10A REMOTE SWITCHING SYSTEM MAINTENANCE

SOFTWARE DESCRIPTION

2-WIRE NO. 1/1A ELECTRONIC SWITCHING SYSTEM

CONTENTS PAGE

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CONTENTS PAGE

1. GENERAL

INTRODUCTION

1.01 The 10A Remote Switching System (RSS) maintenance software performs the maintenance function necessary to maintain a 10A RSS under control of a host No. 1/1A Electronic Switching System (ESS).

1.02 When this section is reissued, the reason for reissue will be given in this paragraph.

1.03 Part 12 of this section provides a defined list of the abbreviations and acronyms used herein.

PURPOSE OF THE RSS MAINTENANCE SOFTWARE

1.04 The RSS maintenance software provides a No. 1/1A ESS Central Office (CO) with the capability to maintain the remote terminal (RT). This RT may be used as a CO replacement vehicle for a small community dial office or as a pair gain system to reduce the number of subscription pairs in the loop plant. Most of the maintenance functions for RSS lines are performed by the host ESS office.

SCOPE OF SECTION

1.05 This section provides an introduction to the RSS maintenance software operating in a No. 1/1A ESS. Information unique to a specific system is based on the 1E7 (No. 1 ESS) and 1AE7 (No. 1A ESS) versions of the generic program.

2. PIDENT DESCRIBED IN SECTION

2.01 Table A provides a pident-to-program number cross reference for the RSS pidents described in this document. Table A is not an exhaustive list of all RSS pidents, rather only those pidents which form the maintenance core of the RSS maintenance software are listed.

3. FUNCTIONAL DESCRIPTION

GENERAL

3.01 The RSS software provides a means of controlling a remotely located switching network. This system takes advantage of existing equipment and control capacity in an ESS to provide a more cost effective switching entity for central offices than provided by conventional stand-alone switches. While software controlling the RSS resides in the host ESS, the remote terminal, with its associated firmware, functions as an autonomous peripheral. A major advantage of this arrangement is that the complex tasks of call processing, using existing software facilities and features, are performed in the host ESS. RSS also furnishes a means of providing ESS services to customers served by electromechanical offices. As shown in Fig. 1, RSS consists of a host ESS office, a remote terminal, and interconnecting voice and data links. Note that a particular ESS may host one or more RSS.

3.02 The data links are used for communication between the ESS central control (CC) via the

TABLE A

RSS MAINTENANCE PIDENTS

PIDENT	TITLE	NO. 1 PR	NO. 1A PR
RSBC	RSS Broadcast Messages	1A620	6A620
RTTI	RSS TTY Interface Program	1A620	6A620
RDOC	RSS Circuit Disposition	1A626	6A626
RSAS	RSS Alarm Summary Report Program	1A659	6A659
RPIN	RSS Physical Initialization Program	1A662	6A662
RTTR	RSS TOUCH-TONE Receiver Diagnostic Program	1A837	6A837
	LINE MAINTENANCE		
RLTD	RSS Local Test Desk	1A625	6A625
RLIT	RSS Line Insulation Test	1A628	6A628
	CHANNEL MAINTENANCE		
CHDL	RSS Channel Maintenance Data Link Interface Program	1A603	6A603
CHNC	RSS Channel Control Program	1A603	6A603
CHND	RSS Channel Diagnostic Program	1A604	6A604
CHCS	Change State of RSS CREN Program	1A632	6A632
CHLS	RSS Channel List Program	1A632	6A632

peripheral unit controller and the microprocessor in the RT. Information such as line origination, acknowledgment, and status (RT and ESS), and network orders (ESS to RT) is passed via the data link.

4. RSS PHYSICAL INITIALIZATION PROGRAM (RPIN)

GENERAL

4.01 It is necessary to initialize an RSS any time (a) the No. 1/1A ESS (host) performs a phase 4 or greater initialization, (b) problems in the RSS cause it to request an initialization, (c) whenever it is necessary to manually force an initialization, or (d) when the RSS recovers from a stand-alone state (cut off from host communication). Such an initialization is performed by pident RPIN.

4.02 The RSS initialization is a complex and intricate function that affects many areas of RSS

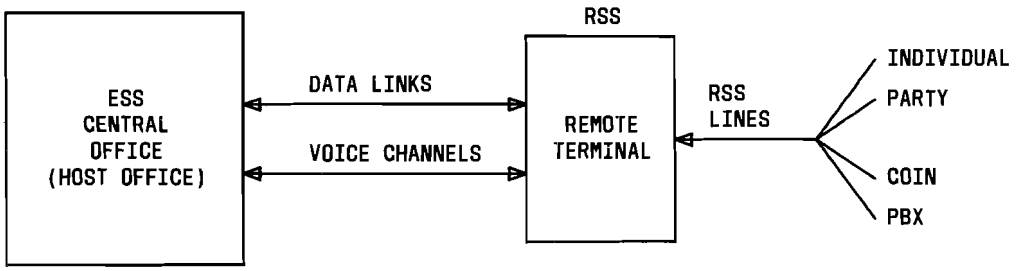

Fig. 1—RSS Block Diagram

activity. The function directly interfaces with the ESS audits, RSS message routing, data link recovery function, and ROB activation. It directly affects these and many other areas of RSS.

4.03 The RSS initialization function can be broken down into three separate yet interrelated functions. These functions are:

- Host initiated phases
- Remote initiated phases
- Stand-alone recovery.

HOST INITIATED PHASES

4.04 Host initiated phases are RSS initializations that are caused by fault recovery actions taken by the ESS machine. They can occur automatically when the host executes phase 4 and 5 initialization, or manually by depressing the appropriate buttons at the master control center (MCC). Any host initialization which is greater than a phase 3 forces all RSSs attached to that host to execute an equivalent initialization action. An initialization of one or more RSS is requested during the host phase but performed outside of the host phase. This allows the signal processor (SP) time to start running (if it is an SP office) and the data links to be up and operational. These are necessary conditions for host-RSS communication.

4.05 Initializations are forced on RSSs for only the more serious fault recovery actions. When the host initiates a phase 4 or phase 5 initialization, the RSSs that are attached to it must perform a transient clear initialization (Fig. 2). When the host initiates a phase 6 or phase 7 which represents stable clear actions (Fig. 3), the RSSs attached to it must also perform stable clear actions.

4.06 When the host executes a phase that affects the RSSs attached to it, certain functions must be performed on the host's RSS software data base and related hardware before these RSSs can be initialized. These functions include the following:

(1) Complete initialization of RSS call store in the host for each RSS to be initialized.

(2) Each Primary Route table corresponding to an RSS to be initialized must have selected entries inhibited.

(3) The RSS control words must be set up indicating the type of initialization and the RSSs to be initialized.

(4) If recent change has been zeroed, it must be indicated in the first RSS control word.

(5) The data links for each RSS must be initialized.

(6) The isolate call processing bit must be set.

(7) The RSS physical initialization routine must be activated.

4.07 Audits 5P and 49 perform functions 1, 2, 4, and 6 above when they run inside the host phase. These audits initialize the host RSS call store data bases commensurate to the phase in progress.

4.08 The data link recovery routines perform functions 3, 5, and 7. The RSS data links are initialized inside a host phase but the data link recovery actions do not reset the duplex link failure bit (which gets set when the data links drop off) until it receives a link restore from the peripheral unit controller (PUC). This message is received outside the host phase, and the RSS initialization cannot take place until after the duplex link failure bit has been cleared. The RSS initialization function uses the duplex link failure bit as an indication to abort an RSS initialization in progress when the data links drop off. Therefore it becomes necessary to perform each RSS initialization as the link restore is received for the data links of a particular RSS. Upon receiving the link restore, the data link recovery routines determine if the host has taken a phase in the last 60 seconds. If it has not it is assumed the RSS has already dropped into stand-alone and stand-alone recovery action must be initiated. If it has performed a phase within the last 60 seconds, then the appropriate bits in the RSS control words are set and the RSS physical initialization function is activated.

REMOTE INITIATED PHASES

4.09 Remote initiated phases are those fault recovery actions which originate in the RSS. These initializations can be initiated in three different ways:

(1) The RSS finds internal problems and requests initialization.

(2) The reset button on the back of the RSS frame is depressed.

