555-4001-021

Meridian 1 Options 201, 211

Meridian SL-100

MCRU Services Guide

BCS36 and up   Standard 01.02   April 1995

northern telecom

Meridian 1 Options 201, 211

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MCRU Services Guide

Publication number: 555-4001-021
Product release: BCS36 and up
Document release: Standard 01.02
Date: April 1995

Publication history

April 1995

Revision 01.02. Revision 01.02. released to incorporate changes to the international market. Also adds information pertaining to translations, Operational Measurements (OMs), and logs.

February 1995

Revision 01.01. Standard release issued. Information reflects operations, maintenance, and recovery information in the implementation of the MCRU in the Australian market for BCS-36.

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About this document

When to use this document

This Meridian Cabinetized Remote Unit (MCRU) services guide provides: overview, signaling, and hardware information for understanding the MCRU product and operation; recovery procedure for returning to service an MCRU from a completely out-of-service condition; alarm clearing procedures for clearing an MCRU alarm condition at the MAP; card replacement procedures for removing and replacing hardware modules in the MCRU as part of maintenance, verification, or acceptance procedures; trouble locating and clearing information for locating and clearing problems beyond the scope of other maintenance procedures; routine maintenance procedures for performing scheduled routine and preventive maintenance tasks. Information in this chapter and throughout this document concerning Emergency Stand-Alone (ESA) operation are for future requirements. The information in this services guide is intended for operating company personnel engaged in MCRU maintenance in the Australian market.

How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new software release. For example, the first release of a document is 01.01. In the *next* software release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but rereleased in the *same* software release cycle. For example, the second release of a document in the same software release cycle is 01.02.

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in *MSL-100 Master Index of Publications*, 555-4031-001.

References in this document

The following documents are referred to in this document:

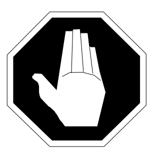
- *Alarm Clearing Procedures, 555-4031-543*
- *Card Replacement Procedures, 555-4031-547*
- *DMS-100 Provisioning Manual, 297-1001-450*
- *Input/Output System Reference Manual*, 297-1001-129
- *Operational Measurements Reference Manual, 555-4031-814*
- *Translations Guide, 555-4031-350*

What precautionary messages mean

The types of precautionary messages used in NT documents include danger, warning, and caution messages. Danger, warning, and caution messages indicate possible risks.

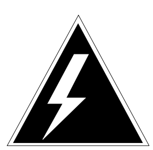
Examples of the precautionary messages follow.

DANGER Possibility of personal injury



DANGER
Risk of electrocution
Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed. The inverter contains high-voltage lines. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

WARNING Possibility of equipment damage



WARNING
Damage to the backplane connector pins
Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.

CAUTION Possibility of service interruption or degradation

> **CAUTION**
> **Possible loss of service**
> Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

>BSY

Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

>BSY CTRL

Variables

Variables are shown in lowercase letters:

>BSY CTRL ctrl_no

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

Responses

Responses correspond to the MAP display and are shown in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.
FP 3 Busy CTRL 0: Command passed.
```

The following excerpt from a procedure shows the command syntax used in this document:

1 Manually busy the CTRL on the inactive plane by typing

>BSY CTRL ctrl_no
and pressing the Enter key.

where

ctrl_no is the number of the CTRL (0 or 1)

Example of a MAP response:

```
FP 3 Busy CTRL 0: Command request has been submitted.
FP 3 Busy CTRL 0: Command passed.
```

MCRU overview

The Meridian Cabinetized Remote Unit (MCRU) is a remote peripheral that provides extended geographic coverage for the MSL-100 switch. The MCRU is configured to operate at a distance of up to 160.9 km (100 mi) from the host office.

The MCRU contains hardware and software maintenance components that perform routine audits and identify malfunctions in the following:

- MCRU
- PCM-30 links that connect the MCRU to the host controller
- subscriber lines

Functional overview

The MCRU provides an interface for two to six PCM-30 links from a PCM-30 line group controller (PLGC), line trunk controller (LTC), remote cluster controller (RCC), remote cluster controller2 (RCC2), and up to 640 subscriber lines connected locally.

Note: When interfacing an RCC or RCC2 in the remote-off-remote configuration, software package NTX381AA is required.

This chapter contains both a hardware and software overview of the MCRU configuration.

Hardware description

This section is intended to give the maintenance engineer an understanding of how the different hardware components of the MCRU interact for maintenance troubleshooting. The following paragraphs describe the hardware necessary for the Meridian Cabinetized Remote Unit, NTNX14AA, feature package.

General configuration

The MCRU is housed in a standard MSL-100 switch single-bay equipment frame. The MCRU frame contains the following main components:

- standard dual-shelf international line concentrating module (ILCM)

- single-shelf remote maintenance module (RMM)
- host interface equipment (HIE) shelf
- frame supervisory panel (FSP)

The lower part of the frame contains the ILCM, consisting of two line concentrating arrays (LCA). The LCAs are accompanied by cooling baffles and fuse panels. The upper part of the MCRU frame contains the HIE shelf, the RMM shelf, and the FSP. The FSP provides power control and alarm circuits for the ILCM, HIE, and RMM shelves and for the ringing generators (RG) in the HIE shelf. See the MCRU frame, shelf, and panel arrangement figure for the layout of the MCRU equipment frame.

International Line concentrating module

The ILCM occupies shelf positions 05 and 19 of the MCRU frame. The dual unit ILCM contains two LCA shelves. LCA-0 is always the bottom array or shelf and LCA-1 is the top array of the ILCM.

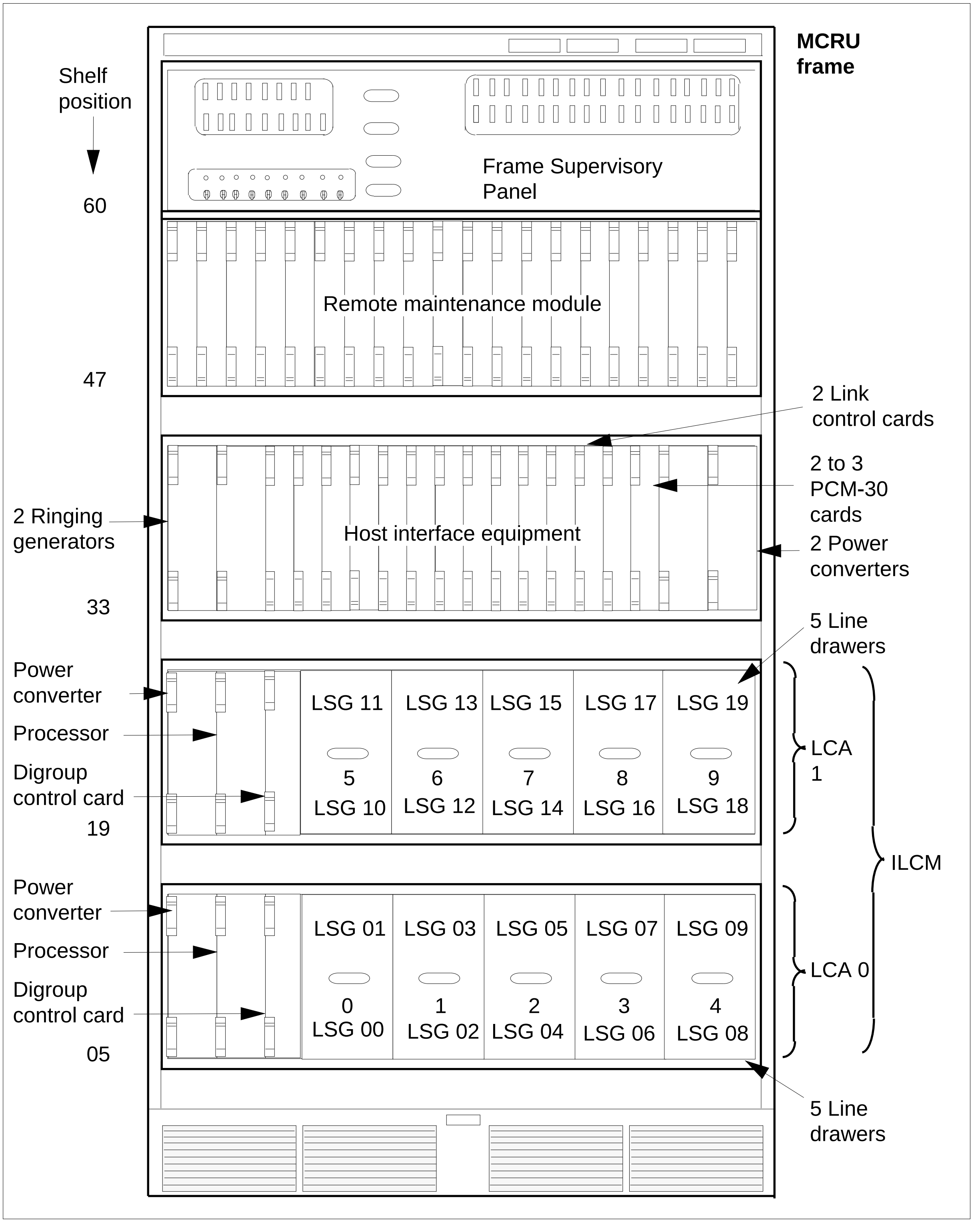
Baffle and fuse panels above each LCA permit air circulation for convectional cooling and carry sets of five +5V, +15 and -48V fuses for the line drawers, as well as a pair of fuses for the ringing voltage outputs (RA, RB). Each LCA shelf is equipped with a processor, digroup controller, power converter, and five line drawers.

Each line drawer connects up to 64 line cards, one for each analog subscriber line serviced by the MCRU. The 64 line cards are divided into two groups of 32. Each group of 32 line cards is called a line subgroup (LSG).

The 10 line drawers and the 20 LSGs in the 2 LCA shelves are identified in the figure on page 1-3.

The maximum number of lines (640) that may be connected to an MCRU is derived from the number of line drawers (10) times the number of line cards per drawer (64).

MCRU frame, shelf, and panel arrangement



In the MCRU, the ILCM connects from two to six PCM-30 C-side links to its 640 subscriber lines. The following ILCM components comprise this interface:

- 2 power converters
- 2 control complexes (ILCM processor and digroup control card)
- 20 LSGs

The MCRU has a minimum of two PCM-30 links because each primary link carries one message channel to the PLGC. Each PCM-30 link carries 30 speech channels making a possible of 60 to 180 available channels, two of which are always nailed up to the host controller. Other ports, up to a total of six ports, can be accommodated depending on traffic capacity and the concentration ratio required.

LCA shelf configuration

The layout of the LCA shelves and line drawers of the MCRU are shown in the figure on page 1-5.

An LCA shelf contains the following parts:

- one power converter
- one control complex
- five line drawers

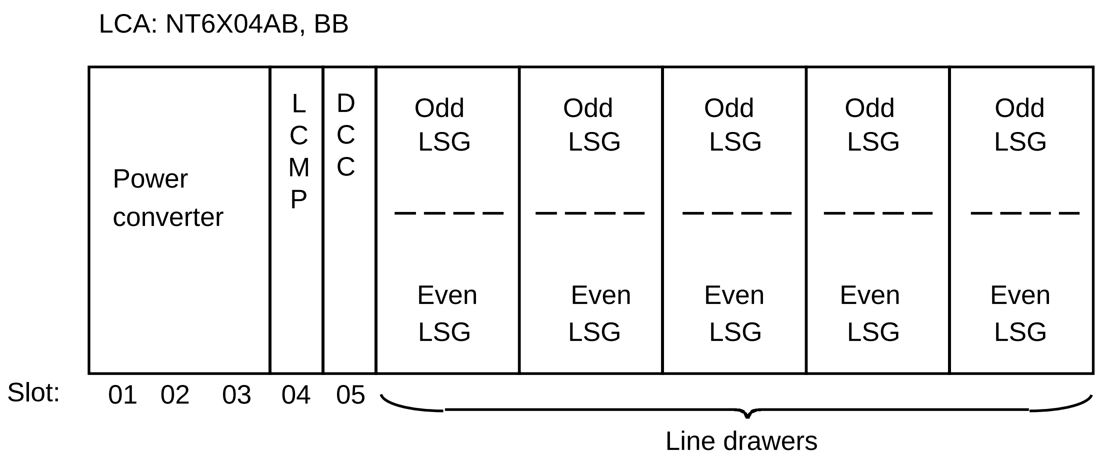
The power converter card is located at the far left of the LCA shelf (slots 01-03), the control complex cards are next (slots 04, 05), and the five line drawers fill the remainder of the shelf.

Power converter card

The power converter card (NT6X53), located in slots 01-03 of the LCA, contains circuits for converting -48V office battery to regulated +5V and +15V outputs for the shelf circuitry. The power converter also contains relay circuits which control the application of ringing, automatic number identification (ANI), and coin voltages from the ringing generator to the ILCM line circuits.

Power connections to the two shelves of an ILCM are arranged so that one converter can supply power to both shelves if the mate converter fails.

Line concentrating array (LCA) shelf layout



Slot	Abbr	NT PEC	Remarks
01-03		6X53AA	Power converter. Also contains ringing and ANI voltage switching circuits.
04	ILCMP	6X51AB	ILCM processor card (see note)
05	DCC	6X52AA	Digroup control card
-	-	6X05AA	Line drawer
-	LSG	-	Line subgroup

Note: The NT6X04AB contains the NT6X51AB 256 kB processor card, which requires the XLCM software load.

ILCM control complex cards

The ILCM processor (ILCMP) card and digroup control card (DCC) are often referred to as common cards in the LCA. In each LCA, the common cards, which are always provided, function identically. The functions of these cards follow.

XLCM processor card

The extended-memory line concentrating module (XLCM) processor card (NT6X51AB) is located in slot 04 of each LCA shelf (NT6X04AB). It connects with the DCC to form the control complex for the LCA, where it checks sanity and monitors activity. The XLCM processor also monitors the power and ringing generator functions of the MCRU.

The XLCM contains 256 kB of RAM storage. It collects dial pulse digits from subscriber lines and handles messages to and from the host PLGC for up to 640 lines. The NT6X51AB requires XLCM software loads.

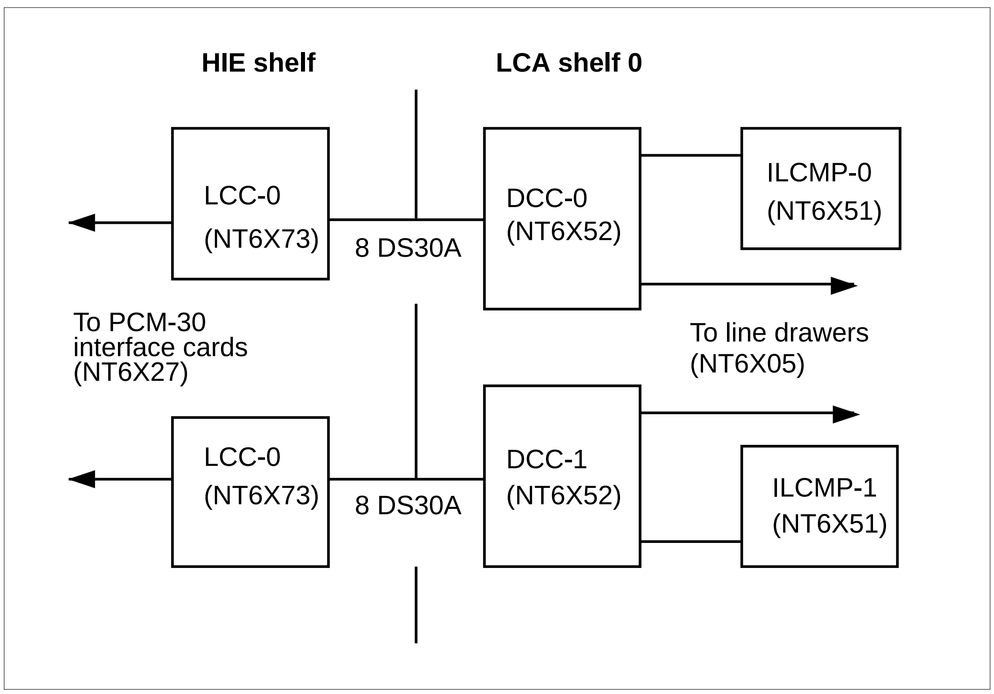
Prior to BCS28, ILCMs were equipped with the NT6X51AA ILCM processor card with 64 kB of RAM storage capacity. The NT6X51AA requires ILCM software loads. The LCA shelf with these cards is NT6X04AA.

Digroup control card

The DCC (NT6X52) is located in slot 05 of the LCA shelf. The DCC allows the LCA and HIE shelves to communicate. The DCC provides an interface between its corresponding ILCM processor in the LCA and one link control card (LCC) in the HIE through eight DS30A links, as shown in the figure below.

The DCC provides time switching for associating a line card to a given channel on a DS30A link. It also provides digital loop-around paths for fault isolation.

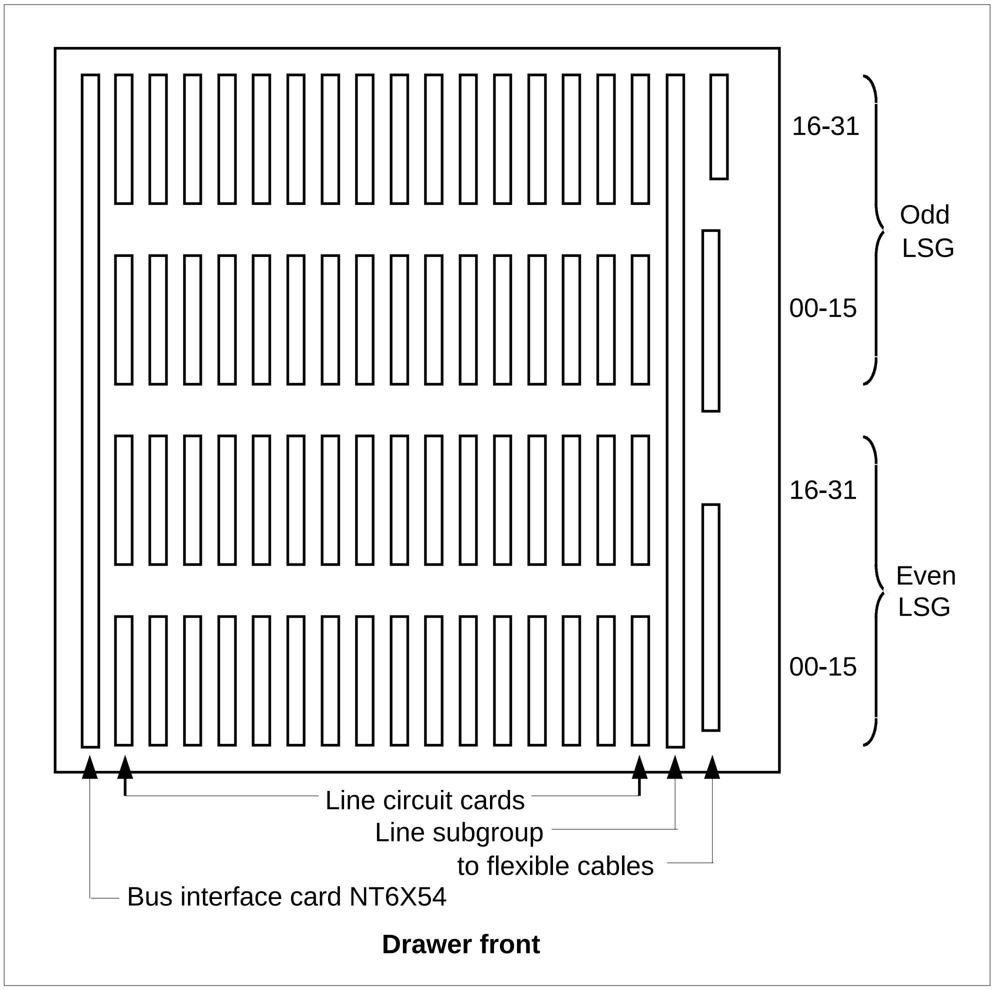
MCRU DS30A to PCM-30 interface



Line drawers

Each line drawer (NT6X05) in the LCA shelf has one bus interface card (BIC) and a maximum of 64 line cards of various types. The figure here shows the side view of a typical LCA line drawer. The line drawer can be withdrawn from the frame to access line circuit cards, yet remain operative because of flexible cables connected to the rear receptacles.

LCA line drawer NT6X05AA, circuit card location



Drawer state display

The codes used to display line drawer states at the MAP terminal are listed in the table on page 1-8. This text uses standard abbreviations rather than code to describe line drawer states.

At the ILCM level of the MAP display, the status of the drawers is displayed below the status of the ILCM units. The drawers are numbered from 0 through 19 and grouped in pairs to show that they share the same BIC card and, normally, interface a different processor (odd or even). The following display shows an example of drawer status:

```
                                11 11  11  11  11
DRWR:  01  23  45  67  89  01  23  45  67  89
       ..  S.  ..  MM  .M  OO  ..  --  SS  I.
```

Whenever the state of a drawer changes, the status display is updated. The state can be changed by the system or manually.

ILCM drawer states

Code	Definition (abbreviation)
• (dot)	In service (InSv)
I	In-service trouble (ISTb)
M	Manual busy (ManB)
O	Offline (OffL)
S	System busy (SysB)
-	Unequipped

Bus interface card

The BIC (NT6X54) is located at the front of the line drawer, behind the front faceplate. The BIC connects to the two LSGs (64 line cards) in the drawer where it is installed. In addition to connecting its two 32-channel LSGs to both LCAs, the BIC performs the following functions:

- Scans line circuits for presence of a hook switch change or message (interpretation of dialed digits).
- Sends signals through a ringing multiplexer to control the relays in the power converter to select ringing and ANI/coin voltages.
- Monitors line drawer activity for maintenance.
- Performs digital looparound on command from the maintenance system.

Communication between LCA-0 and LCA-1, or between two LSGs is accomplished through the single BIC in each drawer.

Line cards

The line cards are located behind the BIC in 4 rows of up to 16 line cards. The top two rows of line cards form the odd-numbered LSG, and the bottom two rows form the even-numbered LSG. Normally, LCA-1 control complex controls the odd LSG of both arrays and LCA-0 control complex controls the even LSGs of both arrays, using the ten 32-channel P-side ports available on the DCC of each array.

Both the LSGs and the individual line cards in the LSGs are numbered. LSG numbers in an MCRU range from LSG-00 through LSG-19. Line card numbers range from 00 through 31. Using these numbers, the line cards are uniquely identified and inventoried in the MSL switch computing module (CM) by their line equipment numbers (LEN), as shown in the following table.

Parts of LEN for MCRU

Part	Description
Site	Four-character alphanumeric name that identifies the remote site where the MCRU is located. The LEN for a line configured in the host office has a site name of HOST.
Frame	Numeric (00-99) that identifies the MCRU frame containing the line card.
ILCM	Numeric (0) that identifies the ILCM in the frame containing the line card. (The MCRU contains only one ILCM identified as ILCM-0).
LSG	Numeric (00-19) that identifies the line subgroup of the ILCM containing the line card.
Circuit	Numeric (00-31) that identifies the position of the line card in the LSG. The example below shows how line cards are numbered for identification within any LSG.

A complete LEN for an MCRU line card consists of five units of information, as described in the following table. The example shows LENs for line cards in a typical office. The first two LEN are for MCRU-supported lines.

Example LENs for line cards

Site	Frame	ILCM	LSG	LC
HOST	01	0	14	6
REM1	00	0	07	30
REM2	00	0	18	26

Line cards are available in several types so that different kinds of analog or digital telephone equipment can be supported by the MCRU. The following line cards are supported:

- Standard line card type A (NT6X17AA, AB, AC, BA: world line card) or plain old telephone service (POTS) card. The type A card supports single-party, two-party, and PBX analog telephone sets (type 500 or 2500). The type A card supports loop start, superimposed ringing, and frequency selective ringing with bridged ringers. The cutover control circuit is also supported. See line card type B, coin.

  Note: The position for LC-00 is assigned to a type A line circuit and used for analog ringing tests. Circuit LC-00 is not available for assignment to a subscriber line.

- Line card type B, coin, (NT6X18AA, AB, AC, BA: world line card). Provides all features of type A, plus multiparty lines. Supports coded ringing, private branch exchange (PBX), ground start, hotel/motel, and analog pay telephone sets requiring coin control. The BA version also contains electronic overvoltage protection in hostile electrical environments.
- Message-waiting line circuit (NT6X19AA). Provides all the features of the type A line circuit, plus a message-waiting lamp driver circuit. When activated, this circuit causes the message waiting lamp on the associated telephone set to flash at 1 Hz, informing the subscriber that a message is being held.

- Message-waiting converter (NT6X20AA). Provides -150V synchronized pulse for the message-waiting lamp circuit. Synchronized from the 2.56-MHz clock pulse in the MCRU. This card must be installed in slot positions 0 and 16 of the odd LSG to function properly.
- Line card type C Meridian Digital Centrex (MDC) (NT6X21AA, AB, AC). Supports MDC-related electronic multiline telephone sets and operator consoles.
- The 6X21BC P-phone line card is provided specifically for the Australian market.

The NT6X21AD line card provides a voice and signaling interface between a 2-wire, analog subscriber line and one channel of the 4-wire, 32-channel, 2.56 Mb/s bit stream of the MSL-100 Family of MSL Systems. The card occupies one slot in the line drawer of the ILCM for use with a P-phone telephone set that is connected to the line card with an ordinary non-loaded (NL) pair of metallic conductors. Simultaneous voice and extended signaling services are provided on the same loop. The transmission bandwidth on the loop is divided into two frequency bands:

1 Voice channel, 300-3400Hz

2 Signaling channel, 6-10kHz, traditional high-voltage signaling (ringing), is substituted with low level signals.

The NT6X21AD is a single line circuit line card that, with appropriate DIP switch settings, is hardware backward compatible with the NT6X21AC line card and provides enhanced features such as

- reduced messaging noise
- DIP switch selectable balance impedance
- UDLC (universal digital loop carrier) optimized operation
- DIP switch selectable (0 or -3.5dB) gain in the D/A (digital to analog) direction
- DIP switch selectable short-loop/long-loop (slp/llp), signaling levels

Feature AE1516 is required to allow datafill of the NT6X21AD cardcode, and maintenance and diagnostics on the new, selectable signaling level, voice receive D/A level, and balance impedance. The following table list the recommended DIP switch settings.

Recommended NT6X21AD S1 DIP switch settings

Recommended application	D/A voice S1		Balance S2		Signaling level S3 and S4			
	switch position ON	OFF	switch position ON	OFF	Both ON	Only S4 ON	Only S3 ON	Both OFF
	0dB	-3.5dB	NL	9+2	1.3Vpp	0.8Vpp	0.6Vpp	0.14Vpp
P-phone sets long loop: 19-24dB EML	X		X		X			
P-phone sets medium loop: 17-19dB EML	X		X			X		
P-phone sets medium loop: 4-17dB EML		X		X			X	
P-phone sets short loops: 0-4dB EML		X		X				X
Northern Telecom UDLCs		X	X					X
Other vendors UDLCs	X			X			X	
6X21AC equivalent mode		X	X		X			

Note: dB=decibel, NL = non-loaded, 9+2=loaded (900 ohm + 2.16 micro-farads) network, Vpp=voltage peak to peak, EML= estimated measured loss, as defined in NTP 297-2011-180 BCS35 version 01.02

Listed in the following two tables, are the two acceptable limits for transhybrid loss (THL) dependent on the D/A level selected. Since the NT6X21AD uses the same diagnostics as the NT6X21AC, the THL limits are modified for diagnostics purposes. The first table is for the NT6X21AC line card, the next table is for the NT6X21AD line card.

NT6X21AC THL Limits

Frequency	304	704	1505	3204
Minimum	-6.2	-6.2	-6.2	-7.2
Maximum	+1.3	+0.8	+0.8	+0.7

NT6X21AD THL Limits

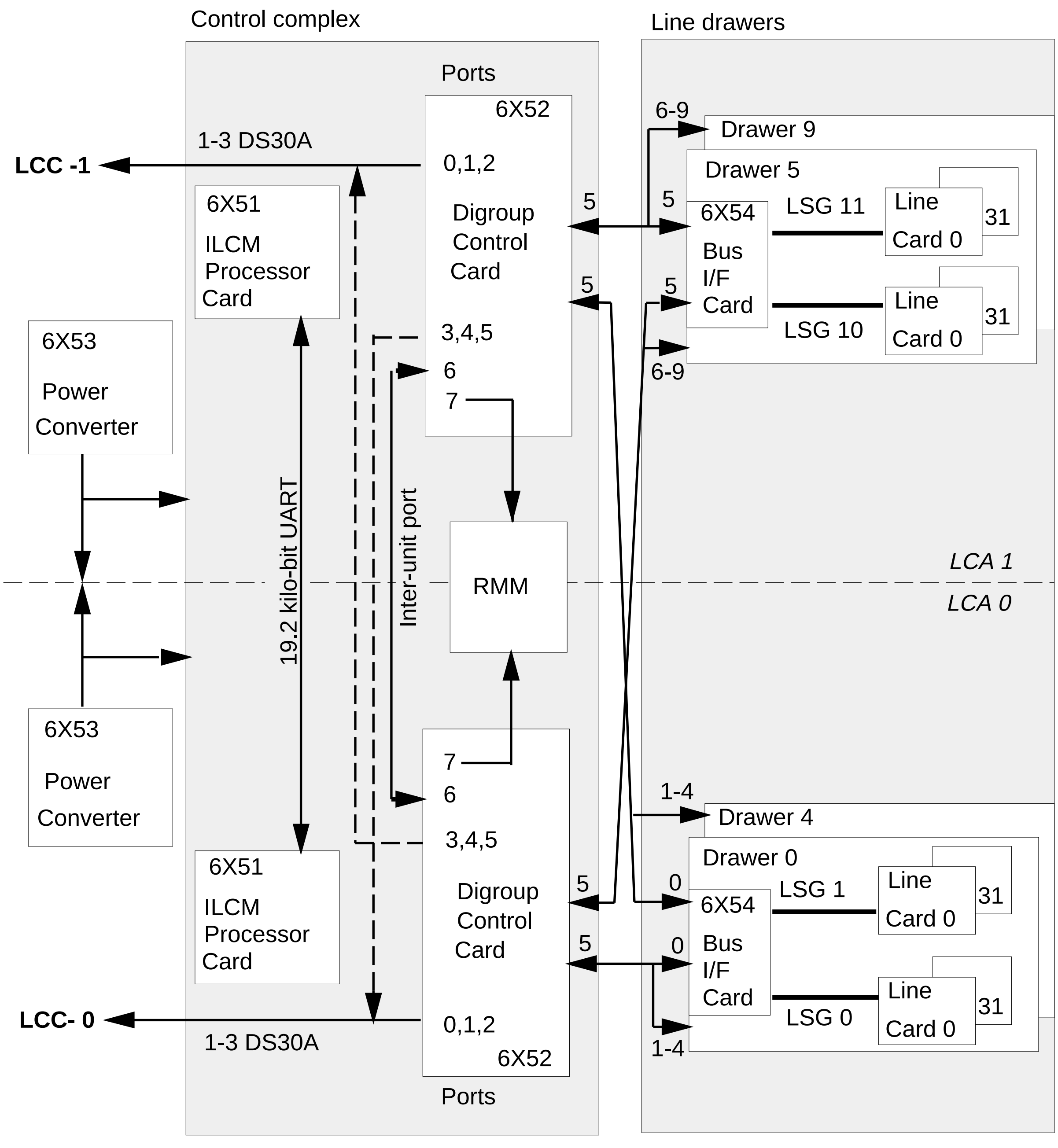
Frequency	304	704	1505	3204
Minimum	-2.7	-2.7	-2.7	-3.7
Maximum	+4.8	+4.3	+4.3	+4.2

Both limits are required so the system software will be able to determine which digital to analog (D/A) gain has been selected on the line card and will compare THL test results against both possible limits.

- Data line card (DLC) (NT6X71AA, AB, AC). Provides data transmission interfaces for operation with computer terminals.
- Integrated bit error rate test (IBERT) line card (NT6X99AA). The IBERT line card provides bit error rate performance (BERP), testing transmission paths for assessing bit error performance of MCRU hardware components.

See the figure on page 1-14 for a functional block diagram of the MCRU LCA shelves. All the components of this figure are discussed in this chapter.

LCA block diagram



Note: Ports 3, 4, and 5 are active through the backplane wiring in the takeover mode only.

HIE description

The HIE occupies a single shelf at position 33 in the MCRU frame. The HIE allows the LCA shelves of the MCRU to connect both to the remote maintenance module (RMM) and to the host office. The HIE shelf contains the following components:

- two ringing generators
- two LCCs
- two to three PCM-30 interface cards
- two power converters
- one emergency stand-alone (ESA) control complex

These components are described in the following sections.

HIE shelf configuration

As shown in the figure on page 1-16, the two ringing generators occupy slots 01-08 in the HIE. Each generator is four slots wide. The ESA control complex, when provisioned, occupies slots 09-16.

The LCCs occupy slots 17 and 18 of the HIE shelf.

Two power converters occupy the far right of the HIE shelf in slots 22-24 and 25, respectively. Slot 25, the rightmost slot on the shelf, is as wide as three regular HIE slots.

Ringing generators

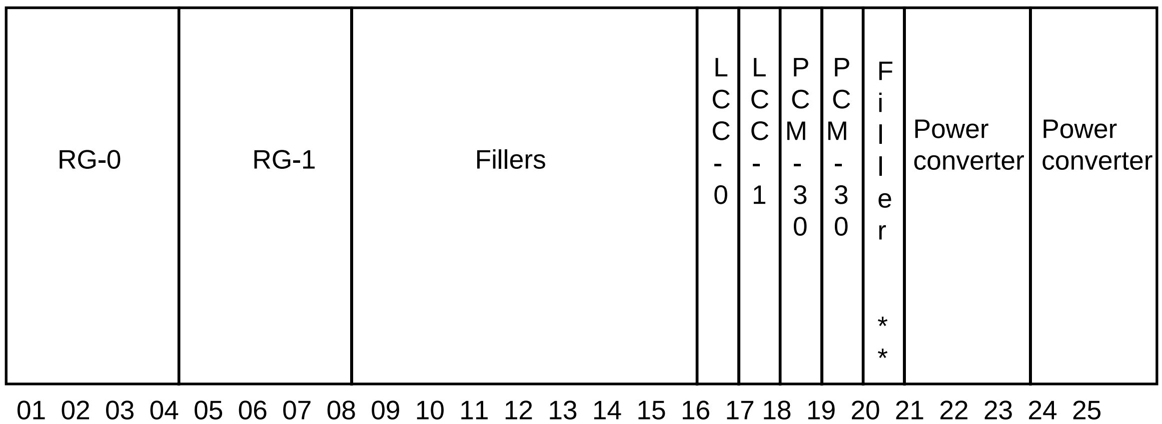
The ringing generators (NT6X60) contain the frequency circuits that generate ringing signals to subscriber line cards on the LCA shelves. Ringing patterns meet Bell Canada and US Bellcore requirements. Coded, superimposed, and frequency selective ringing are supported.

The ringing generators also contain ANI and coin generator circuits that check for two- or four-party ANI, and for coin presence in prepay coin telephones.

The ringing generators also produce voltages required for ANI and coin control (48 Vdc and 130 Vdc). They monitor ANI and coin voltages and ring bus outputs for failure.

HIE shelf layout

HIE:NT6X11BC



Slot	Abbr	NT PEC	Remarks
01-04	RG-0	6X60AE	MCRU ringing generator
05-08	RG-1	6X60AE	MCRU ringing generator
09-13	-	0X50AA	Filler panel
14	ESAM	6X47AC	ESA memory (see note)
15	ESAP	6X45AF	ESA processor (see note)
16	ETC	6X75EA	ESA clock and tone card (see note)
17, 18	LCC	6X73BA	Link control card (LCC-0, LCC-1)
19, 20	PCM	6X27BB	PCM-30 interface (2 PCM-30 links per card)
21	-		Filler panel If additional PCM-30 links are required (for a total of six PCM-30 links), filler panel is replaced by NT6X27BB.
22-24	-	2X70AE	Power converter
25	-	2X70AE	Power converter

Note: The 6X47, 6X45, and 6X75 cards are needed when the ESA option is selected. Otherwise, these slots have filler panels (NT0X50AA).

Link control cards

The two LCCs (NT6X73) fill slots 17 and 18 of the HIE. Each LCC provides an interface between eight DS30A ports from an MCRU LCA shelf and the PCM-30 links to the host office. The LCCs also provide an interface between the ESA processor, if provisioned, and the ILCM. The following figure shows how the PCM-30 links are terminated on the LCC and in the LCA.

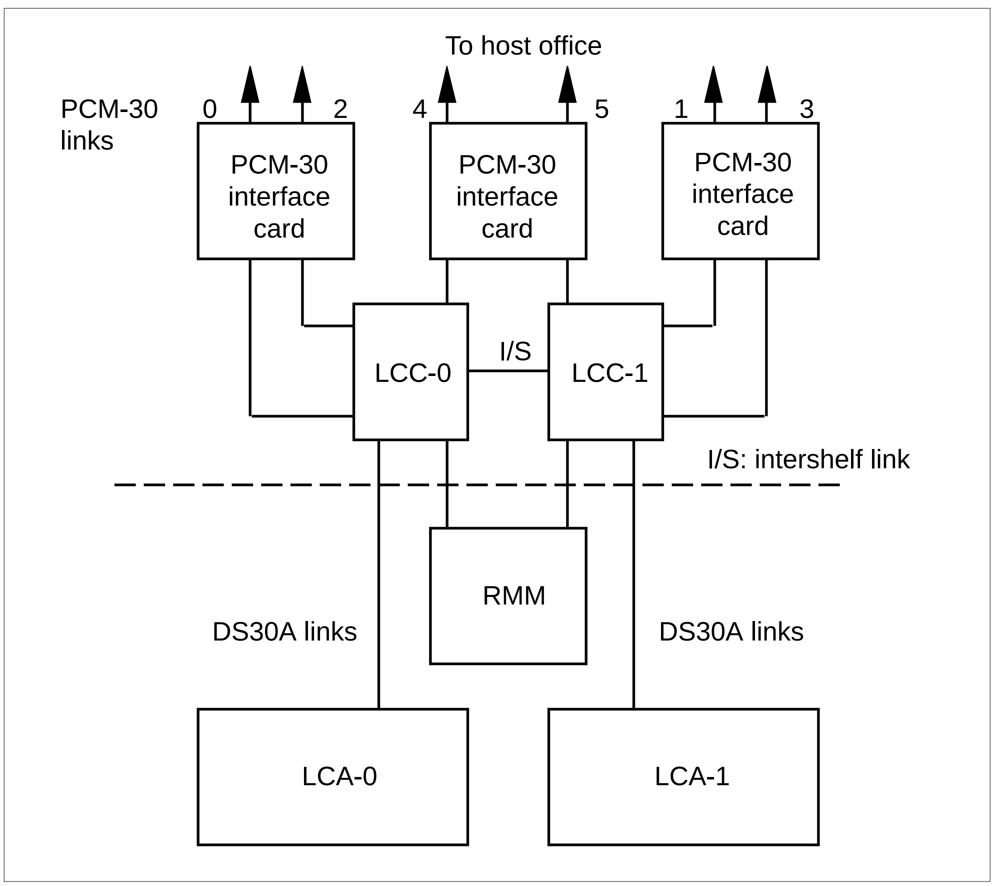
Under normal conditions, when both are active, LCC-0 connects LCA-0, and LCC-1 connects LCA-1. LCC-0 serves even numbered PCM-30 links (0, 2, and 4) from the PCM-30 interface cards, and LCC-1 serves odd numbered PCM-30 links (1, 3, and 5). The following figure shows how the LCCs are configured in the MCRU.

One-to-one mapping of LCA primary ports with PCM-30 links means that all 30 channels of a PCM-30 link come out of one 32-channel DS30A port. Extra channels are used for control and signaling, from the host, and for intra- and interspeech channels.

As shown in the MCRU link to a port map structure on page 1-18, the LCC accepts eight DS30A links from its LCA. Through the LCC, these links provide the following:

- message and speech paths to the host
- connection to the RMM
- link-sharing resources for each LCA

LCC interface to PCM-30 interface cards



The LCC also provides system clocks for the DCC, RMM, and ILCM. When both units of the ILCM are active, LCC-0 is frequency-locked to its primary PCM-30 link, and the LCC-1 clock is locked to LCC-0. Thus, both LCC clocks derive their timing from the same source, which is the host PLGC.

The DS30A ports in the LCA are numbered 0-7. Their functions are listed in the following table.

LCA port assignments and use

Number	Port type	Functions
0,1, 2	Primary	Carries two message channels for the LCA shelf. Message channels are mapped onto channels 1, 2, and 3 of each of the two primary PCM-30 links to the host office. Other channels, carrying speech, are mapped onto channels 4 through 15 and 17 through 31 of the primary PCM-30 links.
3, 4, 5	Image	Normally inactive, these ports become active if the mate LCA and LCC are inactive and takeover occurs. Port 3 takes over mate port 0, port 4 takes over mate port 1, and port 5 takes over mate port 2 of the mate LCA. The mapping of all channels onto the PCM-30 links is maintained, and the active LCC takes control of all PCM-30 links.
6	Interlink	Provides a DS30A link for intershelf connections. During call processing, the channels on this port allow a subscriber line on one LCA to be connected to a subscriber line in the mate LCA, leaving PCM-30 channels to the host office free.
7	Maintenance	Provides the LCA access to the RMM through the LCCs. Through the RMM ports, individual line circuits can be selected and metallic test access (MTA) connections can be made to their tip and ring leads for testing.

PCM-30 interface cards

The PCM-30 interface cards (NT6X27) are located in slots 19 and 20 of the HIE shelf, and an additional card may be provisioned in slot 21 in place of the filler panel. Each PCM-30 interface card accepts two PCM-30 links from the host office PLGC and connects them on up to six links to the LCC.

A minimum of two PCM-30 cards are required so the two primary message channels from the ILCM are carried on different cards for reliability. A third PCM-30 card is added only if six PCM-30 links to the host are needed to handle the traffic load of the MCRU.

PCM-30 ports are not duplicated, but each processor in the LCA shelves of the MCRU can control all six PCM-30 ports.

Primary ports that map one to one with PCM-30 links are known as equipped ports. The number of equipped ports in an LCA depends on the number of PCM-30 interface cards provisioned in the HIE. If three PCM-30 cards are provisioned, all three primary ports (0, 1, 2) for each LCA are equipped. If a port is unequipped, its ports are either not used or are used for features contained in additional MCRU feature packages, if provisioned.

Note: Links 0 and 1 are message-supporting links that have special maintenance protection applied to them. On each PCM-30 message-supporting link, a channel 12 looparound connects the outgoing side of channel 12 to the incoming side of channel 12. This looparound is called extended PCM-30 maintenance. The looparound prevents manually busying the link where the looparound is applied when the unit it supports is still in service. When the unit this link supports is manually busied, the looparound (extended PCM-30 maintenance) is disabled. At this time, the link can be busied and the looparound is reenabled as NT6X27 card diagnostics for maintenance of the PCM-30 link.

Power converter card

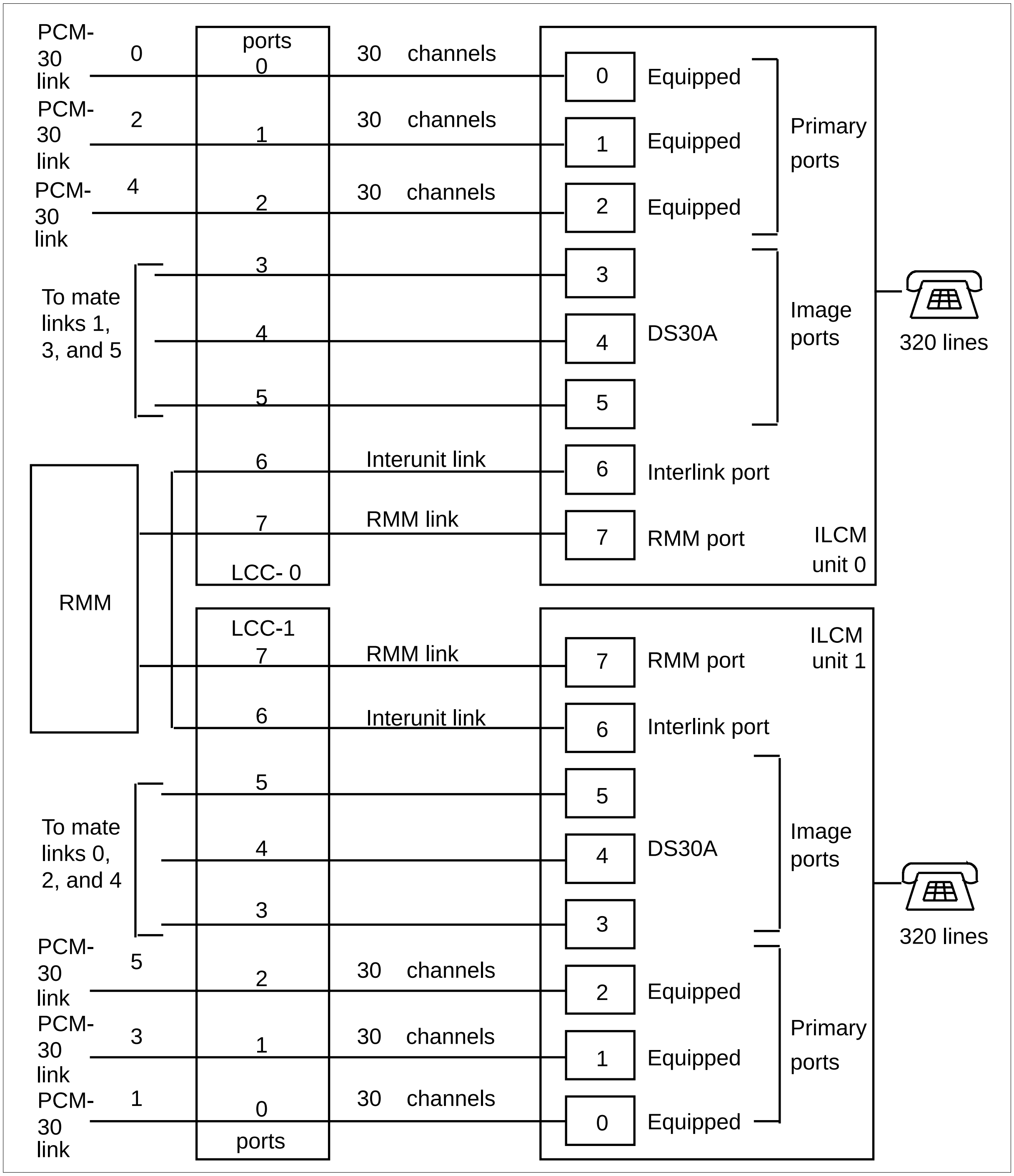
The two HIE power converters, located in slots 22-24 and 25, supply the necessary shelf voltages (5 V, 12 V) for the HIE shelf.

ESA control complex

If the ESA feature package is provisioned, the HIE shelf contains three additional circuit cards, which are located in slots 14, 15, and 16. These cards are the ESA processor card, the ESA memory card, and the ESA clock and tone card. The ESA configuration and operation is discussed in detail in the chapter “ESA maintenance overview.”

The following figure shows the MCRU link, port, and channel structure.

MCRU link, port, and channel structure



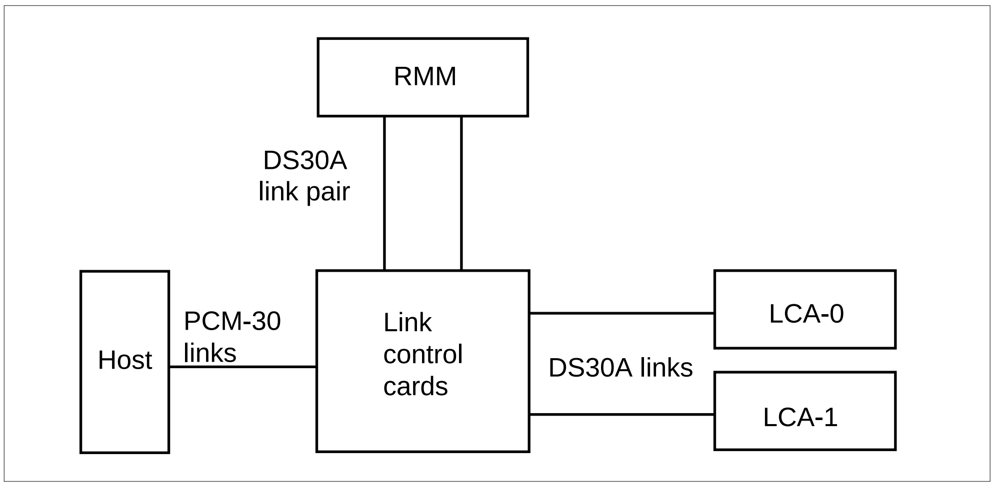
Remote maintenance module (RMM)

RMM description

The RMM, which occupies one shelf in the MCRU, is a modified, reduced-cost form of the maintenance trunk module (MTM). The RMM contains its own processor, which performs scanning of the service circuits and digit collection during ESA.

The RMM C-side interface uses a pair of DS30A links, one to each LCC in the HIE shelf. The DS30A links ensure the RMM is operable, regardless of which LCC is active. The LCC passes maintenance requests from the host to the RMM and provides a link between the RMM and line circuits in the LCA. At the host office, MCRU maintenance is directed to the RMM using the MAP terminal. The following figure shows how the RMM communicates with both the host and the LCA through the LCC.

RMM connection with host and LCA through LCC



The RMM uses DMS-X protocol to communicate reliably with the host, using the LCC interface to the PCM-30 links.

The RMM can accommodate up to 14 maintenance and service circuit cards. These cards vary in type and are selected to meet provisioning requirements.

RMM shelf configuration

The RMM shelf has only 20 slots, as opposed to 25 in the HIE. The two leftmost slots of the RMM (01, 02) are assigned to the DS30 interface and control cards. Slots 17-18 and 20 on the far right of the shelf contain two types of power converters required in the RMM. The remainder of the shelf (slots 2-16) is assigned to whatever service circuit cards are provisioned to meet office engineering requirements. The RMM shelf diagram shows an example of card selections for a typical RMM.

RMM control card

The RMM control card (NT6X74), located in slot 02, is also required in the RMM. The RMM control card acts as an interface between the line concentrating array shelves and the test trunks, service circuits, and alarm circuits of the RMM. The RMM control card is responsible for the processing of DMS-X messages, trunk messages, and pulse code modulation (PCM) data.

Power converters

Two types of power converters are required in the RMM shelf, as follows:

- multi-output power converter (NT2X09)
- 5-V/40-A power converter (NT2X06)

The multi-output power converter, occupying slots 17 and 18 of the RMM, provides a regulated, common-ground dc power supply that has five different outputs (+24 V, +12 V, +5 V, -15 V, and -5 V). The other power converter, located in slot 20, the rightmost slot of the RMM, provides a regulated 5-V/40-A power supply to the RMM shelf.

The group codec (NT2X59), located at the far left of the RMM shelf in slot 01, is a required card. It encodes analog samples from the RMM trunk circuits into PCM code words, and decodes the PCM words from the host or MCRU lines into analog samples.

Provisionable maintenance and service cards

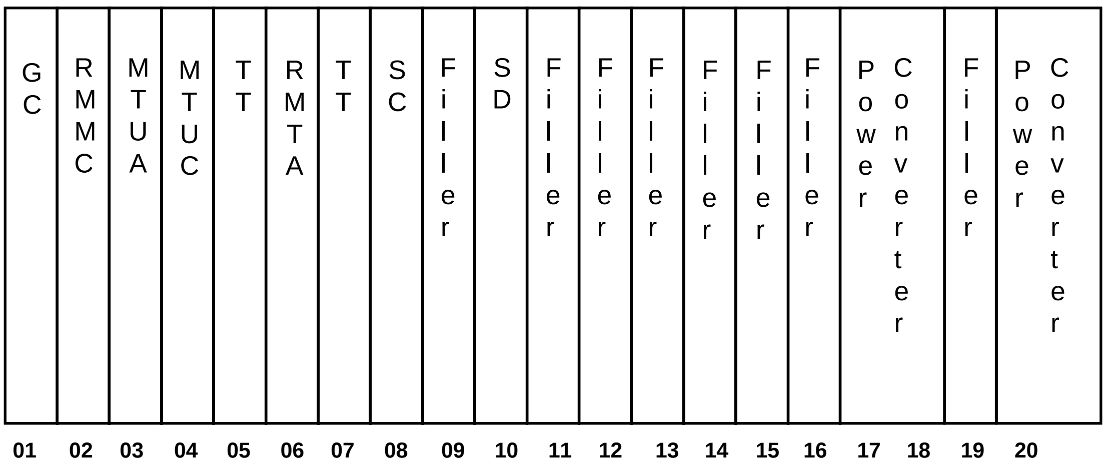
Slots 03-16 of the RMM may be provisioned with various maintenance, test, and service circuits. The number and types of these cards depend on engineering needs. These provisionable cards are as follows:

- Remote metallic test access (8X8), remote (MTA) (NT3X09). The remote MTA provides metallic connections between test access points in the line circuits and testing equipment. It consists of a two-wire metallic matrix with eight horizontal busses and eight vertical. One horizontal bus is connected to the MTA bus for the 320 line circuits in LCA-0 and the other to a similar MTA bus in LCA-1. Two horizontals are unused. The verticals are connected to service circuits or spare line circuits. Host office circuits provide MTA functions during normal MCRU operation. Eight 2-wire paths can be set up simultaneously in this configuration.
- Scan detector card (NT0X10). The scan detector (SC) card provides an interface where the MSL-100 Switch Alarm System software can monitor the state of the MCRU hardware to detect alarm conditions or manually controlled operations. The SC card is divided into two circuits, each known as an SC group. Each SC group comprises seven SC points. Each SC point connects one circuit to be monitored for a change in state.
- Signal distribution card (NT2X57). The signal distribution (SD) card provides an interface between MSL-100 Switch Alarm System software and relay-controlled equipment for the activation of visual and audible alarms. The SC card serves as a monitor, and the SD card serves as an alarm driver. The SD card is divided into two circuits, each known as an SD group. Each SD group consists of seven SD points. Each SD point connects one visual or audible alarm.
- Digitone receiver card (DTR) (NT2X48). The DTR contains Digitone receivers to collect digits during MCRU ESA.
- International metallic test unit (NT4X97, NT4X98). The international metallic test unit (IMTU) is a testing facility that can be connected to a selected line circuit through the remote MTA. The IMTU contains two cards: an analog test and measurement card (NT4X98) and a control card (NT4X97). The two cards must be side by side, the NT4X98 in an odd-numbered slot, the NT4X97 in the adjacent even numbered slot. The IMTU analog test card is used to perform tests and measurements on a subscriber loop or line card circuit, plus additional features such as electronic business set (EBS) testing and high frequency pulse measurement. The NT4X97 control card serves as an interface between the IMTU analog card and the RMM. The IMTU contains two separate tip and ring appearances that time share the same measurement circuits. This is transparent to the system and the IMTU appears as two separate measurement circuits. The IMTU cards replace the Multiline test unit (NT2X10, NT2X11) for international applications.

- Incoming/outgoing test trunk (NT2X90). The test trunk card provides an interface between external test equipment, such as the number 14 line test desk, and the RMM. The test trunk card provides monitoring and speech circuits to subscriber lines and enables operator verification calls through a VER90 trunk.

Remote maintenance module shelf

RMM: 6X13EA



Slot	Abbr	NT PEC	Remarks
01	GC	2X59CA	Group codec and tone card
02	RMMC	6X74AB	RMM control card
03	MTUA	4X98BB	Metallic test unit, analog
04	MTUC	4X97AA	Metallic test unit controller
05	TT	2X90AD	Test trunk circuit
06	RMTA	3X09BA	Remote metallic test access
07	TT	2X90AD	Test trunk circuit
08	SC	0X10AA	Scan detector card
09	-	0X50AC	Filler Panel
10	SD	2X57AA	Signal distribution card 1 (Slots 03 to 16 show a typical complement of RMM test and service circuits. This complement varies depending on office requirements.)
11-16	-	0X50AC	Filler panel
17,18	-	2X09AA	Power converter
19	-	0X50AA	Filler panel
20	-	2X06AB	Power converter

Note: The Digitone receiver card (NT2X48) is optional.

Frame supervisory panel (FSP)

The FSP (NTNX26AA) occupies shelf position 60 of the MCRU frame. The FSP provides talk jacks, fuse alarm features, and power control for the MCRU. The FSP contains 48-V distribution circuit breakers to the ring generators (RG-0, RG-1) in the HIE, and three circuit packs that control the alarm facilities and power converters in the MCRU frame. These circuit packs and their functions follow:

- NT6X36AA Alarm card

  This card is used to monitor the power converters in the RLCE frame, and generate an alarm when an undervoltage condition occurs in any of the power converters.

- NT6X36AC Alarm card (see note)

  Based on information received from interconnect schematic ISNX14AA this card is used to monitor the power in the RLCE frame related to the fan cooling units located below shelf 05 that provide cooling for the MCRU cabinet, and generate an alarm when an undervoltage or fan failure condition occurs in the unit.

Note: At the time of publication, information on the NT6X36AC card was not available pertaining to its function and relationship to the MCRU cabinet. The above information is subject to change and should only be used as a guideline. This card is designed and used specifically for the Australian market.

- NT0X91AA Alarm and Converter Drive

  This circuit pack controls the alarms and power for the NT6X53 power converter for unit 1 of the ILCM and the NT2X70 in slot position 22 of the host interface equipment shelf (HIE).

- NT0X91AE Converter Drive and Protection Circuit

  This circuit pack controls the alarms and power for the NT6X53 power converter for unit 0 of the ILCM, the NT2X70 in slot position 25 of the HIE, and the NT2X09/NT2X06 in slot positions 17 and 20, respectively, of the RMM.

  Note: Refer to the *Card Replacement Procedures*, for replacement of these circuit packs.

Software description

The following sections describe the software operation of the NTNX14AA feature package.

Interface to PCM-30 links

The MCRU provides an interface between the host controller and up to 640 subscriber lines through the PCM-30 links. The LCCs reassign data carried over the 32 channels of a DS30A link to the 30 channels of a corresponding PCM-30 link.

LCC control data

When a unit of the MCRU is to be placed in service (InSv), the LCC for that unit receives control data from the ILCM indicating the number of PCM-30 cards equipped and which clock source is to be used for the MCRU. The ILCM receives this data, in turn, from the host PLGC. Messages are sent to the ILCM unit from the host during its return to service (RTS), and whenever the CM attempts to switch the ILCM clock source from one LCC to the other.

The LCC clock source, which is frequency-locked to the primary PCM-30 links, is controlled by MCRU software, except when both units of the ILCM are inactive. When this is the case, ILCM hardware forces each ILCM unit to take its clock source from its own LCC.

Other host office functions

The following functions are controlled by software resident in the host MSL-100 Family office:

- class of service
- code interpretation
- screening
- routing
- billing

Signaling and supervision

Signaling allows the MSL-100 switch to communicate with its stations or other switching offices. The MCRU uses DMS-X protocol to communicate over its PCM-30 links with the host office. DMS-X, a half-duplex, byte-oriented protocol similar to DS30, is responsible for the transmission and reception of message data over full-duplex media such as the PCM-30 links. DMS-X is a state-driven code, requiring handshake-messaging between the MCRU and host at each stage of data transfer.

Subscriber tones

The host PLGC provides properly cadenced tones, which the MCRU applies as needed to subscriber lines. The tones supported by the host PLGC and applied by the MCRU follow:

- dial tone
- audible ringing
- warble (MDC Meridian business set ringing)
- busy tone
- reorder tone
- receiver off-hook (ROH) tone

The MCRU is subordinate to the MSL-100 switch CM and is not involved in any signaling between the host office and other systems.

Intraswitching capability

Intraswitching capability is automatically provided for the MCRU with feature package NTX156AA. The intraswitching feature redistributes the traffic load within the MCRU so that the PCM-30 links to the host can be available to handle external calls. It allows calls between subscribers served by the same ILCM unit of the MCRU to be connected, which is referred to as *intra*switching, and calls between subscribers on different ILCM units of the MCRU to be connected, which is referred to as *inter*switching. Intraswitched and interswitched calls are accomplished through the LCCs in the HIE shelf, which are connected serially to the DS30A ports of the ILCM.

For more information on intraswitching, see the *Translations Guide, 555-4031-350.*

Functional limitations

For feature package NTNX14AA to work properly, certain conditions must be observed. These limitations or restrictions may be hardware- or software-dependent, as follows.

Hardware restrictions

The following hardware limitations apply to the NTNX14AA:

- A maximum of 640 lines can be served by one MCRU.
- The MCRU has a traffic-carrying capacity of up to eight CCS/line, or a maximum of 1.5 calls per second.
- A minimum of two and a maximum of six PCM-30 links connect the MCRU with the host office.

- All PCM-30 links to the MCRU must terminate on the same host PLGC or PLGC, but on different PCM-30 interface cards.
- The maximum power input to the MCRU bay is 35 A at -48 V.

Software restrictions

Feature package NTNX14AA requires the following software packages in order to operate:

- NTX000AA**:** Bilge
- NTX001AA: Common Basic
- NTX270AA: New Peripheral Maintenance Package
- NTX901AA: Local Features I

In addition, feature package NTX156AA, MCRU Intracalling, is required for the MCRU to have intraswitching capability. Feature package NTX154AA, Emergency Stand-Alone Operation, is required for the MCRU to have ESA capability.

Fault conditions

Several types of faults can occur in the components of the MCRU. In the host office, the C-side links from the MCRU to the host PLGC may go down. If these network links are faulty, messaging from the CM may be lost, and subscriber service may also be lost.

A circuit card in the MCRU, including the power converter card, may be faulty and may adversely affect subscriber service. MCRU equipment, other than circuit cards, may also become faulty.

The MCRU P-side links toward the subscriber carry messages that are vital to the maintenance of subscriber service. A faulty peripheral side link may also impact subscriber service.

The following sections discuss the specific fault conditions which occur in MCRU components and the interfaces between MCRU components.

LCA shelf failure

When a fault condition exists that causes one of the LCA units in the ILCM to go out of service, the in-service unit assumes control of the mate unit's lines in addition to its own. This function, called takeover, is an automatic maintenance feature of the ILCM configuration. See "Takeover capability". If any one of the following fails, the LCA shelf goes into takeover:

- mate processor
- digroup control card in the mate unit
- power converter in the mate unit

- ANI and coin voltages in the mate ringing generator
- mate LCC in the HIE shelf

Line drawer faults

A faulty bus interface card (BIC) or line card causes a faulty condition in a line drawer. This fault is not sufficient to cause a takeover.

Link failure

Link failures include the following:

PCM-30 links

Link failures are usually associated with the PCM-30 interface cards in the host controller, PCM-30 link, or PCM-30 interface cards in the MCRU. Monitoring is performed through operational measurements (OM) that indicate when maintenance or out-of-service thresholds have been exceeded.

The host controller maintains and tests the PCM-30 links, generates alarms for link faults, and reassigns channels when faults occur on these links. Operating company personnel can obtain the bipolar violation (BpV) count at the MCRU either by posting the host XPM with the REMOTE parameter at the carrier level of the MAP display or by posting the host XPM, and issuing the DETAIL command with the REMOTE parameter. BpVs, although not severe enough to raise an alarm, can signal deterioration of a PCM-30 link.

Because the signals on a PCM-30 link travel in two directions, either the host controller or the MCRU can detect faults (such as BpVs). The MCRU notifies the host controller when the BpV count exceeds the threshold of 1 BpV per 10^3 bits. The MCRU also monitors the loss of frame indicator for the PCM-30 links and turns on an outgoing alarm for any frame loss of more than 2.5 s. The outgoing alarm is removed when the frame has been restored for 10 s.

If the MCRU detects loss of the framing pattern for 2.5 s or more, or if the host XPM detects loss of the framing pattern for 220 ms, frame loss at the out-of-service limit has occurred. A local carrier group alarm (LCGA) occurs at the carrier level of the MAP display if the host XPM detects loss of frame; a remote carrier group alarm (RCGA) appears if the MCRU detects the loss of frame. For information on standard troubleshooting procedures to clear these faults, refer to the chapter “Troubleshooting chart.”

DS30A links

DS30A links on the P-side of the MCRU can experience failure. These links connect to an RMM or ESA module. Faults on these links can affect the associated modules as well.

Load file mismatch

A load file mismatch fault condition exists when a load in the ILCM does not match the load specified in table LCMINV.

Automatic maintenance

The MSL-100 Family switch of peripheral modules (PM) are designed to be reliable under many different fault conditions. Peripheral modules contain several hardware redundancies that serve as backup operations for module, card, and link failures. Therefore, fault conditions that do not require any intervention can exist.

When fault conditions occur, the MSL and the MCRU initiate audits or other system actions to try to find the fault and correct it automatically.

The following sections discuss the following types of automatic maintenance:

- MCRU audits
- checksums
- MCRU PLGC speech path diagnostics
- overload resources
- takeover capability
- ESA capability
- MCRU RMM maintenance
- drawer testing
- BIC relay testing (BRT)
- subscriber line automatic maintenance
- ILCM routine exercise (REx) tests

MCRU audits

Audits are scheduled to run in the MCRU every 5 s to refresh the control data for PCM-30 and LCC circuits and to monitor the LCC for faults. The PCM-30 interface cards are monitored for faults by a second audit run every 500 ms. The functions of these system audits, as they affect LCC and PCM-30 circuits, are described in the following paragraphs.

Link control card maintenance

The MCRU monitors the status of its LCC to ensure control data are being transmitted correctly to the LCC and the inactive LCC clock is running fault-free. Control data are rewritten to the LCC periodically.

PCM-30 interface card maintenance

For each of its PCM-30 interface cards, the MCRU automatically monitors the BpV counter and notifies the CM when the count exceeds the threshold of 1 BpV per 10^3 bits (10 kb). The MCRU also monitors the loss-of-frame indicator for the PCM-30 links and turns on an outgoing alarm for any frame loss of more than 2.5 s. The outgoing alarm is removed when frame has been restored for 10 s.

When the MCRU detects PCM-30 slips, it increments a slip counter and provides a message-driven interface to allow the counter to be queried from the host office (from the carrier MAP display level). Control data are rewritten to the PCM-30 cards periodically.

ILCM drawer maintenance

A system audit runs every 10 min for each ILCM and attempts to return to service any drawers in the SysB state. If any faults are detected, drawers in the ISTb state are also tested and handled.

The ILCM unit states, and the corresponding tests, are noted in the following table.

Full in-service tests

State	In-service tests	Busy
InSv	In-service tests	Out-of-service tests
Bsy, sane	In-service tests	Full (all) tests
Bsy, insane	Stand-alone in-service tests	Stand-alone out-of-service tests

Checksums

For the MSL-100 Family of peripheral modules, a number is used to calculate the checksum (CHKSUM) for each software load. After loading the PM and testing it, the checksum total is compared with the expected checksum total. If the totals match, the load is correct. If there is a mismatch, the load must be loaded again using the LOADPM command. Each PM type has a different checksum value for each load. The QUERYPM command displays a checksum value for the load of the PM.

MCRU PLGC speech path diagnostics enhancements

The PLGC diagnostic tests consist of the following two parts:

- Speech path diagnostic (SPCHDIAG). Tests all internal components of the PLGC speech path for data integrity, including C-side and P-side loop-arounds and speech bus timeslots.
- P-side link diagnostic (PLNKDIAG). Test links between the PLGC and any subsidiary peripherals, including the MCRU. Test are performed on either all links or selected links.

Speech path diagnostic for the PLGC

The speech path diagnostic consists of four separate tests:

- hardware presence test
- P-side interface presence test
- P-side loop test
- internal loop test

Each test is executed only if all preceding tests have passed. The four tests are described in the following paragraphs.

Hardware presence test This test ensures the formatter (NT6X41), message (NT6X69), and timeswitch (NT6X44) cards are present in the PLGC. This hardware is necessary for the remainder of the tests. If any one of these cards is not present, the diagnostic returns a `No Resources` error message and produces a PM181 log report.

P-side interface presence test This test ensures that PCM-30 interface (NT6X27) cards, datafilled for the PLGC are still present. It is used to set up the subsequent P-side loop test. The P-side interface test terminates when a failed 6X27 card is detected or removed. When the diagnostic returns a `No Resources` error and produces a PM181 log report.

P-side loop test After the P-side interface test checks for the presence of all NT6X27 cards, the P-side loop test verifies the correct operation of these and other dedicated P-side loop-around circuits for the PLGC. The P-side interface cards supported in the PLGC P-side loop test are as follows.

If the PLGC is in inactive mode where one unit is inactive and the other manual busy (ManB), system busy (SysB), or in-service (InSv), the P-side loop test checks only NT6X48 P-side loops. If the PLGC is in active mode (one unit active and the other in SysB, ManB, or InSv), both NT6X48 and NT6X27 P-side loops are tested. The P-side interface test also checks the PLGC multiplexer.

Internal loop test This test checks the integrity of PLGC speech channels. If the PLGC is out of service (OOS), a full test on every channel is run. If the PLGC is InSv, the test checks two speech channels selected at random. The internal loop test also checks the operation of PLGC PCM enable/disable gates.

PLGC P-side link diagnostic

The P-side link diagnostic consists of three separate tests:

- hardware presence test
- P-side interface presence test (DS30A and PCM-30 link interfaces)
- full peripheral test

Hardware presence test This test checks for the message (NT6X69) and timeswitch (NT6X44) cards in the PLGC. These cards are necessary for the other P-side link diagnostic tests to run. If any of these cards are not present, the diagnostic returns a `No Resources` error message and produces a PM181 log report.

P-side interface presence test This test is the same as that in the speech path diagnostic. It ensures that all PLGC P-side links to be tested are still present. This test flags missing or failed NT6X48 or NT6X27 cards in the PLGC.

Full peripheral test After the first two tests in the P-side link diagnostic, this test ensures necessary hardware is present. The full peripheral test checks one speech channel on each specified PLGC P-side link to the MCRU. This test is run only if the PLGC is in active mode.

MCRU facility maintenance

When line diagnostics are invoked for MCRU-supported lines and the MCRU has no serving IMTU, the MCRU invokes the no-IMTU diagnostic. This software establishes a connection to a transmission test unit (TTU) in the host office, which uses this circuit for limited line testing in place of the IMTU.

Overload resources

When the traffic load on the MCRU is such that the amount of call processing is greater than the ILCM processor cards can handle, the MCRU accepts calls at a slower rate until the overload is cleared. Normally, in processing calls, the MCRU queues the call requests and assigns them priorities in its data store. As the data store fills close to its capacity, the MCRU overload controls react by slowing its rate of load acceptance or by halting the call process until store is available.

Overload control in the MCRU occurs for

- C-side communication and
- line scanning.

In slowing or stopping its C-side communication, the ILCM processor cards decrease the rate they scan for messages on the C-side. By slowing the incoming workload, the demand for data store is decreased. MAP display queries of MCRU status are slowed, as are C-side responses to MCRU-supported terminals.

During overload, the ILCM processor cards also stop scanning the BIC until sufficient data store is available. By not scanning the BIC, incoming work from the P-side is prevented by queuing it in the output buffers of the BIC. When the buffers are full, no more work is accepted, and the results are partial dials or ignored keys on business sets.

Display of overload state

When the MCRU becomes overloaded, its ILCM status display changes to in-service trouble (ISTb) while both units show InSv. When the QUERYPM FLT command is entered at the ILCM level, the phrase `ILCM Overloaded` is included in the response.

Log reports PM128 and PM181 indicate the overload condition in the MCRU. When call processing resumes, PM128 is generated with the phrase `ILCM out of Overload`.

Current expanded memory ILCM (XLCM) overload controls

The XLCM has 256kbytes of memory and a predefined number of small, medium, and large memory blocks, all of a fixed size. Domestic ILCMs and XLCMs use only small and large memory blocks to receive external messages and to send messages. Small memory blocks (SMB) are also used for utility purposes such as timer control blocks. Medium memory blocks (MMB) are used primarily for call data blocks (CDB), which hold data associated with active lines.

In the current XLCM implementation, overload is reported when the XLCM cannot receive an external message, DMSX or Inter-Unit Communication (IUC), because of a lack of small or large memory blocks. Some service degradation may be noticed before overload is entered.

Currently, the XLCM has four levels of throttling to prevent overload. Three of these are based on the number of available SMBs, and are designed to conserve SMBs. They are weighted to give terminating calls priority over originations.

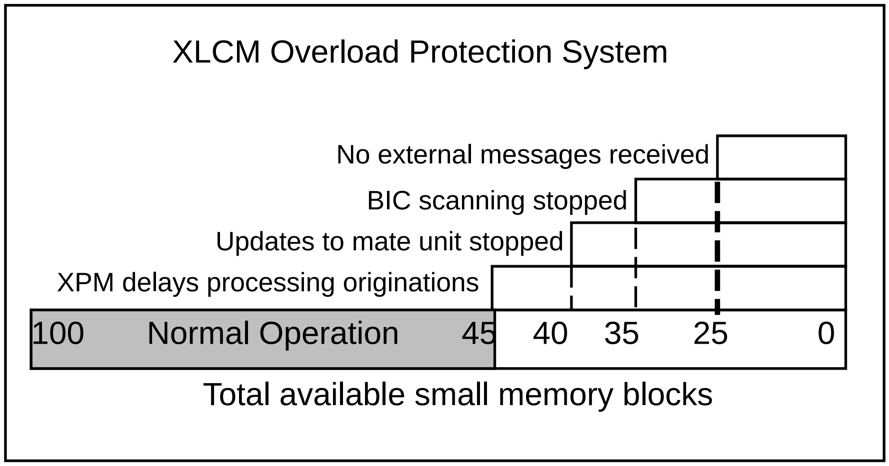
The four levels of throttling are described here.

1. The XPM throttles messages to the XLCM to no more than two every 50 milliseconds. This helps control small peaks of very heavy traffic. Sustained messaging at this rate can drive the XLCM far into overload.
2. The XLCM appends the number of SMBs it has available for external messages to each POTS origination message and all messages originating from P-phones (this number equals total available SMBs minus the number of SMB in reserve). When this number is less than 20, the XPM delays processing the origination until this number returns to 20 or greater.
3. If the total number of SMBs available for external messages is less than 15 (total available SMBs minus the number of SMB reserve less than 15), the XLCM stops sending call processing updates to its mate.
4. If the total number of SMBs available for external messages is less than 10 (total available SMBs minus the number of SMB reserve less than 10), the XLCM stops scanning the bus interface cards (BIC) for line scan changes.

For overload protection, the XLCM holds a reserve of small memory blocks which are not used to receive external messages. This ensures that even if the XLCM enters extremely heavy overload, internal processes will always have enough small memory blocks to finish their tasks. If the total number of SMBs available is less than or equal to the size of the SMB reserve, external messages requiring SMBs are rejected, except for maintenance or monitor messages. At this point, the XLCM sends an overload report to the computing module (CM).

The present overload protection system can be characterized as static since the throttle levels are constant and non-reactive. It can also be characterized as distributed since there is no one place where overload is monitored and where protective measures are initiated and controlled.

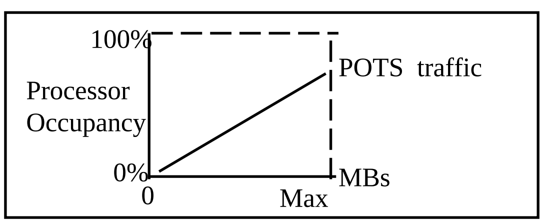
XLCM Overload Protection Systemxxx



Early POTS models of the small memory ILCM (64k), show its capacity to be memory block limited, the ILCM would run out of small memory blocks before it would run out of real-time usage. The overall design of the ILCM depends on this. Memory block limited is an ILCM characteristic that was carried over to the XLCMs.

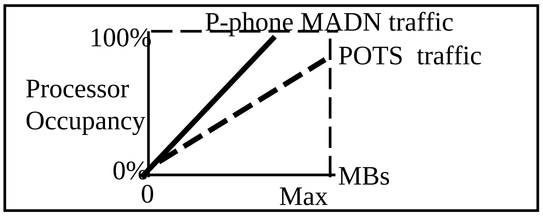
The XLCM overload system works well with POTS traffic. Because with the present selection for the number of SMBs (100) and the size of the SMB reserve (25), the processor is still memory block limited with POTS traffic. It runs out of SMBs before it runs out of real-time usage. This concept can be demonstrated in a rough graph of processor occupancy or real-time usage versus memory block usage as follows:

Memory-block usage



XLCMs have more memory blocks than small-memory ILCMs. Also, there are extra messaging requirements to accommodate P-phones that are richly provisioned with features such as displays and MADN. The result is that the XLCM may run out of real-time before it runs out of memory blocks. This is a real-time overload condition and is represented as follows:

MDC memory-block usage xxx



Since the XLCM was designed to be memory block limited, it is not equipped to handle real-time overload. This can result in outages because of:

- No overload report being sent, because real-time overload is not currently detected by XLCMs. As a result the CM does not suspend functions requiring a response from the XLCM, which it does when overload is reported. If the XLCM does not respond in time, the CM system busies it.
- An inability to handle starvation, when lower priority tasks do not get to run. This may lead to traps or serious software errors, which cause the CM to system busy the XLCM.

Enhancements to the overload protection system

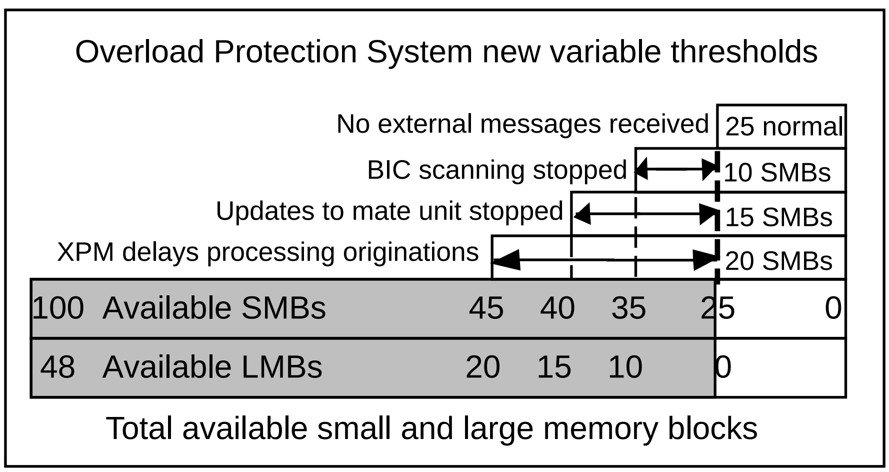
The enhanced XLCM overload protection system will, in addition to its current functions, detect when the XLCM is in real-time overload, report overload to the CM, and take protective measures to assure XLCM sanity. These protective measures will be active for as short a time as possible to retain the XLCMs call processing capacity.

This enhancement adds three new components to the existing Overload Protection System.

- Processor occupancy data collection component will be distributed over key areas of the XLCM code, to collect raw data that can be used to detect real-time overload. It leaves the raw data in a depository for the data analysis component. The priority of this component will match the priority of the segment of the system it resides in.

- The real-time data analysis component analyzes the data in the depository, and produces an easy-to-read processor occupancy status. This status is not a percentage, but a distress rating. Percentages are not used because they are too complex to work on when real-time is scarce, and because they do not supply all of the information the control component will need. The distress rating is used by the control component and is reported to the CM when the XLCM reports overload. In addition, the data analysis component provides indication of its activity, whether or not it has been running regularly. This component will run at a high priority.
- The real-time overload control component looks at the distress rating output by the data analysis component. If the output indicates real-time overload, the control component will adjust parameters in the Overload Protection System to recover some real-time and keep the memory block limits ahead of the real-time limits of the XLCM, as shown below. If the data indicates no trouble, the control component will begin to restore the Overload Protection System parameters to allow maximum call processing. This component will run at a very high priority.

XLCM Overload Protection System thresholdsxxx



Changes to the real-time subsystem

The real-time subsystem will change memory block system parameters in order to keep the memory block limits ahead of the real-time limits.

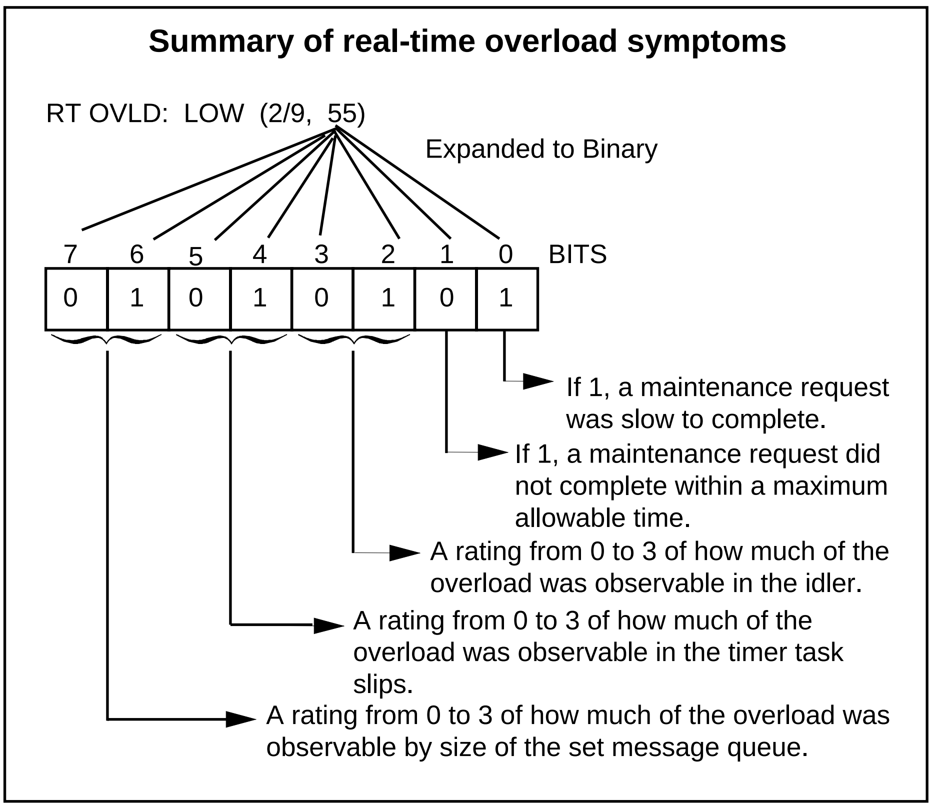
Enhancements to the real-time subsystem includes the following:

- Work shedding, to preserve real-time, would be accomplished by incrementally reducing the number of memory blocks available for external messages, along with all associated throttles, until some real-time usage is recovered.
- Define real-time overload as a processor occupancy rate of 75 percent or higher for a minimum amount of time because in the XLCM, to calculate percentages is very real-time intensive. Also, this is not a flexible method. It may result in premature reaction if the XLCM is not in severe real-time trouble.
- Monitor the amount of time it takes to process certain key maintenance requests at high levels, not to exceed 100 percent occupancy to ensure the XLCM will respond to these requests before the CM times out, or enters overload. Then, benchmark the average time to process these key requests. If it takes longer than this benchmarked average, assume real-time overload.
- Monitor idle task activity and enter real-time overload if an idle task does not run for a predefined period of time.
- Characterize the timer task slip counter at a high occupancy, but not at 100 percent. If the timer task slips at more than the normal high occupancy rate, enter real-time overload.
- Monitor the size of the set message queue, if it gets too high (40 or above), the XLCM is very near real-time overload.
- Include large memory blocks (LMB), in the work shedding component, in order to be completely effective for recovering real-time.

XLCM log report appendages

The XLCM appends a new field to the existing overload messages sent to the CM to reflect how extensive the real-time overload is. If the CM is at CCM04 or later, this new information will appear in the modified PM180 LCM Enters Overload log and modified PM180 LCM Overloaded log. The new field will contain a ratio of the maximum real-time distress reached before the overload report has to be generated (values 0-9), to the maximum possible level of real-time distress (values 5-9). A real-time overload symptoms summary byte in hexadecimal output is provided as described here.

PM180 Real-time overload ratio and distress ratingx



The XLCM will maintain data about overload that will allow it to provide a summary about the overload period. This summary, as described in the figure above, will be appended to the existing overload exit message to the CM. If the CM is at CCM04 or later, this information will be reflected in a modified PM180 LCM out of Overload log.

This feature is active in XLCMs, and International XLCMs with extended memory and XPM04 or later loads. The new logs will apply automatically when CCM04 is installed in the CM.

This feature is intended only to detect real-time overload, so the overload status can be reported to the CM and to preserve enough real-time to ensure the XLCM can function according to its operating model, memory block limited.

The real-time Overload Detection and Protection subsystem will be integrated into the current Memory Block Overload System. When in real-time trouble, the system will begin shedding work by changing memory block overload system parameters to reduce the amount of memory blocks available for new work. This aspect of the design makes the new overload system dynamic where the system will adjust itself to allow very high processor occupancy under any traffic configuration.

Takeover capability

Because there are power connections between the two shelves of the ILCM, the ILCM can operate in a load-sharing mode. If one power converter goes out, the mate converter supplies power to both shelves. This is called takeover. In the takeover state, the in-service unit assumes control of the lines associated with the out-of-service mate unit, in addition to its own. Also, the in-service unit has access to the DS30A C-side ports formerly used by the out-of-service mate. All 20 line subgroups are accessed by the DCC of the in-service unit.

In addition, the mate converter distributes ringing and ANI and coin control voltages, supplied by one of the two ringing generators located in the HIE, to all 20 LSGs of both LCAs.

Takeover also occurs when one LCA control complex, the ILCM processor and digroup card fails, the remaining control complex can support all PCM-30 links and the LSGs of both LCAs.

Calls in process at the time of takeover are terminated and must be redialed, but calls already connected and in progress are maintained.

LCC takeover

The LCC provides an interface between the LCA and the PCM-30 interface cards in the HIE shelf. Each LCA is associated with an LCC in the HIE shelf. If an LCA shelf fails, it is considered inactive and takes down the associated LCC.

Likewise, if an LCC fails, it takes down the associated LCA shelf. If either an LCC or an LCA shelf fails, the active LCC and LCA perform a takeover and support the PCM-30 links of the inactive LCC and LCA. Takeover is possible because of duplicated paths between the LCA shelves. A takeback occurs when the inactive LCC and LCA become active again.

Takeback

When the failed unit is returned to service, the subscriber lines in takeover are redistributed back to their normal processor. No calls in the talking or ringing state are lost when returning to the normal mode of operation.

ESA capability

If communication with the host is lost because of a link or PCM-30 card failure, an MCRU with feature package NTX154AA operates independently. The MCRU automatically enters the ESA mode. The ESA operation continues until communications are restored over at least one of the PCM-30 links. During entry and exit from ESA, all calls are dropped.

See the chapter "ESA maintenance overview" for an overview of ESA operation for the MCRU.

MCRU RMM maintenance

The RMM performs the following maintenance functions:

- bootstrap-level (direct monitor) functions
- RMM table control and MAP workstation maintenance
- scan monitoring processes
- interface with line test equipment
- self testing

Drawer testing

To ensure that message and speech data can be sent to and from the BIC, the MCRU conducts a BIC looparound test to detect line drawer faults. If the BIC test fails, the CC implements a full in-service test on both BICs, to ensure the fault is not transient or from the DCC or processor card.

If any of the BIC or DCC tests fail, the ILCM is not forced into takeover mode.

If a drawer state changes to ISTb or SysB, the state of the MCRU also changes to ISTb or SysB.

Some drawer ISTb conditions can be detected only when the drawer or the PM is OOS. These conditions include BIC scan, BIC inhibit, BIC CM, and BIC activity. If drawers with these conditions are returned to service with an ISTb condition, the ISTb state is cleared when the InSv unit or drawer tests are performed.

- BIC looparound sets the drawer to the SysB state so it cannot have messages sent to it. All lines to the drawer are made line maintenance busy (LMB), since the call processing is disabled.

- BIC scan sends a scan message to the BIC to ensure the scan chip can detect supervision changes on all datafilled lines. Since this involves a message, the path through the DCC is similar to the BIC looparound.
- DCC looparound tests a loop in the DCC. The looparound does not test all the DCC hardware for the DCC/BIC communication. If a fault exists with this hardware, the DCC looparound passes while subsequent BIC looparound tests fail, even though no drawer fault actually exists.
- DCC/BIC looparound sets the drawer to the ISTb state. A failure on the speech path hardware to the drawer has occurred. Although a particular channel may have failed the test, it is not certain if all channels are affected. Call processing may still be possible. For this reason, the drawer state is updated to ISTb at the MAP display, but the drawer is not prevented from handling call processing. The DCC/BIC looparound tests the PCM path by sending test patterns to the BIC. The patterns received by the transmit time switch are expected to be the same within a timeout period.

The list of full InSv tests follows:

- ACTIVITY_READ
- MSG_LOOPAROUND
- ANI_COIN_FAIL
- PARITY_TRAP_FAIL
- BIC_ACT_TEST
- POWER_CONVERTER_FAIL
- BIC_CM_TEST
- RINGING_FAIL
- BIC_INHIBIT_TEST
- RTM_CM_TEST
- BIC_LA_TEST
- RTTS_CM_TEST
- BIC_LOOPAROUND
- SANITY_TIMEOUT_FAIL
- BIC_SCAN_TEST
- SET_MSG_LOOPAROUND
- DCC_LA_TEST
- SUBCYCLE_LENGTH_FAIL
- PCM-30_LOOPAROUND

- SUBCYCLE_ORDER_FAIL
- IUC_LA_TEST
- TIMING_TEST
- LC_COM_TEST
- WRITE_PROTECT_FAIL
- LCC_FAIL
- ZERO_CROSSING_INT_FAST_FAIL
- LCC_LOOPAROUND
- ZERO_CROSSING_INT_SLOW_FAIL
- MEMORY_TEST

Faults that occur on a BIC drawer affect call processing regardless of which unit is in service and controlling that drawer. Since the full in-service tests use the DCC, it must first be determined that the fault is not in the DCC, where takeover is justified. If takeover occurs as a result of a reported drawer fault, the DCC is at fault even though the ILCM has failed the BIC tests.

In the takeover mode, the inactive unit DCC cannot access any drawers for call processing. However, the inactive unit DCC can access any drawer for testing. The active ILCM unit still has access to all drawers through its DCC.

Valid drawer faults do not take an ILCM unit out-of-service. However, the status of the unit is still ISTb. The ISTb reason is either Self Test or Diag Fail, depending on which test failed and caused the ISTb condition. Additional diagnostic information is available for ILCM shelves equipped with the NT6X51AB expanded memory board. After the CM has detected an ILCM unit has ISTb, the unit can still be made SysB by too many unsolicited messages being received.

BIC relay test (BRT)

The BRT tests the tip and ring reversal relay on each BIC of a given ILCM. It allows for both the manual testing of a single drawer of a specified ILCM and the scheduled testing of all ILCMs in an office. The QUERYPM FLT command is enhanced to indicate the drawers that failed the manual or system BIC relay test. This test generates a PM181 log and a new log, PM132, to indicate test results. See the chapter “MCRU related logs” for detailed information on BRT-related logs.

The levels of BRT testing are discussed in the following paragraphs.

Office level

Loops over each ILCM are included in the schedule. A single BRT runs on each drawer of the given ILCM. The results of the tests are displayed in a logutil report that combines the results of each drawer test.

ILCM level

This test runs from the scheduled BRT. The scheduled test selects an ILCM that had none of its drawers tested during the BRT window defined by the office parameters. A BRT is run on each drawer of this ILCM.

Drawer level

This test runs from the ILCM-level scheduled test or manually from the ILCM MAP display level. This is a single ILCM drawer test.

The office-level test loops over the ILCMs in an office and performs the ILCM-level test. The ILCM-level test, in turn, loops over each drawer of a given ILCM and performs the drawer-level test, which actually constitutes a BRT.

Office parameters for test scheduling

Scheduling for the BRT uses the information from two new office parameters in table OFCVAR: BICRELAY_XLCM_TEST_SCHEDULE and BICRELAY_NUM_SIMUL_TESTS. These parameters allow the user the flexibility to schedule the BRT from one to seven days a week, define the window size, and define how many tests (ILCM-level) run concurrently, as follows:

- BICRELAY_XLCM_TEST_SCHEDULE
  - This parameter defines the start time (BRTST_START_TIME) and stop time (BRTST_STOP_TIME) for the office-level test. These times cannot be the same, and the test window must be at least 10 min in length. The last field of this parameter (BRTST_DAYS_OF_TST) specifies the day or days of the week that the office-level test runs (MON, TUE, WED, THU, FRI, SAT, SUN). The user can datafill up to seven days in any combination, but cannot datafill the same day more than once.
  - If the start and stop times are the same or if the test window is less than 10 min, an error message is displayed.
  - If the user tries to make a change during the defined test window (while the test is in progress), a message is displayed indicating that, if necessary, the user can stop the BRT using the BICRELAY OFF command, make the necessary changes, and then restart the BRT using the BICRELAY ON command.
- BICRELAY_NUM_SIMUL_TESTS

- This parameter indicates the number of ILCM-level tests to run simultaneously.
- The start and stop times of BICRELAY_XLCM_TEST_SCHEDULE, plus this parameter, configure the number of ILCMs being tested.
- If the user tries to make a change during the defined test window (while the test is in progress), a message is displayed indicating the user must wait until the test stops. If the change is needed immediately, the user can stop the BRT using the BICRELAY OFF command at the command interpreter (CI) level, make the necessary changes, and restart the BRT using the BICRELAY ON command.

Out of service unit tests

BIC tests are run during out-of-service ILCM unit tests. Only drawers that have the ISTb or SysB state are tested by drawer tests. For this reason, out-of-service unit tests treat previously faulty drawers as follows:

- With both units out-of-service, any drawers with the SysB state are changed to the ISTb state so that they can be tested by the out-of-service test. If the fault persists, it is reset to SysB. If drawers no longer have in-service trouble, the state is changed to InSv.
- With only one unit out of service, only the drawers that have the ISTb and the InSv states are tested, since the mate unit is InSv and currently in control of all drawers. Drawers with a SysB state are therefore not changed or tested.

Changes in table LCMINV

BICTST is a new field in table LCMINV. It is a boolean that indicates whether or not a particular ILCM is included in the test schedule.

Table control for table LCMINV allows the user to change the MEMSIZE of a given tuple from 64 kB to 256 kB when the ILCM is still InSv. If this change is made without changing the load in the ILCM to an XLCM load, the BRT does not test the ILCM. The user must busy the ILCM, reload it with an XLCM load, and RTS the ILCM to include it in the test schedule.

If the user attempts an office-level test or manual ILCM-level test on an ILCM whose load is not changed, the test is not run and a log is output indicating the ILCM does not contain an XLCM load.

If the user changes the MEMSIZE field from 256 kB to 64 kB, the BICTST field must be set to NO. If it is not, a message is displayed indicating that the BICTST field is set to YES, and YES is valid only for XLCMs. The change is then rejected. If the MEMSIZE field is set to 256k, indicating XLCM, the user can set the BICTST field to YES or NO. Any ILCM entry in table LCMINV, with the MEMSIZE field set to YES, is automatically included in the test schedule.

BICRELAY command

The BICRELAY command allows the user to enable, disable, reset, allow, or disallow the PM181 drawer state to change logs when a given ILCM is undergoing the system BRT. Operating company personnel may also query the ON or OFF state of the BRT, determine if the PM181 drawer-state change logs are allowed or suppressed, query the number of BRTs in progress, or query the next ILCM to be tested by the system BRT.

Note: Only the PM181 logs associated with the ILCM undergoing the BRT are suppressed. Any other PM181 log associated with any other ILCM or XPM is allowed.

The BICRELAY command parameters are discussed in the following paragraphs.

ON The ON parameter enables the test to begin at the scheduled window. A message is displayed indicating the test is turned ON. If the current data and time falls within the scheduled window, the office-level test is started immediately. If any tests are in progress when this command is issued, a message is displayed, indicating the user must wait until all tests have completed before restarting the BRT. This option does not affect the operation of the manual TST command at the ILCM MAP display level.

OFF The OFF parameter disallows the resumption of the office-level test. A message is displayed indicating the test is turned OFF. Any system BRTs currently in progress are allowed to complete. This is the default.

Once the test is disabled, it does not begin again until enabled by using the ON option. Once enabled, the office-level test is resumed at the point where it was turned OFF. This option does not affect the operation of the manual TST command at the ILCM MAP display level.

SUPPRESS When an ILCM undergoes a system-initiated BRT, each drawer is busied, tested, and returned to service. When these state changes take place, a PM181 log is generated indicating the change. This parameter allows the user to suppress PM181 logs for any ILCM undergoing a system BRT. However, the PM181 logs for an ILCM not currently undergoing a system BRT are not suppressed. Also, SUPPRESS has no effect on a manual BRT run on a single drawer. This parameter can be issued at any time. A message is displayed indicating the logs are suppressed.

ALLOW The ALLOW parameter allows the PM181 drawer to change logs caused by the system BRT.

RESET The RESET parameter allows the user to restart an office-level test as if no ILCMs had been tested. The user must turn the test OFF before using this parameter. If the user attempts to reset the BRT while it is ON, a message is displayed indicating the BRT must be turned OFF before RESET can be performed and that all currently running tests must be completed. This option can be used at any time and does not affect the operation of a manual TST command at the ILCM MAP display level.

QUERY The QUERY parameter displays the current ON/OFF status of the office-level test, the number of ILCM-level tests currently in progress, the next ILCM to be tested in the scheduled BRT in the format of HOST 00 0 0, and the status of the SUPPRESS/ALLOW commands.

Test operation

The BRT is performed on a per-ILCM basis by the system. If done manually, the BRT is performed on a per-drawer basis. On a per-ILCM basis, the BRT is performed on all drawers of the ILCM automatically. The single drawer test is invoked manually using the TST DRWR *drwr_no* RELAY command at the ILCM MAP display level.

Office-level test The system test performs the following steps:

- loops over each ILCM included in the test schedule
- loops over each drawer for each ILCM
- runs one tip and ring reversal relay test for each drawer
- generates one logutil report with the results of all 20 drawers
- sets the drawer and node ISTb status accordingly

ILCM-level test The office-level (automated) test is run when the scheduling is datafilled in the office parameter. Once an ILCM is tested, it is not retested until each ILCM in the office is successfully tested. When all ILCMs included in the schedule are tested within the window, the BRT stops. Testing resumes when the next window arrives. If an ILCM is not tested, it is skipped in the current window and a PM181 information log is generated indicating the reason the test was not performed. If an ILCM test is still running when the stop time arrives, the current ILCM-level test is allowed to complete.

The BRT remembers which ILCM was the first to be tested within the given window. Each subsequent ILCM to be tested is compared to the first ILCM. If they are the same and the current date and time still fall within the window, the BRT stops. If all ILCMs are not tested within the window, the BRT begins where it left off during the last scheduled window.

The BRT can be scheduled to run concurrently with the automatic line test (ALT) or the ILCM REx test. However, running the BRT and the ALT concurrently is *not* recommended for the following reasons:

- The use of necessary test equipment by both or all of these tests reduces the number of ILCMs that can be tested within the window.
- The completion of the ALT is slowed.

None of these tests run concurrently on the same ILCM. It is up to the user to define a window that does not coincide with the scheduled ALT or REx test.

The ILCM audit, the manual REx, and the system REx cannot be run on the same ILCM that is running the system BRT. Also, the ILCM PM/UNIT cannot be made ManB during the system BRT.

Simultaneous tests (per ILCM) Simultaneous ILCM tests run if test equipment is available up to the number indicated in the BICRELAY_NUM_SIMUL_TESTS parameter described earlier. There must be LTUs or MTUs provisioned to allow the number of simultaneous tests (ILCM-level) to run. Because of real-time considerations, the BICRELAY_NUM_SIMUL_TEST parameter has a range of one through three. A higher number in this field allows more ILCMs to be tested within a given window.

Drawer-level test The BRT drawer-level test requires the metallic test equipment and a single NT6X17 line card located within each drawer being tested. The line card is used to test the BIC relay and must be in a working state. The card must not indicate a diagnostics failure at the MAP terminal and cannot be indicated as missing (M).

Each drawer is placed in a ManB state before the drawer-level test. Each drawer is out of service for approximately 10 s. During this time, call processing is suspended. When the tip and ring reversal relay test on all drawers is completed, the results are displayed by a single new logutil report (PM132) that includes the results of each individual drawer test of a given ILCM. If a drawer was previously out of service or call processing is currently in progress, the drawer is skipped and tested on later passes of the BRT.

Single-drawer test The single-drawer test is mainly for retest purposes if a failure occurs during the system test. This test is run from the ILCM MAP display level and is part of the TST DRWR command. The RELAY option allows the BRT to run without running the main DRWR test. The BRT is not run unless the RELAY option is specified. The drawer must be ManB by the user before this test is run. The user is prompted if the drawer is InSv, ISTb, or SysB. The manual BRT cannot be run on a drawer where the ILCM node is ManB, SysB, C-side busy (CBsy), or offline (OffL). A message is displayed indicating the request is invalid and giving the current state of the node.

The single-drawer test displays a PM181 log with the results of the test. A response is also displayed at the MAP terminal along with a card list indicating the drawer that failed, if necessary. If a single-drawer test cannot be run, the drawer is not set ISTb and can be returned to service to its previous state.

Office-level test The system BRT displays the results of each ILCM-level test in the form of a new logutil information report, PM132.

PM132 displays a combined report of each drawer-level test in a given ILCM, indicating the following:

- test passed
- reversal test failed
- test not run because of unavailable line card
- test not run because of problems encountered using the MTE
- test not run because of being aborted
- test not run because of drawer being previously out-of-service
- test not run because of call processing being currently in progress
- test not run because of bad hardware
- test not run because of message link problems
- test not run because of unavailable resources
- test not run because of an invalid load in the ILCM
- test not run because of an unexpected error condition
- test was run but drawer failed to RTS after test
- test not run because of conflicts in maintenance software

Refer to the chapter “MCRU related logs” for the exact syntax of test result reasons.

If an ILCM-level test does not run because of unavailable equipment before the individual drawer tests, the ILCM is not tested, a PM181 log is generated, and the ILCM node state is not changed.

If a drawer test fails to run, the drawer remains in its current state and is retested in a later window.

QUERYPM FLT command

Additional information to the QUERYPM FLT command at the MAP display level of the ILCM lists all drawers that fail the BRT and are set ISTb. The node ISTb reason is reset to DRAWER FAULT.

Restarts The following information applies to both manual and system-level restarts:

- warm or cold
  - All drawer-level tests are aborted.
  - ISTb reasons are saved.
  - All ILCM-level tests are aborted and are system level only if they are within the window. The test will resume after the restart. ILCMs already tested are not retested.
- reload
  - The BRT is reset as if the RESET option of the BICRELAY command were issued.
  - The ON/OFF settings of the BICRELAY command are retained.
  - The state of the SUPPRESS/ALLOW commands is retained.
  - ISTb reasons are cleared.

Interactions This feature uses the test access bus, the MTE, and a single NT6X17 card within each drawer to complete testing. Therefore, running ALT simultaneously with a BRT can delay both tests because they are competing for the same test equipment.

If REX is running on a given ILCM, BRT is not run on that ILCM. The ILCM remains in its current state, and a PM181 is output indicating the BRT did not run because of the REx in progress.

Restrictions and limitations

The following restrictions apply to this feature:

- The system test manually busies the logical drawer before running the RELAY test. If there are lines in a call processing busy state, the drawer is skipped for this test cycle.
- Before running a manual BRT on a single drawer, the drawer should be ManB.
- If at least one NT6X17 line card is not datafilled within each logical drawer, the drawer is not tested.
- If the line card selected for testing is removed during the test, the drawer fails.
- If a drawer fails to RTS when the system BRT is completed, the drawer is placed SysB so the system audit can attempt to return it to service.
- This test is not run on an ILCM concurrently with an ILCM audit and a REx test.
- The BRTST_START_TIME and BRTST_STOP_TIME fields of the BICRELAY_XLCM_TEST_SCHEDULE office parameter cannot be datafilled with the same value, and must have at least a 10-minute time span between them.

Subscriber lines automatic maintenance

Automatic subscriber line tests are performed on line circuits and loops, usually on a scheduled basis, without switch operator involvement other than for initial scheduling. In a MSL-100 switch office, these tests are performed under the Lines Maintenance Subsystem (LNS).

ILCM REXTEST

The ILCM REXTEST consists of running out-of-service diagnostics for each ILCM unit, as well as in-service diagnostics for each unit in both normal and takeover modes. This test is controlled by the LCDREX_CONTROL office parameter in table OFCVAR.

REX is performed during the specified interval for one ILCM at a time, in the order they were datafilled in the inventory table. It may not be possible to test every ILCM in the office during the REx interval. In this case, when the next interval starts, REx will pick up where it left off during the previous interval. It takes up to 15 min to perform a REx test on an ILCM.

ILCMREX test flow

A REx test for an ILCM includes the following procedure:

1 If both units of the ILCM are in service, unit 0 is made SysB; a PM128 state change log is generated with the reason `REX in progress`, the ILCM node status is made ISTb, and a minor alarm is generated.

2 In-service diagnostics are run on unit 1, which is in takeover; if any diagnostics fail, the unit is placed ISTb and a PM181 log is generated.

3 Unit 0 is returned to service. Out-of-service and in-service diagnostics are run. If out-of-service diagnostics fail, the unit is left SysB, a major alarm is raised, and PM106 is generated. If the unit is returned to service successfully and the in-service diagnostic fails, the unit is placed ISTb and a PM181 log is generated.

4 If unit 0 is returned to service successfully, these steps are repeated for unit 1.

Escalation to manual maintenance

When automatic maintenance fails to correct a fault in the MSL-100 switch, the MSL-100 switch provides trouble indicators that reveal a fault condition still exists. Alarms are examples of trouble indicators. Some OMs and logs also indicate a fault condition and a failure of automatic maintenance. Manual intervention becomes necessary as maintenance personnel attempt to clear the fault at the MAP terminal. Refer to the chapter “Troubleshooting chart” for a procedure on alarm clearing. Refer to the chapter “MCRU related logs” for log information and to the chapter “MCRU related operational measurements” for operational measurements information.

Alarm conditions

The maintenance system status header on the MAP display screen indicates alarm conditions for the MSL-100 switch subsystems. The alarm conditions and their meanings are shown in the following table.

Alarm description

Alarm	MAP display	Description
Minor	(blank)	Usually non-service affecting
Major	(M)	Usually indicates a service-degrading, threatening condition
Critical	(*C*)	Usually indicates a service outage or potential service outage

The type of alarm present is displayed under the header, along with the alarm severity. If several alarms are present, the most serious alarm is shown. When this alarm is cleared, the next most serious alarm is displayed. When there is no alarm condition, that is, when the PM system is fully in service, a dot (.) is shown under the header PM.

The following table shows the alarms related to the MCRU that appear under the PM subsystem header of the MAP display.

Note: If nn is greater than 99, two asterisks (**) are displayed instead of numbers.

Alarm class codes, displays, and conditions

PM header display	Condition
`PM`	All PMs are in service. No alarm conditions are in effect.

`PM`
`nnSysB`
`*C*`
	More than 10% of the PMs are SysB-critical alarm.

`PM`
`nnILCM`
`*C*`
	Both units of one or more ILCMs are not in-service critical alarm.

`PM`
`ILCMRG`
`M`
	Both RGs of an MCRU have ISTb and no critical or major alarm exists.

`PM`
`nnSysB`
`M`
	10% or fewer of the PMs are SysB major alarm.

`PM`
`ILCMRG`
`(blank)`
	One RG of an MCRU has ISTb, and no critical or major alarm exists.

`PM`
`nnISTb`
`(blank)`
	The indicated number of PMs are ISTb.

`PM`
`nnCBsy`
`(blank)`
	The indicated number of PMs are CBsy.

`PM`
`nn ManB`
`(blank)`
	The indicated number of PMs are ManB minor alarm.

-end-

In addition to the above alarm conditions, alarms at the MAP display PM level can be generated by ESA module faults. These alarms are comparable with those raised by existing peripheral modules. The alarms that can be generated are the following:

- MINOR PM alarm: generated by an ESA module in a ManB state
- MINOR PM alarm: generated by an ESA module in a CBsy state
- MINOR PM alarm: generated by an ESA module in an ISTb state
- MAJOR PM alarm: generated by an ESA module in a SysB state
- CRITICAL PM alarm: generated when 10% or fewer of the peripheral modules are in a SysB state

Subscriber lines manual maintenance

Subscriber lines that fail to meet certain quality standards are identified to the switch operator by posting the failures at the line test position (LTP) or by output reports generated by the ALT log subsystem, refer to the *Input/Output System Reference Manual*, 297-1001-129. The automatic maintenance failures thus identified are then manually tested and corrected.

Drawer maintenance

Drawer states can be monitored and changed from the ILCM level of the MAP display. Drawer tests can also be run by manually testing a unit at the MAP display.

When the system detects a faulty card, its drawer can be removed from service for testing and for card replacement, without affecting other call processing or ILCM maintenance.

ESA maintenance overview

Functional description

The Meridian Cabinetized Remote Unit (MCRU) with the Emergency Stand-Alone (ESA) feature package NTX154AA is a different configuration than the standard MCRU. Special hardware components are required in addition to the ESA software. Therefore, the ESA configuration is treated separately in this chapter. Information in this chapter and throughout this document concerning ESA operation are for future requirements.

> ***Note:*** At the time of publication, ESA testing had not been completed. Therefore information relating to ESA in connection with the 6X75EA and 2X48CC cards is subject to change.

Because the MCRU is a remote configuration, there is always the chance that the communication links between the MCRU and the host site may be damaged or severed and service interrupted. Therefore, the ESA feature package has been designed for the MCRU to provide stand-alone call-processing ability in case communication with the host is lost. With the ESA feature package, the MCRU emulates the call processing functions of the PCM-30 line group controller (PLGC) and the computing module (CM).

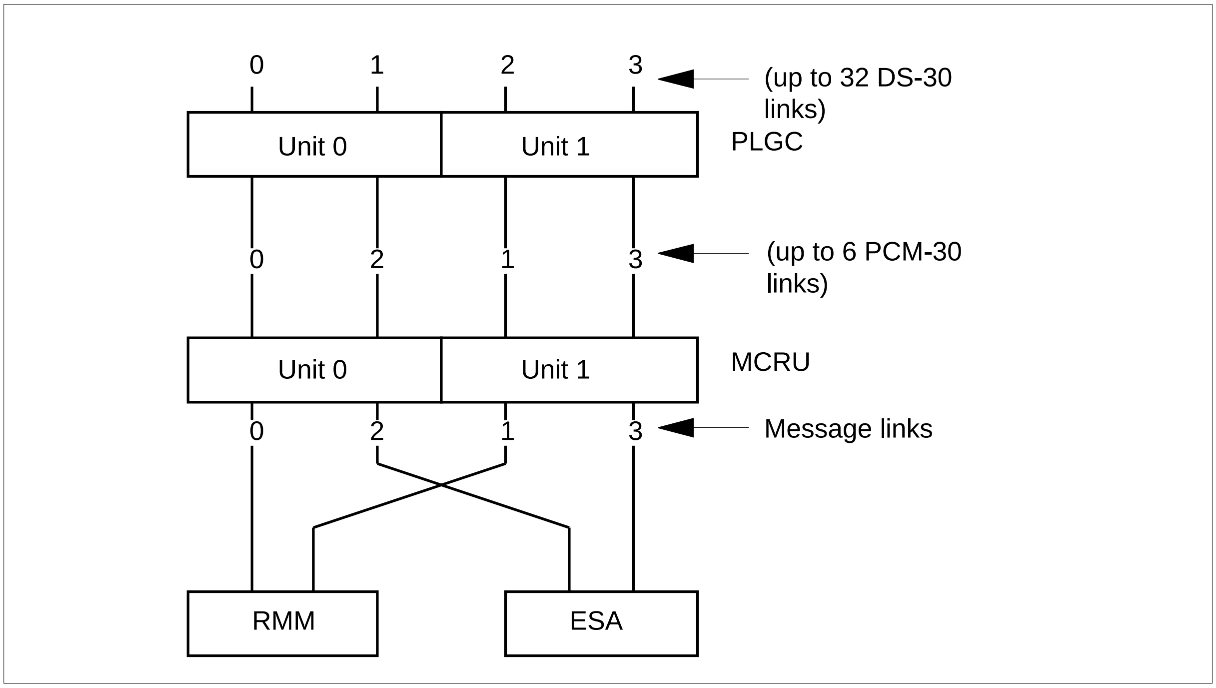
ESA hardware representation

An illustration of the ESA hardware configuration, from the viewpoint of the MAP terminal, is shown in the following figure. This illustration shows the MCRU as a C-side node to both the ESA processor and the remote maintenance module (RMM). In this case, the MCRU is not in the ESA mode.

When the MCRU goes into ESA mode, the illustration in the figure below is no longer accurate. In ESA mode, the ESA processor functionally takes the role of the host peripheral module (PM), in this case, the PLGC. This hardware configuration is not seen from the viewpoint of the MAP terminal because the MCRU is functioning independently of the host.

In the following figure, links 0 and 1 to the RMM are DS30A links supporting 30 channels each. Links 2 and 3 to the ESA processor are single-channel message links.

MCRU ESA hardware representation



ESA operation

The MCRU enters ESA mode when the MCRU determines that it can no longer communicate with the host site. The two situations that cause entry into ESA mode at the MCRU are as follows:

- unusable communication links
- looparound message audit failure

When the MCRU enters ESA mode, all active calls are taken down. This is called a cold enter.

The ILCM detects the loss of communication with the host. When the ILCM determines the ESA mode is required, the ILCM switches the C-side links from the host to the ESA processor. The ESA processor detects the switching of links through the clock and tone card.

When the ESA processor detects the switching of links, ESA-enter is initiated. The time span between loss of communication and ESA mode depends on the type of failure situation.

The ESA processor has a nailed-up (direct) communication link with the MSL CM at all times. The ESA processor is the only processor at the MCRU that can communicate with the MSL CM during ESA exit. The MSL CM must instruct the ESA processor to exit ESA.

During ESA mode, call processing is done through the ESA processor. The ESA processor contains a module of software, called the ESA CC, that emulates the MSL CM and handles line-to-line call processing. The ESA CC contains a subset of the translation data found in the MSL CM.

This subset is a snapshot of the MSL CM data needed for ESA call processing. The translation data in the snapshot data are known as static data. MCRU ESA mode is not entered until the ESA processor is loaded with static data.

The download of the static data to the ESA CC from the MSL CM truncates some translation data; thus static data are not true subsets of the MSL CM and only basic calls are supported. During MCRU ESA mode, plain old telephone service (POTS) and Meridian Digital Centrex (MDC) subscriber lines are supported.

ESA hardware

The additional hardware in feature package NTX154AA for the MCRU equipment frame consists of the following circuit cards:

- one ESA processor card (NT6X45AF)
- one 2 Mbyte memory card (NT6X47AB) or one 4 Mbyte memory card (NT6X47AC)
- one ESA clock and tone card (NT6X75EA).

See the figure on page 2-4 for a block diagram of an MCRU with the ESA hardware.

NT6X45AF - ESA processor card

This is the same processor card that is used in the PLGC. The PLGC processor card, when used in the MCRU equipment frame, is called the ESA processor.

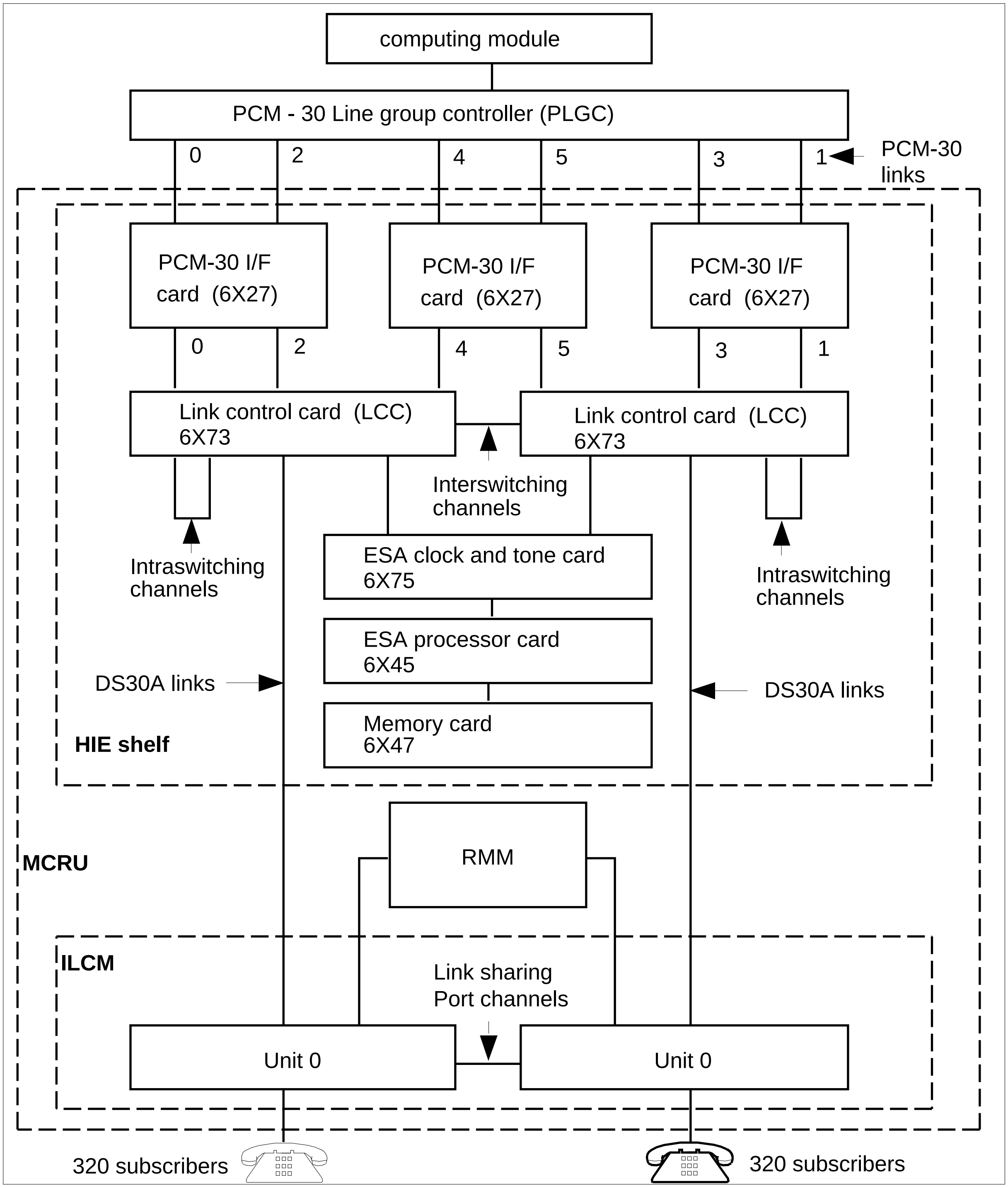
NT6X47AB - 2 Mbyte memory card

This is the same memory card that is used in the PLGC. This card contains 2 Mbyte of memory which is used for call processing when the MCRU enters ESA mode.

NT6X47AC - 4 Mbyte memory card

This is the same memory card that is used in the PLGC. This card contains 4 Mbyte of memory, of which 3 Mbyte may be used for call processing when the MCRU enters ESA. The 6X47AC is required for ESA loads for BCS33 and up.

MCRU with ESA hardware block diagram



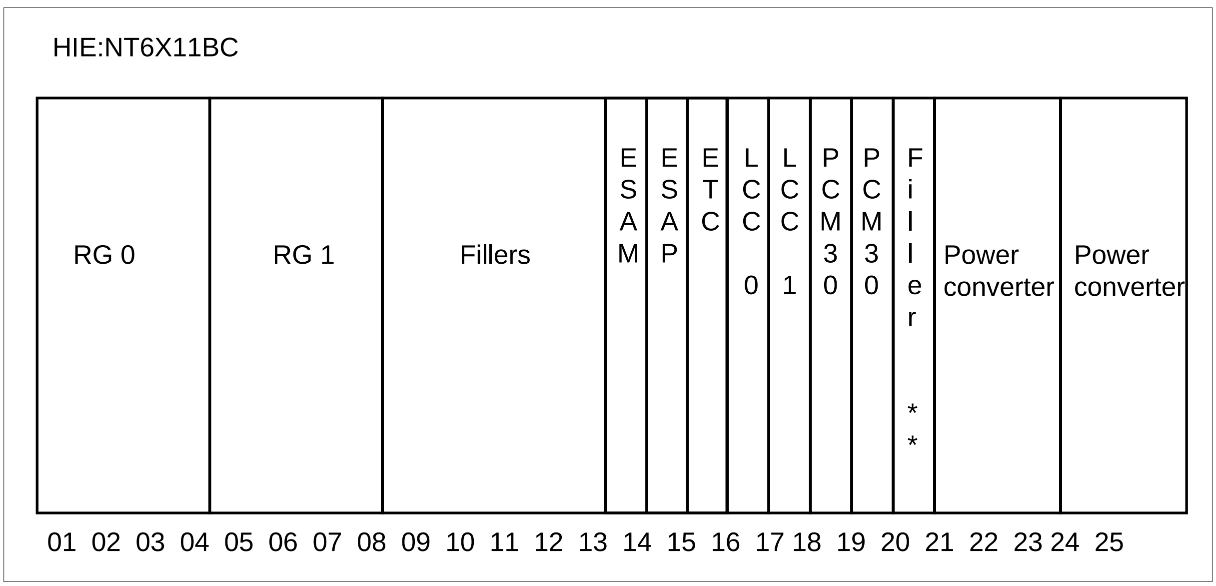
NT6X75EA - ESA clock and tone card

This card provides the following:

- A frame pulse for clock generation during ESA mode to replace the lost PCM-30 frame pulse from the host.
- Tones to an ILCM during ESA.
- An interface so the ESA processor can send and receive messages to and from the host during normal operations, during ESA mode this card communicates with both units of the ILCM and the RMM.

The ESA memory card, processor, and clock and tone card occupy slots 14, 15, and 16, respectively, on the host interface equipment (HIE) shelf. Refer to the following figure for the location of these cards on the HIE shelf of the MCRU equipment frame.

Host interface equipment shelf



NT2X48CC - Digitone receiver card

The Digitone receiver (DTR) card is required in the RMM for ESA operation. The ESA processor brings the DTRs into service when in ESA and turns them off when coming out of ESA. A single card DTR (NT2X48CC) is also used in the RMM for ESA Digitone calls. In addition to Digitone reception, the RMM provides diagnostics for the ESA processor.

Host interface equipment cards

Slot	ABBR	NT PEC	Remarks
01-04	RG 0	NT6X60AE	MCRU ringing generator
05-08	RG 1	NT6X60AE	MCRU ringing generator
09-13	.	NT0X50AA	Filler panel
14	ESAM	NT6X47AC	Emergency stand-alone (ESA) memory (See note 1.)
15	ESAP	NT6X45AF	Emergency stand-alone (ESA) processor (See note 1.)
16	ETC	NT6X75EA	ESA tone and clock card (See note 1.)
17,18	LCC	NT6X73BA	Link control card (LCC-0, LCC-1)
19,20	PCM-30	NT6X27BB	PCM-30 interface (2 PCM-30 links per card)
21	.	NT0X50AA	Filler panel (See note 2.)
22-24	.	NT2X70AE	Power converter
25	.	NT2X70AE	Power converter

Note 1: When ESA is not provisioned, these card slots have filler panels (NT0X50AA).
Note 2: For a total of six PCM-30 links, slot 21 is provisioned with a PCM-30 interface card.

-end-

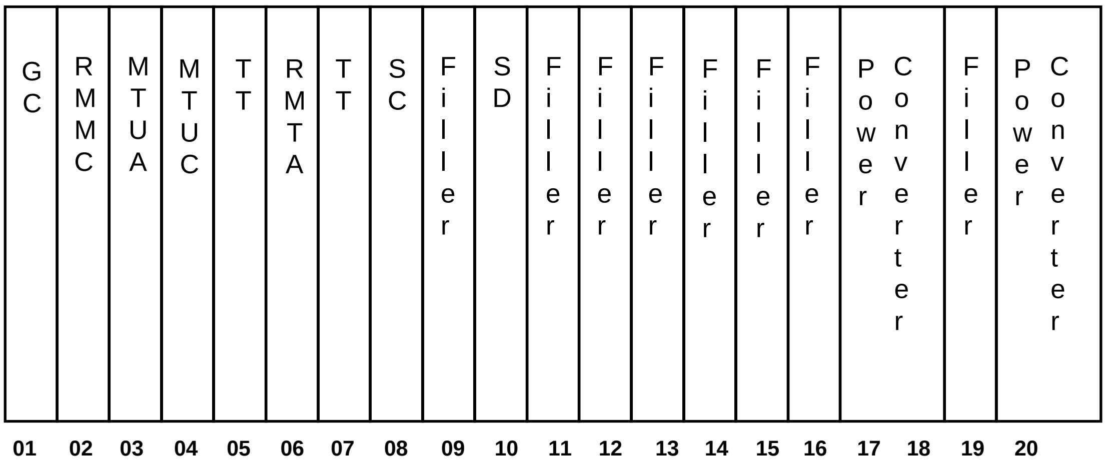
Additional PLGC hardware

The additional hardware in feature package NTX154AA for the host PLGC is the messaging card, (NT6X69). This card allows communications with the ESA processor.

The following figure shows a typical setup of RMM test and service circuit cards. For more information about provisioning, see the *DMS-100 Provisioning Manual, 297-1001-450* and the *Operational Measurements Reference Manual, 555-4031-814.*

Remote maintenance module shelf

RMM: 6X13EA



Slot	Abbr	NT PEC	Remarks
01	GC	2X59CA	Group codec and tone card
02	RMMC	6X74AB	RMM control card
03	MTUA	4X98BB	Metallic test unit, analog
04	MTUC	4X97AA	Metallic test unit controller
05	TT	2X90AD	Test trunk circuit
06	RMTA	3X09BA	Remote metallic test access
07	TT	2X90AD	Test trunk circuit
08	SC	0X10AA	Scan detector card
09	-	0X50AC	Filler Panel
10	SD	2X57AA	Signal distribution card 1 (Slots 03 to 16 show a typical complement of RMM test and service circuits. This complement varies depending on office requirements.)
11-16	-	0X50AC	Filler panel
17,18	-	2X09AA	Power converter
19	-	0X50AA	Filler panel
20	-	2X06AB	Power converter

Note: The Digitone receiver card (NT2X48) is used for ESA operation.

Note: The common location language identifier, (CLLI), name for the Digitone receiver card is ESA digit tone receiver, (ESADGTR), which must be used for table CLLI.

Software operation

For an overview of the software operation of the ESA feature package including a complete list of the specific features, see *Translations Guide*.

Intracalling during ESA mode

ESA mode uses the intracalling feature which also functions in non-ESA mode. Intracalling provides the capability of switching calls at a remote location without requiring transmission back to the host.

The number of intra- and interswitched calls supported during ESA is determined by the number of designated intracalling channels on the MCRU. The number of channels depends on the number of equipped PCM-30 ports available and the number of PCM-30 links used for host communication.

During ESA mode, all the intracalling is handled through the ESA processor. The ESA processor contains a subset of the translation data found in the MSL CM.

ESA call processing

When the MCRU is in ESA mode, the ESA CC handles line-to-line call processing. The figure on page 2-9 shows the basic call processing structure of the ESA CC.

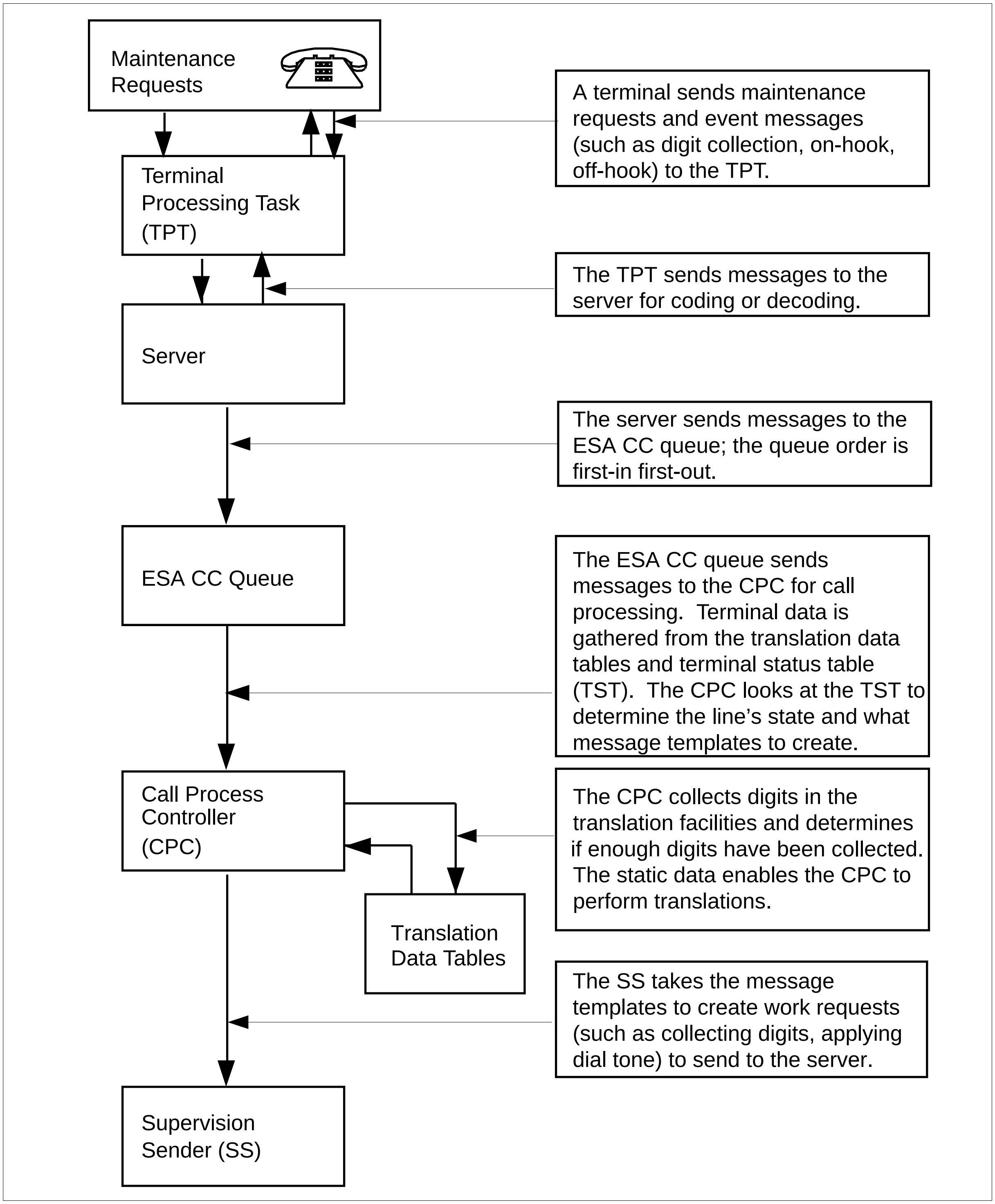
The ESA CC has only one queue; therefore, all messages from the server are sent to this first-in first-out queue for call processing. Before call processing begins, terminal data are needed. Terminal data are gathered from the static data downloaded from the MSL CM and the dynamic data stored in the terminal status table (TST).

Terminal status table

The TST has an entry for each possible line appearance the ESA processor can handle. Each entry has two bytes and each byte contains a data structure. The two data structures are:

- Unprotected line data (ULD): The ULD helps the ESA CC decide what action to take when an event message arrives from a terminal. An event message establishes or changes a line state. The ULD also keeps track of errors generated by a line during call processing.
- ESA call process block (CPB): The ESA CPB stores the number of reorigination attempts for a line. After successful completion of an origination, the TST stores the index of the call in a CPB.

ESA CC basic call processing structure



Every line can have several call processing line states. The call processing line states determine what is done with a specific message. The ESA CC initially screens the line states of all messages. All lines in the idle, originate, abandon, or lockout states are handled by the call process controller (CPC). All lines in the call-processing-busy state are also handled by the CPC. These lines are processed based on the call processing state stored in their CPB. All lines in the system busy (SysB) or manual busy (ManB) states are ignored by the CPC.

Refer to the following figure for an illustration of the TST.

Terminal status table

Line	Byte 1								Byte 0							
	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
0	Error count/cause				Line state				CPB index/origination count							
•	•				•				•							
•	•				•				•							
•	•				•				•							
•	•				•				•							
640	Error count/cause				Line state				CPB index/origination count							

The first byte (unprotected line data) in the TST is divided as follows:

- Error count/cause: The first four bits contain the count of the errors detected by software of a line. The count is incremented by each error. If the error count reaches a preset threshold, the line is taken out of service. The last cause of the error is recorded in place of the error count.
- Line state: The last four bits contain the current state of the line. The line states are as follows:
  - ManB: The line is ManB. Service is suspended to the line. Any messages from the line are ignored. Calls cannot terminate to this line.
  - Idle: The line is equipped. The line is currently call-processing idle and is looking for an off-hook condition. Origination messages from the line are treated as a call origination, and calls can terminate to this line.
  - Originated: The line has originated a call, but resources are not available to service the line. If still off-hook, the line reoriginates the call automatically after a one-second delay. If an on-hook message is received before the one-second timer expires, the line is put in the abandon state. The line can only reoriginate three times before being put into the lockout state. Calls cannot terminate to this line.

- Abandon: The line waits for another origination attempt. Any off-hook or on-hook message puts the line into the idle state. Once in the idle state, idle scan for an off-hook condition starts. Calls cannot terminate to this line.
- Call processing busy: The line is in a call-processing-busy state. In this state, a CPB is associated with the line. The associated CPB index is found in the second byte of the TST, and messages generated by the line are directed to the associated CPB index. Calls cannot terminate to this line.
- Lockout: The line is not involved with an active call. There is no CPB associated with the line, but the line is monitored for an on-hook condition. An on-hook message causes the line to return to an idle state. Once in the idle state, the idle scan for an off-hook condition starts. Calls cannot terminate to this line.
- SysB: Excessive errors have been detected on the line; therefore, the line is put out of service. The last cause of the error is stored in the error count/cause byte of the TST. All messages from the line are ignored.

The ESA line-audit process is responsible for returning the line to service.

The second byte in the TST contains the CPB index/origination count. A CPB is the data base associated with an active call process. There are only enough CPBs to handle the maximum number of intra- and interswitched calls. Since the number of ESA calls that can be supported is lower than the number of lines supported, there are not enough CPBs for all the available channels. The signaling states and call processing data that make up the CPB are as follows:

- CPB states:
  - Call processing idle (CP_Idle): The start-up state prior to any call processing. The line resources (DTR and connection) are requested at this time.
  - Dialing: The SERVER receives the digits. Digit translation is performed when a digit report is received.
  - Routing: This is a transitional state from Dialing or CP_Idle to another state.
  - Revertive wait for on-hook: This is a revertive call. The system is waiting for the call originator to go on-hook before ringing is applied.
  - Ringing: Ringing is applied to the call terminator. Audible ringing is supplied to the call originator. If the call is a revertive call and the office is equipped for coded ringing, then a ring splash is applied to the opposite side of the terminator.

- Talking: This is a voice connection between the call originator and terminator. The tip and ring reversal relay are restored for semipost-paid coin line.
- Originator disconnected: The originator has gone on-hook first. The originating line is idled. Supervision continues on the terminating line.
- Terminator disconnected: The terminator has gone on-hook first. The terminating line is idled. Supervision continues on the originating line. Lines with cutoff on disconnect feature have the cutoff relay operated.
- Release originator: A transitional state where the originator is being released from call processing.
- Busy: A busy tone is being applied to the originating line. Supervision and timing are done on the terminal.
- Reorder: A reorder tone is being applied to the terminal. Supervision and timing are done on the terminal.
- Coin disconnect supervise: The originating coin line has gone on-hook first. Coin release function is implemented. Call processing is waiting for the result of the coin function. Supervision continues on the terminating line.
- Coin disconnect: The terminating coin line has gone on-hook first. Coin release function is implemented. Call processing is waiting for the result of the coin function.

• call-processing data:

- Digit count/digit registers: Digits collected during digit collection are stored in the registers. Digit count indicates the number of digits collected.
- Routing information: This byte contains the results of digit translation. The possible results include the following types of termination:
    - regular
    - automatic line
    - revertive
    - hunt group
    - reorder termination
    - busy
- Terminator line character: The byte is the result of the digit translation.

- Terminator ring character: The byte contains the ringing characteristics as a result of digit translation.
- Originator revertive ring character: The byte contains the ringing characteristics of digit translation.
- Originator, terminator, DTR: This is the channel numbers of the three types of terminals using channels in an active call.
- Translation and audit-specific data: This is the data used by translations as flags for audits on a CPB during the digit collection phase.

Call channel management

All calls at an MCRU in ESA mode are intra- or interswitched. An intra- or interswitched channel is needed to complete a call. If an intra- or interswitched channel is unavailable, the TPT sends a channel-blocking message to the ESA CC. The originator of the call receives a reorder tone.

Digitone receiver management

The ESA processor needs to know where the DTRs are located in the RMM. DTR data are downloaded with the static data. Because digitone receivers are allocated in a circular fashion, all receivers get equal distribution. The following steps explain how a receiver is used.

1 When a line originates a call by going off-hook, a receiver is requested.

2 If an unassigned receiver is found, it is marked “not free” and assigned to the call.

If all receivers are assigned, the system waits three seconds to locate a free receiver. If after three seconds a free receiver is not found, the line is put into the abandon state.

3 When dialing is finished, the receiver is marked “free.” It is unassigned and ready for use by another call.

A receiver is also freed when a dial pulse (DP) digit is received, which occurs when a DP phone is used on a line datafilled as Digitone. Freeing the receiver maximizes DTR use.

ESA CC supervision sender

The ESA CC uses a streamlined set of execs to handle call processing. The definition of all the execs is loaded in the ESA exec lineup at the exec download time of the RTS sequence. The supervision sender uses the execs to create work requests for the server.

ESA translation data

When the MCRU is in ESA mode, translations are done by the ESA CC using a subset of translation data from the MSL CM. The MSL CM downloads this subset of the MSL CM data, needed for ESA call processing, to the ESA CC. This type of translation data is called static data. ESA logs are generated when the downloaded data exceeds the MCRU ESA maximum. Refer to the *Translations Guide, 555-4031-350* for more information about ESA translations.

The ESA CC requires two types of static data:

- general XPM-type
- ESA translations

The general static data are manually downloaded when the ESA CC is ManB or loaded by the system when the ESA CC is being returned to service. The ESA static translations data are only loaded when the ESA CC is in service (InSv).

Downloading the ESA processor

Translation data is downloaded to the ESA processor in the following ways:

- manually: The LOADPM command downloads data manually to the ESA processor.
- during return to service (RTS): The RTS command downloads data automatically to the ESA processor if it cannot do call processing with existing data.
- automatically: The data are loaded during daily updates of the ESA processor as specified in the PRLCM_ESADUPD_HOUR office parameter.

Supported subscriber line types

During MCRU ESA mode, the supported subscriber line types are POTS and MDC, which are listed below.

POTS line types

The POTS line types supported include the following:

- 1FR - single party flat rate
- 1MR - individual message rate. The lines are treated the same as single party flat rate lines.
- 2FR - two parties flat rate
- 4FR - four parties flat rate fully selected without ANI
- 8FR - eight parties flat rate semi-selective without ANI
- 10FR - multiparty flat rate without ANI

- CCF - coin coin first service. The coin is returned.
- CDF - coin dial tone first service. The coin is returned. CDF phones cannot make *911* or *0* calls without the initial coin deposit while in ESA mode.
- CSP - coin semi-postpay service. The coin is not returned and no coin is required to enable a speech path.
- PBX lines - PBX message rate lines are treated as PBX flat rate lines.

MDC lines

The MDC line types supported include the following:

- loop and ground start lines
- 500 and 2500 set
- Meridian business set (MBS). The MBS is treated as a 2500 set. The primary directory number (PDN), HOLD, and RELEASE keys are supported.
- digital data unit (DDU). The PDN, HOLD, and RELEASE keys are supported. There is no modem pooling.
- lines with cutoff on disconnect option. (Cutoff relay is operated for 300 ms.)

Supported subscriber services

During MCRU ESA mode, the supported subscriber services are POTS and MDC.

POTS subscriber services

The POTS services provided include the following:

- one home numbering plan area (HNPA) code for each MCRU
- services for single party, multiparty, coin, and PBX lines
- three to seven digits local dialing plan
- up to 16 prefix or special numbers per MCRU with a maximum of 15 digits each for special termination (for example, 0-, 0+, 411, 911, and so on)
- invalid or vacant terminations routed to reorder or announcement termination

MDC customer group services

The MDC services provided include the following:

- maximum 640 members in a customer group
- maximum 32 customer groups per MCRU

- up to eight prefix or special numbers per MCRU with a maximum of 15 digits each for each customer group.
- station-to-station dialing for one- through six-digit extension numbers
- denied incoming call for a station
- direct outward dialing with or without second dial tone for termination to another customer group or POTS lines within the same MCRU
- inter-customer group calling by the same dialing plan (except lines with the denied incoming option)
- primary numbers of the multiple appearance directory number (MADN) groups are treated as regular MDC lines
- multiple centrex customer dialing plans

Channel configuration

On ESA entry, the C-side channel map of the MCRU is reconfigured to provide more interswitch channels for ESA call processing.

Inter- and intraswitch channels make call connections through the MCRU without involving a host connection. The inter- and intraswitch capability allows call processing to continue in ESA operation.

On MCRU ESA entry, the MCRU channels are configured as if all PCM-30 ports are unequipped except for primary ports 0 and 1. Ports 0 and 1 must be equipped in MCRU ESA.

By reconfiguring the C-side channels on ESA entry, more interswitch channels are available for unit-to-unit calls. Refer to the following table for a list of the channel breakdown in MCRU ESA.

Channel availability after ESA entry

Port number	Number of intra channels	Intra channels	Number of inter channels	Inter channels
0	6	2, 7, 12, 18, 23, 28	0	none
1	6	2, 7, 12, 18, 23, 28	0	none

-continued-

Channel availability after ESA entry (continued)

Port number	Number of intra channels	Intra channels	Number of inter channels	Inter channels
2	18	2, 3, 5, 7, 8, 10, 12, 13, 15, 18, 19, 21, 23, 24, 26, 28, 29, 31	12	1, 4, 6, 9, 11, 14, 17, 20, 22, 25, 27, 30
3	18	2, 3, 5, 7, 8, 10, 12, 13, 15, 18, 19, 21, 23, 24, 26, 28, 29, 31	12	1, 4, 6, 9, 11, 14, 17, 20, 22, 25, 27, 30
4	18	2, 3, 5, 7, 8, 10, 12, 13, 15, 18, 19, 21, 23, 24, 26, 28, 29, 31	12	1, 4, 6, 9, 11, 14, 17, 20, 22, 25, 27, 30
5	18	2, 3, 5, 7, 8, 10, 12, 13, 15, 18, 19, 21, 23, 24, 26, 28, 29, 31	12	1, 4, 6, 9, 11, 14, 17, 20, 22, 25, 27, 30
-end-				

By reconfiguring the C-side channels on MCRU ESA entry, the MCRU does not gain channels overall. However, the MCRU does gain in the number of interswitch channels offset by a decrease in the number of intraswitch channels.

Exiting MCRU ESA mode

After communications are restored, the MSL CM recovers the MCRU from the ESA mode. When the MCRU exits ESA mode, all active calls are taken down. This is called a cold exit.

When C-side communications are restored between the MCRU and the MSL CM, the MSL CM initiates the ESA exit sequence. Before the ESA exit sequence begins, the MSL CM communicates with the ESA processor over the nailed-up connection. This communication determines if the MCRU is in ESA mode and if the MCRU can be recovered immediately. The two possibilities for recovering the MCRU are a system exit or a manual exit.

ESA system exit

A system exit is an automatic exit from ESA mode started by the MSL CM without operator interference. A system exit is started if the following situations are present:

- At least one ILCM unit of the MCRU is SysB or C-side busy (CBsy).
- The PRLCM_XPMESAEXIT office parameter time-out value is not zero.

The following is the system exit sequence.

1. The C-side communications are restored between the MSL CM and the MCRU.
2. The MSL CM discovers the MCRU is in ESA mode.
3. The MSL CM enters ESA time-out mode.
4. When the MSL CM times out, the MSL CM sends an ESA-exit request to the ESA processor.
5. The MCRU and the ESA processor perform exit operations.
6. The ESA processor tells the line concentrating module (ILCM) to return the line link control card (LCC) to normal operations.
7. The ESA processor sends operational measurements, peg counts, and the reason for entering ESA mode back to the MSL CM; this information is displayed in the PM171 log. The PM181 log is generated if the ESA exit has problems.
8. The MSL CM returns to service (RTS) the MCRU.
9. Return to service the ESA processor and RMM nodes.

ESA manual exit

A manual exit is an exit from ESA mode started by operating company personnel at the ILCM MAP level using the RTS command. A manual exit is required if any of the following situations are present:

- Both ILCM units of the MCRU are in a ManB state.
- The PRLCM_XPMESAEXIT office parameter time-out value is zero.

Manually overriding a time-out value other than zero by manually busying the ILCM units of the MCRU at the ILCM MAP level starts a manual exit. The FORCE option should also be used with the BSY command.

The following steps describe the manual exit sequence:

1. The C-side communications between the MSL CM and the MCRU are restored.
2. The MSL CM discovers that the MCRU is in ESA mode.
3. The MSL CM queries the MCRU for the number of active calls.
4. The MSL CM displays the number of active calls on the MAP display and queries the operating company personnel if ESA-exit is desired.
5. If operating company personnel confirms to the MSL CM that ESA-exit is desired, the MSL CM sends the ESA-exit request to the ESA processor.
6. If operating company personnel does not want to continue with the ESA-exit, the MCRU is left ManB. The MCRU stays in ESA mode.
7. The MCRU and the ESA processor perform exit operations.
8. The ESA processor tells the ILCM to return the LCC card to normal operations.
9. The ESA processor sends operational measurements, peg counts, and the reason that the MCRU dropped into ESA mode to the MSL CM. This information is displayed in the PM171 and PM181 logs.
10. The MSL CM RTS the MCRU.
11. RTS the ESA processor and RMM nodes.
12. Receiver off-hook

Tones during ESA mode

The ESA clock and tone card (NT6X75) provides five continuous tones when an MCRU is in ESA mode. The ILCM is responsible for interrupting these tones to give specific types of tones as requested by the system. The tones appear on channel 16 on the incoming C-side ports of the MCRU. The following table shows the MCRU ESA tones, their channel appearance, and cadence.

MCRU ESA tones

Tone type	Tone ID	Channel appearance		Cadence (in seconds)	
	(HEX)	Port	Channel	On	Off
Busy	81	1	16	0.5	0.5
Reorder	82	1	16	0.25	0.25
ROH*	83	2	16	0.1	0.1
Audible	80	4	16	2.0	4.0
Warble	8D	5	16	2.0	4.0
Dial	06	7	16	N/A	N/A

Note: Idle tone uses a start-cadence message, but the MCRU connects the receive path to a port that provides idle tone.

Providing tones

The following steps are necessary to provide tone to a subscriber.

1 The ESA processor sends a start-cadence message to the ESA clock and tone card. This message specifies the tone required, the terminal identification, and the cadence times.

2 Upon receipt of the start cadence message, the ESA clock and tone card perform the following:

a. If necessary, the terminal's current receive path connection is broken.

b. The receive path of the terminal is connected to the appropriate port.

c. The specified cadence for that tone is set up.

The following steps are necessary to clear the tone.

1 The ESA processor sends a stop-cadence message to the ESA clock and tone card. This message specifies the terminal identification.

2 Upon receipt of the stop cadence message, the ESA clock and tone card sends stop-cadence messages to the ILCM to disconnect the terminals connection to the correct port and channel 16.

Ringing during ESA mode

The MCRU needs duplicated ringing generators. The ringing types supported during MCRU ESA mode are as follows:

- coded ringing
- frequency ringing
- superimposed ringing
- immediate ringing

Treatments during ESA mode

The treatments supported during MCRU ESA mode are as follows:

- busy tone
- reorder tone
- receiver off-hook, (ROH), tone

ESA limitations and restrictions

The following limitations and restrictions apply to the MCRU in ESA mode.

Limitations during the ESA mode

Limitations during the ESA mode for POTS lines and features are as follows:

- Only the three to seven digit POTS dialing plan is supported.
- One home number plan area (HNPA) code is supported for each MCRU.

Limitations during the ESA mode for MDC lines and features are as follows:

- Only the MDCXLA translation selector (number of digits in the extension number) is supported for station-to-station calling. If the selector is not datafilled, POTS translation is used.
- Network class of service (NCOS) is not supported for MDC lines. Customer groups or lines are restricted to a dialing plan that is common to all customer groups.

- To be supported during the ESA mode, the primary number of a multiple appearance directory number (MADN) group must be an MDC business set PDN key or a 500/2500 Set directory number.

  Note: Not all MDC and POTS features or lines are supported.

Restrictions during ESA mode

Global restrictions during ESA mode are as follows:

- Line diagnostics are not supported while the MCRU is in ESA mode.
- ESA mode is not provided for a convertible MCRU.
- MADN group operation is not supported.
- Recorded announcements are not supported.

Restrictions during ESA mode for POTS lines and features are as follows:

- Local call detail recording (LCDR) is not supported.
- Local automatic message accounting (LAMA) is not supported.
- Centralized automatic message accounting (CAMA) is not supported.
- Remote register signal distributor point lines are not supported.
- Dial tone speed operational measurements (OM) are not supported.
- Teletypewriter exchange service (TWX) is not supported.
- Foreign exchange calls are not supported.
- Equal access features are not supported.

Restrictions during ESA mode for MDC lines and features are as follows:

- Station message detail recording (SMDR) is not supported.
- Attendant consoles are not supported.
- Custom calling features are not supported. This includes the following features:
  - flashing
  - conference calls
  - digital data unit (DDU) feature keys. No action occurs when feature keys are pressed.
- Remote meter pulsing lines are not supported.
- MDC electronic business set feature keys are not supported. No action occurs when feature keys are pressed.
- Party line circle digits are not supported.

- Automatic number identification (ANI) is not supported.

Fault conditions

The ESA mode of operation is triggered by the fault condition of unusable communication links. The possible reasons for this fault condition are described below.

Unusable communication links

Communication links from the MCRU to the MSL CM become unusable because of the following situations:

- The links are physically severed between the MCRU and the host.
- The peripheral side (P-side) message link (PCM-30 cards) of the PLGC are pulled out.
- The C-side message link (PCM-30 cards) of the MCRU are pulled out.

The PRLCM_ESAENTRY_BADLINK office parameter determines the desired delay time between failure of the C-side message link and the entering of ESA mode.

looparound message audit failure

The MCRU enters ESA mode when the looparound message audit detects the failure of messaging between the MCRU and the MSL CM because of the following situations:

- There is an extended loss of communication with the MSL CM for longer than the time-out period specified in the PRLCM_ESAENTRY_BADCSIDE office parameter.
- Both PLGC units (C-side peripherals) are ManB.
- Network planes of the PLGC are ManB.

The PRLCM_ESAENTRY_BADCSIDE office parameter determines the desired delay time between the failure of MCRU communication with the C-side peripheral and entering ESA mode. The delay time has been implemented to prevent the MCRU from entering the ESA mode while a restart is being performed. A restart causes the looparound message to fail. The MCRU enters ESA mode if all looparound messages within the time-out period fail.

Fault conditions that can occur during ESA operation are as follows:

- line errors
  - too many originations
  - confusion message received
  - line translation error

  - dial pulse error (bad digits)
  - Digitone error (bad digits)
  - ringing error
  - coin error
- faulty Digitone receivers
- static data failure

These fault conditions are corrected by audits, which are described in the following section on automatic maintenance.

Automatic ESA maintenance

When fault conditions occur, the MSL-100 switch and the MCRU initiate audits and other system processes to automatically clear the fault. For ESA maintenance, these automatic features are

- line audits
- DTR audits
- downloading static data
- routine exercise (REX) tests
  - read only memory (ROM) diagnostics
  - read access memory (RAM) diagnostics

ESA line audits

The ESA line audit process is used to return SysB lines to service after a specified period of time. In ESA mode, a line is declared SysB when excessive errors have occurred.

Each time an error occurs on a line, the error count associated with that line is incremented. If the error count reaches a preset threshold, the line is made SysB. The last cause of error is stored in the TST.

A line in a SysB state cannot originate or terminate a call, therefore ESA resources are not tied up. The SysB lines are periodically returned to service by the line audit process. This process ensures that service is not denied to a line with a transient fault.

Digitone receiver audit

The DTR audit monitors the status of the Digitone receivers. If a call process possesses a DTR for longer than two audits, the audit terminates the process. A cleanup process is started for the CPB. The audit also marks the DTR as free, making it ready to be used.

Error tracking detects receivers that are faulty. Before a receiver is unassigned, an error count check is made. When a preset error threshold is reached, the receiver is taken out of service. An audit periodically returns to service the receiver and sets the error count to zero.

Automatic static data downloading and system maintenance

The system automatically loads the ESA CC with static translations data. The downloading of this data can be done automatically by the system after ESA RTS or manually by operating company personnel when the ESA CC is InSv.

At a time determined by office parameter PRLCM_ESADUPD_HOUR, the system updates the static translations data in the ESA CM. The system performs the equivalent to the LoadPM CC ESADATA command in sequence on each MCRU with the ESA option. This ESA option is set in table LCMINV.

> ***Note:*** The MCRU should not be on the same static update hour as a host Remote Switching Center (RSC). The static data will be corrupted.

If the MCRU is running another maintenance function at the automatic update time, the automatic update process waits 30 seconds for the currently running function to finish. If the currently running function is still running after 30 seconds, the MCRU is marked with the in-service trouble (ISTb) status. The reason associated with the ISTb is ESA STATIC DATA.

If the automatic update process fails during the loading of the static data, the MCRU is marked with the SysB status. If there is a failure in downloading a table, an ESA log, ESA101 through ESA107, is generated. Each log identifies and describes the table that failed to download. The remainder of the tables are not downloaded. The MCRU is marked with the SysB status and a reason of ESA DATA.

> ***Note 1:*** The MCRU cannot enter ESA while the static data is being loaded.
>
> ***Note 2:*** If the MCRU is out of service during the daily update, the data is updated as part of the normal RTS sequence.

Routine exercise test

Routine exercise (REX) tests are a series of tests performed on the ESA hardware that is not in use while the ESA processor is providing normal service. These tests can be done on a routine basis or by using the test (TST) command with the REX option. These tests require that both ILCM units of the MCRU, RMM, and ESA processor are InSv.

The REX test tests the ability of the ILCM units to enter and exit ESA mode. Also tested is the ILCM units' ability to send messages to the ESA processor while in ESA mode. Only one ILCM unit is tested at a time. Testing both units at once would result in a loss of service for the calls that were connected at the time of the test. While one unit is being tested, the other unit continues call processing in the takeover mode.

To prevent accidental attempts to perform maintenance on an ILCM unit that is in ESA mode, the system runs a lockout task on the ILCM unit being tested. The lockout task is the same task used during an ESA exit. Lockout does not perform any maintenance.

Takeover and takeback on an ILCM unit affects calls that are being connected, calls already connected are not affected. The ILCM unit is returned to service before the other unit is tested.

The following actions occur during a REX test:

1 The messaging ability of each of the peripherals, ESA module, ILCM units, and RMM, is tested. If any of these preliminary tests fail, REX tests are not run.

2 If the preliminary tests pass, one ILCM unit is placed in the ESA mode and the other unit in the takeover mode. The unit in the ESA mode has its messaging links switched from the host to the ESA module.

3 The ESA processor tests the ability of the ILCM units to message to the ESA module under ESA conditions.

4 Other diagnostics are performed on the ESA module. Other diagnostics are the tones test, and a comparison of LCC control and 6X75 status bytes.

5 After all tests are completed, the unit is taken out of the ESA mode and returned to service.

6 If the REX tests have passed, the system tests the ESA module using the other ILCM unit.

ESA ROM diagnostics

The ESA processor is provided with a ROM diagnostic test. This test can be implemented by operating company personnel by using the LOADPM command.

This test consists of the standard XPM ROM tests, which test the processor and memory complex, and also basic messaging functions. The messaging functions are the MSL CM to ESA processor messaging capabilities.

ESA RAM diagnostics

The ESA processor is provided with a RAM diagnostic test. This test can be implemented by operating company personnel by using the TST command or automatically by the system during a RTS. The ESA RAM diagnostic test consists of the following tests:

- a message test
- a 6X75 card test which tests the following functions:
  - 6X75 status to ESA processor
  - ESA processor to 6X75 control
  - A-bus interface to ESA processor and memory
  - frame interrupt generator
  - clock synchronization hardware
  - tone generator
  - ESA messaging hardware
- the 6X75 card test includes the following:
  - status and control test
  - RAM test
  - frame pulse interrupt test
  - VCXO clock test

Escalation to manual maintenance

Manual maintenance may be required for certain testing situations, described as follows.

Loading ESA static translations data

This section describes how to load the ESA processor manually with static translations data. Static translations data are the subset of MSL CM translation data that are downloaded into the ESA processor.

The steps to manually download static data are as follows:

1 Display the ESA MAP level for the desired MCRU.

2 Ensure the ESA processor is InSv or ISTb

3 Type: **>LOADPM CC ESADATA**

4 Press: ENTER

If this process fails, the ESA processor is made SysB.

ESA manual exit

Operating company personnel can perform a manual exit from the ESA mode at the ILCM MAP level using the RTS command. A manual exit is required under the following conditions:

- Both ILCM units of the MCRU are in a ManB state.
- The time-out value for the PRLCM_XPMESAEXIT office parameter is set to zero.

  Note: To manually override a time-out value other than zero, manual-busy the ILCM units of the MCRU at the ILCM MAP level; this starts a manual exit. The FORCE option should also be used with the BSY command.

The manual exit sequence is described under “ESA manual exit” in this document.

PLGC maintenance to prevent ESA mode

When both PLGC (C-side peripheral) units are ManB, communication between the MCRU and MSL CM is interrupted. When communication between the MCRU and the MSL CM is interrupted, the MCRU enters ESA mode after the time-out period in the PRLCM_ESAENTRY_BADCSIDE office parameter has expired. The warning message that occurs when attempting to manually busy an PLGC is: `This action will take this PM and its subtending nodes out of service.`

To prevent putting the MCRU into ESA mode, busy the MCRU or ESA CC before placing the PLGC in a ManB state.

Signaling for MCRU

Signaling for MCRU

This section describes the signaling protocols used by the Meridian Cabinetized Remote Unit (MCRU) to communicate with the MSL-100 switch and provide subscriber services. The following subsections discuss MCRU signaling and the types of subscriber services they provide.

MCRU signaling links

The PCM-30 interface cards (NT6X27), located in the host interface equipment shelf, are the signaling interfaces between the MCRU and the host XMS-based peripheral module (XPM), which can be a PCM-30 line group controller (PLGC), a line trunk controller (LTC), or the remote cluster controller (RCC) of a Remote Switching Center (RSC).

Each PCM-30 interface card can accept up to two PCM-30 links from the host XPM. The MCRU and the host XPM exchange information over the PCM-30 links through dedicated message channels. This signaling information allows the MCRU and the host XPM to perform such tasks as communicate the states of subscriber lines, execute call processing, set up test configurations, and pass test results.

The MCRU is subordinate to the MSL-100 switch and, therefore, all intersystem (signaling between the host and other systems) and operator (host to subscriber) signaling are handled by the host office.

Message channels

The MCRU requires a minimum of two PCM-30 links to the host. These links are designated as the primary links. The ILCM portion of the MCRU requires two message channels to the host XPM.

The ILCM message channels will occupy channel 1 on each of the primary PCM-30 links to the host. The remote maintenance module (RMM) requires two message channels to the host XPM; these channels occupy channel 2 on each of the primary links.

The emergency stand-alone (ESA) processor also requires two message channels to the host, which occupy channel 3 on each of the primary links.

If the ESA processor is not provisioned, channel 3 will be available for speech traffic.

Signaling protocol

The message channels on the primary PCM-30 links have nailed-up connections to the MSL computing module (CM) and use the DMS-X protocol to communicate with the host.

DMS-X is a half-duplex, byte-oriented protocol implemented using a full duplex message channel such as the PCM-30 links. The ILCM processor handles the DMS-X message protocol on its message channels to the host.

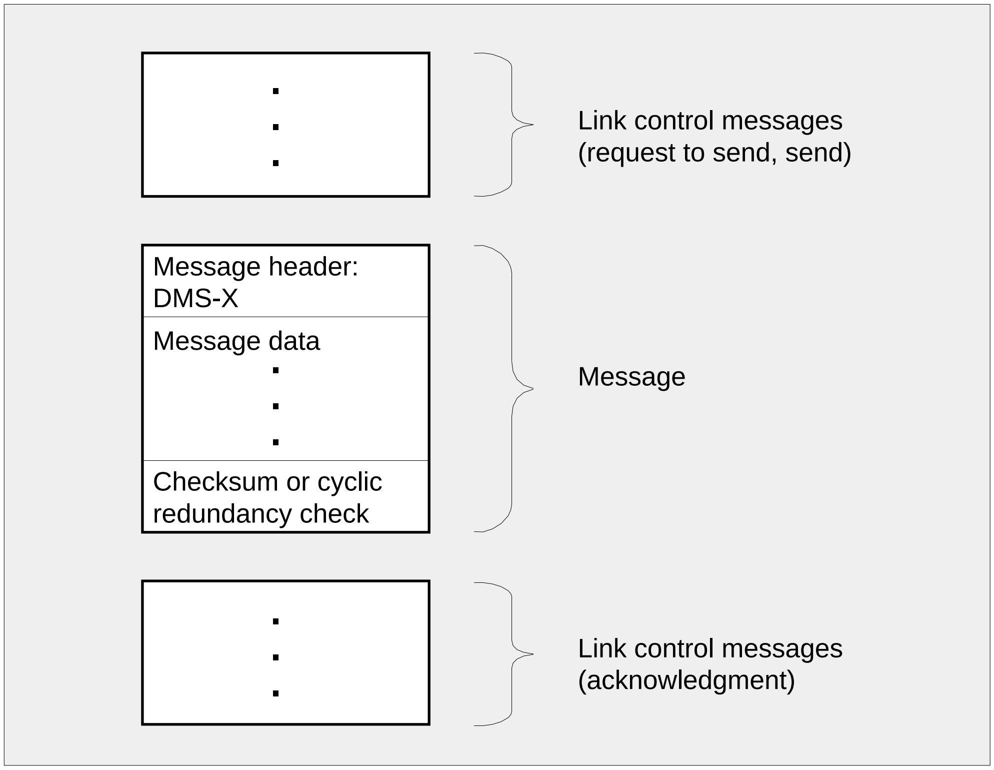
The RMM control card processes DMS-X messages, trunk messages, and pulse code modulation (PCM) data. The ESA processor is the interface that communicates with the host XPM via DMS-X protocol when the MCRU is in ESA mode.

DMS-X protocol

DMS-X protocol is a state-driven code, requiring handshake messaging between the MCRU and host at each stage of data transfer. This allows the communicating terminals to delay the message transfer if either terminal is not ready.

The following figure illustrates a general form of handshaking protocol, which makes up DMS-X protocol.

DMS-X handshaking protocol

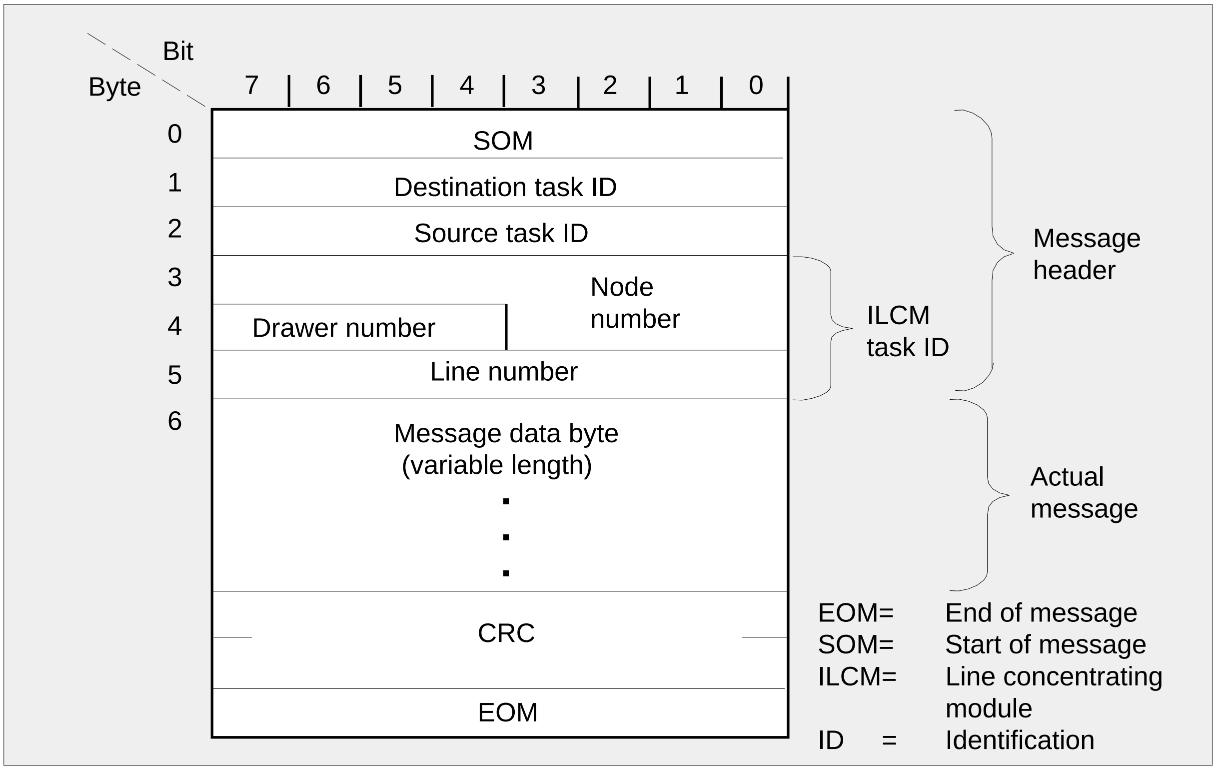


DMS-X protocol includes a cyclic redundancy check (CRC) code for error detection. Message error detection is performed by message time-out and by message checksum or CRC calculation.

In the event of protocol, checksum, or CRC failure on an outgoing message, the sending node retries the send sequence. On an incoming message failure, the sending node reroutes the message over an alternate central-side (C-side) link. Hardware redundancies provide for at least one alternative path to and from a node.

The following figure shows the format of DMS-X messages.

DMS-X message format



The DMS-X message header is in the first six bytes:

- The first byte specifies the start of message (SOM).
- The second byte specifies the destination task identification (ID) of the message. This ID is used in an outgoing message to identify the process (task within the ILCM) that is to receive the message.
- The third byte specifies the source task ID. This ID is used in an incoming message to identify the ILCM task that sent the message.
- The next three bytes specify the task ID number.

The number of bytes in the actual message or data is variable. The CRC, occupying two bytes, is used to detect transmission errors. The end of message occupies one byte.

Signaling functions

Signaling supports call processing activities by allowing the functions of call origination, tone generation, digit collection, and ringing to occur.

Call origination

Signaling is used to transmit the on- and off-hook signals that allow the host XPM to identify subscribers requesting service.

When a subscriber lifts the handset from its cradle, a voltage source located in the MCRU provides a steady flow of current through the transmitter. The ILCM processor detects this current and sends an off-hook message to the central office (CO).

The CO will then interpret the off-hook signal as a request for service and allocate a channel on a PCM-30 link to serve the subscriber line. The CO applies dial tone to the line.

Depending on the type of telephone, the subscriber line will transmit open pulses or dual tone multifrequency signals through the MCRU to the CO. The CO analyzes the digits and determines an interoffice call was placed. The calling end of the trunk will be seized and a connect signal, which is a sustained off-hook signal, is transmitted forward to the called end of the trunk. This signal indicates a request for service and continues as long as the connection is held.

Tone generation

The host XPM provides all properly cadenced tones, which the MCRU applies as needed to subscriber lines. The tones supported by the host and applied by the MCRU are as follows:

- dial tone
- audible ringing
- warble ringing
- busy tone
- reorder tone
- receiver off-hook (ROH) tone

Digit collection

The MCRU performs the digit collection function of subscriber dialing. The types of dialing are supported by either (a) dial pulse, or (b) dual tone multifrequency (DTMF).

The address of a called party may be transmitted using dial pulsing or multifrequency signaling. These are used for digit transmission only and must be combined with other types of signaling to provide the PCM-30 links with complete signaling capability.

Dial pulse signaling The ILCM of the MCRU performs dial pulse digit collection. With dial pulsing, the numerical value of each digit is represented by the number of on-hook intervals in a train of pulses.

The on-hook intervals of each digit are separated by short off-hook intervals while the digits themselves are separated by relatively long off-hook intervals. The break time expressed as a percent of the pulse period (break + make duration) is called percent break.

The three important characteristics of dial pulsing are speed, percent break, and interdigital time. The host XPM analyzes these factors and assigns a channel or time slot in the digital line.

DTMF signaling Digitone phones send dial pulse or dual-tone multifrequency signals to transmit address information over a line. During normal operation, the remote maintenance module (RMM) forwards this signal to the host. During ESA operation, this information is sent to a Digitone receiver in an RMM.

DTMF signals are specific combinations of tones which represent digits (0-9) and various other special units. The actual decoding of the tones to digits is handled by special trunk interface circuits, the DT and MF receivers.

The RMM of the MCRU examines the output of these receivers to determine when a digit has been received. The RMM relays the digits from the MF receiver to the host XPM. The host XPM analyzes the digits and then applies a ringing signal to the called line.

End-to-end signaling

End-to-end signaling allows a subscriber to send DTMF signals to the far end using the keypad of a Meridian Digital Centrex (MDC) Meridian business set (MBS). By pressing certain keys at the MBS, the subscriber can outpulse DTMF signals to the machine that start, stop, rewind, and playback the recordings on tape at the machine. After each 130-millisecond DTMF signal, the PCM signal is reconnected.

Ringing

The CO determines the type of ringing to employ and sends a ringing signal to the MCRU over the PCM-30 channel associated with the subscriber line being called. This directs the MCRU to connect the ringing generator to that line. The following ringing types are provided by the CO and applied by the MCRU:

- bridged ringing (single-party)
- superimposed ringing (multiparty)

- coded ringing (cadency)
- frequency selective ringing (FSR)

ESA signaling

The ESA feature is an emergency service that provides a subset of call-processing capabilities when communications to the host are lost. This includes call processing for basic station-to-station calls within the MCRU for plain old telephone service (POTS) and MDC lines.

The MCRU equipped with the ESA feature package provides the same tones as a functioning MCRU. The tones appear on channel 16 of the incoming C-side ports of the MCRU. Tone cadence is provided by the MCRU software which interrupts the tone by controlling the time switch in the link control card (LCC).

To provide a tone in ESA mode, the ESA processor will send a start cadence message to the MCRU. This message will specify the tone required, the terminal identification, and the cadence times.

Upon receipt of a make cadence message, the MCRU will perform the following steps:

1 Break terminal current receive path connection, if necessary.

2 Connect the receive path of the terminal to the appropriate port.

3 Set up the specified cadence for that tone.

The handling of idle tone also uses the start cadence message but the MCRU will connect the receive path to a port that will provide idle tone.

MCRU hardware

This chapter describes the Meridian Cabinetized Remote Unit (MCRU) hardware components that give subscribers the full resources of the digital switching system. The following sections discuss the hardware components that comprise the MCRU.

MCRU hardware components

The MCRU is housed in a standard MSL frame with four shelves and contains the following components:

- international line concentrating module (ILCM)
- host interface equipment (HIE)
- frame supervisory panel (FSP)
- remote maintenance module (RMM)

Hardware configuration

The figure on page 4-3, shows the layout of the MCRU equipment, housed in a single MSL-100 equipment bay. The approximate external dimensions of the bay are 1.8 m by 72.4 cm by 72.2 cm (72 inches by 28.5 inches by 28.25 inches)

International line concentrating module (ILCM)

The ILCM is the basic design building block of the remote peripheral family. The control side (C-side) of an ILCM interfaces with the host network over DS30A links. The MCRU connects to the host network over two to six PCM-30 links through an intermediary controller peripheral such as a PCM-30 line group controller (PLGC), a line trunk controller (LTC), or a remote cluster controller (RCC).

When the ILCM is connected to PCM-30 links, it can function as an MCRU. The basic operating principle behind the MCRU, is that DS30A ports of the ILCM are mapped to PCM-30 interface cards which connect to the host office. These DS30A ports are on the digroup control cards (DCC) of the ILCM.

The ILCM contains two shelves which are called line concentrating arrays (LCA). Each LCA contains five line drawers; a fully equipped ILCM contains ten line drawers. An ILCM supports 640 subscriber lines when fully equipped. Each LCA also has its own control complex, processor and digroup control and power converter. The control units operate in a load sharing mode. If one of the processors malfunctions, the mate processor takes over complete control of the ILCM. Likewise, if one power converter fails, the remaining power converter can supply power to all line cards of the ILCM.

The MCRU contains a dual-unit ILCM (NT6X04AB/BB), mounted in an ILCM shelf assembly (NT6X0401). The NT6X04AB contains NT6X51AB processor cards with 256 kB of memory that requires the extended memory LCM (XLCM) software load. The circuits contained in the ILCM are as follows:

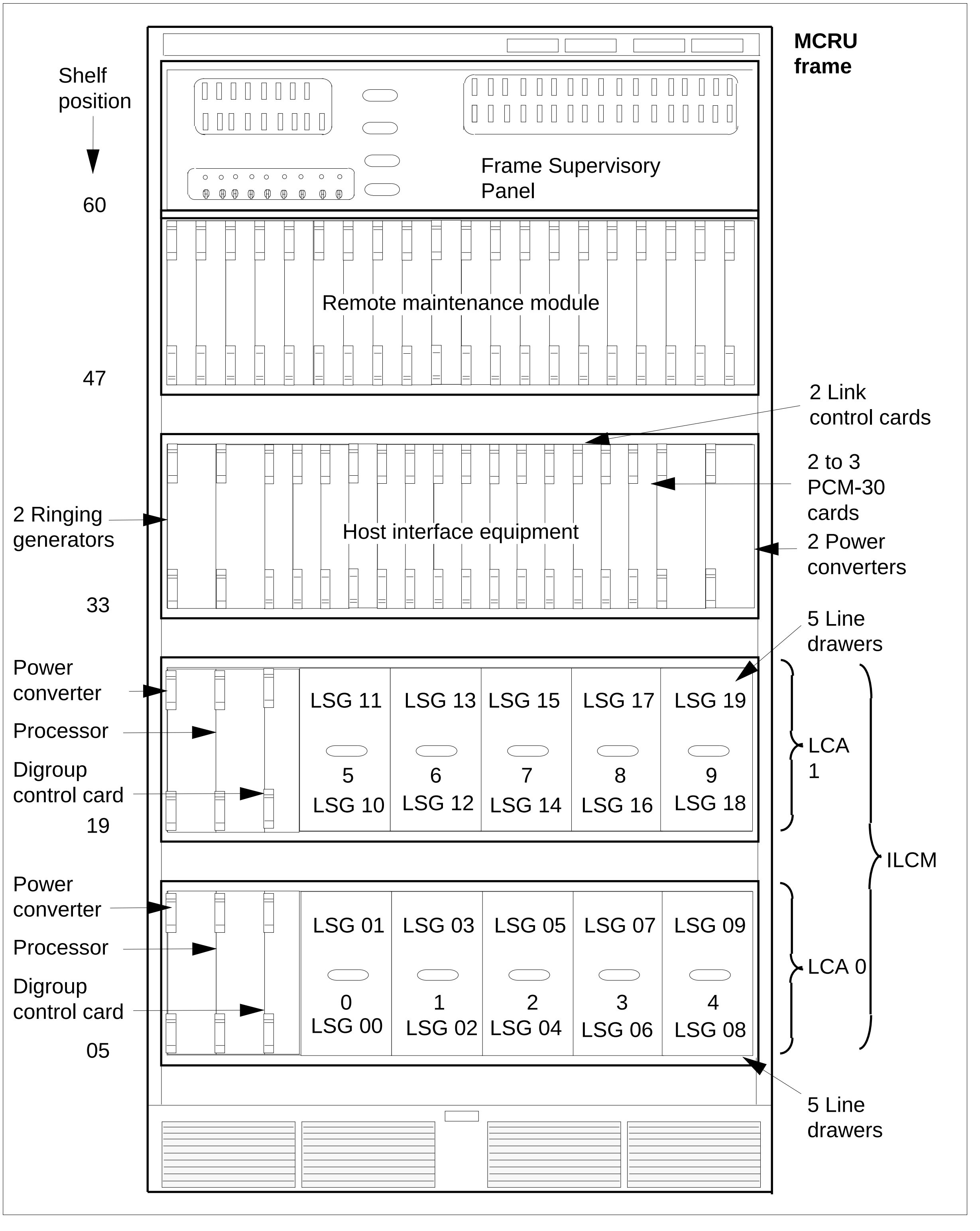
- NT6X53AA-Power converter 5V/15V
- NT6X51AB-Extended LCM processor
- NT6X52AA-Digroup controller
- NT6X54AA-Bus interface card (BIC) (up to ten)
- Up to 640 line cards

Line cards

Each one of the ten line drawers of the ILCM contains a pair of line subgroups (LSG) and a single bus interface card (BIC). Each LSG contains 32 line cards supporting a maximum of 640 subscriber lines. The subscriber line card types supported by the MCRU are as follows:

- NT6X17AA, AB, AC-Standard line card type A or NT6X17BA (World line card)
- NT6X18AA, AB-Line card type B with and without +48 V (coin, PBX, and ground-start) or NT6X18BA (World line card)
- NT6X19AA-Message waiting line card
- NT6X20AA-Message waiting power converter
- NT6X21AA, AB, AC, BC-Standard line card type C and Meridian business set line card
- NT6X71AA, AB, AC-Data line card (DLC) MSL-100/SC-100
- NT6X99AA Integrated bit error rate test (IBERT) line card

MCRU frame, shelf, and panel arrangement



Host interface equipment

The HIE (NT6X11BC) which is housed in shelf assembly (NT6X1101) contains the PCM-30 interface cards (NTX27) for connecting the PCM-30 links to the host controller. The HIE shelf also contains the following common circuit cards:

- NT6X60AE-MCRU ringing generator (two)
- NT6X73BA-Link control card (two)
- NT2X70AE-Power converter, ± 5 V , ± 12 V (two)

Link control cards

The link control cards (LCC) located in the HIE shelf converts data between PCM-30 format, to and from the host office, and DS30A format, to and from the ILCM. The DS30A ports of the ILCM are mapped to the PCM-30 interface cards in the HIE. Data is sent through the PCM-30 links to the host.

One LCC exists in the HIE for each ILCM unit (LCA shelf). In normal operation, the two LCCs are connected alternately to even and odd LCAs. If an LCC fails in the HIE, the mate LCA can handle all the PCM-30 links.

Each LCC functions as a clock by locking its frequency to the primary PCM-30 links. Both LCC clocks are driven from the same clock source, which is the host PLGC. One of the LCCs will be the primary LCC, as directed by the host PLGC, and will frequency lock to its C-side primary link to sync to the timing downloaded by its host peripheral. The other LCC will frequency lock to the primary LCC to derive its timing. The LCC clock functions serve both the DCCs and, if provisioned, the Remote Maintenance Module (RMM).

Frame supervisory panel

The MCRU is provisioned with a frame supervisory panel (FSP) (NTNX26AA). The function of the FSP is to provide interface between the power distribution center in the FSP and the power converters in the ILCM. The FSP also contains alarm circuits to monitor under-voltage conditions from the power converters.

Additional MCRU components

HIE components

In order for the MCRU to function with emergency stand-alone (ESA) capability, the HIE shelf must contain the following additional cards:

- NT6X45AF-XPM processor card
- NT6X47AC-4Mb master processor memory plus card

- NT6X75EA-ESA clock and tone card

Remote maintenance module

An optional component of the MCRU is the RMM (NT6X13EA), which is housed in the RMM shelf assembly (NT6X1301). The RMM is a single-shelf module based on the maintenance trunk module (MTM). The RMM provides maintenance and service capabilities for the MCRU. The RMM consists of two power converters, an RMM control card, a codec and tone card, and space for up to 14 provisionable service cards.

The RMM contains one set of common cards (NT6X13AB). The common cards in the RMM are as follows:

- NT2X59CA-Group codec
- NT6X74AB-RMM control
- NT2X06AB-Power converter common feature
- NT2X09AA-Multi-output power cards

Cards that can be provisioned in the RMM are as follows:

- NT2X90AD-Incoming/outgoing test trunk
- NT4X98BB-Metallic test unit analog
- NT4X97AA-Metallic test unit controller
- NT3X09BA-Remote metallic test access (8X8)
- NT0X10AA-Scan card
- NT2X57AA-Signal distribution

If the MCRU is provisioned with ESA, the RMM shelf must also contain the ESA Digitone receivers (NT2X48CC).

Convertible MCRU

The Convertible MCRU is a temporary configuration that allows later conversion of an MCRU site into a Remote Switching Center (RSC). The Convertible MCRU is supported by feature package NTX622AA. See *Peripheral Modules*, for more information on the Convertible MCRU.

MCRU recovery procedures

This chapter contains recovery procedures for restoring a Meridian Cabinetized Remote Unit (MCRU) to service from a completely out of service condition. References to PRLCM or MCRU are synonymous within this chapter and throughout this document. This procedure can be used by maintenance personnel in a MSL-100/200 office.

MCRU recovery procedure

Application

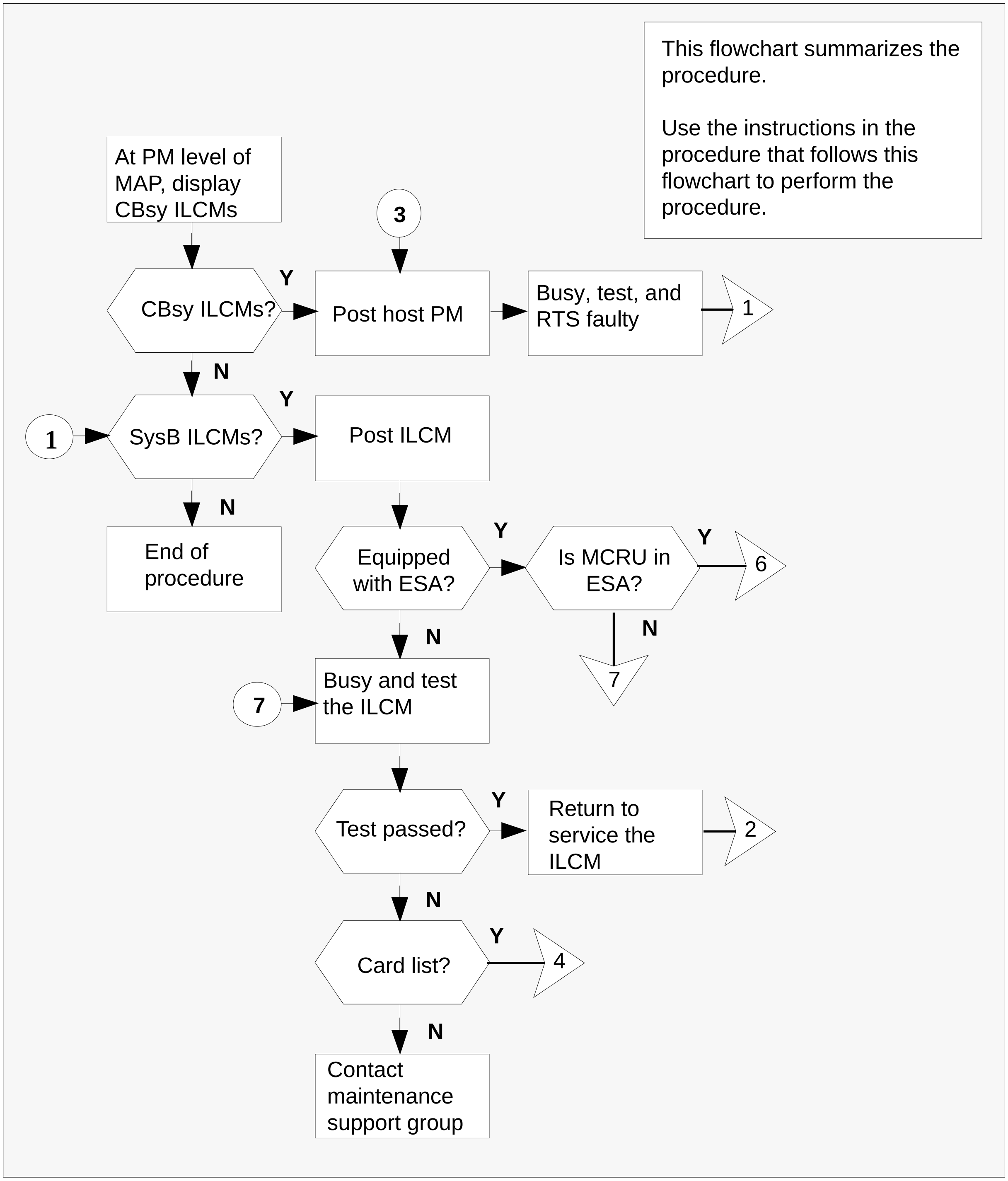
Use this procedure to recover service in an MCRU when both units of the MCRU are out of service. This condition always produces a CBsy alarm. This procedure should be used only when referred to by an alarm clearing procedure.

Action

The following flowchart provides an overview of the procedure. Use the instructions in the step-action procedure that follows the flowchart to perform the recovery task.

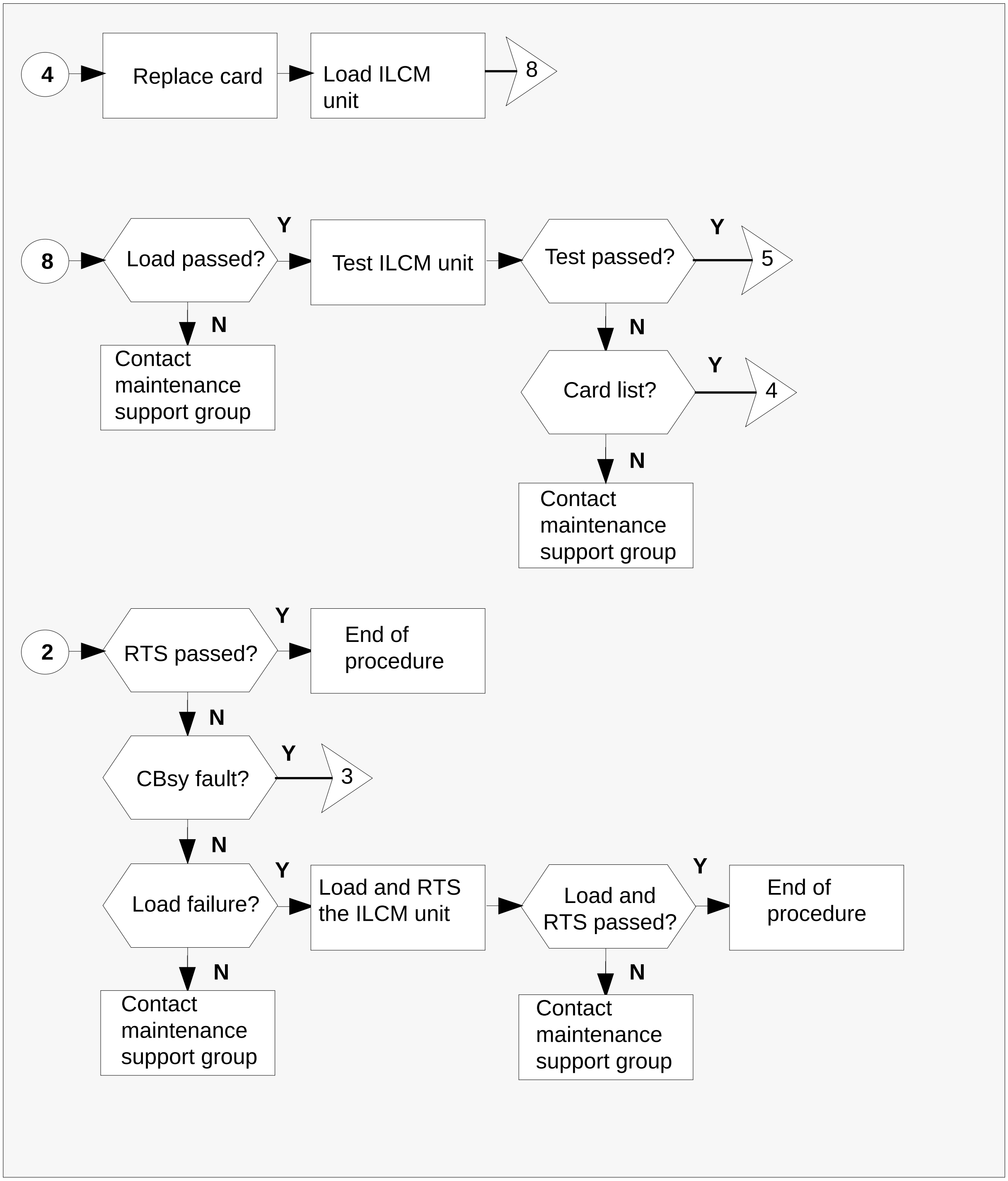
MCRU recovery procedure (continued)

Summary of an MCRU recovery procedure



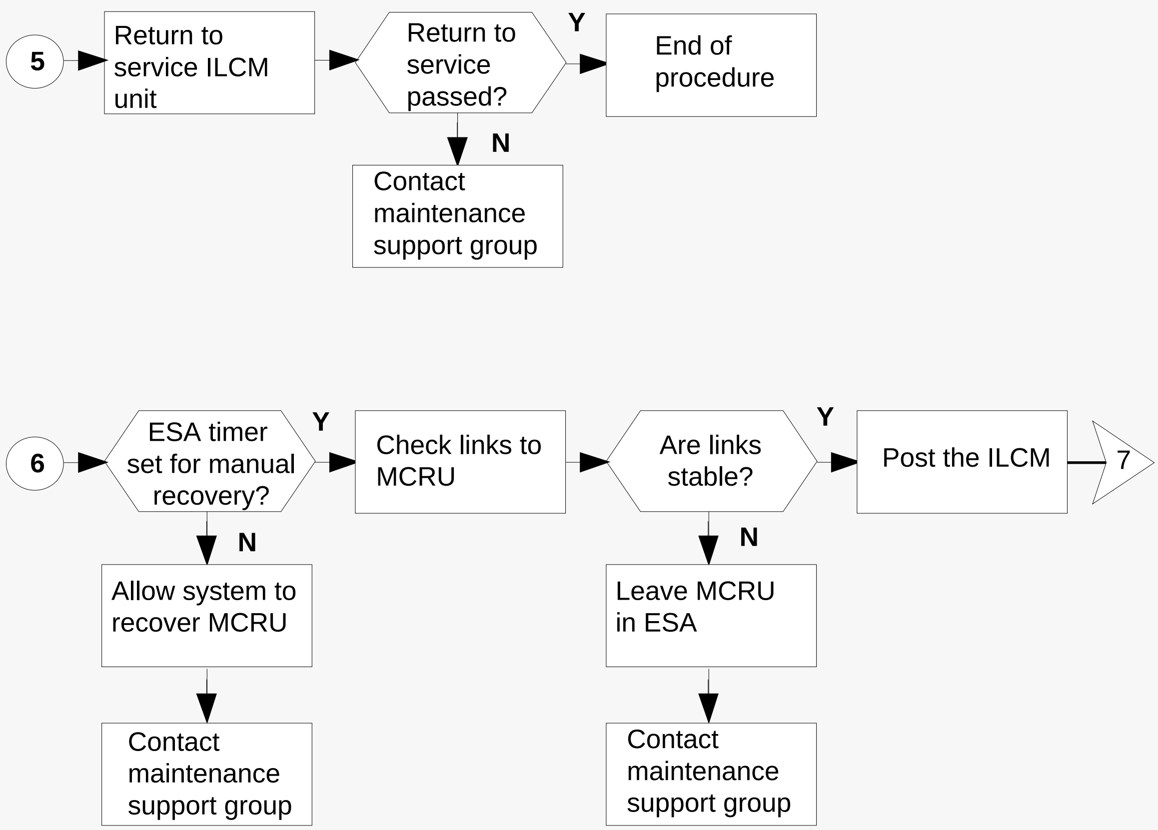
MCRU recovery procedure (continued)

Summary of an MCRU recovery procedure (continued)



MCRU recovery procedure (continued)

Summary of an MCRU recovery procedure (continued)



MCRU recovery procedure (continued)

MCRU recovery procedure

At the MAP terminal

1 If an alarm is still audible, silence it by typing

>MAPCI;MTC;SIL
and pressing the Enter key.

2 Access the PM level of the MAP display by typing

>PM
and pressing the Enter key.

3 Identify the faulty MCRU by typing

>DISP CBSY ILCM
and pressing the Enter key.

If response indicates	Do
no CBsy ILCMs	step 11
CBsy ILCMs	step 4

4 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM (0 or 1)

5 Identify C-side links to the host peripheral module (PM) by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
Link 0: PLGC 0  2; Cap MS; Status: SysB  ;MsgCond: CLS
 Link 1: PLGC 0  6; Cap MS; Status: SysB  ;MsgCond: CLS
```

