297-8251-550

DMS-100 Family

Subscriber Carrier Module-100 Access

Maintenance Manual

XPM13 and up   Standard 11.01   February 2000

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DMS-100 Family

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Maintenance Manual

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Contents

About this document

When to use this document

This Subscriber Carrier Module-100 Access (SMA) maintenance reference manual provides: overview, hardware, and functionality information; automatic maintenance; user interface; manual maintenance information; recovery procedures; alarm clearing procedures; card replacement procedures; and routine maintenance procedures. The information in this maintenance manual is intended for operating company personnel engaged in SMA maintenance.

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 the *DMS-10 and DMS-100 Family Product Documentation Directory*, 297-8991-001.

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in the *DMS-10 and DMS-100 Family Product Documentation Directory*, 297-8991-001.

References in this document

The following documents are referred to in this document:

- *Extended Peripheral Module Translations Reference Manual*
- *Product Documentation Directory, 297-8991-001*
- *S/DMS AccessNode Configuration and Equipment Description, 323-3001-100*
- *S/DMS AccessNode Signal Flow and Circuit Pack Description Volume 1, 323-3001-102*
- *S/DMS AccessNode User Interface Description, 323-3001-301*
- *S/DMS AccessNode Provisioning and Operations Procedures, Volume 4, 323-3001-310*
- *S/DMS AccessNode Alarm and Trouble Clearing Procedures, 323-3001-543*

What precautionary messages mean

The types of precautionary messages used in Nortel Networks documents include attention boxes and danger, warning, and caution messages.

An attention box identifies information that is necessary for the proper performance of a procedure or task or the correct interpretation of information or data. Danger, warning, and caution messages indicate possible risks.

Examples of the precautionary messages follow.

ATTENTION Information needed to perform a task

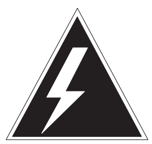
ATTENTION

If the unused DS-3 ports are not deprovisioned before a DS-1/VT Mapper is installed, the DS-1 traffic will not be carried through the DS-1/VT Mapper, even though the DS-1/VT Mapper is properly provisioned.

