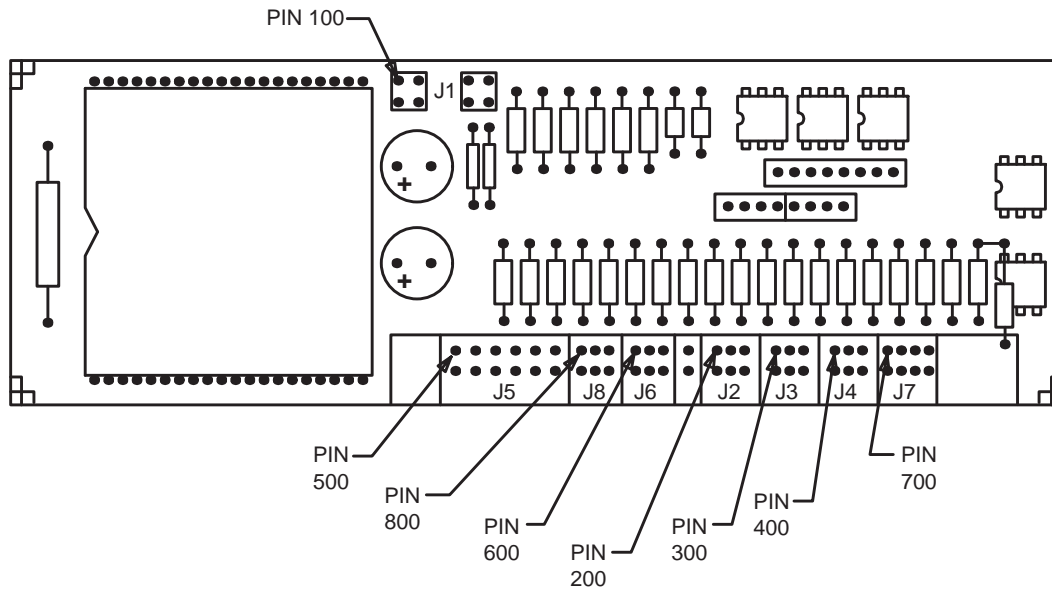


Figure 15.5-1 — Terminal Numbering for a CM233A Circuit Board

15.6 REPLACE KS23884 FAN ALARM CIRCUIT CARD

OVERVIEW

This procedure is used to replace the KS23884L1(X) Fan Alarm circuit card associated with the 6-Fan Bi-directional Unit, 3fan platform fan unit and the 6 fan uni-directional fan unit. The alarm card used with the unit can control the speed of the fans based on inputs from fan power and cabinet temperature. The card also sends the alarm conditions to the IOP controller in the AM and can daisy-chain with other 6-fan units.

When a fan fails or the temperature is too high, an alarm sounds, the fan's light is turned lit on the alarm card, and a message is printed on the Receive-Only Printer (ROP).

The Fan Alarm circuit board (KS23884L1(X)) is mounted on the back of the cabinet fan assembly on the right. There are several versions of the KS23884L1(X). Your current card may not look like the new replacement card. All versions of the KS23884L1(X) are interchangeable. The circuit drawing for the KS23884L1(X) is SD-5D168-02.

Caution: *In this procedure, you will remove the mounting screw that holds the fan alarm card bracket on the fan unit housing. IT IS EXTREMELY IMPORTANT THAT CARE BE TAKEN WHEN REMOVING THIS SCREW. The power bridge for the fans is close by. There is also the potential for the screw to be dropped, which could cause pins to short on the shelf units below, or the screw could fall into the adjacent fan. USE A NON-CONDUCTING SCREWDRIVER, OR COVER THE SCREWDRIVER SHAFT WITH ELECTRICAL TAPE TO PREVENT ACCIDENTAL CONTACT.*

Note: The KS23884L1G fan alarm board is a replacement for the KS23884L1E board. Despite an appearance that differs from earlier boards, it mounts identically, meaning there is no need for any additional items when upgrading to the KS23884L1G.

PROCEDURE

1. Go to the back of the appropriate cabinet and locate the fan alarm card.
2. Tag all the cables that are attached to the card. Either stencil the *Berg*¹ connector or tag the cables themselves.

Note: The orientation for the cables is to have the wire-side towards the cabinet.

3. Remove all connectors from the alarm card.

Note: It is not necessary to remove power to the fans before removing the connectors. Depending on the cabinet's configuration, the fans may power up full speed while performing this task. This is normal.

4. See previous **Caution**. Remove the screw at the top of the fan alarm card. This screw mounts the card bracket to the 6-fan unit.
5. Remove the card by pulling out and up to get the mounting tab clear of the bottom slot.

1. Berg is a registered trademark of FCI Americas Technology, Inc.

6. If the replacement card came already attached to a mounting bracket, go to Step 10.
Otherwise, continue with the next step.
7. At a suitable desk/table, remove the four mounting screws that hold the alarm card to the bracket.
8. Remove the old alarm card and replace it with the new card.
Note: The orientation of the card on the bracket is important. Use the same orientation as the original card. Also, make sure the plastic protector that separates the bracket surface from touching the bottom of the alarm card is in place.
9. Re-use the four screws (removed in Step 6) to mount the replacement card to the bracket.
10. If replacing a KS23884L1E with a KS23884L1G fan alarm board, set all dip switches on the far right top of the KS23884L1G board to: 00000000
If adding a KS23884L1G to a packet OIU, set the dip switches on the far right top of the KS23884L1G board to: 01000000
11. Install the new alarm card on the fan unit by inserting the tab at the bottom of the bracket into the slot and leaning the card up towards the mounting screw hole.
12. Install the bracket mounting screw.
13. Install all connectors removed in Step 3.
Note: The orientation for the cables is to have the wire-side towards the cabinet.
14. If the fan alarm lights are lit on the card, push in the reset button (R) and release. The fans will return to normal speed for the cabinet.
15. Ensure that the fans are running by going to each fan and verifying that it is operational.
16. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

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16. OFFICE DEPENDENT DATA MAINTENANCE

INTRODUCTION

The procedures in this section are used to perform corrective maintenance (trouble clearing) on the Office Dependent Data (ODD) associated with the *5ESS*[®] switch. These procedures include guidelines for solving minor problems associated with the ODD. Some of the reference information that applies to specific functions (for example, system recovery, audits, asserts, and input/output messages) is contained in other *5ESS* switch documentation. For a complete listing of all documentation associated with the *5ESS* switch, refer to 235-000-000, *Numerical Index*.

If a procedure applies to a specific software release, it is indicated in the procedure.

OFFICE DEPENDENT DATA (ODD) – The ODD in a *5ESS* switch is a series of software data structures that define:

- Switching office hardware
- Originating and terminating characteristics for lines and/or trunks
- Routing data for call processing.

The ODD is commonly referred to as *Translation Data*.

EQUIPMENT CONFIGURATION DATA (ECD) – The ECD is the Duplex Multi-Environment Real-Time Operating System (DMERT) and/or *UNIX*¹ RTR Operating System software's data base that identifies the operating environment of the Administrative Module (AM). The ECD includes equipment configuration information on such items as disks, memories, terminals, data links, synchronous timing sources, and craft language options.

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16.1 MODIFY OFFICE DEPENDENT DATA WITH RECENT CHANGE/VERIFY

OVERVIEW

This procedure is used to add new or change existing Office Dependent Data (ODD) using the appropriate Recent Change/Verify (RC/V) mode and manuals. The ODD is commonly referred to as *Translation Data*.

PROCEDURE

1. Determine the type of RC/V available from one of the following commands:
 - RCV-MENU MODE
 - RCV-TEXT INTERFACE MODE
 - RCV-RMAS MODE
 - RCV-BATCH RELEASE MODE.
2. Once the available mode and software release has been determined, obtain the appropriate RC/V manual. The RC/V document identification numbers are 235-118-2XX (where XX is the currently-supported document identifiers.)
3. Using the information provided in the appropriate RC/V manual, add, change, or delete Translation Data (as required) per the appropriate information in the service order.
4. If problems are encountered while performing an RC/V activity, try to resolve the problem locally by close coordination with the maintenance personnel responsible for switch maintenance. If the problems cannot be resolved, **seek technical assistance**.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.2 ANALYZE AND RESOLVE AN AUDIT ERROR REPORT

OVERVIEW

This procedure is used to analyze and resolve an audit error report. An audit is a process in the system integrity software subsystem (under the maintenance software) that is used to verify data in five major software areas:

- Operating System
- Call Processing
- Maintenance
- Administrative Services
- Data Bases.

There are two types of audits: *system* and *application*:

System audits help maintain the Administrative Module (AM) and run under the control of the UNIX¹ System V RTR Operating System. For detailed information applicable to system audits, refer to the 235-600-400, *Audits Manual*.

Application audits run under the control of Operating System for Distributed Switching (OSDS) and are explained in detail in 235-600-400, *Audits Manual*.

An audit error report is an output message printed on the Receive-Only Printer (ROP) located at the Master Control Center (MCC). This report conveys information to trained personnel who are responsible for the analysis and correction of data base errors or hardware equipage that is not consistent with the relation data base. Figure 16.2-1 is an example of one type of audit error output message.

In Figure 16.2-1, the letter "A" in the left margin indicates that the error can be corrected locally and manual action is required. The "ENV=OKP" entry indicates the Operational Kernel Process and the "TKQUE" and "ERROR-CODE=PORT" entries indicate that the trunk queue audit has detected PORT errors. Normally, PORT errors result from an inconsistency in the ODD and continue (repeat) until fixed by a maintenance person. The total number of errors equals four. The EVENT NUMBER for this audit is 756. This number allows a maintenance person to collect and assimilate all the messages related to this error because all other messages have the same EVENT NUMBER.

PROCEDURE

1. Analyze the audit error message by checking the appropriate error code description block provided in the ERROR DESCRIPTION of 235-600-400, *Audits Manual*.
2. If the ERROR DESCRIPTION indicates that the error is associated with one or more relations, then it is necessary to perform an analysis of the affected relations using the field layout contained in 235-600-200, *Translations and Dynamic Data Manual*.

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3. When a specific relation and tuple in that relation are identified, the Office Data Base Editor (ODBE) subsystem is used to display the attributes of the affected tuple(s). Refer to Procedure 16.5.
4. Look for errors or inconsistencies in the tuple and its attribute values. Perhaps a tuple in one relation is not consistent with a tuple in another relation, or there is associated hardware that is not installed or operating consistently with the population of the relation(s) in the data base.
5. If an inconsistency or error in the data base is found, try correcting it using the appropriate RC/V mode and manual. Refer to Procedure 16.1, Modify Office Dependent Data with Recent Change/Verify.
6. If the correction cannot be made using RC/V, follow local practices and either use the Office Data Base Editor (ODBE), Procedure 16.5, or ***seek technical assistance***.
7. Once relations are corrected, verify the correction by observing the ROP printout to ensure that an identical audit error is not being repeated.
8. If an audit error message cannot be resolved using the previous steps, ***seek technical assistance***.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

```
A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756
  ERROR-ADDR=H'0 BAD-DATA=H'0
  LOG-KEY=H' a 10e0002 GOOD-DATA=H'0

A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756
  ERROR-ADDR=H'0 BAD-DATA=H'0
  LOG-KEY=H' a 13e0002 GOOD-DATA=H'0

A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756
  ERROR-ADDR=H'0 BAD-DATA=H'0
  LOG-KEY=H' 140d0002 GOOD-DATA=H'0

A50 AUD ENV=OKP TKQUE ERROR-CODE=PORT EVENT=756
  ERROR-ADDR=H'0 BAD-DATA=H'0
  LOG-KEY=H' a 10a002 GOOD DATA=H'0

AUD ENV=OKP TKQUE COMPLETED ERRORS=4 EVENT=756
```

Figure 16.2-1 — Typical Audit Error Output Message

16.3 ANALYSIS PROCEDURES FOR STATIC OFFICE DEPENDENT DATA AUDIT

OVERVIEW

The procedures in this section are used to analyze, correct, and verify Static Office Dependent Data (SODD) audit error messages.

Note: When errors are encountered during the execution of the SODD audit, they are logged and then output by the service provider. The SODD audit error messages that are output contain the current Population Rule Language, Version 5.0 (PRL5) source code relation name and line number, a printed segment of the code, and the data that violates the rule. Therefore, it is important to understand how to interpret PRL5 source code, how and where to locate the source code, and how to resolve the errors once they are found.

The following information products are the primary sources of SODD audit information:

- 235-105-110, *System Maintenance Requirements and Tools*
This information product contains a brief description of the SODD audit feature.
- 235-105-210, *Routine Operations and Maintenance Procedures*
This information product provides the SODD audit setup, scheduling, and monitoring procedures.
- 235-105-220, *Corrective Maintenance Procedures*
This information product contains the SODD audit error message analysis procedures.
- 235-600-410, *Static Office Dependent Data (SODD) Audits Manual*
This information product provides:
 - A full feature description of the SODD audit
 - Listings of relations checked by subaudits and entity audits
 - SODD audit output message descriptions
 - SODD audit setup, scheduling, and monitoring procedures¹
 - SODD audit output message analysis procedures¹

Along with the previously mentioned documentation, the following documentation could be used in analyzing and resolving SODD error conditions:

- 235-118-2xx, *Recent Change Procedures Manual*
This information product contains RC/V procedures.
- 235-118-251, *Recent Change Reference Manual*
This information product contains RC/V reference information.
- 235-600-1xx, *Population Rules Language (PRL) Data Manual*
This information product contains population rules by relation.

1. These procedures are also provided in the 235-105-210, *Routine Operations and Maintenance Procedures*, and the 235-105-220, *Corrective Maintenance Procedures*.

- 235-600-510, *Software Analysis Guide*
This information product provides instructions on how to use the on-line listing service of Electronic Media Networked Services.

- 235-600-1xx, *Translation Data Manual*
This information product contains relation descriptions.

Note: An x or x's in the last three positions of a release-specific document number indicate the digits that change from release to release. Refer to 235-001-001, *Documentation Description and Ordering Guide*, for the document number associated with each software release.

Types of SODD Audit Error Messages Three forms of error output, or SODD audit error messages, can result from the SODD audit:

- Standard SODD audit error messages
- Functional SODD audit error messages
- Custom SODD audit error messages

Each SODD audit error message has a heading that consists of:

- PRL5 file name in which the failing PRL5 code can be found
- Line number of the PRL5 check that failed
- Software load identifier for which the error message is applicable.

Standard SODD Audit Error Message The standard SODD audit error message is the default error output and is the error message most commonly found. In the standard SODD audit error message, relation and attribute data inconsistencies are identified, and a portion of the PRL5 is presented showing where the data error occurred. This appears in the "RULE" section of the message. See Exhibit 16.3-1.

Exhibit 16.3-1 — Standard SODD Audit Error Message

```
RLfc_trunk.R, line 5597
RULE:

for fc_trunk in RLfc_trunk
begin
if (fc_trunk.enh_psap_sig == DBYES) then
begin
    _581:
    fc_trunk.cama_psap == DBYES;
end
end

The Following Data Violate This Rule:

CONTEXT for Error 4:
<current_pcr=9>
<fc_trunk=<FC_TRUNK:processor=9:port.member=64e:port.module=9>>
```

Functional SODD Audit Error Message The functional SODD audit error message is

similar to the standard SODD audit error message except that instead of the code segment in the "RULE" section of the message, there is only one line of source code printed, along with a message to look at the on-line source code listings for the entire check. See Exhibit 16.3-2.

Exhibit 16.3-2 — Functional SODD Audit Error Message

```
RLrc_oeinf.R, line 588

RULE:
function cnt_multidn(int maxcnt, DMNOC noc, DMLOCDIG digits) returning int
begin /* ...body omitted... */
end
function chk_termky(DMLPORT lport, DMMODULE module) returning {boolean,int}
begin /* ...body omitted... */
end

The following data violate the rule:
Context for error 3:
<current_pcr=2>
<fc_porttyp=<FC_PORTTYP:processor=2:port.member=28:port.module=2>>
```

Custom SODD Audit Error Message If a custom message is written for a particular check, the default SODD audit error message is replaced by a custom SODD audit error message, which includes text and data to assist switch personnel in finding and resolving the error. If the PRL5 assertion label starts with "M" (for example, Mann8a), it signifies a custom SODD audit error message. See Exhibit 16.3-3.

Exhibit 16.3-3 — Custom SODD Audit Error Message

```
RLannc_hdr.R, line 5573

RULE FRAGMENT FROM WITHIN A FUNCTION BODY (TO VIEW THE COMPLETE RULE,
PLEASE REFER TO THE PRL5 ON-LINE LISTINGS, WHICH CAN BE ACCESSED VIA
DIAL-UP CONNECTION TO THE LUCENT TECHNOLOGIES IDS DOCUMENTATION.)

The following APPLICATION/PHRASES entered on the ANNHD form
(view 8.61) do not have the corresponding APPLICATION/PHRASE ID
entered on the PHRASE form (view 8.63) .

The following data contains the APPLICATION, HEADER_ID and
PHRASE in error.

RULE FRAGMENT FROM WITHIN A FUNCTION BODY (TO VIEW THE COMPLETE RULE,
PLEASE REFER TO THE PRL5 ON-LINE LISTINGS, WHICH CAN BE ACCESSED VIA
DIAL-UP CONNECTION TO THE LUCENT TECHNOLOGIES IDS DOCUMENTATION.)

Mann8a:
find exactly 1 phrases in RLphrases on am
where(phrases.ph_id equals annc_hdr.phrase1 and phrases.appl equals
annc_hdr.appl);

The Following Data Violate This Rule:

CONTEXT for Error 1:
<current_pcr=1>
<annc_hdr=>ANNC_HDR:processor=1:appl=FCOSPS_DA hdr_id=7656>
<nappl=OSPSDA>
<hdr_id=7656>
<phrase1=12043>
```

SODD Audit Error Message Description SODD audit error message descriptions are listed alphabetically in the 235-600-410, *Static Office Dependent Data (SODD) Audits Manual*. Each SODD audit error message description contains a SODD audit error message (SODD audit output) along with an explanation of the error, what the failing PRL5 was auditing, what may have caused the failure, and the recommended corrective action. The five sections of the SODD audit error message description include:

1. SODD audit output
2. Diagnosis
3. Explanation of PRL5
4. Cause
5. Corrective action

For an example of a SODD audit error message description, see Exhibit [16.3-4](#).

Exhibit 16.3-4 — SODD Audit Error Message Description

SODD OUTPUT: RLfc_trunk.R,line 5589 (SU 99-0012)

```
RULE:
for fc_trunk in RLfc_trunk
begin
  if(fc_trunk.enh_psap_sig == DBYES) then
  begin
    fc_trunk.cama_psap == DBYES;
  end
end
```

DIAGNOSIS:
Audit has detected an invalid setting for the "cama_psap" [Centralized Public Automatic Message Accounting (CPAMA) Public Safety Answering Point (PSAP)] attribute in the RLfc_trunk base relation.

EXPLANATION OF PRL5:
The RLfc_trunk base relation contains feature data for trunks. This rule verifies that every trunk group that uses Enhanced Public Safety Answering Point Signaling must have RLfc_trunk.cama_psap set to Y. The RLfc_trunk.cama_psap attribute indicates whether the trunk group connects to a CAMA Public Safety Answering Point used for Enhanced 911 service.

CAUSE:
The cause of the failure cannot be determined. RC has a level 2 check to ensure that data is populated correctly.

CORRECTIVE ACTION:

Caution: ODBE should be used by only experienced personnel familiar with the 5ESS(R) switch database.

The data can be corrected as follows. Using the SODD output and ODBE, identify the trunk group/trunk member that caused the SODD audit to fail.

Example of SODD output:

```
<fc_trunk=<FC_TRUNK:AA:BB CC>>
```

where: AA is the processor number
BB is the trunk port member
CC is the trunk port module

1. Invoke ODBE tool.
2. Select processor number (use the AA value from SODD Output section).
3. Specify FC_TRUNK as the relation name.
4. Select the R operation for review.
5. You will be prompted for:
member See above (use the BB value from SODD Output section).
module See above (use the CC value from SODD Output section).
6. Copy the tgroup and the member values.

Given the values found in Step 6, invoke RC View 5.1 (TRUNK GROUP) and update the CAMA PSAP field to Y.

PROCEDURE

1. Find the relation name and line number of the SODD audit error message, then search 235-600-410, *Static Office Dependent Data (SODD) Audits Manual* for an existing SODD audit error message description with the same relation name and line number as those found in the SODD audit error message. For example, a search on the relation name **fc_trunk.cama_psap**, found in the SODD audit error message in Exhibit 16.3-1, is used to find the existing SODD audit error message description in Exhibit 16.3-4.
2. If an existing SODD audit error message description with the same relation name and line number as those of the SODD audit error message is found, then go to Step 4. If an existing SODD audit error message description with the same relation name and line number as those of the SODD audit error message cannot be found, then go to Step 3.
3. Search 235-600-410, *Static Office Dependent Data (SODD) Audits Manual* for an existing SODD audit error message description with the same relation name, a different line number, but the same rule as those found in the SODD audit error message. If a message with the same relation name, a different line number, but the same rule as those found in the SODD audit error message is found, then go to Step 4. If a message with the same relation name, a different line number, but the same rule as those found in the SODD audit error message is not found, then go to Procedure 16.3.1.
4. Read the Diagnosis, Explanation of PRL5, Cause, and Corrective Action for the SODD audit error listed in the SODD audit error message description (see Exhibit 16.3-4).
5. Perform the corrective action as described in the SODD audit error message description, then go to Step 6.
6. Once the error is corrected, verify the correction by executing the SODD entity audit on the relation that caused the failure.
7. Examine the ROP printout of the SODD entity audit to ensure that the audit error is not being repeated.
8. If the SODD entity audit does not detect an error, the procedure is complete. If the SODD entity audit detects an error, then go to Step 9.
9. If the SODD audit error message is a standard or functional error message (see Exhibits 16.3-1 and 16.3-2), then go to Procedure 16.3.1. If the SODD audit error message is a custom error message (see Exhibit 16.3-3), then go to Procedure 16.3.2.
10. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.3.1 Standard and Functional SODD Audit Error Message Resolution

PROCEDURE

Note: In order to resolve an error detected by the SODD audit, an understanding of how to interpret PRL5 source code, how and where to locate the source code, and how to use RC/V and ODBE are all necessary. If you do not feel comfortable attempting to resolve an error, seek the next higher level of technical support.

1. Attempt to identify and locate the inconsistency or error in the database:
 - a. Establish a time frame for the error. Determine if the error was the result of running a full, incremental, or entity audit. This helps narrow the scope of the search.
 - b. Examine the following parts of the SODD audit error message:
 - Relations – to identify the relation name
 - Rule – to read the PRL5 to interpret the check
 - Keys – to identify the data (keys and other data)
 - Other attributes – used in the check or rule.
 - c. Examine the PRL5 files to narrow the search for the location of the error and to give greater context to the PRL5 code segment (rule). And check 235-600-1xx, *Translations Data Manual*, to gather information regarding:
 - The relation and impact of the error
 - The relation to RC view mapping
 - The key attributes.

Although the applicable PRL5 can be obtained from 235-600-1xx, *Translations Data Manual*, or the PRL5 on-line listings, the on-line listings are the recommended source for SODD audit error message PRL5 lookup, since the listings are the most current source and provide character string search tools to assist in locating the applicable PRL5.

Note: Entry in the PRL5 relation file should be made initially by using the line number provided in the SODD audit error message.

- d. Search for and investigate other error messages to see if a series of similar errors have been reported.

If at any time during this analysis process the inconsistency or error in the database is found, go to Step 4. If the inconsistency or error in the database is not found, go to Step 2.

2. Access RC/V in the review mode to:
 - Review information
 - Look for recent change errors
 - Identify problems.

If the inconsistency or error in the database is found, go to Step 4. If the inconsistency or error in the database is not found, go to Step 3.

3. Using the office database editor (ODBE), continue to investigate the specific PRL5 code, relations, tuples, and attributes identified in the SODD audit error message.

Caution: Only office data experts should use ODBE. Inadvertent usage could result in processor down time.

Look for errors or inconsistencies in the tuple(s) and its attribute values [for example, a tuple in one relation is not consistent with a tuple in another relation or associated hardware is not installed/operating consistently with the data population in the relation(s)].

If the inconsistency or error in the database is found, go to Step 4. If the inconsistency or error in the database is not found, go to Step 8.

4. Using the appropriate RC/V mode and the 235-118-2xx, *Recent Change Reference Manual*, try correcting the inconsistency or error in the database, then go to Step 5.

If the correction cannot be made using RC/V, use ODBE to correct the database error, then go to Step 5.

Caution: Only office data experts should use ODBE. Inadvertent usage could result in processor down time.

5. Once the error is corrected, verify the correction by executing the SODD entity audit on the processor and relation that caused the failure, then go to Step 6.
6. Examine the ROP printout of the SODD entity audit to ensure that the audit error is not being repeated, then go to Step 7.
7. If the SODD entity audit does not detect an error, the procedure is complete. If the SODD entity audit detects an error, go to Step 8.
8. If the inconsistency or error in the database can not be found, repeat Step 1. If an audit error message cannot be resolved by repeating the previous steps, seek the next higher level of technical support.
9. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.3.2 Custom SODD Audit Error Resolution

PROCEDURE

1. Perform error resolution by referring to the RC/V views and attributes identified in the custom SODD audit error message.
2. Using the appropriate RC/V mode and the 235-118-2xx, *Recent Change Reference Manual*, try correcting the inconsistency or error in the database.
3. Once the error is corrected, verify the correction by executing the SODD entity audit on the relation that caused the failure.
4. Examine the ROP printout of the SODD entity audit to ensure that the audit error is not being repeated.
5. If the SODD entity audit does not detect an error, the procedure is complete. If the SODD entity audit detects an error, repeat Step 1. If the custom SODD audit error message cannot be resolved by using the previous steps, seek the next higher level of technical support.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.4 ANALYZE AND RESOLVE AN ASSERT ERROR REPORT

OVERVIEW

This procedure is used to analyze and resolve an assert error report. An assert is a statement in a software release that performs a defensive check to detect data base (software) errors. An assert error report is generated when a defensive check (assert) failure requires manual action. Refer to 235-600-750, *Output Messages*, for details.

There are two message classes, **ASRT** and **CP**. The *ASRT* message class applies to the administrative module (AM), switching module (SM), and communication module processor (CMP). The *CP* message class applies to the module controller/time slot interchanger (MCTSI) and packet switching unit (PSU) protocol handler (PSUPH).

PROCEDURE

1. The output message format is as follows:
REPT MANUAL ACTION ASSERT=a b EVENT=g
[MSG-NO=d]
e AT f g
h

Where:

- AM UNK = Unknown AM environment.
- AM ENV = AM environment.
- CHNG = Channel group.
- CMP = Communication module processor.
- MCTSI = A manual action assert occurred in the packet interface (PI) processor.
- PSUPH = A manual action assert occurred in the PSUPH processor.
- SM = Switching module.
- UNK = Unknown environment.

a = Assert number in decimal.

b = The processor environment where the assert occurred. Valid values:

- **AM ENV=h**
- **AM UNK**
- **CMP=i-j k**
- **MCTSI=j-n PI**
- **SM=j**
- **PSUPH=j-o-p-q [CHNG=j-o-p-r]**
- **UNK**

c = Event number.

d = Sequence number used to trace the sequence of messages from a given processor.

e = Name of source file where the defensive check failed.

f = Indicates the scope of variable *g*. Valid values:

— *LINE* = variable *g* is a source file line number.

— *REFERENCE* = variable *g* is a programmer-defined reference number.

g = Decimal line number or decimal reference number in the source file indicating the location of the defensive check.

h = Additional information and data referenced by the “Action to be Taken” section for this defensive check failure in the Manual Action Asserts section of the Asserts manual.

i = Administrative module environment in which assert occurred. Valid values:

— *OKP* = Operational kernel process.

— *SMKP* = Switch maintenance kernel process.

j = SM number.

k = CMP message switch side (MSGs).

l = Physical CMP number.

m = Processor being reported on. Values values:

— *MATE* = Mate CMP.

— *PRIM* = Primary CMP.

n = The MCTSI side that corresponds to the PI side.

o = PSU number.

p = PSU shelf number.

q = PSUPH number.

r = Channel group (CHNG) number.

2. When the output message is printed on the ROP located at the MCC, refer to 235-600-500, *Asserts Manual*, or 235-600-510, *Software Analysis Guide*, for the manual action required.
3. If the problem cannot be resolved, ***seek technical assistance.***
4. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.5 MODIFY OR REVIEW DATA BASE RELATIONS WITH ODBE

OVERVIEW

This procedure is used to modify or review data base relations with the Office Data Base Editor (ODBE). The ODBE is an interactive tool that is used to make manual changes to a data base relation. For detailed information about the attribute and relation descriptions, population rules, and other applicable information, refer to the currently-supported Translations Data Manual, 235-600-1XX, where XX is the currently-supported document identifier.

When using ODBE, it is important that the craft be thoroughly trained in all aspects of the 5ESS[®] switch software data bases. With ODBE, it is possible to update, delete, or insert information into ODD relations that is critical to the operation of the 5ESS switch.

Caution: *Improper use of ODBE can affect service or bring down a processor. Before updating, deleting, or inserting information into a base relation, or overwriting data, consult local supervision concerning policy or seek technical assistance.*

The following generalized information, concepts, and rules apply to ODBE. Review all of them thoroughly before attempting to use ODBE.

Use of ODBE is controlled by an input message from the Recent Change/Verify (RC/V), the Trunk and Line Work Station (TLWS), the Supplementary TLWS (STLWS) video display terminal, or using poke 194 at the Master Control Center (MCC). The output information from ODBE can only be displayed on the video terminal being used as the input device.

The following input message (MML format) is used to access ODBE:

rcv: menu:odbe; PF

Note 1: If the switch accepts the input message [as evidenced by a printout follows (PF) entry at end of input message], then the output message (**OFFICE DATA BASE EDITOR, version X.0**) should appear on the second line of the video terminal display. The X.0 may be either 5.0 or 6.0, depending on the software release.

Note 2: A password may be required to use ODBE. The prompt string **Password:** is printed on the terminal, and the ODBE password must be entered.

The ODBE may operate in either of the following states:

- **Enter Processor Number**
- **Enter Relation Name**
- **Enter Tuple Operation**
- **Enter Primary Key**
- **Enter Attribute Value.**

If the ODBE is in the **Enter Processor Number** state, *simultaneously* press the "CTRL" (control) and "d" keys on the video terminal keyboard to exit ODBE.

When using ODBE, the user response to a given prompt is usually a data base defined name, an encoded choice from a menu of options, or an ODBE special character.

Special characters have a meaning only if they are the first character in a user response. The special characters and their meanings are as follows:

- **The Question (?) Symbol:** This signifies "help" and the switch displays a list of the valid options.
- **The Plus (+) Symbol:** This displays information relevant to the current state (for example, lists all valid relation names in the system).
- **The Exclamation (!) Symbol:** This causes a backup to the next higher data base state (for example, **Enter Processor Number** being the highest state and **Enter Attribute Value** being the lowest state).
- **The Less Than (<) Symbol:** This causes a return to the previous attribute. Valid only when the ODBE is in the **Enter Attribute Value** state.
- **The Greater Than (>) Symbol:** This causes a skip of all the remaining attributes in a tuple and performs the appropriate tuple operation. Valid only when the ODBE is in the **Enter Attribute Value** state.
- **The Carriage Return <cr> Key:** This causes a skip of the attribute and performs an update operation. It leaves the current value of the attribute unchanged. Valid only when the ODBE is in the **Enter Attribute Value** state.

The ODBE states, and the various user operations applicable to those states, are described as follows:

- Administrative Module (AM), Switching Module/Switching Module-2000 (SM/SM-2000) number, or the Communications Module Processor (CMP) where the base relation resides. If a question (?) symbol is entered while in this state, the following prompts are displayed:
 1. **1-192** for the SM number
 2. **193** for the CP (also known as the AM)
 3. **194-205** for the primary Communication Module Processor (CMP) number
 4. **206-217** for the mate CMP number
 5. **ALL** for redundant tuple read (*refer to the following Note*).
Note: The **ALL** option allows the user to examine redundant tuples across all SM processors. On selecting this option, the user is prompted for the relation name and a key value. All tuples that match this key (across all SMs) are written to a user-specified file. This feature is useful for debugging split translations when one SM has data inconsistent with the other SMs.
 6. A **control-d** to exit the ODBE.
- **Enter Relation Name State:** This state of the ODBE prompts the user for the base relation name. If a question (?) symbol is entered while in this state, the following prompts are displayed:
 1. **A relation name:** When a relation name is input, it must be entered in UPPERCASE lettering. If the relation name contains an underscore (_), then the underscore must be preceded by a backslash (\); entry of the backslash is optional. On accepting a valid relation name, the ODBE goes into the **Enter Tuple Operation** state.

2. **PARAMETER to edit parameters:** This option is used when entering global parameters. Extreme **Caution** is required when using this option.
 3. **An Exclamation (!) Symbol:** If this option is input, it changes the editor options in the base state. Use of this symbol always shifts the user to the next higher data base state.
 4. **A Plus (+) Symbol:** If this option is input, it lists all the valid relation names in the system (this list could be rather long).
 5. **STORAGE to modify storage table relations:** This option is used to read or insert tuples of a storage table relation. Extreme **Caution** is required when using this option. If this option is input, the user is prompted for the **Storage Table Name**. On accepting a valid **Storage Table Name**, the ODBE goes into the **Enter Tuple Operation** state.
- **Enter Tuple Operation State:** This state prompts for the tuple operation to be performed. The valid tuple operations are as follows:

I = Insert (add a new tuple)
R = Review (display a tuple)
U = Update (modify a tuple)
D = Delete (remove a tuple)
W = Write a tuple to a file
BI = Batch Insert (add tuples from a file)
BR = Batch Review (output a relation to a file)
BW = Batch Write (output tuples to a file)
VIRT = Displays information about a virtual relation(only valid or displayed when a virtual relation name is entered).

The valid storage table tuple operations are as follows:

I = Insert (add a new Generated Key tuple)
R = Review (display a tuple without entering the generated key)
BI = Batch Insert (add generated key tuples from a file)
BR = Batch Review (output storage tuples to a file)
GKR = Generated Key Review (displays a tuple with the generated key entered)
GKVIRT = Displays the virtual update relations of a Generated Key relation.

The Storage Table Relation Insert or Batch Insert Operations are not logged and would be lost if the affected processor were pumped. To make the Storage Table

Insert or Batch Insert Operations permanent, a back-up of the ODD of that processor is required. Refer to 235-105-210, *Routine Operations and Maintenance Procedures*.

Since the CMP mate side ODD is updated through continuous roll forward using the CMP log file, and ODBE Storage Table Inserts and Batch Inserts are not logged, the Storage Table Inserts and Batch Inserts do not roll forward to the mate side. To get the mate side to contain the Storage Table Inserts or Batch Inserts that the active side has, a soft switch of the CMP is required. Refer to **SW:CMP** in 235-600-700, *Input Messages*.

If a question (?) symbol is entered while in this state, the output message “**You may enter:**” and the following prompts are displayed (*refer to Note 1*):

- A tuple operation code (I, R, U, D, W, BI, BR, BW, or OVWTODD)
- An exclamation (!) symbol.

Note 1: On entering an I, R, U, or D tuple operation, the ODBE goes into the **Enter Primary Key** state. With the W, BI, and BR tuple operation, this is slightly modified. On entry of the W tuple operation, the user is prompted by the following output message: **Enter UNIX¹ system file for tuple review output:**

It then prompts for the **Primary Key** state. On entry of the BI or BR tuple operation, the prompt is for the UNIX system file name in which to print or store the data. When entering the UNIX system file name, you must be in a directory, then any file name can be used.

Note 2: Operations for the MATE CMP and Reverse Index type relations are only a subset of the tuple operations.

- **Enter Primary Key State:** In this state, the user is prompted by name for the components of the key that uniquely defines a tuple in the relation. If a question (?) symbol is entered, the following prompts are displayed:
 - **Enter Primary Key:** Refer to Figures 16.5-1, 16.5-2, 16.5-3, 16.5-4, and 16.5-5.
 - An exclamation (!) symbol to change tuple operations.
 - A plus (+) symbol to list key information.
 - A null (0) character string.
 - **Control-d** to exit.
- **Enter Attribute Name or >:** With this prompt, the user can enter the attribute name or use the greater than (>) symbol. If an attribute name is entered, it must be entered exactly as it appears in the base relation. If the greater than symbol is entered, the ODBE displays the item(s), their existing value, and in the update (U) tuple operation, an enter new value prompt for each item displayed.
- **Enter Attribute Value State:** In this state, the user is prompted (depending on the tuple operation) for the value associated with the attribute name(s). Once the attribute name(s) and attribute value are displayed, the user is prompted to enter a new value or a greater than (>) symbol. If a new value is entered, it is displayed. If the greater than symbol is used, then the ODBE sends the user to

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the end of the tuple. If a question (?) symbol is entered, the output message “**You may enter:**” and the following prompts are displayed:

- **An attribute value:** If specified, the ODBE allows entry of the attribute value.
- **A Backslash or <cr> Symbol:** Used to keep old value.
- **A Less Than (<) Symbol:** Used to go back to the previous item.
- **A Greater Than (>) Symbol:** Used to skip remaining items and update.
- **An Exclamation (!) Symbol:** Used to cancel this tuple update.

PROCEDURE

1. At the appropriate designated video display terminal, determine the ODBE operation to be performed per the following:
 - Insert Tuple Operation – Figure 16.5-1
 - Review Tuple Operation – Figure 16.5-2
 - Update Tuple Operation – Figure 16.5-3
 - Delete Tuple Operation – Figure 16.5-4
 - Write Tuple Operation – Figure 16.5-5
 - Batch Insert Tuple Operation – Figure 16.5-6
 - Batch Review Tuple Operation – Figure 16.5-7
 - Batch Write Tuple Operation – Figure 16.5-8
 - VIRT Operation – Figure 16.5-9
 - Insert Generated Key Tuple Operation – Figure 16.5-10
 - Review Storage Table Operation – Figure 16.5-11
 - Batch Insert Generated Key Tuples Operation – Figure 16.5-12
 - Batch Review Storage Table Operation – Figure 16.5-13
 - Generated Key Review Storage Table Operation – Figure 16.5-14
 - GKVIRT Operation – Figure 16.5-15.
2. Using the appropriate information provided in the OVERVIEW and the figures as guidelines, perform the appropriate data base changes. If any error occurs that cannot be resolved, **seek technical assistance.**
3. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): I
Enter Primary Key
key item 1: servclas = FC_INDVDL
key item 2: signal = FCSSNULL
key item 3: sigtype = DBTT
Enter Attribute Value
enter item 4: critical = 4000
enter item 5: partial = 20000
enter item 6: permsig = 10000
enter item 7: ovldpart = 10000
enter item 8: ovldperm = 1000

Enter Primary Key
key item 1: servclas = ! (Refer to Note 3)

The diagram consists of two vertical curly brackets on the right side of the text. The first bracket groups the three key items (servclas, signal, sigtype) and points to the text '(Refer to Note 1)'. The second bracket groups the five attribute values (critical, partial, permsig, ovldpart, ovldperm) and points to the text '(Refer to Note 2)'.

Note 1: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 2: These values are enumerations only. Refer to the appropriate TDM.

Note 3: The tuple is inserted, but not committed until the exclamation (!) symbol is entered.

Figure 16.5-1 — Typical Insert Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): R
Enter Primary Key
 key item 1: servclas = FC_INDVDL
 key item 2: signal = FCSSNULL
 key item 3: sigtype = DBTT
Enter Attribute Value
 enter item 4: critical = 4000
 enter item 5: partial = 20000
 enter item 6: permsig = 20000
 enter item 7: ovldpart = 10000
 enter item 8: ovldperm = 10000

(Refer to Note 1)

(Refer to Note 2)

Enter Primary Key

Note 1: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 2: These values are enumerations only. Refer to the appropriate TDM.

Figure 16.5-2 — Typical Review Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Primary Key
key item 1: servclas = !
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): U
Enter Primary Key
key item 1: servclas = FC_INDVDL
key item 2: signal = FCSSNULL
key item 3: sigtype = DBTT
} (Refer to Note 1)
Enter Attribute Name or (>): > (Refer to Note 2)
enter item 4: critical = 4000 enter new value = 5000
enter item 5: partial = 20000 enter new value =
enter item 6: permsig = 20000 enter new value =
enter item 7: ovldpart = 10000 enter new value =
enter item 8: ovldperm = 10000 enter new value =
Tuple Rewritten (Refer to Note 3)

Enter Primary Key
key item 1: servclas = ! (Refer to Note 3)

Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): U

Enter Primary Key
key item 1: servclas = FC_INDVDL
key item 2: signal = FCSSNULL
key item 3: sigtype = DBTT
} (Refer to Note 1)
Enter Attribute Name or >: critical (Refer to Note 2)
enter item 4: critical = 5000 enter new value = 4000
enter item 5: partial = 20000 enter new value = >
Tuple Rewritten (Refer to Note 3)
Enter Primary Key
key item 1: servclas = ! (Refer to Note 3)

Note 1: Refer to appropriate Translations Data Manual (TDM) for entries.

Note 2: The attribute name selected must be entered exactly as it appears in the base relation. If the greater than (>) symbol is selected, ODBE prompts for the next item, its existing value, and enter new value prompt. This action continues in numerical sequence until the end of all items. With the enter new value prompt, a new value may be entered or the existing value retained. (The values shown in the above example are enumerations only, refer to the appropriate TDM for specific values.) To continue from one key item to another, press the "RETURN" key. If the greater than (>) symbol is entered for the enter new value prompt, ODBE defaults the rest of the tuple to the state it was in before the update.

Note 3: Tuple update is not committed until an exclamation (!) symbol is entered.

Figure 16.5-3 — Typical Update Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW) = D
Enter Primary Key
 key item 1: servclas = FC_INDVDL
 key item 2: signal = FCSSNULL
 key item 3: sigtype = DBTT
 } (Refer to Note 1)
Would you like to see the tuple before you delete it? (y/n): n
Tuple Deleted (Refer to Note 2)
Enter Primary Key
 key item 1: servclas = ! (Refer to Note 2)

Note 1: Refer to the appropriate Translation Data Manual (TDM) for these entries.

Note 2: The tuple delete is not committed until the explanation(!) symbol is entered.

Figure 16.5-4 — Typical Delete Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): W

Enter an asterisk (*) for output at your terminal or
enter UNIX system file name for directed output: (Refer to Note 1)

Enter Primary Key

key item 1: servclas = FC_INDVDL
key item 2: signal = FCSSNULL
key item 3: sigtype = DBTT } (Refer to Note 2)

item 4: critical = 4000
item 5: partial = 20000
item 6: permsig = 20000
item 7: ovldpart = 10000
item 8: ovlperm = 10000 } (Refer to Note 3)

Enter Primary Key

key item 1: servclas = ! (Refer to Note 4)

Tuple printout completed

Note 1: Response to this prompt must be made from a UNIX system directory using any valid file name from that directory. If an asterisk (*) is entered, output goes only to terminal; otherwise, output goes to both terminal and file.

Note 2: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 3: The values shown are enumeration only. Refer to the appropriate TDM for specific values.

Note 4: The write operation is not committed until the exclamation (!) symbol is entered.

Figure 16.5-5 — Typical Write Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): BI

Enter UNIX system file name: /tmp/datimer (**Refer to Note 1**)
Enter an asterisk (*) symbol for error messages to terminal or enter
UNIX system file name for directed output: *
If you want new tuples to overwrite existing tuples, enter (y or n): y

Insert processing completed. (**Refer to Note 2**)
DA_TIMER 145 tuples inserted, 0 errors detected (**Refer to Note 2**)

Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): !
Enter Relation Name: !
Enter Processor Number (0-192): !

} (**Refer to Note 3**)

Note 1: Response to this prompt must be made from a UNIX system directory using a valid file name from that directory. This file name in this example is the datimer base relation from the previous batch review (BR).

Note 2: This entry is a switch response.

Note 3: Use of the exclamation symbol (!) allows sequential backup to the **Enter Processor Number** state. Once in this state, the "CTRL-d" keys may be used to exit ODBE.

Figure 16.5-6 — Typical Batch Insert (BI) Tuple Operation

Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): BR
Enter UNIX system file name: /tmp/datimer (**Refer to Note 1**)

Review processing completed. (**Refer to Note 2**)
147 tuples written to File /tmp/datimer (**Refer to Note 2**)

Note 1: Response to this prompt must be made from a UNIX system directory using a valid file name from that directory. The file name used in this example is applicable to the da_timer base relation. Refer to

Note 2: This entry is a switch response.

Figure 16.5-7 — Typical Batch Review (BR) Tuple Operation

```
Enter Processor Number (1-217): 1
Enter Relation Name: DA_TIMER
Enter Tuple Operation (I, R, U, D, W, BI, BR, BW): BW
  Enter UNIX system file name: da_timer,bw (Refer to Note 1)
Enter Primary Key
  key item 1: servclas = FC_INDVDL
  key item 2: signal = FCSSNULL
  key item 3: sigtype = DBTT } (Refer to Note 2)
Do you want to print another tuple? (y/n) y
Enter Primary Key
  key item 1: servclas = FC_INDVDL
  key item 2: signal = FCSSNULL
  key item 3: sigtype = DBTT } (Refer to Note 2)
Do you want to print another tuple? (y/n) y
Enter Primary Key
  key item 1: servclas = FC_INDVDL
  key item 2: signal = FCSSNULL
  key item 3: sigtype = DBTT } (Refer to Note 2)
Do you want to print another tuple? (y/n) y
Enter Primary Key
  key item 1: servclas = FC_INDVDL
  key item 2: signal = FCSSNULL
  key item 3: sigtype = DBTT } (Refer to Note 2)
Enter Primary Key
  key item 1: servclas = ! (Refer to Note 3)
  Batch write processing completed.
  3 tuples written to File da_timer,bw
```

Note 1: Response to this prompt must be made from a UNIX system directory using any valid file name from that directory. The file name in this example is the da_timer base relation from the batch write operation.

Note 2: Refer to the appropriate Translations Data Manual (TDM) for these entries.

Note 3: The batch write is not committed until the explanation (!) symbol is entered.

Figure 16.5-8 — Typical Batch Write (BW) Tuple Operation

Enter Processor Number (1-217): 194
Enter Relation Name: RC_LDRMK
Enter Tuple Operation (I,R,U,D,W,BI,BR,BW,VIRT): VIRT

Virtual general use relation RC_LDRMK is composed of physical relations:
LDRMK_R, REM_G

RC_LDRMK.1dit, RC_LDRMK.rcdigs are keys to LDRMK_R (1dit,rcdigs).
LDRMK_R.remarks is key to REM_G (gkREM_G).

RC_LDRMK.1dit is a key attribute.
RC_LDRMK.rcdigs is a key attribute.
RC_LDRMK.rem comes from REM_G.rem.

Virtual relation description output completed

Figure 16.5-9 — Typical VIRT Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): I
Enter Generated Key
key item 1: GK=5
Enter Attribute Value
enter item 2: remark=SMOPER (Refer to Note 1)

Tuple Inserted

Note 1: Refer to the appropriate Translations Data Manual.

Figure 16.5-10 — Typical Generated Key Table Insert Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying Storage Table Relations, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): R
Enter Primary Key
enter item 2: remark=SMOPER (Refer to Note 1)

Note 1: Refer to the appropriate Translations Data Manual.

Figure 16.5-11 — Typical Storage Table Review Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying Storage Table Relations, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): BI
Enter UNIX system file name: /tmp/rem_g (Refer to Note 1)
Enter an asterisk (*) symbol for error messages to the terminal or enter
UNIX system file name for directed output: *

Insert processing completed.
REM_G 13 tuples inserted, 0 errors detected. (Refer to Note 2)

Note 1: Response to this prompt must be made from a UNIX system directory using a valid file name from that directory. The file name in this example is the rem_g base relation from the previous batch review (BR).

Note 2: This entry is a switch response.

Figure 16.5-12 — Typical Generated Key Tuple Batch Insert Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): BR
Enter UNIX system file name: /tmp/rem_g

Review processing completed.
13 tuples written to file /tmp/rem_g (Refer to Note 1)

Note 1: This entry is a switch response.

Figure 16.5-13 — Typical Storage Table Batch Review Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): R
Enter Generated Key
key item 1: GK=5
item 2: remark=SMOPER

Enter Generated Key
key item 1: GK=

Figure 16.5-14 — Typical Storage Table Generated Key Review Operation

Enter Processor Number (1-217): 1
Enter Relation Name: STORAGE
ATTENTION: You ARE modifying a Storage Table Relation, Please Be Careful!
Enter Storage Table Name: REM_G
Enter Tuple Operation (I,BI,R,BR,GKR,GKVIRT): GKVIRT
5 Updatable virtual relations use GK relation REM_G:
1. Virtual rel 1 (uses REM_G 2 times) (**Refer to Note 1**)
2. Virtual rel 2
3. Virtual rel 3
4. Virtual rel 4
5. Virtual rel 5

Parent relation output completed

Note 1: If a GK relation is used multiple times in a virtual relation, then the "(uses . . .)" message will be printed.

Figure 16.5-15 — Typical Storage Table GKVIRT Operation

16.6 ANALYZE AND CLEAR SPLIT TRANSLATIONS (TRANSACTIONS)

OVERVIEW

This procedure is used to analyze and clear split translations (transactions). Each Recent Change/Verify (RC/V) transaction performed on the 5ESS[®] switch may change one or more relations on the Administrative Module (AM), the Communication Module Processor (CMP), and/or each Switching Module/Switching Module-2000 (SM/SM-2000). Although information for these RC/V transactions appears on several views (if using menu mode) or Form IDs (if using text interface mode), they are logically dependent on each other and must be made as a unit to ensure proper operation of the switch.

It is possible that only part of these RC/V changes are committed to the data base; therefore, the terminology "split transactions" applies. If the terminology "split translations" or "split(s)" is used, this represents an error condition that must be resolved for the proper operation of the 5ESS switch.

If, during an RC/V operation, a split translation occurs, this is an error condition and manual intervention is required to restore logical consistency to the Office Dependent Data (ODD).

The Office Data Base Editor (ODBE) is used to identify and correct most split translations.

Caution: *The ODBE should never be used by untrained personnel.*

Most translation splits are detected during an attempted review or modification of an RC/V view or an RC/V Form ID. If an attempted RC/V operation fails with the following message, a split translation problem *may* exist.

xx-yyy STORED DATA CONFLICT [further error information]

In the message, the **xx** identifies the view or the form identification (ID) number and the **yyy** identifies the error number. The [further error information] usually contains sufficient information to identify the problem area, plus it may or may not identify one or more base relation(s) that are experiencing erroneous data. Since only one or two lines are displayed on the video screen (at any one time), it is extremely important that the complete contents of this output message be obtained and recorded before attempting any repair of the base relations, using ODBE.

A split translation may also be detected due to the improper operation of a line, trunk, or other equipment that is dependent on accurate relations. For example, a subscribing customer's line may be experiencing trouble in receiving a dial tone or the customer's line being dead (completely inoperative).

Caution 1: *With ODBE, it is possible to overwrite, delete, or insert information critical to the operation of the 5ESS switch.*

Caution 2: *When using ODBE on any relation, it is extremely important that the user identify and know ALL relations that are affected before attempting any changes. For a detailed listing of all base relations that are associated with applicable RC/V Views, Menu Mode or Form ID, and Text Interface Mode, refer to the applicable Recent Change Manuals identified in Procedure 16.2, Add or Change Office Dependent Data Using Recent Change/Verify.*

PROCEDURE

1. The exact procedure to be followed in the correction of a split translation depends on the following:
 - The applicable RC/V View or Form ID
 - The nature and severity of the split.