MCRU recovery procedure (continued)

6 Post the host peripheral (PLGC, or RCC) by typing

>POST pm pm_no
and pressing the Enter key.

where

pm	is the name of the PM (PLGC, or RCC)
pm_no	is the number of the PM

7 Display the P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
Link 2: ILCM REM1 00 0  0; Cap MS; Status:SysB;MsgCond:CLS
 Link 6: ILCM REM1 00 0  1; Cap MS;
Status:SysB;MsgCond:CLS
```

Record information for the links that have a status other than OK.

8 Busy the faulty link by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no	is the number of a faulty P-side link identified in step 7

9 Test the busied link by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no	is the number of a faulty P-side link busied in step 8

f test	Do
passes	step 10
fails	step 27

MCRU recovery procedure (continued)

10 Return the busied link to service by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no	is the number of a faulty P-side link tested in step 9

If test	Do
passes and no other links are SysB	step 11
passes but other links are SysB	step 8
fails	step 27

11 Identify the faulty MCRU by typing

>DISP SYSB ILCM
and pressing the Enter key.

If response indicates	Do
no SysB ILCMs	step 32
SysB ILCMs	step 12

12 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM (0 or 1)

MCRU recovery procedure (continued)

13 Determine if the MCRU is equipped with emergency stand-alone (ESA) by typing

>QUERYPM
and pressing the Enter key.

Example of a MAP response:

```
PM Type: ILCM  Int. No.: 20  Status index: 9  Node_No:

 Memory Size: 64K
ESA equipped: Yes, Intraswitching is On
Loadnames:LCMINV - ILCM33c ,Unit0: ILCM33c ,Unit1 ILCM33c
Node Status: (MACHINE_BUSY, FALSE)
Unit 0 Status: (MACHINE_BUSY, FALSE)
Unit 1 Status: (MACHINE_BUSY, FALSE)
Site Flr RPos Bay_id  Shf  Description   Slot   EqPEC
 TRLC  01  D04 MCRU 40  04  ILCM  40  0           6X04AA
```

If MCRU is	Do
equipped with ESA	step 14
not equipped with ESA	step 21

14 Determine if the MCRU is in ESA by manually checking for dial tone at the remote. Also, a PM alarm appears on the MAP screen indicating the MCRU is in ESA. PM106 logs are generated when the PM goes SysB, PM110 logs are generated for PCM-30 link alarms. PM128 logs are generated when there is a change of state in the PM.

If the MCRU	Do
has dial tone	step 15
does not have dial tone	step 21

15 Determine if the MCRU has the ESA timer set for manual recovery from ESA. Access table OFCENG by typing

>TABLE OFCENG
and pressing the Enter key.

MCRU recovery procedure (continued)

16 Check the MCRU exit time by typing

>POS PRLCM_XPMESAEXIT
and pressing the Enter key.

Example of a MAP response:

```
        PARMNAME                              PARMVAL
______________________________________________________
PRLCM_XPMESAEXIT                                  3
```

If PARMVAL is	Do
set to zero	step 17
greater than zero	Allow the system to recover the MCRU. Go to step 27.

17 Before manually restoring the MCRU from ESA, check to see if links to the MCRU are stable. Find the link numbers for this MCRU by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
                        Host XPM P-side link number

Link  0:    PLGC 1      0;Cap MS;Status:OK    ;MsgCon:OPN
Link  1:    PLGC 1      2;Cap MS;Status:OK    ;MsgCon:OPN
 Link  2:   PLGC 1      3;Cap  S;Status:OK
 Link  3:   PLGC 1      4;Cap  S;Status:OK
```

18 Access the CARRIER level of the MAP by typing

>TRKS;CARRIER
and pressing the Enter key.

MCRU recovery procedure (continued)

19 Post the host XPM links and check link conditions for slips and framing errors by typing

>POST pm pm_no link_no
and pressing the Enter key.

where

pm	is a PCM-30 line group controller (PLGC) or remote cluster controller (RCC)
pm_no	is the number of the peripheral (0 to 127)
link_no	is the number of the link associated with the host XPM (see step 17 display)

Repeat the POST command for each link.

Example of a MAP response:

```
                        Host XPM P-side link number
N CLASS  SITE PLGC CK D ALRM SLIP FRME  BER   ES  SES

 0 REMOTE HOST   1  0 C        0    0 <-7.    0    0 INSV
```

Note: This display shows carrier facilities from the host XPM to the MCRU. The carrier facilities should also be checked from the remote site back to the host XPM.

If link conditions show	Do
a high number of `SLIP and FRME`	Leave the MCRU in ESA. Go to step 27.
a very low number of `SLIP` and `FRME`	step 20

20 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM (0 or 1)

MCRU recovery procedure (continued)

21 Busy both units of the MCRU by typing

>BSY PM
and pressing the Enter key.

The system requests verification. Respond by typing

>YES
and pressing the Enter key.

22 Test both units of the MCRU by typing

>TST PM
and pressing the Enter key.

If test	Do
passes	step 24
fails, and a card list is produced	step 23
fails, but no card list is produced	step 27

23 The card list identifies the cards most likely to be faulty. Replace the cards one at a time in the order listed as directed by this procedure.

If last card on list has	Do
not been replaced	step 28
been replaced	step 27

24 Attempt to return the MCRU to service by typing

>RTS PM
and pressing the Enter key.

If MAP prompt indicates	Do
RTS is successful	step 32
CBsy	step 5
Load failure	step 25
All other	step 27

MCRU recovery procedure (continued)

25 Attempt to reload the MCRU by typing

>LOADPM PM CC
and pressing the Enter key.

If load	Do
is successful	step 26
is not successful	step 27

26 Attempt again to return the MCRU to service by typing

>RTS PM
and pressing the Enter key.

If return to service for either unit	Do
is successful	step 32
is not successful	step 27

27 Contact your maintenance support group for further instructions in clearing this fault.

28 Go to the *Card Replacement Procedures* to replace the first (or next) card on the card list. Notify outside plant personnel of the card to be changed. Go to step 25 when the card is replaced.

29 Attempt to load the ILCM unit by typing

>LOADPM UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be loaded (0 or 1)

If load is	Do
successful	step 30
not successful	step 27

MCRU recovery procedure (end)

30 Test the ILCM unit by typing

>TST UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be tested (0 or 1)

If test	Do
passes	step 31
fails, and a card list is produced	step 23
fails, but no card list is produced	step 27

31 Attempt to return the ILCM unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be returned to service (0 or 1)

If RTS	Do
passes	step 32
fails	step 27

32 You have successfully completed this procedure. If additional alarms are displayed, proceed to the appropriate *Alarm and Performance Monitoring Procedures*.

MCRU alarm clearing procedures

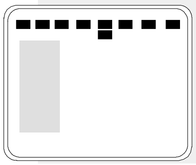
This chapter contains the alarm clearing procedures for the Meridian Cabinetized Remote Unit (MCRU). The alarm indicates the procedure needed to clear the trouble.

These procedures are used by maintenance personnel to clear alarms as they appear at the MAP (maintenance and administration position) display.

Procedures in this section are named to correspond with the alarms as they appear at the MAP display. These procedures are arranged in alphabetical order for easy location when required.

References to PRLCM or MCRU are synonymous within this chapter and throughout this document for the Australian market. These procedures can be used by maintenance personnel in a MSL-100/200 office.

MCRU (RG) critical



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nILCM**	.	.	.	.	.
				C					

Indication

A critical alarm involving an MCRU ringing generator is indicated by *n*ILCM under the PM subsystem header with an *C* beneath it at the MTC level of the MAP display.

Meaning

One of the ringing generator units is in the in-service trouble (ISTb) state.

Impact

Service is not affected since a switching of support to a backup ringing generator (SwRG) automatically occurs. However, if the backup ringing generator fails, ringing will not be produced.

Common procedures

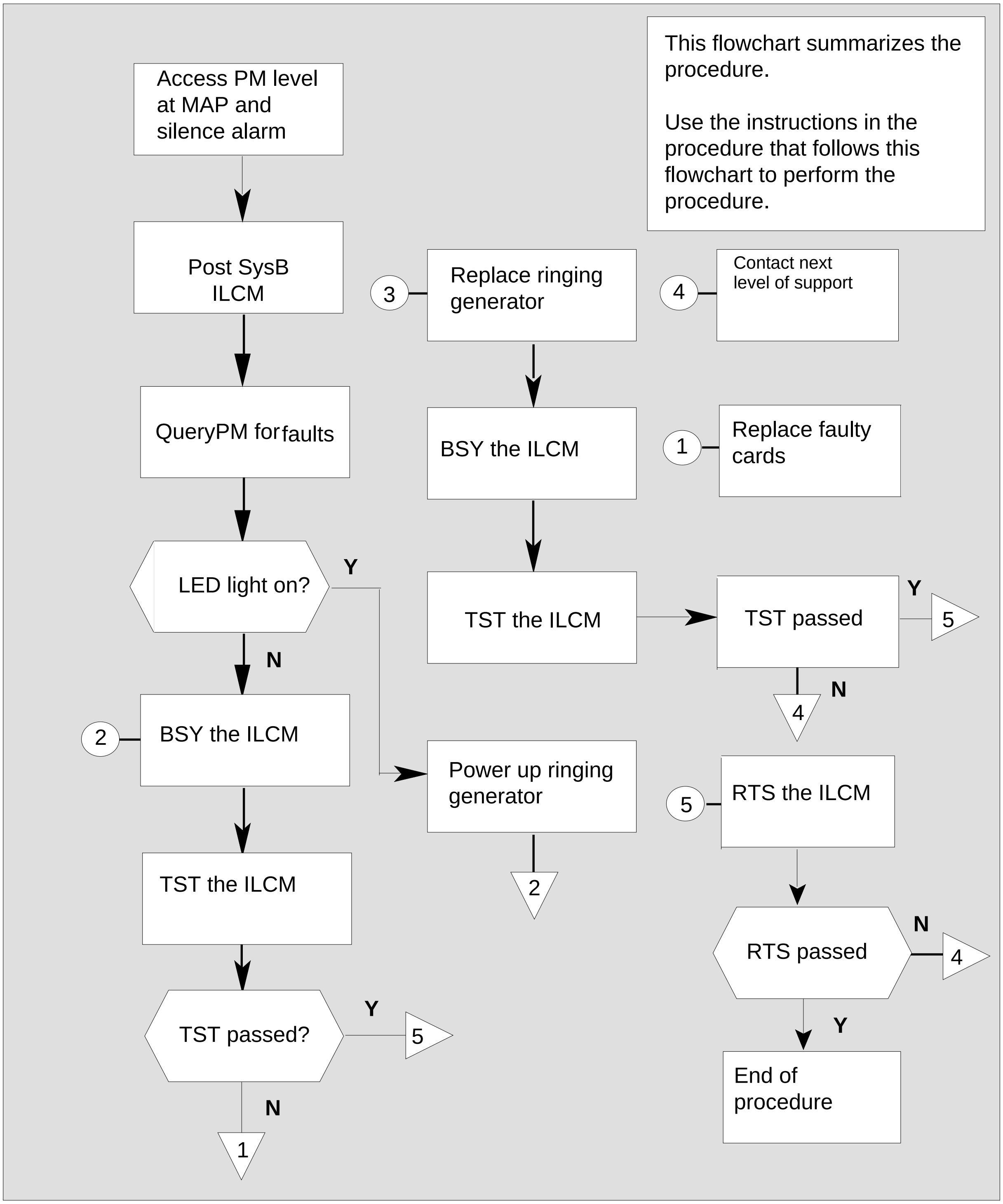
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

MCRU (RG)
critical (continued)

Summary of clearing an MCRU (RG) critical alarm associated with a ringing generator



MCRU (RG)
critical (continued)

Clearing an MCRU (RG) critical alarm associated with a ringing generator

1 You should be entering this procedure from a PM system level alarm clearing procedure step which identified a PM alarm associated with an MCRU ringing generator fault.

At the MAP terminal

2 Silence the alarm by typing

>MAPCI;MTC;PM;SIL
and pressing the Enter key.

3 Identify the faulty MCRU by typing

>DISP ILCM SYSB
and pressing the Enter key.

4 Post the SysB MCRU identified in step 3 by typing

>POST ILCM SYSB
and pressing the Enter key.

Example of a MAP display:

```
 CC     CMC     IOD     Net     PM     CCS     Lns     Trks     Ext
 .       .       .       .     1ILCM    .       .       .        .
                               *C*

 PRLCM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit       PM    1        0        2        0        2          12
 2 Post_      PRLCM  0        0        2        0        2          9
 3 ListSet
 4 SwRG     PRLCM   RSC    14 1 SysB  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   SysB                 /RG: 1
 6 Tst_     Unit1:   SysB                 /RG: 1
 7 Bsy_                                11  11  11  11  11  RG:Pref 1 ISTb
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 ISTb
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

MCRU (RG)
critical (continued)

5 Check for fault indicators by typing

>QUERYPM FLT
and pressing the Enter key.

Example of a MAP display:

```
 CC     CMC     IOD     Net     PM     CCS     Lns     Trks     Ext
 .       .       .       .     1ILCM    .       .       .        .
                               *C*

 PRLCM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit       PM    1        0        2        0        2         12
 2 Post_      PRLCM  0        0        2        0        2          9
 3 ListSet
 4 SwRG     PRLCM   RSC    14 1 SysB  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   SysB                /RG: 1
 6 Tst_     Unit1:   SysB                /RG: 1
 7 Bsy_                               11  11  11  11  11  RG:Pref 1 ISTb
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 ISTb
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM   QueryPM FLT
15            ILCM   UNIT 0  System Busy Reason: Ringing Generator Failure:
16            Ring Generator in Excess load
17            ILCM   UNIT 1  System Busy Reason: Ringing Generator Failure:
18            Ring Generator in Excess load
```

At the MCRU site

6 Make a visual inspection of the ringing generator. Check to see if the LED is lit.

If he LED is	Do
lit	step 7
not lit	step 8

7 Power up the ringing generator by moving the power switch to the ON position. (The LED should go off.) These switches are identified here as follows:

- RG 0 circuit breaker CB1
- RG 1 circuit breaker CB6

MCRU (RG)
critical (continued)

At the MAP terminal

8 Manually busy the SYSB ILCM identified in step 3 by typing

>BSY PM
and pressing the Enter key.

9 Test the ManB ILCM by typing

>TST PM
and pressing the Enter key.

Example of a MAP display:

```
PRLCM REM1 14 1 Unit 1 InSvce Test Initiated
PRLCM REM1 14 1 Unit 1 Tst Failed:(Reason for failure)
                     or
PRLCM REM1 14 1 Unit 1 InSvce Test Initiated
PRLCM REM1 14 1 Unit 1 Tst passed
```

If TST	Do
passed	step 10
failed	step 12 (replace the ringing generator)

10 Return the ILCM to service by typing

>RTS PM
and pressing the Enter key.

If RTS	Do
passed	step 17
failed	step 11

11 Observe the card listing as shown in the following MAP display resulting from step 9.

Example of a MAP display:

```
SITE FLR RPOS BAY_ID   SHF DESCRIPTION SLOT EQPEC
REM1 01  A00  MCRU 00   38  PRLCM:000   :01  6X60
REM1 01  A00  MCRU 00   04  PRLCM:000   :04  6X51
```

MCRU (RG) critical (end)

12 Determine if the NT6X60 ringing generator has been replaced.

If the NT6X60 card has	Do
been replaced	step 13
not been replaced	step 15

13 After you have replaced the ringing generator test the ILCM again by typing

>TST PM
and pressing the Enter key.

If TST	Do
passed	step 14
failed	step 16

14 Return the ILCM to service by typing

>RTS PM
and pressing the Enter key.

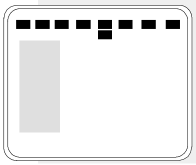
If RTS	Do
passed	step 17
failed	step 16

15 Go to *Card Replacement Procedures*. When you have finished with the card replacement procedures, go to step 13 of this procedure.

16 Obtain further assistance in clearing this alarm, by contacting personnel responsible for higher level support.

17 You have successfully completed this procedure. If there are other alarms displayed, reference the appropriate alarm clearing procedures for the indicated alarms.

MCRU talk battery alarm
Critical



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nILCM**	.	.	.	.	.
				C					

Indication

A critical alarm involving an MCRU is indicated by *n*ILCM under the PM subsystem header with a *C* beneath it at the MTC level of the MAP display.

Meaning

One or both units of the MCRU has no talk battery.

Impact

A loss of call processing with no alarm indication if circuit breaker CB5 is affected or a loss of call processing and a critical alarm when circuit breaker CB9 is affected.

Common procedures

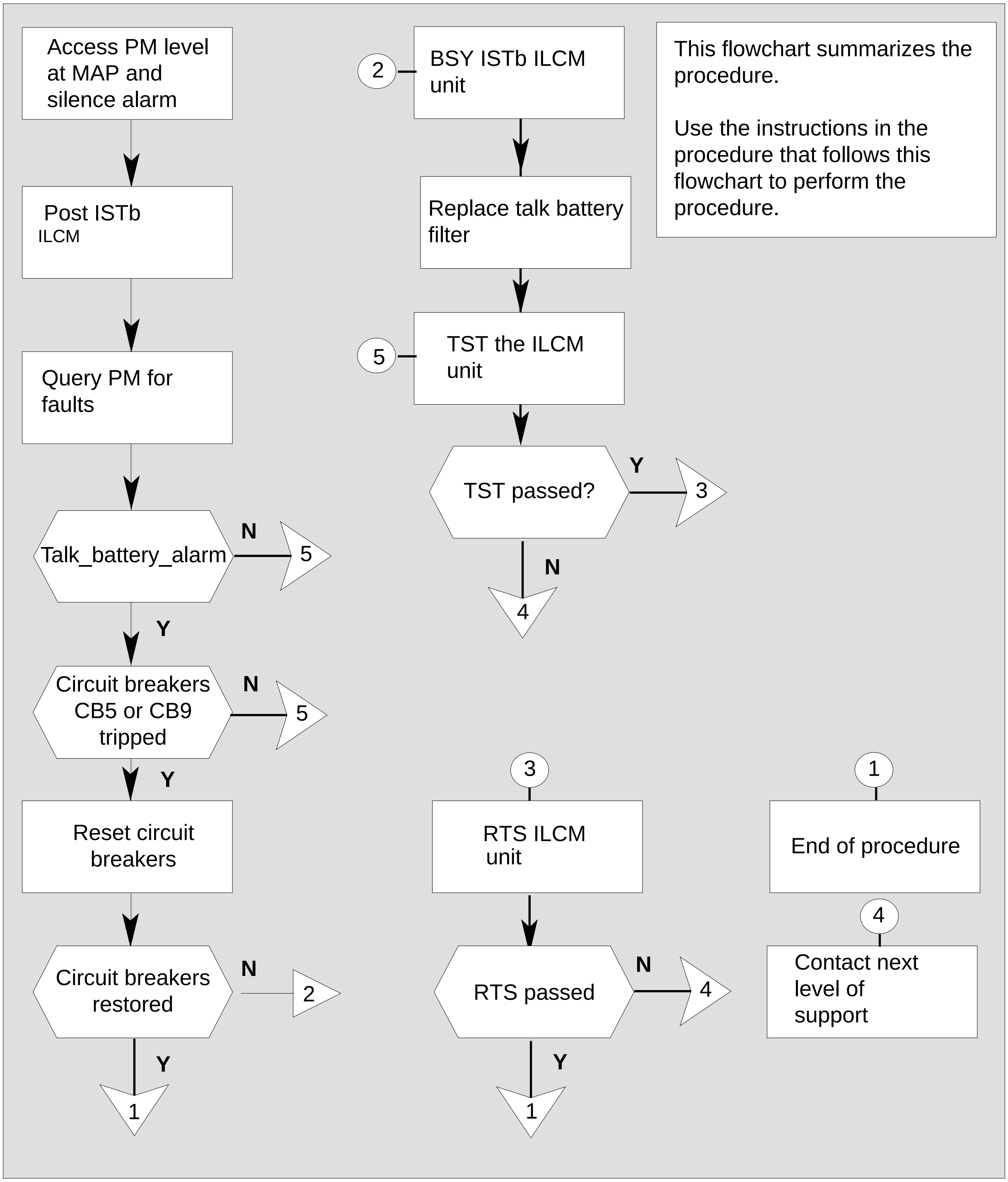
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

MCRU talk battery alarm
Critical (continued)

Summary of clearing an MCRU talk battery alarm Critical alarm



MCRU talk battery alarm
Critical (continued)

Clearing an MCRU talk battery alarm Critical alarm

At the MAP terminal

1 If an alarm is audible, silence it by typing

>MAPCI;MTC;SIL
and pressing the Enter key.

2 Access the PM level of the MAP display by typing

>PM
and pressing the Enter key.

3 Identify the faulty MCRU by typing

>DISP STATE ISTB ILCM
and pressing the Enter key.

4 Post the MCRU which has lost talk battery by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM (0-1)

MCRU talk battery alarm
Critical (continued)

Example of a MAP display:

```
 CM     MS      IOD      Net      PM      CCS      Lns      Trks      Ext   APPL
  .      .       .        .      1ILCM     .        .        .         .     .
                                  *C*

ILCM               SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM     0          0         2         0         2          42
 2 Post_    ILCM    0          0         0         0         2          9
 3 ListSet
 4 SwRG     ILCM    REM04      ISTB      Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   InsV                    /RG: 1
 6 Tst_     Unit1:   InsV                    /RG: 1
 7 Bsy_                                  11  11  11  11  11  RG:Pref 1 InsV
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 Insv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the MCRU

5 Check the fuses in each LCA.

If fuses are	Do
blown (indicator protruding)	step 6
not blown	step 11

MCRU talk battery alarm
Critical (continued)

6 Determine which fuse is blown.

Note: Fuses 01 to 05 each supply +5 V, fuses 06 to 10 each supply +15 V, and fuses 11 to 15 each supply -48 V.

If the blown fuse is any one of	Do
01 to 05	Remove the blown fuse and go to step 9
06 to 15	step 7

7 Use the following table to determine which +15V fuse (06 through 10) is associated with which -48V fuse (11 through 15).

-48V fuse number	+15V fuse number
11	06
12	07
13	08
14	09
15	10

8 Remove the blown fuse and its associated fuse. For example, if the blown fuse is 11, then remove fuse 06 as well.

9 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

MCRU talk battery alarm
Critical (continued)

10

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the +15V fuse, then the -48V fuse.

If the fuse	Do
blows again	step 56
does not blow	step 11

11 Make a visual inspection of the FSP. Check circuit breakers CB5 and CB9.

If circuit breakers are	Do
tripped	step21
not tripped	step 12

At the MCRU

12 Locate the fuses powering the MCRU talk battery circuits.

13 Determine if the fuse is blown.

If the fuse is	Do
blown	step 14
not blown	step 57

14 Remove the fuse holder that contains the blown fuse.

MCRU talk battery alarm
Critical (continued)

At the MCRU

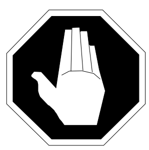
15 Trip the circuit breaker CB5 or CB9 to remove the talk battery filter out of the circuit and prevent blowing the cartridge fuse.

If affected unit is	Trip circuit breaker
Unit 0	CB5
Unit 1	CB9

At the MCRU

16 Replace the cartridge fuse inside the fuse holder.

17



DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Replace the blown fuse.

18 Install the fuse holder back onto the PDC frame.

At the MCRU

19 Reset circuit breaker CB5 or CB9 by moving the switch to the ON/OFF and back to the ON position in quick succession. The LED should go off.

If circuit breaker	Do
trips again	step 20
remains ON, LED goes off	step 57

20 Determine if the fuse is blown again.

If the fuse	Do
blown again	step 56
is not blown again	step 57

MCRU talk battery alarm
Critical (continued)

21 Are NTI repeaters used in the FSP?

NTI repeaters are	Do
used	step 22
not used	step 32 (Step 57 for Australia)

22 Reset circuit breaker CB8 or CB9 by moving the switch to the ON/OFF and back to the ON position in quick succession. The LED should go OFF.

If circuit breaker	Do
trips again	step 23
remains ON, LED goes off	step 57

At the MAP terminal

23 Busy the ILCM unit by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit to be busied

If circuit breaker tripped is	Busy
CB8	unit 0
CB9	unit 1

MCRU talk battery alarm
Critical (continued)

24 Identify the C-side peripheral by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
                  Host XPM type and number
 Link  0: PLGC 0    0;Cap  MS;Status:OK   ;MsgCon:CLS
 Link  1: PLGC 0    1;Cap  MS;Status:OK   ;MsgCon:CLS
 Link  2: PLGC 0    3;Cap   s;Status:OK
 Link  3: PLGC 0    4;Cap   S;Status:OK
```

25 Post the host peripheral by typing

>POST pm_type pm_no
and pressing the Enter key.

where

pm_type	is the name of the host XPM (PLGC, or RCC)
pm_no	is the number of the host XPM

26 Display the P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
Link 0: ILCM REM1 00 0  2;Cap MS;Status:OK;  MsgCond: CLS
Link 1: ILCM REM1 00 0  1;Cap MS;Status:OK;  MsgCond: CLS
```

Record information for the links to be busied.

27 Busy the links by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no	is the number of a P-side link interfacing the MCRU

Note: Perform this step for each link interfacing the MCRU unit busied in step 23.

MCRU talk battery alarm
Critical (continued)

28 Access the CARRIER level of the MAP display by typing

>TRKS;CARRIER
and pressing the Enter key.

29 Post the host XPM P-side links by typing

>POST pm_type pm_no link_no
and pressing the Enter key.

where

pm_type	is the host peripheral (PLGC, RCC, or RCC2)
pm_no	is the number of the peripheral (0 or 256
link_no	is the number of the link associated with the host XPM. See step 24 display.

Use the NEXT command when prompted with the“`MORE ...`”prompt to view additional links.

Example of a MAP response:

```
N CLASS SITE PLGC CK D ALRM SLIP FRME BER  ES SES STATE
0 REMOTE HOST 0   0 C       0    0   <-7. 0   0  ManB
                  ▲
                  └─Host XPM P-side link number
```

30 Offline the links to prevent alarms and to reset the counters when the links are restored by typing

>OFFL item_no
and pressing the Enter key.

where

item_no is the item number under the *n* (0-4) column

> ***Note:*** Perform this step for each link busied in step 27.

At the MCRU

31 Remove the fuses and unseat the repeaters for the affected ILCM unit.

If affected ILCM unit is	Do
unit 0	step 32
unit 1	step 33

MCRU talk battery alarm
Critical (continued)

32 Remove the fuses and repeaters associated with CB8 and LCA 0 in the following order.

- remove -48V line drawer fuses, 11 through 15
- remove fuse F01 of the FSP, associated with CB8 only
- unseat NT repeater cards, 1 through 4.

Go to step 34.

33 Remove the fuses and repeaters associated with CB9 and LCA 1 in the following order.

a. remove -48V line drawer fuses, 11 through 15

b. unseat NT repeater cards, 5 through 7.

34 Obtain a capacitor forming tool.

Note: A capacitor forming tool consists of a 100 watt 120V light bulb screwed into a socket with pigtail leads.

35 Unscrew the slotted nut on the front of the FSP.

36

DANGER
Risk of electrocution
Some terminals inside the FSP have an electrical potential of -48V dc to -60V dc. Do not physically touch any terminals inside the FSP.

Open the FSP panel.

MCRU talk battery alarm
Critical (continued)

37

> **DANGER**
> **Risk of electrocution**
> Some terminals inside the FSP have an electrical potential. Remove all jewelry before performing this step.

Connect the leads of the capacitor forming tool across the top and bottom terminals with wires attached to them, top and second from the bottom terminals, of the tripped circuit breaker.

If after 1 minute, the bulb is	Do
lit and you have not replaced the capacitor	step 38
lit and you have replaced the capacitor	step 56
not lit	step 45

38 Locate the talk battery filter capacitor inside the FSP.

If the circuit breaker is	The capacitor to be replaced is
CB8	C1
CB9	C2

39 Obtain a replacement capacitor.

40 Label the leads going to the positive terminal of the capacitor as (+) and the leads going to the negative terminal as (-) to prevent reversing the leads.

41 Disconnect the leads from the short-circuited capacitor.

42 Remove the capacitor.

43 Install a replacement capacitor.

44 Connect the leads labeled (+) to the positive terminal of the capacitor and the leads labeled (-) to the negative terminal of the capacitor. Go to step 37.

MCRU talk battery alarm
Critical (continued)

45 Set the circuit breaker to ON.

If the circuit breaker	Do
remains ON	step 46
trips again	step 56

46 Insert the five -48V line drawer fuses removed in step 32 , pausing for 15 seconds between each fuse.

47 Reseat the NTI repeaters unseated in step 32.

At the MAP terminal

48 Access the CARRIER level of the MAP display by typing

>TRKS;CARRIER
and pressing the Enter key.

49 Post the host XPM P-side links by typing

>POST pm_type pm_no link_no
and pressing the Enter key.

where

pm_type	is the host peripheral (PLGC, RCC, or RCC2)
pm_no	is the number of the peripheral (0 or 256
link_no	is the number of the link associated with the host XPM. See step 24 display.

Note: Use the NEXT command when prompted with the “`MORE ...`” prompt to view additional links.

Example of a MAP response:

```
N CLASS SITE PLGC CK D ALARM SLIP FRAME BER  ES SES STATE
0 REMOTE HOST 0   0 C       0    0   <-7. 0   0  OFFL
                  └─Host XPM P-side link number
```

MCRU talk battery alarm
Critical (continued)

50 Busy the links offlined in step 30 by typing

>BSY item_no
and pressing the Enter key.

where

item_no is the item number under the *n* (0-4) column

Note: Perform this step for each link previously offlined.

51 Access the PM level of the MAP and post the host peripheral by typing

>PM;POST pm_type pm_no
and pressing the Enter key.

where

pm_type is the name of the host XPM (PLGC, or RCC)
pm_no is the number of the host XPM

52 Return to service the links busied in step 27 by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of a P-side link interfacing the MCRU

Note: Perform this step for each manually busied link.

MCRU talk battery alarm
Critical (end)

53 Post the MCRU by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM

54 Test the ILCM unit by typing

>TST UNIT ILCM_unit
and pressing the ENTER key.

where

ILCM_unit	is the ILCM unit busied in step 23

If TST	Do
passed	step 55
failed	step 56

55 Return to service the ILCM unit by typing

>RTS UNIT ILCM_unit
and pressing the ENTER key.

where

ILCM_unit	is the ILCM unit tested in step 54

56 Obtain further assistance in clearing this alarm, by contacting the personnel responsible for higher level support.

57 You have successfully completed this procedure. If there are other alarms displayed, reference the appropriate alarm clearing procedures for the indicated alarms.

Ext FSP
MCRU frame major

CM	MS	IOD	Net	PM	CCS	Lns	Trks	**Ext**	Appl
.	.	.	.	.	.	.	.	**1FSP** **M**	.

Indication

At the MTC level of the MAP display, FSP preceded by a number appears under the EXT header of the alarm banner, and indicates an external frame supervisory panel (FSP) major alarm.

Meaning

One or more frames in the office has a power fault or a cooling unit fault.

The number of frames affected is indicated by the number under the EXT header of the alarm banner.

Impact

The impact on subscriber service depends on the nature of the fault and the type of frame where the fault is located.

Common procedures

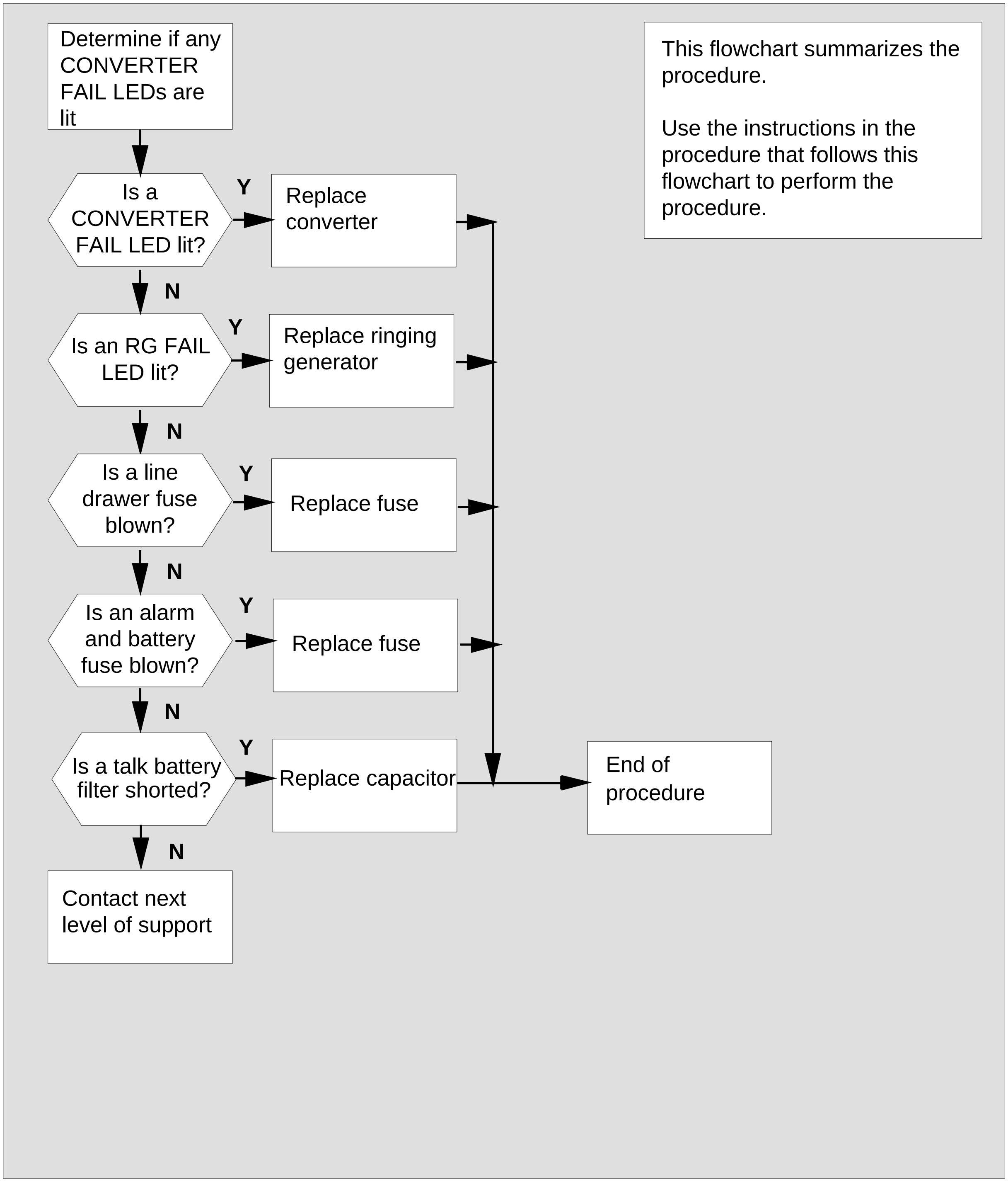
None

Action

The following flowchart is only a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

Ext FSP
MCRU frame major (continued)

Summary of clearing an Ext FSP MCRU frame major alarm



Ext FSP
MCRU frame major (continued)

Clearing an Ext FSP MCRU frame majoralarm

At the MCRU

1 Determine if any of the CONVERTER FAIL LEDs on each converter in the frame are lit.

If	Do
any CONVERTER FAIL LEDs are lit	step 55
no CONVERTER FAIL LEDs are lit	step 2

2 Determine if any of the ringing generator (RG) FAIL LEDs on both RGs, located at the top of the frame, are lit.

Note: The FAIL LED is located behind the front panel of the RG.

If	Do
any FAIL LEDs are lit	step 41
no FAIL LEDs are lit	step 3

3 Determine if any of the line drawer fuses (01 to 15, and RA and RB), located on the fuse panel above each unit in the frame, are blown.

If	Do
a fuse is blown	step 9
no fuses are blown	step 4

4 Determine if any of the alarm battery supply (ABS) fuses (01 to 08), located on the FSP, are blown (protruding fuse indicator).

If	Do
a fuse is blown	step 5
no fuses are blown	step 109

Ext FSP
MCRU frame major (continued)

5 Determine if the alarm battery supply wiring inside the FSP is short-circuited by contacting the personnel at the next level of support, which may also request this information.

6 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

7 Remove the blown fuse.

8

DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows again	step 112
does not blow	step 105

9 Determine which fuse is blown.

Note: Fuses 01 to 05 each supply +5 V, fuses 06 to 10 each supply +15 V, and fuses 11 to 15 each supply -48 V.

If the blown fuse is any one of	Do
01 to 05	step 14
06 to 15	step 10
RA or RB	step 14

Ext FSP
MCRU frame major (continued)

10 Use the following table to determine which +15V fuse (06 through 10) is associated with which -48V fuse (11 through 15).

-48V fuse number	+15V fuse number
11	06
12	07
13	08
14	09
15	10

11 Remove the blown fuse and its associated fuse. For example, if the blown fuse is 06, then remove fuse 11 as well.

12 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

13

DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the +15V fuse, then the -48V fuse.

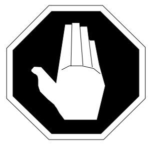
If the fuse	Do
blows again	step 17
does not blow	step 105

14 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

15 Remove the blown fuse.

Ext FSP
MCRU frame major (continued)

16



DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows again	step 19
does not blow	step 105

17 Remove the blown fuse and its associated fuse. For example, if the blown fuse is 06, then remove fuse 11 as well.

18 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

19 Use the following table to determine which drawer in the shelf below the fuse panel is associated with the blown fuse.

Fuse number	Drawer number Array 0	Drawer number Array 1
01, 06, 11	0 (leftmost)	5 (leftmost)
02, 07, 12	1	6
03, 08, 13	2	7
04, 09, 14	3	8
05, 10, 15	4	9

Note: The RA and RB fuses supply ringing voltage to all five drawers in the shelf. Array 0 houses drawers 0-4 and array 1 houses drawers 5-9.

Ext FSP
MCRU frame major (continued)

20

> **CAUTION**
> **Loss of service**
> Perform this procedure during periods of low traffic.

Pull out the line drawer you have just identified.

Note: When dealing with a blown RA or RB fuse, begin with the leftmost drawer.

21

> **DANGER**
> **Personal injury**
> Exercise care when handling the line card. The line feed resistor may be hot.

Unseat all the line cards in the drawer.

Note: Just unseat the line cards, do not remove them from the drawer.

If you are dealing with	Do
any one of fuses 01 to 05	step 23
any one of fuses 06 to 15	step 22
an RA or RB fuse	step 23

Ext FSP
MCRU frame major (continued)

22

DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

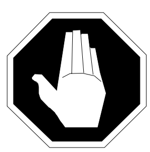
Insert the +15V fuse first, then the -48V fuse.

If the fuse	Do
blows again	step 26
does not blow	step 28

23 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

24 Remove the blown fuse.

25



DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows again	step 26
does not blow	step 28

Ext FSP
MCRU frame major (continued)

26 Determine if the drawer has any loose or short-circuited wires.

If there are	Do
loose or short-circuited wires	step 112
no loose or short-circuited wires, and the fuse you are dealing with is a ringing voltage fuse (RA or RB) and you have not done all five drawers in the shelf	step 27
no loose or short-circuited wires, the fuse you are dealing with is a ringing voltage fuse (RA or RB) and you have done all five drawers in the shelf	step 112
no loose or short-circuited wires, and the fuse you are dealing with is one of the line drawer fuses (01 to 15)	step 112

27 Reseat all the line cards in the drawer and repeat steps 20 and 21 for the next drawer.

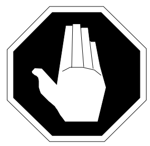
28 Reseat the line cards one at a time.

29 Determine if the fuse is blown after reseating each card.

If after reseating	Do
any line card, the fuse blows again	step 30
all of the line cards, the fuse does not blow	step 105

Ext FSP
MCRU frame major (continued)

30



DANGER
Personal injury
Exercise care when handling the line card. The line feed resistor may be hot.

Remove the line card from the drawer.

31 Obtain a replacement line card. Ensure the replacement card has the same product engineering code (PEC), including the suffix, as the card being removed.

32 Insert the replacement line card into the drawer.

If you are dealing with	Do
any one of fuses 01 to 05	step 36
any one of fuses 06 to 15	step 33
an RA or RB fuse	step 36

33 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

34 Remove the blown fuse and its associated fuse. For example, if the blown fuse is 06, then remove fuse 11 as well.

Ext FSP
MCRU frame major (continued)

35

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the +15V fuse, then the -48V fuse.

If the fuse	Do
blows again	step 112
does not blow	step 39

36 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

37 Remove the blown fuse.

38

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows again	step 112
does not blow	step 39

39 Reseat all the other line cards in the drawer.

40 Push the drawer back in, and go to step 105.

Ext FSP
MCRU frame major (continued)

41 Use the following table to identify which circuit breaker located on the FSP is associated with the RG that is lit FAIL LED.

RG number	Circuit breaker number
RG0 (leftmost)	CB1
RG1	CB6

42 Determine if the associated circuit breaker is ON or OFF.

If the circuit breaker is	Do
ON	step 52
OFF	step 43

43 Set the circuit breaker to ON.

If the circuit breaker	Do
turns OFF, and the FAIL LED on the RG is lit	step 44
remains ON, and the FAIL LED on the RG is not lit	step 105
remains ON, and the FAIL LED on the RG is lit	step 52

At the MCRU

44 Locate the fuse that powers the RG in the MCRU.

45 Determine if the fuse is blown.

If the fuse is	Do
blown	step 46
not blown	step 113

Ext FSP
MCRU frame major (continued)

46 Remove the fuse holder that contains the blown fuse.

47 Replace the cartridge fuse inside the fuse holder.

48

DANGER
Risk of fire
For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Replace the blown fuse.

49 Install the fuse holder back onto the MCRU.

50 Determine if the fuse blows again.

If the fuse	Do
blows again	step112
does not blow again	step 51

At the MCRU

51 Set the circuit breaker to ON.

If the circuit breaker	Do
turns OFF, and the RG FAIL LED is lit.	step 53
remains ON, and the RG FAIL LED is not lit	step105
remains ON, and the RG FAIL LED is lit	step 52

52 Set the circuit breaker to OFF.

53 Replace the RG by performing the appropriate procedure in *Card Replacement Procedures*. When you have completed the procedure, return to this point.

Ext FSP
MCRU frame major (continued)

54 Determine if the RG FAIL LED for the RG you have just replaced is lit.

If the RG FAIL LED is	Do
lit	step 112
not lit	step 105

55 Determine which power converter has a lit CONVERTER FAIL LED.

If the converter is	Do
an NT6X53	step 56
not an NT6X53	step 59

56 Use the following table to identify which circuit breaker located on the FSP is associated with the shelf with a lit CONVERTER FAIL LED.

Shelf number	Circuit breaker number
05	CB2
19	CB7

57 Determine if the associated circuit breaker is ON or OFF.

If the circuit breaker is	Do
ON	step77
OFF	step 58

Ext FSP
MCRU frame major (continued)

58 Set the circuit breaker you have just identified to ON.

If the circuit breaker	Do
turns OFF, and the RG FAIL LED is lit	step 66
remains ON, and the CONVERTER FAIL LED is lit	step 77
remains ON, and the CONVERTER FAIL LED is not lit	step105

59 Determine if the POWER switch on the converter is ON or OFF.

If the POWER switch is	Do
ON	step 61
OFF	step 60

60 Set the POWER switch on the converter to ON.

If the CONVERTER FAIL LED is	Do
lit	step 61
not lit	step 105

61 Use the following table to identify which circuit breaker located on the FSP is associated with the shelf with the lit CONVERTER FAIL LED.

Shelf number	Circuit breaker number
33 NT2X70 in slot 22	CB8
33 NT2X70 in slot 25	CB3
47 NT2X09 in slot 17	CB4

Ext FSP
MCRU frame major (continued)

62 Determine if the associated circuit breaker is ON or OFF.

If the circuit breaker is	**Do**
ON	step 63
OFF	step 64

63 Set the circuit breaker you have just identified to OFF.

64 Press and hold the RESET button on the converter while setting the circuit breaker to ON.

65 Release the RESET button.

If the circuit breaker	**Do**
turns OFF, and the CONVERTER FAIL LED is lit	step 66
remains ON, and the CONVERTER FAIL LED is not lit	step 105
remains ON, and the CONVERTER FAIL LED is lit	step 77

66 Record the numbers of the frame and shelf with the lit CONVERTER FAIL LED.

At the MCRU

67 Locate the fuse that powers the shelf in the MCRU.

68 Determine if the fuse is blown.

If he fuse is	**Do**
blown	step 69
not blown	step 78

69 Remove the fuse holder that contains the blown fuse.

70 Replace the cartridge fuse inside the fuse holder.

Ext FSP
MCRU frame major (continued)

71

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the blown fuse with a fuse of the same type, rating (color code), and manufacturer.

Replace the blown fuse.

72 Install the fuse holder back onto the MCRU.

At the MCRU

73 Determine what type of converter had a lit CONVERTER FAIL LED.

If the converter is	Do
an NT6X53	step 76
not an NT6X53	step 74

74 Press and hold the RESET button on the converter while setting the circuit breaker to ON.

75 Release the RESET button.

If the circuit breaker	Do
turns OFF, and the CONVERTER FAIL LED is lit	step78
remains ON, and the CONVERTER FAIL LED is not lit	step 105
remains ON, and the CONVERTER FAIL LED is lit	step 77

Ext FSP
MCRU frame major (continued)

76 Set the circuit breaker to ON.

If the circuit breaker	Do
turns OFF, and the CONVERTER FAIL LED is lit	step 78
remains ON, and the CONVERTER FAIL LED is not lit	step105
remains ON, and the CONVERTER FAIL LED is lit	step 77

77 Set the circuit breaker to OFF.

78 Replace the converter by performing the appropriate procedure in the *Card Replacement Procedures.* When you have completed the procedure, return to this point.

79 Determine what type of converter you have just replaced.

If the converter you have just replaced is	Do
an NT6X53	step 81
not an NT6X53	step 80

80 Determine if the CONVERTER FAIL LED for the converter you have just replaced is lit.

If the CONVERTER FAIL LED is	Do
lit	step 97
not lit	step 105

Ext FSP
MCRU frame major (continued)

81 Determine the state of the converter you have just replaced, and the associated circuit breaker.

If the circuit breaker	Do
turns OFF, and the CONVERTER FAIL LED is lit	step 83
remains ON, and the CONVERTER FAIL LED is not lit	step 105
remains ON, and the CONVERTER FAIL LED is lit	step 82

82 Set the circuit breaker to OFF.

83 Remove the NT6X51 and NT6X52 cards from the shelf with the lit CONVERTER FAIL LED.

84 Set the circuit breaker to ON.

If the CONVERTER FAIL LED is	Do
lit	step 97
not lit	step 85

85 Set the circuit breaker to OFF.

86 Insert the NT6X51 card back into the shelf.

87 Set the circuit breaker to ON.

If the circuit breaker	Do
turns OFF, and the CONVERTER FAIL LED is lit	step 89
remains ON, and the CONVERTER FAIL LED is not lit	step 91
remains ON, and the CONVERTER FAIL LED is lit	step 88

Ext FSP
MCRU frame major (continued)

88 Set the circuit breaker to OFF.

89 Replace the NT6X51 card by performing the appropriate procedure in *Card Replacement Procedures.* When you have completed the procedure, return to this point.

90 Set the circuit breaker to ON.

If the circuit breaker	Do
turns OFF, and the CONVERTER FAIL LED is lit	step 95
remains ON, and the CONVERTER FAIL LED is not lit	step 91
remains ON, and the CONVERTER FAIL LED is lit	step 94

91 Set the circuit breaker to OFF.

92 Insert the NT6X52 card back into the shelf.

93 Set the circuit breaker to ON.

If the circuit breaker	Do
turns OFF, and the CONVERTER FAIL LED is lit	step 95
remains ON, and the CONVERTER FAIL LED is not lit	step 105
remains ON, and the CONVERTER FAIL LED is lit	step 94

94 Set the circuit breaker to OFF.

95 Replace the NT6X52 card by performing the appropriate procedure in *Card Replacement Procedures.* When you have completed the procedure, return to this step.

Ext FSP
MCRU frame major (continued)

96 Set the circuit breaker to ON.

If the CONVERTER FAIL LED is	Do
lit	step 102
not lit	step 105

97 Determine if there are bent or short-circuited pins on the backplane of the shelf.

If there are	Do
bent or short-circuited pins	step 98
no bent or short-circuited pins, and the converter you are dealing with is an NT6X53	step 100
no bent or short-circuited pins, and the converter you are dealing with is not an NT6X53	step 102

98 Set the circuit breaker to OFF.

99 Straighten or replace bent or short-circuited pins. Then go to step 96.

100 Insert the NT6X51 and the NT6X52 cards back into the shelf.

101 Set the circuit breaker to ON.

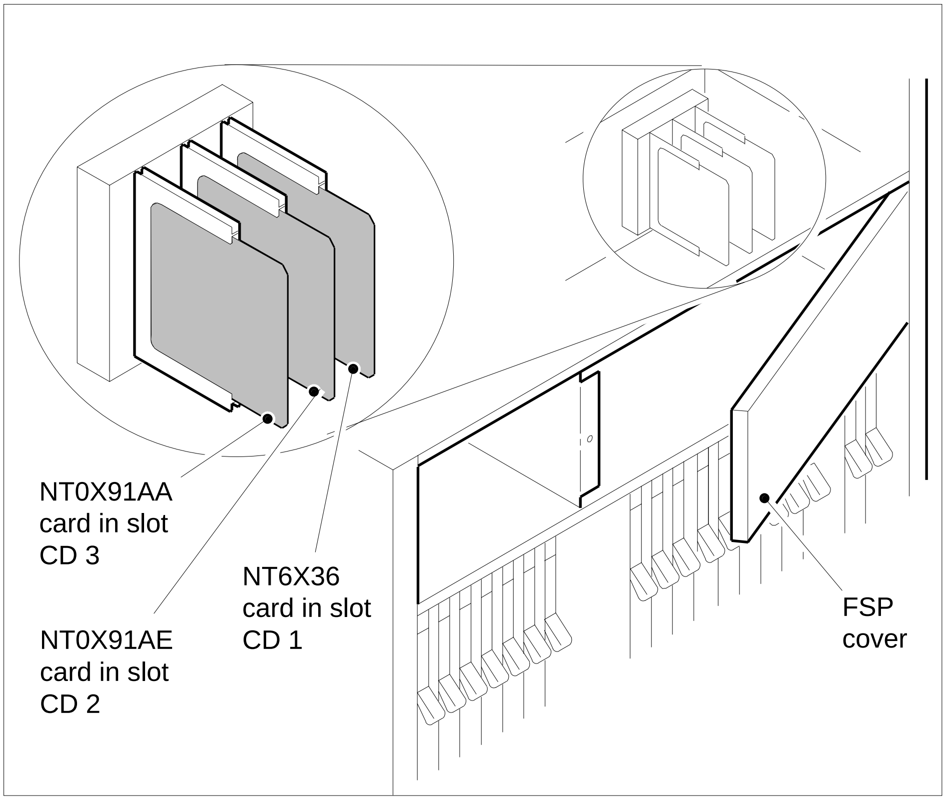
If the CONVERTER FAIL LED is	Do
lit	step 102
not lit	step105

Ext FSP
MCRU frame major (continued)

102 Use the following table and illustration to identify which alarm and control card is associated with the shelf with the lit CONVERTER FAIL LED.

Shelf number	Alarm and control card	Card position
33 NT2X70 in slot 25	slot CD2 NT0X91AE	middle
33 NT2X70 in slot 22	slot CD3 NT0X91AA	left
47 NT2X09 in slot 17	slot CD2 NT0X91AE	middle
05/19 NT6X53 in slot 1	slot CD1 NT6X36	right
33 NT6X60 in slots 1 and 5	slot CD1 NT6X36	right

Ext FSP
MCRU frame major (continued)



103 Record the numbers of the ILCM and RMM in the frame.

104 Replace the alarm and control card by performing the appropriate procedure in *Card Replacement Procedures.* When you have completed the procedure, return to this step.

At the MCRU

105 Determine if the FRAME FAIL lamp on the FSP is lit.

If the FRAME FAIL lamp is	Do
lit, and there are more lit FAIL LEDs or blown fuses	step 2
lit, and there are no more lit FAIL LEDs or blown fuses	step 112
not lit	step 106

Ext FSP
MCRU frame major (continued)

At the MAP terminal

106 Access the EXT level of the MAP display by typing

>MAPCI;MTC;EXT
and pressing the Enter key.

107 Determine whether an FSP alarm is present.

If an FSP alarm is	Do
present, and you have not accessed all the frames with an FSP alarm	step 108
present, and you have accessed all the frames with an FSP alarm	step 112
not present	step 113

108 Perform the appropriate procedure for the type of frame that has the FSP alarm. When you have completed the procedure, return to this step.

At the MCRU

109 Make a visual inspection of the FSP. Check circuit breakers CB5 and CB9.

If circuit breakers are	Do
tripped	step 110
not tripped	step 113

110 Reset circuit breaker (CB5 or CB9) by moving the switch to the ON/OFF and back to the ON position in quick succession. (The LED light should go OFF).

If circuit breaker	Do
trips again	step 111
remains ON (LED goes off)	step113

111 Access the table of contents for the *MCRU talk battery alarm* procedure and return to this step when completed.

Ext FSP
MCRU frame major (end)

112 For further assistance, contact the personnel responsible for the next level of support.

113 You have successfully completed this procedure.

MCRU major

CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nILCM**	.	.	.	.	.
				M					

Indication

The alarm code ILCM under the PM subsystem header indicates an ILCM alarm. The `M` under the ILCM indicates a major alarm. The number *n* before ILCM indicates the number of MCRUs with a major alarm.

Meaning

The *n* is the number of MCRUs that are in the manual busy (ManB), system busy (SysB), or C-side busy (CBsy) state.

Impact

The ManB and SysB do not directly affect service, because one unit of the MCRU is still providing service. However, there is no local backup. If the other unit of the MCRU fails, service is interrupted. A CBsy condition, however, may interrupt communication between the MCRU and the host, which would reduce the service provided by the MCRU to the local area only.

Common procedures

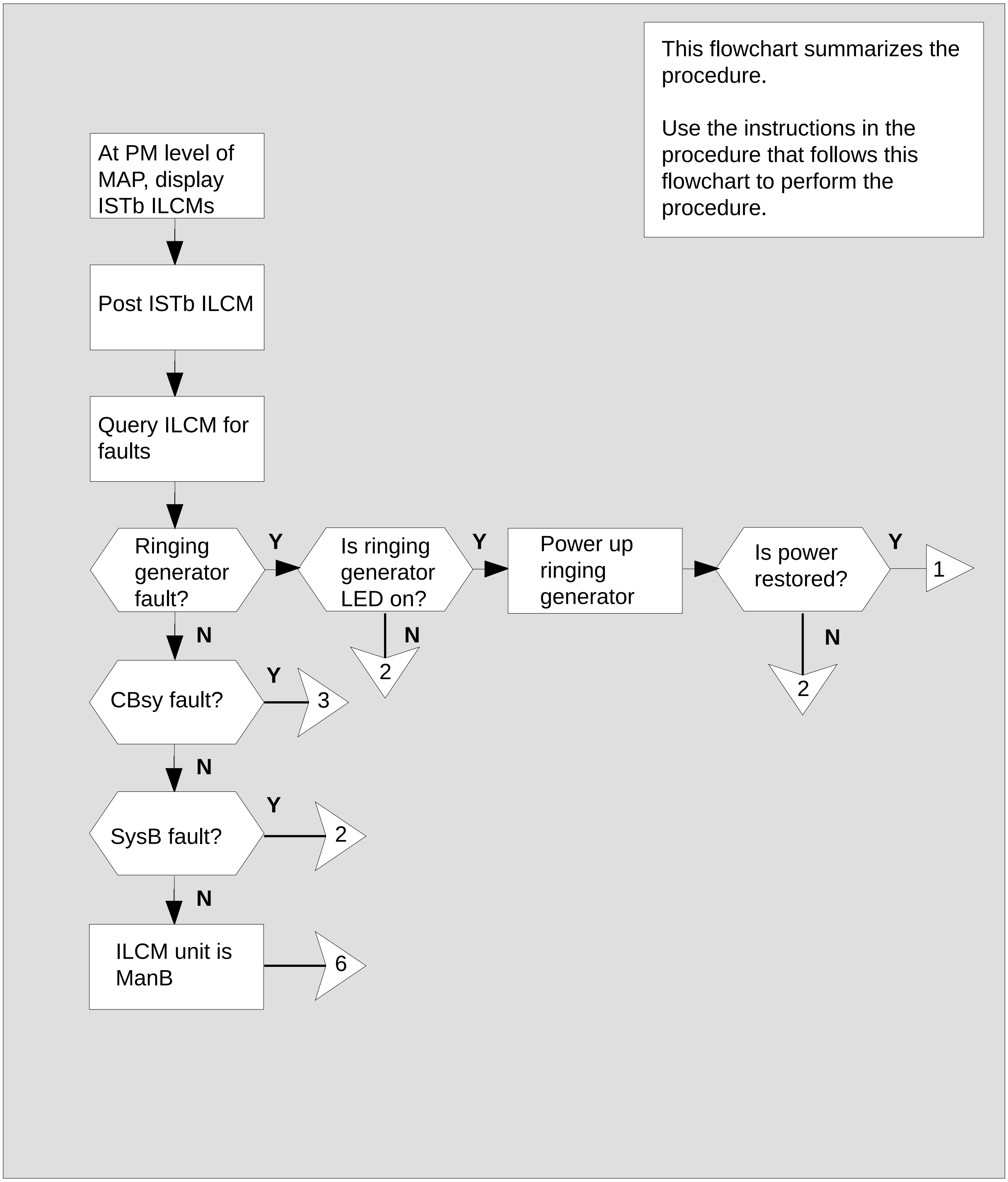
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

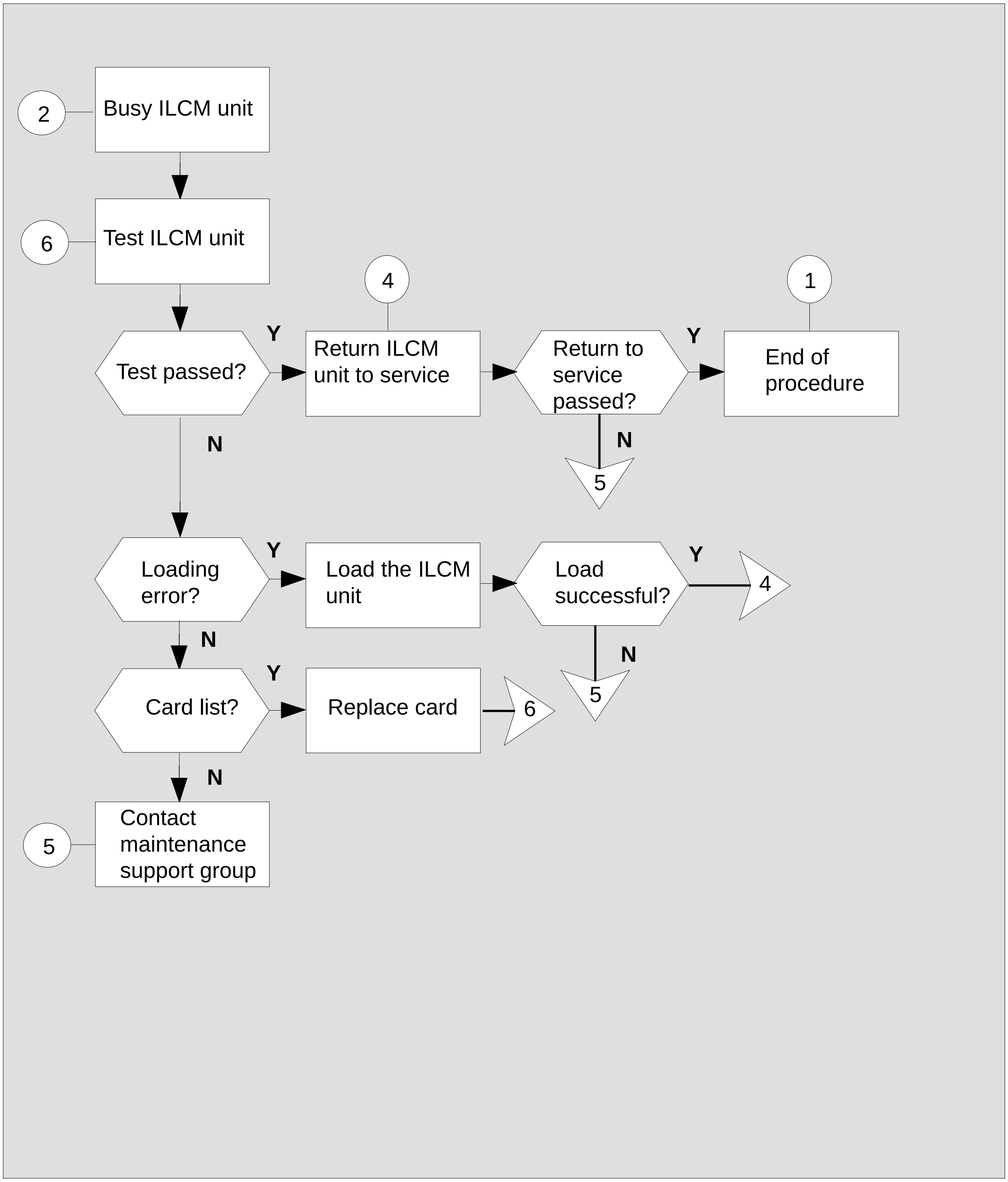
MCRU
major (continued)

Summary of clearing an MCRU major alarm



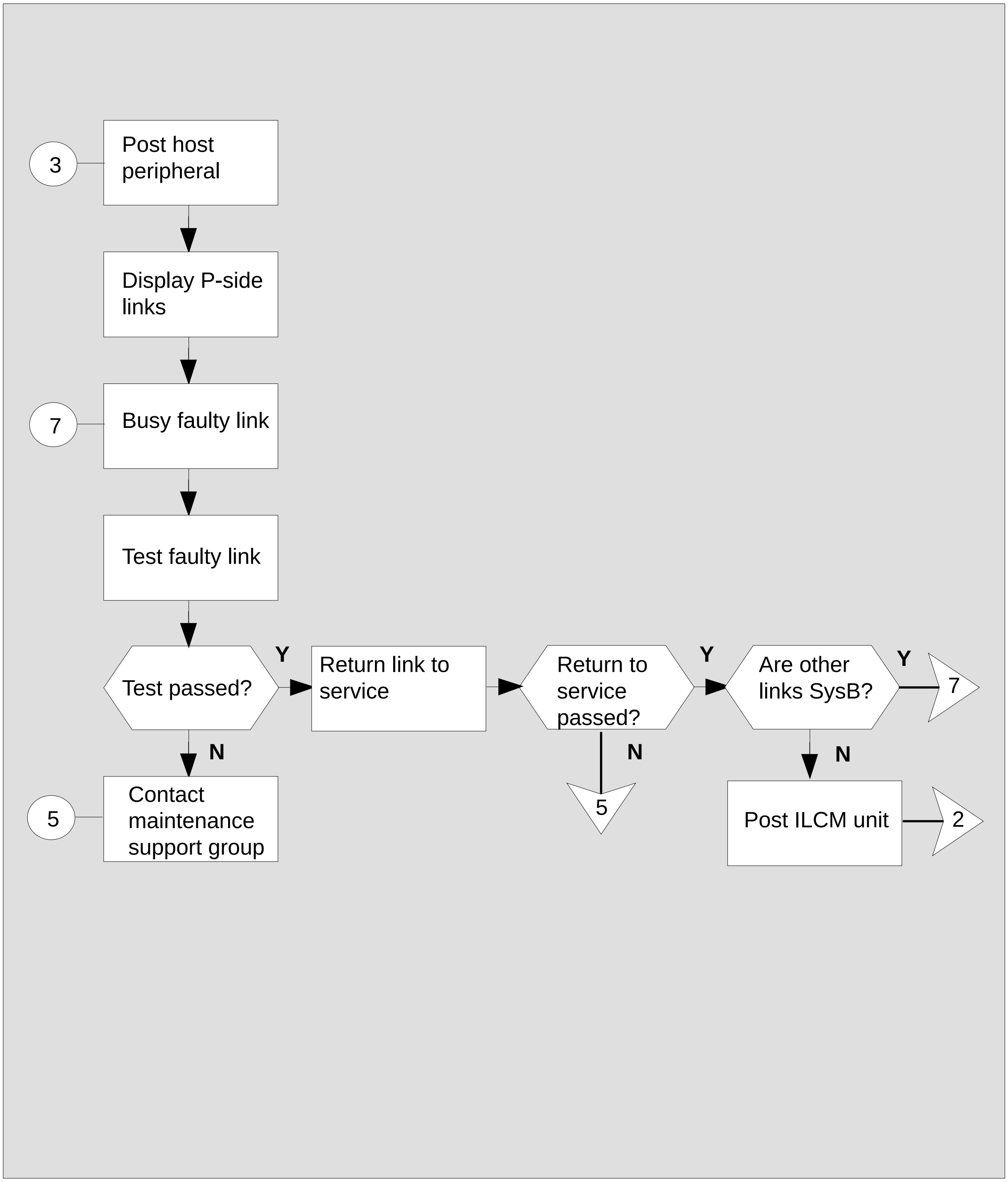
MCRU
major (continued)

Summary of clearing an MCRU major alarm (continued)



MCRU
major (continued)

Summary of clearing an MCRU major alarm (continued)



MCRU major (continued)

Clearing an MCRU major alarm

At the MAP terminal

1 If an alarm is still audible, silence it by typing

>MAPCI;MTC;SIL
and pressing the Enter key.

2 Access the PM level of the MAP display by typing

>PM
and pressing the Enter key.

3 Identify the faulty MCRU by typing

>DISP ISTB ILCM
and pressing the Enter key.

4 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the MCRU

5 Determine the fault indicators by typing

>QUERYPM FLT
and pressing the Enter key.

If fault indicated is	Do
ringing generator	step 6
CBsy (C-side busy)	step 9
SysB	step 16
ManB	step 17

MCRU
major (continued)

At the MCRU

6 Visually inspect the ringing generator to see if the light-emitting diode (LED) is lit.

If the LED light is	Do
lit	step 7
not lit	step 16

7 Power up the ringing generator by moving the power switch to the ON position. (The LED should turn OFF.) These switches are identified as follows:

RG 0 corresponds to ILCM unit 0 CB1

RG 1 corresponds to ILCM unit 1 CB6

8 Determine if power is restored to the ringing generator.

If power is	Do
restored	step 23
not restored	step 16

At the MAP terminal

9 Identify C-side links to the host PM by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
Link 0: PLGC 0       2; Cap MS; Status: OK    ;MsgCond: OPN
Link 1: PLGC 0       6; Cap MS; Status: SysB  ;MsgCond: CLS
```

MCRU major (continued)

10 Post the host peripheral (PLGC, or RCC) by typing

>POST pm_type pm_no
and pressing the Enter key.

where

pm_type	is PLGC, or RCC
pm_no	is the number of the host peripheral

11 Identify the faulty P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
Link 2:ILCM REM1 00 0  0;Cap MS;Status:OK   ;MsgCond: OPN
Link 6:ILCM REM1 00 0  1;Cap MS;Status:SysB ;MsgCond: CLS
```

Record information for the links that have a status other than OK.

12 Busy the faulty link by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no	is the number of a faulty P-side link identified in step 11

13 Test the busied link by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no	is the number of a faulty P-side link busied in step 12

If test	Do
passes	step 14
fails	step 21

MCRU
major (continued)

14 Return the busied link to service by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no   is the number of a faulty P-side link busied in step 12

If RTS	Do
passes and no other links are SysB	step 15
passes but other links are SysB	step 12
fails	step 21

15 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site   is the site name of the MCRU (alphanumeric)
frame   is the frame number of the MCRU (0-511)
ILCM   is the number of the MCRU

16

> **CAUTION**
> **Failing to allow sufficient time may cause false alarm indication.**
> Allow 3 to 5 minutes for the system to clear the alarm before proceeding to the next step.

Busy the MCRU unit associated with the alarm by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit to be busied (0 or 1)

MCRU
major (continued)

17 Test the busied unit by typing

>TST UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit to be tested (0 or 1)

If test	Do
passes	step 19
fails due to loading error	step 18
fails, and a card list is produced	step 20
fails, but no card list is produced	step 21

18 Attempt to load the MCRU unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit to be loaded (0 or 1)

If load is	Do
successful	step 19
not successful	step 21

19 Attempt to return the MCRU unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit to be returned to service (0 or 1)

If RTS	Do
passes	step 23
fails	step 21

MCRU
major (end)

20 The card list identifies the cards most likely to be faulty. Replace the cards one at a time in the order listed as directed below:

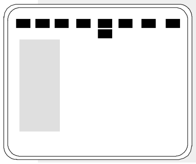
If last card on list has	Do
not been replaced	step 22
been replaced	step 21

21 Contact your maintenance support group for further instructions in clearing this fault.

22 Go to the *Card Replacement Procedures* to replace the first (or next) card on the card list. Go to step 17 when the card is replaced.

23 You have successfully completed this procedure. If additional alarms are displayed, proceed to the appropriate alarm clearing procedure.

MCRU (RG) major



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nILCM**	.	.	.	.	.
				M					

Indication

A major alarm involving an MCRU ringing generator is indicated by *n*ILCM under the PM subsystem header with an `M` beneath it at the MTC level of the MAP display.

Meaning

One of the ringing generator units is in the in-service trouble (ISTb) state.

Impact

Service is not affected since a switching of support to a backup ringing generator (SwRG) automatically occurs. However, if the backup ringing generator fails, ringing will not be produced.

Common procedures

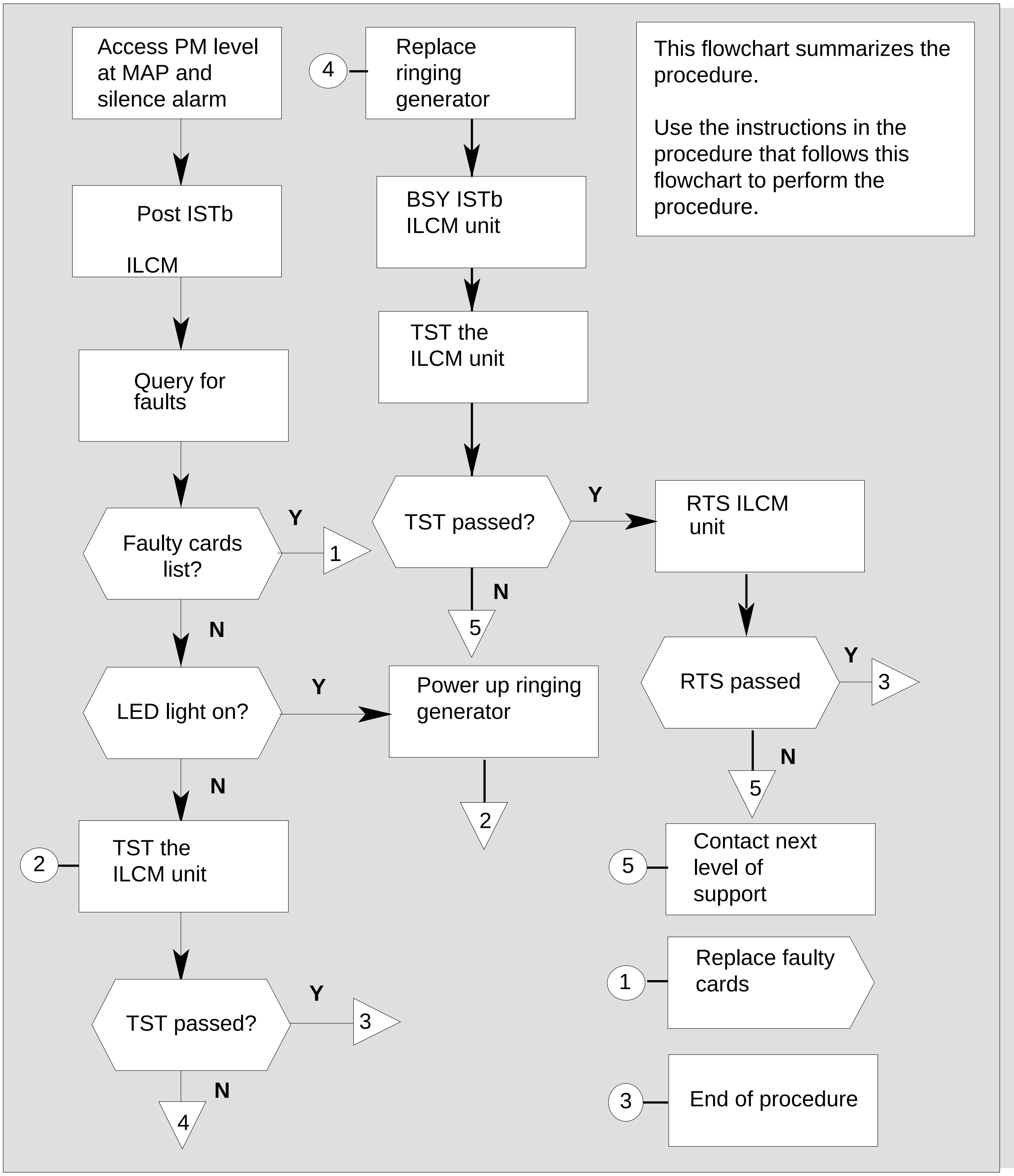
None

Action

The following flowchart is only a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

MCRU (RG) major (continued)

Summary of clearing anMCRU (RG) major alarm associated with a ringing generator



MCRU (RG)
major (continued)

Clearing an MCRU (RG) major alarm associated with a ringing alarm

At your current location

1 You should be entering this procedure from a PM system-level alarm clearing procedure step which identified a PM alarm associated with an MCRU ringing generator fault.

At the MAP terminal

2 Silence the alarm by typing

>MAPCI;MTC;PM;SIL
and pressing the Enter key.

3 Identify the faulty MCRU by typing

>DISP ILCM ISTB
and pressing the Enter key.

4 Post the ISTb ILCM identified in step 3 by typing

>POST ILCM ISTB
and pressing the Enter key.

Example of a MAP display:

```
 CC     CMC     IOD     Net      PM     CCS     Lns     Trks     Ext
  .      .       .       .     1ILCM     .       .        .       .
                                 M

PRLCM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit     PM     1        0        2        0        2         12
 2 Post_    PRLCM   0        0        2        0        2         9
 3 ListSet
 4 SwRG     PRLCM   RSC    14 1 ISTb  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   InsV                 /RG: 1
 6 Tst_     Unit1:   ISTb                 /RG: 1
 7 Bsy_                                11  11  11  11  11  RG:Pref 1 ISTb
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 Insv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

MCRU (RG)
major (continued)

5 Check for fault indicators by typing

>QUERYPM FLT
and pressing the Enter key.

Example of a MAP display:

```
 CC     CMC      IOD      Net      PM      CCS      Lns      Trks      Ext
  .      .        .        .     1ILCM      .        .        .         .
                                  M

PRLCM                  SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit      PM        1        0        2        0        2         12
 2 Post_     PRLCM      0        0        2        0        2          9
 3 ListSet
 4 SwRG      PRLCM   RSC    14 1 ISTb  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_    Unit0:   InsV                 /RG: 1
 6 Tst_      Unit1:   ISTb                 /RG: 1
 7 Bsy_                                11  11  11  11  11  RG:Pref 1 ISTb
 8 RTS_      Drwr:  01  23  45  67  89  01  23  45  67  89    Stby 0 InsV
 9 OffL             ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_   QUERYPM FLT
11 Disp_      Node inservice troubles exist:
12 Next         One or both Units inservice trouble
13            ILCM   UNIT 0  No faults exist
14 QueryPM
15            ILCM   UNIT 1  Inservice Troubles Exist:
16                 Ring Generator in Excess load
17
18
```

If faulty card is	Do
indicated	step 14
not indicated	step 6

At the MCRU

6 Make a visual inspection of the ringing generator. Check to see if the LED is lit.

If the LED is	Do
lit	step 7
not lit	step 8

MCRU (RG)
major (continued)

7 Power up the ringing generator by moving the power switch to the ON position. The LED should go out. These switches are identified here as:

- RG 0 CB1
- RG 1 CB6

At the MAP terminal

8 Manbusy the ISTb ILCM unit identified in step 3 by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the ISTb MCRU unit.

9 Test the ManB ILCM by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the ManB MCRU unit.

Example of a MAP display:

```
PRLCM Rem1 14 1 Unit 1 InSvce Test Initiated
PRLCM Rem1 14 1 Unit 1 Tst Failed:(Reason for failure)
```

or:

```
PRLCM Rem1 14 1 Unit 1 InSvce Test Initiated
PRLCM Rem1 14 1 Unit 1 Tst passed
```

10 Determine the result of the test performed in step 9.

If	Do
TST PASSED	step 12
TST FAILED	Replace the ringing generator and go to step 11.

11 After you have replaced the ringing generator (NT6X60), test the ILCM unit again by typing

>TST UNIT unit_no
and pressing the Enter key.

If	Do
`TST PASSED`	step12
`TST FAILED`	step 17

12 Return the ILCM to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the ManB MCRU.

13 Determine if RTS was successful.

If	Do
`RTS PASSED`	step 18
`RTS FAILED`	step 14

14 Observe the card listing as shown in the following MAP display, resulting from step 9.

Example of a MAP display:

```
SITE FLR RPOS BAY_ID   SHF DESCRIPTION SLOT EQPEC
Rem1 01  A00  LCE(I)00  38  PRLCM:000   :01  6X60
Rem1 01  A00  LCE(I)00  04  PRLCM:000   :04  6X51
```

MCRU (RG)
major (end)

15 Determine if all cards on the list have been replaced.

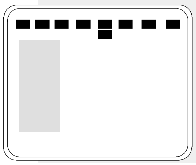
If all cards on list	Do
replaced	step 17
not replaced	step 16

16 Go to the *Card Replacement Procedures.* When you have finished with the card replacement procedures, go to step 11 of this procedure.

17 Obtain further assistance in clearing this alarm by contacting the personnel responsible for higher level support.

18 You have successfully completed this procedure. If there are other alarms displayed, reference the appropriate alarm clearing procedures for the indicated alarms.

RMM major



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nSysB M**	.	.	.	.	.

Indication

If *n*SysB under the PM subsystem header at the MTC level of the MAP display exists, a major alarm associated with an RMM is indicated.

Meaning

The indicated number of RMM units are in the system busy (SysB) state.

Impact

If the RMM unit fails, maintenance and line testing are discontinued. Subscriber service is not affected.

Common procedures

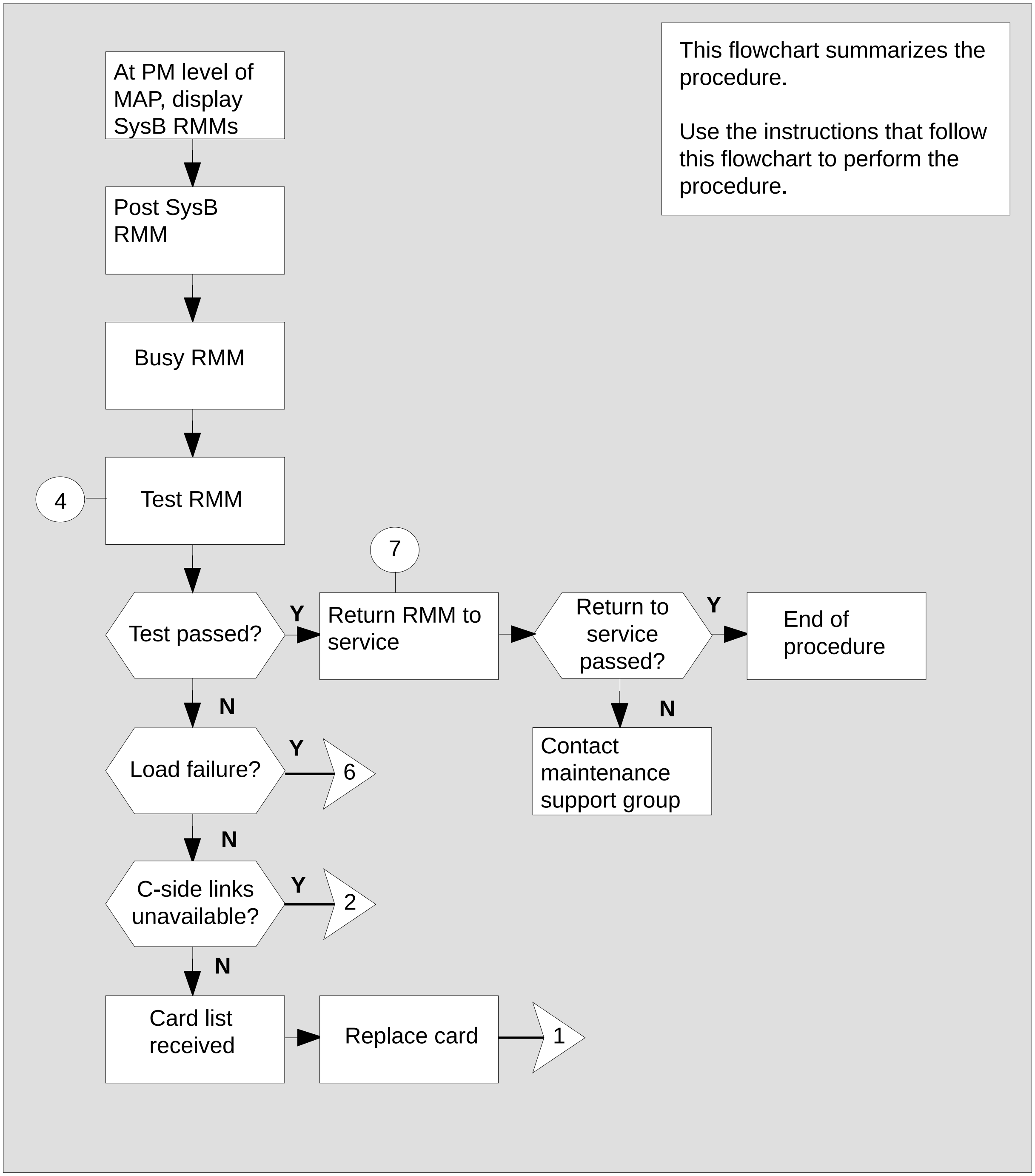
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

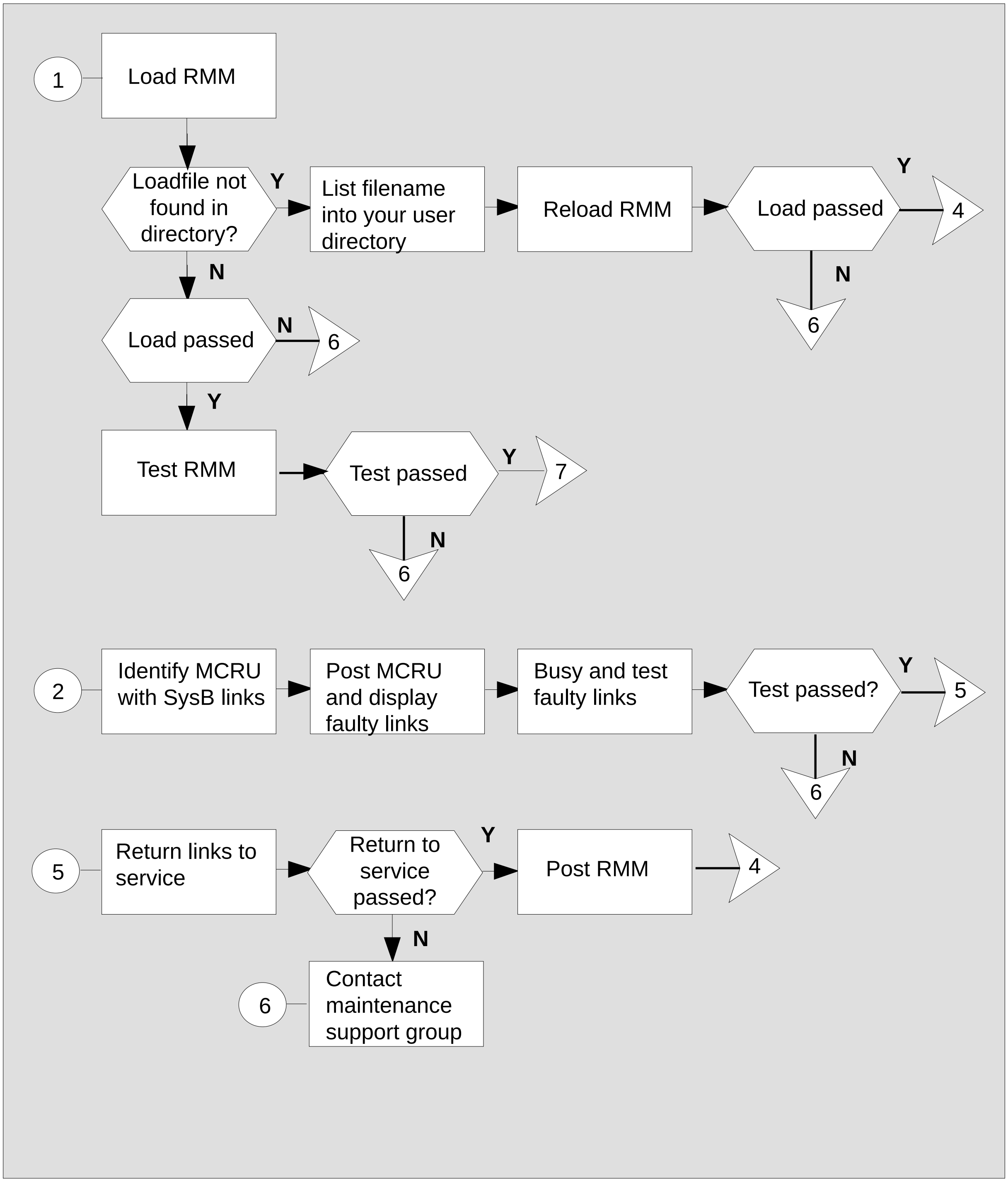
RMM
major (continued)

Summary of clearing an RMM major alarms



RMM
major (continued)

Summary of clearing an RMM major alarm (continued)



RMM
major (continued)

Clearing an RMM major alarm

At the MAP terminal

1 Silence the alarm by typing

>MAPCI;MTC;PM;SIL
and pressing the Enter key.

2 Identify the faulty RMM by typing

>DISP SYSB RMM
and pressing the Enter key.

Example of a MAP response:

```
SysB  RMM: 2
```

3 Post the SysB RMM identified in step 2 by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the faulty RMM

4 Manually busy the RMM posted in step 3 by typing

>BSY
and pressing the Enter key.

5 Perform a test on the faulty RMM by typing

>TST
and pressing the Enter key.

If test	Do
passed	step 32
failed due to load failure	step 6
failed due to C-side links unavailable	step 24
failed and a card list appears	step 33

RMM
major (continued)

6 Load the RMM by typing

>LOADPM
and pressing the Enter key.

If	Do
message `load file not found in directory` is received	step 7
load passed	step 31
load failed	step 35

7 Determine the type of device where the PM load files are located.

If load files are located on	Do
a tape	step 8
an IOC disk	step 14
a SLM disk	step 19

8 Locate the tape that contains the PM load files.

At the IOE frame

9 Mount the tape on a magnetic tape drive.

At the MAP terminal

10 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files

11 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files

RMM
major (continued)

12 Demount the tape drive by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

13 Go to step 23.

14 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

15 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

16 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files obtained in step 14

17 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

18 Go to step 23.

19 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

20 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

21 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files obtained in step 19

RMM
major (continued)

22 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

23 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

If	Do
load failed	step 35
load passed	step 31

24 Identify the MCRU with links in a SysB condition by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
LINK 0: ILCM PRLCM 00 0 0;CAP MS;STATUS:SysB,;MSGCOND:CLS
LINK 1: ILCM PRLCM 00 0 1;CAP MS;STATUS:SysB,;MSGCOND:CLS
```

25 Post the MCRU identified in step 24 by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM

RMM
major (continued)

26

> **CAUTION**
> **Failing to allow sufficient time may cause false alarm indication.**
> Allow 3 to 5 minutes for the system to clear the alarm before proceeding to the next step.