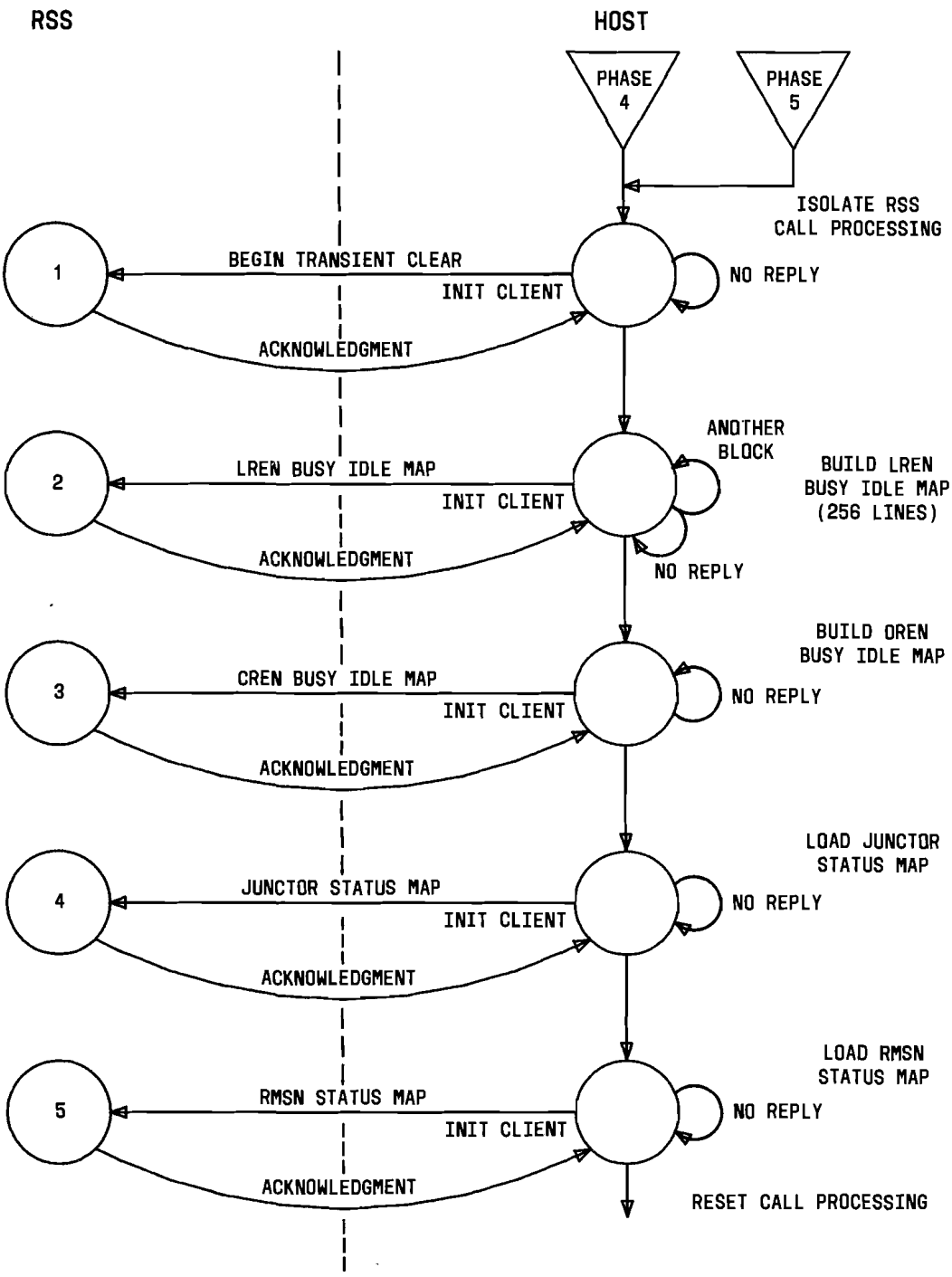

Fig. 2—Host Initiated Transient Clear

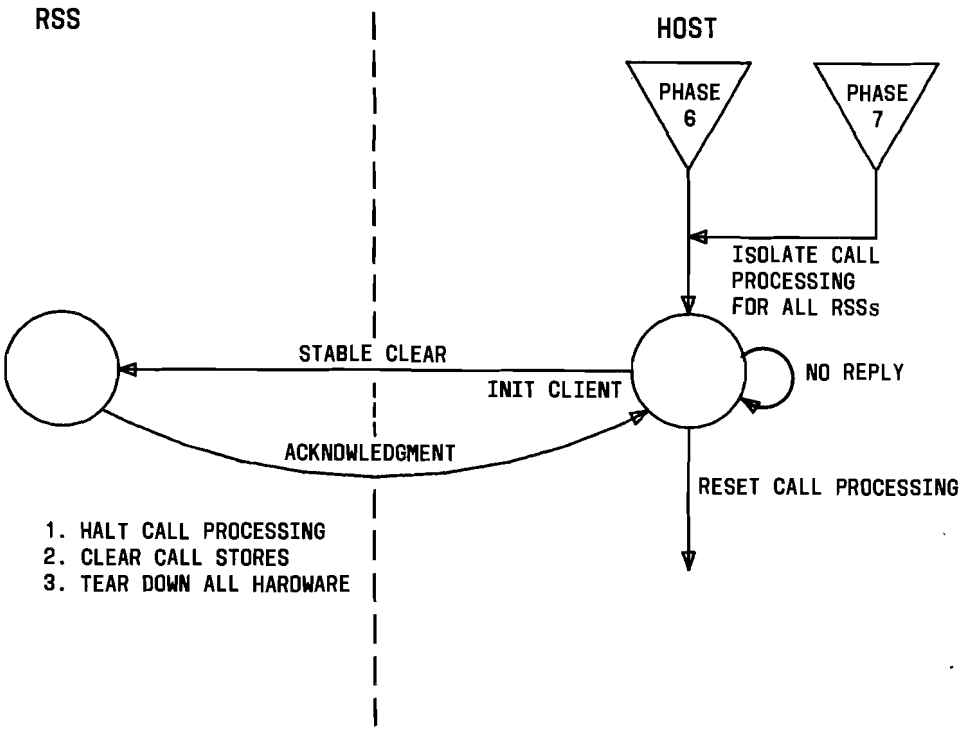

Fig. 3—Host Initiated Stable Clear

(3) An initialization TTY message is typed in at the host's maintenance TTY.

4.10 The first action can cause level 1 through 5 initializations, the second action causes a level 6 initialization, and the last action can cause level 1 through 6 initializations. The host only responds to the more serious initializations (4 through 6). An RSS level 4 initialization is a transient clear (Fig. 4) while levels 5 and 6 are stable clears (Fig. 5). When the RSS initiates a certain level of initialization, it sends a message to the host requesting to begin a phase. If the host is already initializing another RSS, it ignores the request; if not, it isolates call processing, prepares to receive data for initialization, and sends an acknowledgment to the RSS. When the RSS receives this acknowledgment, it will either send an LREN busy idle status map (for transient clear initialization) or an indication to begin stable clear. If the acknowledgment fails, the RSS will wait for a predetermined amount of time and resend the message. Functions 1, 2, 3, 6, and 7 (paragraph 4.06) which were once performed by audit 49, audit 5P, and the data link fault recovery routines must now be performed by the RSS physical initialization function.

STAND-ALONE RECOVERY

4.11 RSS stand-alone recovery (Fig. 6) is necessary any time communication between the RSS and the ESS has been interrupted for a predetermined amount of time causing the RSS to fall into a stand-alone mode. When the RSS is in this stand-alone state, it can only complete intra-RSS calls. Since communication between the ESS (host) and the RSS has been interrupted, no inter-RSS calls can be made. When the RSS falls into a stand-alone mode, it performs a transient clear and forces on-hooks on all the RSS channels. The RSS will remain in stand alone until it receives a stand-alone inquiry message from the host.