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.
```

SMA overview

The Subscriber Carrier Module-100 Access (SMA) provides the Digital Multiplex System (DMS) SuperNode switch interface to the S/DMS AccessNode. In this document the name *SMA* refers to the DMS-100 XMS-based peripheral module (XPM), hardware and software, that provides the interface. The SMA complies with Bellcore Standard TR-TSY-000303, also called TR-303.

The TR-303 is a technical requirements standard. This standard establishes guidelines for multiple vendors to have access to the services and operations of a central office. The TR-303 provides call processing services and operations, administration, maintenance and provisioning (OAM&P) abilities better to earlier TR-008 systems.

The name *SMA system* describes the SMA component and additional components which include:

- operation system (OS) interfaces that are present
- maintenance and provisioning software
- DMS-Core software to support the object-oriented operations interface
- user interfaces at the MAP
- test and service circuits for signal processing
- line testing

The main focus of this document is the maintenance of the SMA. Maintenance functions are also integrated into the MAP station. Maintenance information for the SMA system is included when necessary.

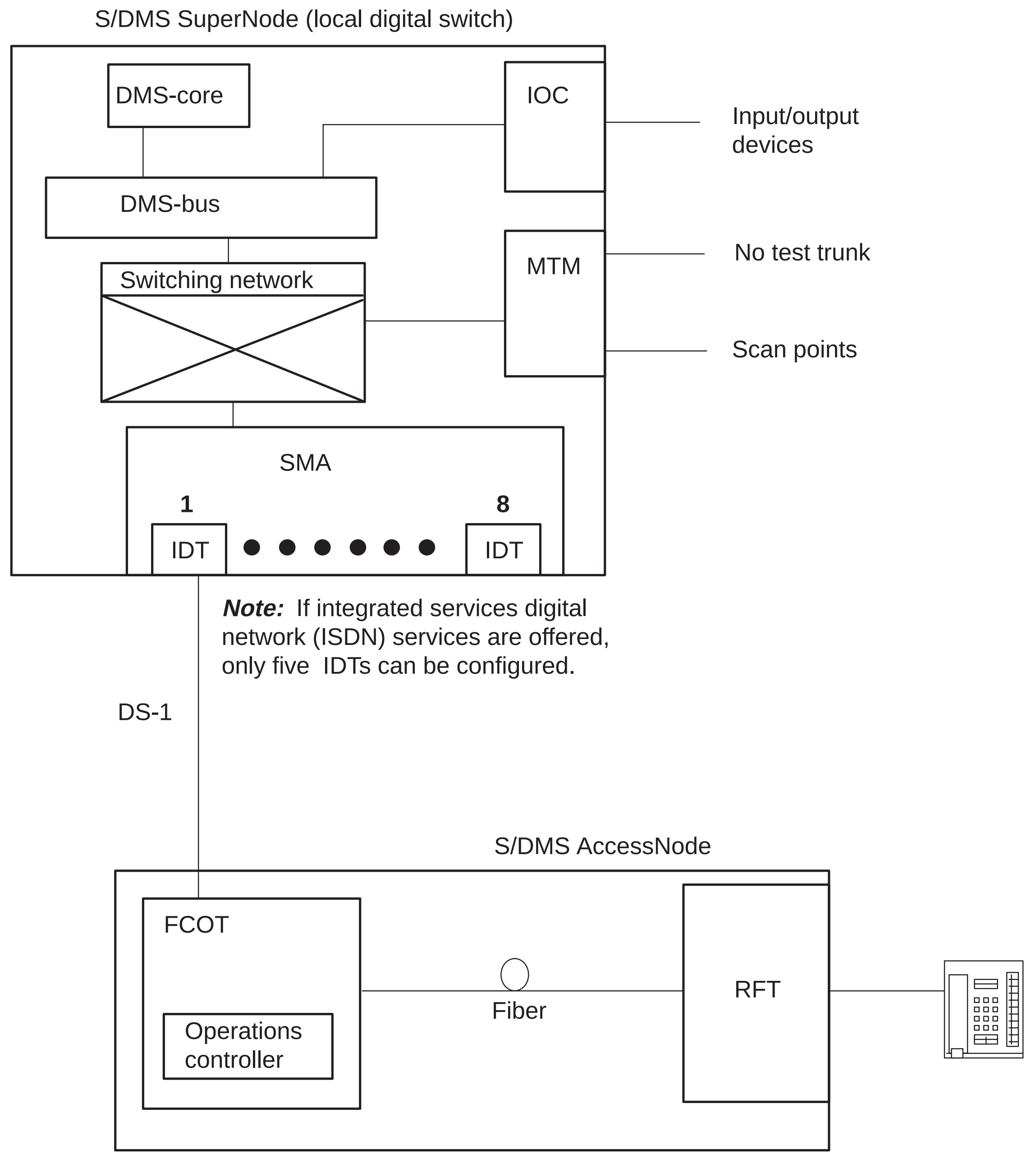
Functional description

This chapter provides a physical and functional summary of the SMA configuration. A study of both configurations allows the reader to understand how maintenance software attempts to correct faults. The maintenance software produces trouble indicators when the problem requires manual interruption for resolution.

Physical summary of the SMA system

The next figure shows the basic physical SMA system configuration and identifies the main components which are outlined in this section.

Summary of the SMA configuration (physical)



Note: If integrated services digital network (ISDN) services are offered, only five IDTs can be configured.

S/DMS AccessNode

The S/DMS AccessNode is the access vehicle that connects terminal devices that transmit voice or data, or both, to the DMS SuperNode.

> ***Note:*** The AccessNode that connects to the SuperNode is an integrated digital loop carrier (IDLC). The AccessNode also can connect to other service nodes which include digital switches, analog switches and digital cross-connect systems. Refer to *S/DMS AccessNode Configuration and Equipment Description* for more information on the use of the AccessNode in these configurations.

Remote fiber terminal (RFT) The RFT can be configured with a minimum of 96 to a maximum of 2048 subscriber lines from different types of terminal devices. The lines connect to one fiber optic transmission facility from the fiber central office terminal (FCOT). The RFT connects and mulitplexes traffic from subscriber lines to and from the optical fiber transmission facility. The RFT normally resides at a remote site. There is currently a hardware limitation of 1344 lines on the RFT. The RFT can be resized to increase or decrease line capacity.

> ***Note:*** The generic term for the RFT is the remote digital terminal (RDT). The name RDT is used in the TR-303. The name refers to the remote digital terminal equipment of a vendor, that complies with the TR-303 specification.

Fiber central office terminal (FCOT) The FCOT provides the bandwidth management and optical-to-electrical conversion. The traffic from the synchronous optical network (SONET) transmission facility is carried to and from the DMS-100 switch over DS-1 facilities. The DS-1 facilities terminate at the SMA. The FCOT also provides protection switching for the SONET facility.

> ***Note:*** The generic term for the FCOT is the digital central office terminal (DCOT). The term DCOT is used in the TR-303. The name refers to digital central office terminal equipment of a vendor, that complies with the TR-303 specification.

S/DMS SuperNode

The SuperNode components integrate the S/DMS AccessNode into the DMS switch.

Subscriber Carrier Module-100 Access The SMA is the key component that connects the AccessNode to the DMS switching network. The P-side of the SMA connects to the FCOT using up to 20 DS-1 links. On the C-side, the SMA connects to the switching network with one DS512 fiber link or a maximum of 16 DS30 links.

Integrated digital terminal (IDT) The IDT is a software entity and a logical entity. The IDT serves as the SMA interface to each RFT (maximum of eight without ISDN, maximum of five with ISDN).

DS-1 links These links carry subscriber traffic and message channels for a maximum of eight RFTs. The protocols used on the message channels are a superset of the protocols that the TR-303 defines. Chapter 3, *SMA signaling and communications*, contains more information on these channels.

DMS-core The DMS-core is not changed for the SMA. The DMS-core includes the local computing module (CM), which is the main processor and the system load module (SLM), which contains the software loads.

Input/output controller The input/output controller (IOC) provides the user interfaces for the SMA. These interfaces include logs, operational measurements (OM) and craft interfaces.

Maintenance trunk module The maintenance trunk module (MTM) contains different test and service circuits for signal processing. These circuits includes signal distribution (SD), scan cards, multiline test units (MTU), line test units (LTU) and metallic test access (MTA) cards.

ISDN capability The SMA can provide ISDN (Integrated Services Digital Network) ability as an option. The hardware configuration to support this ability includes the Cellular Access Processor (CAP), the Enhanced ISDN Signal Preprocessor (EISP) and one or more Enhanced D-channel Handlers (EDCH).

Functional summary of the SMA system

A functional summary shows how the software subsystems spread across the components. The following figure shows the SMA system and the locations of the software that performs these functions.

The SMA configuration contains the following:

- integrated digital terminal (IDT) - The IDT is the software interface that the SMA uses to communicate with the RDT.
- local digital switch (LDS) - A class 5 digital central office switch. In the SMA configuration, the LDS is the DMS host office.
- call processing (CP) - The CP is a call control base that allows the SMA to process calls from different IDLC-based remote access vehicles.
- operations gateway (OGW) - The OGW provides the RDT with an interface to different operations systems.

The following sections explain these functional areas in more detail.

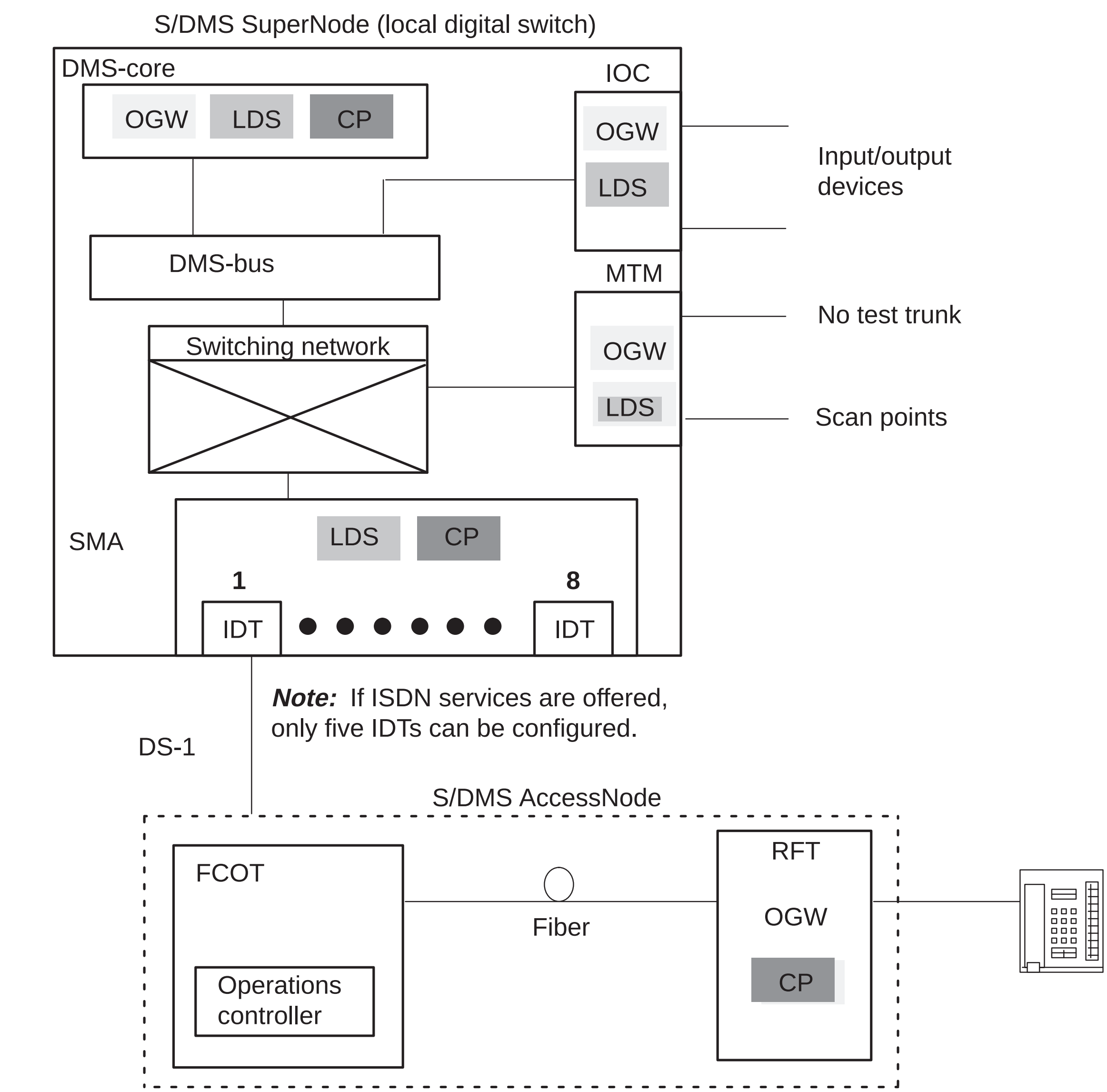
Integrated digital terminal

An IDT is associated with each RDT. The IDT allows the DMS SuperNode switch to comply with the TR-303 requirements and maintain its own resources. The SMA functionally is divided into IDTs. An IDT

- is a logical entity which contains the dedicated switch resources to provision, test and maintain an RDT that associates with the SMA
- functions as a software logical interface that serves as a gateway between C-side and P-side messaging
- minimizes the amount of information the switch must retain that concerns the RDT
- serves as the SMA interface to each RDT. Each SMA can have a maximum of eight IDTs configured without ISDN or a maximum of five with ISDN.
- contains a maximum of 20 logical ports. Each port corresponds to an SMA P-side DS-1 link.

The P-side DS-1 links of an SMA connect to the C-side ports of an RDT. The SMA supports a maximum of 20 DS-1 links on its P-side.

Summary of the SMA configuration (functional)



CP	call processing
OGW	operations gateway
LDS	local digital switch
IOC	input/output controller
MTM	maintenance trunk module
IDT	integrated digital terminal
RFT	remote fiber terminal
FCOT	fiber central office terminal

Local digital switch

An LDS is a class 5 digital central office switch. The LDS is the software for the SMA that provides the table control and maintenance routines. The table control and maintenance routines are required to support the DMS end of the AccessNode interface. This software installs the IDT.

Operations gateway

The OGW function covers the DMS-Core, IOC and MTM. The OGW provides the protocol translation and routing abilities required to connect many RDTs to a different set of operations interfaces. These interfaces include the operations controller (OPC) interface, local switch craft interface (LSCI), logs, scan and signal distribution points and the NTT.

This OGW software performs the following types of tasks.

External alarm interface The operating company, with datafill, can set an external alarm (minor, major or critical) for each RDT. When an alarm is raised, the OGW operates a scan distribution (SD) point. The OGW displays an alarm at the EXT level of the MAP terminal.

No test trunk test The NTT allows external line testing systems to include the subscriber lines off the AccessNode.

Scan and signal distribution points The user can set an external alarm interface with datafill. This interface allows alarms for each RFT to be reported to an alarm system.

Call processing

The call processing (CP) function performs the low-layer call processing tasks and translates between the internal DMS protocol and the Q.921/Q.931-based protocols. The internal DMS protocol is used for communication with the DMS SuperNode switch. The Q.921/Q.931-based protocols are used for communication with the RDT. This software allows the DMS call processing logic to interface with the TR-303-based messages and procedures. The CP software provides the translation and control functions. These functions are necessary to establish, maintain and take down calls originating from, or terminating to, an integrated digital loop carrier (IDLC)-based RDT.

Operations controller

The operations controller (OPC) is a processing complex that contains software that performs the following functions:

- memory, hard drive and tape storage
- nonvolatile storage, downloading and administration of the software that fiber central office terminals (FCOT) and RFTs use

- operations related software applications to facilitate provisioning and maintenance of S/DMS AccessNodes
- interfaces to allow S/DMS AccessNodes to communicate with external operations systems

The OPC function can reside in a separate shelf, a stand-alone workstation or a DMS SuperNode applications processor. For more information on the OPC, refer to *S/DMS AccessNode User Interface Description*.

SMA hardware

This section describes the Subscriber Carrier Module-100 Access (SMA) hardware components.

SMA hardware components

The SMA consists of the following hardware components:

- an equipment frame
- a dual shelf module
- circuit cards.

The following sections describe the characteristics and capabilities of the components.

Equipment frame

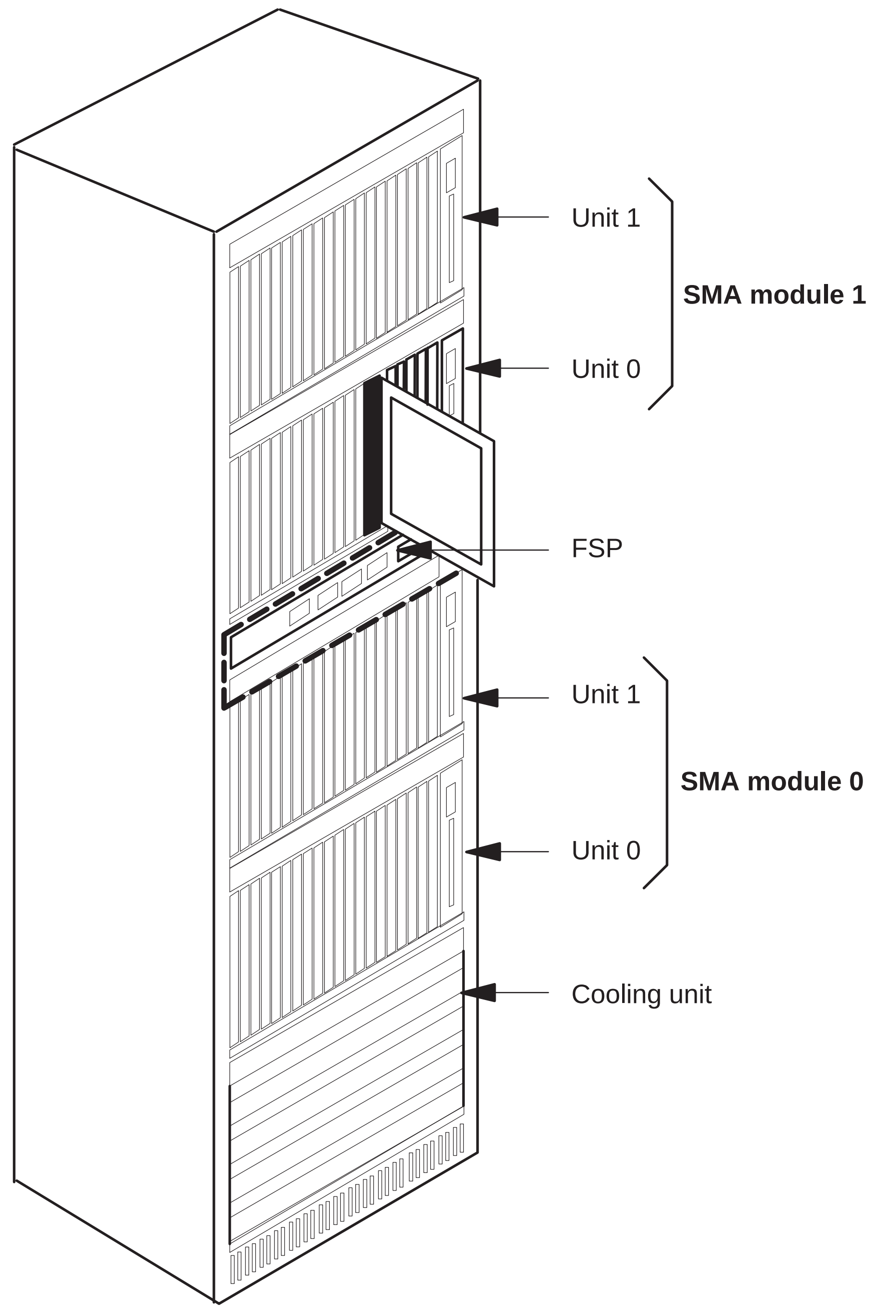
The SMA is a peripheral module (PM) that resides in a line trunk equipment (LTE) frame NT6X01AD in a central office. The equipment frame appears in the next figure. This frame can house two SMA modules. The frame has four shelves used for circuit cards, and a frame supervisory panel (FSP) NT0X28EB. The frame has a cooling unit NT3Z90AC, and a common framework NT0X25AA.

Two shelves of equipment consist of each SMA module. The SMA modules, are in number order. The numbers start in the lower shelf of the first frame. The SMA identification on the frame is SAEI that represents SMA equipment integrated services digital network (ISDN).

Dual shelf module

Each SMA is in a two-shelf configuration. This configuration allows the control complex in a shelf to control all call processing in the SMA. Each shelf includes a control complex that consists of a cellular access processor (CAP), an ISDN signaling preprocessor (ISP), and associated memory. Each shelf provides a duplicated DS30 interface. This interface allows a maximum of 16 DS30 ports to the network or a duplicated DS512 interface.

Equipment frame



Two to ten DS-1 interface cards, are distributed across the shelves of an SMA module. These cards provide a maximum of 20 DS-1 ports. The DS-1 ports service DS-1 links to S/DMS AccessNode fiber central office terminals (FCOTs). The SMA provides an interface for ISDN through the Enhanced D-channel handler (EDCH) circuit card.

The EDCH and the DS-1 interface card are in the same location in the SMA module. An EDCH displaces a DS-1 interface card and reduces the number of DS-1 ports by two.

Circuit cards

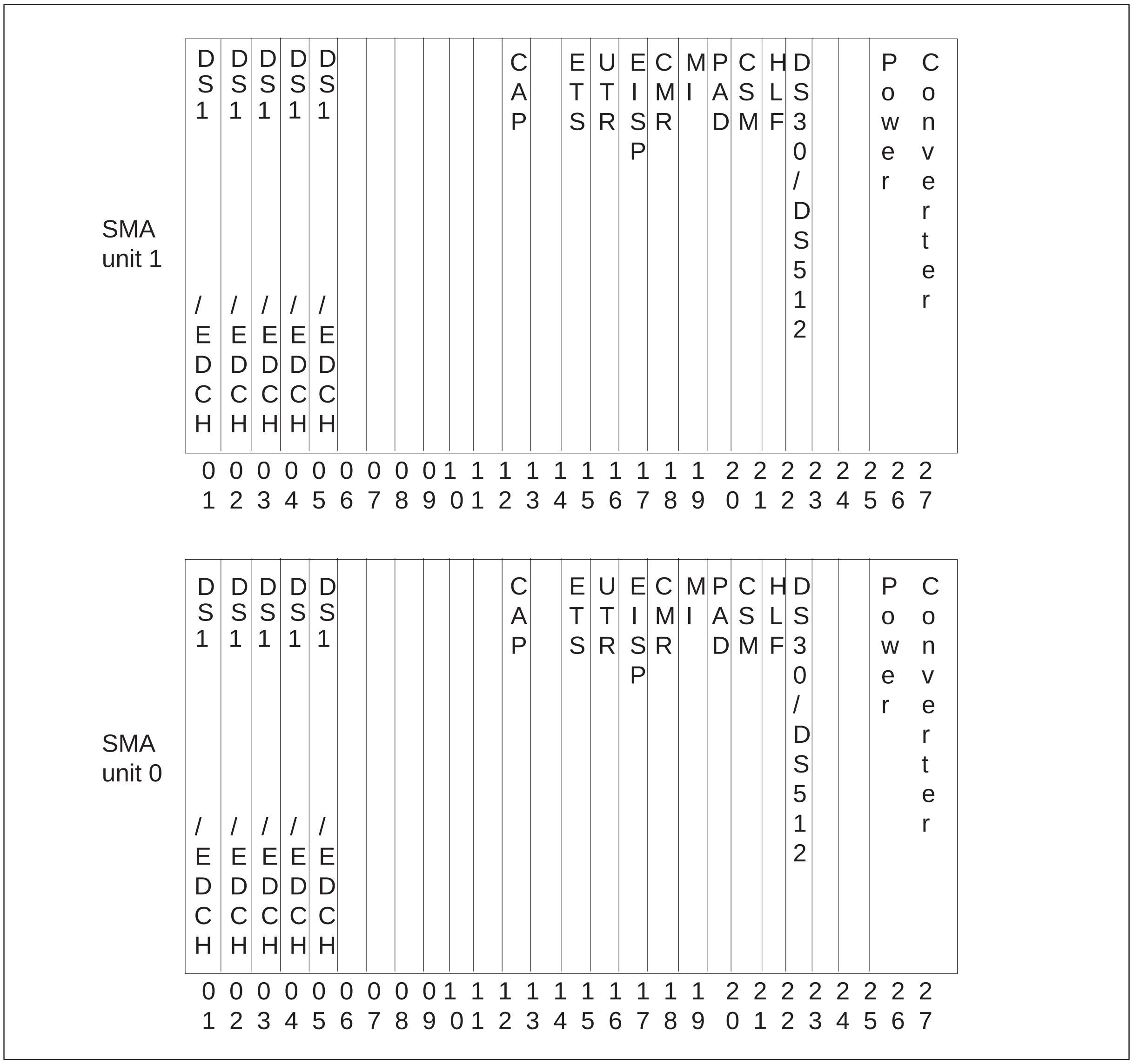
The product engineering code (PEC) of the circuit cards in an SMA, the location and abbreviations of the cards appear in the following table:

SMA circuit cards

Card PEC	Slot number	Circuit card name and abbreviation
NT6X50AB	1 to 5	DS-1 interface (DS-1)
NTBX02BA	1 to 5	Enhanced D-channel handler (EDCH)
NTAX74AA	12	Cellular access processor with 16MB memory (CAP)
NTAX78AB	14	Enhanced time switch (ETS)
NT6X92BC or NT6X92EA	15	Universal tone receiver (UTR), Global tone receiver (GTR)
NTBX01AB	16	Enhanced ISDN signaling preprocessor (EISP)
NT6X78AB	17	CLASS modem resource (CMR)
NT6X69AC	18	Message interface (MI)
NT6X80BA	19	Pulse code modulation loss/addition (PAD)
NTMX71AA	19a paddleboard	XMS-based peripheral module (XPM) plus terminator paddleboard
NT6X42AA	20	Channel supervisory message (CSM)
NT6X41AA or AC	21	Host link formatter (HLF), also known as a speech bus formatter
NT6X40AC, AD, FA, or FB	22	DS30 or DS512 interfaces (DS30)
NT6X40GA or NT6X40DA	22a paddleboard	DS512 paddleboard (DS30)
NT2X70AE	25–27	Power converter

The following figure shows the SMA shelf configuration:

SMA shelf configuration



Host communication cards

These cards translate between the 16 host DS30 ports and the parallel speech bus.

NT6X40 The DS30 or DS512 interface cards receive speech from the network.

The network connects to the SMA with a maximum of 16 pairs of DS30 links or one pair of DS512 links. These links connect in the SMA to two DS30 interface cards NT6X40AC. These links can connect to two DS512 interface cards NT6X40FA. One card is in shelf 0 and one card is in shelf 1.

The NT6X40AC card supplies 16 DS30 ports. The card provides a maximum of 32, 0 through 31, ports on a completely equipped SMA. 16 ports are dedicated to network plane 0 and 16 ports are dedicated to network plane 1. Distribution of port assignments occurs between the two DS30 cards. Even-numbered links are assigned to plane 0 and odd-numbered links are assigned to plane 1. Interface with the network module requires at least three ports for each SMA (three pairs of duplicated links).

Each DS30 or the DS512 card synchronizes the incoming information with the SMA. Each DS30 or the DS512 provides 512 channels for each plane to the formatter cards in units 0 and 1. These channels provide a duplicate path through the active control complex.

Feature AN1121 allows loop around diagnostics for SMAs with NT6X40 cards of version AD or FB. The enhanced diagnostic checks for 6X40AD cards or FB cards that are lost or that failed. The enhanced diagnostic improves testing of the interface section on the NT6X41 card. Failure of one NT6X40 card does not cause loss of service. Links that connect the NT6X40 cards to the matrix cards, are completely redundant through the active unit.

The enhanced diagnostics of the NT6X40AD and FB cards, are enabled when field PEC6X40 in table LTCINV is entered NT6X40AD or FB. A PM777 log that include a card list indicates faults.

NT6X41 The host link formatter, known as the speech bus formatter card, multiplexes the incoming speech on a 640-channel bus. Each formatter handles 512 speech channels for each network plane. The 512 speech channels are added to 128 internal service channels. The speech channels converted to a 640-channel, 512 plus 128, bus to the SMA control complex.

Speech bus cards

These cards, are along the speech bus, which is two speech buses. The speech buses are send and receive.

NT6X42 This channel supervisory message (CSM) card. The CSM card extracts the CSM and checks for parity errors. The SMA works with odd parity, to make sure an odd number of pulse code modulation (PCM) pulses for each 10-bit channel occurs. Parity that is not correct indicates that a bit changed during transmission between PMs.

The CSM is a 40-bit message that includes 24 synchronization bits, 8 integrity bits, and 8 data bits. The system transfers the complete message over 40 frames. The integrity bits must match between the PM that sends the CSM and the PM that receives the CSM. The CM informs the receiving PM of the integrity value to expect. The integrity check makes sure a correct path is present from one PM to another PM. The 8-bit data byte relays data on call setup, maintenance, and other PM data.

NT6X80 This card is the pulse code modulation (PCM) loss addition card and is part of the speech bus circuits. This card receives the PCM speech signal from the formatter card and modifies the signal. The card injects the PCM signal on the speech bus again. This card provides controlled digital attenuation, 0 to 7 dB, of the PCM speech signal on the channels.

NTAX78 This card is the enhanced time switch card. This card converts between the serial stream that is received from, or transmitted to:

- the DS-1 interface card
- the parallel stream that the internal bus uses.

The enhanced time switch is under the control of the signaling processor (SP). The enhanced time switch associates the DS30A or DS-1 channels with the time slots on the parallel bus. The enhanced time switch transfers data between the associated channel and the time slot. The NTAX78AB allows the SMA to support digital test access (DTA) capabilities.

NT6X69 This card is the message protocol and tone generator. This card provides an interface for signaling and control messages between the SMA and the S/DMS host.

NT6X92BC This card is the universal tone receiver (UTR) card. The UTR card identifies and processes PCM tones for the 30 channels on the parallel speech bus.

> **ATTENTION**
>
> For peak performance, do not install the UTR and GTR on the same SMA. You cannot identify the receiver that interprets tones. Some call processing tones can be degraded if designed for use with a GTR.

The NT6X92EA GTR identifies and processes dual-tone multi-frequency (DTMF), MF, MF-socotel, CMF-forward and backward tones in 64 channels. The 64 channels consist of 32 from the peripheral-side (P-side) and 32 from the central-side (C-side), on the parallel speech bus.

The GTR is LATA switching systems general requirements (LSSGR) and International Telegraph and Telephone Consultative Committee (CCITT) flexible. The GTR is available as a replacement for all versions of the UTR.

NTBX01 This card is the EISP card. The EISP communicates with the AX74 card through direct memory access (DMA). This arrangement allows the EISP access to the memory on the AX74 card. The EISP converts the signaling on the common signaling channels (CSCs) and the embedded operations channels (EOCs). This conversion allows the CAP to communicate with the remote digital terminal (RDT).

Processor card

This card controls the SMA.

NTAX74 The CAP card consists of the AX74 motherboard and an NTNX4814 microcontroller subsystem (MCS) daughterboard. The daughterboard has a 68040 processor and 16 megabytes of memory to support downloadable firmware capability. The NTAX74 provides call processing functions, like digit collection (pulse), channel assignment, and message processing. The real-time call processing functions are to send and receive messages, control the enhanced time switch, and supervise channels. The CAP provides dynamic random access memory (DRAM) and DMA from the EISP card.

Peripheral communication cards

These cards translate between the 20 P-side ports and the parallel speech bus.

NT6X50 This card is the DS-1 card. This card provides the interface to DS-1 links that connect to the FCOT.

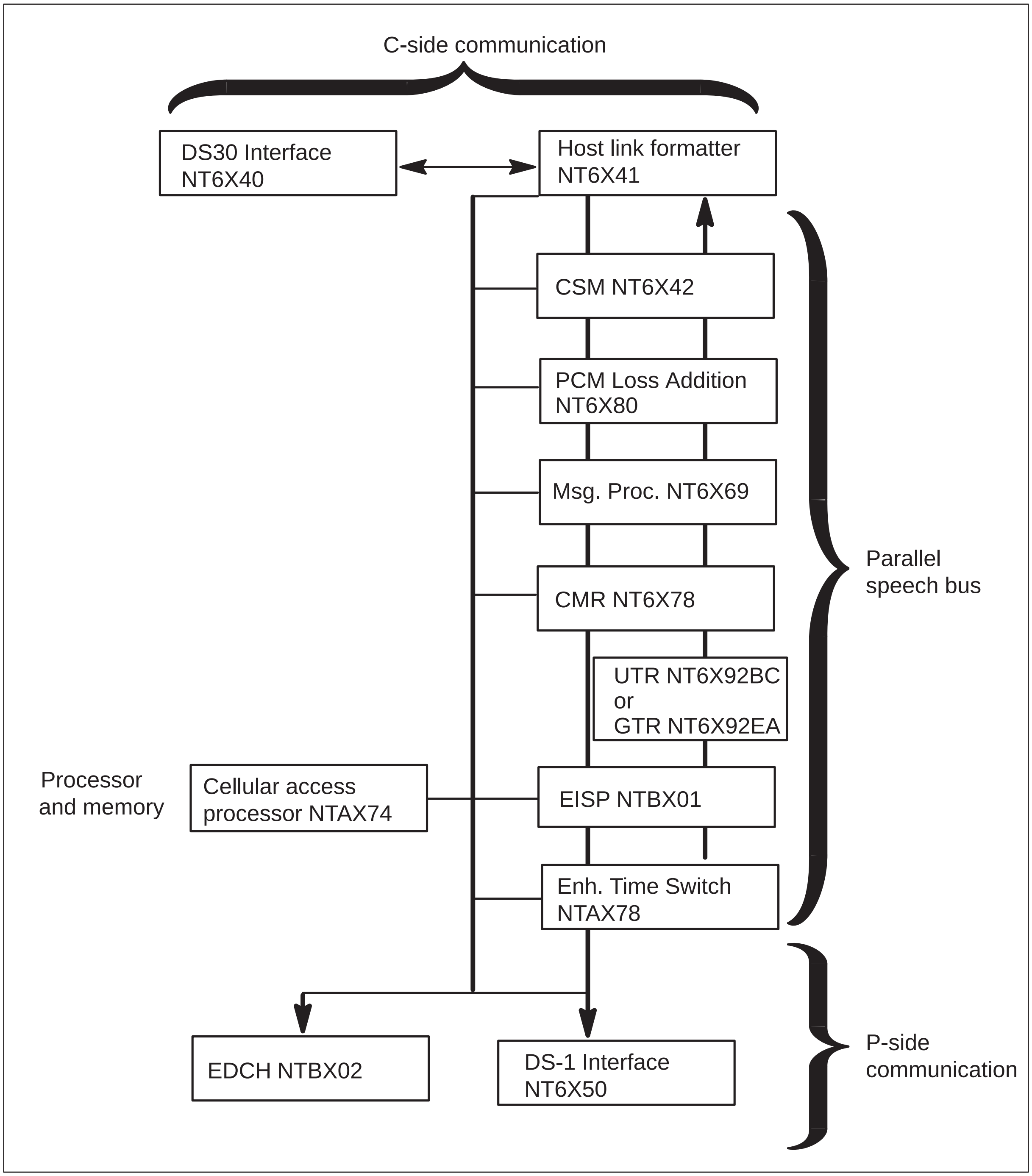
NTBX02 This card is the EDCH. This card provides the interface to ISDN links that connect to the RDT. This card communicates with the EISP over a high level data link controller (HDLC) to transfer signaling and maintenance data. This card passes packet data to and from the DMS Data Packet Network (DPN) through Bd channel links. This card performs terminal endpoint identifier (TEI) management, and operational measurements (OM) collections.

An EDCH replaces one DS-1 interface card and reduces the number of ports by two.

SMA functional block diagram

This section addresses the specified cards and how the cards perform the software function of the SMA system. The next figure shows that the cards of the SMA are organized by function.

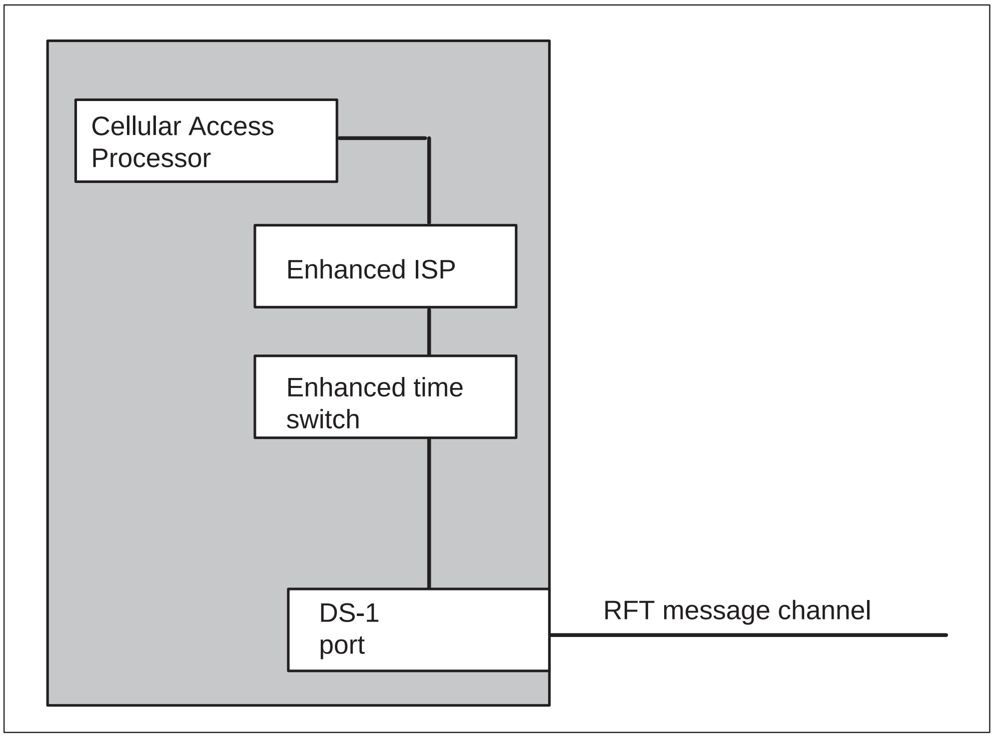
SMA functional block diagram



Message paths

The connection channel path through the SMA appears in the following figure. The message channels route through the enhanced time switch. The EISP translates the message channels so that the unified processor can process the message.

Message channel routing in the SMA



Upgrading an NT6X44CA circuit card to an NTAX78AB circuit card

This section describes the process that upgrades the SMA with the Enhanced Time Switch NTAX78AB circuit card. The following pages describe the procedure that replaces the current Time Switch NT6X44CA circuit card, with the NTAX78AB circuit card.

Make sure the SMA is provisioned with a NT6X50AB DS-1 controller port card of vintage 67 or higher. The NT6X50AA cards are not compatible with NTAX78AB circuit cards. The cards do not function when the SMA connects with the NTAX78AB circuit card. This method requires BCS34 or higher. Make sure LOGUTIL connects to a printer device. Make sure LOGs are enabled. Check the LOGs from the last 24 h to make sure no problems are present with the SMA. Perform the following to check the long and short term failure buffers of the DMS switch:

>MAPCI;MTC;PM
>POST SMA sma_no
>QUERYPM DIAGHIST

If failures are present:

- Take note of the DIAGHIST with a hard copy to a printer.
- To clear the long term failure buffer, type QUERYPM DIAGHIST RESET. To confirm, type Yes or Y.
- To clear the short term failure buffer, type SWACT FORCE. To confirm, type Yes or Y.

When the units recover to the in-service (INSV) state, repeat the QUERYPM DIAGHIST command. This command confirms that the failure buffers are clear and reset.

Power down the SMA before you perform the upgrade procedure. If you cannot perform the upgrade with the SMA out-of-service (OOS), perform the upgrade on one unit of the SMA at a time. The other unit must remain INSV to handle traffic. Reschedule REXTST, NETFAB, ALT, and ATM automated testing, so that the tests do not run when this procedure executes.

The following two sections provide a general description of how to upgrade to an enhanced time switch. The sections are: “Preparations for an enhanced time switch upgrade, and Replacing the NT6X44CA circuit card with a NTAX78AB circuit card”. The procedure to upgrade a NTX6X44CA circuit card to a NTAX78AB circuit card is in the change application procedure.

Preparations for an enhanced time switch upgrade

Preparations for an enhanced time switch upgrade are as follows:

1 To record activities on a printer, type:

>LEAVE ALL
>RECORD START ONTO printer
and press the Enter key twice.

Verify that the log message prints after two carriage returns.

2 To obtain hard copies of tables line trunk controller inventory (LTCINV), line trunk controller P-side inventory (LTCPSINV), and PMLOADS for reference, type:

>TABLE LTCINV;LIST ALL;QUIT
>TABLE LTCPSINV;LIST ALL;QUIT
>TABLE PMLOADS;LIST ALL;QUIT

Note: For each PM type to modify, note the PM load in table LTCINV.

3 Determine the disk used for PMLOAD storage. List the PMLOADs at the MAP terminal where the procedure is performed.

For a disk drive unit (DDU), type:

>DSKUT
>LISTVOL disk_volume ALL
>QUIT

for a system load module (SLM), type:

>DISKUT
>LF disk_volume
>QUIT

If each correct XPM load is on the PMLOAD disk, go to step 4.

If the correct XPM load is not on the PMLOAD disk, mount the new PMLOAD tape. To copy the current XPM PMLOAD to the PMLOAD disk, type:

>MOUNT drive number
>TLIST Tdrive number
>PRINT TAPE$DIR
>COPY filename disk_volume

To demount the drive when the copy is complete, type:

>DEMOUNT Tdrive_number

4 To check the logs the system generates in a 24 h interval, and check the SMA for problems, type:

>LOGUTIL
>STOPDEV printer
>OPEN PM; WHILE (BACK) ()
>OPEN TRAP; WHILE (BACK) ()
>OPEN SWER; WHILE (BACK) ()
>QUIT

5 To make sure LOGUTIL starts on the same print device, type:

>LOGUTIL
>LISTREPS SPECIAL PM

Note: If PM logs, print with a `*SUPP*` mark, these logs must be resumed. To resume these logs, type:

>RESUME PM

6 To start the log output from the printer and check log classes and report updates, type:

>STARTDEV printer
>LISTROUTE DEVICE printer

7 Check the LISTROUTE and make sure log classes 0-31 are updated to the selected printer. To restore a class of logs that the system deletes, type:

>ADDCLASS printer class_number

8 Check the LISTROUTE and make sure the PM logs update to the printer. If the system deletes logs, to restore the PM logs, type:

>ADDREP printer PM

9 To obtain a hard copy of the C-side links that are associated with each modified SMA, type:

>MAPCI;MTC;PM
>POST SMA sma_no
>TRNSL C

10 To check the CLOCK level to make sure the office is of slave clocking configuration, type:

>MAPCI;MTC;MS;CLOCK

If the office is of slave configuration with timing links through XPMs, SWCARR is present in the MAP terminal menu. The timing link XPM connectivity appears.

The office is a master internal or master external office if both of the following conditions occur:

- the SWCARR is not a menu choice
- no XPM connectivity shows for the timing links.

No carrier switch during step 2 of the procedure list that replaces a NT6X44CA circuit card with a NTAX78AB circuit card is necessary.

1 Inspect the NT6X50 circuit cards in the SMA. Record the shelf, slot, PEC, and release of each NT6X50 circuit card. Note if NT6X50AA cards, are present. Use the correct change application procedure to upgrade NT6X50AA circuit cards to NT6X50AB circuit cards.

2 If NT6X50AB circuit cards have a release level lower than 67, use the appropriate change application procedure to upgrade. Upgrade the NT6X50AB circuit cards to release 67 or higher.

Replacing a NT6X44CA circuit card with a NTAX78AB circuit card

To replace a NT6X44CA circuit card with a NTAX78AB circuit card, perform the following:

1 Make sure the SMA is out-of-service (OOS). Perform the upgrade on one unit of the SMA at a time if SMA status is not known.

> **CAUTION**
> **Service disruption: calls can drop!**
> If the XPM cannot be taken out–of–service, service degradation can occur during the upgrade.

2 If the office has master external or master internal clocking, continue to the next step.

If the office has slave clocking, check that the active carrier is not linked to the SMA to be modified. If the active carrier is linked to the modification SMA, you must perform a Switch of Activity (SWACT) on the carrier. To perform a SWACT, type:

>MAPCI;MTC;MS;CLOCK
>SWCARR

3 At the PM level of the MAP display, to post the modification SMA, type:

>MAPCI;MTC;PM
>POST SMA sma_no

4 At the SMA level of the MAP display, to test the SMA type:

>TST PM

5 Unit 0 is the first unit to modify. If unit 0 is the inactive unit, proceed to the next step. If unit 0 is not the inactive unit, type:

>SWACT
>YES

Unit 0 becomes system busy (SysB). Wait for unit 0 to become INSV.

6 To busy (BSY) and test unit 0, type:

>BSY INACTIVE
>PMRESET UNIT 0 NORUN
>TST UNIT 0

7 Use the printout from the preparations section. Access the NET-LINKS level of the MAP display, and BSY plane 0 of network links assigned to the SMA. Use the C-side link data from table LTCINV, or the output from the TRNSL C command.

For a Junctored Network (JNET), type:

>MAPCI;MTC;NET
>LINKS net_pair_number

To translate and BSY the link, type:

>TRNSL P 0 link_number
>BSY 0 link_number

For an Enhanced Network (ENET), type:

>MAPCI;MTC;NET
>SHELF shelf_number
>CARD shelf_number
>LINK link_number

To verify each network links P-side termination before you busy the link, type:

>TRNSL P 0 link_number
>BSY 0 LINK link_number

Note: Repeat step 7 for all network links assigned to unit 0.

8 Wait 5 min.

9 Unseat the circuit cards from unit 0, in the following order:

— NT6X69 circuit card in slot 18

— NTMX77 circuit card in slot 12

— NTBX01 circuit card if present, in slot 16

— NT6X44 circuit card in slot 14, and put the card in an antistatic bag or shipping box. Insert do not seat, a NTAX78 circuit card in slot 14.

10 Power down unit 0, and unseat the power converter circuit card in slot 25.

11 Reseat all circuit cards in unit 0, in reverse order of step 10. Do not reseat the NTAX78AB circuit card in slot 14.

12 Power up unit 0.

13 Reseat the NTAX78AB circuit card in slot 14.

14 Use the printout from the preparations section. Access the NET LINKS MAP level. Test and return to service (RTS) plane 0 of network links assigned to the SMA.

For a JNET, type:

>MAPCI;MTC;NET
>LINKS net_pair_number

To RTS links, type:

>TST 0 link_number
>RTS 0 link_number

For an ENET, type:

>MAPCI;MTC;NET
>SHELF shelf_number
>CARD card_number
>LINK link_number
>TST 0 LINK link_number

To RTS the network link of the card associated with unit 0, type:

>RTS 0 LINK link_number

Repeat step 14 for network links assigned to unit 0.

15 To load and RTS unit 0, type:

>MAPCI;MTC;PM
>POST SMA sma_no
>LOADPM UNIT 0 CC
>PMRESET UNIT 0
>RTS UNIT 0

16 When both units are INSV, achieve data plus superframe synchronization, type:

>TST UNIT 0

17 To perform a SWACT from unit 1 to unit 0, type:

>SWACT
>YES
Wait for unit 1 to become INSV.

18 Wait 15 min after the SWACT to verify normal call processing on unit 0. Use the NTAX78AB circuit card.

19 BSY and test unit 1.

Check both units are INSV. If the units are not INSV, perform a test on the in-service trouble (ISTb) unit.

If both units are INSV, type:

>BSY INACTIVE
>PMRESET UNIT 1 NORUN
>TST UNIT 1

20 Repeat steps 8 through 19 of this procedure for unit 1. When you complete step 19, continue with step 22.

21 Add NTAX78AB as a selection in table LTCINV field OPTCARD, for this SMA.

22 BSY, test and RTS the inactive unit. Enter the following to check the unit 0 is inactive and unit 1 is active:

>MAPCI;MTC;PM
>POST SMA sma_number
>BSY INACTIVE
>TST UNIT 0
>PMRESET UNIT 0
>RTS UNIT 0

23 Wait until unit 0 is INSV, SWACT from unit 1 to unit 0. Wait until unit 1 is INSV, and achieves data synchronization with unit 0.

24 BSY, test, and RTS the inactive unit. Unit 1 is the inactive unit.

25 Wait 15 min after the SWACT to verify the SMA performs normal call processing with both units. Use the NTAX78AB circuit card.

26 Upgrade is complete.

S/DMS AccessNode hardware

Bay frames package the S/DMS AccessNodes. The equipment layouts use a modular approach based on the shelf modules and bay-assembly modules.

Configurations packaged in bays

Configurations available for use in S/DMS AccessNode sub-networks come in bay frames. The configurations are:

- configuration for a maximum of 672 copper lines. This configuration comes with an access bandwidth manager (ABM) shelf and seven copper-distribution shelves (CDS).

- add-drop start-up configuration. This configuration comes with an ABM shelf. You can order the number of CDS required. The bay comes with internal wiring for three or seven CDS. The option that you order determines the wiring.
- multiplexer configuration. This configuration includes an ABM shelf. This configuration does not includes CDS or the internal cables for CDS.
- transport single-shelf bay configuration. This configuration includes a transport bandwidth manager (TBM) shelf. The configuration does not includes CDS or the internal cables for CDS.

Integrated S/DMS AccessNode

The integrated S/DMS AccessNode configuration consists of a transport single-shelf bay configuration at the FCOT. The configuration consists of a bay configured for 672 copper lines at the remote fiber terminal (RFT).

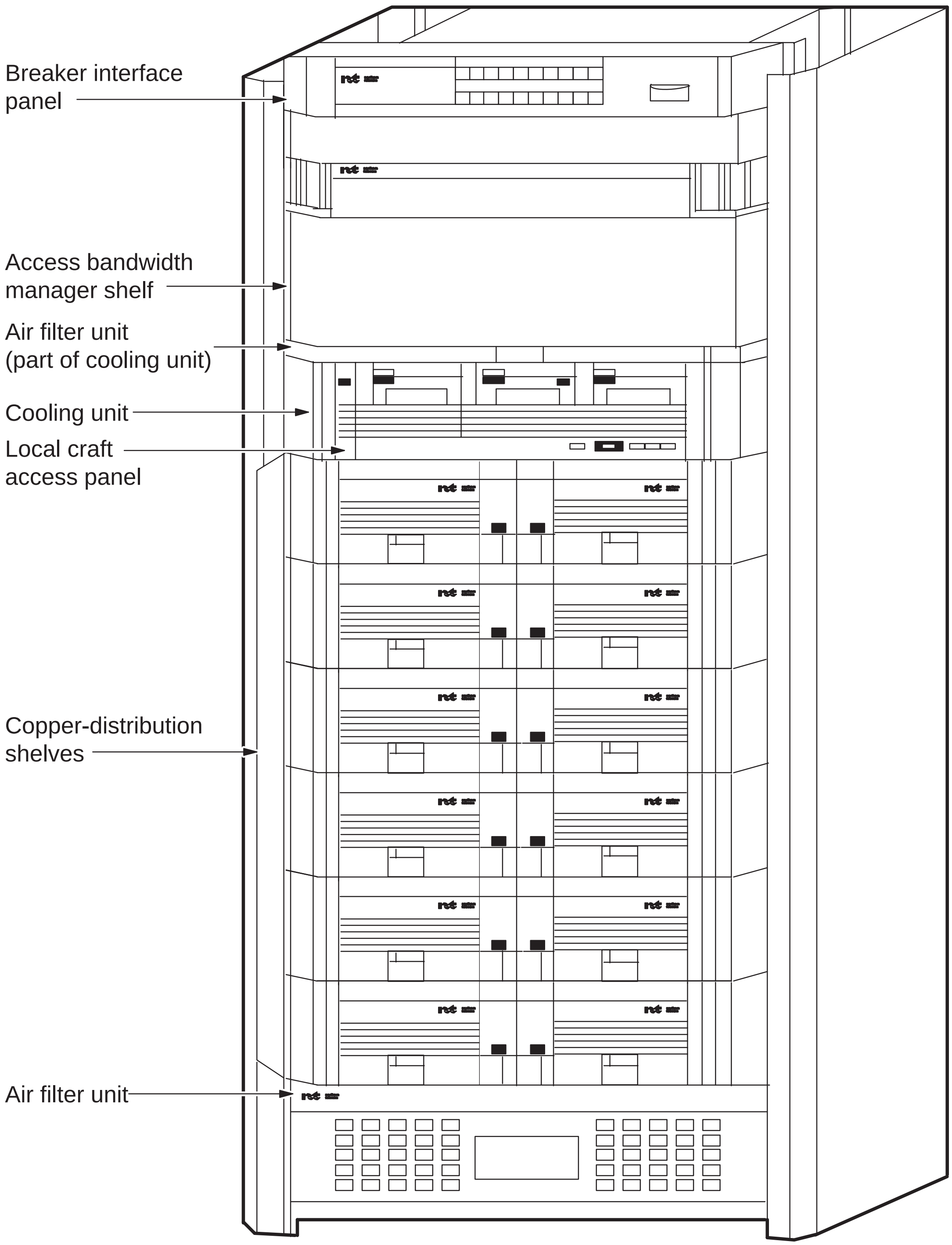
This type of bay supports a maximum of 672 2-wire copper lines. The bay contains the following:

- one breaker interface panel model NT4K14, that includes the following:
  - — one alarm relay card
  - — two talk battery filter cards
- one cooling unit, that includes the following:
  - — three cooling modules
  - — one air filter unit
- one local craft access panel model NT4K16AA
- one ABM shelf
- seven CDS
- ABM intershelf cabling that connects the ABM shelf to the CDS
- orders for line cards must be separate

The next figure shows a 7 ft bay with integrated S/DMS Access Node configuration.

> ***Note:*** In a 9 ft or 11.5 ft bay, the shelf modules are installed at the same height, and the additional space at the top of the bay remains empty.

Bay prewired for 672 copper lines



Transport single-shelf bay configuration

This type of bay includes a TBM shelf. The shelf supports DS-1 channels.

The FCOTs in subnetworks that serve integrated applications use this configuration. The transport single-shelf bay configuration is one of the configurations used in the FCOTs in subnetworks that serve multiplexer applications.

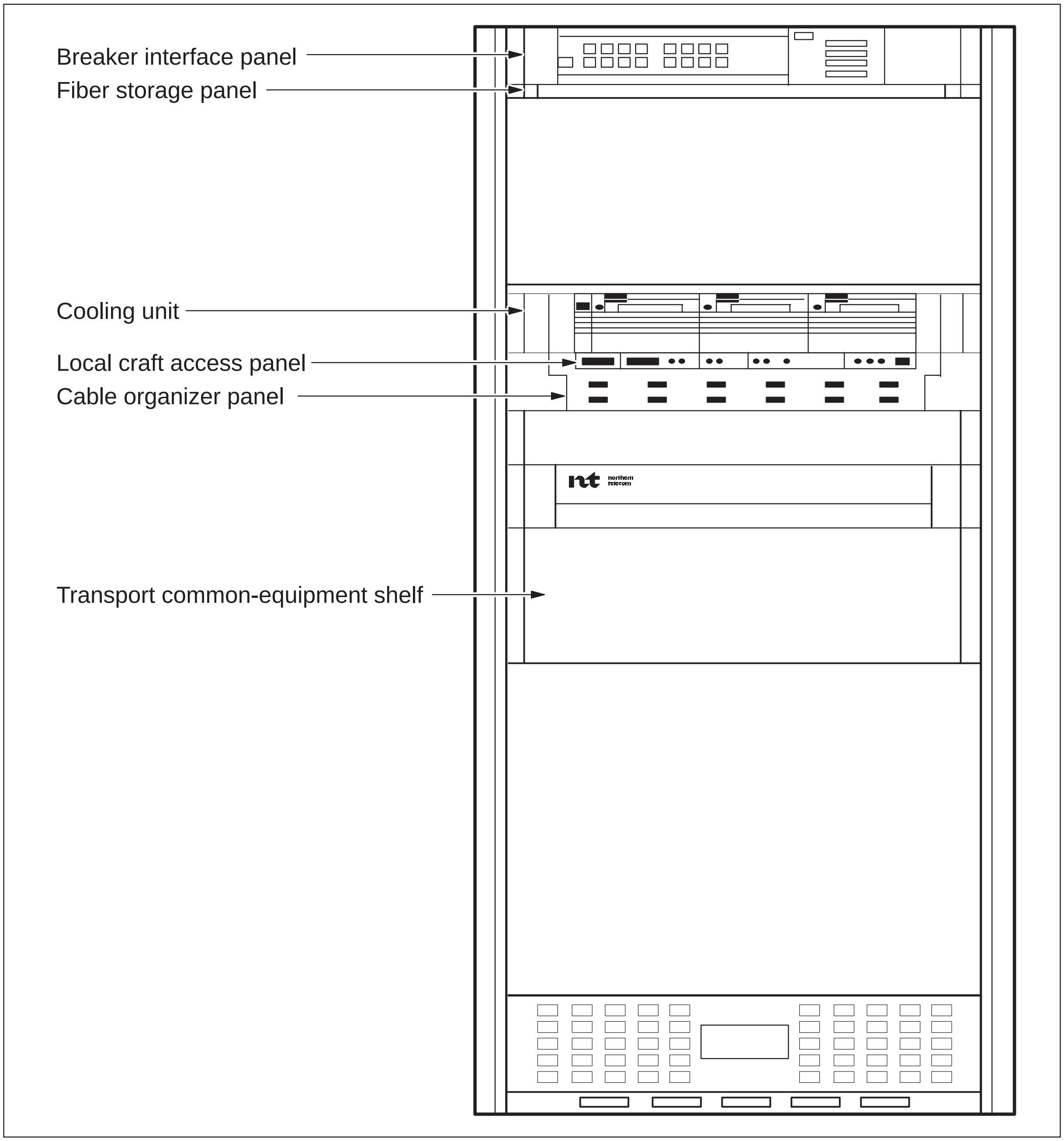
This type of bay assembly includes the following:

- one breaker interface panel model NT7E56AB
- one cooling unit, that has the following:
  - — three cooling modules
  - — one air filter unit
- one local craft access panel model NT7E5051
- one TBM shelf
- one cable organizer panel

The next figure shows a front view of a 7 ft bay with the transport single-shelf bay configuration. The bay includes all the modules that appear above, and includes an optional fiber storage panel.

> ***Note:*** The next figure shows that in a 9 ft or 11.5 ft bay, the shelf modules are installed at the same height. The additional space at the top of the bay is empty.

Transport single-shelf bay configuration



References

A complete description of the hardware required for the S/DMS AccessNode is found in *S/DMS AccessNode Configuration and Equipment Description Volume 1*. A complete description is in the *S/DMS AccessNode Signal Flow and Circuit Pack Description Volume 1*.

SMA signaling and communications

SMA system functionality

This chapter describes the signaling and protocols that the Subscriber Carrier Module-100 Access (SMA) uses to support the SMA system functionality. In addition, this chapter identifies the supported services and abilities.

Introduction

This section addresses the following aspects of SMA system functionality:

- voice and data communications
- call setup, call take-down and call monitoring messages
- operations, administration, maintenance and provisioning (OAM&P) messages
- integrated services digital network (ISDN) Basic Rate Interface (BRI) signaling(functional only, stimulus signaling is not supported)
- Bellcore compliant Analog Display Services Interface (ADSI) tones and compatible voiceband data
- path protection switching
- communications protocols
- call processing
- service abilities

Note: References to the generic term remote digital terminal (RDT) in this chapter apply to the S/DMS AccessNode remotes. These remotes are called remote fiber terminals (RFT). Where specified references to a remote access vehicle are required, the term S/DMS AccessNode or RFT refers to the Nortel (Northern Telecom) next generation digital loop carrier (NGDLC), the S/DMS AccessNode.

Voice and data communications

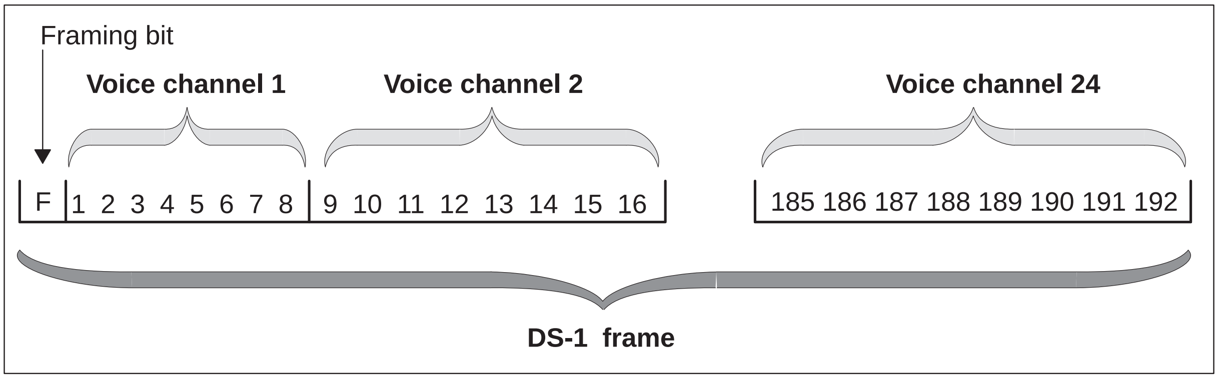
Voice and data call transfers occur between the RDT and the Subscriber Carrier Module-100 Access (SMA) through DS-1 links with the extended superframe format (ESF) signaling.

DS-1 frame format

The SMA and RDT exchange information over DS-1links. DS-1 links operate at a rate of 1.544 Mbyte/s with a sampling frequency of 8000 frames each second.

The DS-1 frame consists of 24 8-bit bytes and a framing bit for a total of 193 bits for each frame. The 8-bit bytes fit into time slots or channels for a total of 24 channels in each frame. The framing bit precedes the 24 channels. These channels carry speech information, signaling information or operations information. The format of a DS-1 frame appears in the following figure.

DS-1 frame format



The framing bit identifies the location of the first time slot in the frame. When the RDT or SMA receives a framing bit, the RDT or SMA is notified that the following 8 bits contain information from time slot one. The framing bit can also perform frame alignment in the extended superframe alignment.

Extended superframe format signaling

Extended superframe format (ESF) signaling monitors DS-1 link performance and maintenance functions. ESF signaling improves robbed bit signaling messages because ESF signaling allows ABCD bits to represent messages instead of AB bits. AB bits are used in the superframe format.

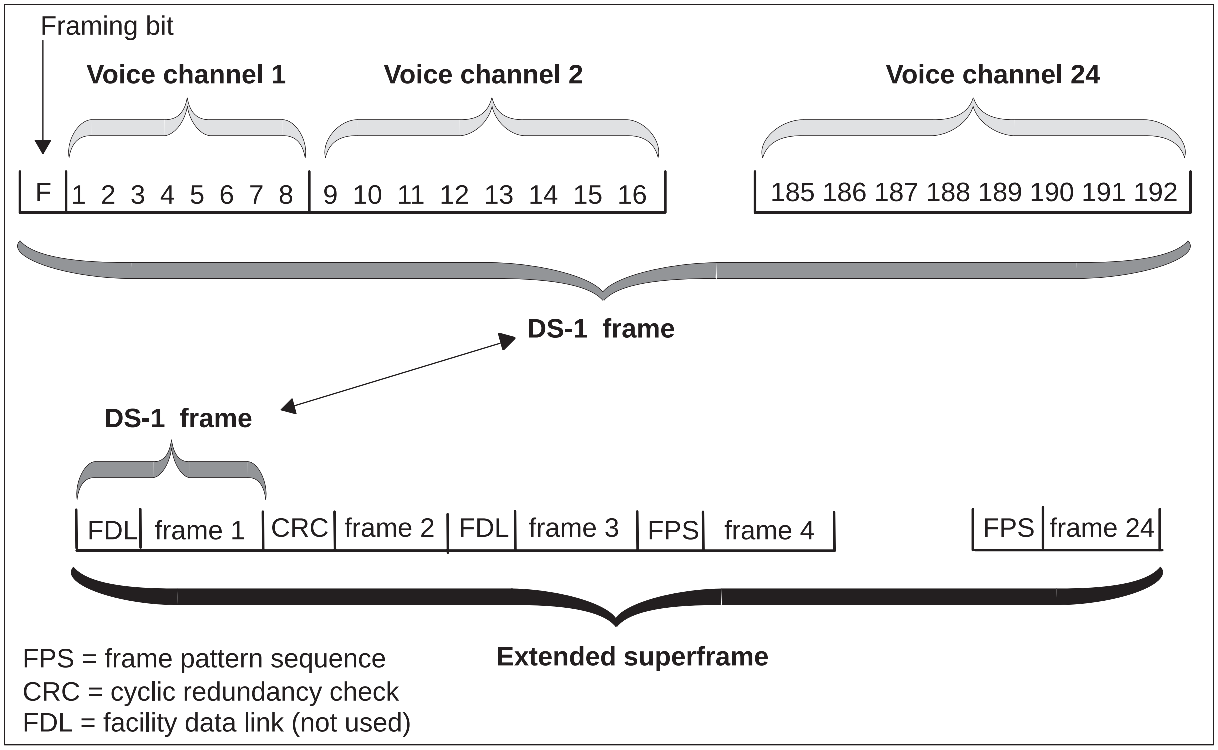
The ESF consists of 24 DS-1 frames. In ESF, the framing bits form a 24-bit pattern, one for each 24-channel frame. The 24-bit pattern conveys three types of information:

- frame pattern sequence (FPS)—The framing bit carries an FPS value of 001010. The FPS begins at the fourth frame and occurs each fourth frame that follows with the use of the framing bits. The FPS defines an in-frame condition with the cyclic redundancy check (CRC).

- facility data link (FDL) performance (this ability is not used)—The FDL4 is a Kb/s message. The FDL begins at the first frame and occurs each second frame that follows with the use of the framing bits. The SMA does not support facility protection and does not use FDL messaging bits.
- cyclic redundancy check—The CRC begins at the second frame and occurs each fourth frame that follows with the use of the framing bits. In an extended superframe, a block check field is checked six times. The CRC-6 check detects bits that emulate an FSP bit, and determines when an out-of-frame condition is present.

The format of a DS-1 ESF appears in the following figure.

DS-1 ESF format



The following table details the superframe alignment pattern.

Superframe alignment pattern

Frame number	Framing bit type	Framing bit value
1	FDL	m
2	CRC	CB1
3	FDL	m
4	FPS	0
5	FDL	m
6	CRC	CB2
7	FDL	m
8	FPS	0
9	FDL	m
10	CRC	CB3
11	FDL	m
12	FPS	1
13	FDL	m
14	CRC	CB4
15	FDL	m
16	FPS	0
17	FDL	m
18	CRC	CB5
19	FDL	m
20	FPS	1
21	FDL	m
22	CRC	CB6
23	FDL	m
24	FPS	0

m = message bits
CB = check bits

Call setup, call take-down and call monitoring

Call setup, call take-down and call monitoring signals use common signaling channel (CSC) signaling between the SMA and the S/DMS AccessNode.

Common signaling channel signaling

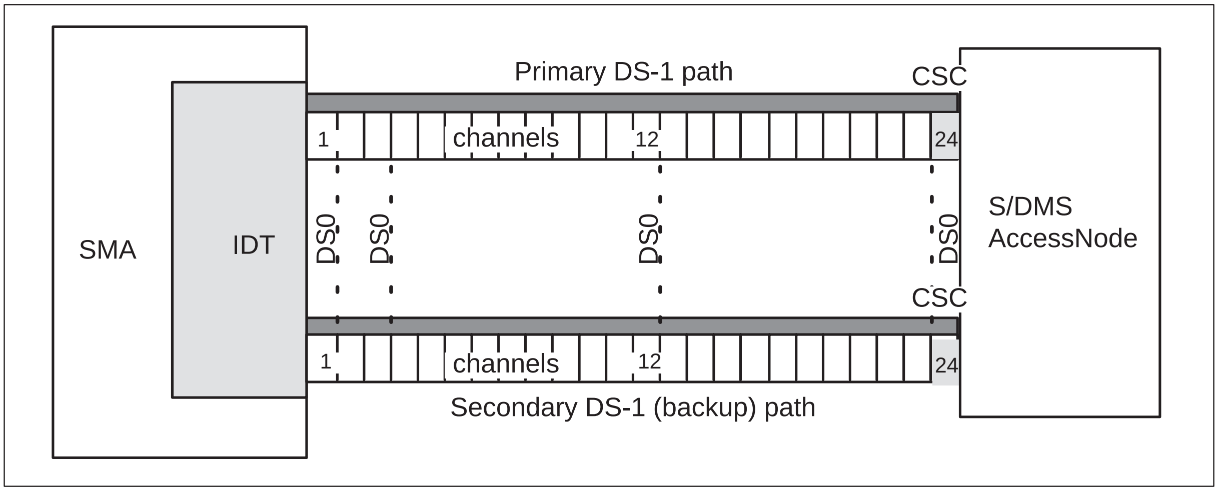
The CSC is a message-oriented signaling type that sets up, monitors and takes down calls in the S/DMS AccessNode. These call processing signals:

- are transmitted over channel 24 of a DS-1 link
- use Q.931 message protocol
- are path protected
- can contain a maximum of 52 octets

All CSC call processing signals transmit over a dedicated channel. This vent is not like TR-303 hybrid signaling (robbed bit signaling). Channel 24 of a DS-1 frame is the dedicated CSC channel. Eight bits of each message, called an octet, are transmitted with each DS-1 frame.

The following figure indicates signaling between an SMA and an S/DMS AccessNode over a DS-1 link. The CSC channel transmitted over channel 24.

SMA to S/DMS AccessNode connectivity



Operation, administration, maintenance and provisioning (OAM&P)

Operations, administration, maintenance and provisioning (OAM&P) messages are transmitted for an SMA and an S/DMS AccessNode over embedded operations channel (EOC) message channels. A description of the EOC message signaling appears in this section.

EOC message signaling

The EOC is a message-oriented operations channel that exchanges OAM&P information between the RDT and the IDT. These operations messages:

- are transmitted over channel 12 of a DS-1 link
- use EOC communication protocol
- use ASN.1 basic encoding rules
- are path protected

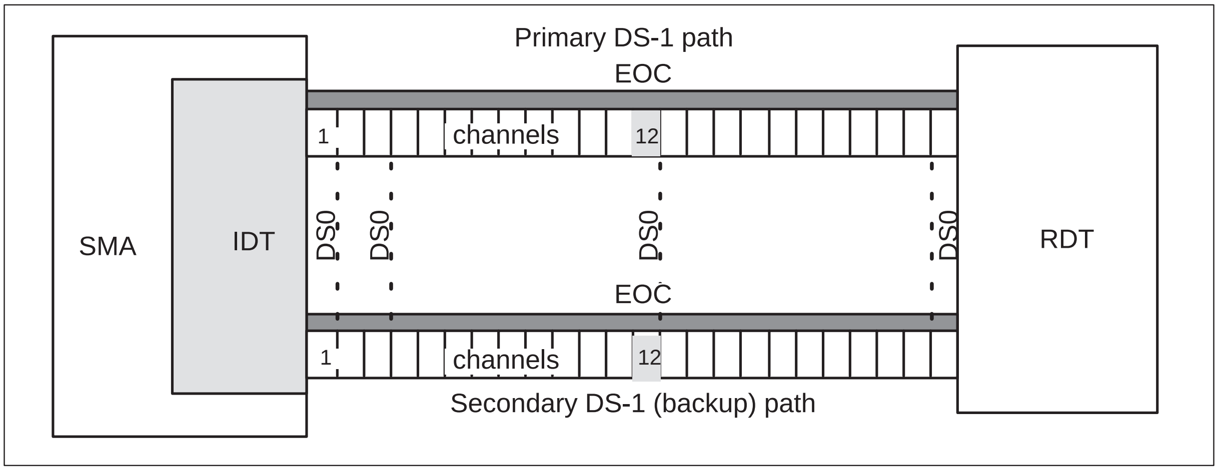
The SMA communicates EOC messages between the IDT and the RDT to

- initialize and maintain object-oriented static data at the RDT
- provide line test position (LTP) abilities to the RDT
- permit the RDT to connect to external test systems

The RDT uses EOC messages to inform the SMA of RDT activities through logs and remote telemetry.

The following figure indicates signaling between an SMA and an RDT over a DS-1 link. The EOC channel transmitted over channel 12.

SMA to RDT signaling over the EOC channel



The following DMS applications use EOC message signaling:

- DMS line provisioning controls the datafill of subscriber services. Line provisioning refers to hardware provisioning and to service provisioning.
- DMS line maintenance and automatic line testing (ALT) controls and monitors subscriber line states from the MAP terminal. This DMS application allows for diagnostic tests of the lines.
- logs and alarms allow for the reporting of alarms and events to the DMS MAP terminal and operations support system that connects to the RDT.
- node maintenance provides for the control of voice and data channels between the DMS CM and peripheral devices. These devices include the SMA and the RDT.

ISDN BRI signaling

Integrated services digital network basic rate interface (ISDN BRI), known as 2B+D, consists of two 64-kbit B-channels for voice and data and a 16-kbit D-channel for signaling and packet data. Two types of ISDN BRI signaling are available: functional and stimulus.

Software in the set of the functional BRI terminal supports functional BRI signaling. The Q.931 protocol and the signaling control protocol sends call control messages between the terminal and the network. The SMA does not support stimulus BRI signaling.

ISDN BRI consists of two B-channels for voice and packet data and a D-channel for signaling. The CSC messages for voice and data dynamically assign the B-channels. The D-channel is nailed up at provisioning time. The D-channel is a network connection assigned on a permanent basis. Messages over the EOC control the assignment of the D-channel.

National ISDN-2/3 BRI Phase I feature

The National ISDN-2/3 BRI Phase I feature increases the operational versatility of BRI line interface configurations. This feature also expands the BRI service options available to end users. To access the enhanced ISDN abilities this section describes, the operating company must purchase the software optionality control (SOC) NI000050 in NA007.

- Two B-channel access—This ability allows a terminal that supports voiceband information (VI) and circuit mode data (CMD) to have access to both B-channels at the same time. This event occurs with a single terminal endpoint identifier (TEI). This ability applies to fully initializing terminals (FIT) and non-initializing terminals (NIT). Provisioning controls the number of B-channels a terminal can access.
- Support for non-initializing terminals (NIT)—This ability supports one non-initializing terminal on a BRI interface that is provisioned with the default logical terminal. A NIT is a new class of BRI terminal that does not initialize Layer 3. A NIT also does not require a service profile identifier (SPID). A SPID is an identification number that a terminal in the initialization process uses.
- Assignment of fixed feature keys to the default logical terminal for NITs—This ability permits the assignment of the following features to the NITs: call forwarding, message waiting, conference calling, call transfer, and call drop. The NIT can access these features with dial-access procedures or feature key management procedures.

The National ISDN-2/3 BRI Phase I feature introduces the following interactions:

- This feature changes the way additional call offering (ACO) operates for terminals with the access privilege entered for two B-channel access. A terminal with one call active and one B-channel free can allow a termination. When this condition occurs, the SETUP that ends contains the channel identifier information element (CID IE) encoded to the value of the free B-channel. For terminals without the two B-channel access privilege, this message has the CID IE encoded to “no-channel”.
- When flexible calling is active on a 2B FIT/NIT conference controller, all the following VI terminations are offered. The terminations are offered to the terminal with the CID IE encoded as “no-channel”.

Bellcore compliant ADSI tones and compatible voiceband data

The SMA generates alerting tones to support the Deluxe Spontaneous Call Waiting Identification (DSCWID) feature. When a line has the DSCWID option, when a call is established, a second call can attempt to terminate to that line. When this action occurs, the SMA provides one of two types of alerting signals or tones.

- a subscriber alerting signal (SAS)—The SAS is the tone the subscriber recognizes as the call waiting tone.
- a SAS followed by a customer premises equipment (CPE) alerting signal (CAS)—The CAS alerts the CPE of incoming data. The SAS followed by a CAS must trigger an ADSI compatible CPE to display the DSCWID options. The CAS tone prepares the CPE to receive caller identification (CID) data.

The DSCWID CPE generates an acknowledge (ACK) tone to indicate the DSCWID CPE is ready to receive DSCWID data. When the CPE is ADSI compatible, the CPE sends a DTMF A ACK signal in response to the CAS. When the CPE is a SCWID CPE, the CPE sends a DTMF D ACK signal in response to the CAS. When alerting tones are sent, the subscriber can control transfer to the incoming call with the CPE softkeys when the CPE is ADSI. The subscriber can control this transfer with hard-coded keys when the CPE is a SCWID or a 2500 set.

A T-tone timer sets the maximum amount of time between when the system sends a flash and the DTMF digit on an ADSI set. After the SMA receives a flash signal from the customer's ADSI compatible CPE, the SMA starts a T-tone timer. The value of T-tone is 600 ms. Speech is mute during the tone. The T-tone timer occurs during the first option of a DSCWID call. The CPE type does not affect the T-tone timer. Any additional DSCWID options on an ADSI set use the T-tone timer.

Any additional DSCWID options on a SCWID or 2500 use a new timer (T-flash). The SCWID and 2500 sets use the T-flash after the called party answers to provide the customer with enough time to select an option after a flash. The system introduces this new timer because a subscriber does not have enough time to flash and dial a DTMF digit in 600 ms. The operating company controls the T-flash timer. The T-flash timer is set from 1 to 8 s. The default value is 1.5 s. The SMA starts the T-flash timer when the NON-ADSI field is Y the SMA receives a flash signal from the customer SCWID or 2500 set. This event occurs during the held or conference call state. When the SMA cannot attach a UTR before 400 ms, the system applies the RETURN option.

Note: For Bellcore TR-416 compliancy, the SMA must provide options when the SMA detects a flash and cannot attach a UTR. The SMA complies with this requirement when the SMA sends a flash to CC. This flash occurs when the SMA cannot attach a UTR in 400 ms.

ADSI interactions

The following ADSI interactions apply:

- A warm SWACT during the download or transmission of softkey data to the CPE prevents the reception of data at the CPE. Failure of the CPE to receive all of the data results in an ADSI call that does not have stability.
- After a warm SWACT, a transmission to the CPE set causes the active ADSI session to drop.
- A busy return to service (RTS) of the CMR circuit card occurs when an application session is active. The result is that an ADSI call does not have stability.
- A busy of the CMR circuit card on the active unit of the XPM occurs. This busy prevents the functioning of CLASS services that use the CMR card circuit.

ADSI restriction

A successful ADSI session requires an ADSI compatible CPE. Ten ADSI sessions can be active for each CMR circuit card.

ADSI hardware requirements

Hardware requirements to support ADSI ability include:

- An NT6X78AB card is required for transmission of softkey and display information to the CPE.
- An NT6X69AD (Tone ROM) circuit card is required. The NT6X69AD circuit card must contain the ADSI tone as TR-30 defines.

Path protection switching

Path protection switching provides protection for the EOC and CSC message and signaling channels. The SMA supports one-for-one path protection switching for these messaging and signaling channels. Path protection switching controls the switching of activity from the active EOC and CSC to the backup EOC and CSC. Path protection switching provides end-to-end protection against failures of message processing hardware in the SMA and the RDT.

The system or the user can initiate path protection switching. The SMA or the RDT can initiate automatic path protection switching when fault detection occurs. For maintenance purposes, the user initiates path protection switching through the integrated digital terminal (IDT) level of the MAP terminal.

The following ideas refer to protection switching:

- path—a CSC or EOC message channel
- active path—the path or channel that is in the active state. The active path carries CSC or EOC messages, and messages for protection switching.
- standby path—the path in the standby state. The standby path carries messages that allow the standby path to become the active channel.
- protection switch—occurs when the active path changes state to standby, and the standby changes state to the active path.

The following rules apply for protection switching:

- The IDT or RDT must be able to detect a failure and to initiate a protection switch.
- When a failure occurs on a channel and protection switching occurs, a switch back to the original active or inactive configuration does not occur. This action does not occur when the cause of the failure clears.
- A standby path stays in multiple-frame operation when this path can have support.

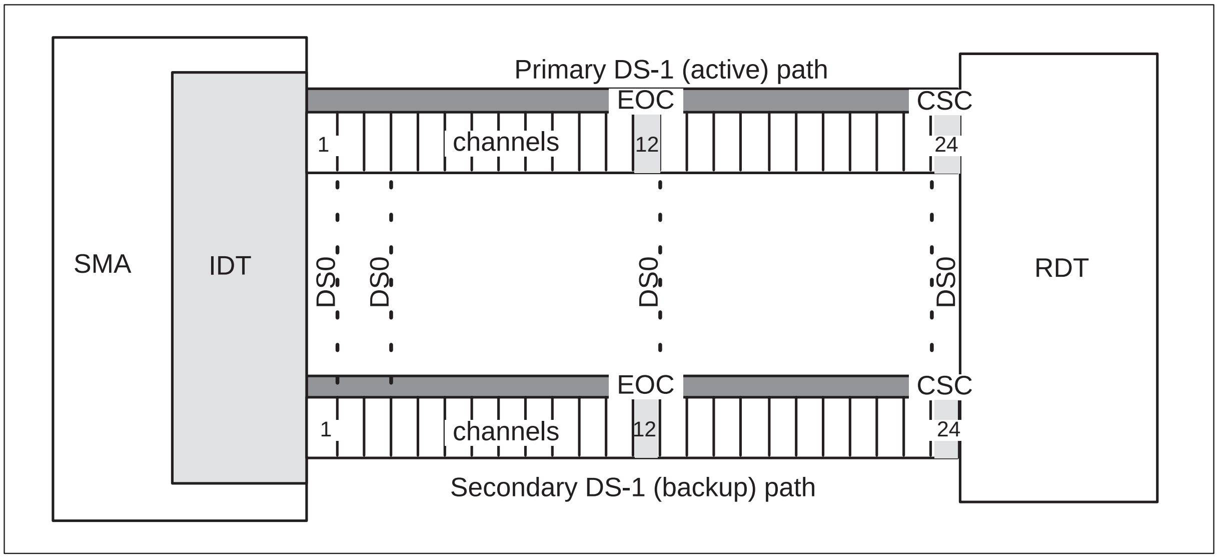
SMA to S/DMS AccessNode path protection switching

For each IDT to RFT connection, a dedicated CSC and EOC on two links is present. One EOC and CSC messaging path can be active on the two links. The inactive EOC and CSC messaging paths are reserved for backup. The EOC message paths can be active on one link and the CSC message path active on the other link. The EOC and CSC can be active on the same link.

The start of path protection switching depends on the SMA configuration and the associated tables datafill. The first two link assignments are the primary and secondary links that carry CSC and EOC messaging. These link assignments occur in Table RDTINV, field LINKTAB.

The following figure illustrates CSC and EOC path protection.

DS-1 control channels



Manual path protection switching control

To control path protection switching from the MAP terminal, operating company personnel:

- initiate a protection switch for the EOC and the CSC channel
- initiate a forced protection switch for the CSC or the EOC channel
- inhibit a standby EOC or CSC path from becoming active
- allow a standby EOC or CSC to become active, when required

Automatic path protection switching

The DS-1 links between the SMA and the S/DMS AccessNode contain primary and secondary CSCs and EOCs. When an active CSC or EOC fails, an automatic switch to the protection channel occurs.

A protection switch occurs on the CSC or EOC under the following conditions:

- failures detected from Q.921 protocol, like a failure to maintain multiple-frame operation. An example of this operation is when the message frame retransmissions N200 LAPD counter exceeds the maximum.
- switch message reception from the computing module through manual interruption
- switch message reception from the RDT

Manual and automatic protection switching restrictions

The following limits apply to manual and automatic protection switching:

- When you inhibit an active path from becoming active, you do not cause a protection switch.
- When you inhibit a path, you cannot automatically or manually switch to that path.
- When you inhibit a path, you cannot initiate a forced switch to that path.

Communication protocols

The RFT communicates with the DMS SuperNode switch over DS-1 links that end on the SMA. To provide subscriber services from an RDT and support communication between the SMA and the RDT, use the following protocols:

- Q.921 CCITT link access procedure on the D-channel (LAPD)
- Q.931 CCITT Digital Network Access
- EOC communication protocol
- DS30 protocol

Q.921 CCITT LAPD protocol

The Q.921 LAPD protocol:

- establishes data link communications between an integrated digital terminal (IDT) and an RDT
- transmits information sent from a higher layer protocol
- receive information for delivery to a higher layer protocol

The Q.921 protocol transmits the following messages:

- common signal channel (CSC) messages for RFTs
- embedded operations channel (EOC) messages

The user can configure Q.921 protocol parameters through Table RDTINV. If change is necessary in the LAPD parameters, change the two parameters, RDT and DMS, on both ends at the same time.

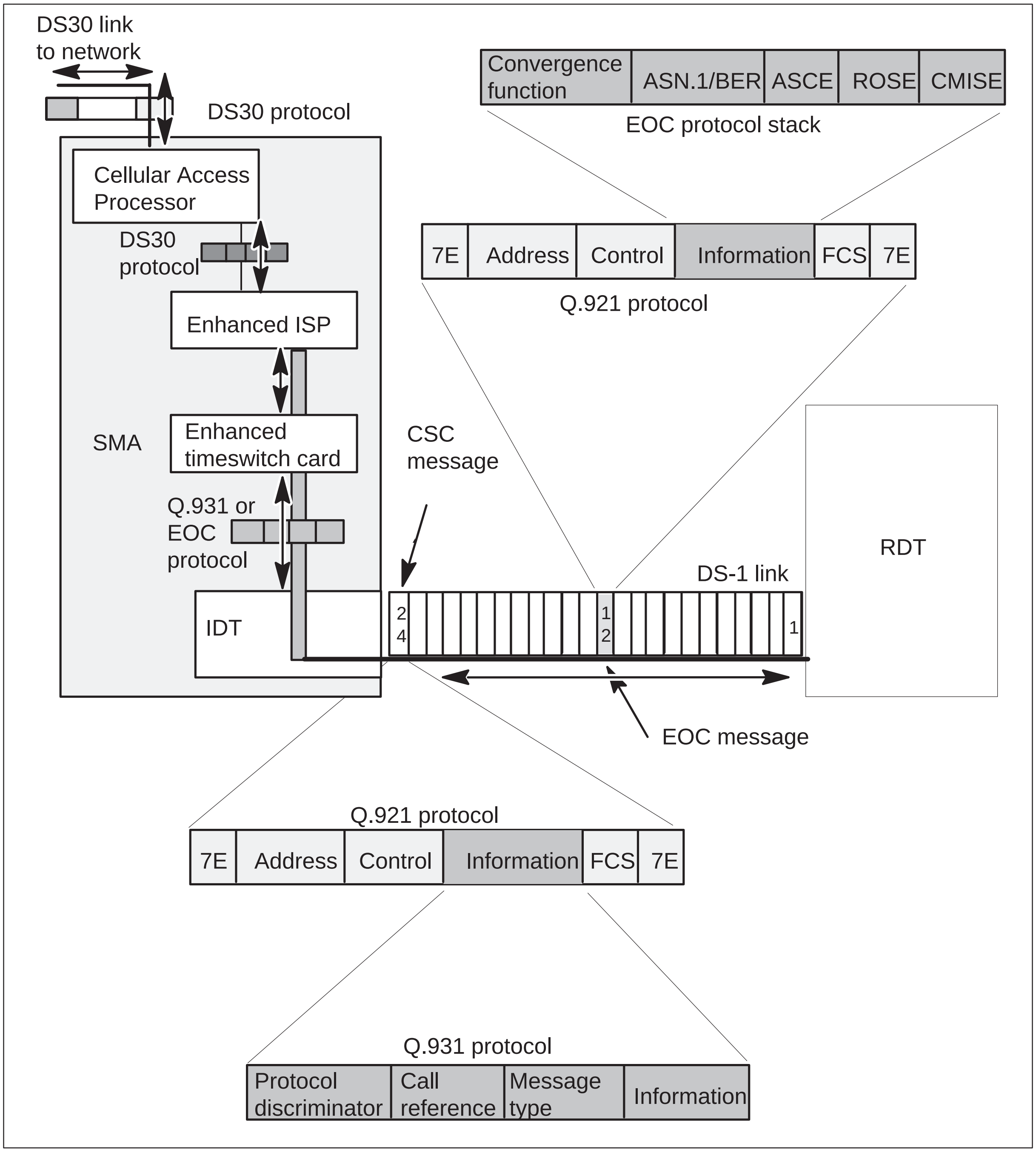
Table RDTINV LAPD parameters

Parameter	Description
Maximum number of unacknowledged frames (K)	The maximum number of remaining unacknowledged message frames that can be sent between the IDT and the RDT. This parameter adjusts the LAPD window size.
Maximum number of retransmissions (N200)	The maximum number of message frame retransmissions allowed.
Maximum number of octets in one frame (N201)	The maximum number of octets allowed in the information field of a message frame.
Maximum time to wait for acknowledgment for one frame (T200)	The maximum length of time in milliseconds (ms) a data link layer entity waits for acknowledgment (time-out) of a transmitted message frame.
Period of inactivity on data link (T203)	The maximum time in seconds allowed without an exchange of message frames.

Q.931 CCITT protocol

The Q.931 protocol communicates call setup, call take-down and call monitoring information between the integrated digital terminal (IDT) on the SMA and the RFT. The SMA must translate the Q.931 generic-based signaling messages that the RDT sends into a message format the host understands. The reverse also applies. The following figure illustrates signal flow from the RDT through the SMA.

Message channel routing in the SMA



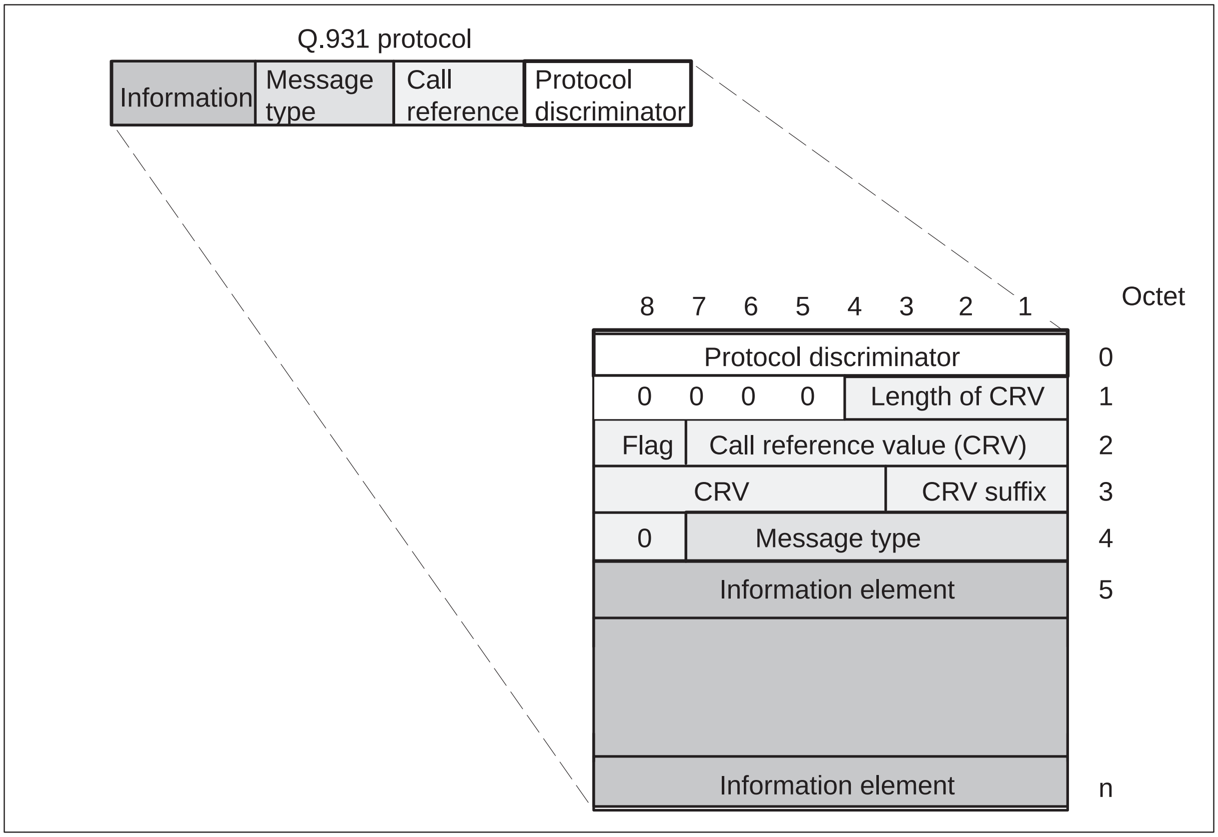
Q.931 protocol message structure

Q.931 protocol message composition has structure. Each message contains the following components in the order listed:

- protocol discriminator
- call reference
- message type
- information elements

For some messages, the information element is optional. The following figure illustrates Q.931 message structure.

Q.931 protocol message structure



Protocol discriminator The protocol discriminator is the first part of a message. The protocol discriminator identifies the type of message. The following bit sequence identifies a Q.931 protocol message: 01001111.

Call reference The call reference is the second part of a message. The call reference identifies the line termination where the message applies. In the occurrence of ISDN, call reference identifies the basic rate access (BRA) B-channel termination.

Call reference length value, fixed at 2 octets, allows 4095 line terminations.

The call reference flag identifies the message originator. The message originator sets this flag to a value of 0. The destination side sets this flag to a value of 1.

The call reference value, bits 1 through 7 of octet 2 and bits 4 through 8 of octet 3, identifies the line termination.

The call reference suffix supports ISDN BRA line terminations. A suffix of 000 indicates a line termination of one channel. A suffix of 001 indicates a line termination associated with a B1 channel. A suffix of 010 indicates a line termination associated with a B2 channel.

Message type The message type is the third part of a message. The message type identifies the type of Q.931 protocol message that follows. Each message has a different bit assignment.

Messages for time slot assignment are put in two groups: messages for call establishment and messages for call take-down or cancellation.

The Q.931 protocol message types appear with their message type identifiers in the following table.

Q.931 protocol message types and identifiers

Message type	Unique identifier	Bit sequence
Establishment message	Call proceeding	00000010
	Alerting	00000001
	Setup	00000101
	Setup acknowledge	00001101
Cancellation messages	Disconnect	01000101
	Release	01001101
	Release complete	01011010

—continued—

Q.931 protocol message types and identifiers (continued)

Message type	Unique identifier	Bit sequence
Messages for signaling	Connect	00000111
	Information	01111011
	Notify	01101110
Messages for management	Status	01110101
	Status enquiry	01110101
Q.931 messages used by ISDN	Setup	00000101
	Connect	00000111
	Status	01110101
	Audit	
	Disconnect	01000101
	Release	01001101
	Release complete	01011010

—end—

Information element The information element is the final part of a Q.931 message. The information element is not always a part of the message. The information element gives additional call processing information required to monitor a call. This information also sets up calls that are not POTS calls.

Each information element has structure. Each information element structure is different. The structural element that each information element has in common is the information element identifier.

A list of the names and functions of Q.931 message information elements appear in the following table:

Q.931 message information element names and functions

Message element name	Function
Bearer capability	Indicates information transfer ability, mode, and rate
Call state	Indicates the following RDT or IDT call states: • null • call initiated • call present • connect request • call active • disconnect indication • release request • permanent signal
Cause	Indicates reason for specified messages and provides diagnostic information
Channel identification	Identifies a time slot in the interface that the Q.931 message controls
Keypad facility	Conveys signaling inputs to the user terminal that addresses information

—continued—

Q.931 message information element names and functions (continued)

Message element name	Function
Notification indicator	Conveys the following line termination signaling information: • timed battery reversal • reverse battery • normal battery • negative loop mode • ground start mode • positive loop mode • timed negative coin check • timed positive coin check • timed negative coin control • timed positive coin control • coin ground • tip party ground • ring party • activate/deactivate message waiting lamp (Meridian Digital Centrex [MDC] 500/2500 sets only)

—continued—

Q.931 message information element names and functions (continued)

Message element name	Function
Signal	Conveys the following alerting information: • negative R ringing (POTS) • reminder ring • distinctive pattern A • distinctive pattern B • distinctive pattern C • distinctive pattern D • distinctive pattern E • distinctive pattern F • alerting off • loop reverse battery alerting • silent alerting (ISDN BRA)
Switch hook	Indicates when a customer goes on-hook and when a change in on-hook or off-hook status occurs
—end—	

Q.931 message descriptions

A list of descriptions of each of the Q.931 messages appears in the following table. The following table includes a list of the information elements that each message contains.

Q.931 message descriptions

Q.931 message	Description	Information element
Alerting	The RDT sends this message to the IDT to indicate that alerting initates to the called party. The time switch connection is made.	This message contains the channel identification information element. Channel identification applies when the alerting message is a first response to a setup message.
Call proceeding	The IDT sends this message to the RDT in response to a setup message for a loop reverse battery signaling call.	This message contains the channel identification information element.

Q.931 message descriptions (continued)

Q.931 message	Description	Information element
Connect	The RDT sends this message to the IDT to indicate a time slot is connected. The called party answers a call. The IDT sends this message to the RDT at the result of digit collection. This message indicates that a complete network address is received. The RDT also sends this message in response to a setup message with an alerting OFF pattern in the signal element.	This message is for ISDN. When this event occurs, the message contains the channel identification information element.
Disconnect	The IDT sends this message to the RDT when the IDT determines the call must be made clear. The RDT sends this message to the IDT to report the subscriber goes on-hook.	This message contains the cause information element.
Information	The RDT or the IDT sends this message to indicate signaling information, addressing information, and/or feature activation.	This message contains information elements: keypad facility, switch hook and signal.
Notify	The RDT or the IDT sends this message to indicate signaling events on the customer line. An example of this event is battery reversal. The RDT and the IDT also use this message to perform coin functions.	This message contains the notification indicator information element.
Release Release complete	The RDT or the IDT sends these messages to indicate the equipment that sends the message disconnected the time slot. The equipment intends to release all resources associated with the call. The equipment that receives the message releases the time switch connection and all resources associated with the call.	These messages contain the cause information element.
Release resources	The IDT sends this message to the RDT to request that the receiver of the message break the time switch connection. The message also requests the release of all resources associated with the call.	This message contains the cause and signal information elements.
Setup acknowledge	The IDT sends this message as a response to a setup message. This message indicates a connection occurs through the enhanced time switch for the call and notifies the RDT of the port and channel for the call.	This message contains the channel identification and notification indicator information elements.

—continued—

Q.931 message descriptions (continued)

Q.931 message	Description	Information element
Status	The IDT or the RDT sends this message at any time during the call when the reception of a message that is not expected occurs or reports other conditions of the call.	This message contains the cause and call state information elements.
Status enquiry	The IDT or the RDT sends this message at any time to solicit a status message from the receiver.	This message does not contain information elements.
	—end—	

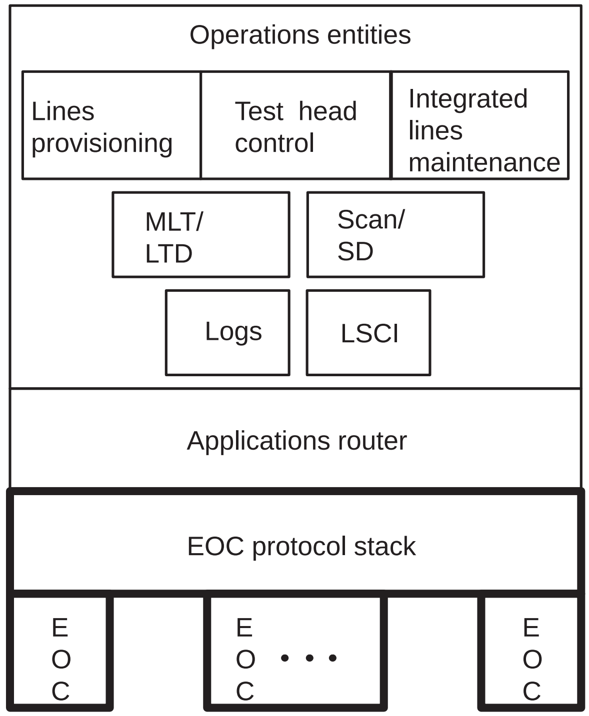
EOC communication protocol

The RDT and the SMA communicate with the use of the EOC communications channel. This communication occurs over a dedicated DS-0 that uses the Q.921 LAPD protocol used on ISDN D-channels. Operations messages transmit between the DMS SuperNode switch and the RDT. The EOC communications channel uses the operations gateway (OGW) software to provide the protocol translation and routing capabilities needed. These capabilities connect RDTs to operations entities. The OGW consists of the following three elements:

- EOC protocol stack—provides the communications function
- applications router—provides the communications function
- operation entities—are the users of this communication function

These elements appear in the following figure, and in the following text.

OGW software functional elements



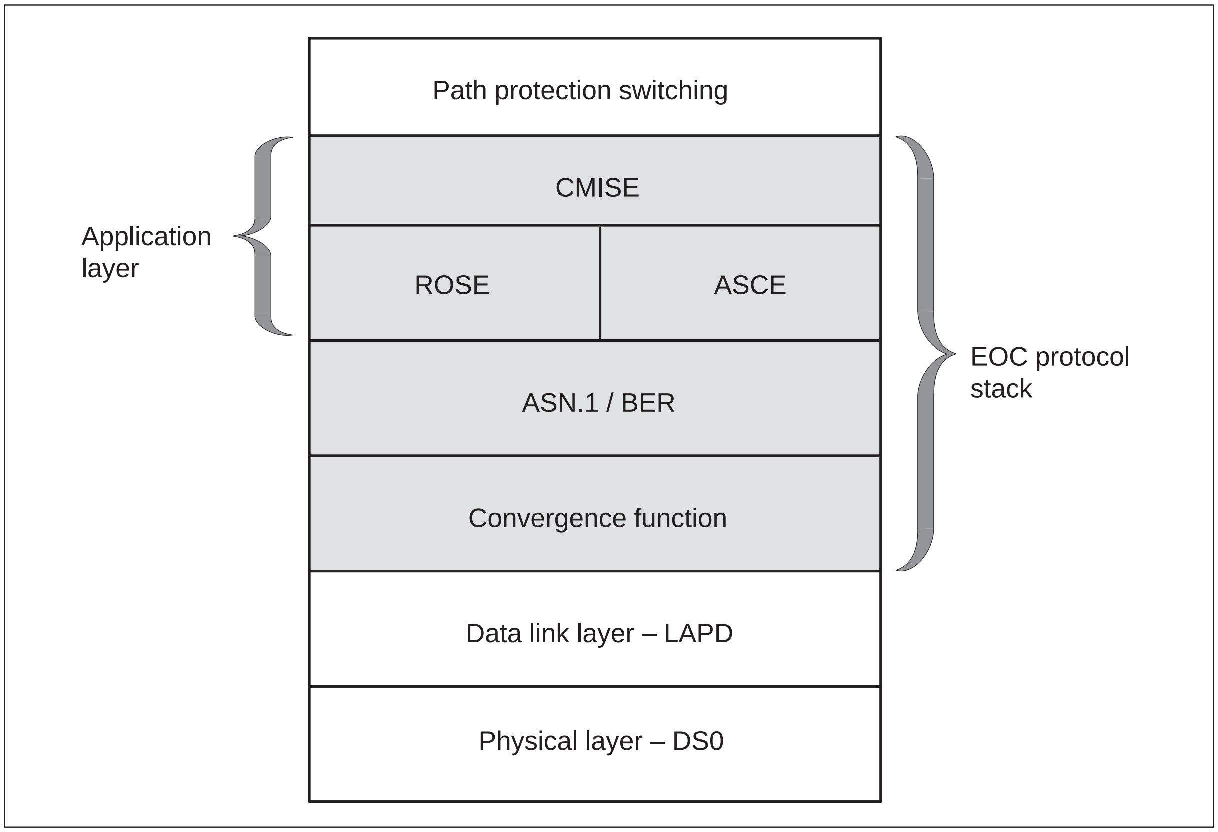
LSCI = local switch craft interface
LTC = line trunk controller
MLT = mechanized loop test
SD = signal distribution

The EOC communication protocol consists of the following four functional areas:

- physical layer is the physical DS-0 channel on the first DS-1 link between the local digital switch (LDS) and the RDT.
- data link layer uses LAPD protocol for processing between the LDS and the RDT.
- EOC protocol stack is a 3-layer communications protocol stack in use to communicate OAM&P information between the IDT and the SMA. A future section describes the EOC.
- path protection switching handles redundant messaging paths and the mechanism of switching activity between the redundant messaging paths.

These four functional areas perform common management information service element (CMISE) message transfers between the LDS software and the RDT. The following figure displays the relationship of these EOC communication protocol functional areas.

EOC communication protocol functional areas



The encoding and decoding of line test EOC messages occur in the SMA. Encoding and decoding in the SMA, and not in the CM, improves real time performance for line tests. The SMA performs encoding and decoding of line test EOC messages for the following:

- metallic test access unit
- test response circuit
- metallic test access path termination
- analog line termination

EOC protocol stack

The EOC protocol stack is a 3-layer communications protocol stack. The EOC protocol stack provides communication operations, administration, maintenance, and provisioning information. The stack provides this information between the IDT and the SMA and the RDT over the EOC communications channel. The EOC protocol stack appears in the figure called EOC communication protocol functional areas. These areas consist of the following three layers:

- convergence function layer—performs the segmentation and reassembly of application protocol data units (APDU). The convergence function layer performs the mapping between the services of the application and data link layers.
- application layer—consists of the following functionalities to allow two application processes to communicate:
  - common management information services (CMISE) exchanges information and commands to manage the SMA system
  - remote operations service element (ROSE) supports communication between communicating application users
  - association control services element (ASCE) controls application associations
- abstract syntax notation one (ASN.1) layer—uses basic encoding rules (BER) and parses and formats messages from functional subcomponents

Applications router

The application router provides the internal connection between the operations entities and the EOC protocol stack.

Operations entities

Operations entities are DMS SuperNode applications or external devices. These entities are the source or end point of operations messages between the SMA and the RDT. These entities use the services of the EOC protocol stack to communicate over the EOC with the RDT.

The IDT software allows operations entities to perform OAM&P tasks. Operations entities send messages over the EOC. The following applications are external to IDT software, and communicate with IDT software:

- line provisioning controls the datafill of subscriber services
- line maintenance allows controlling and monitoring subscriber line states from the MAP terminal and permits diagnostic testing of the lines
- logs and alarms allow alarms and events to report at the MAP terminal and external operating systems

- node maintenance provides for the control of voice and data channels between the CM and the SMA and RDT

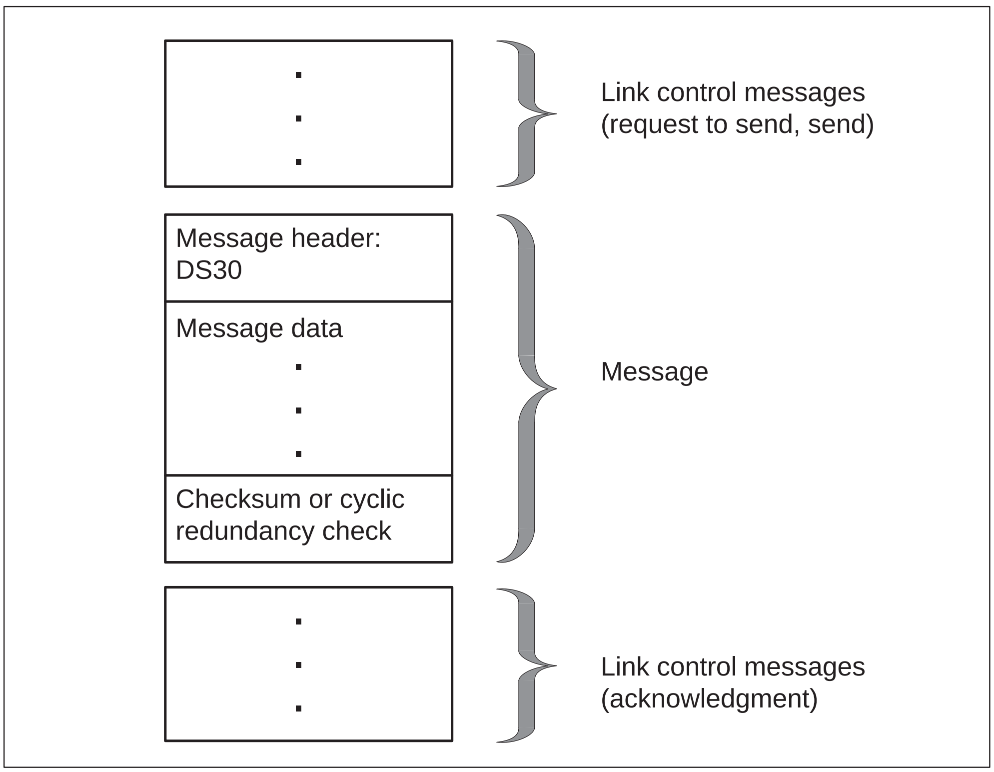
The IDT software communicates with an RDT over an LAPD channel.

DS30 protocol

DS30 protocol is a half-duplex protocol in use on DS30 or DS512 links and includes a message checksum for error detection.

DS30 protocol is a form of handshaking protocol. Handshaking protocol involves message transfer between nodes. This message transfer allows the nodes to inform each other of the present condition of the nodes. This transfer refers to messaging. The next figure displays a general form of handshaking protocol.

Handshaking protocol



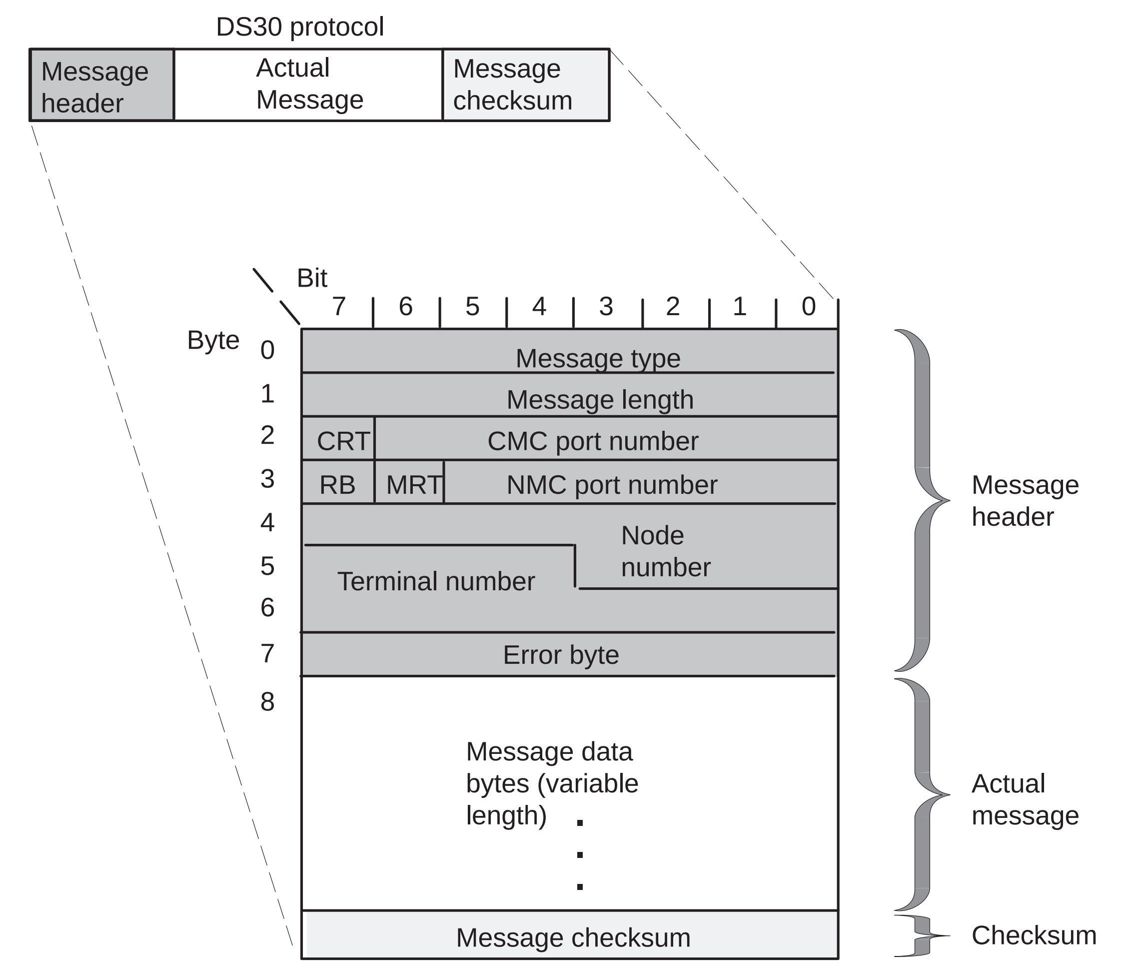
Message time-out, message checksum, or CRC calculation performs message error detection. In the event of protocol, checksum, or CRC failure on an outgoing message, the sending node tries the send sequence again.

On an incoming message failure, the sending node routes the message again over an alternate control side (C-side) link. Hardware redundancies provide a minimum of one other path to and from a node.

The DS30 message is transmitted over a link, with link control messages that come before and after the message. Software understands that messaging occurs between programs that perform in the SMA and programs perform in the CM. Many software tasks or processes communicate with other tasks or processes with messages over the DS30 links.

The format of DS30 messages appears in the next figure.

DS30 message format



CRT = Preferred message switch (MS) (0 or 1)
MRT = Preferred network module (NM) plane
RB = Reroute inhibit flag
CMC = MS port number
NMC = Network module controller

The following DS30 message header is the first eight bytes:

- The first byte specifies the message type:
  - control is one byte long
  - start of message (SOM), for data
- The second byte specifies the total number of bytes in the message.
- The next two bytes specify the route and contain the following fields:
  - CRT specifies the preferred message switch (0 or 1)
  - MRT specifies the preferred network plane

  The CRT and MRT fields are for incoming messages and are set to zero for outgoing messages.
- The next three bytes contain the terminal identifier (TID). The TID identifies the destination node and terminal number for outgoing messages. These bytes also identify the origination node and terminal number for incoming messages.
- The last byte is the message checksum byte field contains a checksum over all bytes in the message. The last byte detects transmission errors.

The number of bytes in the actual message or data can vary.

ADSI protocol

Analog Display Services Interface (ADSI) permits application software to download softkey information to customer premise equipment (CPE). The ADSI provides bi-directional communication between the DMS SuperNode switch and a CPE. To support these abilities, the system requires ADSI protocol. The ADSI protocol uses standard dual-tone multifrequency (DTMF) signaling and standard modem based technology for transmission of caller_id information from a DMS SuperNode switch to a CPE.

The SMA action in ADSI protocol is to act as a message transfer agent between CM and the CMR circuit card. The group of the SMA and CMR act as an interface between CM application software and an ADSI compatible CPE. A message sent to the SMA to support ADSI is forwarded to the CMR. The CMR forwards the correct information to the CPE. The features that use the ADSI protocol are:

- visual screen list editing (VSLE)
- call logging
- Deluxe Spontaneous Call Waiting Identification (DSCWID)

To support the ADSI protocol the DMS SuperNode switch supports the following interfaces:

- the off-hook interface and protocol defined in TR-NWT-000030 (TR-30)
- the ADSI interface and protocol defined in TR-NWT-001273 (TR-1273)

TR-1273 divides the ADSI protocol into three layers: physical, data link and message layers.

Physical layer

The physical layer transmits the bit streams between the DMS switch and the CPE. The DMS Supernode switch must generate a voice band CPE alerting signal and receive standard DTMF signals from the ADSI CPE.

Data link layer

The data link layer provides data transmission between a DMS SuperNode switch and the CPE. This layer also checks for error detection and correction.

Message layer

The message layer controls the character set and data codes when data appears on the CPE.

Call processing

The SMA system performs call processing through Q.921, Q.931, and DS30 protocols and CSC message signaling or TR-303 hybrid signaling.

Call processing can originate from the RDT or from distant subscribers whose calls complete on an RDT that connects from the SMA. In both occurrences, the SMA provides the translation between the Q.931 generic-based messages of the RDT and the DS30 message format the host understands.

Call processing (RDT to IDT)

The call processing description that follows traces the call from the RDT to the DMS SuperNode switch through the IDT. The description is based on POTS/COIN calls. The ISDN calls can be different.

Time slot request

When the originating subscriber goes off-hook, the action causes a loop closure. Current flows in the loop that exceeds a set threshold. The RDT line card detects this current. Coin calls made from coin first equipment have loop closure after the caller deposits a coin.

The RDT uses the CSC message channel to send a setup message to the IDT. The call state is call-initiated. This message contains the call reference and bearer ability associated with the subscriber line that becomes off-hook.

After the RDT sends the setup message, the RDT sets a timer. The RDT waits for a setup acknowledge or a release-complete message from the the IDT. When a response does not occur in the specified time lapse, the RDT transmits a setup message again. When a response does not occur after the second transmission, the RDT sets a delay timer. The RDT and continues to transmit setups until the IDT responds or the subscriber goes on-hook.

Channel selection

The IDT reserves an available channel for the call and sends this information to the RDT in the setup acknowledge message.

When IDT sends the setup acknowledge message, the IDT connects the call to the allocated channel. When the RDT receives the setup acknowledge message, the IDT connects the allocated channel to the line termination of the originating call.

When the IDT establishes a connection, the IDTsends dial tone over the connected channel. The call is now in an overlap sending state.

When channels are not available, the IDT sends a release complete message to the RDT with the reason the cause information element specifies. The IDT returns the call to a null state.

Sending addressing information Two methods can collect digits. The subscriber loop can use dial pulse or dual-tone multifrequency dialing (DTMF). This condition determines the method of digit collection.

- When the RDT receives dial pulse input, the RDT sends an information message to the IDT with this address information. This event occurs with keypad facility information elements.
- When the RDT receives DTMF input, the RDT sends the information to the IDT in-band. The IDT in-band reads this information by the universal tone receiver.

The RDT forwards the addressing information to the CM in the DMS SuperNode switch.

Tone generation

The CM receives the addressing information and determines the address is a valid number. The CM attempts to begin a channel for the call through the network. When the CM begins a channel through the network, the IDT sends a connect message to the RDT. The call is in an active state.

When the CM determines the addressing information is from a toll or coin line, the IDT sends a notify message to the RDT. The notification indication information element is encoded as reverse battery to indicate toll diversion. When the RDT receives this message, the RDT sends reverse battery on the subscriber line.

The CM determines the addressing information is invalid, or cannot establish a connection through the network. The channel remains open to allow the DMS SuperNode switch to provide in-band call progress information to the subscriber. A reorder tone is an example of in-band call progress information.

The message and tones card in the SMA generate dial tone. The time switch card switches the tone under directions from the enhanced ISDN signaling pre-processor (EISP) card onto the correct DS-1 channel. When the called line is busy, the message and tones card generates a busy tone. This tone is sent to the originating party. Originating subscribers can receive other treatments, like reorder tone and announcements. These other treatments depend on conditions present when the caller places the call.

Call disconnection

The IDT and RDT monitor the call for new messages. If the IDT and RDT disable the flash, an end goes on-hook without flash detection for a minimum of 250 ms. The far end receives a disconnect message. This disconnect message allows the release of the time slot and call reference. With flash allowed, the on-hook signaling bit pattern must persist for a minimum of 1200 ms. The pattern must wait for the IDT or RDT to send a disconnect message. At the same time, a timer is set at the disconnect-message end. When the IDT starts call clearing, the state of the call becomes a disconnect indication state. When the RDT starts call clearing, the state of the call becomes disconnect request.

In response to this message, the far end sends a release message that indicates the time slot and call reference are released. A timer is set at release-message end. When the reception of the release message occurs, the disconnect-message end timer is cancelled. A release complete message is sent to the other end to indicate the time slot and the call reference are released.

When a release message is not received before the disconnect-message end timer expires, the end that sends the disconnect message sends a release message. The end sets a timer. When a release complete message is not received before the new timer release-message end expires, the end sends a second release. The timer starts again. When a response to the second release does not occur, the call reference and time slot are released.

Flash detection

When flash is allowed and an off-hook subscriber goes on-hook for a minimum of 250 ms followed by off-hook, the event is a glitch. The call connection remains. The system treats the following sequence as a flash. The subscriber goes on-hook for 250 ms or 360 ms and goes off-hook before 1200 ms expire. 1200 ms from the time the subscriber first goes on-hook, a flash occurs.

A flash is detected on lines that use dial pulse and DTMF at the RDT and encoded into an information message. This message uses the keypad facility information element. The information message is sent to the IDT and processed when the call is in an active state.

When the caller subscribes to call transfer or to three-way calling, the RDT sends the same information message. The RDT sends the message when a flash is detected. The RDT places the call in an overlap sending state to allow for additional digit collection. The message exchange to arrange the second call is the same as to arrange for an end-to-end call. After the second party answers the call and the IDT receives a second flash information message, the call is transferred or bridged.

A flash can be detected in the overlap sending state when a subscriber activates features. These features do not require a caller to place a call, like call forward.

Busy service of subscriber lines

The CM can direct the SMA to busy a subscriber line. This action prevents call processing on the subscriber line and the action normally occurs during maintenance. An example of this maintenance is when the user enters a MAP command from the LTP level to test a line.

Call processing (IDT to RDT)

The call processing description that follows traces the call from the DMS SuperNode switch through the IDT to the RDT. The description is based on POTS/COIN calls. ISDN calls can be different.

Time slot request

The IDT uses the CSC message channel to send a setup message to the RDT. The call is in a call present state. The setup message contains the call reference and bearer capability associated with the subscriber line that originates the call. The setup message also includes channel identification and can include the signal information element.

When the IDT sends the setup message, the IDT sets a timer. The IDT waits for a call that proceeds, alerts or releases a complete message from the RDT. When a response does not occur in the specified time lapse, the setup message is transmitted again. When a response does not occur after the second transmission, the IDT releases the call reference and channel. The IDT sends a release complete message to the RDT with the reason the cause information element specifies. The IDT returns the call to a null state.

Network busy call treatment

When the network is busy, the message and tone card in the SMA generates a reorder tone to the originating party.

Channel selection

In the setup message, the IDT indicates the channel for call connection with the use of the channel identification information element. When the channel is not available, the RDT sends a release complete message back to the IDT.

When the channel is available, the RDT replies with an alerting message or connect message that contains a channel indication information element. The channel indication information element confirms the channel the IDT reserves for the call.

When the called line is busy, the message and tone card in the SMA generates a busy tone. This tone is sent to the originating party.

Alerting

When the setup message received at the RDT is sent with alerting information encoded into the signal information element, the alerting message is sent back to the IDT. An alerting message indicates the called party is alerted. The call is in the call received state. When a called line is ringing, the originator receives a ringback tone.

The SMA supports the single-party alert cadence. Ringing capabilities include single-party 20 Hz ringing and distinctive ringing for Meridian Digital Centrex (MDC).

The following table identifies the ringing cadences the SMA supports.

SMA-supported ringing cadences

	Ringing cadences (in seconds)					
Ring types	**On**	**Off**	**On**	**Off**	**On**	**Off**
single party	2.0	4.0				
distinctive 1	1.5	4.5				
distinctive 2	1.5	.5	1.5	1.5		
distinctive 3	1.5	.5	.5	3.5		
distinctive 4	1.5	.5	.5	.5	.5	2.5
distinctive 5	1.5	.5	.5	.5	1.0	2.0
distinctive 6	1.0	.5	1.0	3.5		
distinctive 7	.5	.5	.5	.5	1.0	3.0
distinctive 8	.5	.5	1.0	.5	.5	3.0

When the called subscriber goes off-hook, the RDT detects the change in the line current and sends a connect message to the IDT. This action trips the ringing. The call is now in a call active state.

On-hook transmission

On-hook transmission allows the network to transmit information like calling number delivery (CND) to the called subscriber. Calling number delivery is an example of an on-hook transmission service that coincides with a terminating call. Other on-hook transmission services, like message delivery, do not coincide with call terminations.

Custom local area signaling service (CLASS) calling number delivery (CND) When a setup message is received, the RDT responds with an alerting message. The call is in the call received state. The RDT delivers the calling number during the first silent ring cycle.

When the called subscriber goes off-hook, the RDT detects the change in the line current and sends a connect message to the IDT. This action trips the ringing. The call is now in a call active state.

Loss padding

Padding of pulse code modulation (PCM) samples take place in the ring/pad card. These samples are introduced to compensate for expected signal loss through the network. The CM directs the SMA to apply padding to specified lines. The ring/pad card in the SMA provides the padding and the enhanced time switch circuit card under NTAX74AA cellular access processor (CAP) circuit card direction, and introduces the padding on appropriate channels.

Call disconnection

The IDT and RDT monitor the call for new messages. When IDT and RDT disable the flash and an end goes on-hook for a minimum of 250 ms, the far end receives a disconnect message. This message allows the release of the time slot and call reference.

With flash allowed, the on-hook signaling bit pattern must continue for a minimum of 1200 ms. This pattern must continue for the IDT or RDT to send a disconnect message. At the same time, a timer is set at the disconnect-message end. When the IDT starts call clearing, the call state becomes a disconnect indication state. When the RDT starts call clearing, the call state becomes a disconnect request.

In response to this message, the far end sends a release message that indicates the time slot and call reference are released. A timer is at the release-message end. When the release message is received, the disconnect-message end timer is cancelled. The other end receives a release complete message. This release complete message indicates that time slot and the call reference are released for future use.

When a release message is not received before the disconnect-message end timer expires, the end that sent the disconnect message sends a release message. This end sets a timer. When a release complete message is not received before this new timer release-message end expires, the far end sends a second release. The timer is started again. When a response to the second release does not occur, the call reference and time slot are released.

Flash detection

With flash allowed and an off-hook subscriber goes on-hook for a minimum of 250 ms, followed by off-hook, the event is treated as a glitch. The call connection remains. When the subscriber goes on-hook for a minimum of 360 ms and goes off-hook before 1200 ms expire, the system treats the sequence as a flash.

The system detects a flash on lines that use dial pulse and DTMF. The IDT processes when the call remains in an active state.

When the caller subscribes to call transfer or to three-way calling, the system places the call in an overlap sending state. This state allows for additional digit collection. The message exchange to set up the second call is the same as the setup of an end-to-end call. The second party answers the call and the IDT receives a second flash. The call is transferred or bridged.

Busy service of subscriber lines

The CM can direct the SMA to have an RDT busy a subscriber line. This action prevents call processing on the subscriber line and is performed during maintenance. An example of this maintenance is when a user enters a MAP command from the LTP level to test a line.

Call processing coin operation

Coin commands

The following commands are used:

- coin collect
- coin return
- coin presence
- coin partial presence (used in local coin overtime)

Coin collect This command directs a coin first (CCF) or coin dial tone first (CDF) telephone to collect coins deposited for a telephone call. When the user deposits the coins, the coins go to the hopper. The hopper stores coins before coin collect or coin return. When the hopper receives a coin collect command, the coins drop from the hopper into the coin vault.

On coin telephones that require a flat rate, the coins are collected when the call completes. On coin telephones that connect to a switching system that supports local coin overtime (LCO), the system collects coins every few minutes.

Coin return The user deposits the coins. The calling party goes off-hook on a coin telephone before the end party answers. A coin return command directs the coin telephone to return the deposited coins.

When channel reassignment occurs and the system cannot reassign the call, the system drops the call for a higher priority call. If the system cannot connect a call because all channels are busy, the system sends a coin return message.

Coin presence This command directs CDF telephones to check for an initial deposit or stuck coins. This command also allows CCF telephones to check for stuck coins.

An operator monitors the tones the telephone generates to process long distance calls on CCF and CDF telephones. The system processes monitored tones according to coins deposited.

Coin partial presence This command occurs with CCF and CDF telephones that support LCO. The coin partial presence test checks for coins deposited after the first deposit.

Battery commands

In addition to the coin commands, the CM can send or instruct the RDT to send reverse battery and normal battery.

Reverse battery All types of coin telephones use this command. This command prevents communication between the calling and called parties. This command also performs the following:

- resets the telephone totalizer, an electromechanical device that totals initial rate deposits
- prepares a telephone station for calls
- signals coin denominations to the operator

Normal battery This command allows the talking state. Some CDF and CCF telephones use this command to set the totalizer again.

Subscriber line signaling

When in-band tone multifrequencyanalog signaling is in use on the subscriber lines that connects the RDT, the SMA transports these coin commands.

Changes to the electrical condition on the loop, metallic signaling, can make the signaling on the subscriber lines that connect the RDT. When this condition occurs, the IDT must translate these coin commands into notify messages that contain the notification indicator information element.

When the RDT receives the notify messages from the IDT, the RDT applies voltages or opens to the tip and ring of the line. These electrical signals applied to the tips and rings of coin telephones lines cause the coin station to initiate actions. Examples of this action includes the return of a deposit to a station user or collection of a deposit.

Coin operation limits and interactions The following limits apply to coin functions. Coin telephone calls, like all calls, cannot be initiated during a warm switch of activity (SWACT) or call processing (CP) switchover. This limit occurs because messaging is inhibited between the SMA and RDT.

Note 1: When a DS-1 link fails, the system causes channel reassignment. A coin line call occupies a channel on the failed link and cannot be reassigned. The SMA sends a coin return message to the RDT. The telephone station user receives coins deposited earlier.

Note 2: When a warm SWACT occurs, a call that includes a coin call when the caller starts communication cannot be added to the records of the new active unit. The call is dropped. Money deposited earlier returns to the telephone station user after the caller starts again and goes off-hook.

SMA service capabilities

A description of the services the SMA supports appears in this section. Switched services end on the SMA. Tandem DS-1 links at the RDT direct non-switched and switched services that are not local.

Plain ordinary telephone service (POTS)

The SMA supports plain ordinary telephone service (POTS) single-party flat rate and single party multi-rate.

Coin operation service

The SMA supports the following three types of coin calls:

- coin first (CCF)
- coin dial-tone first (CDF)
- coin semi-postpay (CSP)

Coin first

Coin first (CCF) service requires the pay station telephones to be off-hook. The caller must deposit the coin before the DMS SuperNode switch supplies the station dial tone.

For CCF telephones, the user must deposit correct coins before the RDT detects the off-hook.

The IDT sends a notify message with timed positive coin check information encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to check for the first coin deposit.

The IDT sends a notify message with ground start mode information encoded in the notification indicator information element to the RDT. When the RDT receives this message, the RDT sends reverse battery. The RDT sends the battery on the line that causes the coin station to home the coin station totalizer. The coin station reports the coins collected.

When the caller deposits the correct coins, the RDT sends the IDT a notify message. The message contains coin ground information in the notification indicator information element. This information informs the CM that the user deposited a coin.

The IDT sends an information message with negative ring information encoded in the signal information element to the RDT. This message allows the calling party in the coin station to receive ring-back. When the called party is on the telephone, the IDT sends a disconnect message. An information message to allow ring-back follows this message.

When the call is a toll free number, the IDT sends a notify message with timed negative coin control information. The information is encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to return the coins deposited earlier.

For toll calls, additional coin functions do not occur until the CCF line goes on-hook. When the caller completes the call, the IDT sends a notify message with timed positive coin control information. The information is encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to collect coins.

Coin dial-tone first

For CDF service, the DMS SuperNode switch supplies dial tone when an off-hook condition occurs at the station. The call fails to go through unless the calling party deposits the appropriate amount of coin when the caller finishes dialing.

When a caller calls from a CDF telephone, the CM requests information about a coin deposit. The IDT sends a notify message that contains a coin presence request in the notification indicator information element. When the caller deposits the coin, the RDT sends the IDT a notify message. The message contains coin ground information in the notification indicator information element to respond to the request. This information informs the CM that the caller desposited a coin.

When the call is made to a toll free number, the IDT sends a notify message with timed negative coin control information. The information is encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to return the coins the user deposited.

When the caller completes the call, the IDT sends a notify message with timed positive coin control information. The information is encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to collect coins.

Coin semi-postpay

For coin semi-postpay (CSP) service, the DMS SuperNode switch provides dial tone and allows dialing and connects the station caller with the called party. The DMS SuperNode prevents conversation until the caller deposits coins.

The IDT sends a notify message with positive loop mode information encoded in the notification indicator information element to the RDT. When the RDT receives this message, the RDT sends reverse battery. The RDT sends the battery on the line that causes the coin station to home the coin station totalizer. The coin station reports on the coins collected.

The CSP lines do not use coin collect, coin return or coin presence tests. CSP lines use reverse battery. Reverse battery allows the caller to hear the end party. The end party cannot hear the caller.

When the caller deposits the correct coins, the system applies the normal battery to allow the caller to hear the called party.

When the switch establishes a channel, the switch sends dial tone and collects digits. The CM of the DMS SuperNode switch sends commands to the RDT to regulate and monitor the collection of coins.

Coin call functionality

Several coin call messages are used when processing coin calls from CCF, CDF and CSP telephones. The CCF telephones use ground start and CDF and CSP (applies to S/DMS AccessNode only) use loop start. Ground start and loop start messages are described as follows:

- Ground start telephones require an initial deposit before dial tone is provided.
- Loop start telephones let the caller receive dial tone without an first deposit. A deposit is not required. The loop start telephones let the caller dial special help calls (n11 calls, like 911 and 411), inward wide area telephone service (INWATS) and operator help calls without charge. CCF telephones make these calls without charge, and first the caller must deposit a coin. The caller makes the call and the system returns the coin.

Custom calling features for Meridian business sets (MBS)

The SMA-S/DMS AccessNode subsystem provides the following custom calling services for Meridian Business Set (MBS):

- Speed Calling
- Call Waiting
- Three-way Calling
- Directory Numbers (DN)
- Automatic Answer Back
- Automatic Dial
- Automatic Line
- Busy Override
- Call Back Queuing
- Call Park
- Call Pickup
- End-to-End Signaling
- Group Intercom
- Individual Business Line
- Intercom
- Listen on Hold
- Make Set Busy
- Malicious Call Hold
- Multiple Appearance DN
- On-Hook Dialing
- Privacy Release
- Ring Again
- Three-Port Conference
- Thirty-Port Conference
- Called Number Display
- Calling Number Display
- Query Time Key
- Display Key
- Call Forwarding

Message waiting indicator

The message waiting indicator allows subscribers to have several messages stored against a station in the DMS SuperNode switch or at a message center. When a message is queued against the subscriber station, the message waiting indicator is activated.

Message waiting lamp

The message waiting lamp feature, available on S/DMS AccessNode, indicates that action is required to respond to a request by another station. The request can be message waiting or call request. To activate the message waiting lamp, the IDT delivers a notify message with the notification indicator element. The message is encoded to Turn On Lamp to the RDT. To deactivate the message waiting lamp, the IDT delivers a notify message with the notification indicator element. The message is encoded to Turn Off Lamp to the RDT.

Meridian business set messaging

The MBS is a Nortel (Northern Telecom) product normally connected to a line concentrating module (LCM). The DMS SuperNode switch and MBS use proprietary protocol when the switch and MBS communicate.

The CSC uses the protocol in which messages are not proprietary and are denoted by a #4F (hex) and different message types. To allow proprietary communication over the CSC for an MBS, a different protocol discriminator, #FA, is used. When a message is designated as proprietary, the message type indicates the type of service offered. The message type for an MBS is #7F.

The SMA uses this proprietary protocol discriminator and message type to support the same MBS communication. The same MBS communication is in use when the MBS is configured off an LCM. The MBS supports the same feature set.

Universal tone receiver services

A universal tone receiver (UTR) circuit card (NT6X92BB) or global tone receiver (GTR) circuit card (NT6X92EA) must be provisioned in slot 15 in the SMA. The UTR card provides a dedicated channel for digit collection during call setup. This channel unloads the network for a part of call setup responsibility. Enter datafill for the UTR card in Table LTCINV to activate the UTR feature on the SMA. Refer to the *XPM Translations Reference Manual* for additional information.

Direct Outward Dial (DOD)

A feature that allows the private branch exchange (PBX) or Centrex station user to access the exchange network without attendant help.

Custom local area signaling service

The SMA subsystem supports CLASS features when the subsystem provisions anoptional CMR card. The calling number delivery (CND) is a CLASS feature that gives single-party subscribers and Meridian Digital Centrex (MDC) customers the ability to receive the incoming calling party number, time and date of call on the customer premises equipment (CPE).

When the operating company requires that lines off the RDT have CND, the company must observe the following requirements:

- The SMA subsystem provisions the CMR card (NT6X78AB) in the SMA. This card transmits the CND data.
- Enter datafill for the CMR card in Table LTCINV. Refer to the *Translations Reference Manual* for additional information.

Meridian Digital Centrex (MDC) features on 500/2500 sets and attendant consoles

The SMA configuration supports current MDC features. The SMA does not support trunks. The MDC features that require trunks cannot end on the SMA.

The SMA supports Meridian Feature Transparency (MFT) meets the needs of MBS users that use ISDN loop technology. The users do not want to remove some MDC features that the ISDN BRA terminals can offer.

Multiple appearance directory number (MADN) feature

The SMA supports the multiple appearance directory number (MADN) feature. The MADN feature associates a single directory number to a group of line appearances in a customer group. The following MADN procedures are possible:

- Multiple call arrangement (MCA) allows each group member to be active with different group members.
- Single call arrangement (SCA) allows one active group member at a time.
- Multi-bridged arrangement(MBA) allows one active call in a group at a one time. The MBA allows other group members to join the call.
- Single bridged arrangement (SBA) allows the arrangement of one call with an external party. The SBA allows one other member to join the call.

- Extension bridging (EXB) allows the arrangement of one three-way conference call with an external party. The EXB allows other group members to join the call for a three-way conference call.

MADN members provisioning The following table provides the MADN members provisioning rules for the SMA2 with an S/DMS AccessNode or AccessNode Express.

SMA2 to S/DMS AccessNode/AccessNode Express MADN members provisioning rules

Parameter	Value	Meaning
Switch average members for each MADN group	4	The engineering guideline for the total number of MADN members or total number of MADN groups on a DMS SuperNode switch.
Maximum number MADN members/group assigned for each S/DMS AccessNode/AccessNode Express	16	The engineering limit for the maximum number of MADN members in a single MADN group on an AccessNode/AccessNode Express shelf
Maximum number MADN members/group assigned for each S/DMS AccessNode/AccessNode Express	16	The limit for how many MADN members in a single group that a group on an AccessNode/AccessNode Express can have assigned.
Maximum number MADN members/group assigned for each SMA2	16	This parameter is an engineering guideline. This guideline specifies the maximum number of members in a single MADN group that are lines off one or more AccessNode/AccessNode Express on the same SMA2.
Maximum number MADN members/group assigned for each group	32	This parameter is the member limit that any single MADN group can have assigned.

Note 1: Enter the maximum number of MADN members assigned for each group in table OFCENG in field MAX_MADN_MEMBERS_PER_LSG.
Note 2: For information about the traffic capacity of the AccessNode/AccessNode Express, please refer to *Traffic and Bandwidth Engineering Information*, 323-3001-152, chapter “Traffic engineering software tool.”

Off-premise extension (bridged service)

The SMA configuration supports a connection between a remote extension station to a main station line that uses the MADN feature.

Private branch exchange (PBX) central office access

The SMA configuration supports connection of PBX to a central office that serves the PBX location. A station can receive calls through the attendant that directs the call to a station.

The station user can originate calls outside the PBX when:

- the station user accesses the attendant that connects the station to an access line.
- the station user bypasses the attendant and dial an outside number with the direct outward dial (DOD) facility, when permitted.

Residential services

The SMA supports residential services that include features normally available with POTS and additional line features earlier available on MDC lines. The services include the essential line (ELN) services feature.

Secretarial line

The SMA supports secretarial lines. A secretarial line provides an answering service when the called party is not available to take calls. Called party lines are bridged to the secretarial line.

Teen service

The SMA supports teen service. Teen service provides multiple directory numbers, each with distinctive ringing patterns, for the same line.

Toll diversion

The SMA supports toll diversion. Toll diversion is a service that permits a PBX to block some station-to-station calls beyond a limited area.

Wide area telecommunications services

The SMA supports wide area telecommunications services (WATS). The WATS allows a measured number of toll calls in a specified geographical area to be charged to a subscriber at a fixed monthly rate. The WATS lines can provide incoming service (INWATS), outgoing service (OUTWATS) or both incoming and outgoing service (two-way WATS).

800 service

The SMA configuration supports 800 services. With 800 services, the called party subscribes to the service and pays for the toll calls made to a specified number. Enhanced 800 service switching point (SSP) services are also supported in offices configured with SSP.

ISDN services

An integrated services digital network (ISDN) provides voice and data services through one or more NTBX02BA enhanced D-channel handler (EDCH) circuit cards. The ISDN also provides services through an NTBX01AC enhanced ISDN signaling pre-processor (EISP) circuit card.

ISDN voice services include the following:

- POTS
- electronic key telephone service (EKTS)
- direct outward dial (DOD)
- network class of service
- call forwarding
- call pickup
- automatic callback (ring again)
- call hold and additional call offering (call waiting)
- flexible calling
- hunt groups
- calling-line id
- busy override
- authorization codes

ISDN data services include the following:

- circuit-switched data
- packet-switched data

Note: The SMA does not support digital trunking or primary rate access (PRA)

Ringing

The SMA supports the following ringing:

- single party (DMS Ring Code 0; TR-303 Code 40)
- distinct, for MDC (DMS Ring Codes 1–8; TR-303 Code 42, 44, and 71–76)
- multiparty fully selective
- coded
- superimposed

- teen
- revertive
- immediate

Dialing

The following dialing codes are interpreted:

- dial pulse
- dual-tone multifrequency dialing (DTMF)

Tones

The following tones are available:

- dial tone
- receiver off-hook
- audible ringback
- reorder
- busy

SMA line card support

The SMA supports the following S/DMS AccessNode line cards:

- Omega Service Adaptive (SAA) software-controlled line card use many services the subscriber switches. The SAA allows flow-through provisioning of AccessNode RFT lines that are locally switched by SERVORD.
- Epsilon Line Card is a less expensive alternative for users that do not require the functionality the Omega card provides. This card is not service adaptive. This card supports Loop Start Residential Services and excludes message waiting lamp notification.

Deluxe Spontaneous Call Waiting Identification

Deluxe Spontaneous Call Waiting Identification (DSCWID) provides an interface to CPEs compliant with Bellcore specification TR-416. The DSCWID is a CLASS feature that allows a subscriber to:

- receive caller identification (CID) information from call waiting when the subscriber is off-hook:
- control the condition of incoming calls when an off-hook stable call is present

Bellcore TR-416 describes the requirements for DSCWID and specifies how this feature interfaces with an:

- ADSI set—a screen-based ADSI CPE that can display options.
- SCWID set—a non-ADSI CPE that can deliver CID data.
- 2500 set—a non-ADSI CPE that can signal DTMF and cannot deliver CID data off-hook.

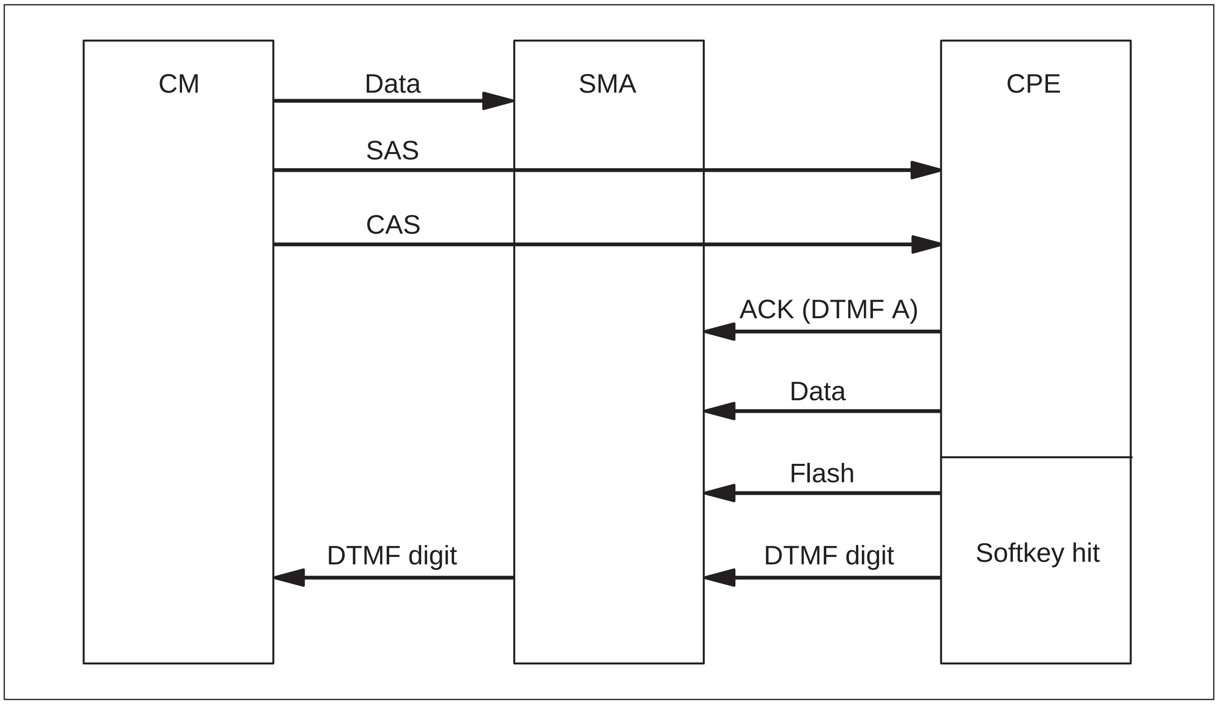
The DSCWID feature needs the NT6X78AB, the NT6X69AD and the NT6X92BB cards. The feature needs these cards in the SMA to comply with ADSI protocol to support the DSCWID feature. The ADSI protocol supports CLASS features that provide display information like DSCWID, to subscribers with ADSI-compatible CPE following circuit cards. The cards function as follows:

- The NT6X92BB UTR card identifies and processes tones for channels on the parallel speech bus.
- The NT6X78 CLASS modem resource (CMR) card supports CND and other CLASS services. The CMR card provides the ADSI protocol to transmit CLASS data between the CC and ADSI compliant CPE.
- The NT6X69AD tone ROM card contains the ADSI tone as defined in TR-30.

The CM alert sends tones to the DSCWID subscriber of a pending call. The CM alert also sends tones to alert the CPE of pending caller data. A line with the DSCWID option has a call and a second call attempts to terminate to that line. The CM provides one of two types of alerting signals or tones. A subscriber alerting signal (SAS) or a SAS followed by a CPE alerting signal (CAS). The SAS is the tone the subscriber recognizes as the call waiting tone (CWT). The CAS alerts the CPE of incoming data when the subscriber line also has the CID feature.

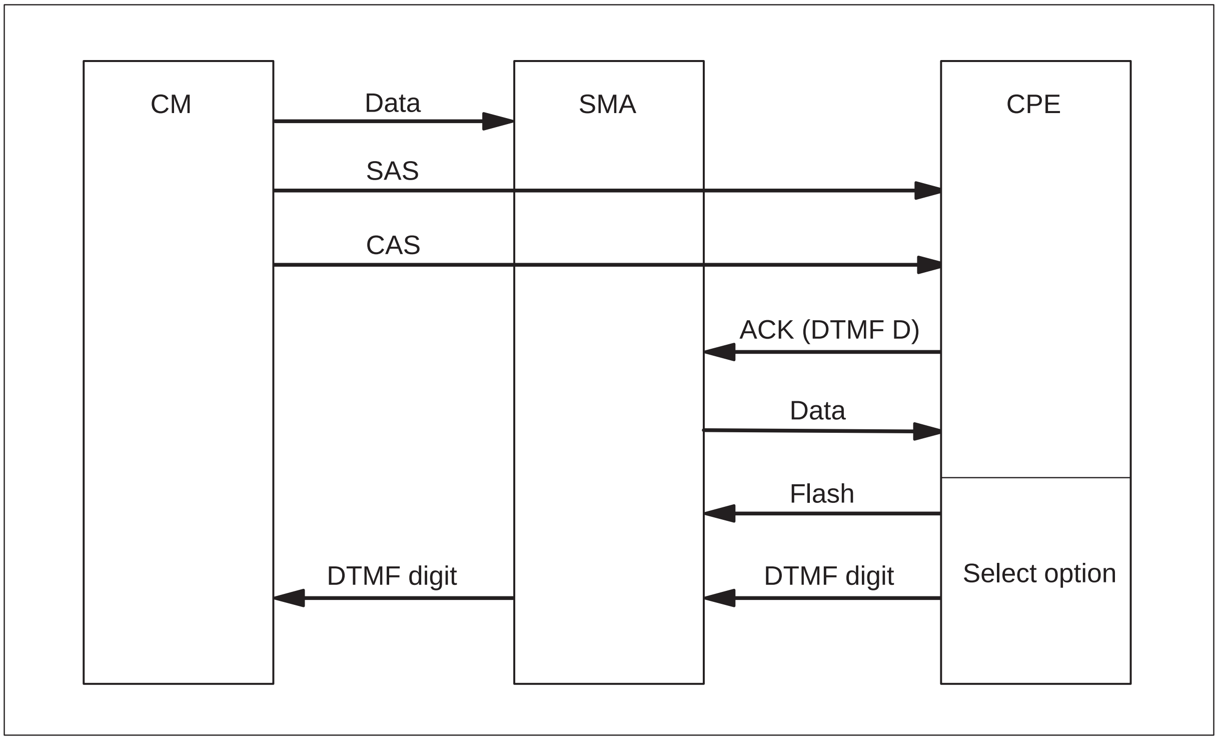
In response to alerting tones, the DSCWID CPE generates an acknowledgment (ACK) tone. The ACK tone indicates the tone is ready to receive DSCWID data. The ACK tone is collected on the UTR circuit card in the SMA. When the CPE is ADSI-compatible, a DTMF A ACK signal is sent in response to the CAS. The following figure indicates examples of responses from an ADSI-compatible set.

Example of a DSCWID call on an ADSI set

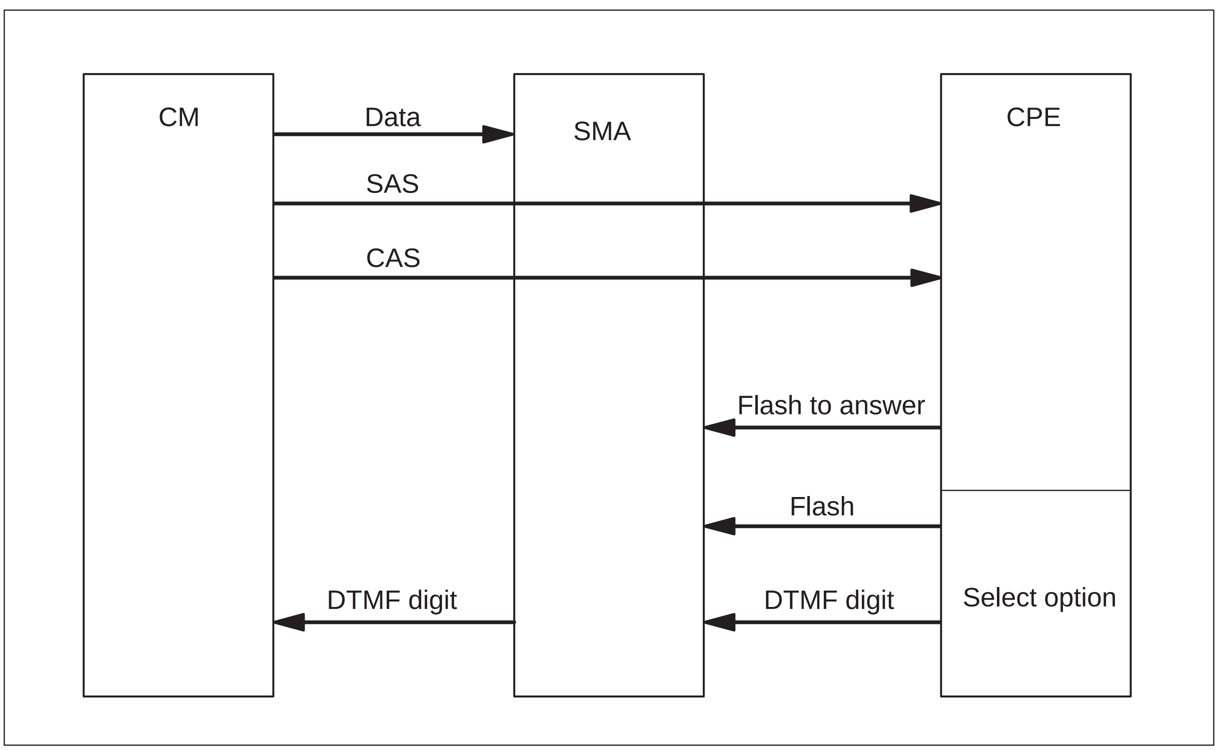


When the CPE is a SCWID CPE, the CPE sends a DTMF D ACK signal in response to the CAS. When alerting tones are sent, the subscriber can control condition of the incoming call. The subscriber responds with the CPE softkeys when the CPE is ADSI. The subscriber can also respond with hard-coded keys when the CPE is a SCWID or a 2500 set. When the CPE does not respond with an acknowledgment tone, the event is treated as a 2500 set. The following figures indicate examples of responses from a SCWID set and a 2500 set.

Example of a DSCWID call on a SCWID set



Example of a DSCWID call on a 2500 set



Alerting signals are sent to the CPE even when a UTR channel is not available. When UTR channels are not available, data is not sent to the CPE. For Bellcore compliance, the DMS SuperNode switch must provide options when a flash is detected and the DMS SuperNode cannot attach a UTR. The SMA sends a flash to the CM if the SMA cannot attach a UTR in 400 ms to comply with this requirement. When the first notification of an incoming call is not acknowledged in 10 s, a second alerting signal is sent. If UTR channels are not available, the system does not send display data to the CPE. The data is held and sent again when another alerting signal is sent.

After the SMA receives a flash signal from the customer ADSI-compatible CPE, the SMA starts a T-tone timer. The T-tone timer times for the maximum amount of time allowed between the SMA that sends a flash and the DTMF digit on an ADSI set. The timeout is 600 ms. The speech path is muted during the timeout. The T-tone timer is started for the initial option selection during a DSCWID call. The CPE type does not affect the T-tone timer. Any following ADSI DSCWID option selections start the T-tone timer.

Any following DSCWID option selections on a SCWID or 2500 set use a T-flash timer. The use of a T-flash timer occurs after the user answers a call on SCWID and 2500 sets. The timer provides the customer with enough time to select an option after a flash. The SCWID or 2500 sets use the T-flash timer because a subscriber cannot flash and dial a DTMF digit in 600 ms.

The operating company can set the T-flash timer from 1 to 8 s. The default is 1.5 s. The SMA starts the T-flash timer when the NONADSI field in Table DSCWDTYP is Y. The SMA also starts the timer when the SMA receives a flash signal from a customer’s SCWID or 2500 set. This flash occurs during the held or conference call state. The SMA must note the DSCWID call state and the type of CPE. The timer in use depends on this information. The SMA applies the RETURN option when the SMA cannot attach a UTR before 400 ms.

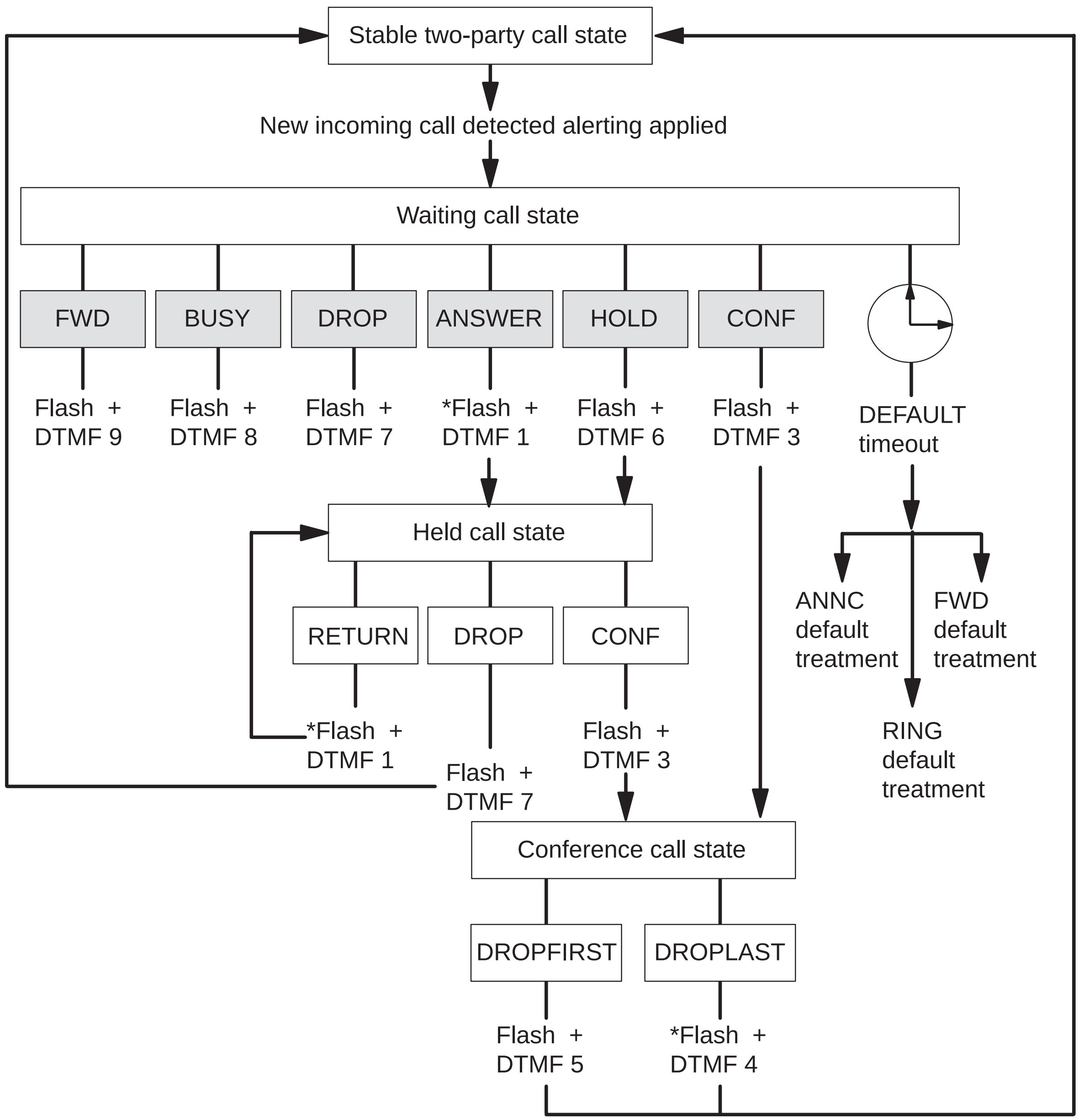
The CM attempts to stay synchronized with the CPE at all times. This close supervision prevents situations that can cause problems for the CM, when the CPE does not perform a normal function. The DMS SuperNode switch does not process the option based on the call state. DSCWID call waiting condition options are:

- answer the new call and put the current call on hold
- disconnect the current call and answer the new call
- forward the new call
- connect the new call to a busy announcement

- put the new call on hold after connecting to a hold announcement
- conference the new call with the current call

The following figure describes the link between the ADSI set conditions.

DSCWID with ADSI set conditions



Note 1: An * indicates a flash can be performed to accomplish the same function as if you send the DTMF code for that digit.

Note 2: If a non-ADSI set is configured for hard-coded keys to perform DSCWID conditions, or the subscriber can provide a DTMF-digit in 600 ms, conditions can be available if NONADSI = Y in Table DSCWDTYP for the given DSCWID type.

Automatic maintenance

Automatic maintenance

The automatic maintenance software for the Subscriber Carrier Module-100 Access (SMA) is like the automatic maintenance software of the line trunk controller (LTC). Maintenance software includes software audits and diagnostics that identify problems in hardware and software. The audits run for the LTC are also run for the SMA. The following sections highlight audit types and the failure conditions these types detect. This section discusses diagnostics later.

The description of automatic maintenance software operations in this chapter refers to the extended peripheral module (XPM) . This chapter uses the name in a generic sense to refer to a peripheral module like the SMA. When XPM appears in this context, SMA is implied.

Parity audit

A parity audit runs as a low priority background task that reads memory locations. If a parity audit finds defective areas, the audit rereads the location. If the reread is defective, the audit tries to write a test pattern to the damaged memory location. A CC acts on a parity audit to correct the memory fault quickly.

Trap recovery

A trap is an error condition that firmware, software or hardware detects. The firmware, software or hardware interrupts a process in progress. The process stops on the instruction that is at fault. When a trap occurs in the XPM, the system performs a test to determine if the system can recover the trap. If the system can recover the trap, the system determines the number of traps that occurred in a specified time period. If the number of traps exceeds the threshold, a trap instruction issues to restart the peripheral. The instruction first checks the number of times the peripheral restarted. If the number of restarts exceeds a restart threshold, the peripheral is reset instead of restarted.

If the system attempts to recover the trap, the trap-handling software loops back through all the software modules. This action makes sure that the system immediately exits each procedure on the return from the called procedure. The trap-handler exits to the highest procedure in the task.

Switch of activity audit

A switch of activity (SWACT) is the process in which the two units of an XPM exchange activity status. This process causes the active unit, which handles call processing, to become the inactive unit. The SWACT audits provide a mechanism in the XPM that increases SWACT reliability. This mechanism prevents a SWACT for a mate unit that cannot maintain activity. If a SWACT occurs and the newly active unit does not establish two-way communication with the central control (CC), another SWACT occurs. The system attempts a SWACT back to the originally active unit. The new mechanism in the XPM that provides this additional SWACT reliability is based on the following audits:

- pre-SWACT audits
  - pre-drop
  - pre-gain
- post-SWACT audits
  - post-gain
  - post-drop

Each audit is present in each unit. In a SWACT, one unit drops activity and the mate unit of a peripheral gains activity. Each audit has a different purpose in the different states of a SWACT. The following sections describe the audits that control a SWACT in the XPM in more detail.

Pre-drop audit

The pre-drop audit accepts a request to drop activity and determines if the mate unit is in a condition to accept activity. This audit runs only in the active XPM unit.

A SWACT of the peripheral initiates from one of two possible sources:

- the CC, in the form of a request to the active unit to drop activity
- the active XPM unit, that causes an autonomous SWACT

To drop activity, the pre-drop audit evaluates the following information:

- source of the request (CC or XPM)
- type of drop request
- known status and history of the currently active unit
- known status and history of the inactive mate unit

For a SWACT that the CC initiates, the SWACT Controller queries the XPM. The SWACT Controller evaluates all SWACT requests. The pre-drop audit in the XPM responds to this query. The XPM informs the CC if the active unit can comply with a request to drop.

Pre-gain audit

The pre-gain audit monitors the XPM status data in the inactive unit. The audit sends this information to the pre-drop audit in the active unit. The pre-drop audit uses this information to determine if the active unit must drop activity. The audit examines the following XPM status data:

- Facility audits. – The XPM records the result of the last run for each diagnostic in the facility audit for a given peripheral.
- Status information contained within the unit. – This information includes if the inactive unit meets the following conditions:
  - — is in service and ready
  - — has CC links OK
  - — does not have corrupt static data
  - — is in sync
  - — is not jammed as the inactive unit

  Note: An inactive unit cannot reach all diagnostic paths. This condition can require a manual SWACT. Perform the manual SWACT with the FORCE option to clear a failure from the pre-gain audit record.

The pre-gain audit continues to monitor and report unit status and condition information while the unit is inactive. The pre-drop audit uses the information from the pre-gain audit to determine that the active unit can drop activity. When this condition occurs, a warm SWACT occurs and the post-gain audit in the newly active unit begins to run.

Post-gain audit

The post-gain audit runs in the newly active unit. The post-gain audit verifies that the unit establishes two-way communication with the CC. If the audit establishes communication, the newly active unit maintains activity. If the communication check fails, the unit forces a drop of activity. The drop of activity initiates a SWACT back to the originally active unit. In this condition, the pre-drop audit allows the SWACT to proceed. If the SWACT back fails, the CC busies and returns to service all of the XPM node.

Post-drop audit

The post-drop audit runs in the newly inactive unit. The newly inactive unit remains in service and does not initialize for a limited time. The post-drop audit cleans the call processing data structures of not stable calls and not synchronized stable calls. If a SWACT back is not needed or a SWACT back is complete, the XPM informs CC. The CC busies and returns to service the inactive unit.

Warm SWACT audit

After the warm SWACT, the newly active unit waits until the cell site controller (CSC) establishes a multiframe state again. The following events occur as part of the warm SWACT audit:

- The unit begins a state mismatch audit for each IDT. This audit compares the IDT TR303 terminal states with the remote digital terminal (RDT) TR303 terminal states.
- The SMA sends a STATUS ENQUIRY message to the RDT for each in-service terminal that is active on the IDT.
- The SMA starts a T322 timer (2 s).
- The RDT must reply to the STATUS ENQUIRY message with a STATUS message. If the T322 timer expires before a STATUS message is received from the RDT, the SMA sends another STATUS ENQUIRY message. The T322 timer starts again. If the T322 timer expires again, a state mismatch occurred and the system takes the call down.
- The SMA sends a RELEASE COMPLETE message to the RDT.
- The system audits all the terminals in the active state (TR303 state 10) in this way. Then the system audits the remaining in-service terminals in the null (0) state.

Path protection switching

Path protection switching is a recovery mechanism for the communication channels of an IDLC system. These channels use the LAPD protocol for links on separate DS-0 channels of a DS-1 link. The purpose of path protection switching is the maintenance of active links for control operations and call processing applications. These links are the CSC and embedded operations channel (EOC).

Two DS-1 links are configured for active and standby capability. Messaging occurs on the active DS-0 channels of control paths. These paths are on the same DS-1 link normally. Path protection switching switches the path activity to the standby DS-0 of a different DS-1.

Operating company personnel or automatic fault detection initiate path protection switching. In both occurrences, the IDT of the LDS, or the RDT may originate a path switch. Logs and alarms notify operating company personnel of path switches. The system also notifies the Internal system interfaces.

The following terms apply to protection switching:

- path—a message channel, which can refer to CSC or EOC messaging.
- active path—the path or channel that is in the active state. The active path carries CSC or EOC messages and messages that protect switching.
- standby path—the path in the standby state. The standby path carries only messages that enable the standby path to become the active channel.
- protection switch—what occurs when the active path changes its state to standby, and the standby changes its state to active path.

The following rules apply for protection switching:

- both ends must be able to detect a failure and initiate a protection switch
- failure on a channel causes protection switching. A switch back to the original active or inactive configuration does not occur when the cause of the failure clears.
- multiple-frame operation keeps a standby path

Logical link configuration

The active EOC and CSC paths have default appearances on separate DS-0s of DS-1, number 1 (at the RDT end). The corresponding protection paths occur on the same DS-0s of DS-1, number *n*. The *n* is configured at the IDT, according to the RDT appearance.

Each of the four DS-0s use the LAPD protocol to accommodate several logical links, that data-link connection identifier (DLCI) addresses differentiate. The DLCI has two parts that consist of the service access point identifier (SAPI) and the terminal equipment identifier (TEI). The CSC uses the SAPI=0 and TEI=0 for the call processing logical link.

The EOC uses SAPI=1 and TEI=4 for IDT RDT operations control. Both the CSC and EOC path types contain a logical link on their DS-0 channels referred to as the path protection link. The path protection link uses SAPI=1 and TEI=0 as its DLCI.

The EOC and CSC applications use the active links for messaging. Path protection switching use both the active and standby DS-0s for path switch messaging. This redundancy permits transfer of control when a blocked active message path exists.

The active paths of the EOC and CSC can be present on DS-1 number 1, or the DS-1 configured for path protection. When the CSC is active, the DS-1 that has the active CSC is the primary DS-1 for facility protection switching. When only the EOC is active, the DS-1 that carries that activity is primary for facility protection switching.

Path states

The following state information is for each of the four DS-0 channels:

- equipped or not equipped
  - — if the equipment and software are present and enabled for configuration of the service
- in-service or out-of-service
  - — if the LAPD links are in an information transfer state
- active or standby
  - — if the path is a specified path to carry the traffic of the application
- inhibited or enabled
  - — if path protection procedures are disallowed from switching activity

Path protection switching triggers

The LAPD links are monitored for failures that relate to multiple frame establishment (MFE). Loss of MFE on any supported logical link of the DS-0 path occurs for the following conditions:

- failure to establish multiple frame operations
- reception of a LAPD disconnect command, or a disconnect mode response frame

- retransmissions that exceed the N200 parameter setting

Other events that can trigger path switching are as follows:

- reception of I-frame data on an application logical link of the standby path
- removal of the inhibit attribute on an in-service standby path, when the active path is out-of-service
- notification from facility protection switching of a DS-1 failure

  Note: A switch back to an active path must result from a manual request or from failure of the current path. The active path is standby at this time.

Control

To control protection switching from the MAP terminal operating company personnel must perform the following:

- initiate a protection switch for either the CSC or the EOC channel
- initiate a *forced* protection switch for either the CSC or the EOC channel
- inhibit a standby EOC or CSC path from becoming active, or an active path from resuming activity
- enable a standby EOC or CSC to become active or enable an active path to resume activity

Inhibit status protection switching interact in the as follows:

- If you inhibit an active path from becoming active, you do not cause a protection switch.
- The IDT cannot switch the path to an inhibited path, automatically or manually.
- You cannot initiate a forced switch to an inhibited path.

Path switch completion

The need for a path switch can occur at the IDT or RDT. If this event occurs that end first determines if the standby path is ready to takeover transmission. If the standby is possible the system sends a request message on the active and standby links. The system sends the message for that path type (EOC or CSC). The request receiver verifies the state of the standby link, and sends an acknowledge message on both paths. This action depends on that condition. The caller receives a positive acknowledgment that indicates the switch was complete. The caller makes the requested path active.

Notification

If a path switch succeeds, IDT maintenance receives notification and logs the event. The IDT maintenance logs the first occurrence of failed path switches that the IDT originates.

If the need for an automated path switch arises, IDT maintenance produces a log. This action occurs when the standby link cannot occur.

A MAP terminal response displays and indicates the occurrence, if an active path receives the inhibit attribute.

A path protection switch request can receive the force option, and the result can be a path failure. If these events occur notification of IDT maintenance results in a log report.

When an IDT node has been in-service, and activity of either path type (EOC or CSC) is lost, an alarm occurs. The alarm is at the PM level of the MAP display. This event occurs when the path protection switching cannot recover the lost path type.

CMR card audit

An audit runs in-service diagnostics on the Custom Local Area Signaling Service (CLASS) modem resource (CMR) card every 1 min. If the audit detects an in-service fault, the SMA is set to in-service trouble. The system generates a PM181 log. This log indicates that the Calling Number Delivery (CND) does not work for lines connected to the SMA. Operating company personnel can perform maintenance on the defective CMR card.

EISP and EDCH data integrity audit

The Enhanced ISDN signal processor (EISP) and Enhanced D-channel handler (EDCH) data integrity audit provide an audit of both time slot and logical terminal data. This audit detects, reports and corrects any static data mismatch between the CAP (AX74), EISP, and EDCH processors.

The CAP is data protected, as a result, the CAP controls the audit. To initiate the audit the CAP sends CAP data to the EISP for comparison. If the data does not match, the EISP returns a fail message to the CAP. A PM180 log provides warning of an update. If the data matches, the EISP requests audits of the EDCH suspected to be defective and all spare EDCHs. The EDCH compares data with the audit data and reports a fail or pass message to the EISP. The EISP forwards this information to the CAP. If the mismatch occurs in the EDCH, a PM180 log provides an update warning. If the mismatch occurs in a spare EDCH, the system busies the card.

EISP overload control

Overload is a condition in which a minimum of one resource detects congestion, with a possible degradation of service to the affected RFT. In this event, overload control mechanisms are activated to make sure that service degradation is the least possible. Overload control for congestion that affects a single IDT consists of the following actions:

- reporting the congestion
- controlling the congestion

The following paragraphs describe these system actions.

Congestion reporting

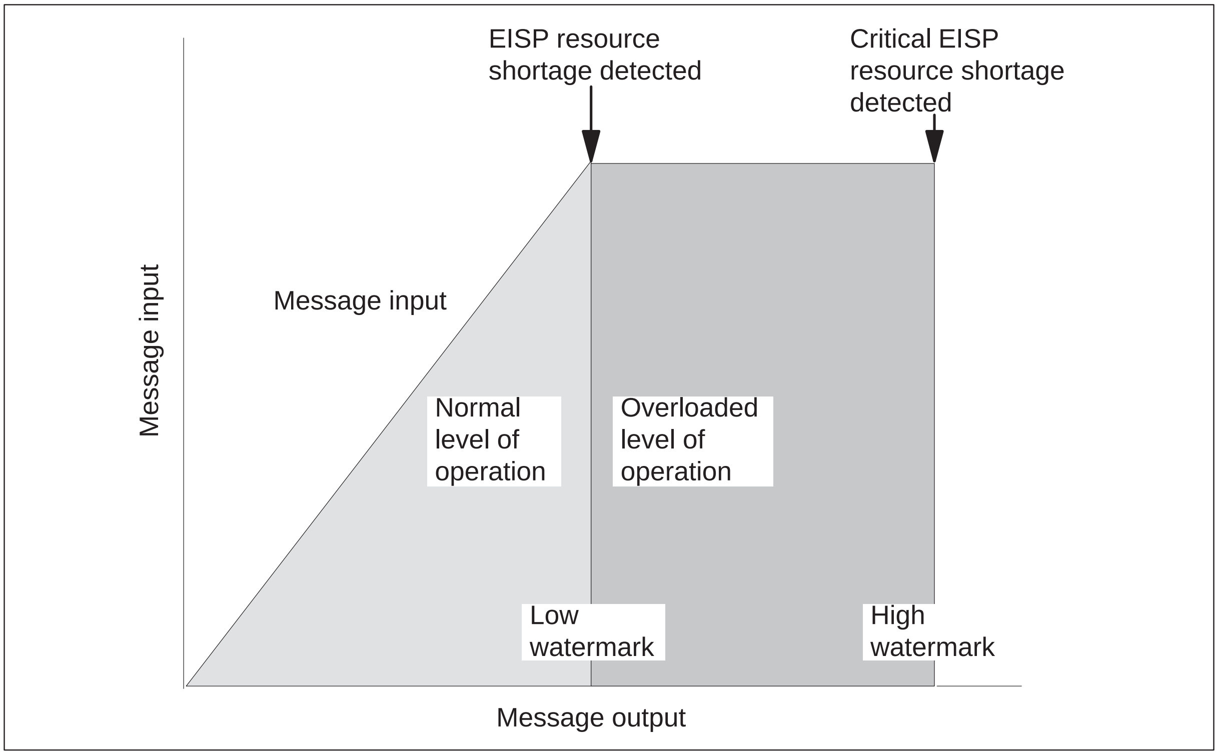
When an overload condition is in the EISP, the system places the affected IDT in an in-service trouble state. The system generates a PM128 log that indicates that a messaging overload condition is in affect for the CSC or EOC. The same information is available at the IDT level of the MAP terminal. To access this information enter the QUERYPM FLT command. When the congestion condition clears, the IDT returns to an in-service state.

The congestion can occur on a resource common to all IDTs associated with an SMA. If this event occurs the system places the SMA in the in-service trouble state. The system generates A PM128 log that indicates the messaging system for the P-side node (the SMA) is overloaded. All IDTs that associate with the affected SMA are placed in an in-service trouble state. When the congestion condition clears, the SMA and associated IDTs are return to the in-service state.

Congestion control

A series of mechanisms that restrict the use of common resources by any EOC or CSC channel or link implement congestion control. These mechanisms only activate during overload conditions. These mechanisms minimize the service impact that heavy message traffic can have on other RDTs associated with the SMA. These mechanisms automatically discard delayed messages. This action makes sure that common resources are not wasted on invalid messages. The following figure illustrates the overload control mechanisms used to minimize service degradation to P-side nodes.

EISP overload control for the IDT



When operation reaches the *low watermark* for resource congestion, the EISP enters the overloaded level of operation. Logical links on the EOC are placed in the receiver-not-ready (RNR) state. The exception is the logical link used for protection switch control. This action reduces the number of incoming messages.

When operation reaches the *high watermark* for resource congestion, the EISP reaches the maximum overloaded level of operation that the system allows. EOC channels are disabled and logical links on the CSC, except for the logical link used for protection switch control, are placed in the RNR state. This action limits incoming messages.

When resource congestion reduces, service gradually restores to the channels and links affected. The EISP gradually returns to a normal operating level.

EISP overload enhancements

Messages incoming from the RFT are separated. Calls in progress are separated from new calls that originate. The calls are placed in separate queues. Calls in progress receive a higher priority over new origination calls. Message handling in the EISP is modified to separate new origination messages from calls in progress. A flow task in the EISP throttles the new calls, and prevents their processing. This action occurs if the call processing task in the EISP is overloaded. New calls pass through the flow task, old originations are discarded before they pass to the call processing task.

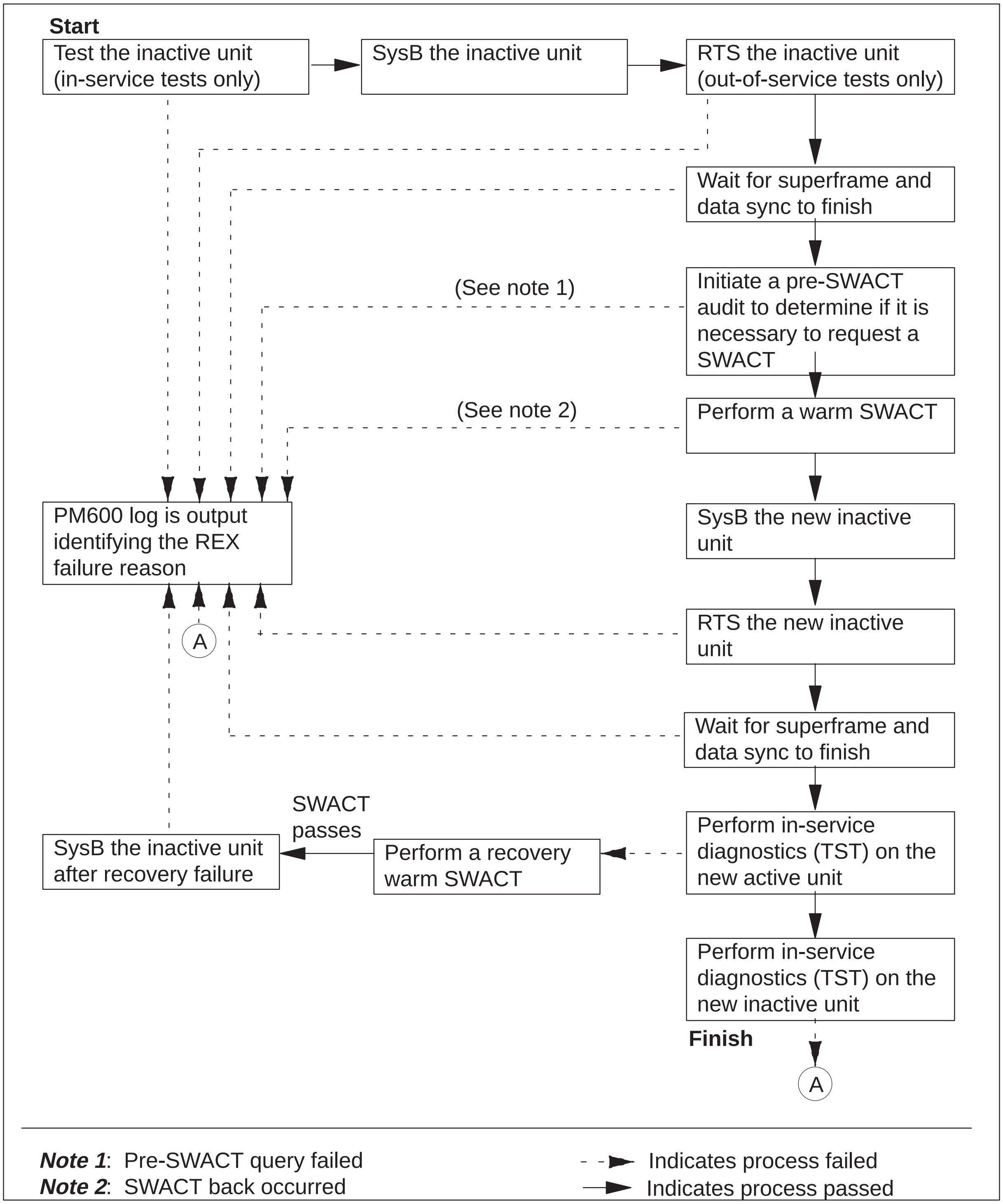
Routine exercise tests

The REX series of tests are performed on an SMA unit. The system scheduler initiates the tests daily or operating company personnel initiates tests manually. The best REX sequence follows:

1. Test the inactive unit. This action includes in-service tests only.
2. System busy the inactive unit.
3. Return-to-service the inactive unit. This action includes out-of-service tests only.
4. Wait for superframe and data sync to finish.
5. Perform a pre-SWACT audit.
6. Perform a warm SWACT.
7. System busy the new inactive unit.
8. Return-to-service the inactive unit.
9. Wait for superframe and data sync to finish.
10. Run in-service diagnostics (TST) on the newly active unit.
11. Run in-service diagnostics (TST) on the inactive unit.

The REX state machine (controller) actions appear in the next diagram.

REX state machine actions



If a REX test fails, the system generates a PM600 log. The PM600 log initiates a major alarm for the XPM that failed the REX test. The major alarm appears at the MAP terminal under the PM banner at the top of the display.

An in-service or out-of-service diagnostic test can fail. The REX failure reason includes the mnemonic of the failed diagnostic and the failed unit (0 or 1).

The PM600 log details:

- the start time of each step that the REX test executes
- the unit affected by the REX step
- the failure reason

The REX steps that follow after the failed step in the log are recovery actions. REX initiates these actions as a result of the failure. The steps contain the unit number if the REX action is unit exact (BSY unit, RTS unit, TST unit, sync). The steps do not contain the unit number if the REX action affects the node (SWACT, BSY both units). The log auxiliary data consists of a cardlist and mnemonic of the failed diagnostic. The following table lists the mnemonics for the diagnostics and a description of the diagnostic.

Diagnostic name and description

Diagnostic name (mnemonic)	Description of diagnostic
ABDIAG	A/B Bits
AMUDIAG	6X50 External Loop
CMRDIAG	CMR Card
CONT DG	Continuity Diag
CSMDIAG	CSM Diag
FORMATR	Local Formatter
MSGDIAG	6X69 Messaging Card
MSGIMC	IMC Link
PADRING	6X80 Pad/Ring
PS LOOP	P-Side Loops
SPCH DG	Speech Path
SYNC DG	Sync Diag

—continued—

Diagnostic name and description (continued)

Diagnostic name (mnemonic)	Description of diagnostic
TONE DG	Tone Diag
TS DIAG	Time Switch Diag
UTR DIAG	UTR Card
—end—	

The QUERYPM command and command strings QUERYPM FLT and TST REX QUERY contain information about the last REX. Both system and manually initiated REXs store and display a new date/time in the REX maintenance record. Both system and manually initiated REXs store and display state (passed/failed) in the REX maintenance record. *Passed* means the REX completed with no errors. *Failed* means the REX did not complete because of an error. This information is available through the QUERY PM and TST REX QUERY commands. If the REX fails, the user either performs a manual return-to-service, a manual REX, or an automated REX. The user must perform one of these actions to return the XPM to service from a in-service trouble state.

Each SMA has a stored REX maintenance record that contains the following information:

- the REX scheduler, if the SMA is in the system
- the date/time and result (passed/failed) of the last REX
- the failure reason, diagnostics failures, and a list of defective cards, if the last REX failed
- the date/time of prior failed REX
- the date/time of first passed REX that follows the earlier failure

The following limits apply to REX tests:

- For REX to be run, the node must be in service, in-service trouble because of a REX failure, or in-service trouble. One of these conditions must occur because peripheral-side (P-side) DS-1 links are out-of-service.
- If a warm SWACT is not possible, REX terminates.
- After successful completion of REX, the SMA has a new active unit because of the SWACT.
- If a restart occurs while REX is in progress, the PM600 log is not output. The system does not generate the PM600 log because the restart deallocates the temporary data store used to build the PM600 log.
- There is no SWACT controller override for manual REX.

REX state machine interface to the pre-SWACT and post-SWACT audits

The REX state machine (or controller) permits the SWACT controller to refuse to attempt a SWACT.

The REX controller performs the following actions:

- call to the SWACT controller during the pre-SWACT step. This action occurs before the start of the SWACT request. The SWACT controller uses the diagnostic history of the unit to determine if a SWACT attempt is correct. The diagnostic history database maintains the diagnostic history of the unit. The SWACT controller bases this decision on the last SWACT attempt to the inactive unit. The SWACT controller also bases this decision on the data the XPM returns in the pre-SWACT query message. This condition means an XPM can fail the pre-SWACT step of REX but not show any failures. Failures are shown in the DiagHist level of the MAP display. This failure occurs when the reasons for the pre-SWACT failure do not include diagnostic failures.
- accounting of SWACT denial and failure reasons
- termination of a REX test if a SWACT denial occurs
- termination of a REX test if a SWACT occurs. The active unit of the XPM is not changed from the time the REX test began. If XPM Pre-SWACT/Post-SWACT Audit is supported, REX terminates without recovery actions. The REX terminates without recovery actions because the SWACT code submits a BSY/RTS of the inactive unit.

- display of the failure reason for a SWACT denial or failure during a manual REX at the MAP terminal as *REX failed*. You can obtain the reason for the failure by using the command string TST REX QUERY for the posted XPM. The system generates a PM600 log report with details on the REX failure reason.

Intermodule communication link audit

Intermodule communication (IMC) links allow the two SMA units to exchange dynamic data. The IMC makes sure that if the active unit fails, the inactive unit can take over call processing. The system audits both IMC links in the SMA to monitor the sanity of messages between the units. One IMC link is between the NT6X69 cards, and the other is between the NTAX74 cards. The IMC audit can fail and the audit can detect the fault at the at the node level. If these conditions occur the SMA enters the in-service trouble state. If the audit detects the fault at the unit level, the defective unit enters the in-service trouble state.

When the system detects an IMC link failure, the following events occur:

- CC receives a fault report
- link is closed and SMA status changes to in-service trouble
- SMA processors no longer use link
- warm SWACTs are prevented

Static data integrity audit

An integrity audit verifies the integrity of the static data in the SMA. The integrity audit calculates the checksum value of the static data in SMA memory. The integrity audit verifies that this value matches the checksum value for the load of static data. The system performs this audit for each IDT.

If the audit detects a static data mismatch in the active unit, the system automatically performs a SWACT.

If the audit determines the static data are already correct, the static data loading is bypassed when the SMA is about to return to service. The static data loading is part of the full return-to-service sequence.

RDT alarm audit

Through datafill, the operating company can decide if the operating company want to set SD points for each RDT. This action is done through the field SDPOINTS in table RDTINV. Every 10 min, an audit queries the RDTs for the current alarm conditions. If the system raises an alarm condition, or raises an alarm of greater value, the scan point activates. An alarm appears at the EXT level of the MAP terminal.

RDT lines audit

The RDT lines audit performs the following actions:

- automatic run every 24 h, or the audit starts in response to the RDTLNAUD command
- synchronization the line states that the RDT and the DMS-100 switch detect
- verification of DMS-100 call processing features that depend on accurate DMS-100 knowledge of the line state for correct operation

Only lines that the DMS SuperNode switch correctly provision are audited. If the audit finds an inconsistency this audit generates an RDT601 log and attempts to correct the problem. If the problem cannot be fixed, the system generates an RDT306 log. The audit runs each day at 02:00 unless the audit from the previous day is not complete.

The audited data includes some of the attributes of object instances that relate to the following:

- analog lines – if the RDT is not datafilled with known object creation, the analog line instances are audited
- ISDN lines – both access (RDT P-side) and transport (RDT C-side) sides are audited. If the RDT is datafilled with known object creation, only the only audit is for the transport side.
- nailed up B channels of MVI RDT ISDN line

The RDT monitors and changes the state of the lines that connect to the RDT. An RDT takes a line out of service because of the following maintenance-related activities:

- diagnostic testing
- hardware failure
- lines provisioning
- loss of data

An RDT can remove a line from service and change the service state of the line to OOS/IDL. When this occurs, the RDT informs the DMS-100 switch of this activity. The DMS-100 switch responds to the state change messages from the RDT. The DMS-100 switch changes the view of the DMS-100 line state to line module busy (LMB) or idle (IDL). This selection is based on the state of the line indicated in the message to match the RDT.

The MAP terminal can display a posted line that connects to an RDT in the line module busy (LMB) state. If this event occurs the RDT is out of service or the RDT indicates a service alarm against the line.

Diagnostic tests

Diagnostic tests pinpoint hardware faults to a card level that can be replaced. Diagnostic tests can be system or manually initiated. The system initiates diagnostics when internal counters exceed fixed levels. Diagnostics require a manual start when the events that follow events occur:

- log reports indicate a common equipment problem
- system detected alarms are generated
- OMs show high error counts

ROM diagnostic

The read only memory (ROM) diagnostic detects faults in the processor and memory cards. The ROM initiates when the XPM is in the who-am-I (WAI) state.

> ***Note:*** After this diagnostic runs the unit requires a reload.

The ROM diagnostic tests the following memory card circuits:

- memory circuitry
- parity circuitry
- holding registers

The ROM diagnostic tests processor card circuits as follows:

- memory mapper unit
- universal synchronous/asynchronous receive/transmit (USART) integrated circuits
- programmable timers

A- and B-bit diagnostic

The purpose of the A-bit and B-bit diagnostic is to test the A-bit and B-bit circuitry. The A-bit and B-bit circuitry is on the NTAX78 enhanced time switch card. The A-bit and B-bit diagnostic tests the global looparound of the time switch card. The A-bit and B-bit diagnostic tests the channel supervision message (CSM) loop-around of the NT6X41 formatter card. This diagnostic performs ready access memory (RAM) tests on the AB transmit and receive memories. The A-bit and B-bit diagnostic tests the time switching function of the time switch. The A-bit and B-bit diagnostic tests the generation and reception of A- and B-bits. The A-bit and B-bit diagnostic tests the enable-disable function of the AB bit receive memory.

The following XPM hardware components are involved in this diagnostic:

- NT6X50 DS-1 interface card

- NTAX78 enhanced time switch card
- NT6X69 message and tones card
- NT6X41 formatter card
- speech bus

CSM diagnostic

The CSM diagnostic tests the hardware involved in the transmission, reception, and use of the CSM. Most of this hardware resides on the NT6X42 CSM card. The CSM diagnostic tests all the memories on the NT6X42 card and the NT6X41 formatter card.

Also tested are:

- the integrity match-mismatch logic
- the speech bus parity error generation (NT6X41 formatter card) and detection (NT6X42 CSM card) logic,
- the channel data byte (CDB) transmission and reception logic

This diagnostic checks for:

- correct actions between bits of the parity error RAM
- correct action between the integrity match-mismatch and CDB update logic
- correct operation of the CSM loop on the NT6X41 formatter card.

The following XPM hardware components apply to this diagnostic:

- NT6X42 CSM card
- NT6X41 formatter card
- speech bus

Formatter diagnostic

The formatter diagnostic tests the control RAM and the C-side loop enable-disable function on the NT6X41 formatter card. This diagnostic also checks for correct functioning of the network framing interrupts, C-side messaging, and P-side messaging. The formatter diagnostic also checks the integrity of the speech bus connection and message memories, both located on the NT6X69 message card.

The following XPM hardware components are involved in this diagnostic:

- NT6X41 formatter card
- NT6X69 message and tones card

- NTAX78 enhanced time switch card
- speech bus

Message diagnostic

The message diagnostic tests the hardware on the NT6X69 message card. The message diagnostic checks to see if the on-board processor functions correctly. The message diagnostic tests time slice processes, the speech bus interface, the IMC link, and the cyclic redundancy check (CRC) ROM. The integrity of the message buffer memory and P- and C-side messaging are validated.

The following XPM hardware components to this diagnostic:

- NT6X69 message and tones card
- NTAX78 enhanced time switch card
- NT6X41 formatter card
- NT6X50 DS-1 interface cards
- speech bus

Tones diagnostic

The tones diagnostic runs PCM checksums on the tones of ports 16 and 17 (phantom ports). The tones diagnostic makes sure that these checksums agree with the checksums in the tone read-only memory (ROM). The tone ROM is on the NT6X69 message card. The tones diagnostic checks the speech bus connection memory for all channels (except 0 and 16). This test checks ports 16 and 17 to make sure that the tones are enabled on the speech bus.

The following XPM hardware components apply to this diagnostic:

- NT6X69 message and tone card
- speech bus

Speech path diagnostic

This diagnostic completely checks all the XPM speech channels for data integrity. This test involves checking all C-side and P-side loop-arounds and all time slots of the speech bus. The speech path diagnostic also tests the highway mux and the PCM enable-disable gates.

The following XPM hardware components apply to this diagnostic:

- NT6X41 formatter card
- NT6X69 message and tones card
- NTAX78 enhanced time switch card
- NT6X50 DS-1 interface card
- speech bus

Time switch card diagnostic

The SMA time switch card switches the speech, control, and supervisory signals. These signals switch from the C-side (toward the switch) to the P-side (away from the switch) of the SMA.

The A-bit and B-bit signaling diagnostic (ABDIAG) verifies that the signaling bit control circuitry in the SMA is operating correctly. This diagnostic is part of CC link audits. This diagnostic runs when the SMA is tested or returns to service from the MAP terminal. The diagnostics are more complete when the SMA is out-of-service instead of in-service. Diagnostics are also more complete for inactive units than active units.

PCM loss addition card diagnostic

The PCM loss addition diagnostic tests the hardware and functionality of the NT6X80 PCM loss addition card. This diagnostic performs a card reset test, memory tests, and verifies the ring/pad interrupt. Tests are also performed on the pad ROM and dc voltages. The NT6X80 card is the only XPM hardware tested.

DS-1 card diagnostic

The DS-1 card diagnostic verifies that DS-1 cards operate correctly. The test of the DS-1 link can occur during diagnostics, depending on how the diagnostics started. The DS-1 card diagnostic runs during CC link audits. This event occurs when a command from the MAP terminal returns the SMA or a DS-1 link to service. The DSC-1 card diagnostic also runs during CC link audit when a DS-1 link is tested from the MAP terminal. The PCM looping tests occur during the test of the DS-1 link from the MAP terminal.

Two link audits are present The in-service audit tests all in-service DS-1 links. The out-of-service audit tests all system busy DS-1 links.

P-side link diagnostic

To test a DS-1 link at the PM level:

- post the associated SMA
- Make sure that the SMA and the associated RDT are InSv
- enter the command string TST LINK link_no

The TST command causes the SMA to execute a PCM loopback test on the link, this command applies to an InSv link. The SMA sends a specified PCM pattern over the DS-1 link to the RDT. The RDT loops the pattern in the time switch card and returns the pattern to the SMA, which compares sent and received samples.

If the PCM loopback test fails, the DMS SuperNode switch generates PM181, PM183, and PM128 logs Refer to the following examples. The failed link is busied and the associated SMA is ISTb.