Identify the faulty P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
LINK  0: RMM 0 0;CAP MS;STATUS:SysB,;MSGCOND: CLS
LINK  1: RMM 0 1;CAP MS;STATUS:SysB,;MSGCOND: CLS
LINK  2: ESA 0 0;CAP  S;STATUS:  OK,;MSGCOND: OPN
LINK  4: ESA 0 1;CAP  S;STATUS:  OK,;MSGCOND: OPN
```

27 Busy the faulty link by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link identified in step 26

28 Test the ManB link by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no is the number of the link (0 or 1) manually busied in step 27

If test	Do
passed	step 29
failed	step 35

RMM
major (continued)

29 Return the link to service by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of the link (0 or 1) tested in step 28

If RTS	Do
passed	step 30
failed	step 35

30 Post the ManB RMM by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM manually busied in step 4

31 Test the RMM by typing

>TST
and pressing the Enter key.

If test	Do
passed	step 32
failed, and a cardlist is produced	step 33
failed, but no cardlist is produced	step 35

32 Return the ManB RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 36
failed	step 35

RMM
major (end)

33 The card list identifies the cards most likely to be faulty. Replace the cards one at a time in the order listed as directed by this procedure.

If all cards on the list have	Do
been replaced	step 35
not been replaced	step 34

34 Go to the card replacement procedure in the *Card Replacement Procedures* for the next card on the card list. When you have finished with the card replacement procedures, go to step 6 of this procedure.

35 Obtain further assistance in clearing this alarm by contacting the personnel responsible for higher level support.

36 You have successfully completed this procedure. If there are other alarms displayed, reference the appropriate alarm clearing procedures for the indicated alarms.

MCRU minor

CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	***n*ILCM**	.	.	.	.	.

Indication

The alarm code ILCM under the PM subsystem header indicates an ILCM alarm. The absence of *C* or M under the ILCM indicates a minor alarm. The number *n* before ILCM indicates the number of ILCMs with a minor alarm.

Meaning

The number *n* of ILCMs are in the in-service trouble (IsTb) state.

Impact

The in-service trouble condition does not directly affect service, because one unit of the ILCM is still providing service. However, there is no local backup. If the other unit of the ILCM fails, service is interrupted.

Common procedures

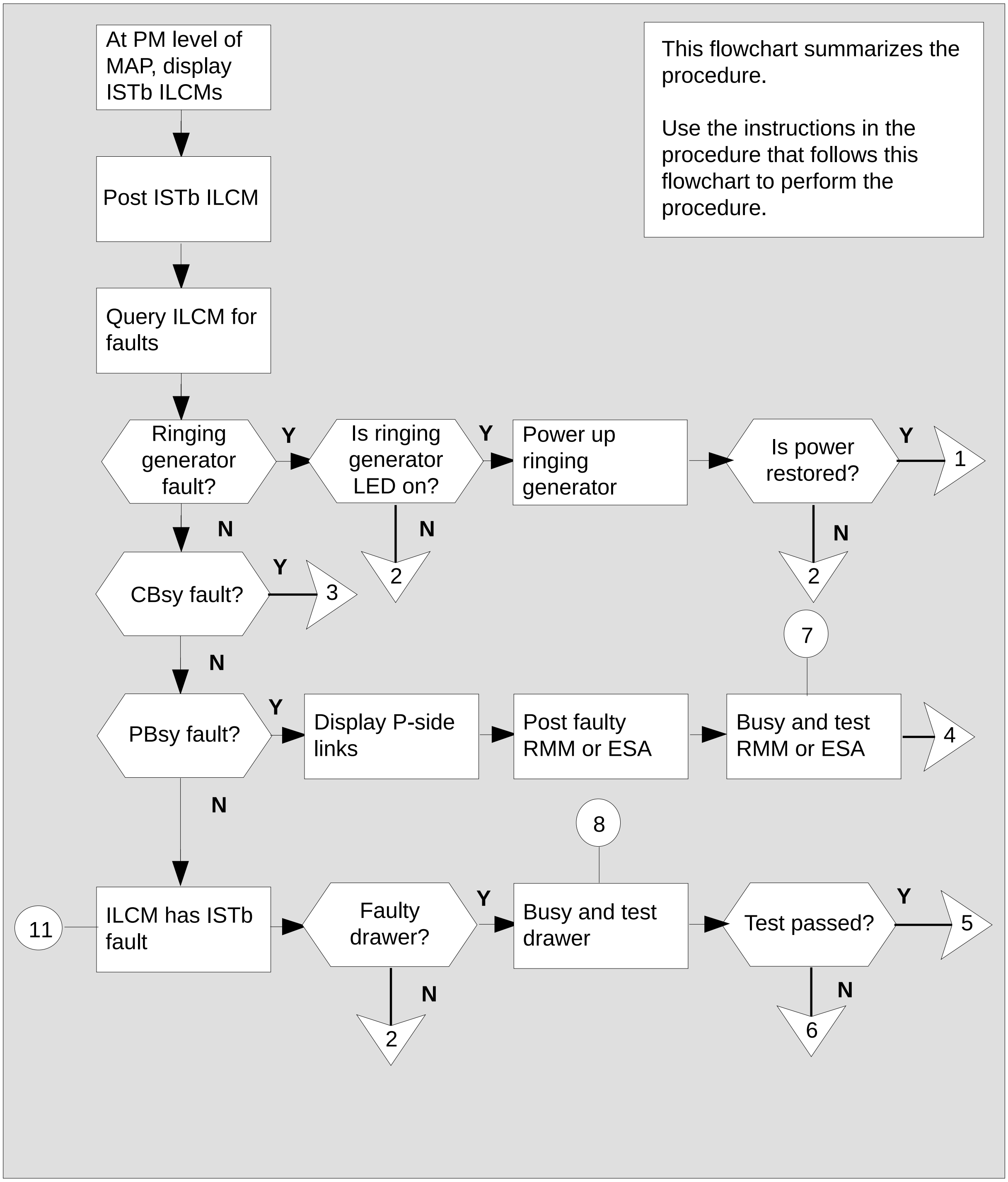
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

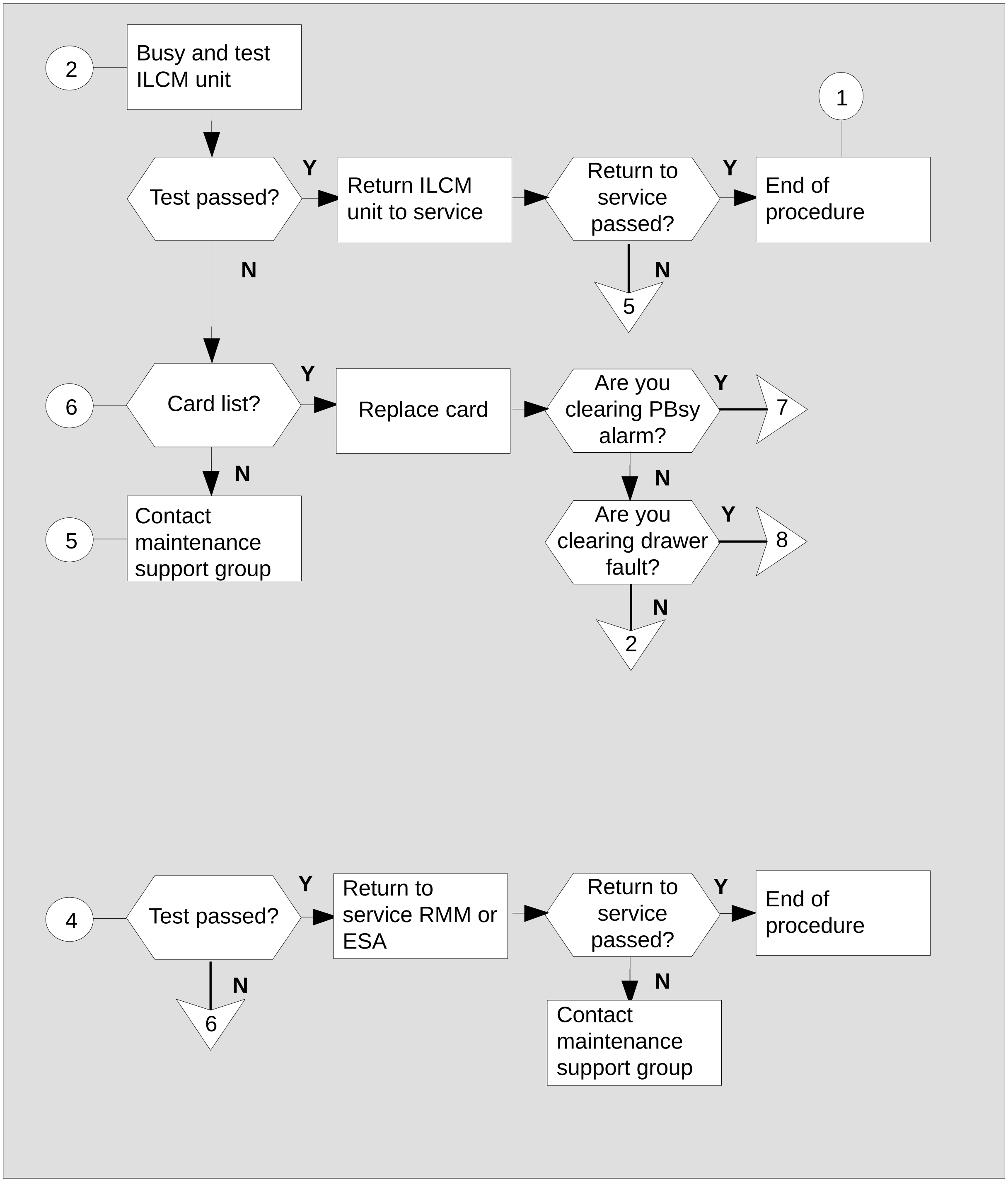
MCRU minor (continued)

Summary of clearing an MCRU minor alarm



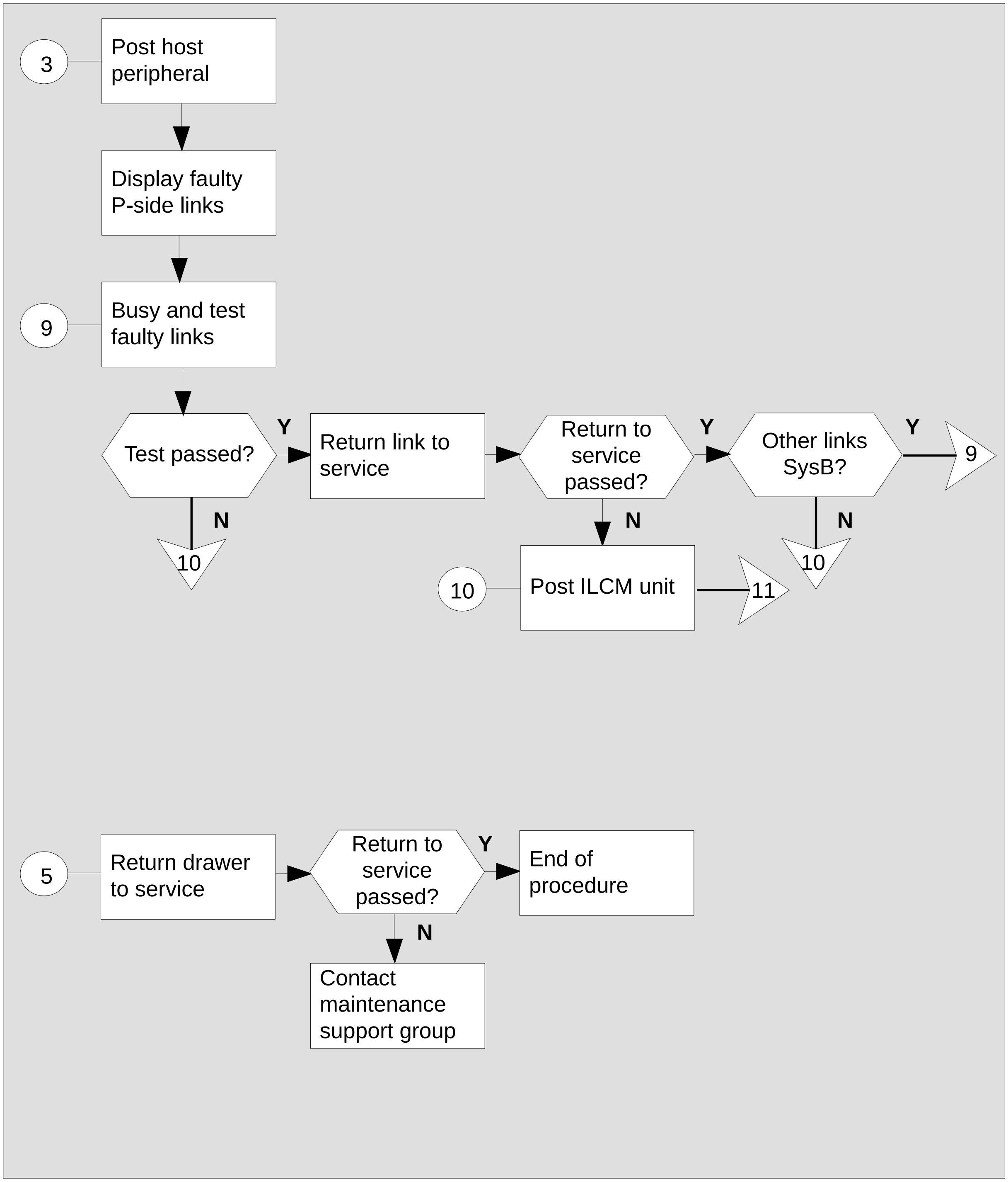
MCRU
minor (continued)

Summary of clearing an MCRU minor alarm (continued)



MCRU
minor (continued)

Summary of clearing an MCRU minor alarm (continued)



Clearing an MCRU minor alarm

At the MAP terminal

1 If alarm is still audible, silence it by typing

>MAPCI;MTC;SIL
and pressing the Enter key.

2 Access the PM level of the MAP display by typing

>PM
and pressing the Enter key.

3 Identify the faulty MCRU by typing

>DISP ISTB ILCM
and pressing the Enter key.

4 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM

5 Determine the fault indicators by typing

>QUERYPM FLT
and pressing the Enter key.

If the fault indicated is	Do
ringing generator	step 6
CBsy (C-side busy)	step 9
PBsy (P-side busy)	step 15
DRWR FLT (drawer fault)	step 21
ISTb (In-service trouble)	step 25

MCRU
minor (continued)

At the MCRU

6 Visually inspect the ringing generator to see if the light-emitting diode (LED) is lit.

If the LED is	Do
lit	step 7
not lit	step 25

7 Power up the ringing generator by moving the power switch to the ON position. (The LED light should go off.) These switches are identified as follows:

RG 0 corresponds to ILCM unit 0 CB1

RG 1 corresponds to ILCM unit 1 CB6

8 Determine if power is restored to the ringing generator.

If power is	Do
restored	step 31
not restored	step 25

At the MAP terminal

9 Identify C-side links to the host PM by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
Link 0: PLGC 0      2; Cap MS; Status: OK    ;MsgCond: OPN
Link 1: PLGC 0      6; Cap MS; Status: SysB  ;MsgCond: CLS
```

MCRU
minor (continued)

10 Post the host peripheral (PLGC, or RCC) by typing

>POST pm_type pm_no
and pressing the Enter key.

where

pm_type is PLGC, or RCC
pm_no is the number of the host peripheral

11 Identify the faulty P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
Link 2: ILCM REM1 00 0  2;Cap MS;Status: OK  ;MsgCond: OPN
Link 6: ILCM REM1 00 0  1;Cap MS;Status: SysB,;MsgCond: CLS
```

Record information for the links that have a status other than OK.

12 Choose and busy the faulty link by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link identified in step 11

13 Test the busied link by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link busied in step 12

If test	Do
passes	step 14
fails	step 21

MCRU
minor (continued)

14 Return the busied link to service by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link busied in step 12

If RTS	Do
passes and no other links are SysB	step 20
passes but other links are SysB	step 12
fails	step 21

15 Display P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
Link  0: RMM 0      0;Cap MS;Status:PBsy ,P;MsgCond:CLS
Link  1: RMM 0      1;Cap MS;Status:PBsy ,P;MsgCond:CLS
Link  2: ESA 0      0;Cap M ;Status:OK   ,P;MsgCond:OPN
Link  3: ESA 0      1;Cap M ;Status:OK   ,P;MsgCond:OPN
```

16 Post the faulty RMM or ESA processor (if equipped) by typing

>POST module module_no
and pressing the Enter key.

where

module is the name of the P-side module (RMM or ESA)
module_no is the number of the RMM or ESA processor

MCRU
minor (continued)

17 Busy the RMM or ESA processor by typing

>BSY
and pressing the Enter key.

18 Test the RMM or ESA processor by typing

>TST
and pressing the Enter key.

If test	**Do**
passes	step 19
fails, and a card list is produced	step 28
fails, but no card list is produced	step 29

19 Return to service the RMM or ESA processor by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passes	step 31
fails	step 29

20 Post the MCRU with the alarm condition by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM

MCRU
minor (continued)

21

CAUTION
Failing to allow sufficient time may cause false alarm indication.
Allow 3 to 5 minutes for the system to clear the alarm before proceeding to the next step.

Determine if the problem is a faulty drawer. A faulty drawer is indicated by letters appearing under the line subgroup numbers associated with a physical drawer.

Example of a MAP response:

```
ILCM  REM1 00 0   ISTb   Links OOS: Cside  0 Pside  0
Unit0: InSv                    /RG: 0
Unit1: InSv                    /RG: 0
                      11 11 11 11 11 RG: Pref 0 InSv
Drwr:  01 23 45 67 89 01 23 45 67 89     Stby 1 InSv
       .. SS .. .. .. .. .. .. .. ..
```

If problem indicated is	Do
faulty drawer	step 22
not a faulty drawer	step 25

MCRU
minor (continued)

22 Busy both line subgroups associated with the faulty drawer by typing

>BSY DRWR lsg
and pressing the Enter key

where

lsg is the number of the line subgroups associated with the faulty drawer

Example of a MAP response:

```
ILCM  REM1 00 0   Drwr 2 will be taken out of service
Please confirm (“YES” or “NO”):
```

>YES
and pressing the Enter key

Repeat this step for the other line subgroup associated with the faulty drawer.

23 Test both line subgroups associated with the faulty drawer by typing

>TST DRWR lsg
and pressing the Enter key.

where

lsg is the number of one of the line subgroups associated with the faulty drawer.

Repeat this step for the other line subgroup associated with the faulty drawer.

If test	Do
passes	step 24
fails, and a card list is produced	step 28
fails, but no card list is produced	step 29

MCRU
minor (continued)

24 Return to service both line subgroups by typing

>RTS DRWR lsg
and pressing the Enter key.

where

lsg is the number of one of the line subgroups associated with the faulty drawer

Example of a MAP response:

```
OSvce Tests Initiated
ILCM  REM1 00 0   Drwr 2 Tst Passed
ILCM  REM1 00 0   Drwr 2 Rts Passed
```

Repeat this step for the other line subgroup associated with the faulty drawer.

If return to service	Do
passes	step 31
fails	step 29

25 Busy the ILCM unit associated with the alarm by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be busied (0 or 1)

26 Test the busied unit by typing

>TST UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be tested (0 or 1)

If test	**Do**
passes	step 27
fails, and a card list is produced	step 28
fails, but no card list is produced	step 29

27 Attempt to return the MCRU to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be returned to service (0 or 1)

If RTS	**Do**
passes	step 31
fails	step 29

28 The card list identifies the cards most likely to be faulty. Replace the cards one at a time in the order listed as directed below:

If last card on list has	**Do**
not been replaced	step 30
been replaced	step 29

29 Contact your maintenance support group for further instructions in clearing this fault.

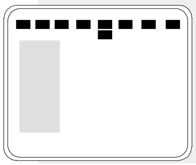
MCRU
minor (end)

30 Go to the *Card Replacement Procedures* to replace the first (or next) card on the card list. When the card is replaced, return to the appropriate step in this procedure as indicated below:

If you are clearing	Do
PBsy alarm	step 18
drawer faults	step 23
all other alarms	step 26

31 You have successfully completed this procedure. If additional alarms are displayed, proceed to the appropriate alarm clearing procedure.

RMM minor



CM	MS	IOD	Net	**PM**	Lns	Trks	Ext	Appl
.	.	.	.	**nCBsy**	.	.	.	.

Indication

If *n*CBsy under the PM subsystem header at the MTC level of the MAP display exists, a minor alarm associated with an RMM is indicated.

Meaning

The indicated number of units are in the C-side busy (CBsy) state.

Impact

Subscriber service is not affected. You will have no local RMM backup if the unit fails.

Common procedures

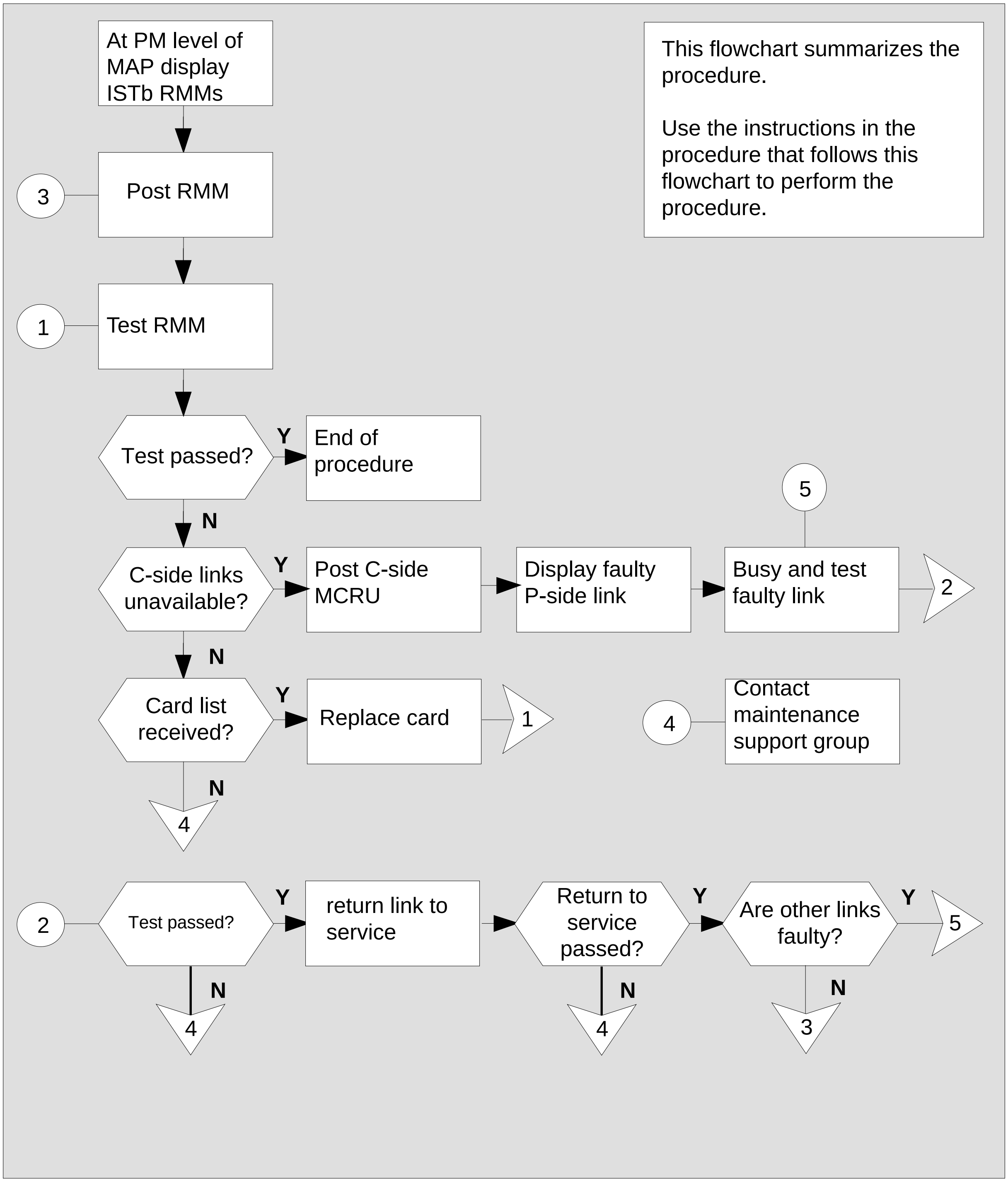
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

RMM
minor (continued)

Summary of RMM minor alarm



Clearing an RMM minor alarm

At the MAP terminal

1 Silence the alarm by typing

>MAPCI;MTC;PM;SIL
and pressing the Enter key.

2 Identify the faulty RMM by typing

>DISP ISTB RMM
and pressing the Enter key.

Example of a MAP response

```
ISTb  RMM: 2
```

3 Post the ISTb RMM identified in step 2 by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the faulty RMM

4 Perform an in-service test on the faulty RMM by typing

>TST
and pressing the Enter key.

If test	Do
passes	step 17
fails due to C-side links unavailable	step 5
fails and a card list appears	step 14
fails and no card list appears	step 17

5 Identify the MCRU with links in a SysB condition by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response

```
LINK  0:  ILCM PRLCM 00 0  0;CAP MS;STATUS:SysB,;MSGCOND:CLS
LINK  1:  ILCM PRLCM 00 0  1;CAP MS;STATUS:  OK,;MSGCOND:OPN
```

RMM
minor (continued)

6 Post the MCRU identified in step 5 by typing

>POSTILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM

7

> **CAUTION**
> **Failing to allow sufficient time may cause false alarm indication.**
> Allow 3 to 5 minutes for the system to clear the alarm before proceeding to the next step.

Identify the faulty P-side links by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response:

```
LINK 0: RMM 0 0;CAP MS;STATUS:SysB,;MSGCOND: CLS
LINK 1: RMM 0 1;CAP MS;STATUS:  OK,;MSGCOND: OPN
LINK 2: ESA 0 0;CAP  S;STATUS:  OK,;MSGCOND: OPN
LINK 4: ESA 0 1;CAP  S;STATUS:  OK,;MSGCOND: OPN
```

8 Busy the faulty link by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no	is the number of the the faulty p-side link identified in step 7

RMM
minor (continued)

9 Test the ManB link by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no is the number of the link (0 or 1) manually busied in step 8

If	Do
TST PASSED	step 10
TST FAILED	step 16

10 Return the link to service by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of the link (0 or 1) tested in step 9

If	Do
RTS PASSED	step 11
RTS FAILED	step 16

11 Determine if additional links need to be cleared.

If all faulty links have	Do
been cleared	step 12
not been cleared	step 8

12 Post the RMM by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM to be posted

RMM
minor (end)

13 Test the RMM by typing

>TST
and pressing the Enter key.

If test	Do
`TST PASSED`	step 17
`TST FAILED`, and a cardlist is produced	step 14
`TST FAILED`, and no cardlist is produced	step 16

14 The card list identifies the cards most likely to be faulty. Replace the cards one at a time in the order listed as directed below.

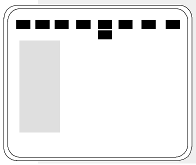
If all cards on the list have	Do
been replaced	step 16
not been replaced	step 15

15 Go to the *Card Replacement Procedures* for the next card on the card list. When you have finished with the card replacement procedures, go to step 13 of this procedure.

16 Obtain further assistance in clearing this alarm by contacting the personnel responsible for higher level support.

17 You have successfully completed this procedure. If there are other alarms displayed, reference the appropriate alarm clearing procedures for the indicated alarms.

ESA
critical, minor



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nESA**	.	.	.	.	.
				C					

Indication

The alarm code ESA under the PM subsystem header indicates an ESA alarm. *C* indicates a critical ESA alarm. The absence of *C* under the ESA indicates a minor ESA alarm. The number *(n)* before ESA indicates the number of ESA processors with the alarm condition.

Meaning

n is the number of ESAs that are in the system busy (SysB) or in-service trouble (ISTb) state.

Impact

The SysB condition does not directly affect service unless the MCRU is in ESA: however, there is no local backup. If, for example, the MCRU is cut off from the host office and the ESA processor is SysB, service is interrupted.

The ISTb condition does not directly affect service even if the MCRU is in ESA. However, the trouble condition should be investigated to avoid the possibility of service interruption should the ESA condition deteriorate.

Common procedures

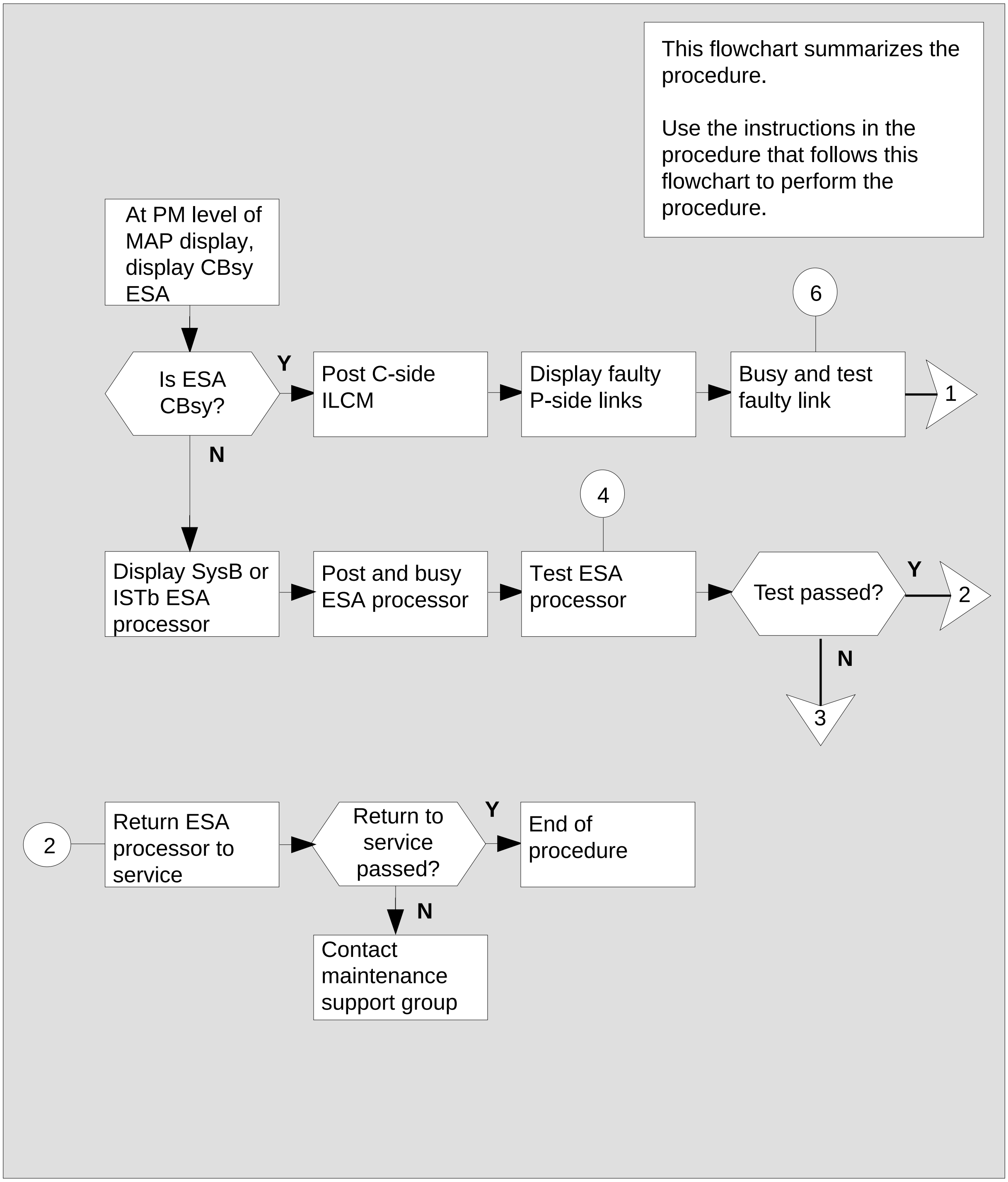
None

Action

The following flowchart is a summary of the procedure. Use the instructions in the step-action procedure that follows the flowchart to clear the alarm.

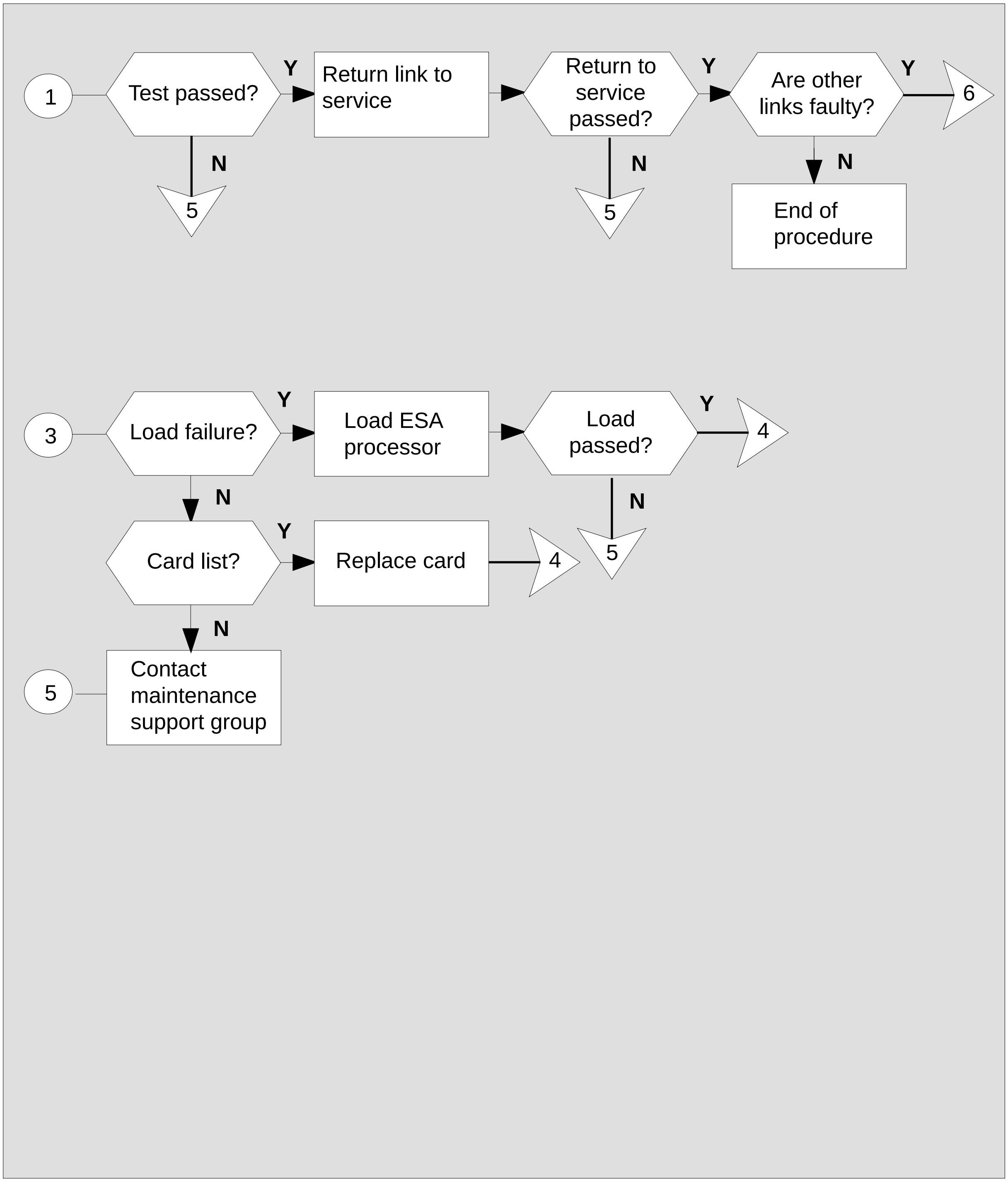
ESA
critical, minor (continued)

Summary of clearing ESA critical, minor alarm



ESA
critical, minor (continued)

Summary of ESA critical, minor alarm (continued)



ESA
critical, minor (continued)

Clearing an ESA critical, minor alarm

At the MAP terminal

1 If an alarm is audible, silence it by typing

>MAPCI;MTC;SIL
and pressing the Enter key.

2 Access the PM level of the MAP display by typing

>PM
and pressing the Enter key.

3 Identify the CBsy ESA processor by typing

>DISP CBSY ESA
and pressing the Enter key.

If ESA is	Do
CBsy	step 4
not CBsy	step 11

4 Post the ESA processor by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no is the number of the ESA processor (0 to 255)

Example of a MAP display:

```
REM1  ESA    0 CBsy
```

5 Display the C-side links and identify which MCRU it is associated by typing

>TRNSL
and pressing the Enter key.

Example of a MAP display:

```
Link 0: RMM 0        0;Cap MS;Status:OK    ;MsgCond:OPN
Link 1: RMM 0        1;Cap MS;Status:OK    ;MsgCond:OPN
Link 2: ESA 0        0;Cap M ;Status:SysB  ;MsgCond:CLS
Link 3: ESA 0        1;Cap M ;Status:SysB  ;MsgCond:CLS
```

Record information for the ESA links that have a status other than OK.

ESA
critical, minor (continued)

6 Identify the MCRU associated with the faulty link and post it by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM (0-1)

7 Identify faulty P-side links associated with ESA by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP display:

```
Link 0: RMM 0        0;Cap MS;Status:OK    ;MsgCond:OPN
Link 1: RMM 0        1;Cap MS;Status:OK    ;MsgCond:OPN
Link 2: ESA 0        0;Cap M ;Status:SysB  ;MsgCond:CLS
Link 3: ESA 0        1;Cap M ;Status:SysB  ;MsgCond:CLS
```

Record information for the ESA links that have a status other than OK.

8 Busy the faulty link by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link identified in step 7

9 Test the busied link by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link

If test	Do
passes	step 10
fails	step 20

ESA
critical, minor (continued)

10 Return to service the busied link by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of a faulty P-side link

If return to service	Do
passes and no other links are SysB	step 21
passes and other links are SysB	step 8
fails	step 20

11 Identify the SysB ESA processor by typing

>DISP SYSB ESA
and pressing the Enter key.

If ESA is	Do
SysB	step 13
not SysB	step 12

12 Identify the ISTb ESA processor by typing

>DISP ISTB ESA
and pressing the Enter key.

13 Post the ESA processor with the alarm condition by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no is the number of the ESA processor (0 to 255)

Example of a MAP display:

```
REM1  ESA    0 SysB
```

14 Busy the posted ESA processor by typing

>BSY
and pressing the Enter key.

MAP response:

```
This action will take this PM out of service
Please confirm (“Yes” or “No”)
```

Confirm busy by typing

>YES
and pressing the Enter key.

15 Test the ESA processor by typing

>TST
and pressing the Enter key.

If test	Do
passes	step 18
fails due to loading error	step 16
fails, and cardlist is produced	step 17
fails, but no cardlist is produced	step 20

16 Attempt to reload the ESA processor by typing

>LOADPM
and pressing the Enter key.

If load is	Do
successful	step 15
not successful	step 20

ESA
critical, minor (end)

17 The card list identifies the cards most likely to be faulty. Replace the cards one at a time in the order listed.

If all cards on the list have	Do
been replaced	step 20
not been replaced	step 19

18 Return to service the ESA processor by typing

>RTS
and pressing the Enter key.

If return to service	Do
is successful	step 21
fails due to loading error	step 16
fails due to CBsy condition	step 4
all other	step 20

19 Go to the card replacement procedure *Card Replacement Procedures* for the next card on the card list. When you have finished with the card replacement procedure, go to step 15 of this procedure.

20 Obtain further assistance in clearing this alarm by contacting the personnel responsible for higher level support.

21 You have successfully completed this procedure. If additional alarms are displayed, proceed to the appropriate alarm clearing procedure.

MCRU card replacement procedures

This chapter contains the card replacement procedures for the Meridian Cabinetized Remote Unit (MCRU). References to PRLCM or MCRU in these procedures and throughout this document are synonymous. These procedures are used by maintenance personnel to remove and replace hardware module circuit cards.

Except when used as part of verification or acceptance procedures, these procedures are used only when referred to by another maintenance procedure, such as the *Alarm Clearing Procedures*.

Procedures in the manual are named to correspond with the Northern Telecom (NT) product equipment code (PEC) and the shelf where the card is to be replaced. These procedures are arranged in alphabetical order for easy location.

NT0X10
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT0X10	AA	Miscellaneous Scan Card (SC)

Common procedures

The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT0X10
RMM (continued)

Summary of card replacement procedure for an NT0X10 card in an RMM

Access the TRKS;TTP level of the MAP terminal

↓

post the OAUSC circuits

↓

Replace card with one having identical PEC

↓

End of procedure

This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

NT0X10
RMM (continued)

Replacing an NT0X10 in an RMM

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP display

2 Access the TTP level of the MAP and post the scan points on the card to be replaced by tying

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no
and pressing the Enter key.

rmm_no	is the number of the RMM with the faulty NT0X10 card.
ckt_no	is the number of the first scan point (SC) of the seven SC points on this card.

Example of a MAP display response:

```
LAST CIRCUIT = 14
POST CKT IDLED
SHORT CLLI IS:  1146
OK, CLLI POSTED

POST  13   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG TESTEQ  RMM 0 0     OAUSC    0     IDL
```

At the RMM shelf

3

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Replace the NT0X10 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point, otherwise go to step 6.

4 Send any faulty cards for repair according to local procedure.

NT0X10
RMM (end)

5 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 7.

6 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

7 You have completed this procedure.

NT0X91AE
MCRU

Application

Use this procedure to replace the following card in an FSP.

PEC	Suffixes	Name
NT0X91	AE	FSP drive and alarm circuit pack

Common procedures

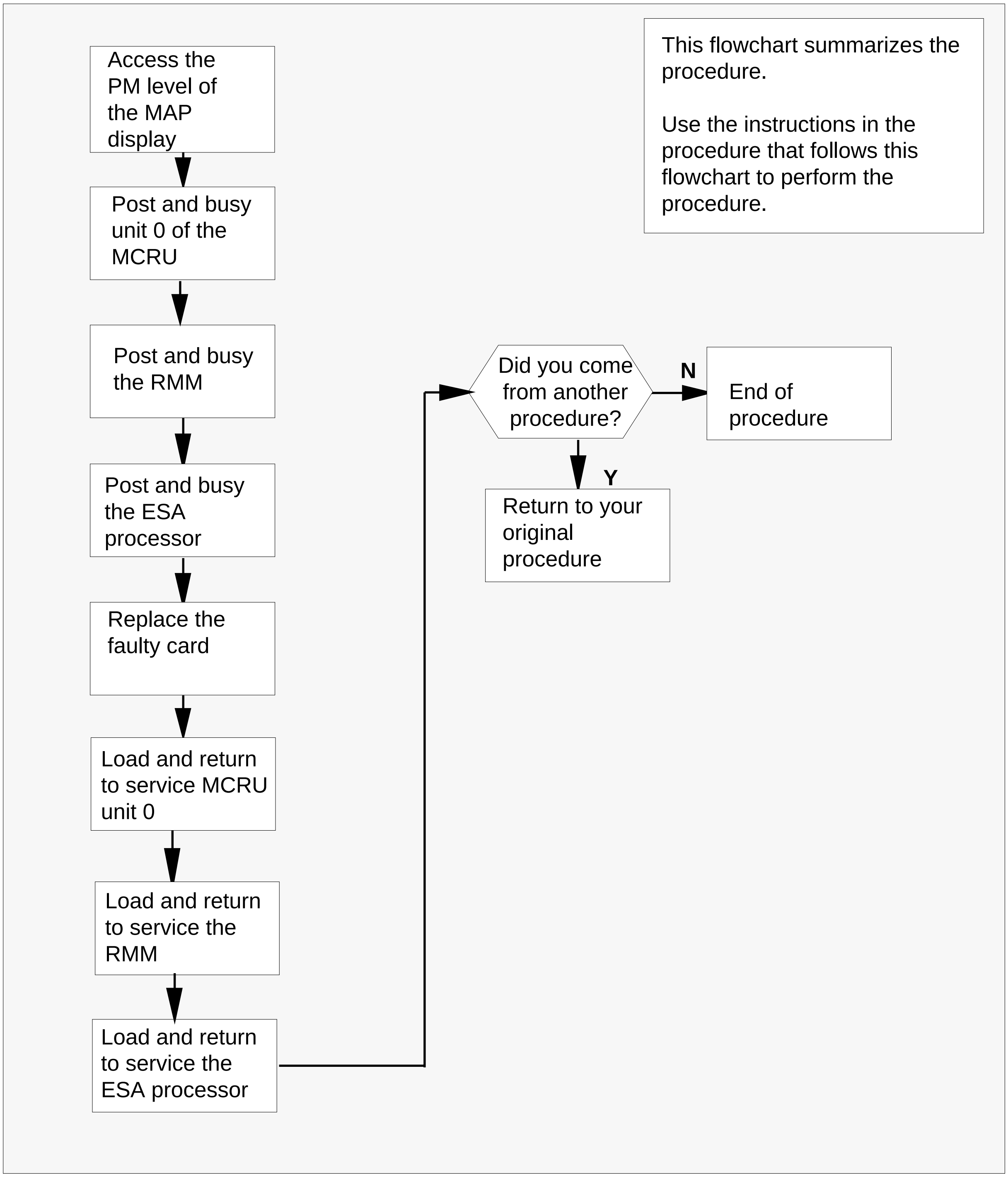
None.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT0X91AE
MCRU (continued)

Summary of card replacement procedure for an NT0X91AE card in an MCRU



NT0X91AE
MCRU (continued)

Replacing an NT0X91AE in an MCRU

At your current location

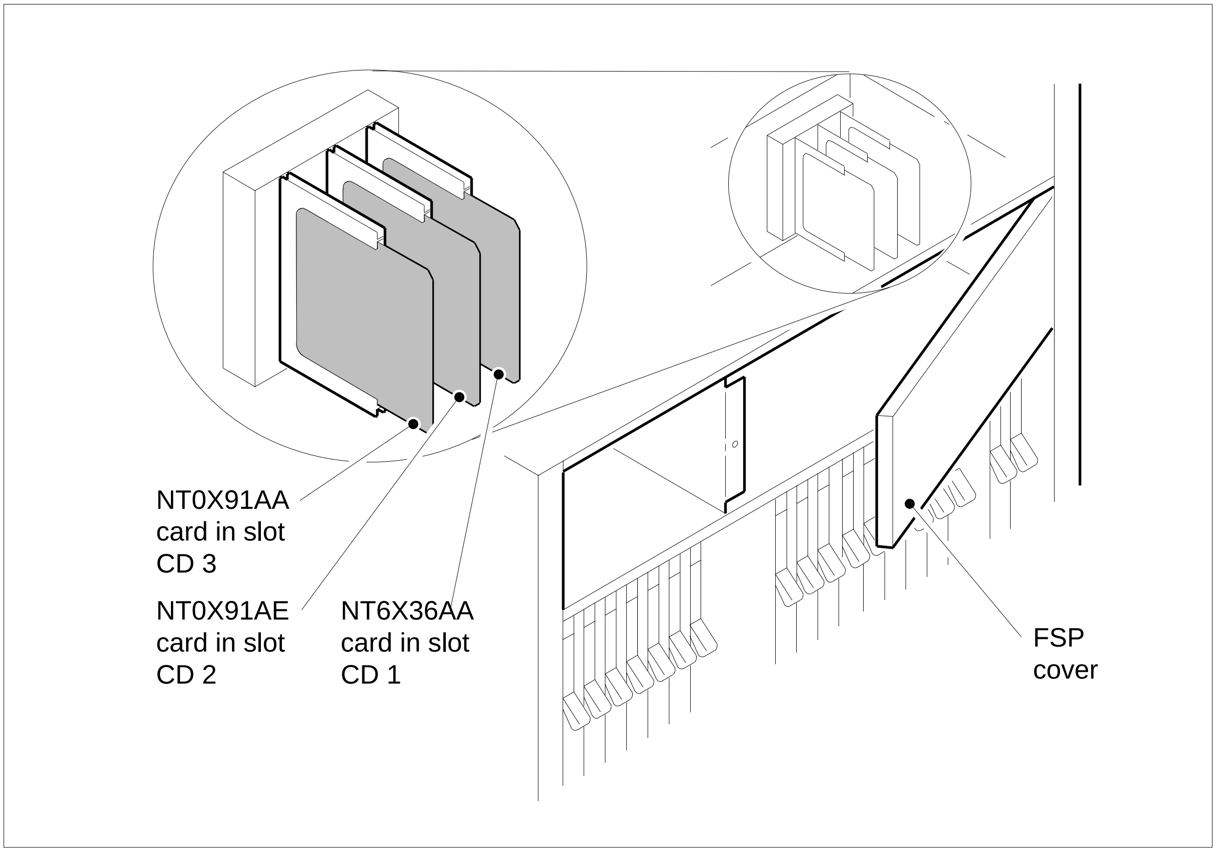
1 Obtain a replacement card. Ensure that the replacement card has the same product engineering code (PEC), including suffix, as the card being removed.

2 Use the following table to identify the slot containing the alarm and control card to be replaced.

Alarm and control card	slot
NT0X91AA	slot CD3
NT0X91AE	slot CD2
NT6X36AA	slot CD1

Note: Refer to the following for FSP card slot locations.

FSP Alarm and Control cards



NT0X91AE
MCRU (continued)

3 Use the following table to identify which shelves, converters, and circuit breakers (CB) are associated with the alarm and control card you want to replace.

Alarm and Shelf control card	power Converter	shelf number	circuit breaker
NT0X91AA	NT2X70 in slot 22	33	CB8
NT0X91AE	NT2X70 in slot 25	33	CB3
NT0X91AE	NT2X09 and NT2X06	47	CB4

Note: The CBs are located on the FSP, shelf position 60.

4 Record the numbers of the shelves and CBs associated with the alarm and control card.

5 Record the numbers of each meridian cabinetized remote unit (MCRU), remote maintenance module (RMM) and emergency stand alone (ESA) module associated with the alarm and control card to be replaced.

At the MAP display

6 Access the PM level of the MAP display by typing

>MAPCI;MTC;PM
and pressing the Enter key.

7

CAUTION
Loss of service
This procedure contains directions to busy one or more peripheral modules (PM) in a frame. Since busying a PM affects subscriber service, replace alarm and control cards only during periods of low traffic.

NT0X91AE
MCRU (continued)

Post the MCRU that is controlled by the alarm and control card as recorded in step 5 by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the ILCM is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM unit associated with the faulty card

8 Busy ILCM unit 0 by typing

>BSY UNIT 0
and pressing the Enter key.

9 Post the RMM that is controlled by the alarm and control card as recorded in step 5 by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no	is the number of the RMM to be posted, as recorded in step 5

10 Busy the RMM by typing

>BSY
and pressing the Enter key.

11 Post the ESA processor that is controlled by the alarm and control card as recorded in step 5 by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no	is the number of the ESA processor to be posted, as recorded in step 5

12 Busy the ESA processor by typing

>BSY
and pressing the Enter key.

13 Set CB3 as recorded in step 4 to ON.

NT0X91AE
MCRU (continued)

At the MCRU frame

14 Put on a wrist strap.

15 Set CB3 as recorded in step 4 to OFF.

16 Set CB4 as recorded in step 4 to OFF.

17 Unscrew the slotted nut located on the left-hand side of the FSP.

18

DANGER
Risk of electrocution
Some of the terminals inside the frame supervisory panel (FSP) have an electrical potential of -48 V dc. Remove all jewelry before replacing a card in the FSP. Do not touch any terminals in the FSP.

Open the FSP panel.

19 Remove the NT0X91AE card from the slot identified in step 2.

20 Insert the replacement card.

21 Close the FSP panel.

22 Tighten the slotted nut on the FSP.

23 Proceed as follows to reset the converters in the host interface equipment shelf (HIE), and the RMM.

24 Power up the NT2X70 in slot 25 as follows:

If NT2X70 suffix is	Do
AE	step 25
AA, AB, AC, or AD	step 26

25 Toggle the ON/OFF/RESET switch on the power converter faceplate, identified in step 3, to the RESET position and hold while setting CB3, on the FSP, to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF, release the ON/OFF/RESET switch.

26 Press the RESET button on the power converter faceplate while setting CB3, identified in step 3, on the FSP to the ON position. The converter FAIL LED will go OFF, release the RESET button.

27 Set the power switch on the NT2X09 and NT2X06 power converters on the RMM shelf to the ON position.

28 Press the RESET button on the NT2X09 power converter while setting CB4, on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go off.

29 Remove the wrist strap.

30 Determine if a Converter Fail LED is lit.

If Converter Fail LED is	Do
lit	step 47
not lit	step 31

At the MAP display

31 Access the PM level of the MAP display by typing

>MAPCI;MTC;PM
and pressing the Enter key.

32 Post the ILCM that is controlled by the alarm and control card you have just replaced by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the ILCM is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM unit with the faulty card

33 Query the ILCM for the name of the current PM load by typing

>QUERYPM
and pressing the Enter key.

34 Access the disk volume which contains the PM loads by typing

>DISKUT
and pressing the Enter key.

35 List the disk volume which contains the PM load files by typing

>LF volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the SLM disk volume containing the PM load files.

36 Quit the diskut environment by typing

>QUIT
and pressing the Enter key.

37 Load ILCM unit 0 by typing

>LOADPM UNIT 0 CC
and pressing the Enter key.

38 Return ILCM unit 0 to service by typing

>RTS UNIT 0
and pressing the Enter key.

If unit 0	**Do**
RTS passed	step 39
RTS failed	step 47

39 Post the RMM that is controlled by the alarm and control card you have just replaced by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM to be posted, as recorded in step 5

40 Load the RMM by typing

>LOADPM
and pressing the Enter key.

NT0X91AE
MCRU (continued)

41 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If the rmm	Do
RTS passed	step 42
RTS failed	step 47

42 Post the ESA processor that is controlled by the alarm and control card you have just replaced by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no is the number of the ESA processor to be posted, as recorded in step 5

43 Load the ESA processor by typing

>LOADPM
and pressing the Enter key.

44 Return the ESA to service by typing

>RTS
and pressing the Enter key.

If ESA processor	Do
RTS passed	step 45
RTS failed	step 47

NT0X91AE
MCRU (end)

45 The next action depends on your reason for performing this procedure

If you were	Do
directed to this procedure from a maintenance procedure	step 46
not directed to this procedure from a maintenance procedure	step 48

46 Return to the maintenance procedure that sent you to this procedure and continue as directed.

47 For further assistance, contact the personnel responsible for the next level of support.

48 You have completed this procedure.

NT0X91AA
MCRU

Application

Use this procedure to replace the following card in an FSP.

PEC	Suffixes	Name
NT0X91	AA	FSP drive and alarm circuit pack

Common procedures

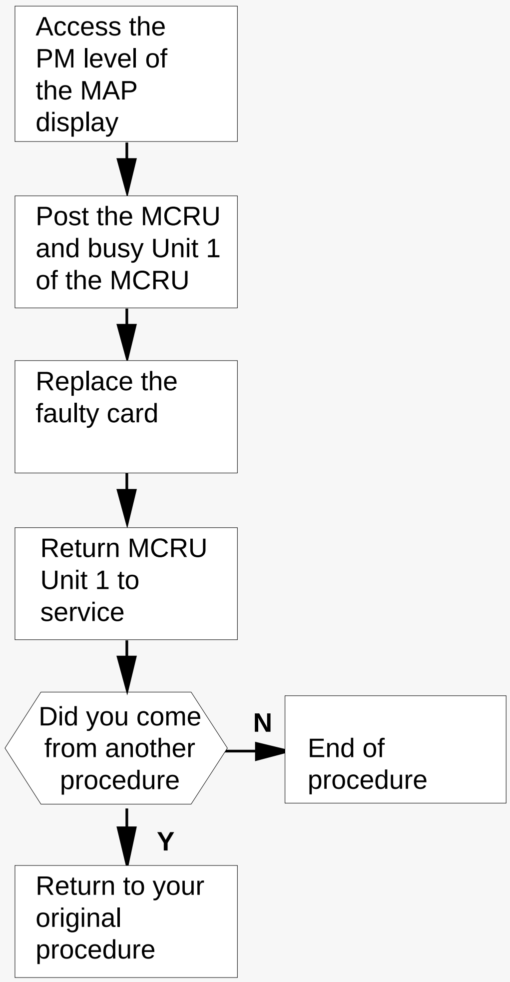
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT0X91AA
MCRU (continued)

Summary of card replacement procedure for an NT0X91AA card in an MCRU



This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

NT0X91AA
MCRU (continued)

Replacing an NT0X91AA card in an MCRU

At your current location

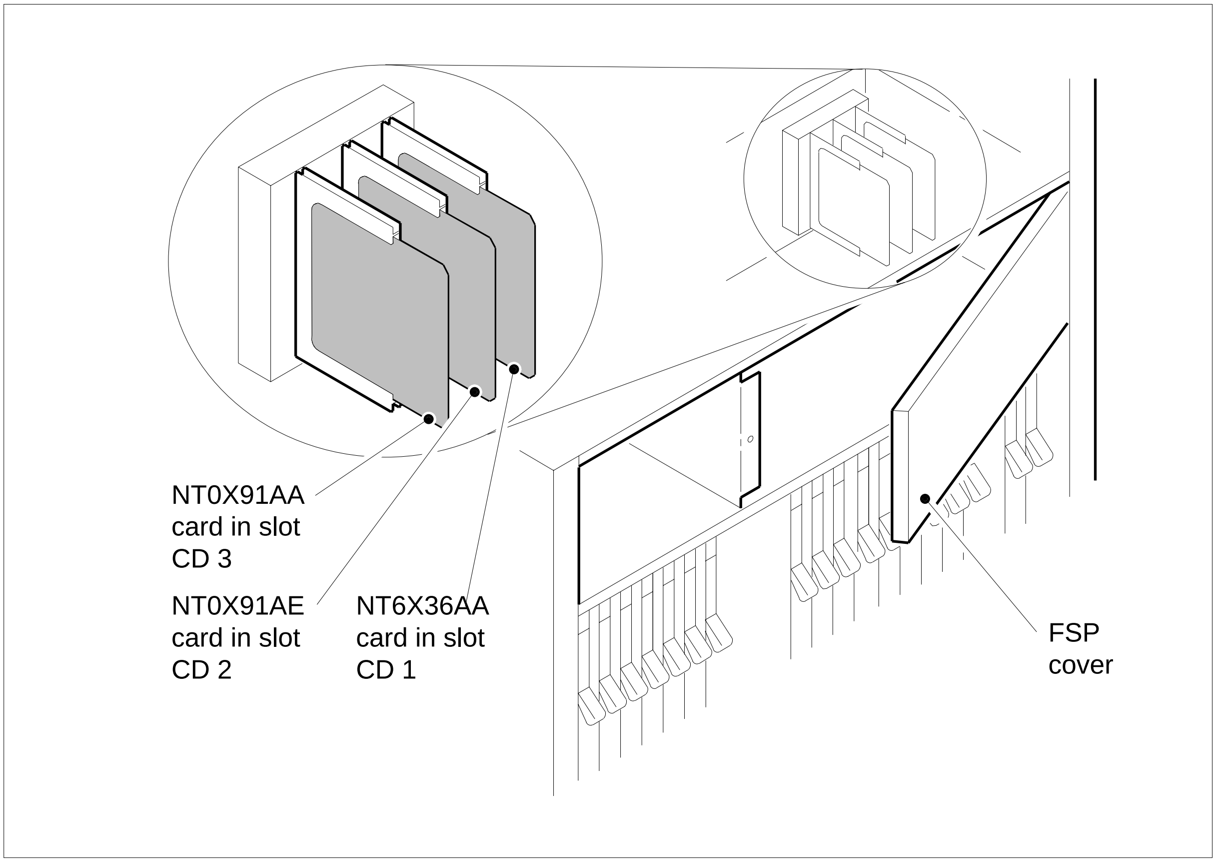
1 Obtain a replacement card. Ensure that the replacement card has the same product engineering code (PEC), including suffix, as the card being removed.

2 Use the following table to identify the slot containing the alarm and control card to be replaced.

Alarm and control card	slot
NT0X91AA	slot CD3
NT0X91AE	slot CD2
NT6X36AA	slot CD1

Note: Refer to the following diagram for FSP card slot locations.

FSP Alarm and control cards



NT0X91AA
MCRU (continued)

3 Use the following table to identify which shelves, converters, and circuit breakers (CB) are associated with the alarm and control card you want to replace.

Alarm and Shelf control card	power Converter	shelf number	circuit breaker
NT0X91AA	NT2X70 in slot 22	33	CB8
NT0X91AE	NT2X70 in slot 25	33	CB3
NT0X91AE	NT2X09 and NT2X06	47	CB4

Note: The CBs are located on the FSP, shelf position 60.

4 Record the numbers of the shelves and CBs associated with the alarm and control card.

5 Record the remote line concentrating module (MCRU) shelf associated with the alarm and control card.

At the MAP display

6 Access the PM level of the MAP display by typing

>MAPCI;MTC;PM
and pressing the Enter key.

7 Post the MCRU that is controlled by the alarm and control card as recorded in step 5 by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the ILCM is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM associated with the faulty card

NT0X91AA
MCRU (continued)

8

> **CAUTION**
> **Loss of service**
> This procedure contains directions to busy one unit of a peripheral module (PM) in a frame. Since busying a unit of a PM affects redundancy, replace alarm and control cards only during periods of low traffic.

Busy ILCM unit 1 by typing

>BSY UNIT 1

and pressing the Enter key.

At the MCRU

9 Put on a wrist strap.

10 Set CB8 as recorded in step 4 to the OFF position.

11 Unscrew the slotted nut located on the left-hand side of the FSP.

12

> **DANGER**
> **Risk of electrocution**
> Some of the terminals inside the frame supervisory panel (FSP) have an electrical potential of -48 V dc. Remove all jewelry before replacing a card in the FSP. Do not touch any terminals in the FSP.

Open the FSP panel.

13 Remove the NT0X91AA card from the slot identified in step 2.

14 Insert the replacement card.

15 Close the FSP panel.

16 Tighten the slotted nut on the FSP.

17 Set CB8 as recorded in step 4 to the ON position.

18 Proceed as follows to reset the converters in the host interface equipment shelf (HIE).

NT0X91AA
MCRU (continued)

19 Press and hold the RESET button on the converter while setting the associated CB, identified in step 3, to the ON position.

20 Release the RESET button.

21 Remove the wrist strap.

22 Determine if a Converter Fail LED is lit.

If Converter Fail LED is	Do
lit	step 28
not lit	step 23

At the MAP display

23 Access the PM level of the MAP display by typing

>MAPCI;MTC;PM

and pressing the Enter key.

24 Post the MCRU that is controlled by the alarm and control card as recorded in step 5 by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the ILCM is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM unit associated with the faulty card

25 Return to service ILCM unit 1 by typing

>RTS UNIT 1
and pressing the Enter key.

26 The next action depends on your reason for performing this procedure

If you were	Do
directed to this procedure from a maintenance procedure	step 27
not directed to this procedure from a maintenance procedure	step 29

27 Return to the maintenance procedure that sent you to this procedure and continue as directed.

28 For further assistance, contact the personnel responsible for the next level of support.

29 You have completed this procedure.

NT2X06
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT2X06	AA, AB	Power Converter (5V/40A)

Common procedures

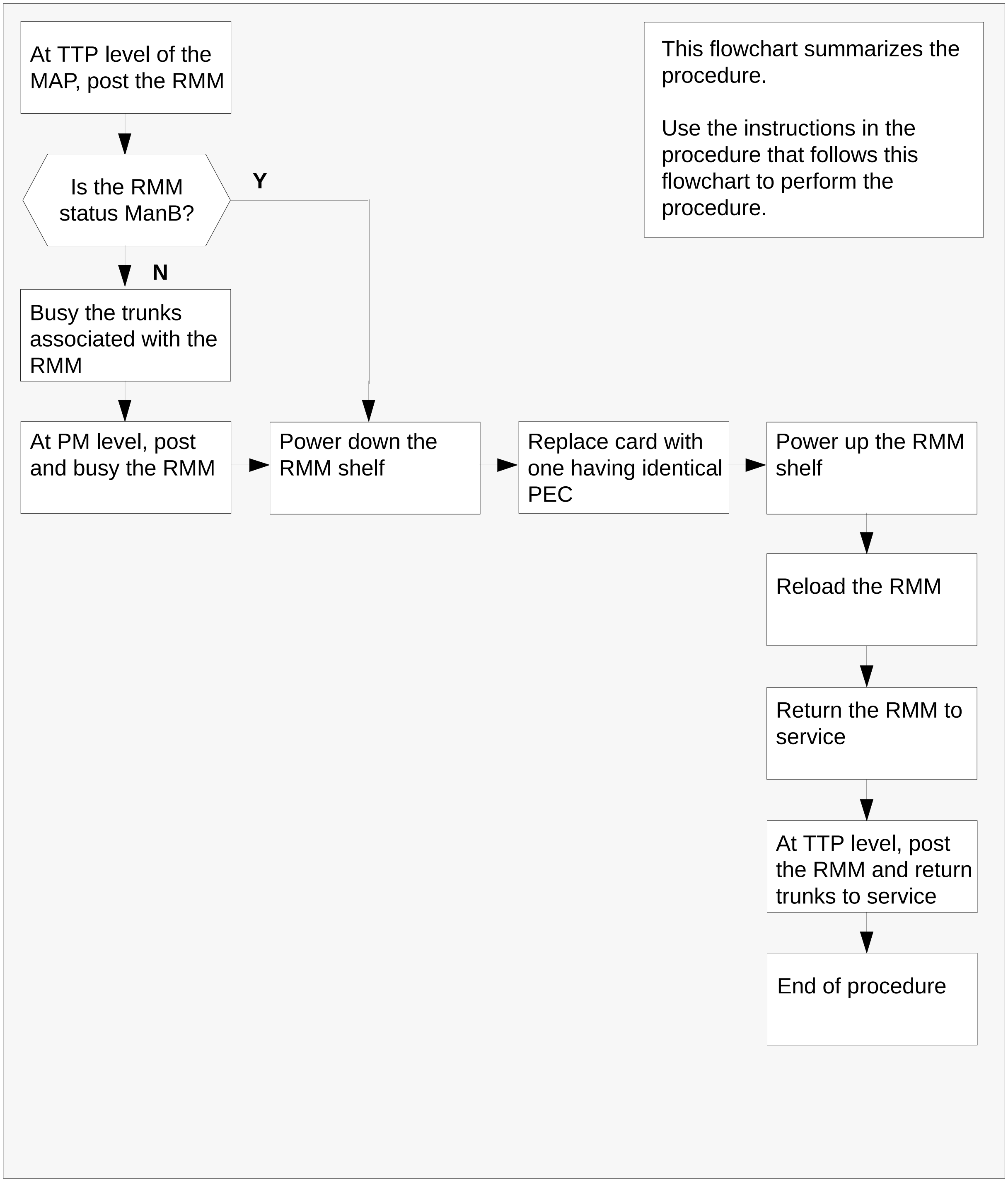
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X06
RMM (continued)

Summary of card replacement procedure for an NT2X06 card in an RMM



NT2X06
RMM (continued)

Replacing an NT2X06 in an RMM

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 8; otherwise, continue with step 3.

At the MAP display

3 Access the TTP level of the MAP and post the RMM that contains the card to be replaced by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

Example of a MAP response:

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  OTDA00
OK, CLLI POSTED

POST  20   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG    MF RMM 0 0  OTWAON23DA00 2001   LO
                                      P_IDL
```

4 Check the status of the RMM.

If	Do
MB, PMB, RMB	step 8
other	step 5

5 Busy the trunks that are associated with the RMM to be busied by typing

>BSY ALL
and pressing the Enter key.

NT2X06
RMM (continued)

6 At the PM level of the MAP display, post the RMM by typing

>PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

Example of a MAP display:

```
         SysB     ManB     Offl     CBsy     ISTb     InSv
 PM         0        2        2        0        7       21
 RMM        0        0        1        0        0        6

 RMM     0    InSv
```

7 Busy the RMM by typing

>BSY
and pressing the Enter key.

At the RMM shelf

8

WARNING
Static electricity damage
Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Power down the unit by setting the ON/OFF switch on the power converter faceplate to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the frame supervisory panel (FSP) will be ON. An audible alarm may sound. If an alarm does sound, silence it by typing

>SIL
and pressing the Enter key.

9 Replace the NT2X06 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point.

10 Power up the RMM unit as follows:

a. Ensure that the converter (NT2X06) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch to the ON position.

NT2X06
RMM (continued)

11 Press the RESET button on the power converter while setting the circuit breaker on the frame supervisory panel (FSP) to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be ON.

12 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 13.

At the MAP display

13 Go to the PM level and post the RMM, if not already posted, and load the RMM by typing

>PM;POST RMM rmm_no;LOADPM
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

If	Do
message `loadfile not found in directory` is received	step 14
load passes	step 31
load fails	step 36

14 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 15
IOC disk	step 21
SLM disk	step 26

15 Locate the tape that contains the PM load files.

At the IOE frame

16 Mount the tape on a magnetic tape drive.

At the MAP display

17 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

18 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

19 Demount the tape drive by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

20 Go to step 30.

21 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

22 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

23 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files obtained in step 21.

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

NT2X06
RMM (continued)

25 Go to step 30.

26 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

27 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

28 List the SLM file names into your user directory by typing

>LV CM;LF Volume_name
and pressing the Enter key.

where

Volume_name is the name of the volume containing the PM load files, obtained in step 26.

29 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

30 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

If	**Do**
load failed	step 36
load passed	step 31

31 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passed	step 32
failed	step 36

NT2X06
RMM (end)

32 Go to the TTP level of the MAP and post the RMM by typing

>TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

33 Return to service the circuits busied in step 7 by typing

>RTS ALL
and pressing the Enter key.

If	Do
passed	step 34
failed	step 36

34 Send any faulty cards for repair according to local procedure.

35 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 37.

36 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

37 You have completed this procedure.

NT2X09
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT2X09	AA, AB	Multioutput Power Converter (5V/40A)

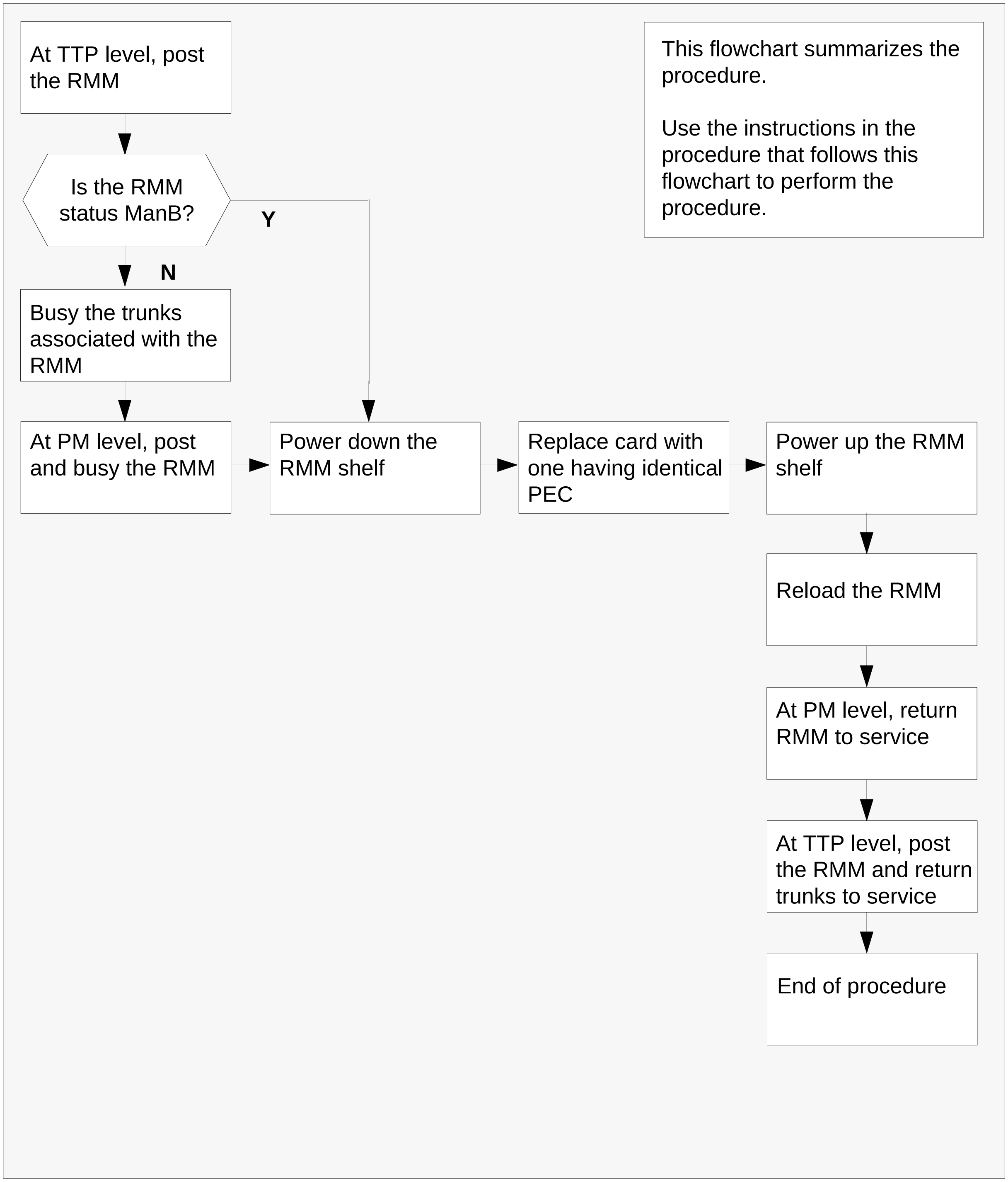
Common procedures

The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

Summary of card replacement procedure for an NT2X09 card in an RMM



NT2X09
RMM (continued)

Replacing an NT2X09 in an RMM

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 8; otherwise, continue with step 3.

At the MAP display

3 Access the TTP level of the MAP and post the RMM that contains the card to be replaced by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

Example of a MAP response:

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  OTDA00
OK, CLLI POSTED

POST  20   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG    MF RMM 0 0  OTWAON23DA00 2001   LO
                                      P_IDL
```

4 Check the status of the RMM.

If RMM status is	Do
MB, PMB, RMB	step 8
other	step 5

5 Busy the trunks that are associated with the RMM to be busied by typing

>BSY ALL
and pressing the Enter key.

NT2X09
RMM (continued)

6 Go to the PM level of the MAP and post the RMM by typing

>PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

Example of a MAP display:

```
        SysB     ManB     Offl     CBsy     ISTb     InSv
PM         0        2        2        0        7       21
RMM        0        0        1        0        0        6

RMM     0    InSv
```

7 Busy the RMM by typing

>BSY
and pressing the Enter key.

At the RMM shelf

8

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Power down the unit by setting the ON/OFF switch on the power converter faceplate to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the frame supervisory panel (FSP) will be ON. An audible alarm may sound. If an alarm does sound, silence it at the MAP terminal by typing

>SIL
and pressing the Enter key.

9 Replace the NT2X09 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point.

10 Power up the RMM unit as follows:

a. Ensure that the converter (NT2X09) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch to the ON position.

NT2X09
RMM (continued)

11 Press the RESET button on the power converter while setting the circuit breaker on the frame supervisory panel (FSP) to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be ON.

12 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 13.

At the MAP display

13 Go to the PM level and post the RMM, if not already posted, and load the RMM by typing

>PM;POST RMM rmm_no;LOADPM
and pressing the Enter key.

where

rmm_no   is the number of the RMM associated with the new NT2X09 card

If	Do
message ”loadfile not found in directory” is received	step 14
load passes	step 31
load fails	step 36

14 Determine the type of device on which the RMM load files are located.

If	Do
tape	step 15
IOC disk	step 21
SLM disk	step 26

15 Locate the tape that contains the PM load files.

At the IOE frame

16 Mount the tape on a magnetic tape drive.

NT2X09
RMM (continued)

At the MAP display

17 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

18 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

19 Demount the tape drive by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

20 Go to step 30.

21 From office records, determine and note the number of the input/output controller (IOC) disk and the number of the volume that contains the PM load files.

22 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

23 List the IOC file names into your user directory by typing

>LISTVOL volume_name all
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 21.

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

25 Go to step 30.

26 From office records, determine and note the number of the system load module (SLM) disk and the number of the volume that contains the PM load files.

27 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

28 List the SLM file names into your user directory by typing

>LV CM;LF Volume_name
and pressing the Enter key.

where

Volume_name is the name of the volume containing the PM load files, obtained in step 26.

29 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

30 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

If	**Do**
load failed	step 36
load passed	step 31

31 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passed	step 32
failed	step 36

NT2X09
RMM (end)

32 Go to the TTP level of the MAP and post the RMM by typing

>TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

33 Return to service the circuits by typing

>RTS ALL
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

If RTS	Do
passed	step 34
failed	step 36

34 Send any faulty cards for repair according to local procedure.

35 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 37.

36 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

37 You have completed this procedure.

NT2X48
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT2X48	AB, CC	Digital 4-channel Digitone Receiver

Common procedures

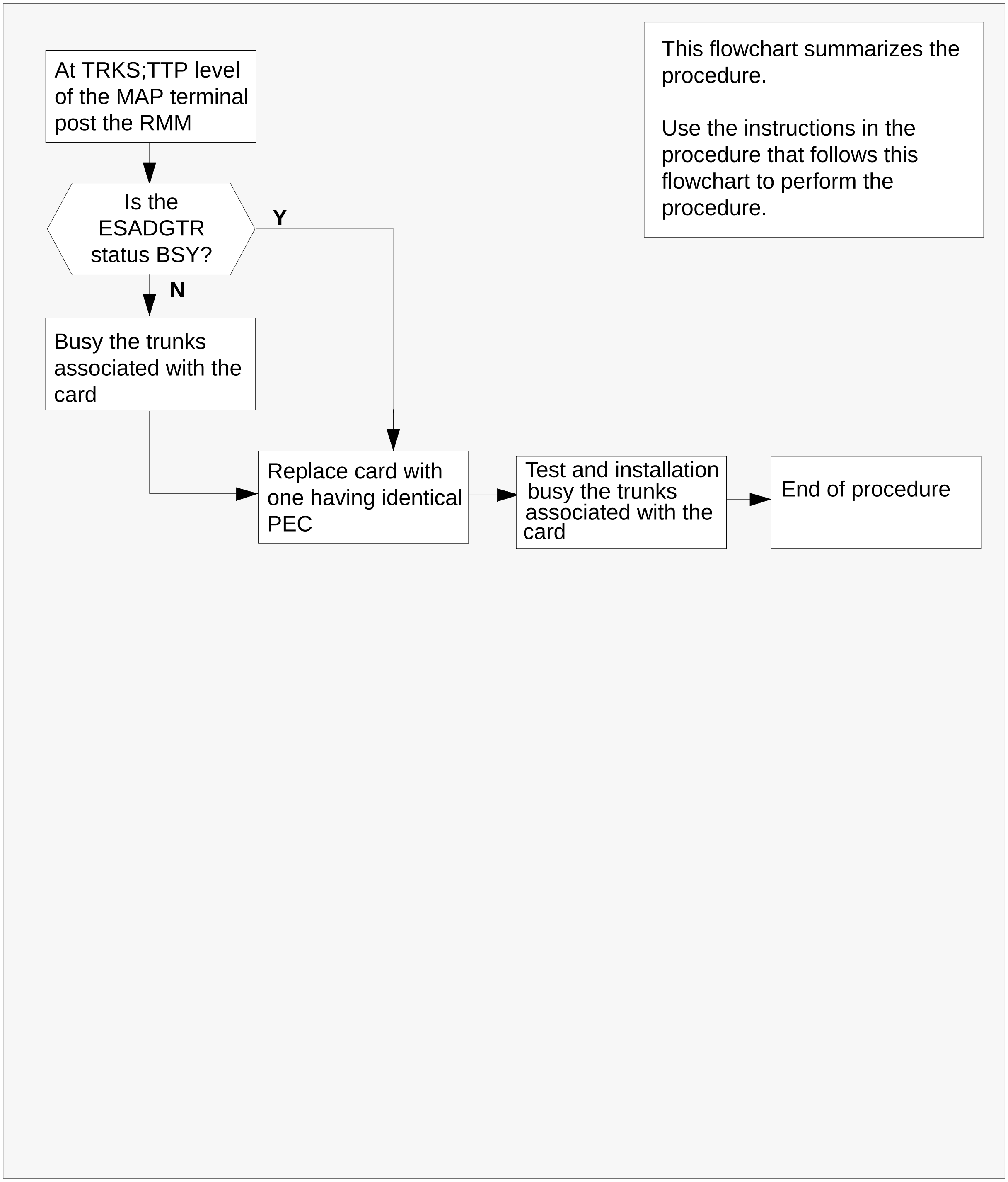
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X48
RMM (continued)

Summary of card replacement procedure for an NT2X48 card in an RMM



NT2X48
RMM (continued)

Replacing an NT2X48 card in an RMM

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP display

2 Access the TTP level of the MAP and post the ESA digitone receivers associated with the card to be replaced by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced
ckt_no is the number of the first circuit where the NT2X48 card is physically located.

Example of a MAP response:

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  1125
OK, CLLI POSTED

POST  3   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG     RMM   0 0      ESAGDTR 11       INB
```

3 Busy the trunks that are associated with the card to be replaced by typing

>BSY;NEXT
and pressing the Enter key.

Note: Repeat this step for each circuit associated with the NT2X48 being replaced.

At the RMM shelf

4

WARNING
Static electricity damage
Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Replace the NT2X48 card using the procedure *Replacing a card*. When you have completed the procedure, return to this point.

At the MAP display

5 Test all of the digitone receivers on the new NT2X48 card by typing

>TST

6 Continue testing through all four digitone circuits on the card by typing

>NEXT

If TST	Do
passed	step 8
failed	step 11

7 Repost all four ESADGTR circuits by typing

>POST P RMM rmm_no ckt_no to ckt_no
and pressing the Enter key.

where

ckt_no is the number of the first and last circuits on the NT2X48 card.

Example of a MAP response:

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  1125
OK, CLLI POSTED

POST  3   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG     RMM   0 0      ESAGDTR 11       IDL
```

NT2X48
RMM (end)

8 Installation busy the trunks that are associated with the new NT2X48 card by typing

>BSY INB ALL

and pressing the Enter key.

Note: ESA digitone receivers should always be in an INB state when the MCRU is under CC control, to prevent CC access. The ESA processor will turn the circuits up to an idle state when the MCRU is in the ESA environment.

9 Send any faulty cards for repair according to local procedure.

10 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 12.

11 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

12 You have completed this procedure.

NT2X57
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT2X57	AA	Signal Distribution Card (SD)

Common procedures

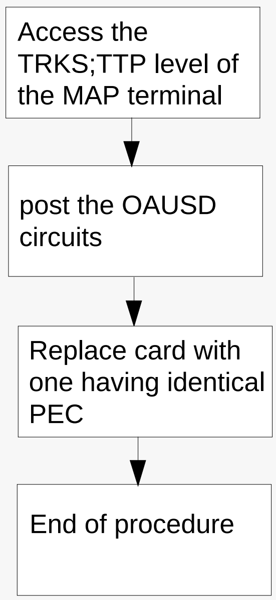
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X57
RMM (continued)

Summary of card replacement procedure for an NT2X57 card in an RMM



This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

Replacing an NT2X57

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP display

2 Access the TTP level of the MAP and post the signal distribution circuits on the card to be replaced by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf where the card is to be replaced
ckt_no is the number of the first circuit where the NT2X57 card is physically located.

Example of a MAP response:

```
LAST CIRCUIT = 14
POST CKT IDLED
SHORT CLLI IS:  1147
OK, CLLI POSTED

POST  13   DELQ       BUSY Q         DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG       STA S R DOT TE R
OG TESTEQ RMM 0 0     OAUSD 0        IDL
```

At the RMM shelf

WARNING
Static electricity damage
Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

3 Replace the NT2X57 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point.

NT2X57
RMM (end)

At the MAP display

4 Repost to verify the signal distribution circuits on the card that was replaced by typing

>POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf where the card was replaced
ckt_no is the number of the first circuit where the NT2X57 card is physically located.

Example of a MAP response:

```
LAST CIRCUIT = 14
POST CKT IDLED
SHORT CLLI IS:  1147
OK, CLLI POSTED

POST  13   DELQ       BUSY Q         DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG       STA S R DOT TE R
OG TESTEQ RMM 0 0     OAUSD 0        IDL
```

5 Send any faulty cards for repair according to local procedure.

6 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 8.

7 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

8 You have completed this procedure.

NT2X59
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT2X59	CA	Group CODEC Card

Common procedures

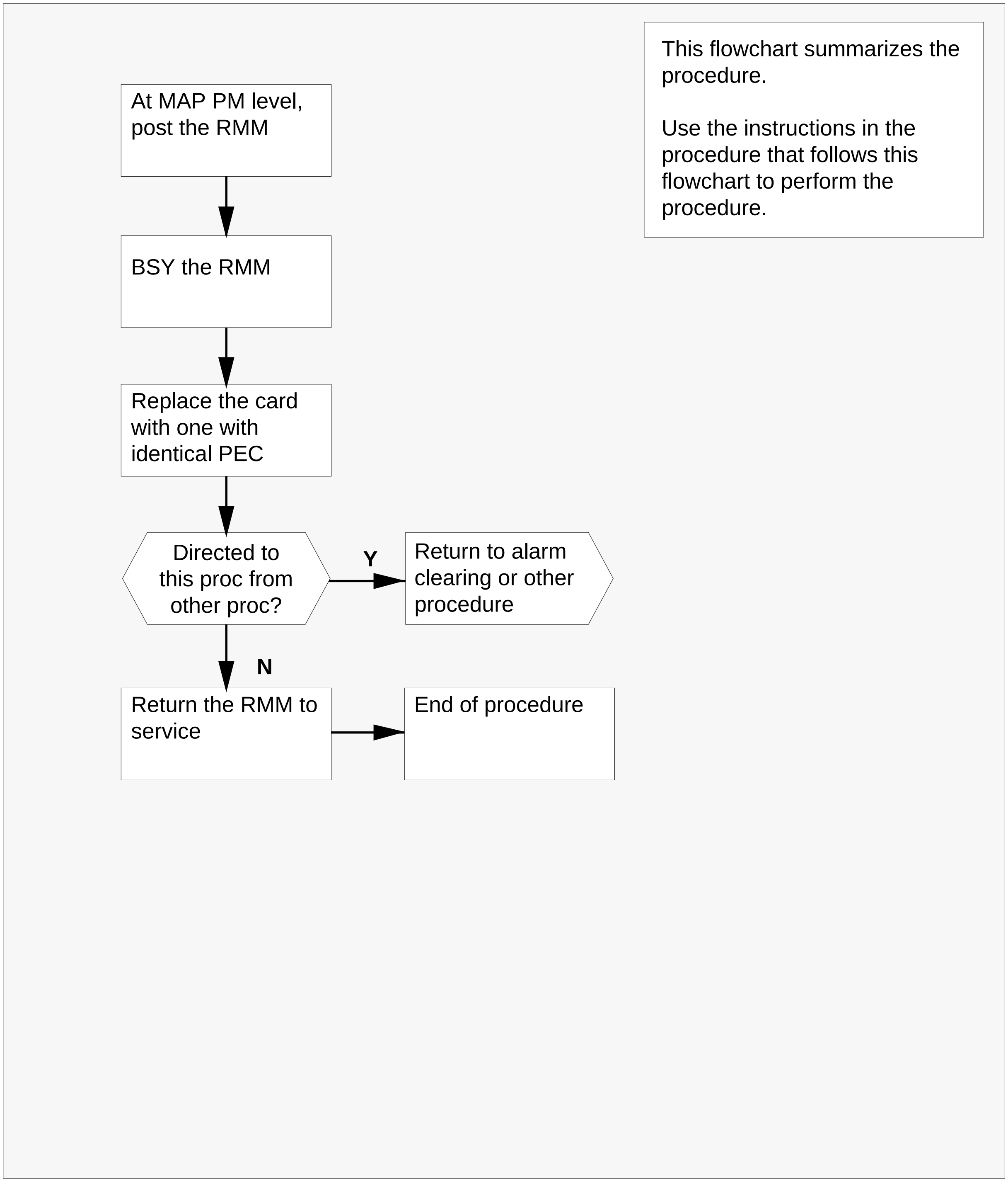
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X59
RMM (continued)

Summary of card replacement procedure for an NT2X59 card in an RMM



Replacing an NT2X59 card in an RMM

At your current location

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure to verify or accept cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC) including suffix, as the card to be removed.

At the MAP display

3 Access the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be replaced

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
   .     .     .      .     4SysB   .      .      .       .      .

RMM                 SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit    PM         4        0       10        3        3       130
 2 Post_   RMM        1        0        0        0        0        15
 3
 4         RMM  5  SysB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT2X59
RMM (continued)

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
   .     .      .      .    3SysB   .      .      .       .      .

RMM                  SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM          3        0       10        3        3       130
 2 Post_   RMM         0        1        0        0        0        15
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing or inserting any cards. This protects the RMM against service degradation caused by static electricity.

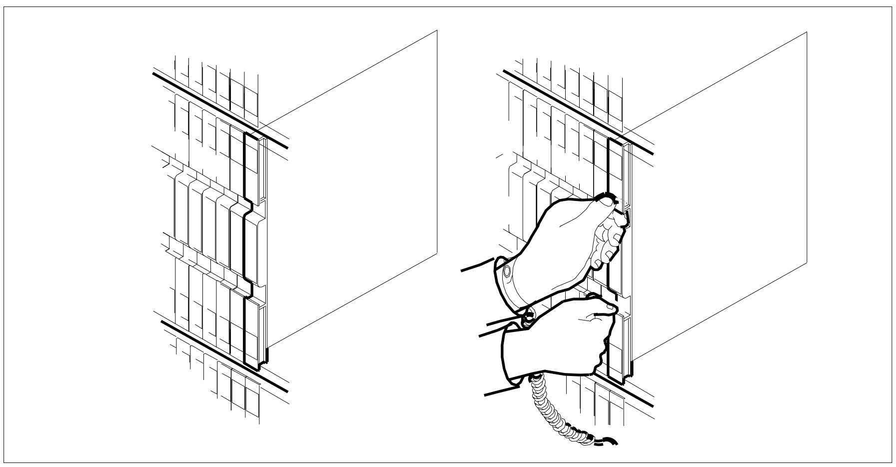
Put on a wrist strap.

6

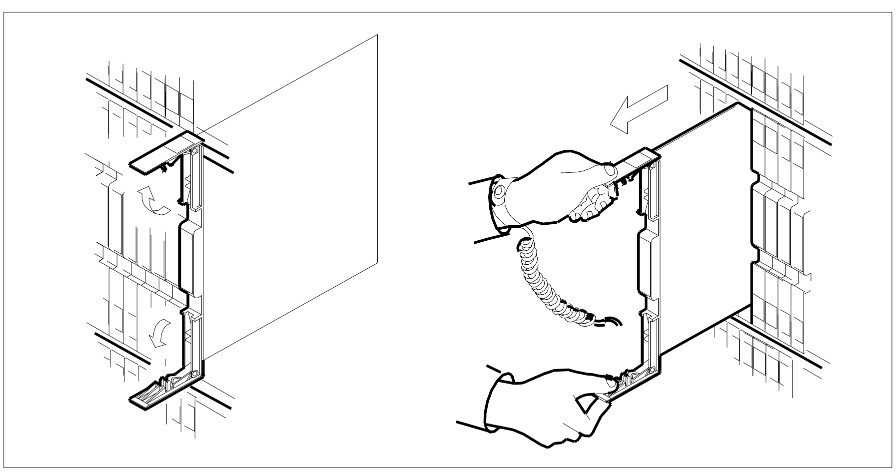
> **WARNING**
> **Equipment damage**
> Take these precautions when removing or inserting a card:
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

Remove the NT2X59 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



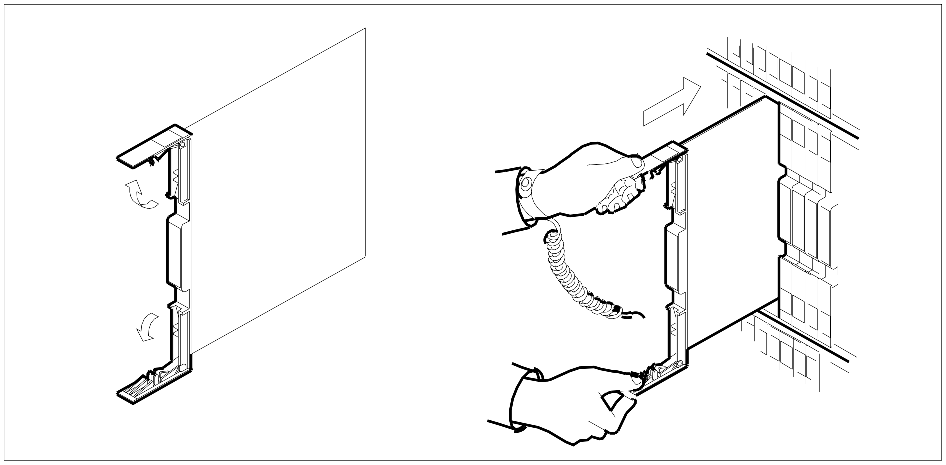
b. Open the locking levers on the card to be replaced and gently pull the card towards you until it clears the shelf.



c. Ensure that the replacement card has the same PEC including suffix, as the card you just removed.

7 Open the locking levers on the replacement card.

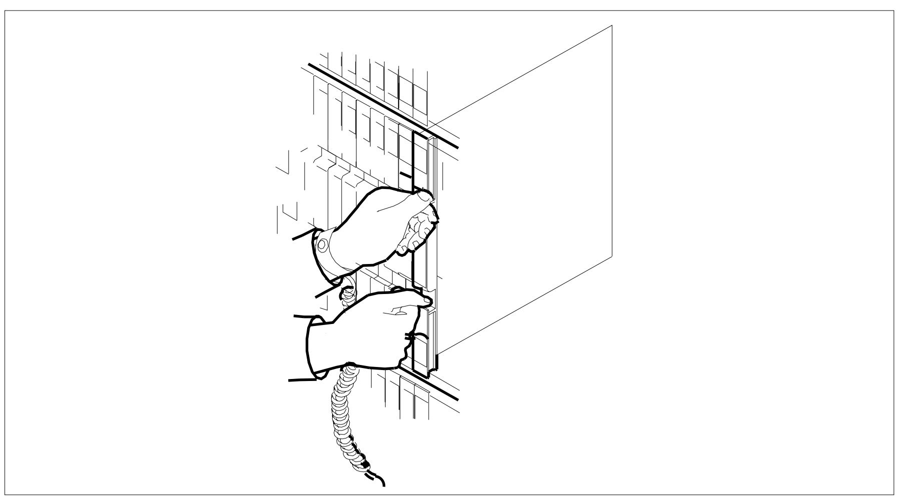
Align the card with the slots in the shelf and gently slide the card into the shelf.



8 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

b. Close the locking levers.



9 Use the following information to determine the next step in this procedure.

If you entered this procedure	Do
from an alarm clearing procedure	step 16
from other	step 10

At the MAP display

10 Load the RMM by typing

>LOADPM
and pressing the Enter key.

11 Test the RMM by typing

>TST
and pressing the Enter key.

Example of a MAP response:

```
Test Passed
    or
Test Failed
```

If TST	Do
passed	step 12
failed	step 16

12 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 13
failed	step 17

13 Send any faulty cards for repair according to local procedure.

NT2X59
RMM (end)

14 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

15 Go to step 18.

16 Return to the *Alarm Clearing Procedure* that directed you to this card replacement procedure. If necessary, go to the point where the faulty card list was produced, identify the next faulty card on the list, and go to the appropriate replacement procedure in this manual for that card.

17 Obtain further assistance in replacing this card by contacting personnel responsible for higher level of support.

18 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X70
HIE

Application

Use this procedure to replace the following card in the host interface equipment (HIE) shelf.

PEC	Suffixes	Name
NT2X70	AA, AB, AC, AD, AE	Power Converter (5V/12V)

Common procedures

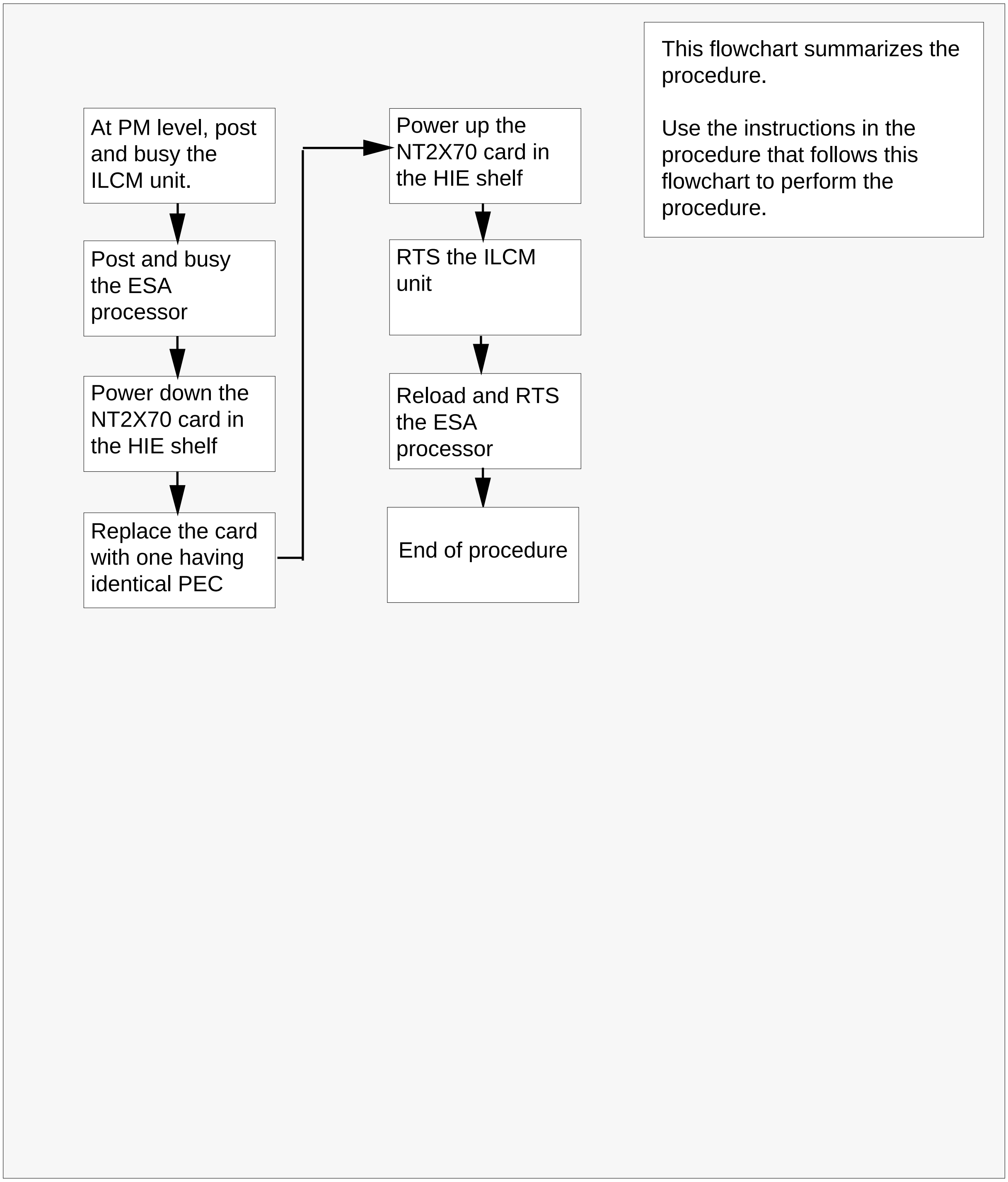
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X70
HIE (continued)

Summary of card replacement procedure for an NT2X70 card in an HIE shelf



Replacing an NT2X70 card in an HIE shelf

At your current location

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure to verify or accept cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC) including suffix, as the card to be removed.

At the MAP display

3 Access the PM level of the MAP display and post the meridian cabinetized remote unit (MCRU) associated with the faulty NT2X70 card by typing

>MAPCI;MTC;PM;POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site, where the MCRU is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM module in the frame

If the NT2X70 card is in	Do
slot 25	step 4
slot 22	step 36

4 Display the P-side links of the MCRU by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP display:

```
Link    0:  RMM 0   0;  Cap MS;Status:    OK; MsgCond:OPN
Link    1:  RMM 0   1;  Cap MS;Status:    OK; MsgCond:OPN
Link    2:  ESA 0   0   Cap M ;Status:    OK; MsgCond:OPN
Link    3   ESA 0   1   Cap M ;Status:    OK; MsgCond:OPN
```

Note: In this example both the RMM and ESA modules are provisioned. However, should either of these modules not be provisioned in your office, skip the steps relating to that module and continue with the rest of the procedure.

NT2X70
HIE (continued)

5

> **CAUTION**
> **Loss of service**
> This procedure contains directions to busy one or more peripheral modules (PM) in a frame. Since busying a PM affects subscriber service, replace power converters only during periods of low traffic

Busy unit 0 of the MCRU by typing

>BSY UNIT 0
and pressing the Enter key.

6 Post the ESA processor identified in step 4 by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no	is the number of the ESA processor associated with the faulty NT2X70 card.

Busy the ESA processor by typing

>BSY
and pressing the Enter key.

Example of a MAP response:

```
This action will take this PM out of service
Please confirm (“Yes” or “No”)
```

Respond to the system prompt by typing

>YES

NT2X70
HIE (continued)

At the HIE shelf

7

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Power down the NT2X70 card in slot 25 of the HIE shelf by setting the ON/OFF switch on the power converter faceplate to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the frame supervisory panel (FSP) will be ON. An audible alarm may sound. If an alarm does sound, silence it, at the MAP terminal, by typing

>SIL

and pressing the Enter key.

Note: For the NTNX14AA cabinet the circuit breaker assignments are:

If NT2X70 is in	trip circuit breaker
shelf 33 slot 25	CB3 on FSP
shelf 33 slot 22	CB8 on FSP

8 Replace the NT2X70 card in slot 25 using the procedure *Replacing a card.* When you have completed the procedure, return to this point

9 Power up the NT2X70 card in slot 25 of the HIE shelf as follows:

a. Ensure that the converter (NT2X70) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch to the ON position.

If NT2X70 suffix is	trip circuit breaker
AE	step 10
AA, AB, AC, or AD	step 11

NT2X70
HIE (continued)

10 Toggle the ON/OFF/RESET switch on the power converter faceplate to the RESET position and hold while setting the circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF, release the ON/OFF/RESET switch. Go to step 12.

11 Press the RESET button on the power converter faceplate while setting the circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF, release the RESET button.

12 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 13.

At the MAP display

13 Post the MCRU associated with the faulty NT2X70 card by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the MCRU is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM module in the frame

14 Return ILCM unit 0 to service by typing

>RTS UNIT 0
and pressing the Enter key.

If RTS	Do
passed	step 15
failed	step 73

15 Post the ESA processor associated with the faulty NT2X70 card by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no	is the number of the ESA processor identified in step 4.

16 Load the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	Do
message “loadfile not found in directory” is not received	step 17
load passed	step 33
load failed	step 37

17 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 18
IOC disk	step 24
SLM disk	step 29

18 Locate the tape that contains the PM load files.

At the IOE frame

19 Mount the tape on a magnetic tape drive.

At the MAP display

20 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

21 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files.

NT2X70
HIE (continued)

22 Release the tape drive from your user directory by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive mounted in step 20.

23 Go to step 34.

24 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

25 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

26 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 24.

27 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

28 Go to step 34.

29 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

30 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

31 List the SLM disk volume names by typing

>LV CM
and pressing the Enter key.

NT2X70
HIE (continued)

32 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name	is the name of the volume that contains the PM load files, obtained in step 29.

33 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

34 Load the ILCM unit by typing

>LOADPM
and pressing the Enter key.

If loadpm	Do
passed	step 35
failed	step 73

35 Return the ILCM unit to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 69
failed	step 73

At the MAP display

36 Post the meridian cabinetized remote unit (MCRU) associated with the faulty NT2X70 card by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the MCRU is located
frame_no	is the number of the frame where the ILCM is located

NT2X70
HIE (continued)

ILCM_no — is the number of the ILCM module in the frame

37 Busy unit 1 of the MCRU by typing

>BSY UNIT 1
and pressing the Enter key.

38 Post the ESA processor identified in step 4 by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no — is the number of the ESA processor associated with the faulty NT2X70 card.

39 Busy the ESA processor by typing

>BSY
and pressing the Enter key.

Example of a MAP response:

```
This action will take this PM out of service
Please confirm (“Yes” or “No”)
```

Respond to the system prompt by typing

>YES

NT2X70
HIE (continued)

At the HIE shelf

40

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Power down the NT2X70 card in slot 22 of the HIE shelf by setting the ON/OFF switch on the power converter faceplate to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the frame supervisory panel (FSP) will be ON. An audible alarm may sound. If an alarm does sound, silence it by typing

>SIL

and pressing the Enter key.

Note: For the NTNX14AA cabinet the circuit breaker assignments are:

If NT2X70 is in	trip circuit breaker
shelf 33 slot 25	CB3 on FSP
shelf 33 slot 22	CB8 on FSP

41 Replace the NT2X70 card in slot 22 using the procedure *Replacing a card.* When you have completed the procedure, return to this point

42 Power up the NT2X70 card in slot 22 of the HIE shelf as follows:

a. Ensure that the NT2X70 card is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch to the ON position.

If NT2X70 suffix is	trip circuit breaker
AE	step 43
AA, AB, AC, or AD	step 44

NT2X70
HIE (continued)

43 Toggle the ON/OFF/RESET switch on the power converter faceplate to the RESET position and hold while setting the circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF, release the ON/OFF/RESET switch. Go to step 45.

44 Press the RESET button on the power converter faceplate while setting the circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF, release the RESET button.

45 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 46.

At the MAP display

46 Post the MCRU associated with the faulty NT2X70 card by typing

>POST ILCM site_name frame_no ILCM_no
and pressing the Enter key.

where

site_name	is the name of the site where the MCRU is located
frame_no	is the number of the frame where the ILCM is located
ILCM_no	is the number of the ILCM module in the frame

47 Return ILCM unit 1 to service by typing

>RTS UNIT 1
and pressing the Enter key.

If RTS	Do
passed	step 48
failed	step 73

48 Post the ESA processor associated with the faulty NT2X70 card by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no	is the number of the ESA processor identified in step 4.

NT2X70
HIE (continued)

49 Load the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	Do
message “loadfile not found in directory” is not received	step 50
load passed	step 68
load failed	step 73

50 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 51
IOC disk	step 57
SLM disk	step 62

51 Locate the tape that contains the PM load files.

At the IOE frame

52 Mount the tape on a magnetic tape drive.

At the MAP display

53 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files

54 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files.

NT2X70
HIE (continued)

55 Release the tape drive from your user directory by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive mounted in step 53.

56 Go to step 67.

57 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

58 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

59 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 57.

60 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

61 Go to step 67.

62 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

63 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

64 List the SLM disk volume names by typing

>LV CM
and pressing the Enter key.

NT2X70
HIE (continued)

65 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 62.

66 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

67 Load the ILCM unit by typing

>LOADPM
and pressing the Enter key.

If loadpm	Do
passed	step 68
failed	step 73

68 Return the ESA processor to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 69
failed	step 73

69 Send any faulty cards for repair according to local procedure.

70 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card.

71 Go to step 74.

NT2X70
HIE (end)

72 Return to the procedure that directed you to this card replacement procedure. If necessary, go to the point where the faulty card list was produced, identify the next faulty card on the list, and go to the appropriate replacement procedure in this manual for that card.

73 Obtain further assistance in replacing this card by contacting personnel responsible for higher level of support.

74 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X90
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT2X90	AB, AC, AD	Incoming/outgoing Transmission Test Trunk Circuit (TTT)

Common procedures

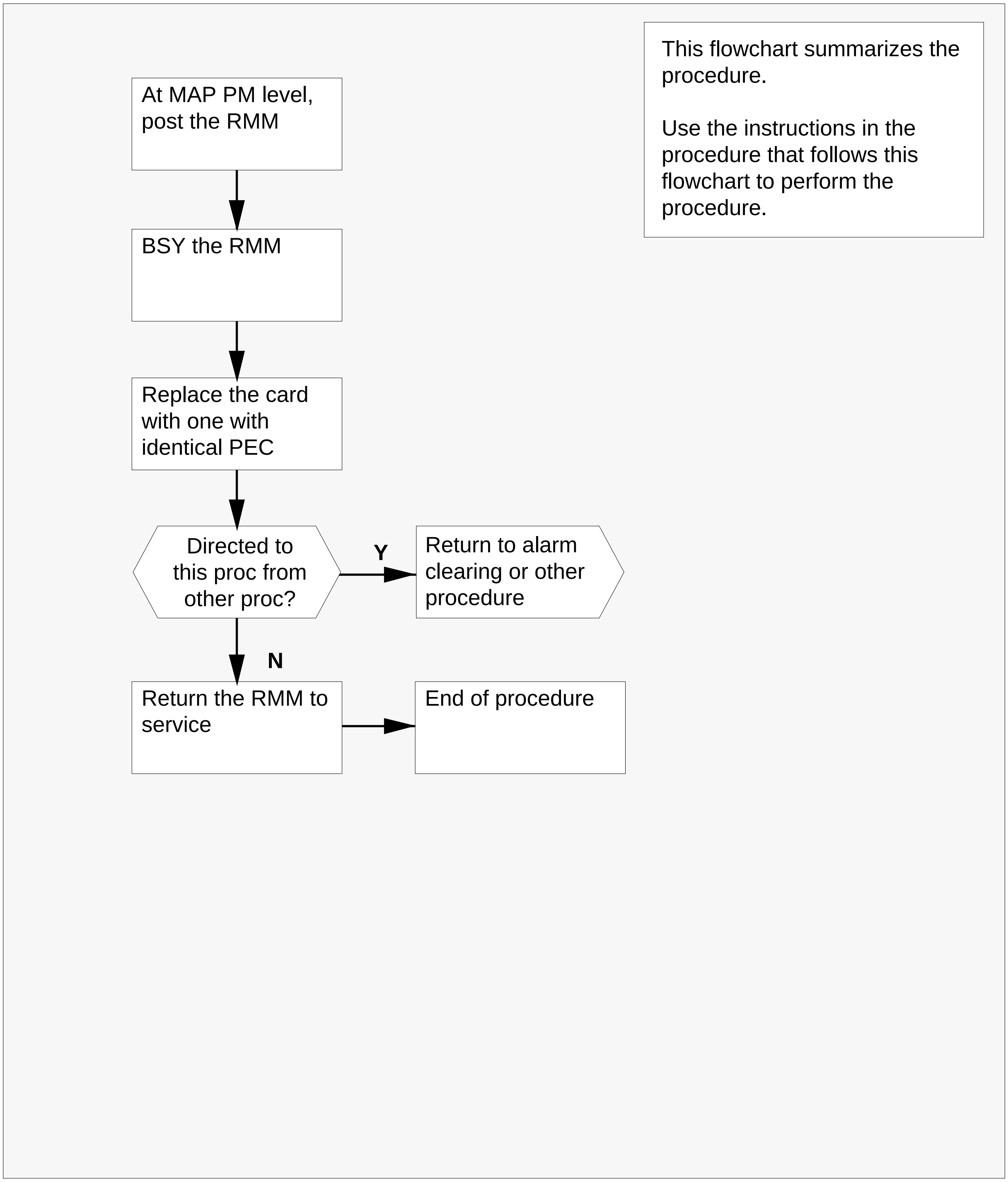
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X90
RMM (continued)

Summary of card replacement procedure for an NT2X90 card in an RMM



Replacing an NT2X90 card in an RMM

At your current location

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure to verify or accept cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC) including suffix, as the card to be removed.

At the MAP display

3 Access the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM from which the card is to be removed

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
   .     .      .      .    4SysB   .      .       .      .      .

RMM               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        4        0       10        3        3       130
 2 Post_   RMM       0        1        1        0        0         2
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT2X90
RMM (continued)

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

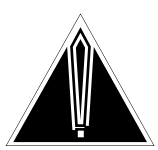
Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
   .     .      .      .    4SysB   .      .      .       .      .

RMM                 SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM          4        0       10        3        3       130
 2 Post_   RMM         0        1        1        0        0         2
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5



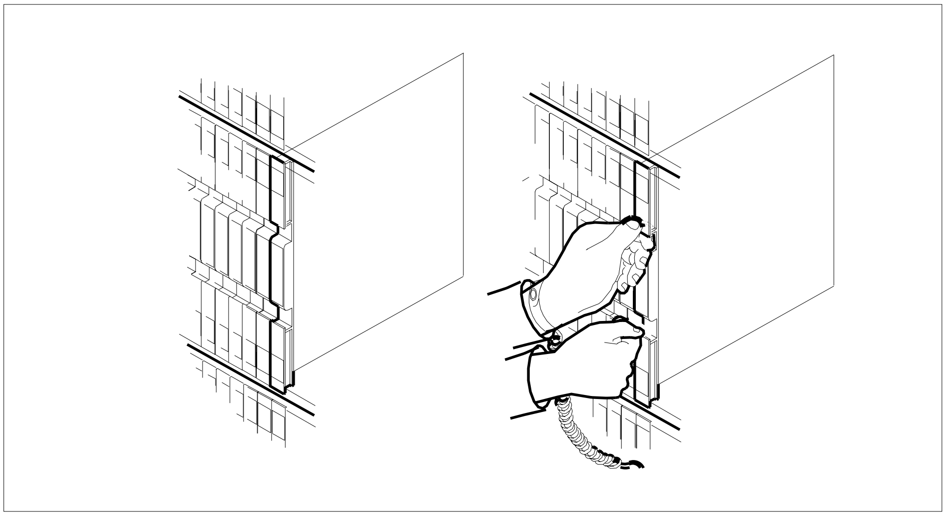
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing or inserting any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

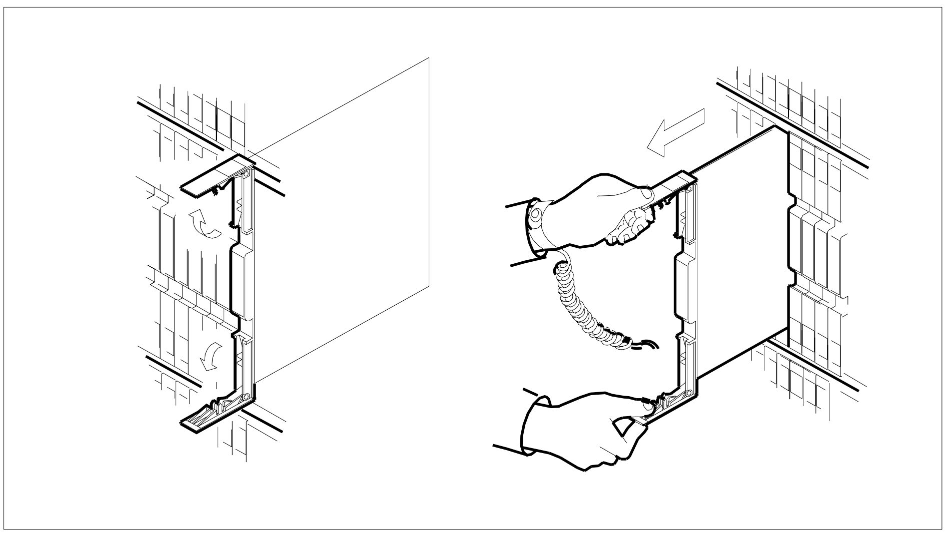
NT2X90
RMM (continued)

6 Remove the NT2X90 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card towards you until it clears the shelf.



c. Ensure that the replacement card has the same PEC including suffix, as the card you just removed.

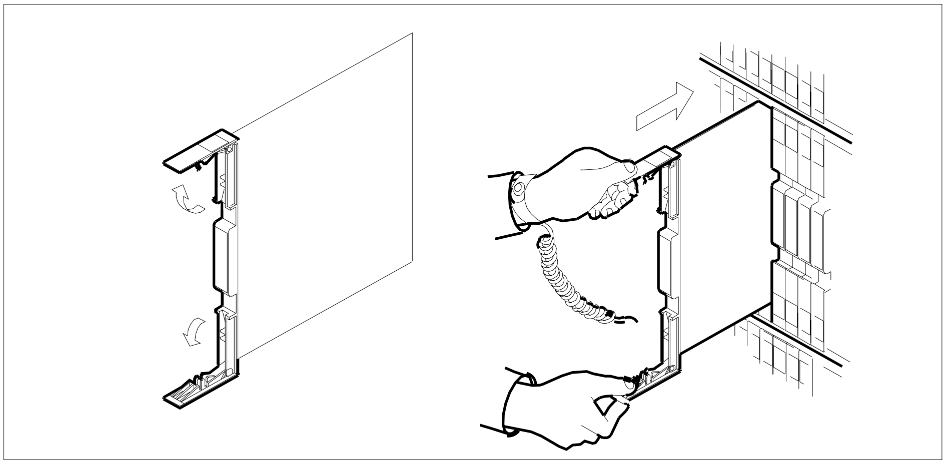
NT2X90
RMM (continued)

7

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2 .Do not force the cards into the slots.

Open the locking levers on the replacement card.

Align the card with the slots in the shelf and gently slide the card into the shelf.

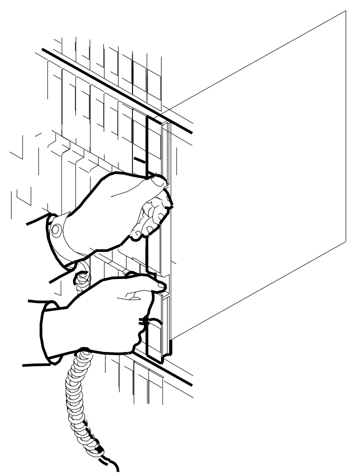


NT2X90
RMM (continued)

8 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

b. Close the locking levers.



9 Use the following information to determine the next step in this procedure.

If you entered this procedure	Do
from an alarm clearing procedure	step 15
from other	step 10

NT2X90
RMM (continued)

At the MAP display

10 Test the RMM by typing

>TST
and pressing the Enter key.

Example of a MAP response:

```
Test Passed
    or
Test Failed
```

If the TST	Do
passes	step 11
fails	step 16

11 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If the RTS	Do
passes	step 12
fails	step 16

12 Send any faulty cards for repair according to local procedure.

13 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card.

14 Go to step 17.

15 Return to the *Alarm Clearing Procedures* that directed you to this card replacement procedure. If necessary, go to the point where the faulty card list was produced, identify the next faulty card on the list, and go to the appropriate replacement procedure in this manual for that card.

NT2X90
RMM (end)

16 Obtain further assistance in replacing this card by contacting personnel responsible for higher level of support.

17 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT3X09
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT3X09	AA, BA	Remote Metallic Access (MTA) card

Common procedures

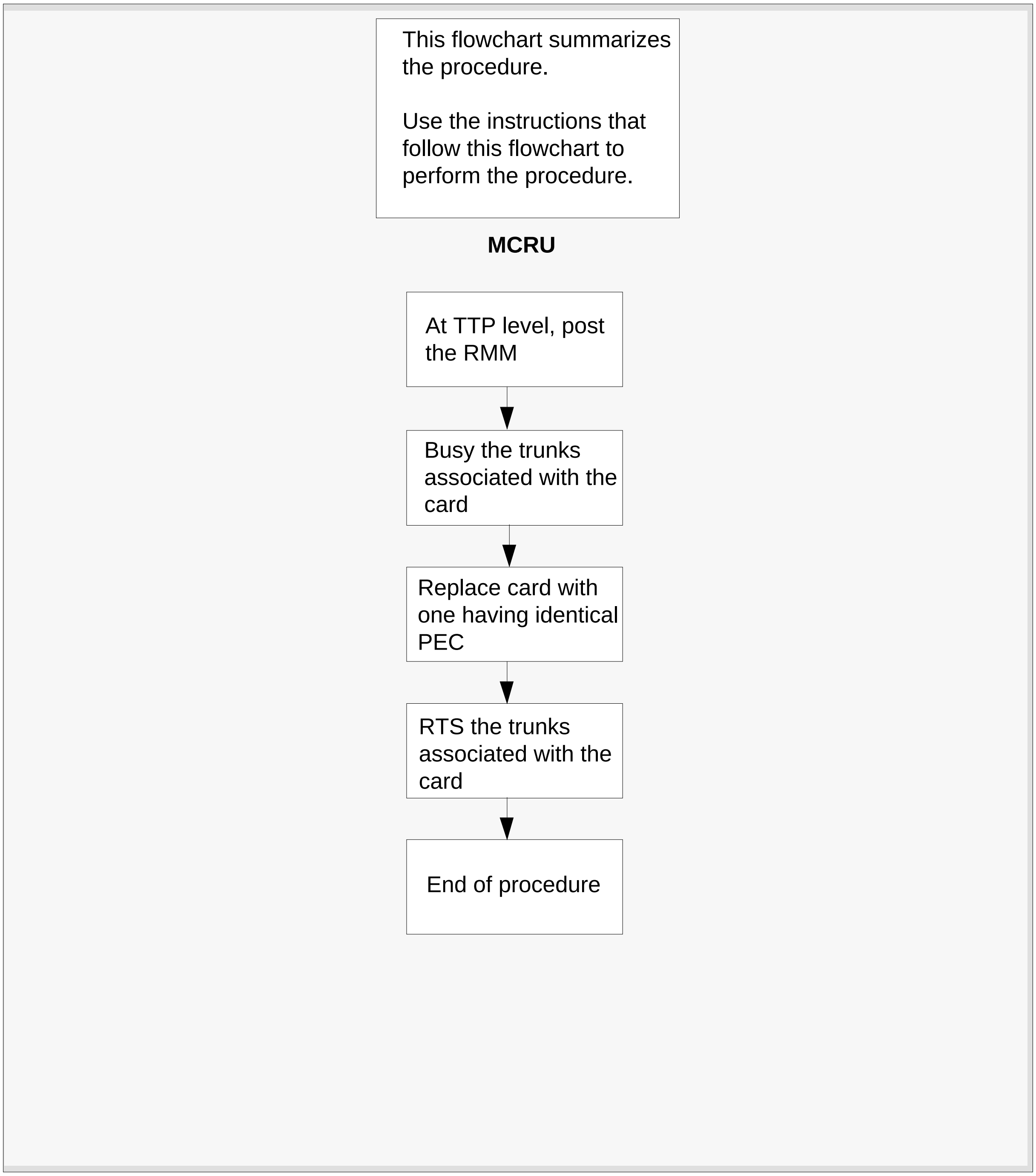
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT3X09
RMM (continued)

Summary of replacing an NT3X09 card in an RMM



NT3X09
RMM (continued)

Replacing an NT3X09 card in an RMM

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

2 Determine whether the NT3X09 card to be replaced is on an MCRU.

If	Do
MCRU	step 3

3 Access the TTP level of the MAP terminal and post the RMM that contains the card to be replaced by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no

and pressing the Enter key.

where

rmm_no   is the number of the RMM shelf in which the card is to be replaced
ckt_no   is the number of the first circuit where the NT3X09 card is physically located

Example of a MAP response:

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  1118
OK, CLLI POSTED

POST  20   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG  MISC RMM 0 0    MTADRIVER 20      LO
```

4 Check the status of the RMM.

If RMM status is	Do
MB, PMB, RMB	step 6
other	step 5

NT3X09
RMM (continued)

5 Busy the trunks that are associated with the card to be replaced by typing

>BSY ; NEXT
and pressing the Enter key.

Note: Repeat this step for all circuits associated with the faulty NT3X09AA/BA card to be replaced.

At the shelf

6

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap connected to the wrist strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

Replace the NT3X09 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point.

At the MAP terminal

7 Post the new NT3X09 card by typing

>POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced
ckt_no is the number of the first circuit where the NT3X0 card is physically located

8 Return to service the circuits busied in step 5 by typing

>RTS ;NEXT
and pressing the Enter key.

Note: Repeat this step for all circuits associated with the new NT3X09 card.

If RTS	Do
passed	step 9
failed	step 11

9 Send any faulty cards for repair according to local procedure.

NT3X09
RMM (end)

10 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 12.

11 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

12 You have completed this procedure.

NT4X97
MCRU RMM

Application

Use this procedure to replace an NT4X97 card in an MCRU RMM.

PEC	Suffixes	Name
NT4X97	AA	Metallic Test Unit Controller

Common procedures

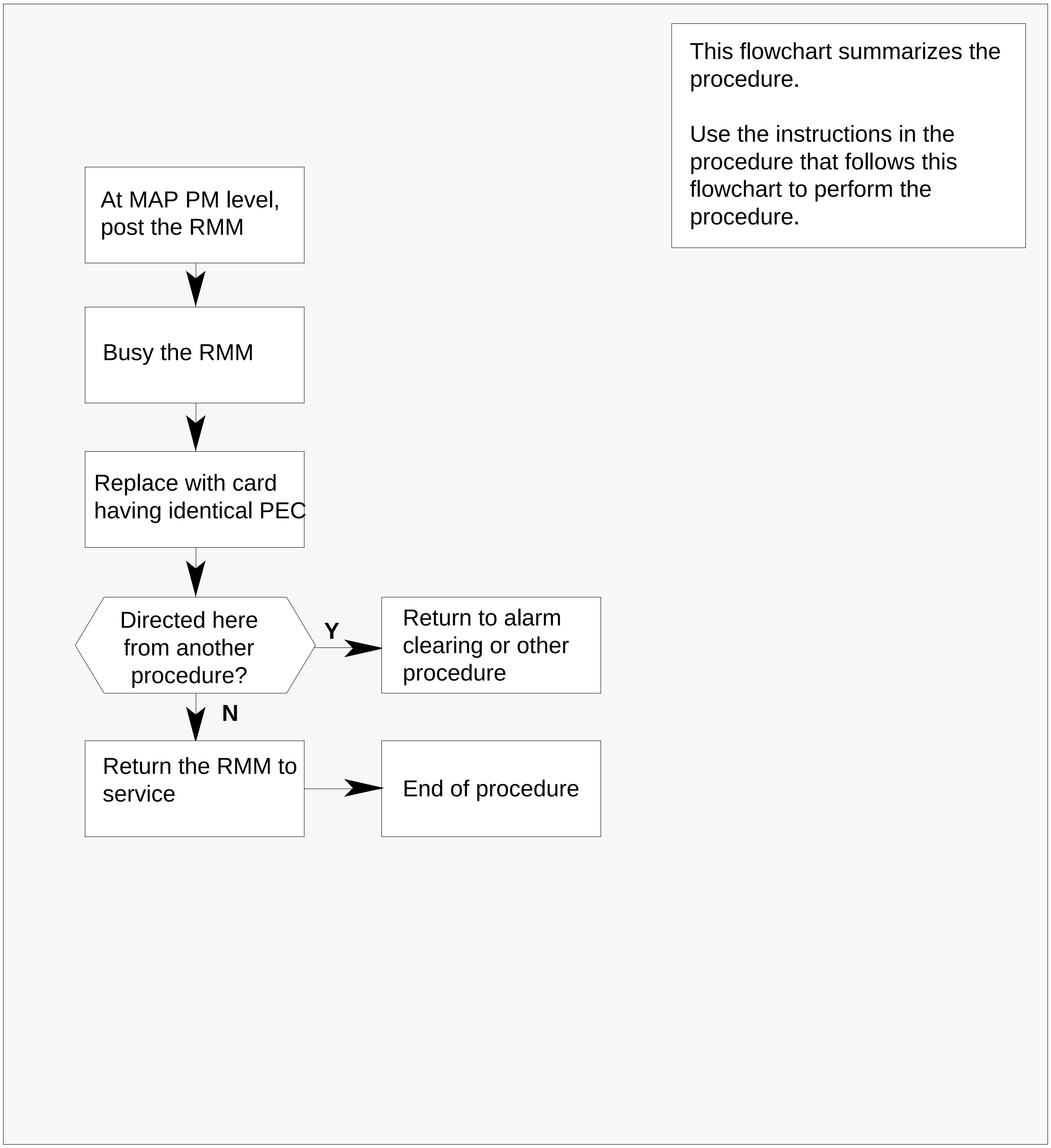
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT4X97
MCRU RMM (continued)

Summary of card replacement procedure for an NT4X97 card MCRU RMM



NT4X97
MCRU RMM (continued)

Replacing an NT4X97 card MCRU RMM

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT4X97 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of MAP display:

```
 CM    MS     IOD     Net     PM     CCS     LNS    Trks    Ext   Appl
 .      .      .       .       .      .       .      .       .      .
RMM                SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0       130
 2 Post_   RMM       0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT4X97
MCRU RMM (continued)

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .       .       .   1ManB   .      .      .       .      .
RMM                 SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        4        0        10        0        0        130
 2 Post_   RMM       0        1         0        0        0          0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

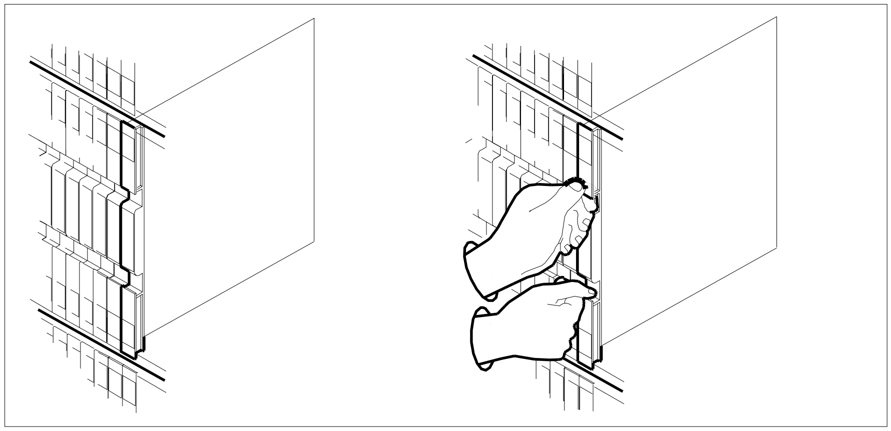
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

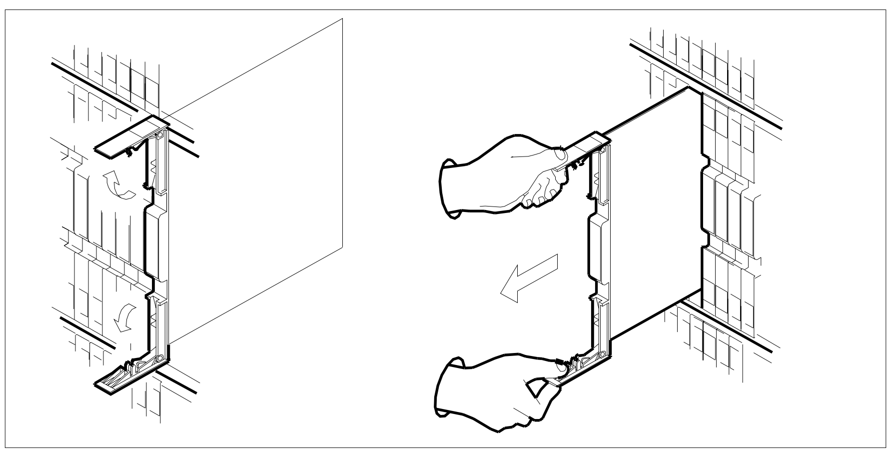
NT4X97
MCRU RMM (continued)

6 Remove the NT4X97 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



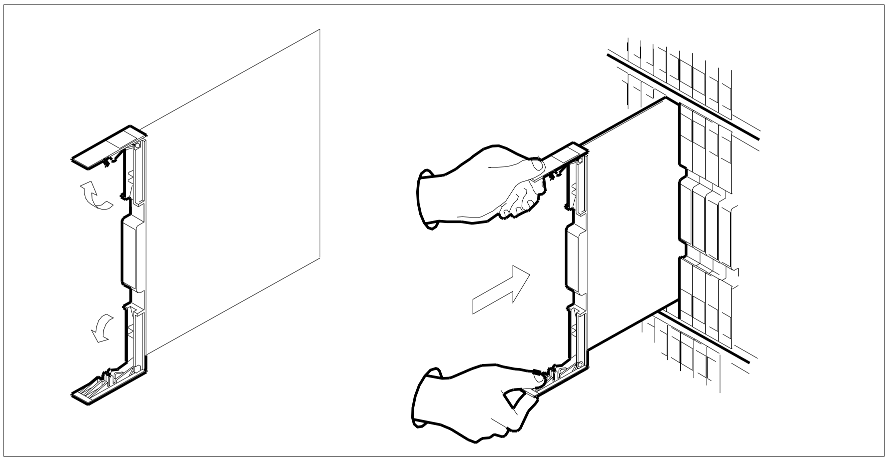
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

NT4X97
MCRU RMM (continued)

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



8

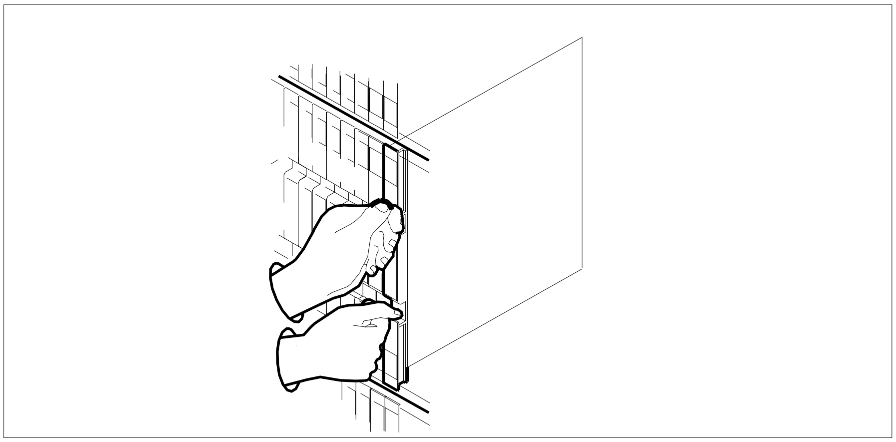
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

NT4X97
MCRU RMM (continued)

b. Close the locking levers.



9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 11
failed	step 14

NT4X97
MCRU RMM (end)

11 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms the prompted replacement of the card. Go to step 16.

14 Return to the *Alarm Clearing Procedures* that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT4X98
MCRU RMM

Application

Use this procedure to replace an NT4X98 card in an MCRU RMM.

PEC	Suffixes	Name
NT4X98	BB	Metallic Test Unit (analog)

Common procedures

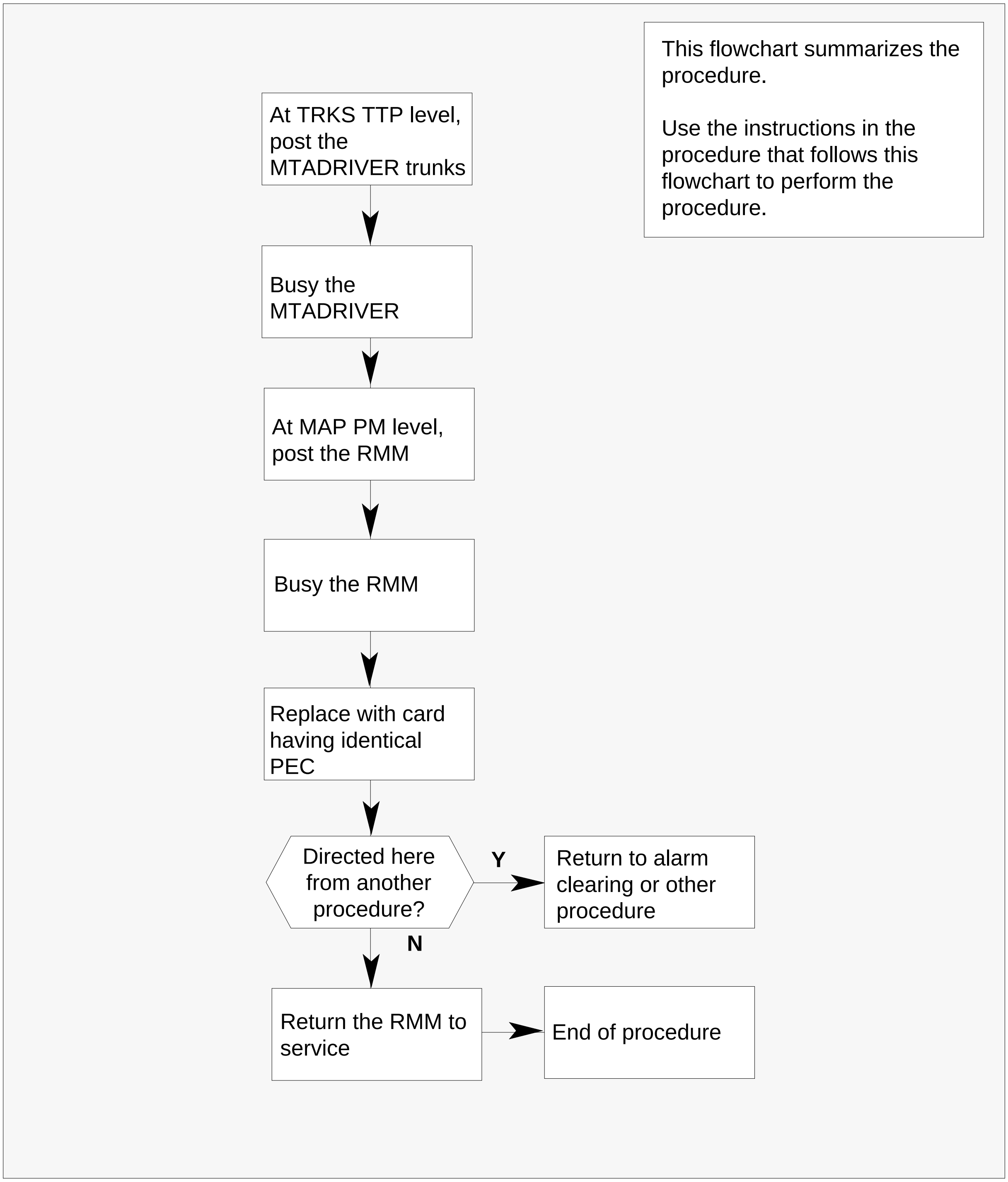
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT4X98
MCRU RMM (continued)

Summary of card replacement procedure for an NT4X98 card MCRU RMM



NT4X98
MCRU RMM (continued)

Replacing an NT4X98 card MCRU RMM

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT4X98 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to PM level and post the RMM by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no

where

rmm_no is the number of the RMM with the faulty MTADRIVER card
ckt_no is the number of the faulty MTADRIVER card
and pressing the Enter key.

Example of a MAP display:

```
 CM      MS      IOD      Net      PM     CCS     LNS     Trks     Ext    Appl
  .       .        .       .        .      .       .       .        .       .
TTP
 0 Quit       POST    1            DELQ         BUSYQ          DIG
 2 Post_      TTP    6-009
 3 Seize_     CKT TYPE    PM NO.  COM LANG     STA  S  R  DOT TE RESULT
 4            MISC   RMM  0  16   MATDRIVER  3 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      TTP:
13 Rls_       LAST CKTN  =  1
14 Ckt_       SHORT CLLI IS:  MTADRI
15 Trnslvf_   OK, CKT POSTED
16 Stksdr_
17 Pads_
18 Level_
```

NT4X98
MCRU RMM (continued)

4 Busy the MTADRIVER by typing

>BSY; BSY INB
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     LNS     Trks    Ext     Appl
 .      .       .       .       .      .       .       .       .       .
TTP
 0 Quit       POST    1            DELQ         BUSYQ          DIG
 2 Post_      TTP    6-009
 3 Seize_     CKT TYPE    PM NO. COM LANG     STA  S  R  DOT TE RESULT
 4            MISC   RMM  0  16  MATDRIVER  3 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      TTP:
13 Rls_       LAST CKTN  =  1
14 Ckt_       SHORT CLLI IS:  MTADRI
15 Trnslvf_   OK, CKT POSTED
16 Stksdr_
17 Pads_
18 Level_
```

NT4X98
MCRU RMM (continued)

5 Set the MAP display to the PM level and post the RMM by typing

>PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of a MAP display:

```
 CM      MS      IOD      Net      PM     CCS     LNS     Trks     Ext    Appl
  .       .       .        .        .      .       .       .        .      .
RMM                  SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM         0         0         0         0         0        130
 2 Post_   RMM        0         0         0         0         0          0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

6 Busy the RMM by typing

>BSY
and pressing the Enter key.