5. RSS REMOTE TERMINAL CIRCUIT DISPOSITION PROGRAM (RDOC)

GENERAL

5.01 The RDOC pident is responsible for removing peripheral circuits from service and also re-

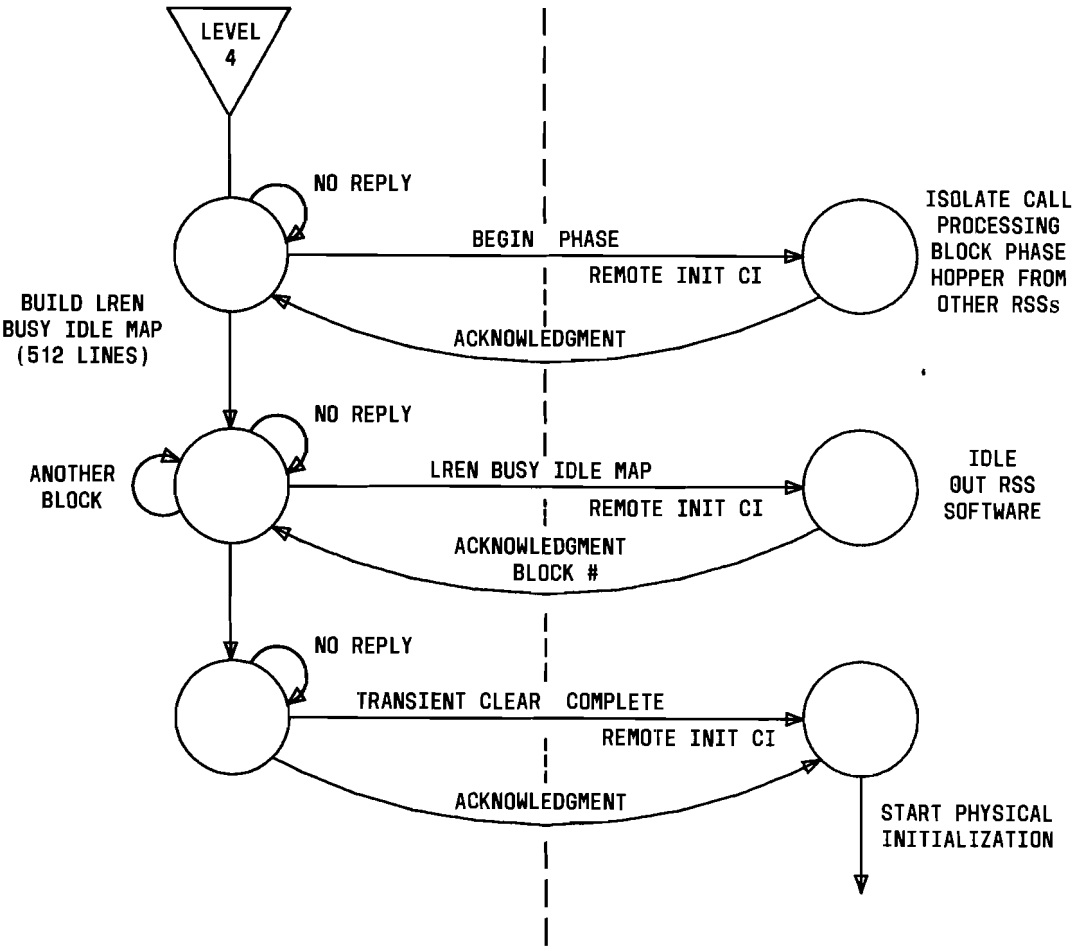

Fig. 4—Remote Level 4 Initialization (Transient Clear)

storing peripheral circuits to service. The removal from service requests may come from the RSS remote terminal (error analysis, quick check, the operating system, or the maintenance panel) or from a manual request via the TTY. The restoral to service requests are generated only from the maintenance panel or the TTY. Another function of RDOC is to provide the capability of printing the out-of-service lists of the various peripheral circuits upon request.

5.02 The circuit disposition programs reside in both the host No. 1/1A ESS and the RSS remote terminal. The reason for this is the call processing programs must be blocked from selecting out-of-service equipment for use. For universal service circuits (USCs) and metallic access buses, the RSS remote terminal maintains the busy/idle and out-of-service states. For all other peripheral circuits, such as A links, channels, junctors, lines, receiver off-hook (ROH) tone circuits, and the maintenance test circuits, the busy/idle and out-of-service states are maintained in the No. 1/1A ESS. The RDOC pident is responsible for all of these circuits except for channels that are controlled by the channel maintenance programs.

5.03 Removal from service requests may be denied for two reasons. First of all, for each type of peripheral circuit except for lines, there exists an out-of-service threshold limit which prevents automatic removal requests by error analysis or quick check from removing more than a given number of circuits from service of any one type. The second reason is the particular circuit may remain busy. There is the capability of camping on a busy circuit so when the circuit is idled, it may be removed from service. However, a circuit may only be camped on for a maximum of 5 minutes at any one time.

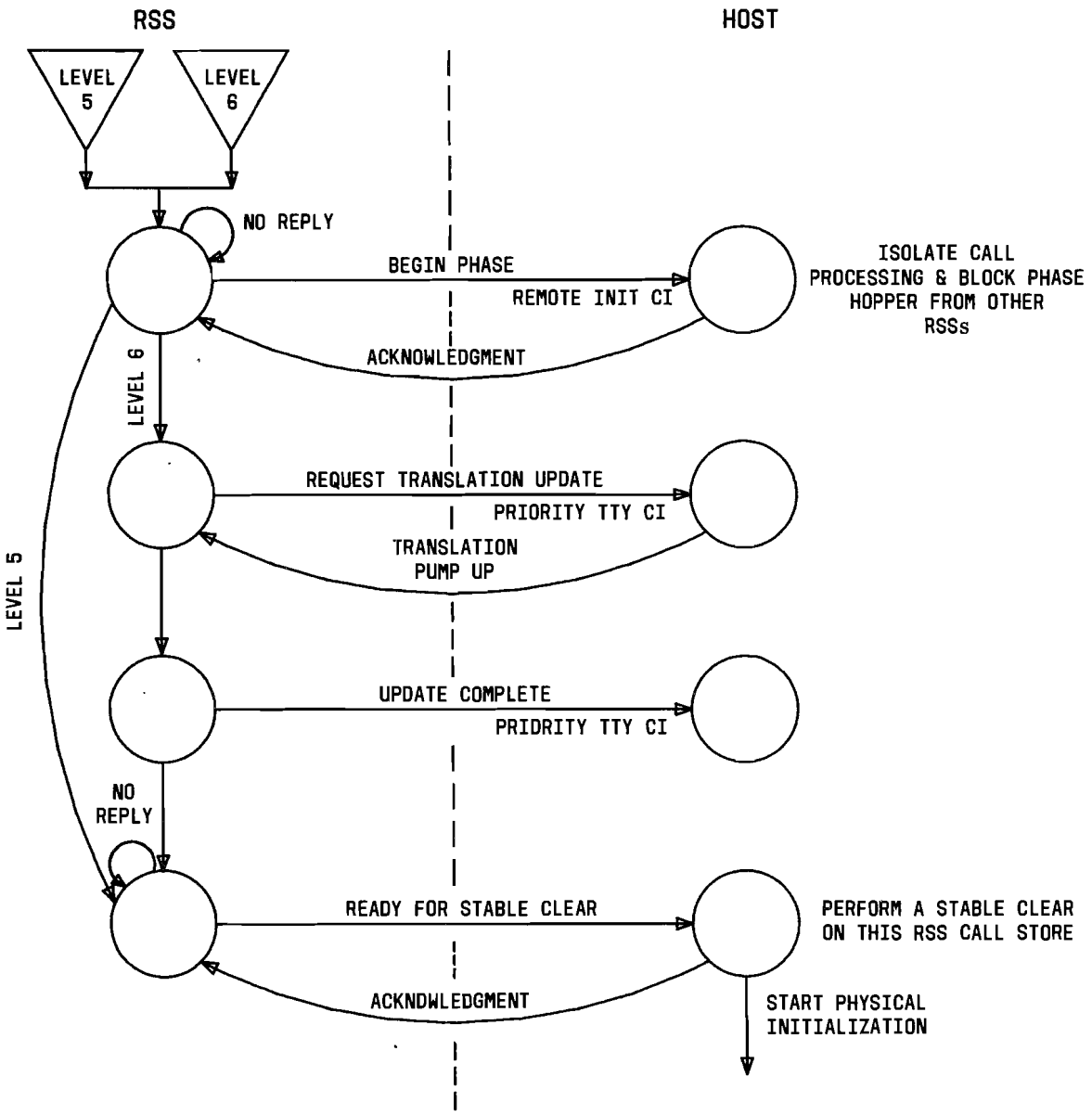

Fig. 5—Remote Initiated Stable Clear

5.04 Each removal request generates a corresponding TTY output message which gives a brief description of the removal result. A manual TTY request either indicates a completed removal, a stopped busy removal (the camp-on timed out), or the out-of-service threshold limit has been reached. For an automatic removal request, a TTY removal or trouble report message is generated which specifies the removal request identifier of either error analysis or quick check, and also the error type or error types that were involved.

5.05 Circuits requested to be removed from service, or restored to service, via a manual request, are checked to see if they are equipped. For cases where the RSS remote terminal is unequipped, the circuit is equipped or unassigned, or the circuit is already in the requested state, a no good (NG) TTY acknowledgment is generated. For automatic removal requests, the circuit should always be equipped. However, if the particular circuit is not equipped, which should never happen, no action is taken and no TTY messages are printed.