```
PM181 MAY16 09:22:12 4588 INFO SMA 60
Node:  ISTb, Unit0 Inact: InSv,  Unit1 Act:  ISTb
PCM Loopback test failed on P-side link 5
```

```
PM183 MAY16 09:23:00 4677 SYSB SMA 60  P-side LINK: 2,
FROM: InSv
```

```
PM128 MAY16 09:23:33 4877 TBL ISTb SMA 60
Node       : ISTb (PSLink OOS) From InSv
Unit0 Inact: InSv
Unit1   Act: InSv
```

When a system audit detects a SysB link, the DMS generates the following PM110 log:

```
PM110 MAY16 09:27:33 4899 INFO CARRIER SMA 60
CARRIER–NO: 8, REASON: REMOTE LINK SYSBSY
```

When a link returns to service, the SMA leaves the ISTb state and enters the InSv state. This action occurs if there are no other faults. The DMS SuperNode switch generates a PM106 log if there are no other faults. Refer to the example that follows. If a fault is present, the DMS SuperNode generates a PM128 log when a link returns to service.

```
PM106 MAY16 11:23:33 4877 RTS SMA 60
Node       : InSv From ISTb
           : ISTb Cleared (PSLink OOS)
Unit0   Act: InSv
Unit1 Inact: InSv


PM184 MAY16 09:33:00 7677 RTS SMA 60  P-side LINK: 2,
              FROM: SysB
```

CMR diagnostic

The CMR card in the SMA is self-diagnosing. The card contains on-board firmware that provides the card level diagnostic. The primary function of the diagnostic is to detect faults that affect service immediately .

This diagnostic provides the SMA with both in service and out-of-service diagnostics. The diagnostic provides a CMR audit that activates the in-service diagnostic at periodic intervals. This feature provides a diagnostic interface to report CMR failures.

The in-service diagnostic provides an interface with and controls the on-board firmware diagnostics, which continuously test different critical components of the CMR card. This diagnostic runs one time each minute as requested by an in-service audit. In addition, operating company personnel may request the in-service diagnostic at the MAP terminal. These diagnostic trigger techniques result in complete in-service testing of the CMR card.

The out-of-service diagnostic is a more complete test of the functionality of important CMR hardware. This diagnostic uses some of the same on-board firmware diagnostics as the in-service tests. This diagnostic allows a more complete testing of all resources. Normal in-service traffic and time controls do not permit complete tests.

The CMR audit runs this diagnostic at periodic intervals. The facility audit normally used for this purpose is too low in repetition time (7.5 minutes) to provide correct detection time for the CMR card. This feature required the creation of a new audit.

The system prints the results of the CMR diagnostic test in log PM181 audit exception report. The PM181 audit exception report lists the failed card list. The log indicates that the CMR diagnostic detected the fault.

EISP diagnostic

Diagnostics for the enhanced-ISDN signaling preprocessor (EISP) card are made of ROM and RAM diagnostics. These diagnostics detect and isolate defective hardware. To determine if the EISP can function and download requires this detection circuitry. This diagnostic also diagnoses write protection circuitry. When the processor is reset the EISP diagnostic executes.

SMA reliability

Computing module datasync

The XPMs must adhere to several requirements to maintain system sanity. One requirement is the node and port tables in both units must remain synchronized. The same internal indexes must reference common tuples to both units and must contain the same data. Maintaining identical indexes in both units allows processes to communicate between units. Active processes continue functioning after a warm switch of activity (SWACT). This synchronization was not difficult to maintain in the original design of the XPMs. When new functionalities are introduced, preserving the synchronization of the mate unit node and port tables is more difficult.

Data is set in an XPM active unit through the node and link, RTS and state changes that are triggered externally. Data transmits to the inactive XPM unit through the bulk and individual messages of the present XPM datasync mechanism. For this process the data uses the following:

- an IMC filter that blocks all individual XPM datasync messages.
- an RTS NODATSYNC that blocks all bulk XPM datasync messages, and compresses the node table in the XPM.
- the CM supplied static and dynamic data for the SMA and subtending P-side nodes in the SMA that receives a SWACT.

To coordinate management of node table synchronization in the XPM, the system forces the inactive unit to order the node table. This process is the same for the active unit. For the inactive unit to order the node table the active unit sends a map of the node table. The active units sends the map during a bulk download of configuration data. The inactive unit uses the map to datafill the node table as data is received from the CM.

The inactive unit does not use the node map to write dynamic updates. The inactive unit expects to receive data in the same order as the active unit. This condition assumes that when the inactive unit runs, the node and port tables remain in synchronization with the active unit. Units can lose synchronization if one unit losses dynamic update. The active unit can contain a temporary inter-processor message link (IPML), used for broadcast loading. The IPML is in the node table at the time a dynamic update occurs. The tables are out of sync, temporary IPMLs are added only in the node table of the active unit.

Node table sync enhancements

Table PMNODES contains a list of all nodes in each XPM. This table transfers XPM node information to the new CM load during a software upgrade. This transfer makes sure the new CM software contains the correct node order for each XPM that becomes active. The CM controls the sequence and datafill of node and port tables in both XPM units. The CM and the tables maintain synchronization in active and inactive XPM units. The XPMs converted to the enhanced node table management system no longer synchronize using mapping information. The mapping information is the information that the active unit sends to the inactive unit.

A new software component, configuration data table (CDT) management, is added. The CDT bind interface allows XPM applications to bind an aspect, and the set of procedures of the aspect to a CDT during initial program load (IPL). A XPM with a software load bound with the new CDT management system notifies the CM during an XPM node data audit. The CM starts a CDT audit every 5 min. The CDT audit initiates the XPM node data audit in the XPMs.

The CDT/XPM node audits and converts XPMs that have compatible software loads into the new node table management control. The CDT/XPM verifies the sanity of XPMs converted. To maintain backward compatibility, XPMs without CDT management maintain mate unit synchronization as described earlier.

The CM has control of both units of an XPM node under the following conditions.

- the CDT/XPM node data audits correctly updated the tuple(s) of that node in table PMNODES. The data and indexes sequence of the tuples in the XPM node and port tables match in tables PMNODES.
- the CM had control in a previous software load.
- a new XPM is added other than during a one night process (ONP) conversion. Nodes added during ONP are not new, the nodes must be in-service.

Note: An office can receive an first software load with the new node table management system. If this event occurs the CM gains control of compatible XPM node and terminal tables. This action occurs during the next scheduled CDT/XPM node data audits. If an XPM is taken out-of-service (OOS), the CM does not assume control immediately. The CM assumes control when the CDT/XPM audits successfully convert an XPM to the CDT management system. The audits align the CM tables with the node tables.

The CM initiates the audit request to an XPM with a VERTUPLE message. The message has a parameter, which identifies if the XPM should respond. The XPM sends a message that contains tuples of data, or a checksum of the table. The audit requests tuple data to supply the CM with the required information to convert an XPM to CDT management control. If differences are present between the active and inactive unit tables, the CM aligns to the table of active units. The CM sets the XPM in-service trouble. After the conversion of an XPM to CDT management control, a checksum of the table is requested. The checksum is requested when the CDT audit runs.

The check of the synchronization of XPM nodes under the CDT management system occurs. This process uses checksums of the node and port table data. The checksums are calculated through regeneration of each tuple in the XPM table. After a tuple is formatted, the system calculates the checksum for that tuple. The system adds the checksum to the table checksum for that XPM. The XPM checksums are verified against corresponding checksums generated in the CM. For both methods an out-of-sync condition causes that unit to be set in-service trouble. During the next audit cycle, if the unit checksum coincides with the CM checksum the in-service trouble condition clears.

The NODATASYNC option with the RTS command inhibits the data synchronization of two XPM units. Before the introduction of the enhanced XPM node table synchronization, the CM table management compresses node table in the XPM. Compression occurred when a unit of an XPM returned to service with the NODATASYNC option.

The CM table management does not compress the node table when an XPM unit returns to service with the NODATASYNC option. The CM table management compresses the XPM node table when both units of an XPM are out-of-service. A new configuration data must download. This process allows the CM to manage the node and port tables.

When the CM is more active in maintaining the accuracy of the node tables in XPMs, XPMs become less active. The XPM accepts the CM data as the data transmits without corrections or adjustments.

To implement the enhanced synchronization capability, the following functions are created or changed.

- The XPM no longer derives node table data from a part of data that the CM sends. The CM specifies all the data in the node and port tables, and the XPM stores the received data.
- The CM notifies operating company personnel if resources are not available on an XPM when inventory tables are changed. Notification occurs if the XPM is manual busy or out-of-service at the time the inventory tables are changed.
- The XPM no longer compares node tables between units. The CM makes sure the node tables in each unit match. The CM controls the content of each table. The RTS of an inactive unit with the NODATSYNC option does not cause a configuration download from the CM. Configuration download occurs when both units become out-of-service and RTS at the same time.
- Node and port table aspect and access routines are created to allow applications to access the data. Applications have a read-only access. Tuples in XPM tables continue to update from the CM while the XPM is in-service.
- The XPM has a new external node number to internal node number look-up table. This table provides fast conversion from external to internal node numbers, and eliminates the possibility of collisions.
- An enhanced messaging interface includes state information between the CM and XPM. The new interface contains the following:
  - — the ability to detect lost messages by addition of a sequence number from 1 to 255 in the header
  - — a byte of data transfer state information, which informs the XPM if more messages follow
  - — a count of tuples that the message affects
  - — table format identification to identify the version of XPM table software. Leaving the present node table management software in the XPM until XPM06 maintains backward compatibility.

Two new PMDEBUG commands are created to allow operating company personnel to determine the tables that are bound in the CDT data distribution. The PMDEBUG commands display tuples in those tables.

To obtain a list of the XPM data tables bound in CDT management, at the CHNL:PROT level of PMDEBUG, type:

>SHOWTBLS
without parameters

To display one or more tuples in a table bound into CDT management, at the CHNL:PROT level of PMDEBUG type

>DISPTBL table_id [<tuple_no> | R <begtuple> <endtuple> | all]
where

table_id	is the name of the table to display
tuple_no	is the number of a specified tuple to display
R	is a range of tuples to display
begtuple	is the beginning tuple of the range
endtuple	is the end tuple of the range
all	is display all tuples in the table

If you provide only the table identification, all tuples appear in a list. Press the RETURN key to abort listing.

Enhanced Dynamic Data Sync (EDDS)

Dynamic data describes the link and node states in the XPM that call processing support requires. These states are normally set in the active unit of an XPM. The RTS node and link, or state changes that external stimuli trigger set these states in the active unit. These states propagate to the inactive XPM unit through the group and separate messages of the XPM data sync mechanism.

The EDDS is a component of warm switch of activity (SWACT). A warm SWACT preserves processing of ISDN and POTS calls. Warm SWACTs occur when the XPM active unit drops activity that an XPM trap, REX test or other cause. The warm SWACT preserves call and unit states for calls to continue without interruption. For a warm SWACT to succeed the inactive unit must be in service (INSV).

If the inactive unit was previously OOS, either ManB, SysB, or CBsy, the following occurs during RTS:

- The inactive unit initializes.
- The OOS tests run on the inactive unit.
- If the inactive unit static data checksum is not correct the CM sends new static data. The CM marks the inactive ISTb.
- The active unit sends dynamic data to the inactive unit (bulk sync).
- The CM marks the inactive unit INSV.

Switch of activity

A SWACT is the process in which the two units of an XPM exchange activity states. The unit that handles call processing becomes the inactive unit. At the same time, the inactive unit becomes the active unit and takes over call processing. This ability to switch activity makes sure that the SMA is reliable.

A SWACT can be a controlled SWACT or an uncontrolled SWACT. The following describes the controlled and uncontrolled SWACTs.

Controlled SWACT

A controlled SWACT is a SWACT that manual action or planned system requests implement. An example of a manual action is use of the SWACT command. Planned system requests include the REX test schedule. A controlled SWACT occurs when the active unit is busied while the inactive is INSV.

A controlled SWACT can occur if the state of both units is INSV. A controlled SWACT can occur if the SMA is ISTb because a previous REX test failed.

In a controlled SWACT, the following message interchange occurs:

- the CM messages the active unit of the SMA to start an audit of the inactive unit
- the active unit messages the inactive unit to start a pre-SWACT audit
- the inactive unit messages back to the active unit the pre-SWACT audit results. A warm SWACT initiates, based on the audit results
- the original active unit stays InSv and clears data that is not stable
- the new active unit sends five gain messages to the CM
- the CM sends five gain-acknowledge messages to the SMA
- the SMA sends three gain-acknowledge received messages to the CM
- the CM tells the original active unit to drop activity
- the original active unit sends the CM a drop message, and the CM expects to receive this message

If a controlled warm SWACT fails, the following message interchange occurs:

- the CM messages the active unit of the SMA to start an audit of the inactive unit
- the pre-SWACT audit occurs
- a warm SWACT initiates, based on the audit results
- the original active unit stays INSV and clears data that is not stable
- the new active unit does not send messages to the CM

- the original active unit wait time of 5 s expires and a SWACT-back occurs
- the original active unit sends a SWACT failed message to the CM
- the CM system busies and returns to service the inactive SMA unit

Uncontrolled SWACT

The system implements an uncontrolled SWACT when a hardware fault or a trap occurs in the active unit. The PM181 log messages inform operating company personnel of the reason that the active unit dropped activity.

In an uncontrolled SWACT, the SMA initiates the pre-SWACT audit. The sequence of messages is as follows:

- the SMA active unit messages the inactive unit to start a pre-SWACT audit
- the pre-SWACT audit occurs
- a warm SWACT initiates, based on the audit results
- the new active unit messages the CM that a gain that was not requested occurred
- the original active unit stays InSv and clears data that is not stable
- the new active unit sends five gain messages to the CM
- the CM sends five gain-acknowledge messages to the SMA
- the SMA sends three gain-acknowledge received messages to the CM
- the CM tells the originally active unit to drop activity

For both controlled and uncontrolled SWACTs, consider the SWACT complete when the conditions occur as follows:

- The CM receives the gain message from the newly active unit.
- The CM acknowledges that gain to the originally active unit.

If a SWACT back cannot complete, both units of the XPM are system-busied and returned to service.

SWACT operation

During a SWACT, the system breaks and restores the maintenance connection. The maintenance connection is the application-to-application logical path between the CM and the RDT. During the time the maintenance connection is not available, an ISTb condition posts to the IDT.

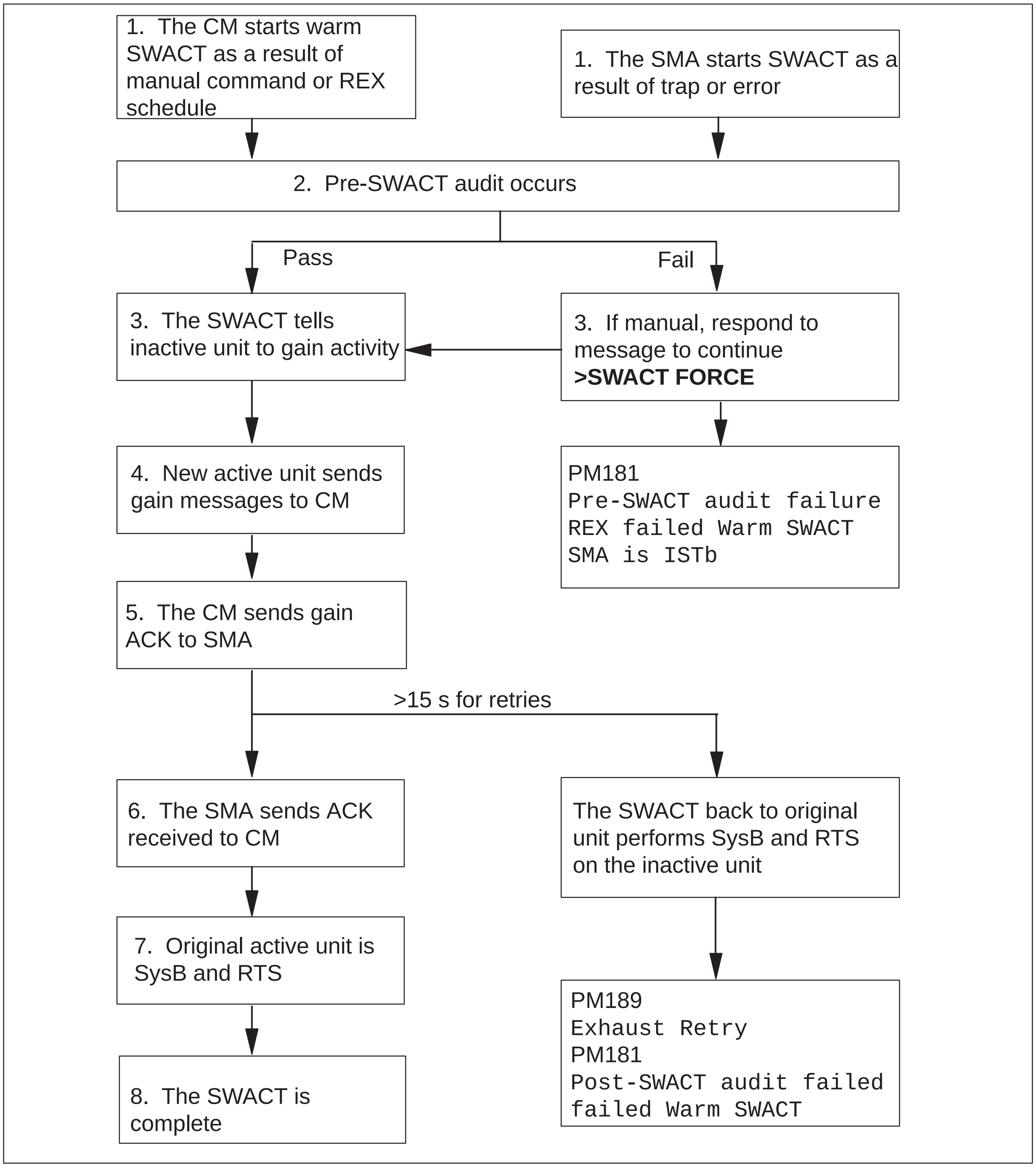
When a SWACT occurs, the CM and the SMA exchange a series of drop and gain messages. These messages communicate all actions. The following table explains common phrases found in these messages.

Message phrases that describe CM to SMA SWACT communication

Message phrase	Explanation
Original active unit	Active unit before the SWACT (unit 0)
Original inactive unit	Inactive unit before the SWACT (unit 1)
Newly active unit	Active unit after the SWACT (unit 1)
Newly inactive unit	Inactive unit after the SWACT (unit 0)
Gain message	The message the new active unit (unit 1) sends to the CM to tell the CM that unit 1 gained activity
Gain acknowledge message	The message the CM sends to the original active unit to confirm that the new active unit sends messages
Gain acknowledge received	The message the original active unit sends to the CM to confirm that the new active unit passed the post-SWACT audit
Drop message	The message the original active unit (unit 0) sends to the CM to tell the CM that unit 0 dropped activity

The following figure illustrates the sequence for a controlled and uncontrolled SWACT and shows the SWACT-back operation. The SWACT-back feature is described in this section.

SWACT sequence



Pre- and post-SWACT audits

The SMA pre-SWACT/post-SWACT audits improve the warm SWACT operation. The audits deny the SWACT if the inactive unit cannot maintain activity or communication with the CM. Under these conditions, the pre- and post-SWACT audits provide the capability to SWACT-back to the originally active unit. The software that drives this feature is the SWACT controller in the CM and an autonomous capability added to SMA software. The SWACT controller and pre- and post-SWACT audits are described as follows:

SWACT controller All manual requests and selected system requests for warm SWACTs route to the SWACT controller in the CM. The SWACT controller polls PM diagnostic history data in the CM and SMA state data. Do not confuse state data with static data. The data polled determines the action of the SWACT controller. The controller denies the request for a warm SWACT or allows a warm SWACT to proceed. During the SWACT, the new inactive unit remains in service. This unit initiates a process to clean data structures left in states that are not stable.

Pre-SWACT audit Before a SWACT occurs, the active SMA unit queries the mate SMA unit. The SMA unit query is on the intermodule communication (IMC) links and messages the SWACT controller in the CM. The pre-SWACT audit of the inactive unit includes the state of the unit during the diagnostics. The pre-SWACT audit assigns a weighted value to the results of the diagnostics. The result of the pre-SWACT audit query is a boolean pass or fail.

If the SWACT controller denies a manual request for a warm SWACT, a MAP terminal message informs operating company personnel. The message includes a reason for the denial. To supercede the SWACT controller, operating company personnel can enter the SWACT FORCE command string. If operating company personnel override the SWACT controller, this action causes a warm SWACT attempt. The warm SWACT attempt occurs without reference to diagnostic history or status data.

Post-SWACT audit After a SWACT, the inactive unit is SysB and RTS if conditions occur as follows:

- two-way communication is available with the CM
- the new active unit can maintain activity

The unit active before remains in service until the new active unit can verify the required conditions. If the conditions required do not occur, the SMA executes a SWACT-back to the original active unit.

Warm SWACT functionality

A warm SWACT passes control of maintenance and call processing from the active unit of an SMA to the inactive unit. During the SWACT, the active unit becomes inactive, and the inactive unit becomes active and gains control.

An uncontrolled warm SWACT automatically happens when the DMS SuperNode switch detects a failure in the active SMA unit.

A controlled warm SWACT occurs when operating company personnel issue the SWACT command from the PM level of the MAP terminal. A controlled warm SWACT also can occur when a scheduled diagnostic like the REX test runs.

When a warm SWACT occurs, the system maintains calls in the talking state. The system drops calls in transient states like digit collection or ringing. When the system drops the call, subscribers immediately receive dial tone. Subscribers must dial the call again. For established calls, the new active unit continues to supervise the call. In TR-303, an established call is a call that reaches the active state. For idle terminals, the warm SWACT is transparent. In TR-303, an in-service idle terminal is in the null state.

A warm SWACT requires that both SMA units be in service. After a reload or a restart, the warm SWACT feature automatically begins.

Warm SWACT supports POTS and coin services.

Warm SWACT is transparent. The transparency makes sure the inactive unit has the necessary data to maintain established calls. The warm SWACT also makes sure the inactive unit can process new calls when it becomes the active unit. The inactive unit must monitor several types of data so that the inactive can take over call processing as required. The following section describes the types of data the inactive unit must monitor.

If an SMA that supports a subscriber line has a warm SWACT, the system drops all parties to the call. The subscriber line must have an active Deluxe Spontaneous Call Waiting Identification (DSCWID) session. The system drops all parties between the alert tones plus the timer default seconds after re-alert and before the incoming call is acknowledged.

Static data Static data is the set of tables sent from the CM to the SMA. Static data defines the following:

- the configuration and functionality of the SMA hardware and software, like line data
- the configuration and functionality of the SMA software
- the association between each IDT and associated RDT

Inventory tables store this data. Operating company personnel can access this data through a table editor at the MAP terminal. The classes of data handled include call processing data, configuration data, and maintenance data. The methods to transfer static data are bulk download, dynamic table, and tuple update.

Bulk data update A bulk data update occurs when the inactive unit is in a state other than in service. The inactive unit and returns to service. Information in this data transfer includes the state of the RDT and the subscriber states (idle or busy).

Dynamic data Dynamic data updates occur on a continuously. As data in the active unit changes, data updates in the inactive unit. Information in this data transfer includes subscriber states, channel assignment or assignment again, and port statuses.

Limits of warm SWACT

The operating company must understand the following limits to a warm SWACT.

Established calls can be dropped The SMA units send messages over the IMC link to communicate. The bandwidth of the IMC link is 64 kbit/s. Processor real time limits the transmission rate. Dynamic updates are low priority. In heavy traffic periods, real time is used for call processing. The inactive unit does not always receive dynamic data updates during periods of heavy traffic. If a warm SWACT occurs during heavy traffic, the system can drop some established calls.

Established calls cannot use hook flash An established call that remains through an uncontrolled warm SWACT can lose its hook-flash ability. The call cannot initiate flash-activated subscriber features. Flash-activated subscriber features include:

- call transfer
- three-way calling
- conference calls
- call parking
- executive busy override

The call cannot initiate flash-activated subscriber features for the remainder of the call. The call ignores the hook flash.

For example, subscriber A calls subscriber B and the call establishes a speech path. A system-detected fault occurs, and an uncontrolled warm SWACT initiates on the XPM where subscriber A connects. The speech path remains established. When subscriber A attempts to set up a three-way call, the call ignores the hook flash.

Coin calls can be taken down The system can take down a coin call when a warm SWACT occurs during heavy traffic.

Enhancements to warm SWACT

Enhanced warm SWACT allows flash-activated subscriber features to retain hook-flash capability over a controlled warm SWACT under specified conditions. These conditions must be present with the line service options assigned to the line that survived the SWACT. Some line service options can disable the enhanced warm SWACT feature. The options must be active. The following table lists those line service options that do not disable the enhanced warm SWACT feature. If a line service option does not appear in the following table, the option can disable the enhanced warm SWACT. The option must be active.

Line service options compatible with Enhanced Warm SWACT

Residential features	
Automatic Call Back	No Receiver Off-Hook Tone
Automatic Recall	Off-Hook Queuing
Call Screening	Originating Line Select Option
Customer Originated Trace	Permanent Hold
Call Pickup	Private Business Line
Make Set Busy	Private Network
Denied Call Forwarding	Private Virtual Network
Denied Incoming	Query Time Display
Denied Originating Service	Random Make Busy
Denied Terminating Service	Requested Suspension
Directed Call Pickup No Barge In	Security Code
Directory Number Network Attributes	Sleeve Leads for Public File Reporting System
Direct Outward Dialing	Special Billing Number
Electronic Switching Network	Speed Calling Long
Equal Access PIC	Speed Calling Short
Equal Access Toll Denied	Speed Calling User
Essential Line Service	Star Equivalent
Expensive Route	Station Message Waiting
Hunt Groups	Stop Hunt
Last Number Redial	Subscriber Line Usage
Line Screening	Terminating Line Select Option
MADN Hold (POTS)	Toll Essential Service
Make Set Busy	Uniform Call Distribution
Network Dial Plan Display	Voice Message Exchange
Network Speed Calling	

Note: Enhanced warm SWACT is available for controlled warm SWACTs only. Controlled warm SWACTS occur when operating company personnel enter the SWACT command or as part of the REX test sequence.

Examples of enhanced warm SWACT The following examples describe the capabilities and limits of enhanced warm SWACT:

In the first example, subscriber A calls subscriber B and the system establishes a speech path. A warm SWACT occurs on the XPM that connects to subscriber A because of a scheduled REX test. The speech path remains over the SWACT. Subscriber A flashes the hookswitch to set up a three-way call. Subscriber A receives a dial tone and dials the third party number. The third party answers and subscriber A flashes the hookswitch to connect subscriber B and complete the three-way call. The enhanced warm SWACT feature remains enabled because a disabling line service option was not active during the SWACT.

In the second example, subscriber A calls subscriber B and the system establishes a speech path. Subscriber A has the call waiting (CWT) line service option. A third party dials subscriber A. Subscriber A receives indication of the waiting call. A controlled warm SWACT occurs on the XPM that connects to subscriber A. Subscriber A attempts to place subscriber B on hold to access the waiting call. The system ignores the hook flash and the speech path between subscribers A and B remains. The system disables the enhanced warm SWACT feature and hook-flash capability is lost. These conditions occur because an incompatible line service option was active during the SWACT.

Pre-SWACT and post-SWACT enhancements

Pre-SWACT and post-SWACT activities are enhanced when the number of pre-SWACT checks on the inactive unit increases. Pre-SWACT and post-SWACT activities are also enhanced when diagnostics run on the newly active unit increase.

Pre-SWACT and post-SWACT tests include the addition of new checks to the pre-SWACT query. Tests also add diagnostics to the current post SWACT audit. The new checks and diagnostics can detect additional faults that can cause the newly active unit to fail. The new checks and diagnostics can detect problems and a SWACT back to the original active unit can occur.

The pre-SWACT query contains the following functionalities:

- For a manual warm SWACT, the pre-SWACT query includes the number of traps in the inactive unit. If the inactive unit contains a trap, a warning message appears at the MAP terminal.
- The pre-SWACT query includes static data mismatch in the decision to SWACT. If the active unit is InSv and the inactive unit is ISTb with static data mismatch, the pre-SWACT query fails.

The post SWACT audit contains the following functionality:

> The post-SWACT audit includes a section of in-service diagnostics on the newly active unit. The post-SWACT audit retains the current check for two-way communication with the computing module (CM). In-service diagnostics allow detection of some hardware faults on the newly active unit before the SWACT-back interval expires. This process permits a return of activity to the originally active unit, to prevent an outage.

The system can deny a warm SWACT request if the inactive unit has a history of failures. The system can deny a warm SWACT if the inactive unit has faults at the time of the SWACT request. If the system denies a request, the system displays the reasons for failure at the MAP terminal. The system displays two types of SWACT failure reasons. The first lists the history of failures by unit (diagnostic and other than diagnostic). The second lists the current diagnostic failure reports by unit. The system displays the failure reasons as the SWACT denial reason. The following is an example of a SWACT denial reason text:

```
Inactive unit has a history of: <history text> or Inactive
unit is reporting: <CPM text>.
```

The history text displays the following values:

- IMC link failures
- message link failures
- superframe sync failures
- inactive unit is unable to keep activity last time
- dropping activity for <autonomous drop reason>
- pre-SWACT query failure
- static data mismatch

The common peripheral module (CPM) text displays the following values:

- unit is jammed inactive
- in overload
- message link failure
- static data corruption
- IMC link failure
- pre-SWACT difficulties
- activity, in-service or out of service, and diagnostics
- history of traps

SWACT back capability

If an SMA does not receive a gain-acknowledged message from the CC, the originally active SMA unit initiates a SWACT-back. During a SWACT back, the originally active unit attempts to regain activity. If the SWACT back completes, the inactive unit becomes system-busy and returns to service. The active unit remains in service. Stable ISDN and POTS calls from the originally active unit remain over the SWACT-back. The system drops all calls made after the SWACT and made before the SWACT-back. If a SWACT back does not complete, both units of the XPM become system busy and return to service.

> ***Note 1:*** After a SWACT back, operational measurements and peg counts do not start again.
>
> ***Note 2:*** The XPM or CM overload does not support this feature.

A user can enter the following SWACT commands to access the SWACT back:

- SWACT
- SWACT TEST
- SWACT NOW
- SWACT ALL
- SWACT FORCE
- TST REX NOW
- BSY UNIT unit_no

> ***Note:*** The SWACT back capability is also available for a routine exercise (REX) test that the REX scheduler initiates For more information on how this feature interacts with the REX tests, refer to “Routine exercise tests”.

Manual switch of activity

To perform a manual SWACT, operating company personnel can enter the SWACT command at the MAP terminal. The following message appears at the MAP display.

```
A warm SWACT will be performed
after data sync of active terminals are attempted.
The inactive unit may not be capable of gaining activity
(please check logs).  Do you wish to continue regardless?
Please confirm (YES or NO)
```

The default is to not proceed because the newly inactive unit can take over call processing again.

Uncontrolled switch of activity

An uncontrolled SWACT can occur when

- both units have state InSv
- the active unit is InSv and the inactive unit is ISTb
- the active unit is InSv and the inactive unit is SysB

Each of these states can cause a different SWACT condition. The state of the units and the reason for the activity drop determine the order of events during an uncontrolled SWACT.

If a hardware fault occurs, the system produces a PM181 log. The log can contain messages that indicate the following:

- activity time-out
- no CM links—The fault causes message links to the CM or host XPM, to break, so that messaging cannot occur.
- duplicate fault—A critical hardware fault occurs.
- jammed—The unit jammed. The unit cannot change status (active/inactive).
- static data corruption
- The original active unit sends a drop message to the CM.
- The new active unit must send a gain message.

Like controlled SWACTs, the XPM continues to send the gain message again for up to 15 seconds.

An uncontrolled SWACT can occur if the original active unit is InSv and the original inactive unit is ISTb. The reason for the ISTb inactive unit determines the system action. If data synchronization causes the ISTb, the action is like the action when the active and inactive units have state InSv. If the ISTb is because of data synchronization, the original active unit drops sync and the XPM starts again.

If the original active unit is InSv for less than 3 min, the unit will RTS without the OOS diagnostics. The previous SWACT ran OOS diagnostics. If the original unit is active for more than 3 min, the active unit will RTS with OOS diagnostics.

The active unit attempts to RTS. If the active unit cannot RTS, both units become SysB and the XPM is SysB.

SMA system user interface

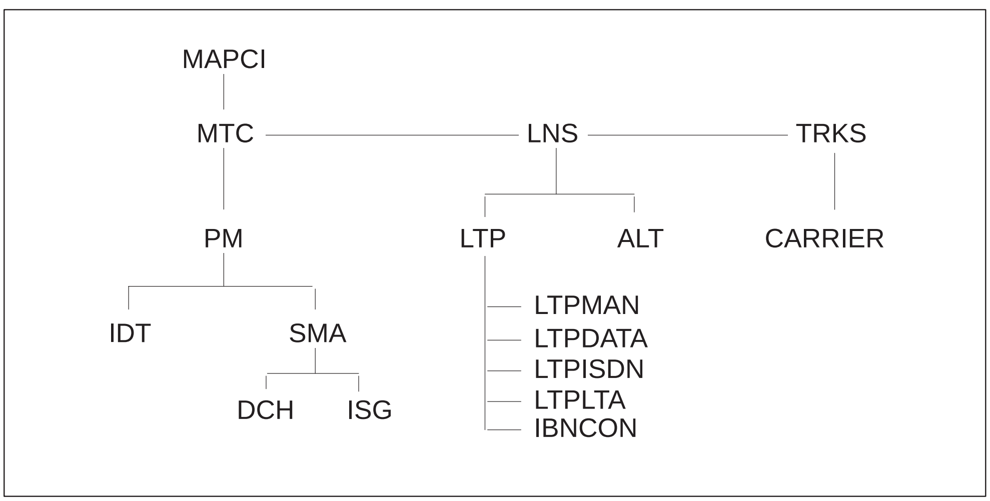
Introduction

This section introduces commands that help to maintain and solve problems in the SMA system.

This chapter describes the SMA system user interface. The name extended peripheral module (XPM) refers to any peripheral module like the SMA. In this context, the term XPM implies SMA.

The following figure shows the directory structure for command levels. The command levels monitor and maintain elements of the SMA system at the maintenance and administration position (MAP) terminal.

MAP directory structure



Obtaining help at the MAP terminal

You can obtain online help information for commands. At the command line at the MAP terminal, enter H or HELP and the command name with which you need help. Online help provides the following information for a command:

- description of the function of the command
- defaults for information that is not specified
- command syntax for required and optional parameters

The following example shows how to access online help with the HELP command:

```
>help queryrdt
QueryRDT: Display the name of the associated IDT for
        a given RDT.
Parms:  <Site>  STRING
        <Frame> {0 TO 99}
        <Unit>  {0 TO 9}
```

Interpreting command syntax

The following is the standard command entry sequence:

- command
- required parameter
- optional parameter

Online help provides information for parameters. Online help uses the following special formats and symbols:

- parameters appear on separate lines
- square brackets [ ] indicate that the parameter is optional
- angle brackets < > enclose the name of a required parameter
- underscore character (_) in a parameter name indicates that the value of the parameter is one word or string
- curly braces { } contain a complete list of possible values for the parameter
- information about the acceptable values for the parameter follow the name of the parameter

CI level user interface

Using the NAG command to display all nodes not in service

The node assessment graph (NAG) command is a command interpreter (CI) level command. The NAG command allows operating company personnel to display all the nodes that are not in service. The MAP response to the NAG command is like the response in the NAG400 log report. The command and log report are part of the NAG feature. This part of the NAG feature provides a snapshot of the nodes in the system that are not in service or that have a REX issue. To include the offline nodes in the output, the operating company personnel enter the command string NAG ALL. To turn the log report function on or off, the operating company personnel enter the command string NAG ON or NAG OFF. The log report function runs once each hour.

The output or log report includes the node if the node is in one of the following states: system busy (SysB), C-side busy (CBsy), in-service trouble (ISTb), or manually busy (ManB). The output or log report also includes the node if the node fails, aborts or does not complete the last REX test. If a node does not have a REX problem, the string ATP appears in the REX column. The string ATP indicates that the node passes all the tests.

An abbreviated report in response to the NAG command appears in the following output.