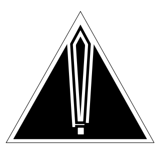
NT4X98
MCRU RMM (continued)

Example of a MAP display:

```
 CM     MS      IOD      Net      PM     CCS     LNS     Trks    Ext    Appl
 .      .        .        .     1ManB     .       .       .       .      .
RMM                  SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM          4        0       10        0        0        130
 2 Post_   RMM         0        1        0        0        0          0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

7



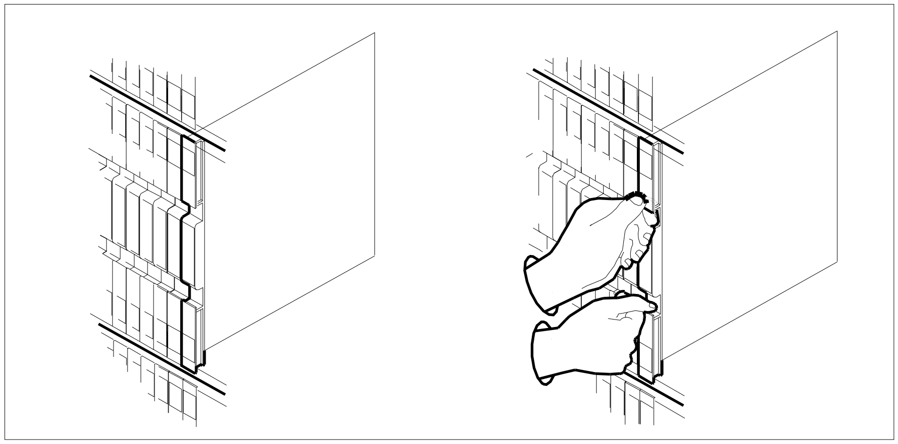
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

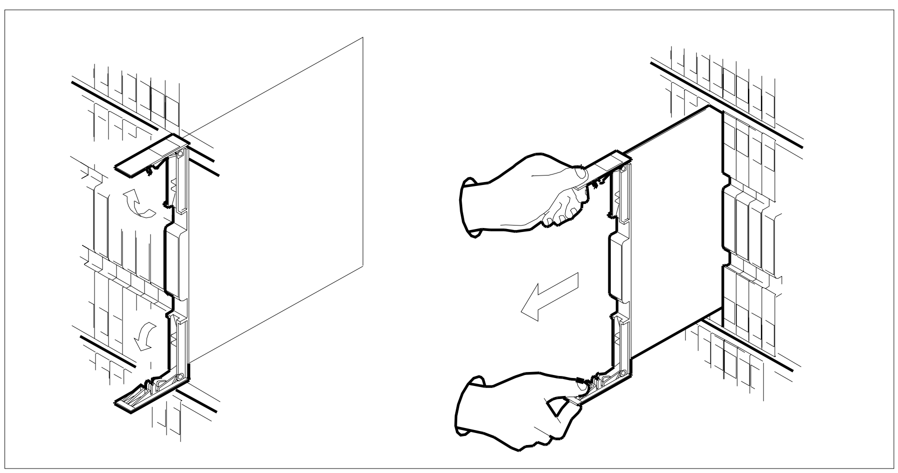
NT4X98
MCRU RMM (continued)

8 Remove the NT4X98 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



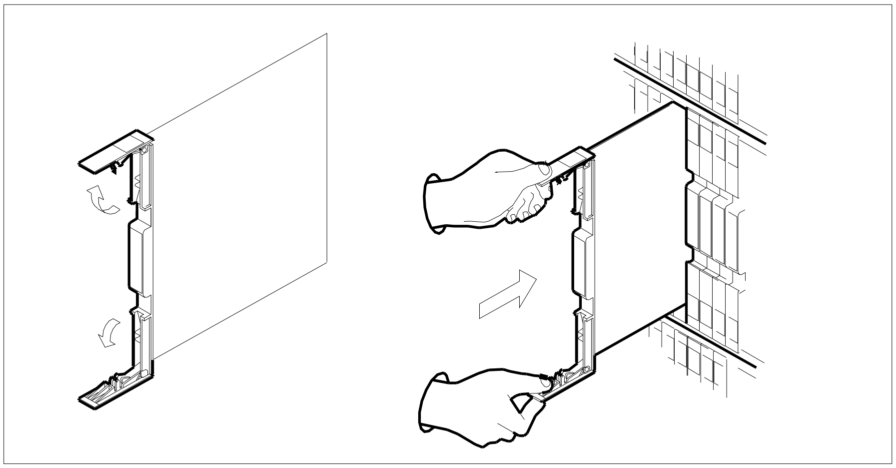
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

9 Open the locking levers on the replacement card.

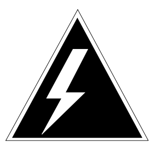
a. Align the card with the slots in the shelf.

NT4X98
MCRU RMM (continued)

b. Gently slide the card into the shelf.



10



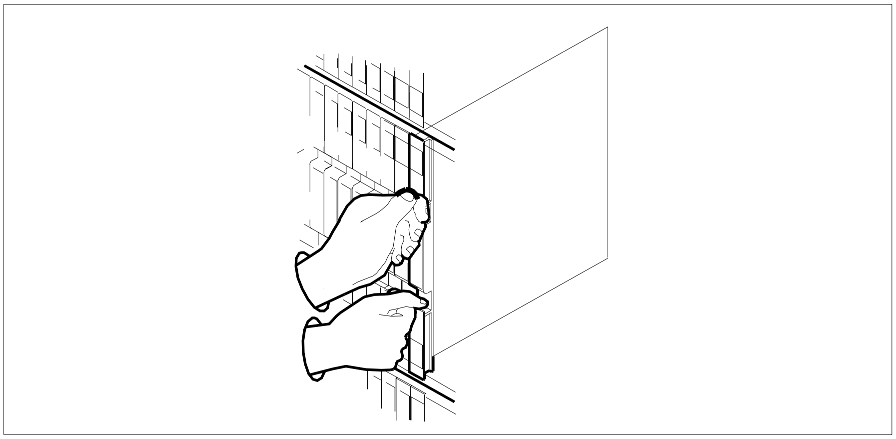
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

NT4X98
MCRU RMM (continued)

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 18
other	step 12

At the MAP terminal

12 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 13
failed	step 18

NT4X98
MCRU RMM (end)

13 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 14
failed	step 19

14 Post the MTADRIVER by typing

>TRKS;TTP;POST P RMM rmm_no ckt_no
where

rmm_no   is the number of the RMM with the new MTADRIVER card
ckt_no   is the number of the new MTADRIVER card
and pressing the Enter key.

15 Return the MTADRIVER to service by typing

>BSY ALL;RTS ALL
and pressing the Enter key.

16 Send any faulty cards for repair according to local procedure.

17 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 20.

18 Return to the *Alarm Clearing Procedures* that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

19 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X17
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X17	AA, AB, AC,BA	Standard Line Circuit Type A (POTS)

Common procedures

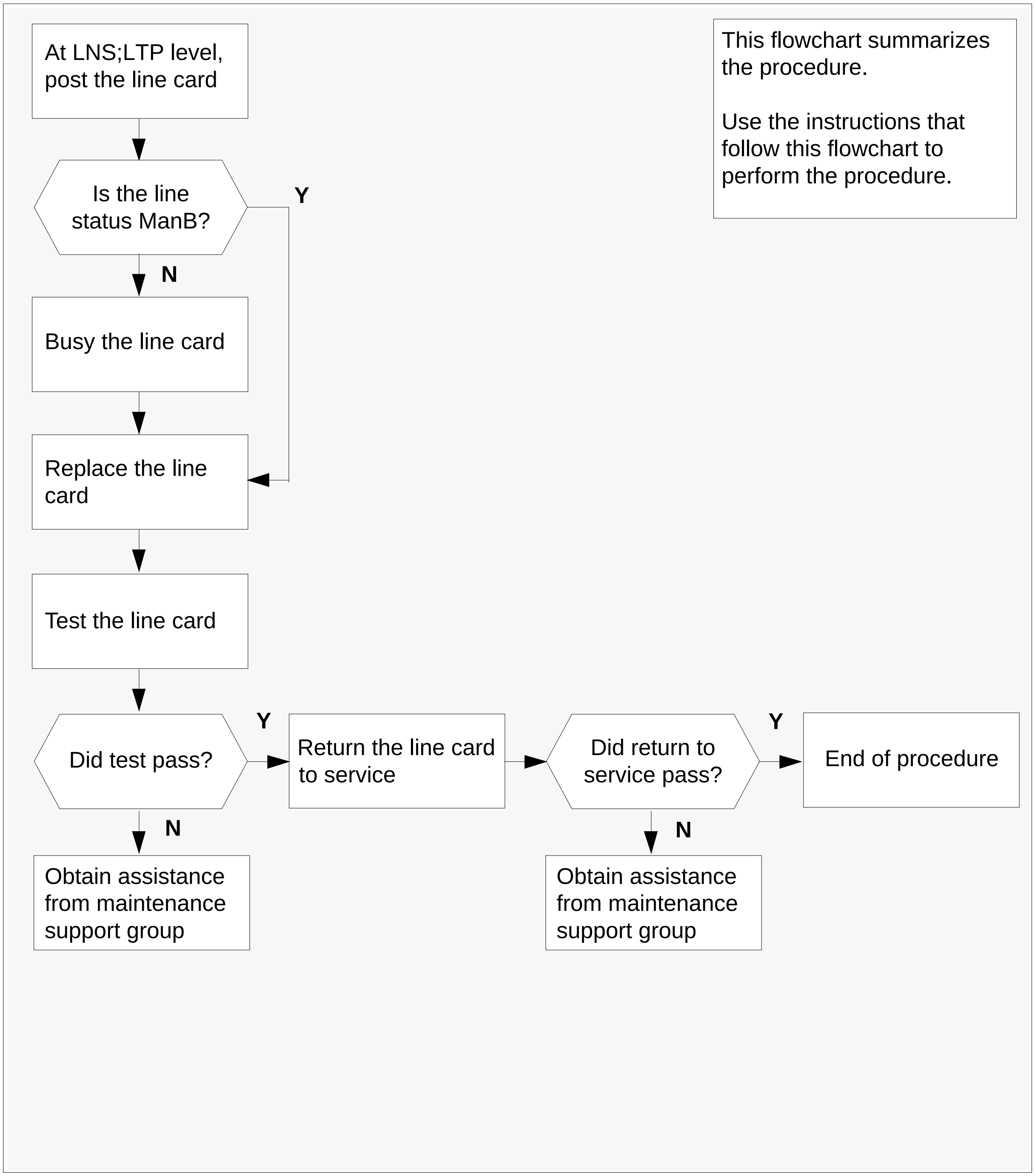
The procedure *Replacing a line card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X17
MCRU (continued)

Summary of replacing an NT6X17 card in an MCRU



Replacing an NT6X17 card in an MCRU

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

2 Access the LTP level of the MAP terminal and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt

and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP response:

```
LCC PTY RNG .....LEN.........  DN   STA F S LTA TE RESULT
IBN      REM1 00 0 03 03     7213355 MB
```

3 Check the status of the posted line.

If the line status is	Do
manual busy (ManB)	step 5
not ManB	step 4

4 Busy the line by typing

>BSY

and pressing the Enter key.

5 Go to the procedure *Replacing a line card.* When you have completed the procedure, return to this point.

NT6X17
MCRU (end)

At the MAP terminal

6 Test the line card just replaced by typing

>DIAG

and pressing the Enter key.

If DIAG	**Do**
passed	step 7
failed	step 10

7 Return the line card to service by typing

>RTS

and pressing the Enter key.

If RTS	**Do**
passed	step 8
failed	step 10

8 Send any faulty cards for repair according to local procedure.

9 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 11.

10 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

11 You have successfully completed this procedure.

NT6X18
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X18	AA, AB, BA	Line Card Type B (COIN)

Common procedures

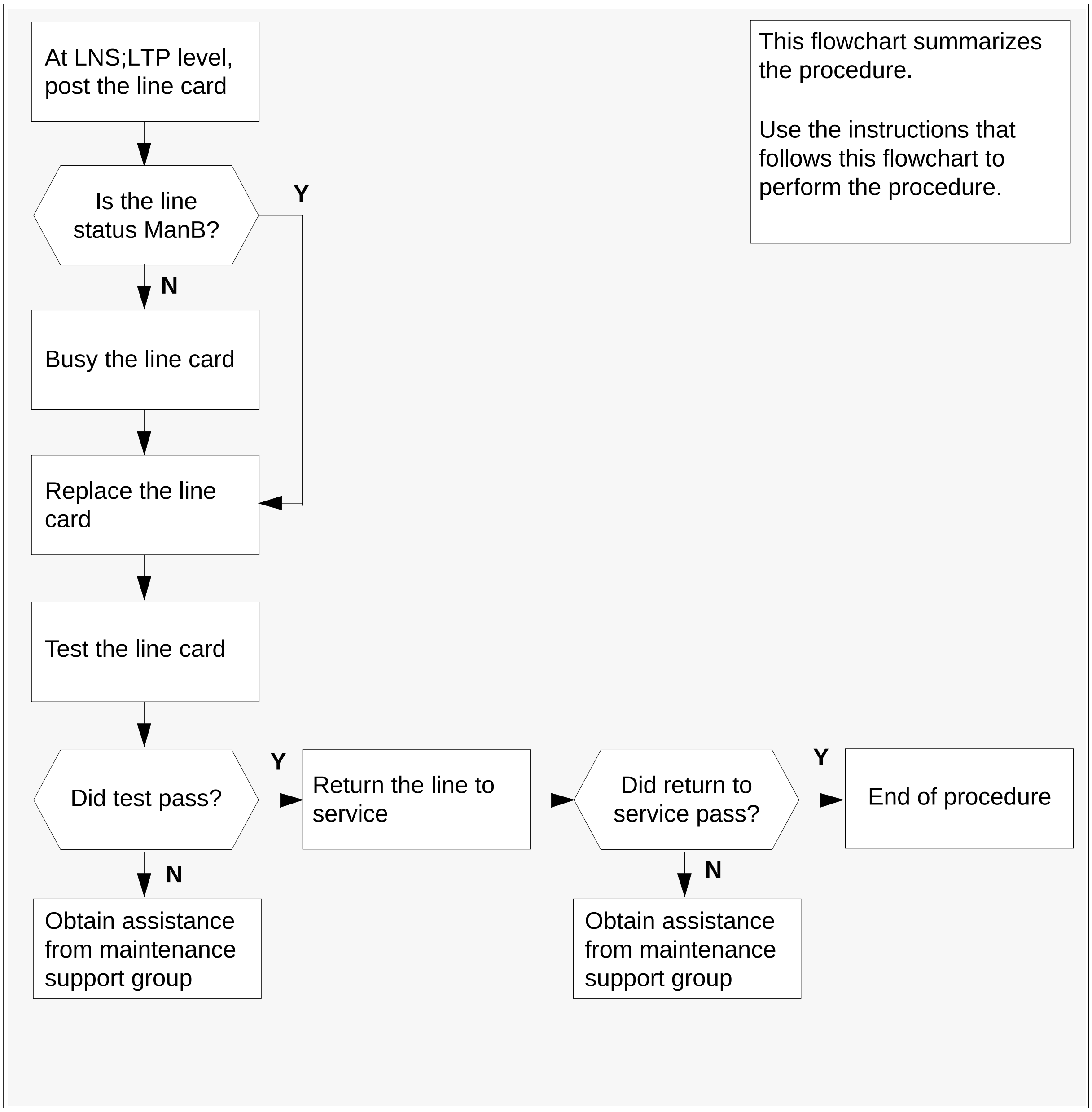
The procedure *Replacing a line card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X18
MCRU (continued)

Summary of replacing an NT6X18 card in an MCRU



Replacing an NT6X18 card in an MCRU

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

2 Access the LTP level of the MAP and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt

and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP response:

```
LCC PTY RNG .....LEN.........  DN   STA F S LTA TE RESULT
IBN         REM1 00 0 03 03   7213355 MB
```

3 Check the status of the posted line.

If the line status is	Do
manual busy (ManB)	step 5
not ManB	step 4

4 Busy the line by typing

>BSY
and pressing the Enter key.

5 Go to the procedure *Replacing a line card.* When you have completed the procedure, return to this point.

NT6X18
MCRU (end)

At the MAP terminal

6 Test the line card just replaced by typing

>DIAG

and pressing the Enter key.

If DIAG	Do
passed	step 7
failed	step 10

7 Return the line card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 8
failed	step 10

8 Send any faulty cards for repair according to local procedure.

9 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 11.

10 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

11 You have successfully completed this procedure.

NT6X19
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X19	AA	Message Waiting Line Card

Common procedures

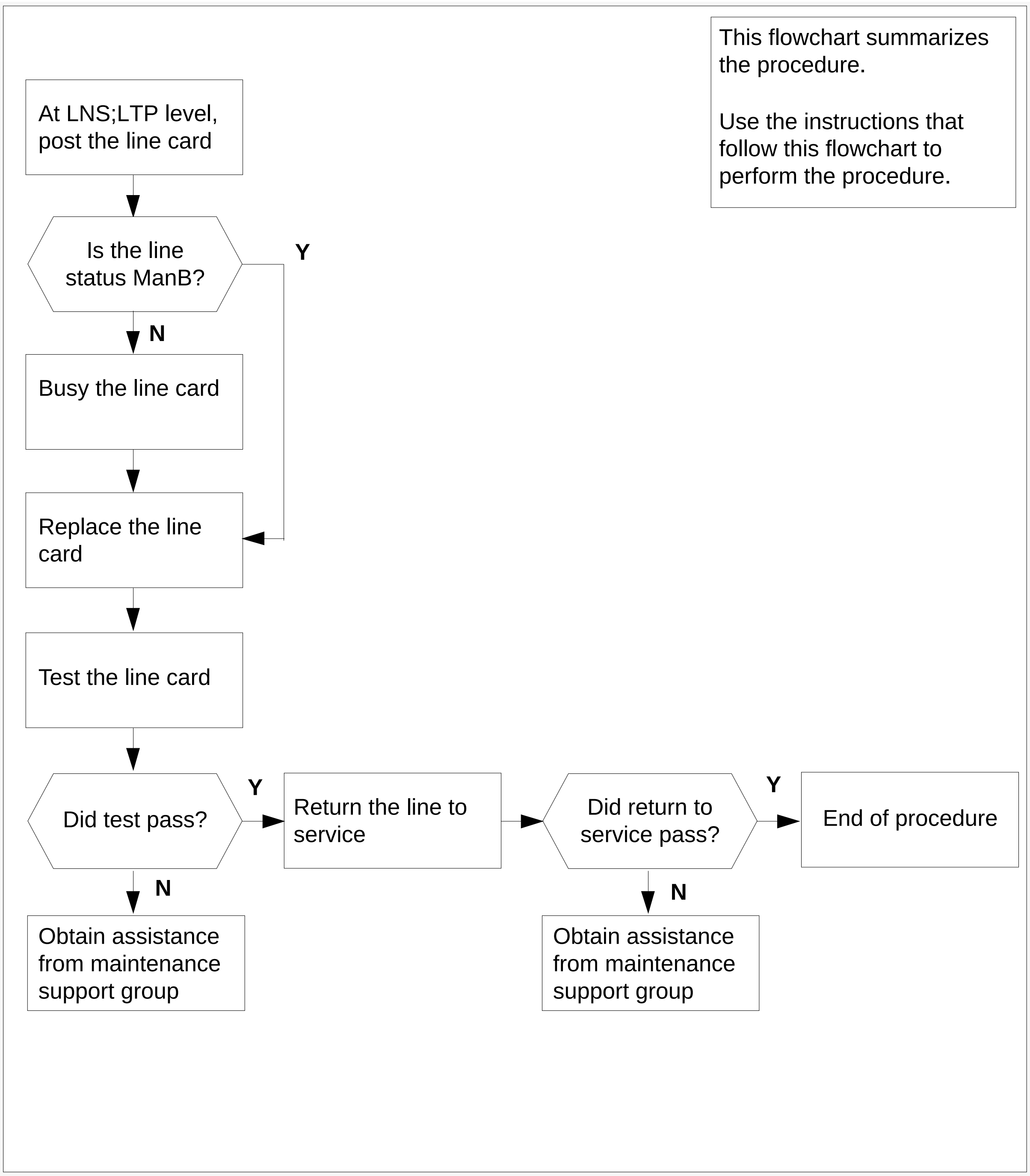
The procedure *Replacing a line card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X19
MCRU (continued)

Summary of replacing an NT6X19 card in an MCRU



Replacing an NT6X19 card in an MCRU

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

2 Access the LTP level of the MAP and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt

and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP response:

```
LCC PTY RNG .....LEN.......... DN   STA F S LTA TE RESULT
IBN      REM1 00 0 03 03     7213355 MB
```

3 Check the status of the posted line.

If the line status is	Do
manual busy (ManB)	step 5
not ManB	step 4

4 Busy the line by typing

>BSY
and pressing the Enter key.

5 Go to the procedure *Replacing a line card.* When you have completed the procedure, return to this point.

NT6X19
MCRU (end)

At the MAP terminal

6 Test the line card just replaced by typing

>DIAG

and pressing the Enter key.

If DIAG	**Do**
passed	step 7
failed	step 10

7 Return the line card to service by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passed	step 8
failed	step 10

8 Send any faulty cards for repair according to local procedure.

9 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 11.

10 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

11 You have successfully completed this procedure.

NT6X20
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X20	AA	Message Waiting Converter

Common procedures

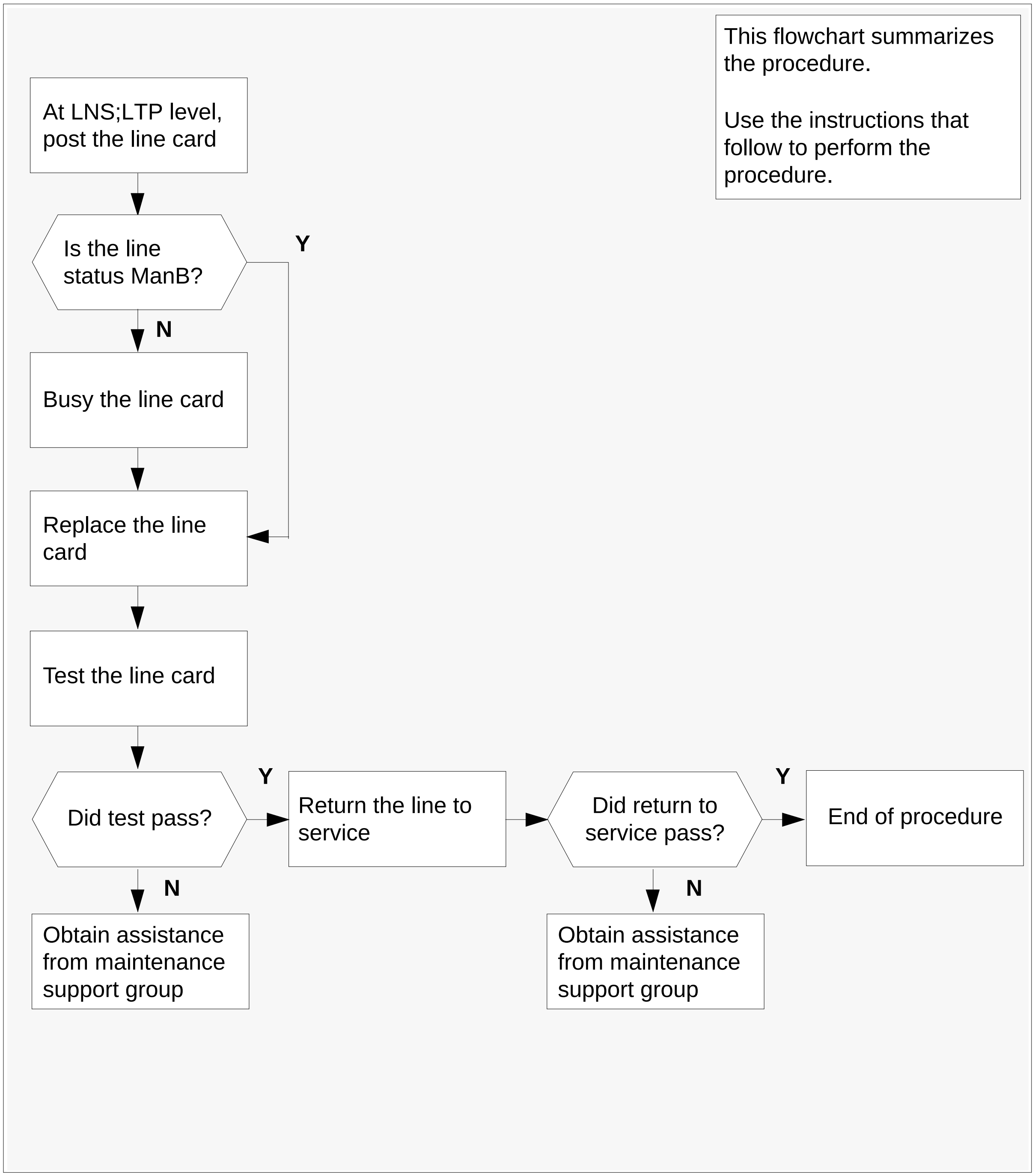
The procedure *Replacing a line card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X20
MCRU (continued)

Summary of card replacement procedure for an NT6X20 card MCRU



Replacing an NT6X20 card in an MCRU

At your current location

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

2 Access the LTP level of the MAP terminal and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt
and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP response:

```
LCC PTY RNG .....LEN.......... DN   STA F S LTA TE RESULT
IBN      REM1 00 0 03 03     7213355 MB
```

3 Check the status of the posted line.

If the line status is	Do
manual busy (ManB)	step 5
not ManB	step 4

4 Busy the line by typing

>BSY
and pressing the Enter key.

5 Go to the procedure *Replacing a line card.* When you have completed the procedure, return to this point.

NT6X20
MCRU (end)

At the MAP terminal

6 Test the line card just replaced by typing

>DIAG

and pressing the Enter key.

If DIAG	Do
passed	step 7
failed	step 10

7 Return the line card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 8
failed	step 10

8 Send any faulty cards for repair according to local procedure.

9 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 11.

10 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

11 You have successfully completed this procedure.

NT6X21 MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X21	AA, AB, AC, AD, BC	Line card type C, Meridian Digital Centrex (MDC), electronic business set

Common procedures

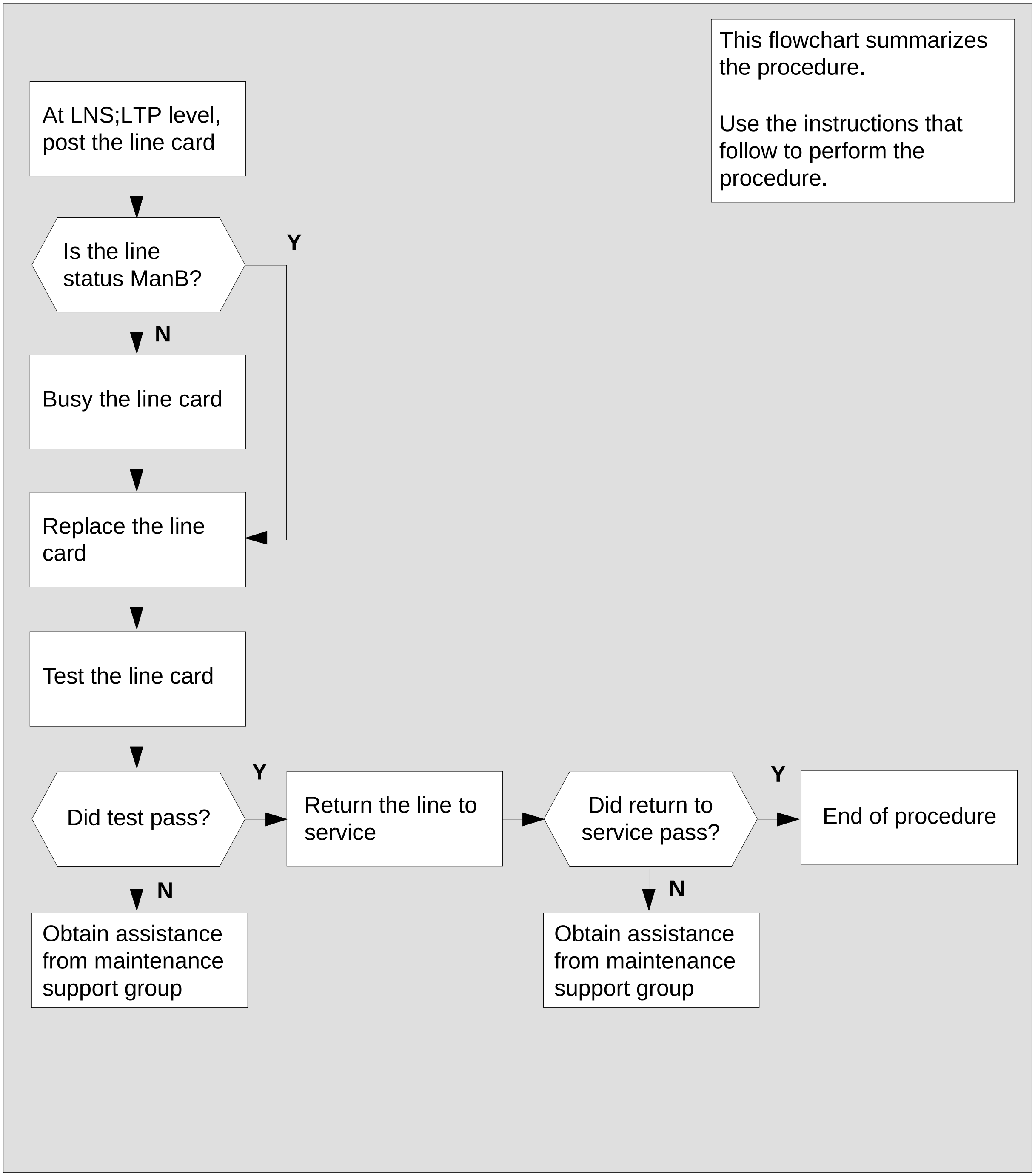
The procedure *Replacing a line card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X21
MCRU (continued)

Summary of replacing an NT6X21 card in an MCRU



Replacing an NT6X21 card in an MCRU

At your current location

1 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

2 Make DIP switch changes for the line card.

If the line card code is	Do
AA, AB, AC	step 4
AD	step 3

3 Make DIP switch settings as referenced in the *Maintenance* section of this manual.

At the MAP terminal

4 Access the LTP level of the MAP terminal and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt
and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP response:

```
LCC PTY RNG .....LEN.......... DN   STA F S LTA TE RESULT
IBN      REM1 00 0 03 03     7213355 MB
```

NT6X21
MCRU (continued)

5 Check the status of the posted line.

If the line status is	Do
manual busy (ManB)	step 7
not ManB	step 6

6 Busy the line by typing

>BSY
and pressing the Enter key.

At the ILCM

7 Go to the procedure *Replacing a line card.* When you have completed the procedure, return to this point.

At the MAP terminal

8 Test the line card just replaced by typing

>DIAG

and pressing the Enter key.

If the DIAG	Do
passed	step 9
failed	step 12

9 Return the line card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 10
failed	step 12

10 Send any faulty cards for repair according to local procedure.

NT6X21
MCRU (end)

11 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 13.

12 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

13 You have successfully completed this procedure.

NT6X27
HIE

Application

Use this procedure to replace the following card in an HIE shelf.

PEC	Suffixes	Name
NT6X27	BB	PCM-30 Interface

Common procedures

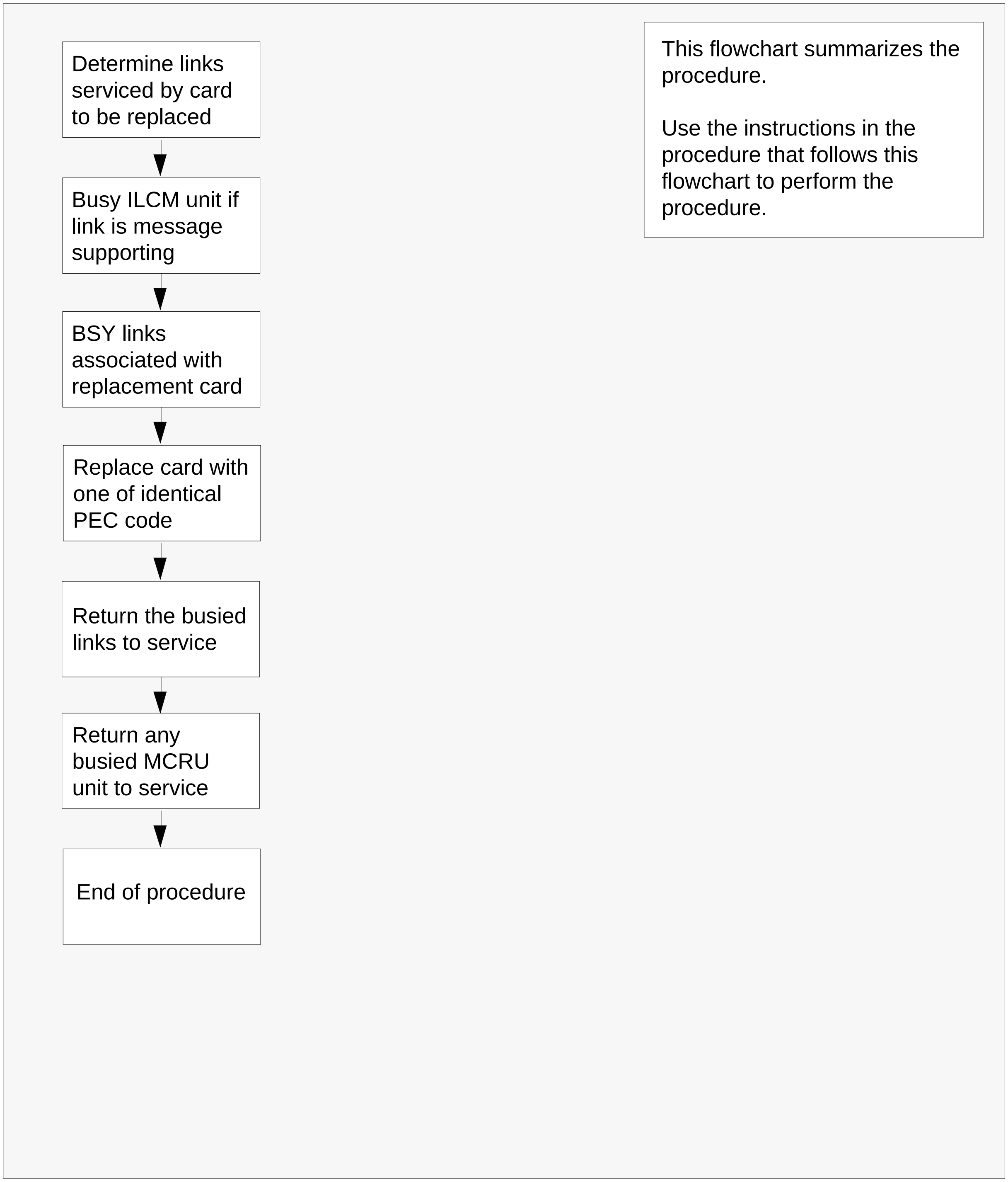
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X27
HIE (continued)

Summary of card replacement procedure for an NT6X27 card in an HIE



NT6X27
HIE (continued)

Replacing an NT6X27 card in an HIE

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 4; otherwise, continue with step 3.

At the MAP display

3 Access the PM level and post the ILCM by typing

>MAPCI;MTC;PM;POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the name of the MCRU site (alphanumeric)
frame	is the frame number of the RLCE (0 to 511)
ILCM	is the number of the ILCM

4 Display C-side link information by typing

> TRNSL C
and pressing the Enter key.

Example of a MAP response:

PLGC P-side link numbers

```
Link 0: PLGC 0       2; Cap MS; Status: OK    ;MsgCond: OPN
Link 1: PLGC 0       6; Cap MS; Status: SysB  ;MsgCond: CLS
```

5 From the display in step 4, determine the C-side peripheral module (PLGC, or RCC) to which the MCRU is connected and post it by typing

> POST host_pm host_pm_no
and pressing the Enter key.

where

host_pm	is the name of the host PM (PLGC, or RCC)
host_pm_no	is the number of the host PM

6 Display P-side link information by typing

> TRNSL P
and pressing the Enter key.

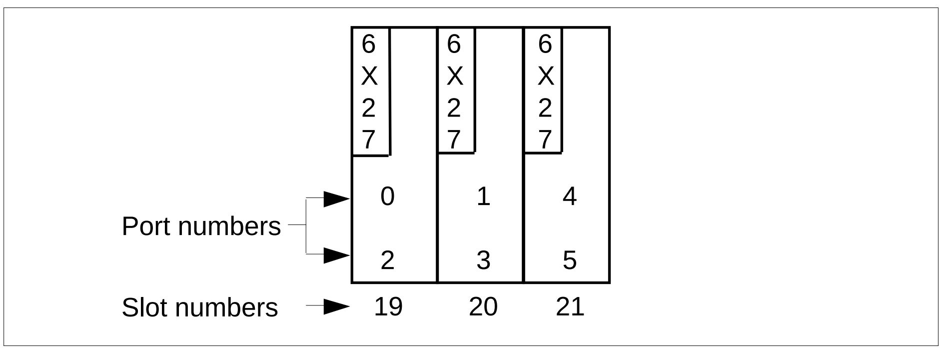
Example of a MAP response:

NT6X27 port numbers

```
Link 2: ILCM REM1 00 0  0;Cap MS;Status:OK   ;MsgCond: OPN
Link 6: ILCM REM1 00 0  1;Cap MS;Status:SysB ;MsgCond: CLS
```

7 Record the numbers of the links with status not OK.

Use the following diagram to determine which PCM-30 interface card or cards corresponds to the links identified as faulty in step 6. Note that each NT6X27 card has 2 ports. For example, the faulty link 6 displayed in step 6 is connected to port 1 as indicated, which corresponds to the NT6X27 in slot 20.



8 Determine the slot location of the faulty card.

If faulty card is in slot	Do
19 or 20 of the HIE	step 9
21 of the HIE	step 12

NT6X27
HIE (continued)

9 Post the ILCM by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the name of the MCRU site (alphanumeric)
frame	is the frame number of the RLCE (0-511)
ILCM	is the number of the ILCM

10 Busy ILCM unit 0 for card in slot 19 or ILCM unit 1 for card in slot 20 by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit	is the MCRU unit to be busied (0 for card in slot 19 or 1 for card
in	slot 20)

11 Post the C-side peripheral module, previously posted in step 5, where the MCRU is interfaced by typing

>POST host_pm host_pm_no
and pressing the Enter key.

where

host_pm	is the name of the host PM, previously posted in step 5
host_pm_no	is the number of the host PM

12 Using the information collected in step 7, busy both links associated with the faulty card by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no	is one of two links associated with the faulty card

Note: Repeat this step for the other link associated with the faulty card.

At the RLCE frame

13

> **WARNING**
> **Calls in progress may be interrupted.**
> The craftsperson must wait at least 15 minutes to allow calls in progress to be completed before removing the NT6X27 PCM-30 interface card.

Change dip switch settings on the new replacement card to match the faulty card being removed.

14 Replace the NT6X27 card using the procedure *Replacing a card.* When the card has been replaced, return to this point.

At the MAP display

15 Test the links busied in step 12 by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no is one of two links associated with the replacement card

Note: Repeat this step for the other link associated with the replacement card.

If test	Do
failed	step 24
passed	step16

NT6X27
HIE (continued)

16 Return to service the links busied in step 12 by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is one of two links associated with the replacement card

Note: Repeat this entry for the other link associated with the replacement card.

If RTS	**Do**
failed	step 24
passed	step17

17 Determine if there are remaining links to clear.

If there are	**Do**
remaining links to clear	step 12
no remaining links to clear	step18

18 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 19.

19 Determine if an ILCM unit is manual busy.

If ILCM unit	**Do**
is ManB	step 20
is not ManB	step 22

NT6X27
HIE (end)

20 Post the ILCM by typing

>POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the RLCE (0 to 511)
ILCM	is the number of the ILCM

21 Return the busied unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit	is the MCRU unit busied in step 10

If RTS	Do
failed	step 24
passed	step 22

22 Send any faulty cards for repair according to local procedure.

23 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Proceed to step 25.

24 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

25 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X36
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X36	AA, AB, AC	FSP alarm card
NT6X36	KA,	FSP alarm and control card

Common procedures

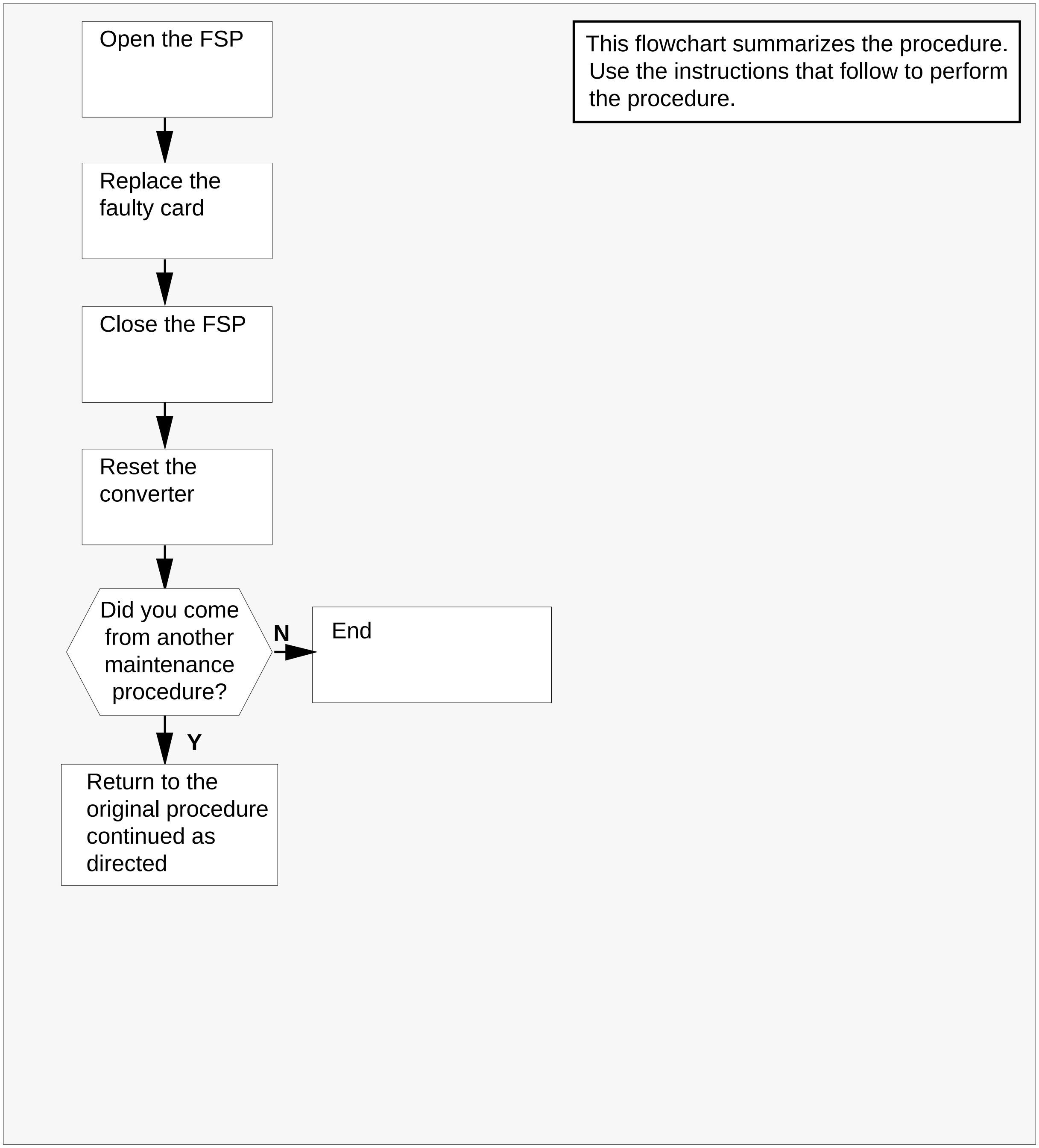
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

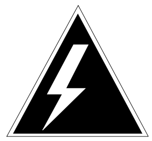
NT6X36
MCRU (continued)

Summary of replacing an NT6X36 card in an MCRU



NT6X36
MCRU (continued)

Replacing an NT6X36 card in an MCRU

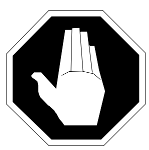


WARNING
Static electricity damage
Wear a wrist strap connected to the wrist-strap grounding point of a frame supervisory panel (FSP) or a modular supervisory panel (MSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

1 Obtain a replacement card. Ensure that the replacement card has the same product engineering code (PEC), including suffix, as the card being removed.

At the MCRU frame

2



DANGER
Risk of electrocution
Some of the terminals inside the frame supervisory panel (FSP) have an electrical potential of -48V dc. Remove all jewelry before replacing a card in the FSP. Do not touch any terminal in the FSP.

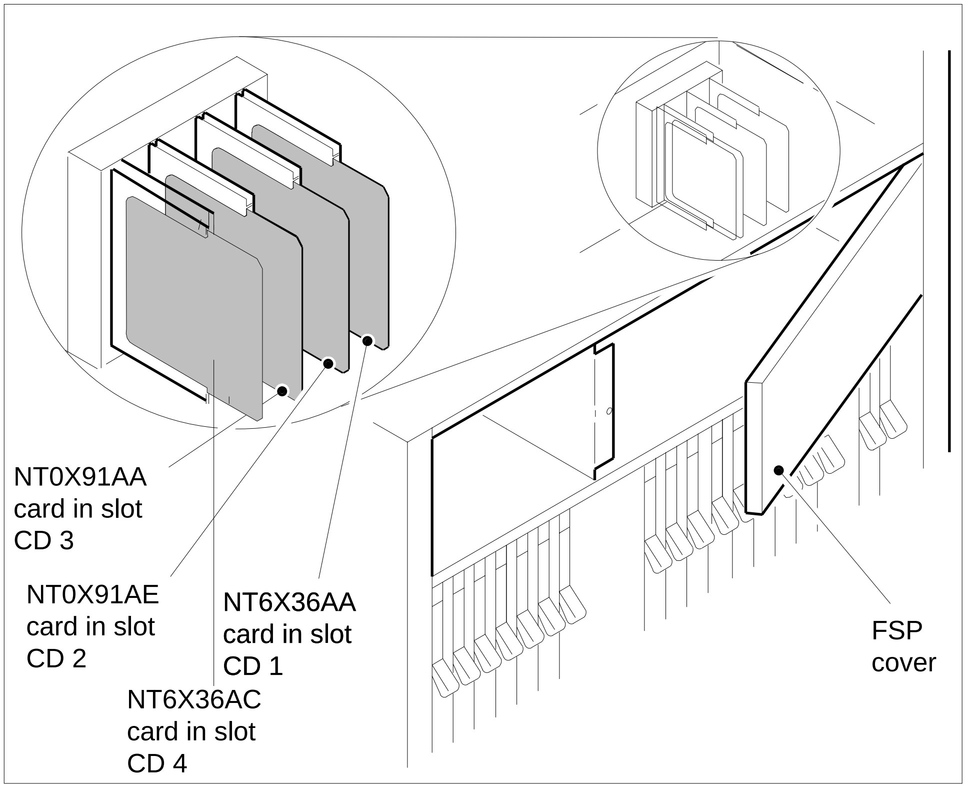
Unscrew the slotted nut on the left-hand side of the FSP.

3 Open the FSP panel.

NT6X36
MCRU (continued)

4 Remove the alarm and control card.

FSP Alarm and control cards



5 Insert the replacement alarm and control card.

6 Close the FSP panel.

7 Tighten the slotted nut on the FSP.

Proceed as follows to reset the converter in each shelf that is controlled by the alarm and control card you have just replaced.

8 Press the RESET button.

If the CONVERTER FAIL LED is	Do
lit	step 11
not lit	step 9

NT6X36
MCRU (end)

9 The next action depends on your reason for performing this procedure.

If you were	Do
directed to this procedure from a maintenance procedure	step 10
not directed to this procedure from a maintenance procedure	step 12

10 Return to the maintenance procedure that sent you to this procedure and continue as directed.

11 For further assistance, contact the personnel responsible for the next level of support.

12 You have completed this procedure.

NT6X45
HIE

Application

Use this procedure to replace the following card in an HIE shelf.

PEC	Suffixes	Name
NT6X45	AF	MCRU ESA Processor (Master Processor-ESA)

Note: NT6X45 with suffix AF is the ESA processor supported only for MCRU ESA.

Common procedures

The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X45
HIE (continued)

Summary of replacing an NT6X45 card in an HIE

This flowchart summarizes the procedure.

Use the instructions that follow to perform the procedure.

At PM level, post and busy the ESA processor

↓

Replace card with one having identical PEC

↓

Reload ESA processor

↓

Return ESA processor to service

↓

End of procedure

Replacing an NT6X45 card in an HIE

1 Obtain a replacement card. Verify that the replacement card has the same product engineering code (PEC), including suffix, as the card to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 5; otherwise, continue with step 3.

At the MAP terminal

3 Post the ESA processor by typing

>MAPCI;MTC;PM;POST ESA esa_no
and pressing the Enter key.

where

esa_no is the number of the ESA processor (0 to 255)

4 Busy the ESA processor by typing

>BSY
and pressing the Enter key.

Example of a MAP response:

```
This action will take this PM out of service
Please confirm (“Yes” or “No”)
```

Respond by typing

>YES
and pressing the Enter key.

At the MCRU frame

5 Replace the NT6X45 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point.

6 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 7.

NT6X45
HIE (continued)

7 Load the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	Do
message “loadfile not found in directory” is received	step 8
load passes	step 26
load fails	step 29

8 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 9
IOC disk	step 15
SLM disk	step 20

9 Locate the tape that contains the PM load files.

10 Mount the tape on a magnetic tape drive.

At the MAP terminal

11 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

12 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

NT6X45
HIE (continued)

13 Demount the tape by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

14 Go to step 25.

15 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

16 Access the disk utility level of the MAP display by typing

>DSKUT
and pressing the Enter key.

17 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step15

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

19 Go to step 25.

20 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

21 Access the disk utility level of the MAP display by typing

>DISKUT
and pressing the Enter key.

22 List all SLM disk volumes into your user directory by typing

>LV CM
and pressing the Enter key.

NT6X45
HIE (continued)

23 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 20

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

25 Reload the ESA processor by typing

>LOADPM
and pressing the Enter key.

If loadpm	Do
failed	step 29
passed	step 26

26 Return the ESA processor to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 27
failed	step 29

27 Send any faulty cards for repair according to local procedure.

28 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 30.

NT6X45
HIE (end)

29 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

30 You have completed this procedure.

NT6X47
HIE

Application

Use this procedure to replace the following card in an HIE shelf.

PEC	Suffixes	Name
NT6X47	AB, AC	Master Processor Memory (ESA) Plus

Common procedures

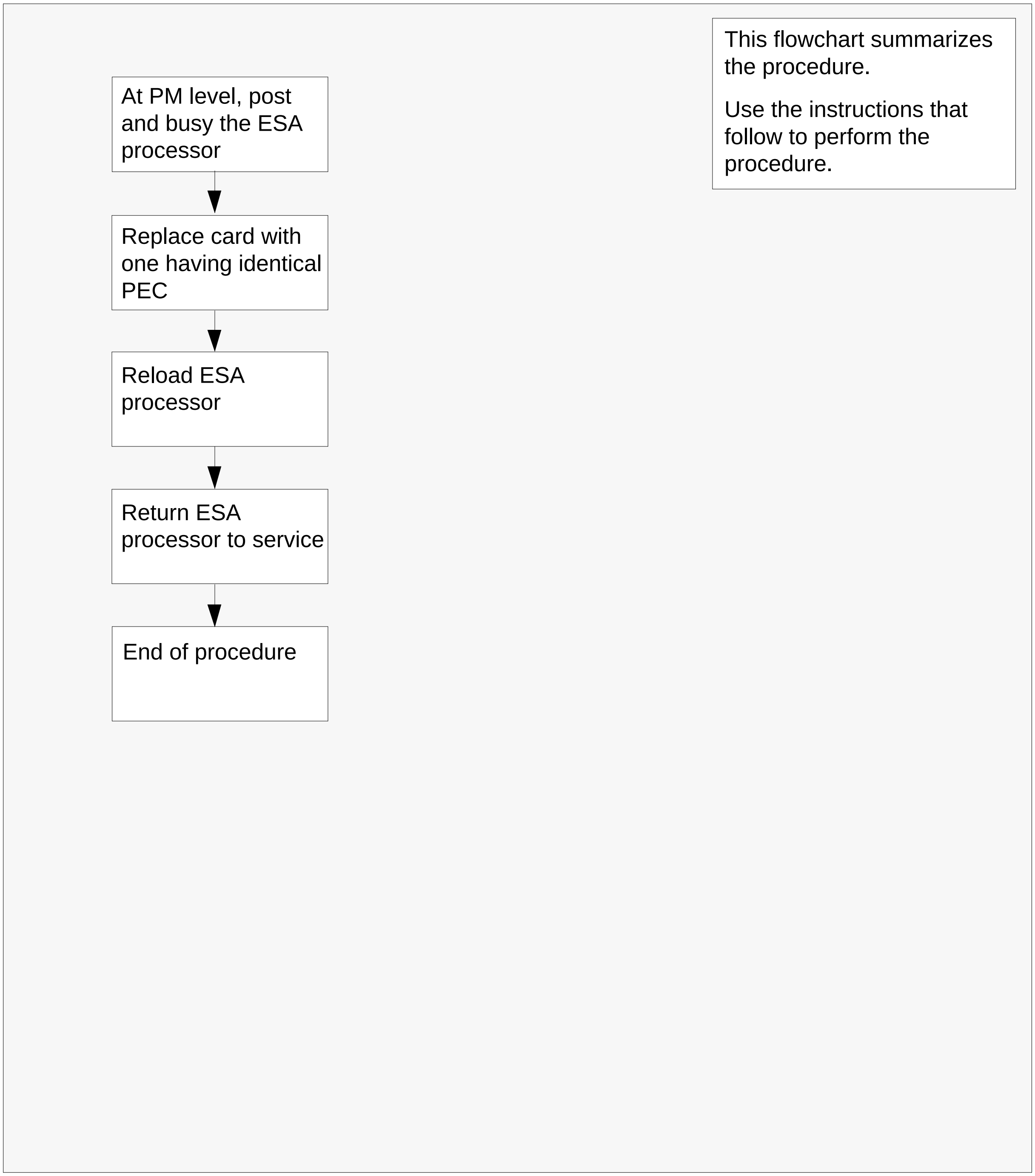
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X47
HIE (continued)

Summary of replacing an NT6X47 card in an HIE



NT6X47
HIE (continued)

Replacing an NT6X47 in an HIE

1 Obtain a replacement card. Verify that the replacement card has the same product engineering code (PEC), including suffix, as the card to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 5; otherwise, continue with step 3.

At the MAP terminal

3 Post the ESA processor by typing

>MAPCI;MTC;PM;POST ESA esa_no
and pressing the Enter key.

where

esa_no is the number of the ESA processor (0 to 255)

4 Busy the ESA processor by typing

>BSY
and pressing the Enter key.

Example of a MAP response:

```
This action will take this PM out of service
Please confirm (“Yes” or “No”)
```

Respond by typing

>YES
and pressing the Enter key.

At the MCRU frame

5 Replace the NT6X47 card using the procedure *Replacing a card.* When you have completed the procedure, return to this point.

6 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 7.

NT6X47
HIE (continued)

At the MAP terminal

7 Load the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	Do
message “loadfile not found in directory” is received	step 8
load passed	step 26
load failed	step 29

8 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 9
IOC disk	step 15
SLM disk	step 20

9 Locate the tape that contains the PM load files.

10 Mount the tape on a magnetic tape drive.

At the MAP terminal

11 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

12 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

NT6X47
HIE (continued)

13 Demount the tape by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

14 Go to step 25.

15 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

16 Access the disk utility level of the MAP display by typing

>DSKUT
and pressing the Enter key.

17 List the IOC disk file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 15

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

19 Go to step 25.

20 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

21 Access the disk utility level of the MAP display by typing

>DISKUT
and pressing the Enter key.

22 List the SLM disk volumes into your user directory by typing

>LV CM
and pressing the Enter key.

23 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name	is the name of the volume containing the PM load files, obtained in step 20

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

25 Reload the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	**Do**
load fails	step 29
load passes	step 26

26 Return the ESA processor to service by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passed	step 27
failed	step 29

27 Send any faulty cards for repair according to local procedure.

28 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 30.

NT6X47
HIE (end)

29 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

30 You have completed this procedure.

NT6X51
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X51	AA, AB	ILCM Processor Card

Common procedures

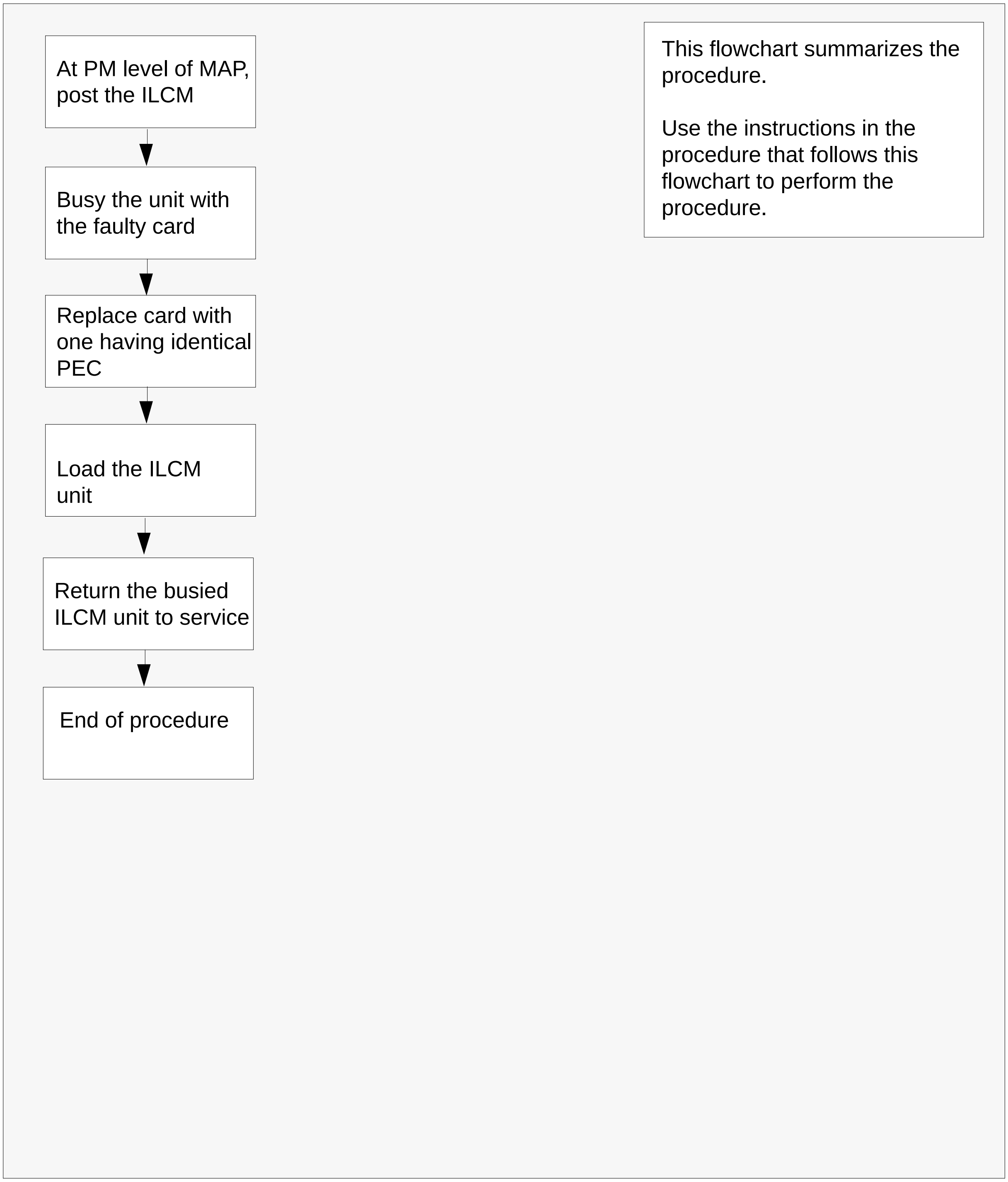
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X51
MCRU (continued)

Summary of card replacement procedure for NT6X51 card in an MCRU



Replacing an NT6X51 card in an MCRU

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 5; otherwise, continue with step 3.

At the MAP display

3 Access the PM level and post the ILCM by typing

>MAPCI;MTC;PM;POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
ILCM	is the number of the ILCM

4 Busy the ILCM unit containing the faulty card by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit	is the ILCM unit to be busied (0 or 1)

At the MCRU frame

5 Replace the NT6X51 card using the procedure *Replacing a card.* When the card has been replaced, return to this point.

6 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 7.

NT6X51
MCRU (continued)

7 Load the ILCM unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be loaded (0 or 1)

If	Do
message “loadfile not found in directory” is received	step 8
load passed	step 26
load failed	step 29

8 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 9
IOC disk	step 15
SLM disk	step 20

9 Locate the tape that contains the PM load files.

At the IOE frame

10 Mount the tape on a magnetic tape drive.

At the MAP display

11 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

NT6X51
MCRU (continued)

12 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files.

13 Demount the tape drive by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

14 Go to step 25.

15 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

16 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

17 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 15.

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

19 Go to step 25.

20 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

21 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

NT6X51
MCRU (continued)

22 List the SLM disk volume names by typing

>LV CM
and pressing the Enter key.

23 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 20.

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

25 Load the ILCM unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be loaded (0 or 1)

If	Do
load failed	step 29
load passed	step 26

26 Return the ILCM unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM busied in step 4 (0 or 1)

If RTS	Do
passed	step 27
failed	step 29

NT6X51
MCRU (end)

27 Send any faulty cards for repair according to local procedure.

28 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card.

Go to step 30.

29 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

30 You have successfully completed this procedure.

NT6X52
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X52	AA, AB	Digital Control Card (DCC)

Common procedures

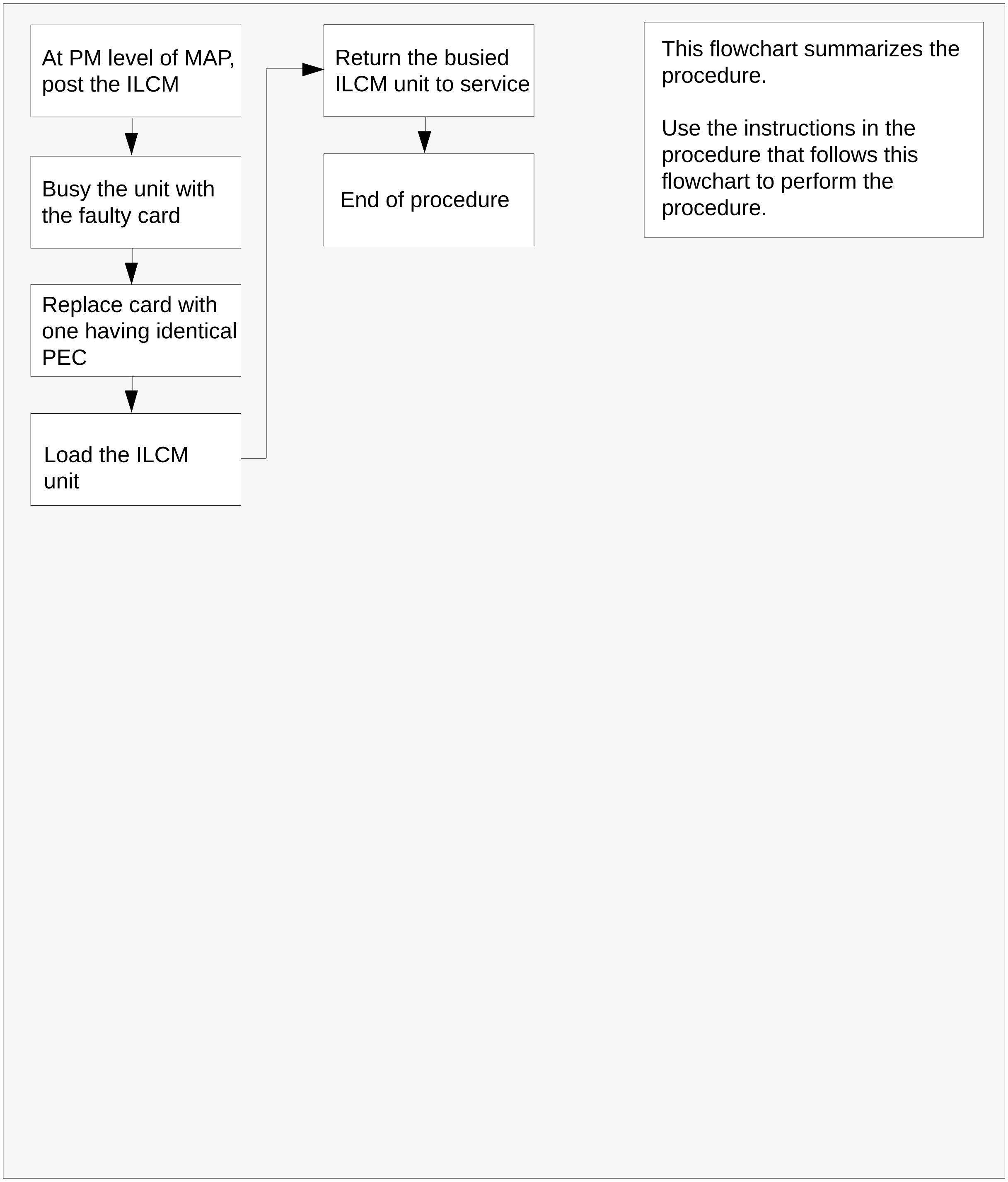
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X52
MCRU (continued)

Summary of card replacement procedures for an NT6X52 card in an MCRU



NT6X52
MCRU (continued)

Replacing an NT6X52 card in an MCRU

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 5; otherwise, continue with step 3.

At the MAP display

3 Access the PM level and post the ILCM by typing

>MAPCI;MTC;PM;POST ILCM site frame ILCM
and pressing the Enter key.

where

site is the site name of the MCRU
frame is the frame number of the MCRU (0 to 511)
ILCM is the number of the ILCM

4 Busy the ILCM unit containing the faulty card by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be busied (0 or 1)

At the MCRU

5 Replace the NT6X52 card using the procedure *Replacing a card*.

6 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 7.

7 Load the ILCM unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be loaded (0 or 1)

If	Do
message “loadfile not found in directory” is received	step 8
load passed	step 26
load failed	step 29

8 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 9
IOC disk	step 15
SLM disk	step 20

9 Locate the tape that contains the PM load files.

10 Mount the tape on a magnetic tape drive.

At the MAP display

11 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

12 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

NT6X52
MCRU (continued)

13 Demount the tape by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

14 Go to step 25.

15 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

16 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

17 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files obtained in step 15

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

19 Go to step 25.

20 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

21 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

22 List the SLM disk volume names by typing

>LV CM
and pressing the Enter key.

NT6X52
MCRU (continued)

23 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 20

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

25 Reload the ILCM unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be loaded (0 or 1)

If	Do
load failed	step 29
load passed	step 26

26 Return the ILCM unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM busied in step 4 (0 or 1)

If RTS	Do
passed	step 27
failed	step 29

27 Send any faulty cards for repair according to local procedure.

NT6X52
MCRU (end)

28 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card.

Go to step 30.

29 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

30 You have successfully completed this procedure.

NT6X53
MCRU

Application

Use this procedure to replace the following card in an MCRU

PEC	Suffixes	Name
NT6X53	AA, BA, CA	Power Converter Card (5V/15V)

Common procedures

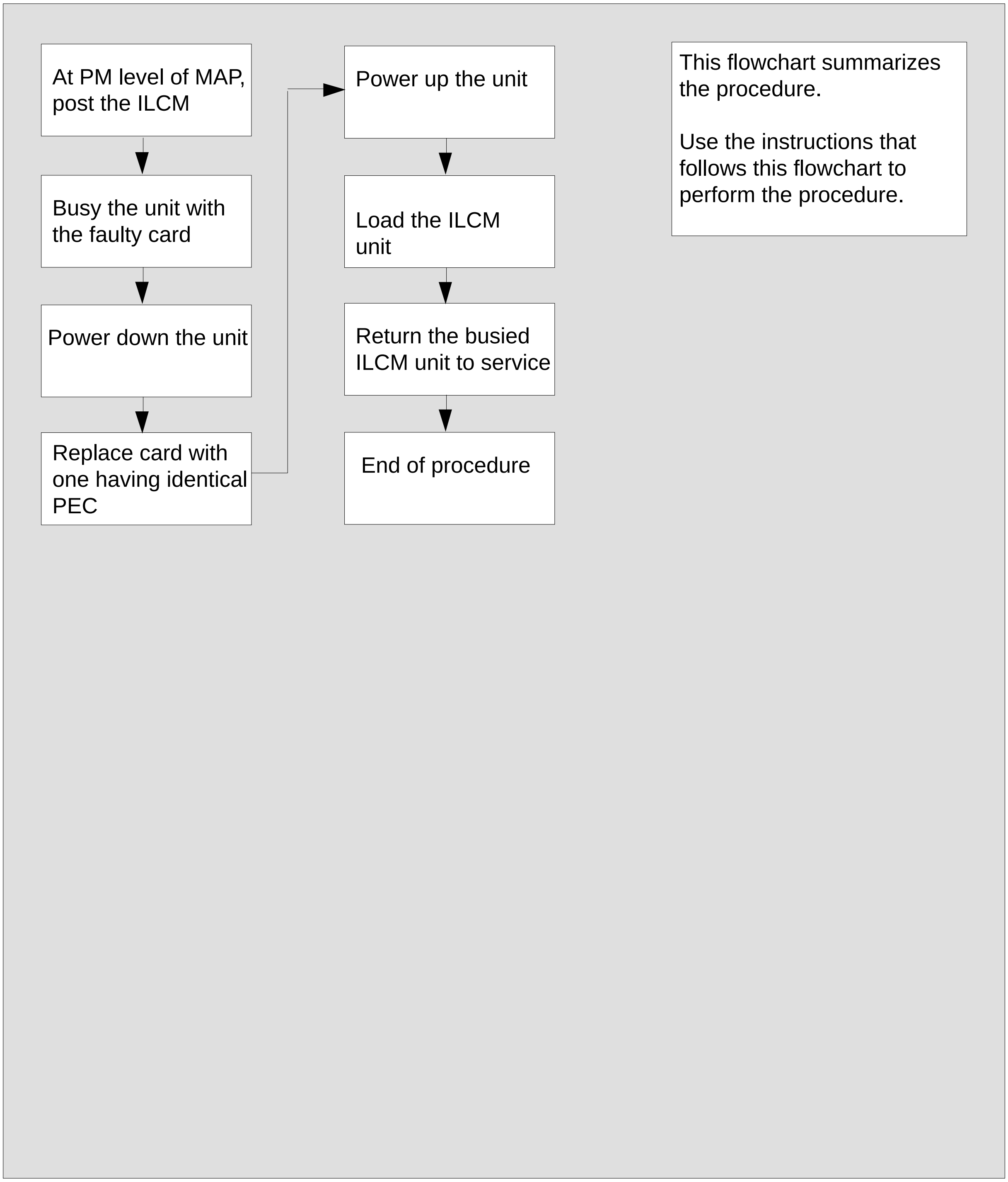
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X53
MCRU (continued)

Summary of card replacement procedure for NT6X53 card in an MCRU



Replacing an NT6X53 in an MCRU

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure to verify or accept cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP display

3 Access the PM level of the MAP and post the ILCM by typing

>MAPCI;MTC;PM;POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the name of the MCRU site
frame	is the frame number of the MCRU frame (0 to 511)
ILCM	is the number of the ILCM

Example of a MAP display:

```
 CM    MS    IOD    Net    PM   CCS   LNS   Trks    Ext    Appl
  .     .     .      .    1ILCM  .     .     .       .      .

ILCM            SysB     ManB     OffL    CBsy     ISTb      InSv
 0 Quit    PM    0        1        0        0        0       130
 2 Post_   ILCM   0        1        0        0        0         0
 3
 4 SwRg         ILCM   Rem1  OO 0 ISTb   Links_OOS: CSide 0 PSide 0
 5 Trnsl        Unit-0:  InSv  Mtce TakeOver    /RG:  0
 6 Tst          Unit-1:  SysB  Mtce             /RG:  0
 7 Bsy                               11 11 11 11 11 RG:Pref:0 InSv
 8 RTS          Drwr: 01 23 45 67 89 01 23 45 67 89    Stby:1 InSv
 9 OffL               .. .. .. .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT6X53
MCRU (continued)

4 Busy the ILCM unit containing the faulty card by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit (0 or 1) to be busied

Example of a MAP display:

```
 CM    MS    IOD    Net    PM   CCS   LNS   Trks    Ext    Appl
  .     .     .      .   1ILCM   .      .     .      .      .

 ILCM             SysB     ManB     OffL    CBsy     ISTb      InSv
 0 Quit    PM    0        1        0        0        0       130
 2 Post_   ILCM   0        1        0        0        0         0
 3
 4 SwRg          ILCM   Rem1  OO 0 ISTb   Links_OOS: CSide 0 PSide 0
 5 Trnsl         Unit-0:  InSv  Mtce TakeOver    /RG:  0
 6 Tst           Unit-1:  ManB  Mtce             /RG:  0
 7 Bsy                                 11 11 11 11 11 RG:Pref:0 InSv
 8 RTS           Drwr: 01 23 45 67 89 01 23 45 67 89    Stby:1 InSv
 9 OffL                .. .. .. .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the MCRU

5 Turn the circuit breaker OFF for the unit in which the power converter is being replaced. Use the table below to determine which FSP circuit breaker serves the unit.

Note: For the NTNX14AA cabinet the circuit breaker assignments are:

Circuit breaker	Unit FED	Locations
CB2	LCA 0	bay 0 slot 01
CB7	LCA 1	bay 0 slot 01

6 Replace the NT6X53 card as shown in the following figures.

7

WARNING
Card damage-transport
Take these precautions to protect the circuit cards from electrical and mechanical damage during transportation:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel of the ILCM. This protects the equipment against damage caused by static electricity.

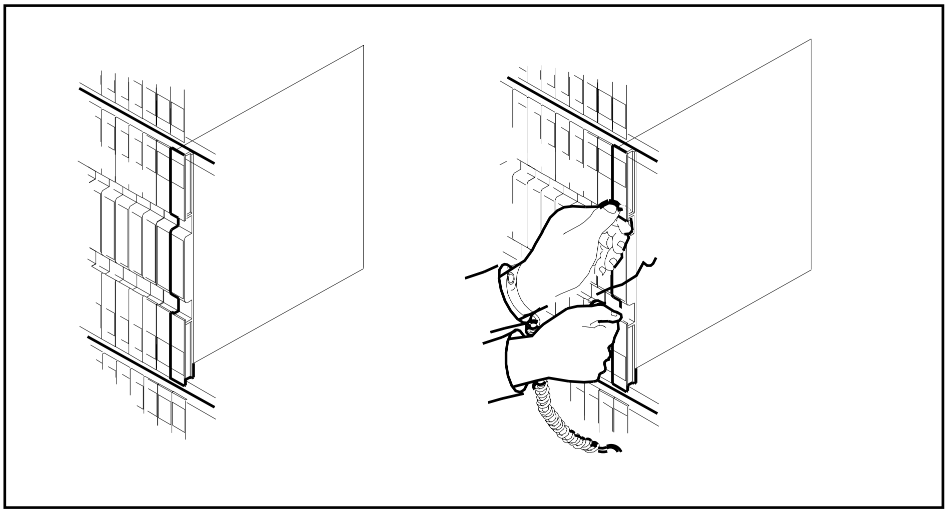
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

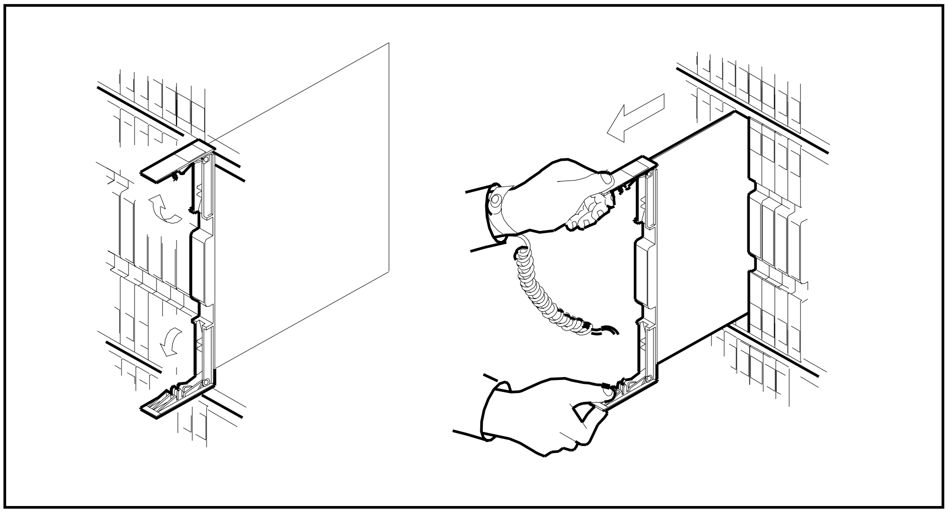
8 Remove the NT6X53 card as shown in the following figures.

NT6X53
MCRU (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card towards you until it clears the shelf.

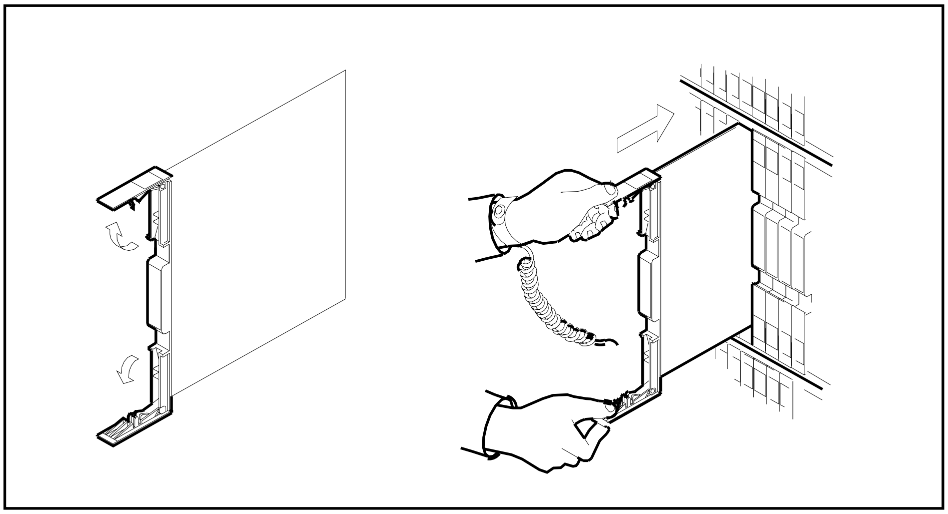


c. Ensure that the replacement card has the same PEC including suffix, as the card you just removed.

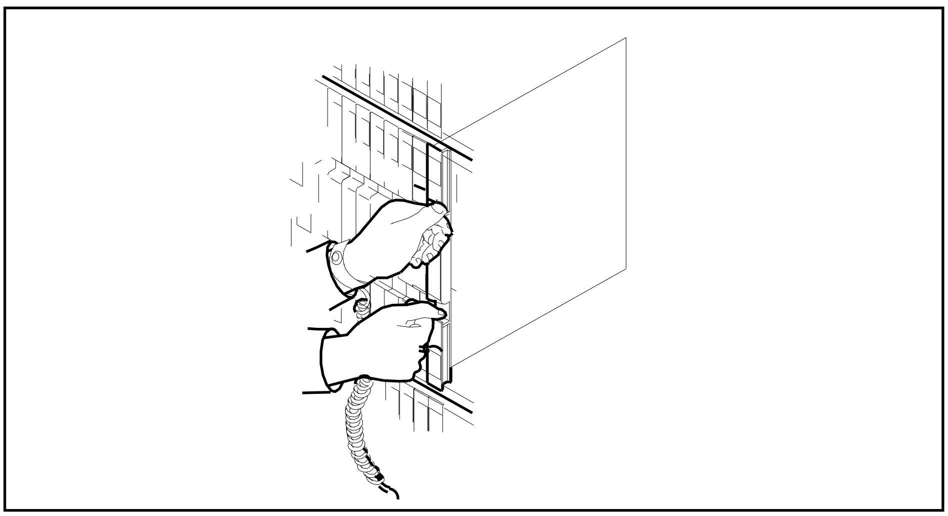
9 Open the locking levers on the replacement card.

NT6X53
MCRU (continued)

a. Align the card with the slots in the shelf and gently slide the card into the shelf.



10 Seat and lock the card.



a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

b. Close the locking levers.

NT6X53
MCRU (continued)

11 Power up the ILCM unit as follows:

1. Ensure that the power converter (NT6X53) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

2. Set the circuit breaker to the ON position. The converter fail LED and frame fail lamp on the FSP will be extinguished.

Determine the correct FSP switch for the shelf in which the power converter was replaced from the diagram below. The switches are numbered corresponding to the shelf position.

Circuit breaker	Unit FED	Locations
CB2	LCA 0	bay 0 slot 01
CB7	LCA 1	bay 0 slot 01

3. Turn the circuit breaker on for the unit with the new power converter.

a. The converter fail LED will be extinguished.

b. The frame fail lamp on the FSP will be extinguished.

12 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 13.

At the MAP display

13 Load the ILCM unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit (0 or 1)to be loaded

If	Do
message “loadfile not found in directory” is received	step 14
load passes	step 33
load fails	step 37

NT6X53
MCRU (continued)

14 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 15
IOC disk	step 21
SLM disk	step 26

15 Locate the tape that contains the PM load files.

At the IOE frame

16 Mount the tape on a magnetic tape drive.

At the MAP display

17 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

18 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files.

19 Release the tape drive from your user directory by typing:

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive mounted in step 17.

20 Go to step 31.

21 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

NT6X53
MCRU (continued)

22 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

23 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name	is the name of the volume that contains the PM load files, obtained in step 21.

24 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

25 Go to step 31.

26 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

27 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

28 List the SLM disk volume names by typing

>LV CM
and pressing the Enter key.

29 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name	is the name of the volume that contains the PM load files, obtained in step 26.

30 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

31 Load the ILCM unit by typing

>LOADPM UNIT ILCM_unit CC
and pressing the Enter key.

where

ILCM_unit   is the ILCM unit (0 or 1)to be loaded

If	Do
load failed	step 37
load passed	step 32

32 Use the following information to determine the next step in this procedure.

If you entered this procedure	Do
an alarm clearing procedure	step 36
other	step 33

tr
33 Return the ILCM unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit   is the ILCM (0 or 1) busied in step 4

If RTS	Do
passed	step 34
failed	step 37

34 Send any faulty cards for repair according to local procedure.

NT6X53
MCRU (end)

35 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card.

Go to step 38.

36 Return to the *Alarm Clearing Procedure* that directed you to this procedure. If necessary, go to the point where the faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

37 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

38 You have successfully completed this procedure.

NT6X54
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X54	AA	Bus Interface Card (BIC)

Common procedures

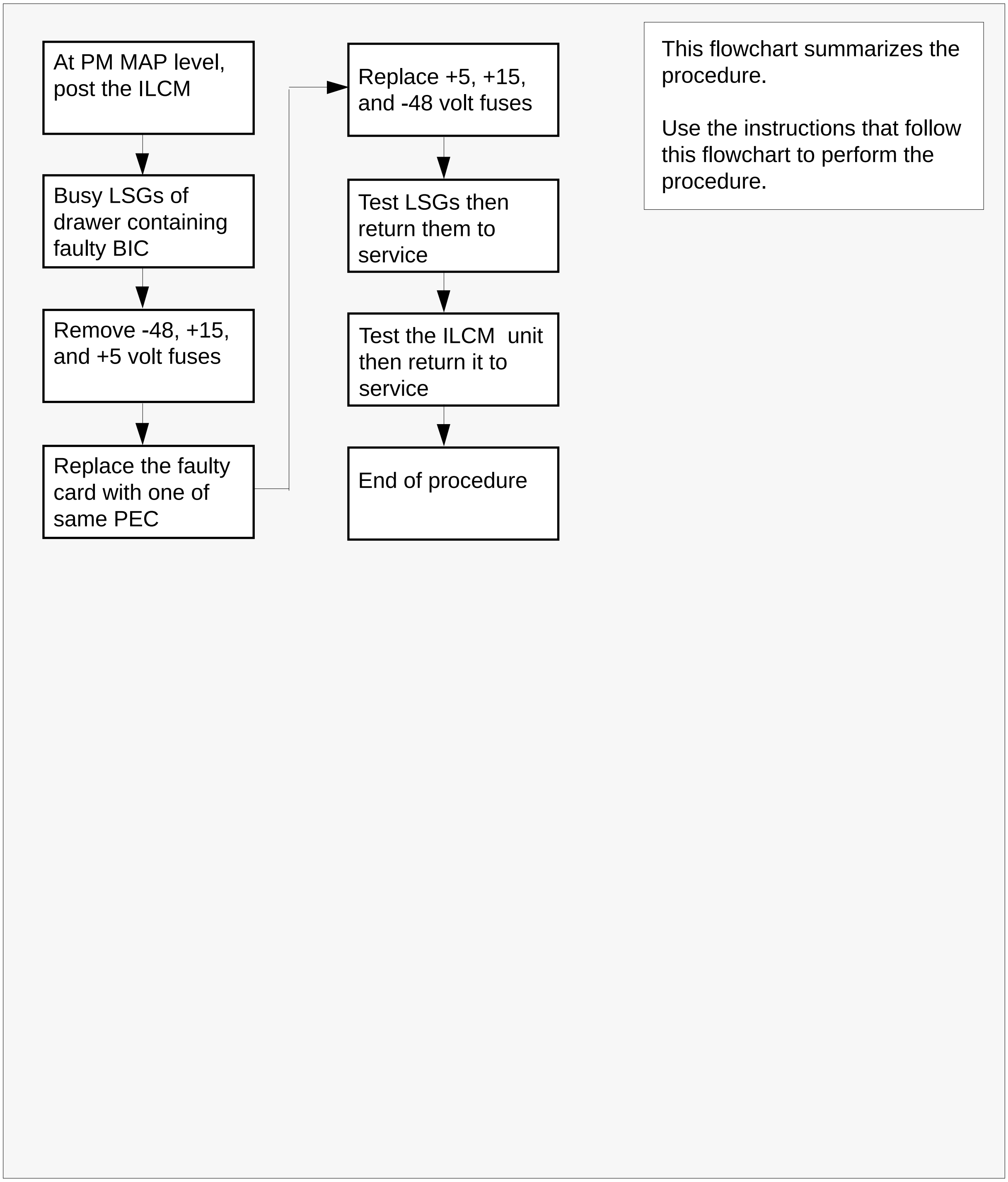
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X54
MCRU (continued)

Summary of card replacement procedures for an NT6X54 card in an MCRU



NT6X54
MCRU (continued)

Replacing an NT6X54 in an MCRU

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

3 If you were directed to this procedure from the *Alarm Clearing Procedures*, go to step 7. Otherwise, continue with step 4.

At the MAP terminal

4 Access the peripheral module (PM) level of the MAP display and post the MCRU by typing

>MAPCI;MTC;PM;POST MCRU site frame MCRU
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0-511)
MCRU	is the number of the ILCM

Example of a MAP response:

```
ILCM REM1 00 0  ISTb Links  OOS: Cside 0 Pside 0
Unit 0: InSv Mtce    /RG:0
Unit 1: InSv Mtce    /RG:1

Drwr: 01 23 45 67 89               RG:Pref 0 InSv
      .. .. SS .. ..               RG:Stby 1 InSv
```

5 Check the status of the affected drawer.

If the drawer status is	Do
S, O, C, I	step 6
M	step 7

NT6X54
MCRU (continued)

6 Busy both line subgroups associated with the MCRU drawer in which the card is being replaced by typing

>BSY DRWR lsg
and pressing the Enter key.

where

lsg is one of two line subgroups associated with the drawer

Example of a MAP response:

```
Please confirm ("YES" or "NO")
```

Confirm the system prompt by typing

>YES
and pressing the Enter key.

Repeat this step for the other line subgroup associated with the drawer.

At the MCRU

7 Remove the -48V fuse for the line drawer containing the faulty bus interface card.

8 Remove the +15V fuse for the line drawer containing the faulty bus interface card.

9 Remove the +5V fuse for the line drawer containing the faulty bus interface card.

10 Replace the NT6X54 card using the procedure *Replacing a card*.

11 Replace the +5V fuse for the line drawer containing the faulty bus interface card.

12 Replace the +15V fuse for the line drawer containing the faulty bus interface card.

13 Replace the -48V fuse for the line drawer containing the faulty bus interface card.

14 If you were directed to this procedure from the *Alarm clearing procedure* , return now to the main procedure that directed you here. Otherwise, continue with step 15.

At the MAP terminal

15 Test the line subgroups associated with the drawer by typing

>TST DRWR lsg
and pressing the Enter key.

where

lsg is one of two line subgroups associated with the drawer

Repeat this step for the other line subgroup associated with the drawer.

If TST	Do
passed	step 16
failed	step 22

16 Return the line subgroups to service by typing

>RTS DRWR lsg
and pressing the Enter key.

where

lsg is one of two line subgroups associated with the drawer

Repeat this step for the other line subgroup associated with the drawer.

If RTS	Do
passed	step 17
failed	step 22

17 Post the MCRU with the line concentrating array (LCA) shelf containing the replaced card by typing

>POST MCRU site frame MCRU
and pressing the Enter key.

where

site is the site name of the MCRU (alphanumeric)
frame is the frame number of the MCRU (0-511)
ILCM is the number of the ILCM

NT6X54
MCRU (end)

18 Test the MCRU unit by typing

>TST UNIT MCRU_unit
and pressing the Enter key.

where

MCRU_unit NT6X54	is the number of the ILCM unit associated with the new card.

If the TST	Do
passed	step 19
failed	step 22

19 Return the MCRU unit to service by typing

>RTS UNIT MCRU_unit
and pressing the Enter key.

where

MCRU_unit	is the number of the MCRU unit tested in step 18.

If the RTS	Do
passed	step 20
failed	step 22

20 Send any faulty cards for repair according to local procedure.

21 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

23 You have successfully completed this procedure.

NT6X60
HIE

Application

Use this procedure to replace the following card in a host interface environment (HIE).

PEC	Suffixes	Name
NT6X60	AA, AB, BA , AE	MCRU Ringing Generator (RG)

A summary of the card replacement procedure for the NT6X60 in a HIE is shown below. The procedure used to perform the task follows the flowchart.

Common procedures

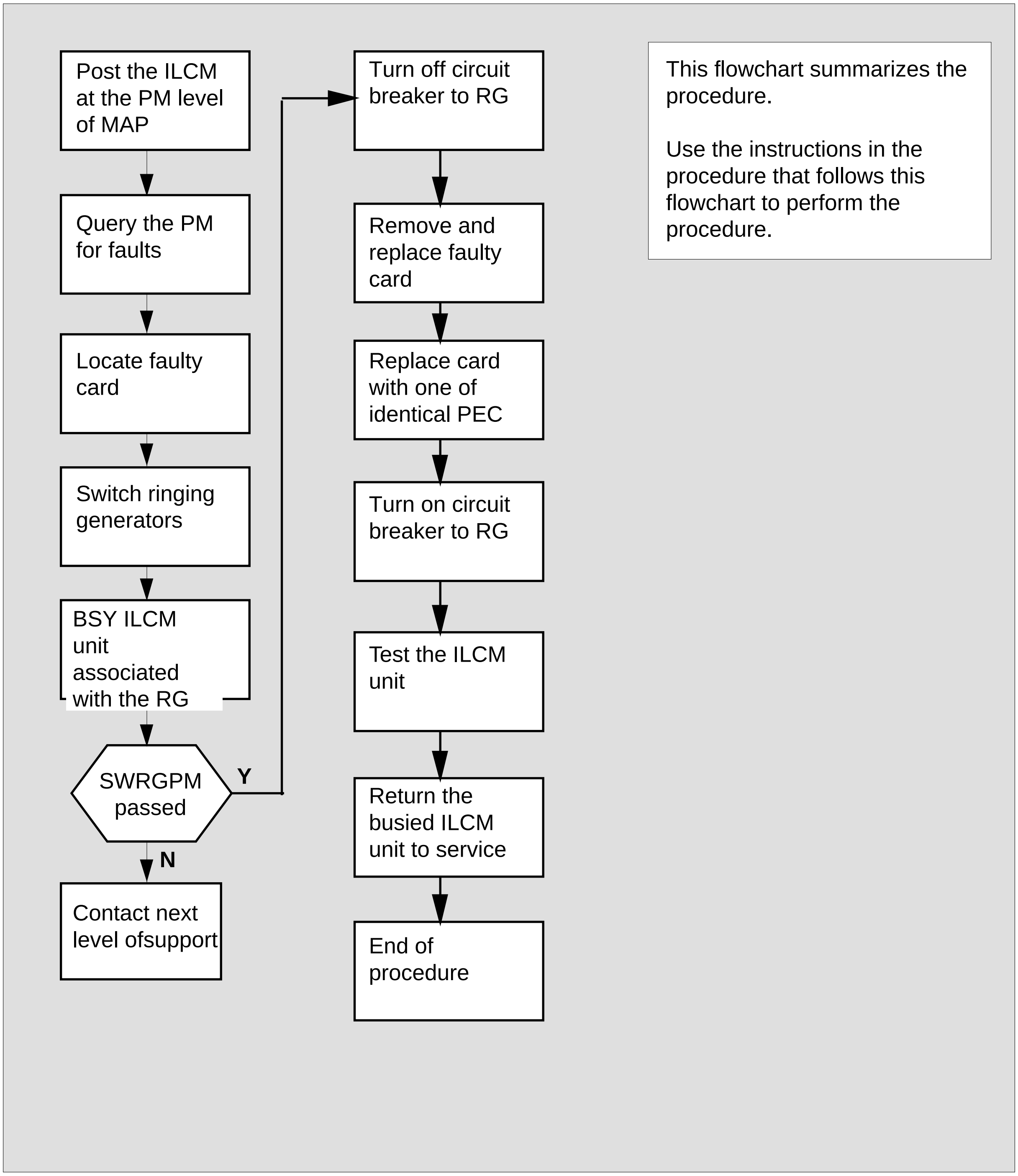
None

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X60
HIE (continued)

Summary of card replacement procedures for an NT6X60 card in an HIE



Replacing an NT6X60 card in an HIE

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC) including suffix, as the card that is to be removed.

At the MAP

3 Access the PM level and post the ILCM by typing

>MAPCI;MTC;PM;POST ILCM ILCM_site_name ILCM_frame_no ILCM_no
and pressing the Enter key.

where

ILCM_site_name is the name of the site at which the ILCM is located
ILCM_frame_nois the number of the frame in which the ILCM is located
ILCM_no is the number of the ILCM unit with the faulty card

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
    .     .     .      .   1ILCM    .      .      .       .      .

ILCM                    SysB     ManB     OffL     CBsy     ISTb   InSv
 0 Quit        PM        1        0        2        0        2     12
 2 Post_      ILCM        0        0        2        0        2      9
 3 ListSet
 4 SwRG     ILCM    REM1   14 1 ISTb  Links_OOS:  CSide  0   PSide  0
 5 Trnsl_   Unit0:   InSv               /RG: 1
 6 Tst_     Unit1:   InSv               /RG: 1
 7 Bsy_                         11 11 11 11 11  RG:Pref 1 ISTB
 8 RTS_     Drwr: 01 23 45 67 89 01 23 45 67 89     Stby 0 InSv
 9 OffL           .. .. .. .. .. .. .. .. .. ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT6X60
HIE (continued)

4 Check for fault indicators by typing

>QUERYPM FLT
and pressing the Enter key.

Example of a MAP display:

```
  CM    MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
   .     .      .       .     1ILCM    .       .        .        .       .

ILCM                   SysB      ManB      OffL      CBsy      ISTb    InSv
 0 Quit        PM       1         0         2         0         2      12
 2 Post_      ILCM       0         0         2         0         2       9
 3 ListSet
 4 SwRG     ILCM    REM1   14 1 ISTb  Links_OOS:  CSide  0   PSide  0
 5 Trnsl_   Unit0:   InSv               /RG: 1
 6 Tst_     Unit1:   InSv               /RG: 1
 7 Bsy_                       11 11 11 11 11  RG:Pref 1 ISTB
 8 RTS_     Drwr: 01 23 45 67 89 01 23 45 67 89     Stby 0 InSv
 9 OffL            .. .. .. .. .. .. .. .. .. ..
10 LoadPM_
11 Disp_
12 Next         QUERYPM FLT
13              Node inservice troubles exist:
14 QueryPM      One or both Units inservice trouble
15              ILCM    UNIT 0  Inservice
16              ILCM    UNIT 1  Inservice
17              Ringing Generator 1 failure
18
```

5 Switch ringing generator activity to the other NT6X60 card by typing

>SWRG PM
and pressing the Enter key.

If the SWRG PM	Do
passed	step 6
failed	step20

6 Busy the ILCM unit with the faulty card by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit to be busied (0 or 1)

At the MCRU

7 Turn OFF the circuit breaker for the ringing generator to be replaced by using the information in the following table:

Circuit breaker	Ringing Generator
CB1	RG-0
CB6	RG-1

8

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel of the ILCM. This protects the equipment against damage caused by static electricity.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

9 Remove the NT6X60 card as follows:

1. Locate the card to be removed on the appropriate shelf.
2. Open the locking levers on the card to be replaced and gently pull the card towards you until it clears the shelf.
3. Ensure that the replacement card has the same PEC including suffix, as the card you just removed.

10 Open the locking levers on the replacement card. Align the card with the slots in the shelf and gently slide the card into the shelf.

NT6X60
HIE (continued)

11 Seat and lock the card.

1. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.
2. Close the locking levers.

At the HIE frame

12 Turn ON the circuit breaker turned OFF in step 7.

13 Use the following information to determine the next step in this procedure.

If you entered this procedure	Do
from an alarm clearing procedure	step 19
from other	step 14

At the MAP terminal

14 Test the ILCM unit by typing

>TST UNIT ILCM_unit_no
and pressing the Enter key.

where

ILCM_unit_no is the number of the ILCM unit posted in step 3

Example of a MAP response:

```
Test Passed
```
or
```
Test Failed
```

If TST	Do
passed	step15
failed	step 20

NT6X60
HIE (continued)

15 Switch ringing generator activity to the new NT6X60 card by typing

>SWRG PM
and pressing the Enter key.

If SWRG PM	Do
passed	step 16
failed	step 20

16 Return the ILCM unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the number of the ILCM unit busied in step 6

If RTS	Do
passes	step 17
fai ls	step 20

17 Send any faulty cards for repair according to local procedure.

18 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 21.

19 Return to the *Alarm Clearing Procedure* that directed you to this procedure. At the point where the faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

20 Obtain further assistance in replacing this card by contacting personnel responsible for a higher level of support.

NT6X60
HIE (end)

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X71
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X71	AA	Data line card DMS-100/SL-100

Common procedures

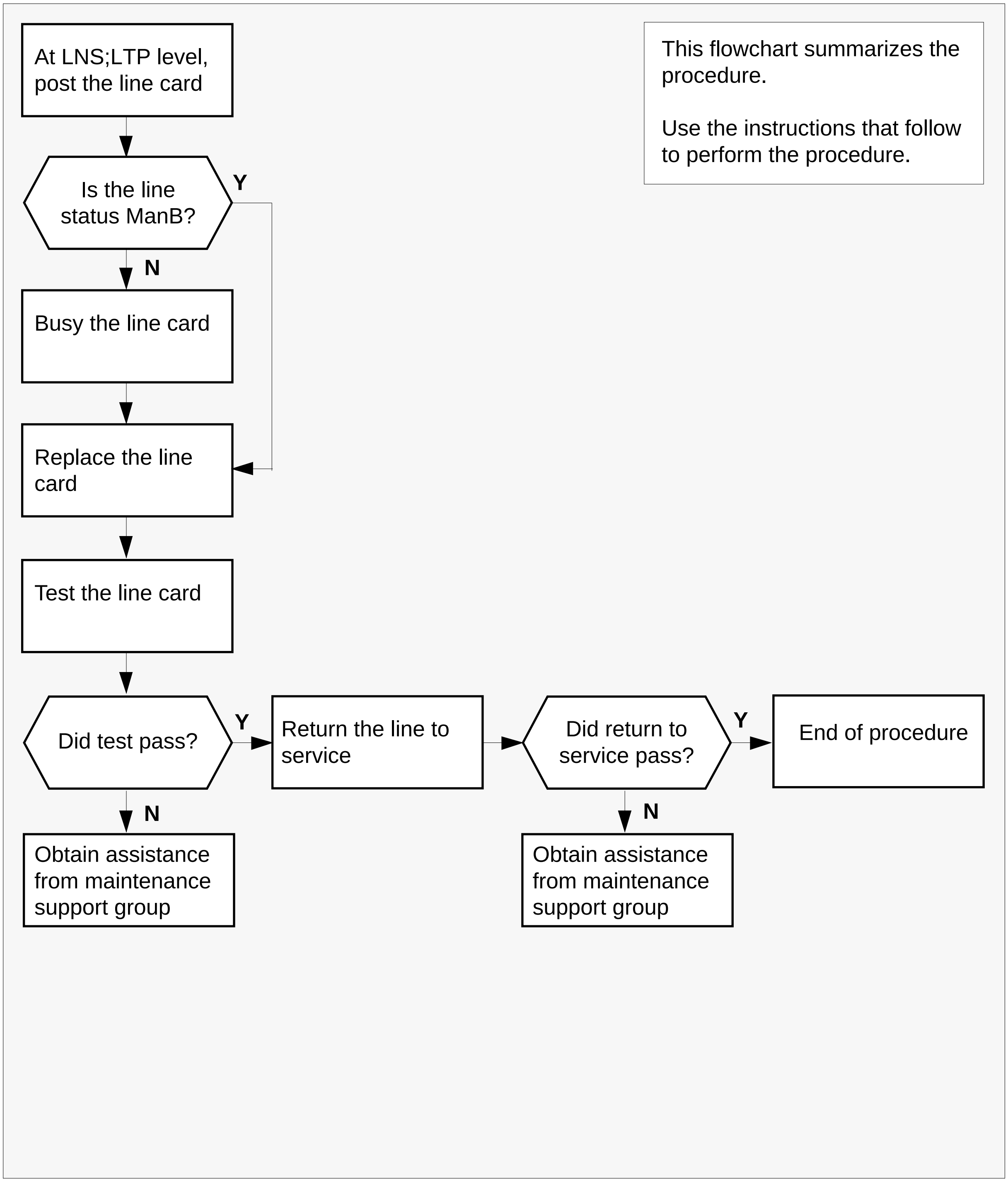
The procedure *Replacing a line card* is referenced in this procedure:

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X71
MCRU (continued)

Summary of card replacement procedures for an NT6X71 card in an MCRU



Replacing an NT6X71 card in an MCRU

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

2 Access the line test position (LTP) level of the MAP display and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt
and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP display:

```
LCC PTY RNG .....LEN..........  DN   STA F S LTA TE RESULT
IBN      REM1 00 0 03 03     7213355 MB
```

3 Check the status of the posted line.

If the line status is	Do
ManB	step 5
not ManB	step 4

4 Busy the line by typing

>BSY
and pressing the Enter key.

5 Go to the procedure *Replacing a line card*. When you have completed the procedure, return here.

NT6X71
MCRU (end)

At the MAP

6 Test the line card just replaced by typing

>DIAG

and pressing the Enter key.

If the DIAG	Do
passed	step 7
failed	step 10

7 Return the line card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 8
failed	step 10

8 Send any faulty cards for repair according to local procedure.

9 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 11.

10 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

11 You have successfully completed this procedure.

NT6X73
HIE

Application

Use this procedure to replace the following card in a host interface equipment (HIE) shelf.

PEC	Suffixes	Name
NT6X73	BA	Link Control Card (LCC)

Common procedures

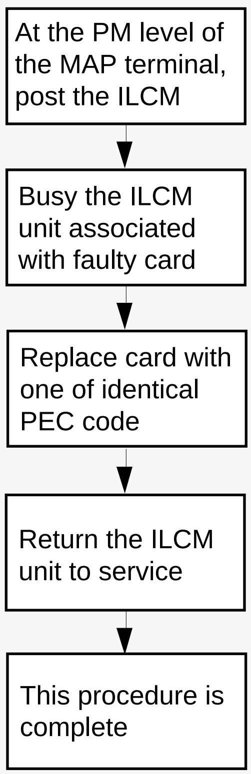
The procedure *Replacing a card* is referenced in this procedure:

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X73
HIE (continued)

Summary of card replacement procedures for an NT6X73 card in an HIE



This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

Replacing an NT6X73 card in an HIE

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

3 If you were directed to this procedure from another maintenance procedure, go to step 7. Otherwise, continue with step 4.

At the MAP terminal

4 Access the peripheral module (PM) level and post the line concentrating module (ILCM) by typing

>MAPCI;MTC;PM;POST ILCM site frame ILCM
and pressing the Enter key.

where

site	is the site name of the MCRU (alphanumeric)
frame	is the frame number of the MCRU (0 to 511)
ILCM	is the number of the ILCM

5 Use the following table to determine which ILCM unit is associated with the faulty NT6X73.

ILCM unit	LCC card	LCC slot
0	LCC0	17
1	LCC1	18

6 Busy the ILCM unit associated with the faulty NT6X73 by typing

>BSY UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the ILCM unit number (0 to 1)

At the HIE shelf

7 Replace the NT6X73 card using the procedure *Replacing a card*.

NT6X73
HIE (end)

8 If you were directed to this procedure from another maintenance procedure, return now to the alarm clearing procedure that directed you here; otherwise, continue with step 9.

At the MAP terminal

9 Return the busied unit to service by typing

>RTS UNIT ILCM_unit
and pressing the Enter key.

where

ILCM_unit is the MCRU unit busied in step 6

If RTS	Do
failed	step 12
passed	step 10

10 Send any faulty cards for repair according to local procedure.

11 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Proceed to step 13.

12 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

13 You have successfully completed this procedure.

NT6X74
RMM

Application

Use this procedure to replace the following card in an RMM.

PEC	Suffixes	Name
NT6X74	AB	RMM Control Card

Common procedures

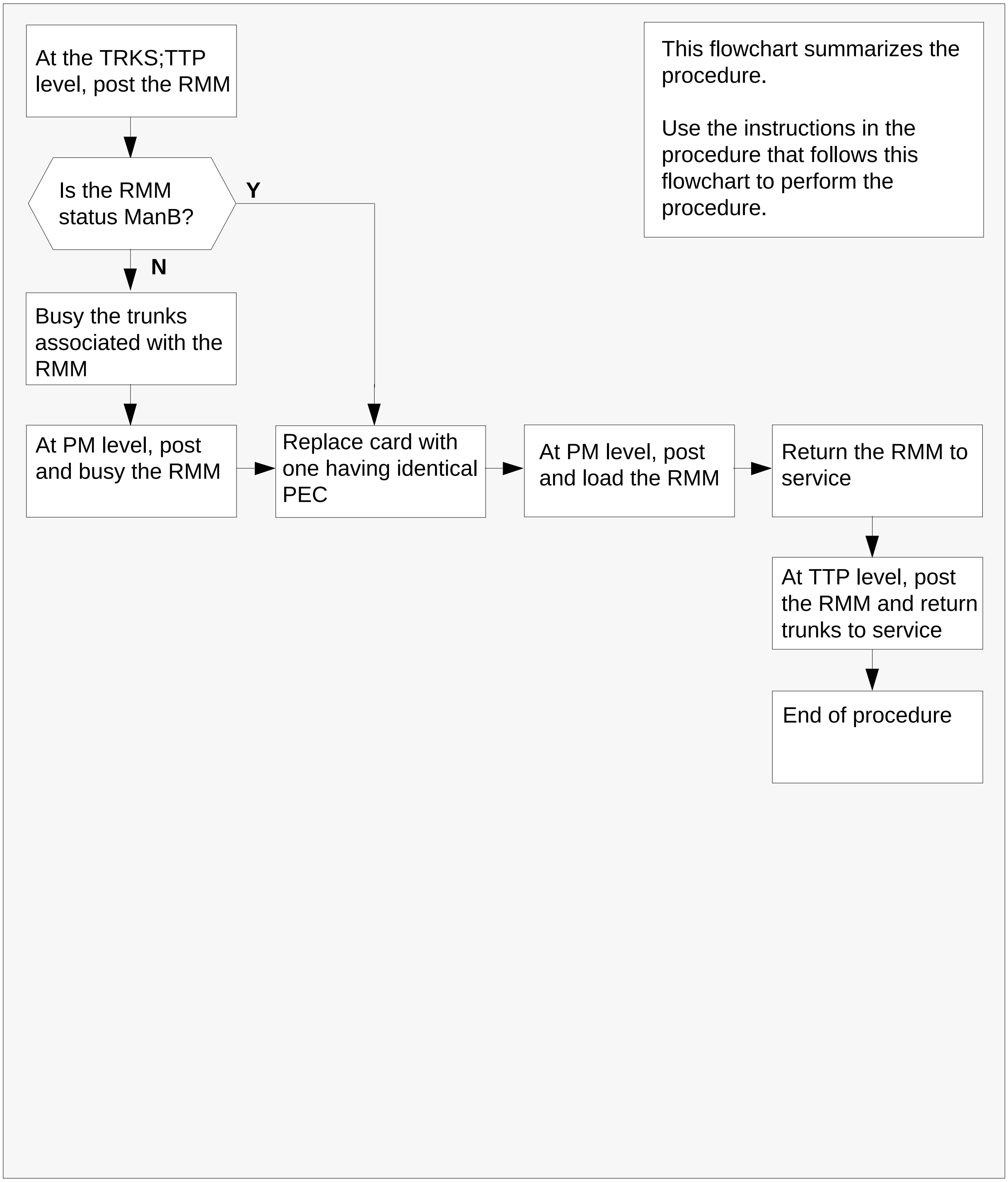
The procedure *Replacing a card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X74
RMM (continued)

Summary of card replacement procedures for an NT6X74 card in an RMM



NT6X74
RMM (continued)

Replacing an NT6X74 card in an RMM

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

2 If you were directed to this procedure from another maintenance procedure, go to step 8; otherwise, continue with step 3.

At the MAP display

3 Access the TTP level of the MAP and post the RMM that contains the card to be replaced by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

Example of a MAP response:

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  OTDA00
OK, CLLI POSTED

POST  20   DELQ       BUSY Q         DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG       STA S R DOT TE R
OG    MF RMM 0 0  OTWAON23DA00 2001   LO
                                     P_IDL
```

4 Check the status of the RMM.

If RMM status is	Do
MB, PMB, RMB	step 8
other	step 5

5 Busy the trunks that are associated with the card to be replaced by typing

>BSY ALL
and pressing the Enter key.

NT6X74
RMM (continued)

6 Go to the PM level of the MAP and post the RMM by typing

>PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

Example of a MAP response:

```
        SysB     ManB     Offl     CBsy     ISTb     InSv
PM         0        2        2        0        7       21
RMM        0        0        1        0        0        6

RMM     0    InSv
```

7 Busy the RMM by typing

>BSY
and pressing the Enter key.

At the RMM

8 Replace the NT6X74 card using the procedure *Replacing a card*. When the card has been replaced, return to this point.

9 If you were directed to this procedure from another maintenance procedure, return now to the procedure that directed you here and continue as directed; otherwise, continue with step 10.

At the MAP display

10 Load the RMM by typing

>LOADPM
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

If	Do
message “loadfile not found in directory” is received	step 11
load passed	step 27
load failed	step 32

NT6X74
RMM (continued)

11 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 12
IOC disk	step 17
SLM disk	step 22

12 Locate the tape that contains the PM load files.

13 Mount the tape on a magnetic tape drive.

14 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files

15 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files.

16 Demount the tape drive by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no   is the number of the tape drive containing the PM load files.

Go to step 27.

17 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

18 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

NT6X74
RMM (continued)

19 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 17.

20 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

21 Go to step 27.

22 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

23 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

24 List all disk volumes to user directory by typing

>LV CM
and pressing the enter key.

25 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 22.

26 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

27 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

If	**Do**
load failed	step 33
load passed	step 28

28 Return the RMM unit to service by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passed	step 29
failed	step 33

29 Go to the TTP level of the MAP and post the RMM by typing

>TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf in which the card is to be replaced

30 Return to service the circuits busied in step 5 by typing

>RTS ALL
and pressing the Enter key.

If RTS	**Do**
passed	step 31
failed	step 33

NT6X74
RMM (end)

31 Send any faulty cards for repair according to local procedure.

32 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 34.

33 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

34 You have successfully completed this procedure.

NT6X75
HIE

Application

Use this procedure to replace the following card in an HIE shelf.

PEC	Suffixes	Name
NT6X75	AA, EA	MCRU ESA Tone and Clock Card

Common procedures

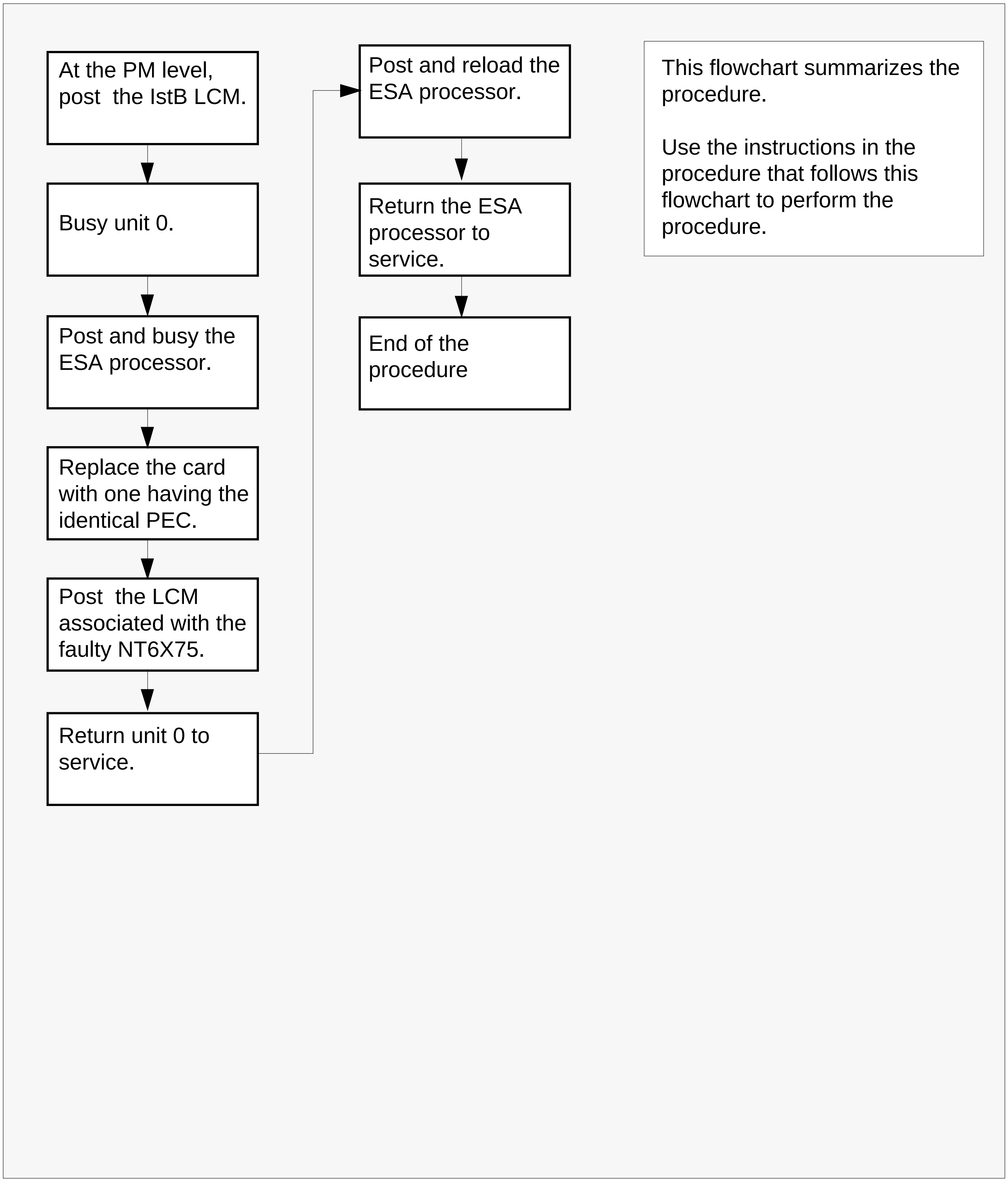
The procedure *Replacing a card* is referenced in this procedure:

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X75
HIE (continued)

Summary of card replacement procedures for an NT6X75 card in an HIE



Replacing an NT6X75 card in an HIE

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

3 If you were directed to this procedure from another maintenance procedure, go to step 10; otherwise, continue with step 4.

At the MAP display

4 Post the LCM associated with the faulty NT6X75 card by typing

>MAPCI;MTC;PM;POST LCM site frame lcm
and pressing the Enter key.

where

site	is the name of the location of the MCRU
frame	is the number of the MCRU
lcm	is the number of the LCM in the MCRU

5 Translate the links to the P-side peripherals by typing

>TRNSL P
and pressing the Enter key.

6 Post the Emergency Stand-Alone (ESA) processor by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no	is the number of the ESA processor identified in step 5.

NT6X75
HIE (continued)

7 Busy the ESA processor by typing

>BSY
and pressing the Enter key.

Example of a MAP response:

```
This action will take this PM out of service
Please confirm ("Yes" or "No")
```

Respond by typing

>YES
and pressing the Enter key.

8 Post the LCM associated with the faulty NT6X75 card by typing

>POST LCM site frame lcm
and pressing the Enter key.

where

site	is the name of the location of the MCRU
frame	is the number of the MCRU
lcm	is the number of the LCM in the MCRU

9 Busy unit 0 by typing

>BSY UNIT 0
and pressing the Enter key.

At the MCRU frame

10 Replace the NT6X75 card using the procedure *Replacing a card*. When you have completed the procedure, return to step 11 of this procedure.

11 If you were directed to this procedure from the *Alarm Clearing Procedures*, return now to the alarm clearing procedure that directed you here. Otherwise, continue with step 12.

At the MAP terminal

12 Return to service unit 0 by typing

>RTS UNIT 0
and pressing the Enter key.

If RTS	Do
passed	step 13
failed	step 36

13 Post the ESA processor identified in step 5 by typing

>POST ESA esa_no
and pressing the Enter key.

where

esa_no is the number of the ESA processor

14 Load the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	Do
message “loadfile not found in directory” is received	step 15
load passed	step 33
load failed	step 36

15 Determine the type of device on which the PM load files are located.

If load files are located on	Do
tape	step 16
IOC disk	step 22
SLM disk	step 27

16 Locate the tape that contains the PM load files.

At the IOE frame

17 Mount the tape on a magnetic tape drive.

At the MAP display

18 Download the tape by typing

>MOUNT tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

NT6X75
HIE (continued)

19 List the contents of the tape in your user directory by typing

>LIST T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

20 Demount the tape by typing

>DEMOUNT T tape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

21 Go to step 32.

22 From office records, determine and note the number of the input/output controller (IOC) disk and the name of the volume that contains the PM load files.

23 Access the disk utility level of the MAP by typing

>DSKUT
and pressing the Enter key.

24 List the IOC file names into your user directory by typing

>LISTVOL volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 22.

25 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

26 Go to step 32.

27 From office records, determine and note the number of the system load module (SLM) disk and the name of the volume that contains the PM load files.

28 Access the disk utility level of the MAP by typing

>DISKUT
and pressing the Enter key.

NT6X75
HIE (continued)

29 List the disk volume names for both S00D and S01D by typing

>LV CM
and pressing the Enter key.

30 List the SLM file names into your user directory by typing

>LF volume_name
and pressing the Enter key.

where

volume_name is the name of the volume that contains the PM load files, obtained in step 27.

31 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

32 Reload the ESA processor by typing

>LOADPM
and pressing the Enter key.

If	**Do**
load failed	step 36
load passed	step 33

33 Return the ESA processor to service by typing

>RTS
and pressing the Enter key.

If RTS	**Do**
passed	step 34
failed	step 36

34 Send any faulty cards for repair according to local procedure.

NT6X75
HIE (end)

35 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card.

Go to step 37.

36 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

37 You have successfully completed this procedure.

NT6X99
MCRU

Application

Use this procedure to replace the following card in an MCRU.

PEC	Suffixes	Name
NT6X99	AA	Data Bit Error Rate Tester Line Card

Common procedures

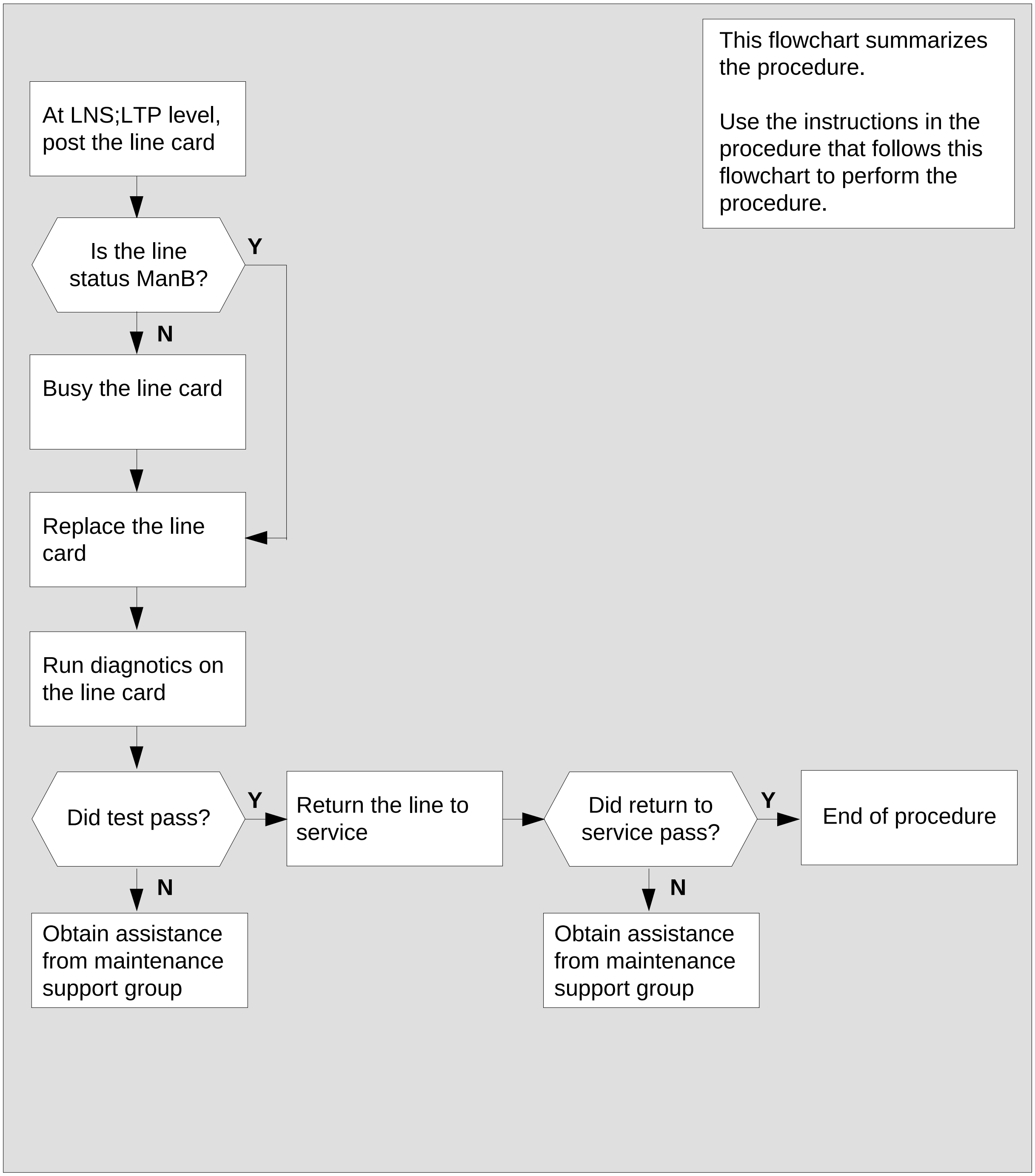
The procedure *Replacing a line card* is referenced in this procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X99
MCRU (continued)

Summary of card replacement procedure for an NT6X99 card in an MCRU



Replacing an NT6X99 card in an MCRU

1 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP display

2 Access the LTP level of the MAP and post the line associated with the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site ILCM lsg ckt
and pressing the Enter key.

where

site is the name of the site where the MCRU is located
ILCMis the number of the MCRU with the faulty card
lsg is the number of the line subgroup with the faulty card
ckt is the number of the circuit associated with the faulty card

Example of a MAP display:

```
LCC PTY RNG .....LEN..........DN   STA F S LTA TE RESULT
IBN         REM1 00 0 03 03  7213355 MB
```

3 Check the status of the posted line.

If the line status is	Do
manual busy (MB)	step 5
not MB	step 4

4 Busy the line by typing

>BSY
and pressing the Enter key.

5 Go to the procedure *Replacing a line card.* When you have completed the procedure, return to this point.

NT6X99
MCRU (end)

At the MAP display

6 Test the line card just replaced by typing

>DIAG
and pressing the Enter key.

If the DIAG	Do
passed	step 7
failed	step 10

7 Return the line card to service by typing

>RTS
and pressing the Enter key.

If the RTS	Do
passed	step 8
failed	step 10

8 Send any faulty cards for repair according to local procedure.

9 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 11.

10 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

11 You have successfully completed this procedure.

Replacing a line card

Application

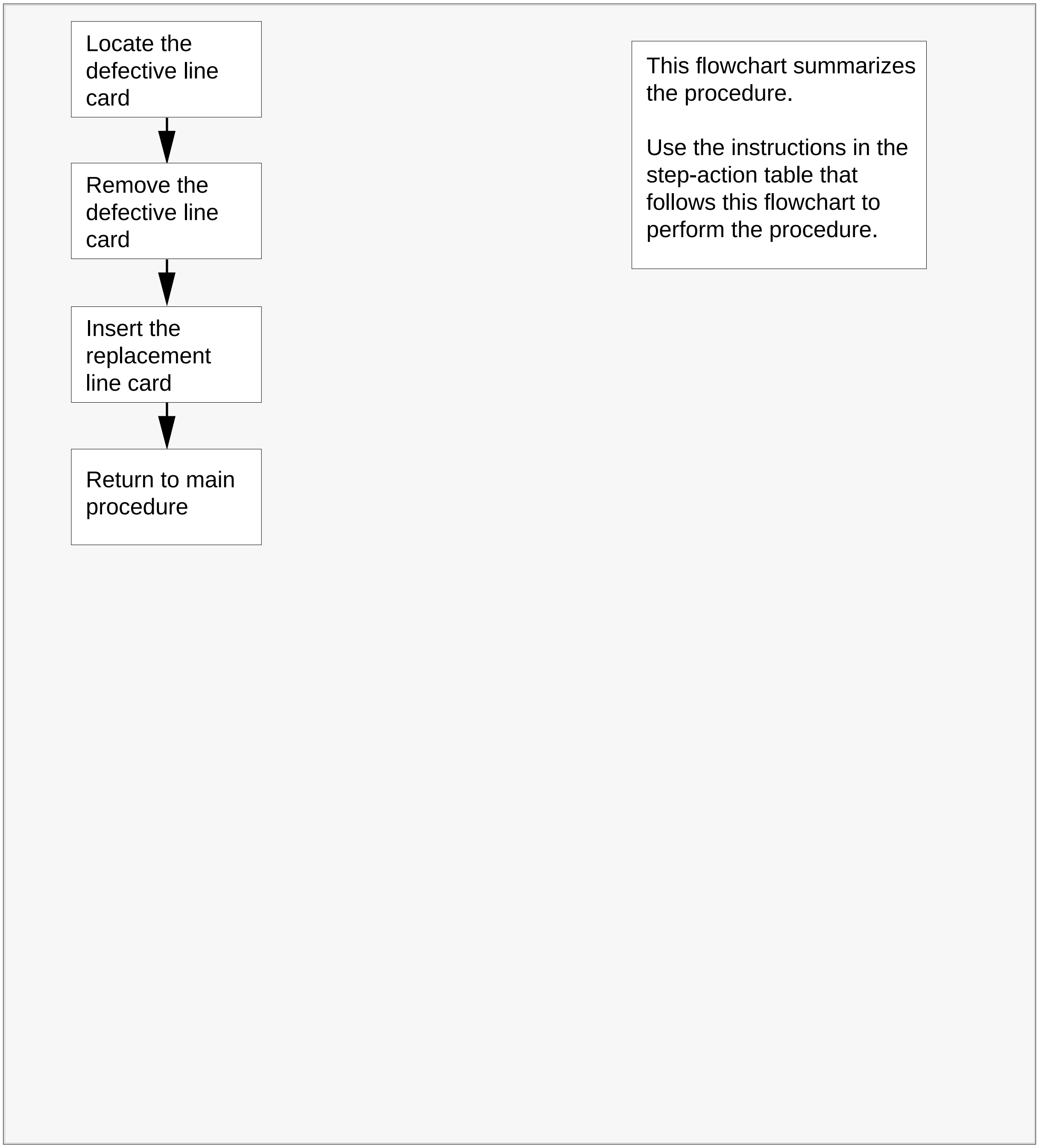
Use this procedure to unseat, remove, and reseat line cards if you have been directed from a maintenance procedure.

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

Replacing a line card
(continued)

Summary of procedure for Replacing a line card



Replacing a line card
(continued)

Replacing a line card

At your current location:

1

WARNING
Improper handling could possibly damage cards
Store and transport circuit cards in electrostatic discharge (ESD) protective containers to prevent electrical and mechanical damage. When handling circuit cards not in ESD protective containers, stand on a conductive floor mat and wear a wrist strap, connected through a 1-megohm resistor to a suitably grounded object such as a metal workbench or a DMS frame. (Refer to Northern Telecom Corporate Standard 5028.)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
•.Do not apply direct pressure to the components.
•.Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, refer to the note at the end of this procedure.

Replacing a line card
(continued)

Proceed only if you have been directed to this procedure from a step in a maintenance procedure. Using this procedure independently may cause equipment damage or loss of service.

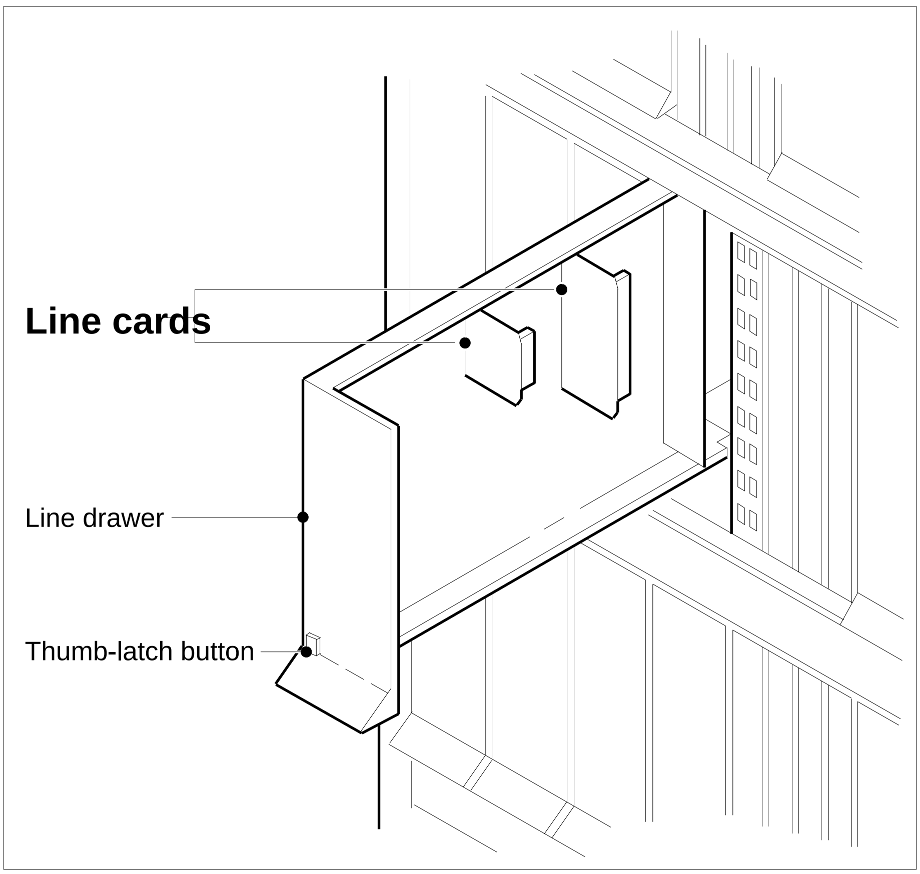
2 Locate the line drawer containing the line card to be removed.

3 Open the line drawer to prepare to remove the faulty card by following the steps below:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with the right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Ensure that a card shroud and line card extractor are available. (See note at end of this procedure.)



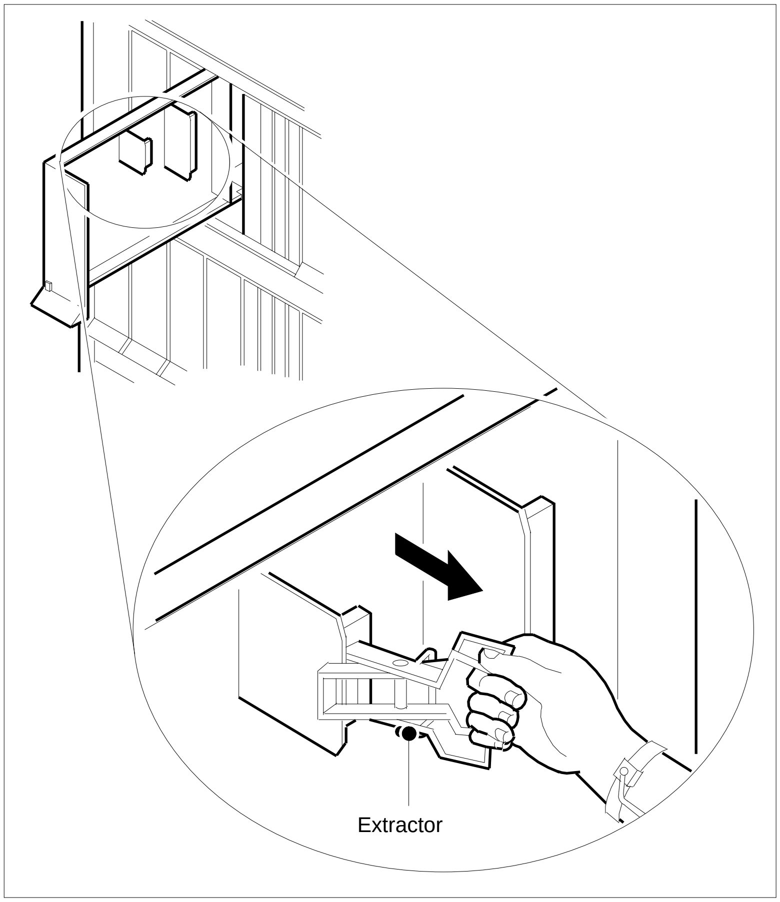
4 Remove the line card to be replaced by using the following steps:

Replacing a line card
(continued)

a. Slide a card shroud over the card to be removed and an adjacent card. (If there is not an adjacent card on either side, do not use the card shroud.)

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.



Step 4 continued...

d. Hold the front cover of the line drawer to steady it with your left hand.

e. Pull the extractor away from the drawer to unplug the card from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

Replacing a line card
(end)

g. Insert the removed card into an ESD container and store according to local procedures.

5 Verify that the product equipment code (PEC) on the nameplate of the removed card and of the replacement card is the same.

6 Replace the faulty card using the following steps:

a. Remove the replacement card from its ESD container.

b. Slide the card into the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

7 You have completed this procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Note: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds are as follows:

Line Card Insertion/Withdrawal Tool (3 in.)

QTH56A (Apparatus Code)

A0298291) (Common Product Code)

Line Card Insertion/Withdrawal Tool (6 in.)

QTH58A (Apparatus Code)

A0313317) (Common Product Code)

Card Removal Tool (3 in. or larger)

QTH57A (Apparatus Code)

A0298292 (Common Product Code)

Large grip tool for 4 inch or larger cards is NT tool ITA9953

Replacing a card

Application

Use this procedure to unseat, remove, and reseat cards.

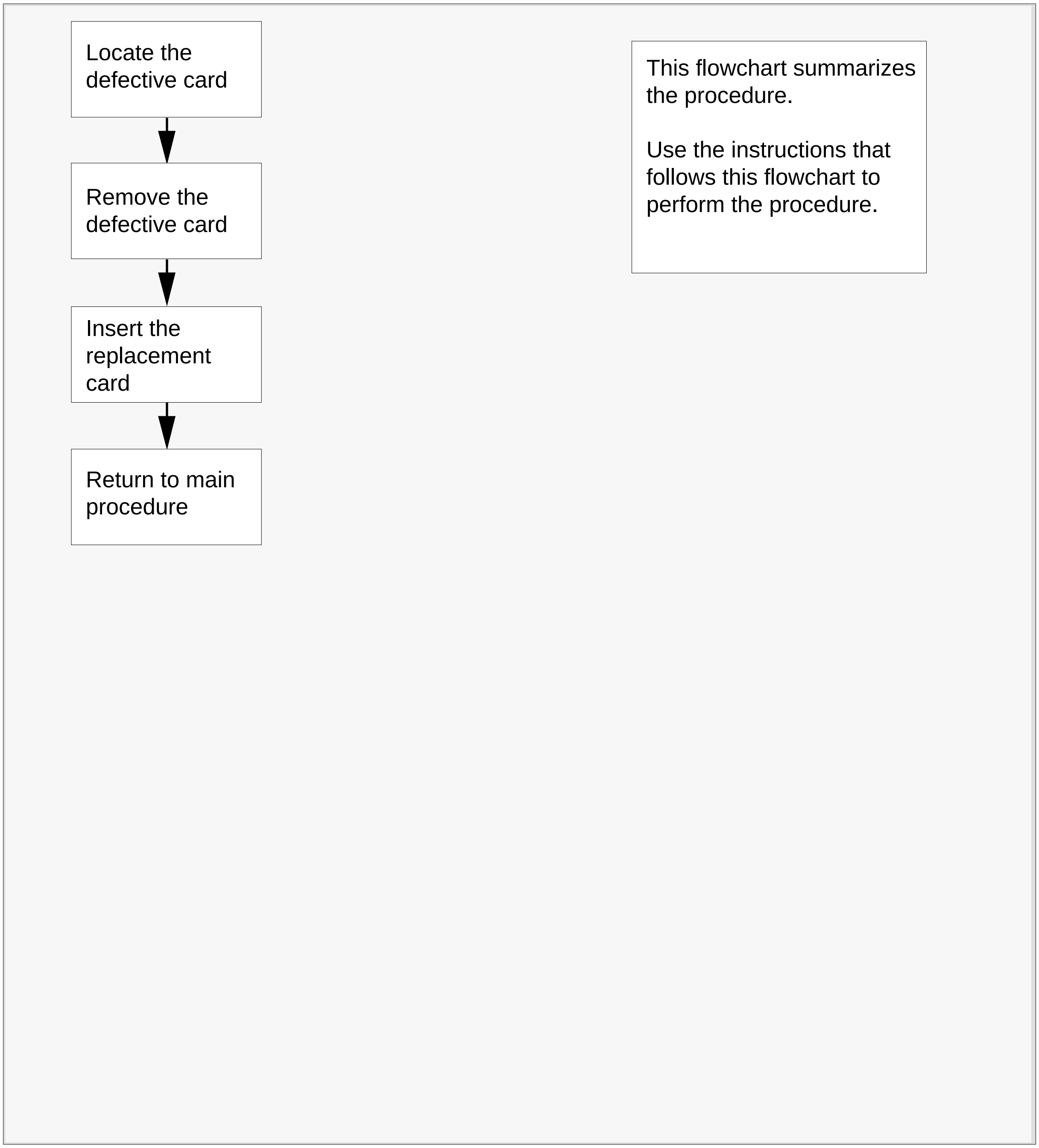
Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

Replacing a card

(continued)

Summary of common procedures for Replacing a card



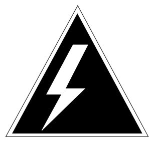
Replacing a card
(continued)

Replacing a card

At the frame supervisory panel:

1 Proceed only if you have been directed to this procedure from a step in a maintenance procedure. Using this procedure independently may cause equipment damage or loss of service.

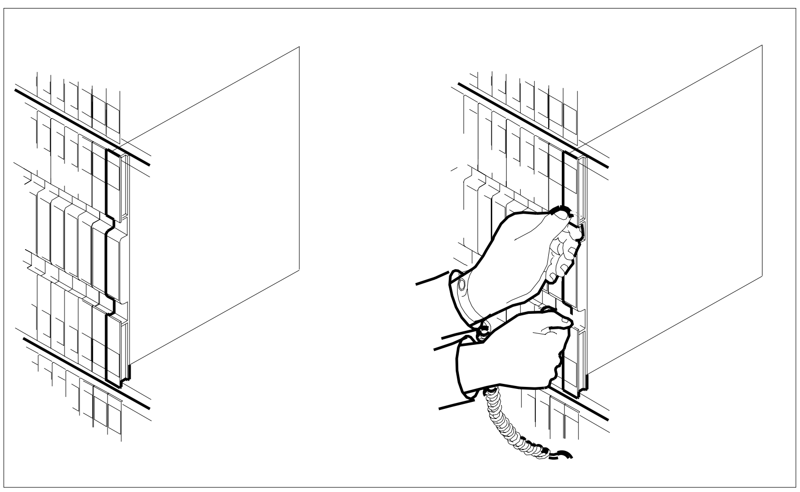
2



WARNING
Static electricity damage
Wear a wrist strap connected to the wrist strap grounding point on the frame supervisory panel (FSP) while handling cards. This precaution protects the cards against damage caused by static electricity.

Remove any cables from the faceplate of the card to be replaced and note the connector numbers.

3 Locate the card to be removed on the appropriate shelf if you have not already done so.

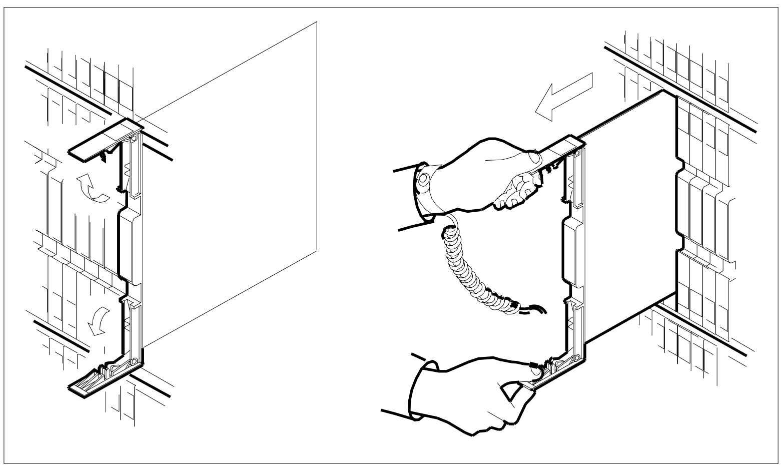


Replacing a card
(continued)

4

WARNING
Do not hold card by levers only
Holding a card by the levers only may result in lever breakage. Once the card has been pulled half way out of the shelf, carefully grasp the card underneath for more secure support and continue to remove the card from the shelf. Avoid touching any wires or internal parts on the card.

Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



5 Examine the switch settings (if any) of the card just removed. Ensure that the switch settings on the replacement card match those of the card being replaced.

6 Place the card you have removed in an electrostatic discharge (ESD) protective container.

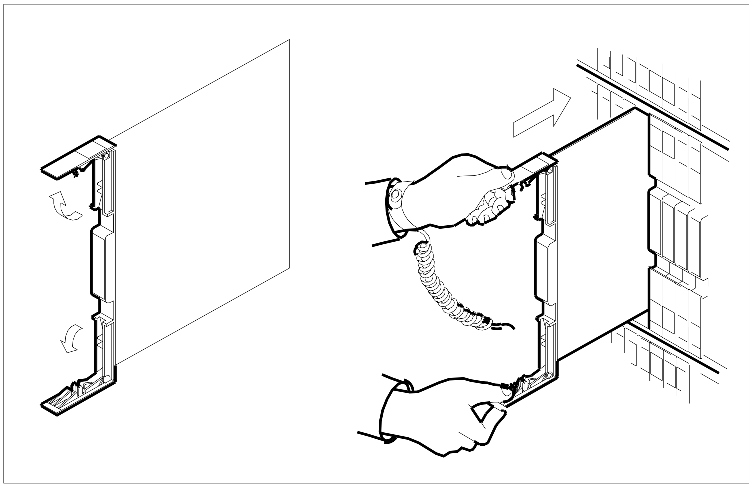
7 Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card you just removed.

8

WARNING
Improper insertion may damage circuit packs
Do not apply direct pressure to the components.
Do not force the cards into the slots.

Replacing a card
(continued)

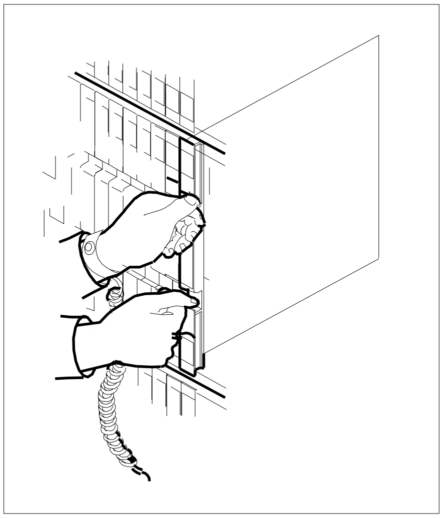
Open the locking levers on the replacement card. Align the card with the slots in the shelf and gently slide the card into the shelf.



9 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

b. Close the locking levers.



10 Reconnect any previously removed cables to the faceplate of the replacement card.

Replacing a card
(end)

11 You have completed this procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Trouble isolation and correction

Description of troubleshooting procedures

This trouble isolation and correction section is intended for use by maintenance engineering and field maintenance personnel who already have a basic knowledge of the MSL-100 Family of switches and of the Meridian Cabinetized Remote Unit (MCRU). It is not to be used by operating company personnel who need specific, step-by-step procedures when performing maintenance tasks.

Basic troubleshooting procedures consist of the following:

- fault locating and clearing
- fault isolation tests
- diagnostic tests
- product-specific test tools

Performance indicators

The first step in locating faults is to examine the performance indicators the system routinely generates. The existence of fault conditions is indicated by operational measurements (OM), log reports, and alarms.

Operational measurements

OMs are a data collecting system that tracks certain types of events and how often they occur. The OM data give an overall indication of performance and usage and are an excellent means for detecting both actual and potential system troubles. The OM thresholding feature should be used to monitor and report key MCRU activity. These reports should be made routinely (daily or weekly) and should be the primary method of trouble detection. See *Operational Measurements Reference Manual* for more information about the OMs that are specific to the MCRU.

Log reports

Logs, used primarily as an analysis tool, provide detailed information on call errors, diagnostic results, and system status. They are also good indicators of trouble conditions, especially when any of the following conditions exist:

- sudden increase in volume of logs

- message not printed reports
- large number of similar logs

Alarms

Audible and visual alarms indicate that something requires corrective action. Proper performance of routine system maintenance and use of OMs and logs should minimize the occurrence of alarms.

Alarm severity and corresponding urgency for corrective action is indicated by the level of the alarm, and is expressed as minor, major, or critical. The following table describes alarm conditions.

Alarm description

Alarm	MAP display	Description
Minor	(blank)	Usually non-service affecting
Major	(M)	Usually indicates a service-degrading condition
Critical	(*C*)	Usually indicates a service outage or potential service outage

The following guidelines are followed when responding to alarms:

- When more than one alarm of the same severity is displayed on the MAP display screen, clear the alarms from the left of the screen to the right.
- If, while fixing an alarm, an alarm of greater severity occurs, respond to the new alarm. Do not continue attempts to clear the less severe alarm.

For alarm clearing procedures, see *Alarm Clearing Procedures*.

Locating and clearing faults

The standard troubleshooting steps for locating and clearing faults follow:

1. Silence audible alarms caused by the system when alarm conditions are detected.
2. Isolate the fault by reading status displays and tracing fault codes to the menu level needed to clear the fault.
3. Busy the hardware to remove system access to the faulty component. This allows maintenance activity to be performed without system interference.
4. Test the faulty component and identify the card to be replaced. Replace the faulty card and test it again.

5 Return the hardware to service.

Fault isolation tests

When a fault condition is detected in the MCRU, a maintenance action is required. Fault isolation tests are used to determine which component is causing the fault and to correct the fault condition or report it to the appropriate maintenance support organization. The following sections list the procedures involved in isolating and correcting faults with specific MCRU components.

Faulty line drawer

To handle a faulty line drawer:

1 Post, busy, test, and RTS the drawer.

2 If a test or RTS fails with a card list, replace the cards with an appropriate card replacement procedure and test and RTS the drawer.