In some cases, a few ODBE operations are all that is required. In others, more extensive operations are required to correct the base relations and repopulate the data.
2. In case of STORED DATA CONFLICTS, the error information provided by the output error message may be sufficient to identify the data modification required. For example, it may be required to insert a tuple in a relation. However, once the tuple is inserted, a different error condition may be reported. When using ODBE, the transaction halts after an inconsistency is detected; therefore, each error condition must be corrected as it is discovered. ***Use extreme caution to avoid introducing an error.***
3. In case of redundant data splits, a manual search of each and every base relation may be required to ensure that all base relations are free from any erroneous data.
4. To further assist in solving split translations, the input message **EXC:SODD** can be useful. However, certain limitations apply when using this input message. Refer to 235-600-700, *Input Messages*, for further information and exact message formats.
5. If a split translation cannot be resolved using the previous steps, **seek technical assistance.**
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.7 PERFORM MANUAL REORGANIZATION OF HASHED RELATIONS AND ADDITIONAL DATA BASE MAINTENANCE PROCEDURES WITH THE ACCESS EDITOR

Access Editor (ACCED)

This procedure is used to perform the six main operations of the Access Editor: **REVIEW, SCAN, OVERWRITE, DESTROY, REORG, and HASHSIM.**

The Access Editor is an interactive tool that is used to manually locate, investigate, and correct 5ESS[®] switch data base corruption, and to reorganize hashed relations. For additional overview material and discussion of ACCED operations, refer to 235-105-110, *System Maintenance Requirements and Tools*.

When using ACCED, it is important that the craft be thoroughly trained in all aspects of the 5ESS switch software data bases.

Caution: With ACCED, it is possible to modify ODD information that is critical to the operation of the 5ESS switch. Improper use of ACCED can affect service or bring down a processor. Before modifying data with ACCED (via DESTROY, OVERWRITE, or REORG operations), consult local supervision concerning policy or seek technical assistance.

The following generalized information, concepts, and rules apply to ACCED. Review all of them thoroughly before attempting to use ACCED.

Use of ACCED is controlled by an input message from the Recent Change/Verify (RC/V), the Trunk Line Work Station (TLWS), or the Supplementary TLWS (STLWS) video display terminal. ACCED can also be executed via the screen program (RCV:MENU:SCREEN) or Control/Display (C/D) Page 194, thus permitting ACCED use on the Master Control Center (MCC) or the Switching Control Center (SCC). The output information from ACCED is displayed on the video terminal being used as the input device. Also, ACCED output messages (OM) may be printed on the receive-only printer (ROP). The OM printing is controlled by the craft (refer to the discussion on special characters).

The following input message (MML format) is used to access ACCED:
rcv:menu:acced; PF

Note 1: If the switch accepts the input message [PF (Printout Follows) at the end of input message], then the first ACCED prompt **Processor Number?** appears on the second line of the terminal display.

Note 2: A password may optionally be required to use ACCED. If the prompt string **Password:** is printed on the terminal, then the ACCED password must be entered.

ACCED operations are specified through a series of prompts. When using ACCED, the response to a given prompt is usually a data base defined name, an encoded choice from a menu of options, a hexadecimal number, or an ACCED special character. Exceptions to this set of allowable responses are specified in the individual prompt descriptions.

ACCED Special Characters

Special characters have a meaning only if they are the first character in a response. The meanings of the special characters are as follows:

- The **Ctrl** (control) and **d** keys on the video terminal keyboard are used to exit ACCED. Both keys must be pressed simultaneously.

- The **Exclamation symbol (!)** is used to back up to the next higher prompt (for example, *Processor Prompt* is one level higher than *Operation Prompt*).
- The **“p” character** is used to toggle the output message (OM) printing status from ON to OFF or from OFF to ON. The ON status means that ACCED OMs for *all* operations are printed on the ROP. The OFF status means that *only* ACCED output messages for *critical* operations (DESTROY and OVERWRITE) are printed on the ROP, and OMs for *non-critical* operations are *not* printed on the ROP. This feature provides the craft with the ability to keep a ROP record of *all* ACCED operations, or to reduce ROP output by recording only *critical* ACCED operations. The default OM printing status is OFF.
- The **Carriage Return <cr> key** is used to leave the current value displayed at the prompt unchanged. A <cr> is a valid response only when a default value is displayed and when ACCED states that <cr> keeps the default.

ACCED Prompts and Operations

The ACCED prompts, along with the various responses applicable to those prompts, are described as follows:

- **Processor Prompt:** This prompts the craft for the Administrative Module (AM), Communication Module Processor (CMP), or Switching Module/Switching Module-2000 (SM/SM-2000) number where the relation resides. The processor prompt is displayed as follows:

Processor Number?

Valid processor numbers are as follows:

- **1-192** for the SM/SM-2000 number
- **193** for the AM
- **194-205** for the primary CMP
- **206-217** for the mate CMP.

Only special characters or the previous processor numbers are accepted; any other input is rejected.

- **Operation Prompt:** This prompts the craft to select one of six ACCED operations, or to select an option to quit ACCED. Typing control-d at any prompt also quits ACCED. The operation prompt is displayed as follows:

1. REVIEW - review data by relation or by BID
2. SCAN - scan a relation for corrupted data
3. REORG - manually reorganize a relation
4. DESTROY - destroy (part of) a relation
5. OVERWRITE - overwrite one, two, or four bytes of memory
6. HASHSIM - run hashing simulator
7. QUIT

Operation?

Selection 1 enters the REVIEW operation, which enables the craft to review a relation's head table, intermediate data pages, data pages, access dictionary, and

tuple information. Also, disk or memory contents may be reviewed given a physical address or a block ID. From selection 1, ACCED prompts for a relation name (see **Relation Name Prompt**), and then it displays **Review Prompt**. See **Review Prompt** for subsequent REVIEW operation prompts.

Selection 2 enters the SCAN operation, which enables the craft to scan a relation for corrupted tuples. From selection 2, ACCED prompts for a relation name (see **Relation Name Prompt**), followed by **Data Page Prompt** (and **Intermediate Data Page Prompt** if relation is 3-level indexed) to get the data page at which to start scanning. Specifying DP 0 (and IDP 0 for 3-level indexed relations) scans the whole relation. If the specified starting data page is empty, ACCED begins scanning the relation at the next non-empty data page.

Selection 3 enters the REORG operation, which enables the craft to reorganize hashed (DBACC_HASH) or generated key (DBACC_GK) relations. From selection 3, ACCED prompts for a relation name (see **Relation Name Prompt**), and then it gives the craft an opportunity to run a hashing simulation (HASHSIM) before prompting for reorganization parameters via **Fold Type Prompt**, **Probe Depth Prompt**, **Head Table Size Prompt**, **Tmax Prompt** (or **Tmax Range Prompt**), and **Data Page Size Prompt** (or **Data Page Size Range Prompt**).

Selection 4 enters the DESTROY operation, which enables the craft to destroy a whole relation, a single data page, or a single intermediate data page. From selection 4, ACCED prompts for a relation name (see **Relation Name Prompt**), followed by **Destroy Prompt**. See **Destroy Prompt** for subsequent DESTROY operation prompts.

Caution: *DESTROY is a potentially damaging operation! Refer to the warnings and Notes listed in the "Destroy Prompt" description.*

Selection 5 enters the OVERWRITE operation, which enables the craft to overwrite one, two, or four bytes of disk or memory contents. From selection 5, ACCED prompts for information it needs for the overwrite via **Overwrite Length Prompt**, **Physical Address Prompt**, **Old Data Prompt**, and **New Data Prompt**.

Note: For CMP, a soft switch is required after OVERWRITE to update the memory on the mate CMP. An ODD backup is required immediately after OVERWRITE on ALL affected processors to preserve the overwrite since OVERWRITE is not logged.

Selection 6 enters the HASHSIM operation, which enables the craft to simulate hashing of hashed (DBACC_HASH) or generated key (DBACC_GK) relations. From selection 6, ACCED prompts for a relation name (see **Relation Name Prompt**), and then it prompts for hashing parameters via **Fold Type Prompt**, **Probe Depth Prompt**, **Head Table Size Prompt**, **Tmax Prompt** (or **Tmax Range Prompt**), and **Data Page Size Prompt** (or **Data Page Size Range Prompt**).

Selection 7 quits ACCED.

Only special characters or selections 1-7 are accepted; any other input is rejected.

- **Relation Name Prompt:** This prompt, which appears after REVIEW, SCAN, REORG, DESTROY, or HASHSIM is selected from the **Operation Prompt**, prompts the craft for the name of the relation on which to operate. The relation name prompt is displayed as follows:

Relation Name? (<CR> leaves it unchanged)

The name may be typed in upper case or lower case. Entering carriage return (<CR>) leaves the current relation name unchanged. Only special characters or names of relations whose access types are DBACC_DIR, DBACC_CIND, DBACC_HASH, DBACC_GK, DBACC_IND, or DBACC_LIN are accepted; any other input is rejected. Also, the current processor and relation's distribution type must be compatible. [For example, a relation with distribution type FP (fixed partitioned) is not valid on the AM.]

- **Destroy Prompt:** This prompts the craft to specify which part of the relation to destroy. The destroy prompt is displayed as follows:

1. Whole Relation
 2. Data Page
 3. Intermediate Data Page
- Destroy What?

Selection 1 is available for all relations, selection 2 is displayed for all but 1-level indexed relations, and selection 3 is displayed for 3-level indexed relations. Only special characters or selections 1-3 are accepted; any other input is rejected.

Selection 1 destroys a whole relation and sets the head table entry in the relation's access dictionary (**acc_head**) to zero (DBNULL). Before the destroy occurs, ACCED allows the craft to modify the access dictionary. From selection 1, ACCED prompts the craft for new access dictionary values via **Fold Type Prompt**, **Probe Depth Prompt**, **Head Table Size Prompt**, **Tmax Prompt**, and **Data Page Size Prompt**. If the relation resides on more than one SM/SM-2000, then ACCED allows the craft to specify whether or not the destroy should operate on all SM/SM-2000s simultaneously.

Selection 2 destroys a data page in the current relation given a data page number (and intermediate data page number if the relation is 3-level indexed). From selection 2, ACCED prompts the craft for DP (and IDP information, if the relation is 3-level indexed) via **Data Page Prompt** and **Intermediate Data Page Prompt**. Then ACCED displays the BID for that DP and requests the craft to verify that the BID corresponds to the specified page.

Selection 3 destroys an intermediate data page in the current relation given an intermediate data page number. From selection 3, ACCED prompts the craft for IDP information via **Intermediate Data Page Prompt**. Then ACCED displays the BID for that IDP and requests the craft to verify that the BID corresponds to the specified page.

Caution: Destroying Generated Key (GK) Access Method Storage relations should be attempted only by experts in ODD Data Base Administration and the GK Access Method.

The GK relations have unique and different properties from other types of relations. Improper GK modifications may lead to widespread office data corruption and could negatively affect call processing. See **Notes 1** and **2** in the beginning of this section.

It is important to note the following:

- Recent Change (RC) must be inhibited before destroying (part of) a relation to avoid possible ODD splits, RC can be inhibited with the input message **INH:RC**.

- Following a destroy of a generated key (GK) relation, the craft should execute a successful generated key compaction and collection (GKCCR) before batch inserting GK tuples. The GKCCR is executed via the **EXC:GKCCR** input message. The GKCCR detects several problems resulting from the destroy, so the craft should expect several REPT:GKCCR output messages and accompanying asserts.
- Before destroying a GK ROOT relation, the craft should have previously batch reviewed the VIRTUAL relation in the Office Data Base Editor (ODBE). Following the DESTROY, the craft must then batch insert the VIRTUAL relation in ODBE to populate the ROOT relation.
- The DESTROY operation is logged for the CMP so the mate CMP is updated through continuous roll-forward. The DESTROY operation is not logged on processors other than the CMP.
- An ODD backup is required immediately after a DESTROY operation to preserve the deletions on processors other than the CMP since the destroy is not logged for those processors.
- **Data Page Prompt:** This prompts the craft to specify a data page number, which corresponds to an index into the relation's head table (or an index into an intermediate data page, if the relation is 3-level indexed). The data page prompt is displayed as follows:

Data page number?

Only special characters or an index within the bounds of the head table (or an intermediate data page) are accepted; any other input is rejected.

- **Intermediate Data Page Prompt:** This prompts the craft to specify an intermediate data page number, which corresponds to an index into the relation's head table. The intermediate data page prompt is displayed as follows:

Intermediate data page number?

Only special characters or an index within the bounds of the head table are accepted; any other input is rejected.

- **Review Prompt:** This prompt, displayed after REVIEW is selected from the **Operation Prompt**, prompts the craft to select a REVIEW operation. The review prompt is displayed as follows:

1. Information (data page and tuple information)
 2. Access Dictionary
 3. Address
 4. Block ID
 5. Data Page
 6. Head Table
 7. Intermediate Data Page
- Review What?

Selections 1-5 are available for all relations, selection 6 is displayed for all but 1-level indexed relations, and selection 7 is displayed for 3-level indexed relations.

Selection 1 displays information about a tuple given a tuple key. Examples of tuple information are DP number, DP block ID, tuple address, and physical tuple

size. From selection 1, ACCED prompts for a tuple key via **Primary Key Prompt**. For a detailed description of tuple information provided by ACCED, refer to 235-105-110, *System Maintenance Requirements and Tools*.

Selection 2 displays the access method common dictionary and access method specific dictionary for the current relation, or for the access dictionary entry given an index into the access dictionary. If the relation is access type DBACC_GK, the GK parent (DB_GKPRNT) and GK control (DB_GKCTRL) dictionaries are also displayed. From selection 2, ACCED prompts for the access dictionary version (CURRENT, ODD, or ANY) via **Dictionary Prompt**. If version is ANY, ACCED prompts for the access dictionary index via **Dictionary Index Prompt**.

Selection 3 displays the contents of memory or disk given a physical address and review length. From selection 3, ACCED prompts for the memory type (DISK or MEMORY) if the processor is AM; memory type is assumed to be MEMORY on all other processors. Then ACCED prompts for information it needs for the review via **Physical Address Prompt** and **Dump Length Prompt**.

Selection 4 displays the contents of memory or disk given a block ID, a memory type, a starting relative address, and a review length. From selection 4, ACCED prompts for the memory type (AM is either DISK or MEMORY, SM/SM-2000 is either RRAM or NRAM/URAM; CMP is assumed to be NRAM/URAM). Then ACCED prompts for information it needs for the review via **Block ID Prompt**, **Relative Address Prompt**, and **Dump Length Prompt**.

Selection 5 displays the contents of a data page given a data page number, a starting relative address into the data page, and review length. From selection 5, ACCED prompts for information it needs for the review via **Intermediate Data Page Prompt** (if the relation is 3-level indexed), **Data Page Prompt**, **Relative Address Prompt**, and **Dump Length Prompt**.

Selection 6 displays the contents of the relation's head table given a starting relative address into the head table, and a review length. From selection 6, ACCED prompts for information it needs for the review via **Relative Address Prompt** and **Dump Length Prompt**.

Selection 7 displays the contents of an intermediate data page given an intermediate data page number, a starting relative address into the intermediate data page, and a review length. From selection 7, ACCED prompts for information it needs for the review via **Intermediate Data Page Prompt**, **Relative Address Prompt**, and **Dump Length Prompt**.

Only special characters or selections 1-7 are accepted; any other input is rejected.

- **Block ID Prompt:** This prompts the craft to specify a memory or disk block ID. The block ID prompt is displayed as follows:

Block ID to review?

Only special characters or a block ID within the bounds of the ODD memory space are accepted; any other input is rejected.

- **SM Memory Type Prompt:** This prompts the craft to specify an SM memory type, which is needed to uniquely identify a memory block ID. The SM memory type prompt is displayed as follows:

1. RRAM - SM redundant ODD
 2. NRAM/URAM - SM non-redundant ODD and unprotected ODD
- Which SM memory type?

Only special characters or selections 1 or 2 are accepted; any other input is rejected.

- **AM Memory Type Prompt:** This prompts the craft to specify an AM memory type, which is needed to uniquely identify a block ID or address as being in disk or memory address space. The AM memory type prompt is displayed as follows:

1. DISK - disk ODD
 2. MEMORY - AM protected and unprotected ODD
- Which AM memory type?

Only special characters or selections 1 or 2 are accepted; any other input is rejected.

- **Dictionary Prompt:** This prompts the craft to specify which access dictionary to review. The dictionary prompt is displayed as follows:

1. Current
 2. ODD
 3. Any
- Which Dictionary?

Selection 1 displays the current run time version of the current relation's access dictionary.

Selection 2 displays the ODD run time version of the current relation's access dictionary. The ODD version is located in the control ODD. The current run time version and ODD run time version are usually identical. They differ only while the access dictionary is being updated, during the period between the beginning of the transaction and the moment the transaction commits.

Selection 3 prompts further for an access dictionary index (see **Dictionary Index Prompt**), and then displays the current run time version of the access dictionary with the given index. This is useful for reviewing future or past versions of the current run time dictionary. It is not possible to specify an index into the ODD run time dictionary. To review ODD versions of the different relations, change relations (see **Relation Name Prompt**) and return back to the **Dictionary Prompt** and choose selection 2.

Only special characters or selections 1-3 are accepted; any other input is rejected.

- **Dictionary Index Prompt:** This prompt, which is part of the REVIEW access dictionary operation, prompts the craft to specify an index into the current run time access method common dictionary (DB_ACCDICT). The dictionary index prompt is displayed as follows:

Index to access method common dictionary?

The index refers to a specific access method common dictionary entry for a specific relation. For example, if a relation has past or future versions of its access dictionary, those versions are unique entries in the DB_ACCDICT dictionary. The dictionary index of the past version is found in the current version's **acc_bidx** entry. The dictionary index of the future version is found in the current version's **acc_nidx** entry.

Only special characters or a nonzero access dictionary index (decimal number) are accepted; any other input is rejected.

- **Relative Address Prompt:** This prompts the craft to specify a starting relative address at which to begin the review. The relative address prompt is displayed as follows:

Beginning relative address (decimal)?

The address is a byte offset from the beginning of the object being reviewed. For example, when reviewing a data page, a starting relative address of 4 means "display data page contents starting with the fifth byte of data."

Valid relative addresses depend on the object being reviewed as follows:

- Review Data Page – a number less than the data page size.
- Review Intermediate Data Page – an even number less than the intermediate data page size.
- Review Block ID – a number less than the block size (256 for a memory block, or 2048 for a disk block).
- Review Head Table – an even number less than the head table size.

Only special characters or a valid relative address are accepted; any other input is rejected.

- **Physical Address Prompt:** This prompts the craft to specify a starting physical address at which to begin the review. The physical address prompt is displayed as follows:

Beginning physical address (hexadecimal)?

The address must be in the ODD address range for the particular memory type being reviewed, either DISK, PRAM, RRAM, or NRAM/URAM [see **SM Memory Type Prompt** and **AM Memory Type Prompt**, respectively]. Only special characters or a valid physical address are accepted; any other input is rejected.

- **Dump Length Prompt:** This prompts the craft to specify a length (number of bytes) to review. The dump length prompt is displayed as follows:

Number of bytes to dump?

Valid dump lengths depend on the object being reviewed as follows:

- Review Data Page – a number such that it plus the starting relative address is less than the data page size.
- Review Intermediate Data Page – an even number such that it plus the starting relative address is less than the intermediate data page size.
- Review Block ID – a number such that it plus the starting relative address is less than the block size (256 for a memory block, or 2048 for a disk block).
- Review Head Table – an even number such that it plus the starting relative address is less than the head table size.
- Review Address – a number that is the smaller of 8196 or the difference between the physical address and the end of the ODD address range.

Only special characters or a valid dump length are accepted; any other input is rejected.

- **Overwrite Length Prompt:** This prompt, displayed after OVERWRITE is selected from the **Operation Prompt**, prompts the craft to specify the number of bytes of disk or memory data to overwrite. The overwrite length prompt is displayed as follows:

Number of bytes of overwrite (1, 2, or 4)?

Only one, two, or four bytes of data may be overwritten. Only special characters or the numbers "1," "2," or "4" are accepted; any other input is rejected.

- **Old Data Prompt:** This prompt, which is part of the OVERWRITE operation, prompts the craft to specify the data value that currently exists at the location that is to be overwritten. The old data prompt is displayed as follows:

Old data value in hexadecimal?

This prompt ensures that the craft is aware of the current memory or disk contents before permitting the overwrite to continue. One, two, or four bytes of data must be specified, depending on the overwrite length entered at the **Overwrite Length Prompt**. One byte of data is specified with two hexadecimal characters, two bytes of data are specified with four hexadecimal characters, and four bytes of data are specified with eight hex characters. Only special characters or two, four, or eight hex characters are accepted; any other input is rejected.

- **New Data Prompt:** This prompt, which is part of the OVERWRITE operation, prompts the craft to specify the new data value to overwrite. The new data prompt is displayed as follows:

New data value in hexadecimal?

One, two, or four bytes of data must be specified, depending on the overwrite length entered at the **Overwrite Length Prompt**. One byte of data is specified with two hex characters, two bytes of data are specified with four hex characters, and four bytes of data are specified with eight hex characters. Only special characters or two, four, or eight hex characters are accepted; any other input is rejected.

- **Probe Depth Prompt:** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craft to specify a new probe depth value for the current relation's **acc_probdepth** access dictionary entry. The probe depth prompt is displayed as follows:

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)?

DESTROY and REORG change the probe depth value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

For relations with access type DBACC_HASH, the probe depth represents the maximum number of element searches on a data page if a hashing collision occurs. For relations with access type DBACC_GK, the probe depth represents the "goal size" of each generated key bucket, where *goal size* is a number to strive to remain less than, but it is not a strict limit.

Entering carriage return (<CR>) leaves the current probe depth value unchanged. Only special characters, a carriage return, or a decimal probe depth value are accepted; any other input is rejected.

- **Head Table Size Prompt:** This prompt, which is part of the DESTROY and REORG operations, prompts the craft to specify a new head table size value for the current relation's **rel_hsze** access dictionary entry. The head table size prompt is displayed as follows:

Head table size (rel_hsze) (<CR> keeps default)?

This prompt does not appear for relations of access type DBACC_GK.

The head table is a power of two between 256 and 8192, inclusive. Entering carriage return (<CR>) leaves the current head table size unchanged. Only special characters, a carriage return, or a valid head table size are accepted; any other input is rejected.

- **Data Page Size Prompt:** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craft to specify a new data page size value for the current relation's **rel_dsze** access dictionary entry. The data page size prompt is displayed as follows:

Data page size (rel_dsze) (<CR> keeps default)?

This prompt does not appear for relations of access type DBACC_GK.

DESTROY and REORG change the data page size value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

The data page size is a power of two between 256 and 8192, inclusive. However, data page size must not exceed 2048 unless the relation's physical tuple size is a power of two. (This guarantees that no tuple crosses a data page boundary, which would violate the memory protection mechanism.) Entering carriage return (<CR>) leaves the current data page size unchanged. Only special characters, a carriage return, or a valid data page size are accepted; any other input is rejected.

- **Data Page Size Range Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craft to specify a new data page size value, or range of data page size values, for use in a hashing simulation. The data page size range prompt is displayed as follows:

Enter <CR> to keep default dsze, or enter new dsze or range of dsze's (example range: 256-512):

This prompt does not appear for relations of access type DBACC_GK.

HASHSIM simply uses the value(s) in a hashing simulation, and it does not change the relation's access dictionary.

A data page size is a power of two between 256 and 8192, inclusive. The craft may enter a single data page size or a range of data page sizes. A range is specified by separating two data page size values with a hyphen (for example, *256-512*). The first data page size value in a range must be less than or equal to the second data page size value. If a range is specified, then more than one hashing simulation may run.

Entering carriage return (<CR>) leaves the current data page size unchanged. Only special characters, a carriage return, a valid data page size, or a valid data page size range are accepted; any other input is rejected.

- ***Tmax Prompt:*** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craft to specify a new maximum number of tuples (tmax) value for the current relation's `rel_tmax` access dictionary entry. The tmax prompt is displayed as follows:

Maximum number of tuples (`rel_tmax`) (<CR> keeps default)?

DESTROY and REORG change the tmax value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

Entering carriage return (<CR>) leaves the current tmax value unchanged. Only special characters, a carriage return, or a valid tmax value are accepted; any other input is rejected.

- ***Tmax Range Prompt:*** This prompt, which is part of the HASHSIM operation, prompts the craft to specify a new maximum number of tuples (tmax) value, or range of tmax values, for use in a hashing simulation. The tmax range prompt is displayed as follows:

Enter <CR> to keep default tmax, or enter new tmax or range of tmax's (example range: 10-100):

HASHSIM simply uses the value(s) in a hashing simulation, and it does not change the relation's access dictionary.

The craft may enter a single tmax value or a range of tmax values. A range is specified by separating two tmax values with a hyphen (for example, *10-100*). The first tmax value in a range must be less than or equal to the second tmax value. If a range is specified, then more than one hashing simulation may run.

Entering carriage return (<CR>) leaves the current tmax value unchanged. Only special characters, a carriage return, a valid tmax value, or a valid tmax range are accepted; any other input is rejected.

- ***Fold Type Prompt:*** This prompt, which is part of the DESTROY, HASHSIM, and REORG operations, prompts the craft to specify a new fold type value for the current relation's `acc_foldtyp` access dictionary entry. The fold type prompt is displayed as follows:

1. DBDEFAULT

2. DBG31

Folding algorithm (`acc_foldtyp`) (<CR> keeps default)?

This prompt appears for relations of access type DBACC_HASH only.

Selection 1 sets the current relation's hashing fold type to DBDEFAULT.

Selection 2 sets the current relation's hashing fold type to DBG31.

DESTROY and REORG change the fold type value in the relation's access dictionary; HASHSIM simply uses the value in a hashing simulation, and it does not change the relation's access dictionary.

Only special characters or selections 1 or 2 are accepted; any other input is rejected.

- **Hash File Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craft to specify the type of file input they are providing to the hashing simulation. The hash file prompt is displayed as follows:

1. Folded key file
2. ASCII input file
3. Neither

Which of the following are you providing?

This prompt appears for relations of access type DBACC_HASH only.

Selection 1 indicates that the craft will provide to the hashing simulation a file containing the relation's folded keys.

Selection 2 indicates that the craft will provide to the hashing simulation a file (refer to the following **Note**) containing an ASCII representation of the relation's data.

Note: An ASCII file may be obtained in ODBE via the batch review (BR) operation.

Selection 3 indicates that the craft has neither a folded key file nor an ASCII input file. In this case, HASHSIM will batch review the relation automatically before continuing.

Only special characters or selections 1-3 are accepted; any other input is rejected.

- **Read File Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craft to specify the name of a file that will be opened for reading. The read file prompt is displayed as follows:

Enter filename:

The file, which contains either folded keys or ASCII data for the relation, may be specified as full *UNIX*'system path name or a relative path name. Only special characters or a valid UNIX system file name are accepted; any other input is rejected.

- **Write File Prompt:** This prompt, which is part of the HASHSIM operation, prompts the craft to specify the name of a file where the relation's automatically generated ASCII information will be saved. The write file prompt is displayed as follows:

Enter UNIX system filename to save relation ASCII to:

This prompt appears only when HASHSIM automatically generates ASCII information, that is, when the craft supplies neither folded key nor ASCII data (see **Hash File Prompt**).

The file may be specified as full UNIX system path name or a relative path name. Only special characters or a valid UNIX system file name are accepted; any other input is rejected.

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- **Primary Key Prompt:** This prompt, which is part of the REVIEW tuple information operation, prompts the craft to specify the name of the component(s) of the key that uniquely identifies a tuple in the relation. The primary key prompt is displayed as follows:

Enter Primary Key

For each component of the tuple key, a prompt is displayed where the craft is required to specify an attribute value (and sub-attribute values, if any) to uniquely identify a tuple. One of the following special characters (refer to the following **Note**) may be entered at the primary key attribute (or sub-attribute) prompt:

- A question mark (?) to list the possible input options available.
- A plus symbol (+) to list key attribute domain.
- An exclamation symbol (!) to back up to the previous prompt.
- A control-D to exit ACCED.

Note: These special characters are exclusively for the **Primary Key Prompt**, and, **for this prompt only**, they override the previously described special characters!

This procedure is used for the SCAN, REORG, DESTROY, and HASHSIM operations. Relative to these operations, REVIEW and OVERWRITE operations are more straightforward and guidelines are not provided. For details on REVIEW, refer to **Review Prompt** and the following:

- Figure 16.7-1 – Review Information Operation
- Figure 16.7-2 – Review Access Dictionary (Current Version) Operation
- Figure 16.7-3 – Review Access Dictionary (Any Version) Operation
- Figure 16.7-4 – Review Address Operation
- Figure 16.7-5 – Review Block ID Operation
- Figure 16.7-6 – Review Data Page Operation
- Figure 16.7-7 – Review Head Table Operation
- Figure 16.7-8 – Review Intermediate Data Page Operation.

For details on OVERWRITE, refer to **Overwrite Length Prompt** and Figure 16.7-14.

Following the sections is a list of ACCED operations and corresponding figures. Using the information provided at the beginning of this section, coupled with the guidelines and figures that follow, perform the appropriate data base reorganization, corruption detection, corruption investigation, and corruption correction. If any error(s) occur that cannot be resolved, **seek technical assistance**.

PROCEDURE

1. SCAN Operation Guidelines

The SCAN operation is useful for detecting and reporting corrupted tuples for relations of access type DBACC_HASH and DBACC_LIN. SCAN cannot detect corruption in relations of access types other than DBACC_HASH and DBACC_LIN.

Corruption is detected by searching for discrepancies between the tuple status and the status bitmap located in the last two bytes of each data page. The bitmap is read from right to left, with each bit in the bitmap representing the status of one tuple. A one (1) in the bitmap corresponds to an available element slot, which should contain all 0's or all 1's in the first two bytes of the tuple. If this is not the case, then SCAN reports tuple corruption. A zero (0) in the bitmap corresponds to an occupied element slot, which can contain any bit pattern, including all 0's and all 1's in the first two bytes of the tuple. SCAN cannot detect corruption in occupied element slots.

2. REORG Operation Guidelines

The REORG operation provides a way to manually reorganize relations of access type DBACC_HASH and DBACC_GK. Relations are reorganized to eliminate overflow tuples. [Note that the hashing simulator (HASHSIM operation) can help avoid costly iterations of unsuccessful reorganization attempts. The REORG operation offers the opportunity to run a hashing simulation before running the reorganization. Refer to **HASHSIM Operation Guidelines** for details on the hashing simulator. The **rel_tmax** value (maximum number of tuples) in a relation may be any reasonable number depending on the relation being reorganized. Although the head table size does not affect hashing, it must be large enough to accommodate the number of data pages required by the relation, including overflow pages.

The **rel_tmax** and **rel_dsze** (data page size) values both affect reorganization. The new **rel_tmax** must exceed the number of tuples currently in the relation. The attribute **acc_tpag** contains the number of tuples per page. This number, times the number of pages in overflow, gives a minimum number of tuples to increase **rel_tmax**.

The first attempt at reorganization should adjust **rel_tmax** as recommended in the previous paragraph. This process should be repeated until no further improvement is made in the number of overflow pages or until the number of overflow pages reaches zero. If a point is reached where no further improvement is made and the number of overflow pages is greater than zero, altering the data page size, **rel_dsze** may help. If the relation still has overflow, try setting **rel_tmax** to the number of tuples. If this does not work, other attempts with increasing **rel_tmax** by the value of **acc_tpag** may be successful.

Other attributes that can be changed are the probe depth, **acc_probdepth** and the fold type, **acc_foldtyp**. For relations with access type DBACC_HASH, the probe depth represents the maximum number of element searches on a data page if a hashing collision occurs. For relations with access type DBACC_GK, the probe depth represents the *goal size* of each generated key bucket, where *goal size* is a number to strive to remain less than, but it is not a strict limit. Fold type specifies the folding algorithm to use when hashing. Fold type values are DBDEFAULT or DBGC31. These two algorithms drastically affect the capability of a relation to hash well. Which algorithm works best depends on the relation.

Use the hashing simulator (HASHSIM) to analyze the effect of different probe depth and fold type values. Note that, for access type DBACC_GK, the fold type is always DBG31.

3. DESTROY Operation Guidelines

The DESTROY operation allows the user to destroy a whole relation, an intermediate data page (for 3-level indexed relations), or a data page. If a whole relation is destroyed, the head table block ID in access dictionary is zeroed out. If an IDP is destroyed, ACCED prompts for the IDP number whose entry in the head table is zeroed out. If a DP is destroyed, ACCED prompts for the DP number whose entry in the head table (or IDP for 3-level indexed relations) is zeroed out.

When destroying a whole relation, ACCED permits the user to modify the access dictionary. This is similar to modifying the access dictionary during a reorganization. A series of prompts will ask to change access dictionary values or keep default values. When destroying a whole relation on an SM/SM-2000, ACCED allows the user to authorize DESTROY to act on all SM/SM-2000s, not just the current SM/SM-2000.

Caution: *The DESTROY operation can have damaging results. It is important to note the following:*

- Recent Change (RC) must be inhibited before destroying (part of) a relation to avoid possible ODD splits. An RC can be inhibited by typing input message **INH:RC**.
- Following a destroy of a generated key (GK) relation, the craft should execute a successful generated key compaction and collection (GKCCR) before batch inserting GK tuples. The GKCCR is executed via the **EXC:GKCCR** input message. The GKCCR detects several problems resulting from the destroy, so the craft should expect several REPT:GKCCR output messages and accompanying asserts.
- Before destroying a GK ROOT relation, the craft should have previously batch reviewed the VIRTUAL relation in the Office Data Base Editor (ODBE). Following the DESTROY, the craft must then batch insert the VIRTUAL relation in ODBE to populate the ROOT relation.
- The DESTROY operation is logged for the CMP so the mate CMP is updated through continuous roll-forward. The DESTROY operation is not logged on processors other than the CMP.
- An ODD backup is required immediately after a DESTROY operation to preserve the deletions on processors other than the CMP since the destroy is not logged for those processors.

4. HASHSIM Operation Guidelines

The HASHSIM operation runs a hashing simulation of DBACC_HASH and DBACC_GK relations to help the user determine optimal dictionary values for manual reorganization.

The simulation is based on the relation's folded key file, which can be provided in one of the following ways. The user specifies which way at the **Hash File Prompt**.

- The user can provide the simulator with a previously generated file of folded keys.
- The user can provide the simulator with the relation's ASCII file. (This may be obtained via ODBE batch review.) The simulator generates a folded key file from the ASCII file.
- The user cannot provide the simulator with a folded key file or an ASCII file. The simulator will generate an ASCII file first, and then generate a folded key file from the ASCII file.

The first option is the fastest because no action is required to generate the folded key. The second option is marginally slower because it must read the ASCII file and generate the folded keys. The third option is considerably slower because generating the ASCII file adds even more time. The length of time depends on the size of the relation.

The user provides the simulator with additional access dictionary information through a series of prompts. Simulation parameters provided by the user are probe depth (**acc_probdepth**), TMAX (**rel_tmax**), fold type (**acc_foldtyp**), and DSZE (**rel_dsze**) (for DBACC_HASH relations). The TMAX and DSZE may be provided by the user as a range of values, for example, 256-1024 for DSZE. Specifying TMAX and DSZE as single values yields a single set of simulation results. Specifying a range for TMAX and/or DSZE yields up to three sets of simulation results using the best combinations of TMAX and DSZE.

Simulation results include the following:

- TMAX value used
- DSZE value used
- Head table size required
- Number of data pages required for each stage
- Tuples per page (**acc_tpag**) that was calculated
- Number of tuples that would end up in overflow
- Total kilobytes of memory allocated
- Load factor (percent of space allocated that is occupied, including overflow pages)
- Average search time that would exist
- Maximum search time that could result
- A score based on overflow, load factor, average search time, maximum search time, and memory use.

The score is provided to help assess simulation results. Lower scores are better, but, do not judge results on score alone. Watch for values for number of data pages, load factor, and search time that may degrade performance or use memory inefficiently. ***Never use values that result in overflow.***

5. ACCED Operations and Figures

At the appropriate designated video display terminal, determine the ACCED operation to be performed, per the following:

- Review Information Operation – See Figure 16.7-1.
 - Review Access Dictionary (Current Version) Operation – See Figure 16.7-2.
 - Review Access Dictionary (Any Version) Operation – See Figure 16.7-3.
 - Review Address Operation – See Figure 16.7-4.
 - Review Block ID Operation – See Figure 16.7-5.
 - Review Data Page Operation – See Figure 16.7-6.
 - Review Head Table Operation – See Figure 16.7-7.
 - Review Intermediate Data Page Operation – See Figure 16.7-8.
 - Scan Operation – See Figure 16.7-9.
 - Reorg Operation – See Figure 16.7-10.
 - Destroy Whole Relation Operation – See Figure 16.7-11.
 - Destroy Data Page Operation – See Figure 16.7-12.
 - Destroy Intermediate Data Page Operation – See Figure 16.7-13.
 - Overwrite Operation – See Figure 16.7-14.
 - Hashsim Operation with Folded Key Input File – See Figure 16.7-15.
 - Hashsim Operation with ASCII Input File – See Figure 16.7-16.
 - Hashsim Operation with Neither ASCII Nor Folded Key File – See Figure 16.7-17.
6. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 1

Enter Primary Key

key item 1: atttn = 15

Tuple information for rel=TM_ATTT, pcr=193, memtype=DBPRAM

Head Table Address	h'009c1f00
Head Table Block ID	1247
DP Number	0
DP Address	h'009c3000
DP Block ID	1264
Tuple Address	h'009c3000
Tuple Number in DP	0
Physical Tuple Size	152
Logical Tuple Size	248

Figure 16.7-1 — Review Information Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) rc_loceq

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 2

- 1: Current
- 2: ODD
- 3: Any (must provide index)

Which Dictionary? 1

Access dictionary for rel=RC_LOCEQ, pcr=193, version=current, index=11,
memtype=DBPRAM, acctype=DBACC_HASH

```
ACCDICT:
acc_rid =          23
acc_head =         821
acc_rcnt =          0
acc_wflg =          0
acc_state = ACCCURRENT
acc_nidx =          0
acc_bidx =          0
rel_hsze =         256
```

Hit <CR> to see access method specific dictionary

```
ACC_HASH:
acc_rid =          23
acc_oflg =          0
acc_foldtyp = DBDEFAULT
acc_probdepth =     3
acc_tpag =          25
rel_dsze =         512
acc_npag =          1      1      1      1
acc_totp =          5
rel_tmax =          17
There are 0 pages of overflow
```

Figure 16.7-2 — Review Access Dictionary (Current Version) Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) rc_loceq

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 2

- 1: Current
- 2: ODD
- 3: Any (must provide index)

Which Dictionary? 3

Index to access method common dictionary? 44

Access dictionary for rel=TM_ATTT, pcr=193, version=ANY, index=44,
memtype=DBPRAM, acctype=DBACC_HASH

ACCDICT:
acc_rid = 7
acc_head = 1247
acc_rcnt = 0
acc_wflg = 0
acc_state = ACCCURRENT
acc_nidx = 0
acc_bidx = 0
rel_hsize = 256

Hit <CR> to see access method specific dictionary

ACC_HASH:
acc_rid = 78
acc_oflg = 0
acc_foldtyp = DBDEFAULT
acc_probdepth = 3
acc_tpag = 13
rel_dsze = 2048
acc_npag = 2 1 1 1 1
acc_totp = 6
rel_tmax = 40

There are 0 pages of overflow

Figure 16.7-3 — Review Access Dictionary (Any Version) Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 3

- 1: DISK - disk ODD
- 2: MEMORY - AM protected and unprotected ODD

Which AM memory type? 2

Beginning physical address (hexadecimal)? 9c1f00

Number of bytes to dump? 64

Data at physical address h'9c1f00, pcr=193, memtype=MEMORY

```
04f004e8 04f80000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
```

Figure 16.7-4 — Review Address Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 4

- 1: DISK - disk ODD
- 2: MEMORY - AM protected and unprotected ODD

Which AM memory type? 2

Block ID to review? 1264

Beginning relative address (decimal)? 0

Number of bytes to dump? 12

Data for block ID 1264, pcr=193, memtype=DBPRAM
Starting address = 0 (relative), h'9c3000 (absolute)
000f0000 00000000 00000000

Figure 16.7-5 — Review Block ID Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 5

Data page number? 0

Beginning relative address (decimal)? 0

Number of bytes to dump? 64

Data page contents for DP=0, rel=TM_ATTT, pcr=193
Starting address = 0 (relative), h'9c3000 (absolute)

```
000f0000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
00000000 00000000 00000000 00000000 00000000 0000b000 39850505 05010909
```

Figure 16.7-6 — Review Data Page Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table

Review What? 6

Beginning relative address (decimal)? 0

Number of bytes to dump? 64

Head table contents for rel=TM_ATTT, pcr=193
Starting address = 0 (relative), h'9c4d00 (absolute)

1620	0	1604	1588	1608	1616	1624	1592
1612	0	1584	1596	1600	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Figure 16.7-7 — Review Head Table Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 1

Relation Name? (<CR> leaves it unchanged) fc_trunk

- 1: Information (data page and tuple information)
- 2: Access Dictionary
- 3: Address
- 4: Block ID
- 5: Data Page
- 6: Head Table
- 7: Intermediate Data Page

Review What? 7

Intermediate data page number? 0

Beginning relative address (decimal)? 128

Number of bytes to dump? 128

Data page contents for IDP=0, rel=FC_TRUNK, pcr=2,
Starting address = 128 (relative), h'21a885c (absolute)

0	0	0	0	0	0	0	0
0	0	0	0	9316	9317	9318	9319
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	9320	9321
9322	9323	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

Figure 16.7-8 — Review Intermediate Data Page Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 2

Relation Name? (<CR> leaves it unchanged) fc_trunk

Intermediate data page number? 0

Data page number? 0

SCAN will start from DP 0 of IDP 0
If this is not an allocated data page, then SCAN will
start from the next available allocated data page.

SCAN completed, no corrupt data found

Figure 16.7-9 — Scan Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 3

Relation Name? (<CR> leaves it unchanged) tm_attt

```
ACCDICT:
acc_rid =          78
acc_head =        1292
acc_rcnt =          0
acc_wflg =          0
acc_state = ACCCURRENT
acc_nidx =          0
acc_bidx =          0
rel_hsze =         256
```

Hit <CR> to see access method specific dictionary

```
ACC_HASH:
acc_rid =          78
acc_oflg =          0
acc_foldtyp = DBDEFAULT
acc_probdepth =     5
acc_tpag =          13
rel_dsze =        2048
acc_npag =          4      1      1      1      1
acc_totp =          8
rel_tmax =          80
There are 0 pages of overflow
```

Do you want to run a hashing simulation before REORG? (y or <cr>) n

Enter desired access dictionary values for REORG:
acc_probdepth = 5

Figure 16.7-10 — Reorg Operation (1 of 3)

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 3

acc_foldtyp = DBDEFAULT

- 1: DBDEFAULT
- 2: DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

rel_hsze = 256

Head table size (rel_hsze) (<CR> keeps default)?

rel_dsze = 2048

Data page size (rel_dsze) (<CR> keeps default)? 1024

rel_tmax = 80

Maximum number of tuples (rel_tmax) (<CR> keeps default)? 100

After REORG, the new access dictionary will be the following:

```
ACCDICT:
acc_rid   =          78
acc_head  =         1292
acc_rcnt  =           0
acc_wflg  =           0
acc_state = ACCCURRENT
acc_nidx  =           0
acc_bidx  =           0
rel_hsze  =          256
```

Hit <CR> to see access method specific dictionary

```
ACC_HASH:
acc_rid   =          78
acc_oflg  =           0
acc_foldtyp = DBDEFAULT
acc_probdepth =         3
acc_tpag  =           6
rel_dsze  =         1024
acc_npag  =          13      5      1      1      1
acc_totp  =           21
rel_tmax  =          100
```

There are 0 pages of overflow

Please confirm: are these the access dictionary values
you want? (y or <cr>) y

REORG in progress ... please wait

REORG COMPLETED:

Figure 16.7-10 — Reorg Operation (2 of 3)

Access dictionaries used for REORG on pcr=193, rel=TM_ATTT,
acctype=DBACC_HASH

```
ACCDICT:
acc_rid   =          78
acc_head  =        1293
acc_rcnt  =           0
acc_wflg  =           0
acc_state = ACCCURRENT
acc_nidx  =           0
acc_bidx  =        1052
rel_hsize =         256
```

Hit <CR> to see access method specific dictionary

```
ACC_HASH:
acc_rid    =          78
acc_oflg   =           0
acc_foldtyp = DBDEFAULT
acc_probdepth =         3
acc_tpag   =           6
rel_dsze   =        1024
acc_npag   =          13      5      1      1      1
acc_totp   =           21
rel_tmax   =          100
There are 0 pages of overflow
```

Figure 16.7-10 — Reorg Operation (3 of 3)

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 4

Relation Name? (<CR> leaves it unchanged) fc_trunk

- 1: Whole Relation
- 2: Data Page
- 3: Intermediate Data Page

Destroy What? 1

DESTROY whole relation also modifies access dictionary.
Enter desired access dictionary values:

rel_hsize = 256

Head table size (rel_hsize) (<CR> keeps default)?

rel_dsze = 256

Data page size (rel_dsze) (<CR> keeps default)? 512

rel_tmax = 100

Maximum number of tuples (rel_tmax) (<CR> keeps default)?

After DESTROY, the new access dictionary will be the following:

```
ACCDICT:
acc_rid =          35
acc_head =        9788
acc_rcnt =          0
acc_wflg =          0
acc_state = ACCCURRENT
acc_nidx =          0
acc_bidx =          0
rel_hsize =        256
```

Hit <CR> to see access method specific dictionary

Figure 16.7-11 — Destroy Whole Relation Operation (1 of 2)

```
ACC_CIND:
acc_rid      =          35
rel_dsze    =         512
rel_tmax     =         100
rel_isze    =         256
inc_maxelt  =         128    128    10
inc_eltsize =           2     2    24
sk_len      =          16     0     0     0     0     0
inc_keylen  =           4
inc_cksplit =           0     0     0
sk_byteoff  =           0     0     0     0     0     0
sk_bitoff   =           0     0     0     0     0     0
inc_kstore  =           0
inc_itype   =          IND3
```

Please confirm: are these the access dictionary values you want?
(y or <cr>) y

Do you want to destroy across all SMs? (y or <cr>) y

DESTROY continuing on all SMs

*** The DESTROY operation is irreversible.
*** The entire relation will be removed from the ODD.
Do you wish to continue? (y or <cr>) y

Destroy being performed on relation FC_TRUNK, processor 2

Destroy SUCCEEDED on relation FC_TRUNK, processor 2

Destroy being performed on relation FC_TRUNK, processor 4

Destroy SUCCEEDED on relation FC_TRUNK, processor 4

Destroy being performed on relation FC_TRUNK, processor 5

Destroy SUCCEEDED on relation FC_TRUNK, processor 5

Whole relation destroyed

Figure 16.7-11 — Destroy Whole Relation Operation (2 of 2)

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 4

Relation Name? (<CR> leaves it unchanged) fc_trunk

- 1: Whole Relation
- 2: Data Page
- 3: Intermediate Data Page

Destroy What? 2

Intermediate data page number? 0

Data page number? 76

The BID for the page to destroy is 9316.

Is this the correct page? (y or <cr>) y

*** The DESTROY operation is irreversible.
*** The entire data page will be removed from the ODD.
Do you wish to continue? (y or <cr>) y

Destroy results for rel=FC_TRUNK, pcr=2
DP=76 (BID=9316) on IDP=0 destroyed

Figure 16.7-12 — Destroy Data Page Operation

Processor Number? 194

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 4

Relation Name? (<CR> leaves it unchanged) acb_port

- 1: Whole Relation
- 2: Data Page
- 3: Intermediate Data Page

Destroy What? 3

Intermediate data page number? 416

The BID for the page to destroy is 7872.