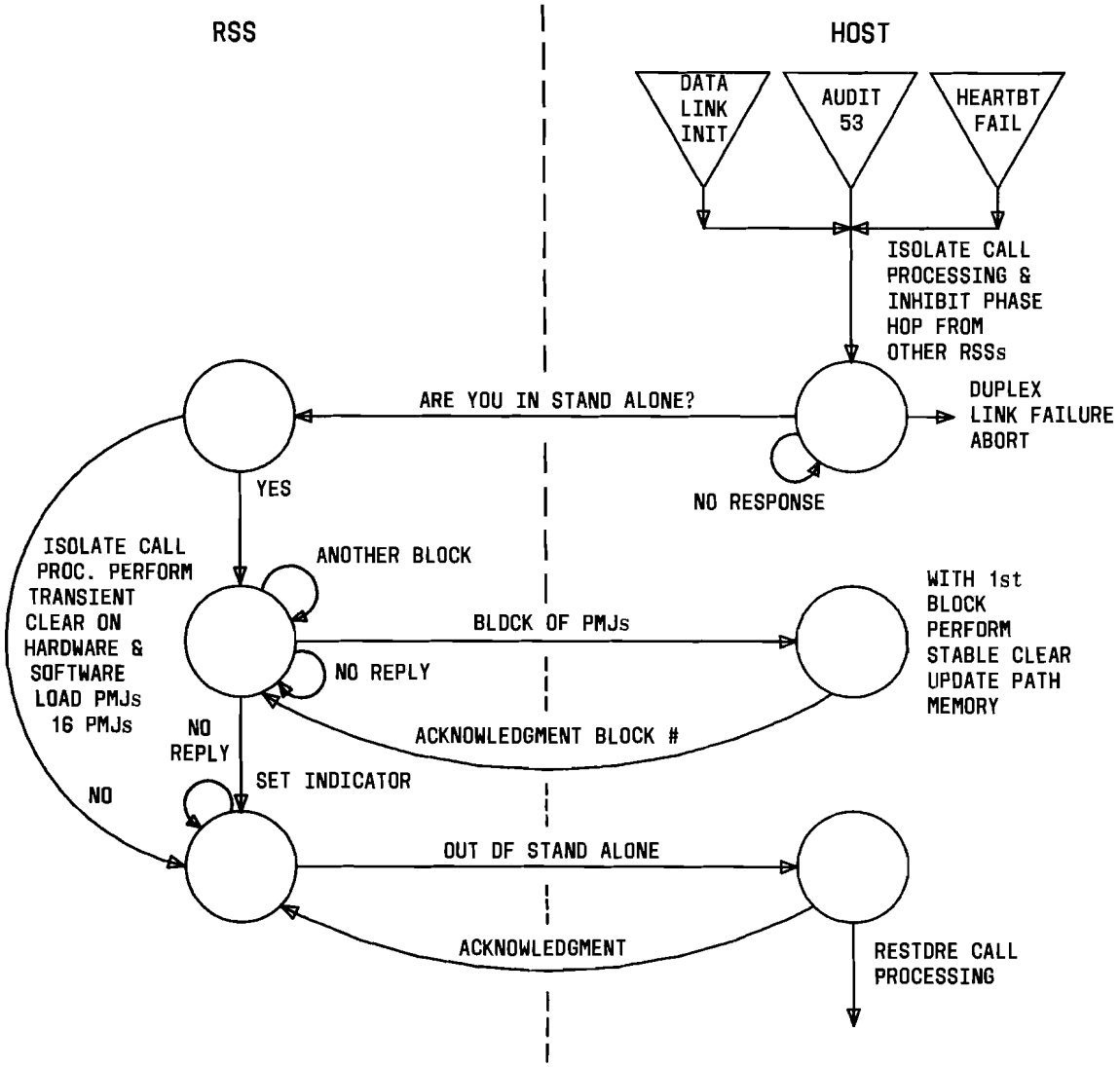

Fig. 6—RSS Stand-alone Recovery

5.06 The way a circuit is marked as being out of service depends upon the type of circuit. A links removed from service are kept on a list that allows up to 32 entries per module. Also, the busy/idle bit for the A link is set to busy which prevents call processing from selecting that A link for use. Junctors have their own path memory word that is set to out of service, and like A links, the associated busy/idle bit is set to busy. The ROH tone circuits have their own path memory word that is set to out of service, and the ROH tone circuit is also removed from the idle linked list. Universal service circuits and metallic access buses are treated the same in the RSS remote terminal. The busy/idle bits are set to busy as are the associated maintenance (out of service) bits. Lines have their own path memory word that is placed in the high and wet state with the ignore bit set. A data link message is also sent to the RSS remote terminal which informs the RSS to mark the path memory word to the ignore state and to turn off battery feed for the line. The maintenance test circuits (automatic line insulation test, miniresponder, remote line test, line test access bus, and the channel test access bus) simply have out-of-service bits that are set to indicate the circuit is out of service.

LOCAL TEST DESK INTERFACE

5.07 The RDOC and RSS local test desk (RLTD) may request control of a line at the same time or while either client has control of a line. Since the local test desk has a higher priority than circuit disposition, the following procedures have been provided. For both single line and line board removals, if the local test desk has control of the line, the line will not be removed from service. For a single line removal, if the line is being camped on by circuit disposition and the local test desk requests control of the line, the camp-on bit for the line is cleared to prevent the idle report from entering circuit disposition. When the 5-minute timer expires, a line removal stopped busy message is printed. For line board removal, if a line is being tested by the local test desk, the line busy counter is incremented to prevent the board removal completion message from being sent to the RSS remote terminal and the camp-on bit for the line is not set to prevent the idle report from entering circuit disposition. If the line should be removed from service, the request will have to be repeated at a later time.

6. RSS ALARM SUMMARY REPORT PROGRAM (RSAS)

6.01 Pident RSAS provides the alarms summary report of RSS scan points by sending a copy (current or initialized) of its host remote miscellaneous scanner number-map to each equipped RSS. When the RSS receives the map, it assumes the new map is the correct one. Then the two maps are compared (the new with the old) and the difference is sent to the host as an alarm report message at the TTY.

7. RSS TTY INTERFACE PROGRAM (RTTI)

7.01 This pident consists primarily of the programs necessary to interface the No. 1/1A ESS host TTY programs with the 10A RSS remote terminal over the connecting data link. Three major components of code are included and are described in the following paragraphs.

7.02 The first component takes the TTY input data and does any necessary preprocessing (primarily encodes strings of ASCII characters). Then it forms the data link header and the message header, and loads the message onto the data link for final processing at the RSS remote terminal.

7.03 The second component takes the data transmitted over the data link from the RSS remote terminal to the host and places it into temporary ESS memory. This transfer involves a small amount of data manipulation before program control is passed to the proper output program.

7.04 The third component of this pident performs any additional data formatting required for the TTY output message and executes the print macro. This component also is the interface between pident RTTI and the TTY output programs.

8. RSS BROADCAST MESSAGES PROGRAM (RSBC)

8.01 The function of pident RSBC is to transmit a requested message to all assigned RSSs.

8.02 The following is a list of the messages that can be sent to the RSSs.

(a) RSBCLL—This entry requests line load control messages to be broadcast.

(b) RSBCCT—This entry requests cutover control messages to be broadcast.

(c) RSBCTM—This entry requests a time of day message to be broadcast.

9. RSS LINE MAINTENANCE

REMOTE LINE INSULATION TEST (RLIT)

9.01 The purpose of pident RLIT is to interface between pident ALIT and the remote terminals. Since the remote terminals have their own ALIT circuits (Automatic Line Insulation Test), the ALIT pident does not do the actual testing but instead controls the testing through pident RLIT. All RT lines are tested through RLIT.

9.02 While ALIT processes the input message, the control action parameter is examined to determine if the test is for RSS or the host.

9.03 An additional check is necessary for those cases where the specified input is a directory number (DN). Since the input message associated with DNs was not modified, a check for RSS is made after the DN translation (TRDWBM).

9.04 Translation TRRIAC is the RSS information translation. It provides information such as: class of service, plug up, or service observed. Transla-

tion TRDWBM gives DN information for the line remote equipment number (LREN). These two are needed in order to determine the DN of the LREN so the DN can be printed when an LREN fails a given test.

9.05 The following types of lines are not tested:

- Centrex attendant console
- Plug up
- Ground start.

In addition if the request is to perform a sequential test, the following types of lines are not tested:

- Service observed
- Service order
- PBX multiple hunt
- Unassigned or inactive.

9.06 For lines found to be testable, a data link message is generated and two 16-bit words are loaded into a remote order buffer (ROB) for execution at the RSS. An external channel data link message, subroutine CHDLMG, from pident CHDL is used to generate the data link orders and utilize the macros to hunt a ROB and activate ROB (AROB). Upon completion of the test at the RSS, it returns a 16-bit data link message.

9.07 After the RSS has completed the test and returned the data link message to the interface package, the RLIT program will analyze the data and return to ALIT (host).

9.08 During sequential testing a message is only outputted when the line fails a test. However if a test for a single LREN or DN is processed, the result of that test, pass or fail, will be outputted.

RSS LOCAL TEST DESK (RLTD)

9.09 Pident RLTD provides the state control for establishing various connections between the Remote Telemetry System (RTS) trunk from the local test desk to the remote line test (RLT) circuit in the 10A RSS (see Fig. 7 through 11). Once the connections are established, the two systems interact to perform the local test desk functions on remote lines.

9.10 Remote line testing requires five stable states.

(1) STATE 0—Idle no connections.

(2) STATE 1—RLT connection.

(a) LTD trunk to any channel (channel A) between RSS and host ESS. (ESS connection.)

(b) Channel A to RLT circuit connection then REN to metallic access bus followed by metallic access bus to RLT circuit connection. (RSS connection.)

(3) STATE 2—Line Ferrod Test State (Fig. 10).

(a) The initial RLT connection is retained.