3 If a test or RTS fails without a card list, perform the appropriate tests that are indicated by the MAP response and RTS the drawer.

Faulty shelf circuit pack

To handle a faulty shelf circuit pack:

1 Post the line concentrating module (ILCM).

2 Determine if there are any fault indicators.

3 Busy the unit with the faulty card.

4 Perform the appropriate card replacement procedures.

5 Test and RTS the ILCM unit.

Faulty line card

During line card diagnostics, if a single card fails the card causes an entire ILCM unit to fail. Finding the single faulty card can be difficult. Usually only one unit of the ILCM is affected. There are two procedures that are useful in identifying the faulty card.

Perform procedure 1 during a maintenance window to avoid possible service interruptions. Experienced technicians can perform this procedure during the day if proper precautions are taken.

Procedure 1

1 Find the vertical connection to the ILCM in trouble. Use table MTAVERT.

2 Carefully use a buttset on the backplane of the MTADRIVER.

Operating company personnel may hear the following things:

- dial tone-In this case, operating company personnel have drawn dial tone from a 6X17 card. Dial the operator and ask what number you are on, which will be your faulty line.
- 8khz tone-This is a data line card 6X71 or 6X76.
- talk battery-If possible, try hooking up a proprietary phone and calling the operator to see what directory number (DN) is being used.

Perform procedure 2 during a maintenance window to avoid possible service interruptions. Experienced technicians can perform this procedure during the day if proper precautions are taken.

Procedure 2

1 Access the line test position (LTP) level of the MAP display and post any line equipment number (LEN) located on the faulty ILCM.

2 Put a tone on the posted LEN, and go to the mainframe with the buttset and listen to all other LENS on the ILCM.

Note: Operating company personnel will find two LENS with tone; one will be the LEN originally posted at the LTP level. The second will be the faulty line card.

Faulty PCM-30 link

To handle a faulty PCM-30 link:

1 Post the MCRU.

2 Determine if there are any fault indicators.

3 Display the central side (C-side) links.

4 Post the host XMS-based peripheral module (XPM) and determine the peripheral module (PM) state of the host XPM.

5 If the host XPM is in service (InSv), display peripheral side (P-side) links, busy, test, and RTS the host XPM.

6 If the host XPM is in service trouble (ISTb), busy and test the host PM in search of the appropriate card list.

7 Perform the appropriate card replacement procedures.

8 RTS the host XPM.

Faulty ringing generator (RG) frequency generator circuit

To handle a faulty RG frequency generator circuit:

1. Test the RG.
2. If the test fails, replace the RG.

Load file mismatch

To handle a load file mismatch:

1. Post the MCRU.
2. Use the QUERYPM command to display the PM load that resides in the MCRU.
3. Determine the correct MCRU PM load.
4. Correct table LCMINV if the table has the wrong PM load for the MCRU.
5. If the table has an incorrect PM load for the MCRU, obtain the correct PM load and reload the MCRU.

Diagnostic tests

Bit error rate performance testing

Bit error rate performance (BERP) tests are used for testing transmission paths through the network and providing the operating company with a tool for assessing the bit error performance of the MSL-100 switch and its subtending nodes. BERP testing is provided with feature package NTX881AB and requires the NT6X99AA IBERT line card provisioned in the ILCM of the MCRU.

The BERP test is composed of many individual bit error rate tests (BERT). Operating company personnel perform a BERT by connecting an integrated bit error rate tester (IBERT) either to itself or to a specified endpoint, such as a data line card (DLC), and transmitting a known bit pattern. This bit pattern is reflected back to the IBERT and compared to what was sent. Any errors in the returned bit stream are recorded. The results of these individual BERTs comprise the result of the BERP test.

The BERP test is accessed from the maintenance (MTC) level of the MAP terminal. Commands at the BERP level are used to set up tests continuously or for a fixed duration.

Link testing

BERP testing can be performed on the PCM-30 links connecting the host controller to the MCRU. To perform the BERP test on a PCM-30 link, it is necessary to have a loopback at some point on the transmission path. The PCM-30 loopback is at the P-side of the host XPM, and all 30 channels on the DS-link are looped back. When a PCM-30 loopback is used, the PCM-30 link being tested must be removed from service.

XPM bit error ratio test

The host XPM performs the XPM bit error ratio test (XBERT) for the MCRU subsystem. XBERT is a diagnostic test that does the following:

- detects and measures pulse code modulation (PCM) bit errors that occur in XPM and MCRU cards
- commissions PCM-30 and PCM-30 links and trunks that are physically looped back at the remote end without the use of a remote node

XBERT detects bit errors in the transmission of high-speed data in the cards of the host XPM, which in this case is a PCM-30 line group controller (PLGC), remote cluster controller (RCC), and cards in the MCRU. XBERT testing is provided with feature package NTX885AA and requires the NT6X99AA IBERT line card provisioned in the ILCM of the MCRU.

Note: To use XBERT, the XPM must be equipped with an NT6X69AB message protocol card or an NT6X69AA message protocol card with an NT6X79 tone card.

Test conditions

For accurate fault detection, the XBERT tests are run on an active in-service XPM unit. They can also be run on an out-of-service unit. At least one unit of the MCRU must be in service.

Note: XBERT should not be used as a tool for providing accurate bit error ratio assessments. It does not use the CCITT standard test patterns in its test procedure. Instead, it uses XPM tone PCM to provide the 64-kbps test bit stream.

Test types

XBERT runs two tests, with the use of the Initiate (I) command, which specifically involve the MCRU. The test names and their corresponding cards are shown in the following table.

XBERT tests

Test name	Related cards
XBERTDCC	NT6X44, NT6X27, NT6X69, NT6X52, NT6X73
XBERTBIC	NT6X44, NT6X27, NT6X69, NT6X52, NT6X54, NT6X73

The isolate command automatically runs tests to isolate a fault to a particular set of cards. The number of cards in its card list can vary from one to three depending on the individual test results.

The P-side ports of the XPM or the MCRU bus interface cards (BIC) can be tested sequentially by one manual request.

Test XBERTDCC (digroup control cards)

For testing the digroup control cards (DCC), the XPMDCC test path travels through the following cards:

- Message card (NT6X69)
- Timeswitch card (NT6X44)
- PCM-30 interface card (NT6X27)
- DCC (NT6X52)
- Link control card (LCC) (NT6X73)

XBERTDCC sets up the test path by attempting to establish a looparound of a manually specified P-side port at the MCRU DCC. If the attempt is unsuccessful, a response is displayed and the test is aborted. If the MCRU looparound is successfully allocated, the test is run.

Test XBERTBIC (bus interface cards)

For testing BICs, the XBERTBIC test path travels through the following cards:

- Message card (NT6X69)
- Timeswitch card (NT6X44)
- PCM-30 interface card (NT6X27)
- LCC (NT6X73)
- DCC (NT6X52)
- BIC (NT6X54)

XBERTBIC sets up the test path by attempting to establish a looparound of the manually specified P-side port at an MCRU BIC. With BIC, the test loop to terminate must be manually specified. If the attempt is unsuccessful, a response is displayed and the test is aborted. If the NT6X54 looparound is successfully allocated, the test is run.

Entering XBERT

The XBERT level can be entered at any level of the MAP terminal. The user enters one of the following commands:

- XBERT <<PM>> <<PM#>>
- XBERT N <<node#>>

By entering the command XBERT N <<node#>>, the user is entering XBERT through the PMs node-assignment number. Node-assignment numbers are found in table NNASST or by posting the PM to be tested at the PM MAP display level using the QUERYPM command.

Lines maintenance

Line circuits, subscriber loops, and stations are tested under the lines maintenance (LNS) subsystem. Line circuits and subscriber loops are tested manually and automatically in this subsystem.

Line testing helps determine if a line circuit, loop, or line circuit and loop combination are functioning properly. If the line proves faulty, line tests also determine if the fault lies in the line circuit or the attached loop. When a fault is in the loop, it is usually referred to another department (for example, plant maintenance). When the fault is in the line circuit, the line card is replaced and the line is retested to verify the fault is cleared.

Automatic line testing

Automatic line tests (ALT) are performed on line circuits and loops, usually on a scheduled basis, without switch operator involvement other than for initial scheduling. Automatic line tests are also performed when a line shows a fault.

The following figure shows the commands available at the sublevels of the LNS subsystem.

Line maintenance commands

LNS

0 QUIT_
3 LTP
4 ALT
5LNSTRBL

LTP

0 Quit
2 Post_
3
4
5 Bsy
6 RTS
7 Diag
8
9AlmStat
10 CktLoc
11 Hold
12 Next
13
14
15
16 Prefix
17 LCO
18 Level_

LNSTRBL

0 Quit
2 Disp_
3StopDisp
4ListAlm_
5
6 CreatSup
7
8 Supress
9 Resume
10 Qsup
11
12
13
14
15
16 ClrAlm_
17 ClrBuf_
18_

ALT

0 Quit
2 Post_
3 ALTInfo
4
5
6
7 SDiag
8 Diag
9 LIT
10 Bal
11 CktTst
12
13
14
15
16
17
18

LTPLTA

0 Quit
2 Post_
3 MonLTA
4 TalkLTA
5 Orig
6 LnTst
7 VDC
8 VAC
9 Res
10 Cap
11 Hold
12 Next
13
14 LTA
15 BalNet
16 Coin_
17 Ring
18 DgtTst

LTPMAN

0 Quit
2 Post_
3
4 Loss
5 Noise
6 ToneGen
7 Jack
8 TstRing
9 Bal
10 RlsConn
11 Hold
12 Next
13
14 Ckttst
15 Sustate
16 SetLpBk_
17
18

LTPDATA

0 Quit
2 Post_
3
4 Equip_
5 Connect_
6 Sustate
7 LoopBk_
8 Bert
9
10 BPVO_
11 Hold
12 Next
13
14
15
16
17
18

IBNCON

0 Quit
2
3 Select_
4 Next
5 Bsy
6 RTS
7 Diagnose
8
9
10 Seize
11 Release
12 Clear
13 PrevDm
14
15
16 QConLine
17 QCustGrp
18 QSeated

ALTLIT (see note)

0 Quit
2 Post_
3 LITInfo
4 Start
5 Stop
6 Remove
7 Define_
8 Submit
9
10
11 DefMAN
12
13 DefSCHD_
14
15 Status_
16
17 OVRride_
18

Note: The menu of commands for the ALTLIT level is the same as for the other ALT sublevels, except the command LITINFO in the ALTLIT level does not appear at any other ALT sublevel.

Automatic line testing in a MSL-100 switch office is performed under the LNS subsystem. The previous figure shows the commands available at the ALT level of the LNS level, which define the ALT. These commands are described below:

- DIAGN executes a comprehensive diagnostic test on the line card circuits. It identifies defective line cards before they cause customer reports. The DIAGN command implements tests using the line test unit (LTU) of the MCRU RMM. If the LTU is not provisioned, this command implements the no-LTU diagnostic.
- SDIAG is a subset of the DIAG test and ensures that most of the line card circuitry is operating correctly.
- BAL automatically sets the balance network in the line card to provide transmission balance between the four-wire side of the switch and the two-wire loop. This minimizes subscriber reports of noise, echo, and garbled speech.
- LIT implements an automatic test that detects cable pair faults to be cleared before they become service-affecting, or before subscribers report problems such as hum, noise, grounds, or false ring trip.
- CKTTST applies to loops using Meridian business sets (MBS), data units (DU) associated with Datapath, asynchronous interface modules (AIM), and IBERT line cards. CKTTST performs circuit tests to confirm the ability of the set or line card, or both, to transmit and receive messages correctly and adhere to message protocol.

Lines that fail to meet certain standards of quality are identified to the switch operator by posting the failures at the LTP or by output reports generated by the ALT log subsystem. The failures identified are then tested manually and corrected.

Station testing

Station testing is performed either under the LNS subsystem at a MAP terminal or, for the Silent Switchman (SSMAN) and Station Ringer (SR) tests, from a station. Stations are tested manually.

Station test results are displayed at the visual display unit (VDU), except for the Station Ringer and Silent Switchman tests. The results of these tests are returned to the station.

Station testing helps determine if a station is functioning properly while connected to a loop and line circuit combination.

Manual line testing

Manual line tests are performed by the switch operator on line circuits, loops, and stations. Line circuits and loops are tested individually. The results of the test are displayed to the switch operator, immediately after testing, at a VDU.

Lines are tested manually as part of routine maintenance, or when a customer report is generated or an ALT failure occurs. Manual line testing is performed at the LTP level using any of the four levels of the LNS subsystem: ALT, LTP, LTP manual (LTPMAN), and LTP line test access (LTPLTA).

Manual line testing at the ALT level defines one line to be tested immediately. At the other three levels, manual testing is performed by placing the line to be acted upon in the control position. The switch operator controls this line, which may be manipulated. A line must be posted first before being placed in the control position.

Product-specific test tools

Line maintenance cutover (LMCUT)

With feature package NTX057, the Line Maintenance Cutover (LMCUT) facility is used by the Automatic Board-to-Board Testing (ABBT) feature (during commissioning) to transfer or cutover in-service lines from an existing switch to a MSL switch. This feature also provides message recording of all the LMCUT command executions in a progress file.

The LMCUT commands are supported on ILCMs. The LMCUT commands are valid only on ILCMs while the switch is cut over by a DN. The cutover occurs according to DNs or to LENs. The commands for cutover by DN and LEN are mutually exclusive with the exception of the commands OPRTCO, RLSCO, and NOBST.

The LMCUT commands allow the user to do the following:

- set or query the cutover mode of the switch (by DN or by LEN)
- enable, disable, clear, or query the progress message recording
- operate, release, or verify the cutover relays on a range of DNs or LENs
- operate, release, or query the HOLD relay setting on a drawer

Troubleshooting chart

Basic troubleshooting procedures for Meridian Cabinetized Remote Module (MCRU) alarms are described in the following table.

MCRU alarm clearing

Alarm condition	Possible cause	Action
Critical	Faulty line concentrating module (ILCM) processor cards in both ILCM units Faulty power converter cards in both ILCM units All DS30A message ports are closed.	Identify and post the system busy (SysB) ILCM. Busy both units of the faulty ILCM. Return to service (RTS) the faulty ILCM. If an RTS fails, load the faulty ILCM. Test and RTS the faulty ILCM.

-continued-

MCRU alarm clearing (continued)

Alarm condition	Possible cause	Action
Major	Faulty ILCM processor Faulty digroup control card Faulty power converter Faulty ringing generator (RG) circuit Closed DS30A message port PCM-30 Line group controller (PLGC) forces activity switch in ILCM.	Identify and post the in-service trouble (ISTb) ILCM. Identify fault indicators with QUERYPM FLT command. If the ILCM is C-side busy (CBsy), identify C-side links to host PM. Post host PM for faulty P-side links. Busy, test, and RTS the faulty P-side links. Post, busy, test, and RTS the faulty ILCM. If the ILCM is system-busy (SysB), busy and test the faulty ILCM unit. If the test fails with a card list, replace any faulty cards, test, and RTS the faulty ILCM unit. If the test fails with no card list, retest and RTS the faulty ILCM unit. If the ILCM is manually busy (ManB), test the faulty ILCM unit. If the test fails with a card list, replace any faulty cards. Test, and RTS the faulty ILCM unit. If the test fails with no card list, retest and RTS the faulty ILCM unit.

-continued-

MCRU alarm clearing (continued)

Alarm condition	Possible cause	Action
Minor	Faulty RG frequency generator circuit Activity mismatch Data error Diagnostic failure Load file mismatch Self-test failure	Identify and post the ISTb ILCM. Identify fault indicators with QUERYPM FLT command. If ILCM is C-Bsy, identify C-side links to the host PM. Post the host PM for faulty P-side links. Busy, test, and RTS the faulty P-side links. Post, busy, test, and RTS the faulty ILCM. If ILCM is SysB, busy and test the faulty ILCM unit. If the test fails with card list, replace any cards. Test and RTS the faulty ILCM unit. If the test fails with no card list, retest and RTS the faulty ILCM unit. If the ILCM is ManB, test the faulty ILCM unit. If the test fails with a card list, replace any faulty cards. Test and RTS the faulty ILCM unit. If the test fails with no card list, retest and RTS the faulty ILCM unit.
	-end-	

More complete troubleshooting methods for MCRU alarms are provided in *Alarm Clearing Procedures.*

Advanced troubleshooting procedures

Under normal circumstances, a faulty unit is busied and tested. As a result of this testing, the MAP terminal displays a list of cards. The card at the top of the list often is the cause of the problem. Once the problem card is replaced, the originally faulty unit is tested again. If the unit passes this test, it is returned to service (RTS) and the troubleshooting procedure is complete.

However, if normal troubleshooting procedures do not restore a unit to service, advanced troubleshooting procedures may be required. Experienced operating company personnel may use MAP terminal responses from unsuccessful troubleshooting attempts to formulate a maintenance strategy. Alternatively, more advanced step-action procedures may be used to repair a fault.

Powering up the MCRU

An anticipated power outage, such as an impending natural disaster, may require operating company personnel to power down the Meridian Cabinetized Remote Unit (MCRU) for the duration of the event, in order to minimize damage to the equipment. This allows the operating company to bring the power back up in an orderly fashion. These procedures are described below.

The MCRU is powered up using the following steps:

1 Post the MCRU from the MAP terminal.

2 At the remote site, set the switch on the power converter to the ON position.

3 While holding in the reset button on the power converter, flip the appropriate circuit breaker up but do not hold it up. If power is applied to the MCRU, the circuit breaker will stay in the ON position. If there is a problem with the power, it will trip back down to the OFF position.

> ***Note:*** Repeat steps 2 and 3 for the other international line concentrating module (ILCM) unit.

4 Busy both ILCM units.

5 List the peripheral module (PM) loads at the input-output (IO) device to be used to RTS the units, if this was not done during the power-up procedure, by typing

>DSKUT;LISTVOL volume name ALL
and pressing the Enter key.

or, if loading from a DMS Supernode, by typing

>DISKUT;LV CM;LF volume name
and pressing the Enter key.

where

volume name   is the volume where the PM loads are found

Note: The PM loads only have to be listed once.

6 Load the MCRU using the LOADPM command.

7 Test the MCRU.

8 Return to service the MCRU.

9 You have successfully completed this procedure.

Powering down the MCRU

CAUTION
Loss of service
This procedure is reserved for extreme conditions such as impending natural disasters. It will result in a complete loss of subscriber service.

The MCRU is powered down from the MAP terminal using the following steps:

1 Post the MCRU.

2 Identify the unit to be powered down.

3 Busy the MCRU unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the to be powered down.

4 Remove the power from the busied MCRU unit by setting the switch on the power converter to OFF. The MCRU unit is now powered down.

5 Repeat this procedure for the mate unit.

6 You have successfully completed this procedure.

Common procedures

Some common troubleshooting procedures are presented in the following sections for loading, RTS, dial tone, and ringing generators.

Troubleshooting a loading failure

The following procedure outlines the steps involved in troubleshooting a failure to load the peripheral program files for the MCRU.

Troubleshooting a loading failure

1 Verify that there are no blown fuses and that all power converters are powered up and supplying the correct voltages.

2 Unseat the 6X51, 6X52, and 6X53 cards from unit 1 and the 6X27 (slot 20 of HIE shelf), 6X73 (slot 18 of HIE shelf), and the 2X70 (slot 22 of the HIE shelf) cards.

3 Attempt to load unit 0.

4 If unit 0 fails to load, reseat the cards that were removed from unit 1. Unseat the 6X51, 6X52, and 6X53 cards from unit 0, and the 6X27 (slot 19 of HIE shelf), 6X73 (slot 17 of HIE shelf), and the 2X70 (slot 25 of the HIE shelf) cards. Attempt to load unit 1.

5 If both units fail to load, attempt to load the PM from another device. The preferred order is to load first from the input output controller (IOC) disk drive, then the system load module (SLM), and then, if the other two fail, the original PMLOAD tape.

6 Replace the 6X51, 6X52, and 6X53 cards in unit 0 and unseat the same cards in unit 1. Attempt to load unit 0.

7 If unit 0 fails, replace the 6X51, 6X52, and 6X53 cards in unit 1 and unseat the same cards in unit 0. Attempt to load unit 1.

8 If both units fail to load, replace the 6X73 (slot 17 of HIE shelf) and the 6X27 (slot 19 of HIE shelf) cards. Attempt to load unit 0.

9 If unit 0 fails to load, replace the 6X73 (slot 18 of HIE shelf) and the 6X27 (slot 20 of HIE shelf) cards, then attempt to load unit 1.

10 If both units fail to load, replace the corresponding 6X27 cards in the host XPM.

11 Power down and unseat the 2X59, 6X74, 2X09, and 2X06 cards in the remote maintenance module (RMM) shelf. Attempt to load each unit.

12

> **WARNING**
> **Possible service interruption**
> Use caution when using PMDEBUG on a working peripheral. Use only the commands shown.

Perform the following to determine if links to the MCRU are faulty:

a. QUERYPM the MCRU. Note its node number. Enter TRNSL C and note the hosting XPM or RCC.

b. PMDEBUG the host XPM by entering <pmdebug hosting XPM> (that is, pmdebug PLGC 0, ...).

c. Find the internal node number by entering <mp * * * * * cp e nn 0> (where nn equals the external node number obtained from QUERYPM in step a).

d. Enter <sp * * * * * n>. This accesses the signal processor new messaging level.

e. Enter <n>. This accesses the netlayer sublevel.

f. Enter <neta>. This accesses the net address sublevel.

g. Enter the internal node number obtained in step a, when prompted.

h. Enter the unit corresponding to the messaging link in question.

i. Note the data link number specified as open.

j. Enter <* d>. This accesses the dl data level.

k. Enter <v dl> (where “dl” equals the data link number obtained in steps h and i). This will verify you are actually working with the proper link. The output should indicate the same type PM as the remote you are working with (for example, prlcm_fmt).

l. Enter <r dl> (same as above). This displays hex values, corresponding to control bytes received from the remote. (It is halted by entering return twice.)

m. Remove the PCM-30 interface card for the link at the remote end.

n. Verify hex values equal #FF. If not, ensure the correct PCM-30 interface card is removed and the proper data link number is being monitored. If both of these are correct, check for miswires or shorts on the link by removing repeater cards until values equal #FF, and correct the problem. If all is okay, proceed to step o.

o. At the remote, loop back the link to be tested (transmit to receive on port) toward the host.

p. With span looped back, verify the values equal one of the following DMS-X control byte values (usually #1E), as shown in the following table.

DMS-X control byte	Value	Meaning
MIS	#8D	May I send
SOM	#4B	Start of message
PACK	#1E	Positive acknowledgment
NACK	#55	Negative acknowledgment
EOM	#4B	End of message
ESC	#4B	Escape character

If values equal the ones in the table, the link is functioning. If values equal anything other than the ones in the table, the link or host equipment is faulty. If values are correct, remove the loopback, verify that values equal #FF, and reseat the PCM-30 interface card. If values are not correct, recheck the loopback to verify it looped correctly, troubleshoot the link, or switch the link with the non-messaging link at both ends, and verify that proper hex values exist.

q. Enter <* * mp>.

r. Enter <quit>.

13 Check for bent pins behind the 6X51, 6X52, 6X53, 6X73, and 6X27 cards. Verify the connector on slot 5 of each shelf on the backplane is secure.

14 If the MCRU fails to load, warm SwAct the PCM-30 line group controller (PLGC). Contact your next level of support.

Troubleshooting RTS failure

The RTS FORCE command is implemented if the MCRU fails to RTS. The RTS FORCE procedure is described in the following procedure.

Troubleshooting RTS failure

1 Check logutil for RTS failure reasons.

2 Replace any cards on the card list given at the MAP level or in the logs.

3 Unseat the 6X51, 6X52, and 6X53 cards from unit 1. Unseat the 6X27 (slot 20 of HIE shelf), 6X73 (slot 18 of HIE shelf), and the 2X70 (slot 25 of the HIE shelf) cards. Attempt to RTS FORCE unit 0.

4 If unit 0 fails to RTS, reseat the cards into unit 1. Unseat the 6X51, 6X52, and 6X53 cards from unit 0 and the 6X27 (slot 19 of HIE shelf), 6X73 (slot 17 of HIE shelf), and 2X70 (slot 22 of the HIE shelf) cards. Reload unit 1 and attempt a RTS FORCE.

5 If the MCRU returns to service (RTS), followed by a C-side busy (CBsy), warm SwAct the PLGC and try again.

6 If the MCRU RTS, followed by a system busy (SysB), there is a possible faulty 6X54 card, line card, or drawer. Check logutil for a possible card list.

7 If any light-emitting diodes (LED) on the RGs are illuminated, go to the procedure "Troubleshooting ringing generator problems."

8 If both units fail to RTS, contact your next level of support.

9 You have successfully completed this procedure.

Troubleshooting dial tone problems

After powering up the MCRU and one or both ILCM units are in service, the line subgroups (LSG) should be checked to verify they have dial tone. If they do not, the following procedure is used to troubleshoot the source of dial tone failure.

Troubleshooting dial tone problems

1 If the even line subgroups (LSG) do not have dial tone, reseat or replace, or both, the 6X52 card in unit 0.

2 If the odd LSGs do not have dial tone, reseat or replace, or both, the 6X52 card in unit 1.

3 If LSGs 0 through 9 do not have dial tone, verify with a voltmeter that TB1 lug 7 reads -48 V. This terminal block is located on the back of the frame supervisory panel (FSP). This voltage is the talk-battery supply for these drawers. This voltage comes from the power distribution center (PDC) for this frame. Check the fuse in the PDC if the voltage is missing.

4 If LSGs 10 through 19 do not have dial tone, verify with a voltmeter that TB1 lug 8 reads -48V. This is the talk-battery supply for these drawers.

5 If you do not have dial tone, contact your next level of support.

6 You have successfully completed this procedure.

Troubleshooting ringing generator problems

If one or both RGs fail, or if the LEDs on the 6X30 RGs are illuminated, perform the following procedure to isolate and correct the fault.

Troubleshooting ringing generator problems

1 Replace the ringing generator (RG) first.

Note: Powering down an RG will remove the corresponding MCRU unit from service. Powering down RG-0 will remove unit 0 from service.

2 Remove the RA and RB fuses one shelf at a time and observe the LEDs. The RA fuse supplies ringing to the even subgroups for the respective shelf. The RB fuse supplies ringing to the odd subgroups for the respective shelf. If the LED is extinguished when a fuse is removed, proceed to step 4. If the LED is not extinguished, proceed to step 3.

3 Busy one unit at a time, then unseat the 6X51, 6X52, and 6X53 cards and watch for the cycling to stop. This isolates the trouble to that unit. Replace the above cards.

4 Reseat the cards in the troubled unit. Begin removing the fuses for each drawer in that shelf. Be sure to pull all three fuses (5 V, 15 V, and 48 V) for the drawer. If the cycling does not stop, replace the fuses for that drawer and proceed to the next drawer until the cycling stops.

5 If all the fuses have been removed and the cycling has not stopped, you may have more than one faulty drawer. In that case, remove all fuses for all drawers in that shelf at the same time. Replace the three fuses for each drawer and note when the cycling starts. When the cycling starts for a given drawer, remove those fuses again and go to the next drawer. This should isolate all the drawers that are at fault.

6 Once the drawer has been isolated, insert the fuses back for that drawer (or drawers) and unplug the controller cable on the back of the line drawer. The controller cable is the center cable, labeled C and D.

7 Replace the 6X54 card in the isolated drawer and connect the controller cable back into position.

8 If the cycling continues, the line cards need to be unseated one at a time in the suspect subgroups to locate the faulty line card, or the line drawer needs replacement.

9 Contact your next level of support.

10 You have successfully completed this procedure.

MCRU routine maintenance procedures

This chapter contains routine procedures for Peripheral Remote Line Concentrating Module (PRLCM) and the Meridian Cabinetized Remote Unit (MCRU). Reference to either of these products is synonymous throughout this section and this document. These procedures cover preventative maintenance tasks performed on a regularly scheduled basis and are intended for use by maintenance engineering and field maintenance personnel.

Testing wrist strap grounding cords MCRU

Application

Use this procedure to verify the resistance of the wrist strap grounding cords is low enough to allow static electricity to discharge from the human body, but high enough to prevent electrocution if the equipment develops a short-circuit while the wrist strap is being worn.

Interval

Perform this procedure every month.

Common procedures

None

Action

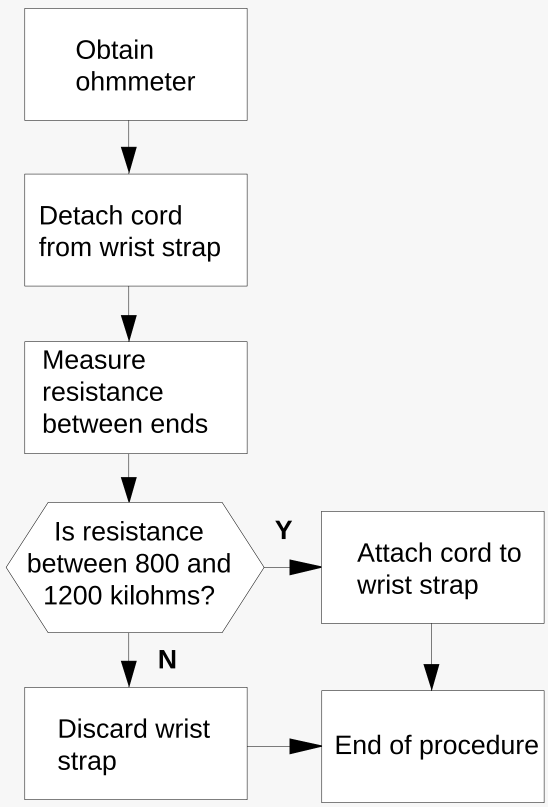
This procedure contains a summary flowchart as an overview of the procedure. Follow the specific steps to perform this procedure.

Testing wrist strap grounding cords
MCRU (continued)

Summary of testing wrist strap grounding cords

This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.



Testing wrist strap grounding cords
MCRU (continued)

Testing wrist strap grounding cords

At your current location

1 Obtain an ohmmeter.

2

> **DANGER**
> **Risk of electrocution**
> The grounding cord is safe to use only if its resistance measures higher than 800 kilohms. A lower resistance exposes the wearer to the risk of electrocution if equipment short-circuits while the wrist strap is being worn.

> **WARNING**
> **Damage to electronic equipment**
> A grounding cord that has a resistance higher than 1200 kilohms cannot conduct static charges to ground adequately. It will not protect sensitive electronic equipment against build-ups of potentially damaging static charges.

Detach the grounding cord from the wrist strap.

3 Measure the resistance between opposite ends of the grounding cord with the ohmmeter.

If resistance is	Do
between 800 kohms and 1200 kohms	step 4
not between 800 kohms and 1200 kohms	step 5

4 You may use the grounding cord and wrist strap assembly. Assemble the wrist strap to the grounding cord.

Go to step 6.

5 Discard the entire assembly. *Do not attempt to use it.*

Testing wrist strap grounding cords MCRU (end)

6 You have successfully completed this inspection procedure.

MCRU translations

Understanding MCRU translations

The Meridian Cabinetized Remote Unit (MCRU) is part of a family of remote peripherals that allow extended geographic coverage of the MSL-100 switch. As with previous chapters concerning the MCRU, any references to either the Remote Line Concentrating Module (RLCM) or the MCRU are synonymous throughout this document. The following chapters will cover translations for the MCRU and reference will be made using RLCM terminolgy. Wherever indicated, RLCM will be datafilled for the appropriate data table.

Before attempting to datafill the MCRU, it is necessary to have a basic understanding of the concepts and terminology of translations. This introduction provides a general description of the MCRU and the translations functions with respect to the MCRU.

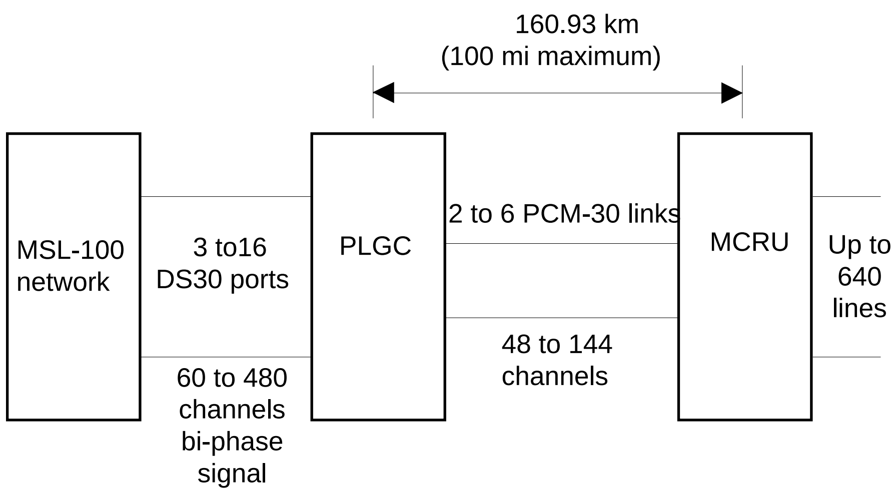
Introduction to the MCRU

The MCRU is a single-frame, remote peripheral module (PM) composed of standard international line concentrating module (ILCM) components and a remote maintenance module (RMM).

The MCRU provides an interface between two to six PCM-30 links from the PCM-30 line group controller (PLGC) at the host office with up to 640 subscriber lines connected locally. It can be operated at a site up to 160.9 km (100 mi) from the host central office. The MCRU can also be configured off of a Remote Switching Center (RSC). The MCRU provides functions comparable to a small community dial office (CDO) or private branch exchange (PBX) and can support host-directed traffic ranging from 1100 to 4200 hundred call seconds (CCS).

The following figure shows the configuration of the MCRU in the MSL-100 network.

MCRU system integration



Note: The PLGC requires 4 to 16 C-side DS30 ports.

The MCRU can be provisioned with additional feature packages that allow intracalling capability and emergency stand-alone (ESA) operation. The translations database allows the MSL-100 switch to recognize the software and hardware capabilities of the MCRU to execute call processing.

Preparing to datafill MCRU

PCL-New Software Delivery Vehicle

After BCS36, Northern Telecom will begin delivering Product Computing-Module Loads (PCLs) instead of BCS releases or Universal Software Loads (USLs).

A PCL consists of features selected from the development stream software product intended for a particular application in a particular market. The PCL contains the capabilities previously divided among many related NTX packages. An eight-digit ordering code replaces the NTX package codes.

In the following table is the ordering code and Functional Group name required for the MCRU, as well as a listing of the former NTX packages included in the Functional Group. These capabilities are associated with the MCRU.

MCRU ordering code

Ordering code	Name	Former NTX package codes
BAS00012	BAS Remotes Generic	NTXN14AA-Meridian Cabinetized Remote Unit NTX147AB-Outside Plant Module Maintenance NTX154AA-Emergency Stand-Alone Operation NTX156AA-RLCM Intracalling

Tasks associated with datafilling the MCRU

The MCRU tables fall into several categories, which comprise the tasks associated with datafilling the MCRU. The categories of tables that must be datafilled are listed in the following summary:

- test trunks, test lines, and service circuits in table CLLI
- MCRU components and location datafill in tables SITE, LTCINV, LTCPSINV, LCMINV, RMMINV, DFINV and LNINV
- call processing translations in the lines, trunks, screening, and routing tables: TRKGRP, TRKSGRP, TRKMEM, LINEATTR, LENLINES, LENFEAT, and DNROUTE
- system alarms in tables ALMSCGRP, ALMSDGRP, ALMSD, and ALMSC
- spare scan and signal distribution points in tables SCGRP and SDGRP
- metallic test access assignments in tables MTAMDRVE, MTAVERT, and MTAHORIZ

Procedures for datafilling the MCRU

The datafill procedures outlined in this guide list the field and subfield names of the key tables that must be datafilled for the MCRU. Explanations of each field and subfield are provided, and information specific to the MCRU datafill is included if required. Examples of field entries are provided for most fields and subfields.

Only the key tables for the MCRU are described in the following chapters of this guide. Other tables, which contain datafill for call processing, scan and signal distribution points, and system alarms, are described in the data schema section of the *Translations Guide*.

Basic call processing in the MCRU

Functional group

Functional group: BAS00012

Feature package

Feature package: NTNX14AA MCRU

Release applicability

BCS35 and up

Prerequisites

To operate, Basic call processing in the MCRU requires BAS00003 which includes:

- Bilge, NTX000AA
- Common Basic, NTX001AA
- New Peripheral Maintenance Package, NTX270AA
- Local Features I, NTX901AA

Description

The BAS00003 functional group allows the MCRU to provide basic call processing capability for up to 640 subscriber lines. Some of the features it provides include line testing capability, alarms processing, coin capability, operational measurements (OM), and basic maintenance features.

Operation

The MCRU is connected to a PCM-30 line group controller (PLGC) or Remote Switching Center (RSC) by two to six PCM-30 links, thus functioning as an interface between the PCM-30 links from the host network and up to 640 subscriber lines connected locally.

The MCRU has remote functions allowing it to operate at a distance of up to 161 km (100 miles) from the host office.

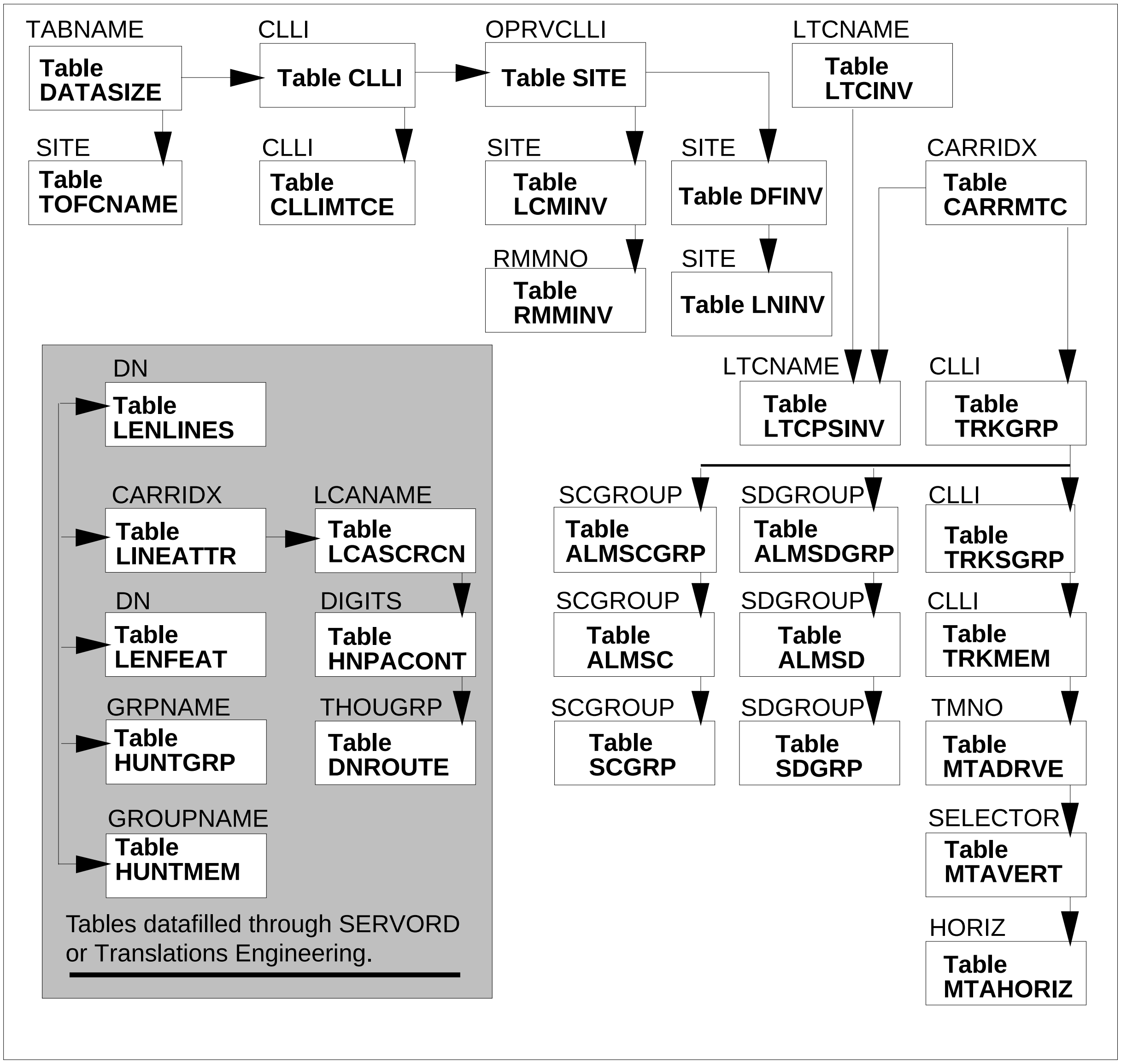
User interface

Basic call processing in the MCRU does not affect user interface.

Basic call processing in the MCRU (continued)

Translations table flow

The Basic call processing in the MCRU translation process is shown in the following flowchart.



Limitations and restrictions

Basic call processing in the MCRU has no limitations or restrictions.

Interactions

Basic call processing in the MCRU has no functionality interactions.

Basic call processing in the MCRU (continued)

Activation/deactivation by the end user

Basic call processing in the MCRU requires no activation or deactivation by the end user.

Billing

Basic call processing in the MCRU does not affect billing.

Station Message Detail Recording

Basic call processing in the MCRU does not affect Station Message Detail Recording.

Datafilling office parameters

The following table shows the office parameters used by Basic call processing in the MCRU For more information about office parameters, refer to *Office Parameters Reference Manual*.

Office parameters used by Basic call processing in the MCRU

Table name	Parameter name	Explanation and action
OFCENG	#_OF_BC_LAMA_UNITS	This parameter specifies the number of recording units required in the host office to collect call data while the call buffer is dumping to a tape or disk.
OFCENG	#_OF_NT_RECORDING_UNITS	This parameter specifies the number of Northern Telecom recording units required in the host office to collect call data while all the automatic message accounting (AMA) buffers are full.
OFCENG	MAX_NO_OF_ALT_TEST_PROCS	Speeds up automatic line testing (ALT) in the host office by allowing several test processes from different ALT users to run simultaneously under the control of one ALT process
OFCENG	NO_OF_FTR_CONTROL_BLOCKS	Specifies the number of feature control blocks required in the host office if it is provisioned with vertical features or MDC feature packages
	-continued-	

Basic call processing in the MCRU (continued)

Office parameters used by Basic call processing in the MCRU (continued)

Table name	Parameter name	Explanation and action
OFCENG	NMULTIBLKS	Allocates memory, multiblocks, for three-way calling and call waiting features assigned to lines in the host office
OFCENG	NUMPERMEXT	Allocates permanent external memory that may be required for certain features in the host office
OFCVAR	BICRELAY_XLCM_TESTS_SCHEDULED	Allows the user to define the start time and stop time of the bus interface card relay test (BRT) to define the window for the office-level test
OFCVAR	BICRELAY_NUM_SIMUL_TESTS	Indicates the number of line concentrating module (ILCM) level tests that can be run simultaneously
OFCVAR	PMSTAT_OM_CONTROL	Allows the user to globally turn on and off data collection for processor occupancy measurements in the PMSTAT OM group
	-end-	

Office parameter #_OF_BC_LAMA_UNITS

This parameter specifies the number of recording units required in the host office to collect call data while the call buffer is dumping to a tape or disk. The call data is used for local automatic message accounting (LAMA) system billing purposes, if provisioned in the office. The value for this office parameter is based on a formula that combines, Datapath, and call-forwarding traffic statistics.

If the MCRU supports any Datapath lines or lines with vertical features such as call forwarding, the value for #_OF_BC_LAMA_UNITS should be increased.

Office parameter #_OF_NT_RECORDING_UNITS

This parameter specifies the number of Northern Telecom recording units required in the host office to collect call data while all the automatic message accounting (AMA) buffers are full.

Basic call processing in the MCRU (continued)

If the centralized automatic message accounting (CAMA) or LAMA systems are provisioned in the office, the data is used for billing purposes. The value for #_OF_NT_RECORDING UNITS is derived from inward wide-area telephone service (INWATS), and call-forwarding traffic statistics.

If the MCRU supports any INWATS lines or lines that support vertical features such as call forwarding, the value of #_OF_NT_RECORDING_UNITS should be increased.

Office parameter MAX_NO_OF_ALT_TEST_PROCS

This parameter speeds up automatic line testing (ALT) in the host office by allowing several test processes from different ALT users to run simultaneously under the control of one ALT process. The parameters value is based on the number of transmission test units (TTU) NT2X47 and NT2X56, and the line test units (LTU) NT2X10 and NT2X11, configured in the office.

For every LTU configured in the remote maintenance module (RMM) shelf of the MCRU, the value of this parameter should be increased by two. If the MCRU is not provisioned with an RMM, or has an RMM without an LTU, this parameter is not affected.

Office parameter NO_OF_FTR_CONTROL_BLOCKS

This parameter specifies the number of feature control blocks required in the host office if it is provisioned with vertical features or MDC feature packages. The value for this parameter is based on the number of plain ordinary telephone service (POTS) lines in the office supporting vertical features or MDC.

If the MCRU supports MDC lines or lines with vertical features, the value of NO_OF_FTR_CONTROL_BLOCKS may need to be increased.

Office parameter NMULTIBLKS

This parameter allocates memory (multiblocks) for Three-way Calling and Call Waiting features assigned to lines in the host office. Its value is partially based on that of parameter, NO_OF_FTR_CONTROL_BLOCKS.

See the previous description of NO_OF_FTR_CONTROL_BLOCKS for conditions that necessitate both of these parameters as they apply to MCRU lines.

Basic call processing in the MCRU (continued)

Office parameter NUMPERMEXT

This parameter allocates permanent external memory that may be required for certain features in the host office. A value must be assigned to parameter NUMPERMEXT if parameter NO_OF_FTR_CONTROL_BLOCKS is provisioned. As with NMULTIBLKS, the value of NUMPERMEXT is based partially on the feature control blocks parameter.

See NO_OF_FTR_CONTROL_BLOCKS for conditions that necessitate parameter NUMPERMEXT as it applies to MCRU lines.

Office parameter BICRELAY_XLCM_TESTS_SCHEDULED

This parameter in table OFCVAR allows the user to define the start time (BRTST_START_TIME) and stop time (BRTST_STOP_TIME) of the bus interface card (BIC) relay test (BRT) to define the window for the office-level test.

These times cannot be datafilled with the same value; they must indicate a window of at least 10 minutes. The last field of this parameter, BRTST_DAYS_OF_TST, specifies the day or days of the week the office-level test is to be run.

The entries for this field are MON, TUE, WED, THU, FRI, SAT, and SUN. Up to seven days can be datafilled. The same day cannot be datafilled twice.

Office parameter BICRELAY_NUM_SIMUL_TESTS

This parameter in table OFCVAR indicates the number of international line concentrating module (ILCM) level tests that can be run simultaneously. The start and stop times used in BICRELAY_XLCM_TESTS_SCHEDULED can be used with this parameter to configure a window that best suits the number of ILCMs and MCRUs in the office.

This parameter may only be changed when the current date and time do not fall within the scheduled window.

If changes are needed immediately, the user may stop the BRT using the command interpreter, (CI) command BICRELAYOFF. After changes are made, the BICRELAYON command must be issued to restore BRT testing.

Office parameter PMSTAT_OM_CONTROL

This parameter in table OFCVAR allows the user to globally turn on and off data collection for processor occupancy measurements in the PMSTAT OM group. It defaults to ON.

Basic call processing in the MCRU (continued)

If the PMSTAT_OM_CONTROL parameter is changed, data is sent immediately to all XMS-based peripheral modules (XPM) that have subtending extended-memory line concentrating modules (XLCM).

If the XPM is in an in-service (InSv) or in-service trouble (ISTb) state, the confirmation message of `polling activated or polling deactivated` is displayed at the MAP terminal.

If the XPM is in an out-of-service (OOS) or manual busy (ManB) state, the data is sent during the return-to-service (RTS) action.

An audit will ensure that all InSv or ISTb XPMs are reporting data when the PMSTAT_OM_CONTROL parameter is turned on. If the audit determines that data is not being reported, static data will be resent to the XPM to begin data collection on the XLCM that was not reporting.

> ***Note:*** This office parameter should only be changed during low traffic periods to prevent undue stress on the message system.

Datafill sequence

In order for BAS00012 functional group to operate properly, the following tables must be datafilled in the order they are listed. After datafill, both the host XPM and the MCRU must be reloaded from the control component (CM) to activate BAS00012 functional group.

The following table lists the tables that require datafill to implement the Basic call processing in the MCRU . The tables are listed in the order in which they are to be datafilled.

Datafill tables required for Basic call processing in the MCRU

Table	Purpose of table
DATASIZE	Ensures adequate system memory to accommodate additional entries in trunk group tables
CLLI	Identifies the maintenance and test trunks used in the MCRU
SITE	Allows the MSL-100 switch to recognize the remote equipment tied to the host
LTCINV	Inventories various peripheral module (PM) types, excluding P-side link assignments
LTCPSINV	Identifies the module type and number and the port designation of the P-side links

-continued-

Basic call processing in the MCRU (continued)

Datafill tables required for Basic call processing in the MCRU (continued)

Table	Purpose of table
CARRMTC	Sets the maintenance and engineering parameters and characteristics for PCM-30, T1 carrier spans
LCMINV	Lists data assignment for each frame associated with an LCM unit
RMMINV	Identifies an RMM by its location, product engineering code (PEC), PM load executive program, and C-side PM
TRKGRP	Identifies the test circuits associated with the maintenance and test trunks
TRKSGRP	Lists the supplementary information for each subgroup that is assigned to one of the trunk groups listed in table TRKGRP
TRKMEM	Identifies the circuits associated with the test equipment used to test lines and trunks
CLLIMTCE	Lists the testing parameters for each trunk group CLLI
ALMSCGRP	Lists alarm scan circuits and their locations and card types, and serves as a head table for the respective scan points
ALMSC	Identifies the functions to be performed by each of the assigned scan points in the alarm scan groups
ALMSDGRP	Lists alarm signal distributor (SD) circuits and their locations and card types, and serves as a head table for the respective SD points
ALMSD	Identifies the function to be performed by each of the assigned SD points in the alarm SD groups
DFINV	Identifies the location of distributing frames at the host or remote sites
SCGRP	Lists the PEC and the physical location at the host or remote switching units for the spare scan groups that are reserved for use as scan points for line features
SDGRP	Lists the PEC and the physical location at the host or remote switching units for the spare SD groups that are reserved for use as SD points for line features
TOFCNAME	Lists all terminating offices in the switch
LNINV	Retains an inventory of subscriber lines and associated line cards for the MCRU

Note 1: Additional data schema sections (such as LENLINES, LENFEAT, or DNROUTE explaining SERVORD datafill that is not specific to MCRU can be found in the *Customer Data Schema Manual*, 555-4001-851.

Note 2: Additional data schema sections explain datafill for each required trunk group type.

Note 3: The data schema section depends on the version of office alarm equipment installed in the office.

-continued-

Basic call processing in the MCRU (continued)

Datafill tables required for Basic call processing in the MCRU (continued)

Table	Purpose of table
MTAMDRIVE	Specifies the physical location and the type of the minibar driver assigned to the minibar switch
MTAVERT	Identifies the vertical connectivity to the MTA matrix
MTAHORIZ	Lists the assignment to a horizontal and horizontal group of MTAMs

Note 1: Additional data schema sections (such as LENLINES, LENFEAT, or DNROUTE explaining SERVORD datafill that is not specific to MCRU can be found in the *Customer Data Schema Manual*, 555-4001-851.

Note 2: Additional data schema sections explain datafill for each required trunk group type.

Note 3: The data schema section depends on the version of office alarm equipment installed in the office.

-end-

SERVORD

The Service Order System (SERVORD) provides operating companies with an efficient means of performing the following operations:

- adding or removing subscriber service lines
- adding or deleting line service options
- changing the LEN or DN of existing lines
- adding to or deleting features from lines

Lines are required to be datafilled in table LNINV in order for SERVORD to automatically datafill the proper line translation and feature tables.

Datafilling table DATASIZE

Table DATASIZE ensures there is enough system memory to accommodate additional entries in tables CLLI, TRKGRP, TRKSGRP, SCGRP, and SDGRP, allowing the addition of MCRU maintenance facilities. The table is initially datafilled with default values for field sizes. To change a default value, use the REPLACE command.

> ***Note:*** After the initial input of the size value for a given table, the SIZE field can only be changed by Northern Telecom.

Basic call processing in the MCRU (continued)

Datafill example for table DATASIZE

The following example shows sample datafill for table DATASIZE.

MAP display example for table DATASIZE

```
DATSKEY     SIZE
_____________________________________________
 CLLI         650
   :            :

  SCGRP        100
  SDGRP        100
   :            :

  TRKGRP       500
  TRKSGRP      500
```

Datafilling table CLLI

Table CLLI, common language location identifier, uniquely identifies the hardware source of each tone, announcement, trunk group, test trunk, and service circuit in the MSL-100 switch.

If the MCRU is provisioned with an RMM shelf, additional entries may be required for RMM circuits, such as remote operator verification, REMOTEVER90 and remote test desk, REMOTETESTDK.

Some CLLI entries are created automatically when corresponding features are present in the MSL-100 switch and may already be present in table CLLI.

If additional entries are not required for RMM circuits, the trunk group sizes for these entries assigned in field TRKGRSIZ should be checked to ensure that the RMM can be accommodated.

CLLI entries whose trunk group size may need to be checked are as follows:

- LTU line test unit
- MONTALK monitor/talk connection
- OAUSC office alarm unit scan points
- OAUSD office alarm unit SD points
- MTADRIVER metallic test access driver

Basic call processing in the MCRU (continued)

The total number of entries where memory is allocated in table CLLI is equal to the value of field SIZE in table DATASIZE for key CLLI.

The following table shows the datafill specific to Basic call processing in the MCRU for table CLLI. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table CLLI

Field	Subfield or refinement	Entry	Explanation and action
CLLI		see subfields (up to 16 characters)	Common language location identifier. This 16-character field uniquely identifies the far end of each announcement, tone, trunk group, test trunk, national milliwatt test lines, and service circuit. The recommended method for naming CLLI is PLACE, PROV, BLDG, TRAFUNIT, and SUFX.
	PLACE	alphanumeric	Place. This four-character code identifies the name of the city or town at the far end of each group.
	PROV	alphanumeric	Province or state. This two-character code identifies the province or state at the far end of the trunk group.
	BLDG	alphanumeric	Building. This two-character code identifies the building number at the far end of the trunk group.
	TRAFUNIT	alphanumeric	Traffic unit. This three-character code identifies the destination of the traffic unit at the far end of the trunk group.
	SUFX	alphanumeric	Suffix. This one-character code identifies trunk groups that terminate at the same CLLI location.

Note: Memory is allocated by the SIZE field in the data size (DATASIZE) table for the entry with field DATSKEY equal to CLLI. The maximum number of CLLI codes is 8192.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table CLLI (continued)

Field	Subfield or refinement	Entry	Explanation and action
ADNUM		numeric	Administrative trunk group number. Enter a number from 0 to a number one less than the size of table CLLI shown in table DATASIZE. The value must be unique.
TRKGRSIZ		0 to 2047	Trunk group size. This four-character field is equal to the maximum quantity of trunk members that are expected to be assigned to the trunk group.
ADMININF		alphanumeric (up to 32 characters)	Administrative information. This 32-character field is used by the operating company to record administrative information. The information in this field is not used by the switching unit. The recommended subfields are TRAFCLS, OFFCLS, and TRKGRTYP.
	TRAFCLS	alphanumeric	Trunk group traffic class. This field is optional input for administrative purposes only.
	OFFCLS	alphanumeric	Office class. This field is optional input for administrative purposes only.
	TRKGRTYP	alphanumeric	Trunk group type. This field is optional input for administrative purposes only.

Note: Memory is allocated by the SIZE field in the data size (DATASIZE) table for the entry with field DATSKEY equal to CLLI. The maximum number of CLLI codes is 8192.

-end-

Basic call processing in the MCRU (continued)

Datafill example for table CLLI

The following example shows sample datafill for table CLLI.

MAP display example for table CLLI

CLLI	ADNUM	TRKGRSIZ	ADMININF
SYNCH	8	10	SYNCH/NONSYNCH
OFFHKSUP	9	10	SUPERVISION_SIGNAL_OFFHOOK
RSMVER90	23	10	REMOTE_SERVICE_MOD_VERIFICATION
OPMPES	78	198	OUTSIDE_PLANT_MODULE_PES
ALMSC	79	240	ALARM_SC
ALMSD	80	240	ALARM_SD
RLCMVER90	81	10	RLCM_REMOTE_VER_CKR

Datafilling table SITE

Table SITE lists all node sites that depend on the MSL-100 switch and miscellaneous configuration information for each of these sites. The first entry in table SITE contains the site name for the host switching office, along with its operator verification trunk group VER90.

The MCRU requires an entry in this table. The entry contains the remote site name for the MCRU, its operator verification trunk group, REMOTEVER90, and the three SD points assigned to critical, major, and minor alarms for the MCRU.

> ***Note:*** This datafill reserves three of the seven SD points in one MCRU SD group. The four remaining SD points in this SD group cannot be assigned to lines for line features.

If there is more than one MCRU at each remote site, each MCRU should be given a different site name.

The following table shows the datafill specific to Basic call processing in the MCRU for table SITE. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Basic call processing in the MCRU (continued)

Datafilling table SITE

Field	Subfield or refinement	Entry	Explanation and action
NAME		alphanumeric (up to 4 characters)	Site name. Enter the site name assigned to the remote switching unit. The first character must be alphabetic. Site names may be up to four characters in length. PM type names cannot be used for site names. Note that the first entry in this field is for the host switching unit.
LTDSN		00 to 99	LEN test desk site number. Enter a unique two-digit number required to dial the site that appears under field NAME.
MODCOUNT		0	Module count. Enter zero. This field is updated by the system when table LCMINV is datafilled.
OPVRCLLI		alphanumeric	Operator verification CLLI. Enter the CLLI assigned to the operator verification trunk group at the remote location.
ALMDATA		see subfields	Alarm data. This field is for remote locations only and consists of subfields ALMTYPE, TMTYPE, TMNO, TMCKTNO, POINT, and CONTMARK.
	ALMTYPE	CR, MJ, and MN	Enter the alarm type: critical (CR), major (MJ), and minor (MN).
	TMTYPE	RMM	Enter the trunk module type (remote service module) where the miscellaneous SD point assigned to the alarm is located.
	TMNO	0 to 255	Enter the number assigned to the remote service module where the miscellaneous SD point assigned to the alarm is located.

Note: Memory is automatically allocated for a maximum of 32 sites.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table SITE (continued)

Field	Subfield or refinement	Entry	Explanation and action
	TMCKTNO	0 to 27	Enter the trunk module circuit on the remote service module where the miscellaneous SD point assigned to the alarm is located.
	POINT	0 to 6	Enter the SD point number within the trunk module circuit number, which is assigned to the alarm.
Note: Memory is automatically allocated for a maximum of 32 sites.			
-end-			

Datafill example for table SITE

The following example shows sample datafill for table SITE.

MAP display example for table SITE

```
     NAME
LTDSN     MODCOUNT         OPVRCLLI
                                            ALMDATA
________________________________________________________
     HOST
   01           34            VER90     $
     RLCM0
   02            2         RLCM0VER90     $
     RLCM1
   03            2         RLCM1VER90     $
     RCR0
   04            1         RCR0VER90    $
```

Datafilling table LTCINV

Table LTCINV, line trunk controller inventory, contains all inventory data except P-side link assignment for the PCM-30 line group controller (PLGC). Memory is automatically allocated in table LTCINV for a maximum of 128 tuples.

Basic call processing in the MCRU (continued)

Table LTCINV must contain an entry for the host controller that connects the MCRU to the MSL-100 network. Table LTCINV identifies the type and location of the host controllers peripheral equipment, its executive programs, and C-side links, that is, those between the host controller and the network.

The following table shows the datafill specific to Basic call processing in the MCRU for table LTCINV. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table LTCINV

Field	Subfield or refinement	Entry	Explanation and action
LTCNAME		see subfields	Line trunk controller name. Contains subfield XPMTYPE and XPMNO.
	XPMTYPE	PLGC	XPM type. Enter PLGC.
	XPMNO	numeric	XPM number. Range for NT40: 0 to 127. Range for SuperNode: 0 to 255.
ADNUM		numeric	Peripheral module administrative number. Enter the administrative number associated with the peripheral module (PM). The range is 0 to 4095.The value of field ADNUM must be unique across all PM inventory tables (DLMINV, IPEINV, LCMINV, LMINV, LTCINV, RCCINV, RCSINV, RCTINV, and VSRINV). Attempts to add a PM with an ADNUM already in use are rejected and the system prompts the user with the next available ADNUM value.Field ADNUM cannot be changed if the operational measurements (OM) counts for that PM are included in an Engineering and Administrative Data Acquisition System (EADAS) or data collection (DC) section associated with the OM groups LMD or UTR.
FRTYPE		LGE	Frame Type. Enter LGE for the PLGC.
Note: Memory is automatically allocated for a maximum of 128 tuples for table LTCINV.			

-continued-

Basic call processing in the MCRU (continued)

Datafilling table LTCINV (continued)

Field	Subfield or refinement	Entry	Explanation and action
Enter the location of the this PM in fields FRNO, SHPOS, FLOOR, ROW, and FRPOS.			
EQPEC		6X02AH	Product equipment code. Enter 6X02AH for a PLGC.
LOAD		alphanumeric	Load. Enter the PM load listed in table PMLOADS.
EXECTAB		see subfields	Executive table. Contains subfields TRMTYPE, EXEC, and CONTMARK. The terminal type and its associated execs are datafilled together.
	TRMTYPE	alphanumeric	Terminal type. Enter the type of terminal models to be used: POTS for regular lines, KSET for EBS terminals, ABTRK for regular trunks, or RMM_TERM for MTC trunks.
	EXEC	alphanumeric	Executive Programs. Enter the execs associated with the terminal type (POTSEX, KSETEX, RSMEX, and DTCEX).
	CONTMARK	+ or $	Continuation mark. Enter a plus sign (+) to continue, a dollar sign ($) to end the vector.
	NMNO	0 to 63	Network module number. Enter the network module pair where the PM is assigned.
	NMPORT	0 to 64	Network module port. Enter the network port corresponding to the above network pair.
	CONTMARK	+ or $	Continuation mark. Enter a plus sign (+) to continue, a dollar sign ($) to end the vector.
OPTCARD		alphanumeric	Optional card. Enter when the PLGC includes the UTR, message, and CMR cards. If the CMR card is included, enter the CMRLOAD. Entries include RAM6X69, 6X44EA, and 6X28.
CMRLOAD		alphanumeric	Class modem resource load. Enter the CMR software load (Future application)
TONESET		NORTHAM, AUS100, or DEFAULT	Tone set. Enter NORTHAM, AUS100, or DEFAULT.

Note: Memory is automatically allocated for a maximum of 128 tuples for table LTCINV.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table LTCINV (continued)

Field	Subfield or refinement	Entry	Explanation and action
PECS6X45		alphanumeric	Product equipment codes 6X45. Enter the PEC of the card in PLGC units 0 and 1. The PEC must reflect minimum firmware capabilities in the processor complex of each unit. PEC MX77AA has been added for XPM PLUS.
E2LOAD		alphanumeric	EEPROM file. Contains the name of the loadfile loaded in the NTMX77AA EEPROM
OPTATTR		blank	Optional attribute. This field is for a DTC supporting CCS7, leave this field blank.
	CONTMARK	+ or $	Continuation mark. Enter a plus sign (+) to continue, a dollar sign ($) to end the vector.
PEC6X40		alphanumeric	6X40 equipment PEC. Enter the version of the NT6X40 to be used.

Note: Memory is automatically allocated for a maximum of 128 tuples for table LTCINV.

-end-

Basic call processing in the MCRU (continued)

Datafill example for table LTCINV

The following example shows sample datafill for table LTCINV.

MAP display example for table LTCINV

```
LTCNAME
 ADNUM FRTYPE FRNO SHPOS FLOOR ROW FRPOS EQPEC LOAD
                                            EXECTAB
                                           CSLNKTAB
                                            OPTCARD
 TONESET  PEC6X45
                   E2LOAD        OPTATTR
PEC6X40
_______________________________________________________
PLGC 0
    1005 LGE    5    18    1   B 5 6X02AG NLT35ZI1
                        (POTS POTSEX) (RMM_TERM RSMEX)$
   (9 17) (13 61) (5 14)(0 29)(1 30)(2 31)(3 28)(4 29)$
               (  UTR16)  (  CMR18 CMR36A15) (MSG6X69)$
DEFAULT  MX77AA  MX77AA  MX77MA24
                        NILLOAD                   $
6X40AC
```

Datafilling table LTCPSINV

Table line trunk controller P-side link inventory (LTCPSINV) contains the assignments of the peripheral side links for the PLGC, SMR, SMS, SMU, and IDTC.

The key for table LTCPSINV is the same as table LTCINV. Memory is automatically allocated in table LTCPSINV for a maximum of 128 tuples.

The list of links in table LTCPSINV should include the PCM-30 links that connect the PLGC and the MCRU.

The following table shows the datafill specific to Basic call processing in the MCRU for table LTCPSINV. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Basic call processing in the MCRU (continued)

Datafilling table LTCPSINV

Field	Subfield or refinement	Entry	Explanation and action
LTCNAME		see subfields	Link trunk controller name. Contains subfields XPMTYPE and XPMNO
	XPMTYPE	PLGC	PM type. Only the PLGC can connect to the RCC
	XPMNO	0 to 255	PM number. Peripheral module number assigned to this PM
PSLNKTAB		0 to 15	P-side link table. Contains subfields PSLINK, PSDATA, and CONTMARK
	PSLINK	0 to 15	P-side link. Enter the P-side port number.
	PSDATA	PCM-30, DS30A, or NILTYPE	P-side data. Enter PCM-30 for trunks and remote nodes, including the RCC and MCRU. Enter DS30A if the P-side interface is to a local ILCM.
	CONTMARK	+or $	Continuation mark. Enter a plus sign (+) to continue, a dollar sign ($) to end the vector.
If PSDATA is PCM-30, fill in fields CARRIDX and ACTION.			
	CARRIDX	DEFAULT	Carrier index. Enter the name to index into table CARRMTC. Enter DEFAULT for the default template in table CARRMTC.
	ACTION	N	Action. Enter Y if the carrier should be removed from service when the out-of-service limit for frame, slip, errored-second, or severe errored-second is exceeded.
Note: Memory is automatically allocated for a maximum of 128 tuples for table LTCPSINV.			

Basic call processing in the MCRU (continued)

Datafill example for table LTCPSINV

The following example shows sample datafill for table LTCPSINV.

MAP display example for table LTCPSINV

```
LTCNAME                                               PSLNKTAB
_______________________________________________________________
PLGC  0
(0 DS30A) (1 DS30A) (2 DS30A) (3 DS30A) (4 DS30A) (5DS30A)
(6 DS30A) (7 DS30A) (8 DS30A)(9 DS30A)(10 DS30A)(11 DS30A)
(12 DS30A) (13 DS30A) (14 DS30A) (15 DS30A) (16 DS30A)
(17 DS30A) (18 DS30A) (19 DS30A) $

PLGC  1
(0 PCM30 Default N) (1 PCM30 Default N) (2 PCM30 Default N)
(3 PCM30 Default N) (4 PCM30 Default N) (5 PCM30 Default N)
(6 PCM30 Default N)(7 PCM30 Default N) (8 PCM30 Default N)
(9 PCM30 Default N)(10 NILTYPE)(11 NILTYPE)(12 NILTYPE)
(13 NILTYPE)(14 NILTYPE)(15 NILTYPE)(16 NILTYPE)(17 NILTYPE)
(18 NILTYPE)(19 NILTYPE) $

PLGC  2
(0 DS30A)(1 DS30A)(2 PCM30)(3 PCM30)(4 NILTYPE)(5 NILTYPE)
(6 DS30A)(7 DS30A)(8 PCM30)(9 PCM30)(10 NILTYPE)(11 NILTYPE)
(12 NILTYPE) (13 NILTYPE) (14 NILTYPE) (15 NILTYPE)
(16 NILTYPE) (17 NILTYPE) (18 NILTYPE) (19 NILTYPE) $
```

Datafilling table CARRMTC

Table carrier maintenance control (CARRMTC) allows the MSL-100 switch administration to datafill maintenance control information in peripherals, out-of-service limits for alarms, and system return-to-service occurrences.

Up to 16 entries exist for each type of peripheral that can provide carrier links in the switch. The choice of entries for each carrier is datafilled in the inventory table of the C-side peripheral, table LTCPSINV.

The following checks are made between table CARRMTC and table LTCPSINV:

- When a carrier index (CARRIDX) is datafilled in table LTCPSINV, an entry for the peripheral module type, in this case, RCC and PLGC, must already be present in table CARRMTC.

Basic call processing in the MCRU (continued)

- When an entry is deleted from table CARRMTC, that entry cannot be referenced by any carriers in table LTCPSINV. Otherwise, the deletion command is rejected.
- When an existing entry in table CARRMTC is changed, table LTCPSINV is checked to determine if that entry is referenced by in-service carriers. If so, the change command is rejected and a list of the in-service carriers is displayed.

The following table shows the datafill specific to Basic call processing in the MCRU for table CARRMTC. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table CARRMTC

Field	Subfield or refinement	Entry	Explanation and action
CSPMTYPE		PLGC	C-side node PM type. Enter the PM type of the node on the C-side of the carrier link; in this case, PLGC.
TMPLTNM		alphanumeric (up to 16 characters)	Template name. Enter the template name (up to 16 characters) for the PM. This entry also appears in the CARRIDX field of table RCCPSINV. Default value: DEFAULT

Note 1: The MSL-100 switch adds the first tuple for PLGC (or RCC) to table CARRMTC automatically during initial program load (IPL) or first restart after IPL. The entry is designated as index 0 and has the value DEFAULT in the TMPLTNM field and default values for the other fields. This tuple cannot be deleted, and only fields ES, SES, and thresholds for frame and slip losses can be changed.

Note 2: Tuples other than the default tuple must be added manually before they can be referenced in table LTCPSINV. These tuples can be deleted only if no PCM-30 carriers are associated with them.

Note 3: Tuples can be changed in table CARRMTC only if the associated PCM-30 carriers are ManB or OffL.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table CARRMTC (continued)

Field	Subfield or refinement	Entry	Explanation and action
RTSML		0 to 255	Return-to-service maintenance limit. Enter the number of times during the audit interval a carrier can be returned to service by the system before a warning is issued. Value 255 disables this feature.
RTSOL		0 to 255	Return to service out-of-service limit. Enter the number of times during an audit interval a carrier can be returned to service by the system before it is placed permanently out of service. Value 255 disables this feature.
ATTR		see subfields	Attribute. This field is comprised of subfield SELECTOR.
	SELECTOR	PCM-30	Selector. Enter carrier type PCM-30.
	CARD	NT6X27BB	Card. Enter the product engineering code (PEC) of the PCM-30 interface card used. Range of values for the RCC: NT6X27BB. ***Note:*** Refer to the *Remote Switching Center Maintenance Guide* for details on retrofitting NT6X27BB on the C-side PCM-30 links for an RCC.
	VOICELAW	A_LAW	Voice law. Enter the voice law used in the carrier. A_LAW is used mainly in international switches. MU_LAW is used mainly in North American switches.

Note 1: The MSL-100 switch adds the first tuple for PLGC (or RCC) to table CARRMTC automatically during initial program load (IPL) or first restart after IPL. The entry is designated as index 0 and has the value DEFAULT in the TMPLTNM field and default values for the other fields. This tuple cannot be deleted, and only fields ES, SES, and thresholds for frame and slip losses can be changed.

Note 2: Tuples other than the default tuple must be added manually before they can be referenced in table LTCPSINV. These tuples can be deleted only if no PCM-30 carriers are associated with them.

Note 3: Tuples can be changed in table CARRMTC only if the associated PCM-30 carriers are ManB or OffL.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table CARRMTC (continued)

Field	Subfield or refinement	Entry	Explanation and action
	FF	SF or ESF	Frame format. Enter SF (standard frame) or ESF (extended super frame) in this field.
	ZLG	ZCS or B8ZS	Zero logic. Enter zero code suppression (ZCS) in the ZLG field. If all zeros are transmitted, a 1 is inserted in the second least significant bit position.
	BERB	BPV or CRC	Bit error rate base. Enter BPV for bipolar violation.
	DLK	NILDL	Data link. Currently, only NILDL is supported.
	IAT	Y or N	Inhibit alarm transmit. Enter Y for the IAT field to inhibit yellow alarms.
	LCGAST	1 to 9999	Local carrier group alarm set. Enter the threshold value in units of 10 ms.
	LCGACL	1 to 9999	Local carrier group alarm clear threshold. Enter the threshold value in units of 10 ms.
	RCGAST	1 to 9999	Remote carrier group alarm set. Enter the threshold value in units of 10 ms.
	CONTMARK	+	Continuation mark. Enter a plus sign (+) to continue a record on the next line.
	RCGACL	1 to 9999	Remote carrier group alarm clear threshold. Enter the threshold value in units of 10 ms.
	AISST	1 to 9999	Alarm indication signal set threshold. Enter the threshold value in units of 10 ms.

Note 1: The MSL-100 switch adds the first tuple for PLGC (or RCC) to table CARRMTC automatically during initial program load (IPL) or first restart after IPL. The entry is designated as index 0 and has the value DEFAULT in the TMPLTNM field and default values for the other fields. This tuple cannot be deleted, and only fields ES, SES, and thresholds for frame and slip losses can be changed.

Note 2: Tuples other than the default tuple must be added manually before they can be referenced in table LTCPSINV. These tuples can be deleted only if no PCM-30 carriers are associated with them.

Note 3: Tuples can be changed in table CARRMTC only if the associated PCM-30 carriers are ManB or OffL.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table CARRMTC (continued)

Field	Subfield or refinement	Entry	Explanation and action
AISCL		1 to 9999	Alarm indication signal clear threshold. Enter the threshold value in units of 10 ms.
BEROL		3 to 6	Bit error rate out-of-service limit. Enter the bit error rate out-of-service limit expressed as the negative of the exponent of 10 (10E-n). The number 3, for example, represents a 1-in-1000 bit error rate.
BERML		4 to 7	Bit error rate maintenance limit. Enter the bit error rate maintenance limit expressed as the negative of the exponent of 10 (10E-n).
ES		0 to 9999	Error second (ES) threshold. Enter the threshold value in units of 10 ms.
SES		0 to 9999	Severe error second (SES) threshold. Enter the threshold value in units of 10 ms.
FRAMEML		0 to 9999	Frame maintenance limit. Enter the maintenance limit for frame loss.
FRAMEOL		0 to 9999	Frame loss limit. Enter the out-of-service limit for frame loss. Note that FRAMEOL should be larger than FRAMEML.

Note 1: The MSL-100 switch adds the first tuple for PLGC (or RCC) to table CARRMTC automatically during initial program load (IPL) or first restart after IPL. The entry is designated as index 0 and has the value DEFAULT in the TMPLTNM field and default values for the other fields. This tuple cannot be deleted, and only fields ES, SES, and thresholds for frame and slip losses can be changed.

Note 2: Tuples other than the default tuple must be added manually before they can be referenced in table LTCPSINV. These tuples can be deleted only if no PCM-30 carriers are associated with them.

Note 3: Tuples can be changed in table CARRMTC only if the associated PCM-30 carriers are ManB or OffL.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table CARRMTC (continued)

Field	Subfield or refinement	Entry	Explanation and action
SLIPML		0 to 9999	Slip maintenance limit. Enter the maintenance limit for slip.
SLIPOL		0 to 9999	Slip out-of-service limit. Enter the out-of-service limit for slip. Note that SLIPOL should be larger than SLIPML.

Note 1: The MSL-100 switch adds the first tuple for PLGC (or RCC) to table CARRMTC automatically during initial program load (IPL) or first restart after IPL. The entry is designated as index 0 and has the value DEFAULT in the TMPLTNM field and default values for the other fields. This tuple cannot be deleted, and only fields ES, SES, and thresholds for frame and slip losses can be changed.

Note 2: Tuples other than the default tuple must be added manually before they can be referenced in table LTCPSINV. These tuples can be deleted only if no PCM-30 carriers are associated with them.

Note 3: Tuples can be changed in table CARRMTC only if the associated PCM-30 carriers are ManB or OffL.

-end-

Datafill example for table CARRMTC

The following example shows sample datafill for table CARRMTC.

MAP display example for table CARRMTC

```
CSPMTYPE  TMPLTNM  RTSML  RTSOL                      ATTR
_________________________________________________________
PLGC      DEFAULT   255    255    PCM30 NT6X27BB A_LAW SF
                                   ZCS BPV NILDL Y 100
                                  300 50 50 150 1000 3  6
                                  864 100 17 511  4  255
```

Datafilling table LCMINV

Table line concentrating module inventory (LCMINV) lists the data assignment for each frame associated with a local or remote ILCM unit. This table should include one entry for each MCRU. Only fields requiring datafill specific to this feature are shown.

Basic call processing in the MCRU (continued)

Table LCMINV associates the site name provided in table SITE with the location of the MCRU, its PM software, ringing data, C-side links, and provisionable options (RMM and any additional MCRU feature packages).

Note 1: The C-side links datafilled for the MCRU in table LCMINV must correspond to those datafilled for the host PLGC in table LTCPSINV.

Note 2: If LCMSELECTOR of field LCMINFO is set to MCRU, table RMMINV must also be datafilled.

The field BICTST was added to table LCMINV in BCS33. This field provides a boolean indication of whether a particular MCRU is to be included in the test schedule.

The following table shows the datafill specific to Basic call processing in the MCRU for table LCMINV. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table LCMINV

Field	Subfield or refinement	Entry	Explanation or action
LCMNM		see subfields	ILCM name. Enter the site name, frame number and peripheral module number assigned to the remote ILCM.
	SITE	alphanumeric	Site. Enter the site name assigned to the remote location.
	FRAME	0 to 511	Frame number. Enter frame number for the ILCM.
	PMNO	0 to 255	Peripheral module number. Enter the peripheral module.
FRTYPE		RLCM	Frame type. Enter the frame type where the PM equipment is mounted.
Enter the location of the C-side PM in fields FRNO, SHPOS, FLOOR, ROW, and FRPOS.			
EQPEC		6X04AA	Equipment product engineering code. Enter the PEC of the PM. For example, 6X04AA
LOAD		alphanumeric	Load name. Enter the name given to the issue of PM software.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table LCMINV (continued)

Field	Subfield or refinement	Entry	Explanation or action
CSPMNO		see subfields	C-side peripheral module type and number. Enter the C-side PMTYPE and PM number.
	PMTYPE	PLGC, PRCC, or RCC2	PMTYPE. Enter the C-side PM type.
	PMNO	0 to 255	Peripheral module number. Enter the number assigned to the C-side PM.
BICTST		Y or N	BIC relay test (BRT). Set to Y to include the MCRU in the next ILCM BRT schedule. Entry values are Y and N.
ADNUM		0 to 4095	Peripheral module administrative number. Enter the administrative number associated with the peripheral module (PM).The value of field ADNUM must be unique across all PM inventory tables (DLMINV, IPEINV, LCMINV, LMINV, LTCINV, RCCINV, RCSINV, RCTINV, and VSRINV). Attempts to add a PM with an ADNUM already in use are rejected and the system prompts the user with the next available ADNUM value.Field ADNUM cannot be changed if the operational measurements (OM) counts for that PM are included in an Engineering and Administrative Data Acquisition System (EADAS) or data collection (DC) section associated with the OM groups LMD or UTR.
MEMSIZE		256K	Memory size. Enter the memory size of the processor card used in the ILCM. Entry values are 256k and 64k. The MEMSIZE field must be set to 256k if BICTST is set to Y.If MEMSIZE is set to 64k, BICTST must be set to N.
LCMTYPE		see subfields	LCMTYPE info multiple with ringing data, ringing type and LCMINFO.
	LCM	alphanumeric	LCMTYPE selector. Enter ILCM selector multiple with ringing data and ringing type.
LCMINFO		see subfields	Enter LCMINFO multiple with LCMSELECTOR, LINKMAP, INTRASW, ESA, CONVERTIBLE and PCM30CARD.

-continued-

Basic call processing in the MCRU (continued)

Datafilling table LCMINV (continued)

Field	Subfield or refinement	Entry	Explanation or action
	LCM SELECTOR	RLCM	Enter HLCM multiple with LINKMAP when C-side link is DS30A or RLCM multiple with LINKMAP, INTRASW, ESA, CONVERTIBLE, and PCM30CARD when C-side link is PCM30.
	LINKMAP	2 to 6	Enter C-side link numbers equipped; minimum of 2 links and a maximum of 6 links.
	INTRASW	Y or N	Boolean Y or N to turn intraswitching ON or OFF
	ESA	Y or N	Boolean Y or N to turn emergency stand-alone ON or OFF
	CONV	Y or N	Boolean Y or N if this MCRU can be converted to an RSC
	PCM30CARD	6X27BB or 6X65AB	Enter the C-side PCM30 interface card type 6X27BB.

-end-

Datafill example for table LCMINV

The following example shows sample datafill for table LCMINV.

MAP display example for table LCMINV

```
   LCMNM  FRTYPE  SHPOS  FLOOR  ROW  FRPOS  EQPEC  LOAD
CSPMNO  BICTST  ADNUM  MEMSIZE
                                                 LCMTYPE
________________________________________________________
REM3 02 0   RLCM    0   1     A  0    6X04AA  LCM19I
PLGC  0   Y   31   256K    $ 48V  RLCM
         ( 2) ( 6) ( 3) ( 7)$ Y N N           6X27BB
```

Datafilling table RMMINV

Table remote maintenance module inventory (RMMINV) identifies an RMM by MCRU, or RSC site including the physical location, equipment product engineering code (EQPEC), PM load, executive program, and attached C-side peripheral module.

Memory is dynamically allocated in this table and its maximum size is 255 entries. An entry is required in table RMMINV if the MCRU is provisioned with an RMM shelf.

The following table shows the datafill specific to Basic call processing in the MCRU for table RMMINV. Only those fields that apply directly to Basic call processing in the MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table RMMINV

Field	Subfield or refinement	Entry	Explanation and action
RMMNAME		alphanumeric	RMM name. Enter the name for the RMM. Contains subfields SITENM, PMTYPE, and RMMNO.
	SITENM	Location	Site. Enter the site name assigned to the remote location. This entry should also appear in table RCCINV, LCMINV, and SITE.
	PMTYPE	RMM	PM type. Enter RMM.
	RMMNO	0 to 255	RMM number. Enter the number assigned to this RMM.
FRTYPE		RLCM	Frame Type. For the MCRU, enter RLCE.
Enter the location of the RCC in fields FRNO, SHPOS, FLOOR, ROW, and FRPOS.			
EQPEC		6X13AA	Equipment PEC. Enter 6X13AA for a regular RMM.
LOAD			Load. Enter the load for the RMM. Ensure that table PMLOADS contains the load and table name.
EXECS		RSMEX	Exec table. Enter the appropriate execs. For the RMM, the exec is RSMEX.
CSPMINFO		see subfields	C-side PM information. Contains subfields RMMSELECTOR, CSIDEPM, and CSIDPORT.
Note: When the RMMSELECTOR is set to RMMRCC, the RMM is located in an RCE frame. Port 0 of the RCC is extended through backplane wiring to shelf position 51 and port 1 is to shelf position 65.			
-continued-			

Basic call processing in the MCRU (continued)

Datafilling table RMMINV (continued)

Field	Subfield or refinement	Entry	Explanation and action
	RMMSELECTOR	RMMILCM	RMM selector. Enter the selector for the type of module on the C-side of the RMM. Either RMMRCC, or RMMLCM.
CSIDEPM		see subfields	C-side peripheral module. Contains subfields PMT and EXT_PMNO.
	PMT	ILCM	PM type. Based on the value in field RMMSELECTOR. Enter RCC or ILCM.
	EXTPMNO	0 to 255	External PM number. Enter the external PM number where the RMM is attached. This number should also appear in table LCMINV or RCCINV for the C-side PM.
	CSIDPORT	0 or 1	C-side port. Enter the C-side port connected to the RMM.

Note: When the RMMSELECTOR is set to RMMRCC, the RMM is located in an RCE frame. Port 0 of the RCC is extended through backplane wiring to shelf position 51 and port 1 is to shelf position 65.

-end-

Datafill example for table RMMINV

The following example shows sample datafill for table RMMINV.

MAP display example for table RMMINV

```
RMMNAME FRTYPE FRNO SHPOS FLOOR ROW FRPOS EQPEC LOAD
EXECS
            CSPMINFO
________________________________________________________
REM3  RMM  0    RLCM   0   56  1   A  1   6X13AA  RMM34C
RSMEX   RMMILCM          ILCM     0
```

Datafilling table TRKGRP

Table trunk group (TRKGRP) defines data for each trunk group associated with the switching unit. Each trunk group entry in table TRKGRP consists of a unique CLLI for the trunk group and several fields determined by the trunk group type (field GRPTYP).

Any incoming or outgoing test trunk card, such as NT2X90AC, provisioned in the RMM should be listed in table TRKGRP as REMOTETESTDK or REMOTEVER90.

The following table shows the datafill specific to Basic call processing MCRU for table TRKGRP. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table TRKGRP

Field	Subfield or refinement	Entry	Explanation and action
GRPKEY		see subfields	Group key. This field is comprised of the subfield CLLI. Enter the CLLI code for the trunk group assigned in table CLLI.
	CLLI	alphanumeric	Group key. This field is comprised of the subfield CLLI. Enter the CLLI code for the trunk group assigned in table CLLI.
GRPINFO		GRPTYP, TRAFSNO, PADGRP, NCCLS, and CARD0	Variable group data. When trunk group type is MAINT, this field is comprised of subfields GRPTYP, TRAFSNO, PADGRP, NCCLS, and CARD.

Note 1: The total number of trunk groups, which memory is allocated in table TRKGRP, is equal to the value of field SIZE in table DATASIZE for key TRKGRP.
Note 2: Each trunk group in table TRKGRP is to be assigned one or two subgroups defined in table TRKSGRP.
Note 3: The physical location of all analog or digital trunks assigned to the trunk groups in table TRKGRP are listed in table TRKMEM.

-continued-

Basic call processing MCRU (continued)

Datafilling table TRKGRP (continued)

Field	Subfield or refinement	Entry	Explanation and action
	GRPTYP	ITL2, TTL2, LOOPA, MAINT, or SOCKT	Group type. Enter the group type for the trunk group. For maintenance and test trunks, the range is ITL2, TTL2, LOOPA, MAINT, or SOCKT.
	TRAFSNO	0 to 127	Traffic separation number. This is not required for maintenance and test trunks.
	PADGRP	alphanumeric	Pad group. Enter the name of the pad group assigned to the trunk group in table PADDATA. For maintenance and test trunks, enter IAO (intra-office trunks). Otherwise, enter NPDGP.
	NCCLS	NCRT	No circuit class. Enter NCRT (no circuit).
	CARD	alphanumeric	Card code. Enter the product engineering code of the maintenance and test trunk.

Note 1: The total number of trunk groups, which memory is allocated in table TRKGRP, is equal to the value of field SIZE in table DATASIZE for key TRKGRP.
Note 2: Each trunk group in table TRKGRP is to be assigned one or two subgroups defined in table TRKSGRP.
Note 3: The physical location of all analog or digital trunks assigned to the trunk groups in table TRKGRP are listed in table TRKMEM.

-end-

Basic call processing MCRU (continued)

Datafill example for table TRKGRP

The following example shows sample datafill for table TRKGRP.

MAP display example for table TRKGRP

```
   GRPKEY                                          GRPINFO
_______________________________________________________________
      VER90                  MAINT  0  NPDGP NCRT  2X90AB
      TTT                    MAINT  0  IAO   NCRT  2X96AA
      TTU                    MAINT  0  IAO   NCRT  2X47AA
      LTU                    MAINT  0  IAO   NCRT  2X11AA
  RLCMVER90                     VR  0  TLD   NCRT      VR
      OG_1              TO  0  TLD NCRT     IE MIDL  7 N
      OG_2              TO  0  TLD NCRT     IE MIDL  4 N
      OG_3              TO  0  TLD NCRT     IE MIDL  4 N
      OG_4              TO  0  TLD NCRT     IE MIDL  4 N
      OG_5              TO  0  TLD NCRT     IE MIDL  4 N
      OG_6              TO  0  TLD NCRT     IE MIDL  4 N
```

Datafilling table TRKSGRP

Table TRKSGRP (trunk subgroup) lists supplementary information for each subgroup assigned to trunk groups listed in table TRKGRP. Input data must be specified for at least one, or a maximum of two subgroups, for each trunk group listed in table TRKGRP, excluding trunk groups defined in TRKGRP as a maintenance group type (MAINT).

No data is required in the trunk subgroup table for the MAINT trunk group type.

Each REMOTETESTDK or REMOTEVER90 provisioned in the RMM of the MCRU should be assigned a corresponding subgroup in this table. The following example shows a sample datafill for table TRKSGRP.

Basic call processing MCRU (continued)

Note: The total number of trunk groups for which memory is allocated in table TRKSGRP is equal to the value of field SIZE in table DATASIZE for key TRKSGRP.

The following table shows the datafill specific to Basic call processing MCRU for table TRKSGRP. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table TRKSGRP

Field	Subfield or refinement	Entry	Explanation and action
SGRPKEY		see subfields	Subgroup key. This field contains subfields CLLI and SGRP.
	CLLI	alphanumeric	Common language location identifier. This subfield contains the code assigned in the CLLI table to the trunk group where the subgroup belongs.
	SGRP	0 or 1	Subgroup number. This subfield contains the number assigned to the trunk subgroup.
CARDCODE		alphanumeric	Card code. This field lists the maintenance and test trunk PEC.
SGRPVAR		see subfields	Variable subgroup data. For standard signaling, this field contains the following subfields: SIGDATA, DIR, OPULSTYP, OSTARTSG, IDGTIME, NUMSTOPS, CCONT, RNGBCK, ESUPR, SAT, REMBSY, DIALMODE, and TRKGDTIM.
	SIGDATA	STD	Signaling data. This subfield lists the signaling code for standard signaling (STD).
	DIR	IC, OG, or 2W	Direction. Enter trunk group direction, incoming (IC), outgoing (OG), or two-way (2W).

Note 1: Memory is allocated for the number of trunk subgroups by the SIZE field in table DATASIZE for the entry with field DATSKEY equal to TRKSGRP.
Note 2: The maximum number of trunk subgroups is equal to twice the number of trunk groups.
Note 3: The maximum number of trunk subgroups that can be assigned is 4096.

-continued-

Basic call processing MCRU (continued)

Datafilling table TRKSGRP (continued)

Field	Subfield or refinement	Entry	Explanation and action
	OPULSTYP	DP, DT, MF, or blank	Outgoing type of pulsing. For maintenance and test trunks, the entry is no pulsing (NP).
	OSTARTSG	DD, IM, LS, GS, or WK	Outgoing start dial signal. For maintenance and test trunks, the entry is wink (WK).
	IDGTIME	0 to 100 or blank	Interdigital timing. For maintenance and test trunks, this value is 2.
	NUMSTOPS	0 to 3, or blank	Number of stop/goes. For maintenance and test trunks, this value is 0.
	CCONT	MW or NO	Coin control. For maintenance and test trunks, the entry is MW (multiwink).
	RNGBCK	IB or N	Ringback. For maintenance and test trunks, the entry is inband (IB).
	ESUPR	F, H, or N	Echo suppressor. For maintenance and test trunks, the entry is no echo suppressor, N.
	SAT	Y or N	Satellite. For maintenance and test trunks, the entry is no satellite, N.
	REMBSY	Y or N	Remote make busy. For maintenance and test trunks, the entry is feature not assigned, N.
	DIALMODE	C or M	Dial mode. For maintenance and test trunks, this subfield is blank.
	TRKGDTIM	16	Trunk guard timing. For maintenance and test trunks, this value is 16 (160 ms elapse time interval before the trunk is returned to the idle link list after trunk disconnect).

Note 1: Memory is allocated for the number of trunk subgroups by the SIZE field in table DATASIZE for the entry with field DATSKEY equal to TRKSGRP.
Note 2: The maximum number of trunk subgroups is equal to twice the number of trunk groups.
Note 3: The maximum number of trunk subgroups that can be assigned is 4096.

-end-

Basic call processing MCRU (continued)

Datafill example for table TRKSGRP

The following example shows sample datafill for table TRKSGRP.

MAP display example for table TRKSGRP

```
 SGRPKEY   CARDCODE
                                                   SGRPVAR

 VER90 0   2X90AB
                     STD OG  NP  WK  0 0 NO NO F N N  17
  TTT 0    2X96AA
                     STD OG  NP  WK  0 0 NO NO F N N  17
  TTU 0    2X47AA
                     STD OG  NP  WK  0 0 NO NO F N N  17
  LTU 0    2X11AA
                     STD OG  NP  WK  0 0 NO NO F N N  17
RLCMVER90 2X90AB
                     STD OG  NP  WK  0 0 NO NO F N N  17
```

Datafilling table TRKMEM

Table TRKMEM (trunk member) lists data associated with each analog or digital trunk assigned to one of the trunk groups and subgroups in tables TRKGRP and TRKSGRP. The following example shows a sample datafill for table TRKMEM.

Entries should be included for each circuit provisioned in the remote maintenance module (RMM):

- No external trunk numbers, field EXTRKNM, should be duplicated in assigning these RMM circuits to existing CLLI (LTU, MONTALK).
- The PMTYPE should be RMM for analog MCRU RMM circuits listed in table TRKMEM.

The following table shows datafill specific to Basic call processing MCRU for table TRKMEM. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Basic call processing MCRU (continued)

Datafilling table TRKMEM

Field	Subfield or refinement	Entry	Explanation and action
CLLI		alphanumeric	Common language location identifier. Enter the code assigned in table CLLI to the trunk group where the trunk is a member.
EXTRKNM		0 to 9999	External trunk number. Enter the external trunk number assigned to the trunk.
SGRP		0 to 1	Subgroup number. Enter the subgroup number where the trunk is assigned. Enter 0 for maintenance and test trunks, 1 for others.
MEMVAR		see subfields	Variable data for members. For RSC applications, this field varies according to whether the trunk is part of an interoffice trunk or a maintenance trunk. For an interoffice trunk, the subfields are PMTYPE, RCCNO, RCCCKTNO, and RCCCKTS.
	PMTYPE	RMM	Peripheral module type. Enter the PM type where the trunk is mounted.
	RMMNO	0 to 255	RMM number. Enter the number assigned to this remote maintenance module.
	RMMCKTNO	0 to 27	RMM circuit number. Enter the RMM circuit number to which the TRKGRP member is assigned.

Note 1: Memory is allocated for the total number of trunks specified in field TRKGRSIZ in table CLLI for the appropriate trunk groups.
Note 2: Table size may be increased with data present by changing field TRKGRSIZ in table CLLI for the appropriate trunk groups.

-end-

Basic call processing MCRU (continued)

Datafill example for table TRKMEM

The following example shows sample datafill for table TRKMEM.

MAP display example for table TRKMEM

```
>Table TRKMEM;LIS;POS RSMVER90
TABLE:  TRKMEM
     CLLI              EXTRKNM SGRP              MEMVAR
--------------------------------------------------------
     RSMVER90             0     0             RMM  2  4
     RSMVER90             1     0             MTM  2  2
     MONTALK 3            2     0             RMM  2  6
     LTU 3                3     0             RMM  2  3
     LTU 5                4     0             RMM  2  5
     MONTALK 5            5     0             RMM  2  8
     ESADGTR 0            6     0             RMM  2  10
     ESADGTR 1            7     0             RMM  2  11
```

Datafilling table CLLIMTCE

Table common language location identifier maintenance (CLLIMTCE) lists the following information for each trunk group CLLI:

- abbreviated CLLI code for use by maintenance staff
- percentage of service circuits that can be removed before specific alarms are displayed
- type of test equipment at the far end
- index to test line control
- index to milliwatt data table
- signaling test runs after diagnostic test
- additional digits to be prefixed in addition to the four digits of subtable test line number.

Table CLLIMTCE is datafilled automatically by the system, when an entry is datafilled in table CLLI. Table CLLIMTCE should be checked for accuracy and maintenance as required.

Datafill example for table CLLIMTCE

The following example shows sample datafill for table CLLIMTCE.

MAP display example for table CLLIMTCE

```
CLLI     SCLLI    MINALM  MAJALM  CRITALM  SYNCTYPE TSTNOIND
MWIDX  SIGTST  PRFXDIGS  DIAGDATA
_________________________________________________________________
RSMVER90 RSMVER90  5      10        50     SYN        0
 0        Y          N       ( 2 )
```

Datafilling table ALMSCGRP

Table alarm scan group (ALMSCGRP) lists MSL-100 alarm scan circuits (alarm sensors), their locations, and their card types. If the MCRU is provisioned with an RMM shelf containing a miscellaneous scan card (NT0X10), it should be listed in table ALMSCGRP.

Datafill example for table ALMSCGRP

The following example shows sample datafill for table ALMSCGRP.

MAP display example for table ALMSCGRP

```
SCGROUP TMTYPE  TMNO  TMCKTNO CARDCODE
_________________________________________________________________
  0      MTM      1         1   3X82AA
  1      MTM      3         1   3X82AA
  2      MTM      1         7   3X84AA
  3      MTM      1        10   0X10AA
  .      .        .         .   .
  .      .        .         .   .
  .      .        .         .   .
 15      RSM      1         7   0X10AA
  .      .        .         .   .
  .      .        .         .   .
 20      RMM      0        10   0X10AA
 21      RMM      0        11   0X10AA
```

Datafilling table ALMSC

Table alarm scan (ALMSC) identifies the function of the assigned scan points in the alarm scan groups. If the MCRU must contain an RMM shelf with an NT0X10 card, the scan points for the MCRU should be listed and

Basic call processing MCRU (continued)

assigned to scan groups in table ALMSC. Scan groups are defined in table SCGRP.

Datafill example for table ALMSC

The following example shows sample datafill for table ALMSC.

MAP display example for table ALMSC

```
FUNCTION   SCGROUP   POINT   NORMALST   REPORT ALM    LOGIC
_____________________________________________________________
TSTSCAN         0      0        1         Y     NA     Y
   :                   :               :

 ABSRLCM       11      0      0   Y   MN N   (RLCMAUD N N)
                                             (RLCMABS N N)
                                             (MNXFER N Y) $
 PDCRLCM       11      1      0   Y   MJ N   (RLCMAUD N N)
                                             (RLCMPDC N N)
                                             (MJXFER N Y) $
AISARLCM       11      2      0   Y   MJ N   (RLCMMAJ N N)
                                               (RLCMAUD N N)
   :                   :               :

  MNRLCM       12      3      0   Y   MN N   (RLCMAUD N N) $
  MJRLCM       12      4      0   Y   MJ N   (RLCMAUD N N) $
  CRRLCM       12      5      0   Y   CR     (RLCMAUD N N) $
```

Datafilling table ALMSDGRP

Table alarm signal distribution group (ALMSDGRP) lists MSL-100 alarm SD circuits (alarm drivers), their locations, and their card types. If the MCRU is provisioned with an RMM shelf containing an NT2X57 card, the card should be listed in table ALMSDGRP.

Basic call processing MCRU (continued)

Datafill example for table ALMSDGRP

The following example shows sample datafill for table ALMSDGRP.

MAP display example for table ALMSDGRP

SDGROUP	TMTYPE	TMNO	TMCKTNO	CARDCODE
0	MTM	1	0	3X82AA
1	MTM	3	0	3X82AA
2	MTM	1	6	3X84AA
4	MTM	1	4	2X57AA
5	MTM	1	5	2X57AA
6	MTM	1	18	2X57AA
7	MTM	1	19	2X57AA
8	MTM	6	18	2X57AA
9	MTM	6	19	2X57AA
10	MTM	9	18	2X57AA
11	MTM	9	19	2X57AA
12	RMM	0	22	2X57AA
8	RMM	0	23	2X57AA
.	.	.	.	.
.	.	.	.	.
.	.	.	.	.
22	MTM	12	18	2X57AA
23	MTM	12	19	2X57AA

Datafilling table ALMSD

Table alarm signal distribution (ALMSD) identifies the function of each of the assigned SD points in the SD groups. If the MCRU contains an RMM shelf with an NT2X57 card, the SD points for the MCRU should be listed and assigned to SD groups in table ALMSD. Table SDGRP defines the SD groups.

Basic call processing MCRU (continued)

Datafill example for table ALMSD

The following example shows sample datafill for table ALMSD.

MAP display example for table ALMSD

FUNCTION	SDGROUP	POINT	NORMALST	AUDIBLE	LAMPTEST
EXPILPWR	2	6	0	N	N
EXPILDMS	2	5	0	N	N
NTALMXFR	2	4	0	N	N
LN101TST	2	3	0	N	N
OAUFAIL	0	0	1	N	N
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
LMMNV	6	6	0	Y	N
PREFLRF	0	6	0	N	N

Datafilling table DFINV

Table distribution frame inventory (DFINV) stores information for up to 31 distribution frames located at the host or in remote locations. The information in this table is provided by Northern Telecom.

An entry in table DFINV corresponding to the MCRU must be included for the MCRU to operate properly. Table DFINV associates the site name for the MCRU with a unique distributing frame name in field DFNAME. This table is datafilled to support automatic line testing (ALT).

Datafill example for table DFINV

The following example shows sample datafill for table DFINV.

MAP display example for table DFINV

DFNO	DFNAME	MAXZONE	SITE
0	HOST	4	HOST
1	RLCM	4	REM3

Datafilling table SCGRP

The scan group (SCGRP) table lists the PECs and physical location of scan groups that provide scan points for line features. Each miscellaneous scan card, NT0X10, provides 14 single-lead scan points.

Basic call processing MCRU (continued)

The card is divided into two scan groups, each group comprising seven scan points, 0-6. Each scan point is assigned to an RMM circuit number in table ALMSC.

The total number of trunk groups, where memory is allocated in table SCGRP is equal to the value of field SIZE in table DATASIZE for key SCGRP.

The seven scan points in the scan group are available for assignment to business set, or regular lines that have the line features remote make busy (RMB) or stop hunt (SHU) which require scan points.

Datafill example for table SCGRP

The following example shows sample datafill for table SCGRP.

MAP display example for table SCGRP

SCGRPNO	TMTYPE	TMNO	TMCKTNO	CARDCODE
0	OAU	0	22	0X10AA
1	RMM	0	10	0X10AA
2	RMM	0	11	0X10AA

Datafilling table SDGRP

Table signal distribution group (SDGRP) lists the PECs and physical location of signal distributor (SD) circuits on the RMM that are assigned to line features. Each SD card provides fourteen SD points subdivided into two SD groups. Each SD group is assigned to a trunk module circuit number.

> ***Note:*** Lines at a remote location must be assigned to SD points belonging to SD groups at the remote location.

Basic call processing MCRU (continued)

Datafill example for table SDGRP

The following example shows sample datafill for table SDGRP.

MAP display example for table SDGRP

SDGRPNO	TMTYPE	TMNO	TMCKTNO	CARDCODE
0	RSM	0	15	2X57AA
1	OAU	0	20	2X57AA
2	MTM	0	6	2X57AA
3	MTM	0	7	2X57AA
4	RMM	0	25	2X57AA

Datafilling table TOFCNAME

Table terminating office name (TOFCNAME) replaces table THOUGRP for BCS33 and up. This table is used to list all terminating offices in the switch. A terminating office is a unique combination of area code and office code.

Up to 1024 TOFCs can be specified in the universal directory number (DN) system, but only 100 TOFCs can be defined in North American offices.

The AREACODE field identifies the area code where the terminating office resides. The area code is previously defined in table SNPANAME or table HNPACONT.

The OFCCODE field identifies the second part of the terminating office code (TOFC) and is a subarea of AREACODE. A number may not to be both an AREACODE and an OFCCODE. For example, if 613 is an AREACODE, then it may not be an OFCCODE within any AREACODE.

This table must be datafilled after tables that define the serving numbering plan area (SNPA), that is, HNPACONT, DNHEAD, and SNPANAME, and before any table that assigns directory numbers, such as HUNTGRP, LENLINES, or IBNLINES.

Basic call processing MCRU (continued)

Datafill example for table TOFCNAME

The following example shows sample datafill for table TOFCNAME.

MAP display example for table TOFCNAME

```
AREACODE     OFCCODE
________________________________________________________________
     613       621
     819       622
     613       722
     613       222
     819       221
```

Datafilling table LNINV

Table line inventory (LNINV) associates the site name from table SITE to each physical line circuit in the MCRU. This table defines the line equipment number (LEN) of a line, indicates the software location and its hardware characteristics. Each line card in the MCRU should be represented by a tuple in table LNINV.

The subfields used to identify the line card have been altered so that a LEN can identify an MCRU line card. In a LEN for an ILCM, the fields for the LEN are defined as follows:

- SITE
- FRAME
- UNIT
- SUBGROUP
- CIRCUIT

Note the following table interactions:

- POTS lines LCMLSG do not have corresponding tuples in keyset-type tables.
- For Meridian business sets, (MBS), the VARTYPE in table LCMINV must be NTPROP.

The following table shows the datafill specific to Basic call processing MCRU for table LNINV. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Basic call processing MCRU (continued)

Datafilling table LNINV

Field	Subfield or refinement	Entry	Explanation and action
LEN		alphanumeric	Line equipment number. This field contains the following subfields: SITE, FRAME, UNIT, SUBGROUP, and CIRCUIT.
	SITE	alphanumeric	Site. Enter the location of the ILCM (four-character alphanumeric). This entry is not optional, and there is no default value assigned to it.
	FRAME	0 to 511	LCM frame. Enter the ILCM frame number, which is not a physical frame but a software entity that represents the group the ILCM belongs to at the site.
	UNIT	0 to 1	LCM unit. Enter the number representing the ILCM unit within the group.
	SUBGROUP	0 to 19	LCM subgroup. Enter the number of subgroups in the line drawers.
	CIRCUIT	0 to 31	LCM circuit. Enter the number of circuits in the subgroups. The range is 0-31.
CARDCODE		alphanumeric	Card code. Enter the PEC of the line card or line card carrier.
PADGRP		STDLN, UNBAL, PPHON, LRLM, and NPDGP.	Pad group. Enter the name of the pad group assigned to the line circuit in the pad data table. The values include STDLN, UNBAL, PPHON, LRLM, and NPDGP.
STATUS		HASU, WORKING, UNEQUIP, CUTOFF, and RESERVED.	Status. Enter the line inventory availability status. The values include HASU, WORKING, UNEQUIP, CUTOFF, and RESERVED.
GND		Y *or* N	Ground. Where line is ground start, enter Y. Otherwise, enter N (for loop start).
BNV		NL	Balanced network value. Enter L when line circuit is configured for a loaded network. Otherwise, enter NL (for nonloaded network).

-continued-

Basic call processing MCRU (continued)

Datafilling table LNINV (continued)

Field	Subfield or refinement	Entry	Explanation and action
MNO		N	Manual override. Enter Y when on-hook balance network test is to be prevented from updating field BNV in this table. Otherwise, enter N to allow off-hook balance network test to update field BNV in this table.
CARDINFO		NIL	Card information. The NIL value is the default. The values are NIL, SSLCC , or ISLCC.
		-end-	

Datafill example for table LNINV

The following example shows sample datafill for table LNINV.

MAP display example for table LNINV

```
  LEN       CARDCODE  PADGRP  STATUS GND BNV MNO CARDINFO
-----------------------------------------------------------
REM1  00 0 0  1  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0  2  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0  3  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0  4  6X17BA  STDLN  WORKING N  NL  N  NIL
REM1  00 0 0  5  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0  6  6X17BA  STDLN RESERVED N  NL  N  NIL
REM1  00 0 0  7  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0  8  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0  9  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 0 10  6X17BA  STDLN   HASU   Y  NL  N  NIL
REM1  00 0 5  0  6X17BA  STDLN   HASU   N  NL  N  NIL
REM1  00 0 5  1  6X17BA  STDLN   HASU   N  NL  N  NIL
```

Datafilling table MTAMDRVE

The metallic test access minibar driver (MTAMDRVE) network is a matrix of vertical and horizontal crosspoints, comparable to a minibar, that connect specified verticals to horizontals within the network.

Basic call processing MCRU (continued)

The MTA network is used to connect testing equipment on the horizontal crosspoints to circuits requiring testing on the vertical crosspoints.

Table MTAMDRVE specifies the physical location and the type of the minibar driver assigned to a minibar switch. The NT3X09 driver has relays on the card itself and does not require an associated minibar switch.

If the MCRU is provisioned with a remote MTA in its RMM, an entry identifying the NT3X09 card is required in table MTAMDRVE. Each minibar driver is identified by its 0, 0 crosspoint in the matrix.

The following table shows the datafill specific to Basic call processing MCRU for table MTAMDRVE. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table MTAMDRVE

Field	Subfield or refinement	Entry	Explanation and action
MTAMEM		0 to 255	Metallic test access minibar driver member. Enter the MTA driver member number. This is the key to the table.
VERT		0 to 639	MTAM driver vertical start location. Enter the vertical start location for the MTAM driver.
HORIZ		0 to 127	MTAM driver horizontal start location. Enter the horizontal start location for the MTAM driver.
TMTYPE		RMM	Trunk module type. Enter the type of trunk module where the minibar driver is mounted. In this case, RMM
TMNO		0 to 255	Trunk module number. Enter the number assigned to the remote maintenance trunk module.
TMCKTNO		0 to 27	Trunk module circuit number. Enter the circuit number of the trunk module where the minibar driver is assigned.
MTACARD		NT3X09BA	MTAM driver card. Enter the card code for the MTAM driver card. The BA version is an 8 by 8 matrix.

Datafill example for table MTAMDRVE

The following example shows sample datafill for table MTAMDRVE.

MAP display example for table MTAMDRVE

```
MTAMEM   VERT HORIZ   TMTYPE  TMNO  TMCKTNO MTACARD
____________________________________________________
   0       0     0      RMM     0       12    3X09AA
```

Datafilling table MTAVERT

Table metallic test access vertical (MTAVERT) identifies the minibar switch verticals that connect the MCRU to the MTA matrix. The type of connection is either single or multiple.

The following table shows the datafill specific to Basic call processing MCRU for table MTAVERT. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table MTAVERT

Field	Subfield or refinement	Entry	Explanation and action
VERT		0 to 639	Vertical. Enter the MTA vertical connection number.
VERTCONN		S *or* M	Vertical connection. Enter either S or M to indicate single or multiple connections.
	SELECTOR	L *or* T	Selector. When selector L is used, the entry in VERTCONN is S. The subfields SITE, FRAME, and UNIT must be datafilled.
	SITE	alphanumeric	Site name. Enter the name selected for the remote location.
	FRAME	0 to 99	Frame number. Enter the frame number.
	UNIT	0 to 1	Unit number. Enter the unit number.

Basic call processing MCRU (continued)

Datafill example for table MTAVERT

The following example shows sample datafill for table MTAVERT.

MAP display example for table MTAVERT

```
VERT                        VERTCONN
____________________________________________________
 0                    S L RCM  01 0
```

Datafilling table MTAHORIZ

Table metallic test access horizontal (MTAHORIZ) lists the assignment of horizontal agents to a horizontal and horizontal group of MTA minibars, (MTAM).

Horizontal agents include line test units, (LTU), metallic test units, (MTU), operator verification, metallic jacks, incoming test access trunks, extended MTA, and short circuits.

Different horizontal agents may use the same horizontal but must be associated with different MTAMs or horizontal groups. A maximum of 160 different horizontal agents is allowed for a given horizontal.

A maximum of 32 MTAMs can be grouped to connect to a single horizontal agent. A horizontal agent can only be used once.

The following table shows the datafill specific to Basic call processing MCRU for table MTAHORIZ. Only those fields that apply directly to Basic call processing MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Note 1: No horizontals are reserved for dedicated LTUs. Nondedicated LTUs have no assignment restriction.

Note 2: When an LTU is assigned to a host switching unit, the horizontal where it is assigned is multiplied to all minibar switches and assigned to the host switching unit. When an LTU is assigned to a remote location, the horizontal where it is assigned is multiplied to all minibar switches also assigned to the remote location.

Note 3: When the minibar switch is located at a host switching unit, no assignment restriction exists for the assignment of incoming test and operator verification trunks. One horizontal is required for each incoming test access trunk and operator verification trunk.

Basic call processing MCRU (continued)

Note 4: Where the MTA configuration is small or medium, the horizontals where the incoming test access and operator verification trunks are assigned are multipled to all minibar switches located at the host switching unit.

Note 5: When the minibar switch is remote from the host switching unit, all horizontals are available for the assignment of incoming test access trunks, operator verification trunks, and for the extension of the metallic test access feature.

Note 6: One horizontal is required for each incoming test access trunk, operator verification trunk, and vertical on the host minibar switch assigned to a horizontal on the minibar switch located at the remote or host location.

Note 7: The number of metallic jacks in each MSL-100 office is restricted to 256.

Note 8: For assignment of LTUs, incoming test access, operator verification trunks-to-trunk group, trunk subgroup, and trunk member tables, see tables CLLI, TRKGRP, TRKSGRP, and TRKMEM.

Note 9: An LTU or MTU must be datafilled in table TRKMEM before being added to table MTAHORIZ. If an LTU or MTU is deleted from table TRKMEM, the corresponding tuple in table MTAHORIZ is marked as deleted. It is automatically restored if the LTU or MTU is re-added to table TRKMEM.

Note 10: The memory for this table is dynamically allocated up to a maximum of 2000 tuples.

Datafilling table MTAHORIZ

Field	Subfield or refinement	Entry	Explanation and action
HORIZ		0 to 127	MTA horizontal. Enter the MTA horizontal where the test equipment, horizontal agent, is connected.
HORIZGRP		0 to 159	MTA horizontal group Enter the horizontal group number that identifies the horizontal and its horizontal agent as a unique tuple. The purpose of the group is to allow assignment of different test equipment on the same MTA horizontal.
HORIZAGT		see subfield	This field contains several subfields that depend on the value of the SELECTOR used.

Basic call processing MCRU (continued)

Datafilling table MTAHORIZ (continued)

Field	Subfield or refinement	Entry	Explanation and action
SELECTOR			Selector. Range: S, L, T, B, E, MJ, J, and LA.
		S	Enter S for a timed short circuit.
		L	Enter L for LTU or MTU assignment, and complete subfields CLLI, EXTRKNM, and ALTUSE.
		T	Enter T for incoming test access or operator verification trunk assignment, and complete subfields CLLI and EXTRKNM.
		B	Enter B for a board-to-board dedicated horizontal, and complete subfield BBTNR.
		E	Enter E to multiply a horizontal of a minibar switch from a host or remote to the vertical of a host minibar switch. Complete subfield EMTAVERT.
		MJ	Enter MJ for metallic connection to the tip and ring of the subscriber line, and complete subfields CLLI and MJACKNUM.
	Selector	J or LA	Selectors J and LA are for licensee use only.
	CLLI	see list	Common language location identifier. Enter LTU for a line test unit or MTU for a metallic test unit. For operator verification or an incoming test access trunk, enter the alphanumeric code that represents this trunk group in table CLLI.
		LTU	Enter LTU for line test unit.
		MTU	Enter MTU for metallic test unit.
		CLLI	For operator verification of an incoming test access trunk, enter the alphanumeric code representing this trunk group in table CLLI.
		MJACK	Enter MJACK for metallic jack.
	EXTRKNM	0 to 9999	External trunk number. Enter the external trunk number assigned in table TRKMEM to the line test unit, metallic test unit, operator verification trunk, or the incoming test access trunk.

-continued-

Basic call processing MCRU (continued)

Datafilling table MTAHORIZ (continued)

Field	Subfield or refinement	Entry	Explanation and action
	ALTUSE	Y or N	Automatic line test use. Enter Y to use line test equipment for automatic line testing (ALT). Otherwise enter N.
	BBTNR	0 to 7	Board-to-board testing number. Enter the number of the board-to-board set with which this horizontal is associated.
	EMTAVERT	0 to 639	Extended metallic test access column. Enter the associated vertical on the MTA in the host where the horizontal is connected.
	MJACKNUM	1 to 256	Metallic jack number. Where the entry in subfield CLLI is MJACK, enter the metallic jack number.
MTAGRP		MTAMEM, HORIZ, and CONTMARK	MTA group. This field is comprised of a list of MTA drivers that multiply to the test equipment. This field is a vector of up to 32 multiples of subfields MTAMEM, HORIZ, and CONTMARK.
	MTAMEM	0 to 255	MTA minibar driver member. Enter the MTAM driver member number where the horizontal is connected.
	HORIZ	0	Horizontal. This is read-only field. It provides information about the physical horizontal where the MTA drivers are connected. Enter 0 to satisfy table control.
	CONTMARK	+ or $	Continuation mark. Enter a plus sign (+) when additional data is specified on the next record. Otherwise, enter dollar sign ($) after last record.

-end-

Basic call processing MCRU (end)

Datafill example for table MTAHORIZ

The following example shows sample datafill for table MTAHORIZ.

MAP display example for table MTAHORIZ

```
HORIZ
        HORIZGRP      HORIZAGT
                         MTAGRP
____________________________________________________
  0
        0       L      LTU  0
                         ( 0 0)$
```

Translation verification tools

Basic call processing MCRU does not use translation verification tools.

MCRU Intracalling

Feature package

Feature package: NTX156AA RLCM Intracalling

Release applicability

BCS35 and up

Prerequisites

To operate, RLCM Intracalling requires BAS00003 which includes:

- Bilge, NTX000AA
- Common Basic, NTX001AA
- Meridian Cabinetized Remote Unit, NTXN14AA
- New Peripheral Maintenance Package, NTX270AA
- Local Features II, NTX901AA

Description

The MCRU Intracalling functional group allows calls between subscribers on the same MCRU to be connected without using the host network. This reduces the use of the PCM-30 links to the host.

Intracalling has two components:

1. *intraswitching*-This component is used to connect calls between subscribers served by the same LCM unit of an MCRU using the MCRU intraswitching channels instead of the host network.
2. *interswitching*-This component is used to connect calls between subscribers served by different LCM units of an MCRU using the MCRU interswitching channels instead of the host network.

Operation

Intraswitching and interswitching connections are achieved through the link control cards (LCC) on the host interface equipment (HIE) shelf. The LCC are connected serially to the DS30A ports of each line concentrating array (LCA) of the LCM.

Each LCA has eight DS30A ports that can be equipped or unequipped with host links. An equipped port has all 24 channels of the PCM-30 link mapped to one 32-channel DS30A port.

Six of the unmapped DS30A channels are used for intraswitching, and two are used for control and signaling. For the DS30A ports unequipped with

MCRU Intracalling (continued)

host links, the LCCs provide 18 channels for intraswitching, 12 channels for interswitching, and 2 channels for control and signaling.

Thus, when the LCCs provide intraswitching and interswitching channels for connecting internal calls, additional channels are free on the PCM-30 links to allow the host network to handle external calls. This maximizes the use of the PCM-30 links that are a limited resource.

Translations table flow

Standard translations data flow is unaltered by this package.

Limitations and restrictions

There are restrictions on the types of lines that can be intraswitched. One- and two-party flat rate lines, and lines connected to P-phones and data units can intraswitch.

Lines with call waiting and call forwarding features can intraswitch, once the features are active, the call reverts to a regular network connection. Coin phone calls cannot be intraswitched.

Multiple access directory number (MADN) line originations from any primary or secondary MADN member, are intra/interswitched whenever possible. Terminations to MADN lines are only intra/interswitched for the primary directory number (PDN). There is a maximum of 73 intra/interswitched calls at a time.

Interactions

MCRU Intracalling has no functionality interactions.

Activation/deactivation by the end user

For the MCRU Intracalling functional group to operate, the intraswitch field in table LCMINV must be set to a Y.

Billing

MCRU Intracalling does not affect billing.

Station Message Detail Recording

MCRU Intracalling does not affect Station Message Detail Recording.

Datafilling office parameters

MCRU Intracalling does not affect office parameters.

Datafill sequence

The following table lists the tables that require datafill to implement MCRU Intracalling. The tables are listed in the order in which they are to be datafilled.

Datafill tables required for MCRU Intracalling

Table	Purpose of table
LCMINV	Lists the data assignment for each frame associated with an LCM unit.

Datafilling table LCMINV

The following table shows the datafill specific to MCRU Intracalling for table LCMINV. Only those fields that apply directly to MCRU Intracalling are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table LCMINV

Field	Subfield or refinement	Entry	Explanation and action
LCMINFO	INTRASW	Y or N	Boolean Y or N to turn intraswitching on or off.

Datafill example for table LCMINV

For the purpose of datafilling the intracalling feature, only one entry is required, the boolean for intraswitching in field LCMTYPE.

The following example shows sample datafill for table LCMINV.

MCRU Intracalling (end)

MAP display example for table LCMINV

```
   LCMNM  FRTYPE  SHPOS  FLOOR  ROW  FRPOS  EQPEC  LOAD
CSPMNO  BICTST  ADNUM  MEMSIZE
                                                  LCMTYPE
_______________________________________________________
REM3 02 0   RLCE    4      1      A   0    6X04AA LCM19I
PLGC  0   Y   31   64K    $ 48V  RLCM
         ( 2) ( 6) ( 3) ( 7)$ Y N N            6X27BB$
```

Intraswitch field

ESA Operation MCRU

Functional group

Functional group: BAS00012

Feature package

Feature package: NTX154AA, MCRU Emergency Stand ALone (ESA) Operation

Release applicability

BCS 35 and up

Prerequisites

To operate, ESA Operation MCRU has the following prerequisites:

Functional group: BAS00003

Description

The emergency stand-alone (ESA) operation is an optional feature available for the MCRU. The ESA module provides limited call processing capability to the MCRU when it loses communication with the host site.

The additional hardware consists of the ESA processor NT6X45AF, a 4-MB memory card, NT6X47AC, and the ESA clock and tone card NT6X75EA, all of which are contained in the host interface equipment (HIE) shelf.

The clock and tone card, in addition to providing clocking and tones, provides an interface so that the ESA processor can message to the host, the line concentrating module (LCM), and the remote maintenance module (RMM).

The RMM must also be provisioned with the ESA digitone receivers, NT2X48CC.

Operation

Communication to the ESA processor is over the same PCM-30 links that connect the MCRU to the host unit. A special ESA channel transmits messages over the PCM-30 links to the host. The status of the messaging link between the host and the MCRU determines entry into ESA mode.

The ESA channel is switched to the ESA processor from within the link control card (LCC). Exiting ESA is determined by a request from the ESA processor when communications to the host are restored.

ESA Operation MCRU (continued)

The MCRU periodically monitors the state of the DMS-X message channel to the host XPM (PLGC) and the receiver framing status for the PCM-30 link carrying the message channel.

If ESA is enabled, the MCRU also checks for an PLGC response to periodic loop-around messages. If there is an indication of link failure, the PLGC sends a message to the MSL-100 CM informing it of the event. The MSL-100 CM uses this information to update a flag indicating a mate link failure.

If the host XPM has a messaging channel to the ILCM, it sends a message to report the DMS-X failure. If ESA is enabled, every time there is a link failure or failure message, the MCRU determines whether or not to enter ESA.

If the MCRU link is bad and the mate unit of the ILCM also has a failed link, the mate is inactive, or the inter-unit communication (IUC) link has failed, then ESA is requested. If both MCRU units are active, both units must request ESA from the ESA processor.

If the IUC has failed and one MCRU unit's messaging link also fails, the unit with the failed link requests ESA while its mate can still communicate with the MSL-100 host. In this case, the LCC hardware does not connect the MCRU unit to the ESA processor.

After a timeout, the unit that requested ESA determines that it cannot message to the ESA processor. It then removes the ESA request and drops activity. This causes the mate unit, which is still communicating with the host, to take control of the affected unit's calls.

To allow for applications where brief link interruptions are frequent, the MCRU may be datafilled to delay requesting ESA until a link failure condition has persisted for a certain number of seconds. If messaging to the host is restored within this period, no ESA request is made. The value of N is set by an optional datafill message from the host giving the delay in units of 500 milliseconds (ms) from 0 through 127. A default delay is provided.

Once in ESA, the messaging link from the MCRU goes to the ESA processor and it has complete control over all calls. When the ESA processor regains its link to the host and is ready to surrender control, it sends a command to both units of the MCRU requesting an ESA exit.

Translations table flow

The following is a list of ESA Operation MCRU translations tables:

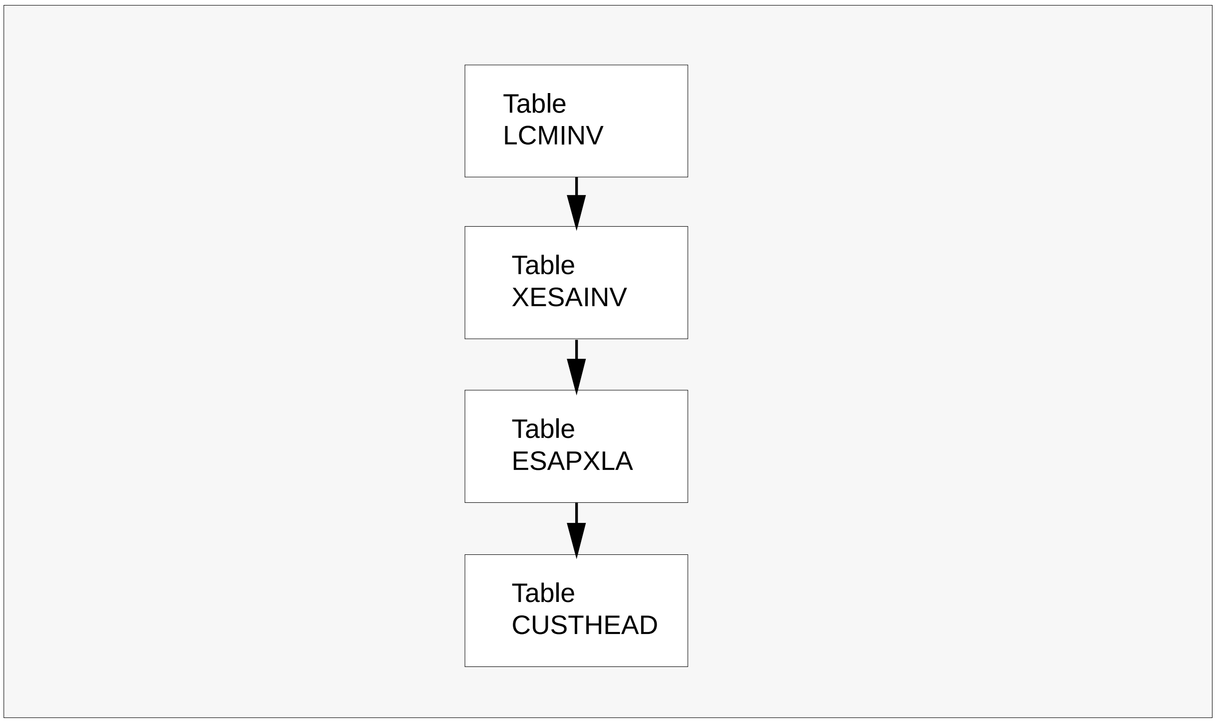
- table LCMINV

ESA Operation MCRU (continued)

- table XESAINV
- table ESAPXLA
- table CUSTHEAD

The ESA Operation MCRU translation process is shown in the flowchart that follows.

Table flow for ESA Operation MCRU



Limitations and restrictions

The following limitations and restrictions apply to ESA Operation MCRU:

- When the ESA module exits the ESA state, all calls in progress are dropped.
- There is no busy tone for a party calling their own party number because no automatic number identification (ANI) is performed.
- Party line circle digits are not supported during ESA.
- A maximum of 64 Automatic Lines (AUL) is supported in ESA.

ESA Operation MCRU (continued)

Interactions

The CM provides special support for ESA call processing. Basic maintenance, ESA entry and exit, and translation data support is provided in feature group BAS00012.

Activation/deactivation by the end user

The following procedure describes the steps necessary to activate the ESA feature package.

Activation/deactivation of ESA Operation MCRU by the end user

1. Ensure that the MSL-100 switch is equipped with a software load of BCS21 or greater.
2. Change the ESA field in table LCMINV from N to Y to enable the ESA feature.
3. Datafill table XESAINV.
4. If necessary, change the office parameters.
5. If necessary, datafill table ESAPXLA.
6. If necessary, datafill table CUSTHEAD.
7. The ESA feature for both units of the MCRU is activated by doing the following actions at the PM MAP level:
   a. At PM level of MAP, post ESA n.
   b. BSY the ESA module.
   c. Loadpm CM ESADATA.
   d. RTS the ESA module.

Billing

There is no billing of lines connected to the MCRU while the remote unit is in ESA mode.

Station Message Detail Recording

There is no SMDR during ESA operation.

Datafilling office parameters

Office parameters help the operating company prepare the office-dependent data for the switching unit. The following table shows the office parameters used by ESA Operation MCRU.

ESA Operation MCRU (continued)

For more information about office parameters, refer to *Office Parameters Reference Manual*.

The following table lists the office parameters used for ESA operation, the table names, and their associated forms.

Office parameters used by ESA Operation MCRU

Table name	Parameter name	Explanation and action
OFCENG	RLCM_ESAENTRY_BADLINK	Used to control the performance of the MCRU ESA feature when a carrier alarm is present.
OFCENG	RLCM_ESAENTRY_BADCSIDE	Used to control the performance of the MCRU ESA feature when a carrier alarm is not present.
OFCENG	RLCM_XPMESAEXIT	Used to control the performance of the MCRU ESA feature when communications to the host are restored.
OFCENG	RLCM_ESASDUPD_HOUR	Used to set the starting time to download ESA static data to all MCRU sequentially according to data in table LCMINV.
OFCENG	RLCM_ESASDUPD_BOOL	Used to determine whether ESA static data should be downloaded to all ESA equipped MCRU nightly update of the MCRU ESA static data.
OFCENG	RLCM_ESA_NOTIFY_TONE	Used to provide a special ESA notification tone to the customer in the ESA mode.

The office parameters support ESA applications as follows:

- RLCM_ESAENTRY_BADLINK: PCM-30 failure timeouts
- RLCM_ESAENTRY_BADCSIDE: loop-around message audit failure timeouts
- RLCM_XPMESAEXIT: ESA EXIT timeout
- RLCM_ESASDUPD_HOUR: MCRU ESA static data updates (nightly)
- RLCM_ESASDUPD_BOOL: MCRU ESA static data updates (nightly)
- RLCM_ESA_NOTIFY_TONE: dial-tone alert

The following pages describe the five office parameters and show examples of each.

ESA Operation MCRU (continued)

For more information about office parameters, refer to *Office Parameters Reference Manual*.

Office parameter RLCM_ESAENTRY_BADLINK

This parameter is the desired delay between link failure and the MCRU dropping into the ESA mode. The delay time is defined in 10-second intervals. For example, 6 means 60 seconds.

The default value for this parameter is 3 with a range of 3 through 100. To activate a change in the parameter, load the ESA data by use of the LOADPM command at the PM level of the MAP terminal with the ESA processor posted.

Office parameter RLCM_ESAENTRY_BADCSIDE

This parameter is the desired delay between failure of MCRU communication with the C-side peripheral and the MCRU dropping into the ESA mode. This condition is detected by the loop-around message mechanism.

The delay time is defined in 1-minute intervals. For example, 6 means 6 minutes.

The default value for this parameter is 15 with a range of 5 through 60. To activate a change in the parameter, load the ESA data by use of the LOADPM command at the PM level of the MAP terminal with the ESA processor posted.

Office parameter RLCM_XPMESAEXIT

This parameter is the desired delay between links being restored (or communication with C-side peripheral recovered) and the MCRU coming out of ESA mode. The time is defined in 10-second intervals. For example, 2 means 20 seconds.

The default value is 0, which means the MCRU is waiting for manual RTS. The range of value is 0 through 100. The activation is immediate upon changing the parameter.

Office parameter RLCM_ESASDUPD_HOUR

This parameter is the daily starting time to download ESA static data to all MCRUs sequentially according to the data defined in table LCMINV. The time is defined in 1-hour intervals. For example, 4 means 4 A.M. and 14 means 2 P.M.

The value chosen must comply with the following conditions:

- It is a time of low traffic on the switch.
- It is not the same time as the weekly ILCM routine exercise (REX) test.
- It is not the same time as the Remote Switching Center (RSC) nightly update. See parameter RSC_ESASDUPD_HOUR in table OFCENG.

The default for this parameter is 4 with a range of 0 through 23. The activation is immediate upon changing the parameter.

Note: The MCRU and RCC should not be on the same static data update hour because the result could be static data corruption for both the MCRU and RCC.

Office parameter RLCM_ESASDUPD_BOOL

This parameter determines whether ESA static data should be downloaded to the nightly update of the MCRU ESA static data for all ESA equipped MCRUs.

If the value is unchanged from the default value of Y, the static data are downloaded at the nightly update.

If the value is changed to N, the static data is not downloaded at the nightly update. The activation is immediate upon changing the parameter.

Office parameter RLCM_ESA_NOTIFY_TONE

This parameter controls whether the subscriber hears a distinctive dial-tone burst (0.25 seconds on, 0.25 seconds off, for seven seconds), to alert the subscriber that the MCRU is in ESA mode.

ESA control of translation facilities

When the MCRU is under host control, translations are done by the MSL-100 CM. When the MCRU is in ESA mode, translations are done by the ESA processor using a subset of translation data from the MSL-100 CM. This subset is a snapshot of the MSL-100 CM data needed for ESA call processing. The translation data in the snapshot is known as static data.

Downloading the static data to the ESA processor from the MSL-100 CM truncates some of the translation data. ESA logs are generated when the downloaded data exceeds the MCRU ESA maximum.

MCRU ESA mode is not entered until the ESA processor is loaded with static data.

ESA Operation MCRU (continued)

ESA static data must be downloaded from the MSL-100 CM to the ESA processor if a change is made to any of the following tables:

- translation data tables
- table ESAPXLA
- table CUSTHEAD

The following table shows the translation data tables, entries, maximum entry types, and applicable ESA logs for downloading errors.

Static data for ESA translations

Table	Type	Entries	
		Max	**Download warning log**
Terminal data	Terminal data	640	N/A
Automatic line	1 for each AUL	64	ESA101
Customer group	1 for each group	32	ESA102
Prefix header	1 for each customer group	32	N/A
Prefix table	1 for each ESA prefix translator		ESA103
	plain old telephone service (POTS)	16	
	customer group	8	
Extension header	1 for each customer group	32	ESA104
Extension table	1 for each MDC extension translator	256	
ABC	1 for each directory number (DN)	640	ESA105
DEFG	DEFG	1000	
Hunt header	1 for each hunt group	26	ESA106
Hunt member	1 for each hunt group	520	ESA107

-continued-

ESA Operation MCRU (continued)

Static data for ESA translations (continued)

Table	Type	Entries	
		Max	Download warning log
Office parameter	1	1	N/A
Digitone receiver	1 for each Digitone receiver	30	N/A
-end-			

Translation data tables

Translation data tables in static data are as follows:

- The terminal data table determines how to set up a call. Terminal data include the following:
  - line type
  - DP or Digitone/DP signaling
  - automatic or coin line
  - AUL index to AUL data table
  - customer group index to customer group data table
  - customer group number for a Meridian Digital Centrex (MDC) line

  There is one entry for each terminal and a maximum of 640 terminals.

- The AUL table contains the DN of the terminator. There is one entry for each AUL with a maximum of 64 entries.
- The customer table contains the prefix table number for special number dialing and extension prefix table number for station dialing. There is one entry for each customer group. There can be a maximum of 32 customer groups.
- The prefix header table contains a maximum of 32 prefix numbers or special numbers up to a maximum of 15 digits each. There is one entry for each customer group and one POTS entry. There can be a maximum of 32 customer groups.
- The prefix table contains one entry for each ESA prefix translator. There can be a maximum of 16 entries for POTS and a maximum of 8 entries for each customer group.

ESA Operation MCRU (continued)

- The extension header table contains one entry for each customer group. There can be a maximum of 32 groups.
- The extension table contains one entry for each MDC extension translator. There can be a maximum of 256 groups.
- ABC table contains one entry for each each DN. There can be a maximum of 640 entries. This table cannot be accessed.
- The DEFG table has 1000 entries and cannot be accessed.
- The hunt header table contains one entry for each hunt group. There can be a maximum of 26 hunt groups.
- The hunt member table contains one entry for each hunt group. There can be a maximum of 520 members.
- The office parameter table is a single entry table.
- The Digitone receiver table contains the terminal identifications (TID) of all the Digitone receivers of the RMM in the remote site. These are the TIDs of the entries in table TRKMEM, that is, the CLLI of ESADGTR in the RMM at the remote site. The TIDs are used by the ESA processor to collect digits from Digitone phones. There is one entry for each Digitone receiver, with a maximum of 30 entries.

  Note: The normal state of these digitone receivers under CM control is INB (Installation Busy), this prevents CM access when the RMM is in the InSv state.

Downloading the ESA processor

Translation data is downloaded to the ESA processor in the following methods:

- The LOADPM CM ESADATA command downloads data to the ESA processor.
- The RTS command downloads data automatically to the ESA processor if it cannot do call processing with existing data.
- Data can be loaded routinely during daily updates of the ESA processor if specified in the MCRU_ESADUPD_HOUR office parameter.

Datafill sequence

The following table lists the tables that require datafill to implement ESA Operation MCRU. The tables are listed in the order in which they are to be datafilled.

Datafill tables required for ESA Operation MCRU

Table	Purpose of table
LCMINV	Lists the data assignment for each bay associated with a local MCRU, including the boolean field ESA.
XESAINV	Identifies ESA capability for the peripherals. If ESA is available, it must first be indicated in table LCMINV. The ESA peripheral may then be added to the MSL-100 inventory by entering the appropriate data in table XESAINV.
ESAPXLA	Contains special prefix translations for POTS and MDC customer group data assignments. This table is only used in the ESA mode.
CUSTHEAD	Links a customer group to the prefix translation table name as identified in table ESAPXLA.

Datafilling table LCMINV

Table LCMINV lists the data assignment for each bay associated with the MCRU.

If ESA is available, it must first be indicated in table LCMINV in the boolean field ESA. Enter Y if the MCRU is equipped with the ESA option. Enter N if the MCRU is not equipped with the ESA option.

Datafilling table LCMINV

The following table shows the datafill specific to ESA Operation MCRU for table LCMINV. Only those fields that apply directly to ESA Operation MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table LCMINV

Field	Subfield or refinement	Entry	Explanation and action
LCMINFO	ESA	Y or N	Boolean Y or N. Use to turn emergency stand-alone on or off.

ESA Operation MCRU (continued)

Datafill example for table LCMINV

For the purpose of datafilling emergency stand-alone, only one entry is required: the boolean for ESA in field LCMTYPE.

The following example shows sample datafill for table LCMINV.

MAP display example for table LCMINV

```
   LCMNM  FRTYPE  SHPOS  FLOOR  ROW  FRPOS  EQPEC  LOAD
CSPMNO  BICTST  ADNUM  MEMSIZE
                                               LCMTYPE
________________________________________________________
REM3 02 0   RLCE    4      1      A   0    6X04AA LCM19I
LTC  0   Y   31   64K    $ 48V  RLCM
         ( 2) ( 6) ( 3) ( 7)$ Y Y N             6X27AA$

                              ESA field
```

Datafilling table XESAINV

Datafill in table XESAINV updates the MSL-100 inventory for all peripherals with ESA capability.

As the ESA is an optional part of the MCRU package, it is first necessary to indicate if it is available in table LCMINV. The ESA may then be added to the inventory of the MSL-100 office by entering the appropriate data in the table XESAINV.

The data contained in this table will also contain information on the default load and the circuit location data. The circuit location data provided in table XESAINV is not checked against the data in table LCMINV.

The following table shows the datafill specific to ESA Operation MCRU for table XESAINV. Only those fields that apply directly to ESA Operation MCRU are shown. For a description of the other fields, refer to the data schema section of this document.

ESA Operation MCRU (continued)

Datafilling table XESAINV

Field	Subfield or refinement	Entry	Explanation and action
ESANAME		see subfields	Emergency stand-alone name. This field is comprised of subfields ESASITE, ESAPMTYPE, and ESANO. See subfields for definitions.
	ESASITE	alphanumeric	Emergency stand-alone site. Enter the site name as listed in table SITE.
	ESAPMTYPE	ESA	Emergency stand-alone peripheral module type. Enter ESA to specify the type of peripheral module (PM).
	ESANO	0 to 255	Emergency stand-alone number. Enter the number assigned to this PM.
Enter the location of the this PM in fields FRNO, SHPOS, FLOOR, ROW, and FRPOS.			
LOAD		alphanumeric	Load. Enter the loadfile used to load the ESA unit.
EXECTAB		see subfields	Executive table. Contains subfields TRMTYPE and EXEC. The terminal type and its associated execs are datafilled together.
	TRMTYPE	alphanumeric	Terminal type. Enter the type of terminal models to be used: ESALINES for regular lines, KSET for EBS terminals, or RMM_TERM for maintenance trunks.
	EXEC	alphanumeric	Executive Programs Enter the execs associated with the terminal type (ESAEX, KSETEX, and RSMEX).
CSPM		see subfields	C-side PM. Consists of subfields HOSTLCMT and HOSTLCMN
	HOSTLCMT	ILCM	Host LCM type. Enter the remote peripheral module type where the ESA is being added.

-continued-

ESA Operation MCRU (continued)

Datafilling table XESAINV (continued)

Field	Subfield or refinement	Entry	Explanation and action
	HOSTLCMN	0 to 255	Host line concentrating module number. Enter the number assigned to this LCM.
PEC6X45		alphanumeric	6X45 equipment PEC. The processor complex of each XPM unit contains one or more NT6X45 cards. Enter the PEC corresponding to the NT6X45 with the minimum firmware capabilities.
		-end-	

Datafill example for table XESAINV

The following example shows sample datafill for table XESAINV.

MAP display example for table XESAINV

```
TABLE: XESAINV

   ESANAME FRTYPE FRNO SHPOS FLOOR ROW FRPOS   LOAD
                                              EXECTAB

CSPM    PEC6X45
_____________________________________________________

REM1 ESA 0 RLCM      0   38     1    A    0   ESA35CR1

                (RMM_TERM RSMEX)    (ESALINES ESAEX)$
ILCM 0   6X45AF
```

Datafilling table ESAPXLA

Table emergency stand-alone prefix translation (ESAPXLA), contains special prefix translation data used for POTS and MDC customer group data assignments.

During regular operation of the MCRU, under MSL-100 CM control, this table is not used. Translations are performed normally. However, if communication with the host is lost and the MCRU enters the ESA mode, this table is used in the prefix translations.

There are two parts of table ESAPXLA that are used when the MCRU enters ESA mode: the prefix translation key (PXLAKEY) and the translation result

(RESULT). The PXLAKEY field defines a set of prefix digits on a specific MCRU for all POTS lines or for a particular MDC customer group. The RESULT subfield specifies the action to take when a POTS customer group member of that MCRU dials the prefix digits.