Is this the correct page? (y or <cr>) y

*** The DESTROY operation is irreversible.

*** The entire intermediate data page will be removed from the ODD.

Do you wish to continue? (y or <cr>) y

Destroy results for rel=ACB_PORT, pcr=194
IDP=416 (BID=7872) destroyed

Figure 16.7-13 — Destroy Intermediate Data Page Operation

Processor Number? 2

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 5

Number of bytes to overwrite (1, 2, or 4)? 2

Beginning physical address (hexadecimal)? 21a885c

Old data value in hexadecimal? 0000

New data value in hexadecimal? ffff

Overwrite at address h'21a885c, pcr=2, memtype=MEMORY
Old data: h'0000
New data: h'ffff

Figure 16.7-14 — Overwrite Operation

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 6

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Folded key file
- 2: ASCII input file
- 3: Neither

Which of the following are you providing? 1

Enter filename: tm_attt.fold

Enter parameters for hashing simulation ...

acc_probdepth = 3

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 5

rel_dsze = 1024

Enter <CR> to keep default dsze, or enter new
dsze or range of dsze's (example range: 256 - 512): 256 - 1024

rel_tmax = 100

Enter <CR> to keep default tmax, or enter new
tmax or range of tmax's (example range: 10 - 100): 10 - 100

Figure 16.7-15 — Hashsim Operation with Folded Key Input File (1 of 2)

OFFICE DEPENDENT DATA MAINTENANCE
Procedure 16.7

235-105-220
November 1998

HASH STAGED SIMULATION: PROBE DEPTH=3 PSZE=152
 FOLDTYPE=DBDEFAULT

1 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	7	2	1	1	1	TOTAL=12
PAGES ALLOCATED:	7	2	0	0	0	TOTAL=9
PERCENT OCCUPIED:	100.00	100.00	0.00	0.00	0.00	

TUPLES=27 PAGES=9 SEARCH=2.481
 TMAX=22 TPAG=3 LOAD=84.375
 OVFLW=0 MSEARCH=6 K-BYTES=4.750
 HSZE=256 IHSZE=N/A DSZE=512
 SCORE=30.685

2 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	8	2	1	1	1	TOTAL=13
PAGES ALLOCATED:	8	2	0	0	0	TOTAL=10
PERCENT OCCUPIED:	100.00	50.00	0.00	0.00	0.00	

TUPLES=27 PAGES=10 SEARCH=1.740
 TMAX=31 TPAG=3 LOAD=76.339
 OVFLW=0 MSEARCH=6 K-BYTES=5.250
 HSZE=256 IHSZE=N/A DSZE=512
 SCORE=31.811

3 of 3

STAGE NUMBER:	1	2	3	4	5	
PAGES RESERVED:	11	4	1	1	1	TOTAL=18
PAGES ALLOCATED:	11	0	0	0	0	TOTAL=11
PERCENT OCCUPIED:	81.81	0.00	0.00	0.00	0.00	

TUPLES=27 PAGES=11 SEARCH=1.407
 TMAX=43 TPAG=3 LOAD=69.701
 OVFLW=0 MSEARCH=3 K-BYTES=5.750
 HSZE=256 IHSZE=N/A DSZE=512
 SCORE=32.619

Figure 16.7-15 — Hashsim Operation with Folded Key Input File (2 of 2)

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 6

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Folded key file
- 2: ASCII input file
- 3: Neither

Which of the following are you providing? 2

Enter filename: tm_attt

Enter parameters for hashing simulation ...

acc_foldtyp = DBDEFAULT

- 1: DBDEFAULT
- 2: DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

acc_probdepth = 3

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 5

rel_dsze = 1024

Enter <CR> to keep default dsze, or enter new dsze or range of dsze's (example range: 256 - 512): 512 - 2048

rel_tmax = 100

Enter <CR> to keep default tmax, or enter new tmax or range of tmax's (example range: 10 - 100): 50 - 200

Figure 16.7-16 — Hashsim Operation with ASCII Input File (1 of 2)

OFFICE DEPENDENT DATA MAINTENANCE
Procedure 16.7

235-105-220
November 1998

HASH STAGED SIMULATION: PROBE DEPTH=3 PSZE=152
 FOLDTYPE=DBDEFAULT

					1 of 3
STAGE NUMBER:	1	2	3	4	5
PAGES RESERVED:	19	7	2	1	1 TOTAL=30
PAGES ALLOCATED:	12	0	0	0	0 TOTAL=12
PERCENT OCCUPIED:	47.36	0.00	0.00	0.00	0.00

TUPLES=27	PAGES=12	SEARCH=1.370
TMAX=65	TPAG=3	LOAD=64.125
OVFLW=0	MSEARCH=3	K-BYTES=6.250
HSZE=256	IHSZE=N/A	DSZE=512
SCORE=38.325		

					2 of 3
STAGE NUMBER:	1	2	3	4	5
PAGES RESERVED:	7	5	1	1	1 TOTAL=15
PAGES ALLOCATED:	7	0	0	0	0 TOTAL=7
PERCENT OCCUPIED:	64.28	0.00	0.00	0.00	0.00

TUPLES=27	PAGES=7	SEARCH=1.370
TMAX=50	TPAG=6	LOAD=55.280
OVFLW=0	MSEARCH=3	K-BYTES=7.250
HSZE=256	IHSZE=N/A	DSZE=1024
SCORE=48.670		

					3 of 3
STAGE NUMBER:	1	2	3	4	5
PAGES RESERVED:	2	1	1	1	1 TOTAL=6
PAGES ALLOCATED:	2	1	0	0	0 TOTAL=3
PERCENT OCCUPIED:	96.15	15.38	0.00	0.00	0.00

TUPLES=27	PAGES=3	SEARCH=2.296
TMAX=50	TPAG=13	LOAD=64.125
OVFLW=0	MSEARCH=5	K-BYTES=6.250
HSZE=256	IHSZE=N/A	DSZE=2048
SCORE=50.085		

Figure 16.7-16 — Hashsim Operation with ASCII Input File (2 of 2)

Processor Number? 193

- 1: REVIEW - review data by relation or by BID
- 2: SCAN - scan a relation for corrupted data
- 3: REORG - manually reorganize a relation
- 4: DESTROY - destroy (part of) a relation
- 5: OVERWRITE - overwrite 1, 2, or 4 bytes of memory
- 6: HASHSIM - run hashing simulator
- 7: Quit

Operation? 6

Relation Name? (<CR> leaves it unchanged) tm_attt

- 1: Folded key file
- 2: ASCII input file
- 3: Neither

Which of the following are you providing? 3

Enter UNIX system filename to save relation ASCII to: tm_attt

Enter parameters for hashing simulation ...

acc_foldtyp = DBDEFAULT

- 1: DBDEFAULT
- 2: DBG31

Folding algorithm (acc_foldtyp) (<CR> keeps default)?

acc_probdepth = 3

Maximum search depth per stage (acc_probdepth) (<CR> keeps default)? 5

rel_dsze = 1024

Enter <CR> to keep default dsze, or enter new
dsze or range of dsze's (example range: 256 - 512): 2048

rel_tmax = 100

Enter <CR> to keep default tmax, or enter new
tmax or range of tmax's (example range: 10 - 100):

Figure 16.7-17 — Hashsim Operation with Neither ASCII nor Folded Key File (1 of 2)

OFFICE DEPENDENT DATA MAINTENANCE
Procedure 16.7

235-105-220
November 1998

HASH STAGED SIMULATION: PROBE DEPTH=5 PSZE=152
FOLDTYPE=DBDEFAULT

					1 of 1
STAGE NUMBER:	1	2	3	4	5
PAGES RESERVED:	6	1	1	1	1 TOTAL=10
PAGES ALLOCATED:	6	0	0	0	0 TOTAL=6
PERCENT OCCUPIED:	34.61	0.00	0.00	0.00	0.00
TUPLES=27	PAGES=6	SEARCH=1.222			
TMAX=100	TPAG=13	LOAD=32.716			
OVFLW=0	MSEARCH=2	K-BYTES=12.250			
HSZE=256	IHSZE=N/A	DSZE=2048			
SCORE=69.754					

Figure 16.7-17 — Hashsim Operation with Neither ASCII nor Folded Key File (2 of 2)

16.8 MODIFY A COMMON NETWORK INTERFACE DATA BASE STRUCTURE WITH CNIDBOC

OVERVIEW

This procedure is used to modify a common network interface data base structure.

The Common Network Interface (CNI) Data Base Consolidator (CNIDBOC) is an interactive *UNIX*¹ system (menu-driven) process that incorporates the Functional Listing, Recent Change (RC), and Disk verification and modification of individual fields of RC structures. It is used by CNI applications for emergency purposes, such as field troubleshooting, or if the application's RC interface to CNI becomes inoperable.

PROCEDURE

1. The CNIDBOC can be accessed from any Trunk and Line Work Station (TLWS) or Recent Change/Verify (RC/V) terminal by entering the following:

rcv:menu:cnidboc

Note: CNIDBOC can also be accessed from the *screen* program (MCC Page 194) by entering menu option "c."

The following menu is displayed on the screen:

```

                <<CNIDBOC (CNI)>>
CCS Node Data:          (C) Domestic Routing Data: (M)
Critical Event Table:  (E) Exception Table:        (X)
GT Translator Data:    (G) History File Descriptor: (F)
                               Logical-Physical:    (L)
Office Data:           (O) Permanent Relation:     (R)
Subsystem Data:        (S) Schedule Table:         (H)
Protocol Timer/Parameter Data: (P) User View Table: (U)
EXIT CNIDBOC: (!)
```

Enter the type of data table ('?'=help):

2. Select and enter the letter associated with the desired data.
3. The CNIDBOC has printed the RC type and the name of the tables that may be modified (Figure 16.8-1). Select the table to be modified.
4. After selecting the table to be modified, the following is displayed:

Enter Operation (R, RB, RD, RDB, RC, U, ?, !):

Enter the desired operation. Each operation is defined as follows:

- (a) The **R** and **RB** operations are used for Review in core and Batch Review in core.
 - If either one of these options are selected, then CNIDBOC verifies the table contents that are modified by the different RC types. The static

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field names in each structure and their contents are printed for each RC type. For fields that have symbolic values, the value is displayed in parentheses on the right-hand side of the symbolic name.

```
< ** Linknode Data ** >
rc.type = LNDATA, DISK_LND
Tables impacted:
Clbitmap      - (bitmap for linknode allocation)      (E)
*Clrnaoffset and Clnodedata - (linknode data)        (C)
cH7gtxtab     - (global title translator table)      (G)
cH1xp_tab,cHp1_tab,cHv1_tab,ln7slots-(log/phy)      (L)
cMA61k        - (CCS6 active link Meas buffers)      (W)
cMA61k        - (CCS6 passive link Meas buffers)    (X)
cMA71k        - (CCS7 active link Meas buffers)      (Y)
cMA71k        - (CCS7 passive link Meas buffers)    (Z)
cNlsrel,cNls_cnt,cNls_rna - (ls related tables)      (R)
cSadjstp      - (adjacent STPs tables)                (D)
cSbrdcst      - (broadcast list table)                (B)
cSpermrel     - (permanent relation table)           (M)
```

* These tables are directly recent changable.

Please enter input: C

Figure 16.8-1 — Typical CNIDBOC Menu Response

- The user has the option of verifying the tables either by viewing a specific element on the terminal (selection **R**) or writing all the table elements to a file (selection **RB**). If the **RB** option is chosen, the user must specify the disk filename where the output should be stored. The path to the disk file is defaulted to the */updtmp* directory (or to a user specified directory by entering the full directory path and filename).
- (b) The **RD** and **RDB** operations are used for Disk Verification.
 - The following disk files may be verified:
 - **c_office** (office data)
 - **cet** (critical event table)
 - **excp** (exception table)
 - **hfdt** (history file descriptor table)
 - **locssn** (local subsystem data)
 - **Inxxyy** (linknode data table - where **xx** is frame and **yy** is member)
 - **lxp_tab** (logical to physical data)
 - **ptp** (protocol timer and parameter data)
 - **permrel** (permanent relation data)
 - **pxl_tab** (physical to logical data)
 - **schd** (schedule table)
 - **ssdist** (subsystem data)
 - **uvdt** (user view descriptor table)
 - **vl_tab** (logical link identification for CCS7 links)

- ccs7_pc (CCS7 point code routing table)
 - rtg_patterns (routing pattern table).
 - The user has the option of verifying the disk files either by viewing one element at a time on the terminal (selection **RD**) or writing all the table elements to a file (selection **RDB**). The pathname for the saved file is also defaulted to the */updtmp* directory (or to a user specified directory by entering the full directory path and filename).
- (c) The **RC** operation is used for Recent Change data.
- The **RC** provides the terminal interface for changing and creating the following CNI data:
 - Domestic routing data
 - Global title translation table
 - Linknode data
 - Office data
 - Permanent relation data
 - Logical to physical table
 - Subsystem data
 - Cet, excp, hfdd, schd, uvdt tables.
 - If the **RC** option is chosen, the contents of each different field in the **work list** is printed and the user is prompted to enter a new value. Pressing the **RETURN** key retains the current field contents.
 - For all **RC** types (except the last one, which is RC measurement), if for some reason the user decides not to continue with the transaction that has been started, an **!** may be entered, at which time the user can return to the RC menu.
- (d) The **U** operation is used to modify an individual field.

Caution: The U operation is potentially service-affecting. It should only be used with Lucent Technologies technical assistance, either present or on-line.

- The modification of an individual field allows the user to change an individual field without going through the error check software process CNIDBA. Since it is potentially service-affecting, access may be gained only through the use of a password, which may be obtained through the assistance of the Customer Technical Support (CTS), 866-582-3688 (866LUCENT8) or 630-224-4672. A message is sent to the Receive-Only Printer (ROP) and to a log file indicating entrance to and exit from this option. Logging is to the RPTERR0 or RPTERR1 file under the directory */log/log*.
- If the user entered this option and selected a field, the contents for that field are printed and the user is prompted to enter a new value. If the user decides not to update this field, either press the **RETURN** key or enter **!**, which returns to the prompt **Any other fields?** If the field will

be updated, the new value will be entered. On updating the field in the Protected Application Segment (PAS), the modified field along with its old and new values are also sent to the ROP and log file.

- The amount of information that must be entered varies, depending on the table and the operation selected.
- (e) The ? symbol means that the information to assist the user (help screen) is displayed.
- (f) The ! symbol means that the current menu is exited and the previous menu is displayed. If the user is in the main menu and enters !, CNIDBOC terminates.

If the RC fails, an error message appears at the ROP. If the user updates the PAS through the update mode, a message is printed on the ROP and in a log file indicating the old and the new values.

5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

16.9 CORRUPTED GK TUPLE DATA CONTENT CORRECTIVE PROCEDURE

OVERVIEW

This procedure is used to correct corrupted generated key (GK) tuple data.

If a generated key (GK) relation has corrupted GK tuple data, the generated key collection and compression routine (GKCCR) finds the error and reports it using the **REPT:GKCCR** output message. If the corrupted GK tuple was marked so that access to any virtual relation using that GK tuple is prevented and the GKCCR is not able to correct the error, then the error must be corrected manually.

Caution: *Only Qualified ODD Maintenance Personnel experienced in virtual relation recovery procedures should attempt recovery of errors reported by the GKCCR. Inappropriate recovery of GK tuple corruption can lead to Call Processing and System Failures and may accidentally modify a large number of virtual relation tuples with incorrect attribute values. Seek technical assistance before executing any of the following recovery procedures.*

The GKCCR can fix all problems found with a GK relation except those errors that may have corrupted tuple data content. If tuple content has been corrupted, the data content must be corrected by updating the **VIRTUAL** tuples that use any of the corrupted GK relation tuples.

Caution: *NEVER correct corruption by directly modifying GK relation tuples.*

Recovering from errors identified by **REPT:GKCCR** output messages as requiring manual action entails the following high-level procedure steps:

- Determine what Virtual Relations use the reported corrupt GK relation(s).
- Identify the set of tuples in those Virtual Relations that reference the missing or corrupted GK relation tuple(s).
- Correct the virtual relation tuples that use the problem GK tuples with appropriate attribute data values using the office data base editor (ODBE).
- Manually execute the GKCCR using the **EXC:GKCCR** command.
- Repeat the procedure until the manual GKCCR command no longer reports any manual action requiring error report messages (**REPT:GKCCR**).

The following text gives a detailed expansion of each of these high-level steps to fixing corrupted or inconsistent virtual relation tuples.

PROCEDURE

1. Determine the affected Virtual Relations:

Because multiple virtual relations may reference the same GK relation, the first step to solving corrupted virtual relation problems is to determine what virtual relations need to be fixed. The ODBE provides this information.

- (a) Execute the ODBE tool (see Procedure [16.5](#) for instructions on how to invoke the tool).
- (b) Using the relation name provided by the **REPT GKCCR** output message that requires manual action, execute the **GKVIRT** operation described in Procedure [16.5](#).

The **GKVIRT** operation provides a list of all Virtual relations using the **REPT:GKCCR** output message specified GK relation.

2. Identify Virtual Tuples Using Corrupted or Missing GK Tuples:

Since multiple virtual tuples from the same or many virtual relations may reference the same GK tuple, the next step is to find all the virtual tuples that reference problem GK tuples.

- (a) Execute the ODBE tool (see Procedure 16.5).
- (b) For each virtual relation determined in the previous step using GKVIRT, use the batch review (BR) operation and place the output into separate *UNIX*' files for each virtual relation.
- (c) If any virtual tuples are referencing GK tuples that are missing or corrupted, one of the following error messages appears:

Error: ODD inconsistency encountered on tuple number ### tuple contains incorrect values.

Error: ODD corruption encountered on tuple number ### tuple contains incorrect values.

Where: ### stands for the tuple number (or line) in the BR output.

For example, if ### was a 4, this would indicate that the 4th tuple output by the BR has either inconsistencies or corruption.

The ODD inconsistency example found references to a GK tuple that does not exist in the virtual relation by the ### virtual tuple in the output file.

The second example indicates that a virtual tuple references a GK that has been marked by the GKCCR as containing corrupt information.

- (d) Only the key fields of the virtual tuple should be considered valid, the remaining attribute values may be invalid. Since the entire virtual tuple could not be completely assembled, the BR function used whatever data content existed in the tuple buffer.
 - (e) Using office data records, determine the proper data content of the virtual tuples. If the relation has a distribution type that stores the same tuple in multiple processors, use ODBE to R the tuple in one of these other processors to find out all the attribute contents that should exist for the tuple on the processor being fixed.
 - (f) Do all the previous steps for each virtual relation determined from the step that used the GKVIRT ODBE operation.
3. Correct the Problem Virtual Tuples:
- Now that the set of problem virtual tuples has been determined, the ODBE tool is used again to correct each tuple.
- (a) Execute the ODBE tool (see Procedure 16.5).

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- (b) For each problem virtual tuple found, specify the virtual relation name and then use the Update (U) operation.
 - (c) Specify the virtual relation keys for each tuple found in the previous steps.
 - (d) Provide the appropriate attribute contents that should exist for this virtual tuple. Be sure to update every attribute in the tuple.
 - (e) After completing the update operation, the virtual tuple can now be reviewed (R option) without an error.
4. Verify all the corruption has been fixed:
- After all the corrupt virtual tuples have been updated, manually execute the GKCCR process on the processors that reported the need for manual action using the **EXC:GKCCR** input command.
- Continue the entire process until no manual action **REPT:GKCCR** output messages occur following **EXC:GKCCR** input messages.
5. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Corrective Maintenance Procedures

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17. TEST EQUIPMENT CALIBRATION

GENERAL

The procedures in this section are used to calibrate and maintain the test equipment used on the *5ESS*[®] switch.

17.1 CALIBRATION CHECK FOR DCTU-PMU CIRCUIT PACKS

OVERVIEW

When Directly-Connected Test Unit (DCTU) – Precision Measurement Unit (PMU) diagnostics fail, this procedure is used to check the calibration of the SM253, SM258, and SM258B circuit packs to determine which units are defective.

In the DCTU-PMU, there is an interaction between the SM253, SM258, and SM258B circuit packs. If a voltage regulator on any of these circuit packs is out of tolerance, the DCTU-PMU diagnostics may fail phase 3-7-4, 4-6-3, 4-6-4, 5-2-3, or 5-2-4 and not clearly indicate the defective circuit pack. This causes an excessive failure rate, even though many of the associated packs are good.

PROCEDURE

1. **Note:** A *Fluke*¹ 8024B Digital Multimeter (or equivalent) with four-digit display and 0.5% basic DC accuracy and two grabber-type clip leads (12 inches or longer) are required.

Caution 1: *Do Not Use alligator-type clip leads; they may accidentally short-circuit to adjacent terminals.*

Caution 2: *Whenever you handle circuit packs, wear an Electrostatic Discharge wrist strap grounded to the frame.*

At the DCTU, *partially* slide the SM250 (MC2P002-C1) out of the PMU.

2. Remove an SM253, SM258(B)-0 or an SM258(B)-1 circuit pack from the PMU.
3. Using one clip lead, attach the *negative* lead of the voltmeter to the large silver 25 μ F capacitor onto the exposed metal lead. Refer to Figure 17.1-1 (SM253) or 17.1-2 (SM258), whichever is applicable, for the location of the capacitor and *the proper placement of the clip lead*.
4. Using the other clip lead, attach the *positive* lead of the voltmeter to pin 024 of the circuit pack under test by clipping onto the exposed metal of the pin close to where it is soldered onto the circuit pack. Refer to Figure 17.1-1 or 17.1-2, whichever is applicable, for the location of pin 024.
5. With the voltmeter attached, carefully reinstall the circuit pack under test into the PMU.

Note: If the clip leads prevent the circuit pack from sliding into the PMU slot, the adjacent circuit pack may be temporarily removed for this measurement.

6. Compare the voltage readings with the voltage bands given in Table 17.1-1.
 - (a) If the reading is bad, replace the circuit pack with a spare circuit pack and return to Step 3.
 - (b) If the reading is good or marginal, remove the circuit pack from the PMU, remove the clip leads, reinstall it in the PMU, and continue with the next step.

Note: Marginal circuit packs could fail in the near future. Those packs may be returned to the factory for recalibration at your discretion or following local practices.

1. Registered trademark of Fluke Corporation.

7. Return to Step 2 for each circuit pack to be tested.
8. Reinstall the SM250 (MC2P002-C1) in the PMU.
9. Return to Step 1 for each PMU.
10. Run the diagnostics. If any of the diagnostic failures listed in the Overview fail, replace the previously-identified marginal circuit packs, starting with the worst case, until diagnostics pass.
11. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

Table 17.1-1 — DCTU Circuit Pack Voltage Readings

CIRCUIT PACK	VOLTAGE BANDS		
	GOOD	MARGINAL	BAD
SM253	8.82 V - 9.10 V	8.64 V - 8.81 V	0.00 V - 8.63 V
SM258(B)-0	7.66 V - 8.10 V	7.57 V - 7.65 V	0.00 V - 7.56 V
SM258(B)-1	7.66 V - 8.10 V	7.57 V - 7.65 V	0.00 V - 7.56 V

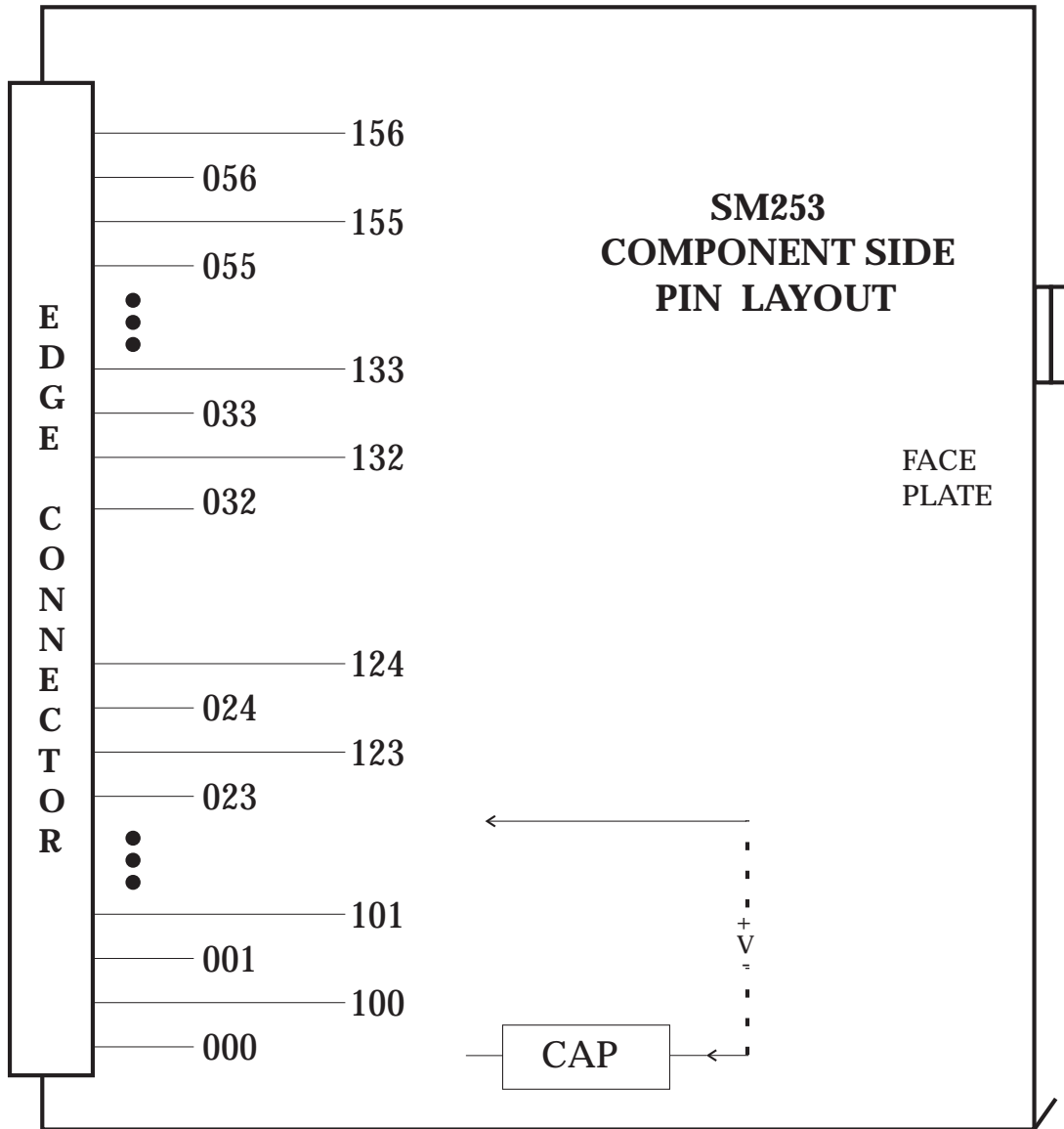


Figure 17.1-1 — SM253 Circuit Pack Pin Layout

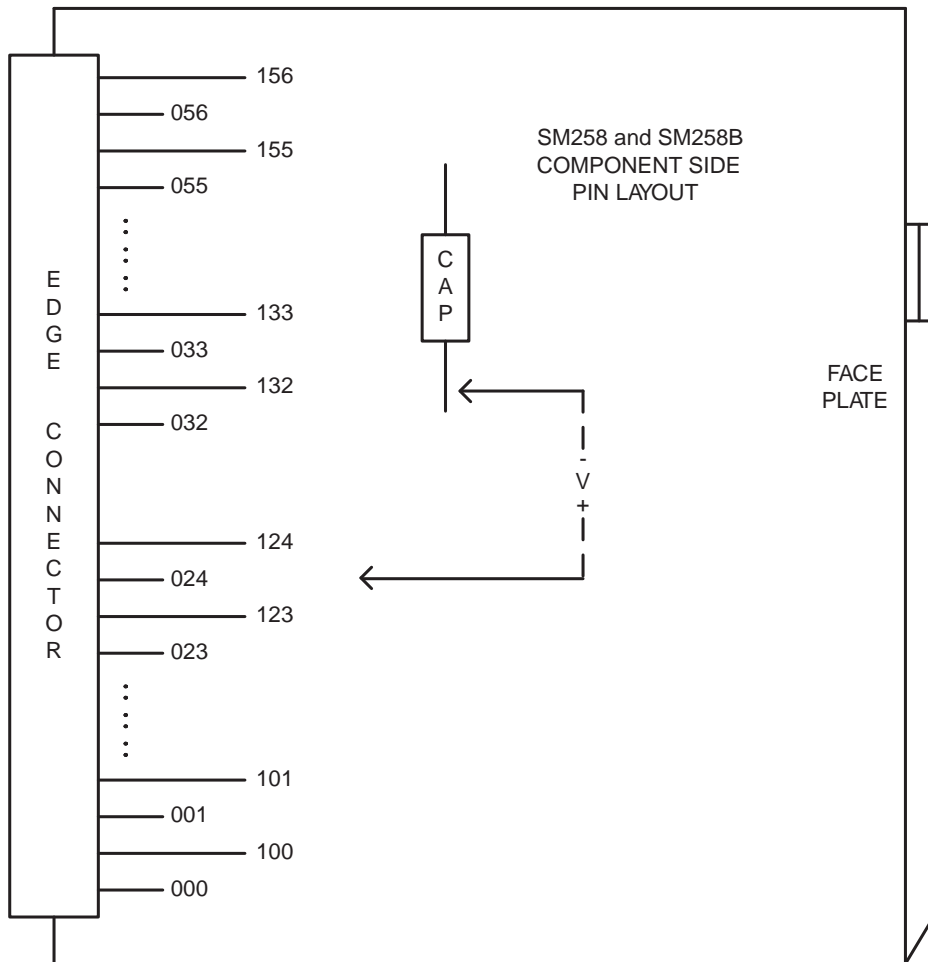


Figure 17.1-2 — SM258(B) Circuit Pack Pin Layout

17.2 CALIBRATING TLWS MEASUREMENTS FOR SLIM-2/DCTU

OVERVIEW

The Trunk and Line Work Station (TLWS) performs various measurements from the Subscriber Line Instrument Measurement -2 (SLIM-2) or Directly Connected Test Unit (DCTU). Unless compensated for, all results are measured relative to the SLIM-2 or DCTU. Two measurements, distance to open circuit (DTO) and resistance, give better results if they are calibrated to the Main Distributing Frame (MDF). *Once a DTO or resistance measurement is calibrated, the measurement can be used to determine whether an open circuit is inside-plant or outside-plant.*

Note: Calibration (test) lines should be assigned [as regular plain old telephone service (POTS) lines] in the data base; one for DTO and one for resistance. The DTO line must have an open circuit between tip and ring at the point on the MDF where it would normally leave the office (for example, carbon blocks). The resistance line uses a short circuit across tip and ring at the time of measurement where it would normally leave the office. ***Do not leave the short circuit across tip and ring; this makes the line appear busy.***

If dedicated calibration (test) lines are not used, then any POTS line is sufficient. When using a POTS line, apply the open or short circuit when requested. When this procedure is completed, the POTS line must be put back in its initial condition.

The correct value for the Recent Change/Verify (RC/V) office parameter view field RESIST setting is determined by making the measurement as described in the procedure and adding the appropriate value.

Note 1: The RC/V office parameter view fields DISTOPEN and RESIST are for calibration purposes.

Note 2: If the office parameter RC/V view does not contain the fields DISTOPEN and RESIST, then the Office Data Base Editor (ODBE) must be used to update these AM-PARAMETERS. The parameters GLCP8DUMMY for resistance and GLCP7DUMMY for DTO should both be set to "0."

PROCEDURE

1. Using a recent change and verify (RC/V) terminal, go to the RC/V View 8.1 (office parameters) and update the fields DISTOPEN and RESIST to "0."
2. At the TLWS video terminal, access a TLWS test position **161,X** from the TLWS test position summary page (160).
3. Seize the DTO calibration line (open circuit across tip and ring) with the poke command **4001,DN**.
4. From the metallic measurement page , use one of the following poke commands to measure the DTO:

SLIM-2 – **5705**

DCTU – **5605**

Record this value to enter into DISTOPEN later.

5. Release the line using the poke command **4999**.
6. Seize the resistance calibration line with the poke command **4001,DN**.
7. Using the same TLWS metallic measurement page, use one of the following poke commands to measure the resistance internal to the office:

SLIM-2 – **5703**

DCTU – **5603**

Once the measurement has begun to report values at the TLWS, place a short circuit across tip and ring (the TLWS takes about 8 seconds to update the screen). Record this value to enter into RESIST later, and note whether the value is in ohms or kilohms.

Note: The calibration (test) line used for the resistance measurements should be on a Line Unit model 2 (LU-2) or model 3 (LU-3). If neither of these types of LUs are available, then the resistance readings obtained from the TLWS should be adjusted before the data base can be updated as follows:

Line Type	Resistance to be Added (Ohms)
AIU	246
LU-1	-80
LU-2	0
LU-3	0
ISLU-Z	-20
ISLU-U (AMI)	243
ISLU-U (ANSI ^a)	246
ISLU2-U (ANSI)	246

a. Registered trademark of American National Standards Institute, Inc.

8. Remove the short circuit from the line and release it using the poke command 4999.
9. Using an RC/V video terminal, go to RC/V View 8.1 (office parameters) and enter the obtained values as positive numbers. The values being entered are in *feet* and *ohms*. (***Be careful. The measurement may be in kilohms.***) The DTO measurement is updated on DISTOPEN; and the resistance measurement is updated on RESIST.
10. Repeat Steps 3 through 8. The values should now be “0” feet for the DTO measurement and “0” ohms for the resistance measurement. If not, repeat this procedure starting at Step 1. If correct, then continue with the next step.
11. Access the TLWS test position summary page (160) and release the TLWS test position (201,X).
Note: If using an active POTS line for calibration, restore the wiring to initial condition at this time.
12. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

17.3 CHECK/ADJUST AC JACK AMPLIFIERS IN TEST ACCESS UNIT

OVERVIEW

This procedure is used to check/adjust the AC1 and AC2 receive amplifiers in the Test Access Unit (TAU), which is located at the Master Control Center (MCC).

PROCEDURE

1. Are trunk group and member numbers of AC1 and AC2 known?
If **YES**, go to Step 15.
If **NO**, continue with the next step.
2. Access MCC display Page 196.
Response: **Input CLASS, CLASS.VIEW, Q, R, V, BMI, BMD, BMR, IM or N > ____**
3. Enter "14.3V" to select Verify_MISC TLWS VIEW.
Response: **Verify_MISC-TRUNK LINE WORK STATION VIEW - 14.3**
4. Enter the TLWS ID number that is the key to the RLtlwsr tuple specifying the TLWS AC jack. For more information, refer to 235-105-110, *System Maintenance Requirements and Tools*.
Response: Information in view filled in.
5. Record Trunk Equipment Numbers (TENs) listed as attributes for AC JACK 1 and AC JACK 2.
6. Enter the "<" character.
Response: **Input VIEW, CLASS.VIEW, Q, R, V, BMI, BMD, BMR, IM, <, or N > ____**
7. Enter "5.9V" to select the VERIFY TRUNK MEMBER VIEW.
Response: **Blank VERIFY-VERIFY TRUNK MEMBER - 5.9**
8. Enter "T" (for analog trunk unit) and the TEN for AC JACK 1 obtained from View 14.3.
Response: Information in view filled in.
9. Record the Trunk Group Number (TGN) and MEM for AC JACK 1.
10. Enter an "R" to start another review.
Response: **VERIFY-VERIFY TRUNK MEMBER - 5.9**
11. Enter "T" (for analog trunk unit) and the TEN for AC JACK 2 obtained from View 14.3.
Response: Information in view filled in.
12. Record the TGN and MEM for AC JACK 2.
13. Enter the "<" character.
Response: **VIEW_MENU 5**
Input VIEW, CLASS.VIEW, H, Q, R, V, BI, BD, BR, I or < _____
14. Enter a "q."
Response: **RCV MENU APPRC COMPL**
Note: Exit the Recent Change/Verify (RC/V) mode.

- Caution:** *If the TAU is located under the access panel of the TAU, do not let the access panel drop fully open. The circuit pack in the TAU could slip out and be damaged.*

At the MCC console, turn the latch screw on the bottom of the TAU assembly until the access panel drops open.

- On MCC display Page 160, enter command (CMD) 161,X[,Y].
Where: X = Test position number (1-32).
Y = ID number.
- To seize the trunk, enter either CMD 412,X or 4102,X, depending on the software release.
Where: X = **GRP,MEM** for AC1 JACK.
- To add the talk and monitor (T&M) phone, enter either CMD 433 or 4303, depending on the software release. (Test to be conducted in monitor mode only.)
- To send 1004-Hz at 0 dBm, enter either CMD 505 or 5005, depending on the software release.
- Connect the transmission test set per Figure 17.3-1.

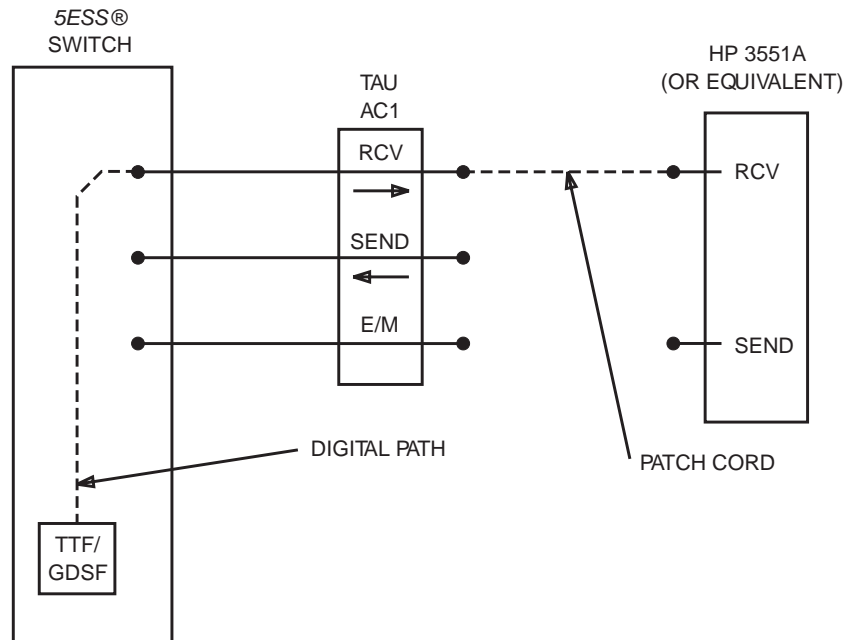


Figure 17.3-1 — Connections Required to Adjust AC1 Amplifier

- Set the transmission test set terminating impedance to 600 ohms.
- Adjust the AC1 RECEIVE amplifier per Figure 17.3-2 until the test set measures 0 dBm at 600 ohms.

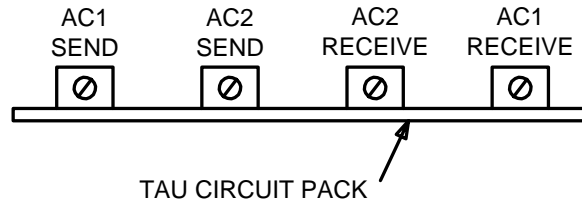


Figure 17.3-2 — Location of AC1 and AC2 Amplifier Screws

23. To stop tone, enter CMD **5999**.
24. To release the connection, enter CMD **4999**.
25. To seize the trunk, enter either CMD **412,X** or **4102,X**, depending on the software release.

Where: X = **GRP,MEM** numbers for AC2 JACK.

26. To add the T&M phone, enter either CMD **433** or **4303**, depending on the software release. (Test to be conducted in monitor mode only.)
27. To send 1004-Hz at 0 dBm, enter either CMD **505** or **5005**, depending on the software release.
28. Move the plug from the AC1 JACK to the AC2 JACK.
29. Adjust AC2 RECEIVE amplifier per Figure 17.3-2 until the test set reads 0 dBm at 600 ohms.
30. To stop tone, enter CMD **5999**.
31. To select the AC1 JACK, enter either CMD **581** or **5801**, depending on the software release.
32. Set the T&M phone to the "MNTR" mode.
33. Connect the transmission test set per Figure 17.3-3.

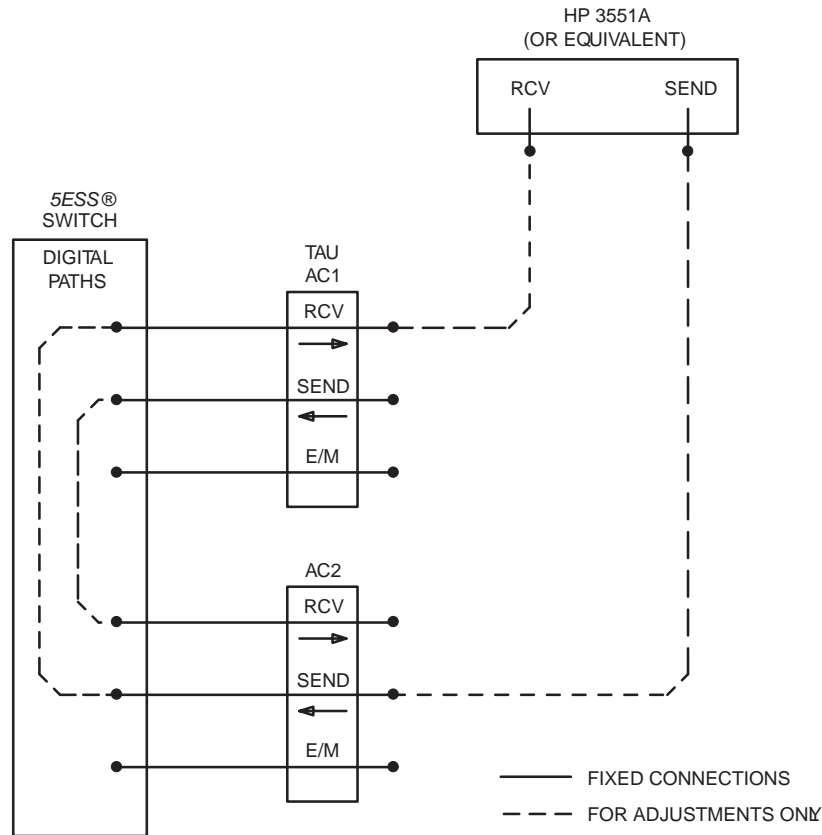


Figure 17.3-3 — Connections Required to Adjust AC2 SEND Amplifier

34. Set the test set to send a 1004-Hz tone at 0 dBm.
35. Adjust SEND amplifier of AC2 so the transmission test set is receiving 0 dBm at 600 ohms from AC1.
36. Connect the transmission test set per Figure 17.3-4.

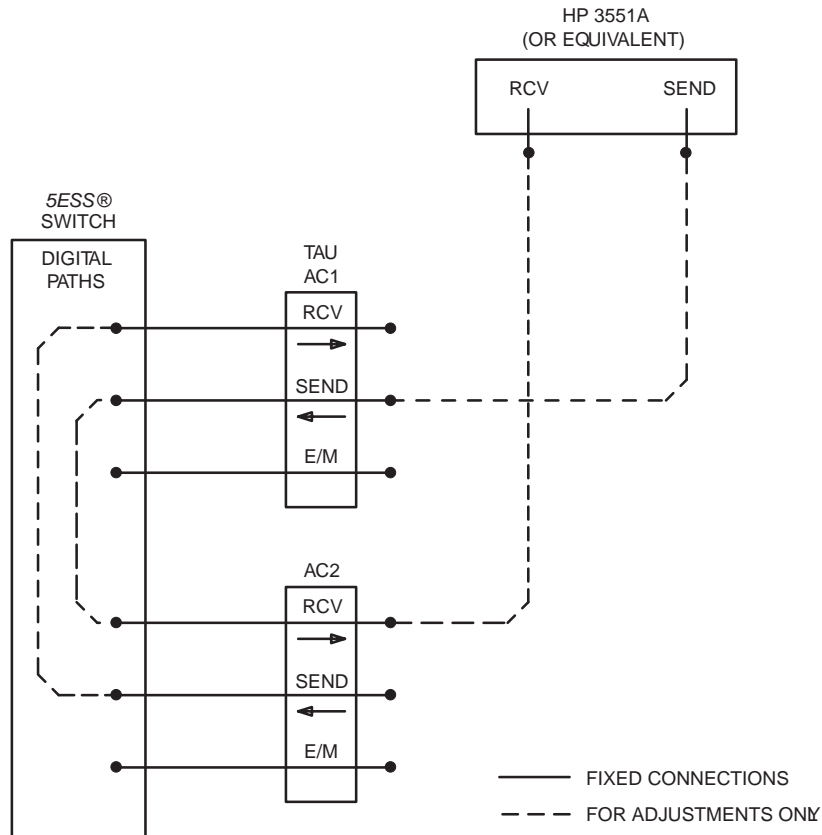


Figure 17.3-4 — Connections Required to Adjust AC1 SEND Amplifier

37. Adjust SEND amplifier of AC1 so the transmission test set is receiving 0 dBm at 600 ohms from AC2.
38. To release the connection, enter CMD 4999.
39. Disconnect the test set.
40. Close the TAU panel.
41. On MCC display Page 160, release the test position by entering CMD 201,X.
Where: X = Test position number (1-32).
42. **STOP. YOU HAVE COMPLETED THIS PROCEDURE.**

A1. DIAGNOSTIC PHASE DESCRIPTIONS

A1.1 DESCRIPTION

This section provides supporting information in the form of Diagnostic Phase Description tables. The Diagnostic Phase Description tables are referenced from procedures in other sections of this information product.

A1.2 PROGRAM LISTINGS

General Information

Within the Diagnostic Phase Description tables for many of the phases is a Program Listing code. This code can be used to identify the software that corresponds to the diagnostic that is being performed. If the description of a diagnostic phase does not help solve a problem, perhaps understanding the software will.

How to Order

The 235-410-220 is not part of the standard switch documentation. Information on how to order the On-Line Program Listings is available in the 235-001-001, *Documentation Description and Ordering Guide*.

How to Access

Access to 5ESS[®] Switch Program Listings is provided through the 235-410-220, *Electronic Media Networked Service (EMNS) Access to On-Line Program Listings*. This information product is a dial-up service that offers a menu of selections, which includes queries that allow you to view the source code in the 5ESS switch. This access is proprietary and the appropriate nondisclosure agreements must be signed before access can be provided.

It is only provided through the EMNS access and is *not* available on Compact Disk-Read-Only Memory (CD-ROM) nor *UNIX*¹ System tape.

Customers with login access to 235-410-220 can refer to the *Software Analysis Guide*, 235-600-510, for the login procedure and basic usage information. Customers can contact the Lucent Technologies Customer Support group for assistance (Call 1-800-228-6763).

How to Use

When using the On-Line Program Listings, the FUNCTION NAME reference is used with the search for information on specific functions.

Note: There is no conversion for the Administrative Module (AM) diagnostic products. The following conversion examples are for the Switching Module (SM) and Communication Module (CM) only.

The general rule to convert an SM program listing name to the MODULE PRODUCT NAME is to remove the SM and colon. Then make all remaining characters lower case except the first two.

- *Example:* **SM:DNFABEX** converts to **DNfabex**.

The method to convert the CM program listing name is a little different. First, remove the CM and colon. Then change all characters except the first three (DNC) to lower case.

1. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company Limited.

Example: **CM:DNC2NC03** converts to **DNC2nc03**.

However, some CM products are 3B-related, in which case the first five characters are DNC3B. In these cases, remove the AM and colon. Then change all characters except the first five (DNC3B) to lower case.

Example: **AM:DNC3BFPC** converts to **DNC3Bfpc**.

A1.3 DIAGNOSTIC PHASE DESCRIPTIONS

This section provides diagnostic phase descriptive information in the form of tables for all hardware (units/circuits) of the 5ESS switch. The entries used in the DIAGNOSTIC ID column are the mnemonics for the different types of units and service groups. The entries closely follow those used on the MCC display pages and I/O messages.

The entry [PR Name=xxxxxxx] in the DESCRIPTION/WHAT IS TESTED column is a mnemonic reference to the appropriate diagnostic PR.

The following is a list of the Diagnostic Phase Description tables:

- Table A1-1, Diagnostic Phase Descriptions for ACHI
- Table A1-2, Diagnostic Phase Descriptions for AIUCOM (COMDAC)
- Table A1-3, Diagnostic Phase Descriptions for AIULC
- Table A1-4, Diagnostic Phase Descriptions for AIULP-U
- Table A1-5, Diagnostic Phase Descriptions for AIULP-Z
- Table A1-6, Diagnostic Phase Descriptions for AIU TAP100
- Table A1-7, Diagnostic Phase Descriptions for AIURG
- Table A1-8, Diagnostic Phase Descriptions for AIUTSGRP
- Table A1-9, Diagnostic Phase Descriptions for AIU PCTDX
- Table A1-10, Diagnostic Phase Descriptions for ALIT
- Table A1-11, Diagnostic Phase Descriptions for ASC
- Table A1-12, Diagnostic Phase Descriptions for BTSR
- Table A1-13, Diagnostic Phase Descriptions for CC (DNU-S)
- Table A1-14, Diagnostic Phase Descriptions for CD (DNU-S)
- Table A1-15, Diagnostic Phase Descriptions for CDFI/RDFI
- Table A1-16, Diagnostic Phase Descriptions for CDI
- Table A1-17, Diagnostic Phase Descriptions for CMP
- Table A1-18, Diagnostic Phase Descriptions for CU in 3B20D (AM)

The following is a list of the diagnostic phase description tables for the 3B20D (AM):

- Table A1-19, Diagnostic Phase Descriptions for CU CC in 3B20D (AM)
- Table A1-20, Diagnostic Phase Descriptions for CU CH in 3B20D (AM)
- Table A1-21, Diagnostic Phase Descriptions for CU CSU in 3B20D (AM)

- Table [A1-22](#), Diagnostic Phase Descriptions for CU DMA in 3B20D (AM)
- Table [A1-23](#), Diagnostic Phase Descriptions for CU MASC in 3B20D (AM)
- Table [A1-24](#), Diagnostic Phase Descriptions for CU SAT in 3B20D (AM)
- Table [A1-25](#), Diagnostic Phase Descriptions for CU UC in 3B20D (AM).
- The following is a list of the diagnostic phase description tables for the 3B21D (AM):
 - Table [A1-26](#), Diagnostic Phase Descriptions for CU in 3B21D (AM)
 - Table [A1-27](#), Diagnostic Phase Descriptions for CU CC in 3B21D (AM)
 - Table [A1-28](#), Diagnostic Phase Descriptions for CU DCI in 3B21D (AM)
 - Table [A1-29](#), Diagnostic Phase Descriptions for CU DFC in 3B21D (AM)
 - Table [A1-30](#), Diagnostic Phase Descriptions for CU DMA in 3B21D (AM)
 - Table [A1-31](#), Diagnostic Phase Descriptions for CU DMCH in 3B21D (AM)
 - Table [A1-32](#), Diagnostic Phase Descriptions for CU IOP in 3B21D (AM)
 - Table [A1-33](#), Diagnostic Phase Descriptions for CU MASC in 3B21D (AM)
 - Table [A1-34](#), Diagnostic Phase Descriptions for CU MHD in 3B21D (AM)
 - Table [A1-35](#), Diagnostic Phase Descriptions for CU MT in 3B21D (AM)
 - Table [A1-36](#), Diagnostic Phase Descriptions for CU MTC in 3B21D (AM)
 - Table [A1-37](#), Diagnostic Phase Descriptions for CU UC in 3B21D (AM).
- Table [A1-38](#), Diagnostic Phase Descriptions for DCLU
- Table [A1-39](#), Diagnostic Phase Descriptions for DCTUCOM
- Table [A1-40](#), Diagnostic Phase Descriptions for DCTUPOINT
- Table [A1-41](#), Diagnostic Phase Descriptions for DFC-Mod 1
- Table [A1-42](#), Diagnostic Phase Descriptions for DFC-SCSI
- Table [A1-43](#), Diagnostic Phase Descriptions for DFI
- Table [A1-44](#), Diagnostic Phase Descriptions for DFI 2
- Table [A1-45](#), Diagnostic Phase Descriptions for DFIH
- Table [A1-46](#), Diagnostic Phase Descriptions for DFTAC
- Table [A1-47](#), Diagnostic Phase Descriptions for DIST
- Table [A1-48](#), Diagnostic Phase Descriptions for DLI
- Table [A1-49](#), Diagnostic Phase Descriptions for DLN
- Table [A1-50](#), Diagnostic Phase Descriptions for DLN-IRN2
- Table [A1-51](#), Diagnostic Phase Descriptions for DUIC
- Table [A1-52](#), Diagnostic Phase Descriptions for EAN
- Table [A1-53](#), Diagnostic Phase Descriptions for FPC
- Table [A1-54](#), Diagnostic Phase Descriptions for GDSF

- Table [A1-55](#), Diagnostic Phase Descriptions for GDSUCOM
- Table [A1-56](#), Diagnostic Phase Descriptions for GDXACC
- Table [A1-57](#), Diagnostic Phase Descriptions for GDXC
- Table [A1-58](#), Diagnostic Phase Descriptions for GDXCON
- Table [A1-59](#), Diagnostic Phase Descriptions for GRID/GRIDBD (SM)
- Table [A1-60](#), Diagnostic Phase Descriptions for GRID/GRIDBD EXERCISE (SM)
- Table [A1-61](#), Diagnostic Phase Descriptions for GRID/GRIDBD PATH TEST (SM)
- Table [A1-62](#), Diagnostic Phase Descriptions for HDFI
- Table [A1-63](#), Diagnostic Phase Descriptions for IDCU
- Table [A1-64](#), Diagnostic Phase Descriptions for IOP
- Table [A1-65](#), Diagnostic Phase Descriptions for ISLUCC
- Table [A1-66](#), Diagnostic Phase Descriptions for ISLUCD
- Table [A1-67](#), Diagnostic Phase Descriptions for ISLUHLSC
- Table [A1-68](#), Diagnostic Phase Descriptions for ISLULBD
- Table [A1-69](#), Diagnostic Phase Descriptions for ISLULC
- Table [A1-70](#), Diagnostic Phase Descriptions for ISLULGC
- Table [A1-71](#), Diagnostic Phase Descriptions for ISLUMAN
- Table [A1-72](#), Diagnostic Phase Descriptions for ISLURG
- Table [A1-73](#), Diagnostic Phase Descriptions for ISTF
- Table [A1-74](#), Diagnostic Phase Descriptions for IUN
- Table [A1-75](#), Diagnostic Phase Descriptions for LDSF3
- Table [A1-76](#), Diagnostic Phase Descriptions for LDSU
- Table [A1-77](#), Diagnostic Phase Descriptions for LDSUCOM
- Table [A1-78](#), Diagnostic Phase Descriptions for LN
- Table [A1-79](#), Diagnostic Phase Descriptions for LN-IRN2
- Table [A1-80](#), Diagnostic Phase Descriptions for LUCHAN/LUCHBD
- Table [A1-81](#), Diagnostic Phase Descriptions for LUCOMC
- Table [A1-82](#), Diagnostic Phase Descriptions for LUHLSC
- Table [A1-83](#), Diagnostic Phase Descriptions for MA
- Table [A1-84](#), Diagnostic Phase Descriptions for MAB
- Table [A1-85](#), Diagnostic Phase Descriptions for MCTSI
- Table [A1-86](#), Diagnostic Phase Descriptions for MCTSI SM-2000
- Table [A1-87](#), Diagnostic Phase Descriptions for MCTSI Unit 3 (MCTU3)
- Table [A1-88](#), Diagnostic Phase Descriptions for MHD-Mod 1

- Table [A1-89](#), Diagnostic Phase Descriptions for MHD-SCSI
- Table [A1-90](#), Diagnostic Phase Descriptions for MI
- Table [A1-91](#), Diagnostic Phase Descriptions for MMP
- Table [A1-92](#), Diagnostic Phase Descriptions for MSCU
- Table [A1-93](#), Diagnostic Phase Descriptions for MSGS
- Table [A1-94](#), Diagnostic Phase Descriptions for MSUCOM
- Table [A1-95](#), Diagnostic Phase Descriptions for MTB
- Table [A1-96](#), Diagnostic Phase Descriptions for MTC
- Table [A1-97](#), Diagnostic Phase Descriptions for MTIB
- Table [A1-98](#), Diagnostic Phase Descriptions for MTIBAX
- Table [A1-99](#), Diagnostic Phase Descriptions for MTTYC
- Table [A1-100](#), Diagnostic Phase Descriptions for NC
- Table [A1-101](#), Diagnostic Phase Descriptions for NLI
- Table [A1-102](#), Diagnostic Phase Descriptions for OFI
- Table [A1-103](#), Diagnostic Phase Descriptions for OFI-IP
- Table [A1-104](#), Diagnostic Phase Descriptions for ONTCCOM – Prior to 5E16.2
- Table [A1-105](#), Diagnostic Phase Descriptions for ONTCCOM – 5E16.2 and Later
- Table [A1-106](#), Diagnostic Phase Descriptions for PCTFI
- Table [A1-107](#), Diagnostic Phase Descriptions for PDLI
- Table [A1-108](#), Diagnostic Phase Descriptions for PMU
- Table [A1-109](#), Diagnostic Phase Descriptions for PPC
- Table [A1-110](#), Diagnostic Phase Descriptions for PROTO
- Table [A1-111](#) and Table [A1-112](#), Diagnostic Phase Descriptions for PSUCOM and PSU2e PSUCOM
- Table [A1-113](#), Diagnostic Phase Descriptions for iPS PSUCOM
- Table [A1-114](#), Diagnostic Phase Descriptions for PSUPH
- Table [A1-115](#), Diagnostic Phase Descriptions for PSUPH-ATM
- Table [A1-116](#), Diagnostic Phase Descriptions for PSUPH-Voice
- Table [A1-117](#), Diagnostic Phase Descriptions for PSUPH-Voice-PHV7
- Table [A1-118](#), Diagnostic Phase Descriptions for PSUPH-GQPH
- Table [A1-119](#), Diagnostic Phase Descriptions for PSUPH-SIP PH
- Table [A1-120](#), Diagnostic Phase Descriptions for PSUPH-PHE3
- Table [A1-121](#), Diagnostic Phase Descriptions for PSUPH-PHE4
- Table [A1-122](#), Diagnostic Phase Descriptions for QGP
- Table [A1-123](#), Diagnostic Phase Descriptions for QLPS (CM2)

- Table [A1-124](#), Diagnostic Phase Descriptions for QLPS (CM3)
- Table [A1-125](#), Diagnostic Phase Descriptions for RAF
- Table [A1-126](#), Diagnostic Phase Descriptions for RAU
- Table [A1-127](#), Diagnostic Phase Descriptions for RCLK
- Table [A1-128](#), Diagnostic Phase Descriptions for RLI
- Table [A1-129](#), Diagnostic Phase Descriptions for RPCN
- Table [A1-130](#), Diagnostic Phase Descriptions for RPCN-IRN2
- Table [A1-131](#), Diagnostic Phase Descriptions for RRCLK
- Table [A1-132](#), Diagnostic Phase Descriptions for RUCI
- Table [A1-133](#), Diagnostic Phase Descriptions for RVPT
- Table [A1-134](#), Diagnostic Phase Descriptions for SAS
- Table [A1-135](#), Diagnostic Phase Descriptions for SCAN
- Table [A1-136](#), Diagnostic Phase Descriptions for SCSDC
- Table [A1-137](#), Diagnostic Phase Descriptions for SDFI
- Table [A1-138](#), Diagnostic Phase Descriptions for SDLC
- Table [A1-139](#), Diagnostic Phase Descriptions for SFI
- Table [A1-140](#), Diagnostic Phase Descriptions for SLIM2
- Table [A1-141](#), Diagnostic Phase Descriptions for TAC
- Table [A1-142](#), Diagnostic Phase Descriptions for TEN/TUCHBD
- Table [A1-143](#), Diagnostic Phase Descriptions for TMS (CM2)
- Table [A1-144](#), Diagnostic Phase Descriptions for TMSFP
- Table [A1-145](#), Diagnostic Phase Descriptions for TMUX (DNU-S)
- Table [A1-146](#), Diagnostic Phase Descriptions for TTFCOM
- Table [A1-147](#), Diagnostic Phase Descriptions for TTYC
- Table [A1-148](#), Diagnostic Phase Descriptions for UCONF
- Table [A1-149](#), Diagnostic Phase Descriptions for UTD
- Table [A1-150](#), Diagnostic Phase Descriptions for UTG.