(b) Customer dial pulse receiver (CDPR) to another RSS to host channel (channel B) connection with CDPR in the idle state. (ESS connection.)

(c) Channel B to REN (RSS connection) with REN in transfer supervision state to CDPR. Scans for origination at 400-ms rate.

(4) STATE 3—TOUCH-TONE Service Equipment Test State (Fig. 11)

(a) LTD trunk to Channel A disconnect.

(b) LTD trunk to port 0 of the station ringer TOUCH-TONE service equipment test circuit.

(c) PORT 1 of the station ringer TOUCH-TONE service equipment test circuit to another channel (channel B) for ESS connection.

(d) Disconnect channel A from RLT (RSS connection).

(e) Channel B to REN (RSS connection).

(f) RLT to REN—transfer to low power state.

(5) STATE 4—Failure Tone State. LTD trunk to tone circuit (ESS connection).

9.11 The following paragraphs describe the state transitions which occur with a specified stimulus.

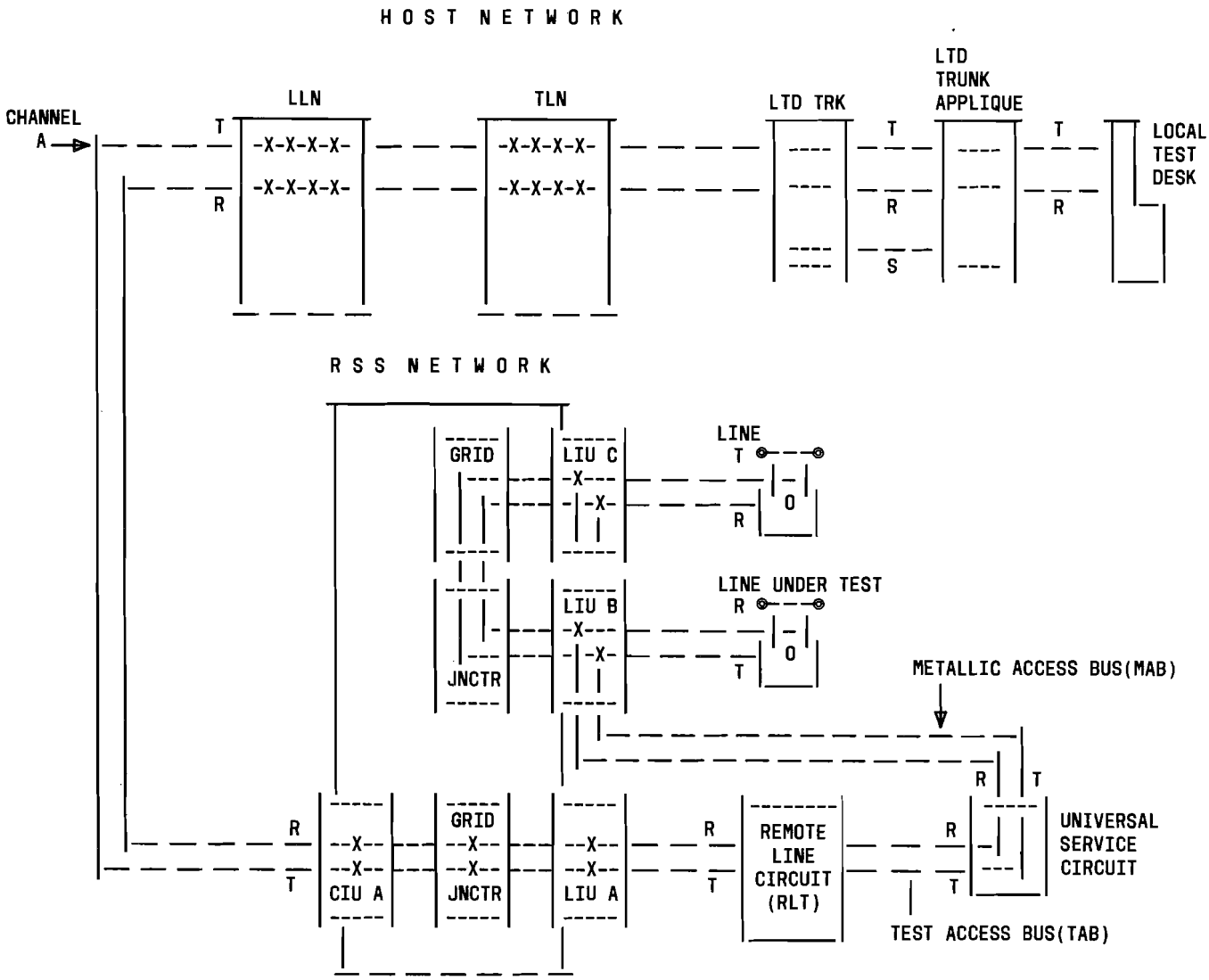

Fig. 7—Local Test Desk Intra-RSS Monitor Connection

9.12 Idle to RLT occurs when the KP key is restored at the LTD. This is an origination. The craftsperson first operates the KP key, then keys in the directory number to be tested and releases the KP key. At this point STATE 1 is established and testing can begin. The KP is restored without correct number of digits keyed; then the local test desk task is terminated.

9.13 The RLT to line ferrod test (LFT) occurs when the 3WO key is operated while in the RLT state. Once the 3WO key is operated, an origination is applied on the line under test by the RLT circuit. A 400-ms repetitive scan is performed on the line ferrod's supervised CDPR scan point until the CDPR supervisory scan point saturates. If the CDPR scan point saturates, dial tone is connected to the line and back to the LTD. At this point the tester can use the talk key to listen for dial tone. Releasing the 3WO key terminates the test, dial tone is removed from the trunk, and the ferrod is removed from the line. When dial tone is not returned to the tester, the line ferrod test has detected that the line cannot originate. In order to repeat the test, operate the 3WO key again.

9.14 The RLT to TOUCH-TONE service equipment test (TTT) occurs when the TT key is operated while in the RLT state. Operating the TT key allows

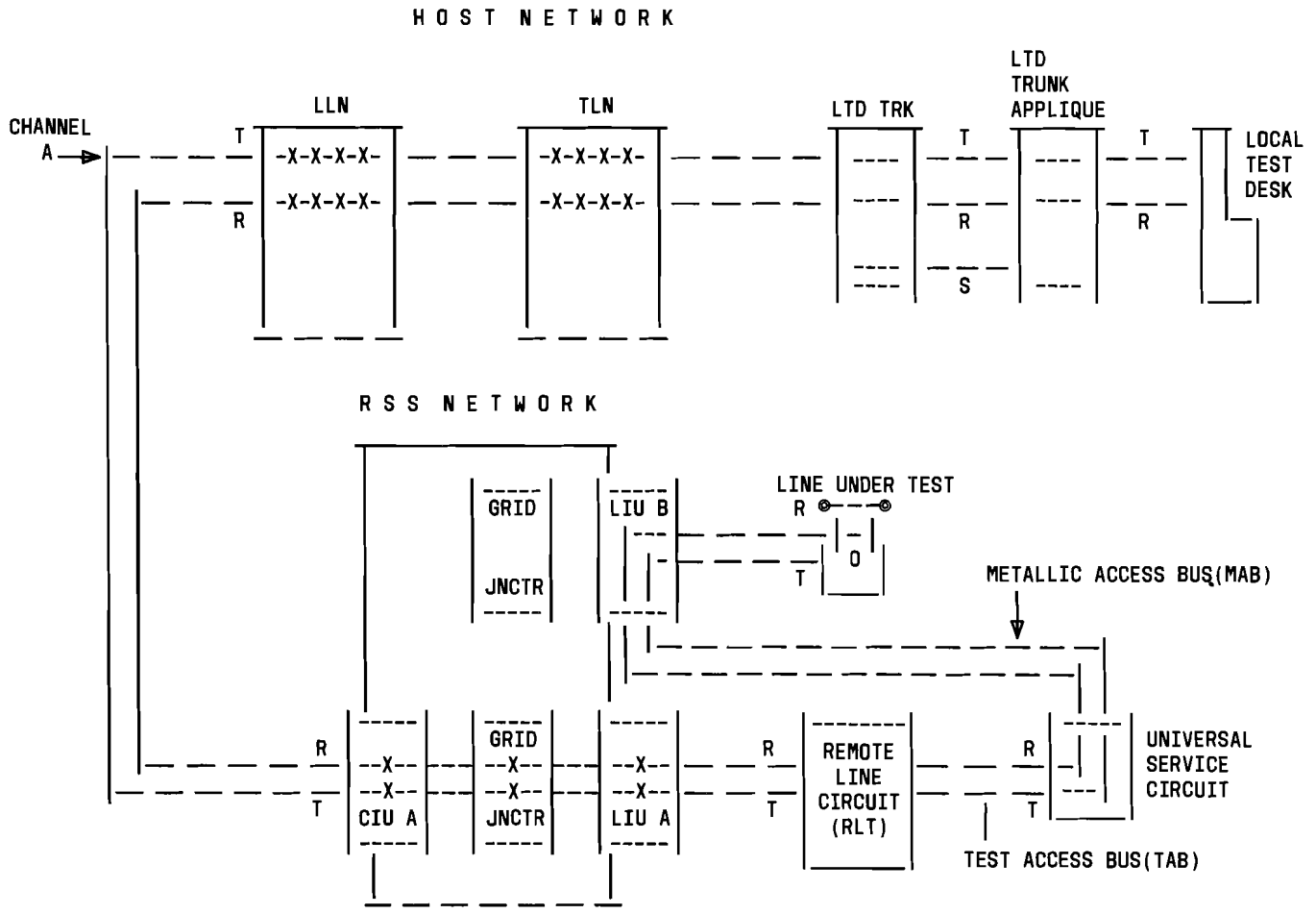

Fig. 8—Local Test Desk Origination Connection

the craftsperson at the LTD and another person or craft at the station test to perform the TTT.