One of the subfields of PXLAKEY is the translator name (XLANAME). If the prefix translation is to be executed when the prefix digits are dialed from a POTS line on the MCRU, ESAPOTS is datafilled in subfield XLANAME.

If the prefix translation is to be executed when an MDC customer group dials these digits, an alphanumeric name of up to eight characters is datafilled in subfield XLANAME. This same name must then be associated with a particular MDC customer group in table CUSTHEAD.

Translation actions

There are six different types of action that the translation can take: line (L), treatment (T), hunt group (H), standard route (R), directed route (D), or access code (A).

When the prefix digits are dialed, the various translations occur as follows:

- The L option is chosen if a connection is to be made to another line on the remote. Information that uniquely identifies the line to which the connection is to be made is datafilled.
- The T option is chosen if a reorder tone is to be given or a strip and translate, with or without a second dial tone, is to be executed, and the type of treatment desired is entered.
- The H option is chosen if the call is to be routed to a hunt group. The information as to which hunt group, as datafilled in table HUNTGRP, is entered.
- The R option is chosen if a connection is to be made to a trunk with standard routing, and information about the route, the number of digits to collect, and the ambiguity of the code is entered.
- The D option is chosen if a connection is to be made to a trunk with directed routing. The information about the route, the number of digits to collect and second dial tone is datafilled.
- The A option is chosen if the digits are to be retranslated. A new prefix translator name is entered, and dial tone is decided.

If XLANAME is ESATRMT (which is a reserved prefix translator name), then the PREFIX field must contain an N and the selector in the RESULT field can be L, H, T, or R. Selectors A and D are not valid.

ESA Operation MCRU (continued)

The following table shows the datafill specific to ESA Operation MCRU for table ESAPXLA. Only those fields that apply directly to ESA Operation MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

Datafilling table ESAPXLA

Field	Subfield or refinement	Entry	Explanation and action
PXLAKEY		see subfields	Prefix translator key. This key identifies a set of prefix digits on a certain site for a particular set of customers. It comprises the following subfields: XLANAME, NODE, and PMTYPE.
	XLANAME	alphanumeric up to 8 characters	Prefix translator name. If this translation is to be performed for any POTS line on the remote, enter ESAPOTS. If it is to be performed for a particular MDC customer group, enter any name up to eight characters and relate this name to a corresponding customer group in table CUSTHEAD.
Node		see subfields	Node. This subfield specifies the MCRU node with which the translator identified by XLANAME is associated. This field is comprised of subfields PMTYPE, SITE, FRAME, LCMNO, and MODULE.
	PMTYPE	ILCM	Peripheral module type. This subfield identifies the peripheral node as MCRU. If ILCM is specified in this subfield, then subfield LCMNO must be datafilled.
	SITE	alphanumeric	Site. Enter the site name assigned to the MCRU location.
	FRAME	0 to 511	Frame. Enter the frame number of the MCRU at the site specified in subfield SITE.
	LCMNO	0 to 255	LCM number. This subfield specifies the MCRU to which this translator applies.

-continued-

ESA Operation MCRU (continued)

Datafilling table ESAPXLA (continued)

Field	Subfield or refinement	Entry	Explanation and action
	MODULE	0	Module. Enter the module number in the MCRU frame.
PREFIX		numeric up to 15 digits	Prefix digits. Enter the 1 to 15 digit prefix associated with the translation.
RESULT		see subfields	Translation result. This field is comprised of subfields SELECTOR, LEN, AMBIG, and RINGCD.

-end-

The following table describes the subfields L, T, H R, D, and A of subfield SEL and shows the actions to take for each.

Subfields with SEL of L

Subfield	Entry	Explanation and action
LEN	alphanumeric	Line equipment number. This subfield defines the line on which the call is to terminate. It is comprised of subfields SITE, FRAME, MODULE, LSG, and CIRCUIT.
SITE	alphanumeric	Site. Enter the name assigned to the site where the termination line is located. Because the remote is operating in ESA, there is no communication with the host. This site must match the site specified in the NODE.
FRAME	0 to 99	Frame. Enter the frame number at the site that contains the line card for the termination line. If PMTYPE is ILCM, this frame number must match the frame number specified in subfield LCMNO, because ESA in an MCRU can support communications only within the same MCRU. If subfield PMTYPE is RCC, communication is supported for all ILCMs attached to the RCC.
MODULE	0	Unit. Enter the module number of the ILCM in this MCRU frame where the line is assigned.

-continued-

ESA Operation MCRU (continued)

Subfields with SEL of L (continued)

Subfield	Entry	Explanation and action
LSG	0 to 19	Line subgroup Enter the number of the line subgroup of the ILCM or MCRU unit in which the line card for that line is assigned.
CIRCUIT	0 to 31	Line card circuit number. Enter the line card circuit number of the line subgroup where the line card is assigned.
AMBIG	Y or N	Ambiguous. If the prefix digits are completely unique, enter N. If the prefix digits may be dialed as the first digits of another number, enter Y. For example, digits 123 would be considered ambiguous if another acceptable number were 12356. If N is entered, the switching process begins immediately after the prefix digits are dialed. If Y is entered, the remote waits for further digits. If no digits are entered within a specified time, the switching process begins.
RNGCD	0 to 7	Ring code. Enter the code for the type of ringing associated with the line specified in the subfield LEN field.
		-end-

The following table describes the subfield T of field SELECTOR.

Subfields with SEL of T

Subfield	Entry	Explanation and action
TRMT	REORDER, SRPXLA, or SRPDXLA	Treatment. Enter the type of treatment to be applied when these prefix digits are dialed. REORDER specifies the reorder tone, SRPXLA specifies strip and translate, and SRPDXLA specifies strip, second dial tone, and translate.

ESA Operation MCRU (continued)

The following table describes the subfield H of field SELECTOR.

Subfields with SEL of H

Subfield	Entry	Explanation and action
HTGRP	0 to 8191	Hunt group number. Enter the number associated with the desired hunt group. The association between this number and the hunt group is made in table HUNTGRP.
SEQNO	0 to 255	Sequence number. Enter the number associated with one member of the hunt group. The call attempts to connect with this hunt group member first. The association between the number and the hunt group member is specified in table HUNTMEM.
AMBIG	Y or N	Ambiguous. If the prefix digits are completely unique, enter N. If the prefix digits may be dialed as the first digits of another number, enter Y. For example, digits 123 are considered ambiguous if another acceptable number were 12356. If N is entered, the switching process begins immediately after the prefix digits are dialed. If Y is entered, the remote waits for further digits. If no digits are entered within a given time period, the switching process begins.

ESA Operation MCRU (continued)

The following table describes the subfield R of field SELECTOR.

Subfields with SEL of R

Subfield	Entry	Explanation and action
RR	0 to 255	Route reference index. Specify the index of the route described in ESARTE to which translation is to proceed.
NUMDIG	0 to 15	Collect digits. Specify the number of digits to collect before outpulsing.
AMBIG	Y or N	Ambiguous. If the prefix digits are completely unique, enter N. If the prefix digits may be dialed as the first digits of another number, enter Y. For example, digits 123 are considered ambiguous if another acceptable number were 12356. If N is entered, the switching process begins immediately after the prefix digits are dialed. If Y is entered, the remote waits for further digits. If no digits are entered within a given time period, the switching process begins.

The following table describes the subfield D of field SELECTOR.

Subfields with SEL of D

Subfield	Entry	Explanation and action
RR	0 to 255	Route reference index. Specify the index of the route described in ESARTE to which translation is to proceed.
NUMDIG	0 to 15	Collect digits. Specify the number of digits to collect before outpulsing.
DIALTONE	Y or N	Dial tone. Indicates whether to give second dial tone after stripping the prefix digits.

ESA Operation MCRU (continued)

The following table describes the subfield A of field SELECTOR.

Subfields with SEL of A

Subfield	Entry	Explanation and action
XLANAME	alphanumeric up to 8 characters	Prefix translator name. A name of up to eight characters that identifies the entries associated with another ESA prefix translator. This permits access to a new set of prefix translators. A table must already be associated with this XLANAME.
DIALTONE	Y or N	Dial tone. Indicates whether to give second dial tone after the prefix digits are stripped.

Datafill example for table ESAPXLA

The following example shows sample datafill for table ESPXLA.

MAP display example for table ESAPXLA

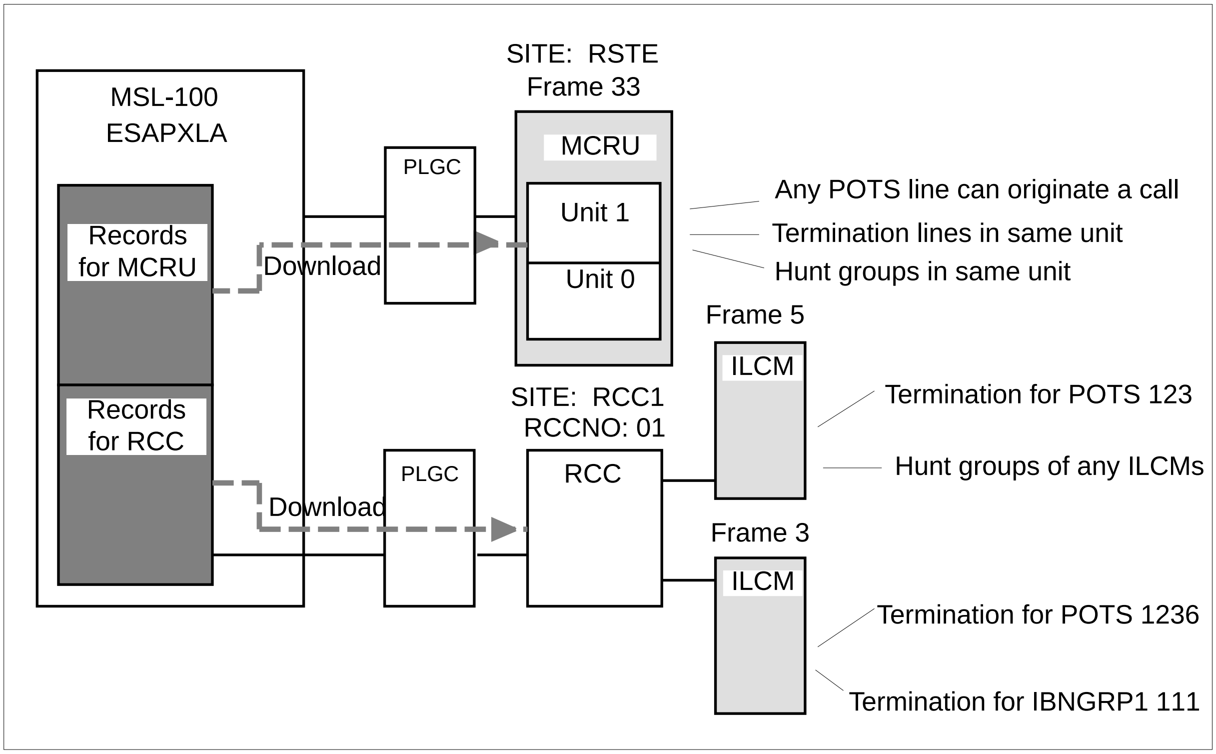
```
TABLE:  ESAPXLA
                            PXLAKEY          RESULT
____________________________________________________
ESAPOTS ILCM RSTE  0    0    411  L  Rem0 00 0 00 02 Y 1
  IBN1  ILCM RSTE  0    0      6                T  SRPXLA
  IBN1  ILCM RSTE  0    0      9                T SRPDXLA
ESATEST ILCM RSTE  0    0    611  L  Rem0 00 1 02 20 N 1
```

As shown in the figure below, there are two remotes off this MSL-100 host office, an MCRU and an RCC. Each record in table ESAPXLA applies to one of these remotes. The NODE field specifies the remote to which the translator in this record applies.

The data for table ESAPXLA is entered into the MSL-100 host and is downloaded to the remote specified in the NODE field according to the RLCM_ESASDUPD_HOUR and RLCM_ESASDUPD_BOOL parameters.

ESA Operation MCRU (continued)

MSL-100 office data input example



Prefix translations for the MCRU using selectors L, T, and H during ESA

Using the above figure as an example of a typical remote configuration, and the following figure as an example of typical table ESAPXLA datafill, prefix translation for various call sources are as follows:

- If any POTS user connected to frame 33, ILCM unit 0 on site RSTE dials 911, a connection is made to hunt group number 3111 starting with member number 001.
- If any POTS user connected to frame 33, ILCM unit 0 on site RSTE dials 123, the MCRU waits for further digits. If it does not receive a digit within the allotted time period, the line is connected to circuit 12, LSG 11, on the same MCRU unit.
- If any POTS user connected to frame 33, ILCM unit 0 on site RSTE dials 123, the MCRU waits for further digits. If a 6 is dialed within the allotted time period, the line is connected in circuit 09, LSG 13 on the same MCRU unit.

ESA Operation MCRU (continued)

- If any POTS user connected to frame 33, ILCM unit 0 on site RSTE dials 6, the user receives another dial tone, and further digits are translated.

Prefix translation example for selectors L, T, and H

COMMAND	PXLAKEY: XLNAME	PXLAKEY: NODE: PMTYPE (LCM / RCC)	PXLAKEY: NODE: LCMNO (SITE FRAME MODULE) / RCC (SITE RCCNO)	PXLAKEY: PREFIX	PXLAKEY: UNIT	RESULT: 1	RESULT: 1 - SEL (L: LEN (SITE FRAME MODULE LSG CIRCUIT) AMBIG RNGCD; T: TRMT; H: HTGRP SEQNO 2 2-AMBIG)
INP	ESAPOTS	LCM	RSTE 33 0	911		H	3111 001 N
	ESAPOTS	LCM	RSTE 33 0	123		L	RSTE 33 0 11 12 Y 4
	ESAPOTS	LCM	RSTE 33 0	1236		L	RSTE 33 0 13 09 N 2
	ESAPOTS	LCM	RSTE 33 0	6		T	SRPDXLA
	ESAPOTS	RCC	RCCI 01	911		H	3245 001 N
	ESAPOTS	RCC	RCCI 01	123		L	RCC1 05 0 19 31 Y 1
	ESAPOTS	RCC	RCCI 01	1236		L	RCC1 03 0 02 03 N 7
	IBNGRP1	RCC	RCCI 01	111		L	RCC1 03 0 01 12 N 3
	IBNGRP2	RCC	RCCI 01	111		T	REORDER
QUI							

Prefix translations for an RCC with P-side trunking using selectors R, D, and A during ESA.

Prefix translation for an RCC with P-side trunking during ESA depends on the source and type of user.

Using the above MSL-100 host office as an example of a typical remote configuration, and the following figure as an example of a typical table ESAPXLA datafill, prefix translation for selectors R, D, and A call sources are as follows:

- If any POTS user connected to an LCM on RCC1 at site REM3 dials 366, a connection is made to a trunk through a standard route referenced by an index of 4 in table ESARTE. Seven additional digits are to be collected before outpulsing.

ESA Operation MCRU (continued)

- If any POTS user connected to an ILCM on RCC1 at site REM3 dials 9, a connection is made to a trunk thst is referenced by an index of 10 in table ESARTE. Dial tone is given and the ESA CM waits for eight additional digits.
- The third example is a special case where a special treatment is required. This is the default treatment.
- If a member of ESAIBN connected to any ILCM on RCC 1 at site REM3 dials 6, the caller receives another dial tone and further digits are translated using the ESAPOTS prefix translator.

Prefix translation example for selectors R, D, and A

	PXLAKEY				RESULT			
COMMAND	XLNAME	NODE: PMTYPE	NODE	PREFIX	1	1 - SEL		
		LCM	LCMO: SITE, FRAME, MODULE		R	RR	NUMDIG	AMBIG
					D	RR	NUMDIG	DIALTONE
		RCC	SITE, RCC NO		A	XLNAME		DIALTONE
INP	ESAPOTS	RCC	REM3 01 0	366	R	04	7	N
	ESAPOTS	RCC	REM3 01 0	9	D	10	8	Y
	ESATRMT	RCC	REM3 01 0	N	R	10	7	N
	ESAIBN	RCC	REM3 01 0	6	A	ESAPOTS		Y
QUI								

The R, D, and A selectors are not applicable to an MCRU. These selectors require standard trunk routes defined in table ESARTE.

Datafilling table CUSTHEAD

Table customer header (CUSTHEAD) links a customer group to the prefix translation table name identified in table ESAPXLA.

For MDC lines it is necessary to link the information in the ESAPXLA prefix tables to a particular customer group. The option ESAPXLA is used to specify the prefix translator name associated with the customer group.

ESA Operation MCRU (continued)

With ESA, datafill the OPTION and XLANAME fields of table CUSTHEAD. If OPTION does not have the ESAPXLA option set, no prefix translation for that customer group is provided.

The following table shows the datafill specific to ESA Operation MCRU for table CUSTHEAD. Only those fields that apply directly to ESA Operation MCRU are shown.

For a description of the other fields, refer to the data schema section of this document.

The following variable entries are available for the OPTION and XLANAME fields in table CUSTHEAD.

Datafilling table CUSTHEAD

Field	Entry	Explanation and action
OPTIONS	ESAPXLA	OPTION. Enter option ESAPXLA.
XLANAME	alphanumeric up to 8 characters	Prefix translator name. Enter the one to eight characters that are assigned to the prefix translator in table ESAPXLA.

Note: Table ESAPXLA must be datafilled before table CUSTHEAD.

Datafill example for table CUSTHEAD

The following example shows sample datafill for table CUSTHEAD.

MAP display example for table CUSTHEAD

```
TABLE   CUSTHEAD

CUSTNAME    CUSTXLA     DGCOLNM     IDIGCOL
                                                  OPTIONS
______________________________________________________________________

POTSDATA    POTSXLA     POTS        NIL
                    ( VACTRMT 0) ( EXTNCOS  0)$
COMIBN2        CXN2       IBN2      NIL
(VACTRMT 0) (EXTNCOS 4) (SUPERCNF) (MHOLD 10 AUDIO1)
(CPR Y AUDIO1 3) (ESAPXLA ESAIBN) $
```

ESA Operation MCRU (end)

Translation verification tools

ESA Operation MCRU does not use translation verification tools.

SERVORD

ESA Operation MCRU does not use SERVORD.

MCRU operational measurements

Operational measurements (OMs) consist of monitoring and counting the occurrences of events within the MSL-100. These events include such items as call counts, usage, errors, and faults. Selected OMs should be printed on a periodic basis and should be used as a supplementary method of system analysis and fault detection.

The OM groups identified in table 13-1 are associated with the Meridian Cabinetized Remote Unit. A description of the OMs and any associated logs are provided.

Table 13-1xxx
MCRU operational measurements

OM Group	Description
LMD	This group counts call attempts and call attempt failures. Associated logs: LINE106, LINE108, LINE138, and NET130
OFZ	This group provides information for traffic analysis. This OM group summarizes the composition of traffic that arrives at an office, the initial routing, and the routing of outgoing traffic. Registers count calls depending on the source of the call (trunk or line) and the intended destination (rather than the actual destination). Associated logs: none
PCMCARR	PCMCARR provides information on pulse code modulated (PCM30) carriers. PCM30 is a transmission standard used to define the characteristics of international digital trunks and transmission links. Associated logs: PM110, PM111, PM180, PM186, and PM187

-continued-

Table 13-1xxx
MCRU operational measurements (continued)

OM Group	Description
PM	This group counts errors, faults, and maintenance state transitions for MSL-100 peripheral modules (PM) with node numbers. Associated logs: NET101, NET102, PM100, PM101, PM102, PM107, PM108, PM109, PM110, PM113, PM114, PM115, PM116, PM117, PM118, PM119, PM122, PM124, PM125, PM126, PM128, PM152, PM160, PM161, PM162, PM163, PM179, PM180, PM181, PM183, and PM185
PMSTAT	This group provides real-time processor occupancy measurements for MCRUs with extended memory line concentrating module (XLCM) equipment and software. Associated logs: none
PMTYP	This group counts PM errors, faults, and state transitions for a group of PMs of the same type. Associated logs: none
RLCDIS	This group provides information on traffic for intraswitched calls in an MCRU with the intracalling feature package (NTX156AA).
SITE	This group provides information about traffic related counts and dial tone speed recording (DTSR) for offices with lines connected to remote sites. Associated logs: none
TRA125M1, TRA125M2, TRA250M1, ENG640M1	These groups provide information about line usage and counts originations and terminations on selected subscriber lines or groups of lines. Associated logs: none
XPMLNK	This group measures link blockage and usage statistics for the PCM-30 links that connect the MCRU to the host XPM. These statistics are used to provide more accurate provisioning of the office. Associated logs: none
-end-	

OM group EMG640M1

OM description

Engineering 640 measurements 1

ENG640M1 provides information about line usage, and counts originations and terminations on selected subscriber lines or groups of lines.

Table ENG640I1 specifies the lines that are monitored. A maximum of 640 entries can be made in the table. The subscriber line usage (SLU) option is added to a line through a service order. The line is then added to table ENG640I1 using the SLUADD command. When the SLU_INSTALL command is given, the contents of table ENG640I1 are copied into ENG640M1.

New entries can be added to table ENG640I1 while group ENG640M1 is monitoring the lines that are originally specified by the table. The new entries do not affect the group until the SLU_INSTALL command is given.

Release history

OM group EMG640M1 was introduced prior to BCS20.

BCS33

Register TBU can be converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class.

BCS31

Existing registers incremented on the SL-100 for intelligent peripheral equipment.

Registers

OM group EMG640M1 registers display on the MAP terminal as follows:

```
TBU             ORIG            TERM
```

Group structure

OM group EMG640M1 provides one tuple for each line specified in table ENG640I1.

Key field: None
Info field: SLU_OM_INFO

OM group EMG640M1 (continued)

The SLU feature is activated by setting parameter OPTIONAL_SLU_FEATURE in table OFCOPT to Y. The SLU feature is enabled in tables LENFEAT, IBNFEAT, and KSETFEAT.

Associated OM groups

TRA125M1, TRA125M2, and TRA250M1 provide information about line usage, and count originations and terminations on other selected subscriber lines or groups of lines.

Associated functional groups

The Meridian SL-100 PBX functional group is associated with OM group EMG640M1.

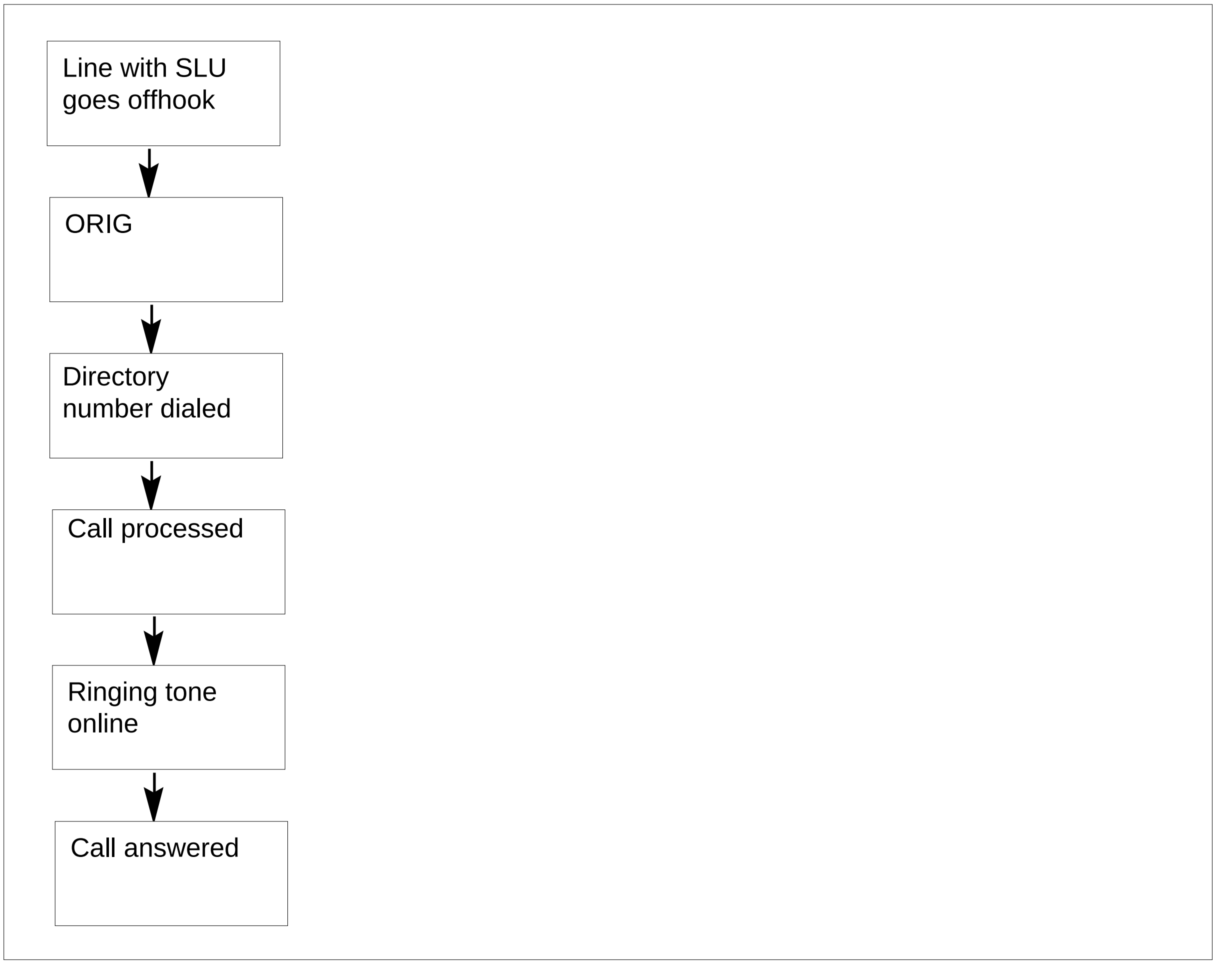
Associated functionality codes

The functionality codes associated with OM group EMG640M1 are shown in the following table.

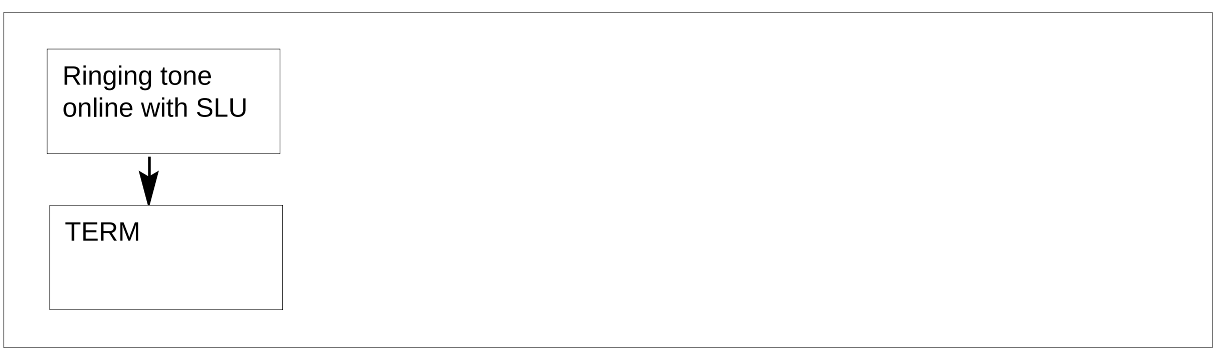
Functionality	Code
Subscriber Line Measurements	NTX082AA
IBN Proprietary Business Set, NTX106AA allows SLU to be assigned to any business set directory number appearance. SLU is not available on business set multiple appearance directory numbe (MADN)	NTX106AA
Extended Peripheral Equipment	NTXN25AA

OM group EMG640M1 (continued)

OM group EMG640M1 registers: originating calls

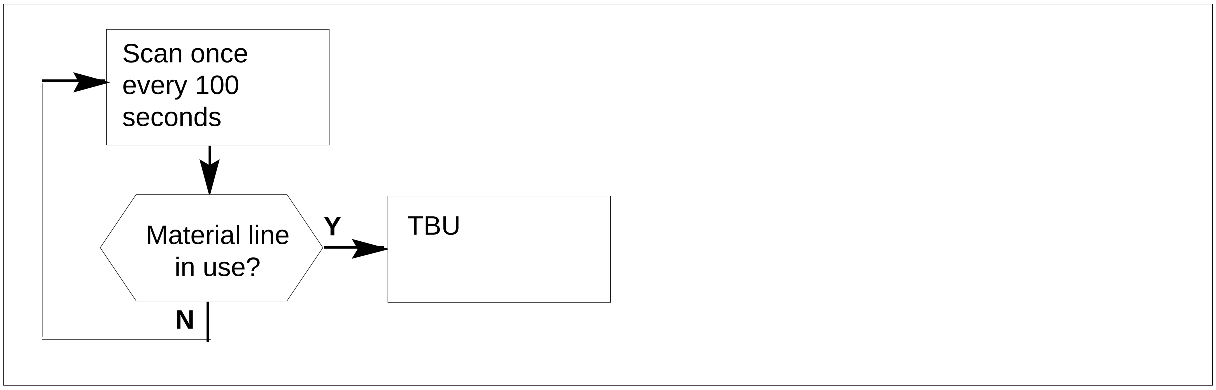


OM group EMG640M1 registers: terminating calls



OM group EMG640M1 (continued)

OM group EMG640M1 registers: usage registers



Register ORIG

Originations

ORIG is incremented when a subscriber with the subscriber line usage (SLU) option attempts to originate a call and dial tone is connected.

If the switch can identify which party of two- and four-party lines made the call attempt, the register is incremented only once. If the switch cannot identify which party of two- and four-party lines made the call attempt, the register counts each directory number on the line.

Register ORIG release history

ORIG was introduced prior to BCS20.

BCS31

ORIG incremented on the SL-100 for intelligent peripheral equipment.

Associated registers

None

Associated logs

None

Extension registers

None

Register TBU

Traffic busy usage

TBU is a usage register. The scan rate is specified by parameter ENG640M1_SCAN_RATE in table OFCVAR. TBU records whether a line is processing calls.

The default value of parameter ENG640M1_SCAN_RATE is 100 s.

Register TBU release history

TBU was introduced prior to BCS20.

BCS33

When the office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS31

TBU incremented on the SL-100 for intelligent peripheral equipment.

Associated registers

None

Associated logs

None

Extension registers

None

Register TERM

Terminations

TERM is incremented when a call has been terminated to a line with the subscriber line usage (SLU) option and ringing tone begins.

TERM does not count calls within the same hunt group or the same equiv group.

Register TERM release history

TERM was introduced prior to BCS20.

BCS31

TERM incremented on the SL-100 for intelligent peripheral equipment.

OM group EMG640M1 (end)

Associated registers

For a hunt group with the SLU option associated with all the lines:
HUNT_HUNTATT - HUNT_HUNTOVFL = TERM

Associated logs

None

Extension registers

None

OM group LMD

OM description

Line traffic

LMD provides traffic information for the following peripheral modules (PM):

- remote line modules (RLM)
- line concentrating modules (LCM)
- remote concentrator terminals (RCT)
- remote concentrator subscribers (RCS)
- integrated services line modules (ISLM)
- digital line modules (DLM)
- very small remotes (VSR)
- enhanced line concentrating modules (ELCM)
- integrated services digital network (ISDN) line concentrating modules (LCMI)
- intelligent peripheral equipment (IPE)
- line modules (LM)

ISUPCGRP counts available circuits for each trunk.

ISUPCONN counts unsuccessful call attempts.

One usage register records the number of busy lines.

Ten registers count the following:

- attempts to find a speech link from the network module to a terminating line
- attempts to find a speech link that fail
- originating call attempts
- originating call attempts that fail
- originating call attempts that are abandoned by the subscriber
- attempts to terminate on a line that fail
- attempts to collect or return coins that fail
- revertive call attempts

OM group LMD (continued)

- Multiple Appearance Directory Number (MADN) group secondary members that are notified of an incoming call

LMD is provided for all types of DMS offices.

Release history

OM group LMD was created prior to BCS20

BCS35

The info field is enhanced to include the ADNUM field, which contains a unique unit number that identifies each peripheral module.

BCS33

Registers LMTRU can be converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class.

BCS32

LMD is expanded to include traffic measurements for the lines associated with the remote digital terminal.

BCS31

One tuple per IPE module on an SL-100 provided by LMD

BCS24

One tuple per ELCM and LCMI provided by LMD

BCS23

One tuple per VSR provided by LMD

BCS21

One tuple per DLM provided by LMD

BCS20

Software change to provide usage registers either in CCS or in deci-erlangs, and one tuple per ISLM provided by LMD

Registers

OM group LMD registers display on the MAP terminal as follows:

```
NTERMATT    NORIGATT    LMTRU       TERMBLK
ORIGFAIL    PERCLFL     STKCOINS    REVERT
MADNTATT    ORIGBLK     ORIGABN
```

Group structure

OM group LMD provides one tuple per line peripheral.

Key field: None

Info field: LMD_OMINFO is the PM identifier. The PM identifier is made up of the site identifier, the frame number, and the unit number. The site identifier consists of four alphanumeric characters. For ISLM, the site identifier must be HOST. The frame number is a number from 0-511. Unit numbers are listed according to PM type:

- ALCM 0-1
- DLM 0-1
- ELCM 0-1
- FRU 0-1
- IPE 0-3
- ISLM 0-3
- LCM 0-1
- LCME 0-1
- LCMI 0-1
- LDT 0
- LM 0-1
- LRU 0-9
- RCS 0-9
- RCT 0-9
- RCU 0-9
- RDT 0-9

Associated OM groups

OFZ monitors office-wide traffic. OFZ registers count calls based on the source of the call and its intended destination.

OTS monitors office-wide traffic. OTS registers count calls based on the source of the call and its actual destination.

Associated functional groups

None

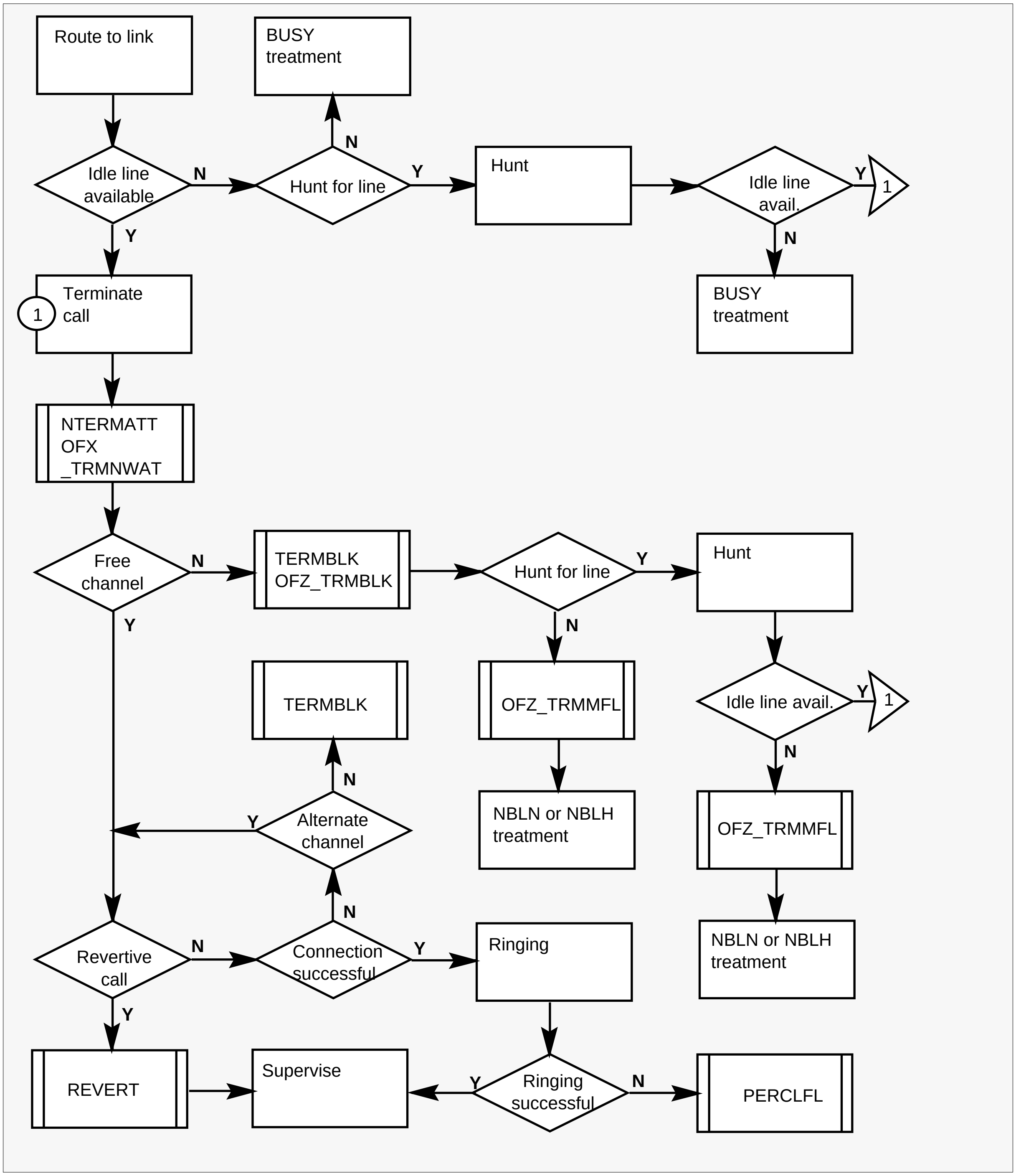
OM group LMD (continued)

Associated functionality codes

The functionality codes associated with OM group LMD are shown in the following table.

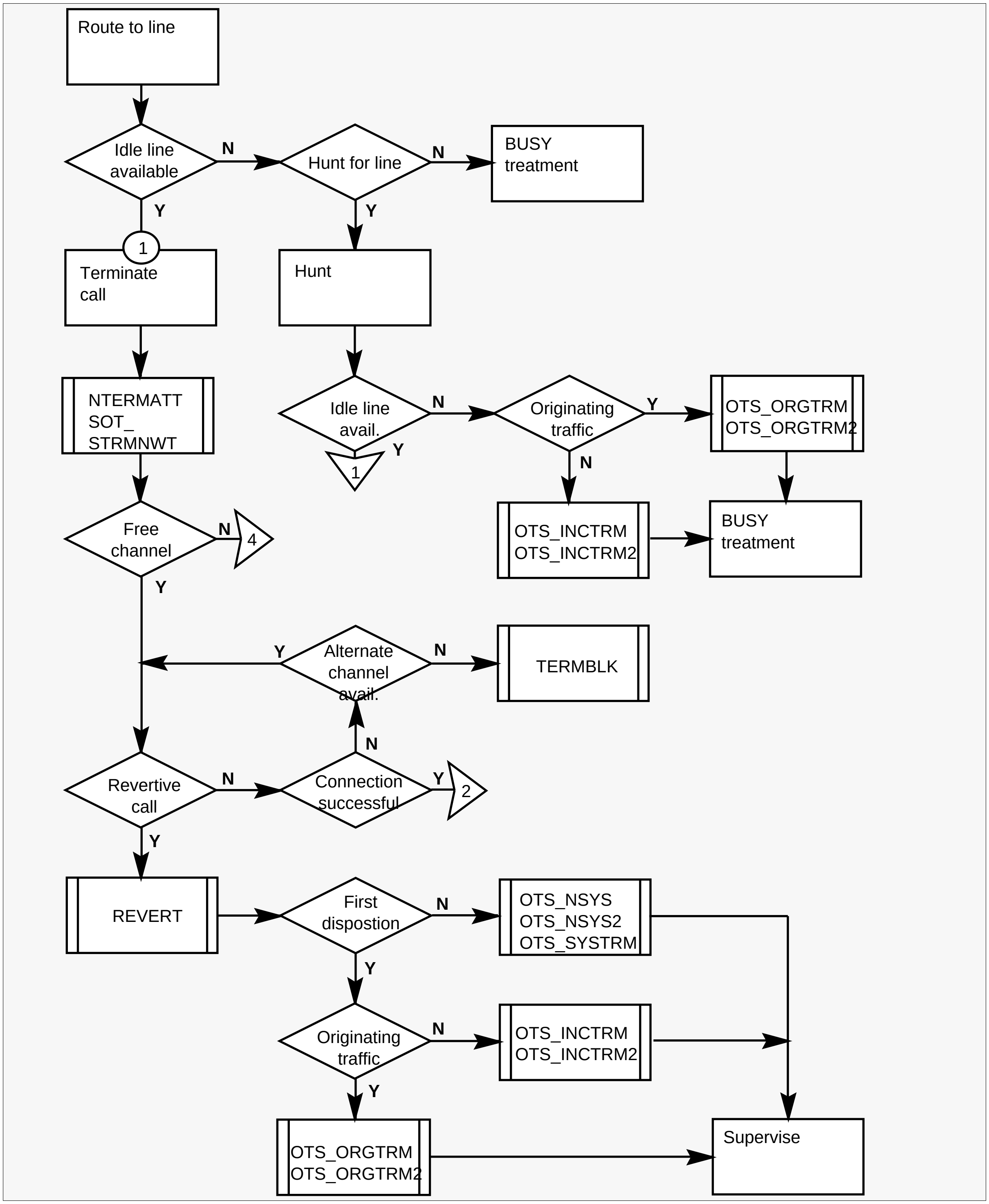
Functionality	Code
Meridian SL-100 Cabinetized Software	NTXA10AA
Extended Peripheral Equipment	NTXN25AA
Common Basic	NTX001AA
Digital Phone M2000-Basic	NTX640AA
OMs in Erlangs	NTX664AA
ISDN Basic Access	NTX750AB

OM group LMD registers



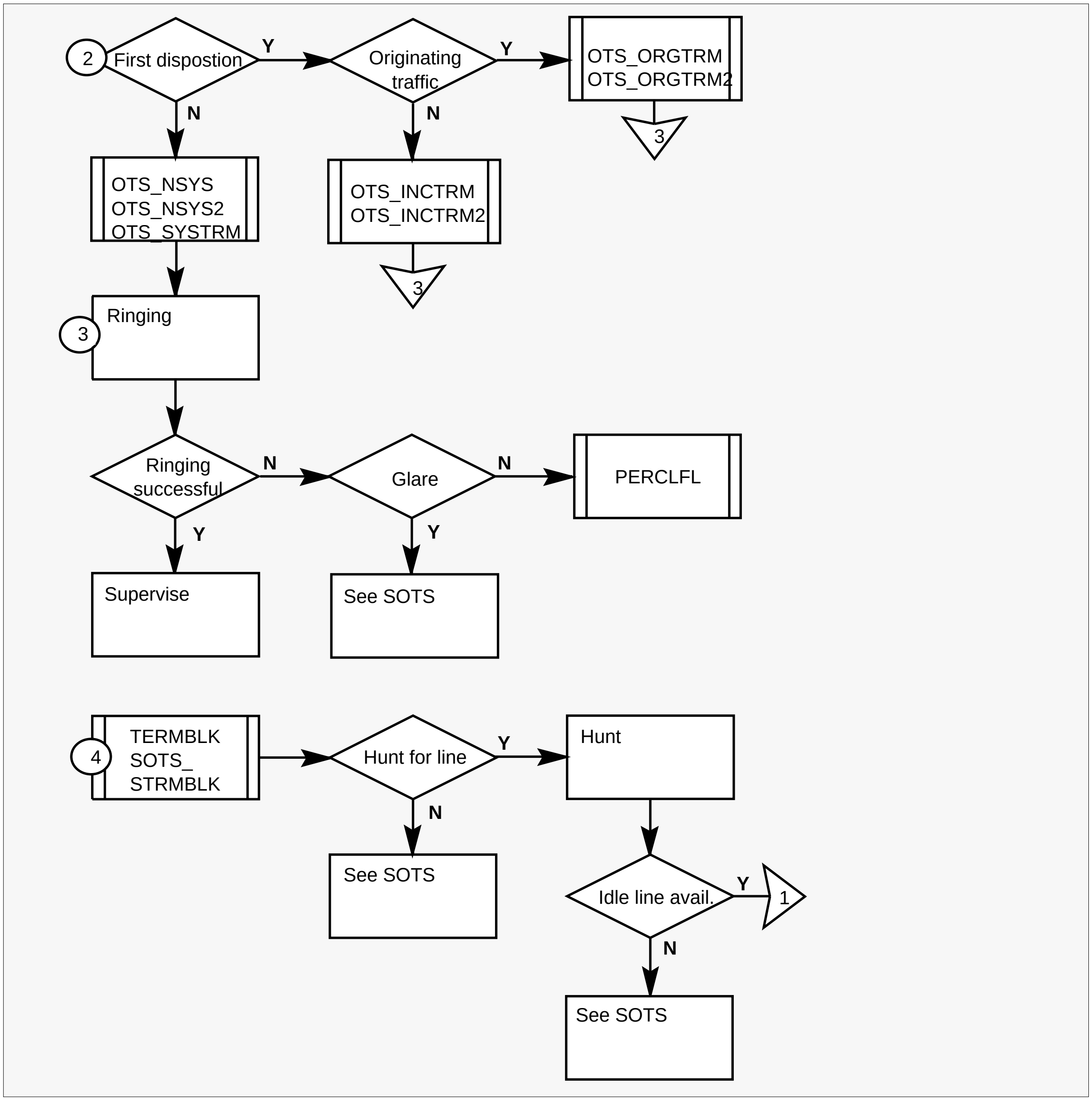
OM group LMD (continued)

OM group LMD registers



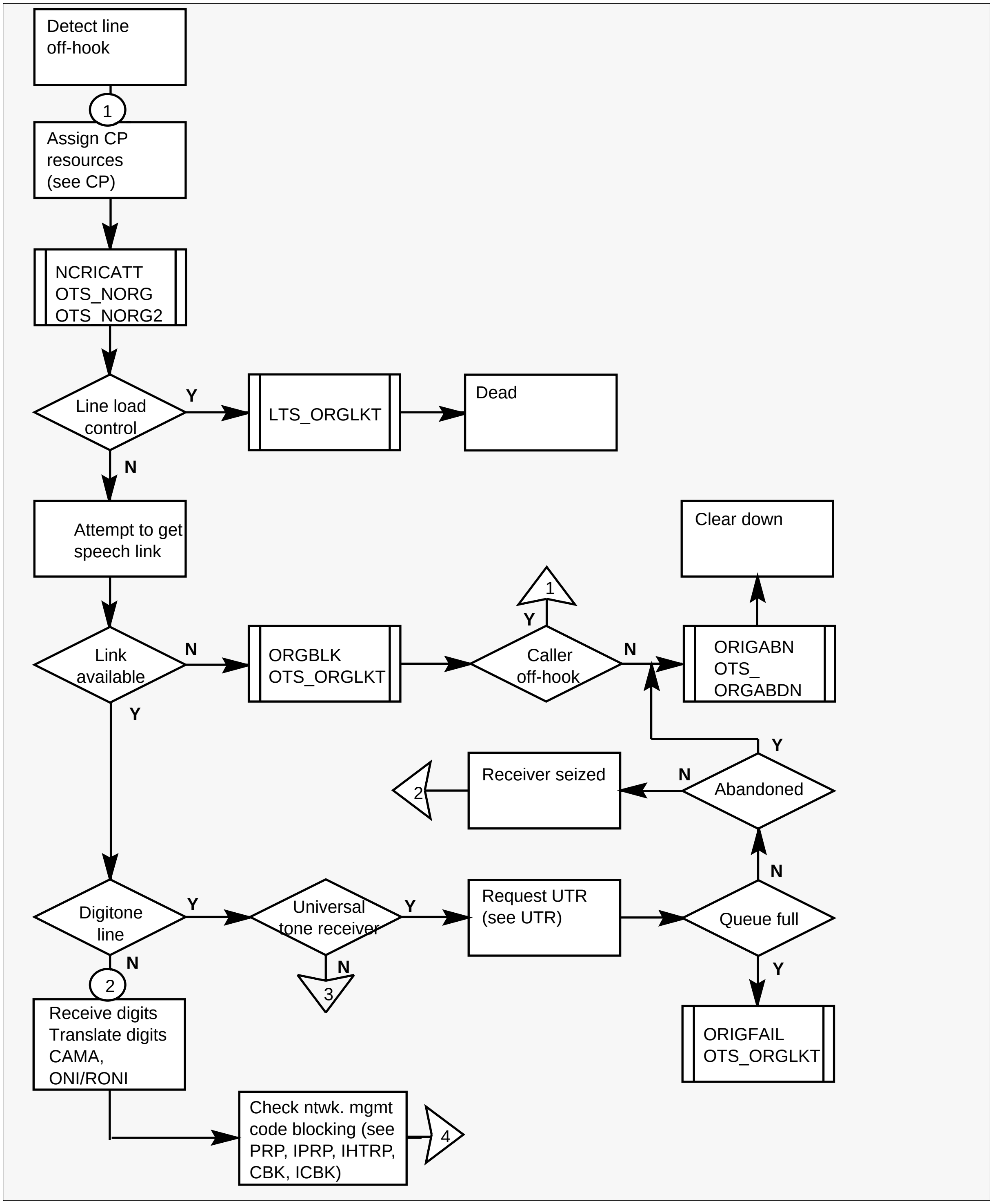
OM group LMD (continued)

OM group LMD registers



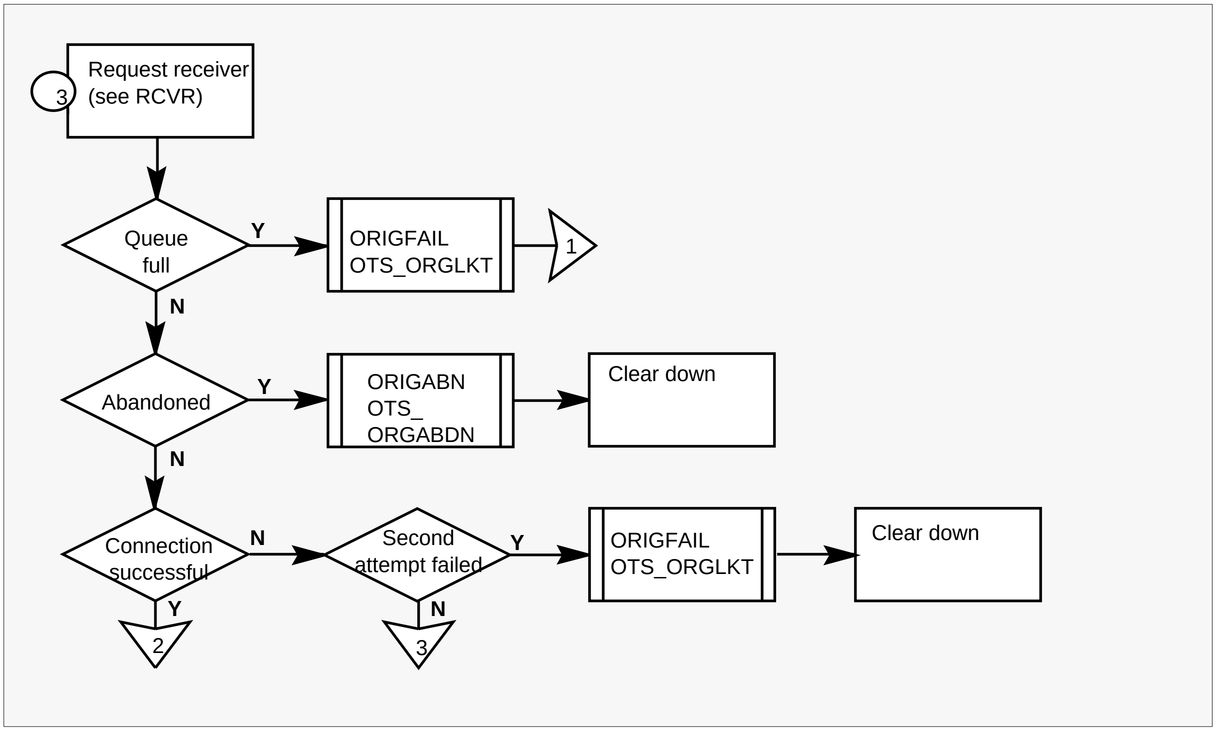
OM group LMD (continued)

OM group LMD registers



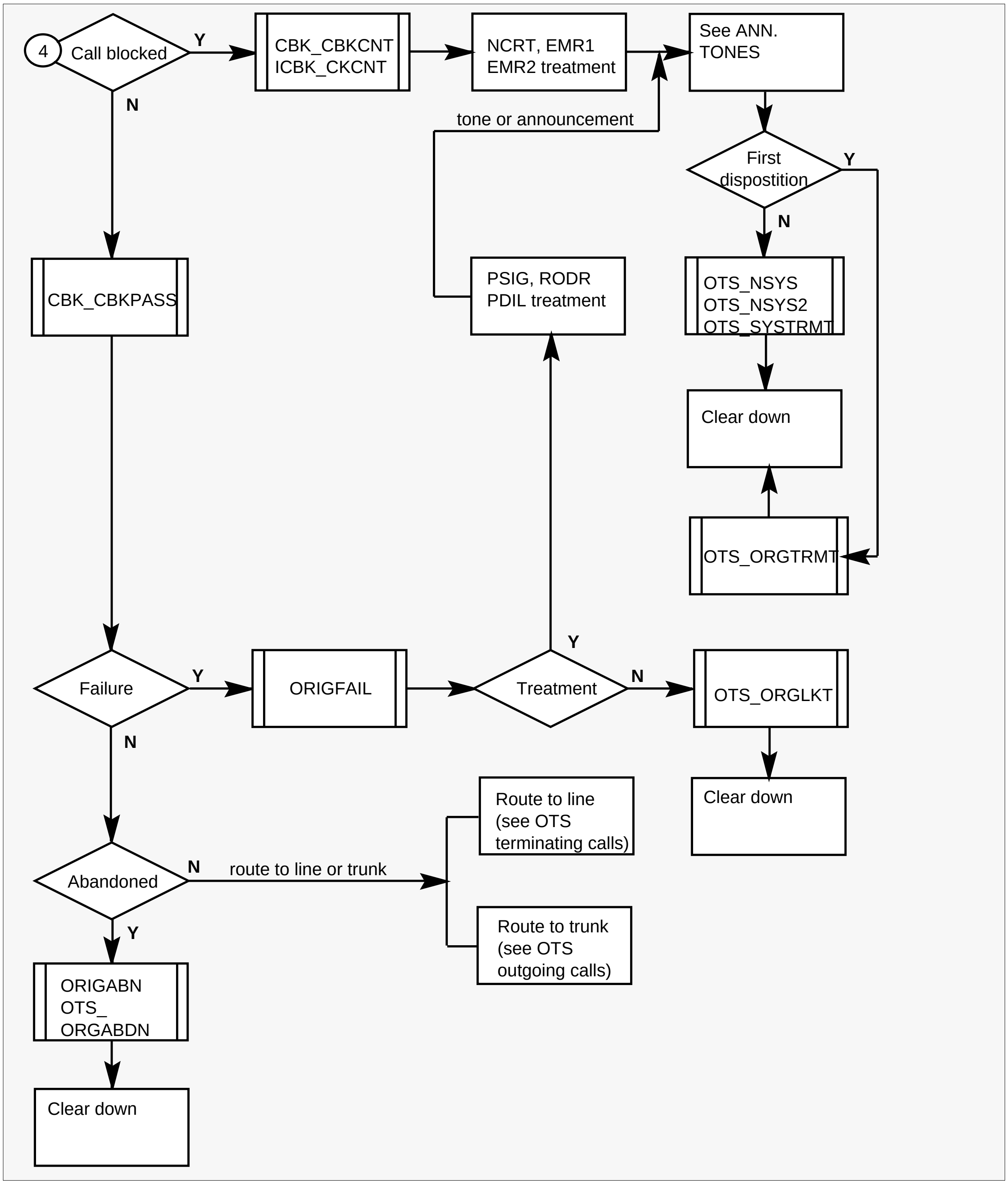
OM group LMD (continued)

OM group LMD registers



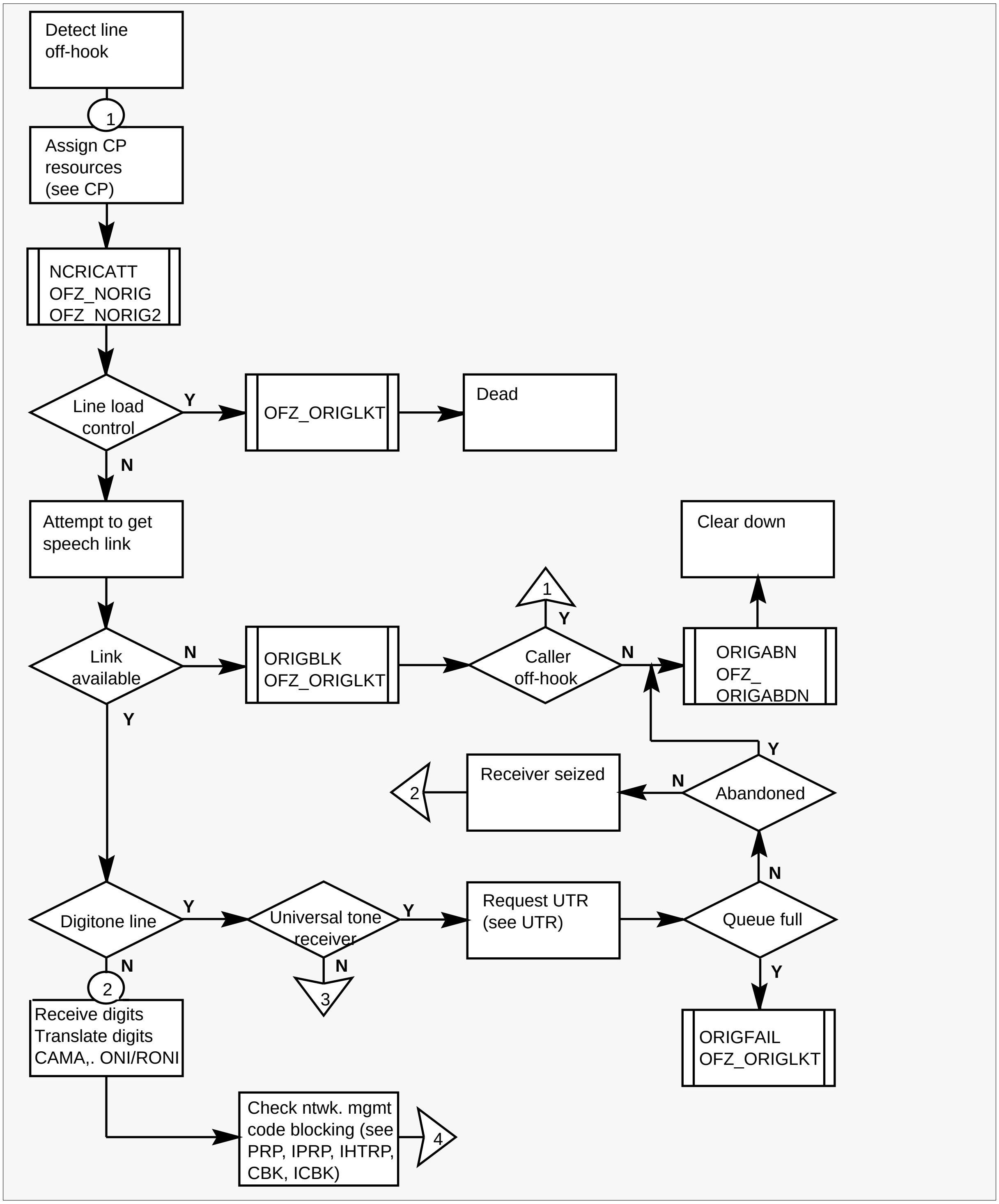
OM group LMD (continued)

OM group LMD registers



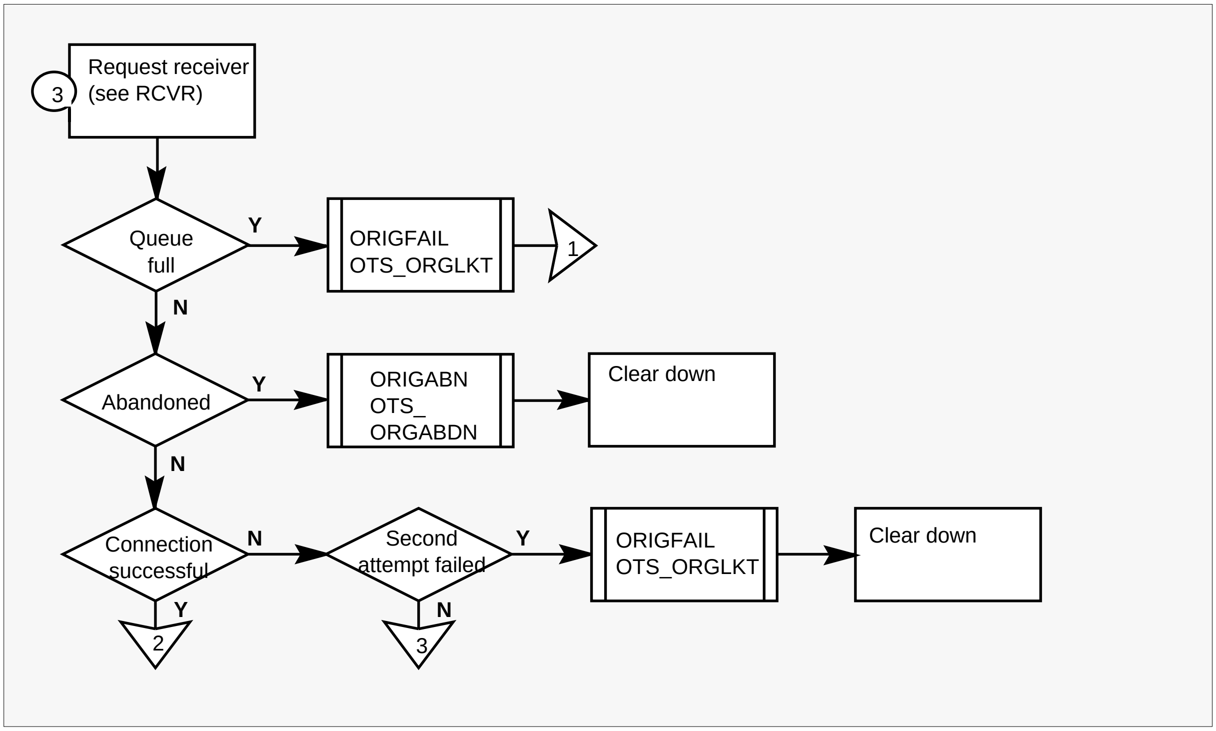
OM group LMD (continued)

OM group LMD registers

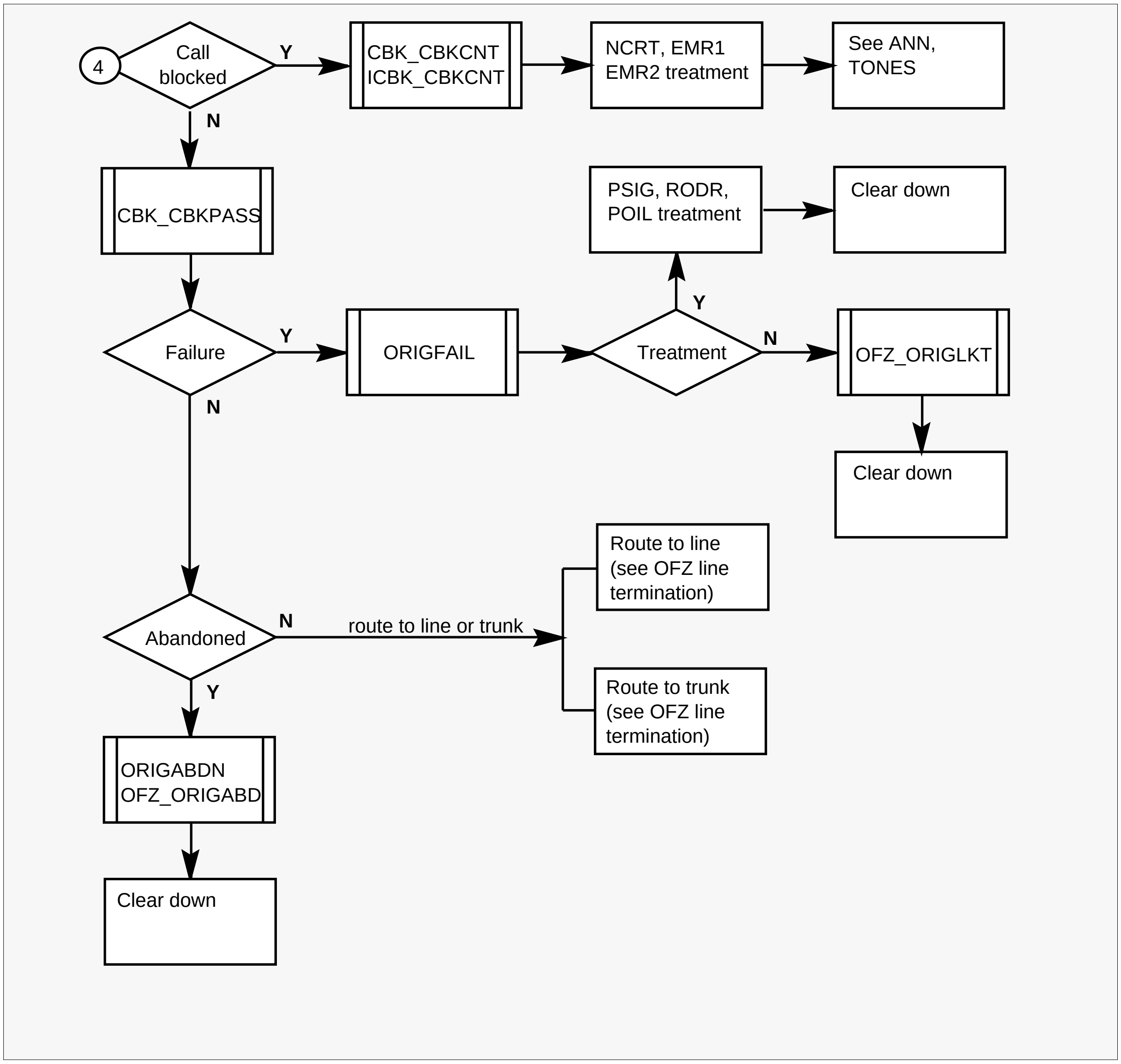


OM group LMD (continued)

OM group LMD registers



OM group LMD registers



Register LMTRU

Traffic busy usage

LMTRU is a usage register. The scan rate is slow: 100 s. LMTRU records the number of lines that are call processing busy or call processing busy deloading.

Register LMTRU release history

LMTRU was created prior to BCS20.

OM group LMD (continued)

BCS33

When the office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS31

Traffic busy usage on the SL-100 for IPE recorded by LMTRU

BCS20

Software change to provide usage register LMTRU in CCS or deci-erlangs

Associated registers

None

Associated logs

None

Register MADNTATT

Multiple Appearance Directory Number (MADN) secondary member terminating attempts

MADNTATT counts secondary members of MADN groups in the PM that are notified of an incoming call.

MADNTATT is incremented once for each electronic business set (EBS) or ringing 500/2500 set that is notified. The primary termination is incremented in NTERMATT.

MADNTATT does not count recalls or rerings of a group member.

Register MADNTATT release history

MADNTATT was created prior to BCS20.

BCS31

MADNTATT incremented on the SL-100 for IPE

BCS24

One tuple per ELCM and LCMI provided by LMD

BCS23

One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

Associated registers

None

Associated logs

None

Register NORIGATT

NORIGATT counts originating call attempts that are reported by the LM to the central control. NORIGATT includes attempts to originate a three-way call.

This register is incremented at the start of call processing, before checks are made for line load control or when congestion occurs on the speech link to the network module. If there is congestion and the originator remains off-hook, the switch automatically makes several re-attempts at origination. NORIGATT and LMD_ORIGBLK are incremented for each origination attempt.

Register NORIGATT release history

NORIGATT was created prior to BCS20.

BCS31
NORIGATT incremented on the SL-100 for IPE

BCS24
One tuple per ELCM and LCMI provided by LMD

BCS23
One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

OM group LMD (continued)

Associated registers

OFZ_NORIG counts originating call attempts that are recognized by the central control.

The relationship between LMD_NORIGATT and OFZ_NORIG is:

Σ LMD_ORIGATT = (65536 * OFZ_NORIG2) + OFZ_NORIG line modules

OTS_NORG counts originating call attempts that are recognized by the central control.

The relationship between LMD_NORIGATT and OTS_NORG is:

Σ LMD_ORIGATT = (65536 * OTS_NORG2) + OTS_NORG line modules

ORIGBLK counts originating call attempts that fail because there is no idle speech path from the originating LM to the network module.

Associated logs

None

Register NTERMATT

Terminating attempts

NTERMATT counts attempts to find an available speech link from the network module to a terminating line, after call processing has determined that the terminating line is available.

The count in NTERMATT includes call-waited calls that are rung through upon termination of the earlier conversation and calls that are answered by the secondary member of a MADN group.

Register NTERMATT release history

NTERMATT was created prior to BCS20.

BCS31

NTERMATT incremented on the SL-100 for IPE

BCS24

One tuple per ELCM and LCMI provided by LMD

BCS23
One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

Associated registers

OFZ_TRMNWAT counts attempts to find a speech path to a terminating line.

The relationship between LMD_NTERMATT and OFZ_NTRMNWAT is:

Σ LMD_NTERMATT = (65536 * OFZ_TRMNWAT2) + OFZ_TRMNWAT line modules

SOTS_STRMNWT counts attempts to find a speech path to a terminating line.

The relationship between LMD_NTERMATT and SOTS_STRMNWT is:

Σ LMD_NTERMATT = (65536 * SOTS_STRMNWT2) + SOTS_STRMNWT line modules

Associated logs

None

Register ORIGABN

Originating abandons before connection

ORIGABN counts originating call attempts that are abandoned by the subscriber before call set up is complete.

Large counts in ORIGABN may indicate line problems or problems in PMs.

Register ORIGABN release history

ORIGABN was created prior to BCS20.

BCS31
ORIGABN incremented on SL-100 for IPE

OM group LMD (continued)

BCS24
One tuple per ELCM and LCMI provided by LMD

BCS23
One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

Associated registers

LMD_NORIGATT counts originating call attempts reported by the LM to the central control.

OFZ_ORIGABDN counts originating call attempts that are abandoned by the subscriber before the call is routed.

The relationship between LMD_ORIGABN and OFZ_ORIGABDN is:

Σ LMD_ORIGABN = OFZ_ORIGABDN line modules

OTS_ORGABDN counts originating call attempts that are abandoned by the subscriber before the call is routed.

The relationship between LMD_ORIGABN and OTS_ORGABDN is:

Σ LMD_ORIGABN = OTS_ORGABDN line modules

Associated logs

LINE106 is generated when trouble is encountered during dial pulse reception on a line.

LINE108 is generated when trouble is encountered during Digitone reception on a line.

Register ORIGBLK

Originating failures

ORIGBLK counts originating call attempts that fail because there is no idle speech path from the originating LM to the network module. The PM originates the call again as long as the caller stays off-hook.

If the count in ORIGBLK is high, it may indicate a fault condition, such as RLM links that are manual busy or system busy. Lower counts may indicate a need to provision more links or reduce load.

Register ORIGBLK release history

ORIGBLK was created prior to BCS20.

BCS31

ORIGBLK incremented on the SL-100 for IPE

BCS24

One tuple per ELCM and LCMI provided by LMD

BCS23

One tuple for each VSR provided by LMD

BCS21

One tuple for each DLM provided by LMD

BCS20

One tuple for each ISLM provided by LMD

Associated registers

LMD_NORIGATT counts origination attempts that are reported by the LM to the central control.

OFZ_ORIGLKT counts originating call attempts that fail and are routed to lock-out, but are not connected or routed to treatment.

The relationship between LMD_ORIGBLK and OFZ_ORIGLKT is:

$$\Sigma \text{ LMD\_ORIGBLK} = \text{OFZ\_ORIGLKT line modules}$$

OTS_ORGLKT counts originating call attempts that fail and are routed to lockout, but are not connected or routed to treatment.

The relationship between LMD_ORIGBLK and OTS_ORGLKT is:

$$\Sigma \text{ LMD\_ORIGBLK} = \text{OTS\_ORGLKT line modules}$$

Associated logs

NET130 is generated when a network path cannot be found.

OM group LMD (continued)

Register ORIGFAIL

Originating attempt failures

ORIGFAIL counts originating call attempts that fail for one of the following reasons:

- not enough digits are sent before a timeout occurs (partial dial)
- no digits are sent before a timeout occurs (permanent signal)
- extra pulses or bad tones are sent
- two Digitone (DT) frequencies that have more than a 6-decibel spread between them are generated
- an unexpected message type (for example, a test failure) is received from a PM during automatic number identification testing on recordable calls

Register ORIGFAIL release history

ORIGFAIL was created prior to BCS20.

BCS31

ORIGFAIL incremented on the SL-100 for IPE

BCS24

One tuple per ELCM and LCMI provided by LMD

BCS23

One tuple for each VSR provided by LMD

BCS21

One tuple for each DLM provided by LMD

BCS20

One tuple for each ISLM provided by LMD

Associated registers

TRMTCM_TCMPSIG counts calls that are routed to permanent signal timeout treatment because no digits are received before a timeout.

TRMTCM_TCMPDIL counts calls that are routed to partial dial timeout treatment because a least one digit has been received, but not all of those required to complete the call.

TRMTER_TERRODR counts calls that are routed to reorder treatment because distorted signals are received during dialing or inpulsing.

Associated logs

AMAB151 is generated when an identification failure occurs while a Station Message Detail Recording (SMDR) record is being made for a call.

LINE108 is generated when trouble is encountered during DT reception on a line. If the trouble interrupts a call in progress, the DMS switch routes the call to treatment and generates LINE138. LINE138 identifies the treatment that was applied to the line.

LINE109 is generated when trouble is encountered during call processing. If the trouble interrupts a call in progress, the DMS switch routes the call to treatment and generates LINE138. LINE138 identifies the treatment that was applied to the line.

LINE120 is generated when the DMS switch fails to set up a three-way call when requested because a hardware or software resource is not available. The DMS switch automatically routes the call to treatment.

LINE138 is generated when a call is routed to treatment after being call processing busy.

LINE104 is generated when trouble is encountered during call processing. If the trouble interrupts a call that is in progress, the DMS switch routes the call to treatment and generates LINE138. LINE138 identifies the treatment that was applied to the line.

LINE105 is generated when trouble is encountered during call processing. If the trouble interrupts a call that is in progress, the DMS switch routes the call to treatment and generates LINE138. LINE138 identifies the treatment that was applied to the line.

LINE106 is generated when trouble is encountered during DP reception on a line. If the trouble interrupts a call that is in progress, the DMS switch routes the call to treatment and generates LINE138. LINE138 identifies the treatment that was applied to the line.

Register PERCLFL

Terminating call attempt failures

PERCLFL counts calls that cannot successfully terminate on a line because of problems in ringing the terminating line.

A ringing failure on an emergency service line does not cause the call to fail and does not increment PERCLFL. The system attempts ringing until it is successful.

OM group LMD (continued)

If the office parameter PER_CALL_GND_LOOP_TEST in table OFCVAR is set to Y, PERCLFL also includes loop faults that are detected during attempted terminations on ground start lines.

Register PERCLFL release history

PERCLFL was created prior to BCS20.

BCS31

PERCLFL incremented on the SL-100 for IPE

BCS24

One tuple per ELCM and LCMI provided by LMD

BCS23

One tuple for each VSR provided by LMD

BCS21

One tuple for each DLM provided by LMD

BCS20

One tuple for each ISLM provided by LMD

Associated registers

TRMTER_TERSYFL counts calls that are routed to system failure treatment because of a software or hardware failure in the switching unit.

Associated logs

LINE107 is generated when a line insulation test is requested.

LINE110 is generated when a foreign electromagnetic force is detected on a line during a foreign potential test.

LINE113 is generated if trouble is encountered when ringing is applied to a line. If the trouble interrupts a call that is in progress, the DMS switch routes the call to treatment and generates LINE138. LINE138 identifies the treatment that was applied to the line.

Register REVERT

Revertive call attempts

REVERT counts revertive calls initiated on an LM. This register is incremented when ringing starts after the caller has gone on-hook for the first time.

Register REVERT release history

REVERT was created prior to BCS20.

BCS31
REVERT incremented on the SL-100 for IPE

BCS24
One tuple per ELCM and LCMI provided by LMD

BCS23
One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

Associated registers

None

Associated logs

LINE138 is generated when a call is routed to treatment after being call processing busy.

Register STKCOINS

Stuck coins

STKCOINS counts attempts to collect or return coins that fail because the coins are stuck.

STKCOINS is incremented when call processing stops attempting to collect or return the coins. The call proceeds as if the attempt to collect or return the coin had been successful.

Register STKCOINS release history

STKCOINS was created prior to BCS20.

BCS31
STKCOINS incremented on the SL-100 for IPE

BCS24
One tuple per ELCM and LCMI provided by LMD

OM group LMD (continued)

BCS23
One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

Associated registers

None

Associated logs

LINE112 is generated when the system fails to remove a stuck coin on a line that is connected to a coin box.

Register TERMBLK

Terminating failures

TERMBLK counts attempts to find a speech link from the network module to a terminating line that fails for one of the following reasons:

- no speech links are available from the network to a terminating line
- no match can be found between an idle channel on the links to the network and an idle channel on the link shelf that is serving the terminating line

Register TERMBLK release history

TERMBLK was created prior to BCS20.

BCS31
TERMBLK incremented on the SL-100 for IPE

BCS24
One tuple per ELCM and LCMI provided by LMD

BCS23
One tuple for each VSR provided by LMD

BCS21
One tuple for each DLM provided by LMD

BCS20
One tuple for each ISLM provided by LMD

OM group LMD (end)

Associated registers

OFZ_TRMBLK counts attempts to find a voice path from the network module to a terminating line that fail for one of the following reasons:

- all LM channels to the network are busy
- no match can be found between an idle channel on the links to the network and an idle channel on the line shelf that is serving the terminating line

The relationship between LMD_TERMBLK and OFZ_TRMBLK is:

Σ LMD_TERMBLK = OFZ_TRMBLK line modules

SOTS_STRMBLK counts attempts to find a voice path from the network to a terminating line that fail for one of the following reasons:

- all LM channels to the network are busy
- no match can be found between an idle channel on the links to the network and an idle channel on the line shelf that is serving the terminating line

The relationship between LMD_TERMBLK and SOTS_STRMBLK is:

Σ LMD_TERMBLK = SOTS_STRMBLK line modules

SOTS_STRMRBLK counts calls that are routed to network blockage normal (NBLN) traffic treatment because they fail to find a voice path from a network module to a terminating line.

SOTS_STRMMFL counts calls that fail to find a voice path to a terminating line because a network connection is unavailable.

TRMTRS_TRSNBLN counts calls that are routed to NBLN traffic treatment when the call is aborted because of failure to get a channel in the terminating PM.

TRMTRS_TRSNBLH counts calls that are routed to the network blockage heavy (NBLH) traffic treatment when the call is aborted because of failure to get a path through the network.

Associated logs

NET130 is generated when a network path cannot be found.

OM group OFZ

OM description

Office traffic summary

Office traffic summary (OFZ) provides information for traffic analysis. This OM group differs from group OTS because registers in the OFZ group count calls for the *intended* destination, not the actual destination where the call eventually terminates. This is called a primary route scoring philosophy.

A call is routed to a tone or announcement because the tone or announcement is the *intended* destination of the call, or because of an error condition that includes a tone or announcement as a part of its treatment. If the treatment includes subsequent routing to another tone or announcement, note that only the first tone or announcement is counted in OFZ.

OFZ records the composition of traffic that arrives at an office, the initial routing, and the routing of outgoing traffic. The relationship between the type of call and the OFZ registers is summarized in tables 1 to 4. Each table corresponds to one of the OFZ flow charts.

The following table contains the registers that count incoming calls. Each incoming call is counted in NIN, and in one of the following registers, depending on whether the source of the call is a line or a trunk: INANN, INLKT, INOUT, INTRM, INTONE, INABNC, or INABNM.

Incoming calls

Register	Intended destination	Routing
INOUT	trunk	trunk
INOUT2	trunk	trunk
INTRM	line	line
INTRM2	line	line
INANN	trunk, line, announcement	announcement
INTONE	trunk, line, tone	tone
INLKT	trunk or line	lockout
INABNC	trunk or line	customer-abandon
INABNM	trunk or line	machine-abandon

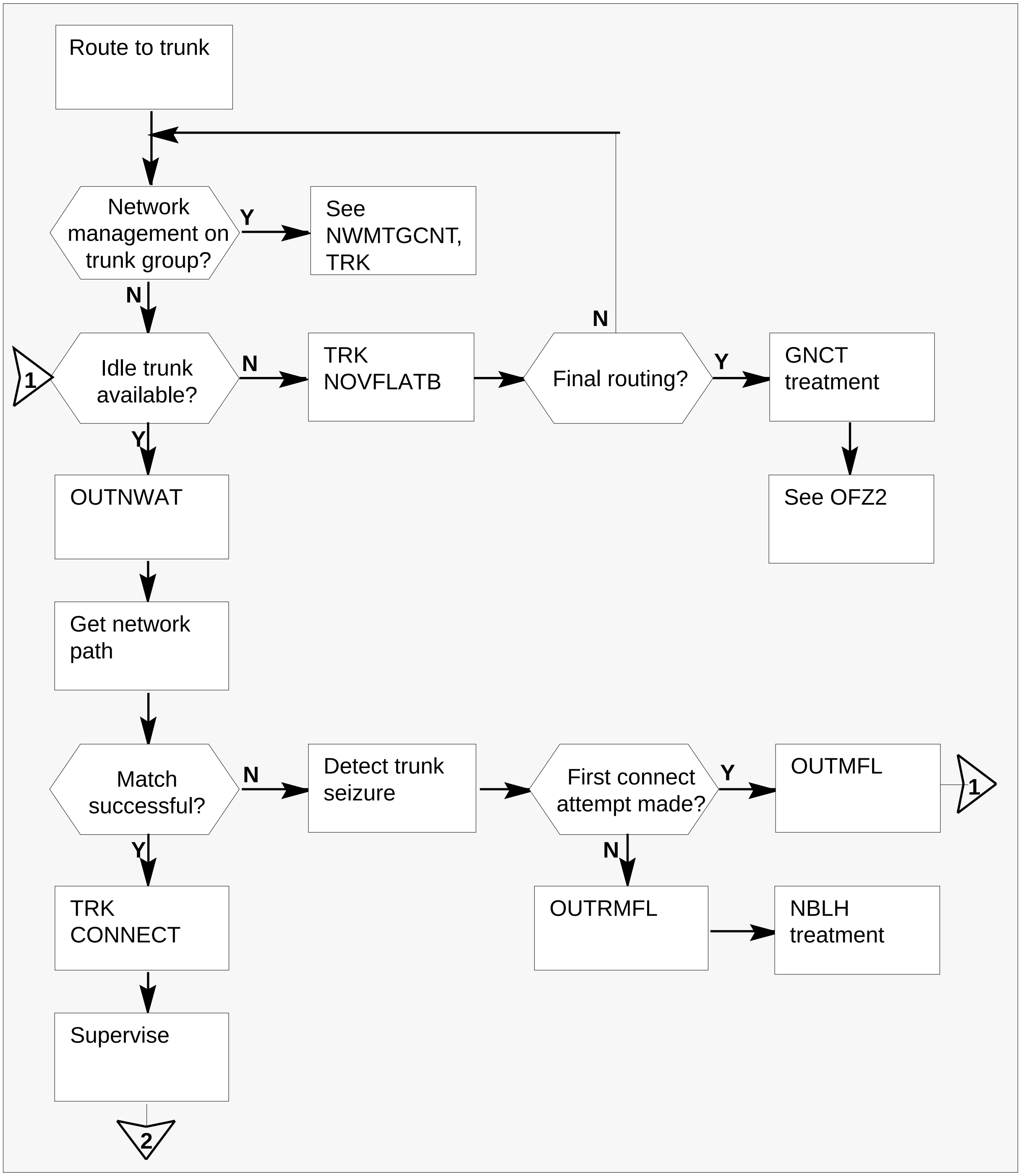
-continued-

OM group OFZ (continued)

Incoming calls (continued)

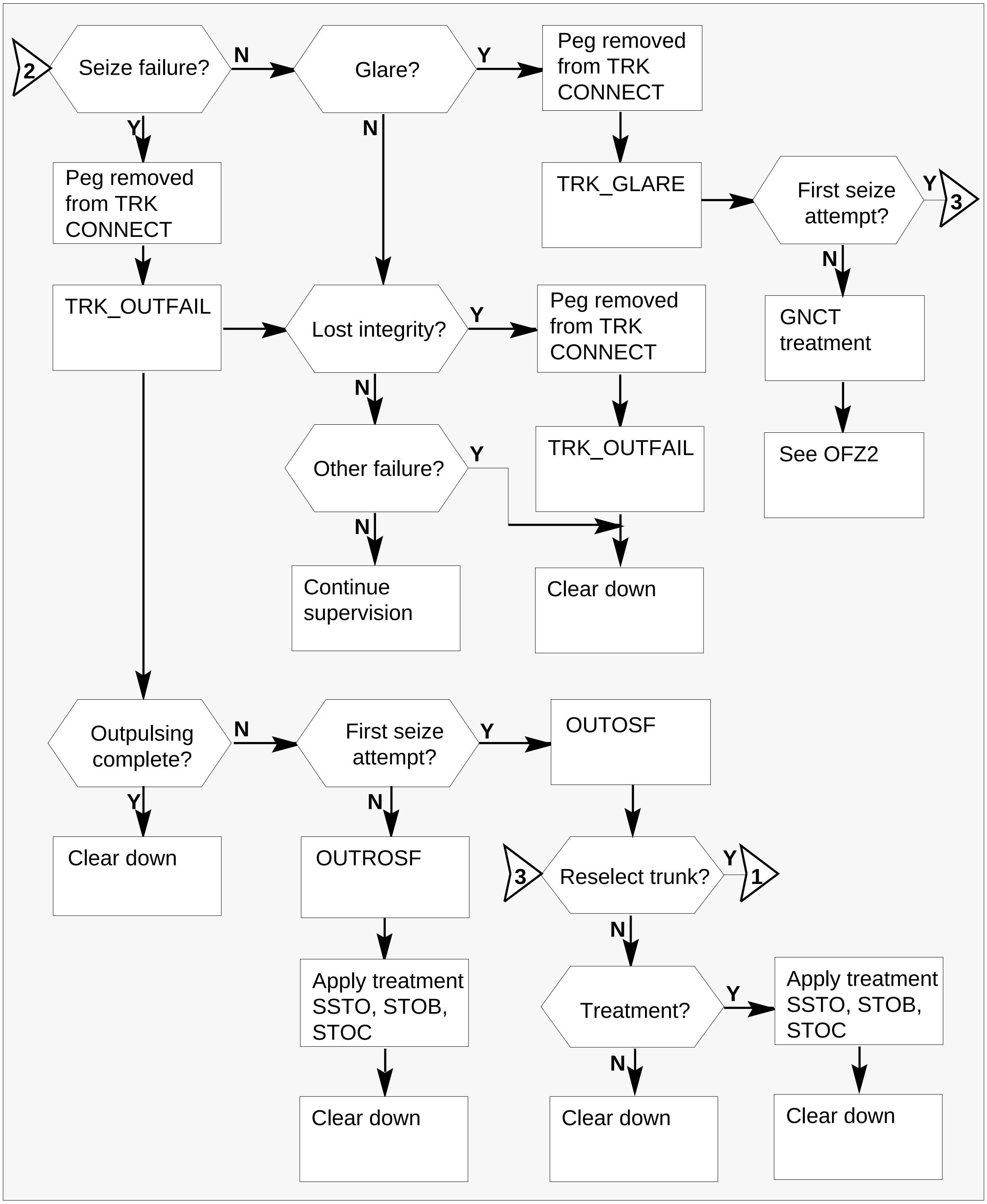
Register	Intended destination	Routing
NIN	all	all
NIN2	all	all
-end-		

OM group OFZ Registers: outgoing calls



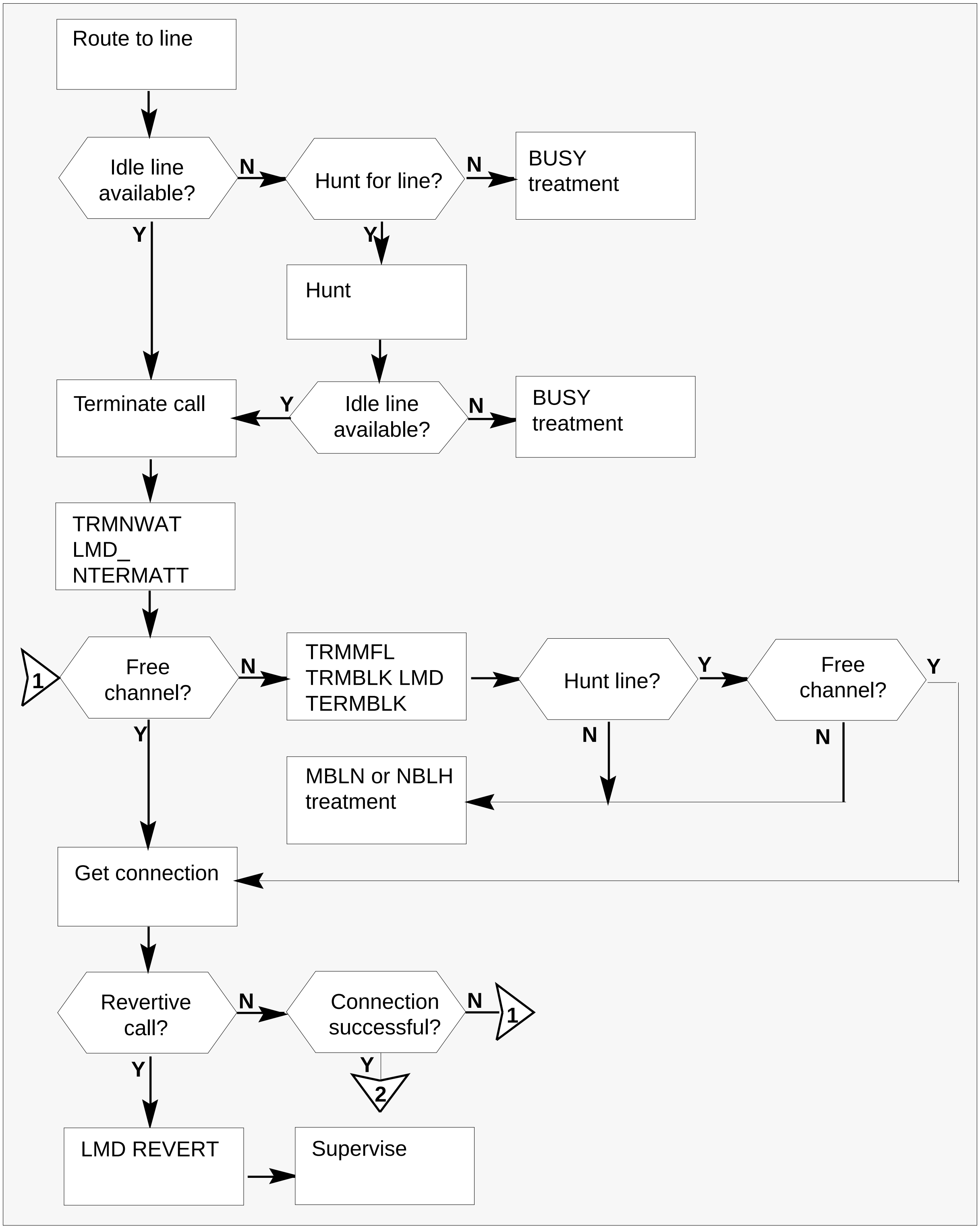
OM group OFZ (continued)

OM group OFZ Registers: outgoing calls



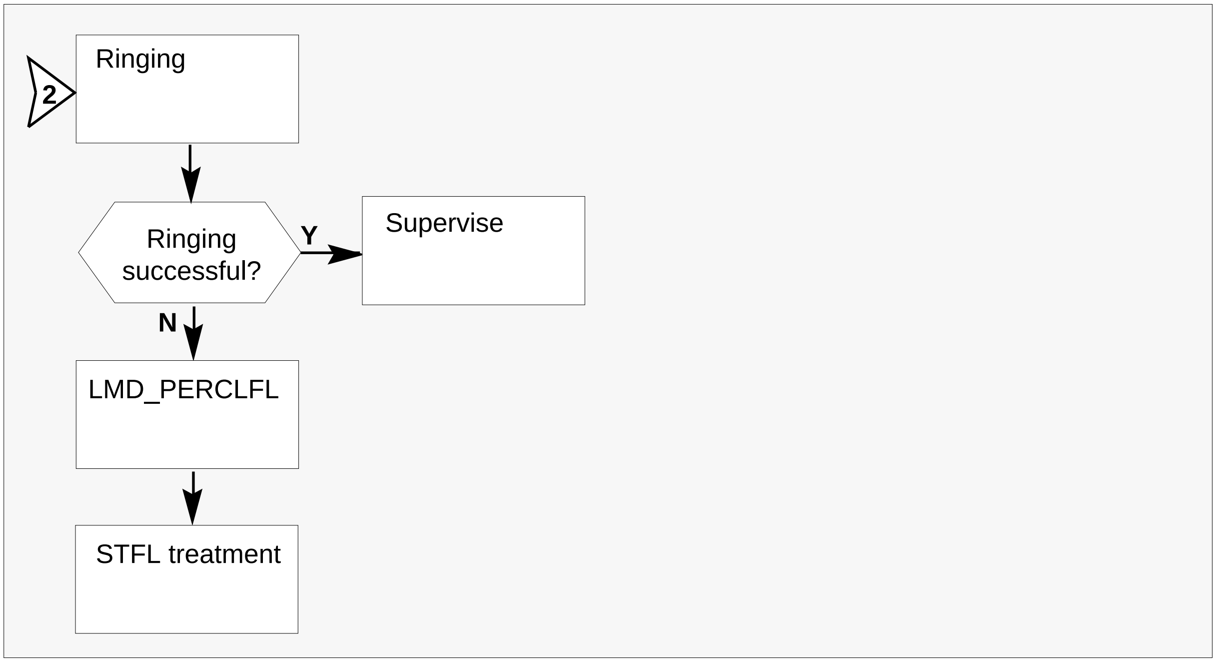
OM group OFZ (continued)

OM group OFZ Registers: terminating calls



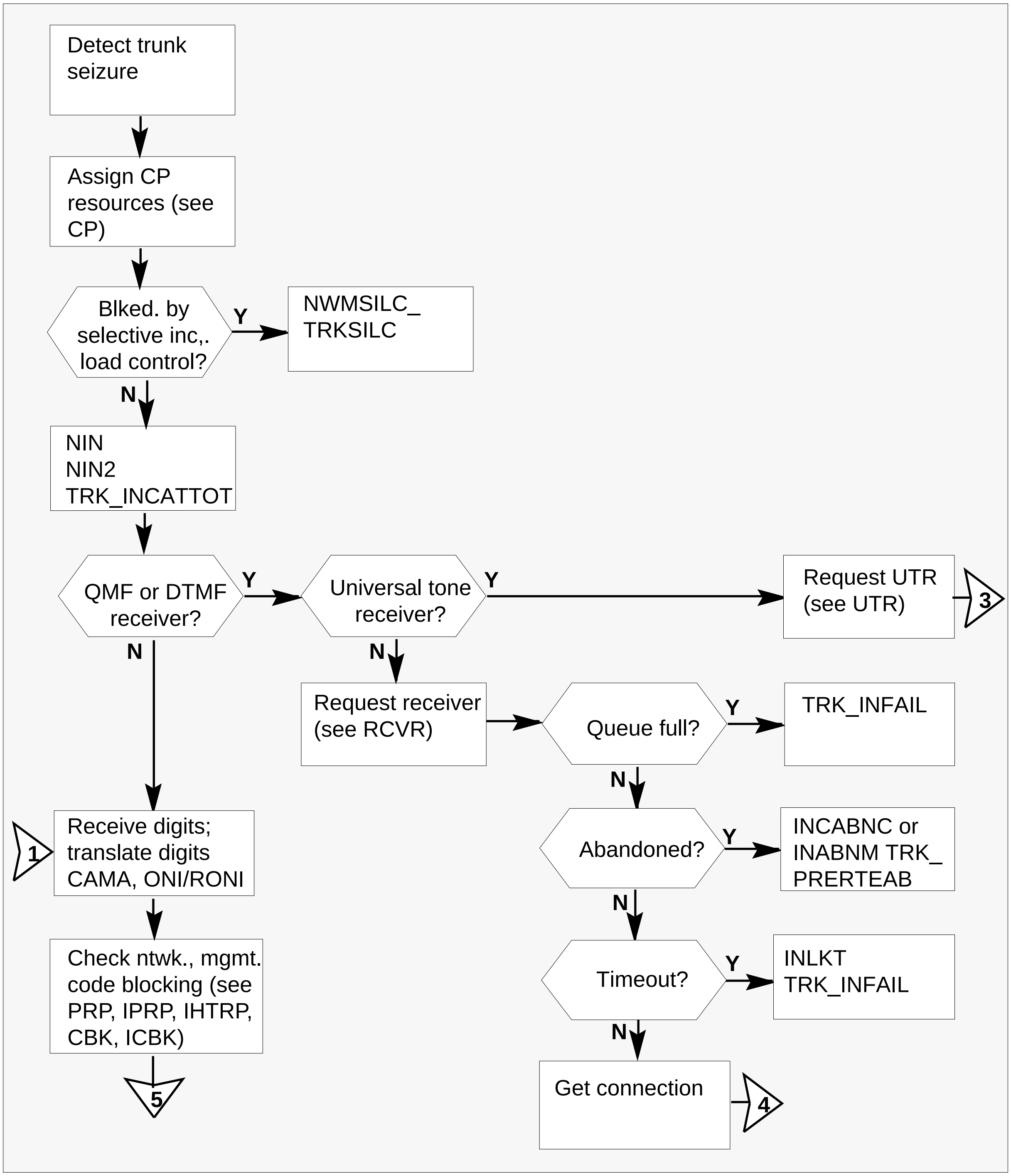
OM group OFZ (continued)

OM group OFZ Registers: terminating calls



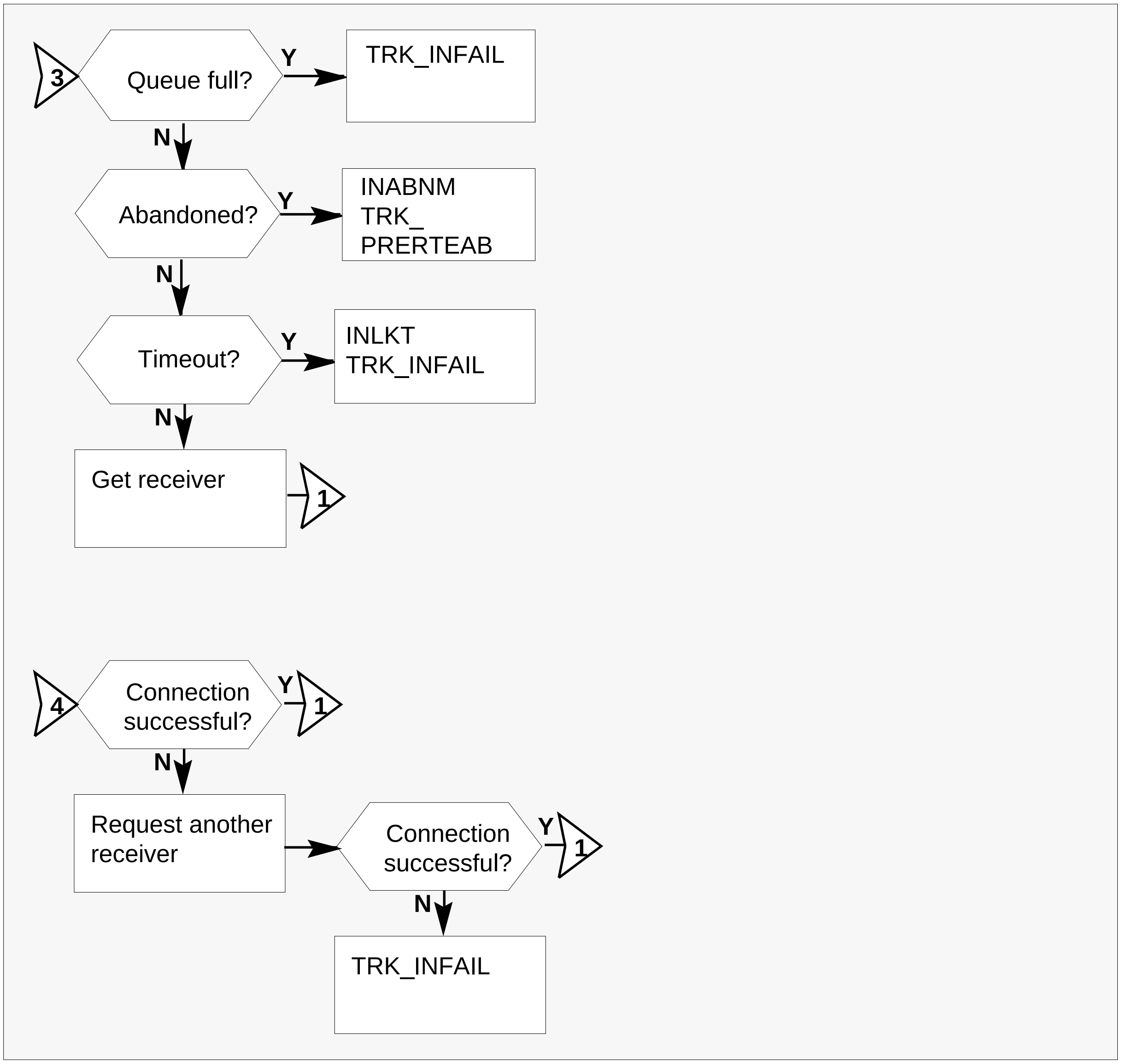
OM group OFZ (continued)

OM group OFZ Registers: incoming calls



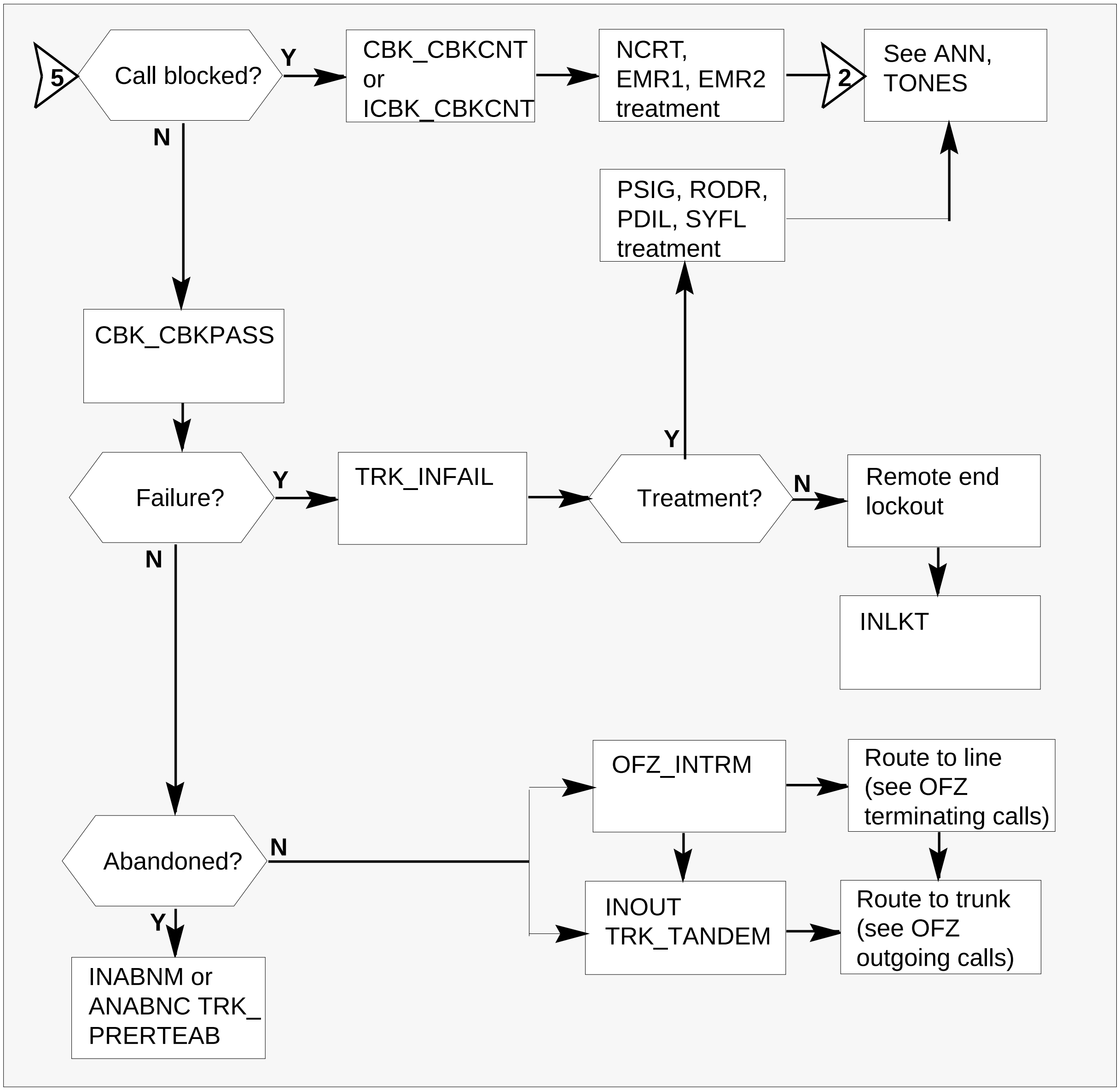
OM group OFZ (continued)

OM group OFZ Registers: incoming calls



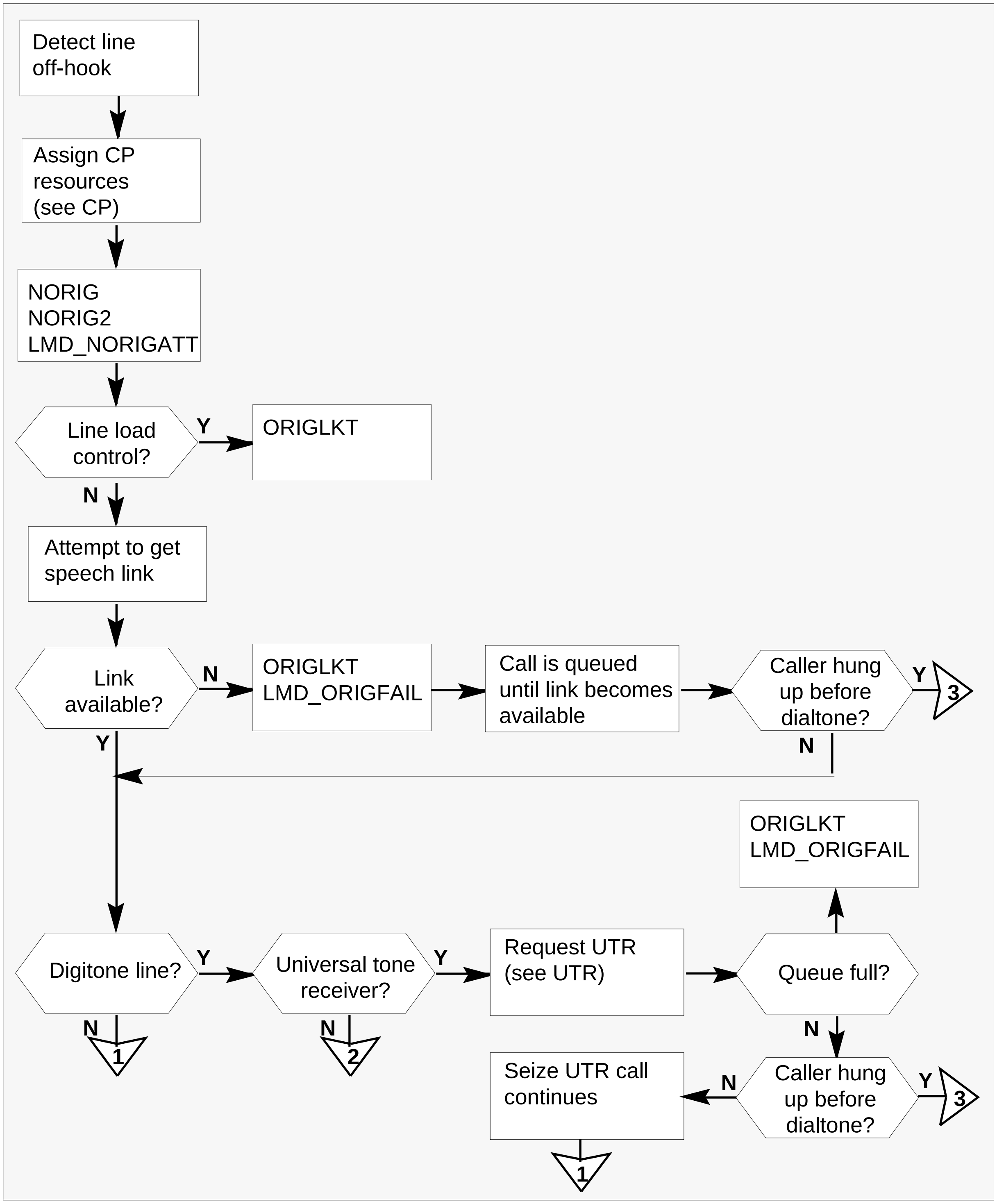
OM group OFZ (continued)

OM group OFZ Registers: incoming calls



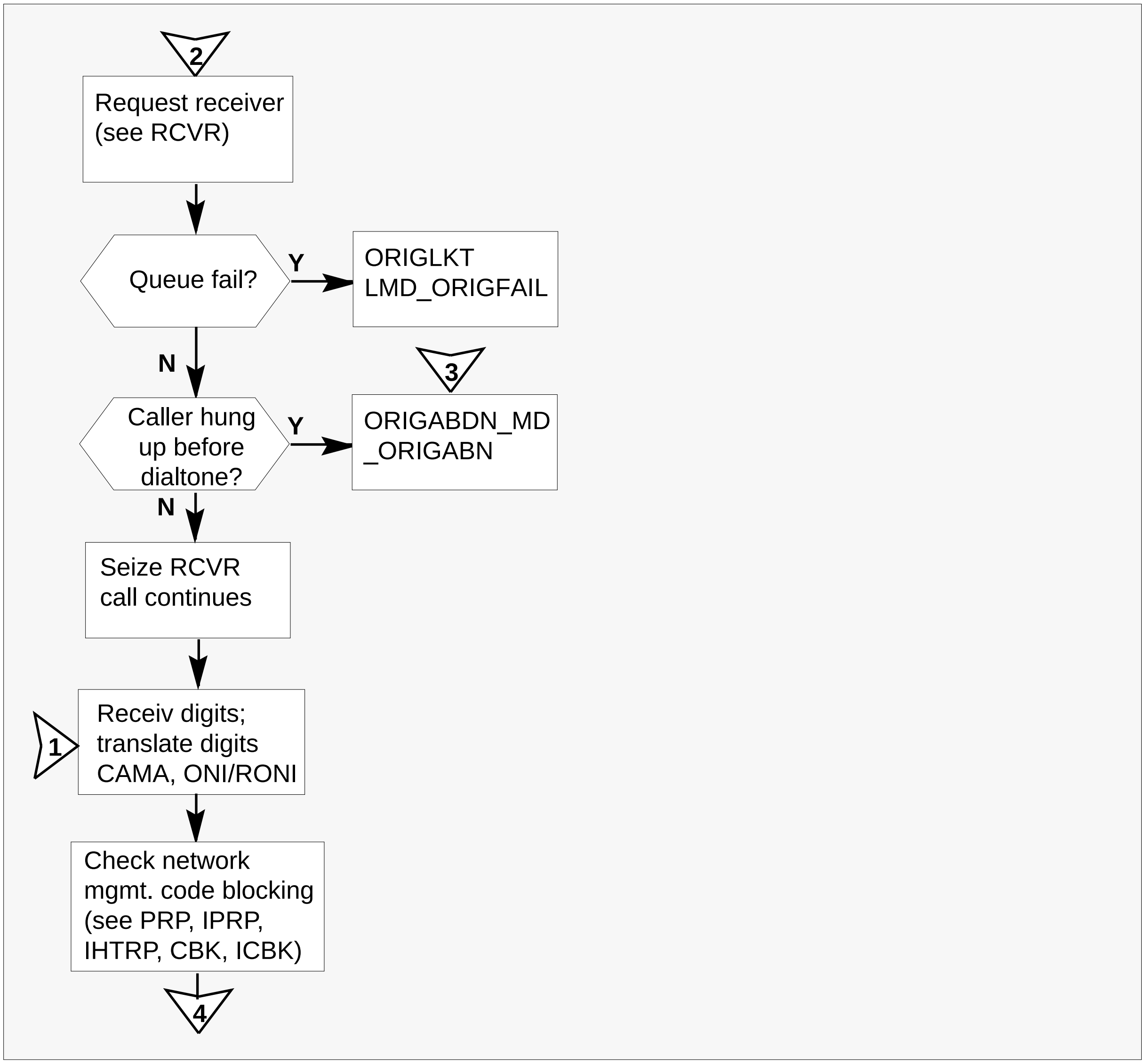
OM group OFZ (continued)

OM group OFZ Registers: originating calls



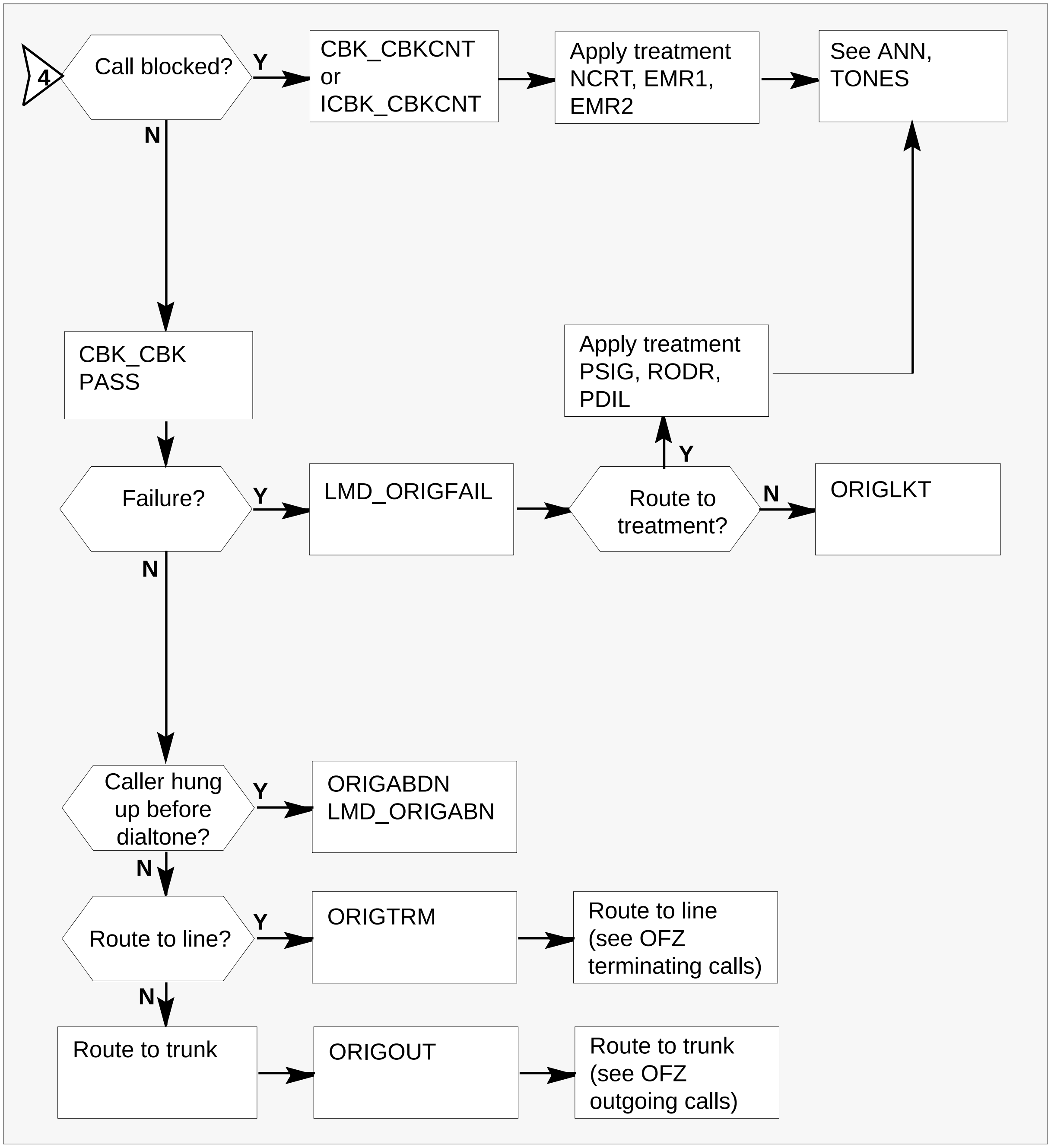
OM group OFZ (continued)

OM group OFZ Registers: originating calls



OM group OFZ (continued)

OM group OFZ Registers: originating calls



OM group OFZ (continued)

The following table contains registers that count originating calls. Each originating call is counted in N0RIG and in one of ORIGANN, ORIGLKT, ORIGOUT, ORIGTRM, ORIGTONE, or ORIGABDN. A call is routed to an announcement or tone because the announcement or tone is the intended destination of the call, or because of an error condition that includes a tone or announcement as a part of its treatment. If a treatment includes subsequent routing to another tone or announcement, only the first tone or announcement is counted in OFZ.

Originating calls

Register	Intended destination	Routing
ORIGOUT	trunk	trunk
ORIGOUT2	trunk	trunk
ORIGTRM	line	line
ORIGTRM2	line	line
ORIGANN	trunk, line, announcement	announcement
ORIGTONE	trunk, line, tone	tone
ORIGLKT	trunk or line	lockout
ORIGABDN	trunk or line	abandon
NORIG	trunk or line	all
NORIG2	trunk or line	all

The following table contains registers that count outgoing calls. Each outgoing call and each retrial is counted in OUTNWAT. Registers OUTMFL, OUTRMFL, OUTOSF, and OUTROSF count match and seize trial failures.

Outgoing calls

Register	Event
OUTMFL	match fail trial 1
OUTRMFL	match fail trial 2

-continued-

OM group OFZ (continued)

Outgoing calls (continued)

Register	Event
OUTOSF	seize fail trial 1
OUTROSF	seize fail trial 2
OUTNWAT	all outgoing traffic and trials
OUTNWAT2	all outgoing traffic and trials
-end-	

The following table contains registers that count terminating calls. Each terminating call is counted in TRMNWAT. Registers TRMMFL and TRMBLK count calls if there is network blockage. LNMBPC counts lines that are made manual busy.

Terminating calls

Register	Event
TRMMFL	NBLH (network blockage heavy traffic) or NBLN (network blockage normal traffic)
TRMBLK	NBLN
LNMBPC	line manual busy
TRMNWAT	all outgoing traffic
TRMNWAT2	all outgoing traffic

Release history

OM group OFZ was created prior to BCS20.

BCS32

OM group expanded to include traffic measurements for the lines associated with the remote digital terminal (integrated digital terminal).

Existing registers incremented by the Integrated Services Digital Network User Part (ISUP) to Telephone User Part (TUP) Interworking feature.

BCS31

Registers OUTOSF and OUTROSF incremented for failed call attempts on DMS-300.

BCS30

Registers INLKT, INOUT, NIN, OUTNWAT, OUTMFL, OUTRFML, OUTOSF, and OUTRSOF incremented for BTUP (UK variant of national user part) to telephone user part plus (TUP+), and TUP+ to BTUP calls, calls from T101 test lines to BTUP, TUP and TUP+ trunks, and calls from BTUP, TUP, and TUP+ trunks to T101 test lines.

BCS27

Software change to count E911 calls on multifrequency (MF)- and dial pulse (DP)-type trunks in INABNC, INABNM, INLKT, NIN.

BCS26

BCS26 Software change to count the following calls in ORIGTONE: activation and deactivation of the Make Set Busy feature and the Call Pickup feature. Whenever a call accesses one of these features, ORIGTONE counts the call, whether the feature terminates successfully or not.

BCS25

Software change to count the following calls in ORIGTONE: Meridian Digital Centrex (MDC) Speed Call short programming, MDC Speed Call long programming, and MDC Automatic Dial programming. Whenever a call accesses one of these features, ORIGTONE counts the call whether the feature terminates successfully or not.

INOUT counts calls for DMS offices in Turkey by ARTER.

BCS21

Traffic Operator Position System (TOPS) software modified so that, in the TOPS environment, Register INOUT counts each TOPS call from a trunk, NIN counts each incoming call attempt from a trunk, and ORIGOUT counts each incoming all from a line.

Registers

OM group OFZ registers display on the MAP terminal as follows:

```
INANN       INLKT       INOUT       INOUT2
INTONE      NIN         NIN2        OUTNWAT
OUTNWAT2    OUTMFL      OUTRMFL     OUTOSF
OUTROSF     INABNM      INABNC      ORIGANN
ORIGLKT     ORIGOUT     ORIGOUT2    ORIGTRM
ORIGTRM2    ORIGTONE    NORIG       NORIG2
INTRM       INTRM2      TRMNWAT     TRMNWAT2
TRMMFL      TRMBLK      LNMBPC      ORIGABDN
```

OM group OFZ (continued)

Group structure

OM group OFZ provides one tuple per office.

Key field: None

Info field: None

Office parameter OFFICETYPE must be datafilled in table OFCSTD. The value of OFFICETYPE controls the output of OFZ. All the registers are output in offices whose OFFICETYPE is OFF100, OFFCOMB, OFFCOMBTOPS, OFF250IBN, OFF100OESD, or OFFCOMBOESD.

The following registers are output in offices whose OFFICETYPE is OFF200, OFF200TOPS, OFF200300, 0FF250, OFF300, or OFF200OESD.

INANN, INLKT, INOUT, INOUT2, INTONE, NIN, NIN2, OUTNWAT, OUTNWAT2, OUTMFL, OUTRMFL, OUTOSF, OUTROSF, INABNM, and INABNC.

Associated OM groups

ANN provides information on use of announcements.

LMD provides information on traffic for each peripheral module.

OTS provides information on office traffic by the actual call destination. Unlike OFZ, OTS also measures system-generated traffic. This results in a balance between the measured incoming and measured outgoing traffic in OTS.

TONES provides information on use of tones.

TOPSTRAF provides information on traffic in the TOPS environment.

TRK provides information on traffic for each trunk group.

Associated functional groups

The following functional groups are associated with OM group OFZ:

- DMS-100 Local
- DMS-100/200 Combined Local and Toll
- DMS-100/200 Combined Local and Toll with TOPS
- DMS-200 Toll
- DMS-200 Toll with TOPS
- DMS-200/300 Combined toll and gateway

- DMS-300 Gateway
- DMS-250 Tandem
- DMS250/SL-100 Combined Tandem and SL-100
- DMS-100 Austrian Local
- DMS-200 Austrian Toll
- DMS-100/200 Austrian Combined Local and Toll

Associated functionality codes

The functionality codes associated with OM group OFZ are shown in the following table.

Functionality	Code
RES (Residential Enhanced Services) Base	NTXA64AA
ISC ARTER	NTXB68AA
Common Basic	NTX001AA
TOPS Call Processing Features (PEP NTX030CB)	NTX030CC
International Switching Center (ISC) Basic	NTX300AA
ISDN Base Access	NTX750AB

Register INABNC

Incoming calls abandoned by the customer

Incoming calls abandoned by the customer (INABNC) counts incoming calls that are abandoned by the subscriber before being processed. No treatment is required for these calls.

Register INABNC release history

INABNC was created prior to BCS20.

BCS27

Software change to include E911 calls on multifrequency (MF)- and dial pulse (DP)-type trunks

OM group OFZ (continued)

Associated registers

INABNM counts incoming calls that are abandoned by the machine.

TRK_PRERTEAB counts incoming calls that are abandoned by the machine or the subscriber. Calls are counted by trunk group.

Σ TRK_PRERTEAB = OFZ_INABNM + OFZ_INABNC

Note: This relationship does not apply to calls originating from a mobile telephone exchange (MTX).

OTS_INCABNC counts incoming calls that are abandoned by the subscriber before being connected.

OFZ_INABNC = OTS_INCABNC

Associated logs

TRK114 is generated if the destination of an incoming call cannot be determined during DP reception.

TRK116 is generated if the destination of an incoming call cannot be determined during MF reception.

TRK162 is generated if trouble is encountered during outpulsing of either a trunk-to-trunk or line-to-trunk call using dual-tone multifrequency (DTMF) signaling.

Extension registers

None

Register INABNM

Incoming calls abandoned by the machine

Incoming calls abandoned by the machine (INABNM) counts incoming calls that are abandoned by the machine before being processed. A call is abandoned when a call times out at the upstream office while waiting for a receiver, or when there is equipment trouble.

Register INABNM release history

INABNM was created prior to BCS20.

BCS27

Software change to include E911 calls on multifrequency (MF)- and dial pulse (DP)-type trunks

Associated registers

INABNC counts incoming calls that are abandoned by the subscriber.

TRK_PRERTEAB counts incoming calls that are abandoned by the machine or by the subscriber. Calls are counted by trunk group.

Σ TRK_PRERTEAB = OFZ_INABNM + OFZ_INABNC

Note: This relationship does not apply to calls originating from a mobile telephone exchange (MTX).

OTS_INCABNM counts incoming calls that are abandoned by the machine before being connected.

OFZ_INABNM = OTS_INCABNM

Associated logs

TRK114 is generated if the destination of an incoming call cannot be determined during DP reception.

TRK116 is generated if the destination of an incoming call cannot be determined during MF reception.

TRK162 is generated if trouble is encountered during outpulsing of either a trunk-to-trunk or line-to-trunk call using dual-tone multifrequency (DTMF) signaling.

Extension registers

None

Register INANN

Incoming call to an announcement

Incoming call to an announcement (INANN) counts incoming calls that are routed to an announcement.

The announcement is either the result of a treatment applied before or after in-pulsing, or the intended result of the call. INANN counts the call before it attempts to get a network connection. A call that is routed to a treatment that routes the call to an announcement after it has been counted in INANN is not counted in INANN again.

Register INANN release history

INANN was created prior to BCS20.

OM group OFZ (continued)

Associated registers

ANN_ANNATT counts attempts to generate announcements.

ORIGANN counts originating calls that are routed to an announcement.

Σ ANN_ANNATT $\geq$ OFZ_INANN + OFZ_ORIGANN

Associated logs

TRK138 is generated if a call is routed to a treatment after being call processing busy.

Extension registers

None

Register INLKT

Incoming calls to lockout

Incoming calls to lockout (INLKT) counts incoming calls that fail and are routed to lockout. The call fails for one of the following reasons:

- the true identity of the incoming trunk is lost
- it is not possible to connect the call to a tone or announcement
- a forced release is initiated manually
- a forced released is initiated because call processing requests a suspension (CP_WAITDENY counts the call)

Register INLKT release history

INLKT was created prior to BCS20.

BCS30

INLKT counts calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101 test lines.

BCS27

Software change to include E911 calls on multifrequency (MF)- and dial pulse (DP)-type trunks.

Associated registers

OTS_INCLKT counts incoming calls that fail to connect or receive treatment and are routed to lockout.

OFZ_INLKT = OTS_INCLKT - (number of calls that fail because of remote-end lockout)

Associated logs

TRK111 is generated if trouble is encountered or a treatment is assigned during routing of a trunk-to-trunk call.

TRK113 is generated if trouble is encountered during call processing of a trunk-to-trunk call.

TRK122 is generated if the central control (CC) detects a loss of integrity on both planes of the network to which the trunk equipment is attached. This indicates a hardware problem with one of the following elements:

- the circuit card
- the facility
- the link between the peripheral module (PM) and the network

TRK123 is generated when the peripheral processor sends the wrong message to the CC. If TRK123 is generated many times, it indicates trouble with one of the following elements:

- the originating trunk
- the terminating trunk
- the link between the PM and the CC
- the link between the PM and its peripheral processor

The system initiates tests to isolate the fault.

Extension registers

None

Register INOUT

Incoming to outgoing

Incoming to outgoing (INOUT) counts incoming calls from:

- trunks
- preset conferences
- originating test lines
- auxiliary operator services system (AOSS) positions

OM group OFZ (continued)

- terminating ARTER trunk test facilities that are initially routed to trunks, TOPS, or AOSS positions

TOPS calls that operate coin stations over trunks using the line number method are also counted.

Register INOUT release history

INOUT was created prior to BCS20.

BCS30

INOUT counts calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101 test lines.

BCS25

Software change to count calls in OFZ_INOUT for DMS offices in Turkey

BCS21

Software change so that OFZ_INOUT counts each incoming TOPS call only once

Associated registers

TRK_TANDEM counts trunk-to-trunk calls, except trunk-to-TOPS calls. Calls are counted by incoming trunk group.

Σ TRK_TANDEM + Trunk-to-TOPS calls = OFZ_INOUT + (OFZ_INOUT2 $\times$ 65536)

Associated logs

None

Extension registers

INOUT2

Register INTONE

Incoming call to tone

Incoming call to tone (INTONE) counts incoming calls that are routed to a tone.

The tone is the result of a treatment applied before or after in-pulsing, or the tone is the intended result of the call. The call is counted in INTONE before it attempts to find a network connection. A call routed to a tone after being counted in INTONE is not counted in INTONE again.

Register INTONE release history

INTONE was created prior to BCS30.

Associated registers

ORIGTONE counts originating calls that are routed to a tone.

TONES_TONEATT counts attempts to attach a call to a tone.

Σ TONES_TONEATT $\geq$ OFZ_INTONE + OFZ_ORIGTONE

Associated logs

TRK138 is generated if a call is routed to a treatment after being call processing busy.

Extension registers

None

Register INTRM

Incoming to terminating

Incoming to terminating (INTRM) counts incoming calls that are routed to a line.

Register INTRM release history

INTRM was created prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

INTRM2

Register LNMBPC

Line manual busy peg count

Line manual busy peg count (LNMBPC) counts lines that are made manual busy.

Register LNMBPC release history

LNMBPC was created prior to BCS20.

OM group OFZ (continued)

Associated registers

None

Associated logs

None

Extension registers

None

Register NIN

Number of incoming calls

Number of incoming calls (NIN) counts incoming calls that are recognized by the central control. The intended destination of the call is a line, trunk, announcement, or tone. NIN counts calls after a call control block and a call process are obtained, but before inpulsing is set up.

Register NIN release history

NIN was created prior to BCS20.

BCS30

NIN counts calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101test lines.

BCS27

Software change to include E911 calls on multifrequency (MF)- and dial pulse (DP)-type trunks.

BCS21

Software change so that OFZ_INOUT and OFZ_NIN count each TOPS call coming in from a trunk only once.

Associated registers

NIN counts each incoming call. Each call is then counted according to destination as follows:

- INABNC if the call is abandoned by the subscriber
- INABNM if the call is abandoned by the machine
- INANN if the destination is an announcement
- INLKT if the call is locked out

- INOUT if the destination is a trunk
- INTRM if the destination is a line
- TONE if the destination is a tone

TRK_INCATOT and OTS_NINC count incoming calls. TRK counts calls by trunk group.

$$OFZ\_NIN + (OFZ\_NIN2 \times 65536) = \Sigma\ TRK\_INCATOT$$

$$OFZ\_NIN + (OFZ\_NIN2 \times 65536) = OTS\_NINC + (OTS\_NINC2 \times 65536)$$

Associated logs

None

Extension registers

NIN2

Register NORIG

Number of originating calls

Number of originating calls (NORIG) counts originating calls that are recognized by the central control.

A call is counted in NORIG after a call condense block and a call process are obtained but before dialing is set up. A single call from the caller's point of view may be counted more than once in NORIG. A three-way call is counted when flashing the switch hook is recognized as a valid feature origination signal for the flashing line.

Register NORIG release history

NORIG was created prior to BCS20.

Associated registers

NORIG counts each originating call. Each call is then counted according to destination:

- ORIGABDN if the call is abandoned
- ORIGANN if the destination is an announcement
- ORIGLKT if the call is locked out
- ORIGOUT if the destination is a trunk
- ORIGTONE if the destination is a tone

OM group OFZ (continued)

- ORIGTRM if the destination is a line

LMD_NORIGATT and OTS_NORG count originating calls. LMD counts calls by line module.

OFZ_NORIG = Σ LMD_NORIGATT = OTS_NORG

Associated logs

None

Extension registers

NORIG2

Register ORIGABDN

Originating calls abandoned

Originating calls abandoned (ORIGABDN) counts originating calls that are abandoned before being routed to a trunk, line, or treatment.

Register ORIGABDN release history

ORIGABDN was created prior to BCS20.

Associated registers

LMD_ORIGABN and OTS_ORGABDN count originating calls that are abandoned before being routed to a trunk, line, or treatment. LMD counts calls that are not routed through an extended multiprocessor system (XMS)-based peripheral module (XPM).

OFZ_ORIGABDN = Σ LMD_ORIGABN = OTS_ORGABDN

Associated logs

LINE106 is generated if the call destination cannot be determined during dial pulse reception on a line.

LINE108 is generated if trouble is encountered during Digitone reception on a line.

Extension registers

None

Register ORIGANN

Originating call to announcement

Originating call to announcement (ORIGANN) counts originating calls that are initially routed to an announcement.

The announcement may be the result of a treatment before or after inpulsing, or it may be the intended result of the call. The call is counted in ORIGANN before an attempt is made to find a network connection.

Register ORIGANN release history

ORIGANN was created prior to BCS20.

Associated registers

ANN_ANNATT counts attempts to attach to announcements.

INANN counts incoming calls that are routed to an announcement.

Σ ANN_ANNATT $\geq$ OFZ_INANN + OFZ_ORIGANN

Associated logs

LINE138 is generated if a call is routed to a treatment after being call processing busy.

Extension registers

None

Register ORIGLKT

Originating call to lock-out

Originating call to lock-out (ORIGLKT) counts originating calls that fail on the intended destination and are routed to lock out, without being connected or routed to a treatment. The call fails for one of the following reasons:

- line load control (line is dead)
- unavailability of a speech link (call is queued until a speech link becomes available and if the caller remains off hook the call can still be successful, but ORIGLKT is only incremented once)
- unavailability of a Digitone receiver, or of a network connection to a Digitone receiver (if caller remains off hook, the call can still be successful when the problem is cleared, but ORIGLKT is only incremented once)

Register ORIGLKT release history

ORIGLKT was created prior to BCS20.

OM group OFZ (continued)

Associated registers

OTS_ORGLKT counts originating calls that fail and are routed to lockout without being connected or routed to a treatment.

The relationship between ORIGLKT and OTS_ORGLKT is:

OFZ_ORIGLKT = OTS_ORGLKT

Associated logs

LINE104 is generated if trouble is encountered during call processing.

LINE105 is generated if trouble is encountered during call processing.

LINE109 is generated if trouble is encountered during call processing.

LINE204 is generated if trouble is encountered during call processing.

NET130 is generated if the system cannot find a network path.

OM2200 is generated if a threshold condition is exceeded.

Extension registers

None

Register ORIGOUT

Originating to outgoing

Originating to outgoing (ORIGOUT) counts originating calls that are routed to a trunk or a test facility.

Register ORIGOUT release history

ORIGOUT was created prior to BCS20.

BCS21

Software change so that ORIGOUT counts TOPS originating calls only once.

Associated registers

None

Associated logs

None

Extension registers

ORIGOUT2

Register ORIGTONE

Originating call to tone

Originating call to tone (ORIGTONE) counts originating calls that are routed to a tone.

ORIGTONE counts the call before it attempts to find a network connection. The tone is either the result of a treatment, or the intended result of the call. A call that is routed to a treatment that routes the call to a tone after it has been counted once in ORIGTONE is not counted in ORIGTONE again.

Register ORIGTONE release history

ORIGTONE was created prior to BCS20.

BCS25
Software change to count calls in ORIGTONE for Meridian Digital Centrex (MDC) Speed Call short programming, MDC Speed Call long programming, and MDC Automatic Dial programming. When one of these features is accessed, ORIGTONE counts the call whether the feature terminates successfully or not.

Associated registers

INTONE counts incoming calls that are routed to a tone.

TONES_TONEATT counts attempts to attach to tones.

Σ (TONES_TONEATT) $\geq$ OFZ_INTONE + OFZ_ORIGTONE

Associated logs

LINE138 is generated if a call is routed to a treatment after being call processing busy.

Extension registers

None

Register ORIGTRM

Originating to terminating

Originating to terminating (ORIGTRM) counts originating calls that are routed to a line. The call is counted whether or not a line is available.

OM group OFZ (continued)

Register ORIGTRM release history

ORIGTRM was created prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

ORIGTRM2

Register OUTMFL

Outgoing match failures

Outgoing match failures (OUTMFL) counts calls that fail to find a network path to a selected outgoing or test trunk on the first attempt. A second attempt is made to find an idle trunk and a network path.

Register OUTMFL release history

OUTMFL was created prior to BCS20.

BCS30

OUTMFL counts calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101 test lines.

Associated registers

OUTMFL and SOTS_SOUTMFL count first trial match failures.

TRK_OUTMTCHF counts match failures by trunk group.

Σ TRK_OUTMTCHF= OFZ_OUTMFL + OFZ_OUTRMFL

SOTS_SOUTMFL counts calls that fail to find a network path from a line or trunk to a selected outgoing or test trunk.

OFZ_OUTMFL = SOTS_SOUTMFL

Associated logs

NET130 is generated if the system cannot find a network path.

Extension registers

None

Register OUTNWAT

Outgoing network attempts

Outgoing network attempts (OUTNWAT) counts incoming and originating calls that are intended for a specific outgoing or test trunk.

Two or more network paths to different ports of the service circuit may be involved in a single call. For example, connection by a conference circuit or digital echo suppressor requires more than one network path.

Register OUTNWAT release history

OUTNWAT was created prior to BCS20.

BCS30

OUTNWAT counts calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101 test lines.

Associated registers

After OUTNWAT counts the call, one of the following actions occurs:

- The connection is made as intended. TRK_CONNECT counts the call.
- After a first trial failure, the call is routed in an attempt to select another outgoing trunk. OUTMFL and TRK_OUTMTCHF count the call.
- After failure to get path followed by network blockage heavy traffic (NBLH) treatment, OUTRMFL and TRK_OUTMTCHF count the call.
- After failure to get a path followed by no treatment, TRK_OUTFAIL counts the call.
- If glare occurs, TRK_GLARE counts the call. A new path selection is attempted. If glare is encountered again, the call is routed to generalized no-circuit (GNCT) treatment.

OFZ_OUTNWAT + (OFZ_OUTNWAT2 × 65536) = OFZ_OUTMFL + OFZ_OUTRMFL + Σ (TRK_CONNECT+TRK_GLARE+TRK_OUTFAIL + TRK_OUTMTCHF)

SOTS_SOUTNWT counts attempts to find a network path from a line or trunk to a selected outgoing or test trunk.

OM group OFZ (continued)

OFZ_OUTNWAT + (OFZ_OUTNWAT2 $\times$ 65536) = SOTS_SOUTNWT + (SOTS_SOUTNWT2 $\times$ 65536)

Associated logs

None

Extension registers

OUTNWAT2

Register OUTOSF

Outgoing original seize failures

Outgoing original seize failures (OUTOSF) counts calls that fail to seize an outgoing trunk on the first attempt after the network paths have been acquired. A second attempt is made to find an idle trunk and a network path, and to seize the trunk. The failure is due to one of the following conditions:

- a reversed trunk
- failure to receive a recognizable start-dial
- unexpected stop-dial
- timeout before getting expected stop-dial
- CCS7 errors

Register OUTOSF release history

OUTOSF was created prior to BCS20.

BCS31

OUTOSF counts DMS-300 failed call attempts.

BCS30

OUTOSF counts calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101 test lines.

Associated registers

SOTS_SOUTOSF counts first trial seize failures that occur after an outgoing trunk has been selected and the necessary network paths acquired.

OFZ_OUTOSF = SOTS_SOUTOSF

Associated logs

TRK113 is generated if trouble is encountered during call processing of a trunk-to-trunk call.

TRK121 is generated if DMS switch does not receive an acknowledgement wink from the far-end equipment indicating that it is ready to receive digits. This occurs during outpulsing on a specific outgoing trunk.

TRK162 is generated if trouble is encountered during outpulsing of either a trunk-to-trunk or line-to-trunk call using dual-tone multifrequency (DTMF) signaling.

C7UP111 is generated when an outgoing call attempt fails.

Extension registers

None

Register OUTRMFL

Outgoing retrial match failures

Outgoing retrial match failures (OUTRMFL) counts calls that fail on the second attempt to find a network path to a selected outgoing or test trunk.

Register OUTRMFL release history

OUTRMFL was created prior to BCS20.

BCS30

Outrmfl Counts Calls From Btup To Tup+, From Tup+ To Btup, From T101 Test Lines To Btup, Tup And Tup+ Trunks, And From Btup, Tup And Tup+ Trunks To T101 Test Lines.

Associated registers

OUTMFL counts first trial match failures.

OUTRMFL and SOTS_SOUTRMFL count second trial match failures.

TRK_OUTMTCHF counts match failures. Failures are counted by trunk group.

Σ TRK_OUTMTCHF= OFZ_OUTMFL + OFZ_OUTRMFL

OFZ_OUTRMFL = SOTS_SOUTRMFL

OM group OFZ (continued)

Associated logs

NET130 is generated if the system cannot find a network path.

Extension registers

None

Register OUTROSF

Outgoing retrial seize failures

Outgoing retrial seize failures (OUTROSF) counts calls that fail on the second attempt to seize an outgoing trunk. This attempt occurs after the network paths have been acquired. The failure is due to one of the following conditions:

- a reversed trunk
- failure to receive a recognizable start-dial
- unexpected stop-dial
- time-out before getting an expected stop-dial

The system takes the call down after the second failure and the call receives start signal timeout (SSTO) treatment. An equal access call receives signal timeout BOC (STOB) or signal timeout IC/INC (STOC) treatment.

OUTROSF is also incremented when a second attempt is made to run a continuity test (COT) for an outgoing ISUP trunk after the first COT attempt failed.

Register OUTROSF release history

OUTROSF was created prior to BCS20.

BCS31

OUTROSF counts DMS-300 failed call re-attempts.

BCS30

OUTROSF incremented for calls from BTUP to TUP+, from TUP+ to BTUP, from T101 test lines to BTUP, TUP and TUP+ trunks, and from BTUP, TUP and TUP+ trunks to T101 test lines.

Associated registers

SOTS_SOUTROSF counts calls that fail the second attempt to seize an outgoing trunk.