Table A1-1 — Diagnostic Phase Descriptions for ACHI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ACHI (AM)	–	Application Channel Interface (Administration Module)
	1	Tests the CC I/O bus interface. [PR Name=DL:ACHI01]
	2	Performs the data register looparound tests. [PR Name=DL:ACHI02]
	3	Performs the miscellaneous function tests. [PR Name=DL:ACHI03]

Table A1-2 — Diagnostic Phase Descriptions for AIUCOM (COMDAC/RCOMDAC/QCOMDAC)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIUCOM (COMDAC) (SM)	–	Access Interface Unit Common Data and Control Controller (Switching Module)
	1	Tests the control interface as well as the control communication with the COMDAC/ RCOMDAC/ QCOMDAC under test.
	2	Tests the COMDAC/ RCOMDAC/ QCOMDAC internal circuitry. Also tests the BZ-RS communication and the “switch-over” relay. Note: For RCOMDACs, a failure in segment 20 indicates a problem with the RCOMDAC, ESA application, or BZ-RS. A TLP note provides additional information for finding the problem. For more information on the ESA application, see 255-800-009 , <i>ESA Application User Guide</i> . For more information on the BZ-RS, see 241-500-009 , <i>BZ-RS User Guide</i> , which was delivered with the BZ-RS.
	3	Tests the COMDAC/ RCOMDAC/ QCOMDAC inter-connections to all the equipped APs. This includes control and data integrity between the COMDAC/ RCOMDAC/ QCOMDAC under test and each equipped AP as well as the RG ringing bus connections.
	4	<i>Demand phase only.</i> This 5e16.2 and later phase is run at the factory and during installation. It is only executed when the dgn:aiucom command is invoked with the udgn option. It tests all APs concurrently (except ADSL), and tests the RG bus and tests the MTB to all APs. Furthermore, Phase 100 is automatically invoked.

Table A1-3 — Diagnostic Phase Descriptions for AIULC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIULC (SM)	–	Access Interface Unit Line Circuit (Switching Module)
	1000	Verifies the LC functionality by requesting the application pack firmware to run tests on the circuits, including PCM path tests between the LC and the controlling COMDAC.

Table A1-4 — Diagnostic Phase Descriptions for AIULP-U

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIULP (U-INTERFACE) (SM)	–	Access Interface Unit Line Pack (U-Interface) (Switching Module)
	1	Verifies the control data flow between the line pack (LP) and both COMDACs/ RCOMDACs/ QCOMDACs, and runs the LP firmware diagnostics.
	2	Verifies the PCM data paths between the LP and both COMDACs/ RCOMDACs/ QCOMDACs.
	3	Performs metallic GPB Bus Interface Tests. For each test, the reply will contain the bus under test (LPEO or LPBL) and the expected state of the bus (open or closed). This provides sufficient information to determine if the LP relays are operating properly from voltage measures made with the COMDAC/ RCOMDAC/ QCOMDAC A/D circuit.
	1000	Tests ISDN line circuits on an LP. This phase is requested the following ways: <ul style="list-style-type: none"> • Individual LC diagnose request (manual or fault recovery) • LP board level diagnostic with all circuits being diagnosed • REX request which can have multiple circuits being diagnosed at once.

Table A1-5 — Diagnostic Phase Descriptions for AIULP-Z

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIULP (Z-INTERFACE) (SM)	–	Access Interface Unit Line Pack (Z-Interface) (Switching Module)
	1	Verifies the control data flow between the line pack (LP) and both COMDACs/ RCOMDACs/ QCOMDACs, and runs the LP resident diagnostics.
	2	Verifies the PCM data paths between the LP and both COMDACs/ RCOMDACs/ QCOMDACs.
	3	Verifies the LP metallic test buses and associated relays including the paths (GPB0/1) from the COMDAC to the LP. Note: The LP metallic bus structure is likely to vary between specific LP types.
	4	Run for Z-POTS circuit packs only. Verifies the LP's connection to the ring generator (RG) buses. Also verifies that the LP can be isolated from the RG buses.
	1000	Verifies the LC functionality by requesting the application pack firmware to run tests on the circuits, including PCM path tests between the LC and the controlling COMDAC.

Table A1-6 — Diagnostic Phase Descriptions for AIU TAP100

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TAP100 (SM)	–	Access Interface Unit Test Application Pack (Switching Module)
	1	Verifies the control data flow between the test pack and both RCOMDACs, and runs the RG firmware diagnostics.
	4	Verifies the metallic test capability over the remote site test buses (MTB) which interconnect all (maximum = 8) the EAIUs to the TAP100.

Table A1-7 — Diagnostic Phase Descriptions for AIURG

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIURG (SM)	–	Access Interface Unit Ring Generator (Switching Module)
	1	Verifies the control data flow between the RG (application pack) and both COMDACs/ RCOMDACs/ QCOMDACs, and runs the RG firmware diagnostics.
	4	Verifies the RG's isolation relay, programmability, and the ringing bus connections to each AIU it is assigned. At least one in-service COMDAC/ RCOMDAC/ QCOMDAC is required for this phase, or the phase completion status is NTR (no tests run).

Table A1-8 — Diagnostic Phase Descriptions for AIUTSGRP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
AIUTSGRP (SM)	–	Access Interface Unit Time Slot Group (Switching Module)
	100	Tests the data interface to the COMDAC/ RCOMDAC/ QCOMDAC. Only the TSGRP undertest will be verified during the execution of this phase. The phase must be called once for each TSGRP that is equipped to completely test the COMDAC/ RCOMDAC/ QCOMDAC data interface.

Table A1-9 — Diagnostic Phase Descriptions for XAIU PCTDX

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PCTDX	–	Multiplex Access Interface Unit
	1	Tests the PCT link, SM to PLI interface, and PLI paddleboard.
	2	Tests the data paths from the SMP to the FCD and the paths to each equipped QCOMDAC over each equipped TSGRP.

Table A1-10 — Diagnostic Phase Descriptions for ALIT

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ALIT (SM)	–	Automatic Line Insulation Testing (Switching Module)
	1	Tests receive control orders from the MSUCOM sanity test and calibration test. [PR Name=SM:DNALIT]
	2	Finds stuck relays.

Table A1-11 — Diagnostic Phase Descriptions for ASC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ASC (RSM)	–	Alarm Status Circuit (Remote Switching Module)
	1	Tests the display and report status of alarms and indicators for the remote site. [PR Name=SM:DNASC]

Table A1-12 — Diagnostic Phase Descriptions for BTSR

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
BTSR (SM)	–	Bootstrapper (Switching Module)
	1	Tests access to the BTSR board, verification of registers, and executes internal self-diagnostic of the BTSR. [PR Name=SM:DNBTSR]
	2	Functional test of the BTSR (attempts to pump to STBY MCTSI memory). [PR Name=SM: DNBTSR]

Table A1-13 — Diagnostic Phase Descriptions for CC (DNU-S)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CC (DNU-S)		Common Control (Digital Network Unit – SONET)
	1	Performs PCT loopback at PCTLI and serial PCAMB loopback at CC. PCT loopback is performed using the PCT loopword time slot. The PCT link loopword time slot is looped back at PCTLI. The PCAMB loopback test is usually done for PCAMBs through both CDs. [PR Name=SM2K:DNUSCC1]
	2	Tests the HIFI device's processor-side interface, loopback, internals, and interrupts. [PR Name=SM2K:DNUSCC1]
	4	Verifies operation of the DNU-S CCP (DNU-S) processor that includes timers, sanity timer, interrupt priority encoder, and the NMIs. It also tests EPROM, I/O write protection, memory write-protection circuits, and address and data parity generators and checkers. [PR Name=SM2K:DNUSCC1]
	5	Tests the operation of the two control interface (CI) devices on the CC pack. [PR Name=SM2K:DNUSCC1]
	7	Tests fan and fuse alarms, parallel PCAMBs between CC under test and both CDs. Then tests the mate bus, ICB interface and mate hashsum. If there is no active CC, this phase will NTR. The mate bus is tested from the active CC towards the CC under test. The CC under test is initialized into DGN mode before the active CC can access it. [PR Name=SM2K:DNUSCC1]
	8	Tests the mate access circuit from the CC under test to the active CC. It verifies that the CC under test can detect mate errors by putting the Active CC in hold and forcing the mate errors. [PR Name=SM2K:DNUSCC1]
	9	Requests the DNU-S CC to run a ROM-based memory test for the CC memory. [PR Name=SM2K:DNUSCC1]

Table A1-14 — Diagnostic Phase Descriptions for CD (DNU-S)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CD (DNU-S)	–	Common Data (Digital Network Unit – SONET)
	1	Tests the PCT link(s) between the SM/SM-2000 and the DNU-S. This phase of the CD diagnostic is a common product shared by all PCT-based peripherals. [PR Name=SM2K:DNUSCD1]
	2	Tests the Internal Control Bus (ICB) and Peripheral Control Interface (PCI) devices and their interface to the ON-LINE and the STBY CC. Also test the general registers and their interface to the PCIBUS. The clock tracking and generating circuits are also tested in this phase. [PR Name=SM2K:DNUSCD2]
	3	Tests the Peripheral Control and Maintenance Bus (PCAMB) interfaces to active and OOS/STBY CC. Both the serial and parallel buses are tested as well as the MCTSI IF sink/source registers that access the PCTLIs. [PR Name=SM2K:DNUSCD2]
	4	Tests the six PCTLI devices on the CD pack. The PCI between the CD and SM-2000 for each PCT link are also tested. [PR Name=SM2K:DNUSCD2]
	5	Tests the BPIDBs to the TMUXs. [PR Name=SM2K:DNUSCD2]

Table A1-15 — Diagnostic Phase Descriptions for CDFI/RDFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CDFI/RDFI (RSM)	–	Communication Link Digital Facility Interface/Remote Digital Facility Interface (Remote Switching Module)
	1	Tests CI/CLRT integrity. [PR Name=SM:DNDFIG1]
	2	Tests CCB integrity. [PR Name=SM:DNDFIG1]
	3	Tests μ C integrity. [PR Name=SM:DNDFIG1]
	4	Tests maintenance buffer integrity. [PR Name=SM:DNDFIG2]
	5	Tests LSI exercises I. [PR Name=SM:DNDFIG2]
	6	Tests LSI exercises II. [PR Name=SM:DNDFIG3]
	7	Tests facility alarm clock. [PR Name=SM:DNDFIG3]
	9	Tests STBY CI/CLRT check. [PR Name=SM:DNDFIG3]
	10	Tests DPR, XPC, FDL integrity. [PR Name=SM:DNDFIG4]
	11	Tests T1 clock, T1 status, and RSM reset exercises. [PR Name=SM:DNDFIG4]
	12	Tests signaling and PCM data path test (the ACT and STB FIU). [PR Name=SM:DNDFIG4]
	13	LSI Exercises 1 (RS,TF,FR Devices). [PR Name=SM:DNDFIG2]
	14	LSI Exercises 2 (RS,TF,FR Devices). [PR Name=SM:DNDFIG3]
	15	Facility Alarms. [PR Name=SM:DNDFIG3]
	16	XMT/RCV Signaling & PCM Data Paths. [PR Name=SM:DNDFIG3]
	17	Mate CI/CLRT Checkout. [PR Name=SM:DNDFIG3]
	18	DPR,XPC,FDL Integrity. [PR Name=SM:DNDFIG4]
	19	T1 Clock, T1 Status, DFI Status and RSM Reset Exercise. [PR Name=SM:DNDFIG4]
	20	Signaling & PCM Data Tests (via active/mate FIU). [PR Name=SM:DNDFIG4]

Table A1-16 — Diagnostic Phase Descriptions for CDI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CDI (TU) (SM)	–	Control and Data Interface (Trunk Unit) (Switching Module)
	1	Tests loopback register, service request register, ASW register, and ESR. [PR Name=SM:DNCDI]
	2	Tests clock errors, data path integrity and data delay circuits. [PR Name=SM:DNCDI]
	3	Tests the interface with the STBY MCTSI. If MCTSI is not ACT/STBY, then CATP completes. [PR Name=SM:DNCDI]

Table A1-17 — Diagnostic Phase Descriptions for CMP (CM2 only)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CMP (CM2)	–	Communication Module Processor (Communication Module, Model 2)
	1	Tests interface between the MSCU (IOMI) and TN1368/TN1800 core board. [PR Name=AM:DNC3BPIP]
	2	Tests IP-side [including Direct Access Memory (DAM), DRAMs] of TN1368/TN1800 core board. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]
	3	Tests the AP side of the TN1368/TN1800 core board. [PR Name=AM:DNC3BPI and CMP:DNPH3PIP_A]
	4	Tests AP-side interface of the TN1368/TN1800 core board to the TN1369 external memory board. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
	5	Tests memory pump of the TN1368/TN1800 and TN1369. [PR Name=AM:DNC3BIP and CMP:DNPH3PIP_I]
	11	<i>(Demand phase only)</i> More exhaustive tests of memory devices on TN1368/TN1800 and TN1369 boards. This phase should be run when there are reports of CMP memory errors, but the normal CMP diagnostic phases (1-5) run ATP. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
	12	<i>(Demand phase only)</i> Runs same test sequences as phase 2 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]

Table A1-17 — Diagnostic Phase Descriptions for CMP (CM2 only) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	13	<i>(Demand phase only)</i> Runs same test sequences as phase 3 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
	14	<i>(Demand phase only)</i> Runs same test sequences as phase 4 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_A]
	15	<i>(Demand phase only)</i> Runs same test sequences as phase 5 except each sequence is run as a separate segment to provide more data on failures. Used primarily in the factory where data may help in component-level fault isolation. [PR Name=AM:DNC3BPIP and CMP:DNPH3PIP_I]

Table A1-18 — Diagnostic Phase Descriptions for CU in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU (3B20D)	–	3B20D Computer Control Unit Complex. The following seven 3B20D Diagnostic IDs (CU CC, CU CH, CU CSU, CU DMA, CU MASC, CU SAT, and CU UC) are specified subunits in an applicable CU (0 or 1). When using DGN input messages to specify a subunit, it is always preceded by the CU designation.

Table A1-19 — Diagnostic Phase Descriptions for CU CC in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CC	–	Control Unit – Central Control
	1	Performs MCH master tests. [PR Name=DL:CC01]
	2	Performs the MCH slave communication tests. [PR Name=DL:CC02]
	3	Performs the MCH slave command tests. [PR Name=DL:CC03]
	4	Performs the MCH microstore address and data register tests. [PR Name=DL:CC04]
	5	Performs the MC clock circuit tests, the microinstruction register tests, and the MC parity tests. [PR Name=DL:CC05]
	6	Tests the MC immediate data path, MCH access to test multiplexer, buffered bidirectional gating register parity bits, and path to the CC error register. [PR Name=DL:CC06]
	7	Tests the MC address sequencer, verifies basic address path for unconditional branch and nobranch. [PR Name=DL:CC07]
	8	Tests the MC address sequencer, conditional jump logic, opcode jam path, MC address stack, INT command to MCH, set interrupt set, and interrupt mask registers. [PR Name=DL:CC08]
	9	Performs the address and memory verification of UN 28 ROM in CU frame slot 0. (Requires equipage bits in ECD.) [PR Name=DL:CC09]
	10	Performs the microstore address bus parity tests. [PR Name=DL:CC10]
	11	Tests the HSR, PSW, and SSR. [PR Name=DL:CC11]
	12	Tests the PPR. [PR Name=DL:CC12]
	13	Tests the gate through the DMU and the byte rotate. [PR Name=DL:CC13]
	14	Tests the DMU bit rotate. [PR Name=DL:CC14]
	15	Tests the ALU matcher. [PR Name=DL:CC15]
	16	Tests the DMU Q-register. [PR Name=DL:CC16]
	17	Tests the DMU X or Z flag and ONES. [PR Name=DL:CC17]
	18	Tests the DMU general registers. [PR Name=DL:CC18]
	19	Tests the ALU and gating paths. [PR Name=DL:CC19]
	20	Tests the 24-bit mode. [PR Name=DL:CC20]
	21	Tests the DMU looparound. [PR Name=DL:CC21]
22	Tests the temporary and firmware registers. [PR Name=DL:CC22]	

Table A1-19 — Diagnostic Phase Descriptions for CU CC in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	26	Performs the MC privileged PROM tests. [PR Name=DL:CC26]
	27	Performs the MC privileged PROM tests. [PR Name=DL:CC27]
	28	Performs the MC privileged PROM tests. [PR Name=DL:CC28]
	30	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 1. (Requires equipage bits in ECD.) [PR Name=DL:CC30]
	31	Writable microstore control logic. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 1. (Requires equipage bits in ECD.) [PR Name=DL:CC31]
	32	<i>(Demand, REX, and DEX phase)</i> Tests the 4K writable microstore (UN48) in CU frame slot 1. (Requires equipage bits in ECD.) [PR Name=DL:CC32]
	33	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC33]
	34	Tests the writable microstore control logic. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC34]
	35	<i>(Demand, REX, and DEX phase)</i> Performs the address and memory test of the 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC35]
	36	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 3. (Requires equipage bits in ECD.) [PR Name=DL:CC36]
	37	Tests the writable microstore control logic. Tests 4K writable microstore (UN48) or 16K writable microstore (UN248) in CU frame slot 3. (Requires equipage bits in ECD.) [PR Name=DL:CC37]

Table A1-19 — Diagnostic Phase Descriptions for CU CC in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	38	(Demand, REX, and DEX phase) Performs the address and memory test of the 4K writable microstore (UN48) in CU frame slot 3. (Requires equipage bits in ECD.) [PR Name=DL:CC38]
	39	Tests the DMU parity. [PR Name=DL:CC39]
	40	Tests the SCR/store control field of microinstruction register to SCR. [PR Name=DL:CC40]
	41	Tests the SDR, SIR, and IB. [PR Name=DL:CC41]
	42	Tests the SAR and PAR. [PR Name=DL:CC42]
	43	Tests the IB parity circuit. [PR Name=DL:CC43]
	44	Tests the address increment and parity predict. [PR Name=DL:CC44]
	45	Tests the address increment (SAR only). [PR Name=DL:CC45]
	46	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC46]
	47	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC47]
	48	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC48]
	49	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC49]
	52	Tests the A and B select and rotate amount multiplexer. [PR Name=DL:CC52]
	53	Tests the mask ROM. [PR Name=DL:CC53]
	54	Tests the FLZ. [PR Name=DL:CC54]
	55	Tests the interrupt registers and logic. [PR Name=DL:CC55]
	56	Tests the timers (includes CL_PT MCH command check). [PR Name=DL:CC56]
	57	Tests the CDR. [PR Name=DL:CC57]
	58	Tests CC I/O bus sanity. [PR Name=DL:CC58]
	59	(Demand phase only) Before running this phase, any units that are causing external error signals should be repaired. Also, do not execute these tests unless all CU units have been diagnosed or the CU has been in-service since the last time power was restored to the frame. This tests the CC interrupt logic circuits connected to units other than the CC. [PR Name=DL:CC59]
	60	Tests error response logic. [PR Name=DL:CC60]

Table A1-19 — Diagnostic Phase Descriptions for CU CC in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	61	Tests the EAI. The following is displayed: PRM_z 0123 4567 89AB CDEF xx xx xx PRM_z 0000 0000 0000 0000 xx xx xx PRM_z FFFF FFFF FFFF FFFF xx xx xx [PR Name=DL:CC61]
	62	Performs the off-line MCH master side tests. [PR Name=DL:CC62]
	70	Performs the address and memory verification of the UN28 (ROM) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC70]
	71	Performs the address and memory verification of the UN28 (ROM) in CU frame slot 2. (Requires equipage bits in ECD.) [PR Name=DL:CC71]
	93	<i>(Demand and DEX phase)</i> Tests the EAI lamp display (located next to the power switch on the CU) and the capability of the EAI to transmit PRMs. A series of PRMs appear on the EAI display page and is printed on the ROP. The lamps on the EAI display are cycled through the specific pattern for that phase as follows: PRM_z 0123 4567 89AB CDEF xx xx xx PRM_z AAAA AAAA AAAA AAAA xx xx xx PRM_z 5555 5555 5555 5555 xx xx xx PRM_z EEEE EEEE EEEE EEEE xx xx xx PRM_z 1111 1111 1111 1111 xx xx xx PRM_z 0000 0000 0000 0000 xx xx xx PRM_z FFFF FFFF FFFF FFFF xx xx xx The following pattern should now be observed: Digits 0-F are sequenced on the hexadecimal digit display. The sequence start switch 0-F-0 to warn you that this part of the phase is beginning. Next, each LED lights and then goes off in a pattern running down the display. Later, lamp flash may occur and should be ignored. If patterns do not occur, the test failed. Lamp display failures indicate the EAI (TN11) is defective. A PRM failure may be due to a defective EAI or a defective MCRT controller (TN83) in the IOP to which the affected MCRT or ROP is connected. Since this failure is indicated visually, it may run ATP in spite of display faults. All forced states on the EAI must be cleared before this phase is run. This is done by activating key "14" on the EAI page. [PR Name=DL:CC93 or CC90]

Table A1-20 — Diagnostic Phase Descriptions for CU CH in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CH (AM)	–	Control Unit – Dual Serial Channel or Direct Memory Access Channel (Administrative Module)
	1	Tests the DSCH-I/O bus interface. [PR Name=DL:DSCH01]
	2	Performs the data register (FIFO) tests. [PR Name=DL:DSCH02]
	3	Performs the DSCH error tests. [PR Name=DL:DSCH03]
	8	Tests the port 0 selection, interrupts, and service requests. [PR Name=DL:DSCH08]
	9	Tests the port 1 selection, interrupts, and service requests. [PR Name=DL:DSCH09]
	10	Tests the port 2 selection, interrupts, and service requests. [PR Name=DL:DSCH10]
	11	Tests the port 3 selection, interrupts, and service requests. [PR Name=DL:DSCH11]
	12	Tests the port 4 selection, interrupts, and service requests. CATP completes when a CNI ring with DLNs is equipped on this channel. [PR Name=DL:DSCH12]
	13	Tests the port 5 selection, interrupts, and service requests. [PR Name=DL:DSCH13]
	14	Tests the port 6 selection, interrupts, and service requests. [PR Name=DL:DSCH14]
	15	Tests the port 7 selection, interrupts, and service requests. [PR Name=DL:DSCH15]
	16	Tests the port 8 selection, interrupts, and service requests. [PR Name=DL:DSCH16]
	17	Tests the port 9 selection, interrupts, and service requests. [PR Name=DL:DSCH17]
	18	Tests the port 10 selection, interrupts, and service requests. [PR Name=DL:DSCH18]
	19	Tests the port 11 selection, interrupts, and service requests. [PR Name=DL:DSCH19]
	20	Tests the port 12 selection, interrupts, and service requests. [PR Name=DL:DSCH20]
	21	Tests the port 13 selection, interrupts, and service requests. [PR Name=DL:DSCH21]
	22	Tests the port 14 selection, interrupts, and service requests. [PR Name=DL:DSCH22]
	23	Tests the port 15 selection, interrupts, and service requests. [PR Name=DL:DSCH23]

Table A1-20 — Diagnostic Phase Descriptions for CU CH in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	24	Performs the port 0 DSCH-DBS communication tests. [PR Name=DL:DSCH24]
	25	Performs the port 1 DSCH-DBS communication tests. [PR Name=DL:DSCH25]
	26	Performs the port 2 DSCH-DBS communication tests. [PR Name=DL:DSCH26]
	27	Performs the port 3 DSCH-DBS communication tests. [PR Name=DL:DSCH27]
	28	Performs the port 4 DSCH-DBS communication tests. [PR Name=DL:DSCH28]
	29	Performs the port 5 DSCH-DBS communication tests. [PR Name=DL:DSCH29]
	30	Performs the port 6 DSCH-DBS communication tests. [PR Name=DL:DSCH30]
	31	Performs the port 7 DSCH-DBS communication tests. [PR Name=DL:DSCH31]
	32	Performs the port 8 DSCH-DBS communication tests. [PR Name=DL:DSCH32]
	33	Performs the port 9 DSCH-DBS communication tests. [PR Name=DL:DSCH33]
	34	Performs the port 10 DSCH-DBS communication tests. [PR Name=DL:DSCH34]
	35	Performs the port 11 DSCH-DBS communication tests. [PR Name=DL:DSCH35]
	36	Performs the port 12 DSCH-DBS communication tests. [PR Name=DL:DSCH36]
	37	Performs the port 13 DSCH-DBS communication tests. [PR Name=DL:DSCH37]

Table A1-20 — Diagnostic Phase Descriptions for CU CH in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	38	Performs the port 14 DSCH-DBS communication tests. [PR Name=DL:DSCH38]
	39	Performs the port 15 DSCH-DBS communication tests. [PR Name=DL:DSCH39]
	40	<i>(Demand and DEX phase)</i> This phase tests data communication between the CU CH (in the CU) and the BIC (in a DFC or IOP). Specify the DFC or IOP in the DGN input message as a helper unit; use DFC 0, DFC 1, IOP 0, and IOP 1. The unit must be OOS when the diagnostic is run. [PR Name=DL:DSCH40]
	44	<i>(Demand phase only)</i> This phase tests reading the normal bootstrap data from the disk into main store. Either DFC 0 or DFC 1 must be OOS for this phase. Run this phase if it is suspected a particular CU and DFC combination does not boot. [PR Name=DL:DSCH44]

Table A1-21 — Diagnostic Phase Descriptions for CU CSU in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CSU (Model 1)	–	Control Unit – Cache Store Unit Model 1
	1	Performs access to cache memories and kernel/interrupt stack enable tests. [PR Name=DL:CSU01]
	2	Performs cache memory match tests. [PR Name=DL:CSU02]
	3	Tests the hit/miss matchers (ATBA to tags A and B). [PR Name=DL:CSU03]
	4	Tests the hit/miss matchers (ATBB to tags A and B). [PR Name=DL:CSU04]
	5	Tests the hit/miss matchers (ATBA to tags C and D). [PR Name=DL:CSU05]
	6	Tests the hit/miss matchers (ATBB to tags C and D). [PR Name=DL:CSU06]
	7	Tests the select enable logic. [PR Name=DL:CSU07]
	8	Tests the write tag control logic (tags A and B). [PR Name=DL:CSU08]
	9	Tests the write tag control logic (tags C and D). [PR Name=DL:CSU09]
	10	Tests the SAT interface (ATBA to tags A and C). [PR Name=DL:CSU10]
	11	Tests the SAT interface (ATBB to tags A and C). [PR Name=DL:CSU11]
	12	Tests the tag parity generators. [PR Name=DL:CSU12]
	13	Tests the tag parity checkers. [PR Name=DL:CSU13]
	14	Tests the hit and miss counters. [PR Name=DL:CSU14]
	15	Tests the cache store write control logic. [PR Name=DL:CSU15]
	16	Tests the cache store write control logic. [PR Name=DL:CSU16]
17	Tests the error check circuits on the cache memory board. [PR Name=DL:CSU17]	

Table A1-21 — Diagnostic Phase Descriptions for CU CSU in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	18	<i>(Demand, REX, and DEX phase)</i> Exercises the mechanism that writes off-line main store values to the cache. Can be run whenever CU CC, CU SAT, CU CSU, and CU MASC tests pass, but trouble is suspected in those areas. This should be run with the RAW option. While running, a selection of memory addresses is accessed using various modes. On completion, the contents of main memory, ATBs, and cache are compared. If no differences (errors) are found, test continues. If no errors, phase runs for 40 seconds. [PR Name=DL:CSU18]
	90	<i>(Demand phase only)</i> This phase is the same as phase 18, except that it runs for 40 minutes if no fault is found. This phase can be run whenever an intermittent or data-dependent fault is suspected. Always run this phase with the RAW option. [PR Name=DL:CSU90]
CU CSU Models 2 & 3	–	Control Unit – Cache Store Unit (Enlarged) (Model 2 and 3)
	1	Access to cache memories and interrupt stack enable tests. [PR Name=DL:CSU01]
	2	Cache tag and cache store memory match tests. [PR Name=DL:CSU02]
	3	Hit/miss matchers (ATBA to tags A and B). [PR Name=DL:CSU03]
	4	Hit/miss matchers (ATBB to tags A and B). [PR Name=DL:CSU04]
	5	Hit/miss matchers (ATBA to tags C and D). [PR Name=DL:CSU05]
	6	Hit/miss matchers (ATBB to tags C and D). [PR Name=DL:CSU06]
	7	Hit/miss matchers (ATBA to tags E and F). [PR Name=DL:CSU07]
	8	Hit/miss matchers (ATBB to tags E and F). [PR Name=DL:CSU08]
	9	Hit/miss matchers (ATBA to tags G and H). [PR Name=DL:CSU09]
	10	Hit/miss matchers (ATBB to tags G and H). [PR Name=DL:CSU10]
	11	Select enable logic. [PR Name=DL:CSU11]
12	Cache tag memory write control logic (tags A and B). [PR Name=DL:CSU12]	

Table A1-21 — Diagnostic Phase Descriptions for CU CSU in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	13	Cache tag memory write control logic (tags C and D). [PR Name=DL:CSU13]
	14	Cache tag memory write control logic (tags E and F). [PR Name=DL:CSU14]
	15	Cache tag memory write control logic (tags G and H). [PR Name=DL:CSU15]
	16	ATBA relocation address to tag memory mod A and E. [PR Name=DL:CSU16]
	17	ATBA relocation address to tag memory mod B and F. [PR Name=DL:CSU17]
	18	ATBA relocation address to tag memory mod C and G. [PR Name=DL:CSU18]
	19	ATBA relocation address to tag memory mod D and H. [PR Name=DL:CSU19]
	20	Address and data parity generators. [PR Name=DL:CSU20]
	21	Address and data parity checkers (tags A, B, C, and D). [PR Name=DL:CSU21]
	22	Address and data parity checkers (tags E, F, G, and H). [PR Name=DL:CSU22]
	23	Cache store write control logic – stack write and write update operations (all tags; A, B, C, D, E, F, G, and H). [PR Name=DL:CSU23]
	24	Cache store write control logic – normal read stack read and test cache mods updated at store complete time (all tags; A, B, C, D, E, F, G, and H). [PR Name=DL:CSU24]
	25	Error check circuits on cache memory board. [PR Name=DL:CSU25]
	26	(<i>Demand, REX, and DEX phase</i>) Cache exercise test (40 seconds). Run when CC, SAT, cache, and main store tests pass, but a trouble is still suspected in one of these areas. A selection of memory address are accessed using various modes. Then the contents of main memory ATBs, and cache are compared. If no differences are found, the test continues. Differences are reported as errors. If no errors are found, this phase runs for 40 seconds. Always run this phase with the RAW option. [PR Name=DL:CSU26]

Table A1-21 — Diagnostic Phase Descriptions for CU CSU in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	90	<i>(Demand phase only)</i> Cache exercise test (40 minutes). Run when an intermittent or data dependent fault is suspected. Same as phase 26 except runs more extensive and longer tests. Always run this phase with the RAW option. [PR Name=DL:CSU90]

Table A1-22 — Diagnostic Phase Descriptions for CU DMA in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DMA	–	Control Unit – Direct Memory Access
	1	Tests the DMA CC I/O bus interface. [PR Name=DL:DMA01]
	2	Performs the status tests. [PR Name=DL:DMA02]
	3	Performs the RAM/register tests. [PR Name=DL:DMA03]
	4	Performs the sequencer tests. [PR Name=DL:DMA04]
	5	Tests the request priority circuit. [PR Name=DL:DMA05]
	6	Performs the store address tests. [PR Name=DL:DMA06]
	7	Performs the store data tests. [PR Name=DL:DMA07]
	8	Performs the DMA error tests. [PR Name=DL:DMA08]
	9	Performs the DMA/Cache interface tests (CAC0). [PR Name=DL:DMA09]
	10	Performs the DMA/Cache interface tests (CAC1). [PR Name=DL:DMA10]
	11	Tests MASU priority and arbitration functions. [PR Name=DL:DMA11]

Table A1-23 — Diagnostic Phase Descriptions for CU MASC in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MASC	–	Control Unit – Main Store Controller
	1	Tests the inactive state of errors B/C and basic MASC response. [PR Name=DL:MASC01]
	2	Tests the address looparound. [PR Name=DL:MASC02]
	4	Performs the data communication tests. [PR Name=DL:MASC04]
	5	Tests the parity circuit (data, address, control tests, and halfword and byte decoding). [PR Name=DL:MASC05]
	6	Performs the maintenance commands, microstore time-out, microinterrupt, and store go-error tests. [PR Name=DL:MASC06]
	7	Performs the MASC memory array response tests. [PR Name=DL:MASC07]
	8	Performs the refresh rate tests. [PR Name=DL:MASC08]
	9	Performs the MASC timing chain tests. [PR Name=DL:MASC09]
	10	Performs the special memory operations and array parity tests (main store array 0). [PR Name=DL:MASC10]
	11	Tests the destination and source wait states. [PR Name=DL:MASC11]
	12	Performs single-bit hamming correction tests. [PR Name=DL:MASC12]
	13	Performs the double-bit error (hamming) tests. [PR Name=DL:MASC13]
	14-28	Performs the same as phase 10 (for memory store arrays 1-15). [PR Name=DL:MASC14-DL:MASC28]
	29	Tests the address looparound through main store update (duplex mode). [PR Name=DL:MASC29]
30	Tests the data communication tests through main store update (duplex mode). [PR Name=DL:MASC30]	
31	Tests the control lead parity and other store error tests through main store update (duplex mode). [PR Name=DL:MASC31]	
32	Performs the microstore error B/C tests. [PR Name=DL:MASC32]	
33	<i>(Demand and DEX phase)</i> This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC33]	

Table A1-23 — Diagnostic Phase Descriptions for CU MASC in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	34	<i>(Demand and DEX phase)</i> This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC34]
	35	Performs the memory data pattern tests. [PR Name=DL:MASC35]
	36	<i>(Demand and DEX phase)</i> This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC36]
	37	Tests the capability to trap a failing address on errors A, C, and D. [PR Name=DL:MASC37]
	38	Tests to ensure that the CC and MASC can fetch and execute instructions. [PR Name=DL:MASC38]
	39	Performs the update mode and refresh data parity check functional tests. [PR Name=DL:MASC39]
	40	<i>(Demand and DEX phase)</i> This phase applies memory patterns and access tests to the main memory. [PR Name=DL:MASC40]
	41	<i>(Demand phase only)</i> Update mode and refresh data parity tests to entire main memory. [PR Name=DL:MASC41]
	42	Tests MASU priority and arbitration functions. [PR Name=DL:MASC42]
	93	<i>(Demand, REX, and DEX phase)</i> Tests main and duplicate refresh address counters. [PR Name=DL:MASC93]
	95	<i>(Demand phase only)</i> Applies memory patterns and access tests to the main memory. Limits are allowed to be set at run time. [PR Name=DL:MASC95]
	96	<i>(Demand, REX, and DEX phase)</i> Tests update mode and refresh data parity to all main memories. Limits are allowed to be set at run time. [PR Name=DL:MASC96]

Table A1-24 — Diagnostic Phase Descriptions for CU SAT in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU SAT	–	Control Unit – Store Address Translator
	1	Tests the SCR control flip-flops. [PR Name=DL:SAT01]
	2	Tests the ATB access and parity. [PR Name=DL:SAT02]
	3	Tests the ATB memory. [PR Name=DL:SAT03]
	4	Tests the counter and invalidate circuit. [PR Name=DL:SAT04]
	5	Tests the address multiplexer. [PR Name=DL:SAT05]
	6	Tests the write control circuit. [PR Name=DL:SAT06]
	7	Tests the ATB hit and ATB miss logic. [PR Name=DL:SAT07]
	8	Tests the protection circuit. [PR Name=DL:SAT08]
	9	Tests the matchers. [PR Name=DL:SAT09]
10	Tests the main store interface. [PR Name=DL:SAT10]	

Table A1-25 — Diagnostic Phase Descriptions for CU UC in 3B20D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU UC	–	Control Unit – Utility Circuit
	1	Tests the BGB – access and enable. [PR Name=DL:UC01]
	2	Performs the access matcher, address leads, and read/write tests. [PR Name=DL:UC02]
	3	Performs the block address matcher, address leads, and read/write tests. [PR Name=DL:UC03]
	4	Performs the address matcher, address leads, and read/write tests. [PR Name=DL:UC04]
	5	Performs the unit identification matcher, address leads, and read/write tests. [PR Name=DL:UC05]
	6	Performs the data matcher, address leads, and read/write tests. [PR Name=DL:UC06]
	7	Performs the event and transfer trace counters and the read/write tests. [PR Name=DL:UC07]
	8	Performs the transfer trace access path unit identification buffers tests. [PR Name=DL:UC08]
	9	Performs the trace memory and read/write tests. [PR Name=DL:UC09]
	10	Performs the trigger function in freeze mode tests. [PR Name=DL:UC10]
	11	Performs the block address matcher adder tests. [PR Name=DL:UC11]
	12	Performs the trigger functions in run mode without match conditions. [PR Name=DL:UC12]
	13	Performs the access matcher run mode tests. [PR Name=DL:UC13]
	14	Performs the data matcher run mode tests. [PR Name=DL:UC14]
	15	Performs the address matcher virtual address leads (SAR), run mode tests. [PR Name=DL:UC15]
	16	Performs the address matcher physical address leads cache address A bus – run mode tests. [PR Name=DL:UC16]
	17	Performs the address matcher physical address leads cache address B bus – run mode tests. [PR Name=DL:UC17]
	18	Performs the unit identification matcher and transfer trace run mode tests. [PR Name=DL:UC18]
	19	Performs the trigger functions in run mode with match conditions. [PR Name=DL:UC19]
20	Performs the transfer trace run mode tests. [PR Name=DL:UC20]	

Table A1-25 — Diagnostic Phase Descriptions for CU UC in 3B20D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	90	<i>(Demand phase only)</i> Run this phase to test the external output of trigger function 0 and the external inputs to trigger functions 1, 2, and 3. To run this phase, clip pin 400 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC90]
	91	<i>(Demand phase only)</i> Run this phase to test the external output of trigger function 1 and the external inputs to trigger functions 0, 2, and 3. To run this phase, clip pin 401 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC91]
	92	<i>(Demand phase only)</i> Run this phase to test the external output of trigger function 2 and the external inputs to trigger functions 0, 1, and 3. To run this phase, clip pin 402 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC92]
	93	<i>(Demand phase only)</i> Run this phase to test the external output of trigger function 3 and the external inputs to trigger functions 0, 1, and 2. To run this phase, clip pin 403 to pin 405 on the backplane at the UC slot. [PR Name=DL:UC93]

Table A1-26 — Diagnostic Phase Descriptions for CU in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU (3B21D)	-	3B21D Computer Control Unit Complex. The following eleven 3B21D Diagnostic IDs (CU CC, CU DCI, CU DFC, CU DMA, CU DMCH, CU IOP, CU MASC, CU MHD, CU MT, CU MTC, and CU UC) are specified subunits in an applicable CU (0 or 1). When using DGN input messages to specify a subunit, it is always preceded by the CU designation.

Table A1-27 — Diagnostic Phase Descriptions for CU CC in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU CC	–	Control Unit – Central Control
	1	Performs on-line MCH master side tests. [PR Name=DL:CC01]
	2	Performs the MCH slave communication tests. [PR Name=DL:CC02]
	3	Performs the MCH slave command tests. [PR Name=DL:CC03]
	4	Performs microstore address (MSA) and microstore data (MSD) registers in off-line MCH. [PR Name=DL:CC04]
	5	Performs BIST and boundary scan tests on CC pack. [PR Name=DL:CC05]
	6	Performs the individual application specific integrated circuit (ASIC) BISTs on CC packs. [PR Name=DL:CC06]
	7	Performs the microcontrol (MC) clock circuit tests, microinstruction register (MIR), and MC parity tests. [PR Name=DL:CC07]
	8	Tests the MC immediate data path, MCH access to test multiplexer, buffered bidirectional gating register (BGR) parity bits, and path to the central control error. [PR Name=DL:CC08]
	9	Tests the MC address sequencer, verifies basic address path for unconditional branch and no branch. [PR Name=DL:CC09]
	10	Tests the MC address sequencer, conditional jump logic and MC address stack. [PR Name=DL:CC10]
	11	Performs verification on read-only memory (ROM) in microstore. [PR Name=DL:CC11]
	12	Performs the microstore address bus parity tests. [PR Name=DL:CC12]
	13	Verifies the status register. [PR Name=DL:CC13]
	14	Tests the pulse point register. [PR Name=DL:CC14]
	17	Tests gate through data manipulation unit (DMU) and barrel shifter to rotate bit function. [PR Name=DL:CC17]
	19	Tests the arithmetic logic unit (ALU) matcher. [PR Name=DL:CC19]
	20	Tests the DMU Q-register. [PR Name=DL:CC20]
	21	Tests the DMU X or Z flag and ONES. [PR Name=DL:CC21]
	22	Tests the DMU general registers. [PR Name=DL:CC22]

Table A1-27 — Diagnostic Phase Descriptions for CU CC in 3B21D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	23	Tests the ALU and gating paths. [PR Name=DL:CC23]
	24	Tests the 24-bit mode. [PR Name=DL:CC24]
	25	Tests the DMU looparound. [PR Name=DL:CC25]
	26	Tests the temporary and firmware registers. [PR Name=DL:CC26]
	29	Performs the MC privileged bits tests. [PR Name=DL:CC29]
	31	Performs the MC privileged bits tests. [PR Name=DL:CC31]
	32	Tests the writable microstore: bidirectional gating bus (BGB), microstore data bus, and microstore address bus access. [PR Name=DL:CC32]
	33	Tests the writable microstore: BGB, microstore data bus, and microstore address bus access. [PR Name=DL:CC33]
	34	Tests the demand-only writable microstore: BGB, microstore data bus, and microstore address bus access. [PR Name=DL:CC34]
	35	Tests the DMU parity check. [PR Name=DL:CC35]
	38	Tests the store control register (SCR). [PR Name=DL:CC38]
	39	Tests the store data register (SDR), store instruction register (SIR), and instruction buffer (IB). [PR Name=DL:CC39]
	40	Tests the store address register (SAR) and program address register (PAR). [PR Name=DL:CC40]
	41	Tests the IB parity circuit. [PR Name=DL:CC41]
	42	Tests the address increment and parity predict. [PR Name=DL:CC42]
	44	Tests the SIR path to halfword multiplexer to IB. [PR Name=DL:CC44]
	45	Tests the SIR path to IB halfword multiplexer. [PR Name=DL:CC45]
	46	Tests the SIR path to path to halfword multiplexer to IB. [PR Name=DL:CC46]
	47	Tests the SIR to halfword multiplexer to IB. [PR Name=DL:CC47]
	50	Tests the A and B select and rotate amount multiplexer. [PR Name=DL:CC50]
	51	Tests the linecard register for masking out errors noted by the ERROR register (MASK). [PR Name=DL:CC51]

Table A1-27 — Diagnostic Phase Descriptions for CU CC in 3B21D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	52	Tests the find-low-zero (FLZ) of DMU. [PR Name=DL:CC52]
	53	Tests the interrupt registers and logic. [PR Name=DL:CC53]
	54	Tests the timers. [PR Name=DL:CC54]
	55	Tests the channel data register. [PR Name=DL:CC55]
	58	Tests central control input/output (CCIO) bus sanity. [PR Name=DL:CC58]
	59	Performs the off-line MCH master side tests. [PR Name=DL:CC59]
	60	<i>(Demand phase only)</i> Tests other unit interrupt. [PR Name=DL:CC60]
	61	Tests error response logic. [PR Name=DL:CC61]
	64	Tests the emergency action interface. [PR Name=DL:CC64]
	65	<i>(Demand phase only)</i> Tests the EAI commands and display tests. [PR Name=DL:CC65]
	68	Tests the SCR and store address translator (SAT) control bits. [PR Name=DL:CC68]
	69	Tests the address translation buffer (ATB) access and parity. [PR Name=DL:CC69]
	70	Tests the ATB memory. [PR Name=DL:CC70]
	71	Tests the counter and invalidate circuit. [PR Name=DL:CC71]
	72	Tests the SAT address multiplier. [PR Name=DL:CC72]
	73	Tests the ATB write control logic. [PR Name=DL:CC73]
	74	Tests the ATB hit and miss logic. [PR Name=DL:CC74]
	75	Tests the ATB protection logic. [PR Name=DL:CC75]
	76	Tests the ATB matching of duplicate circuits. [PR Name=DL:CC76]
	77	Tests the main store interface. [PR Name=DL:CC77]
	80	Tests the access to cache memories. [PR Name=DL:CC80]
	81	Tests the cache tag and cache memory match. [PR Name=DL:CC81]
	82	Tests the hit/miss matcher. [PR Name=DL:CC82]
	83	Tests the write-enable logic. [PR Name=DL:CC83]

Table A1-27 — Diagnostic Phase Descriptions for CU CC in 3B21D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	84	Tests the ATB relocation address tag memory. [PR Name=DL:CC84]
	85	Tests the address and data parity generator. [PR Name=DL:CC85]
	86	Tests the address and data parity checker. [PR Name=DL:CC86]
	87	Tests the cache store write control logic. [PR Name=DL:CC87]
	88	Tests the cache error check circuitry. [PR Name=DL:CC88]
	89	Tests the cache exercise (REX). [PR Name=DL:CC89]
	90	<i>(Demand phase only)</i> Test the phase cache exercise.