9.15 The LFT to RLT occurs when the 3WO key is released while in the LFT state. After performing origination testing, the craftsperson must return to the RLT state by restoring the 3WO key.

9.16 The TTT to RLT occurs when the TT key is restored while in the TTT state. After performing the TTT, the craftsperson can return to the RLT state by restoring the 3WO key.

9.17 Any state to failure tone state will occur if any failure occurs (POB or ROB failures, network blockages) while in any state or while executing a state transition, connections are torn down, and the appropriate failure is returned to the craftsperson.

9.18 The following are the different types of failures and the corresponding tones.

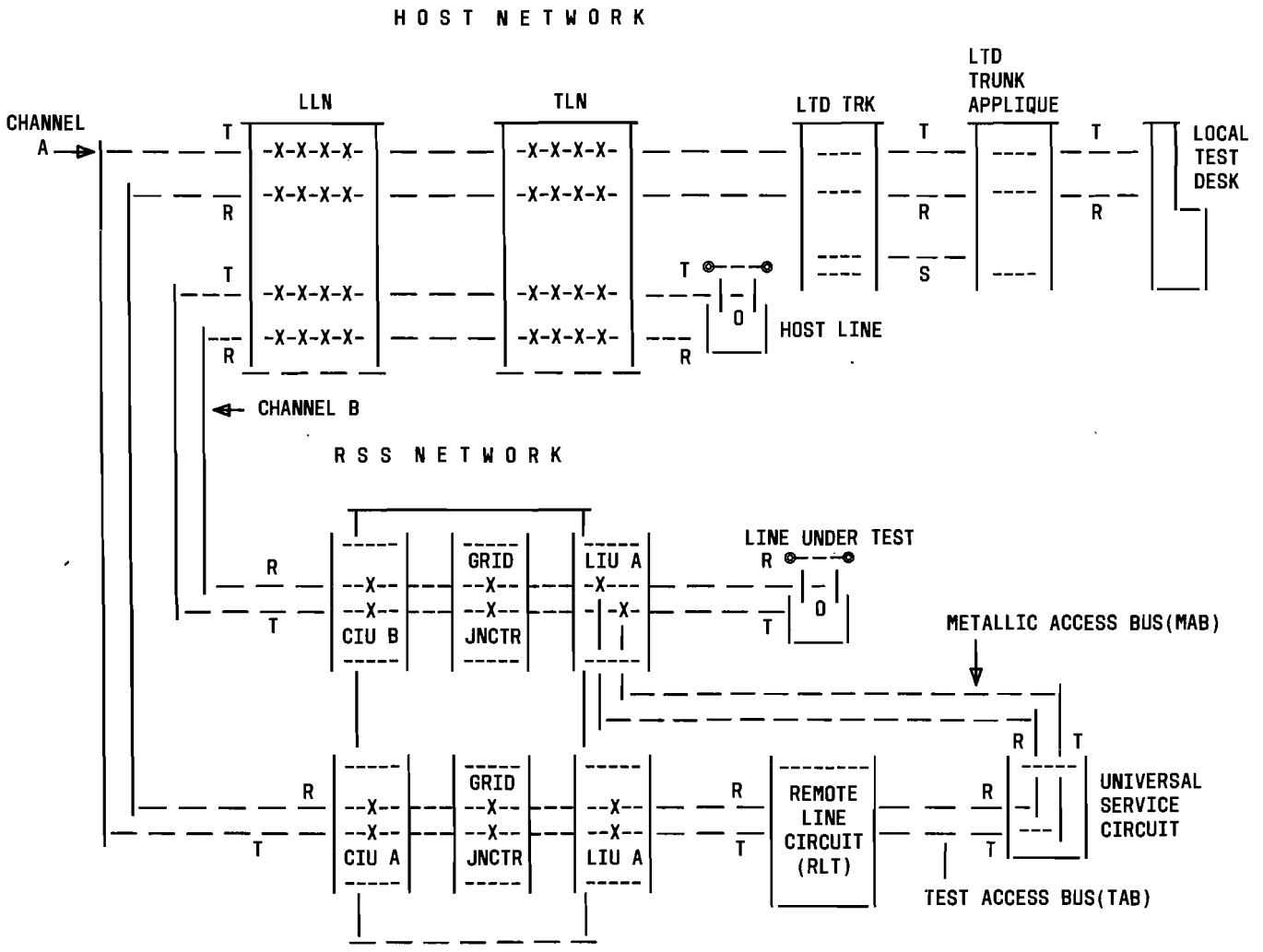

Fig. 9—Local Test Desk Host-to-RSS Monitor Connection

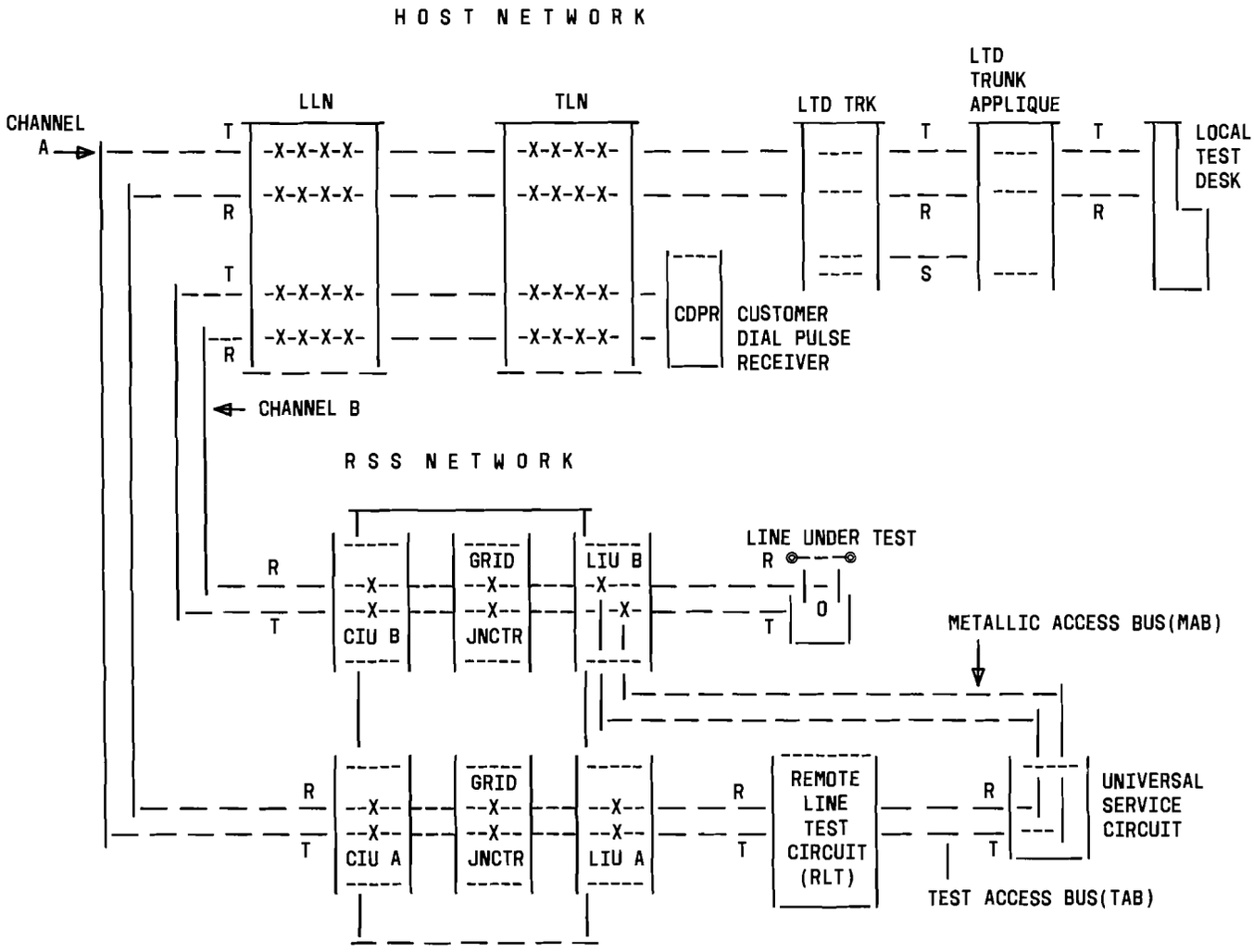

Fig. 10—Line Ferrod Test Connection

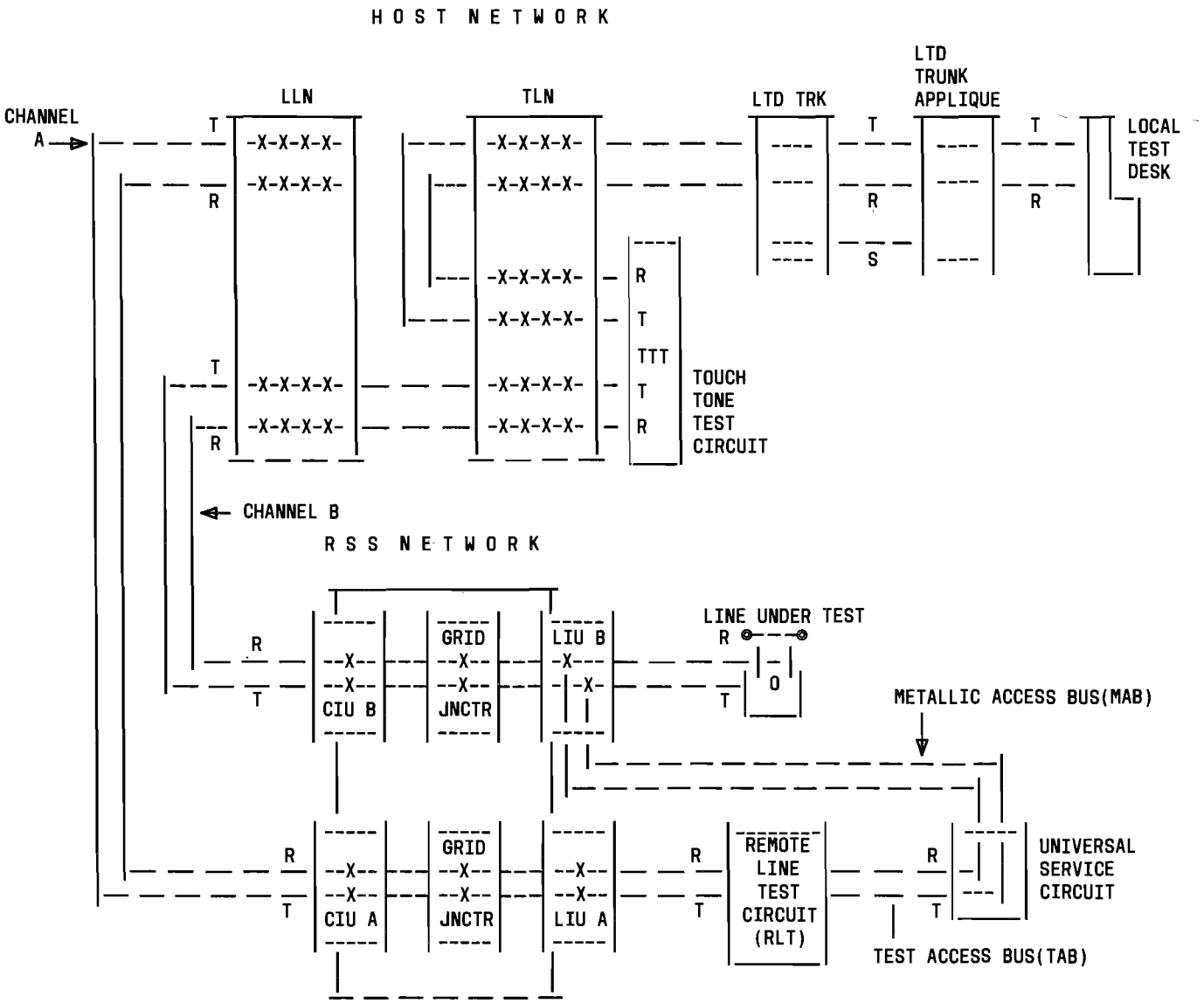

Fig. 11 —TOUCH-TONE Service Equipment Test Connection

TYPE OF FAILURE	TYPE OF TONE
CIN Blockage	60 IPM Low Tone
POB Failure	120 IPM Low Tone
ROB Failure	120 IPM Low Tone
Test Access (Busy)	60 IPM Low Tone

9.19 Failure tone to idle occurs when software failure action is taken. This action is handled in pident LTDK.

10. RSS CHANNEL MAINTENANCE

RSS CHANNEL CONTROL PROGRAM (CHNC)

10.01 Pident CHNC is the library for subroutines used by various RSS pidents.

RSS CHANNEL DIAGNOSTIC PROGRAM (CHND)

10.02 Pident CHND handles channel diagnostics for the RSS. The diagnostic program attempts to (1) verify that a unit is free of faults, and (2) identify the faulty replacement entity (ie, circuit packs) of a faulty unit. The diagnostic procedure is accomplished by applying inputs to a unit, observing the output from the unit, comparing the unit's output with known correct outputs, and associating the failure pattern with faulty circuit pack(s). Also included in the RSS channel diagnostic pident CHND is a diagnostic program for testing the RSS loop-around trunk circuitry.

10.03 The loop-around trunk configuration consists of two trunk circuits, both of which are either SD-1A166-D2 or SD-1A166-05, wired back-to-back via the miscellaneous distribution frame (MDF). The purpose of the loop-around feature is to allow existing trunk maintenance software to treat a line (CLEN) as if it were a trunk.

RSS CHANNEL MAINTENANCE LINK INTERFACE PROGRAM (CHDL)

10.04 The purpose of pident CHDL is to provide host ESS-to-RSS communication for the host line and channel maintenance software. Resource contentions permitting, this routine transmits orders from the host to the RT and returns to the client with the response, if any, from the RSS. CHDL keeps track of the hardware states of the necessary test circuits at the RT and the client need not know their present hardware or software state.

RSS CHANNEL LIST PROGRAM (CHLS)

A. General