```
Front End Load: LECOB006
Level   Node        Status  REX INFO        UNIT 0  UNIT 1
----------------------------------------------------------
   CPU      1         ACT
CM                  NORMAL
MS                  NORMAL
MS                  NORMAL
IOD                 NORMAL
NET                 NORMAL
PM RCCI     0        SYSB   ATP             SYSB    SYSB
   LCM  KOPM 12 0    SYSB   PASS:   PASS    SYSB    SYSB
   RMM      1        SYSB   ----             --      --
   ESA      4        SYSB   ----             --      --
    :       :         :       :               :       :
   LTC      0        ISTB   ATP             ISTB    ISTB
   SMA      1        ISTB   ATP             ISTB    ISTB
   IDT      37       ISTB   ---              --      --
   IDT      38       ISTB   ---              --      --
   SMA      0        ISTB   ATP             ISTB      .
   RCC2     1        ISTB   ATP             ISTB    ISTB
    :       :         :       :               :       :
   LCM KRCM 03  0     .     PASS:   ----      .       .
Offline Node count:  3
```

Using the QUERYRDT command to display the host IDT

The QUERYRDT command allows operating company personnel to display the host IDT at a MAP terminal. Operating company personnel enter the RDT name to display the host IDT and associated host IDT. Use a terminal at the CI level of the menu. Enter the parameter RDT site, the frame (0 through 99), and the unit (0 through 9). This action allows the system to display the controlling host IDT.

For example, if the operating company personnel enter QUERYRDT RALG 00 0, the response of the system can be

```
IDT 5
```

This response means the external number for the IDT is 5.

Display the number of lines and terminals allocated to an IDT

The SHOWTERM command in the SMAUTIL level allows operating company personnel to

- view terminals and free spaces on a specified SMA
- monitor the number of lines and terminals that have been allocated to an IDT
- view the node table before adding more lines
- predict the terminal number fragmentation that would impact call processing

To access the SHOWTERM command, enter SMAUTIL at the CI level with the pm_type and pm_no, where the pm_type is an SMA and the SMA number. For example, if you enter SHOWTERM SMA 1, the response can be

```
>showterm sma 1
|PM NAME  |  TYPE   |# LINES  | NODE #| INDEX #   | START   | # TERMS|
|         |         |         |       |           | TERM    |        |
|--------------------------------------------------------------------|
| IDT   2 |  RFT    |   672   |   35   |   2     |     2   |    673 |
|--------------------------------------------------------------------|
| IDT  4  | GENTMC  |   671   |   36   |   3     |   675   |    673 |
|--------------------------------------------------------------------|
|            *** Free space ***                   |  1348   |  11839 |
|--------------------------------------------------------------------|
|   1343 Lines out of a maximum of 5376 have been allocated.         |
|--------------------------------------------------------------------|
```

Reprovision failed lines with RDTPROV level

Autoprovisioning occurs when the DMS SuperNode switch receives an event report from the RDT. The event report indicates a software problem with corrupt data. The RDT requests the switch to reprovision the RDT with line data from the switch. The system initiates the provisioning changes at the host office. If an RDT loses communication with the SMA at the host office, the system does not send the provisioning changes to the RDT.

Purpose of RDTPROV level commands

Operating company personnel use the RDT line reprovisioning (RDTPROV) tool to update provisioning changes needed between the RDT and the switch. The RDTPROV tool is available at the CI level of the MAP terminal. The RDTPROV tool allows the system to reprovision all failed lines on a RDT or all failed lines on all RDTs. The descriptions of failed lines are as follows:

- For POTS, EBS, and coin lines, a failed line is a line that has tuples in table LNINV. The failed line does not have a corresponding tuple in table RDTLT.
- For ISDN lines, a failed line is a line that has a tuple in table LNINV and
  - — does not have a corresponding tuple in table RDTLT. In this condition, the access side provisioning failed.
  - — the STATUS field equals WORKING, and the field TRANSP equals TRANSP_NIL for the corresponding tuple. The tuple is in table RDTLT. In this condition, the transport side provisioning failed.
  - — a corresponding tuple in table RDTLT. Table SPECCONN contains a tuple. The tuple has B1 or B2 channels of the ISDN LEN in the ENDPT1 or ENDPT2 field. In table RDTLT, the corresponding field NAILUP1 or NAILUP2 equals NAILUP_NIL. For this condition, again the nailup provisioning failed.

Note: To allow the Force command to provision the range of affected lines, operating company personnel must clear or delete the ISDN line objects which the FORCE command affects. Clear or delete the ISDN line objects at the RDT. Clear or delete the ISDN line objects through maintenance access at the RDT. If you do not clear the ISDN line objects, the lines fail to provision, and you must manually clear the ISDN line objects at the RDT. Now, you can run the REPROV command and not use the FORCE option to correct the problem at the DMS SuperNode switch.

The RDTPROV commands allow operating company personnel to initiate line provisioning requests to the RDT. Line provisioning occurs when the user enters the line in table LNINV. Use RDTPROV commands when the original object provisioning request fails. Reasons for provisioning failures vary. Two common reasons for provisioning failures are as follows:

- An attempt to provision an integrated digital loop carrier (IDLC) line in a slot already provisioned for a universal digital loop carrier (UDLC) service. An IDLC line is a line that provides digital access from the RDT to the central office switch. An IDLC line does not provide analog-to-digital conversion. A UDLC line is a line that requires analog-to-digital conversion through different access vehicles to the central office switch.
- An attempt to provision a line on a shelf without an installed line interface card (LIC)

After you resolve the cause of the provisioning failure, use the RDTPROV level commands to initiate a reprovisioning request.

RDTPROV level commands

Type RDTPROV at the CI level to enter the RDTPROV directory. The following commands are in the RDTPROV directory and are described in the next section:

- REPROV – enables lines to be reprovisioned at the RDT that have previously failed to be provisioned.
- ACTIVATE – activates autoprovisioning
- SUSPEND – suspends autoprovisioning

REPROV command

Enter the REPROV command with the appropriate parameters to initiate the reprovisioning request. The command parameters are identified as follows:

Access the RDT provisioning tool by typing

>rdtprov
and pressing the Enter key.

The system responds

```
RDTPROV:
```

Reprovisioning by IDT Reprovision all the failed lines on a specific RDT by typing

>REPROV IDT ext_idtno {Normal, Force}
and pressing the Enter key.

where

ext_idtno   is the external IDT number and has a value from 0 to 255

The NORMAL (default) or FORCE option is used with the command string REPROV IDT ext_IDT_no.

Note: The FORCE option can be used only if the IDT is offline.

The FORCE option is used only when object information is lost at the RDT. The FORCE option used with the command string REPROV IDT ext_IDT_no will not be able to delete and rewrite ISDN line objects if these objects are already present at RDT. This command should be done if there are lost objects at the RDT.

The FORCE option is used to reprovision all lines on the RDT.

The NORMAL option used with REPROV IDT ext_IDT_no will initiate a request to reprovision all the failed lines on the RDT.

Examples of reprovisioning by IDT Reprovision all lines on the RDT having, for example, external IDT number 107 by typing

>reprov idt 107
and press the Enter key.

The system sends a request to the specified RDT to provision all the failed lines. The system responds:

```
Reprovisioning all lines on IDT 107 for which provisioning has failed.
LEN : RDT1  07 0 01 03 RDT line provisioning request completed
LEN : RDT1  07 0 01 04 RDT line provisioning request completed
LEN : RDT1  07 0 01 05 RDT line provisioning request completed
LEN : RDT1  07 0 01 06 RDT line provisioning request completed
LEN : RDT1  07 0 04 54 Warning: Failed to provision line at RDT, Check
RDT306 Logs
5 reprovisioning attempt(s) have been made.
```

If the system generates a line provisioning failure message, check the RDT306 logs. After you resolve the condition that caused the provisioning failure, use the RDTPROV command to initiate the reprovisioning request again.

If operating company personnel attempt to reprovision an unequipped IDT by typing

>reprov idt 109
and pressing the Enter key, the system responds

```
IDT 109 is not equipped.
```

Operating company personnel should verify the external IDT number. If there is an error, repeat the command with an equipped external IDT number.

Reprovisioning by LEN Reprovision a failed line by LEN on a specific RDT by typing

>REPROV LEN len
and pressing the Enter key.

where

len	is any valid LEN which may contain the values for	
	frame	from 0 to 511
	unit	from 0 to 9
	shelf	from 0 to RDTINV defined maximum
	slot	from 0 to RDTINV defined maximum

Examples of reprovisioning by LEN Initiate a reprovisioning request for a line specified by LEN number RDT1 1 0 1 46, by typing

>reprov len rdt1 1 0 1 46
and pressing the Enter key.

The system sends a line provisioning request to the RDT and displays a message that identifies if the reprovisioning request was successful

```
LEN : RDT1 01 0 01 46 RDT line provisioning request completed
```

If operating company personnel attempt to reprovision non-RDT lines by typing

>reprov len RCU0 00 0 00 04
and pressing the Enter key, the system responds

```
LEN: RCU0  00 0 00 00 The line must be an RDT line for the
REPROV command
```

The RDTPROV provisioning tool works for RDT lines only.

If operating company personnel attempt to reprovision failed nailed-up connections on ISDN lines (B channel) that are already assigned to some service by typing

>reprov len RDT1 7 0 1 1

and pressing the Enter key, the system responds

```
SPECCONN tuple inactive, no reprovisioning attempt will be
made.
```

The SPECCONN tuple becomes inactive and B channels are no longer available for making nail-up connections. Operating company personnel should reprovision failed nail-up connections using the RDTPROV tool after the SPECCONN tuple becomes active.

Reprovisioning by range of LENs Reprovision a range of LENs by typing

>RDTPROV; REPROV RANGE start_len end_len {Normal, Force}

where

start_len and end_len are the LENs that make up the range of LENs to be reprovisioned.

The NORMAL or FORCE option is chosen depending on whether or not lines have failed provisioning at the DMS SuperNode switch.

- Enter the FORCE option to reprovision all lines within the designated range.
- Enter the NORMAL option to reprovision only lines that have failed provisioning.

Examples of reprovisioning by a range of LENs Reprovision a range of LENs by typing

>reprov range len rdt 4 0 1 1 rdt 5 0 1 32 FORCE

and pressing the Enter key.

The system deletes and reprovisions all tuples datafilled in LNINV within and including the given range. In this example, all lines are from RDT 4 shelf 1 slot 1 to RDT5 shelf 1 slot 32. If line provisioning fails on one or more lines, the lines are set to system busy (SB) at the DMS SuperNode switch until the problem is corrected at the RDT. After the problem is corrected, the line can be reprovisioned manually or automatically by the RDT line audit. Manual reprovisioning using the command string REPROV RANGE, is useful when provisioning data is lost at the RDT without the knowledge of the DMS SuperNode switch.

ATTENTION

Before using the FORCE option with the RANGE parameter, ensure that line provisioning data is deleted at the RDT for all lines affected by the RANGE parameter.

The FORCE option deletes and reprovisions all tuples datafilled in table LNINV within and including the given range.

The NORMAL option (default) reprovisions only lines that have failed provisioning.

The system responds to a request to reprovision a range of LENs with one or more of the following messages, where nn is the number of lines:

- When a reprovisioning request is submitted for a range of lines and the response is

  `REPROV command attempted to reprovision nn line(s)`

  then one or more of the following messages informing of the status of the line reprovisioning request can also be output

  - `nn line(s) was(were) not provisioned.`
    (if there were any)
  - `nn line(s) was(were) provisioned or being provisioned.`
    (if there were any)
  - `nn line(s) was(were) found unequipped.`
    (if there were any)
  - `nn reprovisioning attempt(s) have been made.`
    (if there were any)

  If none of the reprovisioned lines were in the range of lines submitted in the reprovisioning request, then the following message is output:

  `There are no provisioned lines in given range.`

- If the reprovision request is successful, then the response is

  ```
  All reprovisioning requests have been submitted or
  completed
  ```

  and the following message can also be output if there were lines in the range of lines that failed to reprovision

  ```
  nn line(s) failed to reprovision
  ```

  If attempts to reprovision lines were unsuccessful, then the following message is output

  ```
  No reprovisioning attempts have been made
  ```

Reprovisioning all failed lines Reprovision all the failed lines on all the RDTs by typing

>REPROV ALL
and pressing the Enter key.

Note: Operating company personnel can reprovision only failed RDT lines through this command.

Example of reprovisioning all failed lines Operating company personnel attempt to reprovision all lines on all RDTs by typing

>reprov all
and pressing the Enter key.

The system sends the reprovisioning request to all failed lines and to all RDTs. The response displays the results of the line reprovisioning requests sent to all the RDTs. If there are no equipped lines datafilled in table

LNINV for the IDT, the system responds with a message indicating this condition.

```
Reprovisioning all lines on IDT 101 for which provisioning has failed.
There are no equipped lines datafilled in table LNINV for IDT 101.
Reprovisioning all lines on IDT 102 for which provisioning has failed.
There are no equipped lines datafilled in table LNINV for IDT 102.
Reprovisioning all lines on IDT 103 for which provisioning has failed.
There are no equipped lines datafilled in table LNINV for IDT 103.
Reprovisioning all lines on IDT 104 for which provisioning has failed.
There are no equipped lines datafilled in table LNINV for IDT 104.
```

```
Reprovisioning all lines on IDT 107 for which provisioning has failed.
LEN : RDT1  07 0 01 04 RDT line provisioning request completed
LEN : RDT1  07 0 01 05 RDT line provisioning request completed
LEN : RDT1  07 0 01 06 RDT line provisioning request completed
LEN : RDT1  07 0 04 54 Warning: Failed to provision line at RDT, Check
RDT306 Logs
4 reprovisioning attempt(s) have been made.
Reprovisioning all lines on IDT 108 for which provisioning has failed.
LEN : RDT1  08 0 01 23 RDT line provisioning request completed
LEN : RDT1  08 0 01 54 RDT line provisioning request completed
LEN : RDT1  08 0 04 43 Warning: Failed to provision line at RDT, Check
RDT306 Logs
3 reprovisioning attempt(s) have been made.
```

If the reprovisioning request fails, check log RDT306. After the condition that caused the provisioning failure is resolved, use the RDTPROV tool command to initiate a reprovisioning request.

If operating company personnel attempt to reprovision all lines on all RDTs, and there are no RDTs datafilled in table RDTINV, by typing

>reprov all

and pressing the Enter key, the system responds

```
No RDTs are datafilled in table RDTINV.
```

ACTIVATE command

Activate autoprovisioning for a single RDT by typing

>ACTIVATE IDT <ext_idt_no>

and pressing the Enter key

where

ext_idtno   is a value from 0 to 255.

Activate autoprovisioning for all RDTs by typing

>ACTIVATE ALL

and pressing the Enter key.

SUSPEND command

Suspend autoprovisioning for a single RDT by typing

>SUSPEND IDT <ext_idt_no>

and pressing the Enter key

where

ext_idtno is a value from 0 to 255.

Suspend autoprovisioning for all RDTs by typing

>SUSPEND ALL

and pressing the Enter key.

Using RDTLNAUD level to control of RDT line data audits

The RDT line audit tool is available from the CI level of the MAP terminal. Access the RDTLNAUD level to use the line audit tool. From the RDTLNAUD level, operating company personnel can manually start or stop the RDT line data audit. You can query the audit status. To query the audit history, use the following commands:

The DMS SuperNode switch runs the RDT lines audit automatically every 24 hours. The RDT lines audit makes sure that the RDT receives current data. This audit also allows the system to refresh line data. The system refreshes line data when the line date managed between the IDT and the RDT does not match. Chapter 4, SMA automatic maintenance, describes the RDT lines audit.

Note: Only three manual audits run at one time.

Overview of RDTLNAUD level commands

Command	Parameters	Description
STARTLEN	A specified LEN range.	Starts a manual RDT line audit for a specified LEN range.
STARTRDT	The name of the RDT (site, frame, unit) to audit.	Starts a manual RDT line audit for a specified RDT.
STOP	The name of the RDT (site, frame, unit) to audit.	Stops all manual RDT line audits that run on an RDT.

—continued—

Overview of RDTLNAUD level commands (continued)

Command	Parameters	Description
QUERY	There are no parameters.	Queries the status of manual and system RDT line audit processes.
HISTORY	The name of the RDT (site, frame, unit) to audit.	Displays the start time of the last audit run on the given RDT and the status of the audit for this RDT.
—end—		

HISTORY command

The HISTORY command provides the time of the last audit and the state of the audit for the RDT that the system examines. An example of the table of information displayed in response to the HISTORY command follows:

```
>RDTLNAUD

RDT Audit command interface (RDTLNACI):

>history RDT1 08 0

  RDT OBJECTS AUDIT PROCESS HISTORY:
Last Audit  05/28/96  20:59:50.765 TUE
Status:  done
```

The following terms identify the status of the RDT audit:

- nil—the audit has not started for this RDT
- awaiting—the audit can start for this RDT
- suspended—the association is down and the system suspends the audit for this RDT
- inprogress—the audit is in progress for this RDT
- done—the audit completed for this RDT

QUERY command

The QUERY command takes a snapshot of all audits that run in the system at the time the user enters the command. The system can audit a maximum of seven RDTs and a maximum of three RDTs that are audited manually. In response to the QUERY command, The system provides the information in table form. The table can contain from 0 to 10 entries at any given time. An example of a system response to the QUERY command follows:

```
Type        RDT Name        Status
----        --------        ------
System1     RDT1 08 0       RDT1 08 00 22
Man 1       RDT1 13 0       RDT1 01 13 43
```

Using IDTMCC level to access the IDT maintenance connection

The IDTMCC level monitors and controls the IDT maintenance connection of the IDTs in the CM. The maintenance connection is a logical connection between the DMS SuperNode switch and the RDT. The system carries maintenance commands and messages across the logical connection. To access the IDT maintenance connection, enter IDTMCC at the CI level of the MAP terminal.

The commands and parameters at the IDTMCC level appear in the following table.

Overview of IDTMCC level commands

Command	Parameters	Description
SUMMARY	None	Lists all IDTs defined in table RDTINV and the SMA the IDT attaches to. Lists the state of the maintenance connection and the RDT type, and if the audit is active on this IDT.
QCONN	The number of the IDT from 0 to 255 or all	Provides connection information of one IDT. This information includes: the IDT number, the connection-ID, the state of the maintenance connection and the RDT type.
DISPLAY	The number of the IDT from 0 to 255 or all	Displays the statistical information for a specified IDT or all IDTs.
CLEAR	The number of the IDT from 0 to 255 or all	Clears statistical information for a specified IDT or all IDTs.
SETUP	The number of the IDT from 0 to 255 or all	Requests a maintenance connection to be set up a connection for a specified IDT or all IDTs. ***Note:*** The SETUP command is not directly accessible to the customer. The SETUP command is password protected.

—continued—

Overview of IDTMCC level commands (continued)

Command	Parameters	Description
SMAAUDIT	The number of the SMA or IDT from 0 to 255 or all with a request type of STOP, START, or QUERY, and TIMER. The timer value is 1 to 120 and a choice of timer unit of seconds or minutes	Starts or stops an audit for one SMA or one IDT.
IDTAUDIT	STATUS, START, STOP, and TIMER with a timer value of 1 to 120 and a choice of timer unit of seconds or minutes	Starts, stops, or queries an IDT audit.

RELEASE	The number of IDTs, or all IDTs on which to conduct maintenance actions	Aborts the connection of one IDT.
		Note: When the user enters the RELEASE command, the following warning appears at the MAP terminal:
		`Warning: This command will drop the maintenance connection. All OAM&P activities are disabled during downtime. An ISTb is posted to the IDT during downtime.`
		`MCC maintenance connection to be aborted?`
		`Please confirm (“YES”, “Y”, “NO”, or “N”)`

QUEUES	There are no parameters	Displays the MCC queue statistics.
STATS	What action to perform, PRINT or CLEAR	Displays or clears the MCC statistics.

—continued—

Overview of IDTMCC level commands (continued)

Command	Parameters	Description
SIMUL	The number of IDTs, or all IDTs on which to perform maintenance actions and what action to perform. These actions are like ADD, REMOVE, or ISTB.	Simulates IDT maintenance actions.
MCCIPC	The number of the IDT; and what action to perform, like STATS with PRINT or CLEAR, and STATUS, ACTIVATE, or DEACTIVATE.	Queries, activates, or deactivates MCC-IPC interface.

—end—

IDTMCC level command responses

This section presents responses to commands the user enters at the IDTMCC level of the MAP terminal.

An example of a system response to the QCONN command follows:

```
>QCONN 9
IDT Related Information for IDT  9
- - - - - - - - - - - - - - - - - - -
   IDT Maintenance State        : OffL
   Finite State Machine State   : Idle_Not_Candidate
   Current ISTB Reason Posted   : No Active EOC Path
   Last Abort Reason            : No Active EOC Path
   IDT Type                     : Generic TMC
   IPC Communication Status     : Control Channel is Up
   IPC Communication Status     : Data Channel is Up
   SMA State                    : Swact Not In Progress
   Connection Setup Counter     : 0
   Object Model Type            : TR303 Object Model
   Object Model Release         : 666
   Object Model Subrelease      : 666
   Object Model Version         : NIL_V
   IDT COnnection Timer         :  30 Seconds , State: Stopped
   IDT Transient Timer          :   2 Minutes , State: Stopped

SMA Related Information:
- - - - - - - - - - - - -
   SMA Number                   : SMA 1
   SMA Audit State              : Stopped
   SMA Audit Timer Value        : 5 Minutes
   IDT Audited by SMA audit     : Disable
```

An example of a system response to the SUMMARY command follows:

```
MCC IDT Summary Display:
-----------------------

IDT         SMA     Connection      RDT Type        CM-SMA
  6     SMA     0       Up          AccessNode      Up
  3     SMA     0       Up          AccessNode      Up
 12     SMA     1       Up          AccessNode      Up
 24     SMA     1       Up          AccessNode      up
  4     SMA2    0       Up          Generic TMC     up
  8     SMA2    0       Up          Generic TMC     Up
```

An example of a system response to the QUEUES command follows:

```
MCC Queues Information
----------------------
Number of Events queued to MCC process:      0, Max:     4, Min:    0
Number of free Events in SMA Audit queue:   256, Max:   256, Min:  255
Number of free Events in IDT Audit queue:     1, Max:     1, Min:    0
Number of free Events in SMA msg queue:     256, Queue never used
Number of free Events in Abort Req queue:   256, Max:   256, Min:  255
Number of free Events in Setup Req queue:   256, Queue never used
Number of free Events in MTC Req queue:     512, Max:   512, Min:  507
Number of free Events in NoCMSma queue:     256, Queue never used
Number of free Events in timer queue:       256, Queue never used
```

An example of a system response to the STATS command follows:

```
MCC Global Statistics
--------------------

-->  MCC Process Statistics
     - - - - - - - - - - - -
   NIL (Errors)                                 :    0
   SMA Audit Timer Expired                      :   17
   IDT Audit Timer Expired                      :    5
   SMA Message Received                         :   18
   Abort Connection                             :   22
   Set Up Connection                            :    1
   IDT Maintenance Request                      :   121
   No CM SMA Communication                      :    0
   Connection or Transient Timer expired        :    0

-->  MCC FSM Statistics
     - - - - - - - - - -
   IDT Maintenance Criteria Removed             :    4
   IDT Maintenance Criteria Added               :    8
   Connection Confirmation Received             :    1
   Transient Reject Timer Expired               :    0
   Maintenance Cleanup                          :    2
   Connection Setup Requested by CM             :    1
   Connection Setup Timer Expired               :    0
   Connection Aborted by Invalid OM             :    0
   Connection Aborted by SMA or RDT             :    0
   Connection Aborted by Stack Error            :    0
   Connection Aborted by XPM Swact              :    0
   Connection Aborted by Application            :    0
   Connection Aborted by CI Tool                :    0
   Connection Aborted by SMA Audit              :    0
   Connection Aborted by Lost SMA Com.          :   28
```

PM level user interface

This section presents PM level directories and commands. The user uses these directories and commands to monitor and perform maintenance on the SMA system.

PM states

The following table lists PM states seen at the MAP terminal.

Overview of PM states

PM state	Code	Description
Central side busy	CBsy	PM cannot communicate with the central control (CC) because the network interface links are not available The system uses these links to carry messages between PM and the DMS SuperNode network.
In service	InSv	PM is in-service and able to support any intended process like call processing.
In-service trouble	ISTb	PM is in-service but has a minor fault.
Manual busy	ManB	PM is busy because the user entered the BSY command at the MAP terminal.
Offline	Offl	PM is removed from service to allow commissioning testing or hold the SMA out of service for a limited time.
System busy	SysB	System maintenance removes the PM from service .

SMA level user interface

The SMA level monitors and maintains the SMA.

The system integrates the SMA into the peripheral module (PM) level MAP display. To access information about an SMA, you must post the SMA. The following figure shows a normal response at the MAP display terminal when you post an SMA.

Posting an SMA at the MAP display terminal

```
 CM   MS   IOD   Net   PM   CCS   Lns    Trks    Ext   Appl
  .     .    .     .  4 SysB  .     .      .       .      .
    SMA                 M
0  Quit                    SysB     ManB     Offl     CBsy  ISTb
2  Post_              PM      4        0       10        3     3
3  Listset            SMA     0        0        0        0     1
4
5  Trnsl_          SMA  0   ISTb   Links_OOS:  CSide  0  PSide  0
6  Tst_
7  Bsy_            Unit 0:  Act   ISTb
8  RTS_            Unit 1:  InAct ManB    Mtce
9  Offl
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16 DCH
17 Perform
18 ISG
     userid
 TIME  hh : mm>
```

The next table shows the commands supported for SMA at the PM level. The commands are in alphabetical order.

Overview of SMA commands

Command	Function	Description
BSY	Busy	Busies a unit of a posted SMA, a P-side link, a CLASS modem resource (CMR) card, or an SMA.
DCH	DCH sublevel	Accesses the D-channel handler (DCH) sublevel for D-channel handler maintenance. Available on SMAs that provide integrated services digital network (ISDN).
DISP	Display	Displays a group of SMAs in a specified state when you use the DISP command with the STATE option. Also displays diagnostic history of the SMA when you use the DISP command with the DIAGHIST option.
ISG	ISG sublevel	Accesses the ISDN services group (ISG) sublevel for ISG maintenance. Available on SMAs that provide ISDN.

—continued—

Overview of SMA commands (continued)

Command	Function	Description
LISTSET	Lists posted set	Lists the contents of the posted set.
LOADFW (non-menu)	Load firmware	Loads firmware into a PM or a unit. The parameters for this command are presented in the section titled “In-service firmware downloading” that follows this table.
LOADPM	Load PM	Loads software and data into one or both units of a posted SMA or the CMR card.
NEXT	Next	Posts the next SMA in a displayed set.
OFFL	Offline	Sets a posted SMA offline.
PMRESET	Peripheral reset	Resets posted SMA or SMA unit.
POST	Post	Posts a specified SMA, all SMAs in a specified state, or SMA peripherals as a group.
PERFORM	Perform sublevel	Allows operating company personnel to view details of the performance and activity of the posted SMA.
QUERYPM	Query PM	Displays information about a posted SMA. This information includes physical location, node number, associated peripheral load name, and associated faults. Also displays information about faults when you use the QUERYPM command with the FLT option. Displays information about the diagnostic history when you use the QUERYPM with the DIAGHIST option.
QUIT	Quit	Quits the current PM level of the MAP terminal or cancels an SMA selection.
RECOVER	Recover SysB PM	Recovers a system busy SMA. To recover a system busy SMA, the command determines if the PM was loaded and returns the PM to service.
RTS	Return to service	Returns the following to service a P-side link, one or both units of a posted SMA, or a CMR card.
SWACT	Switch activity	Switches SMA activity from the active to the inactive unit for a posted SMA. The SWACT Controller can deny the SWACT request because of the faults or previous performance of the inactive unit.

—continued—

Overview of SMA commands (continued)

Command	Function	Description
TRNSL	Translate	Displays information about the interface links between the SMA and network. Displays information about the DS-1 links between the SMA and remote digital terminal (RDT).
TST	Test	Tests one or both units of a posted SMA, a CMR card, or a DS-1 link between an SMA and RDT.
	—end—	

In-service firmware downloading

In-service firmware downloading permits XPM firmware loading in an SMA unit while the unit is in service (InSv). This feature reduces the amount of time one unit of the SMA is out-of-service (OOS).

Note: In-service firmware downloading refers to the loading of the firmware while the unit is InSv. The upgrade of the firmware occurs with the SMA unit out of service (OOS).

In-service firmware downloading uses the LOADFW command. The LOADFW command distinguishes the firmware load application from the firmware upgrade application. The command syntax for the LOADFW command is:

```
LOADFW: Load Firmware onto a PM or unit.
       All parameter will execute LOADFW on
       all PMs in the post set of the same
       PM type displayed on the MAP.
       LOADFW UPGRADE must be used to
       activate the new firmware
Parms: <DEVICE> {UNIT <UNIT_NO> {0 TO 1},
                 PM,
                 INACTIVE,
                 ACTIVE}
        [<FILENAME> STRING]
         [UPGRADE]
         [NOWAIT]
         [ALL]
```

To download firmware to the SMA, execute one of the following commands. The following are examples of the LOADFW command.

>LOADFW PM

or

>LOADFW UNIT unit_no

or

>LOADFW INACTIVE

Note 1: If the firmware_file is not specified with the LOADFW command, the command applies the firmware_file datafilled in the appropriate inventory table.

Note 2: By using the LOADFW command without the UPGRADE option, the firmware downloads to the DMS system.

The firmware option of the LOADPM command is disabled. A message is output to the user if the firmware option of the LOADPM command is used. This message states this option is not supported and to use the LOADFW command.

Loadfile verification Integrity checks are performed on the firmware for loadfile accuracy. A loadfile record length check ensures the file is a firmware file before submission to the SMA. If the record length is not 54, a message is output to the user and the LOADFW command fails.

Another accuracy check is a 32-bit cyclic redundancy check (CRC) along with a 16-bit checksum. The CM sends a validation message to the XPM to verify the accuracy of the firmware load. The XPM extracts the CRC and checksum that is in the firmware load. The XPM computes the CRC value and the checksum. The XPM compares the computed and extracted values to see if the values are the same. The XPM sends the result of the comparison to the CM.

To verify the firmware load enter the following command at the MAP display terminal:

>QUERYPM CNTRS

Firmware upgrade After loadfile verification, the XPM can be upgraded to the new firmware. To upgrade the firmware use one of the following command string sets:

>BSY PM
>LOADFW PM UPGRADE
>RTS PM

or

>BSY UNIT unit_no
>LOADFW UNIT unit_no UPGRADE
>RTS UNIT unit_no

or

>BSY INACTIVE
>LOADFW INACTIVE UPGRADE
>RTS INACTIVE

Note: By using the LOADFW command with the UPGRADE option, the firmware is upgraded to the new firmware load.

When this procedure is performed on an individual unit basis, perform a SwAct followed by the RTS command. Execute the LOADFW command with the UPGRADE option on the now inactive unit.

The following table lists parameters used with the LOADFW command.

LOADFW parameters

Parameter	Value	Definition
UNIT	N/A	Peripheral module unit
PM	N/A	Peripheral module
INACTIVE	N/A	State of peripheral module
ACTIVE	N/A	State of peripheral module
unit_no	0 or 1	PM unit number
filename	N/A	Name of firmware file. If the firmware file is not specified, the firmware load found in the appropriate inventory table is used.

Note: In this table N/A is an abbreviation for not applicable.

—continued—

LOADFW parameters (continued)

Parameter	Value	Definition
UPGRADE	N/A	Upgrades the PM to the new firmware load. UPGRADE is an optional parameter.
ALL	N/A	Permits the use of the LOADFW command on a posted set of PMs. ALL is an optional parameter.
NOWAIT	N/A	Returns the prompt before the command is finished, on-screen status is not visible. NOWAIT is an optional parameter.
Note: In this table N/A is an abbreviation for not applicable.		
—end—		

Examples of specific SMA commands

The following section provides examples for SMA (XPM) level commands.

Example of SWACT command

The user enters the command SWACT and does not enter parameters for a posted SMA. The following response appears at the MAP terminal.

```
A Warm SwAct will be performed after data
sync of active terminals.
Please confirm (“YES” or “NO”):
```

The user confirms the request for a SWACT. The following message appears at the MAP terminal.

```
SwAct refused by SwAct Controller
Inactive unit has a history of:
   Message link failures
   Superframe sync failures
Inactive unit is reporting:
   Unit is jammed inactive
```

The user decides to override the SwAct controller. The user enters the SWACT command with the FORCE option. The following response appears at the MAP terminal.

```
A Warm SwAct will be performed after data
sync of active terminals.
Overriding the SwAct Controller
Please confirm (“YES” or “NO”):
```

The user confirms the request to override the SWACT controller. The following message appears at the MAP terminal.

```
SwAct Failed
Reason:  XPM SwActback
```

The MAP response indicates the SWACT failed, and the originally active unit gained activity again.

The system adds additional responses to the history text and XPM text for the SWACT command. The user enters the SWACT command. The following message appears at the MAP terminal.

```
A Warm SwAct will be performed after data
sync of active terminals.
Please confirm (“YES” or “NO”):
```

Operating company personnel confirm the request. The following message appears at the MAP terminal.

```
SwAct refused by SwAct Controller
Inactive unit has a history of:
   Static data mismatch with CC
Warning: The inactive unit has a :
   History of 3 traps
```

Example of the DISP command

There are two options of the DISP command. One option of the DISP command is the STATE option. Use the STATE option with a specified state like SysB. The STATE option requests the system to provide a list of all the PMs in the specified state. Use the STATE option with a specific PM to display all XPMs of the requested type. An example of a type is SMA.

The following is an example of the DISP command with the STATE option with a selected PM. The system responds and lists all XPMs of the requested state and PM type.

>MAPCI;MTC;PM;DISP STATE SMA

```
> MAPCI;MTC;PM;DISP STATE SYSB SMA
   SysB SMA : 0
```

XPM diagnostic history

Extended Peripheral Modules Diagnostics History provides a resident database to record selected diagnostic results of XPMs. The Extended Peripheral Modules Diagnostic History feature captures diagnostic results that indicate the sanity of the XPM. You can use the data in this database to influence DMS maintenance activities. This database provides operating company personnel with MAP command access to data on the accumulated results of diagnostics. The system retains data in the history database over warm, cold, and reload restarts. This feature is part of software package New Peripheral Maintenance (NTX270AA) and is not an optional feature.

This feature is one of a group of three features that are related to each other. The two other features are: XPM PreSwact/Post Swact Audit, and XPM REX Control and Trouble Notification Improvements. The XPM PreSwact/Post Swact Audit feature uses a subset of diagnostic results and past REX tests and SWACT results. The XPM PreSwact/Post Swact Audit uses these results to determine the if the system must perform a SWACT. This text refers to the functionality the XPM PreSwact/Post Swact Audit introduces as the *SWACT controller.* The XPM REX Control and Trouble Notification Improvements feature modifies the XPM REX test to use the *SWACT controller* and provide log improvements.

An XPM can execute diagnostics to test the functionality of the hardware of the XPM. Diagnostics can run because of CC or XPM requests. Diagnostics that the XPM performs are normally part of XPM audits. The *SWACT controller* and operating company personnel use the diagnostic results of the Extended Peripheral Modules Diagnostics History for system analysis.

One option of the DISP command is the DIAGHIST option. The default for the DIAGHIST option is to display all supported XPMs. You can use the option with a specified PM to display all XPMs of the requested type.

If the requested PM is not supported, the system displays the following message.

```
Diagnostic history is not supported
for this PM type.
```

If there are no peripherals on the requested PM, the system displays the following message.

```
None.
```

The following is an example of the use of the DISP command with the DIAGHIST option with a selected PM. The system displays the diagnostic history for all XPMs of the requested PM.

>MAPCI;MTC;PM;DISP DIAGHIST SMA

```
 Diagnostic History for RTPK04AY
 Report generated 95/03/29 WED at 13:36:20

 SMA 0  Long–Term Failure (LTF) last reset: 95/03/24 08:44:53
   UNIT 0  Short–Term Failure (STF) last reset: 95/03/29
  12:28:23
        Last diagnostic failure: 95/03/24 12:28:23
              DIAGLIST      STF         LTF
                AB DIAG      1            3
              CARDLIST     STF          LTF
                NTAX78       2            2
              Note:  Cards reported by the mate unit
                      are indicated by a ”*”
   UNIT 1  Short–Term Failure (STF) last reset: 95/03/28
  16:12:15
        Last diagnostic failure: 95/03/28 15:41:45
              DIAGLIST      STF         LTF
               AB DIAG      1            3
              CARDLIST     STF          LTF
                NTAX78       2            2
```

Using the DIAGHIST option with the QUERYPM command

The QUERYPM command has an added option called DIAGHIST. The DIAGHIST option displays the history of diagnostic failures for the posted peripheral. The DIAGHIST option displays the following information for the posted SMA:

- short- and long-term failure counts for each unit
- last reset date and time for short term failure counters for each unit
- last reset date and time for long-term failure counters for the complete node

Reset of long term failure counters can occur from this level. The last diagnostic failure time is the time of the last diagnostic failure on the specific unit. Enter the command string QUERYPM DIAGHIST to provide a summary of diagnostic failures and cards. The system reports these failures and cards as hardware faults. The hardware faults are identical to the format that the command string DISP DIAGHIST displays. The MAP responses in this text are examples only.

If the requested PM is not supported, for example the IDT, the system displays the following.

```
Diagnostic history is not supported
for this PM type.
```

If a unit of the peripheral does not have diagnostic failures or card faults, the system displays the following.

```
No failures recorded.
```

The DIAGHIST option has three additional parameters:

- reset
  - — allows long-term failure counters to be reset to zero. The system generates a PM601 log and records a summary of the long-term failure counters before the counters are reset.
- diag
  - — displays the short term and long term failure counts of the diagnostics each unit of an XPM fails. The diag parameter does not contain card information.
- card
  - — displays the short term and long term failure counts of the cards on each unit of the XPM. The system reports these failures as hardware failures. The card parameter contains diagnostic information

Note 1: Do not use the reset parameter often. The reset parameter changes long-term failure counters to zero.

Note 2: The card parameter provides a asterisk (*) next to any card that a diagnostic reports on the mate unit in the XPM.

The following examples are examples of the command string QUERYPM DIAGHIST. The user uses with and without optional parameters.

>MAPCI;MTC;PM;POST SMA 1; QUERYPM DIAGHIST

```
SMA 0  Long–Term Failure (LTF) last reset: 97/03/24 08:44:53
  UNIT 0 Short–Term Failure (STF) last reset: 97/03/29
12:28:23
       Last diagnostic failure: 97/03/29 12:47:55
       DIAGLIST  CARDLIST          STF       LTF
         AB DIAG: Total failures     2         3
                : NTAX78             0         3
  UNIT 1 Short–Term Failure (STF) last reset: 97/03/28
16:12:15
       Last diagnostic failure: 97/03/28 15:41:45
       DIAGLIST  CARDLIST          STF       LTF
         AB DIAG: Total failures     1         1
                : NTAX78             0         3
         SPCH DG: Total failures     1         4
                : NTAX78             0         1
                : NT6X41             0         3
```

This response is the default information for the DIAGHIST option. The failed diagnostics and associated cards appear in the response. The two in the STF column of the display shows that on unit 0, the ABDIAG failed twice from the last time unit 0 gained activity. The last time that unit zero gained activity was at 12:28 A.M. on 3/29. The numbers underneath the 1 indicate the cards involved. The ABDIAG failed three times since the LTF reset time. The LTF reset time was 8:44 A.M. on 3/24.

When you define this display, remember that a single test can result in a minimum of one diagnostic failure. A single test can result in zero or more associated cards. The sum of card counts from this display in not always the correct number of times an analysis fails. Also, the cards can be on either unit. Only certain diagnostics report failures on the mate unit. This display shows cards on the same unit that the system runs the diagnostic.

The following command strings identify additional command syntax that you can use with the QUERYPM DIAGHIST command. Enter the command syntax at the command line with the posted SMA.

>QUERYPM DIAGHIST DIAG

This command string displays the diagnostic counts.

>QUERYPM DIAGHIST CARD

This command string displays the card counts.

>QUERYPM DIAGHIST RESET

This command string resets the LTF counts to zero.

SWACT controller

This feature provides short term diagnostic performance data to the *SWACT controller.* A set of query procedures is provided for applications that require the short-term diagnostic performance data. The *SWACT controller* determines if a SWACT must occur. Short–term data for a given unit is diagnostic and audit failure counts. The diagnostic and audit failure counts are measured from the last time a unit gained activity.

Operating company personnel analysis

Extended Peripheral Modules Diagnostics History provides data on the failure history of diagnostics. This data is in the form of the number of failures that occur and which cards are defective. The MAP commands display data for a given XPM or for all XPMs the Extended Peripheral Modules Diagnostics History feature supports. The MAP commands provide two sets of data. The MAP commands provide short–term failure counts and long-term failure counts.

Short term failure counts The system counts these failures from the last time a unit gained activity. Operating company personnel can use this data to guide their maintenance activities and support organizations for outage analysis. If an outage occurs, include the XPM Diagnostic History data for that peripheral with other related data.

Long term failure counts The system accumulates these failures from the last time manual action or Product Computing-Module Load (PCL) application resets long term failure counts. Long term failure counts occur for the life of the PCL. This data returns to the design groups to provide data for additional diagnostic system improvements.

Description of diagnostics

Every type of PM requires different diagnostics because different PM contain different hardware. There are approximately 75 diagnostics for XPMs. A given PM requires only a subset of the 75 diagnostics. This feature captures failures for the following types of diagnostics:

- in service
- out of service
- single diagnostic
- facility audit
- other audits

Each diagnostic indicates zero or more cards. The XPM determines the number of cards. In some conditions, CC generates card lists to display at the MAP terminal or in logs. A list of card failures includes any card that a

XPM diagnostic or audit indicates. The list also includes any card reported to CC.

> ***Note:*** Extended Peripheral Modules Diagnostics History records only the cards that a XPM indicates and not the cards that CC generates.

Diagnostics can be grouped to and run as a set of diagnostics. Diagnostics can be run as a single test. Defined sets of diagnostics are:

- in-service tests
- out of service tests
- facility audit tests
- mate diagnostics
- ROM diagnostics

In-service and out of service tests

In-service and out of service tests are solicited tests. The XPM runs the in-service and out of service tests in response to CC requests. The XPM runs a set of diagnostics when CC requests the use of specified commands to test an XPM unit. The commands are the manual TST command, the manual or system RTS command , the SWACT command, the BSY command and the REX command. The PM type of the XPM determines the diagnostics in the set. The state of the XPM unit and the activity of the XPM unit also determine the diagnostics in the set. When the unit is in service, the XPM runs a set of in-service diagnostics. When the unit is out of service, the XPM runs a set of out of service diagnostics.

The system returns the results of separate diagnostics to CC along with a final result for the complete set. If any cards are defective, the system generates a card list. The system transfers the card list to CC at the termination of the set of tests.

Facility audit

The facility audit is a set of diagnostics the XPM runs periodically to test the XPM. If the facility audit finds problems, the audit sends a message to the CC. The message indicates the problem and provides a list of defective cards.

Mate diagnostics

If the system loses communication with one unit, the mate unit can diagnose the unit. The mate unit sends the results to CC.

ROM diagnostics

If the XPM is at ROM level, the XPM can implement a set of ROM diagnostics.

This feature does not capture failures. This feature does not capture the cards that the mate and ROM diagnostics indicate. The system generates a card list or log for each diagnostic. The system generates the card list or log at the MAP terminal. The system does not record a card list or diagnostic failure in the diagnostic history.

The following table lists and describes the SMA-related diagnostics that this feature supports. The table describes the diagnostics as *solicited*, *audit*, or *both*. The table identifies the diagnostics that the *SWACT controller* requires.

Diagnostics supported

Diagnostic name	Description	Type	Required by SWACT controller
ABDIAG	A/B Bits	solicited	no
AMUDIAG	6X50 External Loop	solicited	no
CMRDIAG	CMR card	both	no
CONT DG	Continuity Diag	solicited	no
CSMDIAG	CSM Diag	solicited	no
DCHIALB	DCH Inactive Loopback		
FACAUD	Facility Audit	audit	no
FORMATR	Local Formatter	solicited	no
ISPHDLC	ISP HDLC Diag	solicited	no
ISPSPHI	ISP Speech Bus Internal	solicited	no
ISPSPHF	ISP Speech Bus Full	solicited	no
MSGDIAG	6X69 Messaging Card	solicited	yes
MSGIMC	IMC Link	both	yes
PADRING	6X80 Pad/Ring	solicited	no
PSLOOP	P-Side Loops	solicited	no
SPCHDG	Speech Path	solicited	no
STRDIAG	Special Tone Receiver	solicited	no
SYNCDG	Sync Diag	both	yes
TONESDG	Tone Diag	both	no

—continued—

Diagnostics supported (continued)

Diagnostic name	Description	Type	Required by SWACT controller
TSDIAG	Time-Switch Diag	solicited	no
UTRDIAG	UTR Card	solicited	no
—end—			

The following table lists the SMA cards that this feature supports.

Supported cards

Card name	Description
NT6X40	Net Interface Link
NT6X41	Speech Bus Formatter and Clock
NT6X42	CSM
NTAX78	Enhanced timeswitch and A/B Bit Logic
NT6X50	DS-1 Interface
NT6X69	Messaging Card
NT6X78	CLASS Modem Resource (CMR)
NT6X92	Universal Tone Receiver (UTR)
NTBX01	ISDN Signaling Processor (ISP)
NTBX02	Enhanced D-channel Handler (EDCH)
NTAX74	Cellular Access Processor (CAP)

How this feature stores diagnostics

This feature stores diagnostic results in counters. Each unit of each peripheral that this feature supports has a specified set of counters. This feature keeps counters for diagnostic failures and for defective cards. This feature keeps three types of counters:

- diag
  — the number of times a diagnostic fails
- card
  — the number of times a card is reported as defective
- diag and card combination
  — the number of times a diagnostic and card combination occurs

This feature keeps two subcounters for each of the three counters. These two subcounters are a short term failure counter, and a long term failure counter. The XPM PreSwact/Post Swact Audit uses short term failure counters to determine if a SWACT must occur. The system resets short term failure counters often in the PCL cycle. Long term failure counters record the diagnostic history of a peripheral or office over a extended period of time. The system resets the long term failure with the QUERYPM DIAGHIST RESET command or by a PCL application.

A single test failure can report one or more diagnostic failures and zero or more defective cards. It is possible for a diagnostic that runs in one unit to report cards in that unit and also the corresponding mate unit. When a diagnostic fails, the separate diagnostic routine sends the failure information to the history database.

Resets and time stamps

The history database stores five time stamps for every peripheral:

- for the node
  — the time when long term failure counters are last reset
- for unit 0
  — the time when short term failure counters for unit 0 are last reset
  — the time when the last diagnostic failure occurred on unit 0
- for unit 1
  — the time when short term failure counters for unit 1 are last reset
  — the time when the last diagnostic failure occurred on unit 1

The system resets short term counters internally for each unit when a unit gains activity. The system sets the short term counters to zero. An RTS or

SWACT command can cause the unit to gain activity. The system resets long term counters for each node from an XPM posted at the MAP terminal. When the system resets long term counters, the system generates a log. The log contains a summary of the data collected for the specific node before the reset.

A PCL application resets all diagnostic history data. The data includes short and long term failure counts. In this occurrence, the system does not generate a log with long term failure counts.

DCH level user interface

The menu display for a posted SMA equipped to provide ISDN service provides access to two additional sublevels: DCH and ISG. The DCH-level and ISG-level commands appear in the next two tables. Enter the following command string at the MAP terminal to obtain a description of command syntax:

>HELP command

where

command is the entry in the Overview of DCH commands, and Overview of ISG commands tables.

Overview of DCH commands

Command	Function	Description
BSY	Busy	Busies a specified Enhanced D-channel handler(EDCH) or all posted EDCHs with ALL option
DISP	Display	Displays EDCH and ISG information
LOADPM	Load EDCH	Loads software into busied EDCH(s)
NEXT	Next	Steps to the next EDCH in the posted set
OFFL	Offline	Sets a specified EDCH offline
POST	Post	Selects one or more EDCHs
QUERYPM	Query EDCH	Displays EDCH location information; FLT parameter displays EDCH fault information
QUIT	Quit	Quits the current level
RTS	Return to service	Returns a specified EDCH to service, and performs diagnostics

—continued—

Overview of DCH commands (continued)

Command	Function	Description
RTS FORCE	Return to service	Returns a specified EDCH to service, does not perform diagnostics
SWITCH	Switch	Moves the EDCH services to a spare
TRNSL	Translate	Displays ISG channel information
TST	Test	Tests the specified EDCH
TST ROM	TestROM	The TST ROM runs a set of non–destructive ROM diagnostics on the specified EDCH. The TST ROM DESTR runs a load destructive test on the EDCH: Do not load the EDCH first
TST ROM DESTR	TestROM	Same as TST ROM as well as destructive memory and address tests on the entire 4 Meg of memory
	—end—	

Overview of ISG commands

Command	Function	Description
BSY	Busy	Busies a specified channel
CONT	Continuity	Performs a channel continuity test on a specified channel
LOOPBK	Loopback	Sets up, releases, or queries a channel loopback point
NEXT	Next	Steps to the next ISG on the posted set
OFFL	Offline	Sets a specified ISG offline
POST	Post	Selects one or more ISGs
QUERYCH	Query channel	Displays channel endpoint information
QUIT	Quit	Quits the current level
RTS	Return to service	Busies a specified channel

User interface for the IDT

The integrated digital terminal (IDT) is a logical entity that corresponds to a section of the switch. The section is for a single access vehicle. The main purpose of this level is to permit maintenance procedures on the message channels between the SMA and the access vehicle.

The following sections contain

- the IDT MAP level
- an overview of the commands in a table
- specified commands that show how the commands work Key parameters are included.
- examples to show the use of the commands
- possible responses to commands in a table

The following figure shows the response at the MAP display when you post an IDT.

Posting an IDT at the MAP display

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     Appl
    .      .      .       .     IDT      .       .       .        .
    IDT
0   Quit
2   Post_                SysB     ManB      Offl     CBsy    ISTb  InSv
3   Listset        PM       0        0         8                0     25
4                  IDT      0        1         1        0       0      5
5   Trnsl
6                  IDT 17   ManB         LINKS_OOS: 0
7   Bsy
8   RTS
9   Offl
10
11  Disp_
12  Next
13
14  QueryPM
15  RDTalarm
16  PPS_
17  CONT_
18  LOOPBK_
       userid
    TIME    hh : mm>
```

The “Overview of IDT level commands” table gives an overview of all IDT commands.

Overview of IDT level commands

Command	Parameters	Description
BSY	None or the message channel, such as EOC1 or CSC1	Busies either the entire IDT or a message channel. You cannot busy the last in-service common signaling channel (CSC) path for an IDT that is in service. If you busy the last embedded operations channel (EOC), you will lose the maintenance interface with the RDT.
CONT	The message channel and the type of test, INT or EXT	Allows a continuity test to be run on an IDT path.
DISP	State (DIAGHIST is not functional for IDT)	Displays all IDTs in specified PM state.
LISTSET	ALL or pm_type	Lists the contents of posted sets.
LOOPBK	The type of loopback command, SETUP, RLS, or QUERY, and the message path	Sets up, releases, or queries a loopback for a path at the enhanced ISDN signaling preprocessor (EISP) towards the RDT. The path must be manually busy, and the SMA must be in service.
NEXT	Next	Posts the next IDT in a displayed set.
OFFL	Offline	Sets a posted IDT offline.
POST	Post	Posts a specific IDT, all IDTs in a specified state, or IDT entities as a group.
PPS	QUERY, ACT, INH, or ENA	Allows operating company personnel to enable, inhibit, or activate protection switching for message channels.
PROGRESS	ON, OFF, or QUERY	Activates, deactivates, or queries the progress field.
QUERYPM	None or FLT	Displays information about the IDT and the RDT name when used with no parameters. When used with the FLT (fault) parameter, gives in-service trouble (ISTb) reasons. The primary operations controller (OPC) id, and the backup OPC id are suppressed if the IDT and RDT are of type GENTMC.
QUIT	None	Quits the current PM level of the MAP terminal or cancels an IDT selection.

—continued—

Overview of IDT level commands (continued)

Command	Parameters	Description
RDTALARM	None	Provides a count of active alarms on the RDT associated with the IDT, sorted by category and severity. The primary OPC id and backup OPC id are not displayed for variant type GENTMC. Alarm categories of threshold alert and indeterminate are displayed.
RTS	None or the message path	Returns to service the IDT or a message channel. The IDT or message channel must be manually busy.
TRNSL	None	Displays the link and channel connectivity for the IDT.
—end—		

Using specific commands

The following sections contain the IDT level commands. The sections also include a section on the relationship between busying and returning to service the CSC channel and associated IDT.

BSY the IDT

You can use this command to manually busy the IDT. The DMS-core performs the following:

1. tells the SMA to update its view of the IDT state to manually busy (ManB)
2. tells the SMA to disable DS-1 maintenance scanning on P-side links of the IDT
3. tells the SMA to close the P-side links of the IDT
4. updates its view of the associated RDT line states to the line module busy (LMB) state
5. updates the state of the IDT to ManB at the MAP display

Note: To implement BSY, the IDT must be in-service (InSv), ISTb, system busy (Sysb), offline (Offl), or C-side busy (CBsy). If the IDT is SysB or Offl, the DMS-core does not perform steps two, three and four.

BSY the message channels

When you use the busy command with the message channel parameter, you only busy the specified message channel. The following events can occur when you busy a message channel:

- If you busy one of two CSCs or EOCs, the IDT goes ISTb and the system generates a PM128 log.
- If you attempt to busy the last CSC available, you receive a message. The message indicates that the system does not permit this action because the action stops call processing.
- If you busy the last EOC, maintenance interface to the RDT is not present.

CONT

The CONT command allows the system to run the continuity path. The system specifies the type of channel like EOC1. A parameter specifies the location of the loopback. One possible value, internal loopback (INT), sets the loopback point at the EISP. The system automatically sets up the loopback. The system automatically takes down the loopback at the end of the test. The other value, EXT, assumes a loopback point has already been set up at the remote end. The EXT parameter runs the continuity test from the EISP to the loopback point. The user must manually take down this loopback at the far end.

To run the CONT test, the IDT must be in-service, but the message channel must be manually busy.

LOOPBK

Use the LOOPBK command to set up, release, or query an external loopback on a path toward the RDT. The possible paths include the EOC or CSC. When the system sets up the path, you can run continuity tests on the path. Use the CONT command to run these continuity tests.

RTS the IDT

The RTS command returns the IDT to service. The DMS-Core performs the following:

1. performs diagnostics on the IDT
2. tells the SMA to enable DS-1 maintenance scanning on the P-side links of the IDT
3. tells the SMA to open the P-side links of the IDT
4. informs the SMA of call processing execs required for the IDT as well as what lines of the associated RDT are to be active for call processing
5. tells the SMA to update its view of IDT to InSv

6 updates the view of the RDT line states to idle (IDL)

7 updates the state of the IDT to InSv at the MAP terminal

Note: To implement a RTS, the SMA and the P-side links of the SMA that contain the messaging channels must be InSv.

RTS the message channels

The RTS command for a message channel runs a series of tests, and returns the channel to service. When the RTS command returns a CSC channel to service, the IDT must already be IsTb. This limit is one of many limits that control the interaction of CSCs and the associated IDTs. The next section explains this interaction.

How BSY and RTS interact for CSCs and IDTs

An IDT requires that at least one CSC is InSv to allow call processing. The following rules determine how the states of the IDT and the associated CSC or CSCs interact:

- When an IDT goes out-of-service, the system marks the CSCs as out-of-service (OOS). If operating company personnel busies the IDT, the CSC paths remain OOS. If operating company personnel busy the CSCs, operating company personnel must busy the paths manually. Operating company personnel can use the PPS QUERY command to view the status of these channels.
- While the system returns an IDT to service, a CSC the operating company personnel busied will not go InSv at the same time. This sequence makes sure that the system does not return a bad CSC to service with the IDT. The CSCs that are OOS but not manually busied are in the return-to-service sequence.
- The system can return an OOS CSC to service if the following occurs:
  - — the IDT is already IsTb
  - — the IDT returns to service

PPS

At the IDT level, you can use the path protection switch (PPS) command to query and control the protection switching capability for the posted IDT. The following capabilities are available:

- to query the status of all paths that subtend the IDT
- to set and clear the inhibit attribute for paths that subtend the IDT
- to use the parameter ACT to manually implement protection switching using the parameter ACT

The parameters for the PPS command appear in the following table.

Parameters of the PPS command

Parameter	Function	Path	Options
ACT	Activates a path or performs a protection switch	EOC1, EOC2, CSC1, or CSC2 (see note)	FORCE
ENA	Enables protection switching to occur to a path	EOC1, EOC2, CSC1, or CSC2 (see note)	None
INH	Does not allow protection switching to occur to a path	EOC1, EOC2, CSC1, or CSC2 (see note)	None
QUERY	Shows how the EOCs and CSCs are configured	not applicable	None

Note: For protection switching to occur, there must be two of each type of path.

PROGRESS

The PROGRESS is a non–menu command that provides access to a field to display the steps of maintenance tasks as the steps occur. Use the PROGRESS command to help operating company personnel understand the sequence of system events for a particular maintenance task.

For example, with PROGRESS ON, the LOOPBK and CONT commands cause the system to display the following messages:

```
Sending CONT Int
Sending CONT Ext
Sending LPBK Set
Sending LPBK Rls
```

RDTALARM command

The RDTALARM command provides information about alarm counts at the RDT. The RDTALARM command also provides information about how to track the alarms. This information includes the RDT name, network element number, and network element name. The RDTALARM command initiates messaging between the DMS SuperNode switch and the RDT. This messaging retrieves the current alarm counts. If messaging fails, the system displays an error message. The type of error message determines if the error message can show the last known alarm counts. This section contains a description of the possible error messages. The alarms table is stored for each IDT. The alarms table contains the number of alarms of each category and severity that are last known to be active at the RDT. The type of IDT posted determines the type of response that the RDTALALARM command receives. The next figure is an example of the response to the RDTALARM command for a GENTMC RDT.

Active alarms table for GENTMC RDT

```
  CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     Appl
   .      .       .       .    1IDT      .       .       .     2Crit
                               *C*                              *C*
    IDT
0  Quit                  SysB     ManB      Offl     CBsy    ISTb   InSv
2  Post_         PM        0        0         3        0       2     130
3  Listset       IDT       0        0         0        0       2      15
4
5  Trnsl         IDT 3    ISTb      LINKS_OOS: 0     RDT Type:  RFT
6                RDTalarm
7  Bsy           RDT Name:  RDT1 03 0
8  RTS           Network Element:   3 RALEIGH_AMEX_B13
9  Offl
10
11 Disp_         ACTIVE ALARMS  :  Fac  Eqp  Env  Sfw  Svc  Thr  Ind
12 Next          ----------------------------------------------------
13               Critical       :   2    0    0    0    0    0    0
14 QueryPM       Major          :   0    1    0    0    0    0    0
15 RDTalarm      Minor          :   0    0    0    0    0    0    0
16 PPS_          Warning        :   2    0    1    0    0    0    1
17 CONT_
18 LOOPBK_
      userid
  TIME    hh : mm>
```

Note: A summary of active RDT alarms is received if the RDT supports the Alarm Count List object class.

The next figure is an example of a failure condition for a GENTMC RDT after the user enters the RDTALARM command.

Active alarms table failure for GENTMC RDT

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    Appl
   .      .     .      .    1IDT    .      .      .     2Crit
                            *C*                         *C*
   IDT
0  Quit                SysB     ManB      Offl     CBsy    ISTb  InSv
2  Post_        PM       0        0         3        0       2     130
3  Listset      IDT      0        0         0        0       2      15
4
5  Trnsl        IDT 3    ISTb       LINKS_OOS: 0     RDT Type:  RFT
6
7  Bsy          RDTalarm
8  RTS          RDT Name:  RDT1 03 0
9  Offl         Network Element:   24 Unnamed
10
11 Disp_
12 Next
13
14 QueryPM
15 RDTalarm
16 PPS_
17 CONT_
18 LOOPBK_
       userid
    TIME   hh : mm>
```

If the RDTALARM command fails, the system displays an error message. This failure message indicates the failure of messaging to the RDT, and the system cannot verify the current alarm counts. Possible reasons for failure are:

- Maintenance connection is not established. The EOC maintenance connection to the RDT is not established. Messaging to the IDT cannot occur until the correction of the problem.
- Temporary resource allocation problem. The system cannot allocate a required system resource. The problem can be transient. Operating company personnel must enter the command again.
- A response was not received from RDT. The DMS SuperNode switch did not receive a response message that contains the active alarms counts. There can be a problem with the maintenance connection, or a failure at the RDT.
- Messaging failure. A problem occurs with the messaging protocol between the DMS SuperNode switch and the RDT. This problem can indicate a software load mismatch, or a software error in the DMS SuperNode switch or RDT.

- Software error – check logs. An unexpected software error is present. Check the DMS SuperNode switch log system for SWERR logs.
- The RDT does not support alarm counting. The queried RDT does not support The Alarm Count List object class.
- Alarm counting is not configured on the RDT. The Alarm Count List object class is not created. The LDS creates the object on the RDT.

Examples at the IDT level

The following examples show the different uses of commands that relate to SMA maintenance.

Finding link and channel information

When you enter the TRNSL command, the following information appears:

- IDT P-side link number
- RDT name and the C-side link number of the RDT
- capabilities (Cap) of the link (either messaging, speech, or both)
- status of the IDT P-side link. The status can be one of the following:
  - OK
  - ManB
  - SysB
  - OK, P
  - OK, C, P
- condition of the message link. The condition can be one of the following:
  - OPN
  - CLS
  - MTC
- SMA name, external number, SMA P-side port, and the channel on that port that is associated with the control channel

Refer to the next figure for an example of a MAP display for the TRNSL (translate) command.

Example TRNSL display for the IDT

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext    Appl
    .      .      .       .      IDT      .       .       .       .
    IDT
0   Quit                SysB     ManB      Offl     CBsy    ISTb  InSv
2   Post_          PM        0        0         0        0       1      12
3   Listset        IDT       0        0         0        0       1      17
4
5   Trnsl          IDT 55         ISTb    LINKS_OOS: 0     RDT Type:  RFT
6
7   Bsy
8   RTS           Link  0;RDT0 00 0  1;Cap MS;Status:OK   ;MsgCond:OPN
9   Offl          Link  1;RDT0 00 0  2;Cap MS;Status:OK   ;MsgCond:OPN
10                Link  2;RDT0 00 0 16;Cap  S;Status:OK
11 Disp_
12 Next
13
14 QueryPM
15 RDTalarm
16 PPS_
17 Cont_
18 LoopBk_
     userid
    TIME   hh : mm>
```

Refer to the next figure for an example of a MAP display for the TRNSL CHAN command.

Example TRNSL CHAN display for the IDT

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext    Appl
    .      .      .       .      IDT      .       .        .       .
    IDT
0  Quit                  SysB     ManB      Offl     CBsy    ISTb   InSv
2  Post_           PM       0        0        0        0       1      12
3  Listset         IDT      0        0        0        0       1      17
4
5  Trnsl           IDT 55     ISTb     LINKS_OOS: 0     RDT Type:  RFT
6
7  Bsy
8  RTS            Link  0;RDT0 00 0  1;Cap MS;Status:OK   ;MsgCond:OPN
9  Offl           Link  1;RDT0 00 0  2;Cap MS;Status:OK   ;MsgCond:OPN
10                Link  2;RDT0 00 0 16;Cap  S;Status:OK
11 Disp_
12 Next            CSC1: SMA 0  5  24; CSPORT: 13; TMCHAN: 10
13                 EOC1: SMA 0  5  12; CSPORT: 13; TMCHAN: 11
14 QueryPM         CSC2: SMA 0  8  24; CSPORT: 13; TMCHAN: 12
15 RDTalarm        EOC2: SMA 0  8  12; CSPORT: 13; TMCHAN: 13
16 PPS_
17 Cont_
18 LoopBk_
      userid
    TIME   hh : mm>
```

Querying the IDT and RDT

The QUERYPM command provides the following information:

- PM type and number
- internal number—used for advanced tools
- node number—used for advanced tools
- SMA name and number
- RDT name—the value entered in table RDTINV
- the last three lines of the MAP response provide the
  - — number of lines connected to a posted IDT
  - — total number of lines defined for the host SMA
  - — total number of lines available for the host SMA

Note: In XPM81/NA008, the information in the last three lines of the response to the QUERYPM commands was contained in the non-menu command RESOURCE. The RESOURCE command was removed and the information put into the QUERYPM command.

Refer to the next figure for an example of a MAP display for the QUERYPM command.

Example QUERYPM display for the IDT

```
 CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    Appl
  .     .     .      .    IDT     .      .       .       .
    IDT
0   Quit                SysB    ManB     Offl    CBsy   ISTb  InSv
2   Post_       PM        0       0        0       0      1     12
3   Listset     IDT       0       0        0       0      1     17
4
5   Trnsl       IDT 55     ISTb    LINKS_OOS: 0    RDT Type:  RFT
6
7   Bsy         QueryPM
8   RTS         PM Type:  IDT  PM No: 23  Int. No: 15  Node No: 52
9   Offl        Prot-switch:  Unavailable
10              SMA Name: SMA 5
11 Disp_        RDT Name: RDT0 00 0
12 Next         Network element:  12   Unnamed
13 RDTalarm     RDT primary OPC:       BMER135
14 QueryPM      RDT backup OPC:        Unnamed
15 RDTalarm     Lines allocated to IDT 10: 671
16 PPS_         Lines defined for SMA 2:  1343
17 CONT_        Lines available to SMA 2:  4033
18 LOOPBK_
       userid
 TIME   hh : mm>
```

The last three lines display the number of lines connected to an RDT, the total number of lines connected to the SMA, and the total number lines the SMA can support but are not yet provisioned.

When you enter the command string QUERYPM FLT at the IDT level, the system identifies the state of the IDT. If the state is not ManB or InSv, the system gives a reason for the state. The following ISTb reasons appear in response to the maintenance connection:

- maintenance connection not established—several reasons that can cause the absence of an established maintenance connection follow:
  - — setup requirements are not present. For example, the IDT is offline, the EOC1 and EOC2 are both manually busy
  - — SMA SWACT
  - — The RDT sent an abort request
  - — SMA to CM communication is lost
- maintenance connection—transient reject and reject reasons are added to this ISTb reason. These reasons can be, XPM SWACT, stack error, and abort from remote.

- maintenance connection—permanent reject where the only reason for a permanent rejection is an object model (OM) incompatibility

The following figure provides an example of a MAP display for the QUERYPM FLT command. The figure notes some ISTb reasons.

Example QUERYPM FLT display for the IDT

```
  CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    Appl
  .     .     .      .     IDT     .      .      .       .      .

IDT                  SysB     ManB      Offl     CBsy    ISTb   InSv
0  Quit        PM       0        0         0        0       1      12
2  Post_       IDT      0        0         0        0       1      17
3  Listset
4              IDT 4       ISTb     LINKS_OOS: 0      RDT Type:  RFT
5  Trnsl
6              QueryPM Flt
7  Bsy         ISTb Reasons:
8  RTS          Mtc connection not established: No CM–SMA communications
9  Offl         EOC database synchronization in progress
10
11 Disp_
12 Next
13
14 QueryPM
15 RDTalarm
16 PPS_
17 Cont_
18 LoopBk_
    userid
 TIME   hh : mm>
```

If the path is ISTB, the data link access procedure on the D-channel (LAPD) logical link is up. The path protection switching (PPS) LAPD logical link is not up. In this condition, the data LAPD logical link is multi-frame established (MFE). The system displays the following ISTb reasons for an ISTb state. The system responds with these reasons when you enter the command string QUERYPM FLT at the IDT level for a posted IDT:

- DS-1 message link busy
- path alarm
- maintenance connection not established
- EOC database synchronization in progress
- EOC database not synchronized
- CSC P-side node messaging overload
- EOC P-side node messaging overload

- P-side node messaging system overload on SMA
- RDT alarms present—use RDTalarm command
- speech link(s) busy
- RDT alarm reporting not enabled
- maintenance connection: transient rejection
- maintenance connection: permanent rejection

Querying and control protection switching

If operating company personnel enters

>PPS QUERY

The next figure illustrates the response to the PPS Query.

Response to PPS QUERY

```
   CM     CMC     IOD     Net     PM     CCS     Lns     Trks     Ext    Appl
    .      .       .       .      IDT     .       .       .        .
    IDT
0   Quit                  SysB     ManB      Offl     CBsy    ISTb   InSv
2   Post_          PM       0        0         0        0       1      12
3   Listset        IDT      0        0         0        0       1      17
4
5   Trnsl          IDT 55      ISTb     LINKS_OOS: 0      RDT Type:   RFT
6
7   Bsy
8   RTS             CSC 1: SMA 4   3   24;InSv;Active;Enable
9   Offl            EOC 1: SMA 4   3   12;InSv;Active;Enable
10                  CSC 2: SMA 4 13   12;InSv;Standby;Enable
11  Disp_           EOC 2: SMA 4 13   12;ManB;Standby;Enable
12  Next
13  RDTalarm
14  QueryPM
15
16  PPS_
17  CONT_
18  LOOPBK_
       userid
    TIME   hh : mm>
```

When a PPS failure occurs, you must restore traffic activity. Traffic activity is EOC or call processing. When possible, restore traffic activity on the last active path. You can restore traffic activity when the data LAPD logical link is MFE. The PPS LAPD logical link state does not affect this action. To provide accurate feedback information to operating company personnel, the path is set to ISTb. In this condition, a path is

- InSv when both LAPD logical links are MFE
- OOS when at least the data logical link is not MFE
- ISTb when the data LAPD logical link is MFE but the PPS LAPD logical link is not MFE.

When operating company personnel enter the command string PPS QUERY, the system displays the state of the paths. The system displays the state of the paths based on the above three path states. The system also displays the state of a path and if the path is enabled. The state of a path can be active or standby.

If the path is OOS, the data LAPD logical link is not MFE. The PPS LAPD logical link can be MFE. Several reasons can cause an LAPD to not be MFE. These reasons follow:

- DS-1 problem
- remote LAPD end point refuses to set up the connection
- LAPD parameters not compatible between each end of the connection

The following figure provides an example of a MAP display for the command string PPS QUERY.

Example PPS QUERY display for the IDT

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     Appl
   .      .       .       .     IDT      .       .       .        .       .

 IDT                   SysB     ManB      Offl     CBsy    ISTb  InSv
 0  Quit          PM       0        0         0        0       1      12
 2  Post_         IDT      0        0         0        0       1      17
 3  Listset
 4                IDT 4       ISTb     LINKS_OOS: 0    RDT Type:  RFT
 5  Trnsl
 6                PPS QUERY
 7  Bsy           CSC 1: SMA 0 0 24;ISTb;Active;Enable
 8  RTS           EOC 1: SMA 0 0 12;InSv;Active;Enable
 9  Offl          CSC 2: SMA 0 0 24;InSv;Standby;Enable
 10               EOC 2: SMA 0 0 12;InSv;Standby;Enable
 11 Disp_
 12 Next
 13
 14 QueryPM
 15 RDTalarm
 16 PPS_
 17 Cont_
 18 LoopBk_
     userid
 TIME   hh : mm>
```

In the previous example, path CSC1 is ISTb. If the path CSC1 is ISTb, the LAPD logical link is not MFE and the data LAPD logical link is MFE. When one or more paths are in the ISTb state, the IDT node state is ISTb.

To make CSC2 the active channel, enter the following command string:

>PPS ACT CSC2

The CSC2 channel becomes the active channel. The CSC1 becomes the standby channel. If operating company personnel attempt to activate an inhibited channel, the activation fails, and a message informs operating company personnel of the failure.

Carefully consider the use of the FORCE option. When you use the FORCE option with the ACT parameter, the channel becomes active. The state of the channel does not affect the activation of the channel. The channel can be out of service or have faults. If the channel cannot take over the messaging functions, the IDT can lose messaging capability and go ISTb or SysB.

> ***Note:*** You cannot use the FORCE option on an inhibited path.

Responses to IDT level commands

The following table lists responses to IDT level commands. The table indicates what the responses mean, and what actions to perform when the responses occur.

Responses to IDT level command

Command	Response	What the response means	What to do
ABTK	`All active maintenance activities will be aborted. Please confirm (“YES” or “NO”)`	The system stops all maintenance actions in progress.	Respond. If YES, system removes maintenance (Mtce) flag.
BSY	`Request invalid: would cause the IDT to go SysB WARNING: Maintenance messaging to the RDT will be interrupted – last EOC path will go out of service. Please confirm (Y/N):`	An attempt is made to busy the last CSC channel when the associated IDT is still in service.	Busy the IDT first. Busy the last CSC channel.
	`Calls on the IDT will be affected. Please confirm (“YES” or “NO”)`	An attempt is made to busy the last in-service EOC channel. If the channel is busy, you cannot perform maintenance tasks on the RDT.	Respond to the prompt. After you busy the last EOC channel, maintenance messaging with the RDT is lost.

—continued—

Responses to IDT level command (continued)

Command	Response	What the response means	What to do
CONT	`IDT n CONT EXT failed – static data mismatch`	The peripheral static data does not match the specified path.	The SMA goes ISTb because of the static data mismatch. Refer to Fault isolation tests in this section.
	`IDT n CONT EXT failed – far end`	The external continuity test failed.	Run the internal continuity test. If the test passes, make sure the external loopback is set. If the external loopback is set, check the span between the SMA and the external loopback point.
	`IDT n CONT INT failed – no response from XPM`	The SMA does not respond to the loopback command.	Check the status of the SMA.
	`IDT n CONT INT failed – channel failure`	The internal continuity test failed.	Check the status of the SMA.
CONT (continued)	`Path must be ManB`	The user attempts to run a CONT test on a path that is not busy.	Busy the path before you run the CONT test.
LOOPBK	`Path must be ManB`	The user attempts to run a LOOPBK on a path that is not busy.	Busy the path before you set up the LOOPBK.
	`LOOPBK RLS failed – no response from XPM`	The SMA does not respond to the request.	Troubleshoot the SMA. Troubleshoot the EISP.
	`LOOPBK SETUP failed – no response from XPM`	The SMA does not respond to the request.	Troubleshoot the SMA. Troubleshoot the EISP.
PROGRESS	`Progress field is active`	You input PROGRESS QUERY.	Use the ON or OFF parameters to implement or cancel PROGRESS.

—continued—

Responses to IDT level command (continued)

Command	Response	What the response means	What to do
RTS	***Note:*** The following responses are for IDT.		
	`IDT 55 Rts Passed`	The IDT returned to service. Look for PM106 logs.	There is no action required
	`Failed to open link0`	PM114	
	`Bad message received from PM`	PM114	
	`Fail message received from PM`	PM114	
	`Check for possible logs`	PM114	
	`No Action Taken: Mtce in Progress`	The user entered another command while a previous maintenance request was still in progress.	Wait until the system completes the previous maintenance request or use ABTK to abort maintenance in progress.
	`RTS failed: no active CSC`	A CSC must be in service to RTS the IDT.	RTS a minimum of CSC.
	`RTS Rejected: Aborted`	PM180, PM181	
	`path failed – LAPD failure`	The system cannot bring the LAPD cannot into service.	Check the status of the RDT and the EISP.
	`path failed – Channel Failure`	The DS-1 carrier failed.	Check the carrier.
	`Request invalid: path is loopbacked toward far end`	A LOOPBK SETUP has already been done on this path .	Release the loopback (LOOPBK RLS) and retry the RTS.

—continued—

Responses to IDT level command (continued)

Command	Response	What the response means	What to do
RTS (continued)	`Request invalid: IDT must be InSv for CSC to RTS`	Before the CSC can return to service, the IDT must also be in service.	RTS the IDT. Use the RTS command with no parameters.
TRNSL	`Request invalid: IDT is not equipped`	An IDT was deleted from table RDTINV while the IDT was posted (status is unequipped (Uneq))	Re-enter tuple for IDT in table RDTINV.

—end—

LNS level user interface

You must use commands from different MAP levels for remote digital terminal (RDT) lines maintenance. from different MAP levels. The type of test desired or, line that you want to test determine what commands to use.

You can access the subscriber line tests and associated maintenance through the LNS subsystem and the sub-levels of the LNS subsystem. You can test all types of Multi Vendor Interface (MVI) RDTs from the LNS subsystem and sub-levels of the LNS subsystem.

Messaging bandwidth limits between the SMA and RDT, cause the following engineering restrictions.

- Attempt a maximum of six simultaneous line maintenance commands on a given SMA.
- The amount of central processing unit (CPU) time allotted to line maintenance activities is inversely proportional to CPU usage.
- As customer traffic and maintenance activities increase in the switch, line maintenance activities take longer to perform. Line maintenance tests may fail. The failure does not always indicate a fault.
- Test the suspected line or circuit again during off peak hours. You can observe faults of this nature when CPU usage exceeds 80%.

Remote digital terminal diagnostic tests

Diagnostic tests for subscriber lines at the RDT appear in the following table.

RDT diagnostics

Test	POTS	COIN	Multi–party	ISDN
Off–hook detection	x	x	x	
Echo return loss	x	x	x	
On-hook detection	x	x	x	
Single party ringing	x	x	x	
Carrier channel loss	x	x	x	
Idle channel noise	x	x	x	
Coin collect test		x (Note 1)		
Coin return test		x (Note 2)		
Reverse battery		x		
Negative tip party ring			x	
Positive ring party ring			x	
Positive tip party ring			x	
Error register query				x
NT1 restore				x
NT1 status				x
T continuity				x
Near end bit error				x
Far end bit error				x

Note 1: The coin collect test includes the coin partial presence test.
Note 2: The coin return test includes the coin presence test.

LTP level

Operating company personnel use the line test position (LTP) level of the MAP terminal to run different tests on lines off the RDT.

The following table summarizes LTP level functionality that the system supports for RDT lines. When plain old telephone service (POTS), coin, and Integrated Services Digital Network (ISDN) lines support the command, the word *All* appears in the *Line types* column.

The system displays the DMS SuperNode switch line state at the LTP MAP level. The DMS SuperNode does not always match the state of the line card and line termination object at the S/DMS AccessNode. A field is added at the LTP MAP level of the DMS MAP to show the state of a line at an RDT. This field displays the RDT line state for lines posted at the LTP MAP level. The field clears when operating company personnel quit the LTP MAP level. The field also clears when a line is moved from the control position to the hold position. The field also clears when a new RDT line is not posted in the control position. An audit process updates all RDT lines posted in the control position every 5 minutes. The audit process displays the latest remote line state.

The remote line states that appear at the DMS MAP for S/DMS AccessNode lines appear in the following table.

S/DMS AccessNode line states seen at the LTP MAP level

Remote line state	Meaning	Description
IS@RDT	In-service at RDT	Indicates the line at the RDT is ready for call processing.
IS–CPB@RDT	In-service call processing busy at RDT	Indicates the line at the RDT is processing a call at this time.
IS–TBL@RDT	In-service trouble at RDT	Indicates the line at the RDT is in service trouble and is not available for call processing.
OOS@RDT	Out-of-service at RDT	Indicates the line at the RDT is out-of-service.
OOS-TST@RDT	Out-of-service test at RDT	Indicates the posted line at the RDT is taken out of service for testing and call processing cannot be performed.
IS–TST@RDT	In-service test at RDT	Indicates the line at the RDT undergoes testing initiated from the RDT. The line is not accessible from the DMS SuperNode switch.
UNEQP@RDT	Unequipped at RDT	Indicates the line card at the RDT is missing.
UNK@RDT	Unknown at RDT	Indicates the line state at the RDT is not known at this time. After the system displays UNK@RDT at the time of the initial post, a background process starts to query the remote line state. When the remote line state becomes available, all the MAPs that have this line posted at the control position are updated to indicate the RDT remote line state.

The following figure shows a normal response when a line is posted at the LTP level. The line is posted with the remote line state field for S/DMS AccessNode lines.

LTP MAP level display with the remote line state field for posted S/DMS AccessNode line

```
  CM    MS    IOD    Net    PM    CCS    Lns     Trks    Ext   Appl
   .     .     .      .   4 SysB   .      .       .       .      .
                              M
LTP
0  Quit    POST  95    DELQ           BUSYQ          PREFIX
2  Post_
3          LCC PTY RNG ....LEN....      DN   STA F S LTA TE Result
4          1FR        RDT1 04 0 01 96 6214196 IDL
5  Bsy
6  RTS                                    IS-TBL@RDT
7  Diag
8
9  AlmStat                                Other remote line states
10 CktLoc                                 that  are presented in this
11 Hold                                   field include:
12 Next                                   IS@RDT
13                                        IS-CPB@RDT
14                                        OOS@RDT
15                                        OOS-TST@RDT
16 Prefix                                 UNEQP@RDT
17 LCO_                                   IS-TST@RDT
18 Level_                                 UNK@RDT
   userid
TIME  hh : mm>
```

The "LTP level commands" table lists the commands available at the various MAP levels for line maintenance. The table describes each command and indicates if the system supports the command and if the command requires a specific configuration.

When plain old telephone service (POTS), coin, MBS, and integrated services digital network (ISDN) lines support the command, the word *All* appears in the *Line types* column.