Table A1-28 — Diagnostic Phase Descriptions for CU DCI in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DCI	–	Control Unit – Dual Serial Channel Computer Interconnect
	1	Tests the dual serial channel (DSCH) with the duplex dual serial bus selector (DDSBS) interface. [PR Name=DL:DCI01]
	2	Tests the DDSBS with the BIC interface. [PR Name=DL:DCI02]
	3	Tests the BIC with the peripheral interface controller (PIC) interface. [PR Name=DL:DCI03]

Table A1-29 — Diagnostic Phase Descriptions for CU DFC in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DFC	–	Control Unit – Disk File Controller
	1	Tests the demand phase only with the BIST boundary scan. [PR Name=DL:DFCS01]
	2	Tests the DDSBS interface and the DDSBS/BIC interface. [PR Name=DL:DFCS02]
	3	Tests BIC to the PIC interface. [PR Name=DL:DFCS03]
	4	Tests the central processing unit (CPU) Test 1. [PR Name=DL:DFCS04]
	5	Tests to verify the ROM contents. [PR Name=DL:DFCS05]
	6	Performs the Test 1-MB static random access memory (SRAM). [PR Name=DL:DFCS06]
	7	Performs the host adapter register test. [PR Name=DL:DFCS07]
	8	Performs the WE32104 direct memory access controller (DMAC) test. [PR Name=DL:DFCS08]
	9	Performs the dual universal asynchronous receiver/transmitter (DUART) test. [PR Name=DL:DFCS09]
	10	Tests the system timing controller (STC). [PR Name=DL:DFCS10]
	11	Performs the small computer system interface (SCSI) protocol controllers tests on both SCSI buses. [PR Name=DL:DFCS11]
	12	Tests only differential type devices attached to the bus. [PR Name=DL:DFCS12]
	13	Tests bus reset capability. [PR Name=DL:DFCS13]
	14	Performs the demand exercise (DEX) bit wise independent test for host adapter (HA) FIFO. [PR Name=DL:DFCS14]
15	<i>(Demand phase only)</i> Tests the interface to nonactive CU. [PR Name=DL:DFCS15]	
90	Performs demand-only test and bus loop test. [PR Name=DL:DFCS90]	

Table A1-30 — Diagnostic Phase Descriptions for CU DMA in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DMA	–	Control Unit – Direct Memory Access
	1	Performs the BIST/boundary scan tests. [PR Name=DL:DMA01]
	2	Tests the DMA/CCIO bus interface. [PR Name=DL:DMA02]
	3	Performs the status tests. [PR Name=DL:DMA03]
	4	Performs the random access memory (RAM) register tests. [PR Name=DL:DMA04]
	5	Performs the sequencer tests. [PR Name=DL:DMA05]
	6	Tests the request priority circuit. [PR Name=DL:DMA06]
	7	Performs the store address tests. [PR Name=DL:DMA07]
	8	Performs the store data tests. [PR Name=DL:DMA08]
	9	Performs the DMA error tests. [PR Name=DL:DMA09]
	10	<i>(Demand phase only)</i> Performs the DMA/CCIO bus interface. [PR Name=DL:DMA10]
	11	Perform the DMA/Cache interface tests. [PR Name=DL:DMA11]
	13	Perform the MASU priority and arbitration tests. [PR Name=DL:DMA13]

Table A1-31 — Diagnostic Phase Descriptions for CU DMCH in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU DMCH	–	Control Unit – Direct Memory Access Channel
	1	Tests the direct IO bus interface. [PR Name=DL:DMCH01]
	2	Performs the data register FIFO tests. [PR Name=DL:DMCH02]
	3	Performs the error tests. [PR Name=DL:DMCH03]
	4	Tests the quad word transfer. [PR Name=DL:DMCH04]
	10	Performs the Port 0 selection, interrupt, and service requests. [PR Name=DL:DMCH10]
	11	Performs the Port 1 selection, interrupt, and service requests. [PR Name=DL:DMCH11]
	12	Performs the Port 2 selection, interrupt, and service requests. [PR Name=DL:DMCH12]
	13	Performs the Port 3 selection, interrupt, and service requests. [PR Name=DL:DMCH13]
	20	Performs the Port 0 DSCH/DDSBS communication tests. [PR Name=DL:DMCH20]
	21	Performs the Port 1 DSCH/DDSBS communication tests. [PR Name=DL:DMCH21]
	22	Performs the Port 2 DSCH/DDSBS communication tests. [PR Name=DL:DMCH22]
	23	Performs the Port 3 DSCH/DDSBS communication tests. [PR Name=DL:DMCH23]

Table A1-32 — Diagnostic Phase Descriptions for CU IOP in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU IOP	–	Control Unit – Input/Output Processor
	1	<i>(Demand phase only)</i> Performs the BIST/boundary scan. [PR Name=DL:IOP01]
	2	Tests the DSCH with the DDSBS interface. [PR Name=DL:IOP02]
	3	Tests the DDSBS with the BIC interface and BIC circuitry excluding PIC interface. [PR Name=DL:IOP03]
	4	Tests the BIC with the PIC interface using PIC resident firmware. [PR Name=DL:IOP04]
	5	Tests the BIC with the PIC communication. [PR Name=DL:IOP05]
	6	Tests the PIC microstore data validity and microstore parity checker. [PR Name=DL:IOP06]
	7	Tests the PIC microsequencer. [PR Name=DL:IOP07]
	8	Tests the PIC register and ALU. [PR Name=DL:IOP08]
	9	Tests the PIC source/destination decoders. [PR Name=DL:IOP09]
	10	Tests the PIC internal registers. [PR Name=DL:IOP10]
	11	Tests the PIC interrupt circuitry. [PR Name=DL:IOP11]
	12	Tests the PIC RAM and sequencer. [PR Name=DL:IOP12]
	13	Tests the input/output microprocessor interface (IOMI) hardware. [PR Name=DL:IOP13]
	15	Tests the IOMI power control circuitry peripheral controller community power converter/monitor. [PR Name=DL:IOP13]
	16	<i>(Demand phase only)</i> Tests the interface with the nonactive CU. The nonactive CU must be specified as the helper unit and must be OOS and ATP. [PR Name=DL:IOP16]

Table A1-33 — Diagnostic Phase Descriptions for CU MASC in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MASC	–	Control Unit – Main Store Controller
	1	Executes the memory controller (MCERT) “power-on” initial test. [PR Name=DL:MASC01]
	2	Performs the boundary scan test. [PR Name=DL:MASC02]
	3	Tests the basic response from MM circuit. [PR Name=DL:MASC03]
	4	Performs the address looparound test. [PR Name=DL:MASC04]
	5	Performs the data path test. [PR Name=DL:MASC05]
	6	Tests store error A. [PR Name=DL:MASC06]
	7	Performs the maintenance command test. [PR Name=DL:MASC07]
	8	Performs store B and C tests. [PR Name=DL:MASC08]
	11	Performs the destination and source wait state tests. [PR Name=DL:MASC11]
	12	Performs the single-bit hamming tests. [PR Name=DL:MASC12]
	13	Performs the double-bit error (hamming) tests. [PR Name=DL:MASC13]
	14	Tests the address trap logic. [PR Name=DL:MASC14]
	15	Performs the arbiter RAM testing. [PR Name=DL:MASC15]
	20	Performs the short march test to Bank 0. [PR Name=DL:MASC20]
	21	Performs the short march test to Bank 1. [PR Name=DL:MASC21]
	22	Performs the short march test to Bank 2. [PR Name=DL:MASC22]
	23	Performs the short march test to Bank 3. [PR Name=DL:MASC23]
	24	Performs the short march test to Bank 4. [PR Name=DL:MASC24]
	25	Performs the short march test to Bank 5. [PR Name=DL:MASC25]
26	Performs the short march test to Bank 6. [PR Name=DL:MASC26]	
27	Performs the short march test to Bank 7. [PR Name=DL:MASC27]	
30	Performs the memory operations and parity tests to Bank 0. [PR Name=DL:MASC30]	

Table A1-33 — Diagnostic Phase Descriptions for CU MASC in 3B21D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	31	Performs the memory operations and parity tests to Bank 1. [PR Name=DL:MASC31]
	32	Performs the memory operations and parity tests to Bank 2. [PR Name=DL:MASC32]
	33	Performs the memory operations and parity tests to Bank 3. [PR Name=DL:MASC33]
	34	Performs the memory operations and parity tests to Bank 4. [PR Name=DL:MASC34]
	35	Performs the memory operations and parity tests to Bank 5. [PR Name=DL:MASC35]
	36	Performs the memory operations and parity tests to Bank 6. [PR Name=DL:MASC36]
	37	Performs the memory operations and parity tests to Bank 7. [PR Name=DL:MASC37]
	38	Tests the address looparound through main store update (duplex mode). [PR Name=DL:MASC38]
	39	Tests the data looparound through main store update (duplex mode). [PR Name=DL:MASC39]
	40	Performs the main store update control and error tests. [PR Name=DL:MASC40]
	41	Performs the memory data pattern tests. [PR Name=DL:MASC41]
	42	Tests the fetch/execute instruction from main store. [PR Name=DL:MASC42]
	43	Performs the function testing of update mode and refresh data parity checks parity checks (some memory locations). [PR Name=DL:MASC43]
	45	Performs the memory data to March pattern tests. [PR Name=DL:MASC45]
	46	Performs the memory data to March pattern tests. [PR Name=DL:MASC46]
	48	Performs the memory data pattern tests using byte, half, and read-modify-write commands. [PR Name=DL:MASC48]
	50	<i>(Demand phase only)</i> Performs the memory data to March pattern tests. [PR Name=DL:MASC50]
	51	<i>(Demand phase only)</i> Performs the memory data to March pattern tests. [PR Name=DL:MASC51]
	52	<i>(Demand phase only)</i> Performs the memory data to March pattern tests. [PR Name=DL:MASC52]
	53	<i>(Demand phase only)</i> Performs the memory data to March pattern tests. [PR Name=DL:MASC53]

Table A1-33 — Diagnostic Phase Descriptions for CU MASC in 3B21D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	95	(Demand phase only) Performs the run user-specified to March pattern tests. [PR Name=DL:MASC95]
	96	Performs the function testing of update mode and refresh data parity checks (all memory locations). User may specify test parameters. [PR Name=DL:MASC96]

Table A1-34 — Diagnostic Phase Descriptions for CU MHD in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MHD	–	Control Unit – SCSI Moving Head Disk (MHD)
	1	Performs the SCSI moving head disk test. [PR Name=DL:MHDS01]

Table A1-35 — Diagnostic Phase Descriptions for CU MT in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MT	–	Control Unit – SCSI Magnetic Tape
	1	Diagnose the SCSI Device identified in the command: (a) Reset and verify reset condition. (b) Execute the built-in self-test of the tape unit. [PR Name=DL:MT01]
	90	Verify read/write of blocked data to tape. (Writable tape must be installed). [PR Name=DL:MT90]
	91	Verify write protection mechanism of the tape unit. (Write-protected tape must be installed). Phase MT90 must be successfully executed before this phase. [PR Name=DL:MT91]

Table A1-36 — Diagnostic Phase Descriptions for CU MTC in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU MTC	–	Control Unit – SCSI Magnetic Tape Controller
	1	Performs the SCSI tape test. [PR Name=DL:MTC01]
	90	Performs the SCSI demand-only test for read/write. [PR Name=DL:MTC90]
	91	Performs the SCSI demand-only test for write protect. [PR Name=DL:MTC91]

Table A1-37 — Diagnostic Phase Descriptions for CU UC in 3B21D (AM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
CU UC	–	Control Unit – Utility Circuit
	1	Performs the bidirectional gating bus access and enable. [PR Name=DL:UC01]
	2	Performs the access matcher, address leads, and read/write test. [PR Name=DL:UC02]
	3	Performs the block address matchers, address leads, and read/write test. [PR Name=DL:UC03]
	4	Performs the address matcher, address leads, and read/write test. [PR Name=DL:UC04]
	5	Performs the unit identification matcher, address leads, and read/write test. [PR Name=DL:UC05]
	6	Performs the data matcher, address leads, and read/write test. [PR Name=DL:UC06]
	7	Performs the event and trace memory addresses counters, and read/write test. [PR Name=DL:UC07]
	8	Performs the transfer trace memory access path unit identification buffers test. [PR Name=DL:UC08]
	9	Performs the trace memory and read/write test. [PR Name=DL:UC09]
	10	Performs the trigger functions in freeze mode tests. [PR Name=DL:UC10]
	11	Performs the trigger functions in run mode without match conditions. [PR Name=DL:UC11]
	12	Performs the access matcher and run mode tests. [PR Name=DL:UC12]
	13	Performs the data matcher and run mode tests. [PR Name=DL:UC13]
	14	Performs the address matcher, virtual address bus (store address register), and run mode tests. [PR Name=DL:UC14]
	15	Performs the address matcher, physical address bus, and run mode tests. [PR Name=DL:UC15]
	16	Performs the unit identification matcher and run mode tests. [PR Name=DL:UC16]
	17	Performs the trigger functions in run mode with match conditions. [PR Name=DL:UC17]
	18	Performs the transfer trace and run mode tests. [PR Name=DL:UC18]
	19	Performs the trace memory read/write indicator bit test. [PR Name=DL:UC19]
90	Performs the demand phase only with special procedure. External input and external output trigger function 0.	

Table A1-37 — Diagnostic Phase Descriptions for CU UC in 3B21D (AM) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	91	Performs the demand phase only with special procedure. External input and external output trigger function 1.
	92	Performs the demand phase only with special procedure. External input and external output trigger function 2.
	93	Performs the demand phase only with special procedure. External input and external output trigger function 3.

Table A1-38 — Diagnostic Phase Descriptions for DCLU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DCLU (SM)	–	Digital Carrier Line Unit (Switching Module)
	1	Tests the CI/CLRT integrity. [PR Name=SM:DNDCLU1]
	2	Verifies operation of DFI select register and the “dummy” CLRT. [PR Name=SM:DNDCLU1]
	3	Tests operation of the Time Slot Select Register (TSSR). [PR Name=SM:DNDCLU1]
	4	Verifies the PIDB to the ACT MCTSI. [PR Name=SM:DNDCLU2]
	5	Verifies the interface between the CI/CLRT for STDBY MCTSI and the PIDB to the STDBY MCTSI. [PR Name=SM:DNDCLU2]

Table A1-39 — Diagnostic Phase Descriptions for DCTUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DCTUCOM (SM)	–	Directly Connected Test Unit Common (Switching Module)
	1	Tests the CI/CLRT integrity. [PR Name=SM:DNDCTC]
	2	Runs DCTU special diagnostic: CPU test, RAM/ROM tests, GPIB loopback, and arithmetic processor. [PR Name=SM:DNDCTC]
	3	Tests the CI/CLRT integrity to STBY MCTSI. [PR Name=SM:DNDCTC]

Table A1-40 — Diagnostic Phase Descriptions for DCTUPOINT

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DCTUPOINT (SM)	–	Directly Connected Test Unit Port (Switching Module)
	1	Runs Group J DCTU tests. [PR Name=SM:DNPORT]

Table A1-41 — Diagnostic Phase Descriptions for DFC-Mod 1

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFC-Mod 1 (AM)	–	Disk File Controller – Mod 1 (Administrative Module)
	1	Tests the DSCH-DDSBS interface. [PR Name=DL:DFC01]
	2	Tests the DDSBS-BIC interface and BIC circuitry. Excludes the PIC's interface. [PR Name=DL:DFC02]
	3	Tests the BIC-PIC interface using PIC resident firmware. [PR Name=DL:DFC03]
	4	Tests the BIC-PIC communication. [PR Name=DL:DFC04]
	5	Tests the PIC microstore data validity and microstore parity checker. [PR Name=DL:DFC05]
	6	Tests the PIC microsequencer. [PR Name=DL:DFC06]
	7	Tests the PIC register and ALU. [PR Name=DL:DFC07]
	8	Tests the PIC source/destination decoders. [PR Name=DL:DFC08]
	9	Tests the PIC internal registers. [PR Name=DL:DFC09]
	10	Tests the PIC interrupt circuitry. [PR Name=DL:DFC10]
	11	Tests the PIC RAM and sequencer. [PR Name=DL:DFC11]
	12	Parallel/serial data interface and MHD control source and destination decoders. [PR Name=DL:DFC12]
	13	MHD control register. [PR Name=DL:DFC13]
	15	<i>(Demand phase only)</i> Tests the interface with the off-line CU. Off-line CU must be specified as a helper unit, and it must be OOS and ATP before running this phase. [PR Name=DL:DFC15]

Table A1-42 — Diagnostic Phase Descriptions for DFC-SCSI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFC-SCSI (AM)	–	Disk File Controller – Small Computer System Interface (Administrative Module)
	1	DSCH-DDSBS interface. [PR Name=DL:DFCS01]
	2	DDSBS-BIC interface and BIC circuitry excluding HA CI. No BIC FIFO buffer memory testing. [PR Name=DL:DFCS02]
	3	BIC-HA CI using HA resident firmware. [PR Name=DL:DFCS03]
	4	WE32100 CPU test. [PR Name=DL:DFCS04]
	5	Verifies ROM's contents. [PR Name=DL:DFCS05]
	6	Test 1 MB SRAM. [PR Name=DL:DFCS06]
	7	HA register tests. [PR Name=DL:DFCS07]
	8	WE32104 DMAC test. [PR Name=DL:DFCS08]
	9	DUART test. [PR Name=DL:DFCS09]
	10	STC test. [PR Name=DL:DFCS10]
	11	SCSI protocol controllers test. Tests both SCSI buses. [PR Name=DL:DFCS11]
	12	Tests (validates) only differential type devices attached to buses. [PR Name=DL:DFCS12]
	13	Tests capability of SCSI devices to recognize and acknowledge bus reset. [PR Name=DL:DFCS13]
	14	<i>(Demand and DEX phase)</i> Bit-wise independence test for the HA FIFO buffer memory. [PR Name=DL:DFCS14]
15	<i>(Demand phase only)</i> Tests the interface with the STBY CU. The STBY CU must be specified as the helper unit, and must be OOS and ATP before running this phase. [PR Name=DL:DFCS15]	
90	<i>(Demand phase only)</i> SCSI bus loop test. This phase requires that existing cables from the DFC be disconnected and the looparound cable be connected between the two buses where they connect to the DFC before running the phase. [PR Name=DL:DFCS90]	

Table A1-43 — Diagnostic Phase Descriptions for DFI

DIAGNOSTIC ID	PHASE ^a	DESCRIPTION/WHAT IS TESTED
DFI (SM) (ANN3, ANN5)	–	Digital Facility Interface (Switching Module) (Announcement 3, Announcement 5)
	1	Tests the active side CI-CLRT. The functions verified: 1. Serial transmission capabilities, including the PICB transmission paths, order start code, order parity, and serial loopback checks. 2. Parallel loopback capabilities, including the subaddresses register, the four subaddress registers, and the Peripheral Control Link (PCL) exercise register. 3. CLRT clear capabilities, including output-piso, the four subaddress registers, and PCL exercise clear. 4. ASW integrity, which includes a check for ASW response and an exercise to check the checker. 5. Status latch control, which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test, which checks the PSR function and a PSR exercise. [PR Name=SM:DNec5_1]
	2	Tests the mate CI-CLRT communication paths and provides a comprehensive system test for the CLRT. The functions verified: 1. Serial transmission capabilities, including the PICB transmission paths, order start code, order parity, and serial loopback checks. 2. Parallel loopback capabilities, including the subaddress Control Link (PCL) exercise register. 3. CLRT clear capabilities, including output-piso, the four subaddress registers, and PCL exercise clear. 4. ASW integrity, which includes a check for ASW response and an exercise to check the checker. 5. Status latch control, which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test, which checks the PSR function and a PSR exercise. [PR Name=SM:DNec5_1]

See note(s) at end of table.

Table A1-43 — Diagnostic Phase Descriptions for DFI (Contd)

DIAGNOSTIC ID	PHASE ^a	DESCRIPTION/WHAT IS TESTED
	3	<p>Tests the integrity of the CCB interface. The functions verified:</p> <ol style="list-style-type: none"> 1. Integrity of the transmission path between CLRT and CCB. 2. CCB data RAM is accessible both for reading and writing. 3. Flag RAM is accessible both for reading and writing. 4. Decision tree for pinpointing raised flags works (activity flags, summary flags). 5. All error reporting mechanisms (address, matching, parity errors) are in working order. 6. That the clear operation visibly works. <p>[PR Name=SM:DNec5_1]</p>
	4	<p>This phase ensures that the microprocessor can be brought up from a cold start and that the firmware enters its process schedule routine. The functions verified:</p> <ol style="list-style-type: none"> 1. Partial check of microprocessor to CCB data access and flag protocol. 2. Sanity time-out indicator (shows that the firmware is cycling in process scheduler). <p>[PR Name=SM:DNec5_1]</p>
	5	<p>This phase tests the PMTG parity walker and the firmware parity error reporting mechanism. It also verifies that the PMTG does not corrupt data passed through it on the active or mate PIDB. The functions verified:</p> <ol style="list-style-type: none"> 1. The circuit's capability to pass PCM and signaling information at the circuit interface is verified by looping through the PMTG over the active and mate PIDBs. 2. The firmware error reporting mechanism is enabled and verified by detecting transmit and receive errors with the PMTG. 3. The circuit's capability to pass PCM and signaling information through the circuit is verified by looping PCM and signaling information through the companion DFI over the far-end active and mate PIDBs. 4. The PMTG parity walker circuitry is verified by forcing the companion DFI to loose synchronization. <p>[PR Name=SM:DNec5_2]</p>

See note(s) at end of table.

Table A1-43 — Diagnostic Phase Descriptions for DFI (Contd)

DIAGNOSTIC ID	PHASE ^a	DESCRIPTION/WHAT IS TESTED
	7	This phase verifies that echo cancellation can be disabled using the 2100 Hz disabling tone. This phase verifies: 1. The 2100 Hz tone recognition and echo cancellation control circuitry. 2. Echo Cancellation and Voice Path Assurance tests. [PR Name=SM:DNec5_2]
	8	Note: The echo cancellation test performed in this phase executes only on the TN1511 EC5s. Phase 7 contains the echo cancellation tests for the TN1825 EC5s. <i>(Demand phase only)</i> This phase verifies cancellation is performed correctly at the proper loss levels and that the voice path assurance tone is passed without cancellation.
	9	This phase initializes and tests the CI-CLRT communication paths and provides a comprehensive system test for the CLRT. The functions verified: 1. Serial transmission capabilities, including the PICB transmission paths, order start code, order parity, and serial loopback checks. 2. Parallel loopback capabilities, including the subaddress register, the four subaddress registers, and the PCL exercise register. 3. CLRT clear capabilities, including output-piso, the four subaddress registers, and PCL exercise clear. 4. ASW integrity, which includes a check for ASW response and an exercise to check the checker. 5. Status latch control, which verifies status reread and explicit clear capabilities as well as a status latch exercise. 6. PSR test, which checks the PSR function and a PSR test. [PR Name=SM:DNdfg1]
	10	Tests the integrity of the CCB. The functions verified: 1. Integrity of the transmission path between CLRT and CCB. 2. CCB data RAM is accessible both for reading and writing. 3. Flag RAM is accessible both for reading and writing. 4. Decision tree for pinpointing raised flags (activity flags, summary flags) works. 5. All error reporting mechanisms (address, matching, parity errors) are in working order. 6. That the clear operation visibly works. [PR Name=SM:DNdfg1]

See note(s) at end of table.

Table A1-43 — Diagnostic Phase Descriptions for DFI (Contd)

DIAGNOSTIC ID	PHASE ^a	DESCRIPTION/WHAT IS TESTED
	11	This phase ensures that the microcomputer can be brought up from a cold start and that the firmware enters its process schedule routine. The DFI is automatically looped on itself by the firmware as part of the initialization process. [PR Name=SM:DNdfg1]
	12	This phase provides a comprehensive check of the Maintenance Buffer and its internal latches. [PR Name=SM:DNdfg2]
	13	This phase writes various exercise patterns to the control streams of each of the three LSI devices and checks for the correct response. Interaction among the MB, TF, RS, FR, CCB, and the firmware is quite extensive, so this phase should give a good indication of the health of the LSI. [PR Name=SM:DNdfg2]
	14	Like the previous phase, this phase writes exercises to the LSI devices. However, these exercises bring up facility alarms that are service-affecting. Hence, these exercises must be run out-of-service. Also, note that the facility response register in the CCB contains the exercise response. [PR Name=SM:DNdfg3]
	15	This phase checks the address and data bus of the microcomputer as well as the integrity of the firmware through the firmware fault flag. [PR Name=SM:DNdfg3]
	16	This phase verifies the integrity of the signaling and PCM data paths in the DFI. Both the active and mate PIDs are checked. [PR Name=SM:DNdfg3]
	17	This phase tests the mate-side CI by running the same tests as in Phase 1. The only difference is that the CLRT is now accessed through the mate CI. [PR Name=SM:DNdfg3]
	18	Tests the XPC-8 Protocol Controller chip, the Dual Port Ram (DPR), and the internal Facility Data Link (FDL) path. The functions verified: 1. Microcomputer/CCB/DPR interface is working properly. All DPR memory cells can be written and read. 2. Microcomputer/CCB/XPC interface is good. The FDL on the DFI is also checked. [PR Name=SM:DNdfg4]
	19	This phase uses the active and standby FIU to test the operation of the T1 Clock and T1 Status leads from the RSM DFI to both FIU sides. [PR Name=SM:DNdfg4]

See note(s) at end of table.

Table A1-43 — Diagnostic Phase Descriptions for DFI (Contd)

DIAGNOSTIC ID	PHASE ^a	DESCRIPTION/WHAT IS TESTED
	20	This phase loops PCM and Signaling data from the Active TSI to the looped RSM DFI. [PR Name=SM:DNdfg4]
Note(s): a. The first eight test phases are associated with the ECSU. Phase 8 is a demand phase and is only used when DFI under test is equipped with a TN1511 EC5. Phase 6 is not used.		

Table A1-44 — Diagnostic Phase Descriptions for DFI 2

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFI 2 (SM)	–	Digital Facility Interface 2 (Switching Module)
	1	Tests the active side CI-CLRT. The functions verified: 1. Serial transmission capabilities, including the PICB transmission paths, order start code, order parity, and serial loopback checks. 2. Parallel loopback capabilities, including the subaddress register, the four subaddress registers, and the Peripheral Control Link (PCL) exercise register. 3. CLRT clear capabilities, including output-piso, the four subaddress registers, and PCL exercise clear. 4. ASW integrity, which includes a check for ASW response and an exercise to check the checker. 5. Status latch control, which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test, which checks the PSR function and a PSR exercise. [PR Name=DNec5_1]

Table A1-44 — Diagnostic Phase Descriptions for DFI 2 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	2	<p>Tests the mate CI-CLRT communication paths and provides a comprehensive system test for the CLRT. The functions verified:</p> <ol style="list-style-type: none"> 1. Serial transmission capabilities, including the PICB transmission paths, order start code, order parity, and serial loopback checks. 2. Parallel loopback capabilities, including the subaddress register, the four subaddress registers, and the Peripheral Control Link (PCL) exercise register. 3. CLRT clear capabilities, including output-piso, the four subaddress registers, and PCL exercise clear. 4. ASW integrity, which includes a check for ASW response and an exercise to check the checker. 5. Status latch control, which verifies status-reread and explicit clear capabilities as well as a status-latch exercise. 6. PSR test, which checks the PSR function and a PSR exercise. <p>[PR Name=DNec5_1]</p>
	3	<p>Tests the integrity of the CCB interface. The functions verified:</p> <ol style="list-style-type: none"> 1. The integrity of the transmission path between CLRT and CCB. 2. The CCB data RAM is accessible both for reading and writing. 3. The Flag RAM is accessible both for reading and writing. 4. The decision tree for pinpointing raised flags works (activity flags, summary flags). 5. All error reporting mechanisms are in working order (address, matching, parity errors). 6. That the clear operation visibly works. <p>[PR Name=DNec5_1]</p>
	4	<p>This phase ensures that the microprocessor can be brought up from a cold start and that the firmware enters its process schedule routine. The functions verified:</p> <ol style="list-style-type: none"> 1. Partial check up to CCB data access and flag protocol. 2. Sanity time-out indicator (shows that the firmware is cycling in process scheduler). <p>[PR Name=DNec5_2]</p>

Table A1-44 — Diagnostic Phase Descriptions for DFI 2 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	5	<p>This phase tests the PMTG parity walker and the firmware parity error reporting mechanism. It also verifies that the PMTG does not corrupt data passed through it on the active or mate PIDB. The functions verified:</p> <ol style="list-style-type: none"> 1. The circuit's capability to pass PCM and signaling information at the circuit interface is verified by looping through the PMTG over the active and mate PIDBs. 2. The firmware error reporting mechanism is enabled and verified by detecting transmit and receive errors with the PMTG. 3. The circuit's capability to pass PCM and signaling information through the circuit is verified by looping PCM and signaling information through the companion DFI over the far-end active and mate PIDBs. 4. The PMTG parity walker circuitry is verified by forcing the companion DFI to loose synchronization. <p>[PR Name=DNec5_2]</p>
	6	<p>The functions verified: That the LST can both transmit and receive 2400 Hz, 2600 Hz, and 2400/2600 Hz combined tones for all 30 channels.</p> <p>[PR Name=DNec5_2]</p>
	7	<p>This phase verifies that echo cancellation can be disabled using the 2100 Hz disabling tone. This phase verifies:</p> <ol style="list-style-type: none"> 1. The 2100 Hz tone recognition and echo cancellation control circuitry. 2. Echo Cancellation and Voice Path Assurance tests. <p>[PR Name=DNec5_2]</p>
	9	<p>This phase verifies the PICB interface between the active/standby MCTSI and the DFI control interface. The PICB interface circuits (parity check, start code check, and capability to force ASW errors) are verified. If the MCTSI is not duplex (ACT/STBY), only the interface to the active processor is tested and the phase completes CATP. [PR Name=DNuci]</p>
	10	<p>This phase tests interface functions that are accessible through the module processor (MP) port. This includes testing of the first in - first out (FIFO) registers RAM, RAM parity checker/generator, summary scan registers, error source registers, mailbox registers, and mask registers. [PR Name=DNuci]</p>

Table A1-44 — Diagnostic Phase Descriptions for DFI 2 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	11	This phase tests the interface between the MP and local processor (LP) through the unified control interface (UCI) device. The specific tests are summary scan, interrupts and masks for the LP, access to registers, and interrupt in the hardware error source register (ESR) for errors on the LP. [PR Name=DNuci]
	12	This phase tests that the microprocessor can be brought up from a cold start and that the firmware enters its process scheduler routine. The sanity time-out indicator is verified, which shows that the firmware is cycling in the process scheduler. A check of the equalizer value leads to the digital signal interface (DSI) is also performed. [PR Name=DNdfid1]
	13	This phase checks the response of firmware that runs EPROM and RAM diagnostics. [PR Name=DNdfid1]
	14	This phase verifies the integrity of the transceiver (XCVR) uP interface. The transmitter, receive synchronizer, and framer functions are checked by demand exercises performed in firmware. This phase also checks the XCVR framer, remote frame alarm, remote multiframe alarm, and receive synchronizer counter functions. The XCVR RAM is checked by running facility side for all the previous tests. [PR Name=DNdfid2]
	15	This phase verifies the integrity of the signaling and PCM data paths in the DFI. Both the active and standby MCTSI PIDBs are checked. The alternate data RAM is used to source 8-bit PCM data toward the DFI. Signaling bits are supplied by the SP. Since the DFI is looped on itself, the data and signaling bits are sent back to the alternate data RAM where they are verified. [PR Name=DNdfid3]
	16	<i>(TN1612 only)</i> This phase tests the XPC (X.25 protocol controller) by writing different patterns to the talk-back channel and verifies a response pattern. With both paths of the RSM DFI looped at the far end, the talk-back channel is used as a means of checking the XPC. [PR Name=DNdfid3]
	17	<i>(TN1612 only)</i> This phase sends PCM data and signaling from the MCTSI to the looped RSM DFI. A single time slot is sourced from the MCTSI and sent through the FIU-DLI to the DFI. Both active and mate FIU-DLI paths are verified. [PR Name=DNdfid3]

Table A1-44 — Diagnostic Phase Descriptions for DFI 2 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	18	(TN1612 only) This phase tests the operation of the T1 status leads from the RSM DFI to both FIU sides of an RSM. [PR Name=DNdfid3]

Table A1-45 — Diagnostic Phase Descriptions for DFIH

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFIH (SM)	–	Digital Facility Interface Host (Switching Module)
	1	Verifies (if the HDFI is the H1DFI) the PICB interface to the UCI from the ACT/STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies (on the H1DFI) operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]
	3	Tests (on H1DFI) the UCI interface to LP side. Verifies communication between the SMP and LP through the UCI and the associated interrupts to the LP. [PR Name=SM:DNUCI]
	4	Initializes (on the HDFI) and tests the CI/CLRT communication paths and provides a comprehensive system test for the CLRT. [PR Name=SM:DNDFRI1]
	5	Ensures (on the HDFI) the following: 1. The integrity of the transmission path between the CLRT and the CCB. 2. The CCB data RAM and flag RAM are accessible both for reading and writing. 3. The decision tree for pinpointing raised flag works. 4. All error reporting mechanisms are in working order. 5. The clear operation visibly works. [PR Name=SM:DNDFRI1]
	6	Ensures that the microprocessor can be brought up from a cold start and that the firmware enters its process schedule routine on the HDFI. It partially checks the microprocessor to CCB data access and flag protocol, sanity time-out indicator, and loop monitor indicator. [PR Name=SM:DNDFRI1]
7	Provides a comprehensive check of the maintenance buffer and its internal latches including the report synchronizer, transmit formatter, framer control and report stream registers, register clear register, ESR, and general purpose latch on the HDFI. [PR Name=SM:DNDFRI1]	

Table A1-45 — Diagnostic Phase Descriptions for DFII (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	8	Writes various exercise patterns to the control streams of each of the three LSI devices on the HDFI and checks for the correct response. Interaction among the MB, TF, RS, FR, CCB, and the firmware is extensive, so this phase gives a good indication of the health of the LSI. [PR Name=SM:DNDFRI2]
	9	Writes (like phase 8) exercises to the LSI devices. However, these exercises bring up facility alarms that are service-affecting. The TF does not have any facility alarm exercises. [PR Name=SM:DNDFRI2]
	10	Checks facility alarm reporting on the HDFI in an indirect manner by taking advantage of the fact that the microprocessor, when functioning properly, reports facility alarms routinely (through firmware). Hence, this phase checks the address and data bus of the microprocessor as well as the integrity of the firmware through the device summary register. [PR Name=SM:DNDFRI2]
	11	Verifies the integrity of the signaling and PCM data paths in the HDFI. Both ACT and STBY PIDBs are checked. [PR Name=SM:DNDFRI2]
	12	Tests the STBY side CI by running the same tests as in phase 4. The only difference is that the CLRT is now accessed through the STBY CI. [PR Name=SM:DNDFRI2]
	13	Tests the XPC (in the HDFI) by writing different patterns to talk back channel and verifying a response of a true data pattern. In H1(s), this test is performed for the different number of time slots that can be used for the control channel in the DLI. [PR Name=SM:DNDFRI2]
	14	Checks microprocessor EPROM and RAM on the HDFI. [PR Name=SM:DNDFRI2]
	15	Ensures that the microprocessor can be brought up from a cold start and that the firmware enters its process schedule routine on the RDFI. It partially checks microprocessor (R1, R2) to CCB (H1, H2) data access and flag protocol and sanity time-out. [PR Name=SM:DNDFRI2]
	16	Provides a comprehensive check of the maintenance buffer and its internal latches including receive synchronizer, transmit formatter, framer control and report stream registers, register clear register, ESR, and general purpose latch on the RDFI. [PR Name=SM:DNDFRI3]

Table A1-45 — Diagnostic Phase Descriptions for DFIH (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	17	Writes various exercise patterns to the control streams of each of the three LSI devices on the RDFI and checks the correct response. Interaction among the MB, TF, RS, FR, CCB, and the firmware is quite extensive, so this phase should give a good indication of the health of the LSI. [PR Name=SM:DNDFRI3]
	18	Writes (like phase 17) exercises to the LSI devices. However, these exercises bring up facility alarms that are service-affecting. The TF does not have any facility alarm exercises. [PR Name=SM:DNDFRI3]
	19	Checks XPC function in the RDFI. Also checks facility alarm reporting in an indirect manner by taking advantage of the fact that the microprocessor, when functioning properly, reports facility alarms routinely (through firmware). The address and data bus of the microprocessor as well as the integrity of the firmware is checked by the device summary register. [PR Name=SM:DNDFRI4]
	20	Verifies the integrity of the signaling and PCM data paths in the RDFI. Both ACT and STBY PIDBs are checked. For one segment, the remote DFI is looped on itself. The looping takes place in the PMTB so that time slot 7 is returned directly to the transmit formatter. For another segment, the RDFI is unlooped and a CD is looped. [PR Name=SM:DNDFRI4]
	21	Checks the microprocessor EPROM and RAM on the RDFI using on-board test routines. [PR Name=SM:DNDFRI4]
	22	Checks the PMTG functions on the RDFI including the walking parity mask and error registers, control register, and remote loss of clock register. [PR Name=SM:DNDFRI4]
	23	Checks the operation of the CI in the R1DFI. The primary responsibility of the CI is to recreate the PICB interface at the remote site in a manner similar to that in the nonremoted application. [PR Name=SM:DNDFRI4]
	24	Tests the communication between the SMP and the H1DFI through the PICB bypass FIFO circuit by writing data in various RAM locations in the UCI and verifying that the same data is returned in the corresponding locations. [PR Name=SM:DNDFRI4]

Table A1-46 — Diagnostic Phase Descriptions for DFTAC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DFTAC (SM)	–	Digital Facility Test Access Unit (Switching Module)
	1	Verifies board ID and basic register operation. [PR Name=SM:DNDFTAC]
	2	Tests junctor network and monitor and talk circuits. [PR Name=SM:DNDFTAC]

Table A1-47 — Diagnostic Phase Descriptions for DIST

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DIST (SM)	–	Distribute (Switching Module)
	1	Tests send and receive data by MSUCOM operation of relay drivers. [PR Name=SM:DNDIST]

Table A1-48 — Diagnostic Phase Descriptions for DLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DLI (SM/ORM)	–	Dual-Link Interface (Switching Module and Optically Remote Module)
	1	Active MP to DLI communication and interface tests. [PR Name=SM:DNPDLI1]
	2	Performs DLI internal function tests (I). [PR Name=SM:DNPDLI1]
	3	Performs DLI internal function tests (II). [PR Name=SM:DNPDLI1]
	6	Performs ACT TSI to DLI interface tests. [PR Name=SM:DNPDLI2]
	7	Performs STBY MP to DLI interface tests. [PR Name=SM:DNPDLI2]
	8	Performs STBY MP SDLC to DLI interrupt and data tests. [PR Name=SM:DNPDLI2]
	9	Performs STBY TSI to DLI interface (data loopback) tests. Also tests the STBY TSI to TRCU loopback tests in an ORM. [PR Name=SM:DNPDLI3]
	10	Performs switch/monitor tests. [PR Name=SM:DNPDLI3]
	11	Performs the TMS NCT link looparound tests, and, for CM3, the LIT48 test, which verifies the TMS hardware associated with the DLI. Segments 2 through 5 indicate a problem with the even-numbered (A) TMS link. Segments 7 through 10 indicate a problem with the odd-numbered (B) TMS link. If the diagnostics indicate an even-numbered link, run an unconditional diagnostic to determine if both TMS links are failing. [PR Name=SM:DNPDLI3]

Table A1-49 — Diagnostic Phase Descriptions for DLN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DLN (CNI)	–	Direct Link Node (Common Network Interface)
	1	Tests NP (TN922), RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable.
	2	Tests NP (TN922), RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable.
	10	Tests the NP (TN922) node sanity.
	11	Tests RI0 (UN122) and RI1 (UN123) basic sanity.
	12	Tests NP (TN922), RI0 (UN122), IFB-P (TN915/TN1803), IFB (TN918). Neighbor node audit on Ring-0. CATP when more than one node is isolated.
	13	Tests NP (TN922), RI1 (UN123), IFB-P (TN915/TN1803), IFB (TN918). Neighbor node audit on Ring-1. CATP when more than one node is isolated.
	20	Tests NP (TN922) memory.
	23	Tests NP (TN922) parity generator.
	24	Tests NP (TN922) interrupt controller.
	26	Tests NP (TN922) DMA controller.
	27	Tests NP (TN922) programmable interval timer.
	30	Tests DSCH (KBN15 on active CU) interface to the DDSBS (TN69B).
	31	Tests DDSBS (TN69B) interface to the 3BI (TN914).
	32	Tests NP (TN922) interface to the 3BI (TN914). Interrupt test.
	33	Tests NP (TN922) interface to the 3BI (TN914). Communication test.
	34	<i>(Demand phase only)</i> Tests off-line DSCH (KBN15) interface to the DDSBS (TN69B). Note: Helper CU must be OOS and specified during diagnostics to get CATP results else NTR is returned.
	35	Tests NP (TN922) interface to the 3BI (TN914). DMA transfer test.
	40	Tests AP (TN1340) Dual Port Memory.
	41	Tests AP (TN1340) circuit board.
42	Tests AP (TN1340) DMA controller.	

Table A1-50 — Diagnostic Phase Descriptions for DLN-IRN2

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DLN -IRN2 (CNI)	–	Direct Link Node 30 (Common Network Interface)
	1	Tests IRN2 (UN304/UN337B), IFB (TN1803), and ring bus cables.
	2	Tests IRN2 (UN304/UN337B), IFB (TN1803), and ring bus cables.
	10	Tests IRN2 (UN304/UN337B) node sanity.
	12	Tests IRN2 (UN304/UN337B), IFB (TN1803). Neighbor node audit on Ring-0. CATP when more than one node is isolated.
	13	Tests IRN2 (UN304/UN337B), IFB (TN1803). Neighbor node audit on Ring-1. CATP when more than one node is isolated.
	20	Tests IRN2 (UN304/UN337B) memory.
	30	Tests DSCH (KBN15 on active CU) interface to the DDSBS (TN69B).
	31	Tests DDSBS (TN69B) interface to the 3BI (TN914).
	32	Tests IRN2 (UN304/UN337B) interface to the 3BI (TN914). Interrupt test.
	33	Tests IRN2 (UN304/UN337B) interface to the 3BI (TN914). Communication test.
	34	(Demand phase only) Tests off-line DSCH (KBN15) interface to the DDSBS (TN69B). Note: Helper CU must be OOS and specified during diagnostics to get CATP results else NTR is returned.
	35	Tests IRN2 (UN304/UN337B) interface to the 3BI (TN914). DMA transfer test.
	40	Tests AP30 (TN1630B) Dual Port Memory.
41	Tests AP30 (TN1630B) circuit board.	
42	Tests AP30 (TN1630B) DMA controller.	

Table A1-51 — Diagnostic Phase Descriptions for DUIC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
DUIC (AM)	–	Direct User Interface Controller (Administrative Module)
	1	Request isolate, control signal, and control signal acknowledge from the PIC. [PR Name=DL:DUIC01]
	2	Read/write access of DAM. [PR Name=DL:DUIC02]
	3	DAM parity checker. [PR Name=DL:DUIC03]
	4	Microdiagnostic. [PR Name=DL:DUIC04]
	5	<i>(Demand phase only)</i> Loopback mode. The DUICs must be equipped. [PR Name=DL:DUIC05]
	6	<i>(Demand phase only)</i> Send-frames mode. The DUICs must be equipped. [PR Name=DL:DUIC06]

Table A1-52 — Diagnostic Phase Descriptions for EAN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
EAN (SM)	–	Equipment Access Network (Switching Module)
	1	Runs Group H DCTU tests. [PR Name=SM:DNEAN]

Table A1-53 — Diagnostic Phase Descriptions for FPC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
FPC (CM2)	–	Foundation Peripheral Controller (Part of MSGS) (Communication Module 2)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board (TN856) of the FPC. [PR Name=AM:DNC3BFPC]
	2	Tests the controller board (TN856) of the FPC. [PR Name=AM:DNC3BFPC and FPC:DNCFP22-25]
	3	Tests the application board (UN173) of the FPC. [PR Name=AM:DNC3BFPC and FPC:DNCFP32-35]

Table A1-54 — Diagnostic Phase Descriptions for GDSF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDSF (SM/SM-2000)	–	Global Digital Service Function (Switching Module or Switching Module-2000)
	1	Verifies the PICB interface from the ACT and STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]
	3	UCI tests the interface to the LP side. The MC sends messages through the UCI for the LP, which, on receipt of the messages, performs the required read and write to the UCI. Then internal read and write to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies all hardware of the circuit pack and its interface to PICBs and PIDBs. All segments executed by resident software have the “LP” prefix; all others use the resident software indirectly. [PR Name=DNds3_4]

Table A1-55 — Diagnostic Phase Descriptions for GDSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDSUCOM (SM)	–	Global Digital Service Unit Common (Switching Module)
	1	Tests CI with the ACT MCTSI. CATP completes if the MCTSI is not ACT/STBY. [PR Name=SM:DNGDSC1]
	2	Tests CI with the STBY MCTSI. NTR completes if the MCTSI is not ACT/STBY. [PR Name=SM:DNGDSC1]
	3	Tests the TSSR. [PR Name=SM:DNGDSC1]
	4	Tests the parity checkers and generators. [PR Name=SM:DNGDSC2]
	5	Tests interrupt registers, DSC parity error, and DSC fault and summary scan. [PR Name=SM:DNGDSC2]
	6	Tests data links to/from ACT and STBY MCTSI (if STBY MCTSI is OOS, then CATP executes). [PR Name=SM:DNGDSC2]

Table A1-56 — Diagnostic Phase Descriptions for GDXACC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDXACC (SM)	–	Gated Diode Crosspoints Access Code (Switching Module)
	1	Tests initialization. For LU1 – [PR Name=SM:DNAXS1]. For LU2 and LU3 – [PR Name=SM:DNCAXS1].
	2	Verifies crosspoints, which make up the 6-by-6 test access network. If cannot test access to all HLSCs (HLSC is busy), then CATP completes. For LU1 – [PR Name=SM:DNAXS1]. For LU2 and LU3 – [PR Name=SM:DNCAXS1].
	3	Verifies operation of crosspoints, which make up the 32-by-8 B-LINK access network. If cannot test access to all HLSCs (HLSC is busy), then CATP completes. For LU1 – [PR Name=SM:DNAXS2]. For LU2 and LU3 – [PR Name=SM:DNCAXS1].
	4	Verifies operation of crosspoints of the 32 forward/reverse networks associated with the channel circuits in this SG. For LU1 – [PR Name=SM:DNAXS3]. For LU2 and LU3 – [PR Name=SM:DNCAXS2].
	5	Verifies access network crosspoints, which connect B-LINKS to the GDX linearization circuit. For LU1 – [PR Name=SM:DNAXS3]. For LU2 and LU3 – [PR Name=SM:DNCAXS2].
	6	Verifies operation of the GDX linearization circuit. For LU1 – [PR Name=SM:DNAXS3]. For LU2 and LU3 – [PR Name=SM:DNCAXS2].

Table A1-57 — Diagnostic Phase Descriptions for GDXC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDXC (SM)	–	Gated Diode Crosspoint Compensator Pack (Switching Module)
	1	Tests receive control orders from the MSUCOM and performs a compensation. [PR Name=SM:DNMCOMP]

Table A1-58 — Diagnostic Phase Descriptions for GDXCON

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GDXCON (SM)	–	Gated Diode Crosspoints Concentrator (Switching Module)
	1	Tests the load and read data from the source gate array and the alarm mask destination. [PR Name=SM:DNGCTR]
	2	Tests the enable checking and reporting circuits. [PR Name=SM:DNGCTR]
	3	Tests the power alarm reporting, storing, and inhibiting circuits. [PR Name=SM:DNGCTR]
	4	Tests transmission, loading, and reading of data to the concentrator LGs. [PR Name=SM:DNGCTR]
	5	Tests circuits that inhibit writes and reads to the concentrator when a multiple enable is detected. [PR Name=SM:DNGCTR]
	6	Turns on the network controller lamp for 1 second, then off for 1 second. Test is repeated 7 times, and then the lamp is left on. [PR Name=SM:DNGCTR]

Table A1-59 — Diagnostic Phase Descriptions for GRID/GRIDBD (SM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GRID/GRIDBD (SM)	–	Grid/Grid Board (Switching Module)
	1	Tests the grid alarm status, verifies the loopable test bit positions of both grid destination gate arrays, initializes all grid crosspoints to their “off” state, and verifies the pseudo alarm capability of the grid to both SG network controllers. For LU1 – [PR Name=SM:DNGRD]. For LU2 and LU3 – [PR Name=SM:DNCGRD].
	2	Verifies capability to write and read state of each crosspoint control latch for scan cutoff crosspoints. Connect/disconnect state not verified. For LU1 – [PR Name=SM:DNGRD]. For LU2 and LU3 – [PR Name=SM:DNCGRD].
	3	Verifies capability to write and read state of each crosspoint control latch for second stage crosspoints. Connect/disconnect state of crosspoint not verified. Also, crosspoint address decoding is tested for the possibility of stuck bits of “don’t care” states, which could cause erroneous or multiple operation of crosspoints. For LU1 – [PR Name=SM:DNGRD]. For LU2 and LU3 – [PR Name=SM:DNCGRD].
	4	Verifies capability to write and read state of each crosspoint control latch for first stage crosspoints. Connect/disconnect states of crosspoints not verified. For LU1 – [PR Name=SM:DNGRD]. For LU2 and LU3 – [PR Name=SM:DNCGRD].
	5	Checks operation of summary scan transition latch programming on the grid. For LU1 – [PR Name=SM:DNGRD]. For LU2 and LU3 – [PR Name=SM:DNCGRD].

Table A1-60 — Diagnostic Phase Descriptions for GRID/GRIDBD EXERCISE (SM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GRID/GRIDBD EXERCISE (SM)	–	Grid/Grid Board Exercise (Switching Module) (LU1, LU2, and LU3)
	1	Tests the scan cut-off crosspoints and associated scan circuitry on each of the ports. [PR Name=SM:DNFABEX]
	2	Tests the first stage crosspoints along the A-LINKS. [PR Name=SM:DNFABEX]
	3	Tests the second stage crosspoints along with the B-LINKS. [PR Name=SM:DNFABEX]

Table A1-61 — Diagnostic Phase Descriptions for GRID/GRIDBD PATH TEST (SM)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
GRID/GRIDBD PATH TEST (SM)	–	Grid/Grid Board Path Test (Switching Module)
	1	Tests grid portion of the path for a resistive leak to ground. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	2	Tests the path (grid and loop facility) for a dangerously high voltage (AC and/or DC). For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	3	Tests the path (grid and loop facility) for foreign voltage. Also tests loop facility for a resistive leak and short circuit between tip and ring leads. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	4	Verifies the scan origination circuit's capability to detect off-hook for 200- and 2500-ohm loops and tests scan cutoff crosspoints for stuck open failures. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	5	Tests scan cutoff crosspoints for stuck closed failures. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	6	Tests the first stage crosspoint of the path for stuck open failures. Tip, ring, or failures on both leads are specifically indicated. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	7	Tests the first stage crosspoint of the path for stuck closed failures. Tip, ring, or failures on both leads are specifically indicated. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	8	Tests the second stage crosspoint of the path for stuck open failures. Tip, ring, or failures on both leads are specifically indicated. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	9	Tests the second stage crosspoint of the path for stuck closed failures. Tip, ring, or failures on both leads are specifically indicated. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].