10.05 The CHLS program is a collection of maintenance subroutines that interface with various RSS channel lists. The interfaces include the channel maintenance list (CML) and the channel maintenance list for audits (CMLA) administration. CHLS also includes routines which administer the channel maintenance usage counts, interface with remote terminal error analysis for channels, and performs channel automatic progression testing.

B. CML Administration

10.06 The channel maintenance list is a special camp-on list for system requested diagnosis of suspected channels. Channels are placed on the CML by call processing programs when they suspect a channel is not properly passing supervision; by the POB failure action program (NMFL) when a channel is implicated in a hardware failure; by the remote terminal error analysis programs; and by the CMLA processing program when a channel has been involved in an audit failure. The CML processing program gets a periodic entry to monitor the channels on the list. When one is found to have become traffic idle, it is seized for diagnosis. If the channel fails two successive diagnostics, it is removed from service (or, if the AML has been reached, the channel is restored to service and a minor alarm). The routines that interface with the CML are the following:

(a) CHPCML—Puts XCREN on CML and starts CML processing

(b) CHNCML—Processes the XCRENs on the CML

(c) CHCMLC—Searches for and removes an XCREN on the CML, or only searches and indicates if found.

C. CMLA Administration

10.07 When an RSS channel is involved in an audit failure (has invalid path memory, inconsistent LEN and CREN states, etc), the current hardware state of the channel is unknown. Also, the audit failure may be an indirect symptom of a hardware problem since failure legs tend to be less well debugged than the successive legs. The CMLA is the

resting place for channels that have failed an audit but have not been idled. The CMLA processing routines cause the channels on the CMLA to be blind-idled, and then places them on the CML for diagnosis. The following routines interface with the CMLA:

(a) CHCMLA—Processes the XCRENs on the CMLA by blind idling them at the remote end and afterwards attempts to put the XCRENS on the CML via CHPCML.

(b) CHRCLA—Removes first XCREN from CMLA and decrements the CMLA counter. Checks are made on the XCREN that is removed, and on the one that replaces it as first XCREN on the CMLA. If the check fails, the head cell and counter are zeroed.

(c) CHPLST—Puts an XCREN on the CMLA, increments the CLMA counter and sets the main program flag assigned to CMLA processing.

(d) CHLLST—Searches for but does not remove XCREN from CMLA. This routine also audits the CMLA and clears the head cell and counter if any discrepancies are found.

(e) CHRLST—Searches for and removes the specified XCREN from the CMLA if found.

(f) CHLIST—See PR-1A632 for list of functions (administers the CLN-LIST-AAA. input message).