OFZ_OUTROSF = SOTS_SOUTROSF

Associated logs

TRK113 is generated if trouble is encountered during call processing of a trunk-to-trunk call.

TRK121 is generated if DMS switch does not receive an acknowledgement wink from the far-end equipment indicating that it is ready to receive digits during outpulsing on a specific outgoing trunk.

TRK162 is generated if trouble is encountered during outpulsing of either a trunk-to-trunk or line-to-trunk call using dual-tone multifrequency (DTMF) signaling.

Extension registers

None

Register TRMBLK

Terminating blocks

Terminating blocks (TRMBLK) counts attempts to obtain a voice path to a terminating line that fail because no free channel can be found between the host network and the terminating line.

More than one failed attempt can occur and be counted if the call is directed to a member of a hunt group.

Each attempt is also counted in OFZ registers TRMMFL and TRMNWAT, and in LMD registers NTERMATT and TERRMBLK for the terminating line control device.

If no alternate line is available, the call is routed to network blockage normal traffic (NBLN) treatment, and counted in Register TRMTRS_TRSNBLN.

Register TRMBLK release history

TRMBLK was created prior to BCS20.

Associated registers

LMD_TERMBLK counts failures in the line-to-network segment. Call failures are counted for modules that are not extended multiprocessor system (XMS)-based peripheral modules (XPM).

OFZ_TRMBLK = Σ LMD_TERMBLK

SOTS_STRMBLK counts attempts to find a voice path from the network to a terminating line that fail because all the LM channels to the network are

OM group OFZ (continued)

busy, or because an idle channel on a line to the network cannot be linked with an idle channel from the line shelf serving the terminating line.

The relationship between TRMBLK and SOTS_STRMBLK is:

OFZ_TRMBLK = SOTS_STRMBLK

Associated logs

NET130 is generated if the system cannot find a network path.

TRK138 is generated if a call is routed to treatment after being call processing busy.

LINE138 is generated if a call is routed to treatment after being call processing busy.

Extension registers

None

Register TRMMFL

Terminating match failures

Terminating match failures (TRMMFL) counts failed attempts to find a voice path to a terminating line.

More than one failed attempt may occur and be counted if the call is to a member of a hunt group.

Each attempt is also counted in OFZ Register TRMNWAT and in LMD Register NTERMATT for the terminating line control device.

If the final cause of failure in the path search sequence is the inability to obtain a path through the host switch network, and no alternate line is available, the call is routed to network blockage heavy traffic (NBLH) treatment.

If the final cause of failure in the path search sequence is the failure to obtain a free channel on a link between the host switch network and the terminating line, the failure is also counted in OFZ registers TRMBLK and LMD Register TERMBLK.

If no alternate line is available, the call is routed to network blockage normal traffic (NBLN) treatment, and counts in Register TRMTRS_TRSNBLN.

Register TRMMFL release history

TRMMFL was created prior to BCS20.

Associated registers

SOTS_STRMMFL counts attempts to find a voice path to a terminating line that fail because a network connection is unavailable.

OFZ_TRMMFL = SOTS_STRMMFL

Associated logs

NET130 is generated if the system cannot find a network path.

LINE138 is generated if a call is routed to treatment after being call processing busy.

TRK138 is generated if a call is routed to treatment after being call processing busy.

Extension registers

None

Register TRMNWAT

Terminating network attempts

Terminating network attempts (TRMNWAT) counts attempts to find a voice path to a terminating line. The complete path includes the following elements:

- a segment through the network
- a channel on the link between the line module and the network
- a matching channel on the line shelf

TRMNWAT counts a call only once for each attempt. Each attempt is counted, whether it succeeds or fails.

Register TRMNWAT release history

TRMNWAT was created prior to BCS20.

Associated registers

LMD_NTERMATT counts intra-office calls. Calls are counted for each line module.

$$OFZ\_TRMNWAT + (OFZ\_TRMNWAT2 \times 65536) = \Sigma\ LMD\_NTERMATT$$

OM group OFZ (end)

SOTS_STRMNWT counts attempts to find a voice path to a terminating line.

OFZ_TRMNWAT + (OFZ_TRMNWAT2 × 65536) = SOTS_STRMNWAT + (SOTS_STRMNWAT2 × 65536)

Associated logs

None

Extension registers

TRMNWAT2

OM group PCMCARR

OM description

Consultative Committee on International Telegraphy and Telephony (CCITT) DS30 digital carrier maintenance summary

PCMCARR provides information on pulse code modulated (PCM30) carriers. PCM30 is a transmission standard used to define the characteristics of international digital trunks and transmission links.

PCM30 trunks interface with international digital trunk controllers (IDTC). PCM30 links provide voice and signaling channels between the very small remote (VSR) and the international line group controller (ILGC).

PCMCARR has 24 peg registers that count the following errors and faults:

- local loss of frame alignment (LLFA)
- local loss of multiframe alignment (LLMA)
- remote frame alarm indication (RFAI)
- remote multiframe alarm indication (RMAI)
- alarm indication signal (AIS)
- bit error rate (BER)
- frame slip (SLIP)
- signaling channel (SIGL)

PCMCARR has four usage registers that record the following PCM30 carrier states:

- system busy
- central side (C-side) busy
- peripheral side (P-side) busy
- manual busy

The data supplied by PCMCARR is used to monitor the performance of PCM30 carriers.

Release history

OM group PCMCARR was introduced prior to BCS20.

CSP02

One tuple is added for each PCM30 carrier on the P-side of the Global Peripheral Platform (GPP) to collect GPP measurements.

OM group PCMCARR (continued)

BCS35

Number of tuples increased to two to accommodate RC02 type measurements.

BCS34

Value RCO2 is added to the info field to support an additional PM type: remote switching center offshore 2 (RCO2).

BCS33

Registers CARRSYSB, CARRCBSY, CARRPBSY, and CARRMANB can be converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class.

BCS32

Registers AIS16ERR, AIS16FLT, CRC4ERR, CRC4FLT, LLCMAERR, LLCMAFLT, CREERR, and CREFLT added.

BCS30

Software change to provide usage counts either in hundred call seconds (CCS) or deci-erlangs.

BCS23

Value VSR is added to the info field to support an additional PM type: P-side peripheral

Registers

OM group PCMCARR registers display on the MAP terminal as follows:

```
LLFAERR     LLMAERR     RFAIERR     RMAIERR
AISERR      BERERR      SLIPERR     SIGLERR
CRC4ERR     AIS16ERR    LLCMAERR    CREERR
LLFAFLT     LLMAFLT     RFAIFLT     RMAIFLT
AISFLT      BERFLT      SLIPFLT     SIGLFLT
CRC4FLT     AIS16FLT    LLCMAFLT    CREFLT
CARRSYSB    CARRCBSY    CARRPBSY    CARRMANB
```

Group structure

OM group PCMCARR provides two tuples for each PCM30 carrier.

Key field: None

Info field: D30OMINF is a structure

The D30OMINF structure contains the following information:

- SITE name where the program model (PM) is located
- PM name and external number
- D30 CIRCUIT number (0-31)
- CARRIER DIRECTION (C or P) indicating whether PM port is to the C-side or P-side of the carrier

Table CARRMTC defines PM maintenance data, out-of-service limits for alarms, maintenance limit for each D30 alarm type and system return-to-service information.

Field ACTION in table LTCPSINV specifies whether a PCM30 carrier is to be made system busy when an out-of-service limit is reached.

Associated OM groups

D30CARR

Associated functional groups

The following functional groups are associated with OM group PCMCARR:

- DMS-100 International
- DMS-300 International
- D30 carrier links

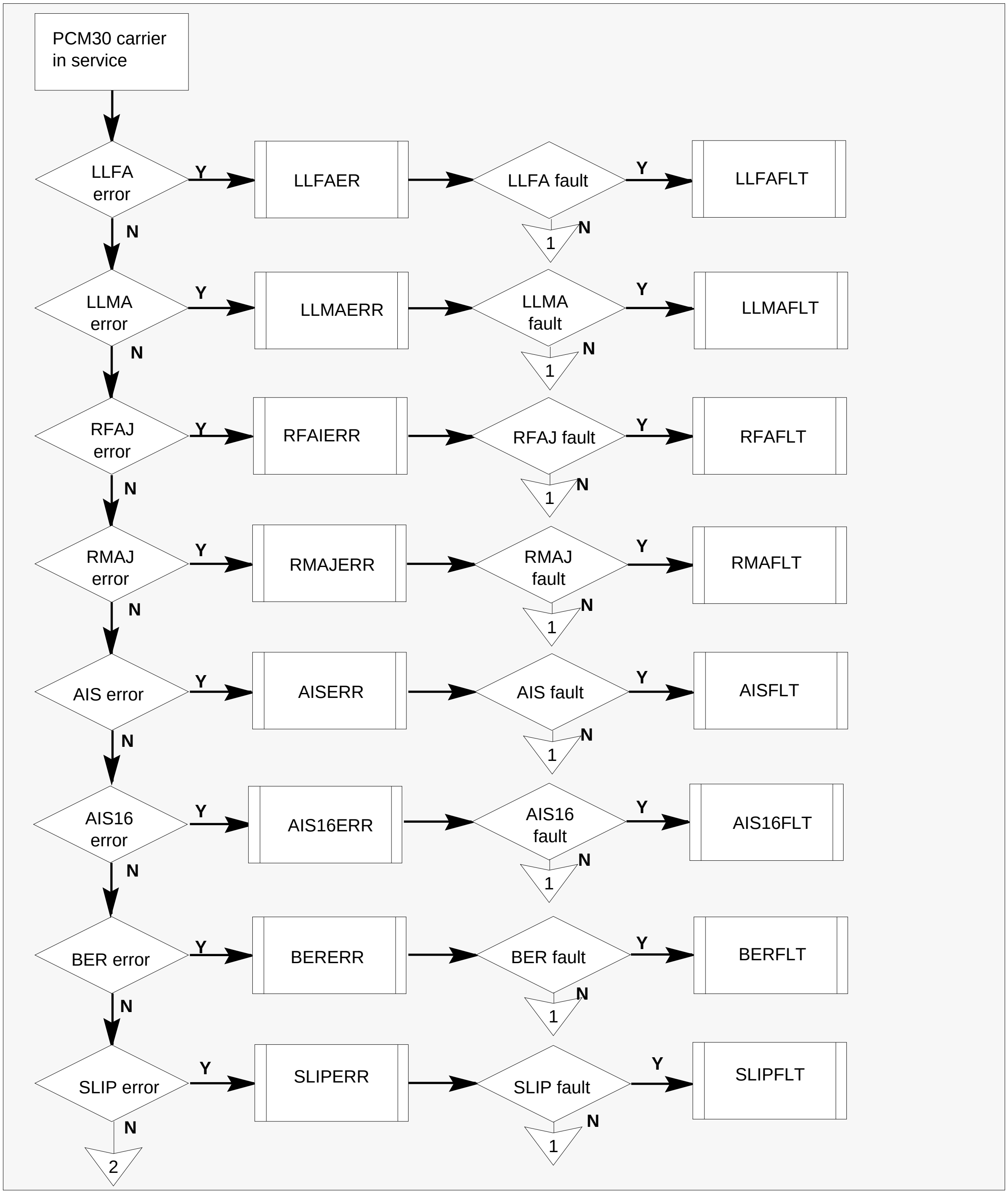
Associated functionality codes

The functionality codes associated with OM group PCMCARR are shown in the following table.

Functionality	Code
DTC 30 Carrier Maintenance	NTX274AA
International Switching Center (ISC) Basic	NTX300AA
CCITT PCM (30+2) Digital Signaling and Maintenance	NTX478AA

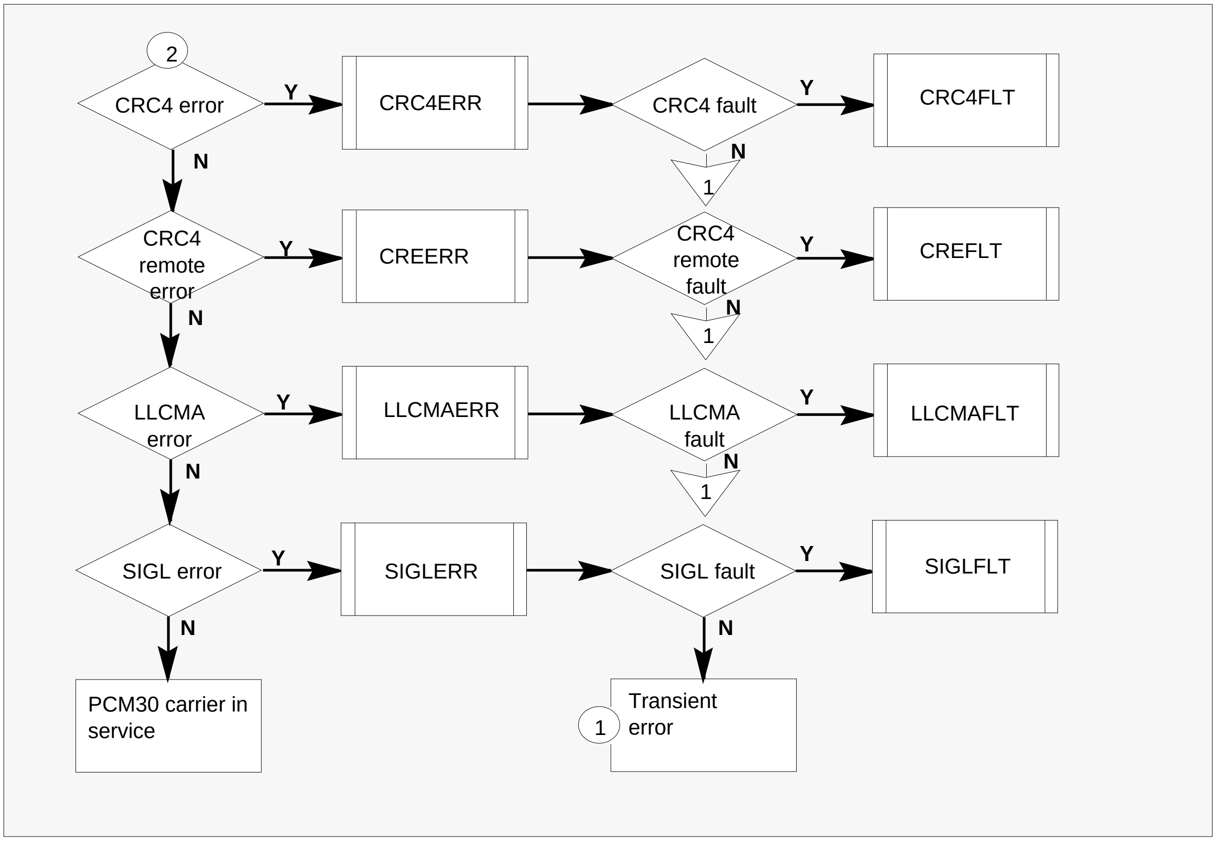
OM group PCMCARR (continued)

OM group PCMCARR registers



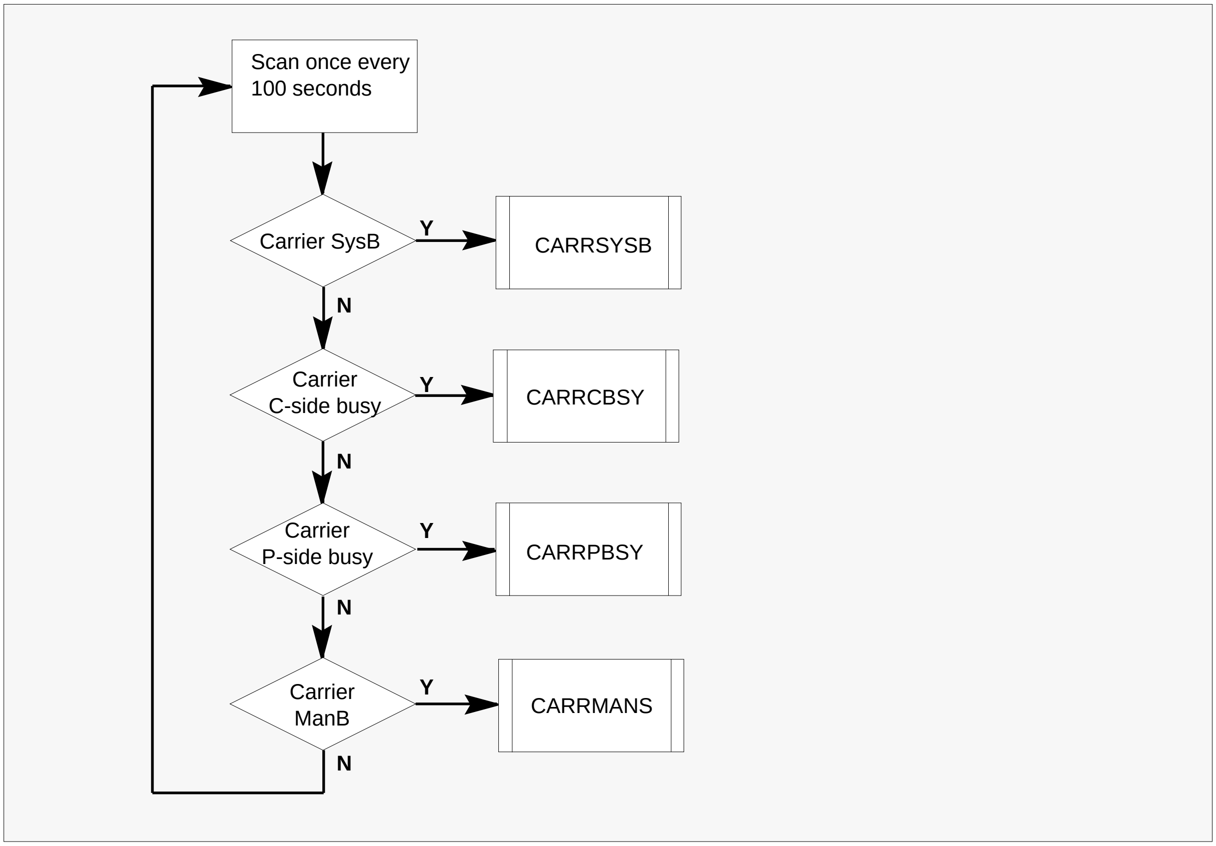
OM group PCMCARR (continued)

OM group PCMCARR registers



OM group PCMCARR (continued)

OM group PCMCARR usage registers



Register AIS16ERR

Alarm indication signal (AIS) in channel 16 error

AIS16ERR is incremented whenever an AIS16 error is detected on the carrier.

Register AIS16ERR release history

AIS16ERR was introduced in BCS32.

Associated registers

AIS16FLT

Associated logs

None

Register AIS16FLT

AIS in channel 16 fault

AIS16FLT is incremented whenever an AIS16 error causes the D30 link to become busy, depending on the AIS16OST and AIS16OL limits set in table CARRMTC.

Register AIS16FLT release history

AIS16FLT was introduced in BCS32.

Associated registers

AIS16ERR is incremented when an AIS16 error is reported from the carrier when the threshold value is AIS16ML. An alarm is raised when the maintenance limit (ML) threshold is exceeded. The ML threshold is datafilled in table CARRMTC.

Associated logs

PM187 is generated by the PM subsystem when a carrier link is made system busy.

Register AISERR

AIS error

AISERR is incremented when a continuous stream of ones (111...) is received on a PCM30 carrier, indicating an AIS error.

Register AISERR release history

AISERR was introduced in BCS32.

BCS23

PM type VSR supported

Associated registers

AISFLT counts AIS faults that make a PCM30 carrier system busy.

Associated logs

None

OM group PCMCARR (continued)

Register AISFLT

AIS fault

AISFLT counts AIS faults that cause a PCM30 carrier to become system busy. AISFLT is incremented

- for each persistent AIS error
- when nonpersistent AIS errors reach the out-of-service limit (AISOL) and table LTCPSINV has been datafilled to allow the carrier to become system busy

A persistent AIS error is an error that persists long enough to reach the out-of-service time limit (AISOST). The nonpersistent error count is maintained in the PM and is reset every 5 min.

Register AISFLT release history

AISFLT was introduced prior to BCS20.

BCS23

PM type VSR supported.

Associated registers

AISERR is incremented when a continuous stream of ones (111...) is received on a PCM30 carrier, indicating an AIS error.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register BERERR

Bit error rate (BER) error

BERERR is incremented when a BER error is detected on a PCM30 carrier.

Register BERERR release history

BERERR was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

BERFLT counts BER faults that make a PCM30 carrier system busy.

Associated logs

None

Register BERFLT

BER fault

BERFLT counts BER faults that cause a PCM30 carrier to become system busy.

BERFLT is incremented when BER errors detected on a PCM30 carrier reach the BER out-of-service limit (BEROL) and table LTCPSINV is datafilled to allow the carrier to become system busy.

Register BERFLT release history

BERFLT was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

BERERR is incremented when a BER error is detected in a PCM30 carrier.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

OM group PCMCARR (continued)

Register CARRCBSY

Carrier C-side busy usage

CARRCBSY is a usage register. Every 100 s the PCM30 carriers are scanned, and CARRCBSY records whether a carrier is C-side busy because the C-side peripheral module (IDTC) is not in service.

Register CARRCBSY release history

CARRCBSY was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS30

Software change to provide usage counts either in CCS or deci-erlangs

BCS23

PM type VSR supported

Associated registers

CARRSYSB records whether a PCM30 carrier is system busy because of a fault.

CARRPBSY records whether a PCM30 carrier is P-side busy because the P-side peripheral (VSR) is not in service.

CARRMANB records whether a PCM30 carrier is manual busy.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register CARRMANB

Carrier manual busy usage

CARRMANB is a usage register. Every 100 s the PCM30 carriers are scanned, and CARRMANB records whether a carrier is manual busy.

Register CARRMANB release history

CARRMANB was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS30

Software change to provide usage counts either in CCS or deci-erlangs

BCS23

PM type VSR supported

Associated registers

CARRSYSB records whether a PCM30 carrier is system busy because of a fault.

CARRCBSY records whether a PCM30 carrier is C-side busy because the C-side PM (IDTC) is not in service.

CARRPBSY records whether a PCM30 carrier is P-side busy because the P-side peripheral VSR is not in service.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

OM group PCMCARR (continued)

Register CARRPBSY

Carrier P-side busy usage

CARRPBSY is a usage register. Every 100 s the PCM30 carriers are scanned, and CARRPBSY records whether a PCM30 carrier is P-side busy as a result of the P-side peripheral VSR not being in service.

Register CARRPBSY release history

CARRPBSY was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS30

Software change to provide usage counts either in CCS or deci-erlangs

BCS23

PM type VSR supported

Associated registers

CARRSYSB records whether a PCM30 carrier is system busy because of a fault.

CARRCBSY records whether a PCM30 carrier is C-side busy because the C-side PM (IDTC) is not in service.

CARRMANB records whether a PCM30 carrier is manual busy.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register CARRSYSB

Carrier system busy usage

CARRSYSB is a usage register. Every 100 s the PCM30 carriers are scanned, and CARRSYSB records whether a carrier is system busy because of a fault.

Register CARRSYSB release history

CARRSYSB was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS30

Software change to provide usage counts either in CCS or deci-erlangs

BCS23

PM type VSR is supported

Associated registers

CARRCBSY records whether a PCM30 carrier is C-side busy because the C-side PM (IDTC) is not in service.

CARRPBSY records whether a PCM30 carrier is P-side busy because the P-side peripheral (VSR) is not in service.

CARRMANB records whether a PCM30 carrier is manual busy.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

OM group PCMCARR (continued)

Register CRC4ERR

Cyclic redundancy check 4 (CRC4) procedure error

CRC4ERR is incremented whenever a CRC4 error is detected on the carrier.

Register CRC4ERR release history

CRC4ERR was introduced in BCS32.

Associated registers

None

Associated logs

None

Register CRC4FLT

Cyclic redundancy check 4 (CRC4) procedure fault

CRC4FLT is incremented whenever a CRC4 error causes the link to become system busy, depending on CRC4OL and CRC4OST limits set in table CARRMTC, and the state of the set action boolean on CRC4OL.

Register CRC4FLT release history

CRC4FLT was introduced in BCS32.

Associated registers

CRC4ERR is incremented each time a CRC4 error is reported from the carrier and the threshold value is CRC4ML.

Associated logs

PM187 is generated when a carrier link is made system busy.

Register CREERR

Cyclic redundancy check 4 (CRC4) remote reporting enable

CREERR counts the number CRC4 errors detected on the remote end where the threshold value is CRC4ML.

Register CREERR release history

CREERR was introduced in BCS32.

Associated registers

CREFLT

Associated logs

None

Register CREFLT

Cyclic redundancy check 4 (CRC4) remote reporting fault

CREFLT is incremented if a CRC4 error causes the link to become system busy, depending on the CRC4 out-of-service limit (CRC4OL) set in table CARRMTC.

Register CREFLT release history

CREFLT was introduced in BCS32.

Associated registers

CREERR

Associated logs

Log PM187 is generated when a carrier link becomes system busy.

Register LLCMAERR

Loss of local CRC4 multiframe alignment (LLCMA) error

LLCMAERR counts the number of times an LLCMA error is detected on the carrier.

Register LLCMAERR release history

LLCMAERR was introduced in BCS32.

Associated registers

LLCMAFLT

Associated logs

None

Register LLCMAFLT

Loss of local CRC4 multiframe alignment (LLCMA) fault

LLCMAFLT is incremented whenever an LLCMA error causes the D30 link to become system busy, depending on the CRC4 out-of-service time limit (CRC4OST) set in table CARRMTC.

Register LLCMAFLT release history

LLCMAFLT was introduced in BCS32.

OM group PCMCARR (continued)

Associated registers

LLCMAERR

Associated logs

Log PM187 is generated by the PM subsystem when a carrier link becomes system busy.

Register LLFAERR

Local loss of frame alignment (LLFA) error

LLFAERR is incremented when an error is detected in three or four consecutive frame alignment patterns of a PCM30 carrier.

Register LLFAERR release history

LLFAERR was introduced prior to BCS20.

BCS23
PM type VSR supported

Associated registers

LLFAFLT counts frame alignment faults that make a PCM30 carrier system busy.

LLMAERR is incremented when an error is detected in two consecutive multiframe alignment patterns of a PCM30 carrier.

Associated logs

None

Register LLFAFLT

Local loss of frame alignment (LLFA) fault

LLFAFLT counts frame alignment faults that cause a PCM30 carrier to become system busy. LLFAFLT is incremented

- for each persistent LLFA error
- when nonpersistent LLFA errors reach the out-of-service limit (LLFAOL) and table LTCPSINV has been datafilled to allow the carrier to become system busy

A persistent LLFA error is an error that persists long enough to reach the out-of-service time limit (LLFAOST). The nonpersistent error count is maintained in the PM and is reset every 5 min.

Register LLFAFLT release history

LLFAFLT was introduced prior to BCS20.

BCS23
PM type VSR supported

Associated registers

LLFAERR is incremented when an error is detected in three or four consecutive frame alignment patterns of a PCM30 carrier.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register LLMAERR

Local loss of multiframe alignment (LLMA) error

LLMAERR is incremented when an error is detected in two consecutive multiframe alignment patterns in a PCM30 carrier.

Register LLMAERR release history

LLMAERR was introduced prior to BCS20.

BCS23
PM type VSR supported

Associated registers

LLFAERR is incremented when an error is detected in three or four consecutive frame alignment patterns.

LLMAFLT counts multiframe alignment faults (LLMA) that make a PCM30 carrier system busy.

Associated logs

None

Register LLMAFLT

Local loss of multiframe alignment (LLMA) fault

LLMAFLT counts LLMA faults that cause a PCM30 carrier to be made system busy. LLMAFLT is incremented

- for each persistent LLMA error
- when nonpersistent LLMA errors reach the out-of-service limit (LLMAOL) and table LTCPSINV has been datafilled to allow the carrier to become system busy

A persistent LLMA error is an error that persists long enough to reach the out-of-service time limit (LLMAOST). The nonpersistent error count is maintained in the peripheral module (PM) and is reset every 5 min.

Register LLMAFLT release history

LLMAFLT was introduced in BCS32.

BCS23

PM type VSR supported

Associated registers

LLMAERR is incremented when an error is detected in two consecutive multiframe alignment patterns of a PCM30 carrier.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register RFAIERR

Remote frame alarm indication (RFAI) error

RFAIERR is incremented when remote equipment reports a frame-level error, an equipment failure, or both in a PCM30 carrier.

Register RFAIERR release history

RFAIERR was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

RFAIFLT counts frame alarm indication faults that make a PCM30 carrier system busy.

RMAIERR is incremented when remote equipment reports a multiframe-level error, an equipment failure, or both in a PCM30 carrier.

Associated logs

None

Register RFAIFLT

Remote frame alarm indication (RFAI) fault

RFAIFLT counts RFAI faults that cause a PCM30 carrier to become system busy. RFAIFLT is incremented

- for each persistent RFAI error
- when nonpersistent RFAI errors reach the out-of-service limit (RFAIOL) and table LTCPSINV has been datafilled to allow the carrier to become system busy
- for remote PM equipment failures

A persistent RFAI error is an error that persists long enough to reach the out-of-service time limit (RFAIOST). The nonpersistent error count is maintained in the PM and is reset every 5 min.

Register RFAIFLT release history

RFAIFLT was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

PCMCARR_RFAIERR is incremented when remote equipment reports a frame-level error, an equipment failure, or both in a PCM30 carrier.

OM group PCMCARR (continued)

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register RMAIERR

Remote multiframe alarm indication (RMAI) error

RMAIERR is incremented when remote equipment reports a multiframe-level error, an equipment failure, or both in a PCM30 carrier.

Register RMAIERR release history

RMAIERR was introduced prior to BCS20.

BCS30

Software change to provide usage counts either in CCS or deci-erlangs.

BCS23

PM type VSR supported

Associated registers

RFAIERR is incremented when remote equipment reports a frame-level error, an equipment failure, or both in a PCM30 carrier.

RMAIFLT counts multiframe alarm indication faults that make a PCM30 carrier system busy.

Associated logs

None

Register RMAIFLT

Remote multiframe alarm indication (RMAI) fault

RMAIFLT counts RMAI faults that cause a PCM30 carrier to become system busy. RMAIFLT is incremented

- for each persistent RMAI error
- when nonpersistent RMAI errors reach the out-of-service limit (RMAIOL) and table LTCPSINV has been datafilled to allow the carrier to become system busy
- for remote PM equipment failures

A persistent RMAI error is an error that persists long enough to reach the out-of-service time limit (RMAIOST). The nonpersistent error count is maintained in the PM and is reset every 5 min.

Register RMAIFLT release history

RMAIFLT was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

PCMCARR_RMAIERR is incremented when remote equipment reports a multiframe level error, an equipment failure, or both in a PCM30 carrier.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier becomes system busy.

Register SIGLERR

Signaling channels error

SIGLERR is incremented when a transient change is detected in the supervisory signaling channels of a PCM30 carrier.

OM group PCMCARR (continued)

Register SIGLERR release history

SIGLERR was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

SIGLFLT counts transient change faults detected in the supervisory signaling channels of a PCM30 carrier that make the carrier system busy.

Associated logs

None

Register SIGFLT

Signaling channels fault

SIGLFLT counts transient change faults detected in the supervisory signaling channels that cause a PCM30 carrier to become system busy.

A PCM30 carrier becomes system busy if the transient changes detected in its supervisory signaling channels reach the out-of-service limit (SIGLOL), and table LTCPSINV has been datafilled to allow it to go system busy.

Register SIGFLT release history

SIGFLT was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

SIGLERR is incremented when a transient change is detected in the supervisory signaling channels of a PCM30 carrier.

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

Register SLIPERR

Slip error

SLIPERR is incremented when a frame slip is detected in a PCM30 carrier.

Register SLIPERR release history

SLIPERR was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

SLIPFLT counts frame slip faults that make a PCM30 system busy.

Associated logs

None

Register SLIPFLT

Slip fault

SLIPFLT counts frame slip faults that cause a PCM30 carrier to become system busy.

A PCM30 carrier becomes system busy if its frame slips reach the out-of-service limit (SLIPOL in table CARRMTC), and table LTCPSINV has been datafilled to allow it to become system busy.

Register SLIPFLT release history

SLIPFLT was introduced prior to BCS20.

BCS23

PM type VSR supported

Associated registers

SLIPERR is incremented when a frame slip is detected in a PCM30 carrier.

OM group PCMCARR (end)

Associated logs

PM110 is generated when carrier alarms are received.

PM111 is generated when a carrier is returned to service from a system busy state.

PM180 is generated either because software has executed improperly or because a hardware problem is affecting software execution.

PM186 is generated when a carrier is returned to service.

PM187 is generated when a carrier is made system busy.

OM group PM

OM description

Peripheral module maintenance summary

PM counts errors, faults, and maintenance state transitions for DMS peripheral modules (PM) with node numbers. This group performs separate counts for each PM that is associated with a DMS switch. The data is used to assess the performance of PMs.

PM registers are incremented by the following types of events that affect PM hardware or software:

- errors and faults
- transitions to system busy or manual busy
- warm or cold control transfers
- the running or failing of circuit tests
- errors or faults detected on the peripheral side (P-side) interface
- ringing generator problems
- calls that are lost when the PM is made system busy or manual busy
- outside plant module circuit failures
- integrity failures reported by the PM
- errors and faults of a PM drawer
- manual-busy or system-busy PM drawers
- manual-busy or system-busy PMs
- manual-busy or system-busy PM units

Release history

OM group PM was introduced prior to BCS20.

CSP02

One additional tuple is added to the info field to include information on the (Global Peripheral Product) GPP peripheral module.

BCS35

The info field includes the value HSI2, identifying the high-speed interface series 2 (HSI2) peripheral module.

OM group PM (continued)

BCS34

Values ICRM and RCO2 were added to key field to include maintenance information on two additional PM types: remote switching center offshore 2 (RCO2), and integrated cellular remote module (ICRM).

BCS33

Registers PMMSBU, PMUSBU, PMUMBU, PMMMBU, PMDRMBU, and PMDRSBU can be converted from hundred call seconds (CCS) to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. RCC was added to key field to include maintenance information on an additional PM type: second series remote cluster controller (SRCC), which is datafilled in table LTCINV and RCCINV.

BCS32

IDT added to key field to include maintenance information on an additional PM type: integrated digital terminal (IDT). DFI added to key field to include maintenance information on an additional PM type: direct fiber interface (DFI). RCC2 added to key field to include maintenance information on an additional PM type: compact remote cluster controller (RCC2). Register PMERR is zeroed

BCS31

IPE added to key field to include maintenance information on an additional PM type: intelligent peripheral equipment (IPE) for Meridian SL-100 PBX

BCS29

RCCI and SMSR added to key field to include maintenance information on two additional PM types: ISDN remote cluster controller (RCCI), and subscriber carrier module-100S remote (SMSR)

BCS28

GIC added to key field to include maintenance information on an additional PM type: generic interface controller (GIC)

BCS25

Registers PMDRFLT, PMDRERR, PMRMBU, and PMDRSBU added

BCS21

Software change to provide usage counts either in hundred call seconds (CCS) or deci-erlangs

Registers

OM group PM registers display on the MAP terminal as follows:

```
PMERR      PMFLT      PMMSBU     PMUSBU
PMMMBU     PMUMBU     PMSBP      PMMBP
PMSWXFR    PMMWXFR    PMSCXFR    PMMCXFR
PMCCTDG    PMCCTFL    PMPSERR    PMPSFLT
PMRGERR    PMRGFLT    PMSBTCO    PMMBTCO
PMCCTOP    PMINTEG    PMDRFLT    PMDRERR
PMDRMBU    PMDRSBU
```

Group structure

OM group PM provides one tuple for each PM node. The tuple is accessed by the node number.

Key field: none
Info field: PM_OM_INFO_TYPE consists of the PM node type (for valid PM types, refer to the following table), the internal number of the node, and an optional asterisk (*).

The presence of an asterisk in the info field indicates that this PM node is datafilled in table PMEXCEPT. Any PM node that is datafilled in table PMEXCEPT is excluded from the register totals for that PM type that are accumulated in PMTYP. The absence of an asterisk in the info field indicates that the node is not datafilled in table PMEXCEPT, and is included in the PMTYP totals.

Table PMEXCEPT must be datafilled with the node number of each PM that is to be excluded from PMTYP subtotals.

If the office parameter OMINERLANGS in table OFCOPT is set to Y (yes), then the output from the usage registers PMMSBU, PMUSBU, PMMMBU, PMUMBU, PMDRMBU, and PMDRSBU is in deci-erlangs.

Info field values and PM types

Info field value	Peripheral module (mode)
ADTC	Austrian digital trunk controller
ALCM	Austrian line concentrating module

-continued-

OM group PM (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (mode)
ALGC	Austrian line group controller
AP	Application processor
APU	Application processing unit
ARCC	Austrian remote cluster controller
CFI	Channel frame interface
CFP	Channel frame processor
CSC	Cell site controller
STM	Conference trunk module
DA	Directory assistance database
DCA	Austrian digital carrier module
DCM	Digital carrier module
DCM250	Digital carrier module DMS-250
DES	Digital echo suppressor
DFI	Direct fiber interface
DLM	Digital line module
DTC	Digital trunk controller
DTC7	Digital trunk controller
DTCI	Digital trunk controller for ISDN
DTCO	Digital trunk controller offshore
DTM	Digital trunk module
EIU	Ethernet interface unit
ELCM	Enhanced line concentrating module
ESA	Emergency stand-alone
EXND	External node
FRCC	Force (download) remote cluster controller
FRIU	Frame relay interface unit
FILP	File processor

-continued-

Info field values and PM types (continued)

Info field value	Peripheral module (mode)
GIC	Generic interface controller
HFT	HDLC frame transceiver
HSI	High speed interface
HSI2	High speed interface series 2
HSIE	High speed interface extended
IAC	ISDN access controller
ICP	Integrated cellular peripheral
ICRM	Integrated cellular remote module
IDT	Integrated digital terminal
IDTC	International digital trunk controller
ILCM	International line concentrating module
LGC	International line group controller
LTC	International line trunk controller
XLCM	International extended line concentrating module
IPE	Intelligent peripheral equipment
ITAC	International TATS access controller
LCM	Line concentrating module
LCME	Enhanced line concentrating module
LCMI	ISDN line concentrating module
LCOM	LIU-COM (link interface unit data communication)
LDT	Line appearance on a digital trunk
LGC	Line group controller
LGCI	Line group controller ISDN
LGCO	Line group controller offshore
LIM	Link interface module
LIU	Link interface unit
LIU7	Link interface unit 7

-continued-

OM group PM (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (mode)
LM	Line module
LRU	Line resource unit
LTC	Line trunk controller
LTCI	Line trunk controller ISDN
MMA	Austrian maintenance trunk module
MSB6	Message switch buffer for CCIS6
MSB7	Message switch buffer for CCIS7
MTM	Maintenance trunk module
NIU	Network interface unit
OAU	Office alarm unit
OPM	Outside plant module
ORDB	Operator reference database
PDTC	PCM30 digital trunk controller
PLGC	PCM30 line group controller
PND	PNODE
PRCC	PCM30 remote cluster controller
PSP	Programmable signal processor
PTM	Packaged trunk module
RCC	Remote cluster controller
RCC2	Compact remote cluster controller
RCCI	ISDN remote cluster controller
RSCO2	Remote switching center offshore 2
RCS	Remote concentrator SLC-96
RCT	Remote concentrator terminal
RCU	Remote carrier urban
RLC	Remote line controller
RLCM	Remote line concentrating module

-continued-

OM group PM (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (mode)
RLM	Remote line module
RMM	Remote maintenance module
RMSC	Remote mobile switching center
RSC	Remote switching center
RSCO	Remote switching center offshore
RSM	Remote service module
SCM	Subscriber carrier module
SMA	Subscriber module access
SMR	Subscriber carrier module-100 rural
SMS	Subscriber carrier module-100S
SMSR	Subscriber carrier module-100S remote
SMU	Subscriber carrier module-100 urban
SPM	Service peripheral module
SRCC	Second series remote cluster controller
SRU	Small remote unit (ISDN LCM)
STCM	Signal terminal controller module
STM	Service trunk module
STS	Standardized traffic statistics
SVR	Server
T8A	Trunk module for CCITT circuits
TACC	TATS access controller
TAN	Test access network
TDTC	MOC DTC (MOC is an NT licencee)
TLGC	MOC LGC (MOC is an NT licencee)
TLTC	MOC LTC (MOC is an NT licencee)
TM	Trunk module
TM2	Trunk module-two wire

-continued-

OM group PM (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (mode)
TM4	Trunk module-four wire
TM8	Trunk module ATT testing
TMA	Trunk module Austria
TMS	TOPS message switch
TPC	TOPS position controller
TRCC	MOC RCC (MOC is a NT licencee)
VPU	Voice processing unit
VSR	Very small remote
VSROM	Very small remote
XLCM	Expanded memory line concentrating module
XLIU	X.25/X.75 link interface unit
XRLCM	Extended remote line concentrating module
-end-	

Associated OM groups

PMTYP is used with PM to provide register totals for PMs of the same type. For example, the first register in PM (PMERR) counts PM errors. This register makes a separate count of PM errors for each PM associated with a DMS switch. The first register in PMTYP (PMTERR) counts all the errors that are accumulated in register PMERR for all PMs of the same type.

Associated functional groups

The following functional groups are associated with OM group PM:

- DMS-100 local office
- DMS-100/200 combined local/toll office
- DMS-100/200 combined local/toll office with TOPS
- DMS-200 toll office
- DMS-200 with TOPS
- DMS-100 Meridian
- DMS-MTX mobile telephone exchange
- DMS-250 toll/tandem switch

- DMS-300 gateway
- Meridian 1 (options 111-211) PABX

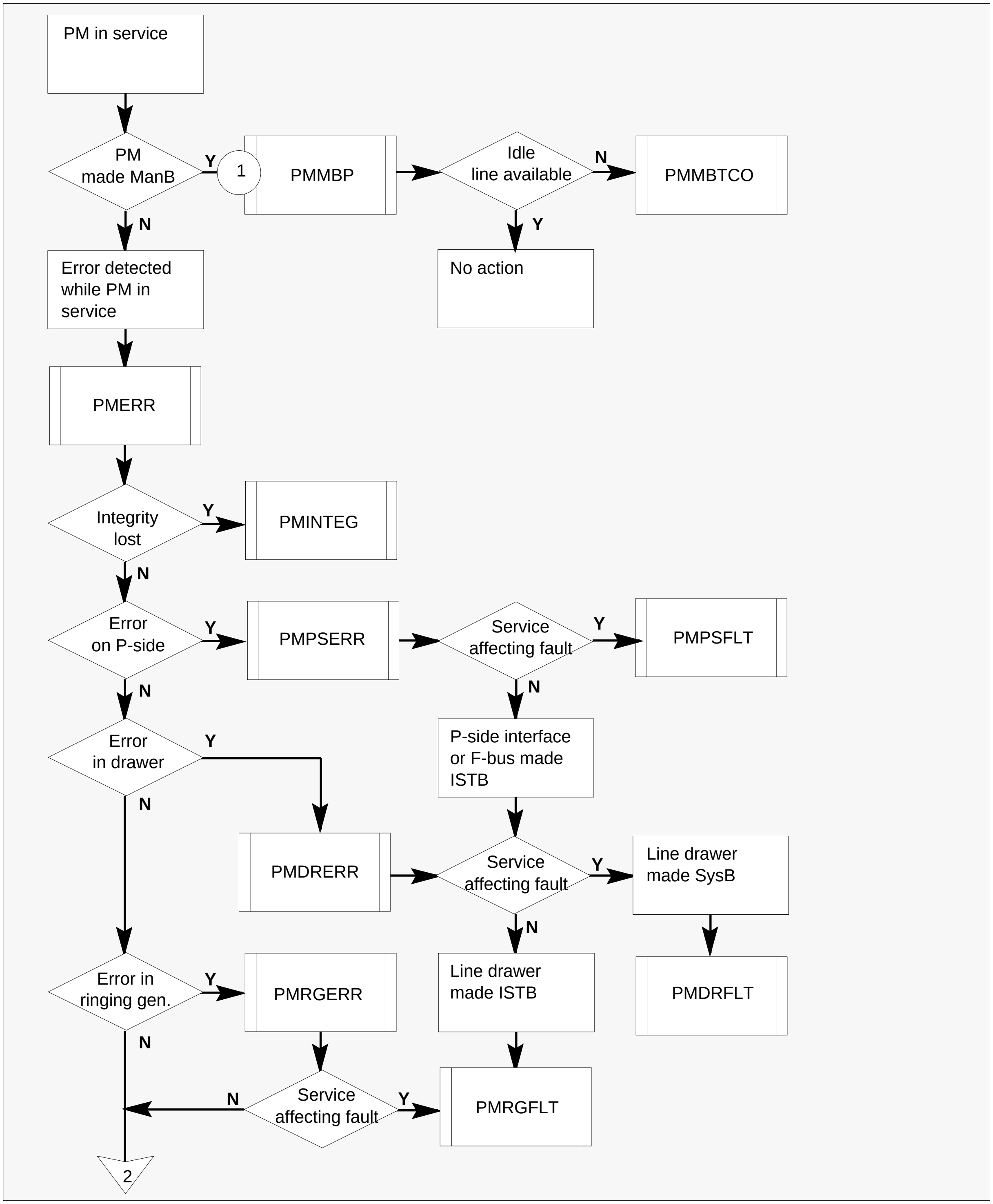
Associated functionality codes

The functionality codes associated with OM group PM are shown in the following table.

Functionality	Code
Extended Peripheral Equipment	NTXN25AA
Common Basic	NTX001AA
RLCM_Emergency Stand-alone Operation	NTX154AA
New Peripheral Maintenance Package	NTX270AA
SMU-Subscriber Module Urban	NTX387AA
Digital Phone M2000-Basic	NTX640AA
OMs in Erlangs	NTX664AA
ISDN Basic Access	NTX750AB
STP Operations	NTX833AA
Mercury Centrex PCM30 Peripherals	NTX913AA

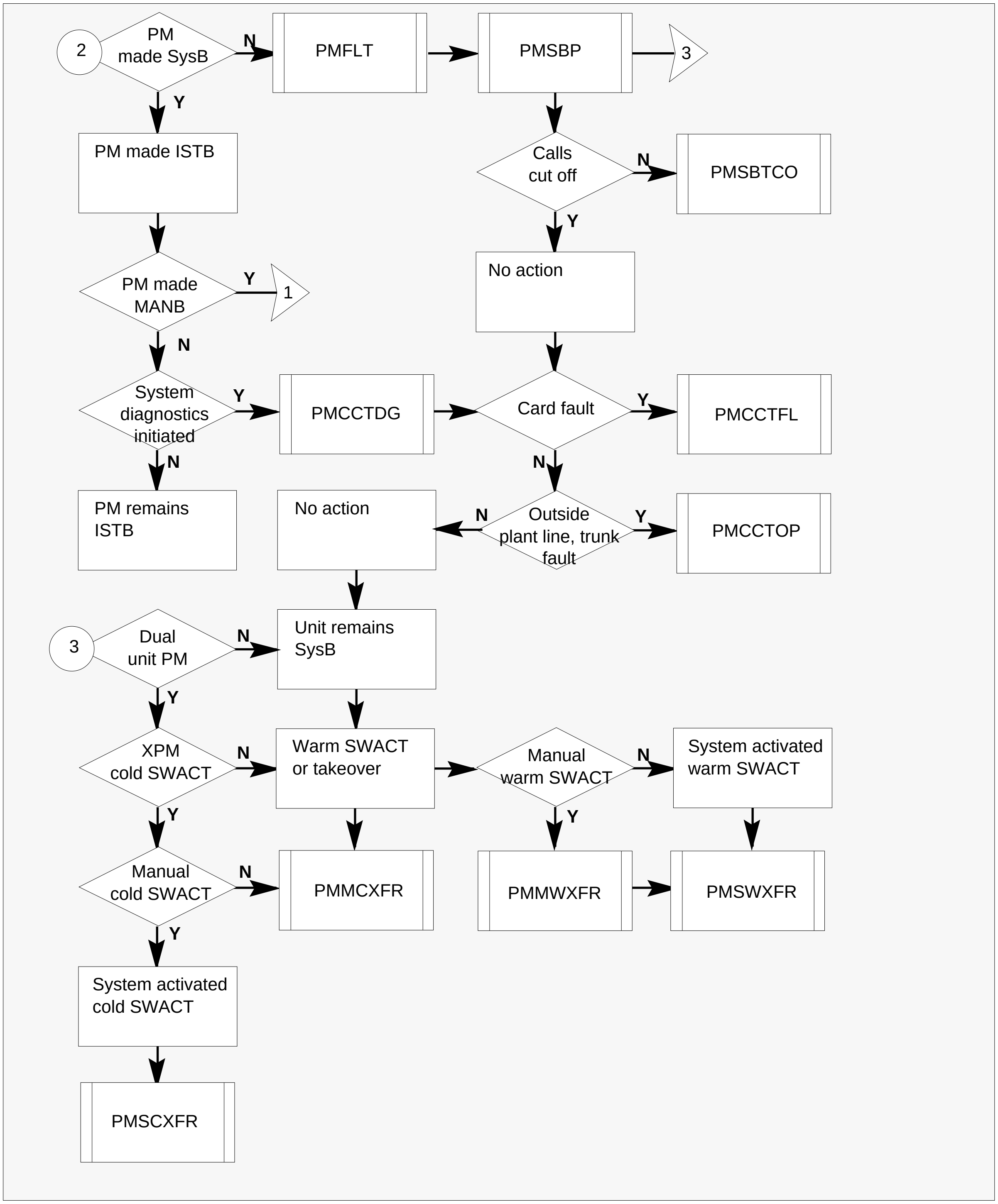
OM group PM (continued)

OM group PM registers



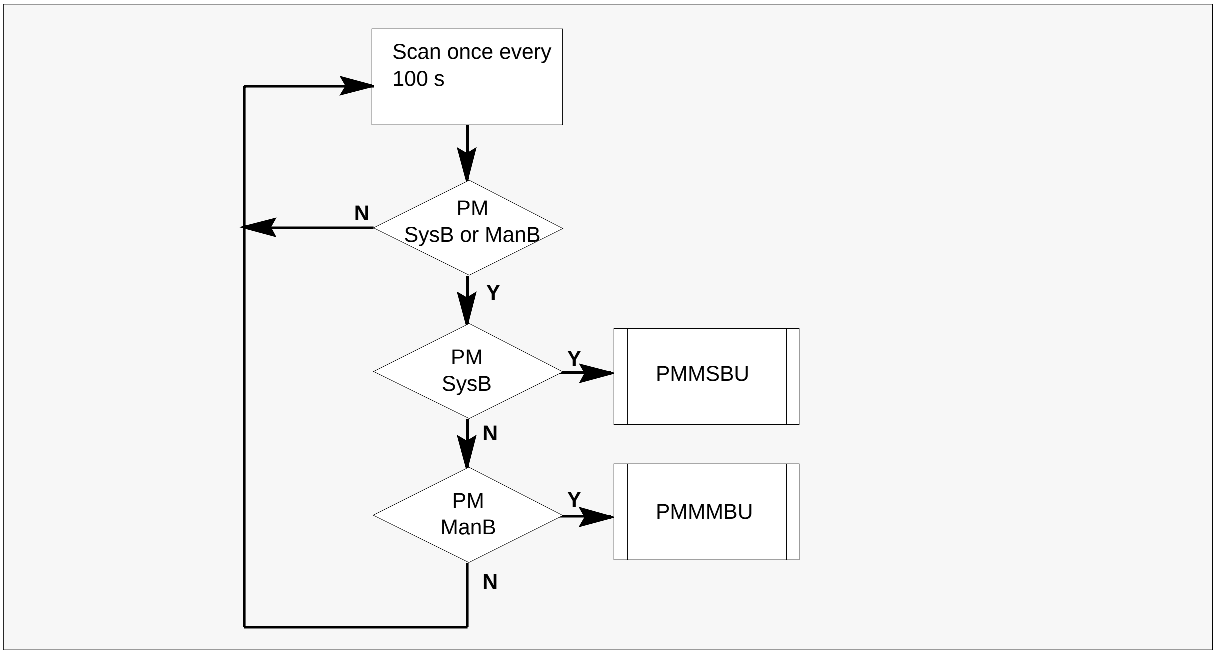
OM group PM (continued)

OM group PM registers



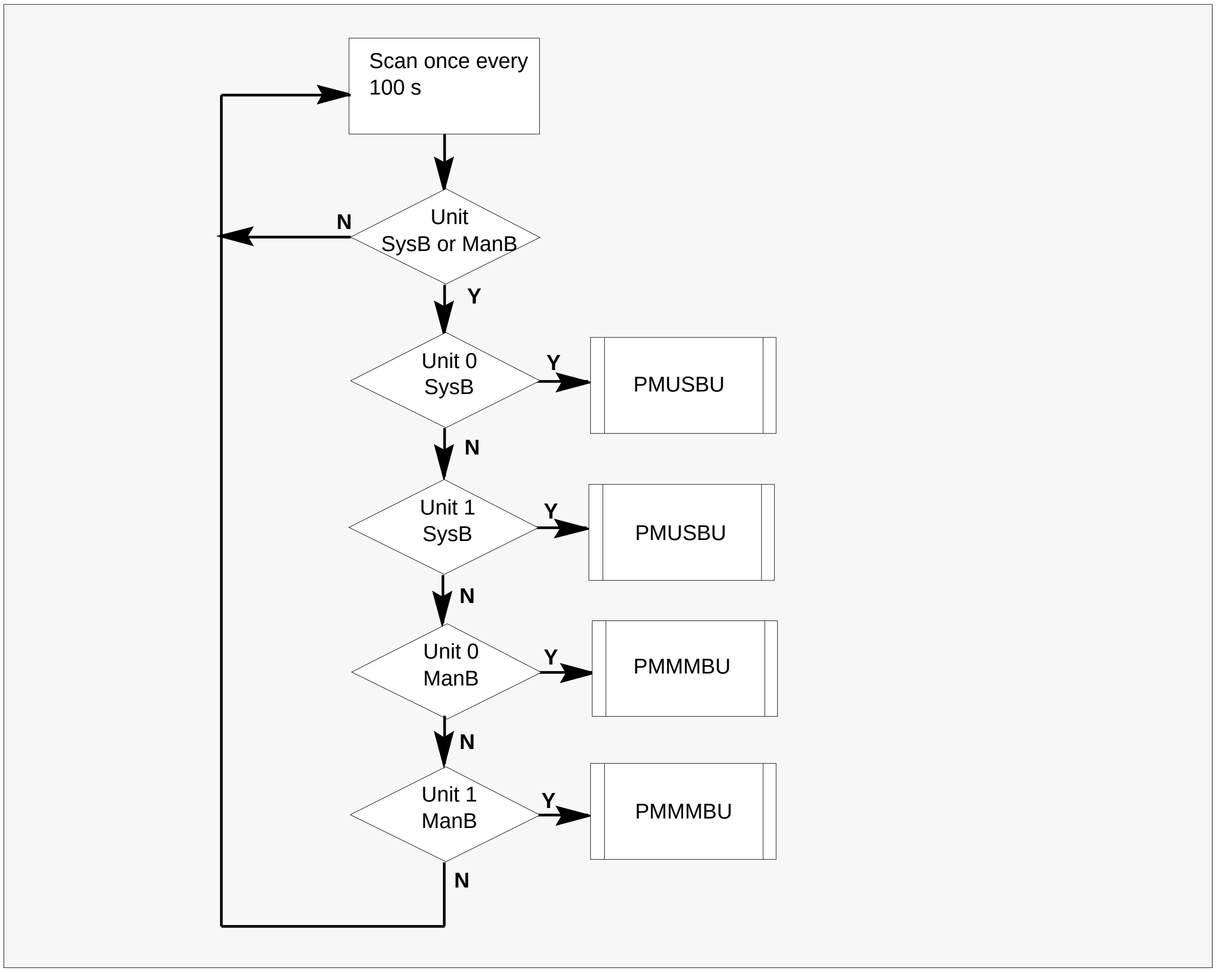
OM group PM (continued)

OM group PM usage registers for PMs



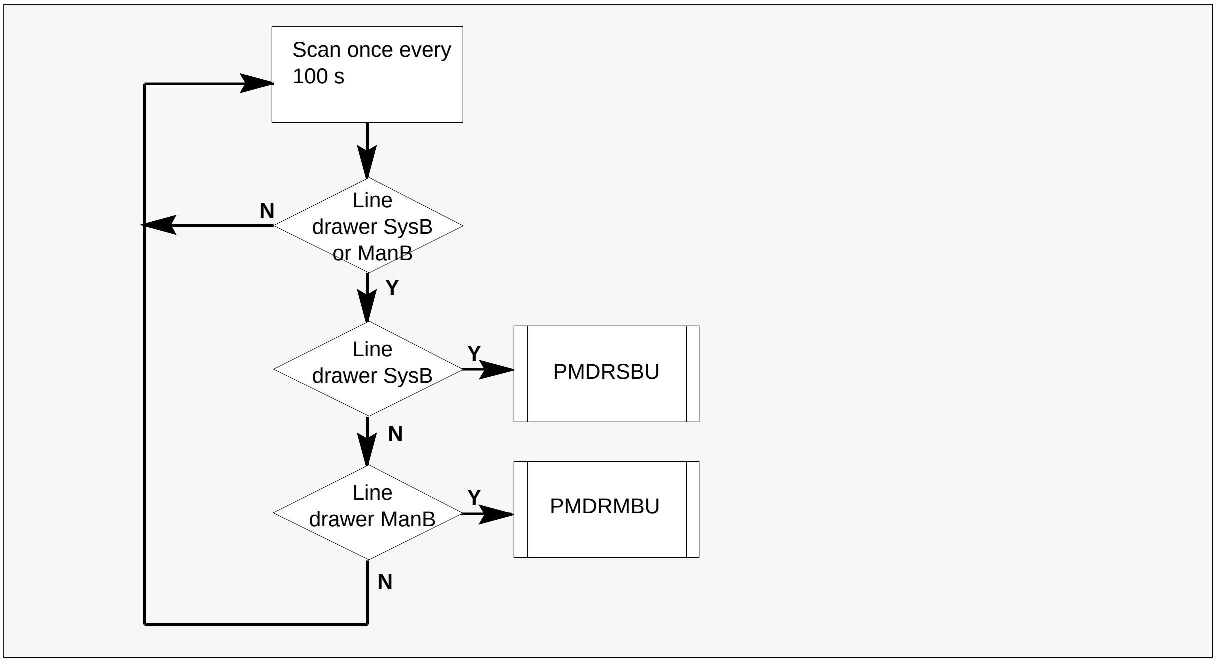
OM group PM (continued)

OM group PM usage registers for PM units



OM group PM (continued)

OM group PM usage registers for line drawers



Register PMCCTDG

PM circuit diagnostics run

PMCCTDG counts system-initiated diagnostic tests that are run on a line card or trunk card because of repeated problems encountered during call processing. The maintenance conditions that cause PMCCTDG to be incremented are different for each PM type.

For the digital carrier module, PMCCTDG counts the tests that are run on any trunk interface card because of problems during call processing. The tests determine whether a DS-1 interface card has been removed, or whether frame loss has caused a local or remote-carrier-group alarm state.

For the line module or the digital line module, PMCCTDG counts system-initiated tests that are run on a line card.

For the trunk module (TM), PMCCTDG counts tests that are run on any trunk interface card or service circuit. The TM tests include

- verification that cards of the right type are present on the shelf
- operation of the test relay

- operation and release of signal distribution points and analysis of scan results
- checking of transmission loss in looparound mode

For the extended multiprocessor system (XMS)-based peripheral modules (XPM), PMCCTDG is incremented when a system-initiated test is run on a line or trunk because of repeated problems during call processing.

Register PMCCTDG release history

PMCCTDG was introduced prior to BCS20.

Associated registers

PM_PMCCTFL is incremented when a system-initiated test determines that a PM maintenance problem is caused by a fault condition.

Associated logs

PM110 is generated when a change occurs in the service counts for a DS-1 trunk or link. These service counts are incremented when an error, fault, or state transition occurs within predetermined time intervals. PM110 indicates that a service count has changed.

TRK106 is generated when trunk equipment fails a test that is initiated either manually or by the system. The log indicates the reason that the equipment failed and the action required to solve the problem.

Register PMCCTFL

PM circuit tests failed

PMCCTFL is incremented when a system-initiated test determines that a PM maintenance problem is caused by a fault condition. The specific faults that increment the register are different for each type of PM.

For the digital carrier module, PMCCTFL is incremented when tests reveal that a fault is caused by removal of a card or by transmission error resulting in a carrier group alarm.

For the line module, PMCCTFL is incremented when tests reveal that a maintenance problem is caused by a PM, card, or facility fault, or by a missing or wrong card.

For the trunk module, the digital carrier module, and extended multiprocessor system (XMS)-based peripheral modules (XPM), PMCCTFL is incremented when tests detect a wrong card, or a missing or faulty card.

OM group PM (continued)

Register PMCCTFL release history

PMCCTFL was introduced prior to BCS20.

Associated registers

PM_PMCCTDG counts system-initiated tests that are run on a line card or trunk card because of repeated problems encountered during call processing.

Associated logs

PM109 is generated when a DS-1 trunk or link is made system busy.

PM183 is generated when a PM P-side link is made system busy.

TRK106 is generated when trunk equipment fails a test that was initiated by a manual or system request. The log indicates the reason that the equipment failed and the action required to solve the problem.

Register PMCCTOP

PM circuit test outside plant

PMCCTOP is incremented when system tests detect a fault on a line or trunk circuit that is located outside the switching office. The circumstances that cause PMCCTOP to be incremented vary with the different PM types. In all cases, PMCCTOP is only incremented the first time the fault is detected. It is not incremented if the same fault is detected again when tests are re-run.

For the digital carrier module and the trunk module, PMCCTOP is incremented when the signaling-test system at a switching office detects a fault on a trunk circuit between itself and a far-end office. For example, PMCCTOP is incremented when an originating office does not receive a start-dial or wink signal from the far-end office in response to an off-hook signal.

For the line module, PMCCTOP is incremented when system tests detect a fault on a line circuit that is located outside the switching office.

For extended multiprocessor system (XMS)-based peripheral modules (XPM), PMCCTOP is incremented when system tests detect a fault on a line or trunk that is located outside the switching office.

Register PMCCTOP release history

PMCCTOP was introduced prior to BCS20.

Associated registers

None

Associated logs

None

Register PMDRERR

PM drawer error

PMDRERR counts errors in a line drawer that cause the drawer to have in-service trouble.

Register PMDRERR release history

PMDRERR was introduced in BCS25.

Associated registers

PM_PMDRFLT counts faults in a line drawer that cause the drawer to be made system busy.

Associated logs

PM102 is generated when a PM is made system busy.

PM181 provides information on the following conditions:

- emergency stand-alone (ESA) run on a remote line concentrating module or remote digital line module
- test failures of ESA mode
- faults discovered during a routine exercise (REX) test
- extended multiprocessor system (XMS)-based peripheral modules (XPM) (for example, line group controllers [LGC] or line trunk controllers [LTC]) that have lost their static data while being returned to service
- loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting LTCs or LGCs to remote cluster controllers
- changes in the loopback status of a link interface unit

OM group PM (continued)

Register PMDRFLT

PM drawer faults

PMDRFLT counts faults in a line drawer that cause the drawer to be made system busy.

Register PMDRFLT release history

PMDRFLT was introduced in BCS25.

Associated registers

PM_PMDRERR counts errors in a line drawer that cause the drawer to have in-service trouble.

Associated logs

PM102 is generated when a PM is made system busy.

PM181 provides information on the following conditions:

- remote line concentrating modules or remote digital line modules that are running in emergency stand-alone (ESA) mode
- test failures of ESA mode
- faults discovered during a routine exercise (REX) test
- extended multiprocessor system (XMS)-based peripheral modules (XPM) (for example, line group controllers [LGC] and line trunk controllers [LTC]) that have lost their static data while being returned to service
- the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting LTCs or LGCs to remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMDRMBU

PM drawer manual busy usage

PMDRMBU is a usage register. Every 100 s, the line drawers in a PM are scanned and PMDRMBU records whether a line drawer is manual busy.

Register PMDRMBU release history

PMDRMBU was introduced in BCS25.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from hundred call seconds (CCS) to deci-erlangs prior to its display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS25

Software change made to provide usage counts in either CCS or deci-erlangs

Associated registers

PM_PMDRSBU is a usage register. It records whether a line drawer in the PM is system busy.

Associated logs

PM102 is generated when a PM is made system busy.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition. There are six possible PM128 log formats.

Register PMDRSBU

PM drawer system busy usage

PMDRSBU is a usage register. Every 100 s, the line drawers in the PM are scanned, and PMDRSBU records whether a line drawer is system busy.

Register PMDRSBU release history

PMDRSBU was introduced in BCS25.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from hundred call seconds (CCS) to deci-erlangs prior to its display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS25

Software change made to provide usage counts in either CCS or deci-erlangs

Associated registers

PM_PMDRMBU records whether a line drawer in a PM is manual busy.

OM group PM (continued)

Associated logs

PM102 is generated when a PM is made system busy.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

Register PMERR

PM error

PMERR counts errors in an in-service PM. The error conditions that cause PMERR to be incremented vary according to PM type.

For Series-1 PMs (for example, line modules, digital carrier modules, and trunk modules), PMERR counts the following errors:

- command protocol violations
- RAM parity failures
- firmware errors
- controller message congestion
- test failures during the running of a routine or initialization audit
- failures to respond to a message over either plane

For extended multiprocessor system (XMS)-based peripheral modules (for example, line concentrating modules, line group controllers, and line trunk controllers), PMERR counts the following errors:

- errors that only result in the generation of a log
- errors that result in further maintenance action
- integrity failures
- errors that result in who-am-I (WAI) messages
- transitions from in-service to central-side (C-side) busy or system busy
- restart reports
- an event that causes a fault and causes register PMFLT to be incremented

Register PMERR release history

PMERR was introduced prior to BCS20.

BCS32

Register no longer incremented as a result of tests performed by routine exercise (REX) tests

OM group PM (continued)

Associated registers

PMFLT counts faults that cause the entire PM or one unit of the PM to be made system busy.

Associated logs

CCS231 is generated by the common channel signaling (CCS) subsystem when a local subsystem changes to in-service trouble. A local subsystem is in in-service trouble if less than the minimum number of instances of the subsystem (specified in table C7LOCSSN) is in service or has in-service trouble.

CCS236 is generated by the CCS subsystem when a local subsystem changes to in-service trouble. This occurs when an in-service local subsystem indicates that it will be going out of service.

DDM101 is generated if the transfer of table data from the central control to the PM fails. Data transfer can fail either when the PM is being returned to service, or during a BCS application.

DDM102 is generated when the distributed data manager (DDM) cannot update the table data of a PM. The table data of the PM becomes erroneous and may cause a degradation of PM performance.

DDM104 is generated when the DDM cannot maintain data in a PM. This situation occurs when the PM fails or when the DDM is unable to download a table. Usually, the PM is made system busy and an attempt is made to return the PM to service.

DLC101 is generated when a minor incoming message overload (ICMO) occurs on the link that is maintained by the data link controller.

DPAC103 is generated when a minor ICMO is detected on a link that is maintained by the data packet controller.

LOST108 is generated when an outgoing message is lost because of a problem with the input-output buffer where the message was stored.

LOST109 is generated when an outgoing message is lost because too many rebounds occurred and the message could not be rerouted.

LOST111 is generated when an incoming or outgoing message is lost because of an input handler error.

MPC906 is generated when a minor ICMO is detected on a link that is maintained by a multiprotocol controller.

OM group PM (continued)

NET102 is generated by the network when a receiving PM detects an integrity fault. An integrity fault can be either a parity failure or an integrity mismatch. Integrity signals from the network can be used to verify the speech path between two PMs.

NPAC210 is generated when a minor ICMO is detected on an X.25 link.

PM101 is generated when the table data in a PM fails a checksum test. The checksum test identifies inconsistencies between the table data found in the PM and the central control.

PM108 is generated when a firmware or hardware error is detected in a PM peripheral processor.

PM113 is generated when there is message congestion at a PM peripheral processor. Message congestion can be expected on high traffic days.

PM115, PM117, and PM118 are generated when a PM peripheral processor detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The logs include a reason for the abnormal condition.

PM116 is generated after a PM sends a report indicating a message error.

PM117 (see PM115)

PM118 (see PM115)

PM119 is generated if either of the following problems arises:

- integrity is lost on an interbay or intrabay link
- integrity or parity failure occurs while a remote line module is handling a call that does not involve a connection through a network module

PM121 is generated when the link between a host digital carrier module and a remote line module ceases to be the active link that carries control channel information between the two PMs. A different link becomes the active carrier of control information. System noise can cause switchovers of this type.

PM122 is generated after a PM receives an exception report. The exception report flags the following types of errors:

- PM firmware errors
- PM checksum errors
- errors created by the central control

PM124 and PM126 are generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The logs include a reason for the abnormal condition. The abnormal condition may be caused by a protocol violation.

PM125 is generated when a firmware or hardware error is detected in the peripheral processor of the PM.

PM126 (see PM124).

PM128 is generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM150 is generated when transient failures are detected in a line drawer.

PM160 is generated when a transient failure is detected on a card in a line module or remote line module.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise (REX) test
- extended multiprocessor system (XMS)-based peripheral modules (XPM) that lost their static data while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples

OM group PM (continued)

- operational faults on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM194 is generated when a signaling terminal controller or D-channel handler performs either of the following actions:

- detects abnormal conditions that are not hardware related or have not yet been linked to a hardware fault
- changes from in service to in-service trouble

PM198 is generated when either a signaling terminal controller or D-channel handler sends an unsolicited message containing a valid fault condition that does not affect service.

TRK123 is generated when a PM sends an incorrect message to the central control. If this log appears often, it may indicate problems with one of the following pieces of equipment:

- the originating or terminating trunk
- the link between the PM and the central control
- the peripheral processor in the PM

UTR100 is generated when a PM fails to send to the central control the operational measurements that relate to the universal tone receiver.

Register PMFLT

PM fault

PMFLT counts faults that cause the entire PM or one of its units to be made system busy.

Once a PM or PM unit is made system busy and is counted by PMFLT, the register does not count the same fault again during subsequent retesting when system tests attempt to clear the fault.

The conditions that cause PMFLT to be incremented differ slightly between PMs and extended multiprocessor system (XMS)-based peripheral modules (XPM).

For in-service trouble PMs (for example, line modules, trunk modules, and digital carrier modules), PMFLT counts errors that cause the PM to be made system busy while waiting for either manual or system recovery.

For XPMs (for example, line concentrating modules, line group controllers, and line trunk controllers), PMFLT is incremented if either of the following conditions occurs:

- an entire PM or a single unit of a PM is made system busy
- a central side (C-side) node or link is made manual busy, then returned to service, resulting in a state transition from C-side busy to system busy because the return to service tests failed during a system audit

Register PMFLT release history

PMFLT was introduced prior to BCS20.

Associated registers

PM_PMERR counts service-affecting and non-service-affecting PM errors.

Associated logs

DLC102 is generated when major incoming message overload (ICMO) exists on a link that is maintained by a data link controller. The overload results in the data link controller being made system busy.

DPAC104 is generated when major ICMO exists on a link that is maintained by a data packet controller.

MPC904 is generated when a multiprotocol controller develops a serious fault and is made system busy.

NPAC211 is generated when a minor ICMO no longer affects an X.25 link.

PM100 is generated when a PM fails a test.

PM101 is generated when the table data in a PM fails a checksum test. The checksum test identifies inconsistencies between the table data found in the PM and that found in the central control.

PM102 is generated when a PM is made system busy.

PM114 is generated when an abnormal condition is detected in a PM that is not hardware related or has not yet been linked to a hardware-related fault. This condition can occur when an attempt is made to load, test, initialize, or return a PM to service.

PM117 is generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

OM group PM (continued)

PM127 is generated when the link that is carrying control messages between the host office and the PM at a remote site is forced out of service. The remote PM may be in the emergency stand-alone (ESA) state.

PM151 is generated when a failure is detected in a line drawer.

PM161 is generated when a card failure is detected in a line module or remote line module.

PM162 is generated when a redundant circuit in a line module or remote line module changes state.

PM164 is generated when a noncritical circuit in a line module controller changes state.

PM180 is generated because software has executed improperly or because a hardware problem affects software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in the ESA mode
- test failures of ESA mode and faults discovered during a routine exercise (REX) test
- loss of static data in XPMs while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of link interface units

PM185 is generated when an error condition (detected by the firmware, hardware, or software) causes a trap interrupt. Execution of the software process that was running is stopped at the instruction where the fault occurred.

PM199 is generated when a system-initiated test is run on a signaling terminal controller or D-channel handler. The log includes the result of the test as either pass or fail.

Register PMERR

PM error

PMERR counts errors in an in-service PM. The error conditions that cause PMERR to be incremented vary according to PM type.

For Series-1 PMs (for example, line modules, digital carrier modules, and trunk modules), PMERR counts the following errors:

- command protocol violations
- RAM parity failures
- firmware errors
- controller message congestion
- test failures during the running of a routine or initialization audit
- failures to respond to a message over either plane

For extended multiprocessor system (XMS)-based peripheral modules (for example, line concentrating modules, line group controllers, and line trunk controllers), PMERR counts the following errors:

- errors that only result in the generation of a log
- errors that result in further maintenance action
- integrity failures
- errors that result in who-am-I (WAI) messages
- transitions from in-service to central-side (C-side) busy or system busy
- restart reports
- an event that causes a fault and causes register PMFLT to be incremented

Register PMERR release history

PMERR was introduced prior to BCS20.

BCS32

Register no longer incremented as a result of tests performed by routine exercise (REX) tests

Associated registers

PMFLT counts faults that cause the entire PM or one unit of the PM to be made system busy.

OM group PM (continued)

Associated logs

CCS231 is generated by the common channel signaling (CCS) subsystem when a local subsystem changes to in-service trouble. A local subsystem is in in-service trouble if less than the minimum number of instances of the subsystem (specified in table C7LOCSSN) is in service or has in-service trouble.

CCS236 is generated by the CCS subsystem when a local subsystem changes to in-service trouble. This occurs when an in-service local subsystem indicates that it will be going out of service.

DDM101 is generated if the transfer of table data from the central control to the PM fails. Data transfer can fail either when the PM is being returned to service, or during a BCS application.

DDM102 is generated when the distributed data manager (DDM) cannot update the table data of a PM. The table data of the PM becomes erroneous and may cause a degradation of PM performance.

DDM104 is generated when the DDM cannot maintain data in a PM. This situation occurs when the PM fails or when the DDM is unable to download a table. Usually, the PM is made system busy and an attempt is made to return the PM to service.

DLC101 is generated when a minor incoming message overload (ICMO) occurs on the link that is maintained by the data link controller.

DPAC103 is generated when a minor ICMO is detected on a link that is maintained by the data packet controller.

LOST108 is generated when an outgoing message is lost because of a problem with the input-output buffer where the message was stored.

LOST109 is generated when an outgoing message is lost because too many rebounds occurred and the message could not be rerouted.

LOST111 is generated when an incoming or outgoing message is lost because of an input handler error.

MPC906 is generated when a minor ICMO is detected on a link that is maintained by a multiprotocol controller.

NET102 is generated by the network when a receiving PM detects an integrity fault. An integrity fault can be either a parity failure or an integrity mismatch. Integrity signals from the network can be used to verify the speech path between two PMs.

NPAC210 is generated when a minor ICMO is detected on an X.25 link.

PM101 is generated when the table data in a PM fails a checksum test. The checksum test identifies inconsistencies between the table data found in the PM and the central control.

PM108 is generated when a firmware or hardware error is detected in a PM peripheral processor.

PM113 is generated when there is message congestion at a PM peripheral processor. Message congestion can be expected on high traffic days.

PM115, PM117, and PM118 are generated when a PM peripheral processor detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The logs include a reason for the abnormal condition.

PM116 is generated after a PM sends a report indicating a message error.

PM117 (see PM115)

PM118 (see PM115)

PM119 is generated if either of the following problems arises:

- integrity is lost on an interbay or intrabay link
- integrity or parity failure occurs while a remote line module is handling a call that does not involve a connection through a network module

PM121 is generated when the link between a host digital carrier module and a remote line module ceases to be the active link that carries control channel information between the two PMs. A different link becomes the active carrier of control information. System noise can cause switchovers of this type.

PM122 is generated after a PM receives an exception report. The exception report flags the following types of errors:

- PM firmware errors
- PM checksum errors
- errors created by the central control

OM group PM (continued)

PM124 and PM126 are generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The logs include a reason for the abnormal condition. The abnormal condition may be caused by a protocol violation.

PM125 is generated when a firmware or hardware error is detected in the peripheral processor of the PM.

PM126 (see PM124).

PM128 is generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM150 is generated when transient failures are detected in a line drawer.

PM160 is generated when a transient failure is detected on a card in a line module or remote line module.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise (REX) test
- extended multiprocessor system (XMS)-based peripheral modules (XPM) that lost their static data while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM194 is generated when a signaling terminal controller or D-channel handler performs either of the following actions:

- detects abnormal conditions that are not hardware related or have not yet been linked to a hardware fault
- changes from in service to in-service trouble

PM198 is generated when either a signaling terminal controller or D-channel handler sends an unsolicited message containing a valid fault condition that does not affect service.

TRK123 is generated when a PM sends an incorrect message to the central control. If this log appears often, it may indicate problems with one of the following pieces of equipment:

- the originating or terminating trunk
- the link between the PM and the central control
- the peripheral processor in the PM

UTR100 is generated when a PM fails to send to the central control the operational measurements that relate to the universal tone receiver.

Register PMFLT

PM fault

PMFLT counts faults that cause the entire PM or one of its units to be made system busy.

Once a PM or PM unit is made system busy and is counted by PMFLT, the register does not count the same fault again during subsequent retesting when system tests attempt to clear the fault.

The conditions that cause PMFLT to be incremented differ slightly between PMs and extended multiprocessor system (XMS)-based peripheral modules (XPM).

For in-service trouble PMs (for example, line modules, trunk modules, and digital carrier modules), PMFLT counts errors that cause the PM to be made system busy while waiting for either manual or system recovery.

OM group PM (continued)

For XPMs (for example, line concentrating modules, line group controllers, and line trunk controllers), PMFLT is incremented if either of the following conditions occurs:

- an entire PM or a single unit of a PM is made system busy
- a central side (C-side) node or link is made manual busy, then returned to service, resulting in a state transition from C-side busy to system busy because the return to service tests failed during a system audit

Register PMFLT release history

PMFLT was introduced prior to BCS20.

Associated registers

PM_PMERR counts service-affecting and non-service-affecting PM errors.

Associated logs

DLC102 is generated when major incoming message overload (ICMO) exists on a link that is maintained by a data link controller. The overload results in the data link controller being made system busy.

DPAC104 is generated when major ICMO exists on a link that is maintained by a data packet controller.

MPC904 is generated when a multiprotocol controller develops a serious fault and is made system busy.

NPAC211 is generated when a minor ICMO no longer affects an X.25 link.

PM100 is generated when a PM fails a test.

PM101 is generated when the table data in a PM fails a checksum test. The checksum test identifies inconsistencies between the table data found in the PM and that found in the central control.

PM102 is generated when a PM is made system busy.

PM114 is generated when an abnormal condition is detected in a PM that is not hardware related or has not yet been linked to a hardware-related fault. This condition can occur when an attempt is made to load, test, initialize, or return a PM to service.

PM117 is generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM127 is generated when the link that is carrying control messages between the host office and the PM at a remote site is forced out of service. The remote PM may be in the emergency stand-alone (ESA) state.

PM151 is generated when a failure is detected in a line drawer.

PM161 is generated when a card failure is detected in a line module or remote line module.

PM162 is generated when a redundant circuit in a line module or remote line module changes state.

PM164 is generated when a noncritical circuit in a line module controller changes state.

PM180 is generated because software has executed improperly or because a hardware problem affects software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in the ESA mode
- test failures of ESA mode and faults discovered during a routine exercise (REX) test
- loss of static data in XPMs while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of link interface units

PM185 is generated when an error condition (detected by the firmware, hardware, or software) causes a trap interrupt. Execution of the software process that was running is stopped at the instruction where the fault occurred.

PM199 is generated when a system-initiated test is run on a signaling terminal controller or D-channel handler. The log includes the result of the test as either pass or fail.

OM group PM (continued)

Register PMINTEG

PM integrity failures

PMINTEG is incremented when the PM detects an integrity failure and reports it to the central control.

Register PMINTEG release history

PMINTEG was introduced prior to BCS20.

Associated registers

None

Associated logs

NET101 is generated when a PM, receiving integrity messages from another PM, detects an integrity failure. The integrity failure can be due to an integrity mismatch, or to channel parity errors. The log indicates whether the integrity fault prevented the call from being set up.

NET102 is generated by the network when a receiving PM detects an integrity fault. An integrity fault can be either a parity failure or an integrity mismatch.

PM108 is generated when a firmware or hardware error is detected in the peripheral processor of a PM.

PM113 is generated when there is message congestion at a PM peripheral processor. Message congestion can be expected on high traffic days.

PM118 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM119 is generated for either of the following events:

- integrity is lost on an inter- or intra-bay link
- an integrity or parity failure occurs while a remote LM is handling a call that does not involve a connection through the network

PM122 is generated after an exception report is received from a PM. The exception report flags the following types of errors:

- PM firmware and checksum errors
- errors created by the central control

PM124 is generated when a PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition. The abnormal condition may involve a protocol violation.

PM180 is generated because of software failure or because a hardware problem affects software execution. A PM exception report is produced when software fails.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in emergency stand-alone (ESA) mode
- test failures of ESA mode
- faults discovered during a routine exercise (REX) 5 test
- XPMs (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM185 is generated when an error condition (detected by the firmware, hardware, or software) causes a trap interrupt. Execution of the software process that was running is stopped at the instruction where the fault occurred.

TRK122 is generated when the central control detects a loss of integrity on both planes of the network to which the trunk equipment is connected. The loss of integrity is usually caused by a hardware problem that exists on a card, the facility, or the link between the PM and the network.

Register PMMBP

PM transitions to manual busy

PMMBP is incremented when a PM is made manual busy from an in-service or in-service trouble state.

For line modules (LM), PMMBP is incremented when the LM is made manual busy during manually requested warm and cold takeovers.

OM group PM (continued)

Register PMMBP release history

PMMBP was introduced prior to BCS26.

Associated registers

PMSBP is incremented when a PM is made system busy from an in-service or in-service trouble state.

Associated logs

PM182 is generated when the P-side link of a PM is made manual busy.

PM191 appears in two formats. The first format is generated when a signaling terminal controller (STC) is made manual busy. The signaling terminal that is identified in PM191 is made manual busy as a result of the change of state of the STC. The second format is generated when the D-channel handler is made manual busy. The ISDN service group (ISG) field in PM191 identifies the services that are affected by this action.

Register PMMBTCO

PM manual-busy terminals cut off

PMMBTCO counts subscriber calls (terminals) that are cut off when a PM is made manual busy. To be counted by PMMBTCO, calls must be associated with lines or trunks that are either call processing busy or call processing deloading.

Register PMMBTCO release history

PMMBTCO was introduced prior to BCS20.

Associated registers

PM_PMSBTCO counts the subscriber calls (terminals) that are cut off when a PM is made system busy.

Associated logs

None

Register PMMCXFR

PM manual cold transfers

PMMCXFR is incremented when a manual action causes an extended multiprocessor system (XMS)-based peripheral module (XPM) to perform a cold switch of activity (SWACT). Two examples of manual actions that can trigger a cold SWACT are the execution of the SWACT command at the MAP terminal, and a manual request that makes the active unit manual busy while the inactive unit is in service.

Register PMMCXFR release history

PMMCXFR was introduced prior to BCS20.

Associated registers

PMSCXFR is incremented when a system action causes an XPM to perform a cold SWACT.

Associated logs

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

Register PMMMBU

PM manual busy usage

PMMMBU is a usage register. Every 100 s, the PM units are scanned and PMMMBU records whether any PMs are manual busy.

Register PMMMBU release history

PMMMBU was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to its display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS25

Software change made to provide usage counts in either CCS or deci-erlangs

Associated registers

PM_PMUMBU records whether a PM unit is manual busy.

OM group PM (continued)

Associated logs

CCS218 is generated when a local subsystem is made manual busy. This occurs if

- one local subsystem instance is made manual busy and all other local subsystem instances are offline
- the last local subsystem is made manual busy from in-service or system busy

CCS233 is generated when local subsystem is made manual busy.

PM105 is generated when a PM is made manual busy.

PM128 is generated when the peripheral processor of the PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM170 is generated when both bays of a line module or remote line module are made manual busy or system busy.

PM182 is generated when the P-side link of a PM is made manual busy.

PM191 appears in two formats. The first format is generated when a manual request makes a signaling terminal controller (STC) manual busy. The signaling terminal that is identified in PM191 is made manual busy as a result of the change of state of the STC. The second format is generated when the D-channel handler is made manual busy. The ISDN service group (ISG) field in PM191 identifies the services that are affected by this action.

Register PMMSBU

PM system busy usage

PMMSBU is a usage register. Every 100 s, the PMs are scanned and PMMSBU records whether a PM is system busy.

For dual-unit PMs, PMMSBU is incremented once if both units of the dual unit PM are made system busy, or if one PM unit is made system busy and the other unit is not in service.

The hardware or software problems that cause the PM to be made system busy vary according to the PM type.

For a digital carrier module (DCM) or trunk module (TM), the following problems cause the PM to be made system busy:

- the DCM or TM fails a routine audit
- no message paths are available to the DCM or TM
- more than 200 unsolicited trouble reports are received from the DCM or TM within one 10-min audit period

For a line module (LM), any of the following problems cause the PM to be made system busy:

- the LM is inaccessible
- the control section of the LM has failed an audit
- the LM has reported more than 200 controller errors or line errors between successive audits

Register PMMSBU release history

PMMSBU was introduced prior to BCS20.

BCS33

When the office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to its display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS25

Software change made to provide usage counts in either CCS or deci-erlangs

Associated registers

PM_PMUSBU records whether a PM unit is system busy.

Associated logs

CCS219 is generated when a local subsystem is made system busy. This occurs when one local subsystem instance is made system busy and all other local subsystem instances are either off line or manual busy.

CCS234 is generated when a local subsystem instance is made system busy.

PM102 is generated when a PM is made system busy.

PM128 is generated when a PM peripheral processor detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

OM group PM (continued)

PM170 is generated when both bays of an LM or remote LM are manual busy or system busy.

PM183 is generated when a PM P-side link is made system busy.

PM190 appears in two formats. The first format is generated when a fault detected in the signaling terminal controller (STC) results in the STC being made system busy. The ST that is identified in the log is made system busy as a result of the change of state of the STC. The second format is generated when a fault detected in the D-channel handler (DCH) results in the DCH being made system busy. The services defined by the ISDN service group (ISG) are switched to a spare DCH, if one is available, to prevent loss of service.

PM192 appears in two formats. The first format is generated when the STC is made manual busy and the central side (C-side) node (the ISDN access controller [IAC]) is removed from service. The second format is generated when the IAC of the D-channel handler is removed from service.

Register PMMWXFR

PM manual warm transfers

PMMWXFR is incremented if manual maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm switch of activity (SWACT) or a unit takeover. The activity transfer that is performed depends on the type of PM that is acted upon by the manual request. PMMWXFR is incremented if

- a manual request forces an extended multiprocessor system (XMS)-based peripheral module (XPM), such as a line group controller or a line trunk controller, to perform a warm SWACT
- a manual request forces a line concentrating module (LCM) to perform a takeover of one unit by the other

An LCM can be forced to perform a takeover by making one unit of the LCM manual busy while the mate unit is in service. PMMWXFR counts a takeover of one unit of an LCM by the other unit, but not a takeback of activity.

Two examples of manual actions that can force an XPM to perform a warm SWACT are

- the execution of the SWACT command at the MAP terminal
- a manual request that makes the active unit of an XPM manual busy while the inactive unit is in service

Register PMMWXFR release history

PMMWXFR was introduced prior to BCS20.

Associated registers

PM_PMSWXFR is incremented if system maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm SWACT or a unit takeover.

Associated logs

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

Register PMPSERR

PM peripheral-side errors

PMPSERR counts errors on the P-side interface of an extended multiprocessor system (XMS)-based peripheral module (XPM), or on a link interface module (LIM) frame transport bus (F-bus). PMPSERR is incremented regardless of whether the error is service affecting or results in further maintenance action. XPMs include the line concentrating module (LCM).

PMPSERR is incremented by

- errors in interface cards that terminate lines, trunks, or links
- errors in lines trunks or links
- F-bus errors

Register PMPSERR release history

PMPSERR was introduced prior to BCS20.

OM group PM (continued)

Associated registers

PM_PMPSFLT counts the faults that are detected either on the P-side interface of the PM or on a LIM F-bus. These faults affect service and must be remedied by further maintenance action.

Associated logs

PM110 is generated when a change occurs in the service counts for a DS-1 trunk or link. These service counts are incremented when an error, fault, or state transition occurs within predetermined time intervals. PM110 indicates that a service count has changed.

PM181 provides information on the following conditions:

- a remote LCM or remote digital line module running in emergency stand-alone (ESA) mode
- test failures of ESA mode
- faults discovered during a routine exercise (REX) test
- loss of static data in XPMs (for example, line group controller and line trunk controller) while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line group controllers or line trunk controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM183 is generated when a peripheral module P-side link or F-bus is made system busy.

Register PMPSFLT

PM peripheral-side faults

PMPSFLT counts faults on the P-side interface of an extended multiprocessor system (XMS)-based peripheral module (XPM) or on the link interface module (LIM) frame transport bus (F-bus). These faults are service affecting and require further maintenance action. XPMs include the line concentrating module (LCM).

PMPSFLT is incremented by

- faults in P-side interface cards that terminate trunks, lines, or links
- faults in lines, trunks, and links that are serviced by the interface cards
- faults in the F-bus

Register PMPSFLT release history

PMPSFLT was introduced prior to BCS20.

Associated registers

PM_PMPSERR counts errors on the P-side interface of a XPM or on the LIM F-bus. PM_PMPSERR is incremented regardless of whether the error is service affecting or results in further maintenance action.

Associated logs

PM109 is generated when a DS-1 carrier is made system busy.

PM183 is generated when a PM P-side link or F-bus is made system busy.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise (REX) test
- XPMs (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links that connect line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMRGERR

PM ringing generator errors while in service

PMRGERR counts errors in the ringing generators that supply ringing and automatic number identification (ANI) coin functions to the line concentrating module (LCM). PMRGERR counts all ringing generator errors, regardless of whether the ringing generator is in service at the time of the error. The LCM must be in service at the time of the error.

Since a single ringing generator may service both LCMs in the same frame, one ringing generator error may be counted four times, once by each of the two line concentrating arrays in each of the two LCMs.

Register PMRGERR release history

PMRGERR was introduced prior to BCS20.

Associated registers

PMRGFLT counts service-affecting faults detected in the ringing generators that supply ringing and ANI coin functions to the LCM. The ringing generator must be in service for PMRGFLT to be incremented.

Associated logs

PM160 is generated when a transient failure is detected on a card in a line module or remote line module.

Register PMRGFLT

PM ringing generator faults while in service

PMRGFLT counts service-affecting faults detected in the ringing generators that supply ringing and automatic number identification (ANI) coin functions to the line concentrating module (LCM). The ringing generator must be in service for PMRGFLT to be incremented.

Register PMRGFLT release history

PMRGFLT was introduced prior to BCS20.

Associated registers

PMRGERR counts errors detected in the ringing generators that supply ringing and ANI coin functions to the LCM. PMRGERR is incremented by all ringing generator errors, regardless of whether the ringing generator is in service at the time of the error. The LCM must be in service at the time of the error.

Associated logs

PM161 is generated when a card failure is detected in a line module or remote line module.

PM162 is generated when a redundant circuit in a line module or remote line module changes states.

PM163 is generated when a redundant circuit in a PM changes states.

Register PMSBP

PM transitions to system busy

PMSBP is incremented when the PM is made system busy from an in-service or in-service trouble state. Normally, the PM is made central side (C-side) busy before being made system busy. If the PM is successfully returned to service from the C-side busy state before being made system busy, PMSBP is not incremented.

For line modules (LM), PMSBP is incremented when the LM is made system busy during both warm and cold takeovers.

Register PMSBP release history

PMSBP was introduced prior to BCS20.

Associated registers

PMMBP is incremented when the PM is made manual busy from in service or from having in-service trouble.

Associated logs

PM107 is generated when a system request makes a PM C-side busy.

PM183 is generated when a PM P-side link is made system busy.

PM190 appears in two formats. The first format is generated when a fault in the signaling terminal controller (STC) results in the STC being made system busy. The signaling terminal that is identified in the log is made system busy as a result of the change of state of the STC. The second format is generated when a fault in the D-channel handler (DCH) results in the DCH being made system busy. The services defined by the ISDN service group (ISG) are switched to a spare DCH, if one is available, to prevent loss of service.

PM192 appears in two formats. The first format is generated when the STC is made manual busy and the C-side node (the ISDN access controller

[IAC]) is removed from service. The second format is generated when the IAC of the DCH is removed from service.

Register PMSBTCO

PM system-busy terminals cut off

PMSBTCO counts subscriber calls (terminals) that are cut off when the PM is made system busy. The specific conditions that cause PMSBTCO to be incremented vary with the different PMs. In all cases, subscriber calls must be associated with lines or trunks that are in either call-processing busy or call-processing deloading to be counted by PMSBTCO.

For the digital carrier module and the trunk module, PMSBTCO counts subscriber calls that are cut off when the PM state changes to central side (C-side) busy from an in-service or in-service trouble state. C-side busy is an intermediate state that occurs prior to the PM becoming system busy.

For the line module (LM), PMSBTCO counts the subscriber calls that are cut off when the LM is made system busy. If an LM recovers from the C-side busy state before becoming system busy and the mate LM becomes system busy, the PMSBTCO register associated with the recovered LM is incremented by the number of subscriber calls that were cut off by the system busy mate. This occurs because the LM that has performed the cold takeover is now responsible for the calls of the mate LM but could not preserve these calls through the takeover.

If a warm takeover occurs when an LM is made system busy, no calls are cut off and PMSBTCO is not incremented. When an LM performs a warm takeback of control of its line drawers after being returned to service from system busy, PMSBTCO is incremented by the number of calls that were cut off by the original change to system busy.

For extended multiprocessor system (XMS)-based peripheral modules (XPM), PMSBTCO counts the subscriber calls that are cut off when the PM is made system busy. PMSBTCO is incremented once when a call in the talking state is cut off.

Register PMSBTCO release history

PMSBTCO was introduced prior to BCS20.

Associated registers

PM_PMMBTCO counts subscriber calls (terminals) that are cut off when the PM is made manual busy.

Associated logs

None

Register PMSCXFR

PM system cold transfers

PMSCXFR is incremented when a system action causes an extended multiprocessor system (XMS)-based peripheral module (XPM) to perform a cold switch of activity (SWACT). The following are examples of system actions that can trigger a cold SWACT in an XPM:

- forcing an XPM to perform a cold SWACT
- making the active unit of an XPM system busy
- making the central side (C-side) links to the active unit of an XPM system busy

Register PMSCXFR release history

PMSCXFR was introduced prior to BCS20.

Associated registers

PMMCXFR is incremented when a manual action causes an XPM to perform a cold SWACT.

Associated logs

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM179 is generated when a software condition affects the normal operation of a PM.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in the emergency stand-alone (ESA) mode
- test failures of ESA mode
- faults discovered during a routine exercise (REX) test
- loss of static data in XPMs (for example, line group controllers and line trunk controllers) while being returned to service

OM group PM (continued)

- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line trunk controllers and line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMSWXFR

PM system warm transfers

PMSWXFR is incremented if system maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm switch of activity (SWACT) or a unit takeover. The activity transfer that is performed depends on the type of PM that is acted on by the system request. PMSWXFR is incremented when one of the following actions occurs:

- the system forces an extended multiprocessor system (XMS)-based peripheral module (XPM), such as a line group controller or line trunk controller, to perform a warm SWACT
- the system forces a line concentrating module (LCM) to perform a takeover of one unit by the other

Note that PMSWXFR counts a takeover of one unit of the LCM by the other unit, but not a takeback of activity in the LCM.

The following are examples of system actions that can force an XPM to perform a warm SWACT:

- forcing an XPM to perform a warm SWACT
- making the active unit of an XPM system busy
- making the central side (C-side) links to the active unit of an XPM busy

The following are examples of system actions that can cause an LCM to perform a takeover:

- making one unit of the LCM system busy while the mate unit is in service
- making the C-side links to either LCM unit system busy while the mate unit is in service

Register PMSWXFR release history

PMSWXFR was introduced prior to BCS20.

Associated registers

PM_PMMWXFR is incremented if manual maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm SWACT or a unit takeover.

Associated logs

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM179 is generated when a software condition occurs that affects the normal operation of a PM.

PM180 is generated either because of software failure, or because a hardware problem is affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or remote digital line module running in the emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise (REX) test
- loss of static data in XPMs (for example, line group controllers and line trunk controllers) while being returned to service
- changes in the loading status of a Custom Local Area Signaling Services (CLASS) modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMUMBU

PM unit manual-busy usage

PMUMBU is a usage register. Every 100 s, the PMs are scanned and PMUMBU records whether a PM unit is manual busy.

If both units of a dual-unit PM are manual busy, PMUMBU is incremented twice after each scan interval, once for each unit.

Register PMUMBU release history

PMUMBU was introduced prior to BCS20.

OM group PM (continued)

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to its display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS25

Software change made to provide usage counts in either CCS or deci-erlangs

Associated registers

PM_PMMMBU records whether the PM is manual busy.

Associated logs

CCS218 is generated when a local subsystem is made manual busy. This occurs if

- one local subsystem instance is made manual busy and all other local subsystem instances are offline
- the last local subsystem is made manual busy from an in-service or system-busy state

CCS233 is generated when a local subsystem instance is made manual busy.

PM105 is generated when a PM is made manual busy.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM182 is generated when the P-side link of a PM is made manual busy.

PM191 appears in two formats. The first format is generated when a signaling terminal controller (STC) is made manual busy. The signaling terminal that is identified in PM191 is made manual busy as a result of the change of state of the STC.

The second format is generated when the D-channel handler is made manual busy. The ISDN service group (ISG) field in PM191 identifies the services that are affected by this action.

Register PMUSBU

PM unit system-busy usage

PMUSBU is a usage register. Every 100 s, the PMs are scanned and PMUSBU records whether a PM unit is system busy.

If both units of a dual-unit PM are system busy, PMUSBU is incremented twice after each scan interval, once for each unit.

One unit of a dual-unit PM can be made system busy as a result of the following problems:

- test failure
- excessive unsolicited messages
- auto unit resets

Register PMUSBU release history

PMUSBU was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to its display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

Associated registers

PM_PMMSBU records whether the PM is system busy.

Associated logs

CCS219 is generated when a local subsystem is made system busy. This occurs when one local subsystem instance is made system busy and all other local subsystem instances are either offline or manual busy.

CCS234 is generated when a local subsystem instance is made system busy.

PM102 is generated when a PM is made system busy.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related, or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

PM152 is generated when a line drawer is made system busy.

PM183 is generated when a PM P-side link is made system busy.

PM190 appears in two formats. The first format is generated when a fault in the signaling terminal controller (STC) results in the STC being made system busy. The signaling terminal that is identified in the log is made system busy as a result of the change of state of the STC. The second format is generated when a fault in the D-channel handler (DCH) results in

OM group PM (end)

the DCH being made system busy. The services defined by the ISDN service group (ISG) are switched to a spare DCH, if one is available, to prevent loss of service.

PM192 appears in two formats. The first format is generated when the STC is made manual busy and the C-side node (the ISDN access controller [IAC]) is removed from service. The second format is generated when the IAC of the DCH is removed from service.

OM group PMSTAT

OM description

Peripheral module status

Peripheral module status (PMSTAT) records statistics on microprocessor occupancy for each unit of the extended line concentrating module (XLCM) family of peripheral modules (PM). Occupancy refers to the amount of time during each 10-s period that the microprocessor spends doing work. PMSTAT records an overhead constant, total processor occupancy, call processing occupancy, peak occupancy, low occupancy, and available time of the XLCM.

Release history

OM group PMSTAT was introduced in BCS35.

Registers

OM group PMSTAT registers display on the MAP terminal as follows:

```
PMOVHEAD        PMAVOC          PMAVCP          PMPEAKOC
PMLOWOC         PMAVAIL
```

Group structure

OM group PMSTAT provides two tuples per line concentrating module (LCM).

Key field: PMSTAT_OM_KEY
Info field: None

Associated OM groups

None

Associated functional groups

The XLCM peripherals functional group is associated with OM group PMSTAT.

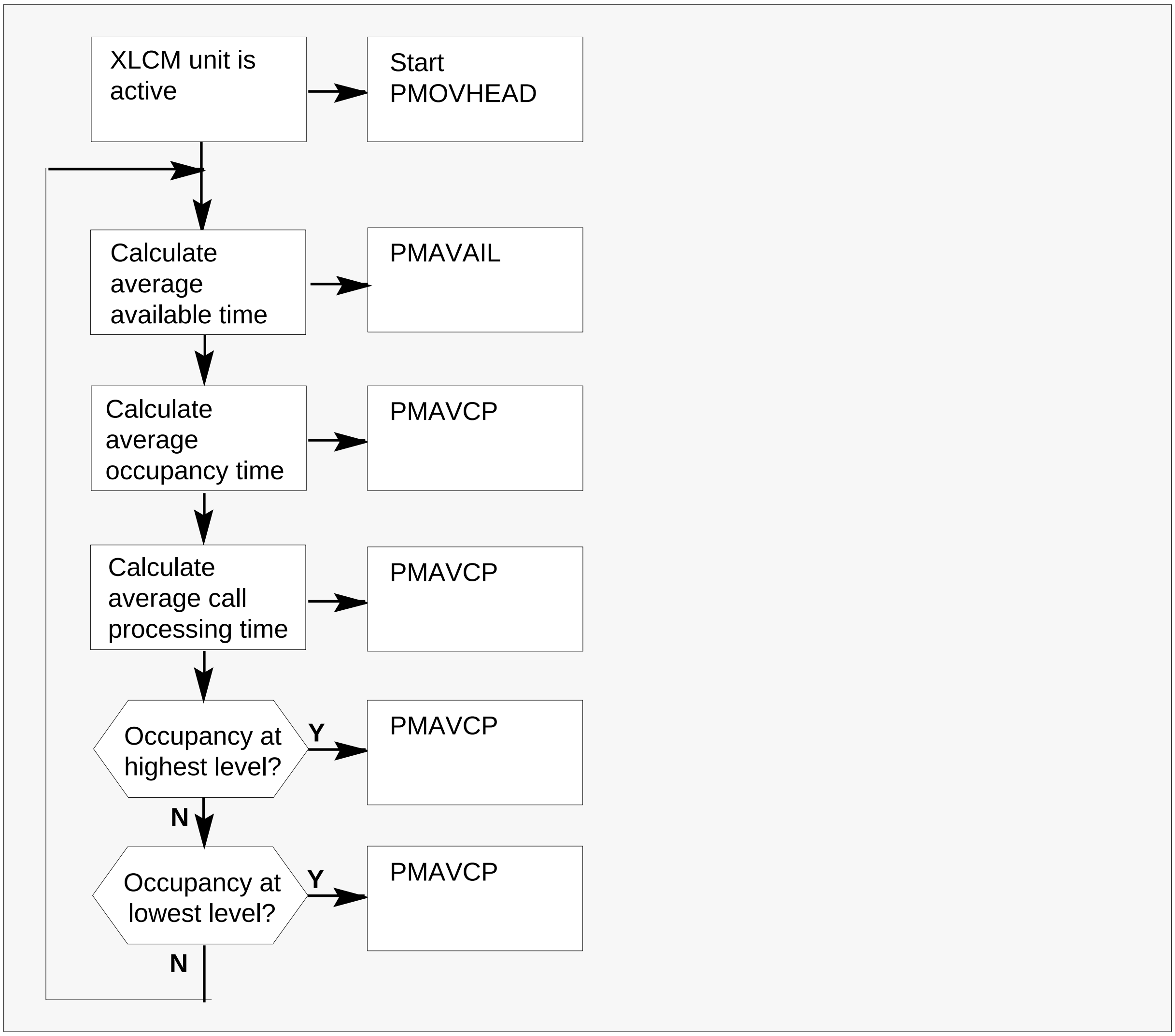
OM group PMSTAT (continued)

Associated functionality codes

The functionality codes associated with OM group PMSTAT are shown in the following table.

Functionality	Code
New Peripheral Maintenance Package	NTX270AA

OM group PMSTAT registers



Register PMAVAIL

PM available

PM available (PMAVAIL) is updated every 10s to record the average amount of time (in percent) that the microprocessor has no work to perform during each 15-min interval. The PM's available time is inversely proportional to the PM's average occupancy (PMAVOC) time.

Register PMAVAIL release history

PMAVAIL was introduced in BCS35.

Associated registers

None

Associated logs

None

Extension registers

None

Register PMAVCP

PM average call processing

PM average call processing (PMAVCP) is updated every 10s to record the average processor occupancy (in percent) used for call processing during each 15-min interval.

Register PMAVCP release history

PMAVCP was introduced in BCS35.

Associated registers

PMAVCP = PMAVOC - PMOVHEAD

PMAVOC is updated every 10s to record the average processor occupancy (in percent) for each 15-min interval.

PMOVHEAD

OM group PMSTAT (continued)

Associated logs

None

Extension registers

None

Register PMAVOC

PM average occupancy

PM average occupancy (PMAVOC) is updated every 10s to record the average processor occupancy (in percent) for each 15-min interval.

Register PMAVOC release history

PMAVOC was introduced in BCS35.

Associated registers

PMAVOC = 100 - PMAVAIL

PMAVAIL is updated every 10s to record the average amount of time (in percent) that the microprocessor has no work to perform during each 15-min interval.

Associated logs

None

Extension registers

None

Register PMLOWOC

PM low occupancy (low-water mark)

PM low occupancy (low-water mark) (PMLOWOC) records the lowest processor occupancy value (in percent) over each 15-min interval. Samples are taken every 10s in each 15-min interval to determine the highest available time. The low occupancy value is then derived as follows:

- PMLOWOC = 100 - highest available time

To predict lowest usage accurately, low-water marks should be gathered for the least busy hours of the least busy days of the year. This data is then used to calculate and adjust the provisioning of processor occupancy so that it is never less than 20% utilized during the least busy times.

Register PMLOWOC release history

PMLOWOC was introduced in BCS35.

Associated registers

None

Associated logs

None

Extension registers

None

Register PMOVHEAD

PM overhead

PM overhead (PMOVHEAD) records the amount of processor usage dedicated to overhead in each 15-min interval. The overhead value is used as a constant for calculating the average call processor usage (PMAVCP).

The overhead constant is used over a 24-hr period. During this time, the available time value in each 15-min interval is checked to determine if it is the highest recorded value. (Note: highest availability = lowest occupancy.) If this value is higher than any of the previous records, it is stored and used to obtain the overhead constant for the following 24-hr period. This method allows for a dynamic calculation of overhead that takes into account configuration changes and additional services allocated in the past 24-hr period.

Register PMOVHEAD release history

PMOVHEAD was introduced in BCS35.

Associated registers

PMOVHEAD = 100 - lowest PMAVOC over 24-hr period

Associated logs

None

Extension registers

None

Register PMPEAKOC

PM peak occupancy (high-water mark)

OM group PMSTAT (end)

PM peak occupancy (high-water mark) (PMPEAKOC) records the peak processor occupancy (in percent) over each 15-min interval. Samples are taken every 10s in each 15-min interval to determine the lowest available time. The peak occupancy is then derived as follows:

- PMPEAKOC = 100 - lowest available time

To predict peak usage accurately, the high-water marks should be gathered for the busiest hours of the busiest days of the year (following either the High-Day Busy Hour or the Extreme Value Engineering provisioning concept). This data is then used to calculate and adjust the provisioning of processor occupancy so that it is never more than 80% utilized during the busiest times.

Register PMPEAKOC release history

PMPEAKOC was introduced in BCS35.

Associated registers

None

Associated logs

None

Extension registers

None

OM group PMTYP

OM description

Peripheral module type

The registers in group PMTYP count the peripheral module (PM) errors, faults, and state transitions for a group of PMs of the same type. For example, PMTYP can count the total errors, faults, and state transitions for all line group controllers.

PMs modules that are being commissioned or are under test can be excluded from the totals provided by PMTYP by datafilling the node number of these PMs in table PMEXCEPT.

The data supplied by group PMTYP are used to access the performance of a group of PMs of the same type. The events that affect PM hardware or software and increment the PMTYP registers include

- errors and faults
- transitions to system busy or manual busy
- warm or cold control transfers
- the running or failing of circuit tests
- errors or faults detected on the peripheral side (P-side) interface
- ringing generator problems
- calls lost when the PM is system or manual busy
- outside-plant circuit failures
- integrity failures reported by the PM
- errors and faults of a PM drawer
- manual busy or system busy PM drawers
- manual busy or system busy modules
- manual busy or system busy units

Release history

OM group PMTYP was created prior to BCS20

CSP02

One additional tuple is added to provide information on the Global Peripheral Product (GPP) peripheral module.

OM group PMTYP (continued)

BCS35

The key field includes the value HSI2 identifying the high-speed interface for series 2 (HSI2) peripheral module.

BCS34

RCO2 added to key field to include maintenance information on an additional PM type: remote switching center offshore #2 (RCO2). ICRM added to key field to include maintenance information on an additional PM type: integrated cellular remote module (ICRM).

BCS32

IDT added to key field to include maintenance information on an additional PM type: integrated digital terminal (IDT). DFI added to key field to include maintenance information on an additional PM type: direct fiber interface (DFI). RCC2 added to key field to include maintenance information on an additional PM type: compact remote cluster controller (RCC2). Register PMTERR no longer incremented as a result of routine exercise (REX) tests.

BCS31

IPE added to key field to include maintenance information on an additional PM type: intelligent peripheral equipment (for Meridian SL-100 PBX).

BCS29

RCCI added to key field to include maintenance information on an additional PM type: ISDN remote cluster controller (RCCI). SMSR added to key field to include maintenance information on an additional PM type: subscriber carrier module-100S remote (SMSR).

BCS28

GIC added to key field to include maintenance information on an additional PM type: generic interface controller (GIC).

BCS25

Registers PMTDRFLT, PMTDRERR, PMTRMBU, and PMTDRSBU added

BCS21

Software change to provide usage counts either in hundred call seconds (CCS) or deci-erlangs

Registers

OM group PMTYP registers display on the MAP terminal as follows:

```
PMTERR      PMTFLT      PMTMSBU     PMTUSBU
PMTMMBU     PMTUMBU     PMTSBP      PMTMBP
PMTSWXFR    PMTMWXFR    PMTSCXFR    PMTMCXFR
PMTCCTDG    PMTCCTFL    PMTPSERR    PMTPSFLT
PMTRGERR    PMTRGFLT    PMTSBTCO    PMTMBTCO
PMTCCTOP    PMTINTEG    PMTDRFLT    PMTDRERR
PMTDRMBU    PMTDRSBU
```

Group structure

OM group PMTYP provides one tuple for each PM type.

Key field: PM_TYPE. The tuple is accessed using the key field. The possible values for the key field and the PMs that correspond to these values are listed in table 1.

Info field: PMTYP_OM_INFO_TYPE. This field includes the total number of PMs of the same type (for example, LCMs) on the switch. The total contained in this field does not include PMs with node numbers datafilled in table PMEXCEPT.

Table PMEXCEPT is datafilled with the node number of each PM that is to be excluded from group PMTYP totals.

If the office parameter OMINERLANGS in table OFCOPT is set to Y (yes), then the output from the usage registers PMTMSBU, PMTUSBU, PMTMMBU, PMTUMBU, PMTDRMBU, and PMTDRSBU is in deci-erlangs.

Info field values and PM types

Info field value	Peripheral module (node)
ADTC	Austrian digital trunk controller
ALCM	Austrian line concentrating module
ALGC	Austrian line group controller
AP	Application processor

-continued-

OM group PMTYP (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (node)
APU	Application processing unit
ARCC	Austrian remote cluster controller
CFI	Channel frame interface
CFP	Channel frame processor
CSC	Cell site controller
CTM	Conference trunk module
DA	Directory assistance database
DCA	Austrian digital carrier module
DCM	Digital carrier module
DCM250	Digital carrier module DMS-250
DES	Digital echo suppressor
DFI	Direct fiber interface
DLM	Digital line module
DTC	Digital trunk controller
DTC7	Digital trunk controller
DTCI	Digital trunk controller for ISDN
DTCO	Digital trunk controller offshore
DTM	Digital trunk module
EIU	Ethernet interface unit
ELCM	Enhanced line concentrating module
ESA	Emergency stand alone
EXND	External node
FRCC	Force (download) remote cluster controller
FRIU	Frame relay interface unit
FilP	File processor
GIC	Generic interface controller
HFT	HDLC frame transceiver

-continued-

Info field values and PM types (continued)

Info field value	Peripheral module (node)
HSI	High-speed interface
HSI2	High-speed interface series 2
HSIE	High-speed interface extended
IAC	ISDN access controller
ICP	Integrated cellular peripheral
ICRM	Integrated cellular remote module
IDT	Integrated digital terminal
IDTC	International digital trunk controller
ILCM	International line concentrating module
ILGC	International line group controller
ILTC	International line trunk controller
IXLCM	International extended line concentrating module
IPE	Intelligent peripheral equipment
ITAC	International TATS access controller
LCM	Line concentrating module
LCME	LCM enhanced
LCMI	ISDN line concentrating module
LCOM	LIU-COM (link interface unit data communication)
LDT	Line appearance on a digital trunk
LGC	Line group controller
LGCI	Line group controller ISDN
LGCO	Line group controller offshore
LIM	Link interface module
LIU	Link interface unit
LIU7	Link interface unit 7
LM	Line module
LRU	Line resource unit

-continued-

OM group PMTYP (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (node)
LTC	Line trunk controller
LTCI	Line trunk controller ISDN
MMA	Austrian maintenance trunk module
MSB6	Message switch buffer for CCIS6
MSB7	Message switch buffer for CCIS7
MTM	Maintenance trunk module
NIU	Network interface unit
OAU	Office alarm unit
OPM	Outside plant module
ORDB	Operator reference database
PDTC	PCM30 digital trunk controller
PLGC	PCM30 line group controller
PND	PNODE
PRCC	PCM30 remote cluster controller
PSP	Programmable signal processor
PTM	Packaged trunk module
RCC	Remote cluster controller
RCC2	Compact remote cluster controller
RCCI	ISDN remote cluster controller
RSCO2	Remote switching center offshore 2
RCS	Remote concentrator SLC96
RCT	Remote concentrator terminal
RCU	Remote carrier urban
RLC	Remote line controller
RLCM	Remote line concentrating module
RLM	Remote line module
RMM	Remote maintenance module

-continued-

Info field values and PM types (continued)

Info field value	Peripheral module (node)
RMSC	Remote mobile switching center
RSC	Remote switching center
RSCO	Remote switching center offshore
RSM	Remote service module
SCM	Subscriber carrier module
SMA	Subscriber carrier module access
SMR	Subscriber carrier module-100 rural
SMS	Subscriber carrier module-100S
SMSR	Subscriber carrier module-100S remote
SMU	Subscriber carrier module-100 urban
SPM	Service peripheral module
SRCC	Second series remote cluster controller
SRU	Small remote unit (ISDN LCM)
STCM	Signal terminal controller module
STM	Service trunk module
STS	Standardized traffic statistics
SVR	Server
T8A	Trunk module for CCITT circuits
TACC	TATS access controller
TAN	Test access network
TDTC	MOC DTC (MOC is a NT licencee)
TLGC	MOC LGC (MOC is a NT licencee)
TLTC	MOC LTC (MOC is a NT licencee)
TM	Trunk module
TM2	Trunk module-2 wire
TM4	Trunk module-4 wire
TM8	Trunk module ATT testing

-continued-

OM group PMTYP (continued)

Info field values and PM types (continued)

Info field value	Peripheral module (node)
TMA	Trunk module Austria
TMS	TOPS message switch
TPC	TOPS position controller
TRCC	MOC RCC (MOC is a NT licencee)
VPU	Voice processing unit
VSR	Very small remote
VSROM	Very small remote
XLCM	Expanded memory line concentrating module
XLIU	X.25/X.75 link interface unit
XRLCM	Extended remote line concentrating module
-end-	

Associated OM groups

PMTYP is used with PM or PM2. The same errors, faults, and state transitions counted by PMTYP are counted by PM and PM2; however, PM and PM2 count these events for individual PMs, while PMTYP counts these events for groups of PMs of the same type. PMTYP provides totals of the counts made by the registers in PM or PM2 for each type of PM.

PM counts maintenance events for PMs that have node numbers. PM2 counts the same maintenance events for PMs without node numbers.

Associated functional groups

The following functional groups are associated with OM group PMTYP:

- DMS-100 Local Office
- DMS-100/200 Combined Local/Toll office
- DMS-100/200 Combined Local/Toll Office with TOPS
- DMS-200 Toll Office
- DMS-200 with TOPS
- DMS-MTX Mobile Telephone Exchange
- DMS-250 Toll/Tandem Switch

- DMS-300 Gateway
- Meridian SL-100 PBX

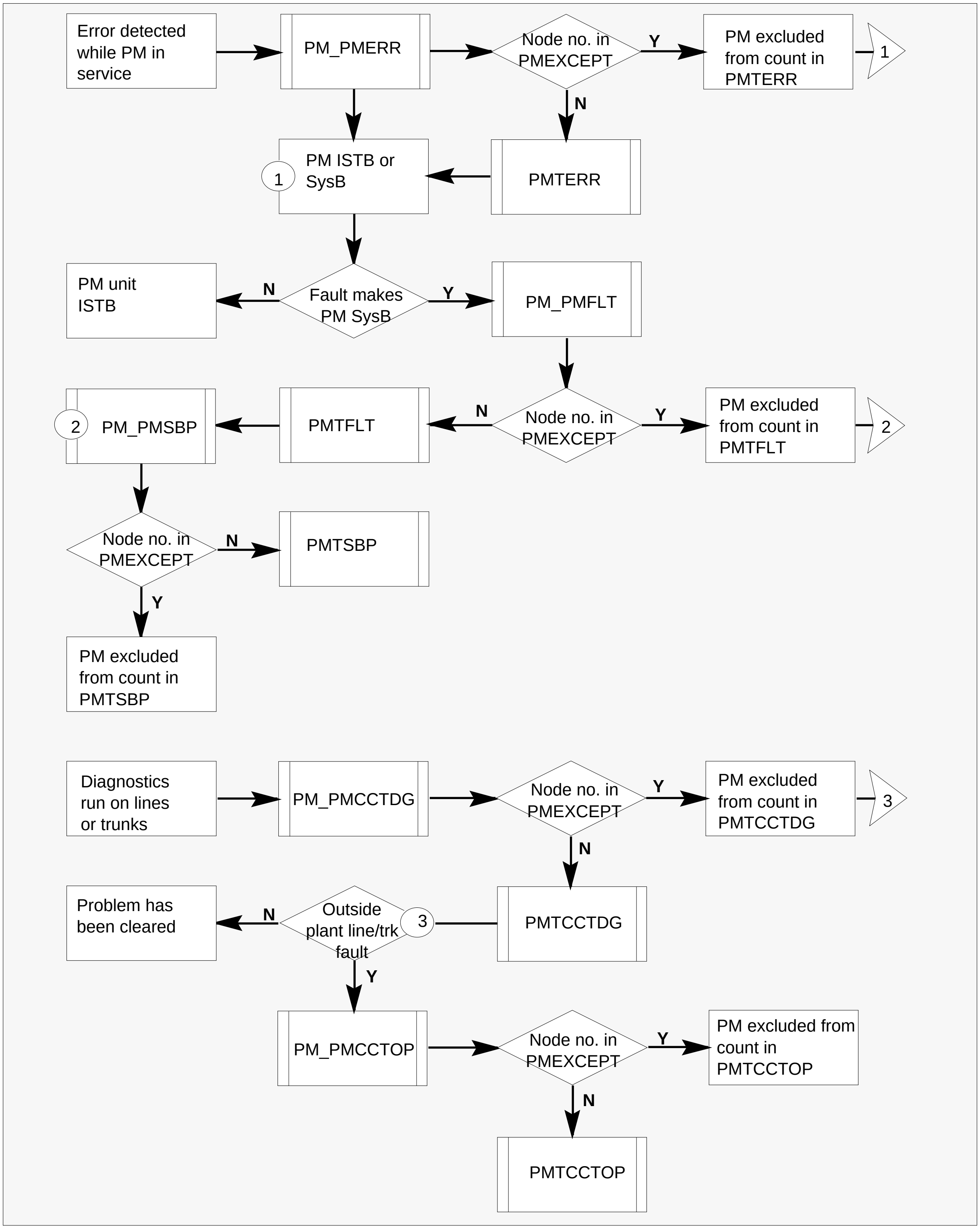
Associated functionality codes

The functionality codes associated with OM group PMTYP are shown in the following table.

Functionality	Code
Meridian SL-100 Cabinetized Software	NTXA10AA
CC MNTCE	NTXB58AA
Extended Peripheral Equipment	NTXN25AA
Common Basic	NTX001AA
New Peripheral Maintenance Package	NTX270AA
Digital Phone M2000-Basic	NTX640AA
OMs in Erlangs	NTX664AA
ISDN Basic Access	NTX750AB

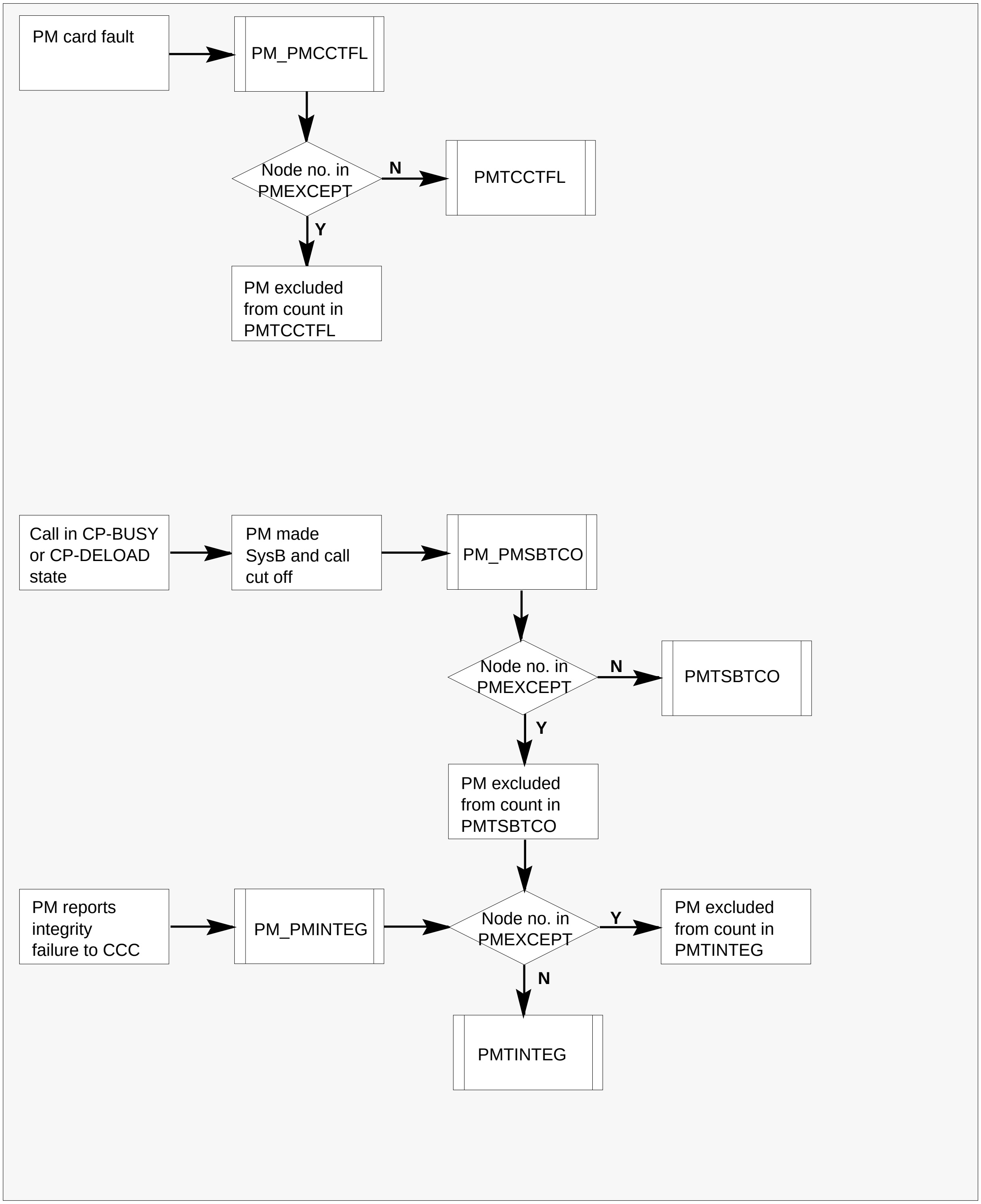
OM group PMTYP (continued)

OM group PMTYP registers: single-unit PM system action



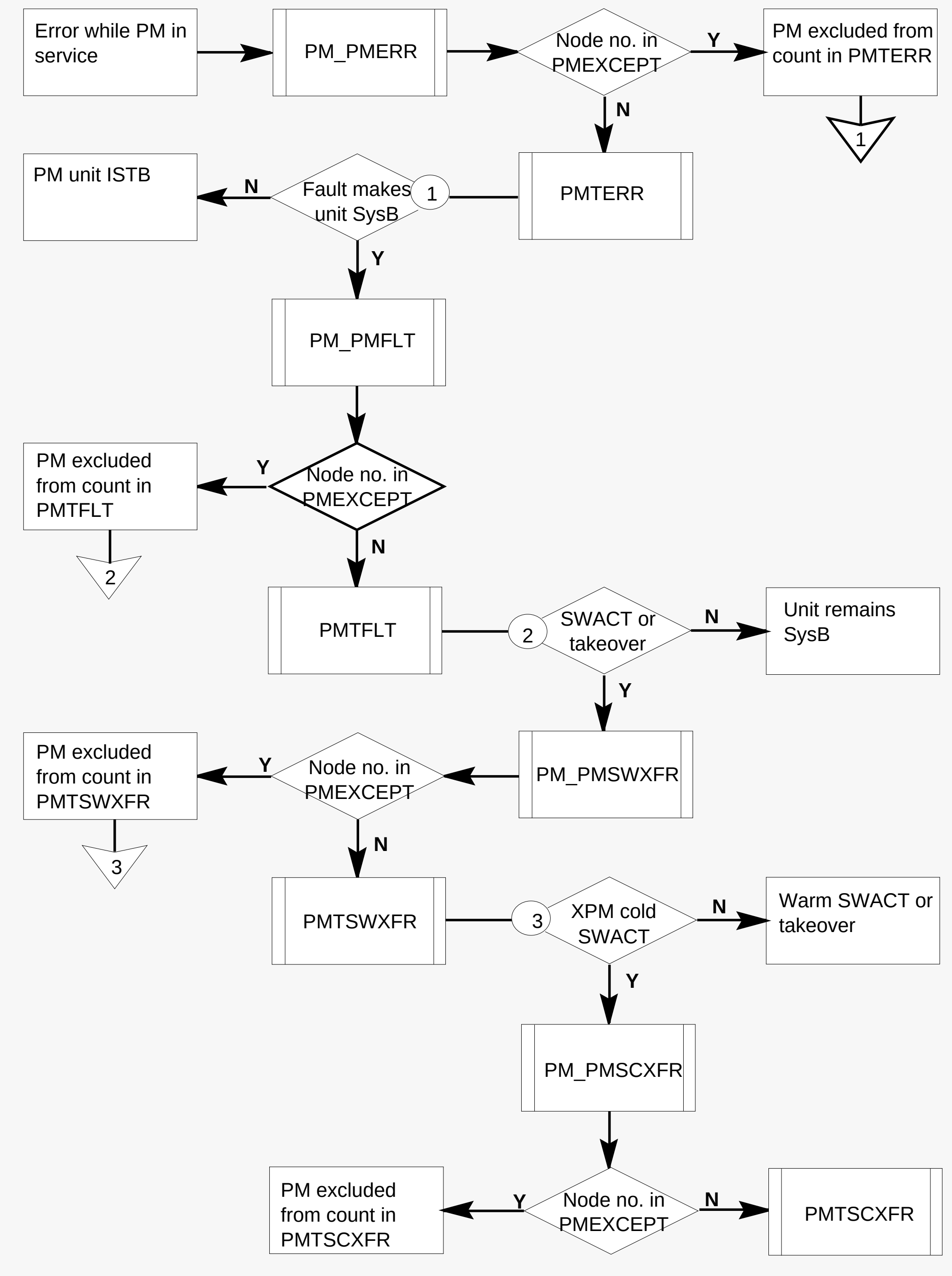
OM group PMTYP (continued)

OM group PMTYP registers: single-unit PM system action



OM group PMTYP (continued)

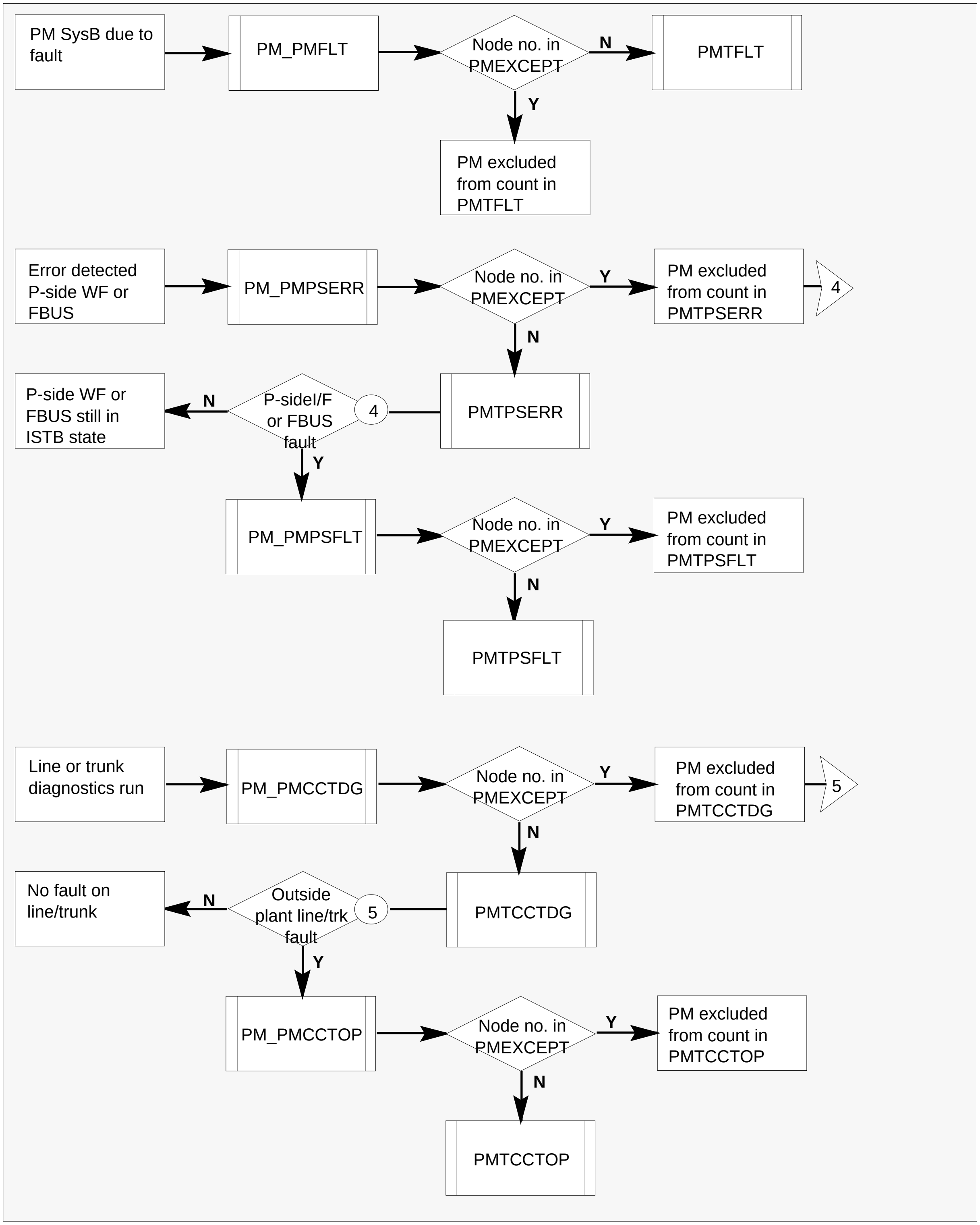
OM group PMTYP registers: dual-unit PMs system action



The very small remote (VSR), enhanced line module (ELCM), and PCM30 line group controller (PLGC) PMs use PMTYP in conjunction with group PM2.

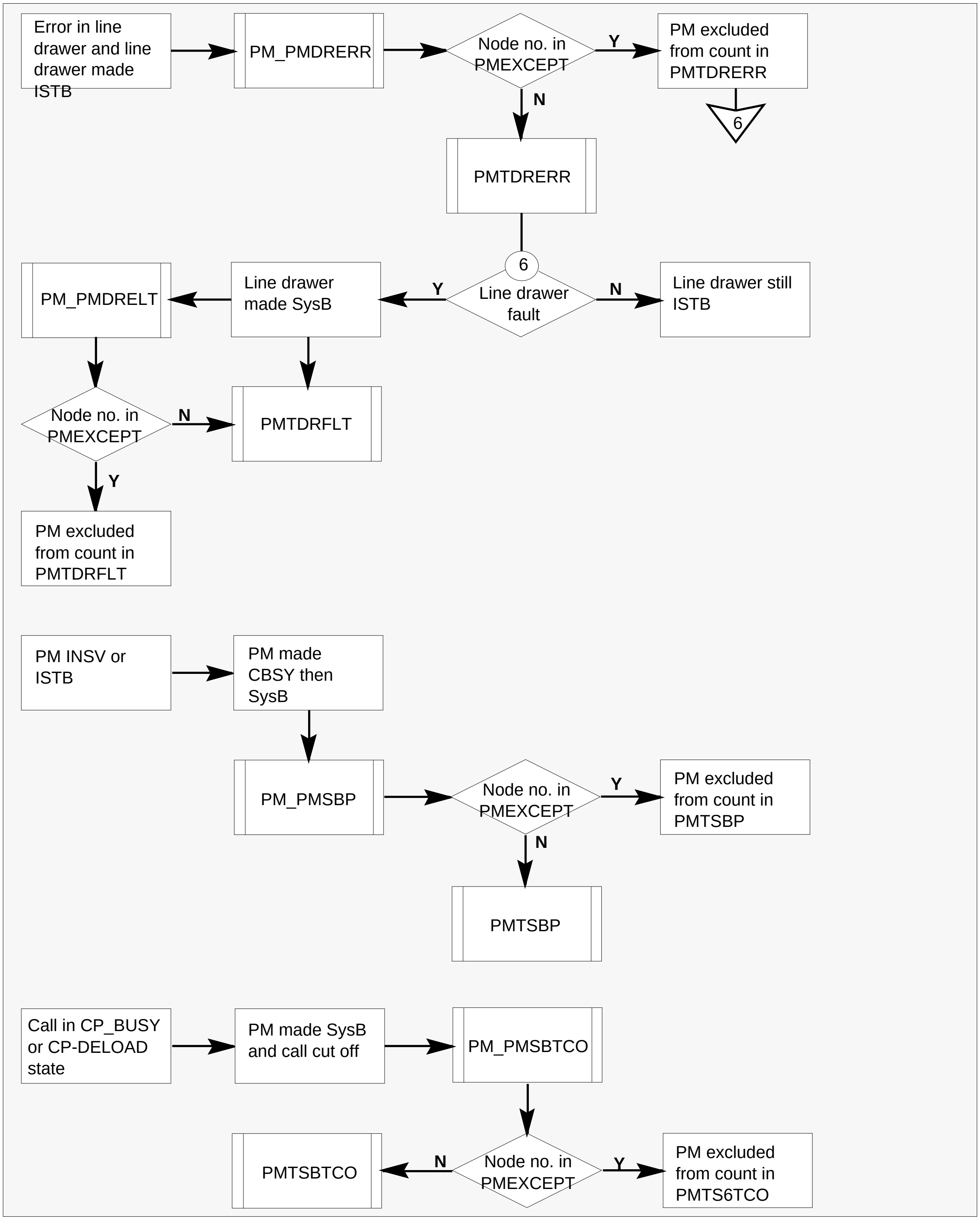
OM group PMTYP (continued)

OM group PMTYP registers: dual-unit PMs system action



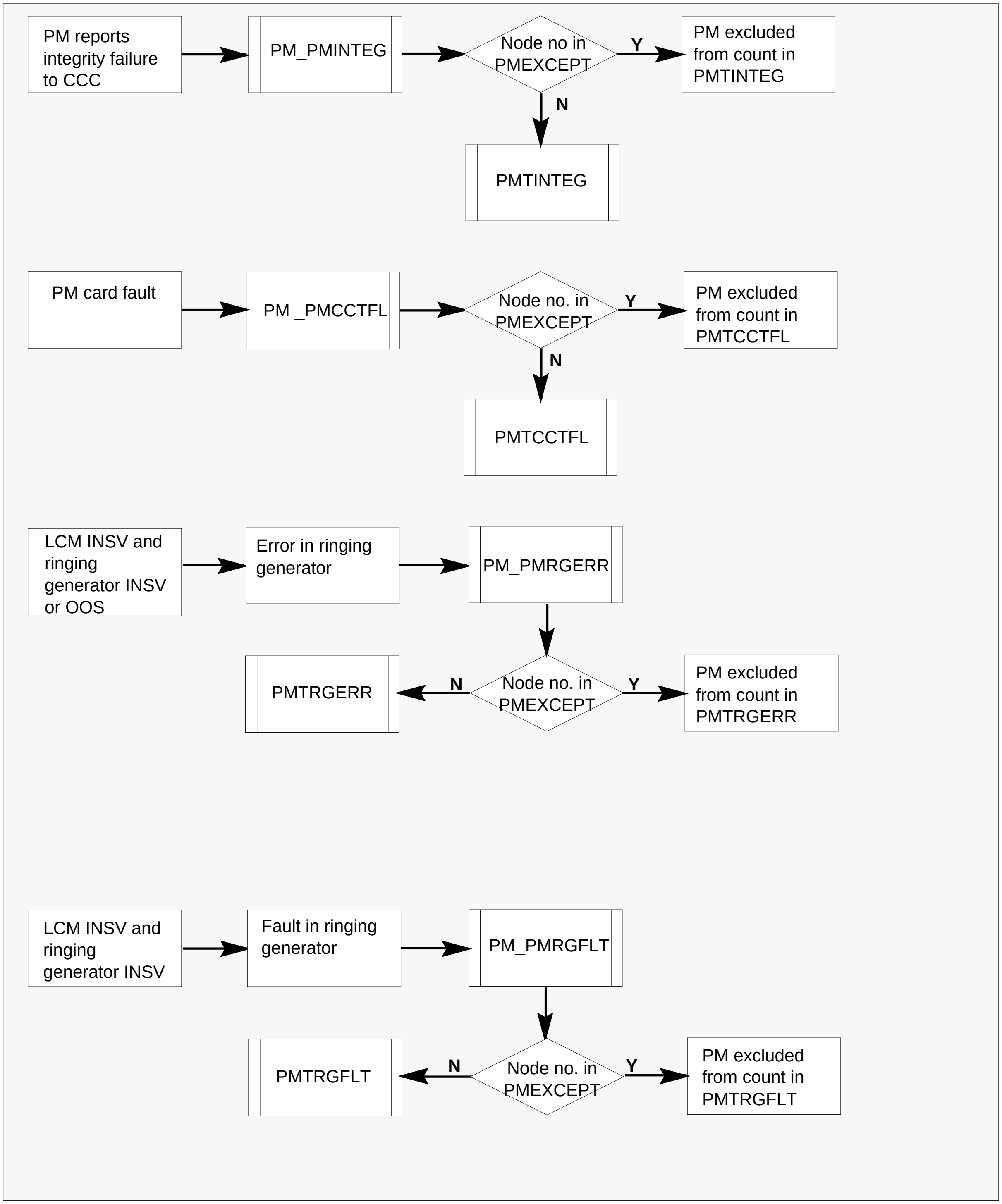
OM group PMTYP (continued)

OM group PMTYP registers: dual-unit PMs system action



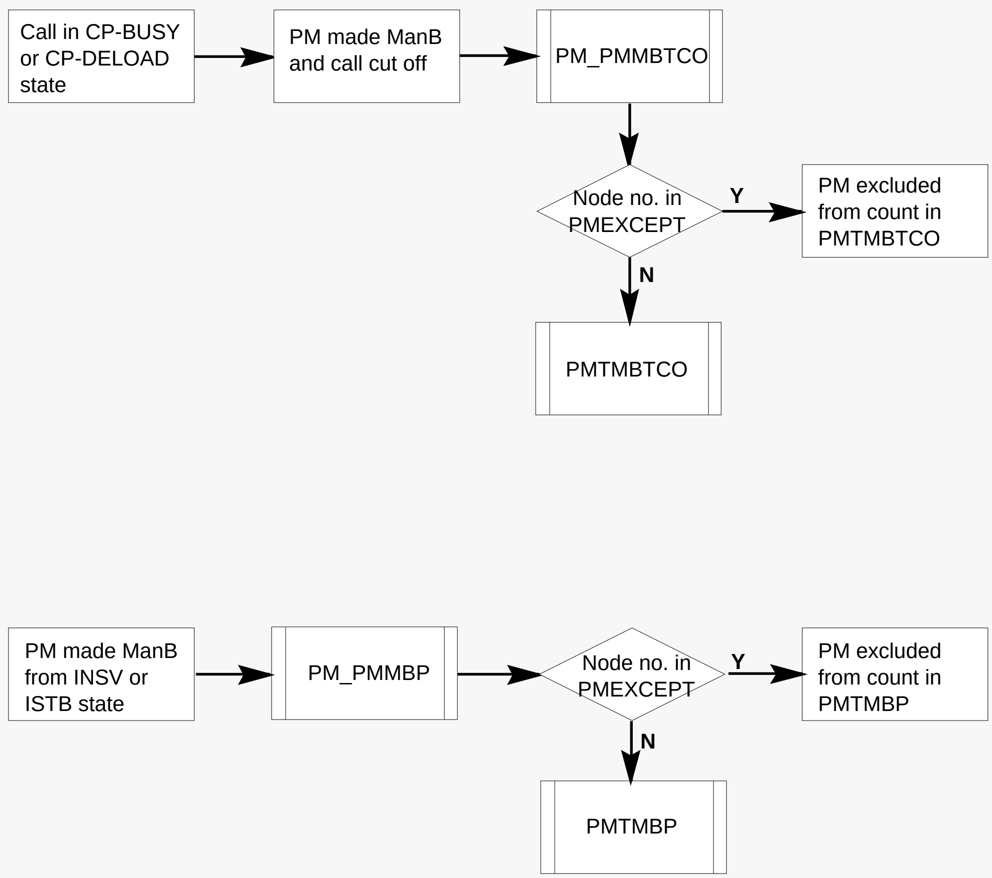
OM group PMTYP (continued)

OM group PMTYP registers: dual-unit PMs system action



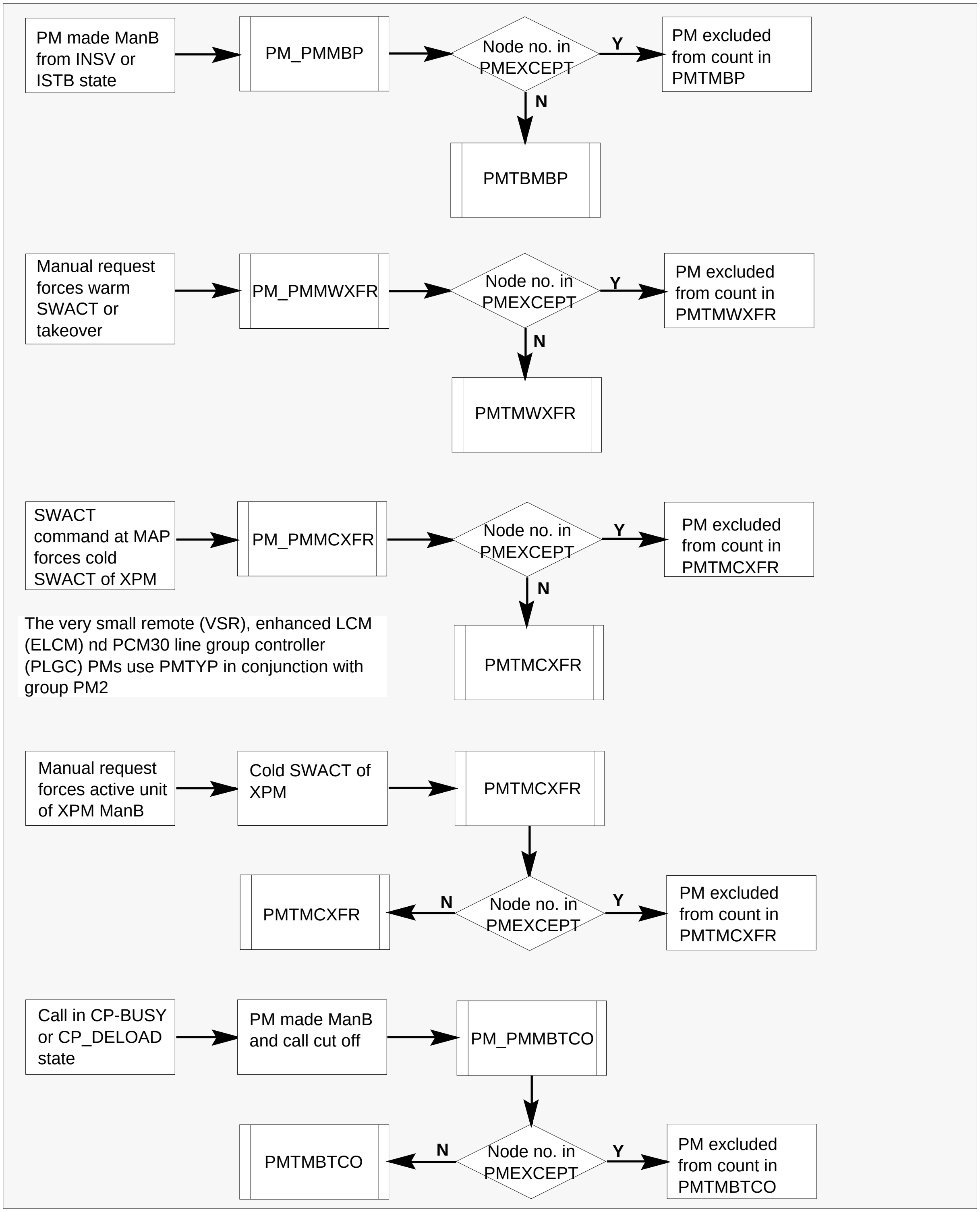
OM group PMTYP (continued)

OM group PMTYP registers: single-unit PMs manual action



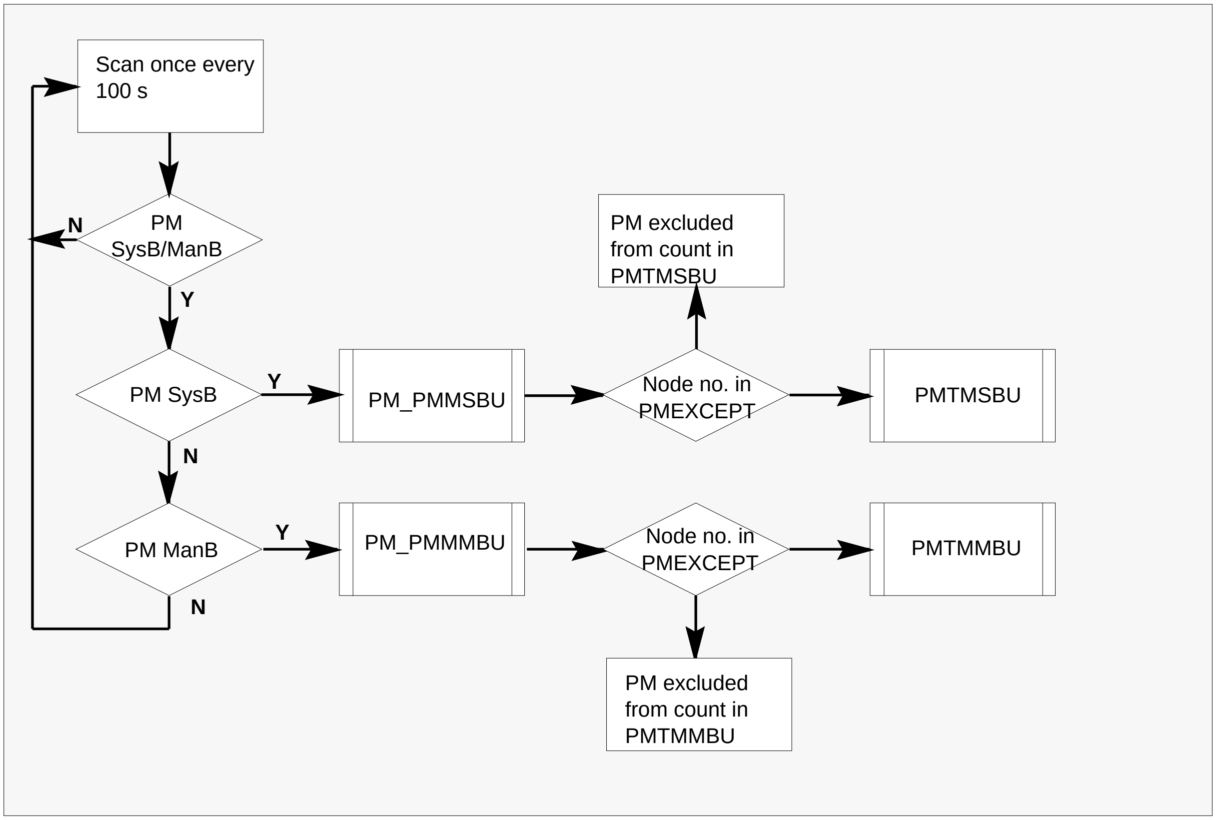
The very small remote (VSR), enhanced line module (ELCM), and PCM30 line group controller (PLGC) PM use PMTYP in conjunction with group PM2.