> ***Note:*** When you perform a change state out-of-service operation at the S/DMS AccessNode, busy the line card at the DMS MAP LTP level. When you busy the line card at the DMS MAP LTP level, wrong line treatments cannot occur. The operational measurements (OM) cannot increase without reason.

LTP level commands

Command	Line types	Description	Configuration notes
QUIT	All	Quits the current level.	Does not apply
POST	All	Places the line in the control position.	Does not apply
BSY	All	Busies the line in the control position.	Does not apply
RTS	All	Returns the line in the control position to idle.	Does not apply
DIAG	All	Invokes the long diagnostic series of end-to-end signaling and transmission tests.	Uses a transmission test unit (TTU) and a multiline test unit (MTU). Communicates with the IRTU using CSC format
ALMSTAT	All	Displays status of the LNS subsystem and allows the user to change thresholds.	Does not apply
CKTLOC	All	Identifies the line circuit in the control position and displays the attributes.	Does not apply
HOLD	All	Places line in the control position to the hold position.	Does not apply
NEXT	All	Places the next line in the posted set in the control position.	Does not apply
PREFIX	All	Sets or changes prefix digits.	Does not apply
LCO	None	Operates or releases the cutoff relay in the line circuit.	Not supported
LEVEL	All	Accesses another LTP level.	Does not supply
FRLS	All	Disconnects the line circuit from test equipment or another circuit and changes the line state to manually busy (MB).	Does not apply

—continued—

LTP level commands (continued)

Command	Line types	Description	Configuration notes
POTSDIAG	None	Allows specified POTS lines to connect to the multiline test unit (MTU) for loss test.	Not supported. This test requires the S/DMS AccessNode. Apply a nonstandard termination to the tested line card.
RECORD_DTSR	All	Enables, disables, or queries dial tone speed recording.	Does not apply

—end—

Access to remote line location information for RFTs is available using the CKTLOC command. If the RFT supports line location queries from the DMS switch, the switch displays physical line card location information.

The following figure is an example of the system response to the CKTLOC command that gives the line location information.

RDT line location display of the LTP level

```
  CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext   Appl
   .     .     .      .   4 SysB   .      .       .       .      .
                              M
LTP
0  Quit      POST  95    DELQ           BUSYQ          PREFIX
2  Post_     LEN RDT1 04 0 01 96
3            LCC PTY RNG                    STA F S LTA TE Result
4            1FR             DN 6214196 IDL
5  Bsy
6  RTS
7  Diag
8
9  AlmStat
10 CktLoc
11 Hold      cktloc
12 Next      RDT Location
13           Frame=1, Shelf=1, Slot=4
14
15           GRD START 2DB  LOSS BAL NETWORK MAN OVR SET
16 Prefix
17 LCO_                 NO        NON LOADED     NO
18 Level_
   userid
TIME  hh : mm>
```

If the RDT does not support physical location information queries from the DMS switch, the system displays the following message:

```
The physical location information is not available from the
RDT.  The RDT interface should be used.
```

This message indicates the physical location information is not available from the RDT. The system tells operating company personnel to query the information from the RDT user interface

If an EOC communication channel is not available, the DMS switch displays the following message:

```
Maintenance connection not available. The CKTLOC command
cannot be performed.
```

This message indicates the circuit location information is not available without the EOC channel.

IBNCON level

The next table summarizes the IBNCON level functionality that the system supports for RDT lines. When plain old telephone service (POTS), coin, and Integrated Services Digital Network (ISDN) lines support the command, the word *All* appears in the *Line types* column. The split and or monitor capability of the MVI RDT determines the support of these commands.

IBNCON level commands

Command	Supported?	Configuration Dependent
QUIT	Yes	No
SELECT	Yes	No
NEXT	Yes	No
BUSY	Yes	No
RTS	Yes	No
DIAGNOSE	Yes	Yes
SEIZE	Yes	No
RELEASE	Yes	No
CLEAR	Yes	No
PREVDM	Yes	No

—continued—

IBNCON level commands (continued)

Command	Supported?	Configuration Dependent
QCONLINE	Yes	No
QCUSTGRP	Yes	No
QSEATED	Yes	No

—end—

LTPMAN level

The following table contains a list of commands available at the LTPMAN level of the MAP terminal. When POTS, coin, and ISDN lines support the command, the word *All* appears in the *Line types* column. The split and or monitor capability of the MVI RDT determine the support of these commands.

LTPMAN level commands

Command	Supported?	Line types	Configuration Dependent?
QUIT	Yes	All	No
POST	Yes	All	No
LOSS (see note 1)	Yes	All, except ISDN	Yes
NOISE (see note 1)	Yes	All, except ISDN	Yes
TONEGEN (see note 1)	Yes	All, except ISDN	Yes
TONEGEN METALLIC (see notes 1 and 4)	Yes	All	Yes

Note 1: Uses external equipment.

Note 2: A trunk module is necessary to test the subscriber lines between the attendant console and the S/DMS Access Node.

Note 3: The functionality of this command does not include the S/DMS AccessNode balance network and pad group functions.

Note 4: These tests use the CSC format to communicate with the IRTU.

Note 5: Use the RLS CONN command in the clean up and release of the tested line.

—continued—

LTPMAN level commands (continued)

Command	Supported?	Line types	Configuration Dependent?
JACK (see note 2)	Yes	All, except ISDN	Yes
JACK METALLIC (see notes 2 and 4)	Yes	All, except ISDN	Yes
TSTRING (see note 4)	Yes	POTS, Coin	Yes
BAL (see note 3)	No	Does not apply	Does not apply
RLSCONN (see notes 4 and 5)	Yes	All	No
HOLD	Yes	All	No
NEXT	Yes	All	No
CKTTST	Yes	MBS, ISDN	No
SUSTATE	Yes	MBS, ISDN	No
DCHCON	Yes	ISDN	No
SETLOOPBK	No	Does not apply	Does not apply

Note 1: Uses external equipment.

Note 2: A trunk module is necessary to test the subscriber lines between the attendant console and the S/DMS Access Node.

Note 3: The functionality of this command does not include the S/DMS AccessNode balance network and pad group functions.

Note 4: These tests use the CSC format to communicate with the IRTU.

Note 5: Use the RLS CONN command in the clean up and release of the tested line.

—end—

LTPLTA level

The following table contains a list of LTPLTA commands. This level of the MAP terminal verifies loop characteristics like impedance, capacitance, and voltage. When POTS, coin, and ISDN lines support the command, the word *All* appears in the *Line types* column.

LTPLTA level commands

Command	Supported?	Line types	Configuration Dependent?
QUIT	Yes	All	No
POST	Yes	All	No
MONLTA (see notes 1 and 4)	Yes	POTS, Coin, MBS	Yes
TALKLTA (see notes 1 and 4)	Yes	POTS, Coin, MBS	Yes
ORIG (see note 4)	Yes	POTS, Coin	Yes
LNTST (see note 4)	Yes	All	Yes
VDC and VDC C (see note 4)	Yes	All	Yes
VAC and VAC C (see note 4)	Yes	All	Yes
RES and RES C (see note 4)	Yes	All	Yes
CAP and CAP C (see note 4)	Yes	All	Yes
HOLD	Yes	All	No
NEXT	Yes	All	No
LTA (see note 2)	Yes	All	No
BALNET (see note 1)	No	Does not apply	Does not apply
COIN	Yes	Coin	Yes

Note 1: The system supports MONLTA and TALKLTA for POTS and COIN lines through a PCM connection. In this condition, the commands do not depend on configuration. Do not use the ORIG command with a PCM MONLTA or TALKLTA connection.

Note 2: The parameters for this command match what the S/DMS AccessNode supports.

Note 3: The functionality of this command does not include S/DMS AccessNode balance network and pad group functions.

Note 4: These tests also communicate with the IRTU. The tests use the CSC format.

—continued—

LTPLTA level commands (continued)

Command	Supported?	Line types	Configuration Dependent?
RING	Yes	POTS, Coin	Yes
DGTTST	Yes	POTS, Coin	Yes

Note 1: The system supports MONLTA and TALKLTA for POTS and COIN lines through a PCM connection. In this condition, the commands do not depend on configuration. Do not use the ORIG command with a PCM MONLTA or TALKLTA connection.

Note 2: The parameters for this command match what the S/DMS AccessNode supports.

Note 3: The functionality of this command does not include S/DMS AccessNode balance network and pad group functions.

Note 4: These tests also communicate with the IRTU. The tests use the CSC format.

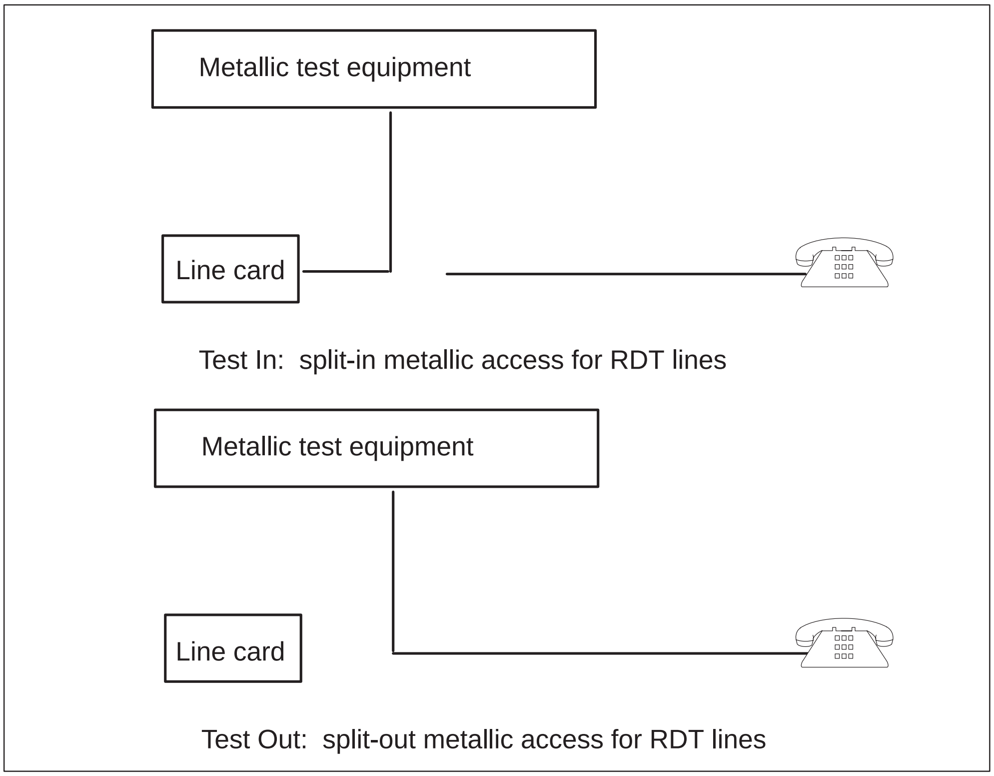
—end—

The LTA command at the LTPLTA level changes the metallic configuration of the line in the control position. The LTA has one optional parameter which indicates the intended configuration (IN, OUT, RLS). If there is no parameter with the LTA command, the command toggles the metallic configuration for the line in the control position. The LTA command toggles the metallic configuration between the test-in and test-out configuration.

Full support of the LTA command for RDT lines requires split-in metallic access. An MTAU with a split access capability from the RDT of nonsimFullSplit provides the split-in metallic access.

The following figure shows the test-in and test-out configurations for RDT lines.

Test-in and test-out configurations for RDT lines



LTPISDN level

The following table contains a list of LTPISDN commands. When POTS, coin, and ISDN lines support the command, the word *All* appears in the *Line types* column.

LTPISDN level commands

Command	Supported?	Line types	Configuration Dependent?
QUIT	Yes	ISDN	No
POST	Yes	ISDN	No
SUSTATE	Yes	ISDN	No
BCHCON	No	Not applicable	Does not apply

Note: Only layer 2 options are valid. The system does not currently support layer 1 performance monitoring.

—continued—

LTPISDN level commands (continued)

Command	Supported?	Line types	Configuration Dependent?
LTLOOPBK	No	ISDN	No
DCHCON	Yes	ISDN	No
HOLD	Yes	ISDN	No
NEXT	Yes	ISDN	No
TSTSGNL	No	Does not apply	Does not apply
TEI	Yes	ISDN	No
QLOOP	Yes	ISDN	No
QLAYER (see note)	Yes	ISDN	No
QPHINFO	No	Does not apply	Does not apply
RLAYER (see note)	Yes	ISDN	No
TEST	No	Does not apply	Does not apply
L1BLMALM (non-menu)	Yes	ISDN	No

Note: Only layer 2 options are valid. The system does not currently support layer 1 performance monitoring.

—end—

Posting ISDN lines with the POST DK command

The customer must purchase the SOC NI000050 2B-FIT/NIT feature to activate the following POST command:

POST DK dn_number [<key#>| 'all']

The POST DK command displays a DN appearance on the specified key on an ISDN terminal. The following figure shows this display. If the DN appearance is active, the system displays the key number of the DN appearance. The system also displays the bearer capability of the call and the far-end information.

LTP MAP level display with a posted ISDN line with a display of the key number and bearer capability

```
  CM     MS     IOD     Net     PM     CCS     Lns      Trks     Ext    Appl
   .      .      .       .    4 SysB    .       .        .        .      .
                                 M
LTP
0  Quit     POST  95    DELQ            BUSYQ           PREFIX
2  Post_
3           LCC PTY RNG ....LEN....      DN    STA F S LTA TE Result
4           ISDN LOOP   HOST 02 1 08 02 6215986 CPB       613 6215982
5  Bsy                                   33  SP
6  RTS
7  Diag
8
9  AlmStat
10 CktLoc
11 Hold
12 Next
13
14
15
16 Prefix
17 LCO_
18 Level_
   userid
TIME  hh : mm>
```

Bearer capability

Key number

After you post the ISDN line with the POST DK command, the line below the control position displays the key number and bearer capability. In the previous example, the CPE has DN 621-5986 assigned to key 33, and has an active speech call. The possible bearer capabilities appear in the following table.

Bearer capability display codes

Bearer capability	Display
Speech	SP
3.1 kHz audio	3AU
Circuit mode data, rate adapted to 56 kHz	56C
Circuit mode data 64 kHz	64C
Packet data	PMD

The system checks the DN state one time each second and updates the display.

Responses to LTP level commands

The following table shows command responses at the LTP level.

Responses to LTP level command

Command	Response	What the response means	What to do
DIAG	`Invalid request: RDT line provisioning mismatch`	Objects at the DMS switch and RDT do not match for the posted line.	When the mismatch is found, the system automatically tries to correct the problem.
RTS	`Remote failed to RTS this line. This line card does not support the requested service. The line is being set to SB state. The RDT line status audit will attempt to RTS this line.`	The maintenance connection is established and a service mismatch condition with the line being returned to service is present.	Replace the line card with a line card that supports the provisioned service.
POST	`Option NI000050 is not enabled`	The user attempted to use the POST DK command and has not enabled software optionality control (SOC) option NI000050.	Use a different POST command to post the DN.
	`The DN is not an ISDN DN Posted circuits unchanged`	The user entered the POST DK command on a non-ISDN line. This command is only valid for ISDN lines.	Either enter the command on an ISDN line, or use a different POST command.
	The system reponds and displays `NO EQUIPMENT` in the LEN field and `NEQ` in the STAtus field.	The posted DN is assigned to an LTID which is not mapped to a LEN in table LTMAP.	Enter the SLT ATT command to Map the LTID to a LEN before you post the DN.

—continued—

Responses to LTP level command (continued)

Command	Response	What the response means	What to do
POST (continued)	`Incorrect DN Appearance.`	The specified DN does not appear on the specified Key.	Enter the POST DK command again with the correct key, or use the ALL option to list all keys for the DN.
	`ACO/AFC DN:The key number shown may be different than the actual key in use`	When you post a DN Appearance which has AFC or ACO provisioned, the DN Appearance is a member of a group of Appearances for the DN. The key numbers for these DNs are not always the same as the keys on the ISDN set. This is because the Q.931 message protocol initially refers to the DN without any reference to the key number. The user or the ISDN set determine which key is required for a call, and that information does not reaches the CM or XPM.	Information only.
—end—			

Responses to LTPMAN level commands

The following table shows command responses at the LTPMAN level.

Responses to LTPMAN level command

Command	Response	What the response means	What to do
SUBSTATE	`Invalid request: RDT line provisioning mismatch`	Objects at the DMS switch and RDT do not match for the posted line.	When the mismatch is found, the system automatically tries to correct the problem.

Responses to LTPLTA level commands

The following table shows command responses for ISDN tests at the LTPLTA level.

Responses to LTPLTA level command

Command	Response	What the response means	What to do
LNTST, VAC, VDC, RES, CAP, LTA	`Invalid request: RDT line provisioning mismatch`	Objects at the DMS switch and RDT do not match for the posted line.	When the mismatch is found, the system automatically tries to correct the problem.

ALT level

The automatic line test (ALT) runs specified tests on specified lines. The operating company define the schedule for these tests in table ALTSCHED. These tests are available at the ALT level of the MAP terminal. The commands available at the ALT level of the MAP terminal appear in the following table.

> ***Note:*** The commands at the ALT level that involve specific tests set the schedule to run these tests. The specified tests can be SDIAG, DIAG, LIT, CKTTST, and BAL. The system runs these tests according to the schedule set.

ALT level commands

Command	Supported?	Configuration Dependent?
QUIT	Yes	No
POST	Yes	No
ALTINFO	Yes	No
SDIAG	No	No
DIAG	Yes	Yes
LIT	Yes	Yes
BAL	Not supported	Does not apply
CKTTST	Yes	No

ISDN line diagnostic tests

Diagnostics include separate tests of ISDN lines. The test suites appear in the following table.

Diagnostics supported

Diagnostic name	Description	Test suite (and required hardware)
LTP DIAG	Runs the complete ISDN line test suite	Missing card test, LC self test, LC restore test, LU continuity test (EDCH), Error register query, NT1 restore test (NT1), NT1 status test (NT1), T continuity test (NT1, EDCH), NEBE test (NT1), FEBE test (NT1)
LTP DIAG INS	Runs an in-service test suite	LC restore test , Error register query, NT1 restore test (NT1). NT1 status test (NT1), NEBE test (NT1), FEBE test (NT1)
LTP DIAG FAST	Runs only the tests that do not require a testhead and long times	LC restore test, LU continuity test (EDCH), Error register query, NT1 restore test (NT1), NT1 status test (NT1), T continuity (NT1), NEBE test (NT1), FEBE test
LTP DIAG LC	Runs only the tests that do not require an NT1	LC self test , LC restore test, LU continuity test, Error register query
No Test Trunk	Does not run any diagnostics	
Shower queue	Runs the same test suite as LTP DIAG INS	LC restore test , Error register query, NT1 restore test (NT1), NT1 status test (NT1), NEBE test (NT1), FEBE test (NT1)

Testing remote digital terminal lines at the subscriber premises

Tests from the subscriber premises do not involve central office personnel. These tests follow:

- silent switchman
- station ringer
- dialable short circuit
- dialable cable pair locator
- digitone detection

Testing RDT subscriber lines from no test trunk (NTT)

You can use different loop test systems to initiate subscriber loop testing for RDT lines from the remote maintenance center. The loop test systems use no test trunk interface to connect to the local digital switch (LDS). The RDTs support no test trunk line testing. The name NTT refers to a standard protocol. This standard protocol allows an external test system to gain access to and test lines and loops on a switch. Mechanized loop testing (MLT) and test desk are types of NTT testing where the user dials a special access code to gain access to the subscriber loop. The switch runs the extended diagnostic on the line under test. The system reports the test results back to the test equipment.

Using MLT and test desk to test POTS, coin, and multiparty lines

The system supports MLT and test desk testing only on POTS, coin, and multiparty lines. When the test system seizes the line under test, the system applies a 56.2 Kohm load between the tip and ring of the test trunk. The load is equivalent to the on hook dc signature. This load indicates the following to the test system:

- The line is idle.
- The dialed number is in a loop carrier system.
- The test system receives a metallic access to that line through the test trunk.

The test system prepares to receive the diagnostic results from the switch through DC voltage signatures.

Using MLT and test desk to test EBS or ISDN lines

For an EBS or ISDN lines, the SuperNode switch disables the dc signature to indicate that test system does not receive the diagnostic results. The system only gives metallic access of that line. An RDT can serve a combination of POTS, coin, multiparty, EBS, and ISDN lines. When this event occurs, the SuperNode switch provides the dc signature for only POTS, coin, and multiparty lines. The SuperNode switch disables the dc signature for EBS and ISDN lines. The test system receives the test results of extended diagnostic and metallic access for POTS, coin, and multiparty lines. The test system receives a metallic connection for EBS and ISDN lines.

To control the NTT dc signature, enter data into the field NTTOPT of table as follows:

- If you set the NTTOPT to “N”, then the system disables the NTT dc signature for all line types that RDT serves.
- If you set the NTTOPT field to “Y”, the system enables the NTT dc signature for POTS, coin, and multiparty lines. In addition, during software upgrades from an old release to a new release, set the field to “Y”.

You can control the NTT dc signature for each RDT. The system can disable the NTT signature for all line types for each RDT basis.

EXT level user interface

The EXT MAP level tracks active RDT alarms. To list active alarms, enter the EXT MAP level and enter one of the following commands:

- LIST
- CRIT
- LIST MAJ
- LIST MIN
- LIST NOALM

To display active RDT signal distribution (SD) points enter the DISP SDALARM command at the EXT MAP level.

The following figure contains the EXT level example of RDT alarm as the example appears through EXT level.

EXT MAP level display

```
   CM     MS     IOD     Net     PM     CCS     Lns      Trks     Ext    Appl
    .      .      .       .    1 IDT     .       .        .     1 CRIT    .
                                *C*                               *C*
 EXT
 0  Quit      Ext Alarms  Crit    FSP     Major   Minor   NoAlm
 2                           1      0        0       0        8
 3
 4
 5            disp sdalarm
 6            SD POINT IN ALARM STATE:
 7  List      RDTSD1
 8  TstDSAlm_ RDTSD3
 9  SetSD_    RDTSD5
 10 SetSC_    RDTCRIT
 11 Disp_
 12
 13 _Crit
 14 _FSP
 15 _Maj
 16 _Min
 17 _NoAlm
 18
    userid
 TIME  hh : mm>
```

TRKS level user interface

The TRKS;CARRIER level monitors, isolates faults, and conducts repair verification on DS-1 links between the RDT and the SMA. The CARRIER level commands remove a DS-1 link from service and perform different manually activated tests. The tests include hardware diagnostics for the DS-1 interface card and a loopback test. The loopback test can determine if a DS-1 problem is in the SMA or in external equipment.

Periodic monitoring of DS-1 links can detect performance that indicates equipment failure. This action allows the network provider to take corrective action before a service outage occurs. To facilitate this type of proactive maintenance and to help diagnose link failures, the SMAs support different performance statistics. The performance statistics are related to DS-1 links. Access to this information is available from the CARRIER level of the MAP. The information includes the following parameters:

- loss of frame count
- estimated bit error rate (BER)

- severe errored seconds (SES)
- slip count
- errored seconds (ES)
- alarm count

Enter user-definable thresholds in table CARRMTC to trigger an alarm when a performance parameter reaches a specified level. You can define thresholds to automatically remove a DS-1 link from service if performance reaches a level that is not acceptable.

The CARRIER level of the MAP terminal is part of the TRKS subsystem. The CARRIER level posts the carriers for the DS-1 links on the P-side of the SMA. When the SMA is at the carrier level, the SMA is posted the same way other PM types are posted.

The following figure contains a sample of a CARRIER level MAP display.

Example carrier POST display

```
   CM    MS    IOD     Net     PM     CCS     Lns     Trks     Ext    Appl
    .     .     .       .       .      .       .        .       .       .
POST
0  Quit       CLASS  ML  OS  ALARM SYSB MANB UNEQ OFFL CBSY PBSY INSV
2  Post_      TRUNKS  0   0      0    0    0    0    0    0    0   26
3             REMOTE  0   0      0    0    0    0    0    0    0   12
4             TIMING  0   0      0    0    0    0    0    0    0    2
5  Loop         DS-1
6  Tst_        N CLASS SITE SMA CKT D ALRM SLIP FRME BER ES SES STATE
7  Bsy_        0 REMOTE HOST   0   0 C         1    0 1.0 2   0  INSV
8  RTS_        1 REMOTE HOST   0   1 C         1    0 1.0 2   0  INSV
9  Offl_       2 REMOTE HOST   0   2 C         0    0 1.0 1   0  INSV
10 DispOpt     3 REMOTE HOST   0   3 C         1    0 1.0 1   0  INSV
11 Disp_       4 REMOTE HOST   0   4 C         1    0 1.0 1   0  INSV
12 Next
13             SIZE OF POSTED SET  :   5
14 Detail_
15
16
17
18
    userid
TIME   hh : mm>
```

Bit error rate performance tool

The bit error rate performance (BERP) tool provides the ability to test the accuracy of the transmission paths associated with the SMA system. The BERP tool allows the system to BERP test the following:

- up to the C-side of the SMA, with the loopback for the testing set on separate channels on the C-side interface of the SMA
- up to the P-side of the SMA, with the loopback for the testing set on a P-side link of the SMA
- up to the NT1 on ISDN U-loops on the S/DMS AccessNode with the loopback for the testing set on a B-channel at the NT1

The BERP tool is available at the MAPCI:MTC:BERP level. The BERP tool helps to identify defective components. To help identify defective components, the BERP tool provides measurements of the bit error rate performance. To measure the bit error rate performance, the BERP tool measures the number of error free seconds (EFS) in a test call of a minimum of 10 min duration. The BERP tool uses the percentage of EFS in a call to determine the true bit error rate performance of the call.

The BERP tool can use the EFS in a test to generate a statistical security level for the true bit error rate performance of the switch. The overall test consists of several calls.

Hardware requirements

The BERP test requires an Integrated Bit Error Rate Tester (IBERT). The IBERT is an IBERT line card (ILC) on a LCM, or a Digital Test Unit (DTU) on a MTM.

Software requirements

The BERP testing feature is part of the SMA S/DMS AccessNode package NTXF46AA. The package must include the Local Switch BER Measurement package NTX881 in the load.

Performing a BERP test

Make sure that the SMAs and IDTs involved in SMA BERP are in service before the test. The line states must be Idle or ManB.

To perform the first step in a BERP test, set up a path from the IBERT back to the IBERT. The path is through a specified loopback point in the path. When you set up the path, the system makes the ILC/DTU transmit a known bit pattern for a fixed period of time. The bit pattern is reflected back to the ILC/DTU. The bit pattern is compared with the bit pattern that was sent.

Note: When you perform a SMA C-side or P-side BERP test, you cannot perform other forms of BERP tests. These other tests can include circuit–based tests, line subgroup–based tests, and Im–based tests.

C-side testing

To test transmission paths to the C-side interface of the SMA, operating company personnel specify the SMA C-side link to test. Operating company personnel specify a POTS or EBS line or number of lines on the S/DMS AccessNode to which the IBERT can connect.

Note 1: The SMA C-side link must be in service.

Note 2: Operating company personnel can only specify POTS and EBS lines. Operating company personnel cannot specify ISDN lines for a C-side test.

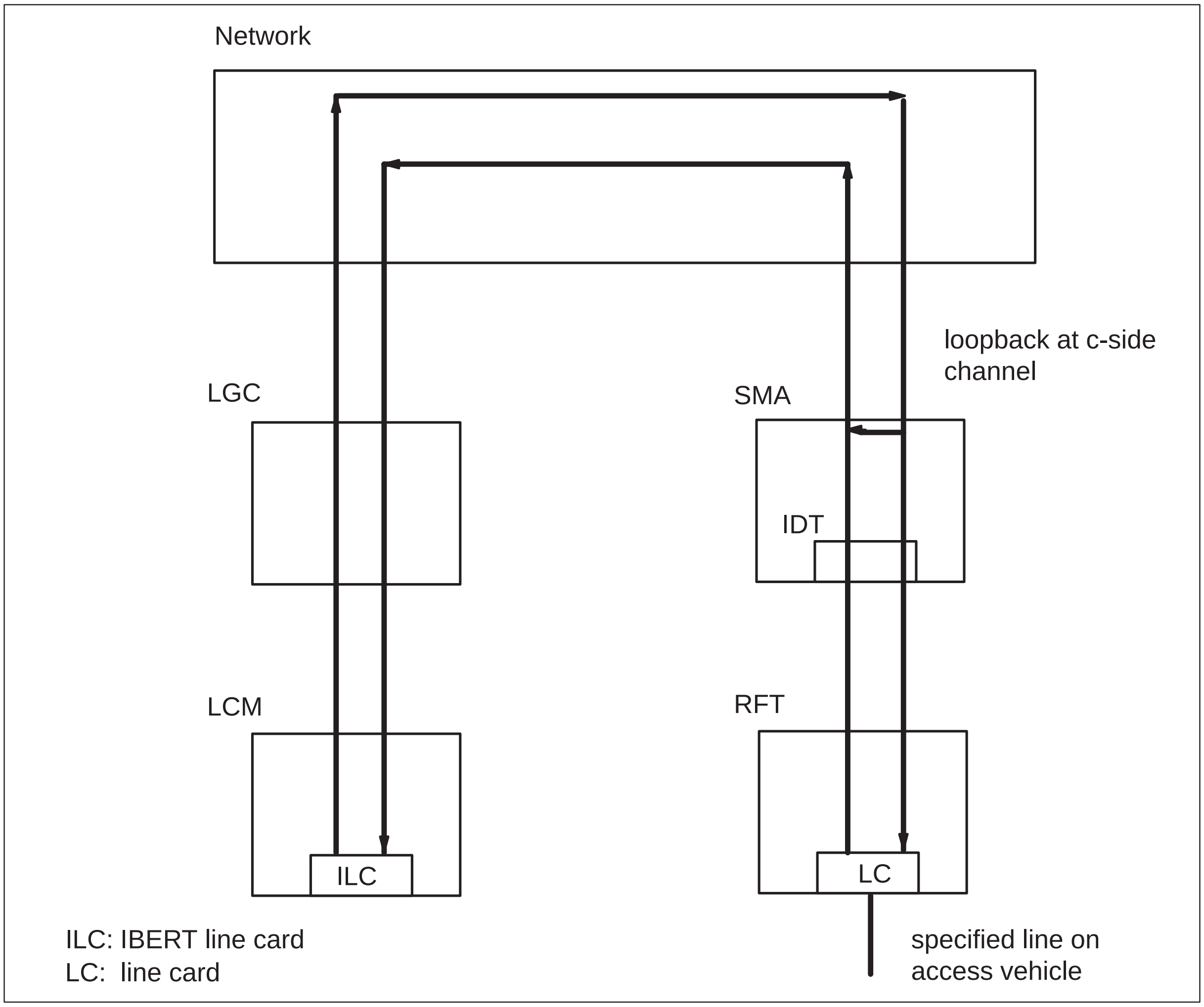
To select an IBERT, or number of IBERTs, use the SELECT command.

Use the DEFINE command to specify the C-side links and the line(s). The total number of POTS or MBS lines must equal the number of IBERTs that you select for the test.

The loopbacks are for each PCM channel at the C-side interface of the SMA peripheral.

An example is the best way to describe test control. Operating company personnel specify a C-side link, two lines on the corresponding RFT and two IBERTs. The system uses the first two channels on the C-side link to establish the first set of two calls. The system uses the next two channels on the C-side link to establish the next set of two calls. If a C-side channel is call processing busy when the system traverses channels traversing, the system skips that channel. The system continues to traverse channels until the specified number of calls expires, or the user issues a STOP command. The system also stops at the scheduled STOP time.

C-side test



P-side testing

To test transmission paths to the P-side interface of the SMA, operating company personnel must specify the SMA P-side link to test. Operating company personnel also can specify a number of links, or the complete peripheral. Operating company personnel must specify a POTS or MBS line or number of lines on each S/DMS AccessNode that subtends the links that the operating company personnel want to test.

Note 1: Manually busy the P-side link before the test.

Note 2: Operating company personnel can specify POTS and EBS lines. Operating company personnel cannot specify ISDN lines with a P-side test.

Note 3: Do not test nailed-up connections that use channels on P-side links. Nailed-up connections can be CSC and EOC channels and SPECCONN connections.

Use the SELECT command to select an IBERT or number of IBERTs.

Use the DEFINE command to specify the P-side links and the line(s). The user can specify a number of POTS or MBS lines for each RFT. This number must equal the number of IBERTs selected for the test.

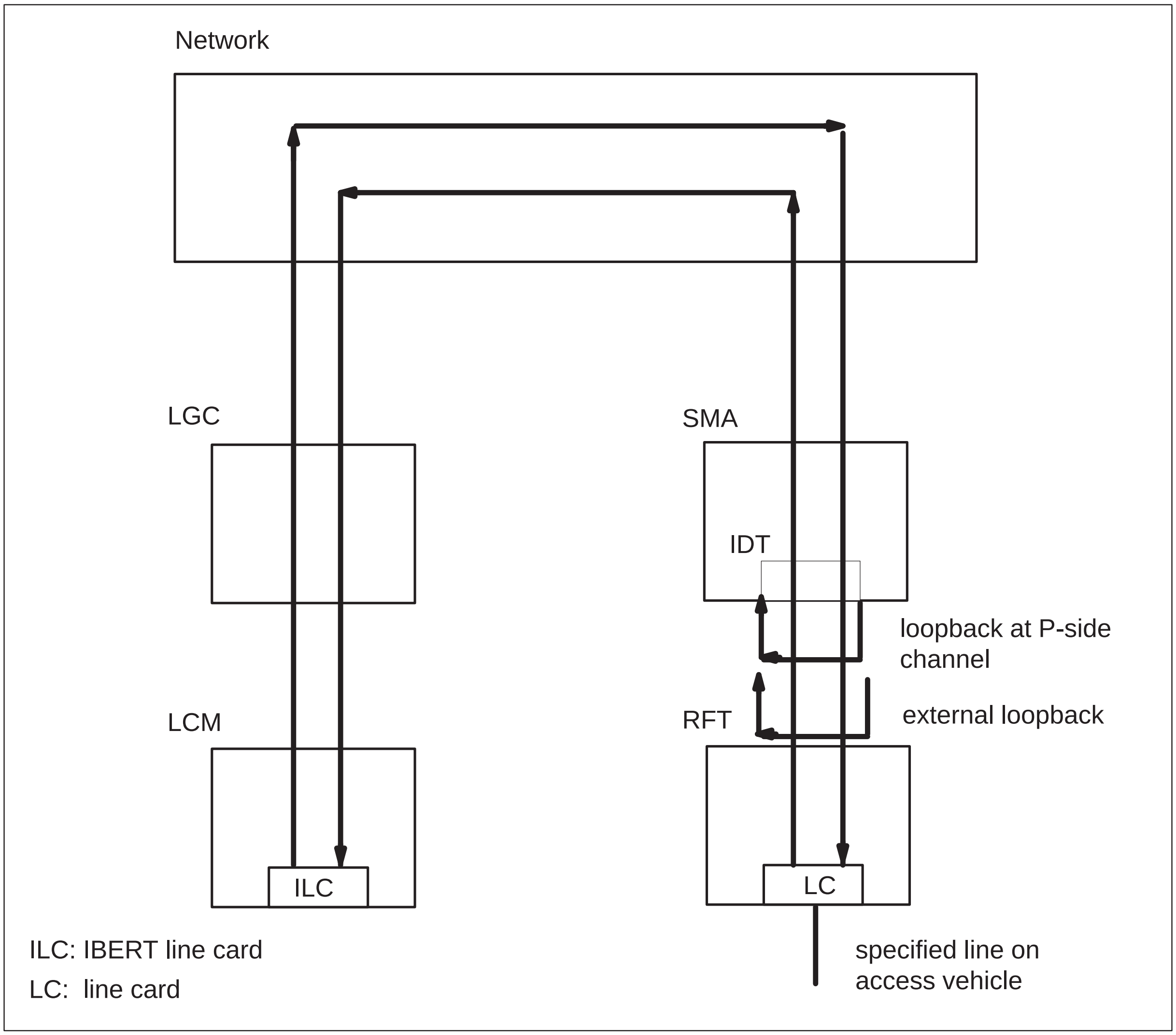
The loopbacks are on a link-by-link basis at the P-side interface of the SMA peripheral. Operating company personnel do not always specify a P-side link looback. The applied link loopback along the link can be external to switch BERP. For example the applied link is at the DS-1 interface at the FCOT). In this condition extended path verification is available beyond the P-side of the SMA peripheral.

Note 1: If operating company personnel specify a DS-1 loopback, a loopback cannot already be present on the DS-1 through an external mechanism. For example, a loopback cannot be present through an external mechanism from the Carrier level of the MAP terminal.

Note 2: If you select the NONE option for the loopback, a remote loopback cannot already exist on the DS-1 through an external mechanism. For example, a loopback cannot exist on the DS-1 through an external mechanism from the Carrier level of the MAP terminal.

An example is the best way to describe the test control. Operating company personnel specify a P-side link, two lines on the RFT that corresponds to the P-side link, and two IBERTs. The system uses the first two channels on the P-side link to establish the first set of two calls. The system uses the next two channels on the P-side link to establish the next set of two calls. This process continues until the specified number of calls expires, or the user issues a STOP command. The system also stops at the scheduled STOP time.

P-side test



Testing the ISDN B-channel at the NT1

The ISDN B-channel test allows the verification of the integrity of transmission paths of ISDN lines up to the NT1.

Use the SELECT command to select an IBERT, or number of IBERTs.

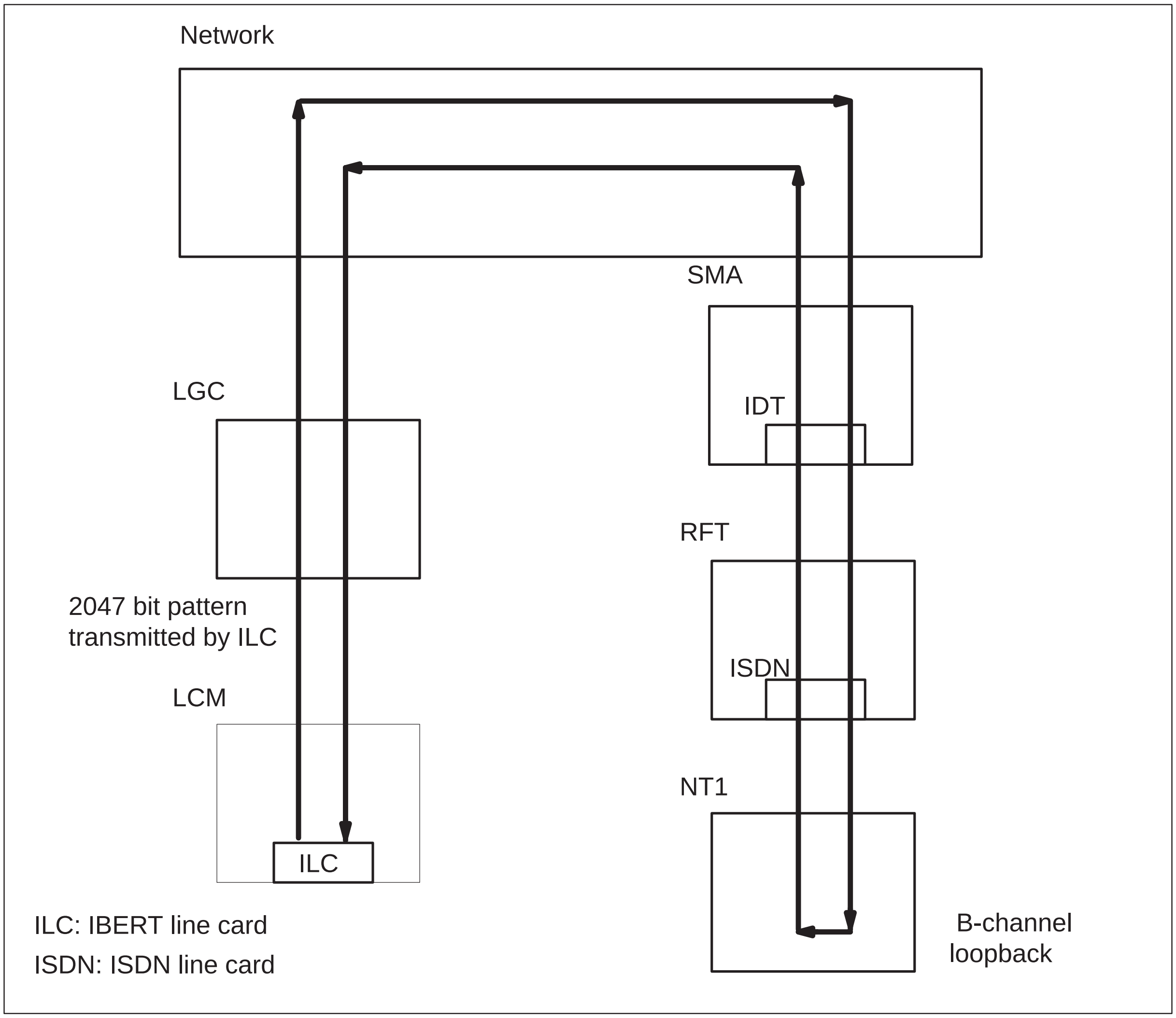
Use the DEFINE command to specify the ISDN line(s) on the S/DMS AccessNode that will connect to the IBERT(s).

The loopbacks are at a B-channel on the NT1.

Test control is not like C-side or P-side test control. Test control uses a pool of circuits based on the circuits that the operating company personnel define.

Operating company personnel use the DEFINE command to define the circuits. Operating company personnel can specify four ISDN lines on the S/DMS AccessNode and two IBERTs. If this event occurs the system establishes the first set of calls between the two IBERTs and the first two circuits. The system establishes the next set of calls between the two IBERTs and the second two circuits. This process continues until the specified number of calls expires, or the user issues a STOP command. The system also stops at the scheduled STOP time.

ISDN B-channel test



Restarts

The system drops BERP test calls in progress in all restarts. The system releases all resources associated with the test. These resources include any loopbacks. In SMA warm swacts, BERP test calls stay in synchronization, but errors occur. In SMA cold SwActs, the system releases BERP test calls.

SMA manual maintenance

This chapter includes descriptions of faults, test configurations, and test tools provided for Subscriber Carrier Module-100 Access (SMA) trouble isolation and correction.

SMA system trouble indicators

The SMA reports maintenance software fault conditions have the following trouble indicators:

- operational measurements (OM)
- log reports
- alarms.

Operational measurements

The OMs consist of monitoring and counting events in the system. The OMs are the best means for the detection of system troubles. Use the OM threshold feature to monitor and report key SMA activity. Make these reports often and form another method of trouble detection. Log reports and alarms are the primary method of trouble detection.

Log reports

Logs, as a primary analysis tool, provide detailed information on call errors, diagnostic results, and system status. Logs can indicate trouble conditions when one of the following conditions is present:

- sudden increase in volume of logs
- reports generated for not printed messages
- large number of logs that are the same.

Alarms

Audible and visual alarms indicate that correcting action is required. How important the alarm is, indicates the level of the alarm. The alarms are expressed as minor, major, or critical. The following table describes alarm conditions:

Alarm description

Alarm	PM banner	Description
Minor	blank	Indicates the alarm does not affect service
Major	M	Indicates a condition that degrades service
Critical	*C*	Indicates a service power failure or potential service failure

Follow these guidelines when you respond to alarms:

- When more than one alarm of the same level appears on the MAP display, clear the alarms from the screen. Clear the screen from left to right.
- If an alarm of a more important level occurs when you fix an alarm, respond to the new alarm. Do not continue attempts to clear the alarm of the lower level.

  Note: When you perform a change state out-of-service (OOS) operation at the AccessNode, busy (BSY) the line card at the Digital Multiplex System (DMS) MAP line test position (LTP) level. This action prevents wrong line treatments and unnecessary pegging of OM.

Messaging bandwidth limits between the SMA and remote digital terminal (RDT) causes the following engineering controls:

- You can attempt a maximum of six simultaneous line maintenance commands on an SMA.
- The amount of central processing unit (CPU) time for a line maintenance activities is inversely proportional to CPU use.
- As customer traffic and maintenance activities increase in the switch, line maintenance activities take longer to execute. A line maintenance test can fail. A failure does not always indicate a fault. Test the suspected line or circuit again, during off peak hours. You can observe faults of this type when CPU use exceeds 80%.

Remote digital terminal alarm reporting

The DMS SuperNode switch software controls signal distribution (SD) points that are electrical relays. These relays normally connect to lights, bells, or remote telemetry monitoring devices. To activate SD points in response to RDT alarms, SD points that indicate important alarms must be entered in Table ALMSD.

One RDT appears at a time. The RDT that appears is RDT with the most important active enabled alarms. To display the RDT with the next most important active alarms disable the alarms that appear at the MAP display. Use the RDT alarm cutoff RDTALRMCO alarm scan function to cut off these alarms. Close a scan point electrical relay to activate a scan function. A scan function is software logic in the DMS switch. The RDTALRMCO disables the alarms that appear through the SD points for that RDT.

New alarms can appear at the MAP display. The cutoff state does not determine if new alarms appear. You can perform manual changes to field SDPOINTS in Table RDTINV, even if the integrated digital terminal (IDT) is not set to the offline (OFFL) state.

An in-service trouble (ISTb) reason for the IDT can be present. The ISTb reason indicates that alarm reporting is not allowed for the corresponding RDT. Alarm reporting is not allowed because the DMS switch is not registered to receive alarms. Normally, manual action is not required to clear this condition. The condition can persist for more than 20 min after maintenance connection is established to the RDT. If this event occurs you must disable and establish the connection again. To disable and establish the connection, manually busy (ManB) the two embedded operations channels (EOCs) for the associated RDT. Return to service (RTS) the EOCs.

> ***Note:*** Do not ManB the common signaling channels (CSCs) of the SMA links. This condition causes call processing to drop.

The maintenance connection to an RDT can be taken down and established again. If this event occurs software cannot determine if the RDTs alarms are old or new. To make sure that the cutoff function does not mask the new alarms, all alarms for that RDT are enabled again when the maintenance connection is established again. Old alarms can appear again even if the old alarms are cutoff.

The ISTb reason applies to RDTs of the remote fiber terminal (RFT) type. The system does not generate a PM128 log for the ISTb reason `RDT alarm reporting not enabled`. The system raises the PM128 log when the system clears the, Maintenance connection not established, ISTb reason. The state of the IDT remains at ISTb until the RDT alarm reporting not enabled ISTb reason clears.

Fault conditions

Several types of faults can occur to the components of the SMA system. In the host office, the central-side (C-side) links from the SMA to the network can go down. If these network links are defective, the system can lose messages from central control (CC). Subscriber service can be lost. A defective DS30 or DS512 card in the SMA can cause defective communication with CC.

In the SMA, circuit cards, like the power converter card, can be defective. A defective circuit card can negatively affect subscriber service. SMA equipment other than circuit cards can become defective.

The SMA peripheral-side (P-side) links to the subscriber carry important messages to support services for the subscriber. A defective P-side link can impact subscriber service.

The following faults are specified faults like XMS-based peripheral module (XPM) parity fault and data mismatch. The following sections include the fault types that can occur in SMA components and the interfaces between SMA components.

SMA faults

Possible fault conditions in the SMA appear in the following description:

Parity fault

The CC handles parity faults when possible. The CC handles faults so that the system can perform an RTS in an efficient manner.

Three types of parity faults are available:

- hard–requires the intervention of operating company personnel
- soft–CC can clear this fault
- intermittent–CC can clear this fault.

A PM181 informs operating company personnel about the type of parity fault. Other logs, like PM128 and PM106, inform operating company personnel of the action that the CC performs. These logs inform operating company personnel if the CC clears the fault. The QUERYPM FLT command helps to determine the type of parity fault.

Data mismatch

Three types of updates help the inactive unit of the SMA to maintain the data necessary to control maintenance and call processing:

- static
- bulk
- dynamic.

Static data update

To perform call processing and maintenance on the SMA, IDTs and subtending RDTs can be necessary. For this action to occur, the SMA must determine the cards, ports, execs, and terminal types that are present. Inventory tables store this information. This information is called static data because the SMA does not change this data as the SMA does for tasks. One task is to establish a connection when a switched call is set up.

Through a process called *dynamic* static data update, some static data in the inventory tables can update and affect service to subscribers. The following static data updates are possible for in-service (INSV) SMA modules without affecting service:

- C-side link modification
- P-side link modification
- IDT modification
- CSC link access procedure for D-channels (LAPD) parameter changes
- EOC and EOC LAPD parameter changes
- ringing data changes
- speech and message link modification

When operating company personnel alter the following types of static data, the system sets the SMA to ISTb. The system informs operating company personnel that a static data mismatch is present. The system provides information for correct action:

- the following data fields in Table LTCINV:
  - — OPTCARD
  - — TONESET
  - — PEC6X40
  - — OPTATTR

- the following data fields in Table RDTINV:
  - — SHELFSLT
  - — VARTYPE
  - — PROT.

ATTENTION

The following RTS procedures with the NODATSYNC option apply to XPMs that are not converted to XPM configuration data table (CDT) management. The Feature AF5678 introduces CDT, XPM Node Table SYNC Redesign, to improve synchronization of XPM units. The XPMs with software loads that contain this feature synchronize the nodes of both units and port tables with the computing module (CM). The XPMs perform this synchronization and do not synchronize unit-to-unit. The XPM Node Table SYNC Redesign eliminates most out-of-synchronization causes except for hardware failure. Clearance of an ISTb with configuration download and the synchronization of the two units occurs when the XPM is BSY and RTS. BSY and RTS the XPM during periods of low traffic to minimize the OOS impact.

The system can prompt operating company personnel to BSY the inactive unit, RTS the active unit, and perform a Switch of Activity (SWACT). At other times the system can prompt the operating company for these actions with a RTS using the NODATASYNC option. The NODATASYNC option allows operating company personnel to update the inactive unit with CC data and not transfer data from the active unit. With each static data mismatch, the system prompts the operating company personnel with the correct action.

> ***Note:*** A RTS of the inactive unit with the NODATASYNC option disables the warm SWACT feature. A cold SWACT is required for the unit. This action causes a loss of service.

The system downloads static data to the SMA under the following conditions:

- The SMA is BSY and RTS. This action occurs if the static data changes after the system downloads the data.
- The inactive unit is BSY and RTS and a cold SWACT occurs. This action occurs if the static data changes after the system downloads the data.
- Two cold SWACTs occur.
- PMRESET the SMA occurs.

Bulk data update

A bulk data update transfers RDT status INSV or BSY and subscriber state idle or BSY information. The update transfers the information from the active SMA unit to the inactive unit when the inactive unit is RTS. A bulk data update brings the inactive unit of the SMA up-to-date with the active unit.

Dynamic data update

A dynamic data update occurs at normals intervals. Data that changes in the active unit is updated in the inactive unit. Dynamic data updates include the following information:

- RDT status INSV or BSY
- subscriber states
- channel reassignment
- port status
- DS-1 link information.

Trap

A trap involves a software error important enough to stop normal processing. For example, a corrupt task identification (task_id). Hardware detected traps like bus, address, or parity errors are possible.

The system reports a trap in two different ways. The state of the peripheral determines the report method. If the peripheral remains INSV during the trap, the peripheral sends an unsolicited message to the CC. The CC uses the PMDEBUG software tool to make sure the trap information goes to the appropriate monitor level. The peripheral can go OOS during the trap. If this event occurs the CC queries the peripheral for traps that are not reported after the next RTS sequence. The PM185 log report captures trap information.

Software error

Software errors (SWERs) are errors produced from software code to flag the execution of a specified path of code. Normally, a SWER indicates a deviation from the normal or expected path.

The SWERs are stored in a buffer. The user can view SWERs through the SWER monitor available at the XPM main monitor level. The PM180 log report captures information on SWERs

S/DMS AccessNode

Refer to *S/DMS AccessNode Fault Locating and Clearing Procedures*, for fault conditions that can be present in the S/DMS AccessNode components.

Fault isolation tests

When the system detects a fault condition in the SMA, the fault condition requires maintenance action. The fault can occur with the SMA components. Operating company personnel use fault isolation procedures to determine the components that caused the fault. Operating company personnel use the procedures to remove the fault condition or report condition to the appropriate maintenance support organization.

Errors not specific to processor cards

The following errors are not specific to processor cards of the SMA:

- static data mismatch faults
  - — Static data defines the SMA configuration and does not change as the system connects calls and disconnects calls. When static data in the host and the SMA do not match, data corruption can result. This event can result in a host that finds a line present, and an SMA that finds a line not present. This event results in lost calls.
- unit node table mismatch faults
- each XPM unit has tables that contain information about nodes that the XPM connects to and terminals the XPM uses. The two systems that determine unit table mismatches are:
  - — Mate unit matching. This system compares the inactive unit tables with the active unit, and sets the XPM ISTb in the event of a mismatch. The active unit sends table mapping information to the inactive unit during updates.
  - — Node table audits determine if this information corresponds to data in the CM table PMNODES. To prevent differences in entries for the XPM units, the CM maintains the node information.

Node Table Sync Redesign introduces the following error handling changes:

- Table Control applications change inventory tables reject tuples, that the system cannot support. The system cannot support the reject tuples when a peripheral does not have the required resources.
- The node table audit raises an ISTb condition on a XPM that has a node table mismatch with the CM. BSY and RTS the XPM to clear the ISTb condition.
- A negative acknowledgment from the XPM causes the system to abort loading or RTS process. This acknowledgment occurs while the XPM downloads the CDT node on port information during a bulk download.
- A negative acknowledgment from the XPM raises and ISTb condition on the XPM. This acknowledgment occurs while downloading either the node CDT or port CDT data during a dynamic configuration update.
- Node Table Sync Redesign creates two new PMDEBUG commands. These commands give operating company personnel the ability to determine which tables are bound to the CDT data distribution. These commands give operating company personnel the ability to display tuples in these tables. The syntax of these commands appears in the following list:
  - To get a listing of the XPM data tables bound to CDT management, in the CHNL:PROT level of PMDEBUG, type:

    >SHOWTBLS
    without parameters

    To display one or more tuples in a table bound to CDT management, in the CHNL:PROT level of PMDEBUG, type:

    >DISPTBL table_id [<tuple_no> | R <begtuple> <endtuple> | all]
    where

table_id	is the name of the table to display
tuple_no	is the number of a exact tuple to display
R	is a range of tuples to display
begtuple	is the beginning tuple of the range
endtuple	is the end tuple of the range
all	is display all tuples in the table

    If the user enters the table identification all tuples are listed. To abort listing press the RETURN key.

Handling a SysB SMA unit

When the SysBs an SMA unit, the unit is not INSV longer. The unit cannot process calls. If the unit is the active unit, the system attempts a warm SWACT.

The following list contains some of the reasons for a SysB SMA unit when the QUERYPM FLT command is issued:

- the system drops activity
- CC audit
- diagnostic fails
- peripheral module (PM) audit
- self-test fails
- trap
- unsol (unsolicited messages) exceeds limit
- reset
- C-side links.

The C-side link problems fall outside the range of PM-level maintenance.

Standard troubleshooting methods require a test of the specified unit of a SysB SMA. If the unit passes tests and can be returned to service, the system can clear the SysB fault. A list of SMA cards suspected to be defective can accompany test failures in the following example:

```
SMA 60 Unit 0 Tst Failed
Failed to open link
Site Flr RPos Bay_id Shf  Description     Slot   EqPEC
HOST 00  C05  SME 00 51   SMA : 60        :22    6X40
HOST 00  C05  SME 00 65   SMA : 60        :22    6X40
HOST 00  C05  SME 00 51   SMA : 60        :21    6X41
HOST 00  C05  SME 00 51   SMA : 60        :18    6X69
```

Replace one card at a time in the order of the list, and test the unit again. Test the unit until the identified fault clears.

The test can fail. If this event occurs a message like *No Reply From PM*, accompanies the failure. A reset of the SMA with the PMRESET command can clear the fault. If the reset fails, a list of suspected defective cards can accompany the failure. Replace the cards one at a time. If one of the cards is defective, replacement of the card can clear the SysB problem.

To clear faults in a SysB SMA it can be necessary to reload the SMA with software.

The SysB fault does not always clear when cards suspected to be defective are reset, reloaded, or replaced. If the SysB fault does not clear there can be a software problem in the SMA. Contact your maintenance support group.

> **ATTENTION**
> The following RTS procedures with the NODATSYNC option apply to XPMs that are not converted to XPM CDT management. The CDT is introduced in feature AF5678, XPM Node Table SYNC Redesign, to improve synchronization of XPM units. The XPMs with software loads that contain this feature synchronize the node and port tables of each unit with the CM. The load does not synchronize unit-to-unit. XPM Node Table SYNC Redesign eliminates most out-of-sync causes except hardware failure. Clearance of an ISTb condition with configuration download and the synchronization of the two units occurs when the XPM is BSY and RTS. BSY and RTS the XPM during periods of low traffic to minimize OOS impact.

Handling an ISTb SMA unit

When an SMA has gone ISTb, one or both units has a fault but can process calls. The following list contains some common responses when the QUERYPM FLT command is given at the SMA level:

- `Data out of date` Reload the PM.
- `Static data mismatch with CC` The SMA requires a download of static data. The SMA must be BSY and RTS, or the inactive unit BSY and RTS. Use the NODATASYNC parameter to perform these actions. A SWACT FORCE must be performed. This action causes a loss of service.
- `P-side links out of service` DS-1 link maintenance is required.
- `Load mismatch with CC` The load entered in table LTCINV must change to match the load that the SMA uses. Issue the command QUERYPM CNTRS to display the SMA load.

A unit of the SMA can require testing. Replace defective cards, reset the SMA, or reload the SMA to clear a fault in the SMA.

Handling data mismatch

When the SMA has data mismatch troubles, like a static data mismatch with CC, the SMA is placed in the ISTb state. To handle the problem BSY the inactive unit of the SMA, RTS the unit, and execute a SWACT. After a successful SWACT, BSY and RTS the new inactive unit. This action clears the ISTb alarm. BSY and RTS the SMA during periods of low traffic to minimize effects on service.

> ***Note:*** An easy way to handle a static data mismatch is to BSY and RDT the unit. If data modification numbers (DMOs) do not run at the time, the static data mismatch clears.

Use the NODATASYNC parameter with RTS to minimize the time that the TWO SMAs must contain the correct data. When the RTS NODATASYNC command is issued for the inactive unit, the following sequence occurs:

1 The system blocks the node translation table transfer from the active to the inactive unit. A node tables are checked to verify if the tables match.

2 Static data is loaded from the CC to the inactive unit.

3 When the inactive unit is RTS, the system disables data synchronization between the active and inactive unit.

A maintenance example that describes how to use the NODATASYNC option follows.

Assume that a static data mismatch is present for the SMA. Operating company personnel must take the following steps:

1 BSY the inactive unit.

2 Use the NODATASYNC option to RTS the inactive unit.

   The inactive unit RTS. If during the RTS static data changes, the system produces a PM128 log with the message *Mismatch found in node table between the two units*. The QUERYPM FLT command for the SMA indicates a node table mismatch.

3 Enter the command string SWACT COLD to perform a cold SWACT.

   After the cold SWACT, the new inactive unit must receive data from the new active unit. The system must clear trouble indicators that associate with the data mismatch as the SMA RTS.

Handling an IMC link fault

When the intermodule communication (IMC) link audit detects data loss or damage of messages over IMC links, the status of the SMA becomes ISTb. The system generates a PM128 log. If operating company personnel enter the QUERYPM FLT command, the response contains the following statement:

```
NON-CRITICAL HARDWARE FAULT
```

Operating company personnel must perform the following steps:

1 Test the two units to confirm the audit result.

2 BSY the inactive unit, set the unit to OFFL, and replace the defective cards listed.

3 RTS the inactive unit.

The node can remain ISTb for more than 5 min and the response to QUERYPM FLT does not always change. If this event occurs the fault can be in the active unit. If the RTS of the inactive unit is successful, perform the following steps:

1 Perform warm SWACT of the units.

2 BSY the new inactive unit.

3 Test the inactive unit.

4 Set the unit with the defective cards to OFFL, and replace the defective cards with good cards.

5 RTS the inactive unit.

Handling a parity error fault

If the system detects a parity fault, the fault can be corrected and a loss of service does not occur. This section provides information on the types of parity faults. This section provides a summary of the actions that the CM takes for parity faults. This section describes the actions that operating company personnel must take.

Three types of parity faults appear in the following list:

- an intermittent fault. Intermittent faults occur when the system detects a fault, and an error is not found during the reread of the location.
- a soft fault. Soft faults occur when the system detects a parity error when the XPM tries to reread the location. An error is not found when the XPM tries to write to the location. The error can occur in the program store or memory store.

- a hard fault. A hard fault occurs when an XPM detects a fault and can not reread or write to the memory location.

When a parity fault occurs, the CM determines the appropriate action to perform on the XPM unit. The selection of action depends on the status of the active or inactive unit that reports the fault. The same CM handles the three types of fault.

The CM can detect a parity fault in the active unit of the XPM. If this event occurs the CM sets the unit ISTb with a reason of parity. The CM recovers the unit during a maintenance window. The maintenance window is used to recover a parity fault on the active unit is the XPM routine exercise test (REX) test window. The time for the XPM REX test window can be the same as the current time of the switch. An audit checks if the active unit of the XPM has an ISTb of parity. If an ISTb is present, the CM performs a SWACT and reloads the XPM if dependencies are not present. This action clears the ISTb parity fault and the short term failure (STF) parity fault peg and resolves the parity fault in the XPM.

When the active unit reports the parity fault, the system generates a PM181 log to notify operating company personnel of the problem. The CM performs recovery actions. The CM performs a SWACT of the XPM and loads the new inactive unit with the XPM software. The corresponding inventory table contains a definition of the XPM software load. The CM considers this loading action an autoload. A manual CM or mate reload of the XPM software to the affected unit clears the ISTb.

The CM does not permit a REX test to occur at the following locations:

- on a P-side or C-side node of the XPM during a recovery from a parity fault
- on the XPM if a P-side or C-side node during a recovery from a parity fault.

The CM does not let two XPMs perform a parity reload if the XPMs are in the same configuration. A P-side node cannot perform a parity reload at the same time as the C-side node. A C-side parity reload cannot occur at the same time as the P-side node. This restriction makes sure that one XPM in a configuration is in simplex state at a time.

The CM informs operating company personnel of a parity fault through PM181 log reports. This log is the primary trouble indicator. Operating company personnel can check for logs that associate with PM181 reports, like the PM128. Operating company personnel can check for these logs to understand the actions that the CM takes. This section provides examples of the messages for the PM181 and PM128 logs.

The XPM unit can be set ISTB with multiple reasons at the same time. A QUERYPM FLT can occur at the MAP level. If this event occurs the ISTb reasons that occur on the unit, that have not cleared, appear.

Hard parity fault

The active unit of the XPM can report a hard parity fault to the CM through the active unit of the XPM. If this event occurs the system generates a PM181 log. This log notifies operating company personnel if:

- a parity fault occurs on the active unit, and the unit is ISTb
- the CM reloads the unit for the next XPM REX test window.

The user can perform a manual SWACT and reload to clear the ISTb and the parity fault.

The following is an example of a PM181 log report:

```
PM181 JUL23 23:29:16 7700 INFO SMA 0 Unit 0
Node: Istb, Unit0 Inact: ISTb, Unit1 Act: ISTb
Parity audit has detected a hard parity fault.
The system will autoload the unit during the next
XPM REX test window.
Monitor the system for maintenance and recovery.
Site Flr  RPos  Bay_id  Shf Description Slot  EqPEC
RAL1 00   C05   LTE 00  51  SMA : 000    12    AX74
```

When a unit changes state to ISTb of UP RAM parity fault, the system generates a PM128 log. This log informs operating company personnel of a change of unit status.

The following is an example of a PM128 log:

```
*PM128 MAY09 09:49:56 9000 TBL ISTB SMA 1
 Node: ISTb (Unit ISTb)
 Unit0 Inact: InSv
 Unit1   Act: ISTb (UP RAM Parity)
```

The command string QUERYPM FLT displays the faults on a posted XPM. The following example MAP response indicates that a hard parity fault is present in unit 1 of the posted XPM:

```
>querypm flt
Node is ISTb
    One or both Units inservice trouble
Unit 0
    no fault exists
Unit 1
    The following inservice troubles exists:
        Parity audit has detected a hard parity fault.
        A reload is required to clear this fault.
        The system will autoload this unit during the next
        XPM REX test window.
```

Action by the CM The CM SWACTs and reloads the XPM for the next XPM REX test window. After the reload the XPM clears of this ISTb fault.

User action Action is not required by operating company personnel. A manual SWACT and reload can clear the parity fault.

Handling P-side messaging overload

When a P-side messaging overload condition is present with the SMA, the system can discard messages on common signaling channels (CSC) or EOCs. The system discards these messages because of queuing delays. This condition can result in service degradation on the subtending remote fiber terminals (RFT). These terminals include the RFT associated with the posted integrated digital terminal (IDT). To minimize service degradation, operating company personnel must perform the following steps:

1. At the IDT level of the MAP terminal, enter the command QUERYPM FLT.
2. Check for ISTb reasons of *CSC messaging overload* or *EOC messaging overload*.
3. The system can indicate a CSC or EOC messaging overload. If this event occurs check for indications of channel or logical link failures for the posted IDT. Correct the failures.
4. If the defective channels or logical links cannot be corrected, operating company personnel must manually busy the failing channel or logical link. Personnel must BSY the link to prevent the use of additional resources to maintain the link.

5 The channel or logical link failures are not always on the posted IDT. The steps before this step, do not always correct the overload condition. If this event occurs the cause of the condition can be an engineering problem with the RDT.

Handling a data communication failure in the communication stack

When a data communication failure occurs in the communication stack maintenance or provisioning information is not exchanged. The information is normally exchanged between the S/DMS AccessNode and the DMS SuperNode.

Action by the data communication software

The system tries to initialize the Communications Stack again. The system is not always able to connect after six consecutive reinitialization attempts within 20 min. If this event occurs the system cannot to initialize the communication stack again. The system generates an APPL OSIstk alarm and a COMM777 log.

User action

Operating company personnel must collect all SWER and log reports related to the problem, and report the problems to Nortel (Northern Telecom). Nortel determines the cause of the problem. Use the DACRM test tool to verify and correct the problem. Use the START ALL command to recover the communication stack.

Changing the line capacity of an RFT

Issues affecting a line capacity change for an RFT

Changes to other fields in table RDTINV are not allowed while changing the SHELFSLT field. If other changes to table RDTINV are attempted while SHELFSLT is being changed, an error message is displayed informing operating company personnel that field SHELFSLT cannot be changed while other fields are being changed.

Note: Before you change the line capacity of an RFT, enter the QUERYPM command at the IDT level to display the total number of lines allocated to an SMA and the number of lines on the posted IDT.

The SHELFSLT value is a four-digit number where only the second is a variable. The other three are constants. If any attempt is made to change these values, a warning message displays.

Example of a MAP response

```
WARNING: minslot and minshelf are being changed to 1 and
maxslot is being changed to 96.
```

How to increase the line capacity of an RFT

Before you increase the line capacity of an RFT, the SMA that connects the RFT to the SuperNode switch must be put in the manually busy (ManB) state using the command string BSY PM FORCE. Any attempt to increase the line capacity of an RFT in any other state results in an error message being displayed that informs operating company personnel that the SMA must be ManB or Offl to change field SHELFSLT.

> **ATTENTION**
>
> When increasing the line capacity of an RFT using the command string BSY PM FORCE, conduct this activity during periods of low traffic. This is because active calls will be dropped and all RFTs connected to the SMA will be viewed as CBsy by the SuperNode switch.

Before you increase the line capacity of an RFT, check that all DTA connections are released for the RFT to be resized. The line capacity of an RFT cannot be increased when DTA lines are equipped or connected. Refer to the procedure “How to release digital test access (DTA) connections” that follows to determine if DTA connections exist and how to release them.

Note: If DTA connections are not released, SMA P-side channels get “hung.” These “hung” channels could result in a complete loss of call processing for the RFT that is to have the line capacity increased.

How to release digital test access (DTA) connections

The following steps must be followed to determine if DTA connections exist on the RFT and to release DTA connections.

At a MAP terminal

1 Access the LTP level by typing

>MAPCI;MTC;LNS;LTP

and pressing the Enter key.

2 Access the LTPDATA sublevel by typing

>LTPDATA

and pressing the Enter key.

3 Determine if DTA connections are equipped by typing

>EQUIP DTA QUERY ALL

and pressing the Enter key.

Example of a MAP response

```
MTR EQUIP        US DS      CONNECT     CHNL STAT
---------------------------------------------------
1 HOST 04 0 01 12 B1 B2
```

If any DTA equipment is reserved, an equipment number and line equipment number (LEN) will be listed under the MTR and EQUIP headings as seen in the previous example. If a DTA connection exists, a LEN will be listed under the CONNECT, CHNL, and STAT headings.

Perform steps 4 and 5 to release the DTA connection and reset the DTA equipment. If there are no DTA connections on the RFT, go to step 6.

4 To release the DTA equipment

>CONNECT eqno RLS

where eqno is the equipment number given in response to the command string EQUIP DTA QUERY ALL

5 To reset the DTA connection

>EQUIP DTA RESET eqno

where eqno is the equipment number given in response to the command string EQUIP DTA QUERY ALL

Note: This step is only needed if DTA equipment is reserved and a connection does NOT exist. You must release the DTA connection before you reset the DTA equipment.

6 You have successfully completed this procedure.

Methods for changing the line capacity of an RFT

In this section procedures for changing the line capacity of an RFT are presented. There are two methods for increasing and one method for decreasing the line capacity of an RFT.

The two methods to increase the line capacity of an RFT:

- method 1 – use two MAP terminals

- method 2 – prepare a read (store) file. This store file is a compilation of all the actions in the first method. The read file is then executed as a single activity. This method eliminates the natural delays imposed by manually entering the commands.

Method 1 – use two MAP terminals

Method 1 requires operating company personnel to control two MAP windows. It consists of the steps that follow.

Note: Operating company personnel should have both MAP terminals available and do as much pre-typing as possible to reduce the time it takes to increase the line capacity of an RFT. The pre-typing activity can be done in table RDTINV up to the point of adding the data presented in steps 2 and 3 of method 1.

> **ATTENTION**
>
> Before you increase the line capacity of an RFT, verify that all DTA connections are released for the RFT to be resized. The line capacity of an RFT cannot be increased when DTA lines are equipped or connected. Refer to the procedure “How to release digital test access (DTA) connections” to determine if DTA connections exist and how to release them.

Perform the following steps to increase the line capacity of an RFT.

Note: Before you change the line capacity of an RFT, enter the QUERYPM command at the IDT level. You can use the QUERYPM command to display the total number of lines connected to an SMA and the number of lines on the posted IDT.

At MAP terminal 1

1 Post the SMA that connects to the RFT that is to have its line capacity increased by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA to be posted

At MAP terminal 2

2 Position on the affected RFT in table RDTINV by typing

>TABLE RDTINV;FORMAT PACK;POS rdtname
and pressing the Enter key.

where

rdtname	consists of the site, frame, and unit number of the RFT datafilled in table RDTINV, for example, RFT1 0 0

3 Change the value of subfield SHELFSLT by typing

>CHA VARTYPE
and pressing the Enter key.

The following confirmation message appears

```
Enter Y to continue processing or N to quit.
```

If you wish to continue, respond to this message by typing

>Y
and pressing the Enter key.

Respond to the MAP terminal response as follows:

`>RDTVAR`
Press the Enter key.

`>SHELFSLT`

Respond to the MAP terminal response by entering the new SHELFSLT value

>newshelfslot value
and pressing the Enter key.

where

newshelfslot value	is the new RFT shelf size to be entered in table RDTINV, field SHELFSLT.

Note: You may respond to the request to confirm in order to verify that all DTA connections are released. If the system responds that DTA connections exist, respond by typing “N” to reject the request. Then proceed to the procedure “How to release digital test access (DTA) connections” earlier in this section. However, if the system responds that the SMA is InSv, proceed to step 4. Do not enter “Y” to confirm until directed to do so in step 5.

At MAP terminal 1

4 Busy the SMA by typing

>BSY PM FORCE

and pressing the Enter key.

The following confirmation message appears

```
This action will take this pm and all of its subtending
nodes out of service
Please confirm (“Yes”, “Y”, “No”, or “N”):
```

If you wish to continue, respond to this message by typing

>Y

and pressing the Enter key.

Note: At this point the SMA is ManB and any calls that are active on RFTs are taken down and an outage occurs.

ATTENTION

Do not proceed to step 5 until both units are in the ManB state.

At MAP terminal 2

5 Ensure step 4 at MAP terminal 1 is complete by noting that both units are ManB before proceeding with this step. Respond “Y” to confirm the change to SHELFSLT by typing

>Y

and pressing the Enter key.

ATTENTION

Do not proceed to step 6 until the “`Tuple changed`” message is received at the MAP terminal.

At MAP terminal 1

6 Return to service the ManB SMA by typing

>RTS PM FORCE

and pressing the Enter key.

At this point the SMA returns to service and the state of the IDTs change from CBsy to InSv.

7 You have successfully completed this procedure.

Method 2 – prepare a store file

Method 2 requires operating company personnel to prepare a store file that contains the steps of method 1. The advantage of method 2 is that outage time is reduced by removing the delays associated with manually entering commands on two MAP terminals.

ATTENTION

Before you increase the line capacity of an RFT, verify that all DTA connections are released for the RFT to be resized. The line capacity of an RFT cannot be increased when DTA lines are equipped or connected. Refer to the procedure titled “How to release digital test access (DTA) connections” presented earlier in this section to determine if DTA connections exist and how to release them.

Note 1: If DTA connections are not released, SMA P-side channels get “hung.” These “hung” channels could result in a complete loss of call processing for the RFT that is to have the line capacity increased.

Note 2: Before changing the line capacity of an RFT, enter the QUERYPM command at the IDT level to display the total number of lines connected to an SMA and the number of lines on the posted IDT.

Perform the following steps to create a store file used to increase the line capacity of an RFT:

1 At the CI level, access the store file editor by typing

>Edit <filename>

and pressing the Enter key.

where

filename is the name you choose for the store file.

2 Enter information into the store file by typing

>Input

and pressing the Enter key.

3 Enter the content of the store file as follows:

a. **>MAPCI NODISP;MTC;PM;POST SMA sma_no**

and press the Enter key.

where

sma_no is the number of the SMA connected to the RFT to be upsized.

b. **>BSY PM FORCE**

and press the Enter key. This command manually busies the SMA.

c. **>Y**

and press the Enter key.

d. **>TABLE RDTINV;FORMAT PACK;POS rdtname**

and press the Enter key.

where

rdtname consists of the site, frame, and unit number of the RFT datafilled in table RDTINV, for example, RFT1 0 0

e. **>CHA VARTYPE**

and press the Enter key.

f. **>Y**

and press the Enter key.

g. Enter the existing value entered in field RDTVAR, for example

>RFT

and press the Enter key.

h. **>newshelfslot value**

where

newshelfslot value	is the new RFT shelf size to be entered in table RDTINV, field SHELFSLT.

and press the Enter key.

i. Enter the response to the system confirmation message asking you to confirm the change to SHELFSLT as

>Y

and press the Enter key.

j. **>QUIT**

and press the Enter key.

k. **>ABORT**

and press the Enter key.

Enter the ABORT command to abort any system responses to incorrect data entry. The ABORT command prevents situations that may arise when the DMS switch prompts the user for correct data in response to incorrect data that was entered in the store file. Entering incorrect data prevents the SMA from returning to service and may prolong the planned outage.

CAUTION
Entering incorrect values may result in an outage longer than planned.
When compiling this store file, ensure all values are correct and entered correctly. If incorrect values are entered, an outage of longer duration than planned could result.

l. **>RTS PM FORCE**

and press the Enter key. This command returns the SMA to service.

m. **>QUIT ALL**

4 After typing the information in step 3 as the store file, press the Enter key twice to stop editing the store file.

5 Save the store file by typing

>file SFDEV

and pressing the Enter key.

where

filename is the name of the store file input in step 1.

6 List the store file by typing

>listsf

and pressing the Enter key. This command lists all the store files in the SFDEV that the user created.

7 Activate the store file to increase the line capacity of the RFT by typing

>read <filename>

and pressing the Enter key.

> **ATTENTION**
>
> When you activate the store file, the SMA is put in the ManB state. Any calls that are active on RFTs connected to the SMA are taken down and an outage occurs. Therefore, conduct this activity during periods of low traffic.

where

filename is the name of the store file to be activated.

This command runs the store file.

8 After the store file has run and the line capacity of the RFT was successfully increased, you may wish to delete the store file. Delete the store file by typing

>Erasesf <filename>

and pressing the Enter key.

where

filename is the name of the store file to be deleted.

9 You have successfully completed this procedure.

How to decrease the line capacity of an RFT

If the line capacity of an RFT is being decreased, the SuperNode switch determines if any LENs are present above the new (lowered) value datafilled in table RDTINV field SHELFSLT. If any LENs are present above the new value, an error message displays informing operating company personnel that the line capacity of the RFT cannot be decreased because there are currently LENs provisioned above the new provisioned value.

Decreasing the line capacity of an RFT is accomplished at one MAP terminal and no outage occurs. When decreasing the line capacity, table LNINV must be verified to ensure the required number of lines are deleted before allowing an update to table RDTINV, field SHELFSLT. Prior to deleting a tuple from table LNINV, the lines will be cleared from other tables such as IBNLINES, KSETLINE, KSETINV, LENLINES, and SPECCONN. Although table RDTLT will be updated after table LNINV, because of provisioning delays, tuples deleted from table LNINV may still be present in table RDTLT, and will need to be checked.

Note: When decreasing the line capacity of an RFT, a decrease in the value of the SHELFSLT field in table RDTINV is allowed only after all LENs that reside above the new (lowered) SHELFSLT value have been removed.

Perform the following procedure to decrease the line capacity of an RFT.

At the MAP terminal

1 Position on the affected RFT in table RDTINV by typing

>TABLE RDTINV;FORMAT PACK;POS rdtname

and pressing the Enter key.

where

rdtname consists of the site, frame, and unit number of the RFT datafilled in table RDTINV, for example, RFT1 0 0

2 Change the value of subfield SHELFSLT by typing

>CHA VARTYPE

and pressing the Enter key.

The following confirmation message appears

`Enter Y to continue processing or N to quit.`

If you wish to continue, respond to this message by typing

>Y

and pressing the Enter key.

Respond to the MAP terminal response as follows:

`>RDTVAR`

Press the Enter key.

`>SHELFSLT`

Respond to the MAP terminal response by entering the new SHELFSLT value

>newshelfslot value

and pressing the Enter key.

where

>newshelfslot value	is the new RFT shelf size to be entered in table RDTINV, field SHELFSLT.