Table A1-61 — Diagnostic Phase Descriptions for GRID/GRIDBD PATH TEST (SM)
(Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	94 ^a	Reverse channel battery is applied, scan cutoff crosspoints are open, and first and second stage crosspoints are closed. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	95 ^a	Forward channel battery is applied, scan cutoff crosspoints are open, and first and second stage crosspoints are closed. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	96 ^a	First and second stage crosspoints are closed. Both tip and ring scan crosspoints are open. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	97 ^a	Ring scan and first and second stage crosspoints are closed. Tip scan crosspoint is open. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	98 ^a	Tip scan and first and second stage crosspoints are closed. Ring scan crosspoint is open. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
	99 ^a	Both tip and ring scan crosspoints and the first and second stage crosspoints are closed. For LU1 – [PR Name=SM:DNLUP2]. For LU2 and LU3 – [PR Name=SM:DNLUP3].
<p>Note(s):</p> <p>a. Phases 94-99 hold a path up to 15 minutes allowing testing of grid and loop characteristics with special instrumentation or procedures. The HLSC is never used in the hold tests, but the channel battery is used for some phases.</p>		

Table A1-62 — Diagnostic Phase Descriptions for HDFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
HDFI (HSM)	–	Host Digital Facilities Interface (Host Switching Module)
	1	Tests the CI/CLRT integrity. [PR Name=SM:DNDFIG1]
	2	Tests CCB integrity. [PR Name=SM:DNDFIG1]
	3	Tests μ C integrity. [PR Name=SM:DNDFIG1]
	4	Tests maintenance buffer integrity. [PR Name=SM:DNDFIG2]
	5	Tests LSI exercises I. [PR Name=SM:DNDFIG2]
	6	Tests LSI exercises II. [PR Name=SM:DNDFIG3]
	7	Tests facility alarm check. [PR Name=SM:DNDFIG3]
	8	Tests transmit and receive signaling and PCM data paths. [PR Name=SM:DNDFIG3]
	9	Tests STBY CI/CLRT check. [PR Name=SM:DNDFIG3]
10	Tests DPR, XPC, and FDL integrity. [PR Name=SM:DNDFIG4]	

Table A1-63 — Diagnostic Phase Descriptions for IDCU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
IDCU (SM)	–	Integrated Digital Carrier Unit (Switching Module)
	1	Verifies the PICB interface from the active and standby MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the Common Control Processor (CCP) Unified Control Interface (UCI) chip from the SMP end. [PR Name=SM:DNUCI]
	3	Tests the Local Processor (LP) of the CCP UCI. The module controller (MC) sends messages through the UCI for the LP, which, on receipt of the messages, performs the required reads and writes to the UCI, and internal reads and writes to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies operation of the timers, sanity timer, processor interrupts, and NMIs. It also tests EPROM, I/O write protection circuits, and address and data parity generators and checkers. [PR Name=SM:DNIDCOM]
	5	Verifies the control interface between the PIDB Transmission Interface (PTI) control logic and all PTI VLSI devices: PIDB Receive Formatter (PRF), Timeslot Interchanger (TSI), Signal Processor (SP), and Control Interface (CI). The VLSI devices are tested to the extent possible (for example, alarms, BIST, etc.) without using the data paths. The interrupt masking and clock selection/detection circuitry is also tested. [PR Name=SM:DNIDCOM]
	6	Verifies the functionality of the PTI internal data paths and interconnection of the PRF, SP, and TSI devices. All modes of SP signaling state change detection are tested. [PR Name=SM:DNIDCOM]
	7	This phase tests the mate access bus by verifying communication from the ACT CCP to the CCP under test with the side under test in hold. A mate memory hashsum check is also performed. [PR Name=SM:DNIDCOM]
	8	This phase tests the mate access bus by verifying communication from the CCP under test to the ACT CCP with the ACT CCP put in hold. The PTI mate clock selection and LSI DSI driver enable/override circuits are also tested in this phase. [PR Name=SM:DNIDCOM]
	9	This phase verifies all (D)PIDB connections and associated (D)PIDB interface circuitry.
10	This phase runs a memory test on the CCP memory (RAM). [PR Name=SM:DNIDCOM]	

Table A1-63 — Diagnostic Phase Descriptions for IDCU (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	21	Verifies the Internal Control Bus (ICB) interface from the PTI to the Loop Side Interface (LSI) pack. [PR Name=SM:DNLSI1]
	22	Verifies operation of the LSI UCI chip from the PTI end. [PR Name=SM:DNLSI1]
	23	Tests the LP of the LSI. The CCP sends messages through the UCI for the LP, which, on receipt of the messages, performs the required reads and writes to the UCI, and internal reads and writes to verify interrupts to the LP. [PR Name=SM:DNLSI1]
	24	This phase runs a memory test on all of the LSI memory (RAM). [PR Name=SM:DNLSI1]
	25	Verifies the LSI processor, processor clock, interrupts, timers, sanity timer, 4 MHz clock detector circuit, and EPROM. It also verifies communication from LSI to Data Link Processors (DLPs) and functionality of the DLP, DLP RAM, DLP timers and interrupts, and control to Serial Communications Controller (SCC) devices. Lastly it verifies control to the rest of the devices on the pack such as the transceivers and the timeslot multiplexer/demultiplexer. [PR Name=SM:DNLSI1]
	26	Verifies the functionality of the LSI internal data paths and interconnection of the timeslot multiplexer/demultiplexer, transceiver, SCC, and digital signal interface (DSI) devices. [PR Name=SM:DNLSI1]
	27	Verifies all Internal Data Bus (IDB) connections and associated IDB interface circuitry. [PR Name=SM:DNLSI1]
	28	<i>(Demand phase only for factory and installation use)</i> Verifies the LSI switch circuitry mainly that on the DSI device and the sync signals between the two SGs. The LSIs in both SGs must be in the growth state. [PR Name=SM:DNLSI2]
	29	<i>(Demand phase only for factory and installation use)</i> Verifies the DSI output drivers and the data paths between the LSI and Electrical Line Interface (ELI) along with the output of the ELI. This phase requires a special loopback connector on the backplane, or all facilities looped back at the DSX. The LSIs in both SGs must be in the growth state, or the unit must be duplex failed. [PR Name=SM:DNLSI2]

Table A1-63 — Diagnostic Phase Descriptions for IDCU (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	30	<i>(Demand phase only for factory and installation use)</i> Verifies a hitless switch can be performed. This phase requires a special loopback connector on the backplane, or all facilities looped back at the DSX. The LSIs in both SGs must be in the growth state. [PR Name=SM:DNLSI2]

Table A1-64 — Diagnostic Phase Descriptions for IOP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
IOP (AM)	–	Input/Output Processor (Administrative Module)
	1	Tests the DSCH-DDSBS interfaces. [PR Name=DL:IOP01]
	2	Tests the DDSBS-BIC interface and BIC circuitry. Excludes the PIC. [PR Name=DL:IOP02]
	3	Tests the BIC-PIC interface, using the PIC resident firmware. [PR Name=DL:IOP03]
	4	Tests the BIC-PIC communications. [PR Name=DL:IOP04]
	5	Tests the PIC microstore data validity and microstore parity checker. [PR Name=DL:IOP05]
	6	Tests the PIC microsequencer. [PR Name=DL:IOP06]
	7	Tests the PIC and ALU. [PR Name=DL:IOP07]
	8	Tests the PIC source/destination decoders. [PR Name=DL:IOP08]
	9	Tests the PIC internal registers. [PR Name=DL:IOP09]
	10	Tests the PIC interrupt circuitry. [PR Name=DL:IOP10]
	11	Tests the PIC RAM and sequencer. [PR Name=DL:IOP11]
	12	Tests the I/O microprocessor interface hardware. [PR Name=DL:IOP12]
	13	Tests the I/O microprocessor interface power control circuitry peripheral controller community power converter/monitor. [PR Name=DL:IOP13]
	15	<i>(Demand phase only)</i> Tests the interface with the off-line CU. The off-line CU must be specified as a helper unit, and it must be OOS and ATP. [PR Name=DL:IOP15]

Table A1-65 — Diagnostic Phase Descriptions for ISLUCC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUCC (SM)	–	Integrated Services Line Unit Common Control (Switching Module)
	1	Verifies the PICB interface from the ACT and STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]
	3	UCI tests the interface to the LP side. The MC sends messages through the UCI for the LP, which, on receipt of the messages, performs the required reads and writes to the UCI, and internal reads and writes to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies operation of the timers in the CC microprocessor sanity timer, PIC, and NMIs. Also tests EPROM, I/O write protection circuits, and address and data parity generators and checkers. [PR Name=SM:DNICC]
	5	Verifies operation of the control sequencer on the CC under test. This includes the CS register, the sync circuitry, the CS memory, the CS memory parity generators and checkers, the 2-MHz interface and its error detection and propagation, and the 4-MHz interface and its error detection and propagation. [PR Name=SM:DNICC]
	6	Verifies the interface between the CC and peripheral boards. It also verifies operation of the enable controller, ASW controller, and the service request controller. [PR Name=SM:DNICC]
	7	Verifies operation of the STBY access bus from the ACT CC to the CC under test. It also verifies peripheral select bit and the CIDB interface to the ACT CD. [PR Name=SM:DNICC]
	8	Verifies operation of the STBY access bus from the CC under test to the ACT CC. [PR Name=SM:DNICC]
	9	Runs memory test on the CC memory (RAM). [PR Name=SM:DNICC]

Table A1-66 — Diagnostic Phase Descriptions for ISLUCD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUCD (SM)	–	Integrated Services Line Unit Common Data (Switching Module)
	1	Verifies the interface between the CD under test and the ACT and STBY CCs. It also tests the peripheral register access controller's service request register and its mask register. [PR Name=SM:DNICD]
	2	Tests the parity generators and checkers used in the PCM-MUX for its different control memory banks (A, B, and T). [PR Name=SM:DNICD]
	3	Runs a memory test on all the CDs in the PCM-MUX control memory. [PR Name=SM:DNICD]
	4	Tests the CIDB interface to the ACT and STBY CC from the CD under test and the corresponding configuration bits. This phase does not perform any test if the CCs are not duplex. [PR Name=SM:DNICD]
	5	Verifies multiplexing function of the CD between all PIDBs and equipped LGCs by looping data at the LGC, using on-board signature only. [PR Name=SM:DNICD]
	6	Verifies data interface between the CD packs and the ACT/STBY DI and the ACT/STBY DFs. [PR Name=SM:DNICD]

Table A1-67 — Diagnostic Phase Descriptions for ISLUHLSC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUHLSC (SM)	–	Integrated Services Line Unit High-Level Service Circuit (Switching Module)
	1	Verifies communication between the ACT/STBY CCs and the HLSC. Also tests the capability to shut down the power converter on the HLSC and ring-trip service request. Finally, it verifies the firmware version. [PR Name=SM:DNIZHSC]
	2	Tests internals of the HLSC with self-test routines. [PR Name=SM:DNIZHSC]
	3	Tests the HLSC buses 0 and 1 output relays. It also verifies ring-trip function and the capability of the HLSC to supply DC voltages. [PR Name=SM:DNIZHSC]

Table A1-68 — Diagnostic Phase Descriptions for ISLULBD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLULBD (U and Z)	–	Integrated Services Line Unit Line Board
	1	Checks CPID, LIDB parity, and error register functions. Verifies reset register bit decoding. Verifies CI to CD by switching LIDB sides. Tests common metallic network relays except in Phase 1 of the RLG.
	2	Verifies interface (control and data) from line board to an equipped line circuit not OOS fault or trouble analysis.
	3	Verifies operation of directed and fault summary scan from line board to an equipped LCKT not OOS fault or trouble analysis. This phase is not run on Z16-type LBDs.
	4	Not currently used.
	5	Runs only under ISLU2 LG diagnostic request. Checks if LCKTs are transmitting on other time slots in LG under test. Tests loopback mode by looping back a frame of known data by STBY (ACT minor) CD and verifying contents. If LB being tested resides in the RLG, the LIBD selection function is tested.
	6	Not currently used.

Table A1-69 — Diagnostic Phase Descriptions for ISLULC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLULC (T-CARD) (SM)	–	Integrated Services Line Unit Line Card (T-Interface Card) (Switching Module)
	1	Verifies the CIs to the line card (LC), the function of the maintenance circuitry and its masks, and the directed scanning and isolation functions. [PR Name=SM:DNITC]
	2	Verifies a test for single bit errors in the time slot comparator and parity of the B and D channels. It also tests the capability of the T-Interface Card to communicate over a path to the TSI. [A duplex path (two time slots at the TSI, the same time slot number on LIDB sides 0 and 1 to the card under test) is set up between the ACT TSI and the T-Interface Card under test. The dual upstream mode of the card is also tested over this duplex path.] [PR Name=SM:DNITC]
	3	Only runs on ISLULGC diagnosis with LC option requested. Verifies the time slot comparator, the origination and fault scan operation, and the broadcast mode operation. [PR Name=SM:DNITC]
ISLULC (AMI/ANSI ^a U-TYPE CARD) (SM)	–	Integrated Services Line Unit Line Card (Alternate Mark Inversion/ANSI U-Type Interface Card) (Switching Module) – Unless otherwise specified, these descriptions are for both the AMI and ANSI U-Type Interface cards. The segment numbers for the AMI cards begins with 4000 and the segment numbers for the ANSI cards begins with 5000.
	1	Runs for all sources. Concerned with the control access to the LC through primitive reads and writes provided by ISLU base software. Checks the control path to the LC and checks for proper register access as a foundation to other tests. Also verifies the time slot selection feature of the LC. [PR Name=SM:DNISUC]
	2	Runs for all sources. Concerned with the various channel's mode of operation. The group interface data bus (GIDB) data path, e-bit control, and data parity are examined. Also checks local loopback of data, U-K logic, and verification of the echo canceler. Finally, this phase checks the operation of the spare U-DSL card and the U-DSL card crosspoints through the LG bus, and the capability to spare the LC is examined through the spare bus. [PR Name=SM:DNISUC]

See note(s) at end of table.

Table A1-69 — Diagnostic Phase Descriptions for ISLULC (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	3	Can only be run if the ISLULGC is OOS. The ISLULGC diagnostic must be run with the LC option. Checks broadcast features of the LC and performs fault and summary LG scan tests. Also does a full test of the B and D time slot comparator. [PR Name=SM:DNISUC]
	4	<i>(Demand phase only)</i> For the AMI U-Type Interface Card, examines the upstream responses to changes in the downstream N-channel signaling using the NT1. For the ANSI U-Type Interface Card, examines the upstream response to the downstream EOC messages sent to the NT1. For both the AMI and ANSI U-Type Interface Cards, verifies that each channel can transmit/receive without data corruption through loopbacks and a digital source. Each channel is also checked for data integrity. Also does a metallic mismatch test to check for a mismatch between the LC/NT1 installed and the ODD and also a check for a tip and ring open or short circuit. For AMI, checks for a tip and ring reversal. [PR Name=SM:DNISUC]
	5	Used only by the ANSI U-Type Interface Card. Runs for all sources except automatic, which is called by fault recovery. Performs tests to check the PM circuitry. [PR Name=SM:DNISUC]
ISLULC (Z-CARD) (SM)	–	Integrated Services Line Unit Line Card (Z-Interface Card) (Switching Module)
	1	Verifies the CIs to the LC. Also verifies the function of the maintenance circuitry and its masks. Also tests the digital circuitry to the MCTSI and e-bit control. [PR Name=SM:DNIZC1]
	2	Tests the DC portion of the LC, which can be tested without closing the tip and ring crosspoints. Also tests spare bus continuity if the card is a spare card. [PR Name=SM:DNIZC1]
	3	Tests the remaining DC portion of the LC and the metallic connections to access buses 0 and 1. [PR Name=SM:DNIZC1]
	4	Tests the ring-trip circuit on the LC. [PR Name=SM:DNIZC1]
	5	Performs basic transmission testing in the ISLU. [PR Name=SM:DNIZC3]
	6	<i>(Demand phase only)</i> Performs comprehensive transmission tests including auto-out, idle channel noise, receive and transmit filters, balance network, and gain states. [PR Name=SM:DNIZC2]

See note(s) at end of table.

Table A1-69 — Diagnostic Phase Descriptions for ISLULC (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	7	Performs basic time slot comparator check. [PR Name=SM:DNIZC3]
	8	<i>(Demand phase only)</i> Runs the tests that may interfere with a PBX if the line is a PBX line. [PR Name=SM:DNIZC2]
	9	Runs only if the ISLULGC diagnostic is requested with the LC option. Tests the summary scan, fault scan, and performs a comprehensive time slot comparator check. [PR Name=SM:DNIZC2]
a. Trademark of American National Standards Institute, Incorporated.		

Table A1-70 — Diagnostic Phase Descriptions for ISLULGC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLULGC (SM)	-	Integrated Services Line Unit Line Group Controller (Switching Module)
	1	Verifies the interface to the LGC from the ACT/STBY major and minor CD. It also tests the internal logic and bit decoding, and verifies the capability to communicate with an LC and both GIDBs. [PR Name=SM:DNLGC]
	2	Verifies the interface from the LGC to each equipped LC in the SG - not OOS due to a faulty condition. Also, each LC in an OOS faulty condition is verified that no directed scan is detected when it is isolated. [PR Name=SM:DNLGC]
	3	Verifies the directed, faulty, and summary scan from each equipped LC in the SG - not OOS due to a faulty condition. [PR Name=SM:DNLGC]
	4	Verifies operation of the loopback mode for the LGC. In this mode, data and control are looped back to the STBY CC from the LGC under test. [PR Name=SM:DNLGC]

Table A1-71 — Diagnostic Phase Descriptions for ISLUMAN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLUMAN (SM)	–	Integrated Services Line Unit Metallic Access Network (Switching Module)
	1	Verifies communication between ACT/STBY CCs and the MAN circuit pack. It also verifies the reset function that de-energizes all relays and associated latches. [PR Name=SM:DNMAN]
	2	Tests the MTB relays, test termination relays, ringing generator maintenance relays, and spare relays. Also tests protocol circuit, MTB protection circuit, and verifies that the MAN circuit pack is disconnected from STBY MAN circuit pack on the spare bus. [PR Name=SM:DNMAN]
	3	Tests all RG relays on the MAN circuit pack. [PR Name=SM:DNMAN]
	4	Tests all relays on the MAN circuit pack associated with HLSCs. [PR Name=SM:DNMAN]
	5	<i>(Demand phase only)</i> Verifies that there are no foreign T&R short circuits and/or voltage potentials connected to the MAN circuit pack and more testing is done on the MTB relays. [PR Name=SM:DNMAN]

Table A1-72 — Diagnostic Phase Descriptions for ISLURG

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISLURG (SM)	–	Integrated Services Line Unit Ringing Generator (Switching Module)
	1	Verifies communication between ACT/STBY CCs. [PR Name=SM:DNIRG]
	2	Tests the RG voltages and the following modes: <ol style="list-style-type: none"> 1. Earth backed with ring on tip lead 2. Earth backed with ring on ring lead 3. Battery backed with ring on ring lead 4. Battery backed with ring on tip lead. Also tests the sources of service request on the RG and verifies that the RGs ringing frequency agrees with that of ODD. [PR Name=SM:DNIRG]
	3	Verifies that the RG can output its ringing voltage to each of the four MAN CPs. In addition, the BCF service request is also tested. [PR Name=SM:DNIRG]

Table A1-73 — Diagnostic Phase Descriptions for ISTF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
ISTF (SM)	–	Integrated Services Test Facility (Switching Module)
	1	Same as phase 1 LDSU (SM). [PR Name=SM:DNUCI]
	2	Same as phase 2 LDSU (SM). [PR Name=SM:DNUCI]
	3	Same as phase 3 LDSU (SM). [PR Name=SM:DNUCI]
	4	Same as phase 4 LDSU (SM). [PR Name=SM:DNDSU2]
	5	Same as phase 5 LDSU (SM). [PR Name=SM:DNDSU2]
	6	Same as phase 6 LDSU (SM). [PR Name=SM:DNDSU2]
	8	Performs memory test and operational image pump verification. [PR Name=SM:DNDSU2]

Table A1-74 — Diagnostic Phase Descriptions for IUN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
IUN (CNI)	–	Interprocess Message Switch User Interface (Common Network Interface)
	1	Tests NP (TN922), RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable.
	2	Tests NP (TN922), RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable.
	10	Tests the NP (TN922) node sanity.
	11	Tests RI0 (UN122) and RI1 (UN123) basic sanity.
	12	Tests NP (TN922), RI0 (UN122), IFB-P (TN915/TN1803), IFB (TN918). Neighbor node audit on Ring-0. CATP when more than one node is isolated.
	13	Tests NP (TN922), RI1 (UN123), IFB-P (TN915/TN1803), IFB (TN918). Neighbor node audit on Ring-1. CATP when more than one node is isolated.
	20	Tests NP (TN922) memory.
	23	Tests NP (TN922) parity generator.
	24	Tests NP (TN922) interrupt controller.
	26	Tests NP (TN922) DMA controller.
	27	Tests NP (TN922) programmable interval timer.

Table A1-75 — Diagnostic Phase Descriptions for LDSF3

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LDSF3 (SM-2000)	–	Local Digital Service Function 3 (Switching Module-2000)
	1	Verifies the PICB interface from the ACT and STBY MCTSI. [PR Name=SM:DNUCI]
	2	Verifies operation of the UCI chip from the SMP end. [PR Name=SM:DNUCI]
	3	UCI tests the interface to the LP side. The MC sends messages through the UCI for the LP, which, on receipt of the messages, performs the required read and write to the UCI. Then internal read and write to verify interrupts to the LP. [PR Name=SM:DNUCI]
	4	Verifies all hardware of the circuit pack and its interface to PICBs and PIDBs. All segments executed by resident software have the “LP” prefix; all others use the resident software indirectly. [PR Name=DNds3_4]

Table A1-76 — Diagnostic Phase Descriptions for LDSU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LDSU (SM)	–	Local Digital Service Unit (Switching Module)
	1	Tests CI with ACT and STBY MCTSI. If STBY MCTSI is OOS, then CATP completes. [PR Name=SM:DNUCI]
	2	Tests the internal functions of the UCI chip on the LDSU. [PR Name=SM:DNUCI]
	3	Tests the LP-UCI interface. [PR Name=SM:DNUCI]
	4	Tests LDSU bus interface to DSU2. [PR Name=SM:DNDSU2] <i>For TN1890 only: [PR Name=DNds3_4]</i>
	5	Performs LP tests – interrupt controller, timers, parity, and write protect. [PR Name=SM:DNDSU2]
	6	Tests DSPs, SDI, and data to/from LDSU bus. [PR Name=SM:DNDSU2]
	8	Performs memory test and operational image pump verification. [PR Name=SM:DNDSU2]

Table A1-77 — Diagnostic Phase Descriptions for LDSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LDSUCOM (SM)	–	Local Digital Services Unit Common (Switching Module)
	1	Tests CI with the ACT MCTSI. If the MCTSI is not ACT/STBY, then CATP completes. [PR Name=SM:DNLDSC1]
	2	Tests CI with the STBY MCTSI. If the MCTSI is not ACT/STBY, then NTR completes. [PR Name=SM:DNLDSC1]
	3	Tests the TSSR. [PR Name=SM:DNLDSC1]
	4	Tests the parity checkers and generators. [PR Name=SM:DNLDSC2]
	5	Tests the interrupt registers, DSC parity error, DSC fault and summary scans. [PR Name=SM:DNLDSC2]
	6	Tests data links to/from ACT and STBY MCTSI. If STBY MCTSI is OOS, then CATP completes. [PR Name=SM:DNLDSC2]

Table A1-78 — Diagnostic Phase Descriptions for LN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LN (CNI)	–	Link Node (Common Network Interface)
	1	Tests NP (TN922), RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable.
	2	Tests NP (TN922), RI0 (UN122), RI1 (UN123), IFB-P (TN915), IFB (TN918), and ring bus cable.
	10	Tests the NP (TN922) node sanity.
	11	Tests RI0 (UN122) and RI1 (UN123) basic sanity.
	12	Tests NP (TN922), RI0 (UN122), IFB-P (TN915/TN1803), IFB (TN918). Neighbor node audit on Ring-0. CATP when more than one node is isolated.
	13	Tests NP (TN922), RI1 (UN123), IFB-P (TN915/TN1803), IFB (TN918). Neighbor node audit on Ring-1. CATP when more than one node is isolated.
	20	Tests NP (TN922) memory.
	23	Tests NP (TN922) parity generator.
	24	Tests NP (TN922) interrupt controller.
	26	Tests NP (TN922) DMA controller.
	27	Tests NP (TN922) programmable interval timer.
	40	Tests NP (TN922) interface to the LI (TN916/TN917).
	41	Tests LI (TN916/TN917) circuit board.
	48	Tests NP (TN922), LI (TN916/TN917) and DSU (2556/BAT) full path connectivity.
49	<i>(Demand-Phase Only)</i> Repeats Phase 48 ten times.	

Table A1-79 — Diagnostic Phase Descriptions for LN-IRN2

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LN - IRN2 (CNI)	-	Link Node (Common Network Interface)
	1	Tests IRN2 (UN304/UN337B), IFB (TN1803), and ring bus cables.
	2	Tests IRN2 (UN304/UN337B), IFB (TN1803), and ring bus cables.
	10	Tests IRN2 (UN304/UN337B) node sanity.
	12	Tests IRN2 (UN304/UN337B), IFB (TN1803). Neighbor node audit on Ring-0. CATP when more than one node is isolated.
	13	Tests IRN2 (UN304/UN337B), IFB (TN1803). Neighbor node audit on Ring-1. CATP when more than one node is isolated.
	20	Tests IRN2 (UN304/UN337B) memory.
	40	Tests IRN2 (UN304/UN337B) interface to the LI (TN916).
	41	Tests LI (TN916) circuit board.
	48	Tests IRN2 (UN304/UN337B), LI (TN916) and DSU (BAT/2556) full path connectivity.
49	<i>(Demand-Phase Only)</i> Repeats Phase 48 ten times.	

Table A1-80 — Diagnostic Phase Descriptions for LUCHAN/LUCHBD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LUCHAN/LUCHBD (SM)	-	Line Unit Channel Circuit/Line Unit Channel Board (Switching Module)
	1	Tests control to channel circuit. For LU1 – [PR Name=SM:DNCHN]. For LU2 and LU3 – [PR Name=SM:DNCCHN1].
	2	Tests DC portion of channel circuit - battery feed, cutoff, scan encoding, loop bias, and power up/down. Initializes all GDY crosspoints associated with the channel under test. For LU1 – [PR Name=SM:DNCHN]. For LU2 and LU3 – [PR Name=SM:DNCCHN1].
	3	Tests AC portion of channel circuit - parity bit, CODEC power down, CODEC circuit, hybrid gain, idle channel noise, and CODEC filter balance network. Completes CATP if either the STBY MCTSI or the TTFCOM is OOS. For LU1 – [PR Name=SM:DNCHN]. For LU2 and LU3 – [PR Name=SM:DNCCHN1].
	4	Performs more exhaustive test of CODEC. Completes CATP if either the STBY MCTSI or the TTFCOM is OOS. For LU1 – [PR Name=SM:DNCHN]. For LU2 and LU3 – [PR Name=SM:DNCCHN1].
	5	Checks the crosspoints associated with the path to the channel being tested. For LU1 – [PR Name=SM:DNCHN]. For LU2 and LU3 – [PR Name=SM:DNCCHN1].

Table A1-81 — Diagnostic Phase Descriptions for LUCOMC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LUCOMC (LU1) (SM)	–	Line Unit Common Data and Control (Line Unit 1) (Switching Module)
	1	Tests CI with the MCTSI. Completes NTR if the MCTSI is not ACT/STBY. [PR Name=SM:DNCD]
	2	Tests remaining control to registers on COMDAC. Reports CI errors - does not check interface to COMDAC subtending circuits. [PR Name=SM:DNCD]
	3	Tests CI with the STBY MCTSI. NTR completes if MCTSI not ACT/STBY. [PR Name=SM:DNCD]
	4	Verifies operation of the common data circuit. NTR completes if the MCTSI is not ACT/STBY. [PR Name=SM:DNCD]
	5	<i>(Demand, automatic, or growth phase)</i> Tests the interface of COMDAC and its subtending circuits. [PR Name=SM:DNCD]
LUCOMC (LU2 and LU3) (SM)	–	Line Unit Common Data and Control (Line Unit 2 and Line Unit 3) (Switching Module)
	1	Tests CIs with MCTSI, peripheral sequencer, and maintenance register. CATP completes if MCTSI not ACT/STBY. [PR Name=SM:DNCCD1]
	2	Tests service request controller. [PR Name=SM:DNCCD1]
	3	Tests board - enable multiplexer. [PR Name=SM:DNCCD1]
	4	Tests ASW controller. [PR Name=SM:DNCCD1]
	5	Tests CI with STBY MCTSI. NTR completes if MCTSI not ACT/STBY. [PR Name=SM:DNCCD2]
	6	Tests PIDB interface with ACT and STBY MCTSI. CATP completes if MCTSI is not ACT/STBY. [PR Name=SM:DNCCD2]
7	<i>(Demand, automatic, or growth phase)</i> Tests interface of COMDAC with its subtending circuits. [PR Name=SM:DNCCD2]	

Table A1-82 — Diagnostic Phase Descriptions for LUHLSC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
LUHLSC (LU1) (SM)	–	Line Unit High-Level Service Circuit (Line Unit 1) (Switching Module)
	1	Verifies basic operations - control of power converter, bridge switch, amplifier detect overcurrent, overvoltage protection, and output reversal. [PR Name=SM:DNHLSC1]
	2	Tests operation of the MABs. [PR Name=SM:DNHLSC1]
	3	<i>(Demand phase only)</i> Generates and detects DC voltages and operation of the voltage flip-flop. [PR Name=SM:DNHLSC2]
	4	<i>(Demand phase only)</i> Tests filtered current crosspoints, reset time constant, ring flip-flop and ring-trip RG. [PR Name=SM:DNHLSC2]
	5	<i>(Demand phase only)</i> Performs DC current generation/detection and the current sensing modes single-ended, differential, and single-ended-times-four. [PR Name=SM:DNHLSC3]
LUHLSC (LU2 and LU3) (SM)	–	Line Unit High-Level Service Circuit (Line Unit 2 and Line Unit 3) (Switching Module)
	1	Tests CI to HLSC, runs firmware self-tests, and verifies version. [PR Name=SM:DNCHLSC1]
	2	Tests HLSC output connections through A and B relays. [PR Name=SM:DNCHLSC1]

Table A1-83 — Diagnostic Phase Descriptions for MA

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MA (SM)	–	Metallic Access (Switching Module)
	1	Tests send and receive data with MSUCOM, generates interrupt to MSUCOM, and operation of relay drivers. [PR Name=SM:DNMAXS]

Table A1-84 — Diagnostic Phase Descriptions for MAB

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MAB (SM)	–	Metallic Access Bus (Switching Module)
	1	Tests access bus and all connecting relays in MSU shelf. [PR Name=SM:DNJUNC]

Table A1-85 — Diagnostic Phase Descriptions for MCTSI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MCTSI (SMP1/12/23) (SM)	–	Module Controller/Time Slot Interchange (Switching Module Processor 1/12/23) (Switching Module)
	1	Tests static RAM, PICs address, data latches access to all boards of IMP, and all equipped memory boards in SMP 1/12/23. Skips PIC test if either DLI is OOS and completes CATP. [PR Name=SM:DNMP1]
	2	Processor sanity test, tests dormant logic and parity checkers on TN871/TN1397/TN1407 in SMP 1/12/23. [PR Name=SM:DNMP2]
	3	Tests ROM checksum, write protect, stack protect, address decoder, and microcode number on TN874 in SMP 1/12/23. [PR Name=SM:DNMP3]
	4	Tests ESRs, sanity and I/O timers, reset handling circuits, status registers, BCR and its shadow register, subunit mismatch error detection, and address decoders on the TN873/TN1533 in SMP 1/12/23. [PR Name=SM:DNMP4]
	5	Tests SDLC and DMA circuits, and DLI interface on the TN872 in SMP 1/12/23. Completes CATP if either DLI is OOS. [PR Name=SM:DNMP5]
	6	Tests TN875/TN1409/TN1527 and all memory boards - row and column parity, hamming and a 2-pass memory test in SMP 1/12/23. [PR Name=SM:DNMP6]
	7	<i>(Demand and Manual phase only, not REX)</i> Memory tests - a more exhaustive (8-pass) memory test in SMP 1/12/23. Use when suspected marginal memory board, but normal MCTSI is ATP. [PR Name=SM:DNMP6]
	8	Tests the power alarm circuitry on the TN874B and ASC in SMP 1/12/23. [PR Name=SM:DNMP7]
	9	Tests the CPI in SMP 1/12/23. Will not perform test if either DLI or any TMS link is OOS and completes CATP. [PR Name=SM:DNMP7]
	10	Performs update bus test for SMP 1/12/23. [PR Name=SM:DNMP8]
11	Performs the subunit access test for SMP 1/12/23. [PR Name=SM:DNMP8]	
90	<i>(Demand phase only)</i> Tests the TN874. Primary use is during software update when TN874 has been changed on one side of the MCTSI and needs to be tested (including the EPROM microcode number and checksum over the code in the EPROMs). [PR Name=SM:DNMP8]	
MCTSI (SMP20) (SM)	–	Module Controller/Time Slot Interchange (Switching Module Processor 20) (Switching Module)

Table A1-85 — Diagnostic Phase Descriptions for MCTSI (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	1	Tests the ACT processor's capability to write and read the STBY through the update bus, the dynamic memory, and the interconnections between circuit packs in an SMP20 (UN515/UN520). [PR Name=SM:DNMC2_1]
	2	Verifies sanity for off-line execution, tests STBY module controller, interrupt controller, 10 ms timer, capability for STBY to be awakened and put to sleep, reset and total hold masks, sanity maze, address and data parity checkers, shadow operation register, internal and external cache, processor performance, and cross coupled interrupts/DLI interrupts in SMP20 (UN515/UN520). [PR Name=SM:DNMC2_2]
	3	Tests the UN517 board, billing counter, stack protect, 10 ms timer, and verifies the microcode number in SMP20. [PR Name=SM:DNMC2_3]
	4	Tests all circuitry on UN516 CS1 board not previously tested in SMP20. Tests ASR, PSRs 1&2, SPR "A"FF, 8255 port hardware, software and global memory ESRs, sanity and I/O timer, reset handling circuitry, BCR, shadow BCR, and MPF circuitry. [PR Name=SM:DNMC2_3]
	5	Tests the applications board (UN518), SDLC and DMA circuitry in SMP20. [PR Name=SM:DNMC2_4]
	6	Tests the dynamic memory boards, EDC circuits, write protect circuits, memory refresh circuits, dynamic RAM devices, and memory self-test in SMP20 (TN1374, TN1376, and TN1661). [PR Name=SM:DNMC2_5]
	7	<i>(Demand phase only)</i> Tests dynamic memory boards by doing reads and writes from software in addition to self-tests in SMP20 (TN1374, TN1376, and TN1661). [PR Name=SM:DNMC2_6]
	8	<i>(Demand phase only)</i> Tests RSM lamp circuitry on UN516 (CS1) board and the ASC in SMP20. [PR Name=SM:DNMC2_6]
	9	Tests CPR hardware in SMP20. [PR Name=SM:DNMC2_5]
	10	Tests the OOS processor's capability to access the ACT side over the update bus, as well as local and STBY side pump DMA activity to memory in SMP20. [PR Name=SM:DNMC2_5]
	11	Tests SIB in SMP20. [PR Name=SM:DNMC2_5]

Table A1-85 — Diagnostic Phase Descriptions for MCTSI (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	66	Tests interface to the B TSR circuit on the UN518 - the PIDB interface from the DI, and level 6 interrupt to UN516 in SMP20. [PR Name=SM:DNMC2_66]
MCTSI (SMP1/12/20/23) (SM)	-	Module Controller/Time Slot Interchange (Switching Module Processor 1/12/20/23) (Switching Module)
	31	Tests TSI - MP interface, TSI control circuitry, control RAMs A-E, ADR, and RCV and TMT TSIs, attenuator ROM, e-bit buffer, and TSI data paths. [PR Name=SM:DNTSI1]
	32	Tests TSI - DLI interface. NTR completes if either DLI is OOS. [PR Name=SM:DNTSI2]
	51	Tests the SP - mode latch, M-RAM, ignore RAM, and immediate access RAM. [PR Name=SM:DNSP]
	52	Tests the SP - FIFO, parity check circuits, ESR, interface to programmable interrupt controller on the TN872, and ready time-out error. [PR Name=SM:DNSP]
	61	Tests the DI circuits. [PR Name=SM:DNDI]
	62	Tests the DI parity check from peripheral. [PR Name=SM:DNDI]
	63	Tests the DI fan-out on TN1377. [PR Name=SM:DNDI]
	64	Performs no testing at this time and is reserved for future use. [PR Name=SM:DNDI]
	71	Tests CI - MP interface and CI register access. [PR Name=SM:DNCI1]
	72	Tests the CI - CI transmit/receive sequencers. [PR Name=SM:DNCI1]
	73	CI - tests integrity of PICB paths to/from peripherals. [PR Name=SM:DNCI1]
	74	(5E15 and later) Verifies the CI2 (UN71C) to SMP interrupt structure and the broadcast capability to the equipped and in-service peripherals when the parallel pump feature is enabled. This phase completes No Tests Run (NTR) if the pump feature is disabled for all equipped CI2s. [PR Name= DNSU_CI1]
	81	Verifies SUIB interface of the PI. Fundamental communication and error reporting are verified. The port processor and DARAM are not accessed except to initialize them into a noninterfering configuration. [PR Name=SM:DNPI1]

Table A1-85 — Diagnostic Phase Descriptions for MCTSI (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	82	Verifies access to full range of DARAM from SUIB side of PI. A complete memory test is provided from port processor side of PI. This phase is only used to verify addressing, the capability to reset memory, the write protect of memory, and auto increment of address register when reading or writing data to the DARAM. [PR Name=SM:DNPI1]
	83	Verifies operation of the error correction and detection circuits from SUIB side of DARAM. Also verifies capability to detect and correct single-bit errors and to detect and report multiple-bit errors. [PR Name=SM:DNPI1]
	84	Verifies port processor side of the PI. The PI is reset and pumped. Basic communication of PB is verified. If communication looks good, a sanity maze and a memory test are run. This phase does not continue its operation if the initial pump fails or if set up of PB from on-line PSUCOM fails. Port processor is in a diagnostic mode. [PR Name=SM:DNPI1]
	85	Verifies packet bus from PI to STBY side of PSUCOM. Only attempts test if PSUCOM is in STBY mode. If PSUCOM is OOS, test reports a CATP. The port processor in the PI is in a diagnostic mode during this phase. [PR Name=SM:DNPI1]

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MCTSI (SM-2000)	–	Module Controller/Time Slot Interchange (Switching Module-2000)
	1	<p>Verifies:</p> <ul style="list-style-type: none"> • the sanity of the OOS MCTSI for power (SN516/410AA/UN589B) • SMP state • SMP equipage with respect to the database • capability to perform the accesses across the SMP update bus to the I/OS on CORE (UN540/UN540B/UN560/UN588/UN593/UN594/UN732/UN733^a) • Bus Service Node (BSN; KBN8/KBN8B/KBN8C) • equipped external memory boards (TN1685/TN1806/TN1816) • Application Controller (UN539/UN539B/UN539C) • Message Handler (UN538/UN584/UN550) • parity checkers and generators connected to update bus • interconnections between circuit packs • SMP error source hierarchy • access to APCO/APCX (UN599/UN555) if equipped. <p>Tests the external memory and its initialization using on-board self-tests, except for the UN732/UN733^a which employs no external memory. For the UN560, it also tests the internal timer and on-CORE memory and external cache using self-test. For UN732 and UN733^a the boundary scan test and CORE700/CORE970update cable test are also run. [PR Name=SM2000:DNmc4_01]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	2	<p>Tests circuits on CORE (UN540/UN540B/UN560/UN588/UN593/UN594/UN732/UN733^a) and BSN (KBN8/KBN8B/KBN8C). Verifies:</p> <ul style="list-style-type: none"> • power-up reset (exception 0) circuit to and from OOS SMP • cross coupled processor status signals between ACTive and OOS SMP • capability to wake-up and stop the OOS processor for off-line execution • sanity and mate lockout, short ready timeout • A-FF and loss-of-clock detector • sanity maze • cache • SPFMR operation • parity checkers and generators on the Local System (LS) bus • conditional suspend timer • processor performance • CRC checks of the generic firmware. <p>For the UN560, UN588, UN593, and UN594, the external cache maintenance modes, internal timers, lock protocol, loss of sync, and write posting buffer are also tested. [PR Name=SM2000:DNmc4_02]</p>
	3	<p>Tests circuits on CORE and BSN. Verifies:</p> <ul style="list-style-type: none"> • processor status registers • PICs • to/from mate interrupt signals between the ACT and OOS SMPs • control/display circuits (SN516 for SM-2000 with SMPU4/UN589 for SM-2000 with SMPU5 or SMU6) • sanity timer • I/O timers • bus error circuits • MPF circuits for ACT and OOS SMPs. <p>[PR Name=SM2000:DNmc4_03]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	4	<p>Tests the circuits on BSN (KBN8/KBN8B/KBN8C). The BSN is the interface between the LS, RS bus, and SMP update bus. Verifies:</p> <ul style="list-style-type: none"> • bus control circuits and shadow bus control • address • data • control shadow registers • BSN write protects • matchers • shadow circuits • parity checkers and generators on the RS bus. <p>[PR Name=SM2000:DNmc4_04]</p>
	5	<p>Tests the circuits on APC. Verifies:</p> <ul style="list-style-type: none"> • address decoders on APC • stuck at faults on the APC I/Os • Bootstrapper DLI interface circuit (BDL) • Bootstrapper Direct Memory Access (BTSR-DMA) circuits • Sub Unit Interface Bus (SUIB) • hardware delay register. <p>If APCO/APCX is equipped, verify register accesses and device BIST. Verifies error detection circuitry to each equipped OCDCOM/XCDCOM (UN651/TN1996). [PR Name=SM2000:DNmc4_05]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	6	<p>Tests the circuits on the external memory boards and the circuits associated with on-CORE (UN560/UN588/UN593/UN594/UN732/UN733^a) memory. For the UN560 and UN732/UN733^a it tests the on-CORE memory circuit, scrubbing, and address comparators on Dynamic Ram Controller. Verifies:</p> <ul style="list-style-type: none"> • memory equipage • address decoder and I/O registers • different size memory accesses • refresh circuits • corr-bit counter and threshold circuits • Error Detection and Correction (EDC) circuits • memory self-test logic including the comparators • pattern matchers • system address leads • different self-test modes and its interactions with hardware reset • NMI. <p>[PR Name=DNmc4_06 - UN560/ UN588/ UN593/ UN594 CORE only]</p> <p>[PR Name=DNfx_06 - UN732/UN733 CORE only]</p>
	7	<p><i>(Demand phase only)</i> Tests the circuits on the external memory boards and the circuits associated with on-CORE (UN560/UN588/UN593/UN594^a) memory. Verifies self-test inhibit circuit, which prevents the running of the memory board self-test on the ACT side. This phase is a demand phase only, which typically would only be executed on those occasions where the memory self-test is suspect of not finding faulty memory boards or when new memory boards are being grown in the unit. This phase does not apply to CORE700 (UN732) or CORE970 (UN733). [PR Name=SM2000:DNmc4_07]</p>
	8	<p><i>(Demand phase only)</i> Tests the circuits on KBN8/KBN8B/KBN8C, Alarm Status Unit (ASU) paddleboard (9822DU), and Stand Alone Monitor circuit in ASU, when ASU is equipped (EXM2000 configuration). Verifies the ASU equipage and then tests the RSM sanity and stand-alone indicator logic on BSN and SAM in ASU. [PR Name=SM2000:DNmc4_08]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	9	Tests the central processor intervention (CPI) circuit on KBN8/KBN8B/KBN8C. [PR Name=SM2000:DNmc4_09]
	10	Tests the SMP update bus circuits on CORE and BSN. Verifies the update bus status signals, parity, capability to drive address, data, control signals, various access modes from OOS to ACTIVE SMP. Tests the operation of mate ready-time-out and internal global system-ready-timeout circuits. For UN732/UN733, tests of the CORE700/CORE970 update bus cables and error detection circuitry are run. [PR Name=SM2000:DNmc4_10]
	21	Tests the local processor, on-board RAM, and BRICPIT devices of all equipped MHs (UN538/UN584). Tests the OOS MH interfaces to ACTIVE SMP and ACTIVE MH. Includes tests of: <ul style="list-style-type: none"> • sanity maze • MMU • cache • interrupts • interrupt handlers • parity circuits • MH update buses. [PR Name=SM2000:DNmc4_21]
	22	Tests the SPYDER-T (synchronous/asynchronous protocol data formatter) device functions of all equipped MH boards (UN538). Includes tests of: <ul style="list-style-type: none"> • lost clock and sync circuit • transmit and receive (internal loop-back) • dynamic configuration • interrupt (EOB, EOF, and EOL) • CRC • parity • transmit and receive paths. [PR Name=SM2000:DNmc4_22]

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	23	<p>This phase is used to test the System-Oriented Network Interface Controller (SONIC) device of all equipped Message Handler for Ethernet Interface Boards (MHEIB) boards (UN584). This includes:</p> <ul style="list-style-type: none"> • SONIC registers access • initialization of SONIC Content Addressable Memory (CAM) and SONIC buffer • internal loopback • CRC checking • SONIC interrupt • SONIC read parity error • Ethernet test to far-end system or hub (if so equipped). <p>[PR Name=SM2000:DNmc4_23]</p>
	24	<p>This phase tests the active MCTSI access to OOST (out of service test) MHPPCs (UN550) and active MH's access to OOST MHPPC. The IBM 750FX PowerPC microprocessor complex is diagnosed. The RS-bus subsystem, plus interrupts, interrupt handling, parity, and memory are checked.</p> <p>[PR Name=SM2000:DNmc4_24]</p>
	25	<p>This phases diagnoses the PQ-II and SPYDER-256 complexes on the MHPPC (UN550) circuit pack.</p> <p>[PR Name=SM2000:DNmc4_25]</p> <p>If HSFT is equipped on this SM, verify MCTSI circuit pack requirements. KBN8C and UN539C packs are required for this feature.</p> <p>[PR Name=SM2000:DNmc4_26]</p>
	26	<p>This phase tests the MHPPC (UN550) Ethernet ARP (Address Resolution Protocol) and ping tests.</p> <p>[PR Name=SM2000:DNmc4_26]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	33	<p>Tests circuits on TSICOM board (UM74/UM74B/UM74C/UM74D/KLX1):</p> <ul style="list-style-type: none"> • Basic TSICOM access from SMP • TSICOM version check • SMP to TSICOM interfaces via APC • function of TSICOM error source/mask register • function of TSIU4/SMU6 service request register (with mask) • function of TSIU4/SMU6 interrupt source/mask register • function of the clock-control register and other TSICOM registers • device self-tests on the TSICOM. <p>This phase also tests TSIU4/SMU6 unit equipage and all registers on all equipped TSIS boards (KLU1/KLU1B/KLX1/KLX2). Tests all registers on all equipped TSIS boards, including access of all equipped TSIS ports. [PR Name=SM2000:DNts_33]</p>
	34	<p>Tests each equipped TSIS (KLU1/KLU1B/KLX1/KLX2) board, including:</p> <ul style="list-style-type: none"> • basic access from the SMP • diagnostic control and error source/mask registers • CRC error propagation • boundary scan self-test • intra-bound interconnect and cluster tests • device BIST • Control Time Slot (CTS) registers • port equipage and version checks. <p>[PR Name=SM2000:DNts_34]</p>
	35	<p>Tests each equipped TSIS (KLU1/KLU1B/KLX1/KLX2) board-level self-tests. [PR Name=SM2000:DNts_35]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	36	<p>Tests:</p> <ul style="list-style-type: none"> • TSIS board interfaces to Interfaces to Application Controller (UN539/UN539B/UN539C) • MCP link to TSIS-0 are tested in segment 10 • reference clock interfaces (either CM-sourced or external references) are tested in segments 50-52 • the (E)NLI interfaces to the TSI-links are tested in segments 60-69 • any equipped PLI interfaces to the TSI-links are tested in segments 70-79. <p>Note: PLIs assigned for OXU usage are not tested in this phase. [PR Name=SM2000:DNts_36]</p>
	37	Reserved for future use.
	38	<p>Performs additional TSIS (KLU1, KLX1, and KLX2) functional unit-level BIST tests, concentrating on inter-TSIS board connections. [PR Name=SM2000:DNts_38]</p>
	40	<p>(5E15 and later) Tests the OCDCOM/XCDCOM (UN651/TN1996) if equipped. Tests include:</p> <ul style="list-style-type: none"> • on-board BIST • XDX (UN553) and CI2 (UN71C) equipage • access • crosstalk • interrupt hierarchy • power scan • distribute circuitry. <p>If OCDCOM (UN651) is equipped, verify the functions of the clock control register. [PR Name=DNts_40]</p>
	43	<p>(5E15 and later) Tests the OXU Peripheral Link Interface (PLI) and Data Peripheral Link Interface (DPLI) hardware. Verifies equipage and register access to the PLI. Verifies equipage and device BIST for the DPLI. [PR Name=DNts_43]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	44	<p>Tests all circuits of equipped DX(UM73)/XDX(UN553 in TSIU4-2/SMU6) boards. Included are:</p> <ul style="list-style-type: none"> • initial access test of control RAMs • board configuration and inter-board crosstalk tests (segments 9 - 11) • TSICOM to DX/XDX communication tests (segments 20, 21) • control RAM tests of parity • rd/mod/write masking and memory tests (segments 30-32) • board reset • device BIST tests (segments 40-43). <p>[PR Name=DNts_44]</p>
	45	<p>Tests further the DX/XDX boards individually and in looped back configurations. These tests include:</p> <ul style="list-style-type: none"> • TSI-link CRC tests (segment 50) • PIDB parity buffer tests (segment 51) • fan-out/fan-in tests (segment 60) • PIDB monitoring of active/standby peripheral sides for valid parity (segment 70) • multi-access-board PCM-looping test at the DX/XDX PIDB outputs (segment 9975). <p>[PR Name=DNts_45]</p>
	46	DX/XDX demand phase not available to craft (this phase requires additional test equipment).
	66	<p>Tests circuits on CORE, BSN, APC, and MH-APC interface. Verifies pump data assembler circuit on APC, billing counter clock input, pump circuits on APC-MH interface, APC_MH SPYDER interface.</p> <p>[PR Name=DNmc4_66]</p>
	67	<p>This phase tests the MHPPC (UN550) to Application Controller (APC) interface.</p> <p>[PR Name=DNmc4_67]</p>
	71	<p>Diagnoses the interface between the micro-processor and the CI. At the completion, if no errors have occurred, then the data bus, address bus, and interface registers can be considered operational. Also, the address and data parity generators and checkers are exercised. [PR Name=DNci71]</p>

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	72	Diagnoses the internal hardware of the CI as much as possible without attempting to communicate with the peripheral unit over a peripheral interface control bus. Assumes that the interface to the microprocessor is operable and that the microprocessor can communicate with all the registers in the CI. If no errors occurred, then all the CI hardware except the selectors and buffers connecting to the peripheral units, interrupt source register, and the interrupt mask registers can be considered operational. [PR Name=DNci72]
	73	Diagnoses the interface between the CI and all equipped and in-service peripheral units. Assumes that the CI can communicate with the module processor. On completion, the balance of all CI hardware used to connect the equipped PICBs with PUs are verified (including, multiplexers, incoming and outgoing buffers, and local and remote interrupt structures. [PR Name=DNci73]
	74	(5E15 and later) Verifies the CI2 (UN71C) to SMP interrupt structure and the broadcast capability to the equipped and in-service peripherals when the parallel pump feature is enabled. This phase completes No Tests Run (NTR) if the pump feature is disabled for all equipped CI2s. [PR Name= DNci74]
	75	(5E15 and later) Diagnoses the OXU/XCDU CI2 boards. Diagnoses the interface between the micro-processor and the CI. At the completion, if no errors have occurred, then the data bus, address bus, and interface registers can be considered operational. Also, the address and data parity generators and checkers are exercised. [PR Name=DNci75]
	76	(5E15 and later) Diagnoses the OXU/XCDU CI2 boards. Diagnoses the internal hardware of the CI as much as possible without attempting to communicate with the peripheral unit over a peripheral interface control bus. Assumes that the interface to the microprocessor is operable and that the microprocessor can communicate with all the registers in the CI. If no errors occurred, then all the CI hardware except the selectors and buffers connecting to the peripheral units, interrupt source register, and the interrupt mask registers can be considered operational. [PR Name=DNci76]

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	77	(5E15 and later) Diagnoses the OXU/XCDU CI2 boards. Diagnoses the interface between the CI and all equipped and in-service peripheral units. Assumes that the CI can communicate with the module processor. On completion, the balance of all CI hardware used to connect the equipped PICBs with PUs are verified (including, multiplexers, incoming and outgoing buffers, and local and remote interrupt structures. [PR Name=DNci77]
	78	(5E15 and later) Diagnoses the OXU/XCDU CI2 boards. Verifies the CI2 (UN71C) to SMP interrupt structure and the broadcast capability to the equipped and in-service peripherals when the parallel pump feature is enabled. This phase completes No Tests Run (NTR) if the pump feature is disabled for all equipped CI2s. [PR Name=DNci78]
	81	This is the first phase of the Packet Interface diagnostic; packet interface circuit PI1 (TN1042) and PI2 (UN395/UN395B) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the SUIB interface of the packet interface and basic communication across the SUIB; also, all register functions (excluding the memory and error correction. The port processor and DARAM are not accessed except to initialize them into a noninterfering configuration. [PR Name=DNpi81]
	82	This is the second phase of the Packet interface diagnostic; packet interface circuit PI1 (TN1042) and PI2 (UN395/UN395B) is used to interface the PSIU to the SMP in an ISDN SM. Verifies access to the full range of DARAM from the SUIB side of the PI. Verifies addressing, the capability to clear the memory, capability to write protect the memory, and the auto increment of the address registers when reading or writing data to the DARAM. [PR Name=DNpi82]
	83	Note: This phase is for PI1 (TN1042) only. This phase is not run on PI2 (UN395/UN395B), so PI2 is always ATP. This is the third phase of the Packet Interface diagnostic; packet interface circuit (TN1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the subunit interface bus (SUIB) interface to the PI. Verifies the operation of the error correction and detection circuits from the SUIB side of the DARAM and also, detect and correct single-bit errors and multiple-bit errors. [PR Name=DNpi83]

See note(s) at end of table.