D. Maintenance Usage Count Administration

Increment TUC and Decrement MUC

10.08 A client enters routine CHITUC to increment the traffic usage counter (TUC) by 1 and decrement the maintenance usage counter (MUC) by 1 when an RSS channel goes from locked-out to active. The RSS group head cell contains the TUC and MUC counters. If the channel goes idle routine RTCKIL in program RTAD will decrement the TUC by 1. The number of idle channels plus TUC plus MUC should equal the number of RSS channels in the RSS group.

Increment MUC and Decrement TUC

10.09 Routine HIMUC is entered to increment the MUC by 1 and decrement the TUC by 1 when an RSS channel goes from active to locked-out. When an RSS channel is removed from the idle link list, the TUC is incremented by 1. When an RSS channel is restored to the idle link list, the TUC is decremented by 1. The total number of channels in an RSS group is equal to the number of idle channels plus TUC plus MUC.

Check Automatic Maintenance Limit (AML)

10.10 Routine CHTOAD determines if the specified RSS group (determined from inputted XCREN) is at or exceeding the AML. Routine CHTOAD also will transfer to the client's return address plus 1 if the AML is not exceeded or transfer to the client's return address plus 0 if the AML is reached or exceeded.

E. Remote Terminal Channel Error Analysis Interface

10.11 When the RSS error analysis routine reaches the error limit for an RSS channel, the error analysis routine sends a data link message to pident RDOC, which in turn enters CHNLMF. If the channel is idle, routine CHNLMF will either lock-out the channel or put it on the CML to be diagnosed.

F. Channel Automatic Progression Testing (APT)

10.12 Channel automatic progression testing begins at 1:00 am on Monday morning. Starting with the first assigned channel in the smallest assigned RSS group member number, APT will diagnose idle RSS channels until 5:00 am. If testing has not completed, it will resume at 1:00 am the next morning and terminate at 5:00 am unless testing has completed earlier. This continues each morning at 1:00 am until the last assigned XCREN in the largest assigned RSS group member number has been diagnosed. When the last channel has been diagnosed, automatic progression testing terminates until the following Monday morning. If a channel fails two consecutive tests, it will be locked out unless the AML for that RSS group would be exceeded. Otherwise, it remains in service.

CHANNEL STATE OF RSS CREN PROGRAM (CHCS)

10.13 Pident CHCS provides routines necessary in administering the software change in state of a CREN circuit. There are three main routines in CHCS that are used to change the state of a CREN (CHOFFL, CHCAMP, and CHREST/CHCRES).

Note: Some clients do not call these routines directly. Instead the associated routines in pident TNCS are called (TNOFFL, TNCAMP, and TNREST).

10.14 Before changing the state of a CREN, it must be off all lists or it must be in the process of being restored after being traffic busy. The program unit Dispose of Maintenance Busy CRENs (routine CHREST) is used to dispose of a maintenance busy CREN (locked-out, put on CML, made active, or high and wet).

10.15 Routine CHOFFL has been provided to remove the CREN from any specified states. The routine may also be used to only determine the current software state of a CREN circuit without removing it from any list. If the CREN is traffic busy, it cannot be removed from any maintenance state that it is currently in. A separate return (client return address plus 1) is given to the client if the CREN is found to be traffic busy.

10.16 If the CREN is in an invalid state (eg, PMR code indicates idle, but not on idle list), the client is notified by another return (client return address plus 0) and/or a bit in the output set up by the routine.

10.17 If the CREN is in a valid condition and the client requested only the state of the CREN, the state of the CREN is put in the Y-register and G6state, and a return is made to the client at their return address plus 2.

10.18 If the client requested that the CREN be removed from specified states and the CREN is in one of the states specified on input, then CREN is removed from the state that it is in and the PMR word is zeroed. The original maintenance state of the CREN is preserved by setting the remote maintenance busy bit if the CREN was locked out.

10.19 If the CREN was not originally locked out, the PMR word is set to indicate that it is off all lists. A return address is made to the client return address plus 2 with the state of the CREN in the Y-register and G6state. Several error conditions can occur which will prevent routine CHOFFL from performing its requested task. Those error conditions are listed in the functional description for program unit CHOFFL.

10.20 After the CREN has been removed from all states or found to be traffic busy by routine CHOFFL or is known to be traffic busy, it may be camped on for the desired maintenance state. Routine CHCAMP has been provided to perform this function. The routine is supplied the requested state in the form of a camp-on code and the origin or source of the request in the form of a source code. The routine determines the actions necessary in performing the camp-on. This may include setting the remote maintenance busy bit and entering the appropriate information in the R1CAMP list.

10.21 After the CREN has been camped on, it may be put in the desired state immediately if the CREN was not found to be traffic busy by calling routine CHREST. If the CREN is traffic busy, no action can be taken on the CREN until it is no longer traffic busy. When a traffic busy CREN has been camped on to go to a maintenance state, CHCRES is entered via routine RTCKIL in pident RTAD, when the CREN is restored after disconnect on the call. Routine CHREST disposes of the CREN according to information, if any, contained in the camp-on list (R1CAMP), CML, and the remote maintenance busy bit.

10.22 The maintenance usage and traffic usage counters are incremented or decremented according to the original and final state of the CREN. If the CREN was camped on with information in the R1CAMP list, an output message is printed if the source is other than G6NPRT (no-print). This message is printed when the state of an RSS channel is changed. The message can occur in response to a T-CLN message, actions taken at a TLTP/STTP/MTTP, a system requested diagnostic, or a Centralized Automatic Reporting on Trunks (CAROT) or Remote Office Test Line (ROTL) system test set remote request.

10.23 After the CREN has been put into the requested state by CHREST, a return is made to the client.

11. RSS TOUCH-TONE (SERVICE EQUIPMENT) RECEIVER DIAGNOSTIC PROGRAM (RTTR)

11.01 Pident RTTR provides the diagnostic program with phase two of the RSS tone/TOUCH-TONE service equipment board diagnostic. This diagnostic consists of two phases: Phase one diagnoses all of the circuit packs except the TOUCH-TONE service equipment receiver circuit (tone sources and network) and runs the diagnostic in the RSS remote terminal,while phase two diagnoses the TOUCH-TONE service equipment receiver circuit

and is controlled by the host programs of MAC II. A path is set up between a TOUCH-TONE service equipment receiver test set in the host and the TOUCH-TONE service equipment receiver under test in the remote terminal. A sequence of test tones are sent by the test set and collected by the host for analysis. The process is repeated until a failure is encountered or until all tests have been run. A TTY message detailing the results of the diagnostic is printed and the test is terminated.

12. ABBREVIATIONS AND ACRONYMS

12.01 The following abbreviations and acronyms apply to this section.

ALIT	Automatic Line Insulation Test
AML	Automatic Maintenance Limit
APT	Automatic Progression Testing
CC	Central Control
CDPR	Customer Dial Pulse Receiver
CML	Channel Maintenance List
CMLA	Channel Maintenance List Audit
CO	Central Office
CREN	Channel Remote Equipment Number
DN	Directory Number
ESS	Electronic Switching System
LFT	Line Ferrod Test
LREN	Line Remote Equipment Number
MTTP	Manual Trunk Test Panel
MUC	Maintenance Usage Counter
POB	Peripheral Order Buffer
POTS	Plain Old Telephone Service
PUC	Peripheral Unit controller
RTLD	RSS Local Test Desk
RLT	Remote Line Test
ROB	Remote Order Buffer
ROH	Receiver Off-hook
RSS	Remote Switching System
RT	Remote Terminal
RTS	Remote Telemetry System
SP	Signal Processor
STTP	Supplementary Trunk Test Panel
TLTP	Trunk and Line Test Panel
TTT	TOUCH-TONE Service Equipment Test
TUC	Traffic Usage Counter
USC	Universal Service Circuit

13. REFERENCES

BELL SYSTEM PRACTICES

13.01 Consult the following references for further information.

(a) Section 231-037-022—No. 10A Remote Switching System Interface Description and Maintenance Consideration—2-Wire No. 1/1A Electronic Switching System

(b) Section 231-045-153—Operation with Remote Switching System Feature—2-Wire No. 1/1A Electronic Switching System

(c) Section 231-045-235—Trunk and Line Test—Software Subsystem Description (SSD)—2-Wire No. 1/1A Electronic Switching System

(d) Section 231-048-346—Recent Change Implementation Procedures for Remote Switching System (RRS)—2-Wire No. 1/1A Electronic Swithing System

(e) Section 231-049-310—Remote Switching System Remote Terminal Maintenance from Host—2-Wire No. 1/1A Electronic Switching Systems

(f) Section 231-053-000—RSS Interface (TOP) Maintenance From Host—No. 1/1A Electronic Switching System.

OTHER

(a) RSS PIDENTs (See Table A)

(b) IM-6A001 TTY Input Message Manual

(c) IM-1A001 TTY Input Mesage Manual (No. 1 ESS)

(d) OM-6A001 TTY Output Message Manual

(e) OM1-1A001 TTY Output MEssage Manual (No. 1 ESS).