3 Confirm the new SHELFSLT entry into table RDTINV by typing

>Y

and pressing the Enter key.

4 You have successfully completed this procedure.

Locating and clearing faults

The standard troubleshooting steps for locating and clearing faults appear in the following list:

1 Silence audible alarms that the system initiates when the system detects alarm conditions.

2 Read status displays and trace fault codes to isolate the fault. Trace the fault to the menu level needed to clear the fault.

3 Offstream BSY the hardware to remove system access to the defective component. This action allows for maintenance. This action does not cause system interference.

4 Test the defective component, and identify the card you must replace. Replace the defective card. Test the card again.

5 RTS the hardware.

Fault isolation program

The fault isolation program improves the XPM capability to isolate faults and provides the following diagnostics:

- improved read-only memory (ROM) diagnostics

  These diagnostics allow the SMA to detect a wider range of possible faults that can develop in the processor. These diagnostics perform better fault isolation, reduced testing time, and not destructive tests.

- mate diagnostics

  Mate diagnostics provide CC with a method of diagnosing a defective SMA unit through the mate unit. The XPM_MATE_DIAGNOSTICS_AVAILABLE parameter must be set to Y (yes) to activate mate diagnostics.

- IMC diagnostics

  The IMC diagnostics provide diagnostic support for the links of an XPM. An IMC audit drives to verify the integrity of the IMC links at normal intervals. An audit failure initiates automatic maintenance activity.

- XPM memory parity audit
- XPM static data audit.

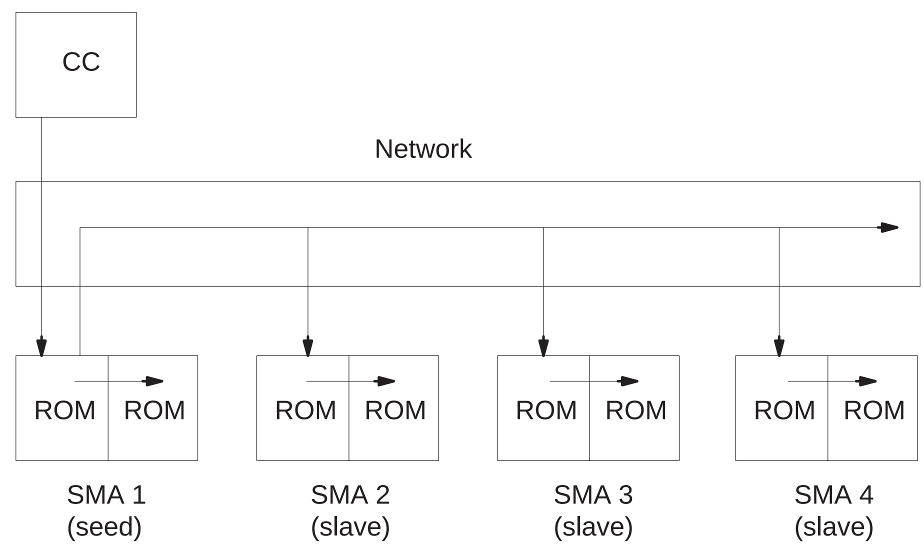
Office recovery program

The office recovery program improves the reliability and performance of the system restarts. The method for office recovery is to RTS good nodes as quickly as possible. For two unit nodes like the SMA, the emphasis is on the RTS of an active unit. The RTS of an active unit occurs during the recovery process. Postpone the recovery of the inactive unit for a later time, when all active units RTS.

The office recovery program provides the following system improvements:

- XPM broadcast mate loading. Refer to the following figure.
- RECOVER command for manual dead-office recovery
- hardware and software initialization control that provides quick system restarts.

SMA broadcast mate loading



Sequence of events:
- CC forwards load to seed unit
- Seed loads itself
- Seed forwards load to the network
- Seed forwards load to the mate
- Slave SMAs listen for load
- Slave SMAs load shelves and forward loads to mates

Testing line functionality

This section summarizes how lines off the S/DMS AccessNode can be tested. This section summarizes:

- how operating companies set up line testing systems
- lists of different types of testing equipment
- identify how testing equipment interact with the DMS SuperNode switch and the SMA system

Operating company line testing

Operating companies employ two line testing systems: non-integrated and integrated. Some tests can initiate form the subscriber premises, for example, the silent switchman, station ringer, and dialable short circuit tests.

Non-integrated

In this system, control of the line testing functions is decoupled from the local switch. The operating company can use one type of line testing system for different types of switches. The SuperNode-SMA system supports the non-integrated system when the user uses exact configurations.

Integrated

In this system, local switch controls line testing. Complete testing of the lines is possible. The local switch can test lines that use proprietary equipment. For the DMS SuperNode switch, these lines include meridian business set (MBS). An example of integrated testing is the LTP commands. These commands are used to test subscriber lines.

Subscriber premise line testing

The following types of tests are initiated from the premise of the subscriber.

Silent switchman

In this test, the subscriber line is isolated from the S/DMS AccessNode line card. This isolation allows for identification of facility faults through the use of external test equipment. When the DMS receives a dial-up service code, the switch sends a confirmation tone. The subscriber line disconnects from the S/DMS AccessNode line card. Entries control the length of time the loop is disconnected from the line card.

Station ringer test

This test is a set of tests that verifies the subscriber station equipment. The test consists of one or more subtests, like dial pulse collection, dual-tone multi-frequency (DTMF) collection, coin return, and MBS checks.

Dialable short circuit

This test causes the tip and ring leads of the line under test to be shorted together. When the DMS SuperNode switch receives a dial-up service code, the switch sends a confirmation tone, and applies the short circuit. Entries control the length of time the tip and ring of the line of the subscriber is shorted.

Supported non-integrated line testing systems

The SMA system supports several different non-integrated testing systems. The following section describes these testing systems.

Local test desk

A #3 local test cabinet or a #14 local test desk.

Centralized Automatic Loop Reporting System/Enhanced Line Test Unit (CALRS/ELTU)

Bell Canada uses this system. Note that although this product is a Nortel product, the CALRS/ELTU is a non-integrated system.

3703 local test cabinet

A series 3703 local test cabinet.

Mechanized loop test

The mechanized loop test (MLT) system is used in most of the Bell operating companies.

Reliance Telecommunications Electronics Company (RTEC)

The RTEC MITS70 system from the RTEC. The MITS70 system consists of the T-9/15 or T-9/SX central office unit, the T-916 remote test unit (RTU) selector, and the T-9/X RTU.

Teradyne

The 4-Tel system from Teradyne. The 4-Tel system consists of the computer control unit (CCU) and the RMU230 test head.

Lines maintenance

The following section describes line maintenance functions that the Digital Multiplex System-100 (DMS-100) provides when connected to a S/DMS AccessNode.

Digital test access

Digital test access (DTA) is a digital monitoring method used to access subscriber loop information. Copying of the digital data streams to and from a subscriber line establishes the DTA. The DTA is permitted on integrated services digital network (ISDN) lines whose host SMA has the Enhanced Timeswitch NTAX78AB circuit card.

The DTA is present for upstream to the DMS switch and downstream away from the DMS switch directions for the following ISDN channel types:

- time division multiplex (TDM) D channels
- Bd channels routed to a DMS switch packet handler
- provisioned B (PB) channels
- circuit switched B (CSB) channels.

The ISDN basic rate interface (BRI) service consists of two 64 kb/s B-channels and one 16 kb/s D-channel. The DTA provides the capability to monitor these channels. Duplicate the data stream to and from the ISDN phone and transmission of it to the protocol analyzer to perform monitoring. The protocol analyzer extracts data from the B1 and B2 channels of an ISDN line. The B1 channel receives the upstream data, and the B2 channel receives the downstream data from the monitored line. The DTA is not invasive. The data of the monitored channel goes to the normal destination, and the protocol analyzer. The B, D, and Bd channel data replicates in the time switch in the SMA.

The connection between the monitoring equipment and the monitored channel, is established through nailed up connections. These connections stay in place until operating company personnel remove the connections. The monitoring equipment is not restricted to the SMA host that the ISDN line the system monitors. The monitoring equipment can be present off DMS-100 ISDN line cards (ISLC). Monitored equipment is reserved for DTA usage and connects to the monitored channel by the EQUIP and CONNECT commands. The EQUIP command permits operating company personnel to define an ISDN loop. The CONNECT command makes the upstream and downstream monitor connection, for the ISDN loop posted to the DTA monitor equipment.

The protocol analyzer required for DTA must be able to interconnect with an ISDN network termination 1 (NT1) S/T interface. The protocol analyzer must be able to resolve separate D-channel members from the TDM group. The protocols of are X.25, Q.921, and Q.931.

When a ISLC is used for DTA, the ILSC must be in table LNINV. The status field of the ISLC must be assigned as hardware assigned software unassigned (HASU). The B-channel of the ISLC cannot be nailed-up for PB channel service. The loop state must be ISTb.

The steps required for DTA use are as follows:

1 Identify the loop to monitor.
2 Identify the monitor equipment.
3 Make sure the monitor equipment is provisioned properly.
4 Connect the protocol analyzer to the selected access point.
5 Enter the LTPDATA or PRADCH level of the MAP display.
6 Post the loop to monitor.
7 Reserve the monitoring equipment.
8 Connect the monitoring equipment.
9 Query each DTA (optional).
10 Check connection integrity (optional).
11 Release the DTA connection.
12 Release the monitoring equipment.

Interactions Removal of a DTA connection while a SMA is out of service can increase the time required to return the SMA to service. The DTA system downloads connection information as static data. Removal of a DTA connection while the SMA is out-of-service, requires all static data to download when the SMA returns to service. This event results in an increased recovery time for the SMA.

Limits The following is a summary the limits of the DTA process:

- Office parameter MAX_DTA_ON_SWITCH in table OFCENG limits the number of DTA connections active in a office.
- A maximum of six simultaneous DTA connections are permitted in a SMA.
- The DTA allocates channels on the links between the loop monitoring point and the monitoring equipment. The DTA makes connections across peripheral and network modules between the allocated channels. The allocated channels are not available for call processing while the DTA connection is active.
- Junctor Network (JNET) to Enhanced Network (ENET) retrofits require the DTA special connections that the system must delete.
- The system cannot delete the C-side ports used for DTA applications until the DTA special connections are removed.

- The system deletes each DTA connection when an over night process occurs.
- The DTA protocol analyzer cannot interface with a SMA DS-1 port.

Integrated remote test unit

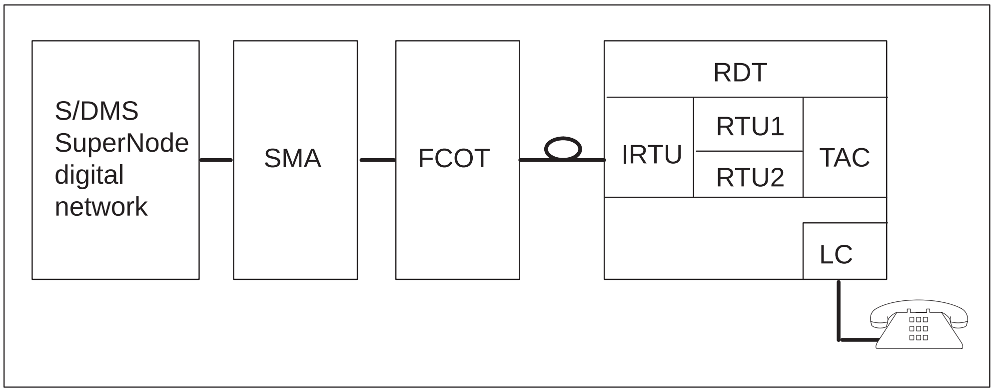
The IRTU is a new type of remote metal test equipment that resides in the S/DMS AccessNode. This equipment provides line circuit measurement capabilities for lines that reside in a S/DMS AccessNode. The IRTU replaces the multi-line test unit (MTU) with test bypass pair (TBP), in the DMS SuperNode switch, or an external remote test unit (ERTU) at the AccessNode. The ability of the IRTU to emulate the MTU and digital remote test unit (DRTU) helps to accomplish this process. The DRTU is one type of ERTU. Through the removal of the TBP and MTU, the IRTU remove the distance limits and electrical deviations that the TBP creates. The IRTU also removes the need for a metal path and associated hardware.

The IRTU has two analog test heads, remote test unit 1 (RTU 1) and remote test unit 2 (RTU 2). Before tests can occur, access to the line under test must be gained through the metallic test access unit (MTAU) and the metallic test access path termination (MTAPT). A permanent correlation is present between the remote test unit (RTU) and the test access point (TAP). The RTU 1 connects to TAP 1, RTU 2 connects to TAP 2.

An ERTU device requires control and talk or monitor paths that are provided. Line cards provide these paths. The control path sends commands to the test head. The talk or monitor path is used to monitor or talk to the line under test. For the IRTU, the IRTU line cards (ILC) that reside on the test access card in the S/DMS AccessNode provide this functionality. MAP display based MONLTA and TALKLTA connections require the ILC talk path.

The IRTU provides an interface to internal and external testing systems. An example of an internal test system is the S/DMS SuperNode MAP terminal. The IRTU provides MTU emulation to perform line maintenance tests that start from the MAP terminal. The following is an example of an internal test system.

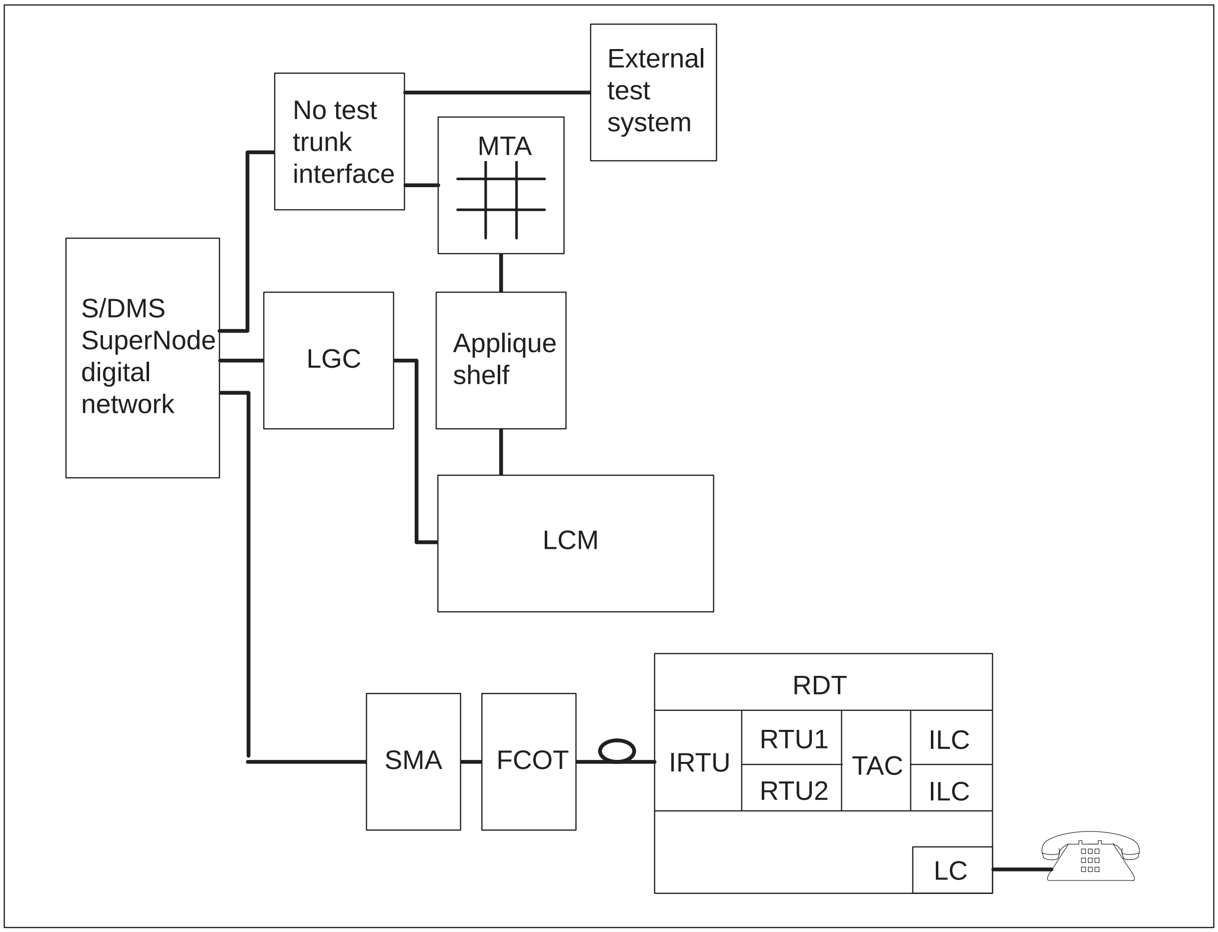
Internal IRTU interface



Examples of external test systems are a centralized automatic loop reporting system (CALRS) and a local test cabinet. The IRTU provides DRTU emulation for external test system line maintenance activities. Access to the IRTU occurs through the control and talk or monitor paths through ILCs. The control path is a physical connection that passes through the metallic test access (MTA) matrix. This matrix includes a horizontal and vertical connection. The horizontal connection represents interface into the S/DMS

SuperNode of the external system. The vertical connection is the control path to the line under test. An example of an external test system follows.

External IRTU interface



The IRTU line card represents a virtual concept that does not require a circuit card. A line card must not be present in the slot that the ILCs are defined in. Operating company personnel can use line cards normally reserved for control, talk, or monitor paths for other purposes. IRTU line cards continue to require definition in present line card slots. The IRTU line cards use current slots, the line size of the remote is reduced. The IRTU line card provides two test heads. Each test head requires control, talk, or monitor paths when an external test system uses test heads. This state reduces the line size of the IDLC configuration by a maximum of four lines; two for each test head. In a combined IDLC, universal digital loop carrier (UDLC), the line size of the remote can be reduced by a maximum of 6 lines. The UDLC configuration requires a separate control path from the IDLC.

Vertical connections for test heads are provisioned in table RDTINV. Information entered in table RDTINV are; the type of test head, the associated vertical identification number, and the metallic test access path. This information is in field MTSTACPT (metallic test access point). Enter a maximum of three test heads in table RDTINV. You can provision these test heads with verticals because of the restriction set by table MTAVERT. Test bypass pair (TBP) and ERTU that are valid entries for field MTSTACPT require a vertical. The IRTU requires a vertical if an external test system uses the IRTU. The IRTU is accessed through TAP 1 or 2. The TBP is accessed through the TBP TAP. The ERTU can be accessed through TAP 1, 2, or the TBP TAP.

> ***Note:*** A maximum of one test head can occupy a given TAP.

The following combinations of test heads are valid:

- IRTU separately (one or both test heads defined; only one test head is defined for no test trunk [NTT] use)
- ERTU separately
- TPB separately
- IRTU and TBP (one or both test heads defined with only one test head that the external system uses)
- IRTU and ERTU (one or two test heads defined; IRTU must be MAPIF, ERTU must be NTT and provisioned on TBP TAP)
- ERTU and TBP (TBP provides MAPIF)

> ***Note 1:*** The IRTU test head 1 (RTU 1), and TBP cannot be used together, even though the test heads can be provisioned together. The RTU1 and TBP use the same internal test bus in the S/DMS AccessNode. If IRTU and TBP are required for MAP testing, the preferred combination is TBP with RTU 2.
>
> ***Note 2:*** The IRTU must be provisioned on TAP 1 or TAP 2. The ERTU or TBP must be provisioned on TBP TAP.

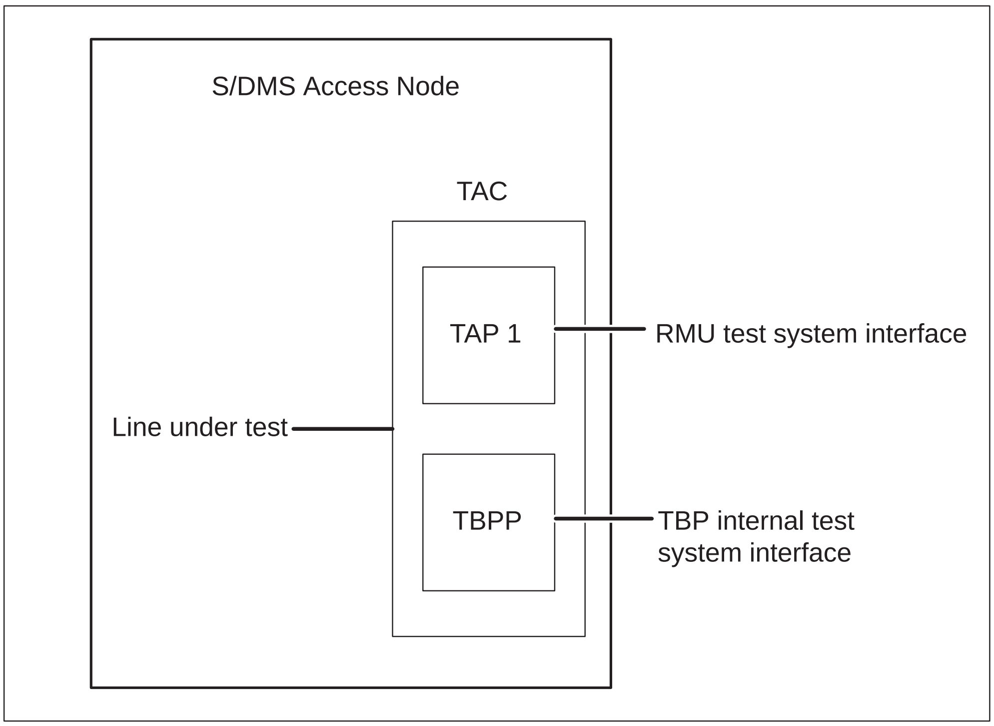
For SMAs ALT can use the two IRTU test heads, if the heads are both provisioned in table RDTINV, field MTSTACPT. The ALT uses either the IRTU or TBP for testing. The ALT starts a separate test stream for each of the RTUs provisioned on a given RDT. These RTUs have ALTUSE set to Y (yes) in table RDTINV. The line test range that the user submits is split in two subranges. Each RTU tests one subrange separately from the other RTU. The line test range is divided on a shelf boundary. This division is to make sure the two test streams do not interfere with each other.

The following section provides test configuration examples.

Operating company personnel want internal (MAP terminal) testing through TBP, and external NTT/MLT/TERADYNE/RTEC testing through external remote maintenance unit. An IRTU is not configured, current ILCs are not used. Table entries for the fields that this feature affects are as follows. The following figure describes this setup.

```
          TEST HEAD    TEST HEAD
TSTUTTYP  TBP          ERTU
TSTHDUSR  MAPIF        N/A
VERTID    11           12
TSTACCPA  TBPP         TAP1
```

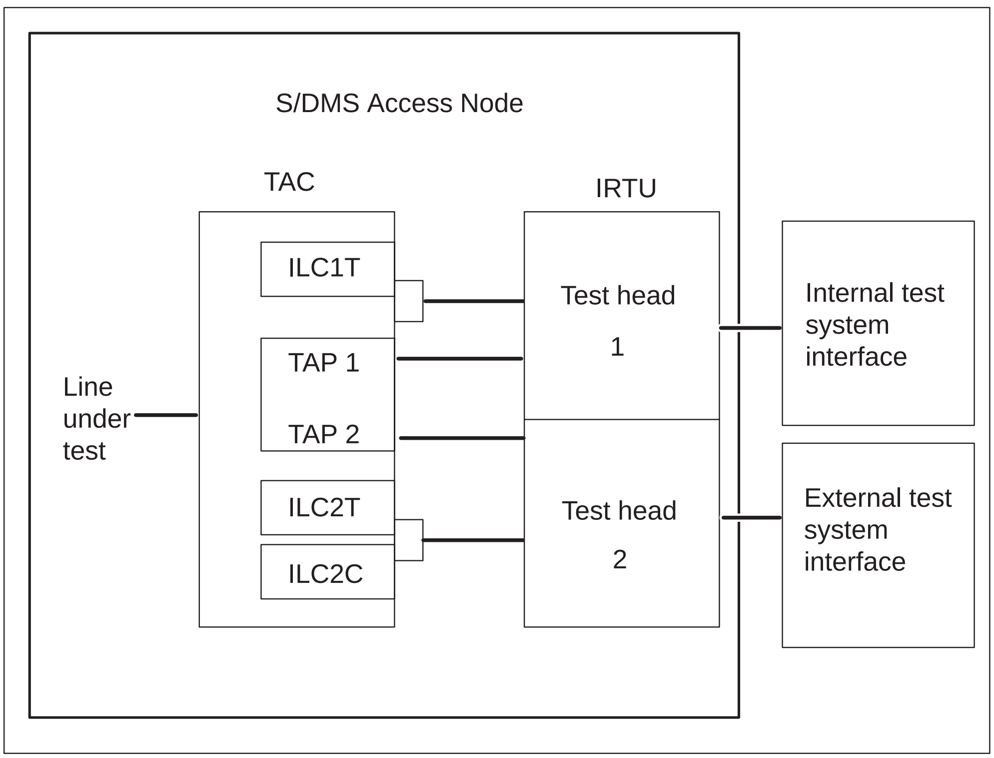
MAP terminal through TBP, remote maintenance unit or NTT through TAP 1



Operating company personnel want both internal (MAP terminal) and external testing through IRTU. The two IRTU test heads and four current line appearances for ILCs are assigned. Table entries for the fields that this feature affects are as follows. The following illustrates this setup.

```
          TEST HEAD    TEST HEAD
TSTUTTYP  IRTU         IRTU
RTUNUM    RTU1         RTU2
TSTHDUSR  MAPIF        BOTH
VERTID    N/A          10
TSTACCPA  TAP1         TAP2
```

MAP terminal through IRTU, NTT through IRTU



The following table contains possible test equipment combinations for MAP testing.

Test equipment combinations

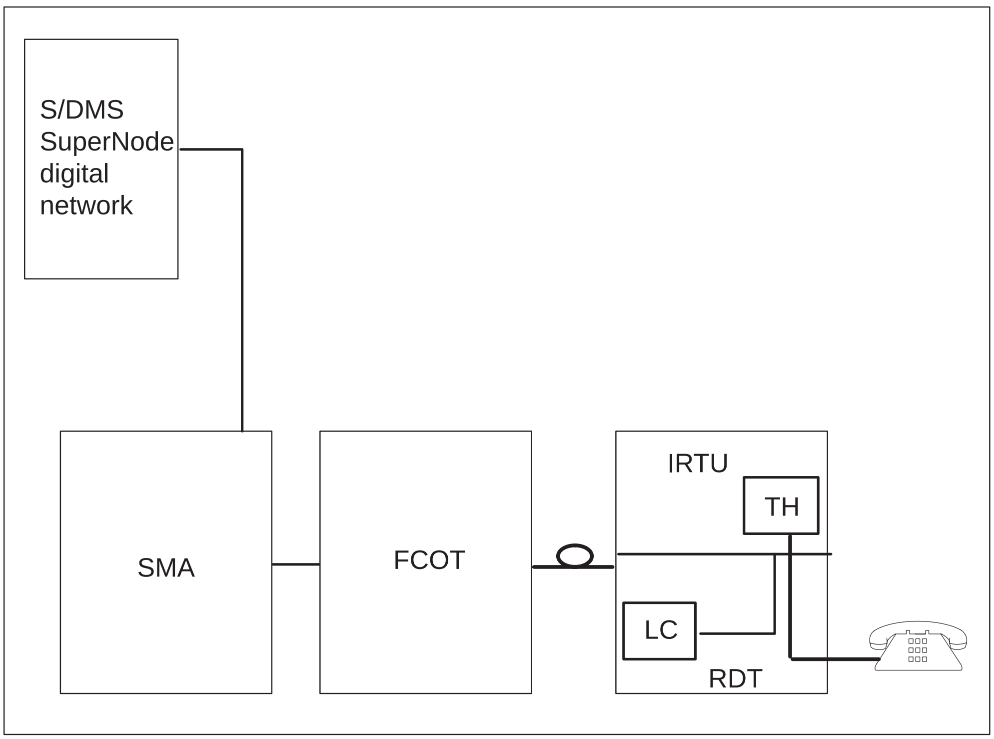
TBP MAPIF
TBP NTTIF
TBP BOTH
TBP MAPIF ERTU TAP 1
TBP MAPIF ERTU TAP 2
TBP MAPIF RTU2 MAPIF
TBP MAPIF RTU1 NTTIF
TBP MAPIF RTU2 NTTIF
TBP MAPIF RTU1 BOTH
TBP MAPIF RTU2 BOTH
TBP MAPIF RTU1 MAPIF and RTU2 MAPIF
TBP MAPIF RTU1 MAPIF and RTU2 NTTIF
TBP MAPIF RTU1 MAPIF and RTU2 BOTH
TBP MAPIF RTU1 NTTIF and RTU2 MAPIF
TBP MAPIF RTU1 BOTH and RTU2 MAPIF
TBP NTTIF RTU2 MAPIF
TBP NTTIF RTU1 MAPIF and RTU2 MAPIF
TBP BOTH RTU1 MAPIF
TBP BOTH RTU2 MAPIF
TBP BOTH RTU1 MAPIF and RTU2 MAPIF
ERTU TAP 1
ERTU TAP 2
ERTU TBPP
RTU1 MAPIF only
RTU2 MAPIF only
RTU1 NTTIF only
RTU2 NTTIF only
RTU1 BOTH
RTU2 BOTH
RTU1 MAPIF and RTU2 MAPIF
RTU1 MAPIF and RTU2 NTTIF
RTU1 MAPIF and RTU2 BOTH
RTU2 MAPIF and RTU1 NTTIF
RTU2 MAPIF and RTU1 BOTH

IRTU test configurations

The following section is an summary of test configurations with the IRTU, for MAP display testing.

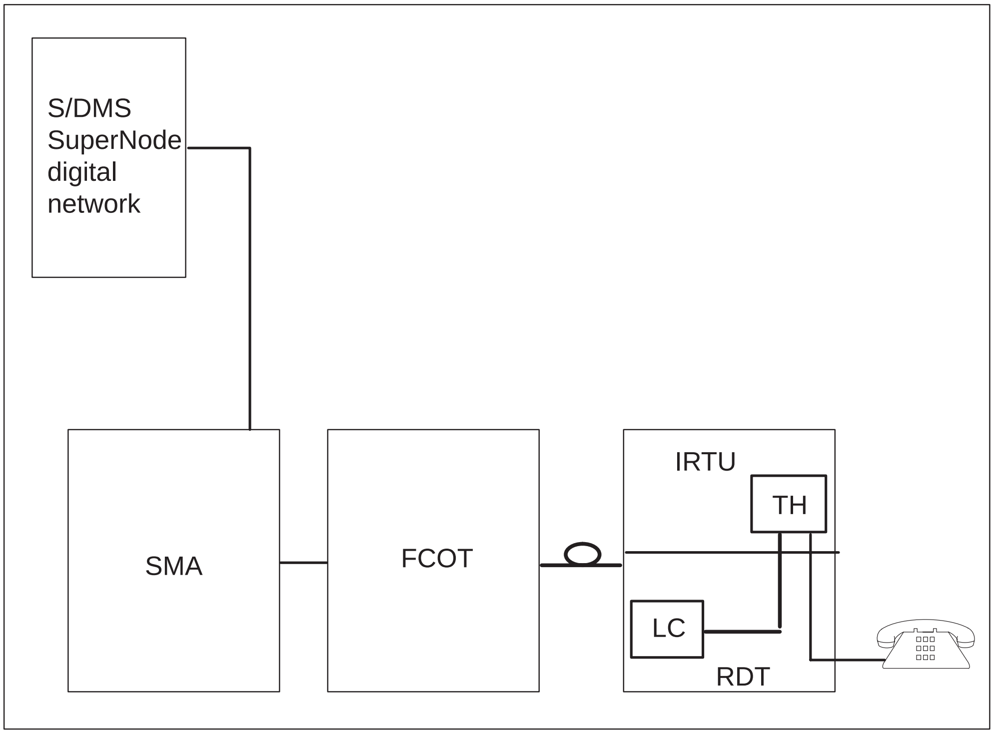
The test configuration for the VDC, VAC, RES, CAP and LNTST commands when the IRTU is available is as follows. The S/DMS AccessNode line card is disconnected from the subscriber loop. The line test access (LTA) direction selected is outward. The S/DMS AccessNode connects the subscriber loop to the IRTU test head. In this configuration the IRTU test head performs DC, AC, RES, and CAP electrical measurements on the subscriber loop.

Test configuration for VDC, VAC, RES, CAP and LNTST



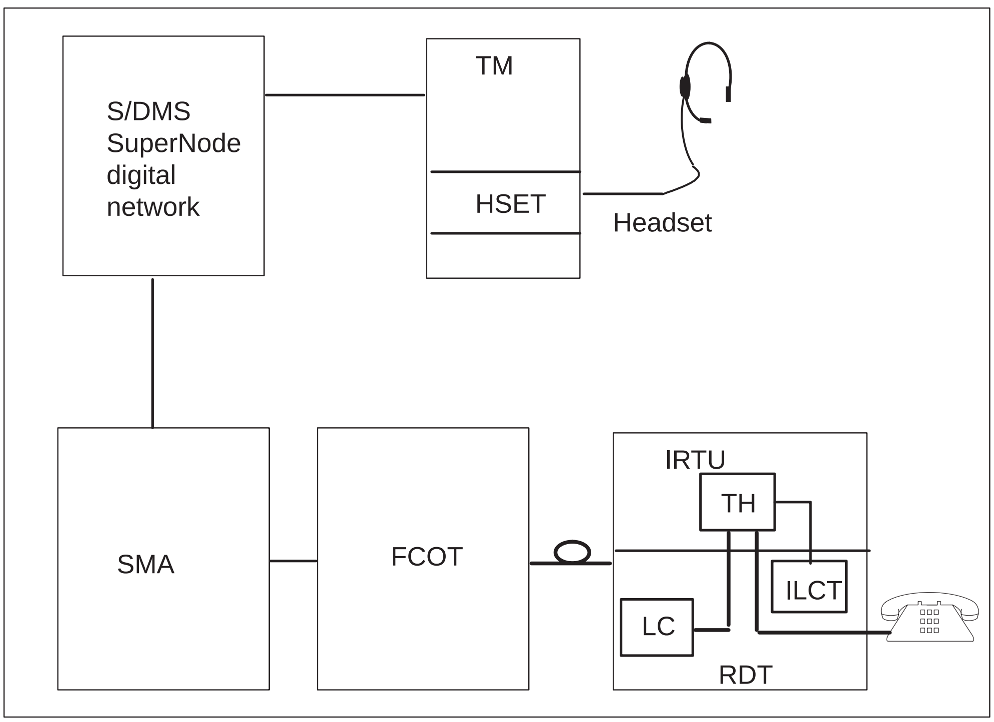
The test configuration for the TSTRING command when the IRTU is available is as follows. The S/DMS AccessNode line card is disconnected from the subscriber loop. The LTA direction is inward. The S/DMS AccessNode connects the line card to the IRTU test head. In this configuration the IRTU test head detects ringing voltage that the line card applies.

Test configuration for TSTRING



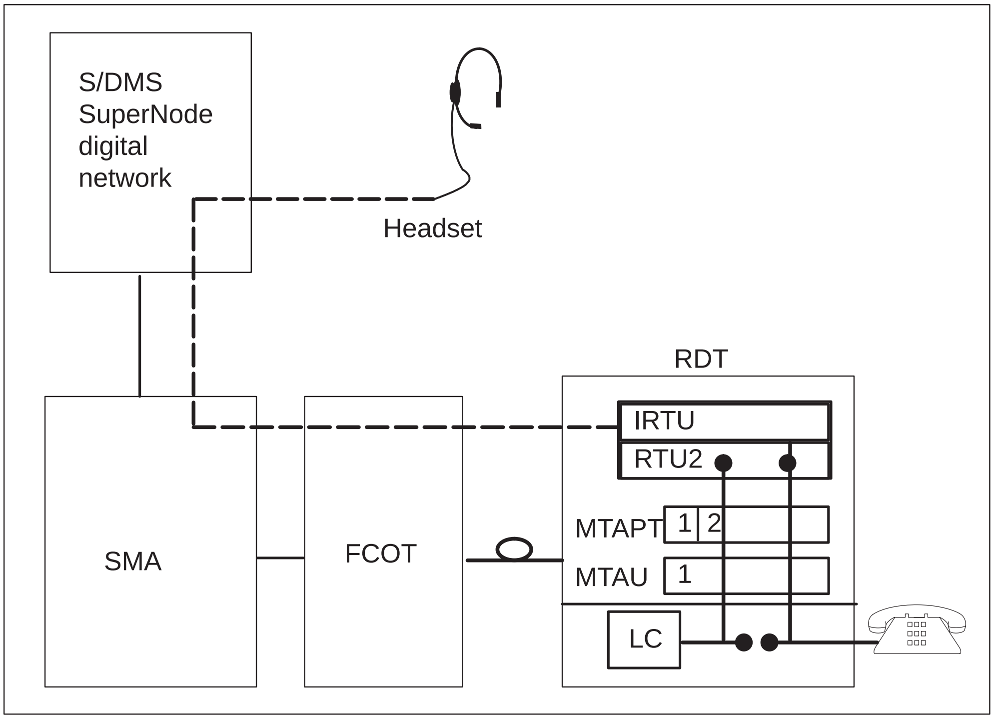
The MONLTA, TALKLTA, and ORIG commands use this configuration when IRTU is available. The subscriber loop connects to the IRTU test head, and through the ILC talk monitor path to a pulse code modulation path (PCM). The PCM terminates on the 101 communication test line circuit (HSET) that resides in the trunk module (TM). Use the MONLTA command to connect a headset circuit to a subscriber line. The connection allows operating company personnel to listen to a line. Use the TALKLTA command to test for specified signaling conditions. For the TALKLTA command, the real terminal equipment is used. In the ORIG configuration, the IRTU can simulate on and off hook conditions, and subscriber that dials numbers. Audible feedback is available through a headset that connects to the HSET trunk.

Test configuration for MONLTA, TALKLTA and ORIG



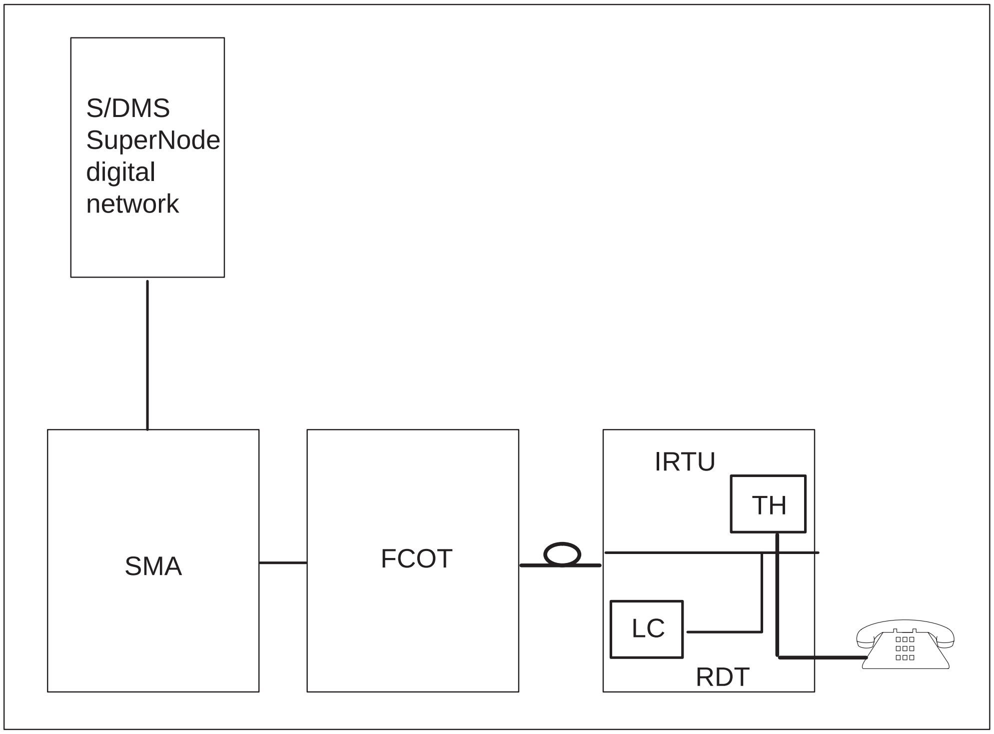
The TALKLTA with battery command uses this test when IRTU is available. The TALKLTA B command establishes a talk connection between the subscriber set and the CM headset. This connection occurs while an MTE is used to maintain battery to the loop. Operating company personnel can talk to the subscriber while the line card cut-off from the loop. The system does not support TALKLTA B for RDTEBS lines.

Test configuration for TALKLTA with battery



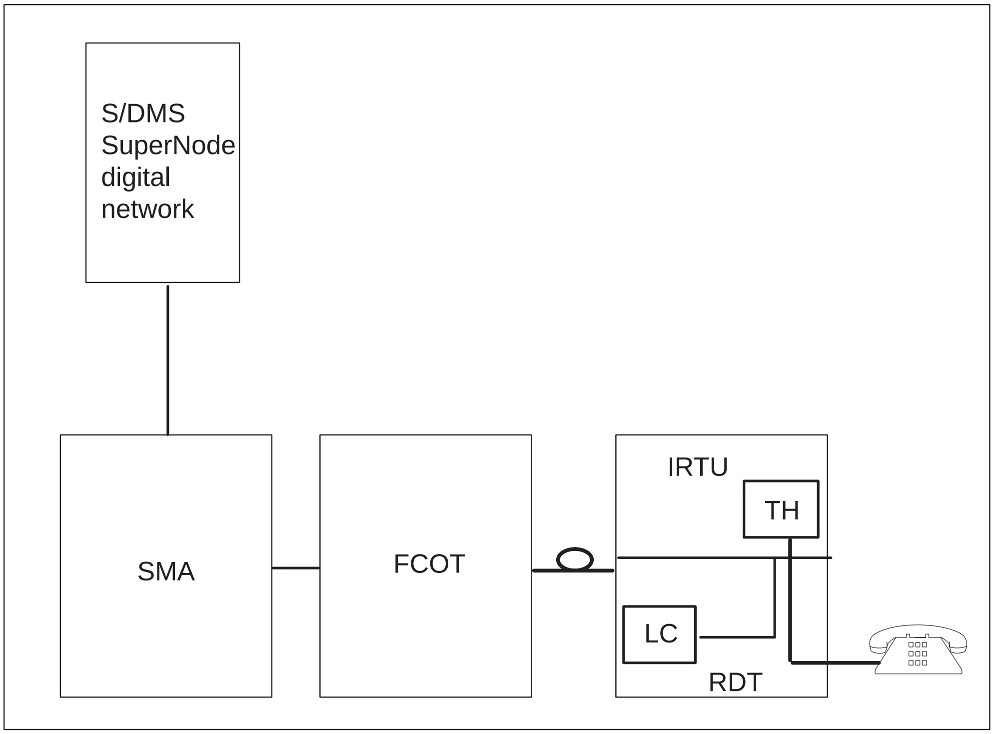
The TONEGEN METALLIC command uses this test configuration when the IRTU is available. The S/DMS AccessNode line card is disconnected from the subscriber loop. The S/DMS AccessNode connects the subscriber loop to the IRTU test head. In this configuration the IRTU test head provides tones on the subscriber loop.

Test configuration for tonegen metallic



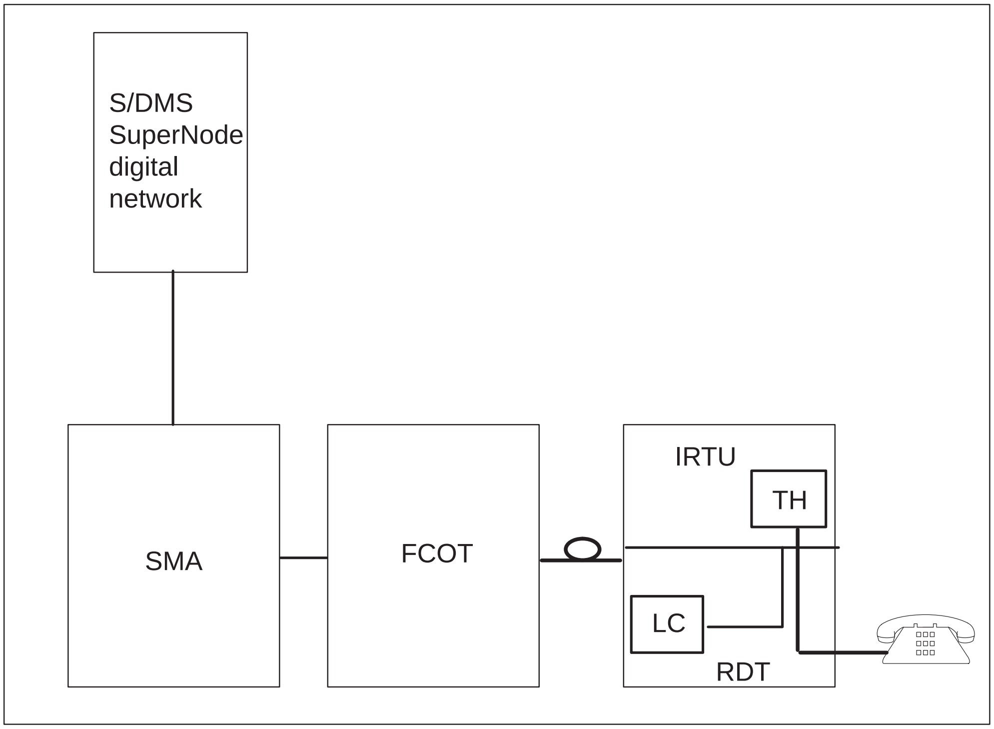
The DIALABLE SHORT CIRCUIT command uses this configuration when the IRTU is available. The S/DMS AccessNode line card disconnects from the subscriber loop. The S/DMS AccessNode connects the subscriber loop to the IRTU test head. In this configuration the IRTU test head provides a short across the tip and ring leads of the subscriber loop. Plain ordinary telephone service (POTS), COIN, and Meridian business set (MBS) lines use dialable short circuit.

Test configuration for dialable short circuit



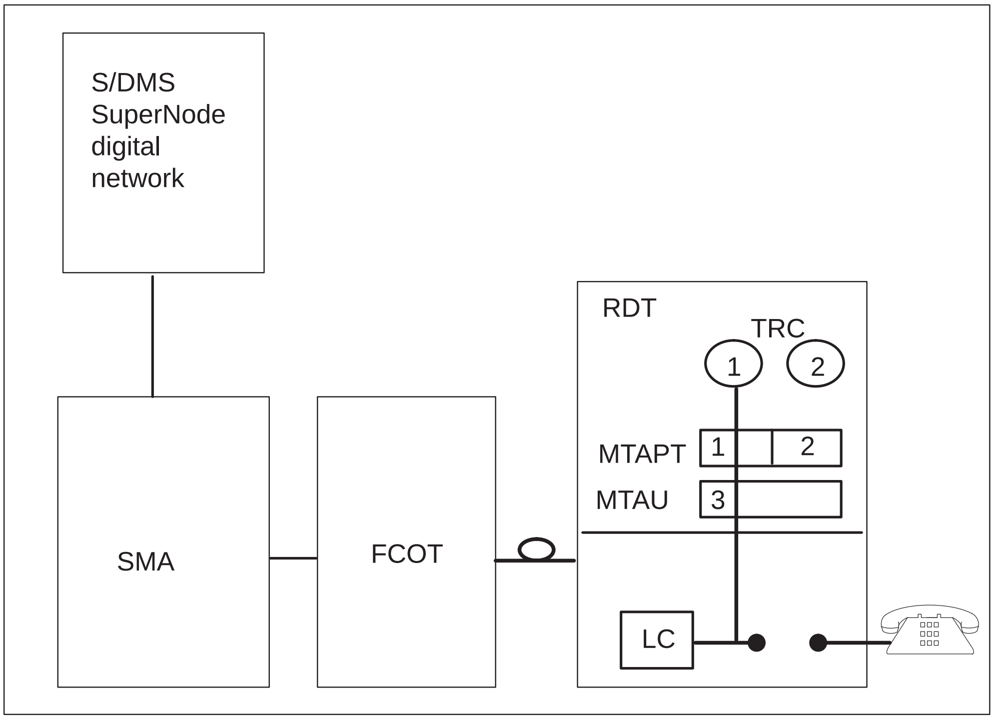
The ALT LIT command uses this test configuration when the IRTU is available. The S/DMS AccessNode line card disconnects from the subscriber loop. The S/DMS AccessNode connects the subscriber loop to the IRTU test head. In this configuration the IRTU test head performs DC, AC, RES, and CAP measurements on the subscriber loop.

Test configuration for ALT LIT



This diagram is the test configuration for the SDIAG command that supports POTS and coin lines. The EBS lines are not tested because a test can cause a loss of battery on the loop.

Test configuration for SDIAG



The ISDN SDIAG runs the ISDN DIAG. The POTS/coin SDIAG executes the following tests. These tests run as part of the subset of the standard DIAG test target:

- P-side channel check
- missing card test
- single party ringing test
- carrier channel loss test (also known as the transhybrid loss test)
- idle channel noise test

This subset of tests requires the use of the test response circuitry (TRC). The TRC requires MTAU/MTAPT access. ALT107 log reports report connection failures that associate with SDIAG tests. Possible reasons for connection failure are:

- free test sessions not available
- test access card (TAC), metallic test access card (MTAC), or TRC is out of service at the S/DMS AccessNode

In the event of a connection failure, the ALT test stream stops for 30 min and attempts a restart.

Integrated remote test unit messaging

To improve real time performance on the S/DMS AccessNode, line test access and line test functionality messages are not sent over the EOC channel. These messages are now sent over the CSC . Messages previously sent over the DS-1 channel of the EOC are sent over the DS-1 channel of the CSC. The purpose of message conversion from EOC to CSC is to improve real time performance on the S/DMS AccessNode.

The SMA sends and receives IRTU messages to and from the DMS SuperNode. The SMA state machine guides the functional line test application message to the CSC channel. The specified function that the state machine selects sends the message to the S/DMS AccessNode. The S/DMS AccessNode responds to the message. The message comes to the SMA through the CSC of the DS-1 link. The SMA reads the incoming message and the state machine implements a message that must go to the DMS SuperNode computing module (CM).

Message functionality is added to the SMA to perform remote test unit activities. These activities map to software objects in the S/DMS AccessNode. The remote test unit activities created in the SMA send and receive data to perform functions to control the IRTU in the S/DMS AccessNode. These tasks are

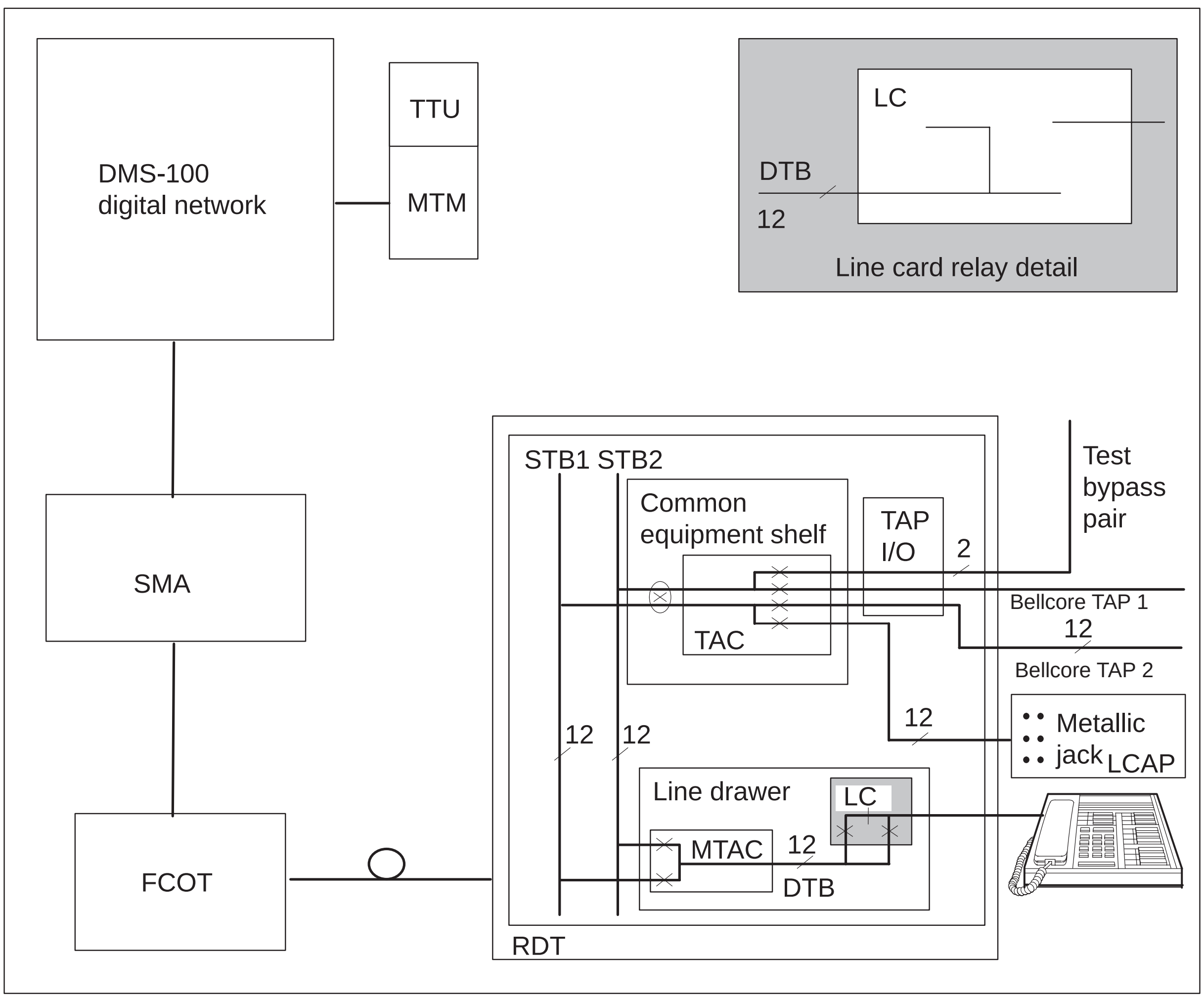
- emulate the MTU
- emulate the DRTU
- connect the test access
- disconnect the test access
- short circuit
- reset a 75 s timer

Line maintenance test configurations

This section describes test configurations for different types of line testing. A numbered diagram specifies each configuration. The diagram identifies different equipment modules required. The diagram describes the connections between equipment modules. This section provides information after each diagram for additional explanation.

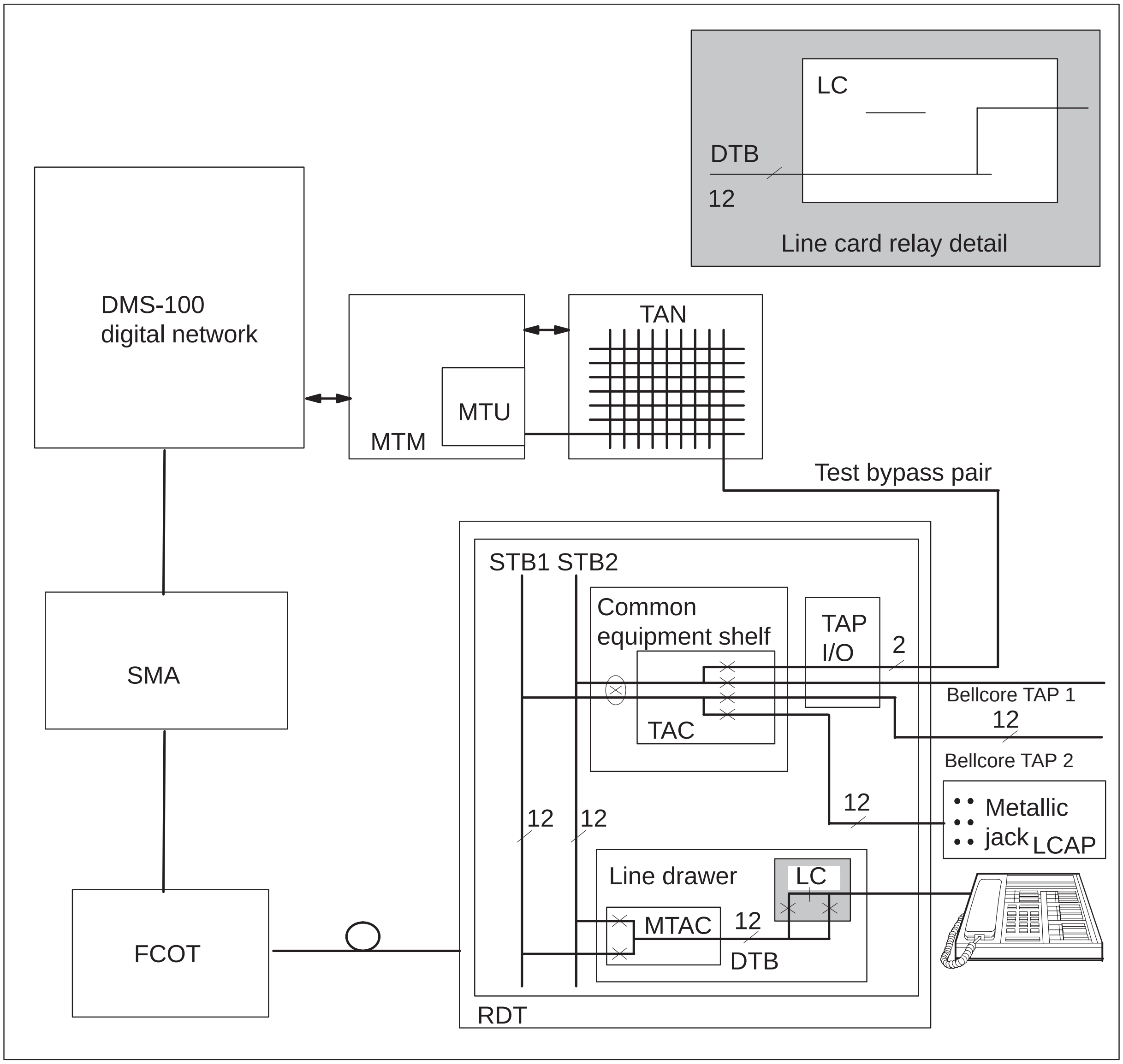
The DIAG and SDIAG tests uses test configuration 1. The S/DMS AccessNode line card connects to an internal test response circuit and not a subscriber line. The test response circuit applies different reflective and absorbent terminations toward the line card. The signaling conditions the circuit detects determines the type of termination. The transmission test unit (TTU) performs different transmission performance measurements and connects to the S/DMS AccessNode line card through a pulse code modulation (PCM)

Test configuration 1



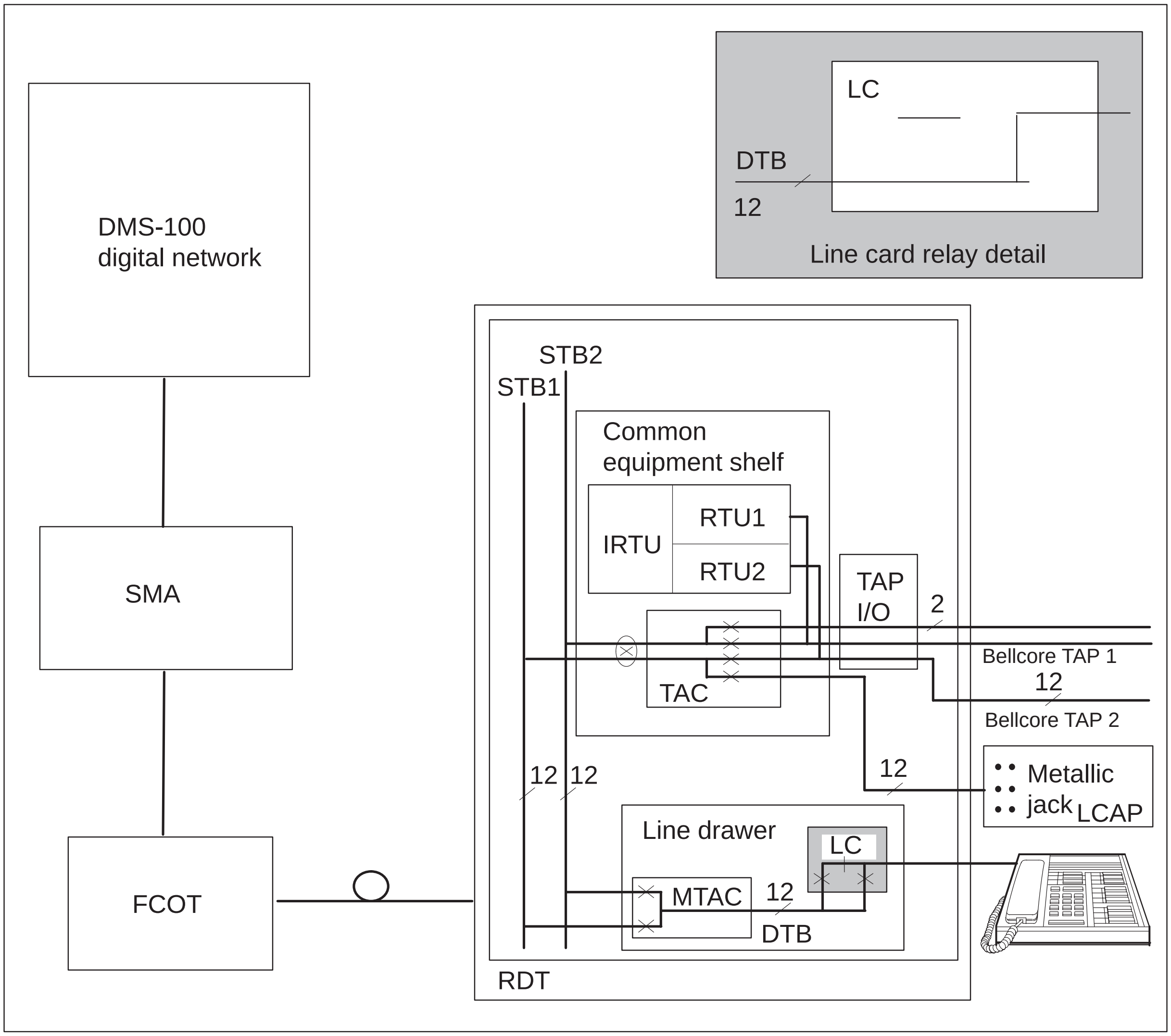
The LNTST, LIT, VDC, VAC, RES, and CAP commands use test configuration 2 when the IRTU option is not equipped. The S/DMS AccessNode line card disconnects from the subscriber line. The S/DMS AccessNode connects the subscriber line to a metallic bypass pair. This pair connects to the multi-line test unit (MTU) through the test access network (TAN). In this configuration the MTU performs different electrical measurements on the bypass pair and subscriber line.

Test configuration 2



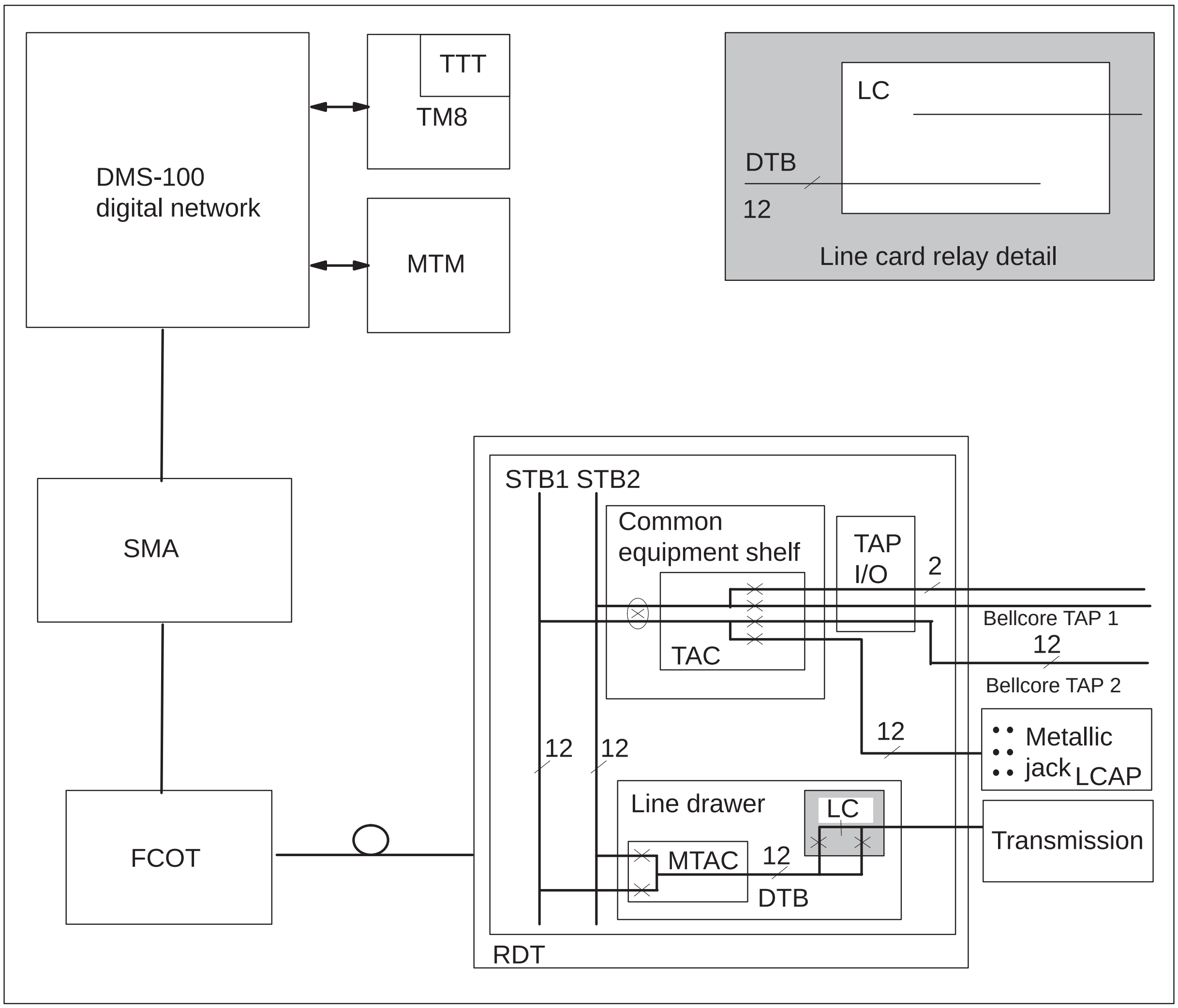
The LNTST, LIT, VDC, VAC, RES, and CAP commands use test configuration 3 when the IMC option is not equipped. The S/DMS AccessNode line card disconnects from the subscriber line. The S/DMS AccessNode connects the subscriber line to the integrated measurement card (IMC) test head. In this configuration, the IMC test head performs different electrical measurements on the subscriber line. The DMS-100 switch controls the IMC test head. The EOC conveys control messages between the DMS-100 switch and the IMC test head.

Test configuration 3



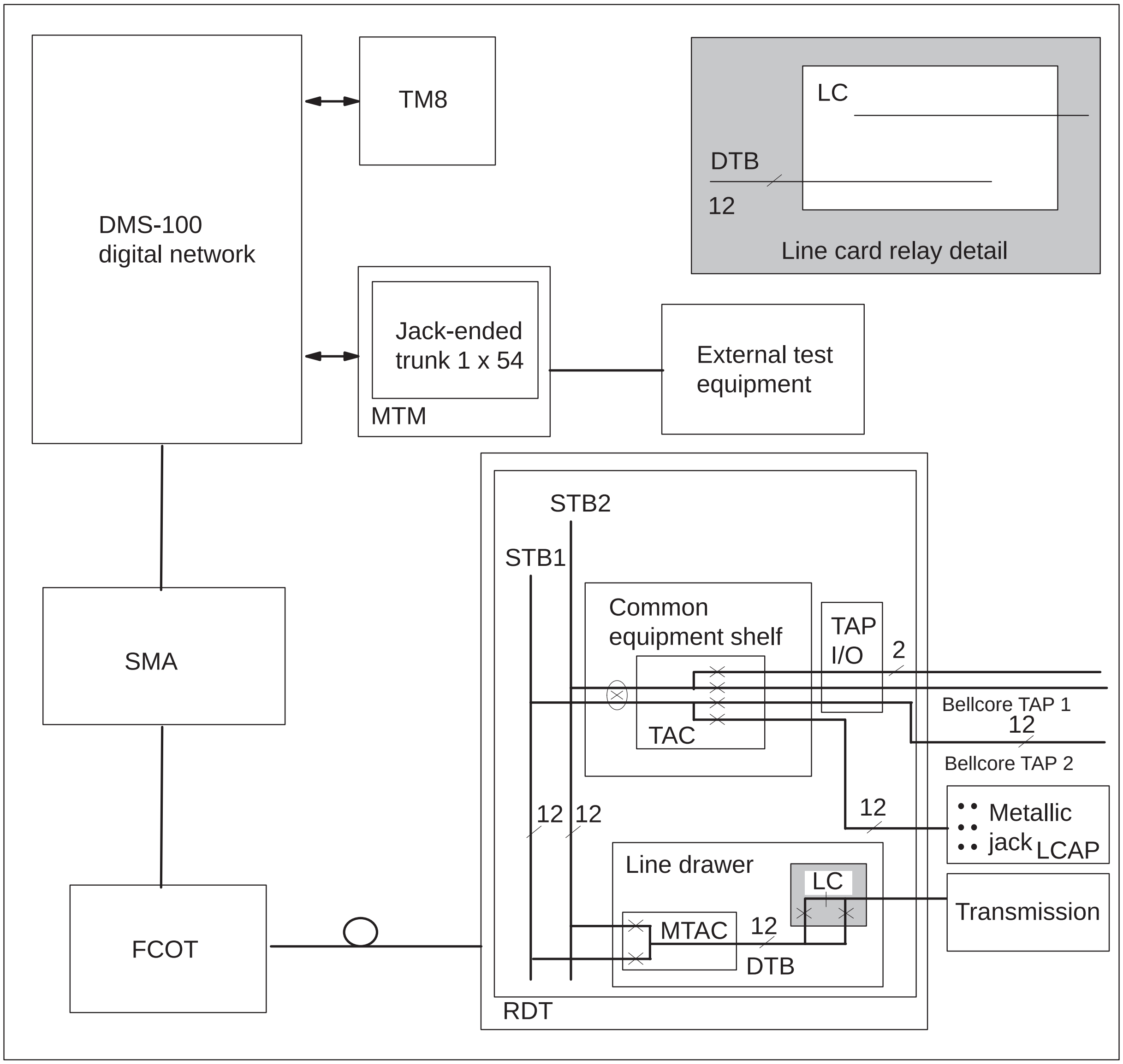
The LOSS, NOISE, and TONEGEN commands use test figure 4. The subscriber line connects through a PCM path through the network to the termination test trunk (TTT). The transmission test set consists of portable test equipment that can generate and measure voice frequency signals. This figure does not intend a specified brand of test equipment.

Test configuration 4



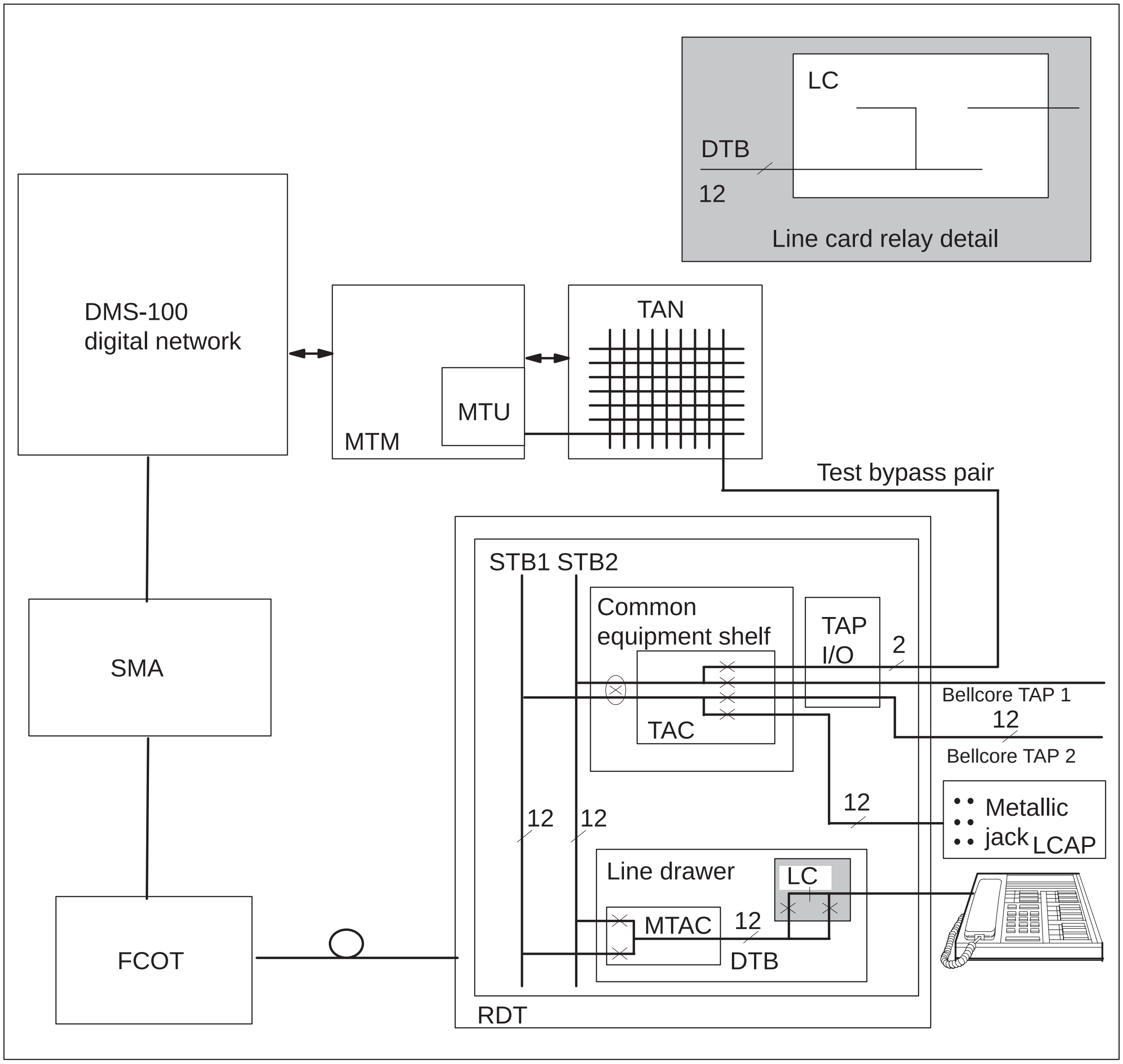
The JACK command uses test configuration 5. The subscriber line connects through a PCM path through the network to the jack-ended trunk. The jack-ended trunk allows external test equipment to connect to the circuit.

Test configuration 5



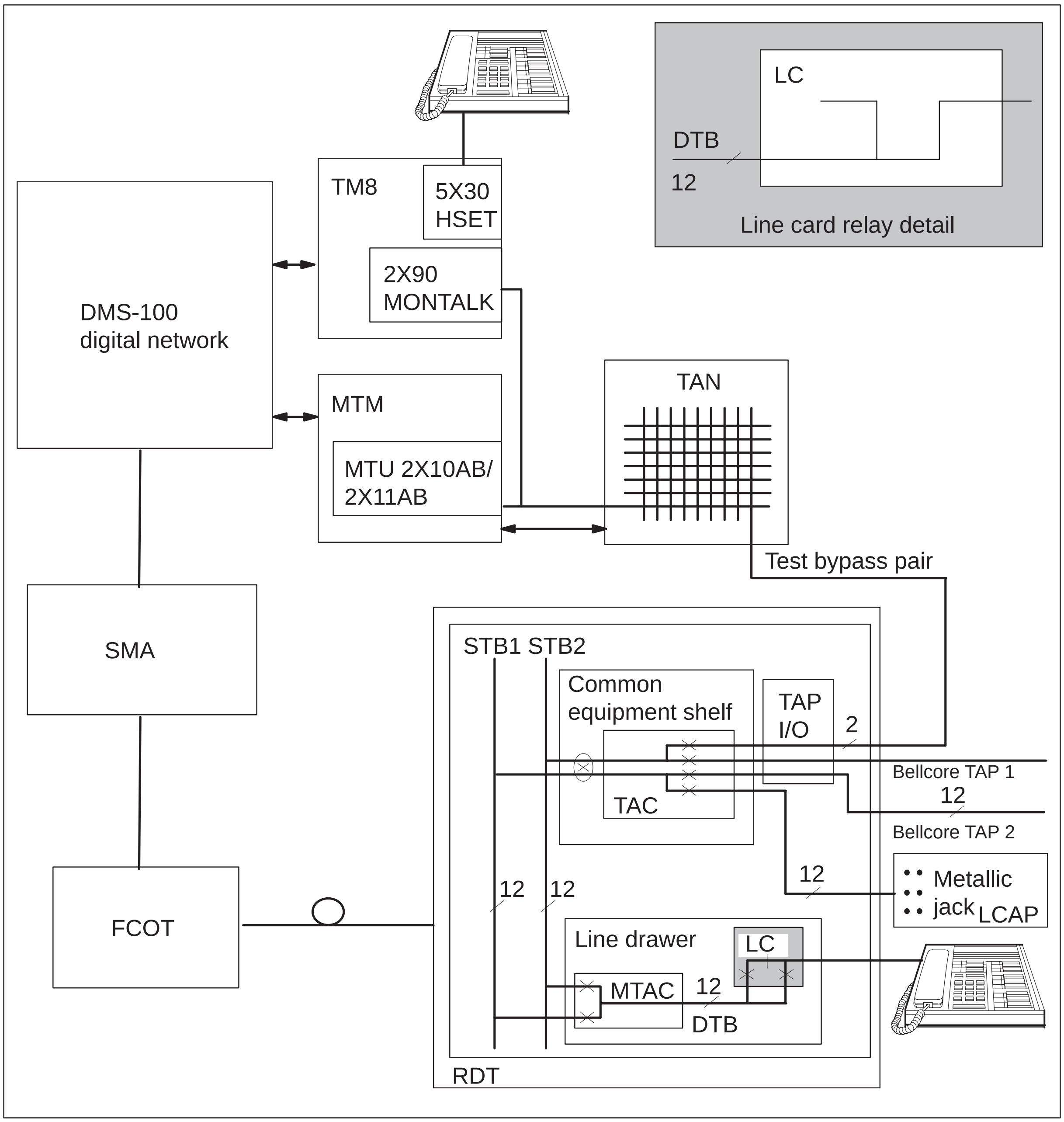
The TSTRING command uses test configuration 6. The subscriber line disconnects from the S/DMS AccessNode line card. The S/DMS AccessNode line card connects to the test access card (TAC). The TAC detects ringing voltage that the line card applies when TSTRING is implemented.