OM group PMTYP registers: dual-unit PMs manual action



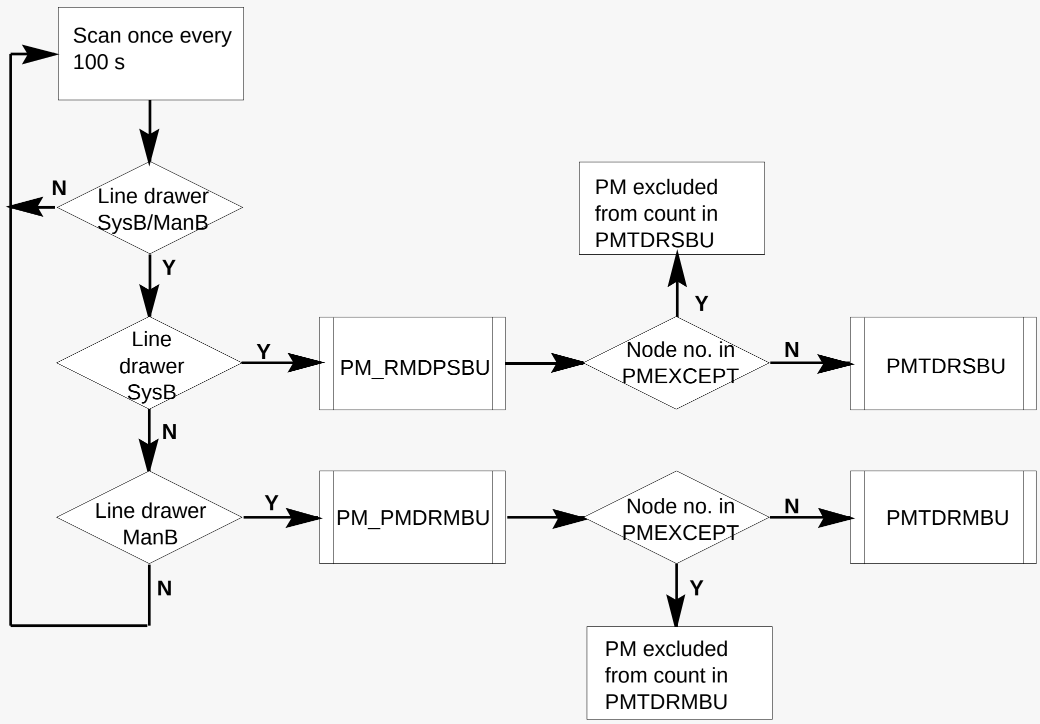
OM group PMTYP (continued)

OM group PMTYP usage registers for PMs



OM group PMTYP (continued)

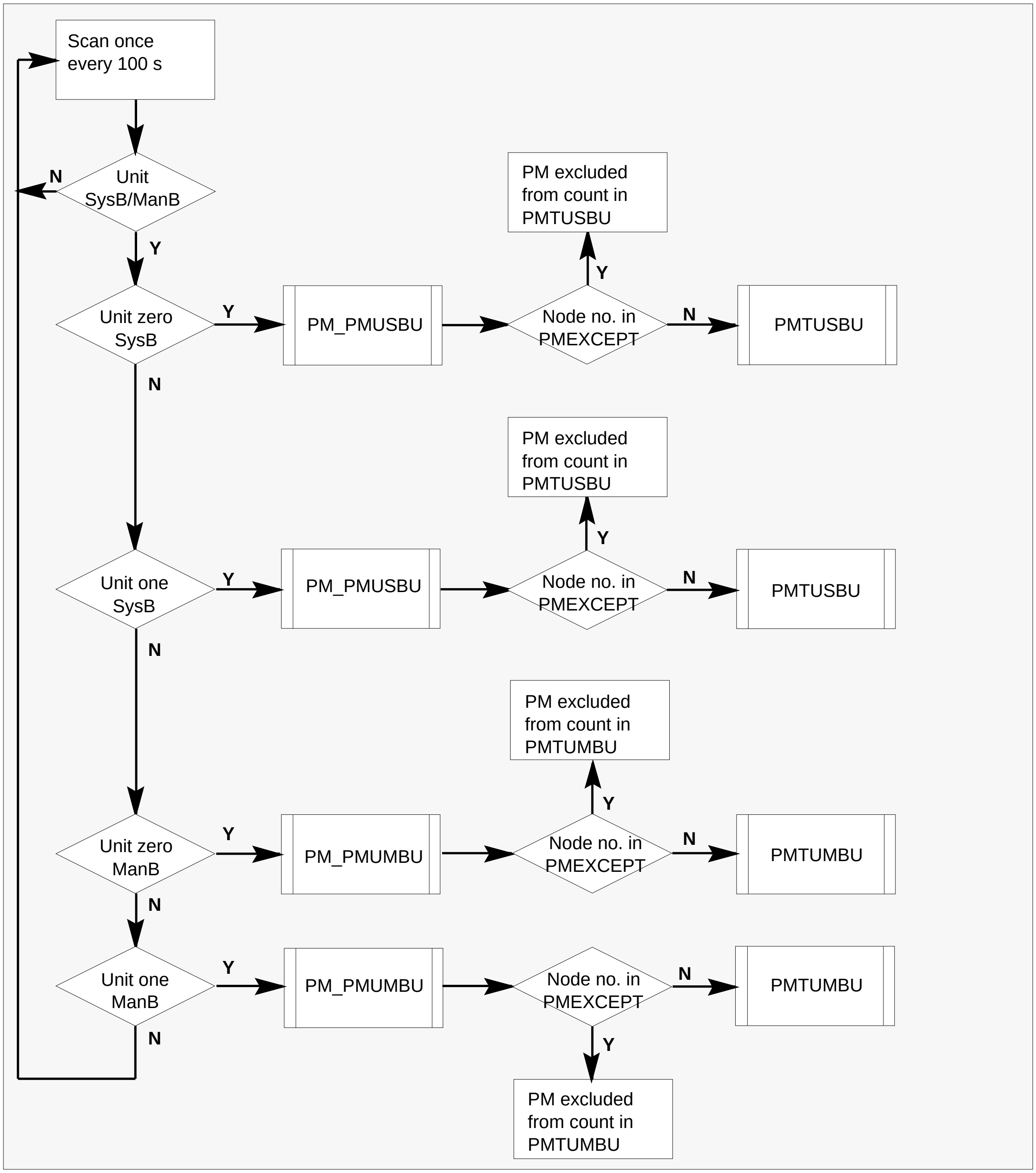
OM group PMTYP usage registers for line drawers



The very small remote (VSR), enhanced line module (ELCM), and PCM30 line group controller (PLGC) PMs use PMTYP in conjunction with group PM2.

OM group PMTYP (continued)

OM group PMTYP usage registers for PM units



Register PMTCCTDG

PM total circuit diagnostics run

PMTCCTDG counts system-initiated tests run on a line card or trunk card because of repeated problems encountered during call processing. PMTCCTDG counts this type of maintenance event for an entire group of PMs of the same type. The maintenance conditions that cause PMTCCTDG to be incremented vary for the different PMs.

For the digital carrier module, PMTCCTDG counts tests run on any trunk interface card because of problems during call processing. The diagnostics determine whether a DS-1 interface card has been removed or whether loss of framing has caused a local or remote-carrier-group alarm state.

For either the line module or the digital line module, PMTCCTDG is incremented whenever system-initiated diagnostics are run on line cards.

For the trunk module, PMTCCTDG is incremented when diagnostics are run on any trunk interface card or service circuit. The trunk module diagnostics include

- verification that cards of the right type are present on the shelf
- operation of the test relay
- operation and release of signal distribution points and analysis of scan results
- checking of transmission loss in looparound mode

For extended multiprocessor system (XMS)-based peripheral modules (XPM), PMTCCTDG is incremented when a system-initiated diagnostic is run on a line or trunk because of repeated problems during call processing.

Register PMTCCTDG release history

PMTCCTDG was introduced prior to BCS20.

Associated registers

PM_PMTCCTDG counts system-initiated diagnostics for each PM.

PMTYP_PMTCCTFL is incremented when system-initiated diagnostics determine that a PM maintenance problem is caused by a card fault, a missing card, a wrong card, or various other fault conditions. PMTYP_PMTCCTFL counts this type of activity for a group of PMs of the same type.

OM group PMTYP (continued)

Associated logs

PM110 is generated when a change occurs in the service counts for a DS-1 trunk or link.

TRK106 is generated when trunk equipment fails a test initiated by a manual or system request.

Register PMTCCTFL

PM total circuit diagnostics failed

PMTCCTFL is incremented when system-initiated diagnostics determine that a PM maintenance problem is caused by a card fault, a missing card, a wrong card, or various other fault conditions. PMTCCTFL counts these events for an entire group of PMs of the same type.

The specific faults that cause the count of PMTCCTFL to increase are different for each PM.

For the digital carrier module, PMTCCTFL is incremented when diagnostics reveal that a fault is caused by one of the following conditions:

- a card was removed
- a transmission error, resulting in a carrier group alarm

For the line module, PMTCCTFL is incremented when diagnostics reveal that a maintenance problem is caused by a PM fault, a card fault, a facility fault, or by a missing or wrong card.

For the trunk module, the digital carrier module, and extended multiprocessor system (XMS)-based peripheral modules (XPM), PMTCCTFL is incremented when diagnostics detect a wrong card, no card, or a faulty card.

Register PMTCCTFL release history

PMTCCTFL was introduced prior to BCS20.

Associated registers

PM_PMCCTFL is incremented when a system-initiated diagnostic determines that a PM maintenance problem is caused by a fault condition. PM_PMCCTFL is incremented for an individual PM.

PMTYP_PMTCCTDG is incremented when system-initiated diagnostics are run on a line card or trunk card because of repeated problems encountered during call processing. PMTYP_PMTCCTDG counts this type of maintenance event for an entire group of PMs of the same type.

Associated logs

PM109 generated when a DS-1 trunk or link is made system busy.

PM183 is generated when a PM P-side link is made system busy by a system request.

TRK106 is generated when trunk equipment fails a test that was initiated either by a manual or system request. The log indicates the reason why the equipment failed and the action required to rectify the problem.

Register PMTCCTOP

PM total circuit diagnostics outside plant

PMTCCTOP is incremented when system diagnostics detect a fault on a line or trunk circuit that is located outside the switching office premises. PMTCCTOP counts this type of fault for a group of PMs of the same type.

The circumstances that cause PMTCCTOP to be incremented vary with the different PM types. In all cases, PMTCCTOP is only incremented the first time the fault is detected, and is not incremented if the same fault is detected again when tests are rerun.

For the digital carrier module and the trunk module, PMTCCTOP is incremented when the signaling-test system at a switching office detects a fault on a trunk circuit between itself and a far-end office. For example, PMTCCTOP is incremented when an originating office does not receive a start-dial or wink signal from the far-end office in response to the off-hook signal that it sent.

For the line module (LM), PMTCCTOP is incremented when system diagnostics detect a fault on a line circuit that is located outside the switching office.

For extended multiprocessor system (XMS)-based peripheral modules (XPM), PMTCCTOP is incremented when system diagnostics detect a fault on a line or trunk that is located outside the switching office premises.

Register PMTCCTOP release history

PMTCCTOP was introduced prior to BCS20.

Associated registers

PM_PMCCTOP is incremented when system diagnostics detect a fault on a line or trunk circuit that is located outside the switching office.

OM group PMTYP (continued)

Associated logs

None

Register PMTDRERR

PM total drawer error

PMTDRERR is incremented when an error is detected in a line drawer that causes the drawer to be placed in an in-service trouble state. PMTDRFLT counts this type of line drawer fault for a group of PMs of the same type.

Register PMTDRERR release history

PMTDRERR was introduced in BCS25.

Associated registers

PM_PMDRERR counts errors in a line drawer that cause the drawer to have in-service trouble.

PMTYP_PMTDRFLT is incremented when a fault is detected in a line drawer that causes the drawer to be made system busy. PMTYP_PMTDRFLT counts this type of fault for a group of PMs of the same type.

Associated logs

PM102 is generated when a PM is made system busy.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or an RDLM running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise test
- extended multiprocessor system (XMS)-based PMs (XPM) (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMTDRFLT

PM total drawer faults

PMTDRFLT counts faults in a line drawer that cause the drawer to be made system busy. PMTDRFLT counts this type of line drawer fault for a group of PMs of the same type.

Register PMTDRFLT release history

PMTDRFLT was introduced in BCS25.

Associated registers

PM_PMDRFLT counts faults in a line drawer that cause the drawer to be made system busy.

PMTYP_PMTDRERR counts errors in a line drawer that cause the drawer to become in-service trouble. PMTYP_PMTDRERR counts line drawer errors for a group of PMs of the same type.

Associated logs

PM102 is generated when a PM is made system busy by a system request.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or an RDLM running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise test
- extended multiprocessor system (XMS)-based PMs (XPM) (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource (CMR) file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

OM group PMTYP (continued)

Register PMTDRMBU

PM total drawer manual busy usage

PMTDRMBU is a usage register. Every 100 s, the line drawers are scanned and this register records whether line drawers in a group of PMs of the same type are manual busy.

Register PMTDRMBU release history

PMTDRMBU was introduced in BCS25.

Associated registers

PM_PMDRMBU records whether a line drawer in a PM is manual busy.

PMTYP_PMDRSBU records whether line drawers in a group of PMs of the same type are system busy.

Associated logs

PM102 is generated when a PM is made system busy.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is either not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

Register PMTDRSBU

PM drawer system busy usage

PMTDRSBU is a usage register. Every 100 s, the line drawers are scanned and this register records whether line drawers belonging to a group of PMs of the same type are system busy.

Register PMTDRSBU release history

PMTDRSBU was introduced in BCS25.

Associated registers

PM_PMDRSBU records whether a line drawer in the PM is system busy.

PMTYP_PMTDRMBU records whether line drawers in a group of PMs of the same type are manual busy.

Associated logs

PM102 is generated when a PM is made system busy.

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not linked to a hardware fault. A reason for the abnormal condition is included with the log.

Register PMTERR

PM total errors

PMTERR counts errors detected in a group of PMs of the same type. The errors counted by PMTERR must occur in PMs that are in service; however, these errors do not have to result in further maintenance action in order to be counted.

For single-unit PMs (line modules, digital carrier modules, maintenance trunk modules, and trunk modules), PMTERR counts the following errors:

- command protocol violations
- RAM parity failures
- firmware errors
- controller message congestion
- test failures during the running of a routine or initialization audits
- failure to respond to a message over either plane of a network

For dual-unit extended multiprocessor system (XMS)-based peripheral modules (XPM) (line concentrating modules, line group controllers, and line trunk controllers), PMTERR is incremented if of the following maintenance events occur in either unit of the PM:

- errors that only result in the generation of a log
- errors resulting in further maintenance action
- integrity failures
- errors resulting in Who-Am-I messages
- transitions within a unit from in service to central side (C-side) busy or system busy
- restart reports
- any event that causes a fault and increments the PMTYP_PMTFLT register

OM group PMTYP (continued)

Register PMTERR release history

PMTERR was introduced prior to BCS20.

BCS32

Register is no longer incremented as a result of routine exercise tests

Associated registers

PM_PMERR counts errors in in-service PMs that have node numbers. PM2_PM2ERR counts the same errors for PMs that do not have node numbers.

PMTYP_PMTFLT is incremented whenever an error or state transition is counted in PMTERR that results in the PM or PM unit going out of service.

Associated logs

CCS231 is generated by the common channel signaling (CCS) subsystem when the status of a local subsystem changes to in-service trouble. A local subsystem has in-service trouble if less than the minimum number of instances of the subsystem (specified in table C7LOCSSN) are in service or in-service trouble.

CCS236 is generated by the CCS subsystem when the status of a local subsystem instance changes to in-service trouble. This occurs when an in-service local subsystem instance indicates it will be going out of service.

DDM101 is generated if the transfer of table data from the central control to the PM fails. Data transfer failure can occur when the PM is being returned to service or during a BCS application.

DDM102 is generated when the table data of a PM cannot be properly updated by the distributed data manager (DDM). The table data of the PM becomes erroneous and may cause a degradation of PM performance.

DDM104 is generated when the DDM cannot maintain data in a PM. This situation occurs when the PM fails or when the DDM is unable to download a table. Usually, the PM is made system busy and an attempt is made to return the PM to service.

DLC101 is generated when a minor incoming message overload (ICMO) condition exists on the link maintained by the data link controller.

DPAC103 is generated when a minor ICMO condition is detected on a link maintained by the data packet controller.

LOST108 is generated when an outgoing message is lost because of a problem with the input-output buffer where the message was stored.

LOST109 is generated when an outgoing message is lost because too many rebounds occurred and the message could not be rerouted.

LOST111 is generated when an incoming or outgoing message is lost due to an input handler error.

MPC906 is generated when a minor ICMO condition is detected on a link maintained by a multiprotocol controller.

NET102 is generated by the network when a receiving PM detects an integrity fault. An integrity fault can be either a parity failure or an integrity mismatch. Integrity is used to verify the speech path between two PMs.

NPAC210 is generated when a minor ICMO condition is detected on an X.25 link.

PM101 is generated when the table data in a PM fails a checksum test. The checksum test identifies inconsistencies between the table data found in the PM and the central control.

PM102 is generated when a PM is made system busy.

PM107 is generated when a system request makes a PM central side (C-side) busy.

PM108 is generated when a firmware or hardware error is detected in the peripheral processor of a PM.

PM113 is generated when there is message congestion at a PM peripheral processor. Message congestion can be expected on high traffic days.

PM115, PM117, and PM118 are generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The logs include a reason for the abnormal condition.

PM116 is generated after a PM sends a report indicating a message error.

PM117 (see PM115)

PM118 (see PM115)

OM group PMTYP (continued)

PM119 is generated if one of the following situations occurs:

- integrity is lost on an interbay or intrabay link
- integrity or parity failure occurs when a remote line module is handling a call that does not involve a connection through the network

PM121 is generated when the link between a host digital carrier module and a remote line module ceases to be the active link that carries control channel information between the two PMs. A different link becomes the active carrier of control information. System noise may cause switchovers of this type.

PM122 is generated after an exception report is received from a PM. The exception report flags errors in PM firmware, PM checksum, or central control.

PM124 and PM126 are generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The logs include a reason for the abnormal condition.

PM125 is generated when a firmware or hardware error is detected in the PM peripheral processor.

PM126 (see PM124)

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to hardware fault. A reason for the abnormal condition is included with the log.

PM150 is generated when transient failures are detected in a line drawer.

PM160 is generated when a transient failure is detected on a card in a line module or remote line module.

PM179 is generated when a software condition occurs that affects the normal operation of a PM.

PM180 is generated because of software failure or because a hardware problem affects software execution.

PM194 is generated when a signaling terminal controller (STC) or D-channel handler (DCH)

- detects abnormal conditions that are not hardware related or have not yet been linked to a hardware fault
- changes from in service to in-service trouble

PM198 is generated when either an STC or a DCH sends an unsolicited message containing a valid fault condition that does not affect service.

TRK123 is generated when a PM sends an incorrect message to the central control. If this log appears often, there may be problems with one of the following equipment items:

- the originating or terminating trunk
- the link between the PM and the central control
- the peripheral processor in the PM

UTR100 is generated when a PM fails to send operational measurements relating to the universal tone receiver to the central control.

Register PMTFLT

PM total faults

PMFLT counts PM faults detected in a group of PMs of the same type. The faults counted by PMTFLT must cause the entire PM or one unit of the PM to become system busy.

The register does not count the same fault again during subsequent retesting when system diagnostics attempt to clear the fault. The conditions that cause PMTFLT to be incremented differ slightly for single-unit PMs and extended multiprocessor system (XMS)-based peripheral modules (XPM).

For single unit PMs (line modules, digital carrier modules, and trunk modules), PMTFLT counts all errors that cause the PM to become system busy while waiting for either manual or system recovery.

For XPMs (line concentrating modules, line group controllers, and line trunk controllers), PMTFLT is incremented if either of the following events occur:

- an entire PM or a single unit of a PM is made system busy
- a central side (C-side) node or link is made manual busy and returned to service, resulting in a transition from C-side busy to system busy

OM group PMTYP (continued)

Register PMTFLT release history

PMTFLT was introduced prior to BCS20.

Associated registers

PM_PMFLT and PM2_PM2FLT count faults that cause the entire PM or one unit of the PM to be made system busy. PM_PMFLT counts faults for PMs that have node numbers. PM2_PM2FLT counts the same faults for PMs that do not have node numbers.

PMTYP_PMTERR counts service affecting and non-service affecting errors.

Associated logs

DLC102 is generated when a major incoming message overload (ICMO) condition exists on a link maintained by a data link controller. The overload condition results in the DLC being made system busy.

DPAC104 is generated when a major ICMO condition exists on a link maintained by a data packet controller.

MPC904 is generated when a multiprotocol controller develops a serious fault and is made system busy.

NPAC211 is generated when a minor ICMO condition is no longer affecting an X.25 link.

PM100 is generated when a PM fails a test.

PM101 is generated when the table data in a PM fails a checksum test. The checksum test identifies inconsistencies between the table data found in the PM and in the central control.

PM102 is generated when a PM is made system busy by a system request.

PM107 is generated when a system request makes a PM C-side busy.

PM114 is generated when an abnormal condition is detected in a PM that is not hardware related or has not yet been linked to a hardware-related fault. This condition can occur when trying to load, test, initialize, or return a PM to service.

PM117 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. The log includes a reason for the abnormal condition.

OM group PMTYP (continued)

PM127 is generated when the link that is carrying control messages between the host office and the PM at a remote site is forced out of service. The remote peripheral may be in emergency stand-alone (ESA) mode.

PM151 is generated when a failure is detected in a line drawer.

PM161 is generated when a card failure is detected in a line module (LM) or remote line module (RLM).

PM162 is generated when a redundant circuit in an LM or RLM changes state.

PM164 is generated when a non-critical circuit in a line module controller changes state.

PM179 is generated when a software condition occurs that affects the normal operation of a PM.

PM180 is generated either because of software failure or because there is a hardware problem affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or an RDLM running in ESA mode
- test failures of ESA
- faults discovered during a routine exercise test
- XPMs (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM185 is generated when an error condition detected by the firmware, hardware, or software, causes a trap interrupt. The software process that was running stops at the instruction where the fault occurred.

PM199 is generated when a system-initiated test is run on a signaling terminal controller or D-channel handler. The log includes the result of the test.

OM group PMTYP (continued)

Register PMTINTEG

PM total integrity failures

PMTINTEG is incremented when the PM detects an integrity failure and reports it to the central control (CC). PMTINTEG counts integrity failures for a group of PMs of the same type.

Register PMTINTEG release history

PMTINTEG was introduced prior to BCS20.

Associated registers

PM_PMINTEG is incremented when the PM detects an integrity failure and reports it to the CC.

Associated logs

NET101 is generated when a PM, receiving integrity messages from another PM, detects an integrity failure. The integrity failure can be due to either a mismatch of the integrity byte or channel parity errors. The log report indicates whether the integrity fault prevented the call from being set up.

NET102 is generated by the network when a receiving PM detects an integrity fault. An integrity fault can be either a parity failure or an integrity mismatch.

PM108 is generated when a firmware or hardware error is detected in the PM peripheral processor.

PM113 is generated when there is message congestion at a PM peripheral processor. Message congestion can be expected on high traffic days.

PM118 is generated when the PM peripheral processor detects an abnormal condition that is either not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

PM119 is generated if integrity is lost on an inter- or intra-bay link, or if integrity or parity failure occurs while a remote line module is handling a call that does not involve a connection through the network.

PM122 is generated after an exception report is received from a PM. The exception report flags errors in PM firmware, PM checksum, or CC.

PM124 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log. The abnormal condition may involve a protocol violation.

PM180 is generated because of software failure or because there is a hardware problem affecting software execution. A PM exception report is produced when software fails.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or an RDLM running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise test
- XPMs (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM185 is generated when an error condition detected by the firmware, hardware, or software, causes a trap interrupt. Execution of the software process that was running is stopped at the instruction where the fault occurred.

TRK122 is generated when the CC detects a loss of integrity on both planes of the trunk equipment. The loss of integrity is usually caused by a hardware problem on a card, the facility, or the link between the PM and the network.

Register PMTMBP

PM total transitions to manual busy

PMTMBP is incremented when a PM is made manual busy from an in-service or in-service trouble state. PMTMBP counts this type of state transition for a group of PMs of the same type.

For line modules (LM), PMTMBP is incremented when the LM is made manual busy during manually requested warm and cold takeovers.

OM group PMTYP (continued)

Register PMTMBP release history

PMTMBP was introduced prior to BCS26.

Associated registers

PM_PMMBP is incremented when a PM is made manual busy from an in-service or in-service trouble state.

PMTYP_PMTSBP is incremented when a system request makes a PM system busy from an in-service or in-service trouble state.

Associated logs

PM182 is generated when a manual request makes the peripheral side (P-side) link of a PM manual busy.

PM191 appears in two formats. The first format is generated when a signaling terminal controller (STC) is made manual busy. The signaling terminal that is identified in PM191 is made manual busy as a result of the change of state of the STC.

Register PMTMBTCO

PM total manual busy terminals cut off

PMTMBTCO counts calls (terminals) that are cut off when a PM is made manual busy. PMTMBTCO counts the calls that are cut off for a group of PMs of the same type.

The calls must be either call processing busy or call processing deloading to be cut off and counted by PMTMBTCO.

The specific conditions that cause PMTMBTCO to be incremented vary with the different PM.

For the digital carrier module, the line module, and the trunk module, PMTMBTCO counts the subscriber calls that are cut off when the PM changes to manual busy from in service or in-service trouble.

For line modules, if a warm takeover occurs after the line module is made manual busy, subscriber calls in the talking state are not cut off. If a takeover does not occur, then PMTMBTCO is incremented once for each subscriber call that is cut off. If a warm takeback occurs after the LM is made manual busy, PMTMBTCO is incremented once for each subscriber call that is cut off.

For extended multiprocessor system (XMS)-based peripheral modules (XPM), PMTMBTCO counts the subscriber calls that are cut off when the PM is made manual busy. The subscriber calls must be either call-processing busy or call-processing deloading to be counted by PMTMBTCO. PMTMBTCO is incremented once when a call in the talking state is cut off.

Register PMTMBTCO release history

PMTMBTCO was introduced prior to BCS20.

Associated registers

PM_PMMBTCO and PM2_PM2MBTCO count the subscriber calls (terminals) that are cut off when a PM is made manual busy.

PMTYP_PMTSBTCO counts the subscriber calls (terminals) that are cut off when a system request makes a PM manual busy.

Associated logs

None

Register PMTMCXFR

PM total manual cold transfers

PMTMCXFR is incremented when a manual action causes an extended multiprocessor system (XMS)-based peripheral module (XPM) to perform a cold switch of activity (SWACT). PMTMCXFR counts manually initiated cold SWACTS for a group of PMs of the same type.

Two examples of manual actions that can trigger a cold SWACT are the execution of the SWACT command at the MAP terminal, or a manual request that sets the active unit manual busy while the inactive unit is in service.

Register PMTMCXFR release history

PMTMCXFR was introduced prior to BCS20.

Associated registers

PM_PMMCXFR and PM2_PM2MCXFR count manually initiated cold SWACTS for individual PMs. PM_PMMCXFR counts manually initiated cold SWACTS for PMs that have node numbers. PM2_PM2MCXFR counts manually initiated cold SWACTS for PMs that do not have node numbers.

OM group PMTYP (continued)

PMTYP_PMTSCXFR is incremented when a system action causes an XPM to perform a cold SWACT. PMTSCXFR counts system-initiated cold SWACTS for a group of PMs of the same type.

Associated logs

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

PM180 is generated because of software failure, or because a hardware problem is affecting software execution.

Register PMTMMBU

PM total module manual busy usage

PMTMMBU is a usage register. Every 100 s, the PMs are scanned and this register records whether PMs of the same type are manual busy.

Register PMTMMBU release history

PMTMMBU was introduced prior to BCS20.

BCS21

Software change made to provide usage counts in either hundred call seconds (CCS) or deci-erlangs

Associated registers

PM_PMMMBU and PM2_PM2MMBU record whether an individual PM is manual busy. PM_PMMMBU provides a usage count for PMs that have node numbers. PM2_PM2MMBU provides the same usage count for PMs that do not have node numbers.

PMTYP_PMTUMBU records whether PMs belonging to a group of the same type are manual busy.

Associated logs

CCS218 is generated when a local subsystem becomes manual busy. This occurs if one local subsystem is made manual busy and other local subsystems are off line, or if the last local subsystem changes from in service or system busy to manual busy.

CCS233 is generated when a subsystem changes to manual busy.

PM105 is generated when a PM is made manual busy.

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

PM170 is generated when both bays of a line module or remote line module are made manual busy or system busy.

PM182 is generated when a peripheral side (P-side) link of a PM changes to manual busy.

PM191 appears in two formats. The first format is generated when a signaling terminal controller (STC) changes to manual busy. The signaling terminal that is identified in PM191 is made manual busy as a result of the change of state of the STC. The second format is generated when the D-channel handler changes to manual busy. The ISDN Service Group (ISG) field in PM191 identifies the services that are affected by this action.

Register PMTMSBU

Peripheral module total module system busy usage

PMTMSBU is a usage register. Every 100 s, the PMs are scanned and this register records whether PMs in a group of the same type are system busy.

The hardware or software problems that cause the PM to become system busy vary according to the PM type.

For a digital carrier module (DCM) or trunk module (TM), the following problems cause the PM to become system busy:

- the DCM or TM fails a routine audit
- no message paths are available to the DCM or TM
- more than 200 unsolicited trouble reports are received from the DCM or TM within one 10-min audit period

For a line module (LM), the following problems cause the PM to become system busy:

- the LM is inaccessible
- the control section of the LM has failed an audit
- the LM has reported more than 200 controller or line errors between successive audits

OM group PMTYP (continued)

Register PMTMSBU release history

PMTMSBU was introduced in BCS20.

BCS21

Software change made to provide usage counts in either hundred call seconds (CCS) or deci-erlangs.

Associated registers

PM_PMMSBU and PM2_PM2MSBU record whether an individual PM is system busy. PM_PMMSBU provides a usage count for PMs that have node numbers. PM2_PM2MSBU provides the same usage counts for PMs that do not have node numbers.

PMTYP_PMTUSBU records whether units of a group of PMs of the same type are system busy.

Associated logs

CCS234 is generated when a local subsystem becomes system busy.

PM102 is generated when a PM is made system busy.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log. There are six possible PM128 log formats.

PM170 is generated when both bays of an LM or remote LM are manual busy or system busy.

PM183 is generated when a PM peripheral side (P-side) link becomes system busy because of a system request.

PM190 appears in two formats:

- The first format is generated when a signaling terminal controller (STC) changes to system busy. The signaling terminal that is identified in the log report is made system busy as a result of the change of state of the STC.
- The second format is generated when a fault detected in the D-channel handler (DCH) results in the DCH being made system busy. The services defined by the ISDN Service Group (ISG) are switched to a spare DCH, if one is available, to prevent loss of service.

PM192 appears in two formats:

- The first format is generated when the signaling terminal controller (STC) is made manual busy and the C-side node (the IAC) is removed from service.
- The second format is generated when the C-side node (the IAC) of the DCH is removed from service.

Register PMTMWXFR

PM total manual warm transfers

PMTMWXFR is incremented if manual maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm switch of activity (SWACT) or a unit takeover. PMTMWXFR counts this type of activity transfer for a group of PMs of the same type.

The activity transfer that is performed depends on the type of PM that is acted on by the manual request. PMTMWXFR is incremented if either of the following events occurs:

- a manual request forces an extended multiprocessor system (XMS)-based peripheral module (XPM) such as a line group controller or a line trunk controller to perform a warm SWACT
- a manual request forces a line concentrating module (LCM) to perform a takeover of one unit by the other

An LCM can be forced to perform a takeover by making one unit of the LCM manual busy while the mate unit is in-service. A takeover of one unit of an LCM by the other unit increments PMTMWXFR, but a takeback of activity does not increment PMTMWXFR.

Two examples of manual actions that can force an XPM to perform a warm SWACT are as follows:

- the execution of the SWACT command at the MAP terminal
- making the active unit of an XPM manual busy, while the inactive unit is in service

Register PMTMWXFR release history

PMTMWXFR was introduced prior to BCS20.

OM group PMTYP (continued)

Associated registers

PM_PMMWXFR and PM2_PM2MWXFR count activity transfers for individual PMs.

PM_PMMWXFR counts activity transfers for PMs that have node numbers. PM2_PM2MWXFR counts the same transfers for PMs that do not have node numbers.

PMTYP_PMTSWXFR is incremented if system maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm SWACT or a unit takeover. PMTSWXFR counts this type of activity transfer for a group of PMs of the same type.

Associated logs

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log. There are six possible PM128 log formats.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

Register PMTPSERR

PM total peripheral side (P-side) errors

PMTPSERR counts errors on the P-side interface of an extended multiprocessor system (XMS)-based peripheral module (XPM) or on a link interface module (LIM) frame transport bus (F-bus) for a group of PMs of the same type.

PMTPSERR is incremented by the following types of problems:

- errors in interface cards that terminate lines, trunks, or links
- errors in lines, trunks or links
- F-bus errors

Register PMTPSERR release history

PMTPSERR was introduced prior to BCS20.

Associated registers

PMPSERR counts errors on the P-side interface of an XPM or on a LIM F-bus. PM_PMPSERR counts errors for PMs that have node numbers. PM2_PM2PSERR counts errors for PMs that do not have node numbers.

PMTYP_PMTPSFLT counts faults on the P-side interface of the PM or on a LIM F-bus for a group of PMs of the same type.

Associated logs

PM110 is generated when a change occurs in the service counts for a DS-1 trunk or link. These service counts are incremented when an error, a fault, or a state transition occurs within predetermined time intervals. PM110 indicates that a service count has changed.

Register PMTPSFLT

PM total peripheral side (P-side) faults

PMTPSFLT counts faults on the P-side interface of an extended multiprocessor system (XMS)-based peripheral module (XPM) or on the link interface module (LIM) frame transport bus (F-bus) for a group of PMs of the same type.

These faults affect service and require further maintenance action to remedy them.

PMTPSFLT is incremented by the following types of faults:

- faults in P-side interface cards that terminate trunks, lines, or links
- faults in lines, trunks, and links that are serviced by the interface cards
- faults in the F-bus

Register PMTPSFLT release history

PMTPSFLT was introduced prior to BCS20.

Associated registers

PM_PMPSFLT and PM2_PM2PSFLT count faults on the P-side interface of an XPM or on the LIM F-bus. PM_PMPSFLT counts faults detected on the P-side interface of PMs that have node numbers. PM2_PM2PSFLT counts the same faults for PMs that do not have node numbers.

PMTYP_PMTPSERR is incremented when an error is detected either on the P-side interface of an XPM or on the LIM F-bus for a group of PMs of the same type.

OM group PMTYP (continued)

Associated logs

PM109 is generated when a DS-1 carrier becomes system busy.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or an RDLM running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise test
- XPMs (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line group controllers or line trunk controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

PM183 is generated when a PM P-side link or F-bus is made system busy by a system request.

Register PMTRGERR

PM total ringing generator errors while in service

PMTRGERR counts errors detected in the ringing generators that supply ringing and automatic number identification (ANI) coin functions to the line concentrating module (LCM) or the very small remote (VSR). PMTRGERR counts these errors for a group of PMs of the same type.

PMTRGERR is incremented by all ringing generator errors regardless of whether the ringing generator is in service at the time of the error; however, the LCM or VSR must be in service at the time of the error. Since a single ringing generator may service both LCMs in the same frame, one ringing generator error may be counted four times, once by each of the two line concentrating arrays in each of the two LCMs.

Register PMTRGERR release history

PMTRGERR was introduced prior to BCS20.

Associated registers

PM_PMRGERR and PM2_PM2RGERR count ringing generator errors for individual PMs.

PMTYP_PMTRGFLT counts service-affecting faults detected in the ringing generators that supply ringing and ANI coin functions to the LCMs or VSRs. PMTYP_PMTRGFLT counts faults in ringing generators for a group of PMs of the same type.

Associated logs

PM160 is generated when a transient failure is detected on a card in a line module or remote line module.

Register PMTRGFLT

PM total ringing generator faults while in service

PMTRGFLT counts service-affecting faults in the ringing generators that supply ringing and automatic number identification (ANI) coin functions to the line concentrating module (LCM) or very small remotes (VSR) for a group of PMs of the same type. The ringing generator must be in service for PMTRGFLT to be incremented.

Register PMTRGFLT release history

PMTRGFLT was introduced prior to BCS20.

Associated registers

PM_PMRGFLT and PM2_PM2RGFLT count ringing generator faults for individual PMs. PM_PMRGFLT counts faults for PMs that have node numbers. PM2_PM2RGFLT counts faults for PMs that do not have node numbers.

Associated logs

PM161 is generated when a card failure is detected in a line module or remote line module.

PM162 is generated when a redundant circuit in a line module or a remote line module RLM changes state.

PM163 is generated when a redundant circuit in a PM changes state.

OM group PMTYP (continued)

Register PMTSBP

PM total transitions to system busy

PMTSBP is incremented when a PM module is made system busy from either in service or in-service trouble. PMTSBP counts this type of state transition for an entire group of PMs of the same type.

Normally, the PM is changed to central side (C-side) busy before being made system busy. If the PM is successfully returned to service from C-side busy before being made system busy, PMTSBP is not incremented.

For line modules, PMTSBP is incremented when the LM is made system busy during either warm or cold takeovers.

Register PMTSBP release history

PMTSBP was introduced prior to BCS20.

Associated registers

PM_PMTSBP is incremented when an individual PM is made system busy from in- service or in-service trouble state.

PMTYP_PMTMBP is incremented when a manual request makes a PM in a group of PMs of the same type manual busy from in service or in-service trouble.

Associated logs

DLC102 is generated when a major incoming message overload (ICMO) condition exists on a link maintained by a data link controller (DLC). The overload condition results in the DLC being made system busy.

DPAC104 is generated when a major ICMO condition exists on a link maintained by a data packet controller.

MPC904 is generated when a multiprotocol controller develops a serious fault and is made system busy by a system request.

NPAC211 is generated when a minor ICMO condition no longer affects an X.25 link.

PM107 is generated when a system request makes a PM C-side busy.

PM183 is generated when a PM P-side link is made system busy.

PM190 appears in two formats. The first format is generated when a signaling terminal controller (STC) is made system busy. The signaling terminal that is identified in the log is made system busy as a result of the change of state of the STC. The second format is generated when a fault detected in the D-channel handler (DCH) results in the DCH being set to system busy. The services defined by the ISDN Service Group (ISG) are switched to a spare DCH, if one is available, to prevent loss of service.

PM192 appears in two formats. The first format is generated when the STC is made manual busy and the C-side node (the IAC) is removed from service. The second format is generated when the C-side node (the IAC) of the DCH is removed from service.

Register PMTSBTCO

PM total system busy terminals cut off

PMTSBTCO counts subscriber calls (terminals) that are cut off when a system request makes a PM system busy. PMTSBTCO counts subscriber calls that are dropped by the system for a group of PMs of the same type.

The specific conditions that cause PMTSBTCO to be incremented vary with the different PMs.

For the digital carrier module and the trunk module, PMTSBTCO counts subscriber calls that are cut off when the PM is made central side (C-side) busy from in service or in service trouble. The subscriber calls must be call-processing busy or call-processing deloading to be counted by PMTSBTCO. C-side busy is an intermediate state that occurs prior to the PM becoming system busy.

For the line module (LM), PMTSBTCO counts subscriber calls that are cut off when the line module is made system busy. The subscriber calls must be call-processing busy or call-processing deloading to be counted by PMTSBTCO.

If an LM recovers from C-side busy before becoming system busy and the mate LM becomes system busy, the PMTSBTCO register associated with the recovered LM is incremented by the number of subscriber calls that were dropped by the system busy mate. This is because the LM that has performed the cold takeover is now responsible for the calls of the mate LM, but could not preserve these calls through the takeover.

If a warm takeover occurs when an LM is made system busy, no calls are cut off and PMTSBTCO is not incremented. When a LM performs a warm takeback of control of its line drawers after being returned to service from system busy. PMTSBTCO is incremented by the number of calls that were dropped by the original system busy state change.

For extended multiprocessor system (XMS)-based peripheral modules (XPM), PMTSBTCO counts subscriber calls that are cut off when the PM is made system busy. The subscriber calls must be either call-processing busy or call-processing deloading to be counted by PMTSBTCO. PMTSBTCO is incremented once when a call in the talking state is dropped by the system.

Register PMTSBTCO release history

PMTSBTCO was introduced prior to BCS20.

Associated registers

PM_PMSBTCO and PM2_PM2SBTCO count calls that are cut off when an individual PM is made system busy.

PMTYP_PMTMBTCO counts the subscriber calls (terminals) that are cut off when the PM is made manual busy. PMTYP_PPMTMBTCO counts calls for an entire group of PMs of the same type.

Associated logs

None

Register PMTSCXFR

PM total system cold transfers

PMTSCXFR is incremented when a system action causes an extended multiprocessor system (XMS)-based peripheral module (XPM) to perform a cold switch of activity (SWACT). PMTSCXFR counts system-initiated cold SWACTS for an group of PMs of the same type.

Three examples of system actions that can trigger a cold SWACT in an XPM and increment PMTSCXFR are as follows:

- forcing an XPM to perform a cold SWACT
- making the active unit of an XPM system busy
- making the central side (C-side) links to the active unit of an XPM system busy

Register PMTSCXFR release history

PMTSCXFR was introduced prior to BCS20.

Associated registers

PM_PMSCXFR and PM2_PM2SCXFR count system-initiated cold SWACTS for individual PMs. PM_PMSCXFR counts cold SWACTS for PMs that have node numbers. PM2_PM2SCXFR counts the same SWACTS for PMs that do not have node numbers.

PMTYP_PMTMCXFR is incremented when a manual action causes an XPM to perform a cold SWACT. PMTYP_PMTMCXFR counts manually initiated cold SWACTS for a group of PMs of the same type.

Associated logs

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to hardware fault. A reason for the abnormal condition is included with the log.

PM179 is generated when a software condition occurs that affects the normal operation of a PM.

PM180 is generated because of software failure or because there is a hardware problem affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or RDLM running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise test
- XPMs (for example, line group controllers and line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line group controllers or line trunk controllers to remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMTSWXFR

PM total system warm transfers

PMTSWXFR is incremented when system maintenance forces a dual-unit PM to perform a switch of activity (SWACT) consisting of either a warm SWACT or a unit takeover. PMTSWXFR counts this type of activity switch for a group of PMs of the same type.

OM group PMTYP (continued)

The activity transfer that is performed depends on the type of PM that is acted on by the system request. PMTSWXFR is incremented each time one of the following events occurs:

- a system request forces an extended multiprocessor system (XMS)-based peripheral module (XPM), such as a line group controller or a line trunk controller, to perform a warm SWACT
- a system request forces a line concentrating module (LCM) to perform a takeover of one unit by the other

Note that if one unit of the LCM takes over the activity of the other, PMTSWXFR is incremented, but a takeback of activity in the LCM does not increment PMTSWXFR.

Three examples of system actions that can force an XPM to perform a warm SWACT are as follows:

- forcing an XPM to perform a warm SWACT
- making the active unit of an XPM system busy
- making the central side (C-side) links to the active unit of an XPM busy

Two examples of system actions that can cause an LCM to perform a takeover are as follows:

- making one unit of the LCM system busy while the mate unit is in service
- making the C-side links to either LCM unit busy while the mate unit is in service

Register PMTSWXFR release history

PMTSWXFR was introduced prior to BCS20.

Associated registers

PM_PMSWXFR and PM2_PM2SWXFR count activity transfers for individual PMs. PM_PMSWXFR counts activity transfers for PMs that have node numbers. PM2_PM2SWXFR counts the same transfers for PMs that do not have node numbers.

PMTYP_PMTMWXFR is incremented if manual maintenance forces a dual-unit PM to perform a transfer of activity consisting of either a warm SWACT or a unit takeover. PMTSWXFR counts this type of activity transfer for an entire group of PMs of the same type.

OM group PMTYP (continued)

Associated logs

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

PM179 is generated when a software condition occurs that affects the normal operation of a PM.

PM180 is generated because of software failure or because a hardware problem is affecting software execution.

PM181 provides information on any of the following conditions:

- a remote line concentrating module or an RDLM running in emergency stand-alone (ESA) mode
- test failures of ESA
- faults discovered during a routine exercise test
- XPMs (for example, line group controllers or line trunk controllers) that lose their static data while being returned to service
- the loading status of a CLASS modem resource file
- the success or failure of XPMs to generate tone samples
- operational faults occurring on DS-1 message links connecting line trunk controllers or line group controllers to remote cluster controllers
- remote cluster controllers
- changes in the loopback status of a link interface unit

Register PMTUMBU

PM total unit manual busy usage

PMTUMBU is a usage register. Every 100 s, the PMs are scanned and this register records whether PMs in a group of the same type are manual busy.

If both units of an extended multiprocessor system (XMS)-based peripheral module (XPM) are manual busy, PMTUMBU is incremented twice after each scan interval, once for each unit.

OM group PMTYP (continued)

Register PMTUMBU release history

PMTUMBU was introduced in BCS20.

BCS21

Software change made to provide usage counts in either hundred call seconds (CCS) or deci-erlangs

Associated registers

PM_PMUMBU and PM2_PM2UMBU record whether an individual PM is manual busy.

PM_PMUMBU provides a usage count for PMs that have node numbers. PM2_PM2UMBU provides the same usage count for PMs that do not have node numbers.

PMTYP_PMTMMBU records whether members of a group of PMs of the same type are manual busy.

Associated logs

CCS218 is generated when the status of a local subsystem changes to manual busy. This occurs if either of the following is true:

- one local subsystem is made manual busy and all other local subsystems are off line
- the last local subsystem is changed from in service or system busy to manual busy

CCS233 is generated when a manual request makes a local subsystem manual busy.

PM105 is generated when a PM is made manual busy.

PM128 is generated when the PM peripheral processor detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

PM182 is generated when the peripheral side (P-side) link of a PM is made manual busy.

PM191 appears in two formats:

- The first format is generated when a manual request changes a signaling terminal controller (STC) to manual busy. The signaling terminal that is identified in PM191 is made manual busy as a result of the change of state of the STC.
- The second format is generated when a manual request changes the D-channel handler to manual busy. The ISDN Service Group (ISG) field in PM191 identifies the services that are affected by this action.

Register PMTUSBU

PM total unit system busy usage

PMTUSBU is a usage register. Every 100 s, the PM units are scanned and this register records whether units of a group of PMs of the same type are system busy.

If both units of an extended multiprocessor system (XMS)-based peripheral module (XPM) are system busy, PMTUSBU is incremented twice after each scan interval, once for each unit. For single-unit PMs, such as the line module, digital carrier module, and trunk module, PMTUSBU is incremented once if the PM is system busy.

Some of the problems that can cause one unit of an XPM to become system busy are as follows:

- a diagnostic failure
- excessive unsolicited messages
- auto unit resets

Register PMTUSBU release history

PMTUSBU was introduced in BCS20.

BCS21

Software change made to provide usage counts in either hundred call seconds (CCS) or deci-erlangs

OM group PMTYP (end)

Associated registers

PM_PMUSBU and PM2_PM2USBU record whether an individual PM is system busy.

PM_PMUSBU provides a usage count for PMs that have node numbers. PM2_PM2USBU provides the same usage counts for PMs that do not have node numbers.

PMTYP_PMTMSBU records whether units of a group of PMs of the same type are system busy.

Associated logs

CCS234 is generated when the status of a local subsystem changes to system busy.

PM102 is generated when a PM is made system busy by a system request.

PM128 is generated when the peripheral processor of a PM detects an abnormal condition that is not hardware related or is not yet linked to a hardware fault. A reason for the abnormal condition is included with the log.

PM170 is generated when both bays of a line module or remote line module are manual busy or system busy.

PM183 is generated when a PM peripheral side (P-side) link is made system busy.

PM190 appears in two formats:

- The first format is generated when a signaling terminal controller (STC) changes to system busy because of a system request.
- The second format is generated when the D-channel handler (DCH) changes to system busy.

PM192 appears in two formats:

- The first format is generated when the STC is made manual busy and the central side (C-side) node (the IAC) is removed from service.
- The second format is generated when the C-side node (the IAC) of the DCH handler is removed from service.

OM group RLCDIS

OM description

Remote line concentrating module intraswitched calls

RLCDIS provides information on traffic for intraswitched calls in a remote line concentrating module (RLCM) or intraswitch remote line concentrating module (IRLCM). Intraswitching is a feature that enables an RLCM or IRLCM to switch calls internally when both the calling and called parties are serviced by the same RLCM or IRLCM.

If no idle intraswitch channels are available when an RLCM or IRLCM attempts to perform intraswitching, the RLCM or IRLCM reports blocking to the central control (CC). The call is switched through the host office network.

Six registers count the following type of RLCM or IRLCM intraswitched call attempts:

- unit 0 or unit 1
- within or between units
- blocked in both units
- blocked in unit 0 or in unit 1

The usage registers record the number of RLCM or IRLCM intraswitch channels that are in use as follows:

- in unit 0
- in unit 1
- within units 0 and 1
- between units 0 and 1

If one RLCM or IRLCM unit performs a takeover of the other unit, RLCDIS continues to associate intraswitched calls with the unit that supports the calling and called parties, even if the unit is out of service.

RLCDIS does not apply to integrated services line modules (ISLM) and line concentrating modules for ISDN (LCMI).

The data supplied by RLCDIS is used to monitor the intraswitched call traffic in an RLCM or IRLCM, and to ensure that the configuration meets traffic requirements.

Release history

OM group RLCDIS was created prior to BCS20.

OM group RLCDIS (continued)

BCS36

In the Info field, the line module number in RLCMINFO is replaced by the value of field ADNUM in table LCMINV.

BCS22

Group name changed from RLCMIS to RLCDIS. Supports an additional PM type: international line concentrating module (ILCM).

BCS21

Usage counts in hundred call seconds (CCS) or deci-erlangs.

Registers

OM group RLCDIS registers display on the MAP terminal as follows:

```
ISTOTATT      ISTOTBLK      ISTOTTRU      ISUN0ATT
ISUN0BLK      ISUN0TRU      ISUN1ATT      ISUN1BLK
ISUN1TRU
```

Group structure

OM group RLCDIS provides one tuple for each RLCM or IRLCM identified by the info field.

Key field: None

Info field: RLCDIS_INFO is the RLCM or IRLCM identifier. It consists of RLCMINFO and the subfield values for site, frame, and unit that are datafilled in field LCMNM in table LCMINV.

Field INTRASW in table LCMINV must be datafilled to enable intraswitching for the RLCM. Office parameter INTL_INTRASWITCHING in table OFCOPT must be datafilled to enable intraswitching for the IRLCM.

Associated OM groups

LMD provides information on LM and RLM traffic.

Associated functional groups

None

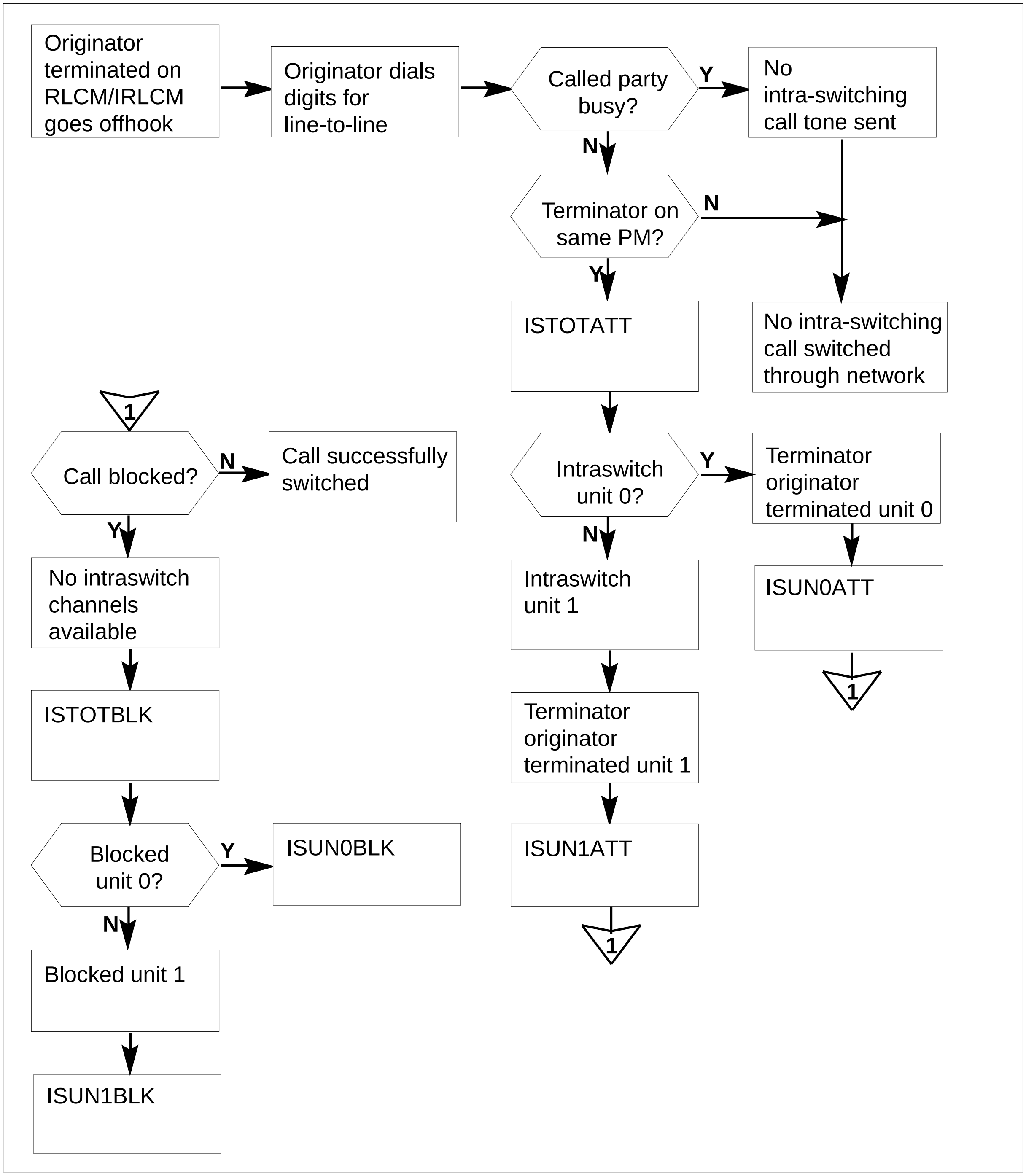
Associated functionality codes

The functionality codes associated with OM group RLCDIS are shown in the following table.

Functionality	Code
RSC-Intra-RSC Calling	NTX150AA
Intra-RLCM Calling	NTX156AA
Intraswitching on the IRLCM	NTX652AA
OMs in Erlangs	NTX664AA
ISDN Basic Access	NTX750AB
EADAS Hardware Inventory Control	NTXR21AA

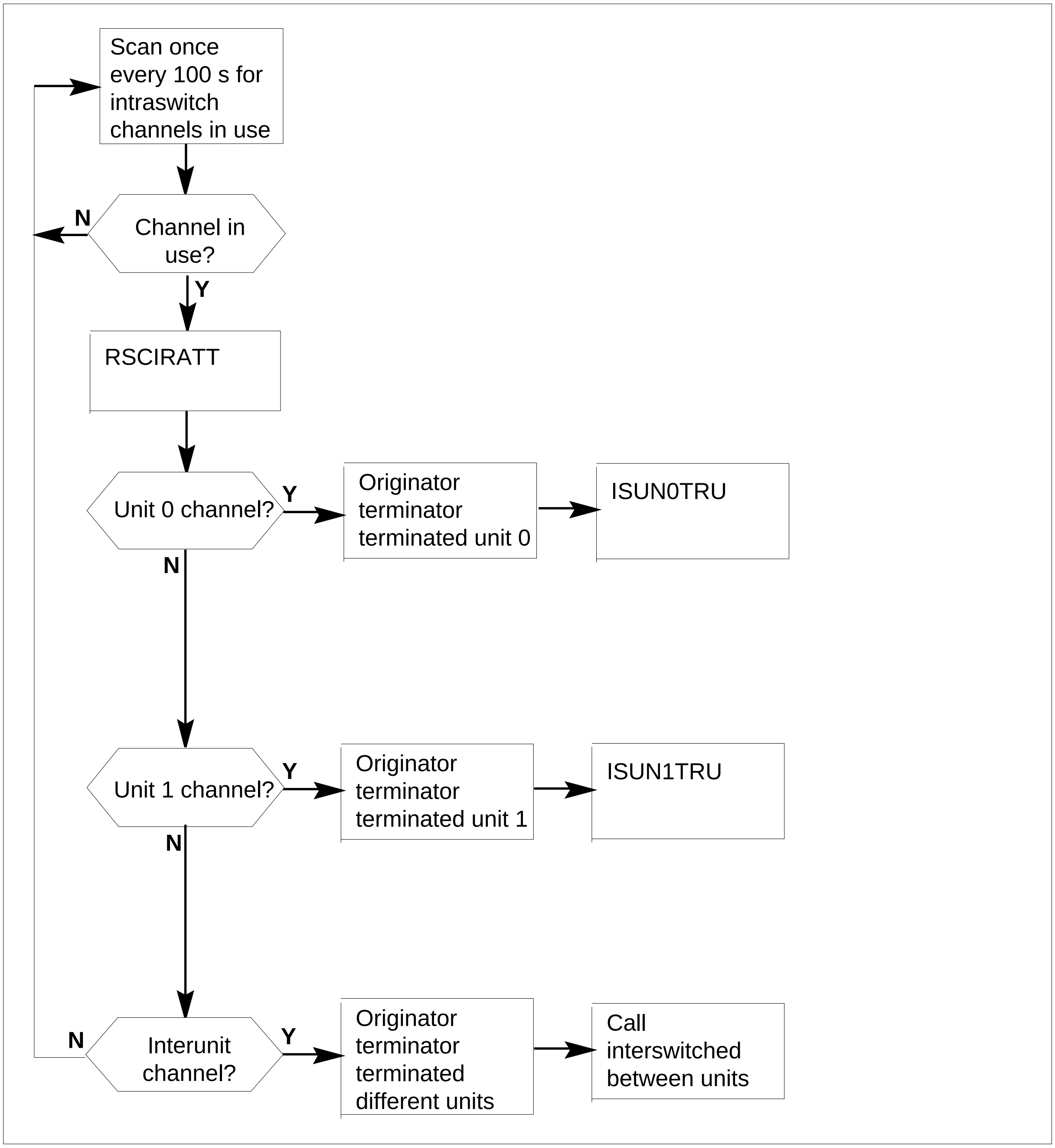
OM group RLCDIS (continued)

OM group RLCDIS registers



OM group RLCDIS (continued)

OM group RLCDIS usage registers



Register ISTOTATT

Total intraswitching call attempts

OM group RLCDIS (continued)

ISTOTATT counts intraswitch call attempts that occur in an RLCM or IRLCM, including the following components:

- intraswitched calls when both the calling and called parties are serviced by the same unit of the RLCM or IRLCM
- intraswitched calls when the calling and called parties are serviced by different units of the same RLCM or IRLCM
- call attempts that are blocked because all intraswitching channels are busy

Register ISTOTATT release history

ISTOTATT was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

Associated registers

ISUN0ATT counts intraswitched call attempts that occur in unit 0 of an RLCM or IRLCM.

ISUN1ATT counts intraswitched call attempts that occur in unit 1 of an RLCM or IRLCM.

The number of interswitched call attempts = ISTOTATT - (ISUN0ATT + ISUN1ATT).

Associated logs

None

Extension registers

None

Register ISTOTBLK

Total intraswitched calls blocked

ISTOTBLK is incremented when an intraswitched call attempt is blocked in an RLCM or IRLCM because no intraswitch channels are available. ISTOTBLK counts intraswitched calls whether both parties involved in the call are serviced by the same unit or by different units of an RLCM or IRLCM.

When an intraswitched call is blocked, the CC is notified and the call is switched through the network modules.

Register ISTOTBLK release history

ISTOTBLK was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

Associated registers

None

Associated logs

None

Extension registers

None

Register ISTOTTRU

Total intraswitch channels traffic busy usage

ISTOTTRU is a usage register. Every 100 s the channels are scanned, and ISTOTTRU records whether intraswitch channels are in use within units or between units of an RLCM or IRLCM.

Register ISTOTTRU release history

ISTOTTRU was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

BCS21

Usage counts in hundred call seconds (CCS) or deci-erlangs.

Associated registers

ISUN0TRU records whether intraswitch channels are in use in unit 0 of an RLCM or IRLCM.

LMD_LMTRU records whether lines are in use.

LMTRU = 2 (ISTOTTRU)

Associated logs

None

OM group RLCDIS (continued)

Extension registers

None

Register ISUN0ATT

Intraswitched unit 0 call attempts

ISUN0ATT counts intraswitched call attempts that occur when the calling and called parties are serviced by unit 0 of an RLCM or IRLCM. ISUN0ATT counts calls that are successfully intraswitched in unit 0, as well as calls that are blocked in unit 0 because all intraswitch channels are busy.

ISUN0ATT does not count call attempts when the called party is already off hook.

Register ISUN0ATT release history

ISUN0ATT was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

Associated registers

ISTOTATT counts intraswitched call attempts that occur in an RLCM or IRLCM.

ISUN1ATT counts intraswitched call attempts that occur in unit 1 of an RLCM or IRLCM.

The number of interswitched call attempts =
RLCDIS_ISTOTATT - (RLCDIS_ISUN0ATT + RLCDIS_ISUN1ATT)

Associated logs

None

Extension registers

None

Register ISUN0BLK

Total intraswitched unit 0 calls blocked

ISUN0BLK is incremented when an intraswitched call attempt is blocked in unit 0 of an RLCM or IRLCM because no intraswitch channels are available.

When an intraswitched call is blocked, the CC is notified and the call is switched through the network modules.

Register ISUN0BLK release history

ISUN0BLK was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

Associated registers

ISUN1BLK is incremented when an intraswitched call attempt is blocked in unit 1 of an RLCM or IRLCM because no intraswitch channels are available.

Associated logs

None

Extension registers

None

Register ISUN0TRU

Intraswitching unit 0 traffic busy usage

ISUN0TRU is a usage register. Every 100 s the channels are scanned, and ISUN0TRU records whether intraswitch channels are in use in unit 0 of an RLCM or IRLCM.

Register ISUN0TRU release history

ISUN0TRU was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

BCS21

Usage counts in hundred call seconds (CCS) or deci-erlangs.

Associated registers

ISUN1TRU records whether intraswitch channels are in use within units and between units of an RLCM or IRLCM.

LMD_LMTRU records whether lines are in use.

LMD_LMTRU = 2 (RLCDIS_ISTOTTRU)

OM group RLCDIS (continued)

Associated logs

None

Extension registers

None

Register ISUN1ATT

Intraswitched unit 1 call attempts

ISUN1ATT counts intraswitched call attempts that occur when the calling and called parties are serviced by unit 1 of an RLCM or IRLCM. ISUN1ATT counts calls that are successfully intraswitched in unit 1, as well as calls that are blocked in unit 1 because all intraswitch channels are busy.

ISUN1ATT does not count call attempts when the called party is already off hook.

Register ISUN1ATT release history

ISUN1ATT was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

Associated registers

ISUN0ATT counts intraswitched call attempts in unit 0 of an RLCM or IRLCM.

Associated logs

None

Extension registers

None

Register ISUN1BLK

Intraswitched unit 1 calls blocked

ISUN1BLK is incremented when an intraswitched call attempt is blocked in unit 1 of an RLCM or IRLCM because no intraswitch channels are available.

When an intraswitched call is blocked, the CC is notified and the call is switched through the network modules.

Register ISUN1BLK release history

ISUN1BLK was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

Associated registers

ISUN0BLK is incremented when an intraswitched call attempt is blocked in unit 0 of an RLCM or IRLCM because no intraswitch channels are available.

Associated logs

None

Extension registers

None

Register ISUN1TRU

Intraswitching unit 1 traffic busy usage

ISUN1TRU is a usage register. Every 100 s, the channels are scanned and ISUN1TRU records whether intraswitch channels are in use in unit 1 of an RLCM or IRLCM.

Register ISUN1TRU release history

ISUN1TRU was created prior to BCS20.

BCS22

ILCM-type peripheral module is supported.

BCS21

Usage counts in hundred call seconds (CCS) or deci-erlangs.

Associated registers

ISUN0TRU records whether intraswitch channels are in use in unit 0 of an RLCM or IRLCM.

LMD_LMTRU records whether lines are in use.

LMD_LMTRU = 2 (RLCIS_ISTOTTRU)

Associated logs

None

OM group RLCDIS (end)

Extension registers

None

OM group SITE

OM description

Traffic and dial tone speed recording, remote sites

SITE provides information about traffic-related counts and dial tone speed recording (DTSR) information for remote sites. DTSR is used to measure the ability of the switch to return dial tone within three seconds.

The dial tone speed-test process sends commands to two separate line concentrating module (LCM)-based remotes at each site every four seconds. These two commands cause the LCM-based remotes to send messages to the central control (CC) purporting to be originations from a dial pulse and a Digitone line, respectively. The central processor uses the processing code to find a path for each test call through the originating LCM-based remote, and a path to an available dual-tone multifrequency (DTMF) receiver for each Digitone call. The CC sends the LCM-based remote a message, telling it that set-up is complete.

The LCM-based remote returns a message indicating whether more than three seconds elapsed before dial tone passed to the fictitious line. If this message is not received at the CC by the time the next test runs, the CC increments the delay count register, just as it does when it gets a message showing a delay of more than three seconds.

DTSR is deactivated if a switch experiences receiver queue overflows on Digitone receivers. DTSR is automatically deactivated during degradation situations if the office parameter DTSR_AUTO_DEACTIVATION_ENABLE in table OFCENG is set to true. If this parameter is set to false, DTSR will not be deactivated during degradations.

Registers DPTESTC, DPDELAY, DTTESTC, and DTDELAY are applicable to offices with remote line modules (RLM) only. All other registers are applicable to offices with remote lines on new peripherals that are connected by the line group controller (LGC) or subscriber module remote (SMR).

Release history

OM group SITE was introduced prior to BCS20.

BCS36

Key field range is modified so that the range of this field is 1 to 127. This value is automatically assigned when a tuple is datafilled in table SITE.

OM group SITE (continued)

BCS35

Registers LCMDP_D, LCMDT_D, and LCMKS_D include counts for calls abandoned after dial tone delay.

BCS34

OM group SITE added to international application.

Registers

OM group SITE registers display on the MAP terminal as follows:

There are two variations of registers in the SITE group. The first variation applies to remote line modules. Eight registers are provided with this group and appear at the MAP terminal as follows:

```
INTRASIT        INTERSIT        RORIGOUT        INRTERM
DPTESTC         DPDELAY         DTTESTC         DTDELAY
```

The second variation is applicable to remote peripheral modules. Thirty-two registers are provided with this group:

```
INTRASIT        INTERSIT        RORIGOUT        INRTERM
LMDP_T          LMDP_D          LMDT_T          LMDT_D
LCMDP_T         LCMDP_T2        LCMDP_D         LCMDP_D2
LCMDT_T         LCMDT_T2        LCMDT_D         LCMDT_D2
LCMKS_T         LCMKS_T2        LCMKS_D         LCMKS_D2
RCTDP_T         RCTDP_T2        RCTDP_D         RCTDP_D2
RCTDT_T         RCTDT_T2        RCTDT_D         RCTDT_D2
DLMKS_T         DLMKS_T2        DLMKS_D         DLMKS_D2
```

Group structure

OM group SITE provides one tuple for each site up to a maximum of 127 tuples. (The HOST index is 0, but does not have a tuple in OM group SITE, therefore there are only 127 possible tuples.)

Key field: SITE_INDEX, the site index and external identifier as assigned in the SITE table. The range of this field is 1-127. This value is automatically assigned when a tuple is datafilled in table SITE.

Info field: SITE_MODULE_COUNT is the number of peripheral modules assigned to the SITE name.

DTSR is automatically deactivated during degradation situations if parameter DTSR_AUTO_DEACTIVATION_ENABLE in table OFCENG is set to true.

Associated OM groups

DTSR contains traffic-related counts and DTSR information for host sites.

SITE2 contains traffic-related counts and DTSR information for offices with lines connected to remote concentrator SLC-96 sites and remote carrier urban sites.

Associated functional groups

None

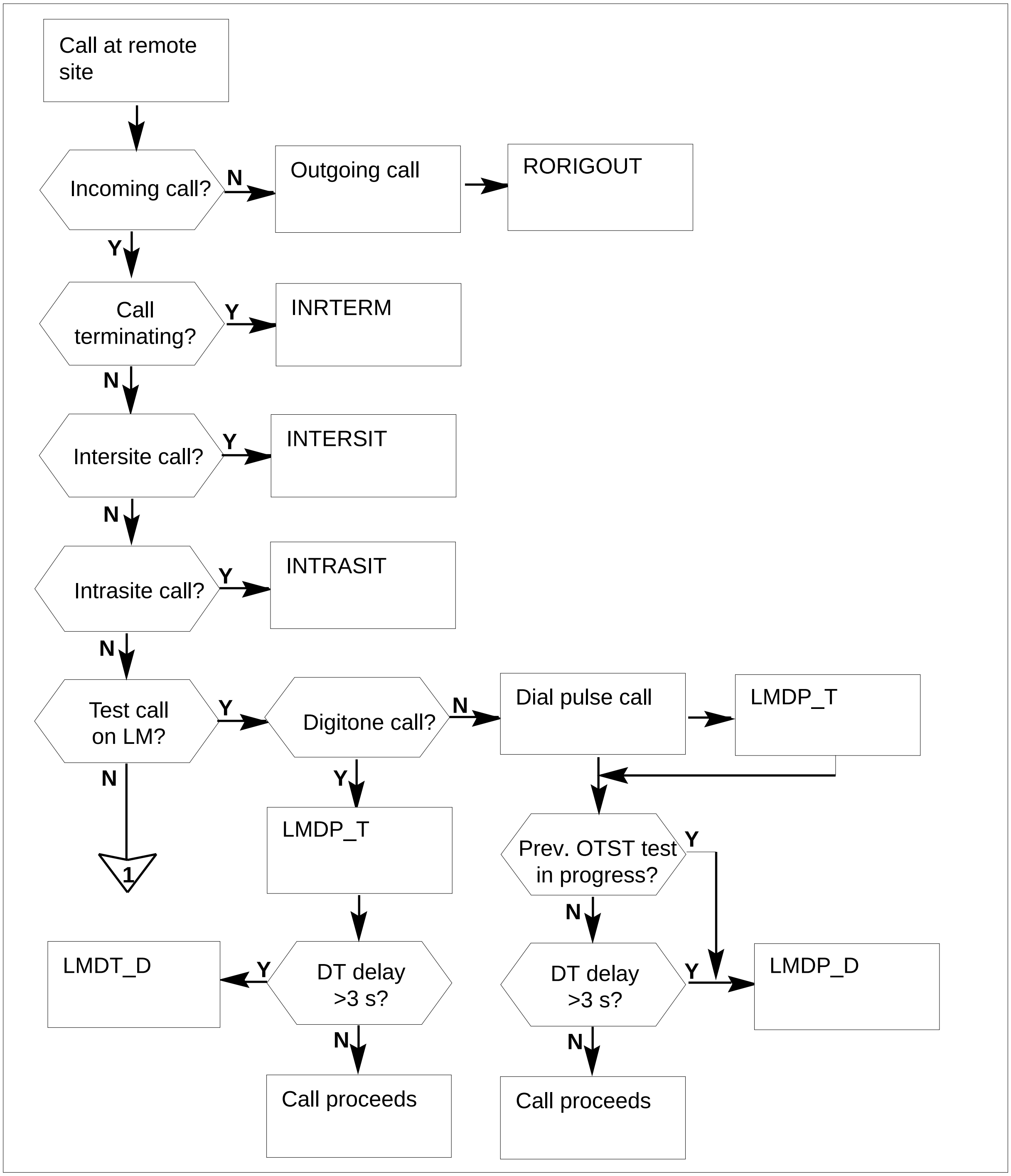
Associated functionality codes

The functionality codes associated with OM group SITE are shown in the following table.

Functionality	Code
Remote Line Module	NTX023AB
Subscriber Carrier Module Interface to DMS 1 Rural	NTX213AA
New Peripheral Maintenance Package	NTX270AA

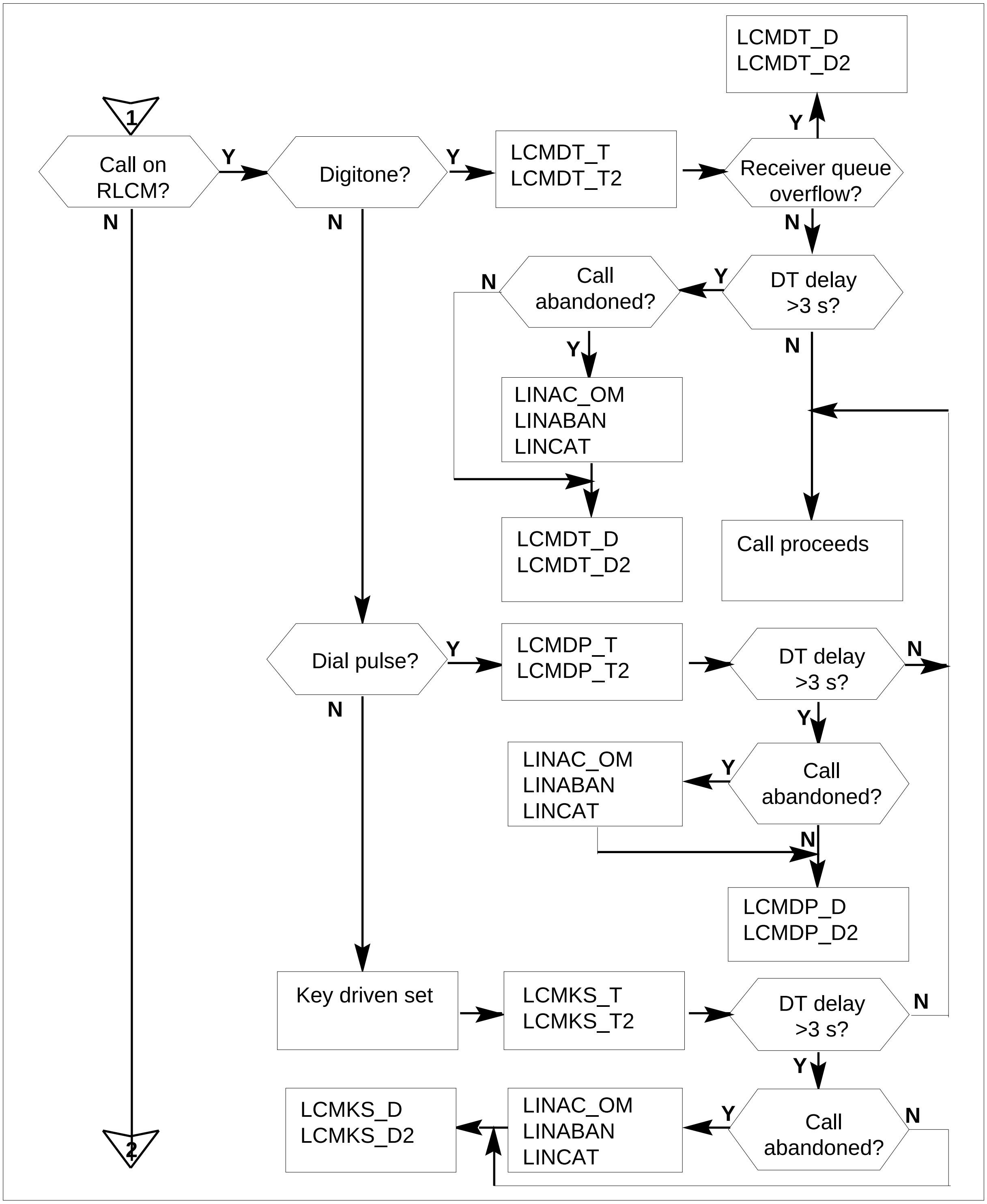
OM group SITE (continued)

OM group SITE registers: remote peripheral modules



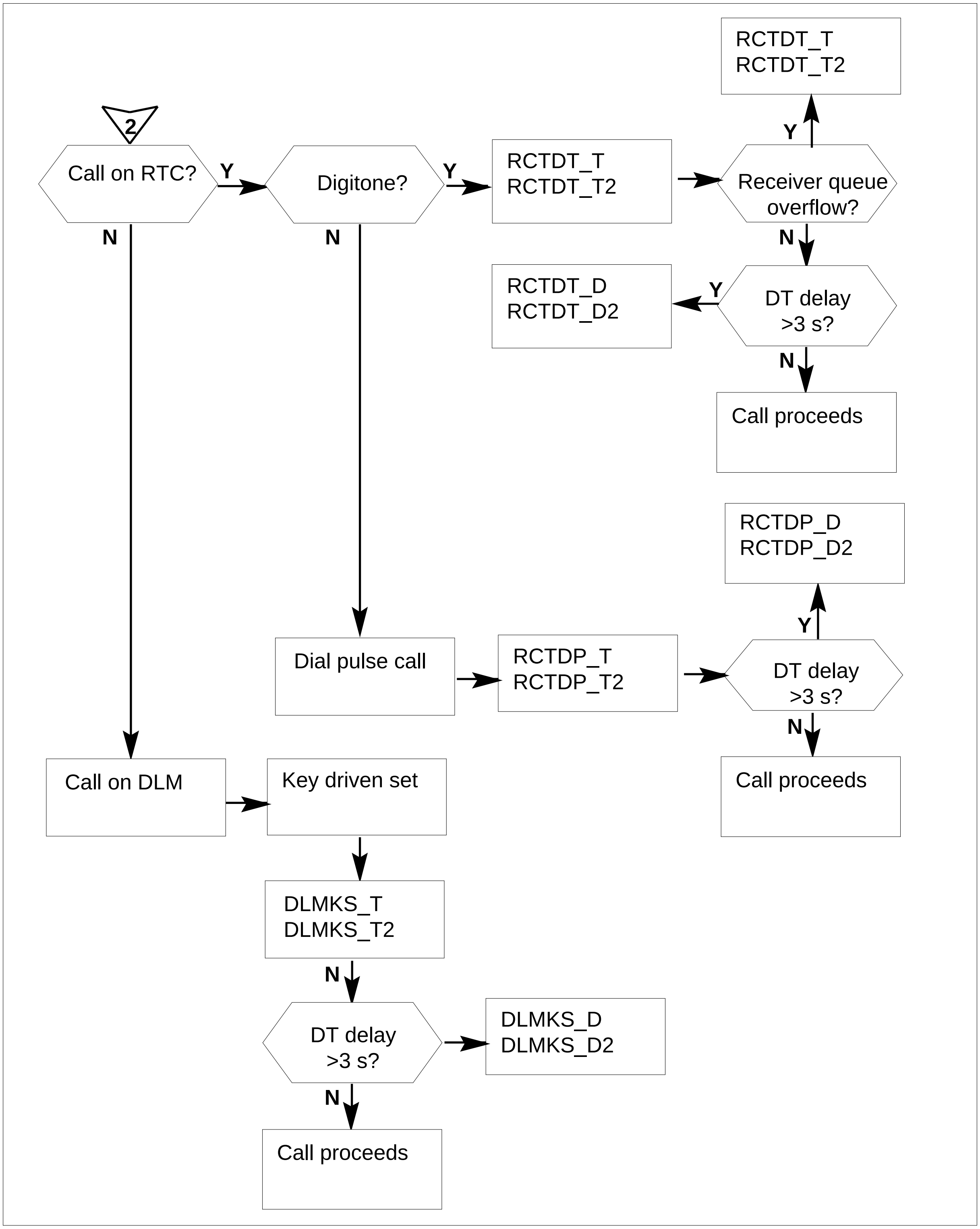
OM group SITE (continued)

OM group SITE registers: remote peripheral modules (continued)



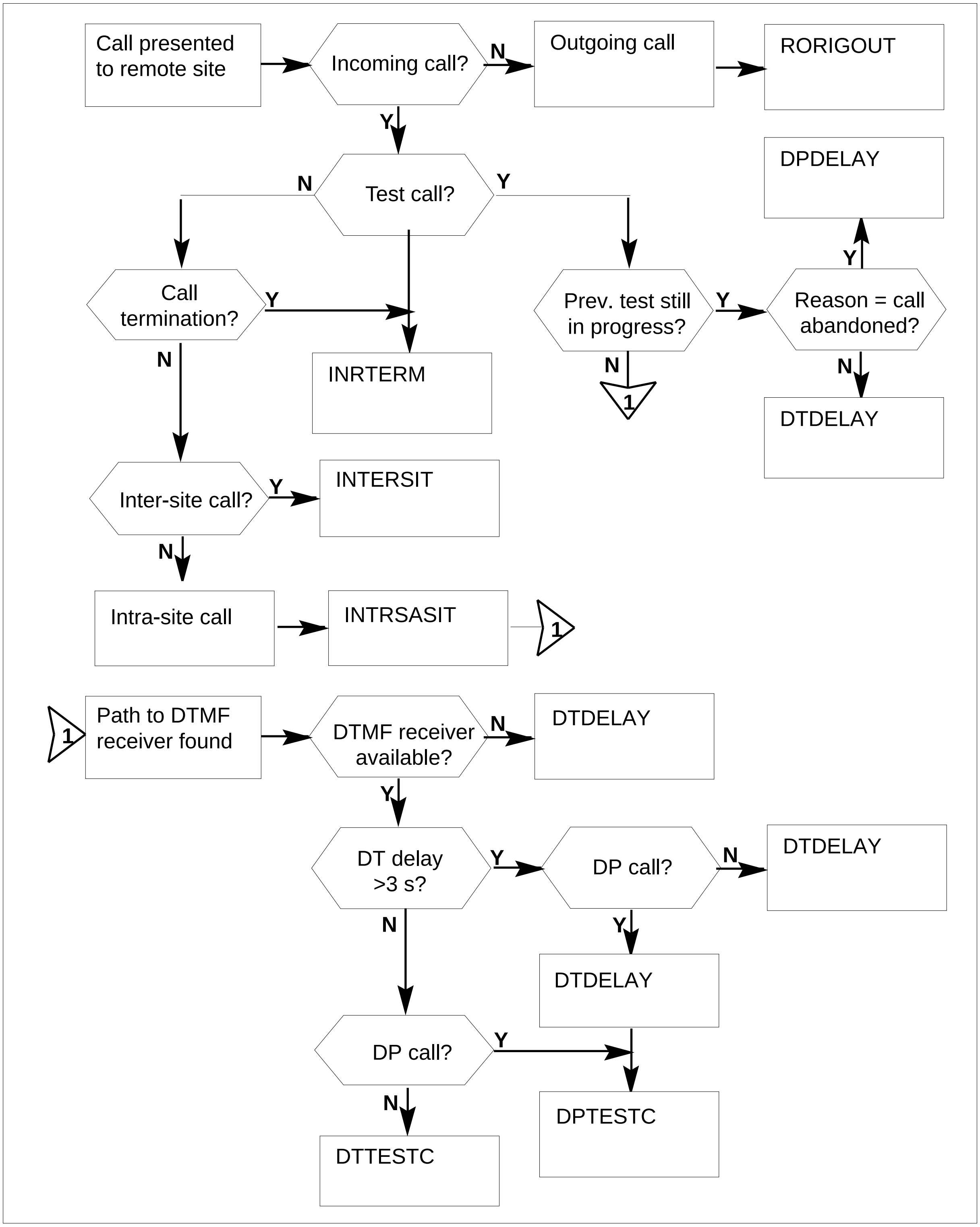
OM group SITE (continued)

OM group SITE registers: remote peripheral modules (end)



OM group SITE (continued)

OM group SITE registers: remote line modules



OM group SITE (continued)

Register DLMKS_D

Digital line module key driven set delay

For key-driven set lines on digital line modules, DLMKS_D counts calls that experience a dial tone delay that exceeds three seconds.

This register is updated every 15 min, just before the OM transfer process.

Register DLMKS_D release history

DLMKS_D and DLMKS_D2 were introduced prior to BC20.

Associated registers

None

Associated logs

None

Extension registers

DLMKS_D2

Register DLMKS_T

Digital line module key driven set total

DLMKS_T counts test calls on key-driven set lines that are on digital line modules.

This register is updated once every 15 min, just before the OM transfer process.

Register DLMKS_T release history

DLMKS_T and BLMKS_T2 were introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

DLMKS_T2

Register DPDELAY

Dial pulse delay

DPDELAY counts dial tone speed recording (DTSR) test calls on dial pulse lines that experience one of the following conditions:

- a dial tone delay that exceeds three seconds
- a previous DTSR test that is still in progress on the remote line module (RLM)

A test is initiated on an RLM at each site every four seconds.

A high count in this register indicates an extremely high switch usage, RLM trouble, or channel blockage.

Register DPDELAY release history

DPDELAY was introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

None

Register DPTESTC

Dial pulse test calls

DPTESTC counts dial tone speed recording (DTSR) test calls that are on dial pulse lines.

DPTESTC is incremented after the result of the test has been determined.

Register DPTESTC release history

DPTESTC was introduced prior to BCS20.

Associated registers

None

Associated logs

None

OM group SITE (continued)

Extension registers

None

Register DTDELAY

Digitone delay

DTDELAY counts dial tone speed recording (DTSR) test calls on Digitone lines that experience one of the following conditions:

- a dial tone delay that exceeds three seconds
- a DTMF receiver queue overflow
- a previous DTSR test that is still in progress on the remote line module (RLM)

A test is initiated on an RLM at each site every four seconds.

A high count in this register indicates high switch usage, RLM trouble, channel blockage, or an insufficient number of available DTMF receivers.

Register DTDELAY release history

DTDELAY was introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

None

Register DTTESTC

Digitone test calls

DTTESTC counts dial tone speed recording (DTSR) test calls that are on Digitone lines.

DTTESTC is incremented after the result of the test has been determined.

Register DTTESTC release history

DTTESTC was introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

None

Register INRTERM

Incoming routed to terminating

INRTERM counts incoming calls that are initially routed to a line at a remote site.

Register INRTERM release history

INRTERM was introduced prior to BCS20.

Associated registers

OFZ_NIN, OFZ_INTRM, and TRK_INCATOT count incoming calls.

Associated logs

None

Extension registers

None

Register INTERSIT

Intersite

INTERSIT counts calls that originate at a remote line module (RLM), remote line concentrating module (RLCM), remote switching center (RSC), or remote concentrating terminal (RCT) and are routed to a line at another site.

INTERSIT is incremented before an attempt is made to set up network connections between the two lines, and before the originating office determines whether the called line is busy or otherwise unavailable.

Register INTERSIT release history

INTERSIT was introduced prior to BCS20.

OM group SITE (continued)

Associated registers

OFZ_NORIG, OFZ_ORIGTRM, LMD_NORIGATT count calls originating at an RLM.

Associated logs

None

Extension registers

None

Register INTRASIT

Intrasite

INTRASIT counts calls that originate at a remote line module (RLM), remote line concentrating module (RLCM), remote switching center (RSC), or remote concentrating terminal (RCT) at a remote site and are routed to another line at the same remote site.

INTRASIT is incremented before an attempt is made to set up network connections between the two lines, and before determining whether the called line is busy or otherwise unavailable.

Register INTRASIT release history

INTRASIT was introduced prior to BCS20.

Associated registers

OFZ_NORIG, OFZ_ORIGTRM, LMD_NORIGATT, and LMD_REVERT count calls originating at an RLM.

Associated logs

None

Extension registers

None

Register LCMDP_D

Line concentrating module dial pulse delay

For dial pulse lines on LCM-based remotes, LCMDP_D counts calls that experience a dial tone delay that exceeds three seconds.

This register is updated every 15 min, just before the OM transfer process.

A high count in this register indicates high switch usage, trouble on the LMC-based remote, or channel blockage.

Register LCMDP_D release history

LDMDP_D and LCMDP_D2 were introduced prior to BCS20.

BCS35

Calls abandoned after dial tone delay included.

Associated registers

None

Associated logs

None

Extension registers

LCMDP_D2

Register LCMDP_T

Line concentrating module dial pulse total

LCMDP_T counts calls that are on dial pulse lines on LCM-based remotes.

The register is updated once every 15 min, just before the OM transfer period.

Register LCMDP_T release history

LCMDP_T and LCMDP_T2 were introduced prior to BCS20.

Associated registers

None

Associated logs

Mpme

Extension registers

LCMDP_T2

OM group SITE (continued)

Register LCMDT_D

Line concentrating module Digitone delay

For Digitone lines onLCM-based remotes, LCMDT_D counts calls that experience one of the following conditions:

- a dial tone delay that exceeds three seconds
- a DTMF receiver queue overflow

This register is updated every 15 min, just before the OM transfer process.

A high count in this register indicates high switch usage, trouble on LCM-based remotes, channel blockage, or an insufficient number of available DTMF receivers.

Register LCMDT_D release history

LCMDT_D and LCMDT_D2 were introduced prior to BCS20.

BCS35

Calls abandoned after dial tone delay included.

Associated registers

None

Associated logs

None

Extension registers

LCMDT_D2

Register LCMDT_T

Line concentrating module Digitone total

LCMDT_T counts calls that are on Digitone lines on LCM-based remotes.

This register is updated every 15 min, just before the OM transfer process.

Register LCMDT_T release history

LCMDT_T and LCMDT_T2 were introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

LCMDT_T2

Register LCMKS_D

Line concentrating module key-driven set delay

For key-driven set (such has business sets, data units) lines on LCM-based remotes, LCMKS_D counts calls that experience a dial tone delay that exceed three seconds.

This register is updated every 15 min, just before the OM transfer process.

A high count in this register indicates high switch usage, trouble on the LCM-based remote, or channel blockage.

Register LCMKS_D release history

LCMKS_D and LCMKS_D2 were introduced prior to BCS20.

BCS35
Calls abandoned after dial tone delay included.

Associated registers

None

Associated logs

None

Extension registers

LCMKS_D2

Register LCMKS_T

Line concentrating module key-driven set total

LCMKS_T counts test calls that are on key-driven set lines on LCM-based remotes.

This register is updated once every 15 min, just before the OM transfer process.

Register LCMKS_T release history

LCMKS_T and LCMKS_T2 were introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

LCMKS_T2

Register LMDP_D

Line module dial pulse delay

For dial pulse lines on remote line modules (RLM), LMDP_D counts dial tone speed recording (DTSR) test calls that experience one of the following conditions:

- a dial tone delay that exceeds three seconds
- a previous DTSR test that is still in progress on the remote line module (RLM)

A test is initiated on an RLM at the site every four seconds.

A high number of delayed calls indicates high switch usage, RLM trouble, or channel blockage.

Register LMDP_D release history

LMDP_D was introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

None

Register LMDP_T

Line module dial pulse test

LMDP_T counts dial tone speed recording (DTSR) test calls that are on remote line module (RLM) dial pulse lines.

LMDP_T is incremented after the result of the test has been determined.

Register LMDP_T release history

LMDP_T was introduced prior to BCS20.

Associated registers

None

Associated logs

None

Extension registers

None

Register LMDT_D

Line module Digitone delay

For Digitone lines on remote line modules (RLM), LMDT_D counts dial tone speed recording (DTSR) test calls that experience one of the following conditions:

- a dial tone that exceeds three seconds
- a DTMF receiver queue overflow
- a previous DTSR test that is still in progress on the remote line module (RLM)

A test is initiated on an RLM at the site every four seconds.

A high number of delayed calls indicates high switch usage, RLM trouble, or channel blockage.

Register LMDT_D release history

LMDT_D was introduced prior to BCS20.

Associated registers

None

OM group SITE (continued)

Associated logs
None

Extension registers
None

Register LMDT_T
Line module Digitone total

LMDT_T counts dial tone speed recording (DTSR) test calls that are on Digitone lines on the remote line module (RLM).

LMDT_T is incremented after the result of the test has been determined.

Register LMDT_T release history
LMDT_T was introduced prior to BCS20.

Associated registers
None

Associated logs
None

Extension registers
None

Register RCTDP_D
Remote concentrating terminal dial pulse delay

For dial pulse lines on remote concentrating terminals (RCT), RCTDP_D counts calls that experience a dial tone that exceeds three seconds.

A high count in this register indicates high switch usage, RCT trouble, or channel blockage.

Register RCTDP_D release history
RCTDP_D and RCTDP_D2 were introduced prior to BCS20.

Associated registers
None

Associated logs
None

Extension registers

RCTDP_D2

Register RCTDP_T

Remote concentrating terminal dial pulse total

RCTDP_T counts calls that are on dial pulse lines on remote concentrating terminals (RCT).

The register is updated every 15 min, just before the OM transfer period.

Register RCTDP_T release history

RCTDP_T and RCTDP_T2 was introduced in BCS20.

Associated registers

None

Associated logs

None

Extension registers

RCTDP_T2

Register RCTDT_D

Remote concentrating terminal Digitone delay

For Digitone lines on remote concentrating terminals (RCT), RCTDT_D counts calls that experience one of the following conditions:

- a dial tone delay that exceeds three seconds
- a DTMF receiver queue overflow

A high count in this register indicates high switch usage, RCT trouble, channel blockage, or an insufficient number of available receivers.

Register RCTDT_D release history

RCTDT_D was introduced prior to BCS20.

Associated registers

None

Associated logs

None

OM group SITE (continued)

Extension registers
RCTDT_D2

Register RCTDT_T
Remote concentrating terminal Digitone total

RCTDT_T and RCTDT_T2 counts calls that are on Digitone lines on remote concentrating terminals (RCT).

This register is updated every 15 min, just before the OM transfer period.

Register RCTDT_T release history
RCTDT and RCTDT_T2 were introduced prior to BCS20.

Associated registers
None

Associated logs
None

Extension registers
RCTDT_T2

Register RORIGOUT
Remote originating to outgoing

RORIGOUT counts calls originating at a remote line module (RLM), remote line concentrating module (RLCM), remote switching center (RSC), or remote concentrating terminal (RCT) that are routed to a trunk.

Register RORIGOUT release history
RORIGOUT was introduced prior to BCS20.

Associated registers
OFZ_NORIG, OFZ_ORIGOUT, LMD_NORIGATT, and TRK_NATTMPT count calls originating at an RLM for the line module and trunk group concerned.

Associated logs
None

Extension registers

None

OM group TRA125M1

OM description

Traffic route analysis 125 measurements 1

TRA125M1 provides information about line usage, and counts originations and terminations on selected subscriber lines or groups of lines.

Table TRA125I1 specifies the lines that are monitored. A maximum of 125 entries can be made in the table. The subscriber line usage (SLU) option is added to a line through a service order. The line is then added to table TRA125I1 using the SLUADD command. When the SLU_INSTALL command is given, the contents of table TRA125I1 are copied into TRA125M1.

New entries can be added to table TRA125I1 while group TRA125M1 is monitoring the lines originally specified by the table. The new entries do not affect the group until the SLU_INSTALL command is given.

Release history

OM group TRA125M1 was introduced prior to BCS20.

BCS33

Register TBU can be converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class.

BCS31

Existing registers incremented on SL-100 for intelligent peripheral equipment (IPE).

Registers

OM group TRA125M1 registers display on the MAP terminal as follows:

```
TBU             ORIG            TERM
```

Group structure

OM group TRA125M1 provides one tuple for each line specified in table TRA125I1.

Key field: None
Info field: SLU_OM_INFO

OM group TRA125M1 (continued)

The SLU feature is activated by setting parameter OPTIONAL_SLU_FEATURE in table OFCOPT to Y. The SLU feature is enabled in tables LENFEAT, IBNFEAT, and KSETFEAT.

Associated OM groups

ENG640M1, TRA125M2, and TRA250M1 provide information about line usage and count originations and terminations on other selected subscriber lines or groups of lines.

Associated functional groups

The Meridian SL-100 PBX functional group is associated with OM group TRA125M1.

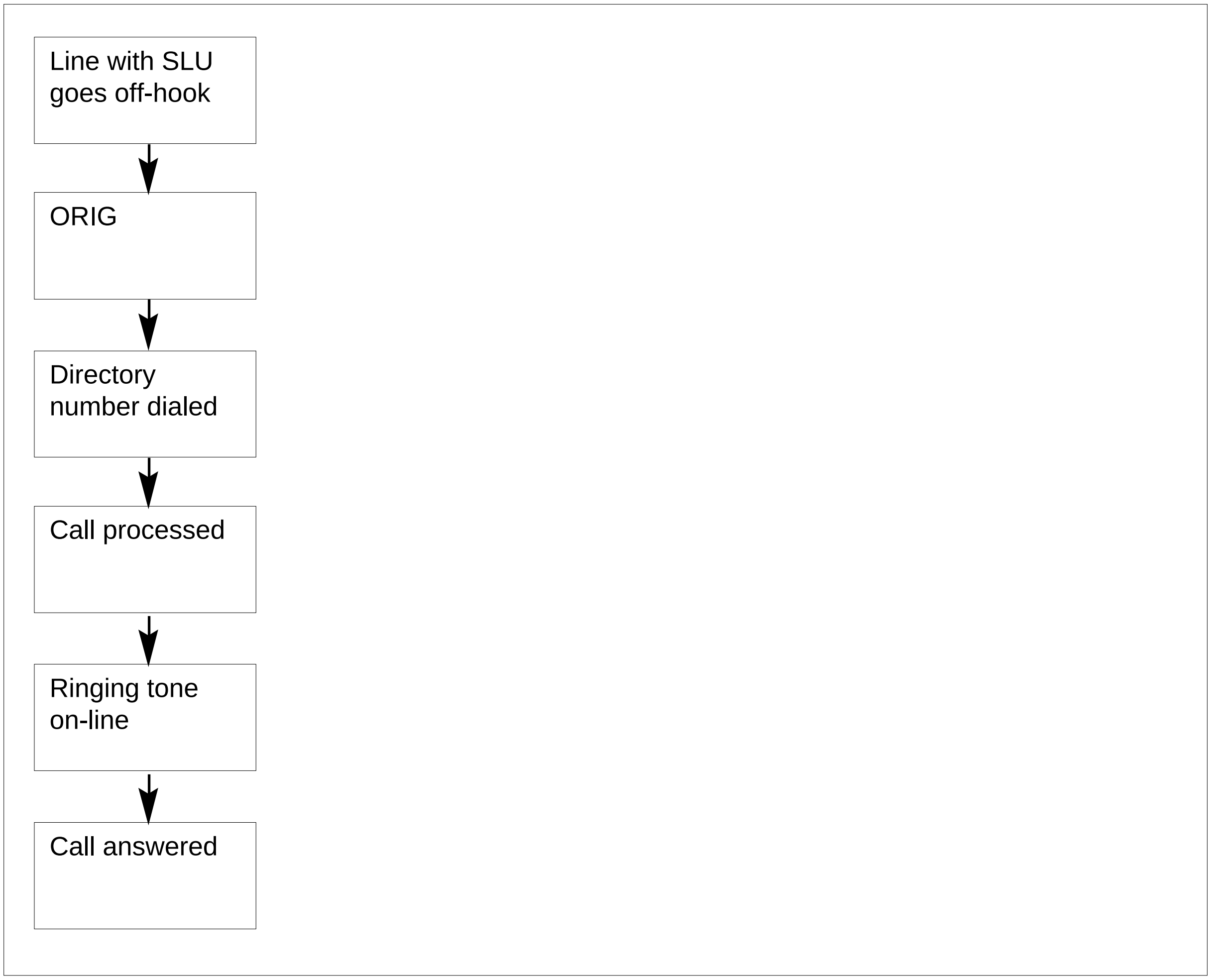
Associated functionality codes

The functionality codes associated with OM group TRA125M1 are shown in the following table.

Functionality	Code
Extended Peripheral Equipment	NTXN25AA
Subscriber Line Measurements	NTX082AA
IBN Proprietary Business Set.	NTX106AA
NTX106AA allows SLU to be assigned to any business set directory number appearance. SLU is not available on business set multiple appearance directory number (MADN) secondary directory appearances.	

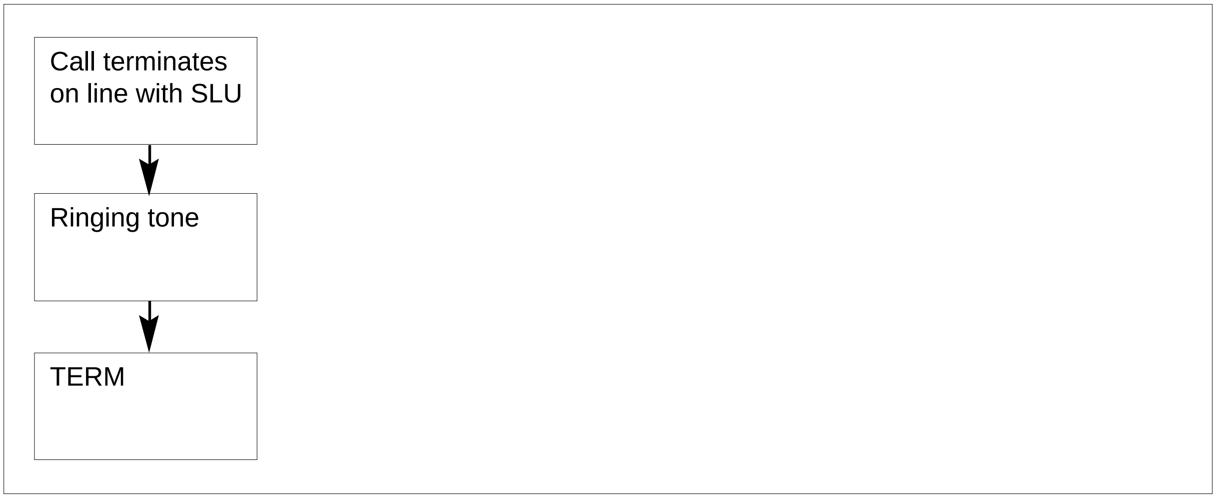
OM group TRA125M1 (continued)

OM group TRA125M1 originating calls registers



OM group TRA125M1 (continued)

OM group TRA125M1 terminating calls registers



OM group TRA125M1 usage registers

Register ORIG

Originations

ORIG is incremented when a subscriber with the SLU option attempts to originate a call and dial tone is connected.

If the switch can identify which party of two- and four-party lines made the call attempt, the register is incremented only once. If the switch cannot identify which party of two- and four-party lines made the call attempt, the register counts each directory number on the line.

Register ORIG release history

ORIG was introduced prior to BCS20.

BCS31
ORIG incremented on SL-100 for IPE.

Associated registers
None

Associated logs
None

Extension registers
None

Register TBU
Traffic busy usage

TBU is a usage register. The scan rate is specified by parameter TRA125M1_SCAN_RATE in table OFCVAR. TBU records whether a line is processing calls.

The default value of parameter TRA125M1_SCAN_RATE is 100 seconds.

Register TBU release history
TBU was introduced prior to BCS20.

BCS33
When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS31
TBU incremented on SL-100 for IPE.

Associated registers
None

Associated logs
None

Extension registers
None

OM group TRA125M1 (end)

Register TERM

Terminations

TERM is incremented when a call has been terminated to a line with the SLU option and ringing tone begins.

TERM does not count calls within the same hunt group or the same equiv group.

Register TERM release history

TERM was introduced prior to BCS20.

BCS31

TERM incremented on SL-100 for IPE.

Associated registers

For a hunt group with the SLU option associated with all the lines:
HUNT_HUNTATT - HUNT_HUNTOVFL = TERM

Associated logs

None

Extension registers

None

OM group TRA125M2

OM description

Traffic route analysis 125 measurements 2

TRA125M2 provides information about line usage and counts originations and terminations on selected subscriber lines or groups of lines.

Table TRA125I2 specifies the lines that are monitored. A maximum of 125 entries can be made in the table. The subscriber line usage (SLU) option is added to a line through a service order. The line is then added to table TRA125I2 using the SLUADD command. When the SLU_INSTALL command is given, the contents of table TRA125I2 are copied into TRA125M2.

New entries can be added to table TRA125I2 while group TRA125M2 is monitoring the lines originally specified by the table. The new entries do not affect the group until the SLU_INSTALL command is given.

Release history

OM group TRA125M2 was introduced prior to BCS20.

BCS33

Register TBU can be converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class.

BCS31

Existing registers incremented on SL-100 for intelligent peripheral equipment (IPE).

Registers

OM group TRA125M2 registers display on the MAP terminal as follows:

```
TBU             ORIG                TERM
```

Group structure

OM group TRA125M2 provides one tuple for each line specified in table TRA125I2.

Key field: None
Info field: SLU_OM_INFO

OM group TRA125M2 (continued)

The SLU feature is activated by setting parameter OPTIONAL_SLU_FEATURE in table OFCOPT to Y. The SLU feature is enabled in tables LENFEAT, IBNFEAT, and KSETFEAT.

Associated OM groups

ENG640M1, TRA125M1, and TRA250M1 provide information about line usage and count originations and terminations on other selected subscriber lines or groups of lines.

Associated functional groups

The Meridian SL-100 PBX functional group is associated with OM group TRA125M2.

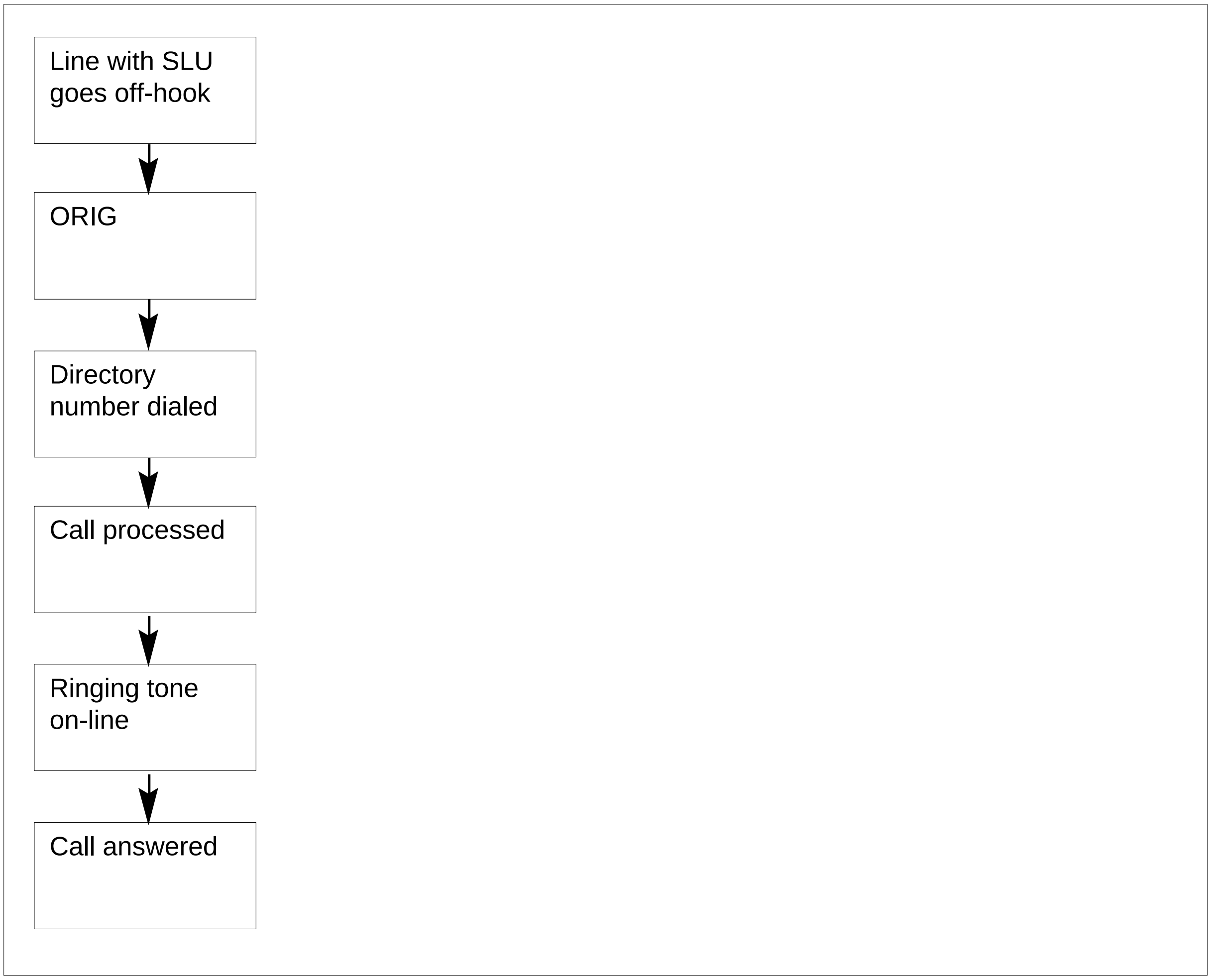
Associated functionality codes

The functionality codes associated with OM group TRA125M2 are shown in the following table.

Functionality	Code
Extended Peripheral Equipment	NTXN25AA
Subscriber Line Measurements	NTX082AA
IBN Proprietary Business Set NTX106AA allows SLU to be assigned to any business set directory number appearance. SLU is not available onbusiness set multiple appearance directory number (MADN) secondary directory appearances.	NTX106AA

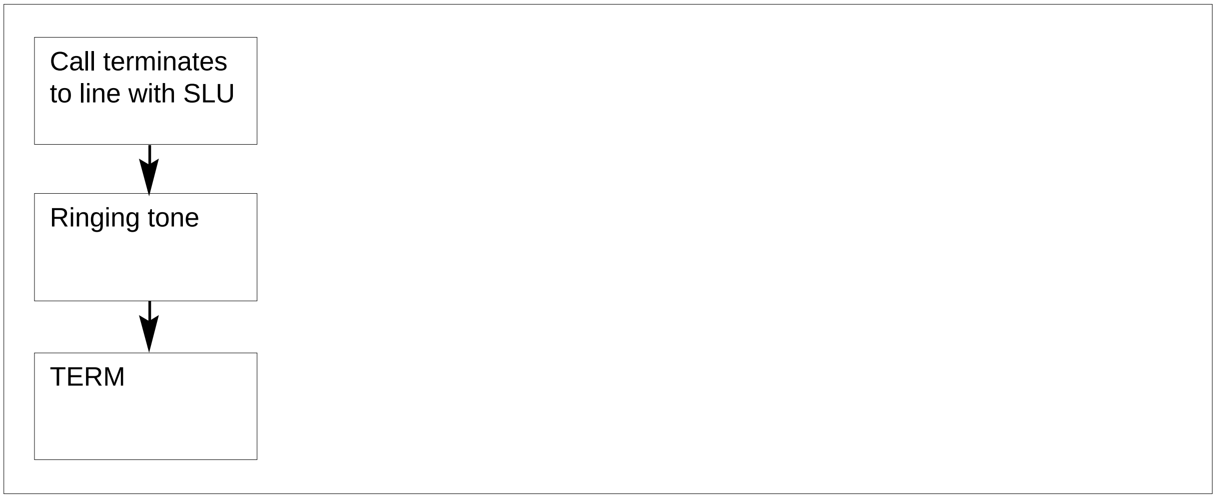
OM group TRA125M2 (continued)

OM group TRA125M2 originating calls registers



OM group TRA125M2 (continued)

OM group TRA125M2 terminating calls registers



OM group TRA125M2 usage registers

Register ORIG

Originations

ORIG is incremented when a subscriber with the subscriber line usage (SLU) option attempts to originate a call and dial tone is connected.

If the switch can identify which party of two- and four-party lines made the call attempt, the register is incremented only once. If the switch cannot identify which party of two- and four-party lines made the call attempt, the register counts each directory number on the line.

Register ORIG release history

ORIG was introduced prior to BCS20.

BCS31

ORIG incremented on SL-100 for IPE.

Associated registers

None

Associated logs

None

Extension registers

None

Register TBU

Traffic busy usage

TBU is a usage register. The scan rate is specified by parameter TRA125M2_SCAN_RATE in table OFCVAR. TBU records whether a line is processing calls.

The default value of parameter TRA125M2_SCAN_RATE is 100 seconds.

Register TBU release history

TBU was introduced prior to BCS20.

BCS33

When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS31

TBU incremented on SL-100 for IPE.

Associated registers

None

Associated logs

None

Extension registers

None

OM group TRA125M2 (end)

Register TERM

Terminations

TERM is incremented when a call has been terminated to a line with the subscriber line usage (SLU) option and ringing tone begins.

TERM does not count calls within the same hunt group or the same equiv group.

Register TERM release history

TERM was introduced prior to BCS20.

BCS31

TERM is incremented on SL-100 for IPE.

Associated registers

For a hunt group with the SLU option associated with all the lines:
HUNT_HUNTATT - HUNT_HUNTOVFL = TERM

Associated logs

None

Extension registers

None

OM description

Traffic route analysis 250 measurements 1

TRA250M1 provides information about line usage and counts originations and terminations on selected subscriber lines or groups of lines.

Table TRA250I1 specifies the lines that are monitored. A maximum of 250 entries can be made in the table. The subscriber line usage (SLU) option is added to a line through a service order. The line is then added to table TRA250I1 using the SLUADD command. When the SLU_INSTALL command is given, the contents of table TRA250I1 are copied into TRA250M1.

New entries can be added to table TRA250I1 while group TRA250M1 is monitoring the lines originally specified by the table. The new entries do not affect the group until the SLU_INSTALL command is given.

Release history

OM group TRA250M1 was introduced prior to BCS20.

BCS33

Register TBU can be converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class.

BCS31

Existing registers incremented on SL-100 for intelligent peripheral equipment (IPE).

Registers

OM group TRA250M1 registers display on the MAP terminal as follows:

```
TBU             ORIG            TERM
```

Group structure

OM group TRA250M1 provides one tuple for each line specified in table TRA250I1.

Key field: None
Info field: SLU_OM_INFO

OM group TRA250M1 (continued)

The SLU feature is activated by setting parameter OPTIONAL_SLU_FEATURE in table OFCOPT to Y. The SLU feature is enabled in tables LENFEAT, IBNFEAT, and KSETFEAT.

Associated OM groups

ENG640M1, TRA125M2, and TRA125M1 provide information about line usage and count originations and terminations on other selected subscriber lines or groups of lines.

Associated functional groups

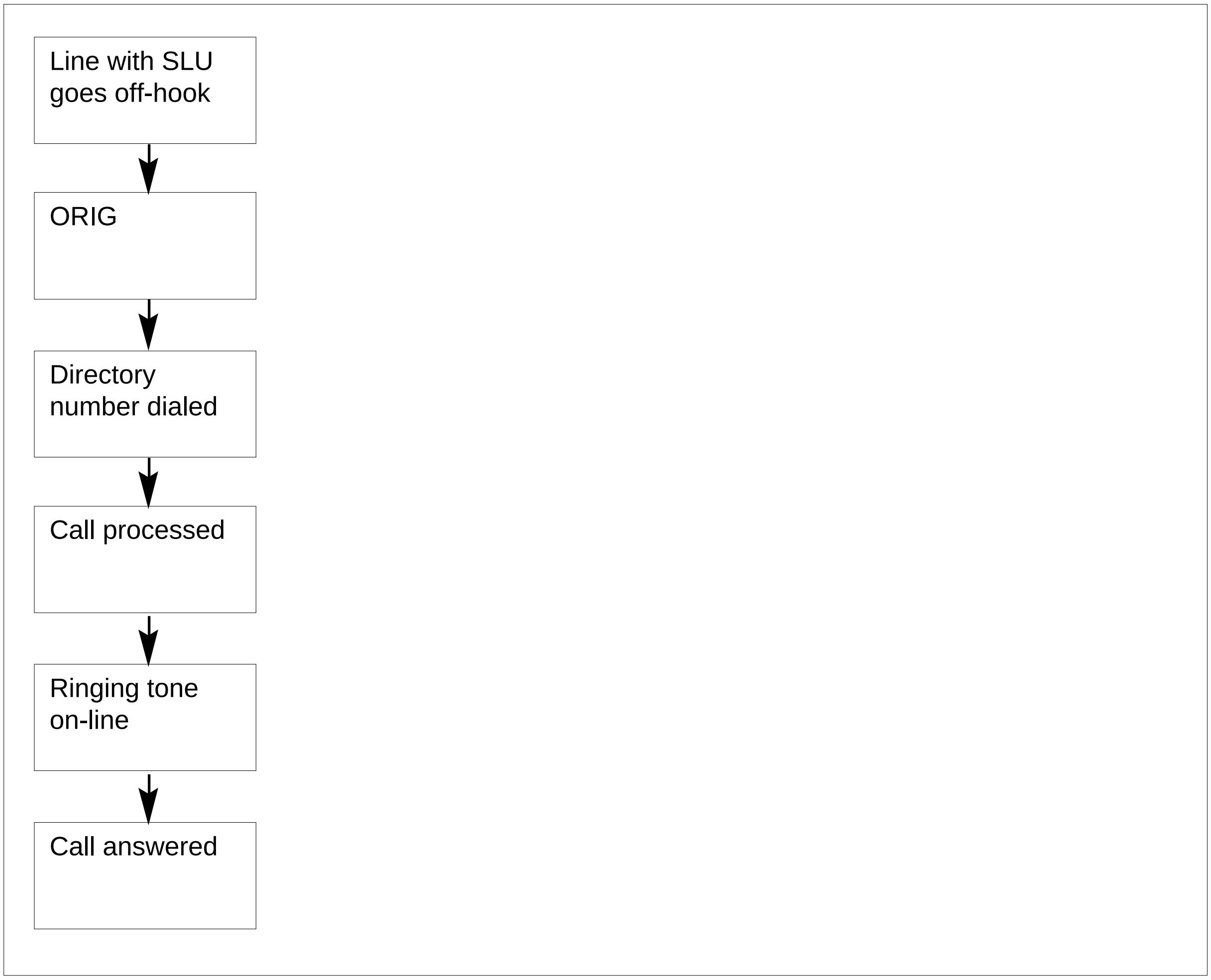
The Meridian SL-100 PBX functional group is associated with OM group TRA250M1.

Associated functionality codes

The functionality codes associated with OM group TRA250M1 are shown in the following table.

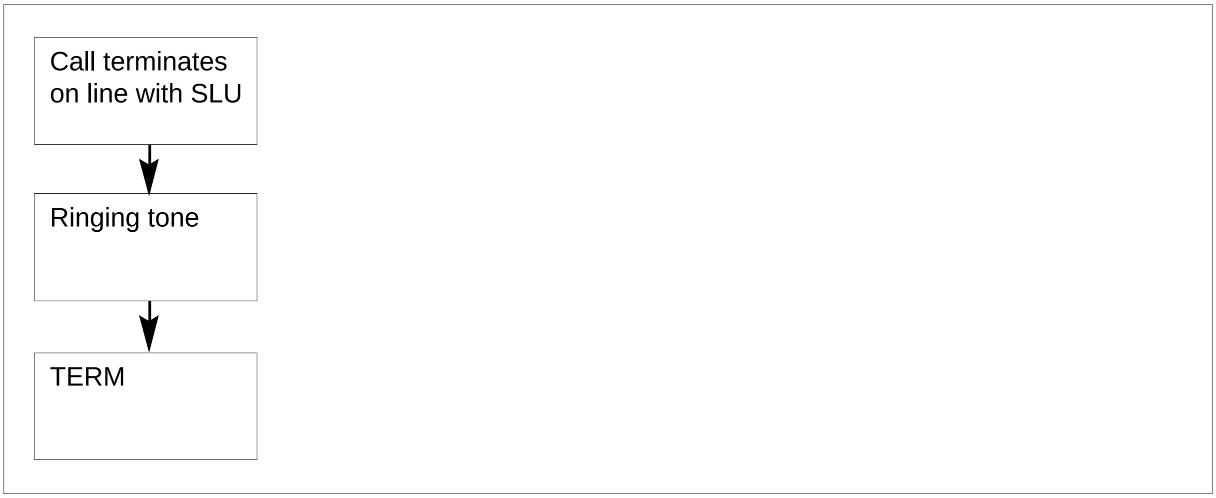
Functionality	Code
Extended Peripheral Equipment	NTXN25AA
Subscriber Line Measurements	NTX082AA
IBN Proprietary Business Set. NTX106AA allows SLU to be assigned to any business set directory number appearance. SLU is not available on business set multiple appearance directory number (MADN) secondary directory appearances.	NTX106AA

OM group TRA250M1 originating calls registers

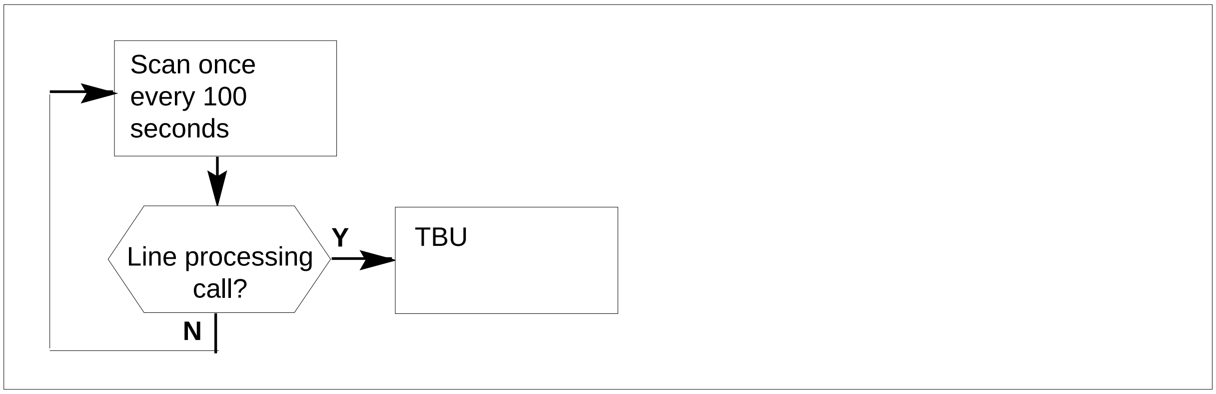


OM group TRA250M1 (continued)

OM group TRA250M1 terminating calls registers



OM group TRA250M1 usage registers



Register ORIG

Originations

ORIG is incremented when a subscriber with the subscriber line usage (SLU) option attempts to originate a call and dial tone is connected.

If the switch can identify which party of two- and four-party lines made the call attempt, the register is incremented only once. If the switch cannot identify which party of two- and four-party lines made the call attempt, the register counts each directory number on the line.

Register ORIG release history

ORIG was introduced in prior to BCS20.

BCS31
ORIG incremented on SL-100 for IPE.

Associated registers
None

Associated logs
None

Extension registers
None

Register TBU
Traffic busy usage

TBU is a usage register. The scan rate is specified by parameter TRA250M1_SCAN_RATE in table OFCVAR. TBU records whether a line is processing calls.

The default value of parameter TRA250M1_SCAN_RATE is 100 seconds.

Register TBU release history
TBU was introduced in prior to BCS20.

BCS33
When office parameter OMINERLANGS is set to Y, the usage count is converted from CCS to deci-erlangs prior to their display using the OMSHOW command on the ACTIVE class. The value held in the active registers is not altered and remains in CCS.

BCS31
TBU incremented on SL-100 for IPE.

Associated registers
None

Associated logs
None

Extension registers
None

Register TERM

Terminations

TERM is incremented when a call has been terminated to a line with the subscriber line usage (SLU) and ringing tone begins.

TERM does not count calls within the same hunt group or the same equiv group.

Register TERM release history

TERM was introduced prior to BCS20.

BCS31

TERM incremented on SL-100 for IPE.

Associated registers

For a hunt group with the SLU option associated with all the lines:
HUNT_HUNTATT - HUNT_HUNTOVFL = TERM

Associated logs

None

Extension registers

None

OM group XPMLINK

OM description

XMS-based peripheral module link

XPMLNK records one-way and two-way link blockage and usage for all extended multiprocessor system (XMS)-based peripheral modules (XPM) with switched lines.

Release history

OM group XPMLINK was introduced in BCS34.

Registers

OM group XPMLINK registers display on the MAP terminal as follows:

```
CSLCBU          PSLCBU          CSLAA          PSLAA
CSLBLK          PSLBLK          CSLMU          PSLMU
```

Group structure

OM group XPMLINK provides one tuple for each XPM equipped with LCDs.

Key field: PM_TYPE PM_NO
Info field: None

Associated OM groups

LMD Line module device used with line controlling module (LCM) OMs

RSCIS Remote switching center (RSC) intraswitching measurement

RLCDIS Remote line controlling device intraswitching measurement

Associated functional groups

The Peripheral module functional groups are associated with OM group XPMLINK.

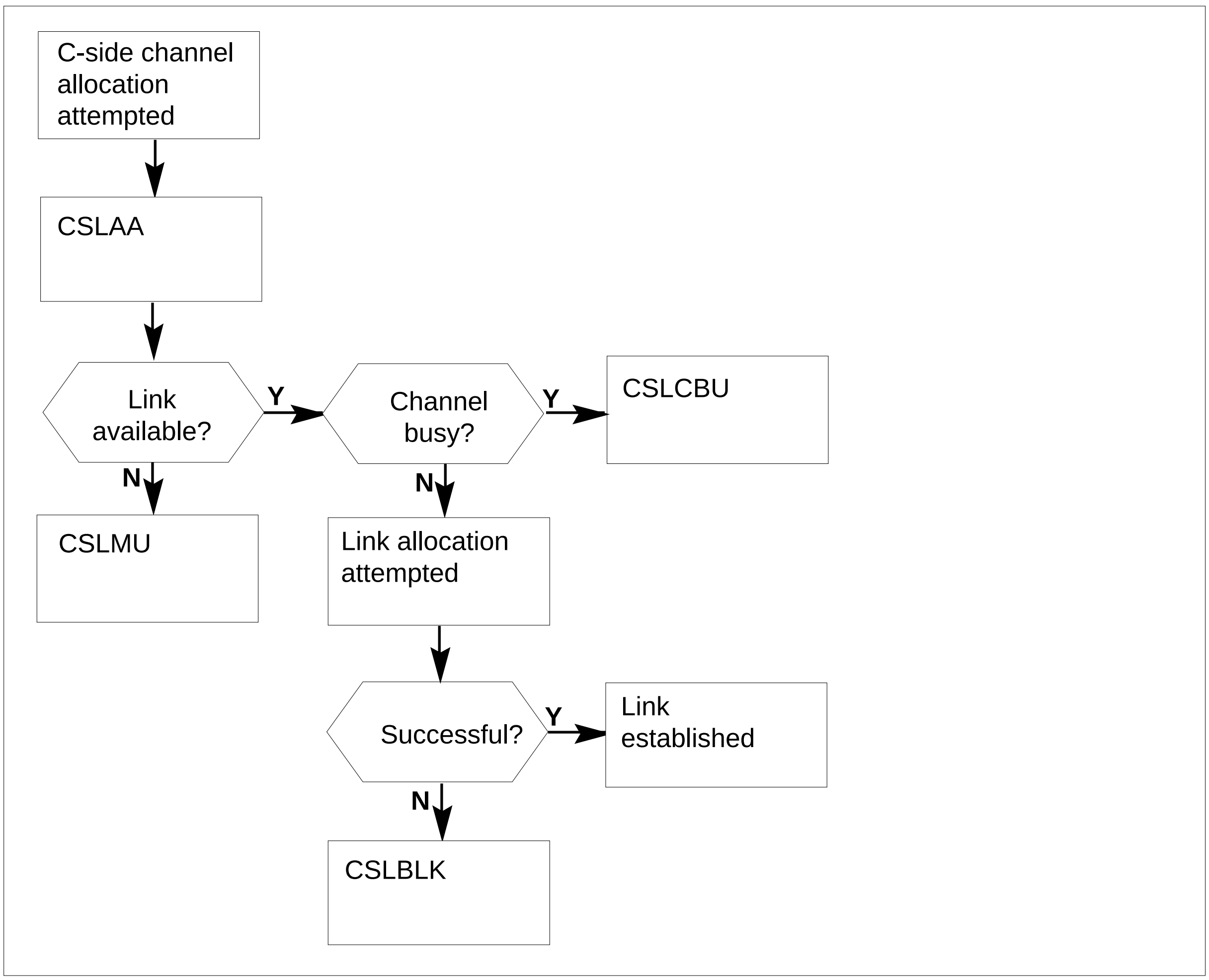
OM group XPMLINK (continued)

Associated functionality codes

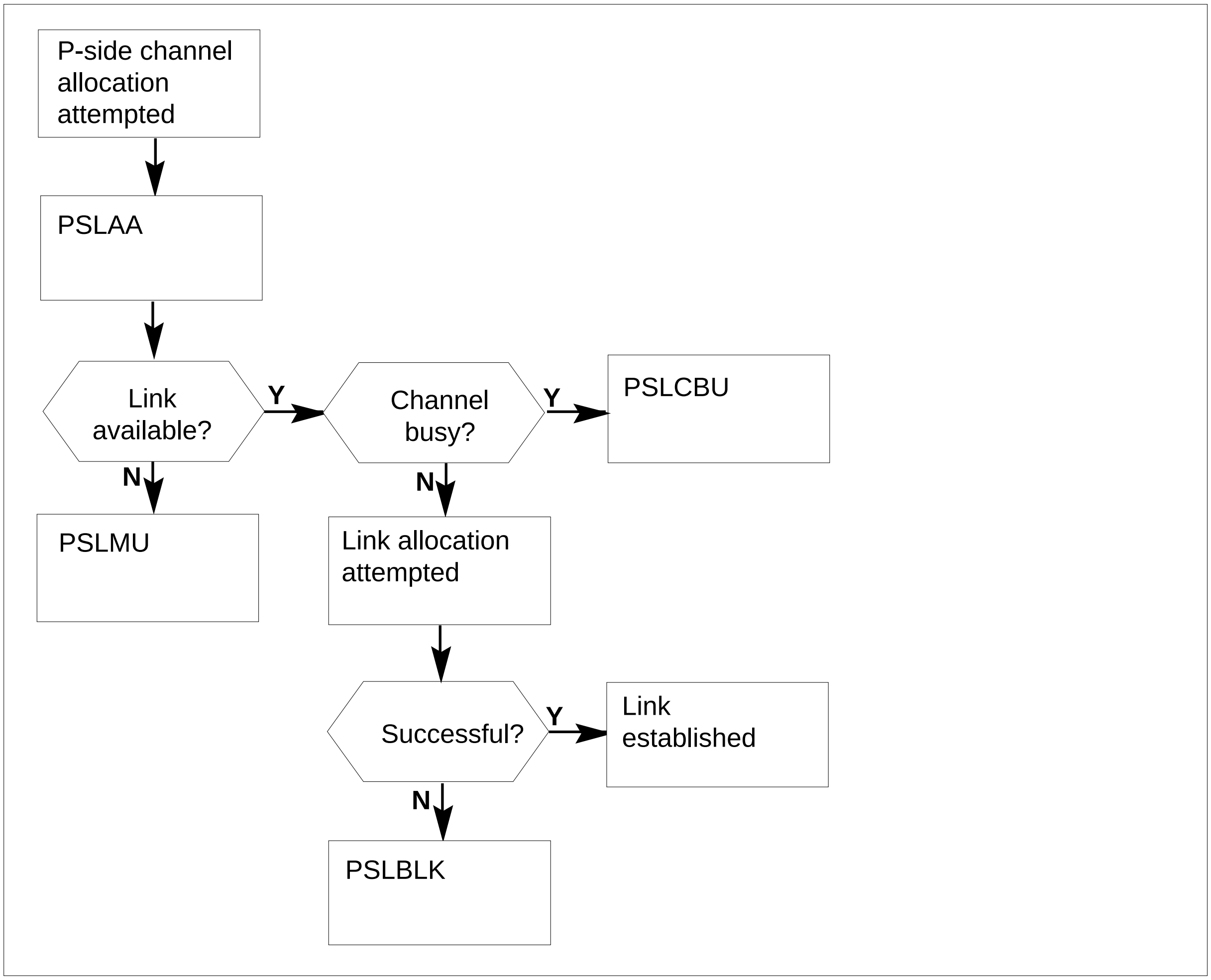
The functionality codes associated with OM group XPMLINK are shown in the following table.

Functionality	**Code**
New Peripheral Maintenance Package	NTX270AA

OM group XPMLINK registers



OM group XPMLINK registers



Register CSLAA

C-side link allocation attempts

CSLAA is incremented each time the network attempts to allocate a channel to the XPM.

Register CSLAA release history

CSLAA was introduced in BCS34.

Associated registers

None

OM group XPMLINK (continued)

Associated logs

None

Extension registers

None

Register CSLBLK

C-side link blockage

CSLBLK is incremented for each failed attempt to allocate a channel between the network and the XPM.

Register CSLBLK release history

CSLBLK was introduced in BCS34.

Associated registers

None

Associated logs

None

Extension registers

None

Register CSLCBU

C-side link call busy usage

CSLCBU records the time in hundred call seconds (CCS) that C-side links are busy due to call processing.

Register CSLCBU release history

CSLCBU was introduced in BCS34.

Associated registers

LMD_LMTRU, RSCIS_RSCISCBU, RLCDIS_ISTOTTRU

Associated logs

None

Extension registers

None

Register CSLMU

C-side link maintenance busy usage

CSLMU records the time (in CCS) that the C-side links are unavailable for call processing.

Register CSLMU release history

CSLMU was introduced in BCS34.

Associated registers

None

Associated logs

None

Extension registers

None

Register PSLAA

P-side link allocation attempts

PSLAA is incremented each time a channel is allocated between an XPM and its subtending nodes.

Register PSLAA release history

PSLAA was introduced in BCS34.

Associated registers

LMD_NTERMATT, LMD_NORIGATT

Associated logs

None

Extension registers

None

Register PSLBLK

P-side link blockage

PSLBLK is incremented for each failed attempt to allocate a channel between the XPM and one of its subtending nodes.

OM group XPMLINK (continued)

Register PSLBLK release history

PSLBLK was introduced in BCS34.

Associated registers

LMD_PMTRMBLK

Associated logs

None

Extension registers

None

Register PSLMU

P-side link maintenance busy usage

PSLMU records the time (in CCS) that the links between the XPM and its subtending nodes are unavailable for call processing.

Register PSLMU release history

PSLMU was introduced in BCS34.

Associated registers

None

Associated logs

None

Extension registers

None

Register PSLCBU

P-side link call busy usage

PSLCBU records the time (in CCS) that P-side links are busy due to call processing.

Register PSLCBU release history

PSLCBU was introduced in BCS34.

Associated registers

None

OM group XPMLINK (end)

Associated logs

None

Extension registers

None

Meridian 1 Options 201, 211

Meridian SL-100

MCRU Services Guide

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules, and the radio interference regulations of the Canadian Department of Communications. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

Allowing this equipment to be operated in such a manner as to not provide for proper answer supervision is a violation of Part 68 of FCC Rules, Docket No. 89-114, 55FR46066.

The SL-100 system is certified by the Canadian Standards Association (CSA) with the Nationally Recognized Testing Laboratory (NRTL).

This equipment is capable of providing users with access to interstate providers of operator services through the use of equal access codes. Modifications by aggregators to alter these capabilities is a violation of the Telephone Operator Consumer Service Improvement Act of 1990 and Part 68 of the FCC Rules.

Publication number: 555-4001-021
Product release: BCS36 and up
Document release: Standard 01.02
Date: April 1995
Printed in the United States of America

northern
telecom