Table A1-86 — Diagnostic Phase Descriptions for MCTSI SM-2000 (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	84	<p>Note: This phase is for PI1 (TN1042) only. This phase is not run on PI2 (UN395/UN395B), so PI2 is always ATP.</p> <p>This is the fourth phase of the Packet Interface diagnostic; packet interface circuit (TN1042) is used to interface the PSIU to the SMP in an ISDN SM. Verifies the port processor side of the packet interface and the basic communication across the packet bus. The PI is reset and pumped. If communication looks good; a sanity maze and a memory test are run on the PI. The phase does not continue its operation if the initial “pump” fails or if the setup of the packet bus from the on-line PSIUCOM fails. The port processor is in a “diagnostic” mode during this under OSDS in the PI. Communicates with the diagnostic system process through packet bus messages. [PR Name=DNpi84]</p>
	85	<p>Verifies the packet bus from the PI to the standby side of the PSUCOM. This phase only attempts the test if the PSUCOM is in a standby mode. If the PSUCOM is in an OOS mode, the test reports a CATP. The port processor in the PI is in a diagnostic mode during this phase. This phase executes for PI1 (TN1042) and PI2 (UN395/UN395B). [PR Name=DNpi85]</p>
	86	<p>Note: This phase is for PI2 (UN395/UN395B) only. This phase is not run on PI1 (TN1042), so PI1 is always ATP.</p> <p>This phase tests the PI2 system command block in the DSRAM, initiates the ROM resident RAM test for both the DSRAM and LSRAM, and pumps the PI2. This phase executes for the PI2 only. This phase automatically ATPs if PI circuit packs are equipped. [PR Name=DNpi86]</p>
	87	<p>Verifies the packet bus from the PI to the standby side of the PSUCOM. This phase only attempts the test if the PSUCOM is in a standby mode. If the PSUCOM is in an OOS mode, the test reports a CATP. The port processor in the PI is in a diagnostic mode during this phase. This phase executes for PI1 (TN1042) and PI2 (UN395/UN395B). [PR Name=DNpi87]</p>
<p>Note(s): a. UN733 is available in 5E24 and later.</p>		

Table A1-87 — Diagnostic Phase Descriptions for MCTSI Unit 3 (MCTU3)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MCTSI (MCTU3) (SM)	–	Module Controller/Time Slot Interchange (Module Controller and Time Slot Interchange Unit 3) (Switching Module)
	1	Tests circuits on SB20CORE (KBN17, KBN18, or KBN19). Verifies the sanity of the OOS MCTSI for power, SMP state, SMP equipage with respect to the database, capability to perform the accesses across the SMP update bus. It also verifies parity checkers and generators, Ready Time Out (RTO) detection, and SMP error source hierarchy. Test address aliasing between DRAM, I/O and the quad integrated communications controller (QUICC) device on the SB20CORE. Tests the on-board memory using self-test. [PR Name=SM:DNMC3_1]
	2	Tests circuits on SB20CORE. Verifies power-up reset (exception 0) circuit to and from the OOS SMP. Rough test of timers. Verifies cross coupled status signal between ACTive and OOS SMP, capability to wake-up and stop the OOS processor for the off-line execution, sanity and mate lockout. Tests internal address and data bus, bus arbiter error, sanity maze, processor performance, I/O accesses with instruction cache enabled, SPFMR operation, A-FF, shadow operations register, ROM checksum. [PR Name=SM:DNMC3_2]
	3	Tests circuits on SB20CORE. Verifies processor status registers Verifies the SBPCD (TN1424) functions, write and stack protection, resets, sanity timer, mate power fail (MPF) signal, I/O timers, Bus Control Register (BCR) and shadow BCR, fan alarm verification, bus errors, and the sub-unit interface bus (SUIB). [PR Name=SM:DNMC3_3]
	4	Tests parts of the timers, programmable interrupt controllers (TPC) device on SB20CORE. Verifies billing counter, timers, PICs, to/from mate interrupts signals between ACT and OOS SMPs, DLI interrupts, SDLC parity, DLI register access. [PR Name=SM:DNMC3_4]
	5	Tests the QUICC device and its interfaces on SB20CORE. Includes QUICC dual port RAM test, write protection test, hardware and software reset, timer tests, synchronous data link controller (SDLC) transmitter/receiver tests, internal (QUICC) direct memory access (IDMA) tests, and Bootstrapper (BTSR) tests. [PR Name=SM:DNMC3_5]

Table A1-87 — Diagnostic Phase Descriptions for MCTSI Unit 3 (MCTU3) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	6	Tests dynamic memory (DRC device, SIMM modules) on SB20CORE. Verifies address decoding, error detection and correction (EDC) circuits, scrubbing, memory refresh. Tests DRAM initialization, and DRAM using self-test. [PR Name=SM:DNMC3_6]
	7	<i>(Demand phase only)</i> Tests dynamic memory on SB20CORE. Verifies BIST inhibit logic, which prevents the running of the memory self-test/initialization on the ACT SMP. Verifies internal data lead coupling in the memory complex. [PR Name=SM:DNMC3_7]
	8	Verifies the alarm status unit (ASU) equipage and then tests the RSM sanity and stand-alone indicator logic on the SBPCD and the SB20CORE. [PR Name=SM:DNMC3_8]
	9	Tests the Central Processor Intervention (CPI) hardware on the SB20CORE by requesting diagnostic CPI messages from the AM (or VCDX workstation) and verifying that each message is received properly. For a VCDX it verifies the CPI paddleboard. [PR Name=SM:DNMC3_8]
	10	Tests circuits on SB20CORE. Tests the SMP update bus with the OOS SMP as the master. Tests the capability to drive address, data, and control signals across the ACT SMP to OOS SMP data bus. Tests the capability to receive mate status signals. [PR Name=SM:DNMC3_8]
	11	Tests QUICC device and its interfaces on the SB20CORE. Verifies the QUICC hardware and software reset. Verifies that the OOS SMP can transfer data through the direct memory access (DMA) over the update bus to the ACT SMP. Verifies that the BISR, under IDMA control, can transfer data to the ACT SMP and OOS SMP. Verifies that at least one of the QUICC SDMA devices is capable of driving the update bus. Verifies that at least one of the QUICC IDMA devices is capable of driving the update bus. [PR Name=SM:DNMC3_9]
	12	Tests the Ethernet controller part of the QUICC device and its interfaces on the SB20CORE. Tests include Ethernet transmitter and receiver operation (loops, external connections to Ethernet paddleboard, error detection) and transmission to/reception from the Ethernet medium. [PR Name=SM:DNMC3_9]
	13-30	These phases are not used for MCTU3 testing.

Table A1-87 — Diagnostic Phase Descriptions for MCTSI Unit 3 (MCTU3) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	31	Tests TSI-DLI interface, TSI control and alternate data RAMs, TSI-SMP interface, all TSI registers, receive and transmit TSI RAMs. [PR Name=SM:DNTSI1]
	32	Tests TSI-DLI interface. Will complete CATP if either DLI is OOS. [PR Name=SM:DNTSI2]
	33-50	These phases are not used for MCTU3 testing.
	51	Tests SP-mode latch, M RAM, ignore RAM and immediate access RAM. [PR Name=SM:DNSP]
	52	Tests SP-FIFO, parity check circuits, error source register, interface to programmable interrupt controller on the TN1086, and ready time-out error. [PR Name=SM:DNSP]
	53-60	These phases are not used for MCTU3 testing.
	61	Tests DI. [PR Name=SM:DNDI]
	62	Tests parity on PIDBs from PUs. Verifies receivers on PIDB links. [PR Name=SM:DNDI]
	63	Tests DI fan-out on TN1377 or TN1524. All PIDBs are checked. [PR Name=SM:DNDI]
	64	Tests PIDB driver and receiver on odd DI when PU is OOS. [PR Name=SM:DNDI]
	65	This phase is not used for MCTU3 testing.
	66	Tests the BTSR circuitry on the SB20CORE. Taking real PIDB data generated in the TSI, this phase verifies that the BTSR loops back true parity from the DI. Also verifies the BTSR to PIDB interface by generating pump data in the TSI. [PR Name=SM:DNMC3_66]
	67-70	These phases are not used for MCTU3 testing.
	71	Tests parity on PICBs from PUs. Verifies receivers on PICB links. Tests CI-MP interface and CI (UN71/UN71B) register access. [PR Name=SM:DNCI1]
	72	Tests CI-CI transmit and receive sequencers (UN71B). [PR Name=SM:DNCI1]
	73	CI – tests integrity of control paths to and from all equipped peripherals (UN71/UN71B). [PR Name=SM:DNCI1]
	74-80	These phases are not used for MCTU3 testing.
	81	Verifies SUIB interface of PI. Fundamental communication and error reporting are verified. In addition, all register functions, excluding memory and error correction, are verified. [PR Name=SM:DNPI1]

Table A1-87 — Diagnostic Phase Descriptions for MCTSI Unit 3 (MCTU3) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	82	Verifies access to full range of DARAM from SUIB side of PI. A complete memory test is provided from port processor side of PI. This phase is only used to verify addressing, capability to reset memory, write protect of memory, and auto increment of address register when reading or writing data to DARAM. [PR Name=SM:DNPI1]
	83	Verifies operation of error correction and detection circuits from SUIB side of DARAM. It also verifies capability to detect and correct single bit errors and to detect and report multiple bit errors. [PR Name=SM:DNPI1]
	84	Verifies port processor side of PI. The PI is reset and pumped. Basic communication of PB is verified. If communication looks OK, a sanity maze and a memory test are run on PI. This phase does not continue its operation if initial pump fails or if setup of PB from on-line PSUCOM fails. Port processor is in diagnostic mode during this phase. [PR Name=SM:DNPI1]
	85	Verifies packet bus from PI to standby side of PSUCOM. This phase only attempts test if PSUCOM is in STBY mode. If PSUCOM is in an OOS mode, test reports CATP. Port processor in PI is in diagnostic mode during this phase. [PR Name=SM:DNPI1]
	86	Verifies 68040 core of a PI2. For a PI, no tests are run. [PR Name=SM:DNPI1]
	87	Verifies the packet bus cabling between the PI/PI2 and the PSUCOM. [PR Name=SM:DNPI1]
	88-90	These phases are not used for MCTU3 testing.

Table A1-88 — Diagnostic Phase Descriptions for MHD-Mod 1

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MHD-Mod 1 (AM)	–	Moving Head Disk - Mod 1 (Administrative Module)
	1	Tests the parallel/serial data interface and the MHD control source and destination decoders. [PR Name=DL:MHD01]
	2	Tests MHD control register. [PR Name=DL:MHD02]
	3	Tests the parallel/serial data interface. [PR Name=DL:MHD03]
	4	Tests the MHD control, disk select, and driver enable. [PR Name=DL:MHD04]
	5	Tests the MHD clock. A fully formatted disk must be mounted and spinning on the drive under test. [PR Name=DL:MHD05]
	6	Tests the read/write circuitry and error correction circuitry. A fully formatted disk pack must be mounted and spinning on the drive under test. [PR Name=DL:MHD06]
	7	Tests the seek, seek error detection, servo offset, and fault detection circuitry of the drive. A fully formatted disk pack must be mounted and spinning on the drive under test. [PR Name=DL:MHD07]
	8	Tests data transfer between CU and drive. A fully formatted disk pack must be mounted and spinning on drive under test. [PR Name=DL:MHD08]

Table A1-89 — Diagnostic Phase Descriptions for MHD-SCSI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MHD-SCSI	–	Moving Head Disk - Small Computer System Interface (Administrative Module)
	1	Diagnoses SCSI disk through self-tests of SCSI device controller buffer and read/write access to the MHD maintenance area. [PR Name=DL:MHDS01]

Table A1-90 — Diagnostic Phase Descriptions for MI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MI (CM2)	–	Message Interface (Communication Module 2)
	1	Tests interface from host FPC to MI under test and major buses between MI boards and access of source registers. [PR Name=FPC:DNCDMI01]
	2	Tests all clocks. [PR Name=FPC:DNCDMI02]
	3	Tests time slot switching control and memory and MIB parity using associated PPC/MMPs as host circuit. [PR Name=FPC:DNCDMI03]
	4	Tests the CPI time slot matching functions of the UN187 board. [PR Name=FPC:DNCDMI04]
	5	Tests local transmission of the CPI diagnostic message. [PR Name=FPC:DNCDMI05]
	6	Tests external transmission of CPI diagnostic messages using TMS. [PR Name=FPC:DNCDMI06]
	7	<i>(Demand phase only)</i> Tests the MIBs using the PPC/MMPs as host circuits. Both PPC/MMPs are automatically removed and restored during this phase. [PR Name=FPC:DNCDMI07, MMP:DNC2MMP52-57, and PPC:DNCPPC42-43]

Table A1-91 — Diagnostic Phase Descriptions for MMP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MMP (CM2)	–	Module Message Processor (Communication Module 2)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board of the MMP. [PR Name=AM:DNC3BMMP]
	2	Tests the microprocessor board (TN856) of the MMP. [PR Name=AM:DNC3BMMP and MMP:DNC2MMP22-25]
	3 ^a	Tests application board (TN870) of the MMP. [PR Name=AM:DNC3BMMP and MMP:DNC2MMP32-36]
	4 ^a	Tests application board (TN870) of the MMP and MIB from that MMP by looping data at the TMS. [PR Name=AM:DNC3BMMP and MMP:DNC2MMP42-47]
<p>Note(s):</p> <p>a. In a dual MMP configuration, the opposite MMP from that being diagnosed is automatically removed and restored during this phase. This happens because data is delivered over the MIB, and that MMP must be removed.</p>		

Table A1-92 — Diagnostic Phase Descriptions for MSCU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MSCU (CM2)	–	Message Switch Control Unit (Communication Module 2)
	1	Tests the PSM boards - SN516, 495FB, and UN33. [PR Name=AM:DNCMSCU]
	2	Tests the DDSBS TN69. [PR Name=AM:DNCMSCU] With MSCU3, the TN69 board is replaced with the KBN10 board.
	3	Tests the BIC-TN70. [PR Name=AM:DNCMSCU] With MSCU3, the TN70 board is replaced with the KBN10 board.
	4	Tests the BIC and BIC/PIC interfaces - TN70 and UN178. [PR Name=AM:DNCMSCU] With MSCU3, the TN70 and UN178 boards are replaced with the KBN10 board.
	5	Tests the PIC-UN178 and UN199. [PR Name=AM:DNCMSCU] With MSCU3, the UN178 and UN199 boards are replaced with the KBN10 board.
	6	Tests the interface between the IOMIs and the PIC and the power circuitry of the IOMIs-UN25 and UN178. [PR Name=AM:DNCMSCU] With MSCU3, the UN25 and UN178 boards are replaced with the KBN10 board.
	7	Tests the interface between the IOMIs and the PC communities – UN25 and TN856. [PR Name=AM:DNCMSCU] With MSCU 3, the UN25 board is replaced with the KBN10 board.

Table A1-93 — Diagnostic Phase Descriptions for MSGS (CM3)

DIAGNOSTIC ID	PHASE	DESCRIPTION OF FUNCTION TESTED
MSGS (CM3)	–	Message Switch (Communication Module 3)
	1	Interfaces between DSCH-DDSBS and DDSBS-BIC.
	2	MSGS power/BIST/Boundary-Scan; MSGS-IP Power QUICC bus access; DSCH controller, Asset IP power/BIST/Boundary-Scan; Critical MSGS reset; MSGS/Asset Loop 6 Boundary-Scan; IP DRAM March Test; AP DRAM BIST.
	3	IP Register Access, Interrupts, Reset, PCI.
	4	IP Timers, IP Sanity Maze.
	5	IP DRAM/ECC, Cache, MMU.
	6	AP Register Access, Interrupts, Reset, PCI.
	7	AP Timers, AP Sanity Maze.
	8	AP Caches, MMU.
	9	<i>(Demand phase only)</i> IP and AP PFI.
	10	IP and AP Interface.
	11	PACMAN static functional operation; PCI bus for application; Ethernet controller reset; ACT MSGS/NCC presence/power status; MSGS IP/AP interrupts/error tree; PFI registers with disabled PFI strap; DMA/control strobe points interface update; MSGS clock.; Functional tests of Ethernet controller, Ethernet link connectivity to MSGS and Ethernet Switch, and ARP of Ethernet switch associated with network side.
	12	MSGS SPYDER-256 platform static tests; PCI/device resets; SRAM BIST; PCI/message errors; Standby and key registers; SRAM access/scrub; Serial loop; Multi-channel.
	13	Connectivity between OOST MSGS and ACT ONTC over CTS links.
	14	Connectivity between OOST MSGS and ACT ONTC over pump link.
	15	Capability of OOST MSGS to establish and use the CDAL link to each ONTCCOM.
16	<i>(Demand phase only)</i> PFI registers with enabled PFI strap.	

Table A1-94 — Diagnostic Phase Descriptions for MSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MSUCOM (SM)	–	Metallic Service Unit Common (Switching Module)
	1	Tests the CI with the MCTSI. For single-module office, [PR Name=SM:DNMSC] For multimodule office, [PR Name=SM:DNMMSC]
	2	Tests CI with the STBY MCTSI. For single-module office, [PR Name=SM:DNMSC] For multimodule office, [PR SM:DNMMSC]
	3	Tests the remote interrupt mask and scan registers, interrupt latches and interrupt polarity bit. For single-module office, [PR Name=SM:DNMSC] For multimodule office, [PR SM:DNMMSC]

Table A1-95 — Diagnostic Phase Descriptions for MTB

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTB (SM)	–	Metallic Test Bus (Switching Module)
	102	<p>Verifies the interconnections between the MTB under test and its termination.</p> <p>Also verifies proper operation of the relays on the MA that connect the junctors to the MTB.</p> <p>Segment 1: Will set-up the initial TLP, and will seize the necessary resources</p> <p>Segment 2: Verifies the operation of each of the relay drivers related to the MTB under test. It will also verify the Inhibit Enable Function (INHEN) on each relay.</p> <p>First, the number of the relay driver to be verified is determined. This is done by setting the number of the first relay driver to be verified equal to the number of the MTB under test.</p> <p>Test 1 and Test 2 verify that the driver opens and closes.</p> <p>Test 3 verifies the Inhibit Enable Function on the driver.</p> <p>The next relay driver to be tested is determined. Test numbers increment by 3 for 4 iterations. To determine the number of the next relay to be tested, add 16 to the number of the last relay driver that was tested. For example, If MTB “5” is under test, then its related relays are: 21, 37, and 53.</p>

Table A1-95 — Diagnostic Phase Descriptions for MTB (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	102 (cont'd)	<p>Segment 3: Checks the proper operation of the relay contacts and the MTBs by running protocol tests over the MTB under test. First, the termination circuit is seized. If the seize fails, the diagnostics will CATP and the phase will terminate. If the seize is successful, the respective junctor will be seized, path setup, and protocol tests run over the MTB. If seize is not successful, DG will CATP. If a junctor is busy, it will be skipped and diagnostics will continue.</p> <p>Also, this segment determines whether this MTB supports any form of diode protocol testing (DPT). If not, the MTB diagnostic will simulate success with an ATP result. By default, the DPT will not be skipped. If the far-end termination for this MTB is to a pair-gain test controller (PGTC), then the PGTC has no diode and its MTB cannot be diagnosed, so the DPT is skipped for this case.</p> <p>The MTB under test may be connected to a Remote Measurement Unit If the far-end termination for this MTB is to some type of AIU. In this case the diode test is skipped.</p> <p>This segment will go through all four juncctors. The tests in this segment are arranged in a way that each test is associated with a particular junctor. Test numbers are in the format xyy where “x” is the the junctor number (0–3), and “y” is each digit of the test number (0–9).</p> <p>Each available junctor is seized and verified. If the seize is successful, the segment is CATP and continues with determining the next available junctor and adding the junctor on the TLP. The path is connected from the protocol circuit to the termination point and tests are run according to termination type. Protocol tests are performed as follows:</p> <p>Tests 501–504: Run protocol tests.</p> <p>Tests 505–516: Run protocol tests on TBCU. Diode should be in closed state when seize succeeded.</p> <p>Test 517: Get data on the configuration of the MTB under test. Report on configuration if MTB terminates at the DCTU.</p> <p>Tests 518–528: Run protocol tests. Test numbers increment by 200 for 4 iterations. [PR Name=DNMAXS]</p>

Table A1-95 — Diagnostic Phase Descriptions for MTB (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	103	<p>Verifies the interconnections between the MTB under test and the ISLC (integrated subscriber loop carrier) in RT (remote terminal) terminations.</p> <p>Also verifies proper operation of the relays on the MA that connect the junctors to the MTB.</p> <p>Segment 1, Test 1: This segment and test will set-up the initial TLP, seize the necessary resources, and initialize the MA by opening the corresponding relays (the 4 relays that will connect to each of the junctors) on the MTB under test.</p> <p>Segment 2: This segment verifies integrated SLC (SLC 96 is a 24 channel multiplexer) terminations only, and checks the proper operation of the relay contacts and MTBs by running a protocol test over the MTB under test. First, the termination is seized. If the seize fails, the diagnostics will CATP and the phase will terminate. If the seize is successful, the respective junctor will be seized, path set-up, and protocol tests run over the MTB. If a junctor is busy, it will be skipped and diagnostics will continue.</p> <p>Tests are arranged in a way that each test is associated with a specific RT and protocol test. There are up to 20 RT's (1-20) per metallic test pair (MTP), and 16 protocol tests (1-16). The test number arrangement is xxyy where "xx" is the RT number (01-20), and "yy" is the protocol test number (01-16). For example, test number 1205 represents RT 12 and protocol test number 5.</p> <p>Note: Protocol tests 1 & 2 do not relate to any specific RT. In these two cases the RT number (3rd & 4th digits) will be "00" which signifies that no particular RT is related to these tests.</p> <p>Test numbers increment by 100 for 20 iterations.</p>

Table A1-95 — Diagnostic Phase Descriptions for MTB (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	103 (cont'd)	<p>Test 1: Tests tip & ring reversal on MTP (no continuity).</p> <p>Test 2: Tests for absence of diode on MTP from all RT's.</p> <p>Test 103–112: Close RTs one by one. Perform close diode test, then open diode and perform open diode test.</p> <p>Test 113: Performs tip & ring reversal test if no MTB short termination is detected.</p> <p>Test 114: Perform the diode present test for both diode and short terminations.</p> <p>Test 115–116: Open RT diode and run open diode test. [PR Name=DNMAXS]</p>

Table A1-96 — Diagnostic Phase Descriptions for MTC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTC (AM)	–	Magnetic Tape Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:MTC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:MTC02]
	3	Tests the DAM parity checker. [PR Name=DL:MTC03]
	4	Tests the microdiagnostic. [PR Name=DL:MTC04]
	5	<i>(Demand phase only)</i> Tests the tape transport. A fully formatted diagnostic test tape (J-1P059AB-1 List 1M1) must be mounted on the tape transport under test. With prolonged use, the diagnostic test tape can become worn and cause STF results in this phase. Sometimes moving the load point (BOT) a few feet farther into the tape reel and formatting the tape at the new load point temporarily corrects STF results caused by worn tape. To format a diagnostic tape: 1. Mount a 200-foot tape with a write-enable ring on an in-service MT. 2. Press the "LOAD" button. This should move the tape to the load point (BOT). 3. Press the "ON LINE" button. The ON LINE light should go on. 4. Enter the following command where "c" is the MT unit number: COPY:TAPE:DATA.TEST,TD="/dev/mtc8"; [PR Name=DL:MTC05]

Table A1-97 — Diagnostic Phase Descriptions for MTIB

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTIB (SM)	–	Metallic Test Interconnect Bus (Switching Module)
	1	Performs end-to-end protocol test of complete interconnect bus. [PR Name=SM:DNMTIB]
	2	Performs step-by-step verification of interconnect bus interfaces to MSU shelves. [PR Name=SM:DNMTIB]

Table A1-98 — Diagnostic Phase Descriptions for MTIBAX

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTIBAX (SM)	–	Metallic Test Interconnect Bus Access (Switching Module)
	1	Tests send and receive data switch with MSUCOM, interrupts, and operation of relay drivers. [PR Name=SM:DNMTAC]
	2	Tests relay connections to all MTIBs. [PR Name=SM:DNMTAC]

Table A1-99 — Diagnostic Phase Descriptions for MTTYC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
MTTYC (AM)	–	Maintenance Teletypewriter Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:MTTYC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:MTTYC02]
	3	Tests the DAM parity checker. [PR Name=DL:MTTYC03]
	4	Tests the microdiagnostic. [PR Name=DL:MTTYC04]

Table A1-100 — Diagnostic Phase Descriptions for NC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
NC (NC2/CM2 ^a)	–	Network Clock 2 (Communication Module 2)
	1	Tests the communication interface between the host FPC and NC, and the CLRT subunit on the controller board. [PR Name=FPC:DNC2NC01]
	2	Tests the CCB subunit on the controller board. [PR Name=FPC:DNC2NC02]
	3	Tests the microprocessor portion of the controller board. [PR Name=FPC:DNC2NC03]
	4	Tests the synchronizer boards (0 and 1) of the NC. [PR Name=FPC:DNC2NC04]
	5	Tests the DPLL board and the operation of the NC in its entirety. [PR Name=FPC:DNC2NC05]
	6	<i>(Demand phase only)</i> Determine what hardware units are causing phase 5 to CATP. [PR Name=FPC:DNC2NC06]
Note(s):		
a. For CM3 offices, the NC is tested as part of the ONTCCOM diagnostic.		

Table A1-101 — Diagnostic Phase Descriptions for NLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
NLI (SM-2000)	–	Network Link Interface (Switching Module-2000)
	1	Verifies the interface of the LI to the active and mate side Time Slot Interchangers, as well as the functionality of various error checks. [PR Name=DNnli_1]
	2	Verifies the interface of the LI to the ONTC TMS. For CM3, this includes the LIT48 test, which verifies the TMS hardware associated with the NLI. [PR Name=DNnli_2]

Table A1-102 — Diagnostic Phase Descriptions for OFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
OFI (SM-2000)	1	Tests the PCT link, SM-to-PLI interface, and the PLI pack. Interfaces to both sides of the MCTSI.
	2	Tests the PCT interface to the circuit under test. The slot position and the PCT physical connection at the circuit under test are tested.
	3	Runs self-tests, pack-to-pack communication tests, and the ROM-based RAM tests. Segment 1: Phase initialization/set-up Segment 2: Execute resident ckt pack self-tests, and verify the OFI to SMP interface. Segment 3: Execute Pack to Pack communication test. Segment 4: Execute ROM based RAM tests.
	4	Tests the integrity of the facility data (PCM) path from the SMP to the OFI, on all equipped PCT links. Segment 1: Phase initialization/set-up. Segment 10: This segment will verify the facility data path from the SMP to the OFI. The facility loopback will be performed at the SPECTRA.
	5	<i>(Demand phase only)</i> Tests the external facility loopback on the OFI. Installation of an external loopback is required before running this phase. Segment 1: Phase initialization/set-up. Segment 2: Execute external loopback test.
	6	<i>(Demand phase — performs no diagnostics)</i> . Used to retrieve failure information stored in the non-volatile pack.

Table A1-103 — Diagnostic Phase Descriptions for OFI-IP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
OFI	1	Tests the PCT link, SM-to-PLI interface, and the PLI pack. Interfaces to both sides of the MCTSI.
	2	Tests the PCT interface to the circuit under test. The slot position and the PCT physical connection at the circuit under test are tested.
	3	Runs self-tests, pack-to-pack communication tests, and the ROM-based RAM tests. OIU-IP hardware tested include the microprocessor interface, the SONET interface, the IP interface, the Digital Signal Processors, all FPGAs, SRAM memory and the crosscouple link between mate pairs of OFI-IP packs.
	4	Not used.
	5	(Demand phase only) Tests the external facility loopback on the OFI. Installation of an external loopback is required before running this phase.

Table A1-104 — Diagnostic Phase Descriptions for ONTCCOM (CM3) – Prior to 5E16.2

DIAGNOSTIC ID	PHASE	DESCRIPTION OF FUNCTION TESTED	
ONTCCOM (CM3)	–	Office Network and Timing Complex Common (Communication Module 3)	
	1	NCC power/presence.	
	2	ONTC processor reset; AM and ONTC-IP communication; Asset IP power/BIST/Boundary-Scan; NCC/Asset Loop 6 Boundary-Scan; IP DRAM March test; AP DRAM BIST.	
	3	IP Register Access, Interrupts, Reset, PCI.	
	4	IP Timers, IP Sanity Maze.	
	5	IP DRAM/ECC, Cache, MMU.	
	6	AP Register Access, Interrupts, Reset, PCI.	
	7	AP Timers, AP Sanity Maze.	
	8	AP Caches, MMU.	
	9	<i>(Demand phase only)</i> IP and AP PFI.	
	10	IP and AP Interface.	
			NCC
	11	SPYDER-256 platform.	
	12	Register exercises; TMSFP ESRs in NCC_CSI; STARS/CSI/SPYDER to IRR error propagation; SPYDER/CSI to IP SIPEND error propagation; DMA state machine and phase mux operation on STARS; STARS input mux control register; Line framer T7630 capability; Operation of HWPLEN in PLL/frequency control registers.	
	13	Far/Near side oscillator power and board presence; STARS equipped digital/analog and unequipped analog references; Cross couple references.	
	14	Operation of digital/analog references and oscillator; CDAL link synchronization; CDAL bits A/E/F/G; CDAL bits B/C/D.	
	15	<i>(Demand Phase Only)</i> PFI registers with enabled PFI strap.	
			TMS
	16	AM and ONTC-AP communication; TMSF reset; Primary CSI; Fuse alarm; Fan alarm.	
	17	FMI reset; FMI BIST; FMI secondary CSI; FMI test function; FMI CPI; FMI CPTL/CTS.	
	18	(On all TMSF/Xs) LIT48 reset; LIT48 BIST; LIT48 secondary CSI; FMI - LIT48 FDI links, PFI registers with disabled PFI strap.	
	19	(On all TMSF/Xs) FMI - LIT48 - FMI TMS link to link internal loopback; FMI fabric.	
20	TRCU (NAR only).		
21	<i>(Demand phase only)</i> External TMS link loopback.		
22	<i>(Demand phase only)</i> TMSF/X PFI registers with enabled PFI strap.		

Table A1-105 — Diagnostic Phase Descriptions for ONTCCOM (CM3) – 5E16.2 and Later

DIAGNOSTIC ID	PHASE	DESCRIPTION OF FUNCTION TESTED
ONTCCOM (CM3)	–	Office Network and Timing Complex Common (Communication Module 3)
	1	NCC power/presence.
	2	ONTC processor reset; AM and ONTC-IP communication; Asset IP power/BIST/Boundary-Scan; NCC/Asset Loop 6 Boundary-Scan; IP DRAM March test; AP DRAM BIST.
	3	IP Register Access, Interrupts, Reset, PCI.
	4	IP Timers, IP Sanity Maze.
	5	IP DRAM/ECC, Cache, MMU.
	6	AP Register Access, Interrupts, Reset, PCI.
	7	AP Timers, AP Sanity Maze.
	8	AP Caches, MMU.
	9	<i>(Demand phase only)</i> IP and AP PFI.
	10	IP and AP Interface.
	NCC	
	11	SPYDER-256 platform.
	12	Register exercises; TMSFP ESRs in NCC_CSI; STARS/CSI/SPYDER to IRR error propagation; SPYDER/CSI to IP SIPEND error propagation; DMA state machine and phase counters operation on STARS; STARS input mux control register; Line framer T7630 capability; Operation of HWPLEN in PLL/frequency control registers.
	13	Far/Near side oscillator power and board presence; STARS equipped digital/analog and unequipped analog references; Cross couple references.
14	Operation of digital/analog references and oscillator; CDAL link synchronization; CDAL bits A/E/F/G; CDAL bits B/C/D.	
15	<i>(Demand Phase Only)</i> PFI registers with enabled PFI strap.	

Table A1-106 — Diagnostic Phase Descriptions for PCTFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PCTFI	1	Tests the PCT link, SM-to-PLI interface, and the PLI pack. Interfaces to both sides of the MCTSI.
	2	Tests the interface between the TSI IF peripheral registers to the PCT-TE. Both sides of the MCTSI are tested, where applicable.
	3	<i>(Demand phase only)</i> Uses the peripheral loopback word to verify the integrity of the data path to the far end. The PLI must have Xmit link looped back onto the Rcv link.

Table A1-107 — Diagnostic Phase Descriptions for PDLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PDLI (SM/ORM)	–	Pagable Dual-Link Interface (Switching Module/Optically Remote Module)
	1	ACT MP to DLI communication and interface tests. [PR Name=SM:DNPDLI1]
	2	Performs DLI internal function tests. [PR Name=SM:DNPDLI1]
	3	Performs DLI internal function tests. [PR Name=SM:DNPDLI1]
	6	Performs ACT TSI to DLI interface tests. [PR Name=SM:DNPDLI2]
	7	Performs STBY MP to DLI interface tests. [PR Name=SM:DNPDLI2]
	8	Performs STBY MP SDLC to DLI interrupt and data tests. Also tests the STBY TSI to DLI data loopback on all time slots. [PR Name=SM:DNPDLI2]
	9	Performs STBY TSI to DLI interface (data loopback) tests. Also tests the STBY TSI to TRCU loopback tests in an ORM. [PR Name=SM:DNPDLI3]
	10	Performs switch/monitor tests. [PR Name=SM:DNPDLI3]
	11	Performs the TMS NCT link tests. CTS is looped back in the TMS. [PR Name=SM:DNPDLI3]

Table A1-108 — Diagnostic Phase Descriptions for PMU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PMU (SM)	–	Precision Measurement Unit (Switching Module)
	1	Runs Group D DCTU tests. [PR Name=SM:DNPMU1]
	2	Runs Group E DCTU tests. [PR Name=SM:DNPMU2]
	3	Runs Group F DCTU tests. [PR Name=SM:DNPMU3]
	4	Runs Group G, Series A through I – DCTU tests. [PR Name=SM:DNPMU4]
	5	Runs Group G, Series J through O – DCTU tests. [PR Name=SM:DNPMU5]

Table A1-109 — Diagnostic Phase Descriptions for PPC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PPC (CM2)	–	Pump Peripheral Controller (Communication Module 2)
	1	Tests the interface between the MSCU (UN25) and the microprocessor board of the PPC. [PR Name=AM:DNC3BPPC]
	2	Tests the microprocessor board (TN856) of the PPC. [PR Name=PPC:DNCPPC22-25 and AM:DNC3BPPC]
	3	Tests the application board (TN886) of the PPC. [PR Name=PPC:DNCPPC32-38 and AM:DNC3BPPC]
	4	Tests the MIBs by looping data out of PPC through MIB through MI 0 and TMS 0 and back. In a dual PPC configuration, the opposite side PPC from that being diagnosed is automatically removed and restored. This happens because data is delivered over the MIB and that PPC must be removed. [PR Name=PPC:DNCPPC42-43 and AM:DNC3BPPC]

Table A1-110 — Diagnostic Phase Descriptions for PROTO

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PROTO (SM)	–	Protocol Circuit (Switching Module)
	1	Tests operation of the protocol circuit to a termination circuit. [PR Name=SM:DNPROTO]

Table A1-111 — Diagnostic Phase Descriptions for PSU2 PSUCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUCOM (SM) (PSU2)	–	Packet Switch Unit Common Controller (Switching Module)
	1	Tests the PICB communication between the CI and the UCI chip on the CF. [PR Name=SM:DNUCI]
	2	Tests the UCI chip on the CF. [PR Name=SM:DNUCI]
	3	Tests the LP of the CF's UCI chip. The SMP sends messages for the LP; and when the LP sees the messages, performs the required reads and writes (to verify interrupts to the LP). [PR Name=SM:DNUCI]
	4	Tests the CFs LP ESRs and CRC in ROM. [PR Name=SM:DNPS1]
	5	Tests the CIB between the CF, PF, and DF. [PR Name=SM:DNPS1]
	6	Tests the PB between the CF, PF, and PI. [PR Name=SM:DNPS1]
	7	<i>(Demand phase only for factory and growth testing)</i> Tests all DUARTS in the CF for unequipped shelves. [PR Name=SM:DNPS1]
	8	<i>(Demand phase only for factory and growth testing)</i> Tests the internal CF interfaces to all unequipped PFs. [PR Name=SM:DNPS1]
	9	<i>(Demand phase only for factory and growth testing)</i> Tests the OOS lamps on equipped and growth CFs, PFs, and DFs. The diagnostic cycles through five times, starting by turning all lamps off. [PR Name=SM:DNPS1]
	10	Tests the CF2 polling RAM, arbiter, and packet bus between the active and mate PIs through the CF2. (Only executed with the PSU/CF2 pack.)
	11	Tests the communication between the CI and PF. [PR Name=SM:DNPS2]
	12	Tests the LPs ROM and the capability of the PF to be reset. [PR Name=SM:DNPS2]
	13	Tests the communication between the PF and each of the equipped and growth PHs. [PR Name=SM:DNPS2]
	14	Tests the packet arbiter and the packet bus connections through the PF to each equipped PH. [PR Name=SM:DNPS2]
15	<i>(Demand phase only for factory and growth testing)</i> Tests the internal communication path on the PF for each unequipped PH. [PR Name=SM:DNPS2]	

Table A1-111 — Diagnostic Phase Descriptions for PSU2 PSUCOM (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	16	<i>(Demand phase only for factory and growth testing)</i> Tests the internal communication path on the PF for each unequipped PH. [PR Name=SM:DNPS2]
	21	Tests the communication path between the CI and DF through the CF. [PR Name=SM:DNPS3]
	22	Tests the LPs ROM for the capability of the DF to be reset. [PR Name=SM:DNPS3]
	23	Performs reads and writes on the DFs 8751 bus. [PR Name=SM:DNPS3]
	24	Provides a memory test for the DFs parity error buffer. [PR Name=SM:DNPS3]
	25	Performs a test on the DFs TSI chip. [PR Name=SM:DNPS3]
	26	Tests the data paths on the DF. [PR Name=SM:DNPS4]
	27	<i>(Demand phase only for factory and growth testing)</i> Tests the data paths between the DF and the STBY common data board through the DPIDBs. [PR Name=SM:DNPS4]
	28	Tests the PLI associated with any DF2 equipped in the PSUCOM under test.
	29	Tests the DFTS and PCTLI devices resident on the DF2 circuit pack.
	30	Test interdevice connections, timing circuitry, and PHDB connections from a DF2 to equipped PHs.

Table A1-112 — Diagnostic Phase Descriptions for PSU2e PSUCOM (5E18.1 and later)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUCOM (SM) (PSU2e)	–	Packet Switch Unit 2 Enhanced Common Controller (Switching Module)
	1	Tests the PICB communication between the CI and the UCI chip on the CF. [PR Name=SM:DNUCI]
	2	Tests the UCI chip on the CF. [PR Name=SM:DNUCI]
	3	Tests the LP of the CF's UCI chip. The SMP sends messages for the LP; and when the LP sees the messages, performs the required reads and writes (to verify interrupts to the LP). [PR Name=SM:DNUCI]
	4	Tests the CF Processor Core (by testing BIST, Boundary Scan, SDRAM, L1 Cache, and MMU), the Packet Bridge FPGA device, and performs SERDES port tests. [PR Name=SM:DNPSE1A]
	5	Tests for communication to the CF, the CIB interface between the CF, PF, and DF and the reset of the PF and DF. [PR Name=SM:DNPSE1A]
	6	Tests the PB between the CF, PF, and PI by checking for CTS, and tests for PB Clock failure. [PR Name=SM:DNPSE1B]
	7	<i>(Demand phase only for factory and growth testing)</i> Tests all DUARTS in the CF for PFs and DFs in unequipped shelves. [PR Name=SM:DNPSE1C]
	8	<i>(Demand phase only for factory and growth testing)</i> Tests the communication to the CF. [PR Name=SM:DNPSE1C]
	9	<i>(Demand phase only for factory and growth testing)</i> Tests the OOS lamps on equipped and growth CFs, PFs, and DFs. The diagnostic cycles through five times, starting by turning all lamps off. [PR Name=SM:DNPSE1C]
	10	Performs communication test between the active and standby PIs and the active PSUCOM and Under Test PSUCOM. This test is also performed when both PSUCOM are in the Growth state. [PR Name=SM:DNPSE1B]
	11	Tests the communication and detection of specific errors between the CI and each PF via the CF. [PR Name=SM:DNPSE2A]
12	Tests for communication with each equipped PF, tests the PF Processor Core (by testing BIST, Boundary Scan, SDRAM, L1 Cache, and MMU), the Packet Bridge FPGA device, and performs the SERDES port and link tests. [PR Name=SM:DNPSE2A]	

Table A1-112 — Diagnostic Phase Descriptions for PSU2e PSUCOM (5E18.1 and later) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	13	Tests the communication between the PF and each of the equipped and growth PHs, and tests the Error Lead functionality. [PR Name=SM:DNPSE2A]
	14	Tests the RST/CTS functionality between the PF and equipped PHs, and tests PB connectivity. [PR Name=SM:DNPSE2B]
	15	<i>(Demand phase only for factory and growth testing)</i> Tests the internal communication path on the PF for each unequipped PH. [PR Name=SM:DNPSE2B]
	16	<i>(Demand phase only for factory and growth testing)</i> Tests the RTS/CTS functionality on the PF for each unequipped PH. [PR Name=SM:DNPSE2B]
	17	<i>(Demand phase only for factory and growth testing)</i> Tests all the SDRAM memory for the CF and all equipped PFs. This test will take up to 30 minutes to run. [PR Name=SM:DNPSE2B]
	21	Tests the communication path between the CI and the DF via the CF, and tests the detection of specific errors between the DF and CF. [PR Name=SM:DNPS3]
	22	Tests the LPs ROM and RAM for the capability of the DF to be reset. [PR Name=SM:DNPS3]
	28	Tests the PLI associated with any DF2 equipped in the PSUCOM under test. [PR Name=SM:DNPS5]
	29	Tests the DFTS and PCTLI devices resident on the DF2 circuit pack. [PR Name=SM:DNPS6]
	30	Test interdevice connections, timing circuitry, and PHDB connections from a DF2 to equipped PHs. [PR Name=SM:DNPS6]
	31	<i>(Demand phase only for factory and growth testing)</i> Tests all memory locations in the DF's RAM memory. [PR Name=SM:DNPS6]

Table A1-113 — Diagnostic Phase Descriptions for iPS PSUCOM (5E20.1 and later)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUCOM (iPS)	-	iPS Packet Switch Unit Common Controller
	1	Verifies the PICB interface from the SMP to the PSUCOM CF (Control Fanout) pack under test. R/W operations from the SMP to the UCI device on the CF are performed to verify access. Both the Active and Standby PICB interface to the CF are verified.
	2	Verifies the ability of the SMP to directly access the UCI device on the CF. The SMP performs and verifies operations independent of the CF's processor.
	3	Verifies the ability of the CF to access the UCI and perform operations requested by the SMP.
	4	This phase will verify the PIDB (if equipped) and Packet Bus interface to the CF as well as the functionality of the CF itself. A suite of resident tests on the CF will be executed to verify the integrity of the pack. The Active and Standby Packet Bus and PIDB interfaces will be verified.
	5	Verifies the interfaces from the CF to each equipped PF and DF. This includes the CIB (Control Interface Bus) to each equipped PF and DF and the PIB (Packet Interface Bus) to each equipped PF. The CIBs and PIBs are bundled as one cable assembly from CF to each shelf.
	12	Verifies the functionality of the PFs equipped. A suite of tests resident on the PFs are executed to verify the integrity of the pack.
	13	Verifies the PF interface to equipped in-service PHs. The tests performed verify the PHCB (Control) and PHPB (Packet) interfaces. The tests are executed on each active or standby PH.
	28	Verifies the PCT interface from the SMP to the DFs equipped for the PSUCOM under test. This includes testing of the PLI and COTD boards which terminate the PCT.
	29	Verifies the internal functionality of the DFs equipped. The tests focus on the DFTSI and PCTLI devices on the DFs.

Table A1-113 — Diagnostic Phase Descriptions for iPS PSUCOM (5E20.1 and later)
(Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	30	Verifies the timing circuitry and PHDB (Data) interfaces on the DF. The PHDB interfaces to all equipped and in-service PHs from the DF under test are also verified.
	31	Verifies the internal DFTSI RAM by performing R/W operations to each RAM location. This phase is a Demand Only phase.

Table A1-114 — Diagnostic Phase Descriptions for PSUPH

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH (PH2/3/4/6/22)	-	Packet Switch Unit Protocol Handler Models 2, 3, 4, 6, and 22
	1	Tests the interface between the ACT PF and PH under test (TN1081 or TN1367). This includes the CB, and the CB and PB leads. [PR Name=SM:DNPH1]
	2	Tests the port processor side of the PH board. [PR Name=SM:DNPH1]
	3	Tests the HDLC processor of the PH under test. [PR Name=SM:DNPH1]
	4	Tests the DMA processor interfacing with the active and standby PSUCOM. Also, tests the PHDB bus from the PH under test to the active DF and for the TN1366, also test to the standby DF. [PR Name=SM:DNPH2]
	5	Tests the interfaces between the STBY PF and PH under test. [PR Name=SM:DNPH2]
	90	<i>(Demand phase only)</i> Tests the full range of memory using a high-coverage memory algorithm. [PR Name=SM:DNPH2]
	91	<i>(Demand phase only)</i> More exhaustive test of the SPORT chips on the TN1081 circuit pack. [PR Name=SM:DNPH2]

Table A1-114 — Diagnostic Phase Descriptions for PSUPH (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	92	<i>(Demand phase only)</i> Runs the same test sequences as phase 2 except each sequence is run as a separate segment to provide more data on failures. This phase is expected to be used primarily in the factory where the additional data may help in component-level fault isolation. This phase only applies to a TN1367 PH; a request for it on a TN1086 PH produces an NTR result. [PR Name=SM:DNPH2]
	93	<i>(Demand phase only)</i> Runs the same test sequences as phase 3 except each sequence is run as a separate segment to provide more data on failures. This phase is expected to be used primarily in the factory where the additional data may help in component-level fault isolation. This phase only applies to a TN1367 PH; a request for it on a TN1086 PH produces an NTR result. [PR Name=SM:DNPH2]

Table A1-115 — Diagnostic Phase Descriptions for PSUPH-ATM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH PHA (Secure Feature – SFID 224)	–	Packet Switch Unit Protocol Handler – Asynchronous Transfer Mode
	1	Tests the common portions of PBC core40 type circuit packs used in the PSU2. Tests are as follows: Verifies that communication to a PI from SMP is good. Verifies that initial pump of PBC is done. Tests ROM resident memory. Tests interfaces from PSU to PBC. Runs RAM resident tests of the PBC core.
	2	Tests the AMEX as follows: Runs BIST on both the AMEX and on its associated SRAM. Verifies communication between the AMEX and PBMACs. Checks AMEX capability to process cells into packets, and vice-versa, in the various transmit modes. Verifies OAM cell processing. Verifies AMEX ABORT capability. Checks AMEX scrubbing function and its capability to compose packets out of a mixed stream of cells. Tests packet bus holdoff capability and remaining registers.
	3	Tests the TERMINATOR and TRAC as follows: Verifies functionality of the TRAC. Verifies BIST on the TERMINATOR SRAM. Verifies TERMINATOR-AMEX interface. Checks TERMINATOR's cell transmission capability. Tests TERMINATOR registers. Runs different segments, depending on whether the PHA under test is in point-to-point or central stage ATM-fabric configuration.
	4	Tests the PHDB interface and SPI device as follows: Self-tests (BIST) STP device. Tests PHDB interface. Checks SOH/POH manipulations. Verifies PHDB-SOH/POH data interchangeability.
	5	(Due to optical link instability – <i>Demand phase only</i>) Causes all tests to be run on the terminator.
	6	(Due to optical link instability – <i>Demand phase only</i>) Cause all tests to be run on the terminator. This phase is intended for PHA growth and the optical transmitter to be fiber-optic looped to the optical receiver on the backplane-mounted optical paddleboard. If no signal is present on the optical receiver, this phase fails.

Table A1-116 — Diagnostic Phase Descriptions for PSUPH-Voice

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH PHV1/2/3/4	–	Packet Switch Unit Protocol Handler – Voice – PHV1, PHV2, PHV3, PHV4
	1	Tests the common portions of PBC core40 type circuit packs used in the PSU2. Tests are as follows: Verifies that communication to a PI from SMP is good. Verifies that initial pump of PBC is done. Tests ROM resident memory. Tests interfaces from PSU to PBC. Runs RAM resident tests of the PBC core.
	2	Sends messages to the resident code to execute tests on the vocoders and visa devices. Also, tests the visamux device (PHV4) to verify its capabilities and interfaces.
	3	Tests the “voice path” of the PHV. Signals are sent to the vocoders compressed and uncompressed by the same vocoder and the return signal is measured.
	4	<i>(Demand phase only)</i> This test is run to give more details of phase 1 failures.

Table A1-117 — Diagnostic Phase Descriptions for PSUPH-Voice-PHV7

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH PHV7	–	Packet Switch Unit Protocol Handler – Voice – PHV7
	1	Verify the control & packet interfaces to the PHV7 from the ACT PSUCOM. Once communication to the PHV7 has been verified, the pack's circuitry and device functionality will be verified. This includes: reset side select initialization device interconnects.
	2	Verify the PLI and it's interface to the SM. Both the ACT and STBY interface to the MCTSI will be verified. Once the interface to the MCTSI has been verified, the PLI internal circuitry and functionality will be tested.
	3	Verify the PHV7's higher level functions which support call processing. This includes call set-up, header and voice packet verification and DSP exercises. Control & packet interface to the STBY PSUCOM will also be verified.
	4	Verify the PLI to PHV7 interface over the PCT link. All the PCT link overhead registers and functions will be tested.
	5	This is a DEMAND phase and will not be executed during AUTO or MAN type requests unless the phase is specifically requested. Executes an exhaustive test algorithm on the circuit pack's DDR2 memory.
	6	Verifies optical XCVR ports 1, 2 and 3 which are not available on packs for field applications at this time. These ports are reserved for future application and can only be tested at the manufacturing facility. It requires all the optical XCVRs to be equipped and to have optical loopback cables installed before running this phase.

Table A1-118 — Diagnostic Phase Descriptions for PSUPH-GQPH

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH (PH33-GQPH)	-	Packet Switch Unit Protocol Handler – General QLPS Protocol Handler (GQPH)
	1	Verifies the interface between the active PF2, active CF2, standby PF2, standby CF2 and the Protocol Handler PowerPC (PHPPC) under test. This includes the control signal leads, the packet bus signal leads, interrupt signal leads, and side select signal leads. This phase also tests the PHPPC reset capability and the Protocol Handler Data Bus (PHDB) between the PHPPC and the DF2.
	2	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PowerPC based Protocol Handlers. This includes tests for the PHPPC SDRAM, MPC755 processor, Exception Handling, MPC107 and CUB, PCI, PBMAX, Memory Management Unit (MMU), and Data and Instruction Caches.
	3	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PH30 based PowerPC Protocol Handlers. This includes tests for the PH30 PCI interfaces, the Network Processor to PBMAX Interface, the Network Processor FPGA, the Network Processor's 8MBytes of SRAM, and the Network Processor's 128MBytes of SDRAM.
	4	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is specific to the PH33 application. This includes tests for the PH33 Application Network Processor and a test to verify that a paddleboard is not connected to PH33.
	5	(DEMAND ONLY PHASE) for all Protocol Handler PowerPC (PHPPC) circuit packs. Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PowerPC based Protocol Handlers that cannot run in an automatic phase but will be able to run in a demand phase. This phase will do a memory test of the entire SDRAM on the PHPPC under test.
	6	(DEMAND ONLY PHASE) for the PH33. Tests the PH33 circuitry that was not testable during an automatic phase.