Test configuration 6



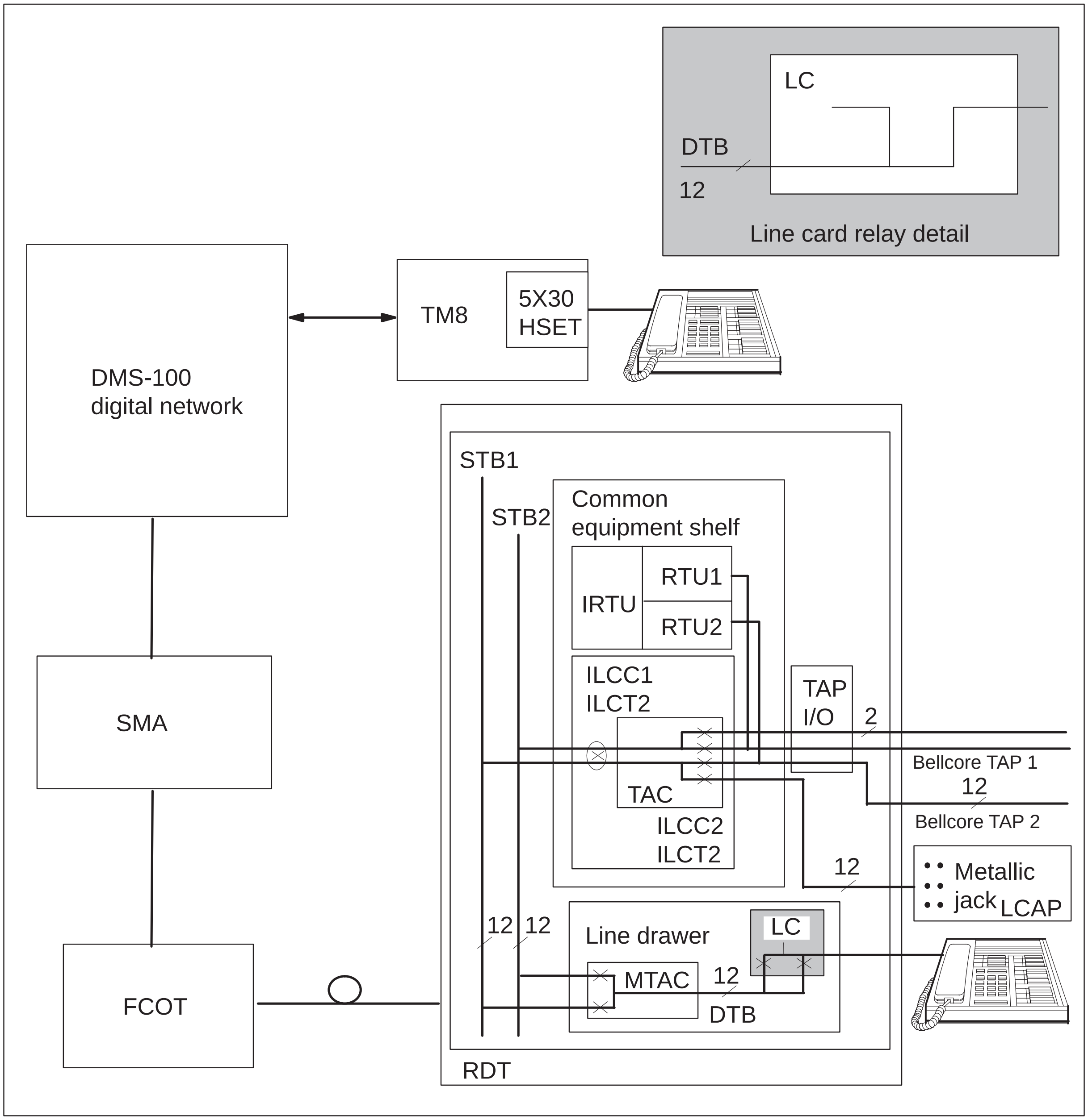
The MONLTA command uses test configuration 7 when the IMC option is not equipped. The subscriber line connects through a PCM path through the network to another subscriber line or interoffice trunk. The subscriber line is bridged to a metallic bypass pair. The subscriber line connects to the 101 communication test line (HSET) circuit through an intermediate test 2X90 trunk.

Test configuration 7



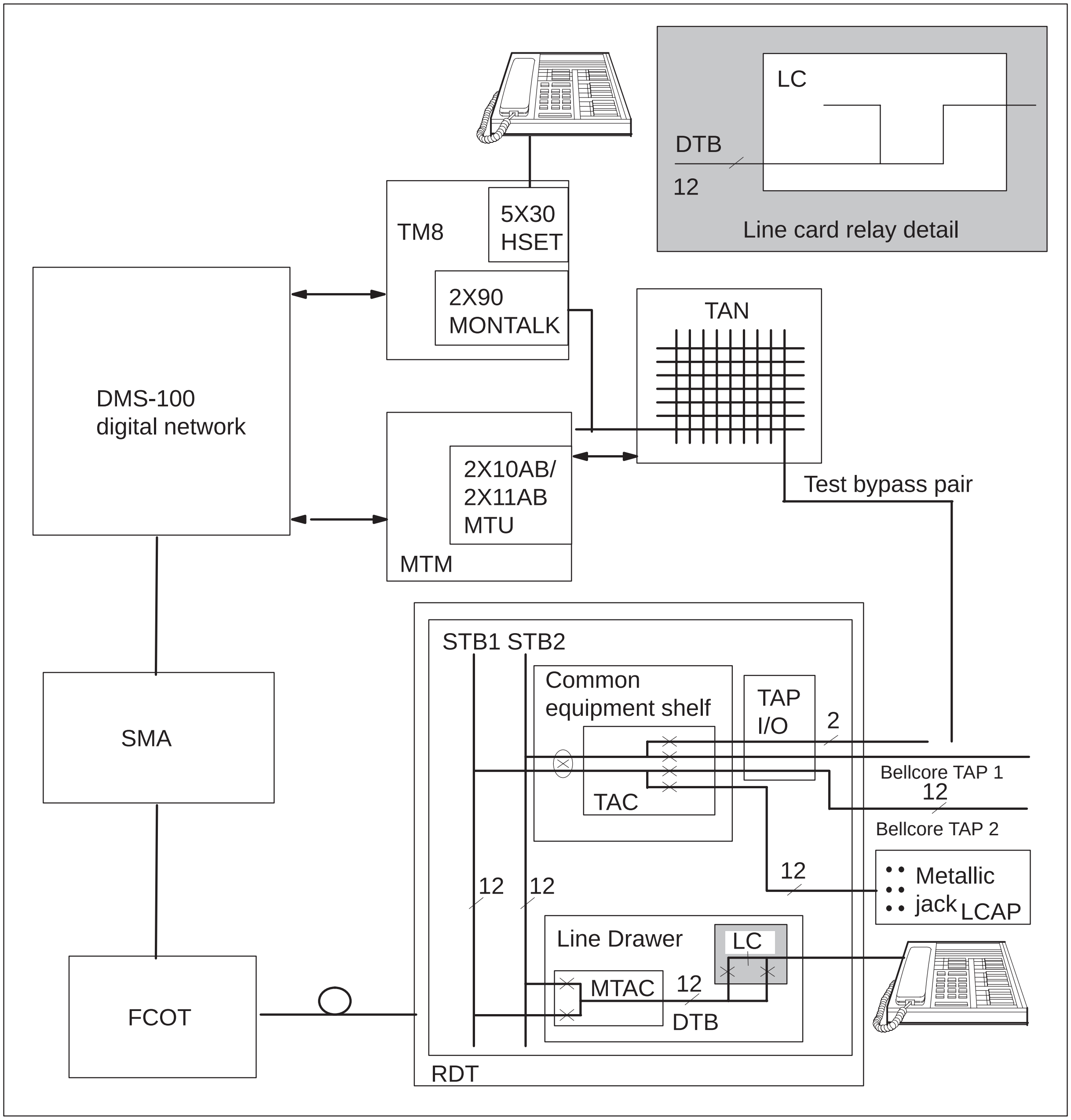
The MONLTA command uses test configuration 8 when the ICM option is equipped. The subscriber line connects through a PCM path through the network to another subscriber line or an interoffice trunk. The subscriber line connects through a digital bridge in the IMC, to a PCM path that terminates on the HSET. The HSET resides in the trunk module (TM). In this configuration, monitor an active S/DMS AccessNode circuit from a telephone that connects to a HSET.

Test configuration 8



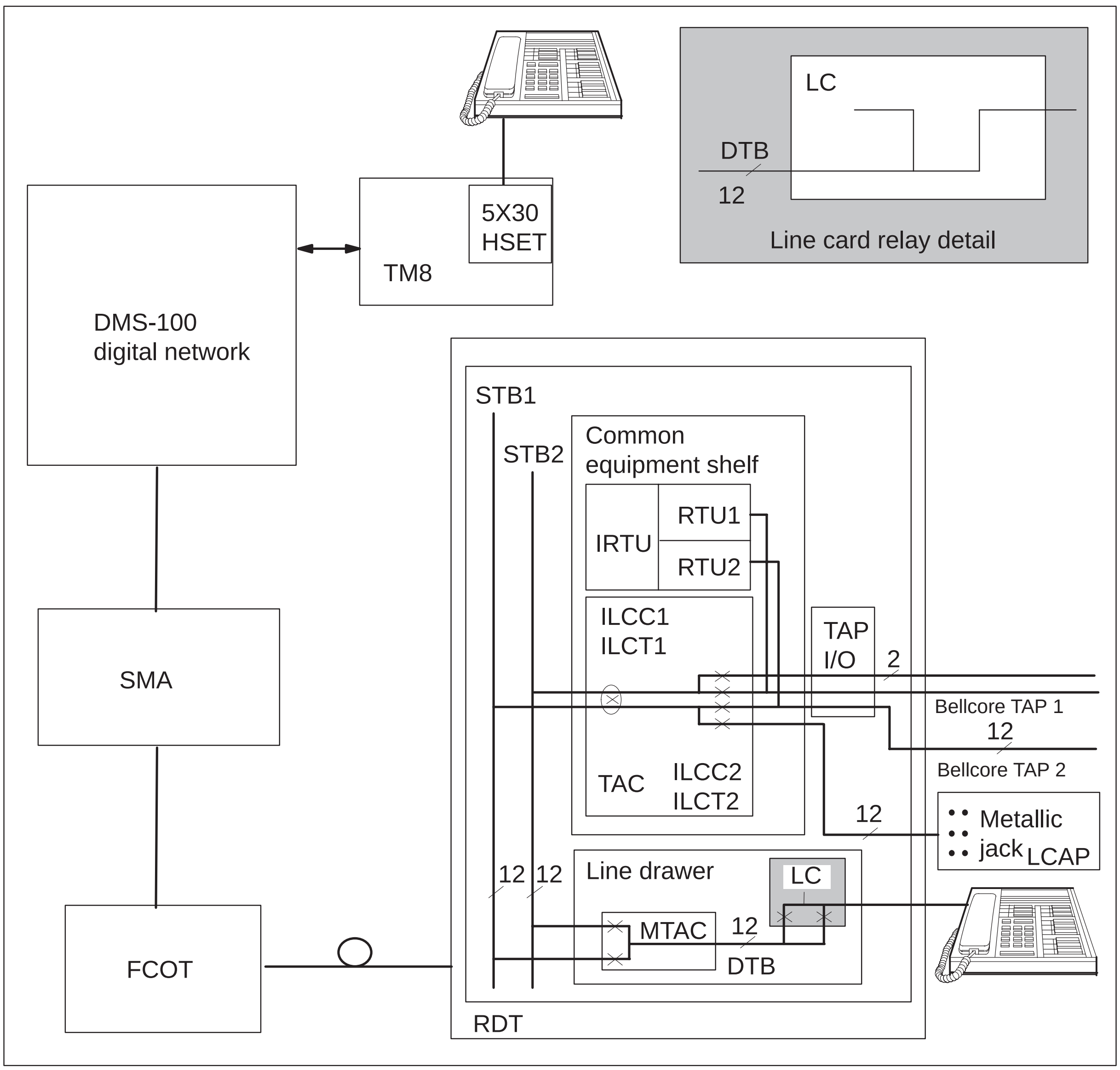
The ORIG command uses test configuration 9 when the IMC option is equipped. The subscriber line disconnects from the S/DMS AccessNode line card. The S/DMS AccessNode line card connects to a metallic bypass pair. The bypass pair connects to the MTU through the TAN. The bypass pair connects to the HSET through an intermediate 2X90 test trunk.

Test configuration 9



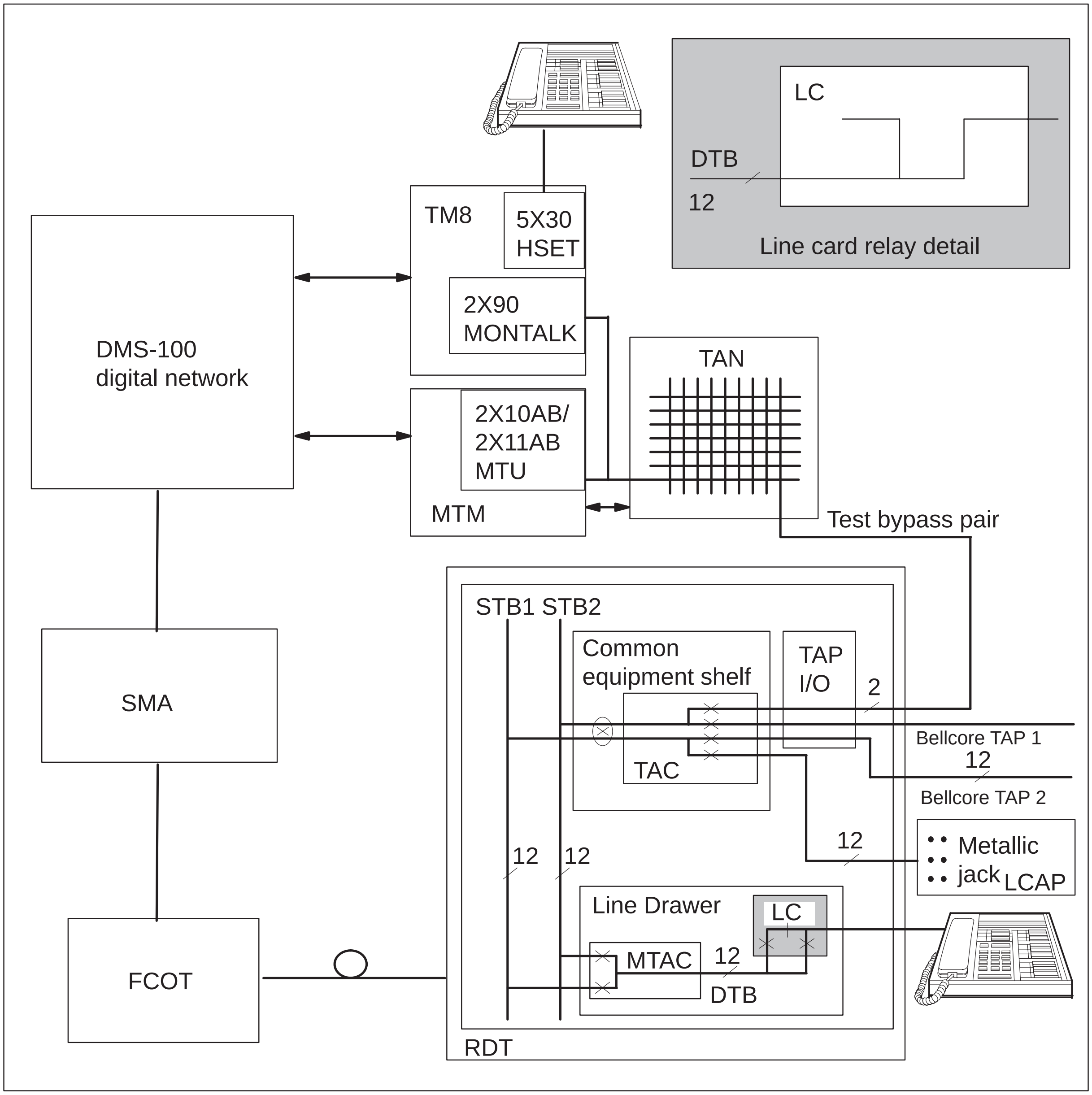
The ORIG command uses test configuration 10 when the IMC option is equipped. The subscriber line disconnects from the S/DMS AccessNode line card. The S/DMS AccessNode line card connects to circuitry in the IMC. The IMC can simulate off hook, on hook, and a subscriber dialing. The S/DMS AccessNode line card connects through an ILCT path from the TAC that terminates on the HSET that resides in the TM. In this configuration, the IMC can simulate the signaling conditions that associate with the originating call. An audible feedback is available through a telephone attached to the HSET trunk through a jack.

Test configuration 10



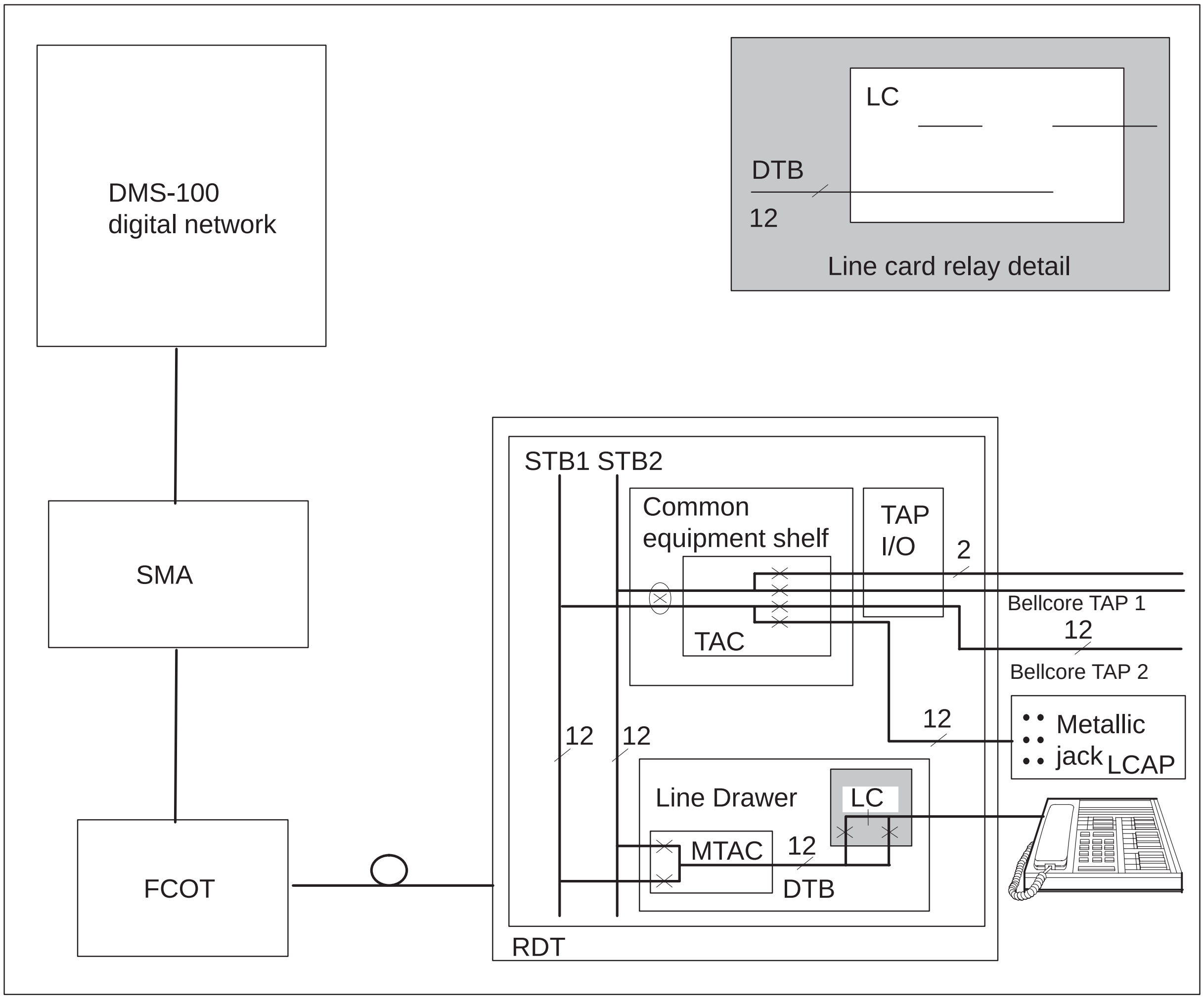
The TALKLTA, COIN, RING, and DGTTST tests use test configuration 11 when the IMC card is not equipped. The subscriber line connects through a PCM path, through the network to the HSET through the MONTALK circuit.

Test configuration 11



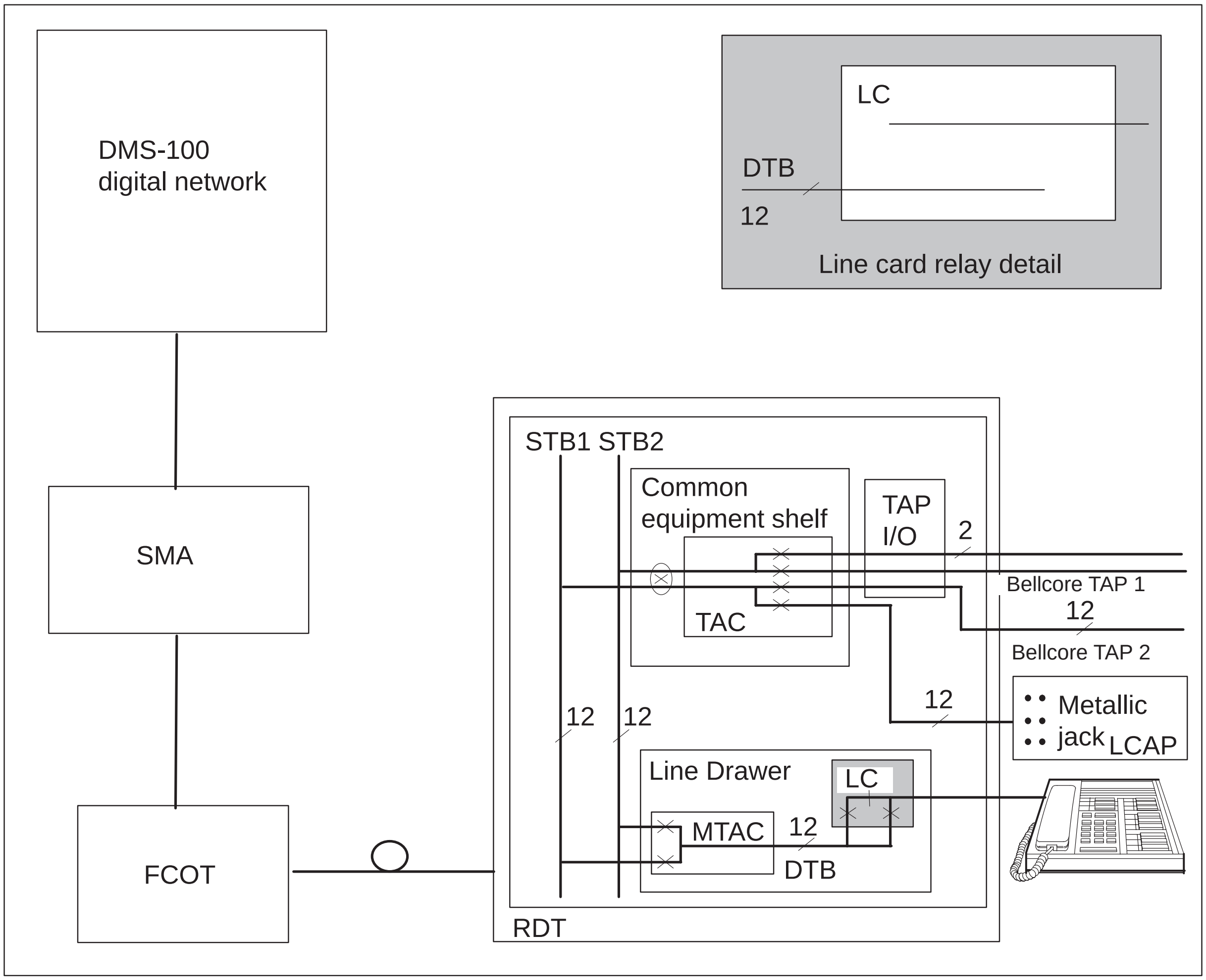
Silent switchman tests use test configuration 12. The S/DMS AccessNode line card disconnects from the subscriber line.

Test configuration 12



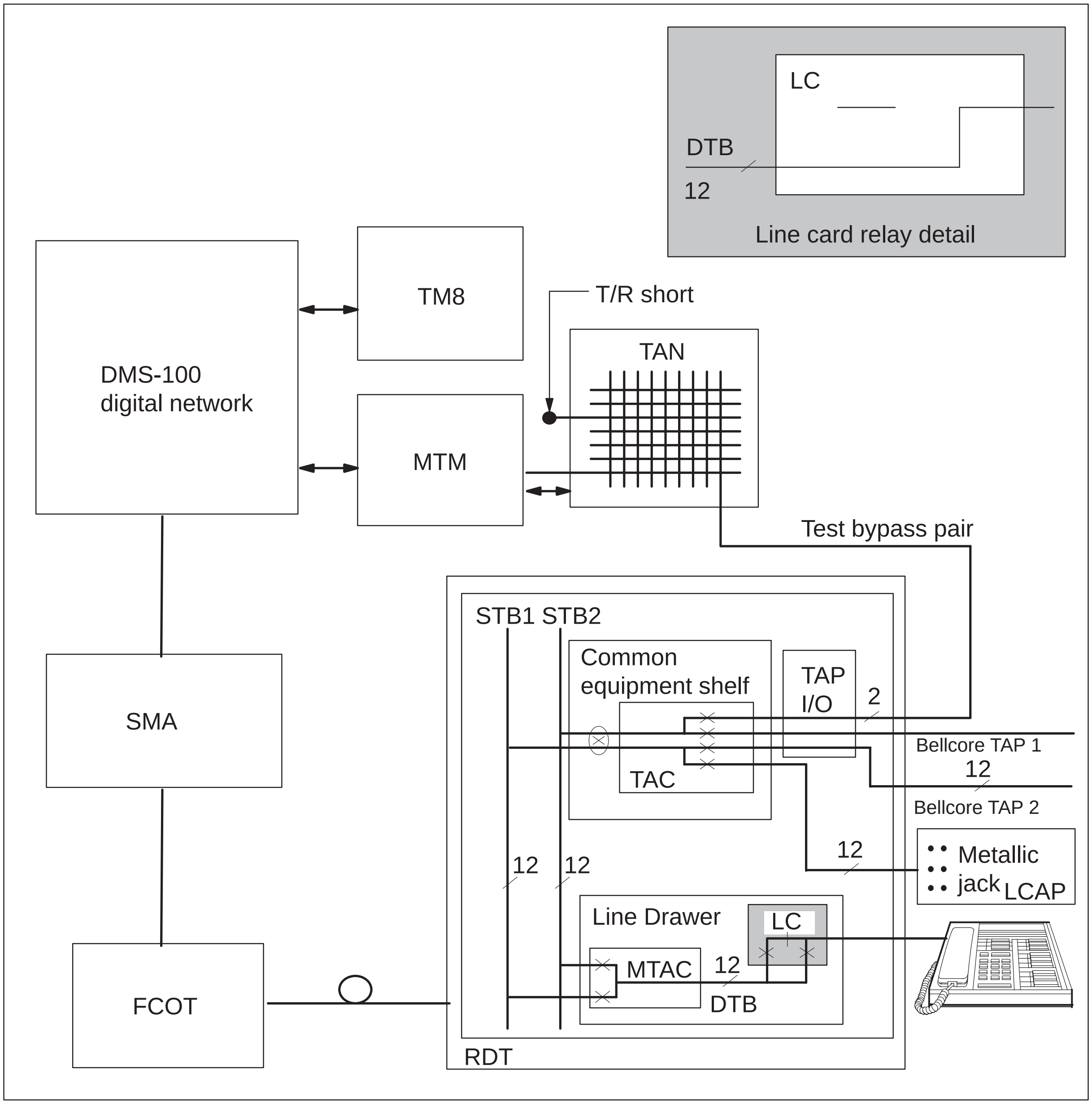
The station ringer test uses test configuration 13.

Test configuration 13



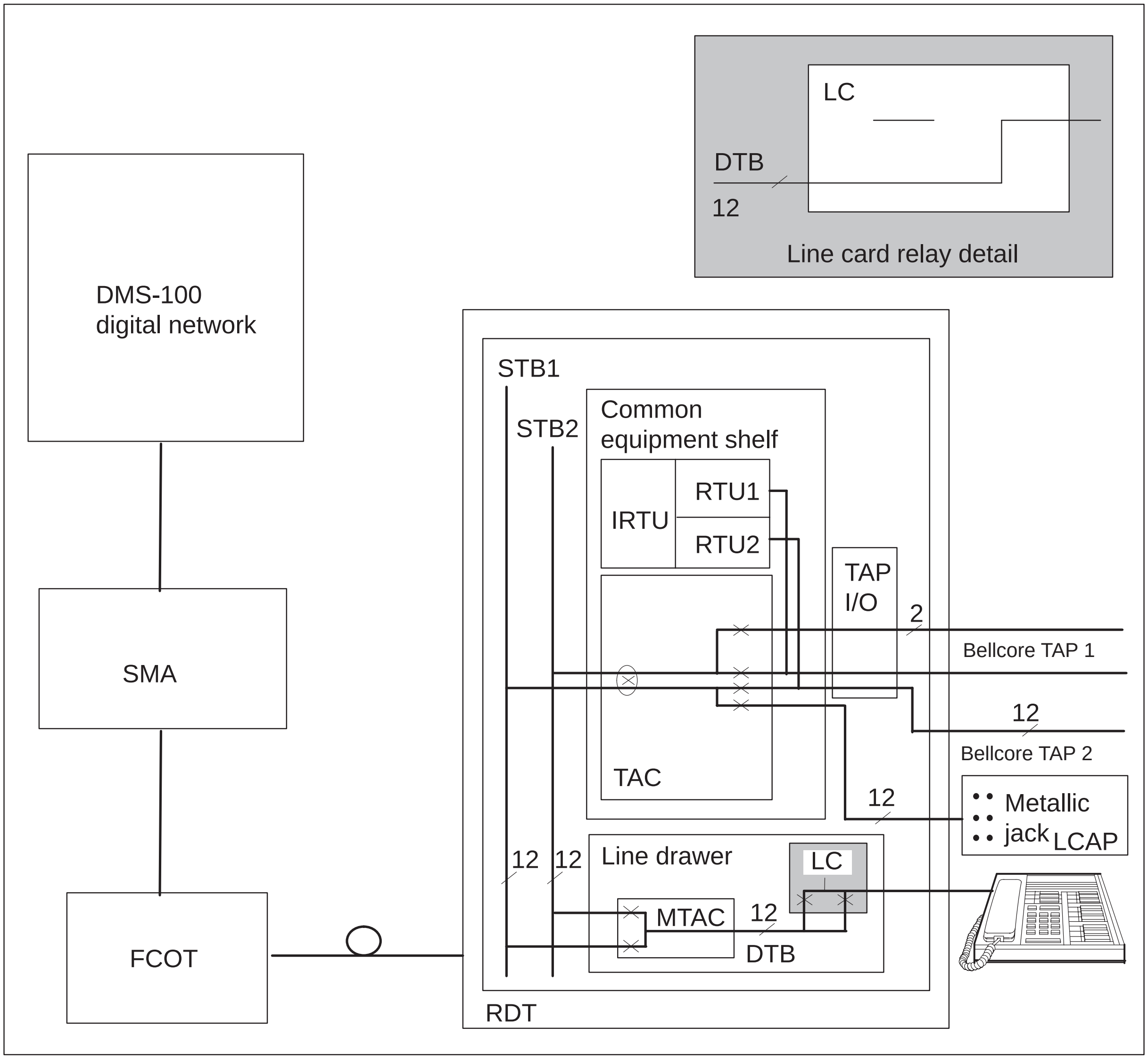
The dialable short circuit test uses test configuration 14 when the IMC option is not equipped. The S/DMS AccessNode line card disconnects from the subscriber line. The subscriber line connects through the S/DMS AccessNode to a metallic bypass pair through the S/DMS AccessNode. The bypass pair connects to a shorting termination through the TAN. This test requires the MTM because the TAN contains the interface to control the TAN.

Test configuration 14



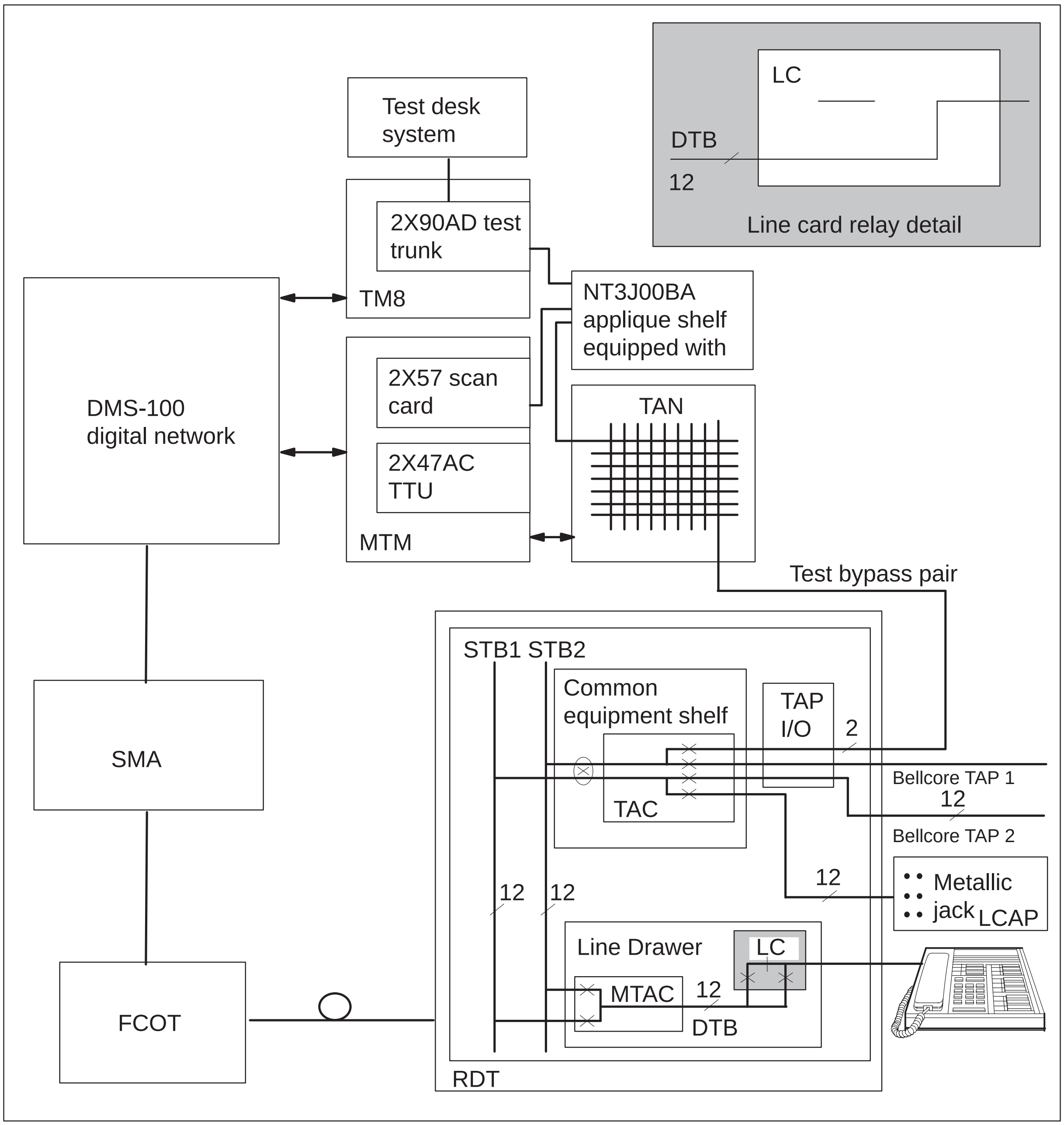
The dialable short circuit test uses test configuration 15 when the IMC option is equipped. The S/DMS AccessNode line card disconnects from the subscriber line. The subscriber line connects through the S/DMS AccessNode to a shorting termination in the IMC card.

Test configuration 15



The local test cabinet number 13 and local test desk number 14 use test configuration 16. The 3703 local test cabinet also use this configuration when the IMC option is not equipped. The subscriber line or S/DMS AccessNode line card can connect to the local test desk through the TAN and the 2X90 test trunk. The MTM is required because the MTM contains the interface to control the TAN.

Test configuration 16

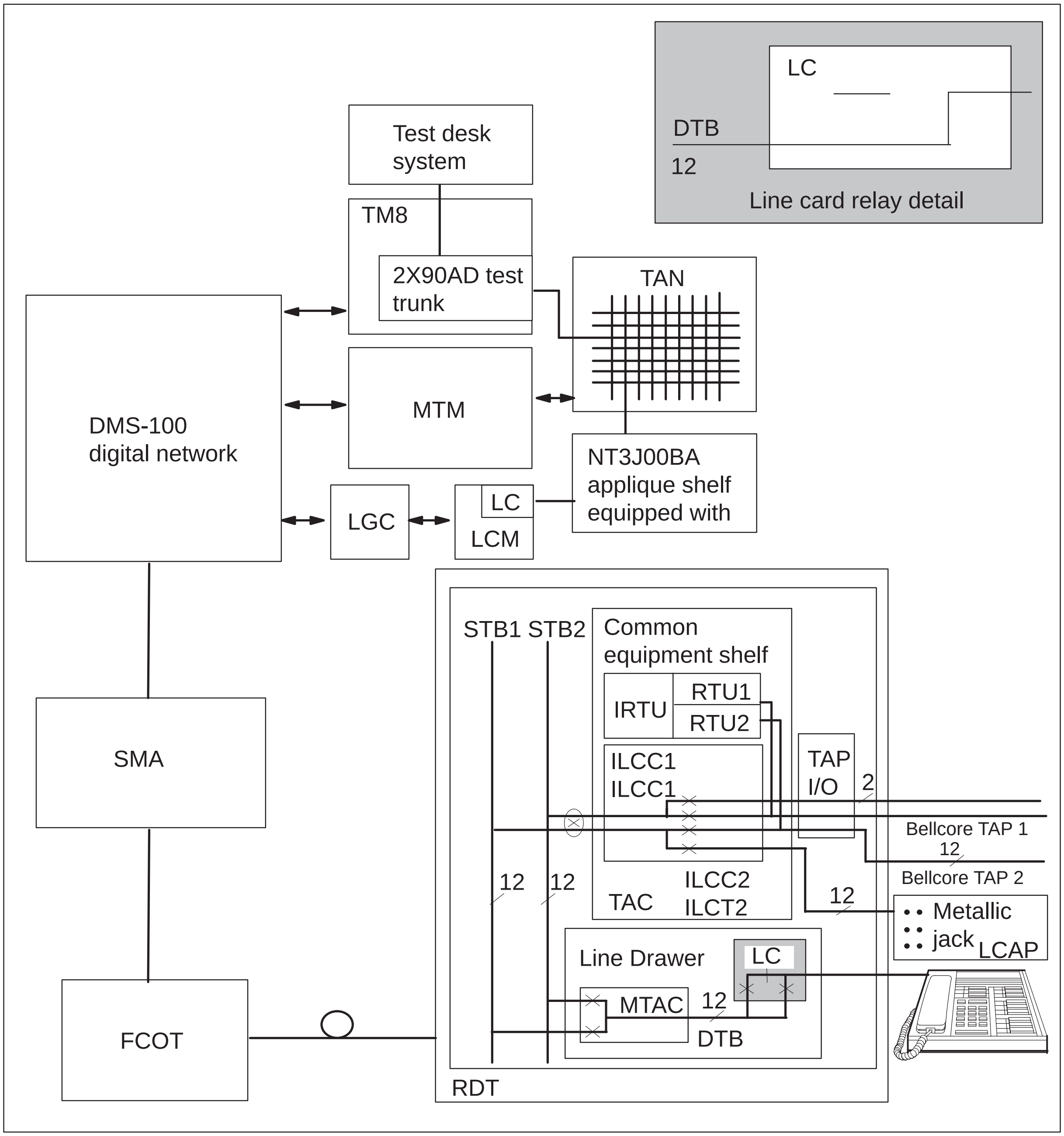


The Centralized Automated Loop Reporting System (CALRS) and the external line testing unit (ELTU), or the 3703 local test cabinet use test configuration 17 when the IMC option is equipped. The S/DMS AccessNode line card disconnects from the subscriber line. The subscriber line connects through the S/DMS AccessNode to the IMC TH. The IMC test head emulates a digital remote test unit (DRTU) and performs electrical measurements on the subscriber line. The applique circuit provides a DC signature toward the ELTU or 3703 local test cabinet. This circuit informs the ELTU, or 3703 local test cabinet, the line under test, is on a remote access vehicle. The MTM is required because the MTM contains interfaces to control the TAN and applique circuit.

The ELTU or 3703 local test cabinet control the IMC test head. The ELTU/3703 local test cabinet uses a path that the following links form, to control IMC test head.

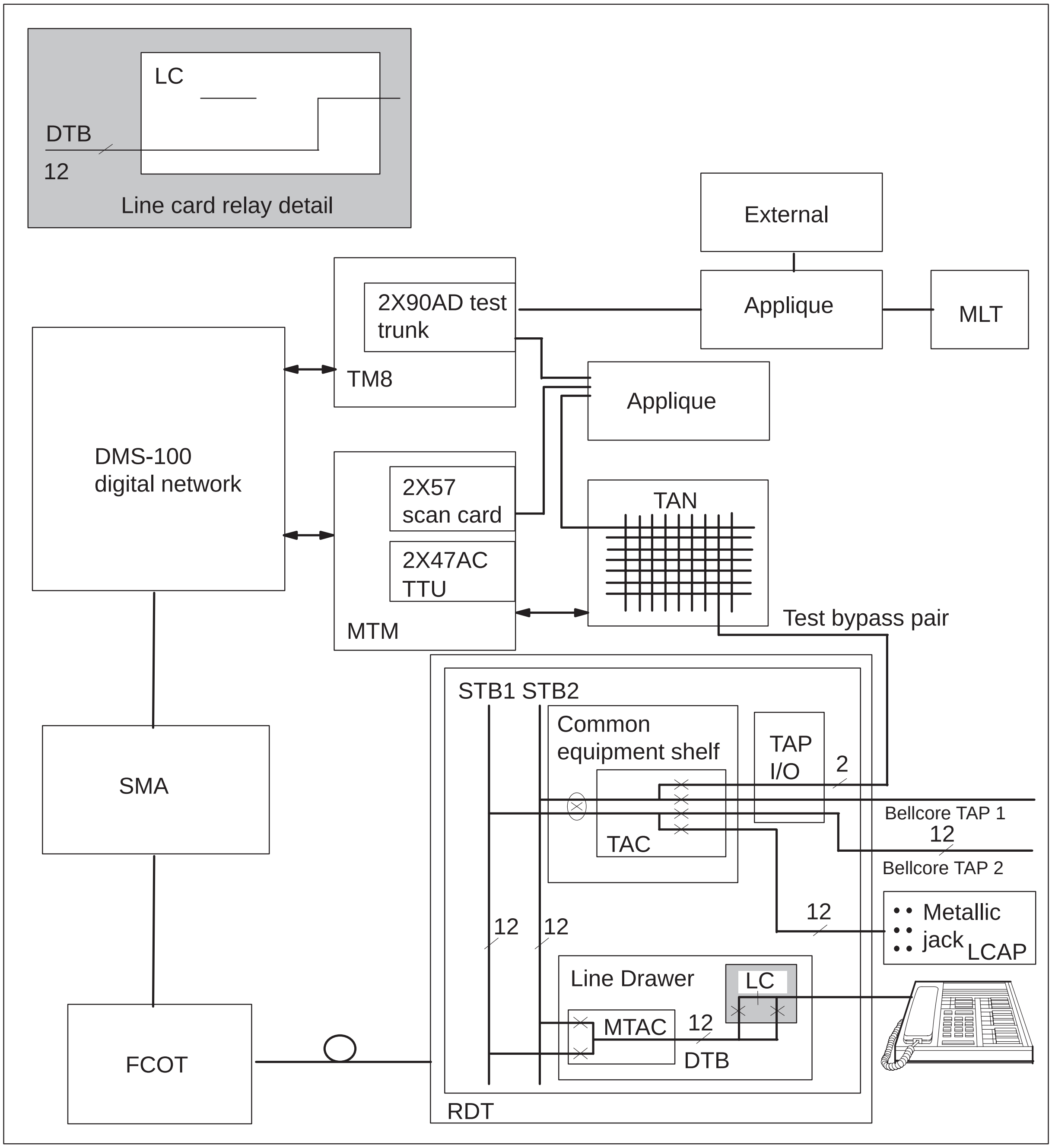
- The IMC test head connects through an internal virtual line card to a PCM path.
- The PCM path connects through the DMS-100 network to a line concentrating module (LCM) line card.
- The LCM line card connects through a metallic pair to a vertical on the TAN.
- The TAN vertical connects to a TAN horizontal.
- The TAN horizontal connects through a metallic pair to the applique circuit.
- The applique circuit connects through a metallic pair to the 2X90 test trunk.
- The 2X90 test trunk connects through a metallic pair to the ELTU or the 3703 local test cabinet.

Test configuration 17



The mechanized loop tester (MLT) uses test configuration 18 when the RMU option is not equipped. The S/DMS AccessNode line card disconnects from the subscriber line.

Test configuration 18



The subscriber line connects to the MLT through a metallic path. The links used to form the path are as follows:

- The subscriber line connects through the S/DMS AccessNode to a metallic bypass pair.
- The metallic bypass pair connects to a vertical on the TAN.
- The TAN vertical connects to a TAN horizontal.
- The TAN horizontal connects through a metallic pair to applique circuit 1.
- Applique circuit 1 connects through a metallic pair to the 2X90 test trunk.
- The 2X90 test trunk connects through a metallic pair to the MLT.

Applique circuit 1 provides a DC signature toward the MLT. This signature informs the MLT the line under test is on a remote access vehicle.

The MTM is required because the MTM contains interfaces that control the TAN and applique circuit.

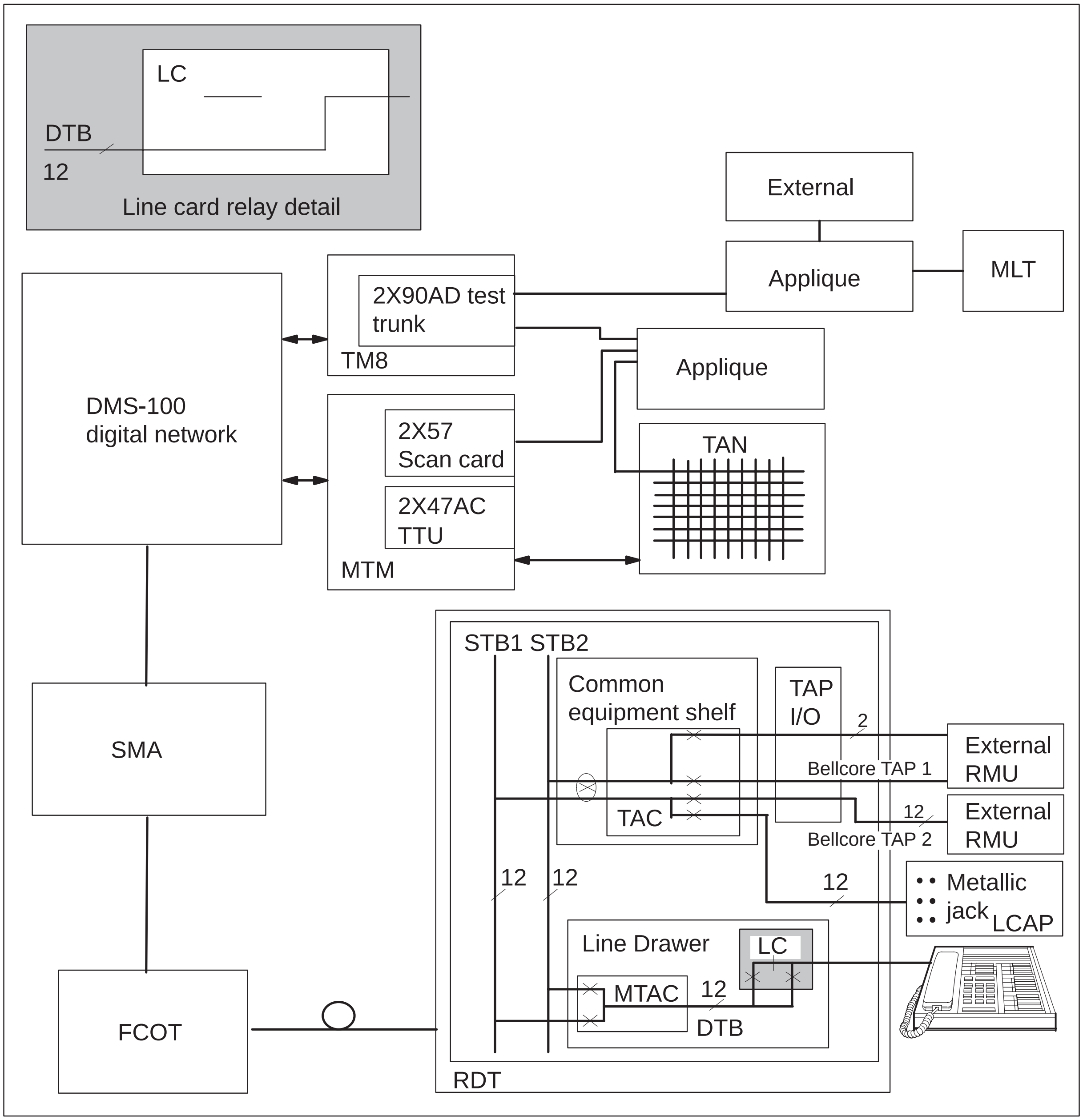
Applique circuit 2 senses and processes a request for a Digitone test. The external receiver collects and checks dual tone multi-frequency (DTMF) digits that a subscriber station equipment transmits.

The MLT uses test configuration 19 when the RMU option is equipped. The S/DMS AccessNode line card disconnects from the subscriber line. The subscriber line connects through the S/DMS AccessNode to the RMU. The RMU performs electrical measurements on the subscriber line.

Applique circuit 1 provides a DC signature to inform the MLT the line under test is on a remote access vehicle. The TAN maintains compatibility with current DMS-100 test access software. The TAN does not provide a connection service in this configuration. The MTM is required because the MTM contains interfaces that control the TAN and applique circuit 1.

Applique circuit 2 senses and processes a request for a Digitone test. The external receiver collects and checks DTMF digits that the subscriber station equipment transmits.

Test configuration 19



Reliance Telecommunication Electronics Inc. (RTEC) use configuration 20. The S/DMS AccessNode line card disconnects from the subscriber line. The subscriber line connects through the S/DMS AccessNode to the RTEC T-9/X. The T9/X performs electrical measurements on the subscriber line. The version 6 T-9/SX Remote Test System, or the T-9/15 Automatic Line Test System in the central office (CO) controls the T-9/X. The T-9/X communicates with the host controller through a dial-up control path established at the beginning of each test. The system maintains the path until the test is complete.

This dial-up path contains of the following links:

- The T-9/X connects to a dedicated S/DMS AccessNode line card.
- The T-9/X can detect when the system establishes test access to a line in the S/DMS AccessNode. After detection, the T-9/X places a call to a dedicated line card in the CO located on a LCM.
- The LCM line card connects to the T-916 RTU selector. The T-916 answers the call from the T-9/X and completes the connection to the T-9/15 or T-9/SX.

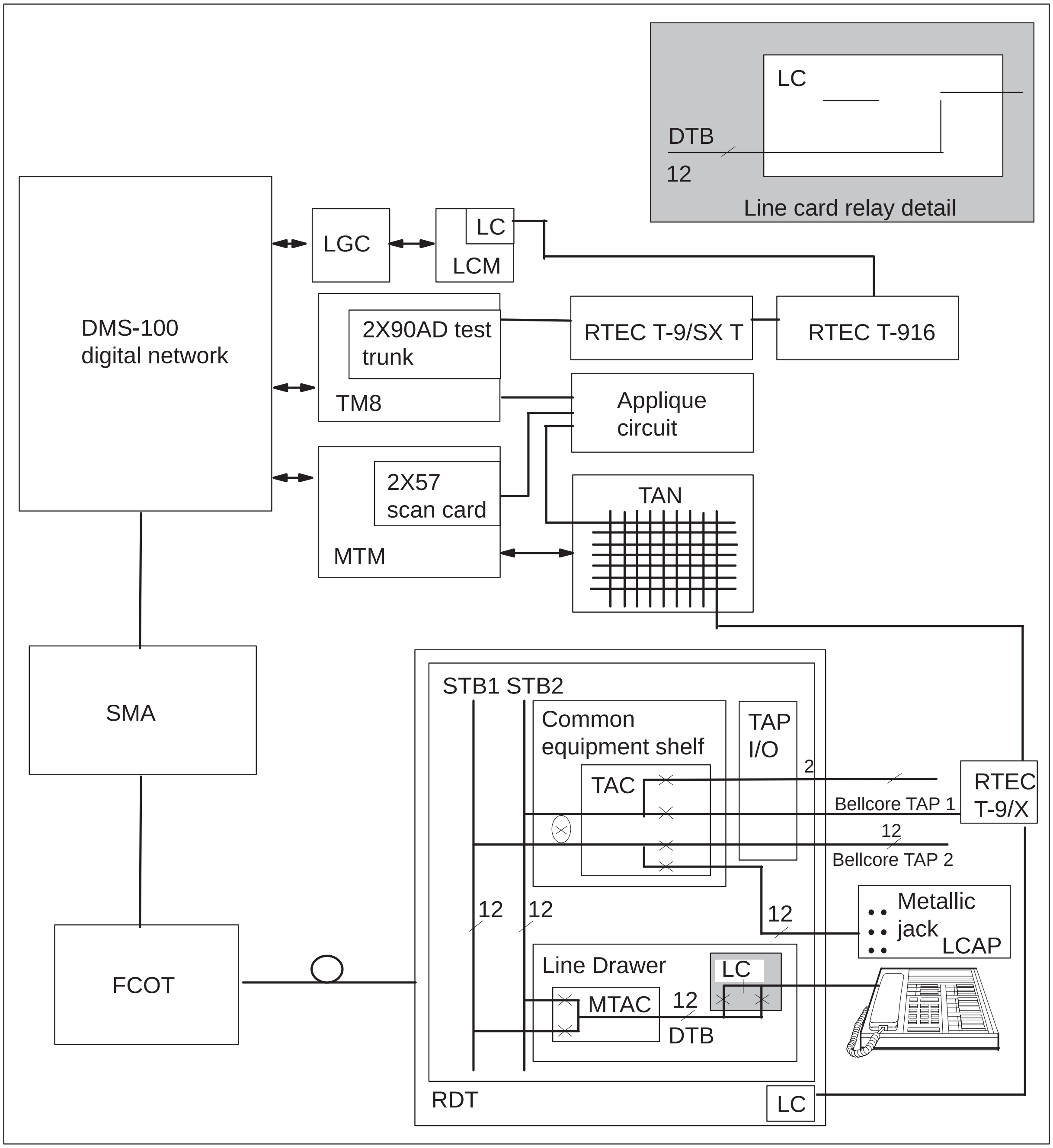
The T-9/SX and T-9/15 can perform interactive tests that require a direct metallic path between the T-9/SX or T-9/15, and the subscriber line.

The following links perform this path:

- The subscriber line connects through the S/DMS AccessNode to the T-9/X.
- The T-9/X connects the subscriber line to the metallic bypass pair when an appropriate command from the host controller is received.
- The bypass pair connects to a vertical on the TAN.
- The TAN vertical connects to a TAN horizontal.
- The TAN horizontal connects through a metallic pair to the applique circuit.
- The applique circuit connects through a metallic pair to the 2X90 test trunk.
- The 2X90 test trunk connects through a metallic pair to the T-9/SX or the T-9/15.

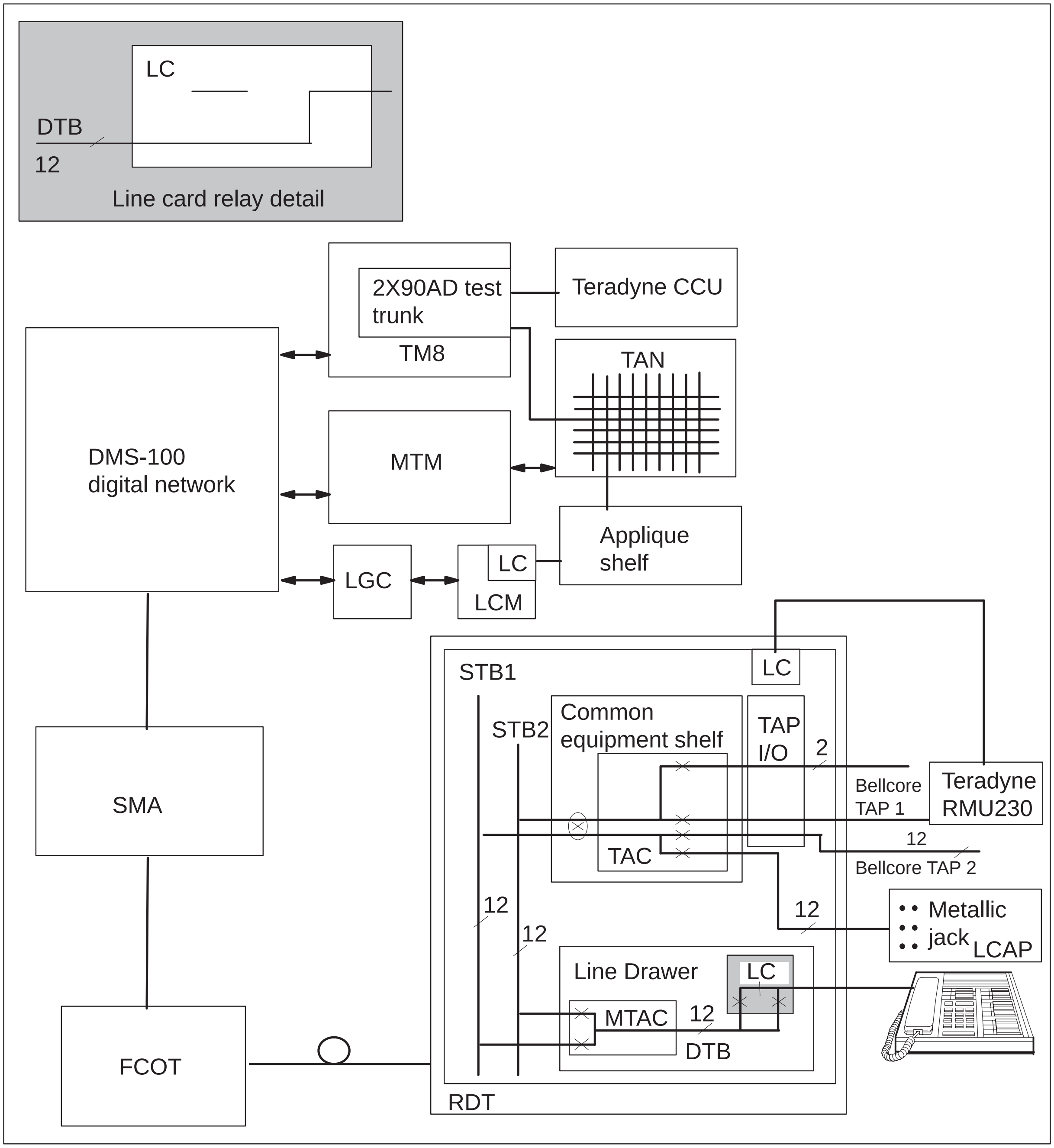
The applique circuit provides a DS signature toward the T-9/15 or the T-9/SX. This action indicates the line under test resides on a remote access vehicle. The MTM is required because the MTM contains interfaces to control the TAN and the applique circuit.

Test configuration 20



Teradyne uses test configuration 21. The S/DMS AccessNode line card disconnects from the subscriber line. The subscriber line connects through the S/DMS AccessNode to the RMU230. The RMU230 performs electrical measurements on the subscriber line.

Test configuration 21



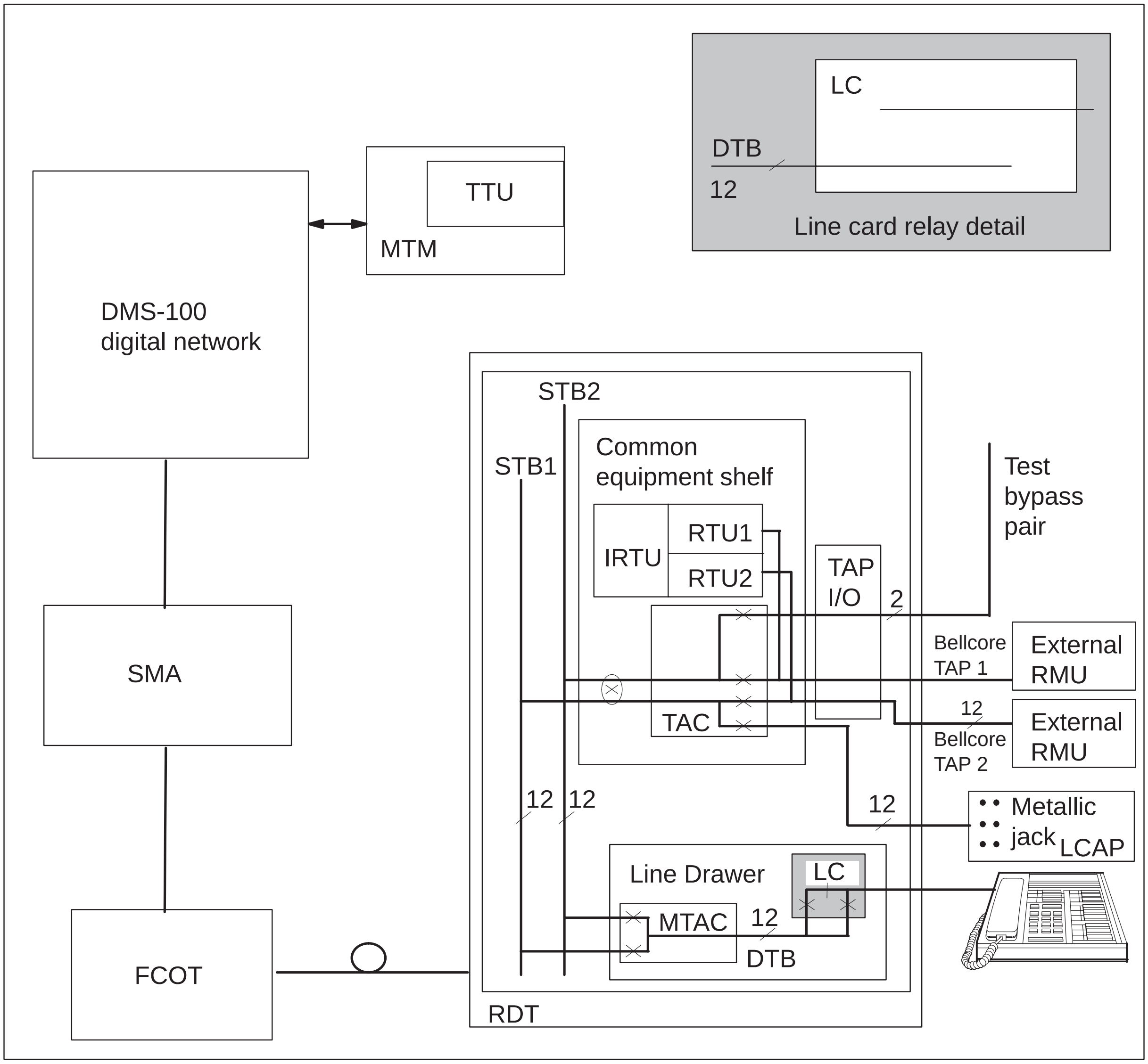
The Teradyne computer control unit (CCU) uses a path that the following links form to control the RMU230:

- The RMU230 connects through a metallic pair to a dedicated S/DMS AccessNode line card.
- The S/DMS AccessNode line card connects through a PCM path through the DMS-100 network to a dedicated LCM line card.
- The LCM line card connects through a metallic pair to a vertical on the TAN.
- The TAN vertical connects to a TAN horizontal.
- The TAN horizontal connects through a metallic pair to the applique circuit.
- The applique circuit connects through a metallic pair to the 2X90 test trunk.
- The 2X90 test trunk connects through a metallic pair to the Teradyne CCU.

The applique circuit provides a DC signature to inform the Teradyne CCU the line under test is on a remote access vehicle.

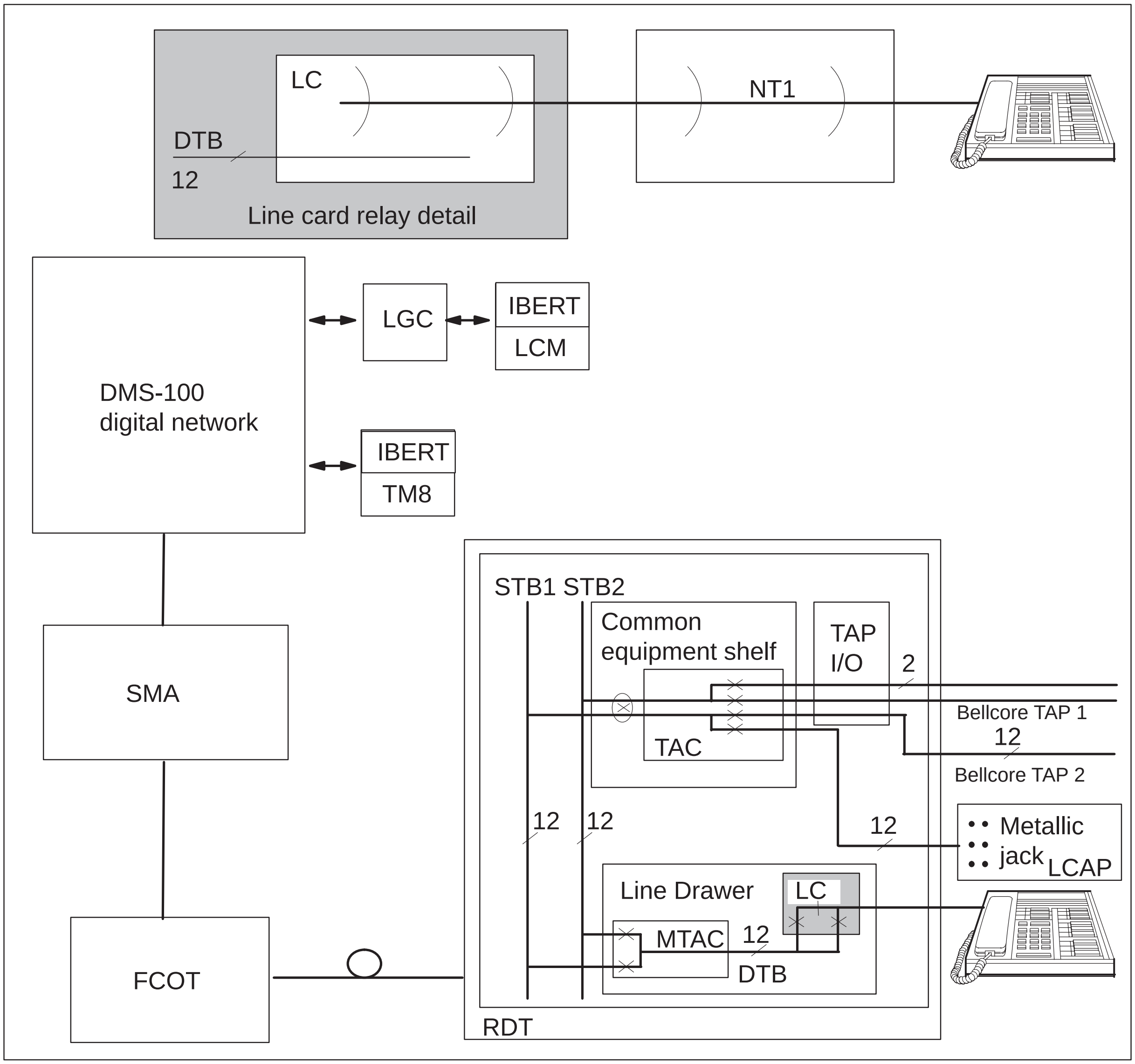
The BAL and BALNET commands use test configuration 22. The subscriber line connects through a PCM path, through the network to the TTU. At present, the system does not support BAL and BALNET on S/DMS AccessNode lines.

Test configuration 22



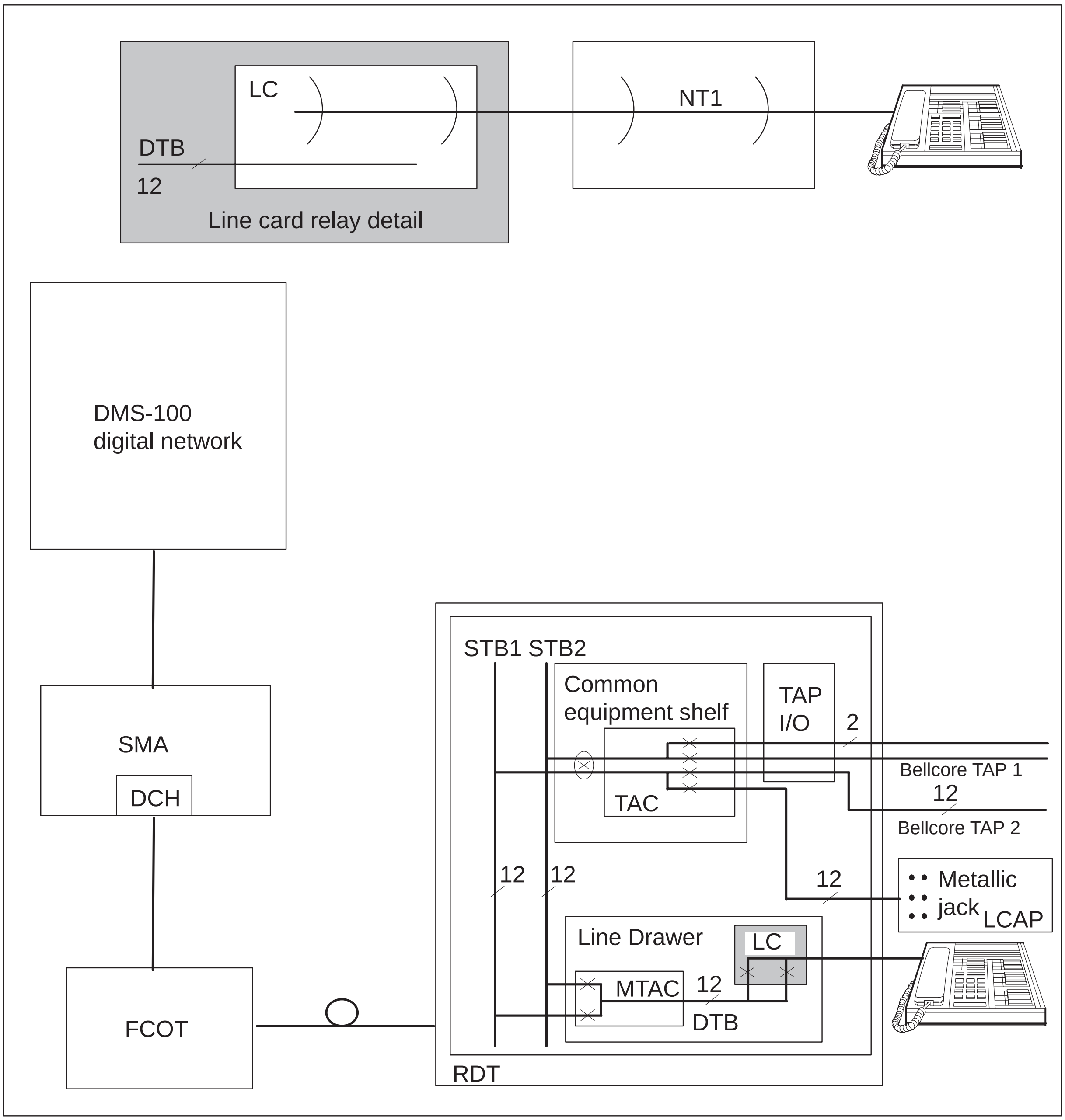
The BERT and LOOPBK commands use test configuration 23. One of the B-channels on the subscriber line connects from the network termination 1 (NT1) to an integrated bit error rate tester (IBERT) card on an LCM. The B-channel connects through the S/DMS AccessNode, fiber central office terminal (FCOT), SMA, digital network, and the line trunk controller (LTC). The LOOPBK command establishes a loopback point in the S/DMS AccessNode or NT1. The IBERT card injects a continuous test pattern. This pattern passes the B-channel to the loopback point and is reflected back. The IBERT card monitors the returning signal and maintains statistics that reflect signal quality.

Test configuration 23



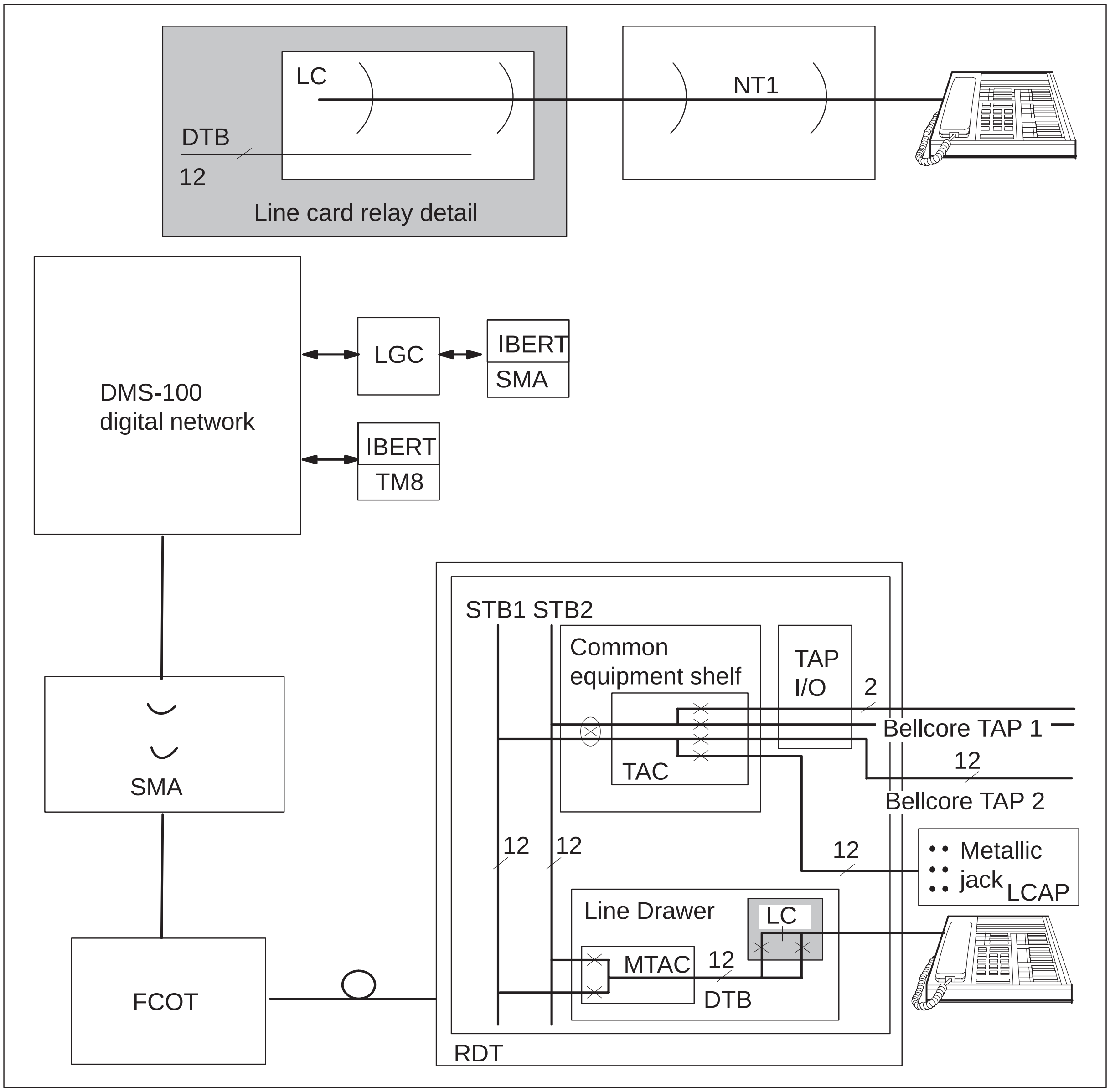
The DCHCON command uses test configuration 26. The D-channel on the subscriber line loops back in the S/DMS AccessNode or NT1. The number, location, and type of loopback points in the S/DMS AccessNode must be determined. The NT1 loopback consist of a 2B+D loopback. The CM instructs the DCH to insert a test message in the looped back D-channel. In this test configuration, the CM originates the test request message.

Test configuration 24



The BERP command uses test configuration 25. A system establishes loopback point in the SMA, S/DMS AccessNode, or NT1 through the LOOPBACK command. The IBERT card inserts a continuous test pattern. This pattern passes to the loopback point and is reflected back. The IBERT card monitors the returning signal and maintains statistics that reflect signal quality.

Test configuration 25



Product-specific test tools

This section describes SMA specific test tools.

CALLTRAK

The CALLTRAK is a general-purpose, call processing tool environment that provides detailed information on calls. The CALLTRAK provides the ability to select one or more terminals, either line or trunk terminals. The CALLTRAK collects information on calls from the selected terminal or terminals. The information collected depends on the CALLTRAK tools are enabled.

The TIMECALL is a CALLTRAK tool that can be enabled in CALLTRAK after the terminals are selected. Type CALLTRAK from the CI prompt and select the terminals to enable CALLTRACK. The TIMECALL lists call events, the real time cost of the events, and the total real time cost for the call.

The SELECT command provides different methods to select an originating terminal. Options TID, TRK, ALL, DN, LEN, or LTID can select terminals. The system can support options TID, DN, and ALL for RDT lines.

MSGTRC

The message trace (MSGTRC) facility provides a sublevel to the master processor (MP) monitor. Operating company personnel can obtain information from Q.931 messages as the messages are sent from one EISP task to another task. The user can tailor the trace through the commands at the MSGTRC sublevel.