Table A1-119 — Diagnostic Phase Descriptions for PSUPH-SIP PH

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH (PHE2-SIP PH)	-	Packet Switch Unit Protocol Handler – Session Initiation Protocol (SIP) Protocol Handler (PH)
	1	Verifies the interface between the active PF2, active CF2, standby PF2, standby CF2 and the Protocol Handler PowerPC (PHPPC) under test. This includes the control signal leads, packet bus signal leads, interrupt signal leads, and side select signal leads. This phase also tests the PHPPC reset capability and the Protocol Handler Data Bus (PHDB) between the PHPPC and the DF2.
	2	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PowerPC based Protocol Handlers. This includes tests for the PHPPC SDRAM, MPC755 processor, Exception Handling, MPC107 and CUB, PCI, PBMAX, Memory Management Unit (MMU), and Data and Instruction Caches.
	3	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PH30 based PowerPC Protocol Handlers. This includes tests for the PH30 PCI interfaces, the Network Processor to PBMAX Interface, the Network Processor FPGA, the Network Processor's 8MBytes of SRAM, and the Network Processor's 128MBytes of SDRAM.
	4	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is specific to the PHE2 application. This includes tests for the PHE2 Application Network Processor and the PHE2 Paddle Board.
	5	(DEMAND ONLY PHASE) for all Protocol Handler PowerPC (PHPPC) circuit packs. Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PowerPC based Protocol Handlers that cannot run in an automatic phase but will be able to run in a demand phase. This phase will do a memory test of the entire SDRAM on the PHPPC under test.
6	(DEMAND ONLY PHASE) for the PHE2. Tests PHE2 circuitry that was not testable during an automatic phase. This includes Manual Ethernet Loop around tests.	

Table A1-120 — Diagnostic Phase Descriptions for PSUPH-PHE3

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH (PHE3)	-	Packet Switch Unit Protocol Handler - Ethernet - PHE3
	1	Verifies the interface between the active PF, active CF, standby PF, standby CF and the Protocol Handler PowerPC (PHPPC) under test. This includes the control signal leads, the packet bus signal leads, interrupt signal leads, and side select signal leads. This phase also tests the PHPPC reset capability and the Protocol Handler Data Bus (PHDB) between the PHPPC and the DF.
	2	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PowerPC based Protocol Handlers. This includes tests for the PHPPC SDRAM, MPC755 processor, Exception Handling, MPC107 and CUB, PCI, PBMAX, Memory Management Unit (MMU), and Data and Instruction Caches.
	3	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PH30 based PowerPC Protocol Handlers. This includes tests for the PH30 PCI interfaces, the Network Processor to PBMAX Interface, the Network Processor FPGA, the Network Processor's 8MBytes of SRAM, and the Network Processor's 128MBytes of SDRAM.
	4	Verifies circuitry on the Protocol Handler PowerPC (PHPPC) that is specific to the PHE3 application. This includes tests for the PHE3 Application Network Processor and the PHE3 Paddle Board.
	5	(DEMAND ONLY PHASE) for all Protocol Handler PowerPC (PHPPC) circuit packs. This phase will be used to verify circuitry on the Protocol Handler PowerPC (PHPPC) that is common with all PowerPC based Protocol Handlers that cannot run in an automatic phase but will be able to run in a demand phase. This phase will do a memory test of the entire SDRAM on the PHPPC under test. This phase takes up to 20 minutes to run.
	6	(DEMAND ONLY PHASE) for PHE3. This phase will test PHE3 circuitry that was NOT testable during an automatic phase. This includes Manual Ethernet Loop around tests. This phase requires a loop-around cable on the paddle board prior to execution. Loop around tests.

Table A1-121 — Diagnostic Phase Descriptions for PSUPH-PHE4

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
PSUPH (PHE4)	-	Packet Switch Unit Protocol Handler - Ethernet - PHE4
	1	Verify the interface between the active PF4, active CF4, standby PF4, standby CF4 and the PHE4 under test. This includes the control signal leads, the packet bus signal leads, interrupt signal leads, and side select signal leads. This phase also tests the PHE4 reset capability, Active PF4 Initiated PHE4 Boundary Scan, Local PHE4 Boundary Scan, Network Processor FPGA BIST, the Network Processor's Bank 0 and 1 - 128 Mbytes of RLDRAM II, and Local SERDES BIST(Packet Bus).
	2	This phase tests the PHE4 SDRAM, MPC7410 processor, Exception Handling, MPC107 and PUC, PCI, Memory Management Unit (MMU), and Data and Instruction Caches.
	3	Verify circuitry on the PHE4 that is related to the Network Processor Subsystem.
	4	Verify circuitry on the Protocol Handler that is specific to the PHE4 application. This includes tests for the PHE4 Application Network Processor, the PM8374 DualPHY 1G SERDES Interface(External), and the PHE4 Ethernet Transmit and Receive Looparound.
	5	Demand Phase to test all 256 Mbytes of SDRAM.
	6	Demand Phase to run application specific diagnostics that require manual intervention. Tests PHE4 circuitry that is NOT testable during an automatic phase by running PHE4 Ethernet Frame Transmit and Receive tests with the PHE4 Ethernet Transmit connection looped around to the Ethernet Receive connection with the support of an external optical cable.

Table A1-122 — Diagnostic Phase Descriptions for QGP (CM2)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
QGP (CM2)	–	Quad-Link Gateway Processor (Communications Module 2)
	1	Tests power, interface between MSCU and QGP processor board; RAM that both MSCU and QGP IP can access (DAM).
	2	Tests QGP IP processor.
	3	Tests QGP AP processor.
	4	Tests interface between QGP processor board and QGP link board; QGP link and QGL cable.
	5	Tests verifies that QGP can be pumped.

Table A1-123 — Diagnostic Phase Descriptions for QLPS (CM2)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
QLPS (CM2)	–	Quad-Link Packet Switch
	1	Tests interface between TMS controller and QLPS board, BIST, registers, error propagation.
	2	Tests error detection (with and without sending packets through the TMS fabric).
	3	Tests RX detection of Level 2 errors, miscellaneous, QGL connectivity, Packet RAM (PRAM), Routing RAM (RR), stress testing (lots of packets), tests to check TMS fabric between QLPS and all other QLI/QLI2 boards in TMS.

Table A1-124 — Diagnostic Phase Descriptions for QLPS (CM3)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
QLPS (CM3)	–	Quad-Link Packet Switch
	1	AM and ONTC-AP communication; PRISM reset; PRISM device/PRAM BIST; PRISM secondary CSI.
	2	PRISM QTMSLNK; PRISM pointer monitor; PRISM packet reception.
	3	PRISM single broadcast; PRISM multiple broadcast; PRISM QGL.

Table A1-125 — Diagnostic Phase Descriptions for RAF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RAF (SM)	–	Recorded Announcement Function (Switching Module)
	1	Tests CI with ACT and STBY MCTSI. Completes ATP if STBY MCTSI is OOS. [PR Name=SM:DNUCI]
	2	Tests the internal functions of the UCI chip on the LDSU. [PR Name=SM:DNUCI]
	3	Tests the LP-UCI interface. [PR Name=SM:DNUCI]
	4	Tests LDSU bus interface to DSU2. [PR Name=SM:DNDSU2]
	5	Performs LP tests – interrupt controller, timers, parity, and write protect. [PR Name=SM:DNDSU2]
	6	Tests DSPs, SDI, and data to/from LDSU bus. [PR Name=SM:DNDSU2]
	7	Tests RAF memory. [PR Name=SM:DNDSU2]
8	Performs memory test. [PR Name=SM:DNDSU2]	

Table A1-126 — Diagnostic Phase Descriptions for RAU

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RAU (RSM)	–	Remote Alarm Unit (Remote Switching Module)
	1	Tests the entire RAU in the RSM. [PR Name=SM:DNRAU]

Table A1-127 — Diagnostic Phase Descriptions for RCLK

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RCLK (RSM)	–	Remote Clock (Remote Switching Module)
	1	Performs CLRT tests. [PR Name=SM:DN2NC1]
	2	Performs CCB tests. [PR Name=SM:DN2NC2]
	3	Performs controller and oscillator tests. [PR Name=SM:DN2NC3]
	4	Performs synchronizer board tests. [PR Name=SM:DN2NC4]
5	Performs DPLL and clock performance tests. [PR Name=SM:DN2NC5]	

Table A1-128 — Diagnostic Phase Descriptions for RLI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RLI (RSM)	–	Remote Link Interface (Remote Switching Module)
	1	ACT MP to DLI communication and interface tests. [PR Name=SM:DNPDLI1]
	2	Performs DLI internal function tests (I). [PR Name=SM:DNPDLI1]
	3	Performs DLI internal function tests (II). [PR Name=SM:DNPDLI1]
	4	ACT CI to FIU communication tests (TN835 and TN618). [PR Name=SM:DNFIU1]
	5	STBY CI to FIU communication tests (TN835 and TN618). [PR Name=SM:DNFIU2]
	6	ACT TSI to DLI interface tests. [PR Name=SM:DNPDLI2]
	7	STBY MP to DLI interface tests. [PR Name=SM:DNPDLI2]
	8	STBY MP SDLC to DLI interrupt and data tests. [PR Name=SM:DNPDLI2]
	9	STBY TSI to DLI interface (data loopback) tests. [PR Name=SM:DNPDLI3]
	10	Power switch/monitor tests. [PR Name=SM:DNPDLI3]
	13	Performs the FIU clock circuitry and controller board tests (TN835 and TN618). [PR Name=SM:DNFIU2]
	14	Performs the FIU – link A tests (TN834). [PR Name=SM:DNFIU3]
	15	Performs the FIU – link B tests (TN834). [PR Name=SM:DNFIU3]
	16	Performs the FIU – MUX A tests (TN619). [PR Name=SM:DNFIU4]
	17	Performs the FIU – MUX B tests (TN619). [PR Name=SM:DNFIU4]

Table A1-129 — Diagnostic Phase Descriptions for RPCN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RPCN (CNI)	–	Ring Peripheral Controller Node (Common Network Interface)
	1	Tests NP (TN922), IFB (TN915/TN1803) and ring bus cables.
	2	Tests NP (TN922), IFB (TN915/TN1803) and ring bus cables.
	10	Tests DSCH (KBN15 on active CU) interface to the DDSBS (TN69B).
	11	Tests DDSBS (TN69B) interface to the 3BI (TN914).
	12	Tests NP (TN922) interface to the 3BI (TN914). Interrupt test.
	13	Tests NP (TN922) interface to the 3BI (TN914). Communication test.
	14	<i>(Demand phase only)</i> Tests off-line DSCH (KBN15) interface to the DDSBS (TN69B). Note: Helper CU must be OOS and specified during diagnostics to get CATP results else NTR is returned.
	20	Tests NP (TN922) memory.
	23	Tests NP (TN922) parity generator.
	24	Tests NP (TN922) interrupt controller.
	26	Tests NP (TN922) DMA controller.
	27	Tests NP (TN922) programmable interval timer.
	30	Tests NP (TN922) node sanity.
	31	Tests RI0 (UN122) and RI1 (UN123) basic sanity.
32	Tests NP (TN922), IFB (TN915/TN1803). Neighbor node audit Ring-0. CATP when more than one node is isolated.	
33	Tests NP (TN922), IFB (TN915/TN1803). Neighbor node audit Ring-1. CATP when more than one node is isolated.	

Table A1-130 — Diagnostic Phase Descriptions for RPCN-IRN2

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RPCN- IRN2 (CNI)	–	Ring Peripheral Controller Node (Common Network Interface)
	1	Tests IRN2 (UN304/UN337B), IFB (TN1803), and ring bus cables.
	2	Tests IRN2 (UN304/UN337B), IFB (TN1803), and ring bus cables.
	10	Tests DSCH (KBN15 on active CU) interface to the DDSBS (TN69B).
	11	Tests DDSBS (TN69B) interface to the 3BI (TN914).
	12	Tests IRN2 (UN304/UN337B) interface to the 3BI (TN914). Interrupt test.
	13	Tests IRN2 (UN304/UN337B) interface to the 3BI (TN914). Communication test.
	14	(Demand phase only) Tests off-line DSCH (KBN15) interface to the DDSBS (TN69B). Note: Helper CU must be OOS and specified during diagnostics to get CATP results else NTR is returned.
	20	Tests IRN2 (UN304/UN337B) memory.
	30	Tests IRN2 (UN304/UN337B) node sanity.
	32	Tests IRN2 (UN304/UN337B), IFB (TN1803). Neighbor node audit Ring-0. CATP when more than one node is isolated.
	33	Tests IRN2 (UN304/UN337B), IFB (TN1803). Neighbor node audit Ring-1. CATP when more than one node is isolated.

Table A1-131 — Diagnostic Phase Descriptions for RRCLK

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RRCLK (SM)	–	Remote Real Clock (Switching Module)
	1	Checks CI/CLRT through DFI – RCLK PICB, CCB, microprocessor talk back and sanity timer. Diagnostics are resident in the R1DFI firmware. [PR Name=SM:DNRRCLK]
	2	Runs RCLK diagnostics that are resident in the RCLK firmware. The RAM and EPROM, the control latches, reference phase registers, DCO, clock generator, and interrupts are checked. [PR Name=SM:DNRRCLK]
	3	Tests the RCLK energy detector circuitry with diagnostics resident in RCLK firmware. Also tests clock's reference from each R1DFI and XCPL wire connecting RCLKs. [PR Name=SM:DNRRCLK]

Table A1-132 — Diagnostic Phase Descriptions for RUCI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RUCI (SM)	–	Remote Unified Control Interface (Switching Module)
	1	Same as phase 1 LDSU. [PR Name=SM:DNRUCI]
	2	Same as phase 2 LDSU. [PR Name=SM:DNRUCI]
	3	Same as phase 3 LDSU. [PR Name=SM:DNRUCI]

Table A1-133 — Diagnostic Phase Descriptions for RVPT

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
RVPT (SM)	–	Revertive Pulsing Transceiver (Switching Module)
	1	Tests failure alarm circuits on the RVPT board. [PR Name=SM:DNRPT1]
	2	Tests TSSR of RVPT pack. [PR Name=SM:DNRPT1]
	3	Tests the parity checker and parity generator of the RVPT. [PR Name=SM:DNRPT1]
	4	Tests the summary scan register on the RVPT. [PR Name=SM:DNRPT2]
	5	Performs run on-board self tests, test overflow bit, and test I/O address and data leads. [PR Name=SM:DNRPT2]
	6	Performs loop test calls through RVPT pack. [PR Name=SM:DNRPT2]

Table A1-134 — Diagnostic Phase Descriptions for SAS

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SAS	–	Service Announcement System
	1	Verifies control interface with active and mate MCTSI. Will CATP if mate MCTSI is OOS. [PR Name=SM:DNuci_1]
	2	Verifies all functions of the SASDSC UCI device that are accessible from the MCTSI. [PR Name=SM:DNuci_2]
	3	Tests the SASDSC LP-UCI interface. The diagnostic code is downloaded to the SASDSC through the PICB. [PR Name=SM:DNuci_3]
	4	Tests all the hardware components of the SASDSC. [PR Name=SM:DNdsc3_4]
	5	Tests SASMEM equipage, flash card equipage, and phrases stored in flash cards. [PR Name=SM:DNSas_5]
	6	<i>(Demand phase only)</i> Tests the programmability of each of the SASMEM flash cards if SAS CLI equals 0; tests the SDRAM of the CSCP-SAS if SAS CLI equals 1. [PR Name=DNSas_6]

Table A1-135 — Diagnostic Phase Descriptions for SCAN

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SCAN (SM)	–	Scan Circuits
	1	Tests the MSU scan pack with the exception of closing the scan points. [PR Name=SM:DNSCAN]
	2	<i>(Demand phase only)</i> Tests low state of scan points with no backplane connections. [PR Name=SM:DNSCAN]

Table A1-136 — Diagnostic Phase Descriptions for SCSDC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SCSDC (AM)	–	Scanner and Signal Distributor Controller (Administrative Module)
	1	Tests the request isolate control signal and acknowledge from PIC. [PR Name=DL:SCSDC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:SCSDC02]
	3	Tests the DAM parity checker. [PR Name=DL:SCSDC03]
	4	Tests the microdiagnostic. [PR Name=SCSDC04]

Table A1-137 — Diagnostic Phase Descriptions for SDFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SDFI (SM)	–	Subscriber Loop Carrier Digital Facility Interface (Switching Module)
	1	Tests CI/CLRT integrity. [PR Name=SM:DNDFIS1]
	2	Tests CCB integrity. [PR Name=SM:DNDFIS1]
	3	Tests μ C integrity. [PR Name=SM:DNDFIS1]
	4	Tests maintenance buffer integrity. [PR Name=SM:DNDFIS2]
	5	Tests LSI exercises I. [PR Name=SM:DNDFIS3]
	6	Tests LSI exercises II. [PR Name=SM:DNDFIS3]
	7	Tests facility alarm clock. [PR Name=SM:DNDFIS3]
	8	Tests TSI integrity. [PR Name=SM:DNDFIS4]
	9	Tests signaling and PCM data path test. [PR Name=SM:DNDFIS4]

Table A1-138 — Diagnostic Phase Descriptions for SDLC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SDLC (AM)	–	Synchronous Data Link Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:SDLC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:SDLC02]
	3	Tests the DAM parity checker. [PR Name=DL:SDLC03]
	4	Tests the microdiagnostic. [PR Name=SDLC04]

Table A1-139 — Diagnostic Phase Descriptions for SFI

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SFI (DNU-S)	-	STXS-1 Facility Interface (DNU-S) (Digital Network Unit – SONET)
	1	Tests the Internal Control Bus (ICB) from both CCs to the SFI, PCI device, the capability to read and write the general registers, the capability to detect PCIBUS errors, and the operation of each SFI reset mode. [PR Name=SM2K:DNUSSFI1]
	2	Tests the TSCs, drivers, encoders, receivers, upstream LOS detectors, upstream spare selection and early loopbacks to the spare and service TMUXs. Contains one task dedicated to duplicating the tests performed under PIST. This allows any PIST failures to be reproduced by OOS diagnostics. [PR Name=SM2K:DNUSSFI1]
	3	Tests the upstream and downstream relays, downstream LOS, SLI LOS, facility loopback capability, and the SLIs. If the mate SFI is not active, the SLI and second downstream relay (D2) tests are skipped and the phase completes CATP. [PR Name=SM2K:DNUSSFI1]
	9	Tests the upstream relay, secondary downstream relay, the service TIDB and the facility loopback capability for facilities in the GROW state using an external loopback manually applied to the SLI. [PR Name=SM2K:DNUSSFI1]

Table A1-140 — Diagnostic Phase Descriptions for SLIM2

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
SLIM2	–	Subscriber Line Instrument Measurement 2
	1	Tests: The interface between the MSUCOM circuit pack and the SLIM2 The capability to read/write SLIM2 registers The capability to generate/mask service requests and all seems well operation The four FIFO stacks The control field programmable gate array (FPGA) operation. [PR Name=SM:DN2SLM01]
	2	<i>(Demand phase only)</i> Tests microprocessor-related hardware like: RAM Pump RAM ROM Sanity timer. [PR Name=SM:DN2SLM02]
	3	<i>(Demand phase only)</i> Tests the DSP and DSP-related hardware like the RAM and FPGA interfaces. Background exercises are run on the DSP and microprocessor for a period of time. [PR Name=SM:DN2SLM03]
	4	Tests the analog hardware on the SLIM2 circuit pack. Similar to a linesman calling the SLIM2 self-test, but runs more detailed tests to obtain more information about the nature of the defect. [PR Name=SM:DN2SLM04]
	5	Uses the SLIM2 to perform a number of functional tests on the test termination on the SLIM2. Line capacitance, distance to open, foreign voltage, line insulation, and dial pulse distortion are checked. [PR Name=SM:DN2SLM05]
	6	Tests the operation of the four junctor access relays. Each junctor will be connected to the protocol circuit on the common board. [PR Name=SM:DN2SLM06]

Table A1-141 — Diagnostic Phase Descriptions for TAC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TAC (SM)	–	Test Access Circuit (Switching Module)
	1	Seizes CDI and finds ACT data side. Interconnects loop outgoing and incoming test circuits, normal battery loop open, and E&M signaling test. Trunk access network is tested in groups of four. Facility test network is tested. [PR Name=SM:DNTAC]
	2	Tests initialization of the T&A destination register and analog termination segment. The D/A converters are tested; the test reference and detector are tested; and a test for short circuits between the maintenance leads is performed. [PR Name=SM:DNTAC]

Table A1-142 — Diagnostic Phase Descriptions for TEN/TUCHBD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TEN/TUCHBD (SM)	–	Trunk Equipment Number/Trunk Unit Channel Board (Switching Module)
	1	Performs signaling test for the trunk circuit under test (for example, SN102, SN103, SN104, SN105, etc.). [PR Name= ^a]
	2	Performs transmission tests of the trunk circuit. Verifies correct operation of the CODEC, filter, and transformer. Completes CATP if either the STBY MCTSI or the TTFCOM is OOS. [PR Name= ^a]

Note(s):

a. The PR having listings for phases 1 and 2 depends on the type of trunk.

Where:

PR NAME = TRUNK TYPE

SM:DNLIN = Loop Start Input

SM:DNLOUT = Loop Start Output

SM:DN2EM = 2-Wire E & M

SM:DN4EM = 4-Wire E & M

SM:DNTLI = Toll Loop Start Input

SM:DNTLO = Toll Loop Start Output

SM:DNT2EM = Toll 2-Wire E & M

SM:DNT4EM = Toll 4-Wire E & M

SM:DNTST = Test Trunk

Table A1-143 — Diagnostic Phase Descriptions for TMS (CM2)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TMS ^a (CM2)	–	Time Multiplexed Switch (Communication Module 2)
	1	Tests the PSM boards and the interface between the FPC and the TMS2. [PR Name=FPC:DNC2TMS01]
	2	Tests the operation of the TMS2 controller (TN884, UN183, and TN881) and test the controllers CIC unit towards switching units. [PR Name=TMS:DNC2TMS02, and FPC:DNC2FTMS02]
	3	Tests communications between the controller and all UN182, KBN2, TN883, and TN888 boards and their registers. [PR Name=TMS:DNC2TMS03 and FPC:DNC2FTMS03] For the CM2C, the UN182, KBN2, TN883 and TN888 boards are changed to the TN1812 and TN1830 boards.
	4	Tests error detecting, propagational masking in KBN1/KBN5, KBN2, TN883, and TN884 boards. [PR Name=TMS:DNC2TMS04 and FPC:DNC2FTMS04] For the CM2C, the KBN1/KBN5, KBN2, TN883 and TN884 boards are changed to the TN1813 and TN1830 boards.
	5	Tests data paths in switch units using test function. [PR Name=TMS:DNC2TMS05 and FPC:DNC2FTMS05]
	6	Tests AUTISS function, KBN2 sequencing, and all fabric paths. [PR Name=TMS:DNC2TMS06, and FPC:DNC2FTMS06]
	11	<i>(Demand phase only for factory or growth testing)</i> Tests the NCT link receivers and transmitters. Requires fiber looparound straps installed at the TMS end or SM end of the NCT link. [PR Name=TMS:DNC2TMS11 and FPC:DNC2FTMS11]
	12	Tests the TMS fabric load/stress test. [PR Name=TMS:DNC2TMS12, and FPC:DNC2FTMS12]
	13	<i>(Demand phase only for factory or growth testing)</i> Tests NCT link receivers/transmitters. All links must have looparound straps installed at the TMS or SM end of the NCT links. All links are tested concurrently. This phase is a more exhaustive test than phase 11. [PR Name=TMS:DNC2TMS13 and FPC:DNC2FTMS13]

See note(s) at end of table.

Table A1-143 — Diagnostic Phase Descriptions for TMS (CM2) (Contd)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
	14 b (CM2)	(Demand phase to be run when an earlier phase fails with <i>Note No. 36</i> in its Suspected Faulty Equipment List. Does sectionalized testing of the E-bus circuits to produce a more accurate Suspected Faulty Equipment List. [PR Name=TMS:DNC2TMS14 and FPC:DNC2FTMS14])
	15	A manual diagnostic phase that does NCT link looparound tests from the TMS link board (TN888) to the local TRCU (TN1344) circuits interfacing links to ORMs. [PR Name=TMS:DNC2TMS15 and FPC:DNC2FTMS15] For the CM2C, the TN888 board is changed to the TN1830 board.
<p>Note(s):</p> <p>a. For CM3 offices, the TMS is tested as part of the ONTCCOM (prior to 5E16.2) or TMSFP (5E16.2 and later) diagnostic.</p> <p>b. In 5E14.1, the response from a TMS Phase 14 failure can display inappropriate circuit pack locations in the SUSPECTED FAULTY EQUIPMENT list. If the suspected circuit pack does not exist in the location displayed, look to another bay for a similar pack. This problem has been fixed in later releases.</p>		

Table A1-144 — Diagnostic Phase Descriptions for TMSFP

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TMSFP	–	Time-Multiplexed Switch Fabric Pair
	1	AM and ONTC-AP communication; TMSF reset; Primary CSI; Fuse alarm; Fan alarm.
	2	FMI reset; FMI BIST; FMI secondary CSI; FMI test function; FMI CPI; FMI CPTL/CTS.
	3	(On all TMSF/Xs) LIT48 reset; LIT48 BIST; LIT48 secondary CSI; FMI - LIT48 FDI links; PFI registers with disabled PFI strap.
	4	Internal loop-around of LIT48 - FMI.
	5	(On all TMSF/Xs) FMI - LIT48 - FMI TMS link-to-link internal loopback; FMI fabric.
	6	TRCU3 (NAR only).
	7	TMS link loopback.

Table A1-145 — Diagnostic Phase Descriptions for TMUX (DNU-S)

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TMUX (DNU-S)	–	Transmission Multiplexer (Digital Network Unit – SONET)
	1	Verifies the ICB interface (physical connection) from the CC to the TMUX. The ICB interface circuits (parity check, start code check, capability to force ASW errors) and the capability of the mate CC to access the TMUX are verified. [PR Name=SM2K:DNUSTX1]
	2	Verifies that all functions in the UCI on the TMUX that are accessible through the CC. This includes the FIFO circuitry, RAM, RAM parity checker/generation, and summary scan/error source/mailbox/mask registers. [PR Name=SM2K:DNUSTX1]
	3	Verifies the TMUX interface to the UCI. This includes the summary scan interrupts and masks, access to registers and interrupts in the hardware ESR for errors on the TMUX accesses. [PR Name=SM2K:DNUSTX1]
	4	Verifies the microprocessor-related circuitry on the TMUX including byte enables, timers, maskable interrupts and priority encoder, sanity timer, NMI circuitry, bus error circuitry, I/O write protection, RAM write protection, data parity checkers/generators, and on-chip cache. [PR Name=SM2K:DNUSTX1]
	9	Verifies the RAM on the TMUX. [PR Name=SM2K:DNUSTX1]
	11	Verifies the individual SONET devices for read/write parity and protocol errors and the connections of the STS-1 level devices to the VT level devices. Devices that have a built-in, self-test (BIST) are also run. [PR Name=SM2K:DNUSTX2]
	12	Verifies the transmission of SONET payloads through the SONET devices on the TMUX. The C1 overhead byte is used first to verify basic connections between devices. Then, different payloads with different signaling modes are looped through both the transmit and receive portions of each device and verified for accuracy. [PR Name=SM2K:DNUSTX2]
	14	Verifies the BPIB connections to the CD packs and the TDIB connections to the SFI packs. Parity generation/checking is verified for each link. [PR Name=SM2K:DNUSTX2]

Table A1-146 — Diagnostic Phase Descriptions for TTFCOM

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TTFCOM (SM)	-	Transmission Test Facility Common (Switching Module)
	1	Tests failure alarm and system maintenance functions associated with the interface board. [PR Name=SM:DNTFC1]
	2	Tests failure alarm and system maintenance functions associated with the processor board. [PR Name=SM:DNTFC1]
	3	Tests failure alarm and system maintenance functions associated with the tone generator Digital Signal Processor (DSP) board (TN304 or TN304B). [PR Name=SM:DNTFC1]
	4	Tests failure alarm and maintenance functions associated with the measurement. The DSP board fails if the dip switches on TN304 or TN304B are configured incorrectly. [PR Name=SM:DNTFC1]
	7	Tests parity check circuit on the interface board. [PR Name=SM:DNTFC1]
	8	Tests firmware's capability to generate a summary scan interrupt. [PR Name=SM:DNTFC2]
	9	Tests write/read of the firmware's pseudo Time Slot Select Register (TSSR). [PR Name=SM:DNTFC2]
	10	Tests parity generator. [PR Name=SM:DNTFC2]
	11	Tests the reset function and verifies the TTF's reports. [PR Name=SM:DNTFC2]
	12	Tests the TTF tone sources – looped back to the TTF responder. Dummy test – if the CLI is equal to 0. [PR Name=SM:DNTFC2]
	13	Tests send and receive paths of each responder and PTC tone detector in the TTF. Dummy test – if the CLI is equal to 0. [PR Name=SM:DNTFC2]
	14	Tests AGC function of the PCT tone detector and the operation of the CDA tone detector. Dummy test – if the CLI is equal to 0. [PR Name=SM:DNTFC2]
	15	Tests receive path of each TT test function in the TTF. Dummy test – if the CLI is equal to 0. [PR Name=SM:DNTFC2]

Table A1-147 — Diagnostic Phase Descriptions for TTYC

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
TTYC (AM)	–	Teletypewriter Controller (Administrative Module)
	1	Tests the request isolate control signal and the control signal acknowledge from the PIC. [PR Name=DL:TTYC01]
	2	Tests the read/write access of the DAM. [PR Name=DL:TTYC02]
	3	Tests the DAM parity checker. [PR Name=DL:TTYC03]
	4	Tests the microdiagnostic. [PR Name=DL:TTYC04]

Table A1-148 — Diagnostic Phase Descriptions for UCONF

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
UCONF (SM)	–	Universal Conference Circuit (Switching Module)
	1	Tests failure alarm circuits. [PR Name=SM:DNCONF1 (for three-port) or SM:DN6CONF1 (for six-port)]
	2	Test the TSSRs. [PR Name=SM:DNCONF1 (for three-port) or SM:DN6CONF1 (for six-port)]
	3	Tests the parity checker. [PR Name=SM:DNCONF1 (for three-port) or SM:DN6CONF1 (for six-port)]
	4	Tests the parity generator. [PR Name=SM:DNCONF2 (for three-port) or SM:DN6CONF2 (for six-port)]
	5	Performs functional tests, using static data sent from the TSI alternate data RAM. [PR Name=SM:DNCONF2 (for three-port) or SM:DN6CONF2 (for six-port)]

Table A1-149 — Diagnostic Phase Descriptions for UTD

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
UTD (SM)	–	Universal Tone Decoder (Switching Module)
	1	Tests failure alarm circuits associated with the UTD. [PR Name=SM:DNCUTD1]
	2	Tests the TSSR. [PR Name=SM:DNCUTD1]
	3	Tests the parity checker. [PR Name=SM:DNCUTD1]
	4	Tests SSR, tone decoder, and read and write control registers. [PR Name=SM:DNCUTD2]
	5	Performs functional tests with tones from the UTG looped back to the UTD. [PR Name=SM:DNCUTD2]

Table A1-150 — Diagnostic Phase Descriptions for UTG

DIAGNOSTIC ID	PHASE	DESCRIPTION/WHAT IS TESTED
UTG (SM)	-	Universal Tone Generator (Switching Module)
	1	Tests the failure alarm circuits. [PR Name=SM:DNUTG1]
	2	Tests the TSSR. [PR Name=SM:DNUTG1]
	3	Tests the parity generator. [PR Name=SM:DNUTG1]

GLOSSARY

These abbreviations, acronyms, and terms are used in this information product.

ABER	Acceptable Bit Error Rate
ACCED	Access Editor
ACP	Alarm Control Process
ACNR	Automatic Critical Node Recovery
ACSR	Automatic Customer Station Rearrangement
ACT	ACTIVE Grid State
ADP	Automatic Diagnostics Process
AGC	Automatic Gain Control
AIM	Application Integrity Monitor
AIU	Access Interface Unit
AIS	Alarm Indication Signal
ALCB	Access Link Control Block
ALE	Automatic Line Evaluation
ALIT	Automatic Line Insulation Test
AM	Administrative Module
AMA	Automatic Message Accounting
AMADL	Automatic Message Accounting Data Link
AMARC	Automatic Message Accounting Recording Center
AMATPS	Automatic Message Teleprocessing System
APPLVL	Application Initialization Level Counter
APC	Application Controller
APR	Automatic Power Recovery
APT	Automatic Progression Testing
ARR	Automatic Ring Recovery
ASC	Alarm Status Circuit
ASM	Administrative Services Module
ASU	Alarm Status Unit
ATP	All Tests Passed
ATTS	Automatic Trunk Test Scheduler
AUTISSING	Automatic Time-Slot Switching
BDL	Bootstrapper DLI interface circuit
BE	Block Error
BERT	Bit Error Rate Test
BI	Batch Insert

BIST	Built-In Self Test
BLKSZ	Block Size
BOLO	Back Out Last Official
BR	Batch Review
BRI	Basic Rate Interface
BSN	Bus Service Node
BST	Basic Services Terminal
BTSR	Bootstrapper
BUD	Backup Update Data Base
BWM	Broadcast Warning Message
C/D	Control and Display
CA	Call Appearance
CAICOM	Call Appearance ICOM
CAM	Content-Addressable Memory
CAMA	Centralized Automatic Message Accounting
CAROT	Centralized Automatic Reporting on Trunks
CATP	Conditional All Tests Passed
CC	Common Control
CCB	Channel Control Block
CCP	Common Control Processor
CCS	Common Channel Signaling
CD	Common Data
CDA	Configuration Status Audit
CDX	Compact Digital Exchange
CE	Customer Engineer
CFGSTAT	Configuration Status
CGA	Carrier Group Alarm
CH	Channel
CHAN	Channel
CI	Control Interface
CIB	Control Interface Bus
CKT	Circuit
CLI	Change Level Indicator
CLNK	Communication Link
CLRT	Communication Link Receiver/Transmitter
CLR	Clear

CM	Communication Module
CMCU	Communication Module Control Unit.
CMD	Command
CMP	Communication Module Processor
CMU	Communications Module Unit
CN	Change Notice
CNI	Common Network Interface
CNIDBOC	Common Network Interface Data Base Consolidator
CNR	Critical Node Recovery
CNTL	Control
CO	Central Office
COMDAC	Common Data and Control
CONCEN	Concentrator
CONT	Controller
CORC	Customer-Originated Recent Change
CP	Central Processor
CPE	Customer Premises Equipment
CPI	Central Processor Intervention
CPS	Circuit Pack Schematic
CRC	Cyclic Redundancy Check
CSCANS	Customer Service Computer Access Network System
CSD	Circuit Switched Data
CSOP	Craft Spooler Output Process
CSU	Cache Store Unit
CSV	Circuit Switched Voice
CTS	Control Time Slot; or, Customer Technical Support, part of Technical Support Services (TSS).
CTTU	Centralized Trunk Test Unit
CU	Channel Unit
CU	Control Unit
CUD	Current Update Data Base
DA	Direct Audit
DACS	Digital Access Cross Connect System
DAM	Dual Access Memory
DAP	Display Administration Process
DAS/C	Directory Assistance System/Computer
DAT	Digital Audio Tape

DBM	Data Base Manager
DCI	Dual Serial Channel Computer Interconnect
DCLU	Digital Carrier Line Unit
DCMS	Design Change Management System
DCS	Digital Cross Connect System
DCTU	Directly Connected Test Unit
DCTUCOM	DCTU Common Control
DEN	Digital Equipment Number
DFC	Disk File Controller
DF	Digital Facility
DFI	Digital Facility Interface
DFI2	Digital Facility Interface - Model 2
DFIH	Digital Facility Interface Host
DFIR	Digital Facility Interface Remote
DG	Data Group
DFSA	Disk File System Access
DGN	Diagnostic, diagnose
DGR	Degraded Grid State
DGRF	Degraded Forced
DI	Data Interface
DIOP	Disk Independent Operation
DLC	Digital Loop Carrier
DLI	Dual Link Interface
DLM	Disk Limp Mode
DLN	Direct Link Node
DLTU	Digital Line Trunk Unit
DLTUH	DLTU Host
DLTUR	DLTU Remote
DMA	Direct Memory Access
DMERT	Duplex Multiple Environment Real Time Operating System
DMI	Dual Message Interface
DNU-S	Digital Network Unit - SONET
DNUSCC	Digital Network Unit - SONET Common Control
DNUSCD	Digital Network Unit - SONET Common Data
DMQ	Diagnostic Message Queue
DN	Directory Number

DOC	Dynamic Overload Control
DS0	Digital Signal Level 0
DSC	Digital Service Circuit
DSIG	Direct Signaling
DSL	Digital Subscriber Line
DSLG	Digital Subscriber Lines Group
DSN	Defense Services Network
DSP	Digital Signal Processor
DSU	Digital Service Unit
DSU2	Digital Service Unit - Model 2
DSU3	Digital Service Unit - Model 3
DT	Distant Terminal
DTO	Distance to open circuit
DTA	Dial-Through Announcement
DUC	Dual Access Utility Circuit
DUP	Disk Unit Package
EA	Emergency Action
EADAS	Engineering and Administration Data Acquisition System
EAI	Emergency Action Interface
EAN	Equipment Access Network
ECD	Equipment Configuration Data
ECD/SG	Equipment Configuration Data/System Generation
EDC	Error Detection and Correction
EIS	External Information System
EKTS	Electric Key Telephone Service
ELI	Electrical Line Interface
ELS	Electronics Loop Segregation
ENETWK	Ethernet Network (MSGs)
EOB	End Of Block, or End Of Buffer
EOC	Embedded Operations Channels
EOF	End Of File, or End Of Frame
EOL	End Of List
ERL	Echo-Return Loss
ESAC	Electronic Switching Assistance Center
ESD	Electrostatic Discharge
ESM	External Sanity Monitor

ESP	Essential Service Protection
ETL	Equipment Test List
FA	Fuse Alarm
FAB	Fabric Exercise
FABEX	Fabric Exerciser
FAC	Facility
FELP	Far-End Loop
FEX	Feature Execution
FI	Facility Interface
FIDB	Facility Interface Data Bus
FMGR	File Manager
FPC	Foundation Peripheral Controller
FGPA	Field Programmable Gate Array
FPI	Full Process Initialization
FSDB	File System Debugger
FTS	Field Test Set
GDSU	Global Digital Service Unit
GDSF	Global Digital Services Function
GDSUCOM	GDSU Common Control
GDY	Gated Diode Crosspoint
GDYACC	Gated Diode Crosspoint Access
GDYXC	Gated Diode Crosspoint Compensator
GDYCON	Gated Diode Crosspoint Control
GIDB	Group Interface Data Bus
GPDF	Global Power Distribution Frame
GQPH	General QLPS Protocol Handler
GRASP	Generic Access Package
HDFI	Host Digital Facility Interface
HLSC	High-Level Service Circuit
HOBIC	Hotel Billing Information Center
HOBICR	HOBIC Record-Quote Data Link
HOBICV	HOBIC Voice-Quote Data Link
HOBIS	Hotel Billing Information System
HSM	Host Switching Module
HW	High and Wet; Hardware
Hz	Hertz (Unit of Frequency)

I/O	Input/Output
ICB	Internal Control Bus
ICOM	Intercom
IDCU	Integrated Digital Carrier Unit
IDCU COM	IDCU Common Board
IDUMP	Interactive Dump Utility
IFAC	IDCU Facility
ILEN	IDCU Line Equipment Number
IM	Interface Module
IMS	Interprocess Message Switch
INIT	Initialization
IOP	Input/Output Processor
IP	In Progress; Internet Protocol
ISDN	Integrated Services Digital Network
ISLU	Integrated Services Line Unit
ISLU2	Integrated Services Line Unit - Model 2
ISLUCC	ISLU Common Controller
ISLUCD	ISLU Common Data
ISLULC	ISLU Line Card
ISLULGC	ISLU Line Group Controller
ISLUMAN	ISLU Metallic Access Network
ISLURG	ISLU Ringing Generator
ISM	Integrated Services Module
ISTF	Integrated Services Test Function
KW	Keyword
LASS	Local Area Signaling Service
LC	Line Card
LCC	Line Class Code
LCCB	Logical Channel Control Block
LCEN	Line Card Equipment Number
LCN	Line Card Number
LDFT	Load Disk From Tape
LDSF3	Local Digital Service Function 3
LDSU	Local Digital Service Unit
LDSUCOM	LDSU Common Control
LDT	Lightwave Data Transceiver

LED	Light Emitting Diode
LEN	Line Equipment Number
LG	Line Group
LGC	Line Group Controller
LI	Line Interface
LIM	Local Interface Module
LLA	Low-Level Access
LN	Link Node
LNGRP	Line Group
LSI	Loop Side Interface
LSM	Local Switching Module
LSS	Line Security Scan
LTP	Logical Test Port
LU	Line Unit
LUCHAN	Line Unit Channel Circuit
LUHLSC	Line unit high-level service circuit
LUPEX	Line Unit Path Exerciser
MA	Metallic Access
MAB	Metallic Access Bus
Manual Page	An output message or input message (no matter how many screens or sheets of paper are used to complete the description).
MCC	Master Control Center
MCRT	Maintenance Cathode Ray Terminal
MCTSI	Module Controller and Time Slot Interchanger
MTC	Magnetic Tape Controller
MCTU	Module Controller and Time Slot Interchange Unit
MCTU2	Module Controller and Time Slot Interchange Unit - Model 2
MD	Message Delivery
MDF	Main Distributing Frame
MDII	Machine Detected Interoffice Irregularity
MEM	Member
MF	Multifrequency
MFFU	Module Fuse Filter Unit
MHD	Moving Head Disk
MHEIB	Message Handler for Ethernet Interface Board
MI	Message Interface
MIB	Message Interface Bus

MI/NC	Message Interface/Network Clock
MINMODE	Minimum Configuration Mode
MLHG	Multiline Hunt Group
MLT2	Mechanized Loop Testing System Generation 2
MM	Mismatch
MML	Man-Machine Language
MMP	Module Message Processor
MOOS	Manual Out of Service
MOR	Manual Over-Ride; a momentary rocker switch that overrides the OFF lockout for emergency power off.
MP	Module Processor
MSCU	Message Switch Control Unit
MSGCLS	Message Class
MSGS	Message Switch
MSPU	Message Switch Peripheral Unit
MSU	Metallic Service Unit
MSUCOM	MSU Common
MT	Magnetic Tape
MTB	Metallic Test Bus
MTIB	Metallic Test Interface Bus
MTIBAC	Metallic Test Interface Bus Access
MTTY	Maintenance Teletypewriter
MTTYC	Maintenance Teletypewriter Controller
NC	Network Clock
NCT	Network Control and Timing
NEN	DNU-S Networking Equipment Number
NLI	Network Link Interface
NM	Network Management
NMI	Nonmaskable Interrupt
NO2SES	No. 2 Service Evaluation System
NT1	Network Termination 1
NTR	No Tests Run
OAP	OSPS Administrative Processor
OC3	Optical Carrier - Level 3
OC3C	OC3 Concatenated
ODBE	Office Data Base Editor
ODD	Office Dependent Data

OFFN	Off Normal
OFI	Optical Facility Interface
OFI—IP	Optical Facility Interface —Internet Protocol
OFI PG	OFI Protection Group
OIU	Optical Interface Unit
OIU-IP	Optical Interface Unit - Internet Protocol
OIUUDP	Optical Interface Unit - User Datagram Protocol
ONL	On-line
ONTC	Office Network Timing Complex
ONTCCOM	Office Network Timing Complex Common
OOD	Out-of-Date
OOS	Out-of-Service
OOSF	Out-of-Service Family
OOSP	Out-of-Service Power
OOST	Out-of-Service Transient
OPD	Outpulse Digits
OPT	Operator Position Terminal
ORM	Optically Remote Module
OS	Operating System
OSC	Operator Service Center
OSDS	Operating System for Distributed Switching
OSPS	Operator Services Position System
OSPSDA	OSPS Directory Assistance
OSPSRC	OSPS Recent Change
OSPSTA	OSPS Toll and Assistance
OTC	Operating Telephone Company
OTF	Operational Test Failure
OXU	Optical eXtended control and interface Unit
PAS	Protected Application Segment
PC	Peripheral Controller
PCFD	Power Control Fuse Distribution
PCM	Pulse Code Modulation
PCN	Product Change Notice
PCT	Peripheral Control and Timing
PDB	Packet Data Bus
PDBTS	PDB Time Slot

PDF	Power Distribution Frame
PER	Protocol Error Records
PFR	Peripheral Fault Recovery
PF	Packet Fanout
PG	Protection Group
PGTC	Pair Gain Test Controller
PH	Protocol Handler, or Phase
PHDB	Protocol Handler Data Bus
PIB	Packet Interface Bus
PICB	Peripheral Interface Control Bus
PID	Process Identification
PIDB	Peripheral Interface Data Bus
PKT	Packet
PLI	Peripheral Link Interface
PLS	Protection Line Switch
PMU	Precision Measurement Units
PN	Private Network
POP	Point of Presence
POTS	Plain Old Telephone Service
PPC	Pump Peripheral Controller
PR	Program listing
PRF	PIDB Receive Formatter
PRM	Processor Recovery Message
PSM	Position Switching Module
PSS	Programmer Support System
PSU	Packet Switch Unit
PSUCOM	PSU Common Controller
PSUPH	PSU Protocol Handler
PTI	PIDB Time Slot Interchanger
PTS	Peripheral Time Slot
PVC	Permanent Virtual Circuit
PVN	Private Virtual Network
QGL	QLPS - QGP Link
QGP	QLPS Gateway Processor
QLNK	QLPS Link
QLPS	Quad Link Packet Switch

QLPSNW	QLPS Network
QPH	Quad Link Packet Switch (QLPS) Protocol Handler
QPIPE	QLPS Pipe
QTMSLNKS	QLPS Pseudo TMS Links
QUICC	QUad Integrated Communicaitons Controller
RAF	Recorded Announcement Function
RAS	Remote Alarm Section
RC	Recent Change
RCL	Remote Communication Link
RCLK	Remote Clock
RC/V	Recent Change/Verify
RDFI	Remote Digital Facility Interface
REX	Routine Exercise
RFAC	Remote Facility
RG	Ring ground
RISLU	Remote Integrated Services Line Unit
RLI	Remote Link Interface
RMAS	Remote Memory Administration System
RN	Ring-Node
RNC	Ring-Node Cabinet
ROH	Receiver Off-Hook
ROP	Receive-Only Printer
ROS	Request Out of Service
ROTL	Remote Office Test Line
RPCN	Ring Peripheral Control Node
RPT	Repeat
RSM	Remote Switching Module
RST	Restore
RT	Remote Terminal
RTFAC	Remote Terminal Facility
RTR	Real-Time Reliable
RTRS	Real-Time Rating System
RTTU	Remote Trunk Test Unit
RT&M	Remote T&M
SAM	Stand-alone Monitor
SAS	Service Announcement System

SBUS	SCSI Bus
SCANS	Software Change Administration and Notification System
SCB	Stack Control Block
SCC	Switching Control Center
SCCS	Switching Control Center System
SCSI	Small Computer System Interface
SCTP	Stream Control Transmission Protocol
SDFI	Subscriber Loop Carrier Digital Facility Interface
SDL	Synchronous Data Link
SDLC	Synchronous Data Link Controller
SEG	Segment
SFI	STSX-1 Facility Interface
SG	Service Group
SI	Selective Initialization
SID	Site Identification Number
SIM	System Integrity Monitor
SIP	Session Initiation Protocol
SIP—PH	Session Initiation Protocol - Protocol Handler
SIP-T	Session Initiation Protocol for Ethernet Termination
SLEN	Subscriber Loop Carrier Line Equipment Number
SLI	STSX-1 Link Interface
SLIM-2	Subscriber Line Instrument Measurement -2
SM-2000	Switching Module-2000
SM	Switching Module
SMD	Storage Module Device
SMP	Switching Module Processor
SODD	Static ODD
SONET	Synchronous Optical Network
SONIC	System-Oriented Network Interface Controller
SPD	Secondary Power Distribution
SPID	Service Profile Identifier
SPYDER	Synchronous/asynchronous protocol data formatter
SRAM	Synchronous Random Access Memory
SRC	Software Recovery Control
SSA	Summary Status Area
STE	SONET Termination Equipment

STEFAC	SONET Terminating Equipment Facility
STF	Some Tests Fail
STLWS	Supplementary Trunk and Line Work Station
STS	Synchronous Transport Signal
STS3C	Synchronous Transport Signal - Level 3 Concatenated
SUIB	Sub Unit Interface Bus
SXS	Step-by-Step
SYSSTAT	System Status
T&M	Talk and Monitor
T&R	Tip and ring
TAP	Trouble Analysis Procedure
TAU	Test Access Unit
TCAP	Transaction Capability
TCTS	TRCU Control Time Slot
TEI	Terminal Endpoint Identifier
TEN	Trunk Equipment Number
TG	Tip ground
TGN	Trunk Group Number
TID	Terminal Identifier
TIDB	Transmission Interface Data Bus
TKGMN	Trunk Group and Member Number
TLWS	Trunk and Line Work Station
TM	Terminal Maintenance
TMC	Time Slot Management Channel
TMCU	Time Multiplexed Control Unit
TMO	Delay threshold time
TMP	Transmission Measurement Plan
TMS	Time Multiplexed Switch
TMSLNK	TMS Link
TMSU	Time Multiplexed Switch Unit
TMUX	Transmission Multiplexer
TOPAS	Testing, Operations, Provisioning, and Administration System
TP	Test Position
TRCU	Transmission Rate Converter Unit
TRCUPATH	TRCU Path from host TRCU to remote TRCU
TRCURMK	TRCU Remark

TRG	Tip and Ring to Ground
TRM	Transmissionless Remote Module
TRM	Two-Mile Optically Remoted Module
TSDKEY	Time Slot Data Block Key
TS	Time Slot
TSI	Time Slot Interchanger
TSICOM	Time Slot Interchange Common
TSIG	Trunk Signaling
TSIS	Time Slot Interchange Slices
TSIU	Time Slot Interchanger Unit
TSSR	Time Slot Select Register
TTF	Transmission Test Facility
TTYC	Teletypewriter Controller
TU	Trunk Unit
UC	Utility Circuit
UCB	Unit Control Block
UCL	Unconditional
UCONF	Universal Conference Circuit
UCI	Unified Control Interface
UDP	User Datagram Protocol
UID	Utility Identification
UNEQ	Unequipped
UNIQ	Uniqueness Field - OSDS
UNVP	Unavailable Power
UPEDCUD	Current Update Data Base and History File Editor
USPID	User Service Profile Identifier
UTD	Universal Tone Decoder
UTG	Universal Tone Generator
VBS	Voiceband Signaling
VCDX	Very Compact Digital Exchange
VDT	Video Display Terminal
VERTPOS	Vertical Position
VT	Virtual Tributary, or virtual terminal
VTG	Virtual Tributary Group
VTM	Virtual Tributary Member

WB **Wideband**

NUMERICAL

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