For example, with the VERBOSE option, the user can display the integrated digital loop carrier (IDLC) subset of Q.931 messages in an easier to read format. The example below, is a display in which an information element is missing or contains invalid values in the ID number.

Example of VERBOSE format for a Q.931 message

```
<0002> SRC:  ISP IDLCSP B4  DEST: ISP IDLCCP 04  BUF#: 003
GET:01:04:35:59.11 SEND:01:04:35:59.11 RELEASE:01:04:35:59.12

     Message Type : SETUP
         CR length :      2
                PD : #4F
         CR Suffix :      0
               CRV :      5
           CR Flag :      0
     *************<reason invalid>***************
    DATA: xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
     xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
     xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
     xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
     xxxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx
```

The features for the MSGTRC tool depends on the selection of criteria used to perform the trace. The narrower the message trace selection, the better the trace. To limit the trace to the IDLC subset of Q.931 messages, the protocol discriminator and message type bytes must have values recognized as the IDLC subset of Q.931 messages. Refer to the following tables for descriptions of these values.

Q.931 message types

Hex	Call establishment messages
01	ALERTing
02	CALL PROCeeding
05	SETUP
07	CONNect
0D	SETUP ACKnowledge

Hex	Call clearing messages
45	DISConnect
4D	RELease
5A	RELease COMplete

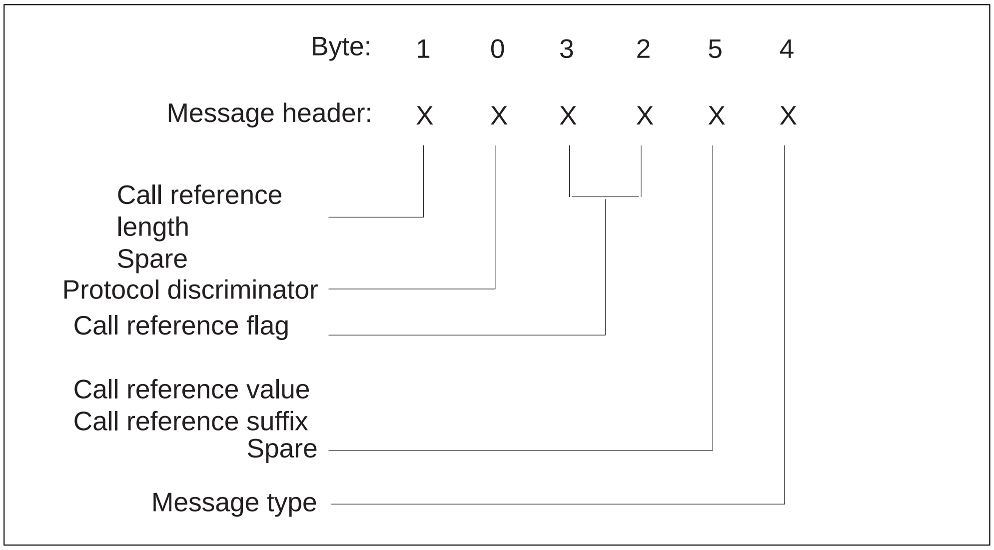
Hex	Call supervision messages
7B	INFOrmation
6E	NOTIFY

Hex	Other messages
75	STATUS ENQ
7D	STATUS

Q.931 information element identifiers

Hex	Variable length information elements
04	Bearer capability
08	Cause
14	Call state
2C	Keypad facility
18	Channel notification
27	Notification identifier
34	Signal

Byte assignments for Q.931 message header



Problem solving chart

The following chart provides operating company personnel with problem solving procedures for Subscriber Carrier Module-100 Access (SMA) alarms.

Clearing an SMA alarm

Alarm condition	Possible cause	Action
SMA Critical	Power problems cause both units to be out of service (OOS).	Proceed as follows: 1 Verify the SMA is powered up. Check for EXT alarm and end aisle alarm lights. 2 Identify SMA in critical state. 3 Post and busy the defective SMA. 4 Return-to-service (RTS) the defective SMA. 5 Replace displayed cards in card list. Use appropriate card replacement procedures. 6 If no reply from the peripheral module (PM), set the defective SMA again. 7 If reset fails, load the defective SMA again. 8 Return SMA to service.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
SMA Major	Defective card causes one unit to be out-of-service	Proceed as follows: 1 Identify the system-busy (SysB) SMA unit. 2 Post and busy the defective SMA unit. 3 Perform out-of-service test. 4 Replace displayed cards in card list. Use appropriate card replacement procedures. 5 Load RTS SMA unit again, if necessary.
SMA Minor	Defective card causes some degradation of service	Proceed as follows: 1 Identify the in-service trouble (ISTb) SMA unit. 2 Post and busy the defective SMA unit. 3 Perform out-of-service test. 4 Replace displayed cards in card list. Use appropriate card replacement procedures. 5 RTS SMA unit.
	Peripheral-side (P-side) links out-of-service cause some degradation of service	Proceed as follows: 1 Display P-side links at the MAP (maintenance and administration position). 2 Busy and test system busy links. 3 If test fails, replace cards in card list. Test cards again. 4 If test passes, return links to service.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
	Central-side (C-side) links out-of-service cause some degradation of service	Proceed as follows: 1 Display C-side links at the MAP. 2 Busy and test SysB links. 3 If test fails, replace cards in card list. Test cards again. 4 If test passes, return links to service.
	PM load mismatch with inventory table	Proceed as follows: 1 Determine the load the SMA must use. 2 Enter correct load name in table LTCINV. 3 Busy and load the SMA. Return the SMA unit to service.
	Data is out of date or static data mismatch with central control (CC)	Proceed as follows: 1 Busy the defective unit. 2 Load the unit with CC data. 3 Return the unit to service.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
IDT Critical	Fault on common signaling channels (CSC)	Proceed as follows: 1 Identify and post the SMA for the defective integrated digital terminal (IDT). 2 If SMA has alarms, clear the alarms. 3 If IDT alarm continues, display SMA P-side message links. Attempt to RTS closed link. 4 If RTS fails, post the SysB IDT and display P-side message channels. 5 If CSC is not active, busy and activate the CSC. Return the CSC to service. 6 If CSC alarm continues, make sure path protection is activated for both CSCs. 7 If CSC remains out-of-service, busy the CSC. RTS the CSC. 8 If alarm continues, busy and test the defective CSC for internal continuity. 9 If the internal continuity test fails, post the SMA with the defective IDT. 10 Busy and test the inactive unit and replace any cards that appear in a card list. 11 Load, test, and RTS the inactive SMA unit. 12 RTS the CSC and set up an external loopback at the S/DMS AccessNode fiber central office terminal (FCOT). A failure of the external loopback test indicates a problem at the S/DMS AccessNode.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
	CC restart Link audit (occurs when IDT message links go out of service) State mismatch Unsolicited message limit exceeded	Proceed as follows: 1 Monitor alarm status. 2 System action normally clears the alarm condition.
	Remote digital terminal (RDT) alarms present	Proceed as follows: 1 Determine the number and type of RDT alarms. 2 Clear the fault conditions at the remote fiber terminal (RFT).
IDT Critical	SMA is SysB	The IDT remains central side busy (CBsy) until the user returns the SMA to service. Refer to clearing an SMA alarm steps.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
IDT Major and Minor	DS-1 message link busy Path alarm	Proceed as follows: 1 Identify and post the defective IDT. 2 Identify and post the associated SMA. 3 If SMA has alarms, clear the alarms. 4 If IDT alarm continues, display SMA P-side message links. 5 Attempt to return SysB link to service. 6 If RTS fails, post the ISTb IDT and display C-side links. 7 Display message channels and identify those on the defective link. 8 Busy the CSC and embedded operation channel (EOC) on the defective link and test continuity for both channels. 9 Return the CSC and EOC to service.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
	Maintenance connection not established EOC database synchronization in progress	Proceed as follows: 1 Identify the defective IDT. 2 Post the SMA associated with the IDT. 3 If connection is not established after 30 min, check logs for software errors (SWERR). The system attempts synchronization again. 4 If MAP display indicates EOC database synchronization is in progress, display the P-side message links. 5 Determine the message link numbers for the defective IDT. 6 Post the IDT, and display the P-side message channels. 7 Make sure an active EOC is in service. 8 Wait 10 min for synchronization to complete. Check for and clear RDT alarms. 9 If alarm condition continues, the system attempts a maintenance connection again.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
IDT Major and Minor	EOC database damaged	Proceed as follows: 1 Identify the SMA and RDT with the defective IDT. 2 Make sure the distinguished name (DN) of the RDT found in table RDTINV is the same as the DN on the RFT. 3 Make sure the links entered in table RDTINV (field LINKTAB) are valid. 4 Busy the active EOC path. Return the EOC to service.
	CSC P-side node messaging overload EOC P-side node messaging overload P-side node messaging system overload on SMA	Proceed as follows: 1 Identify and post the defective IDT. 2 Display the C-side links. If messaging links are closed, post the SMA. Return the appropriate links to service. 3 At the IDT level, display message channel information. 4 Activate EOC and CSC paths if they are not active. 5 Return EOC and CSC paths to service. 6 If overload conditions continue, check RFT engineering parameters.

—end—

Advanced troubleshooting procedures

Task list

There is no task list.

Advanced trouble locating procedures

There are no procedures to locate advanced trouble location procedures at this time.

Powering-up the SMA unit

The SMA unit is part of the host office. The general host office power-up procedure describes powering-up the SMA unit. The following steps are necessary to power-up the SMA unit only:

1 Unseat the NT6X80 (PCM Loss Addition) card in slot 19.

2 Set the switch of the power converter to the ON position.

3 Hold the RESET button on the power converter in. Flip the matching circuit breaker up and do *not* hold the circuit breaker up. If power is applied to the SMA unit, the circuit breaker remains in the *up* position. If a power problem is present, the breaker returns to the *off* position. Release the RESET button.

4 Repeat steps 2 and 3 for the other SMA unit.

5 Reseat the NT6X80 (PCM Loss Addition) card in slot 19.

6 To post the SMA unit to power up, type

>MAPCI;MTC;PM;POST SMA sma_number

7 To busy both SMA units, type

>BSY PM

8 To discover the name of the PM load data file, type:

>QUERYPM

Note: The display provides the name of the load file. Cross-reference the load file to the disk volume name on the PMLoad File Office Record, or to an equal list of all PM load files maintained in your office.

9 To access the disk utility program and list all files contained on the disk volume, type:

>DSKUT;LISTVOL volume_name ALL

or

>DSKUT;LF volume–name

10 To exit the disk utility program, type:

>QUIT

11 To check that the correct load runs, type:

>QUERY CNTRS

12 If the load is not correct, load the firmware of one unit of the SMA. To perform this action, type:

>LOADFW UNIT unit_number

13 To load the same unit of the SMA, type:

>LOADPM UNIT unit_number CC

14 Repeat steps 11, 12 and 13 for the other SMA unit.

15 After you load the SMA unit, test the SMA unit. To test the unit, type:

>TST PM

16 If the test passed, return to service (RTS) the unit. To RTS the unit, type:

>RTS PM

Powering down the SMA unit

The following steps are necessary to power down the SMA unit only:

1 To post the SMA to the power down procedure, type:

>MAPCI;MTC;PM;POST SMA sma_number

2 To identify the network links to the network interface cards in the SMA unit, type:

>TRNSL C

3 To access the links level of the network, type:

>NET;LINKS network_module pair_number

4 To busy the network ports associated with the network module accessed in step 3, type:

>BSY plane_number port_number

Note 1: Repeat this step for all ports associated with the network module pair accessed in step 3.

Note 2: A warning message appears and a the system requests confirmation. Enter *Yes* to confirm.

5 Repeat steps 3 and 4 for all network module pairs that terminate links from the SMA unit.

6 To return to the PM level of the MAP display and to assign the SMA unit, type:

>MAPCI;MTC;PM;POST SMA sma_number

7 To check that all C-side links are busy, type:

>TRNSL C

8 To busy the SMA unit, type:

>BSY PM

9 To set to offline the SMA unit set to busy in step 8, type:

>OFFL

10 Set the switch on the power converters in both units to OFF to remove the power from the SMA unit.

11 The power down procedure for the SMA unit is complete.

Common procedures

There are no common procedures.

SMA recovery procedures

This section contains recovery procedures for the Subscriber Carrier Module-100 Access (SMA) and references to recovery procedures for the S/DMS AccessNode. These procedures describe how to recover a SMA manually. Maintenance engineering and field maintenance personnel use these procedures.

Recovering an out-of-service SMA

Application

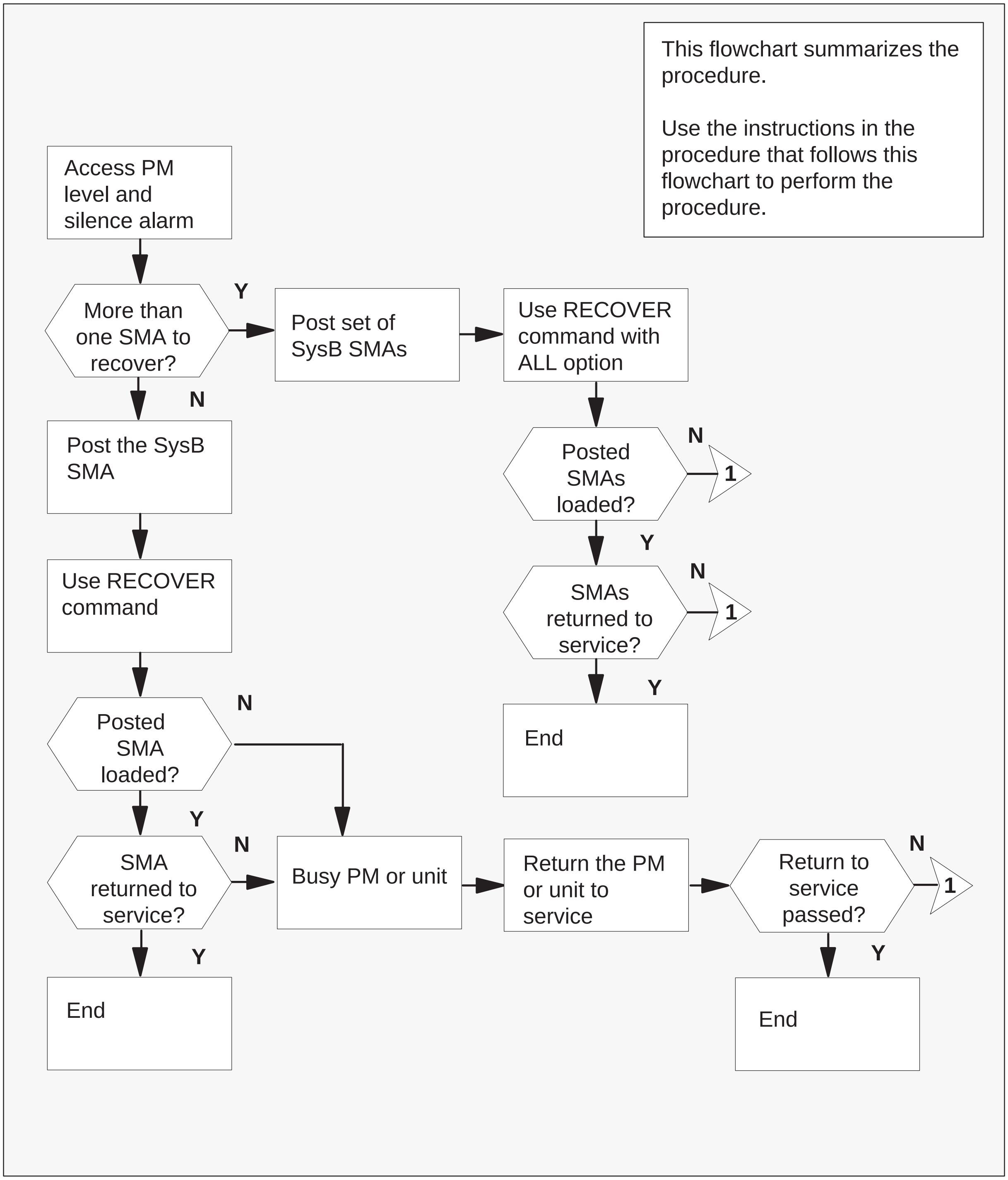
Use this procedure to return to service (RTS) a SMA made busy by the system (SysB).

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.

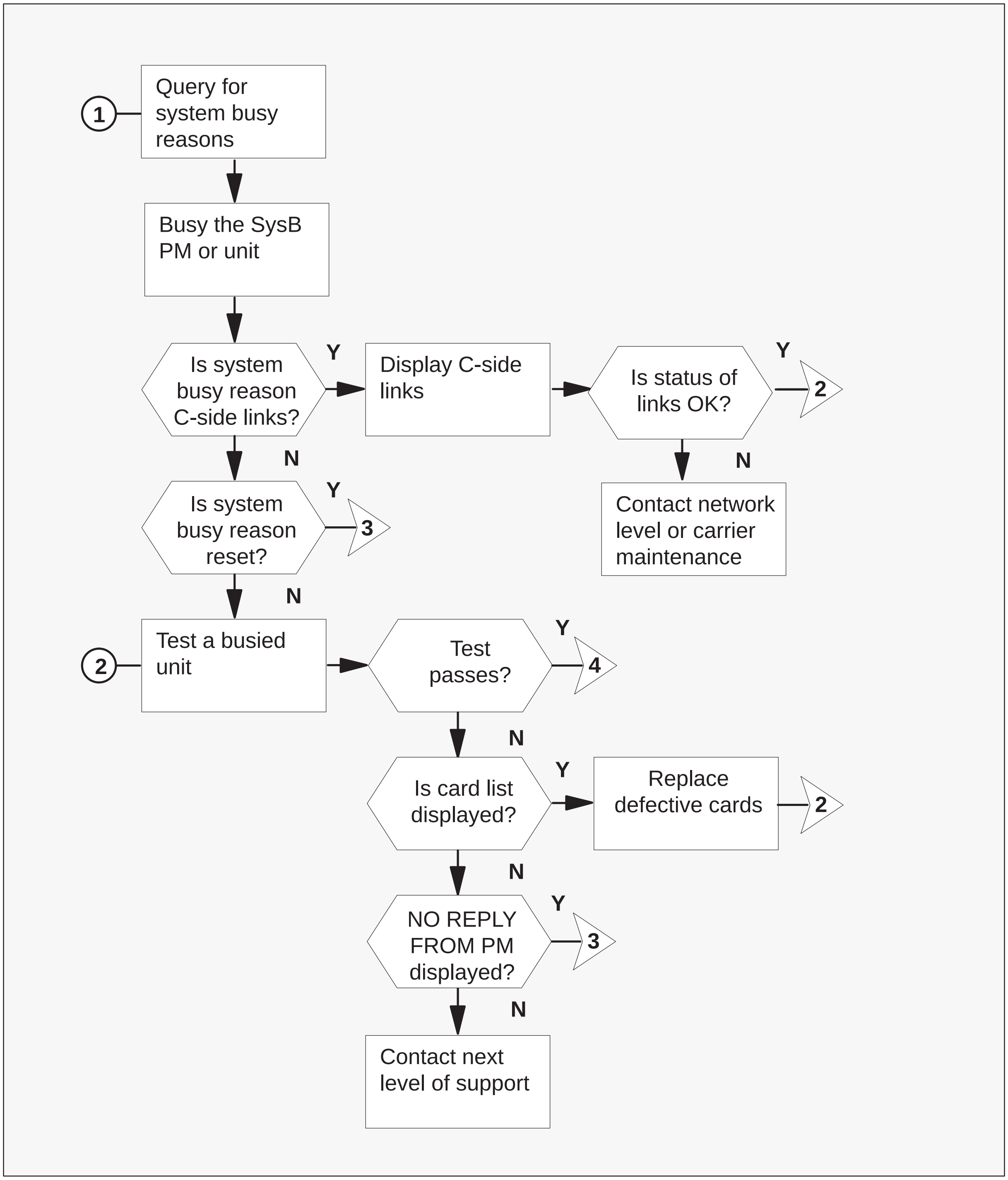
Recovering an out-of-service SMA (continued)

Summary of Recovering an out-of-service SMA



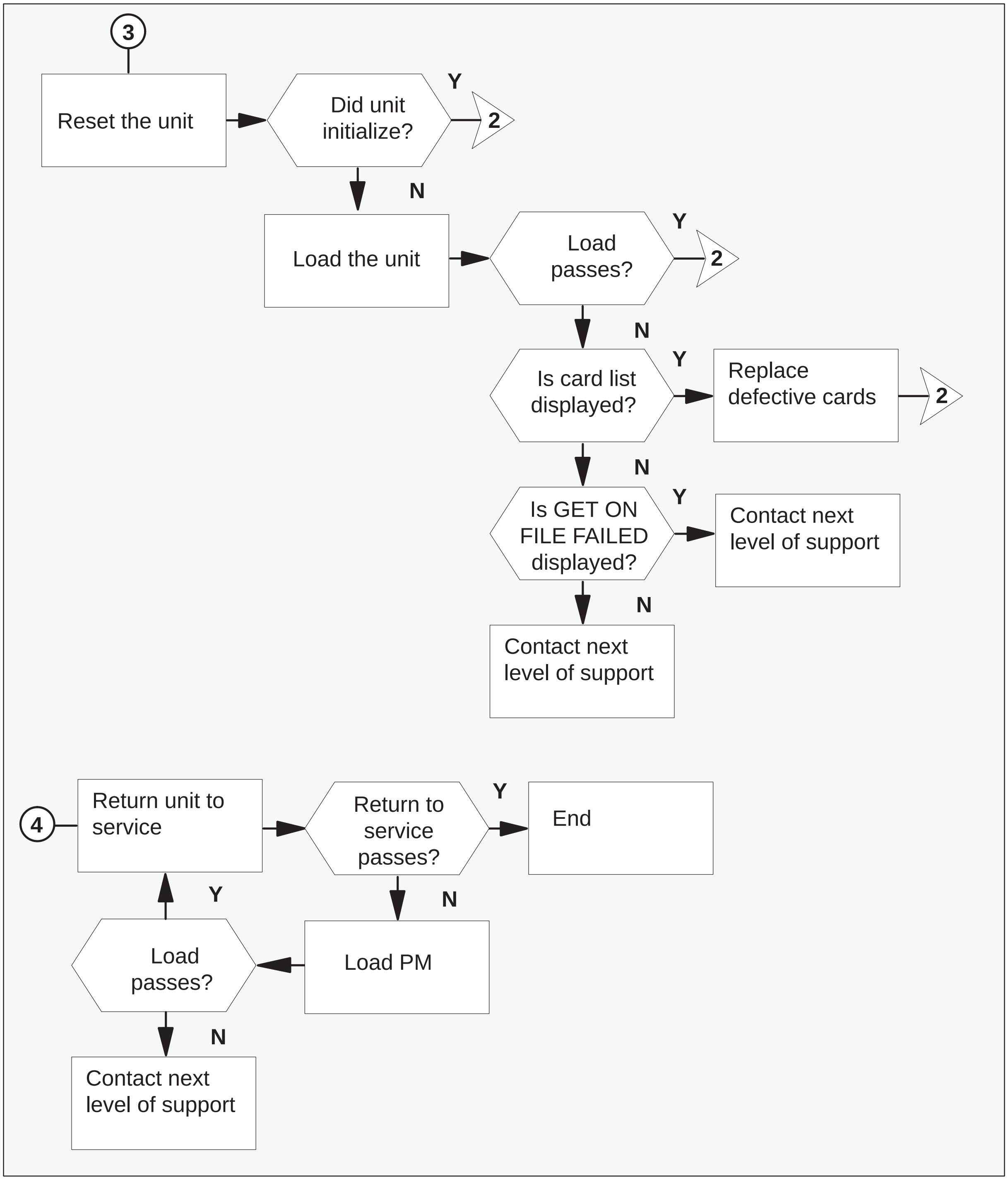
Recovering an out-of-service SMA (continued)

Summary of Recovering an out-of-service SMA



Recovering an out-of-service SMA (continued)

Summary of Recovering an out-of-service SMA



Recovering an out-of-service SMA (continued)

Recovering an out-of-service SMA

At the MAP terminal

1 When the system detects a fault, the system can trigger an audible alarm. To access the peripheral module (PM) level of the MAP display and silence the alarm, type

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

2 To display the system-busy (SysB) SMA, type

DISP STATE SYSB SMA
and press the Enter key.

Example of a MAP response:

```
SysB SMA: 0
```

If there is	Do
one SMA system-busy	step 5
more than one SMA system-busy	step 3

3 To access the set of system-busy SMAs, type

>POST SMA SYSB
and press the Enter key.

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0     1     3     2    13
    SMA    2     0     0     3     0     7

SMA 0 SysB  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   SysB
Unit1:  Inact SysB
```

Recovering an out-of-service SMA (continued)

4 To recover as many of the system-busy SMAs with the peripheral module (PM) recovery tool, type

>RECOVER ALL
and press the Enter key.

Example of a MAP response:

```
This operation will be executed on n SMAs.
Please Confirm (“YES” or “NO”):
```

Note: In the MAP terminal response *n* is the number of all SMAs in the posted set.

Go to step 7.

5 To access the system-busy SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA displayed in step 2

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     3     2    13
    SMA    1     0    0     3     0     7

SMA 0 SysB  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   SysB
Unit1:  Inact SysB
```

6 To recover as many of the system-busy SMAs with the PM recovery tool, type

>RECOVER
and press the Enter key.

Example of a MAP response:

```
This operation will be executed on 1 SMA.
Please Confirm (“YES” or “NO”):
```

Note: In the MAP response 1 is the posted SMA.

Recovering an out-of-service SMA (continued)

7 To confirm the need for the recovery operation, type

>YES

and press the Enter key.

The recovery tool submits a recover request for each posted SMA, as shown in the following example of a MAP response.

Example of a MAP response:

```
SMA 0 Recover request submitted
SMA 1 Recover request submitted
  .
  .
SMA n Recover request submitted
```

The tool determines which of the posted SMAs need recovery. For each SMA that needs recovery, the tool attempts to load the PM units 0 and 1. For each SMA the system loads, the tool attempts to return to service the active unit. The tool also attempts to return to service all other SMAs to service.

In the following example:

- SMA 0 was loaded and returned to service.
- SMA 1 was returned to service.
- SMA 2 failed to load unit 0, but can load unit 1, and returned to service unit 1.
- SMA 3 failed to load.

Example of a MAP response:

```
SMA 1 Recover passed
SMA 0 Unit 0  LoadPM passed
SMA 0 Unit 1  LoadPM passed
SMA 2 Unit 0  LoadPM failed
              Failed to initialize
SMA 2 Unit 1  LoadPM passed
SMA 3 Unit 0  LoadPM failed
              Failed to initialize
SMA 3 Unit 1  LoadPM failed
              Failed to initialize
SMA 2 Unit 0  Reloading required.
              RTS attempted on mate
SMA 0 Recover passed
SMA 2 Recover passed
  .
  .
SMA n Recover passed
```

Recovering an out-of-service SMA (continued)

The tool provides a summary of the operation as shown in the following example:

Example of a MA terminal response:

```
Summary:
3 passed
1 failed
```

8 Determine if all the SMAs recovered.

If	Do
all SMAs recover	step 36
one or more SMAs did not recover	step 9

9 Record the SMAs that cannot be recovered.

10 Work on the SMAs that have both units out-of-service (OOS). Use the *Alarm Clearing Procedures* to clear any SMAs with one unit out-of-service.

If the system	Do
cannot load one or more SMAs and both units are out of service	step 11
cannot load or return to service one unit of a SMA	step 34

11 To post the system-busy SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of a SMA recorded in step 9

12 To busy the system-busy SMA, type

>BSY PM
and press the Enter key.

Recovering an out-of-service SMA (continued)

13 To return to service the system-busy SMA, type

>RTS PM
and press the Enter key.

If RTS	Do
passes on both units	step 33
fails on one or both units	step 14

14 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

15 Determine if one or both units need to be recovered.

If recovery	Do
is needed on both units	step 16
is needed one unit	step 34

16 Identify the system-busy message in step 14.

If system-busy reason	Do
is activity dropped	step 17
is CC audit	step 17
is diagnostics failed	step 17
is PM audit	step 17
is self test failed	step 17
is trap	step 17
is unsol exceeded	step 17
is reset	step 22
is C-Side links	step 30
is none of the above	step 32

Recovering an out-of-service SMA (continued)

17 To test the SMA units that did not recover, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of one of the units busied in step 12

If test	Do
passes	step 18
fails	step 20

18 To return the unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit tested in step 17

If RTS	Do
passes	step 36
fails one time	step 19
fails more than one time	step 35

19 To reload unit, type

>LOADPM UNIT unit_no CC FORCE
and press the Enter key.

where

unit_no is the number of the unit that failed to return-to-service in step 18

If LOADPM	Do
passes	step 18
fails	step 35

Recovering an out-of-service SMA (continued)

20 Identify the test failure message.

If display	Do
is `NO REPLY FROM PM`	step 21
is `FAIL MESSAGE RECEIVED FROM PM`	step 35
is a card list	step 25

21 Determine if the `NO REPLY FROM PM` message occurred.

If `NO REPLY FROM PM` message	Do
occurred before	step 35
is the first occurrence of this message	step 22

22 To reset the unit, type

>PMRESET UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit tested in step 17

Note: During reset, the MAP terminal should indicate the reset events as they occur. These events occur in the order shown in the following MAP response.

Example of a MAP response:

```
RESET
 STATUS
 RUN
 INITIALIZE
 LOADING DATA
```

If unit	Do
failed to initialize	step 23
initialized	step 27

Recovering an out-of-service SMA (continued)

23 Determine if the system displayed the `NO REPLY FROM PM` message.

If `NO REPLY FROM PM`	Do
is still displayed	step 35
is not displayed any longer	step 24

24 Determine if the system displayed `NO WAI AFTER RESET` message.

If `NO WAI AFTER RESET`	Do
is displayed	step 25
is not displayed	step 17

25 Observe the card list displayed at the MAP terminal.

Example of a MAP response:

```
SITE FLR RPOS  BAY_ID SHF DESCRIPTION SLOT EQPEC
HOST  00  M07  LTE 00  51  SMA : 000    12  AX74
HOST  00  M07  LTE 00  65  SMA : 000    12  AX74
```

If all cards	Do
are replaced	step 35
are not replaced	step 26

26 Go to *Card Replacement Procedures* for the next card on the list. When you return from the card replacement procedures, go to step 17 of this procedure.

Recovering an out-of-service SMA (continued)

27 To load the unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit to be loaded

If LOADPM	Do
passes	step 17
fails	step 28

28 Identify the failed load reported in step 27.

If message displayed	Do
is `NO WAI AFTER RESET`	step 25
is `FAIL ROM DIAG`	step 25
is `GET ON FILE FAILED`	step 29
none	step 35

29 The message `GET ON FILE FAILED` indicates a problem with the storage device. Go to step 32.

30 To display the status of central-side (C-side) links, type

>TRNSL C
and press the Enter key.

Example of a MAP response:

```
LINK0 ENET 0 0 30 00  0;Cap:MS;Status:OK  ;MsgCond:OPN,Restricted
LINK1 ENET 1 0 30 00  0;Cap:MS;Status:SBsy;MsgCond:CLS,Restricted
LINK2 ENET 0 0 30 00  1;Cap:MS;Status:OK
LINK3 ENET 1 0 30 00  1;Cap:MS;Status:OK
```

Recovering an out-of-service SMA (end)

31 Take note of the numbers and conditions of the links.

If	Do
MS link condition is CLS	step 32
status of all links is not OK	step 32
status of all links is OK	step 17

32 Probable cause is a problem with the network interface card or the ENET port interface card. Contact the network level maintenance group.

33 Recover the next SMA PM recorded in step 9.

If	Do
another SMA PM needs to be recovered	step 11
all SMA PMs are recovered	step 36

34 Go to the appropriate alarm clearing procedure in the *Alarm Clearing Procedures* section to determine what steps to take.

35 For further assistance, contact the next level of support.

36 This procedure is complete.

Recovering an S/DMS Accessnode

Application

Use this procedure to return to service an S/DMS AccessNode busied by the system (SysB).

Note: Remote digital terminal (RDT) is a generic term. The S/DMS AccessNode remote fiber terminal (RFT) is a type of RDT. In an integrated S/DMS AccessNode configuration, the word RDT always means RFT.

Action

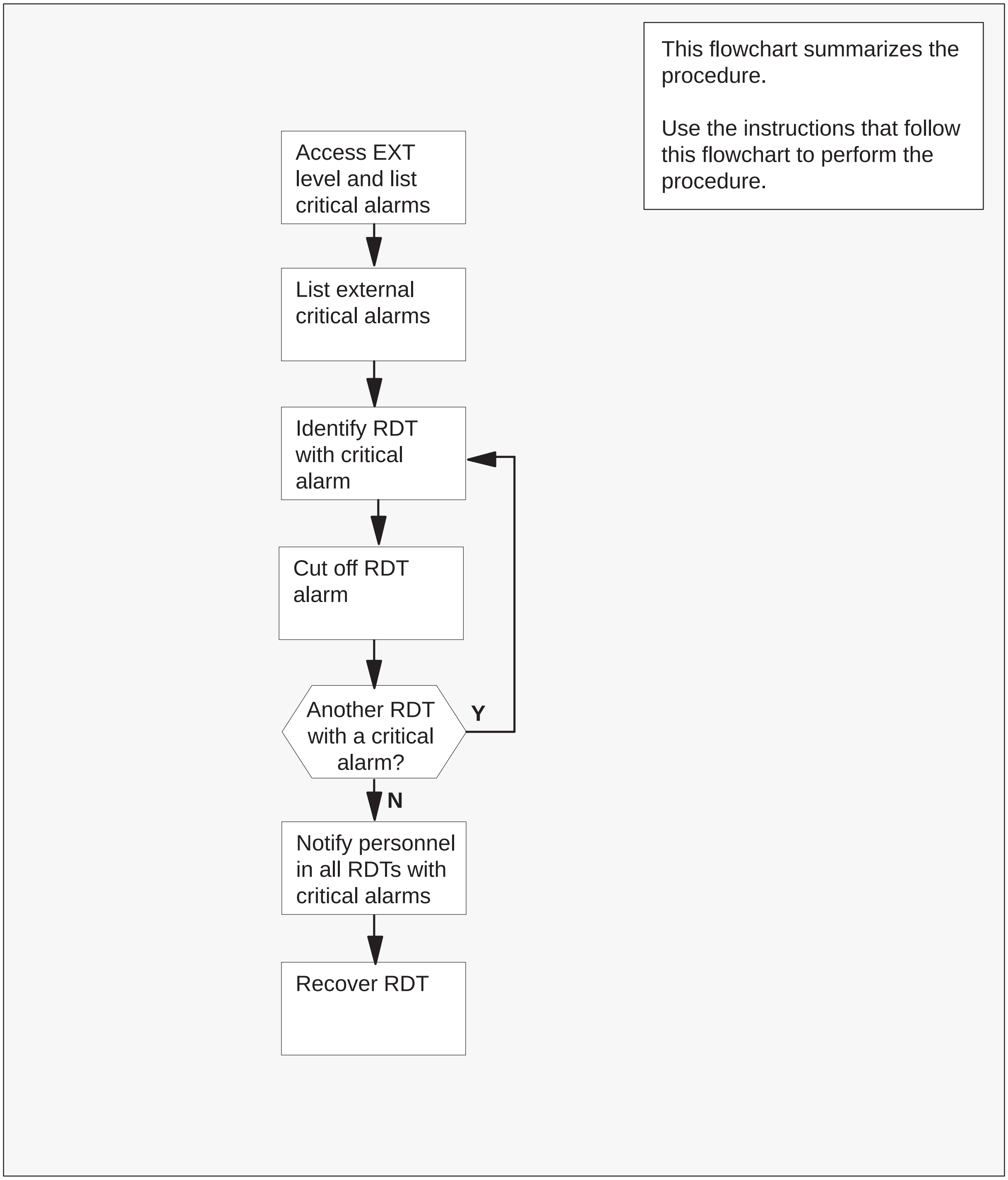
The flowchart that follows gives an overview of the procedure. Use the instructions in the step-action procedure that follows the flowchart to perform the recovery task.

Reference

You need *S/DMS AccessNode Alarm and Trouble Clearing Procedures*.

Recovering an S/DMS Accessnode (continued)

Summary of Recovering an S/DMS Accessnode



Recovering an S/DMS Accessnode (continued)

Recovering an S/DMS Accessnode

At the MAP terminal

1 When the system detects a RDT failure, the system raises a critical alarm at the EXT level of the MAP display. To access the EXT level when the system raises a critical EXT alarm, type

>MAPCI;MTC;EXT
and press the Enter key.

2 When the system detects a fault, the system can trigger an audible alarm. To silence the alarm, type

>SIL
and press the Enter key.

3 To determine if the external critical alarms are related to an RDT, type

>LIST CRIT
and press the Enter key.

If RDT CRIT	Do
appears	step 5
does not appear	step 4

4 An S/DMS AccessNode is not the external unit that causes the EXT critical alarm. Identify the unit that causes the alarm, and refer to documentation to correct the problem.

5 To determine which signal distribution (SD) alarm points that operate for each critical alarm, type

>DISP SDALARM
and press the Enter key.

The SD points that correspond to the location of the RDT appear. An SD point related to the active alarm state also appears. The system displays SD points for one RDT at a time. The RDT with the most critical condition appears.

Recovering an S/DMS Accessnode (continued)

Example of a MAP terminal display:

```
CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext   Appl
                              2IDT                           2 Crit
 *      *      *       *      *C*     *       *       *       *C*

Ext
 0 Quit       Ext Alarms     Crit   FSP      Major   Minor   NoAlm
 2            EXT:            1      0         0       0       0
 3
 4            disp sdalarm
 5            SD POINT IN ALARM STATE:
 6            RDTSD1
 7 List_      RDTSD3
 8 TstDSAlm   RDTSD8
 9 SetSD_     RDTCRIT
10 SetSC_
11 Disp_
12
13 _Crit
14 _FSP
15 _Maj
16 _Min
17 _NoAlm
18
   userid
Time  hh:mm >
```

6 Record all the RDT SD points (RDTSDn) associated with each RDTCRIT alarm.

For example, in the MAP display shown in step 5, record the following in association with the RDTCRIT alarm:

- RDTSD1
- RDTSD3
- RDTSD8

The SD points (RDTSDn) that appear identify each RDT in table RDTINV.

Recovering an S/DMS Accessnode (continued)

7 To cut off the alarm, type

>SETSC RDTALRMCO OP;SETSC RDTALRMCO REL
and press the Enter key.

The scan point for the RDT alarm cut-off operates and releases. When other RDTs with alarms appear, the system displays the RDT with the most critical alarm. The system displays signal distribution points for a minimum of 20 s. If a more critical alarm does not occur or the system does not activate the alarm cutoff.

If there	Do
are other RDT alarms	step 3
are no other RDT alarms	step 8

8 To access table RDTINV from the CI level of the MAP display, type

>TABLE RDTINV
and press the Enter key.

Example of a MAP response:

```
TABLE:  RDTINV
```

9 To display table RDTINV headings, type

>HEADING
and press the Enter key.

Example of a MAP response:

```
RDTNAME     ADNUM           IDTNAME             NENAME
            PRIMOPC                            BACKOPC
                              VARTYPE   CLAPDFLT
                                            MTSTACPT
                                             LINKTAB
PROT      POTSPADG           EOC
                                            SDPOINTS
                                               RDTDN
```

Recovering an S/DMS Accessnode (end)

10 To display the tuple that contains the pattern identified in step 6, type

>LIST ALL (SCPOINTS eq ‘sdpoint_name sdpoint_name’)
and press the Enter key.

where

sdpoint_name is the signal distribution point pattern identified in step 5

The tuple that contains the specified pattern appears.

Example of a MAP response:

```
RDTNAME     ADNUM      IDTNAME             NENAME
           PRIMOPC                      BACKOPC
                              VARTYPE   CLAPDFLT
                                           MTSTACPT
                                            LINKTAB
PROT    POTSPADG       EOC
                                         SDPOINTS
                                              RDTDN
------------------------------------------------------
 REM3  0 1   3     SMA 0 0               AccessNode
        BRTPY205                           $
                              RFT 1 7 1  96  Y    $
                                (TBP 12   2 3 N)  $
                            (1 0) (2 3) (4 5)     $
 N        STDLN         S
 RDTSD1 RDTSD3 RDTSD6  $
(NETWORK_ID 1) (SYSTEM_ID 1) (NETWORKELEMENT_ID 14)
(EQUIPMENT_ID 1)  $
```

11 Identify the name of the RDT where the critical alarm occurs. For example, the name of the RDT in step 10 is REM3.

12 Notify operating company personnel at each RDT where a critical alarm occurs.

13 Use S/DMS AccessNode documentation to recover the RDT. Refer to the *S/DMS AccessNode Maintenance, Alarm and Trouble Clearing Procedures* for details.

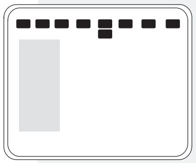
14 This procedure is complete.

SMA alarm clearing procedures

This section contains alarm clearing procedures for the Subscriber Carrier Module-100 Access (SMA). The procedures describe alarm clearing tasks that maintenance engineering and field maintenance personnel can use.

PM DCH major

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**1DCH**	.	.	.	.	.
				M					

Indication

The alarm code DCH appears under the PM header at the MTC level of the MAP display. This code indicates a D-channel handler (DCH) alarm.. A number precedes the code, and an M appears below the code. The number preceding the alarm code indicates the number of DCHs affected. The M indicates that the alarm class is major.

Meaning

A DCH is system-busy (SysB). The DCH resides in a peripheral module (PM). A system-busy DCH causes the PM to go in-service trouble (ISTb). A DCH can be system-busy for the following reasons:

- the ISDN signaling preprocessor (ISP) and the central control (CC) cannot communicate with the DCH
- a DCH returns to service from a central-side busy (CBsy) state
- a DCH undergoes system-initiated diagnostics
- a DCH is initializing after the PM starts again.
- a DCH takeover failed
- a DCH appears to be babbling
- traps caused a DCH reset

Result

The affected DCH cannot support ISDN service. The system automatically reassigns ISDN service groups (ISG) to the spare DCH. All offices are equipped with DCH sparing.

Common procedures

This procedure references the common procedure “Loading a PM”.

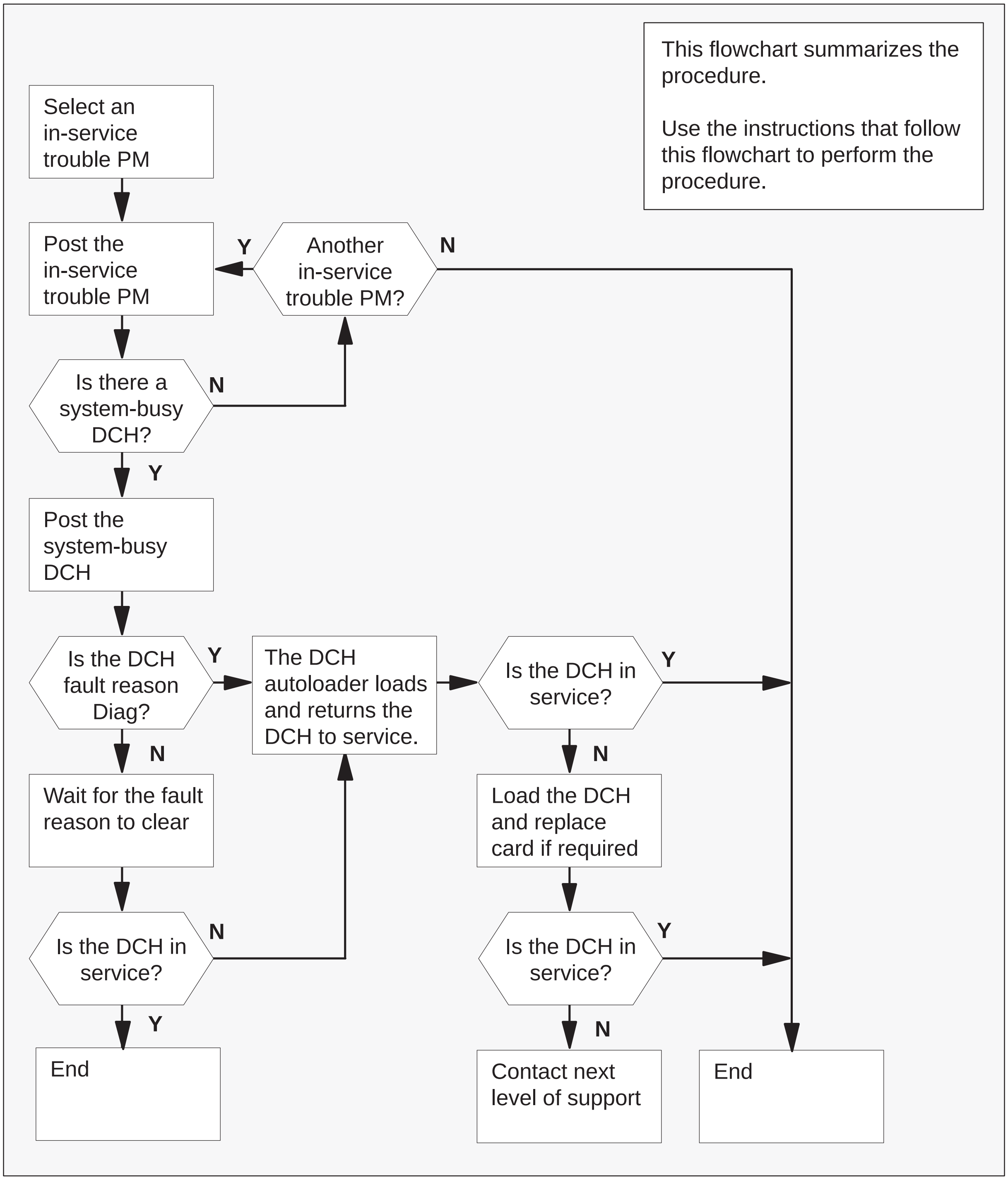
Do not go to the common procedure unless the step-action procedure directs you to go.

Action

This procedure contains a flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM DCH
major (continued)

Summary of clearing a PM DCH alarm



PM DCH
major (continued)

Clearing a PM DCH alarm

At the MAP terminal

1 To access the PM level of the MAP display, type

>MAPCI;MTC;PM
and press the Enter key.

Example of a MAP display:

```
                SysB    ManB    OffL    CBsy    ISTb    InSv
PM                 8       0      19      19       3      13
```

2 To display all in-service trouble PMs, type

>DISP STATE ISTB
and press the Enter key.

Example of a MAP display:

```
ISTb LTC : 0,10,90
ISTb LCME: 30
```

3 Record the PM type and the PM numbers for all in-service trouble PMs that are equipped with DCHs.

Note: The system displays the PM type to the right of the ISTb header in the MAP display response. The PM number for each in-service trouble PM appears to the right of the PM type. Where multiple in-service trouble PMs are present, commas separate the PM numbers.

PM DCH
major (continued)

4 To post a PM from the list recorded at step 3, type

>POST pm_type pm_no
and press the Enter key.

where

pm_type is the PM type recorded at step 3
pm_no is the PM number recorded at step 3

Example input:

>POST LTC 0
Example of a MAP display:

```
          SysB    ManB    OffL    CBsy    ISTb    InSv
PM           8       0      19      19       3      13
LTC          0       0       0       0       3       4

LTC      0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Act   InSv
Unit1:   Inact InSv
```

5 To access the DCH level of the MAP display, type

>DCH
and press the Enter key.
Example of a MAP display:

```
          SysB    ManB    OffL    CBsy    ISTb    InSv
PM           8       0      19      19       3      13
LTC          0       0       0       0       3       4

LTC      0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Act   InSv
Unit1:   Inact InSv

DCH          2       1       0       0       2       1
```

Note: The states for all DCHs associated with the posted PM appear on the bottom line of the MAP display.

PM DCH
major (continued)

6 Determine the states of the DCHs.

If	Do
one or more DCHs are system-busy	step 7
all DCHs for the posted PM are in-service (INSV) or in-service trouble (ISTb)	step 20

7 To post all system-busy DCHs, type

>POST SYSB
and press the Enter key.

Example of a MAP display:

```
             SysB    ManB    OffL    CBsy    ISTb    InSv
PM              8       0      19      19       3      13
LTC             0       0       0       0       3       4

LTC     0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Act   InSv
Unit1:   Inact InSv

DCH             2       1       0       0       2       1
DCH  82 ISG 200 SysB LTC    0 port  3 Access error
```

Note: When two or more DCHs are in the posted set, the system displays each DCH one at a time. The system begins the with the first member of the posted set.

8 Determine the fault reason for the displayed DCH.

Note: The fault reason appears at the end of the line for the current DCH of the posted set. In the example at step 7, the fault reason is access error.

If the fault	Do
displayed is `Diag`	step 10
displayed is other than listed here	step 9

PM DCH
major (continued)

9 Wait 1 min for the fault to clear.

If within 1 min	Do
the state of the DCH is system-busy, and the fault reason is `Diag`	step 10
the state of the DCH is system-busy, and the fault reason is not changed	step 18
the state of the DCH is in-service or in-service trouble	step 19

The DCH autoloader loads and returns to service one DCH at a time. Log DCH604 documents which DCHs the loader has an effect on.

10 To cancel any maintenance action that can be in progress for this DCH, type

>ABTK
and press the Enter key.

Note: The autoloader services one DCH at a time. The operating company might decide to abort the autoloader process and manually load multiple DCHs in parallel. Manually loading DCH cards in parallel is faster than the autoloader process.

11 To manual-busy the DCH, type

>BSY
and press the Enter key.

Example of a MAP response:

```
DCH 82 Bsy Passed
```

12 To return the DCH to service, type

>RTS
and press the Enter key.

Example of a MAP response:

```
DCH 82   Out-of-service test initiated
Fail message received from PM
Site Flr RPos  Bay_id   Shf  Description    Slot    EqPEC
HOST  01  B02  LTEI 00  32   LTC : 000      05       BX02
DCH 82 Tst Failed Testid :  DCHIFdiag
```

If the RTS command	Do
passes, and the DCH is in-service or in-service trouble	step 19
fails, and the DCH is manual-busy	step 13

13 To load the DCH, type

>LOADPM
and press the Enter key.

Example of a MAP display:

```
Request submitted on DCH 82
DCH 82  load Passed : EDH07BH
```

If the LOADPM command	Do
passes	step 17
fails	step 14

14 Perform the procedure “Loading a PM” in this document. When you have completed the procedure, return to this point.

15 Determine your next step.

If the procedure Loading a PM	Do
was successful	step 17
was not successful	step 16

PM DCH
major (continued)

16 Perform the correct procedure in *Card Replacement Procedures* to change the DCH (NTBX02) card. When you complete the procedure, return to this point.

17 To return the DCH to service, type

>RTS
and press the Enter key.

Example of a MAP display:

```
DCH 82 Out-of-service test initiated
DCH 82 Tst Passed
DCH 82 Rts Passed
```

If the RTS command	Do
passes, and the DCH is in-service or in-service trouble	step 19
fails, and the DCH continues to be manual-busy	step 18

18 Record the following information about the DCH that you are working on:

- the PM type and number
- the DCH number
- the original and the current fault reason, and the state of the DCH

After you return to service (RTS) as many system-busy DCHs as possible, give this information to your next level of support.

19 To display the next DCH in the posted set, type

>NEXT
and press the Enter key.

If	Do
the system displays another system-busy DCH	step 8
the system displays `End of post set`	step 20

PM DCH
major (end)

20 Determine your next step.

If you	Do
posted all in-service trouble PMs, worked on all system-busy DCHs, and returned all the DCHs to service	step 24
posted all in-service trouble PMs, worked on all system-busy DCHs, and you cannot return all DCHs to service	step 23
did not post all in-service trouble PMs	step 21

21 To return to the PM level of the MAP display, type

>QUIT
and press the Enter key.

22 To post the next PM on the list made at step 3, type

>POST pm_type pm_no
and press the Enter key.

where

pm_type is the PM type recorded at step 3
pm_no is the PM number recorded at step 3.

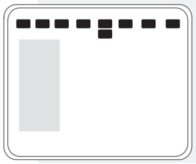
Go to step 5.

23 For additional help, contact the personnel responsible for the next level of support.

24 The procedure is complete.

PM DCH minor

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**1DCH**	.	.	.	.	.

Indication

At the MTC level of the MAP display, the alarm code DCH preceded by a number appears under the PM header in the alarm banner. This code indicates a D-channel handler (DCH) minor alarm.

Meaning

A DCH is in-service trouble (ISTb). The DCH can be in-service trouble for any of the following reasons:

- a congested or overloaded DCH
- a command protocol violation
- ISDN service group (ISG) channels associated with a DCH are manual-busy or system-busy (SysB)
- DCH product engineering code (PEC), load or sparing problems
- DCH is manual-busy (ManB)

A central-side busy (CBsy) DCH can also cause a DCH minor alarm. If central-side busy causes a DCH minor alarm, all DCHs that are not manual-busy or offline (Offl) are central-side busy.

Central-side busy DCHs occur when the PM is system-busy (SysB). When the PM is system busy, the PM-related alarm indicator masks the DCH minor alarm.

The number under the PM header in the alarm banner indicates the number of affected DCHs.

Result

This alarm does not affect service.

Common procedures

This procedure refers to the common procedure Loading a PM.

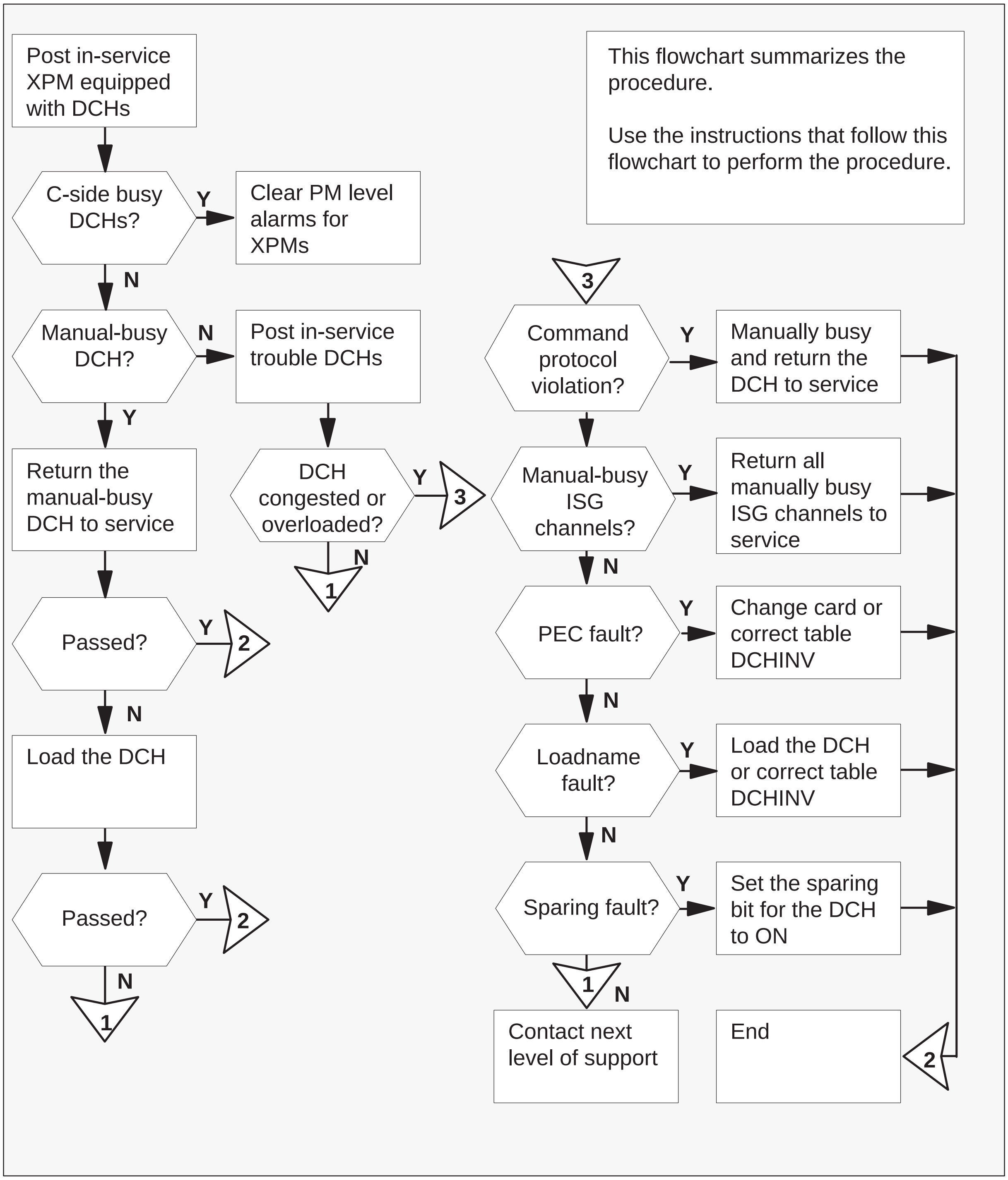
Do not go to the common procedure unless the step-action procedure directs you to go.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM DCH
minor (continued)

Summary of clearing a PM DCH alarm



PM DCH
minor (continued)

Clearing a PM DCH alarm

At the MAP display:

1 To access the PM level of the MAP display, type

>MAPCI;MTC;PM
and press the Enter key

Example of a MAP display response:

```
            SysB    ManB    OffL    CBsy    ISTb    InSv
PM             8       0      19      19       3      13
```

2 To display all in-service (InSv) PM(s), type

>DISP STATE INSV
and press the Enter key

Example of a MAP display response:

```
InSv MTM : 1,2
InSv STM : 0,2,4,8,10
InSv LTC : 3
InSv DTCI: 2
InSv LCME: HOST 55 0,HOST 86 0,HOST 67 0,HOST 65 0
```

3 Record the PM type and the PM numbers for all in-service PMs that have with DCHs. Consult office records or office personnel if required.

Note: The PM type appears on the right side of the InSv header in the MAP response. The PM number for each in-service PM appears on the right side of the colon. If there are multiple in-service PMs, commas separate the PM numbers.

PM DCH
minor (continued)

4 To post the first PM in the list recorded in step 3, type

>POST pm_type pm_no
and press the Enter key

where

pm_type is the PM type recorded at step 3
pm_no is the PM number recorded at step 3

Example input:

>POST LTC 3
Example of a MAP display response:

```
              SysB    ManB    OffL    CBsy    ISTb    InSv
PM               8       0      19      19       3      13
LTC              0       0       0       0       3       4

LTC     3 InSv  Links_OOS: CSide  0 , PSide  0
Unit0:   Inact InSv
Unit1:   Act   InSv
```

5 To access the DCH level of the MAP display, type

>DCH
and press the Enter key

Example of a MAP display response:

```
              SysB    ManB    OffL    CBsy    ISTb    InSv
PM               8       0      19      19       3      13
LTC              0       0       0       0       3       4

LTC     3 InSv  Links_OOS: CSide  0 , PSide  0
Unit0:   Inact InSv
Unit1:   Act   InSv

DCH              0       1       0       0       1       3
```

Note: The states for all DCHs associated with the posted PM appear on the bottom line of the MAP display.

6 From the MAP display, determine if central-side busy DCHs are present.

If central-side busy DCHs	Do
are present	step 7
are not present	step 8

7 The fault is present in the PM or on the central-side (C-side) of the PM in which the DCH resides. Perform the correct Alarm clearing procedure in this document to clear other PM-related alarms. Complete the procedure and return to this point.

8 From the MAP display, determine if there are manual-busy DCHs.

If manual-busy DCHs	Do
are not present, and in-service trouble DCHs are not present	step 90
are present	step 9
are not present but in-service trouble DCHs are present	step 18

9 To post all manual-busy DCHs, type

>POST MANB
and press the Enter key

Example of a MAP display response:

```
              SysB    ManB    OffL    CBsy    ISTb    InSv
PM               8       0      19      19       3      13
LTC              0       0       0       0       3       4

LTC     0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Act   InSv
Unit1:   Inact InSv

DCH              0       1       0       0       1       3
DCH  82 ISG 200 ManB LTC    0 port  3
```

Note: When the system displays two or more DCHs in the posted set, the DCHs appear one at a time. The DCHs start with the first member of the posted set.

PM DCH
minor (continued)

10 From office records or from office personnel, determine why the DCH is manual-busy. Determine if the the DCH can return to service.

If the DCH	Do
can return to service	step 11
cannot return to service	step 16

11 To return the DCH to service, type

>RTS

and press the Enter key

Example of a MAP display response:

```
RTS
DCH 82   Out-of-service test initiated
Fail message received from PM
 Site Flr RPos  Bay_id   Shf  Description  Slot     EqPEC
 HOST  01  B02  LTEI 00   32  LTC : 000    05       BX02
DCH 82 Tst Failed Testid :  DCHIFdiag
```

If the RTS command	Do
passes	step 16
passes or fails and there are central-side busy DCHs for the posted PM	step 7
fails, and there are not central-side busy DCHs for the posted PM	step 12

PM DCH
minor (continued)

12 To load the DCH, type

>LOADPM
and press the Enter key

Example of a MAP display response:

```
Request submitted on DCH 82
DCH 82  load Failed : S00DTEMP
Failed To Open File
```

If the LOADPM command	Do
passes	step 14
fails	step 13

13 Perform the correct procedure in *Card Replacement Procedures* to change the ISDN D-channel handler card. Complete the procedure and return to this point.

14 To return the DCH to service, type

>RTS
and press the Enter key

If the RTS command	Do
passes and the DCH is in-service or in-service trouble	step 16
fails	step 15

15 Record the following information about the DCH you are working on:

- the PM type and number
- the DCH number
- the original fault reason (manual-busy)

Return to service (RTS) as many manual-busy DCHs as you can. Give all information to the next level of support.

PM DCH
minor (continued)

16 To display the next manual-busy DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another manual-busy DCH appears	step 10
`End of post set` appears	step 17

17 From the MAP display, determine if in-service trouble DCHs are present.

If in-service trouble DCHs	Do
are present	step 18
are not present	step 90

18 To post all DCHs that are in-service trouble, type

>POST ISTB
and press the Enter key

Example of a MAP display response:

```
                SysB    ManB    OffL    CBsy    ISTb    InSv
PM                 8       0      19      19       3      13
LTC                0       0       0       0       3       4

LTC     3 InSv  Links_OOS: CSide  0 , PSide  0
Unit0:   Inact InSv
Unit1:   Act   InSv

DCH                0       1       0       0       1       3
DCH  50 ISG 200 ISTb LTC   3 port  3 Overloaded
```

Note: When the system displays two or more DCHs in the posted set, the DCHs appear one at a time. The the first member of the posted set appears first.

PM DCH
minor (continued)

19 To determine the fault reason for the currently displayed DCH.

Note: The fault reason appears at the end of the line for the posted DCH. In the example at step 18, the fault reason is Overloaded.

If fault reason	Do
is congested	step 20
is `CPV`	step 22
is `DCH Chnls BSY`	step 27
is `Sparing Off`	step 37
is incorrect PEC	step 40
is `Loadname`	step 72
is `Overloaded`	step 20

20 There is a DCH provisioning problem. Record the following information about the DCH you are working on:

- the PM type and number
- the DCH number
- the fault reason obtained at step 19

Return to service as many DCHs as you can. Give all information to the level of support.

21 To display the next DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another in-service trouble DCH appears	step 19
`End of post set` appears	step 90

22 To cancel any maintenance action in progress for this DCH, type

>ABTK
and press the Enter key

PM DCH
minor (continued)

23 To manual-busy the DCH, type

>BSY
and press the Enter key

Example of a MAP display response:

```
DCH 50 Bsy Passed
```

24 To return the DCH to service, type

>RTS
and press the Enter key

Example of a MAP display response:

```
DCH 50   Out-of-service test initiated
Fail message received from PM
 Site Flr RPos  Bay_id   Shf  Description    Slot     EqPEC
 HOST  01  B02  LTEI 00   32  LTC : 003      05       BX02
DCH 50 Tst Failed Testid :  DCHIFdiag
```

If the RTS command	Do
passes	step 26
fails	step 25

25 Record the following information about the DCH you are working on:

- the PM type and number
- the DCH number
- the original fault reason (and the current fault reason if different from the original)

Clear the in-service trouble fault reasons for as many DCHs you can. Give all information to the next level of support.

PM DCH
minor (continued)

26 To display the next DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another in-service trouble DCH appears	step 19
`End of post set` appears	step 90

27 Record the DCH number and the ISG number for the posted.

Note: The DCH number appears on the right side of the DCH header on the bottom line of the MAP display. The ISG number appears on the right side of the ISG header on the bottom line of the MAP display.

Example of a MAP display response:

```
              SysB    ManB    OffL    CBsy    ISTb    InSv
PM              8       0      19      19       3      13
LTC             0       0       0       0       3       4

LTC     3 InSv  Links_OOS: CSide  0 , PSide  0
Unit0:   Inact InSv
Unit1:   Act   InSv

DCH              0       0       0       0       1       4
DCH  50 ISG 200 ISTb LTC   3 port  3 DCH CHNLS BSY
```

28 To access the ISG level of the MAP display, type

>ISG
and press the Enter key

PM DCH
minor (continued)

29 To post the ISG for the in-service trouble DCH, type

>POST isg_no
and press the Enter key

where

isg_no is the number of the ISG (0 to 255) recorded at step 27
Example of a MAP display response:

```
              SysB    ManB    OffL    CBsy    ISTb    InSv
PM               8       0      19      19       3      13
LTC              0       0       0       0       3       4

LTC     3 InSv  Links_OOS: CSide  0 , PSide  0
Unit0:   Inact InSv
Unit1:   Act   InSv
ISG                1111111111 2222222222 33
         123456789 0123456789 0123456789 01
         ......... .....OOOOO OOOO...... MM

ISG  42 DCH  50 ISTb LTC    3 port  3 DCH Chnls BSY
```

30 Determine the state of the ISG channels that associate with the DCH you are working on.

If one or more channels	Do
are manual-busy and no channels are in any other out-of-service (OOS) state	step 31
are any other OOS state	step 35

31 To return the ISG channels to service, type

>RTS ALL
and press the Enter key

If all manual–busy ISG channels	Do
return to service	step 33
did not return to service	step 32

PM DCH
minor (continued)

32 Record the state of the ISG channels.

Note: The state of the ISG channels appear on the right side of the DCH number.

33 To access the DCH level of the MAP display, type

>DCH
and press the Enter key

34 Determine the state of the DCH you are working on.

Note: The state of the DCH appears on the left side of the ISG number on the bottom line of the MAP display.

If the state of the DCH	Do
is in-service (InSv)	step 36
is other than listed here	step 35

35 Record the following information about the DCH you are working on:

- the PM type and number
- the DCH
- the original fault reason (and the current fault reason if different from the original)

Clear the in-service trouble faults reasons for as many DCHs as you can. Give all information to the next level of support.

36 To display the next DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another in-service trouble DCH appears	step 19
`End of post set` appears	step 90

PM DCH
minor (continued)

37 To turn on the sparing bit, type

>SPARING ON
and press the Enter key

Example of a MAP display response:

```
DCH 50 Enable Takeover Passed
```

If the SPARING command	Do
passes	step 39
fails	step 38

38 Record the following information about the DCH you are working on:

- the PM type and number
- the DCH number
- the original fault reason (Sparing off)

Clear the in-service trouble fault reasons for as many DCHs as you can. Give all information to the next level of support.

39 To display the next DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another in-service trouble DCH appears	step 19
`End of post set` appears	step 90

40 Determine the PEC, including PEC suffix, the DCH requires from office records or office personnel.

41 To determine the PEC entry for the DCH, type

>QUERYPM
and press the Enter key

Example of a MAP display response:

```
  Site Flr RPos  Bay_id   Shf  Description  Slot     EqPEC
  HOST  01  B02  LTEI 00   32  LTC : 000    05       BX02
Loadnames: DCHINV – EDH07BH, DCH – EDH07BH ; INTL INDEX : 1
```

Note: The PEC appears under the EqPEC header on the MAP display. In this example, the PEC entered for the DCH is NTBX02. The prefix NT is not included on the display.

42 Determine the location of the DCH.

Note: The location of the DCH appears under the Site, Flr, RPos, Bay_id and Shf headers on the MAP display.

At the XPM:

43 Locate the DCH. Record the PEC, including PEC suffix, of the DCH in the slot.

Note: The PEC and PEC suffix appear on the faceplate of the card.

At the MAP display:

44 Determine the level of the PEC mismatch.

If the PEC obtained from office personnel or office records	Do
matches the PEC entry obtained at step 41, and the PEC does not match the PEC on the faceplate of the card obtained at step 43	step 45
matches the PEC on the faceplate of the card obtained at step 43, and the PEC does not match the entered PEC obtained at step 41	step 53
does not match the PEC entry obtained at step 41, and does not match the faceplate of the card obtained at step 43	step 68

PM DCH
minor (continued)

45 To manual-busy the DCH, type

>BSY
and press the Enter key

Example of a MAP display response:

```
Services may be affected
Please confirm (”YES”, ”Y”, ”NO”, OR ”N”):
```

46 To confirm the command, type

>YES
and press the Enter key

Example of a MAP display response:

```
DCH 50 Bsy Passed
```

47 Perform the correct procedure in *Card Replacement Procedures* to replace the DCH with a DCH that has the correct PEC and suffix. Complete the procedure and return to this point.

48 To test the DCH just replaced, type

>TST
and press the Enter key

Example of a MAP display response:

```
DCH 50   Out-of-service test initiated
Fail message received from PM
 Site Flr RPos  Bay_id   Shf  Description  Slot     EqPEC
 HOST  01  B02  LTEI 00   32  LTC : 003    05       BX02
DCH 50 Tst Failed Testid :  DCHIFdiag
```

If the TST command	Do
generates a card list	step 49
does not generate a card list	step 50

49 Record the location and PEC, including PEC suffix, of the card on the list. Obtain a good card before you proceed.

Go to step 47.

PM DCH
minor (continued)

50 To load the DCH, type

>LOADPM
and press the Enter key

Example of a MAP display response:

```
Request submitted on DCH 50
DCH 50  load Failed : S00DTEMP
Failed To Open File
```

If the LOADPM command	Do
passes	step 52
fails	step 51

51 Perform the procedure Loading a PM in this document. Complete the procedure. Return to this point.

52 To return the DCH to service, type

>RTS
and press the Enter key.

Example of a MAP display response:

```
DCH 50 Out-of-service test initiated
DCH 50 Tst Passed
DCH 50 Rts Passed
```

Go to step 67.

53 Determine if the DCH is a spare.

If the DCH	Do
is a spare	step 60
is not a spare	step 54

54 Record the number of the posted DCH.

55 To post all DCHs, type

>POST ALL
and press the Enter key.

PM DCH
minor (continued)

56 To display all members of the posted set, type

>DISP ALL
and press the Enter key.

Example of a MAP display response:

```
DCH  51 ISG 203 ISTb LTC   1 port 15
DCH  91 ISG 202 ISTb LTC   1 port 17
DCH  92 spare   InSv LTC   1 port 19
```

57 Determine the number of a spare DCH from the MAP response obtained at step 56.

58 To post the DCH you worked on, type

>POST dch_no
and press the Enter key.

where

dch_no is the number of the ISTb DCH recorded at step 54

59 To switch the ISG to the spare DCH, type

>SWTCH dch_no
and press the Enter key.

where

dch_no is the number of the spare DCH recorded at step 57

60 To access table DCHINV, type

>TABLE DCHINV
and press the Enter key.

Example of a MAP display response:

```
TABLE: DCHINV
```

61 To position on the entries for the DCH, type

>POS dch_no
and press the Enter key.

where

dch_no is the number of the DCH (0 to 255) you are working on

Example of a MAP display response:

```
   50        LTC    0 BX02BA  EDH07BH    3
```

62 To change the PEC entry for the DCH to match the PEC for the installed card, type

>CHA DCHPEC
and press the Enter key.

Example of a MAP display response:

```
ENTER Y TO CONTINUE PROCESSING OR N TO QUIT
```

63 To confirm the command, type

>Y
and press the Enter key.

64 To enter the correct PEC, type

>pec
and press the Enter key.

where

pec is the PEC of the DCH recorded at step 43

Example of a MAP display response:

```
TUPLE TO BE CHANGED:
   50        LTC    0 BX02BA  EDH07BH    3
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

65 To confirm the command, type

>Y
and press the Enter key

66 To quit table DCHINV, type

>QUIT
and press the Enter key.

PM DCH
minor (continued)

67 From the MAP display, determine the state of the DCH you are working on.

Note: The state of the DCH you are working on appears on the right side of the ISG number. The ISG number appears on the bottom line of the MAP display.

If in three minutes, the state of the DCH	Do
is in-service	step 69
is other than listed here	step 68

68 Record the following information about the DCH on which you work:

- the PM type and number
- the DCH number
- the original fault reason and the current fault reason if different from the original
- cards replaced
- the PEC obtained from office records or office personnel

Clear the in-service trouble fault reasons for as many DCHs as you can. Give all important information to your next level of support.

69 To post all in-service trouble DCHs, type

>POST ISTB
and press the Enter key

If the posted set	Do
includes DCHs	step 70
does not include DCHs	step 90

70 Determine if you worked on the displayed DCH.

If you	Do
worked on the DCH and recorded the reason why the DCH is in-service trouble	step 71
did not work on the DCH	step 19

PM DCH
minor (continued)

71 To display the next DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another in-service trouble DCH appears	step 70
`End of post set` appears	step 90

72 From office records or from office personnel, determine the correct load for the DCH.

73 To determine the load entered for the DCH and the load that runs on the DCH, type

>QUERYPM
and press the Enter key

Example of a MAP display response:

```
  Site Flr RPos  Bay_id   Shf  Description Slot    EqPEC
  HOST  01  B02  LTEI 00   32  LTC : 000    05      BX02
Loadnames: DCHINV – EDH07BH, DCH – DCH01CV; INTL INDEX : 18
```

Note: The loadname datafilled for the DCH appears on the right side of the DCHINV header. The loadname running on the DCH appears on the right side of the DCH header. In this example, the loadnames are EDH07BH and DCH01CV.

PM DCH
minor (continued)

74 Determine the level of the loadname mismatch.

If the loadname from office personnel or office records	Do
matches the entry loadname obtained at step 73, and loadname does not match the name of the load on the DCH	step 75
matches the name of the load on the DCH, and the loadname does not match the entry loadname obtained at step 73	step 80
does not match the entry loadname obtained at step 73 and does not match the name of the load on the DCH	step 88

75 To manual-busy the DCH, type

>BSY
and press the Enter key

Example of a MAP display response:

```
Services may be affected
Please confirm (”YES”, ”Y”, ”NO”, OR ”N”):
```

76 To confirm the command, type

>YES
and press the Enter key

Example of a MAP display response:

```
DCH 50 Bsy Passed
```

PM DCH
minor (continued)

77 To load the DCH, type

>LOADPM
and press the Enter key

Example of a MAP display response:

```
Request submitted on DCH 50
DCH 50  load Failed : S00DTEMP
Failed To Open File
```

If the LOADPM command	Do
passes	step 79
fails	step 78

78 Perform the procedure Loading a PM. The procedure is in this document. Complete the procedure and return to this point.

79 To return the DCH to service, type

>RTS
and press the Enter key

Example of a MAP display response:

```
DCH 50 Out-of-service test initiated
DCH 50 Tst Passed
DCH 50 Rts Passed
```

Go to step 87.

80 To access table DCHINV, type

>TABLE DCHINV
and press the Enter key

Example of a MAP display response:

```
TABLE: DCHINV
```

81 To position on the entry for the DCH, type

>POS dch_no
and press the Enter key

where

dch_no is the number of the DCH (0 to 255)

Example of a MAP display response:

```
   50         LTC    3 BX02BA  EDH07BH    3
```

82 To change the loadname entry for the DCH to match the loadname that runs on the DCH, type

>CHA LOAD
and press the Enter key

Example of a MAP display response:

```
ENTER Y TO CONTINUE PROCESSING OR N TO QUIT
```

83 To confirm the command, type

>Y
and press the Enter key

84 To enter the correct DCH load name, type

>loadname
and press the Enter key

where

loadname is the loadname that runs on the DCH, recorded at step 72

Example of a MAP display response:

```
TUPLE TO BE CHANGED:
   50         LTC    0 BX02BA  EDH07BH    3
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

85 To confirm the command, type

>Y
and press the Enter key

86 To quit table DCHINV, type

>QUIT
and press the Enter key

PM DCH
minor (continued)

87 Determine the state of the DCH you are working on.

Note: The state of the DCH you are working on appears on the right side of the ISG number. The ISG number appears on the bottom line of the MAP display.

If in three minutes, the state of the DCH	Do
is in-service	step 89
is other than listed here	step 88

88 Record the following information about the DCH on which you work:

- the PM type and number
- the DCH number
- the original fault reason (Loadname)
- the load name obtained from office records or office personnel

Clear the in-service trouble fault reasons for as many DCHs as you can. Give all information to the next level of support.

89 To display the next DCH in the posted set, type

>NEXT
and press the Enter key

If	Do
another in-service trouble DCH appears	step 19
`End of post set` appears	step 90

PM DCH
minor (end)

90 Determine your next step.

If you	Do
posted all in-service PMs and worked on all in-service trouble DCHs and all DCHs are in-service	step 94
posted all in-service PMs and worked on all in-service trouble DCHs and cannot return all DCHs to service	step 93
did not post all in-service PMs	step 91

91 To quit the DCH level of the MAP display, type

>QUIT
and press the Enter key

92 To post the next PM on the list recorded at step 3, type

>POST pm_type pm_no
and press the Enter key

where

pm_type is the PM type recorded at step 3
pm_no is the PM number recorded at step 3

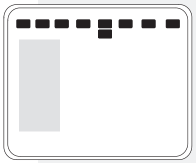
Go to step 5.

93 For additional help, contact the next level of support.

94 The procedure is complete.

PM IDT
critical

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nIDT**	.	.	.	.	.
				C					

Indication

The integrated digital terminal (IDT) alarm appears under the peripheral module (PM) header in the MAP subsystem display. This alarm indicates an alarm condition exists for an IDT.

The *n* indicates the number of IDT modules with alarms. The **C** that appears under the alarm indicates a critical alarm.

Meaning

This alarm indicates one or more S/DMS AccessNode remote digital terminals (RDT) has a critical alarm. This alarm can indicate problems with the links or message channels between the RDT and the IDT.

> ***Note:*** RDT is a generic term. The S/DMS AccessNode remote fiber terminal (RFT) is a type of RDT. In an integrated S/DMS AccessNode configuration, the name RDT always means RFT.

Impact

A critical alarm class code indicates the IDT cannot process calls.

Common procedures

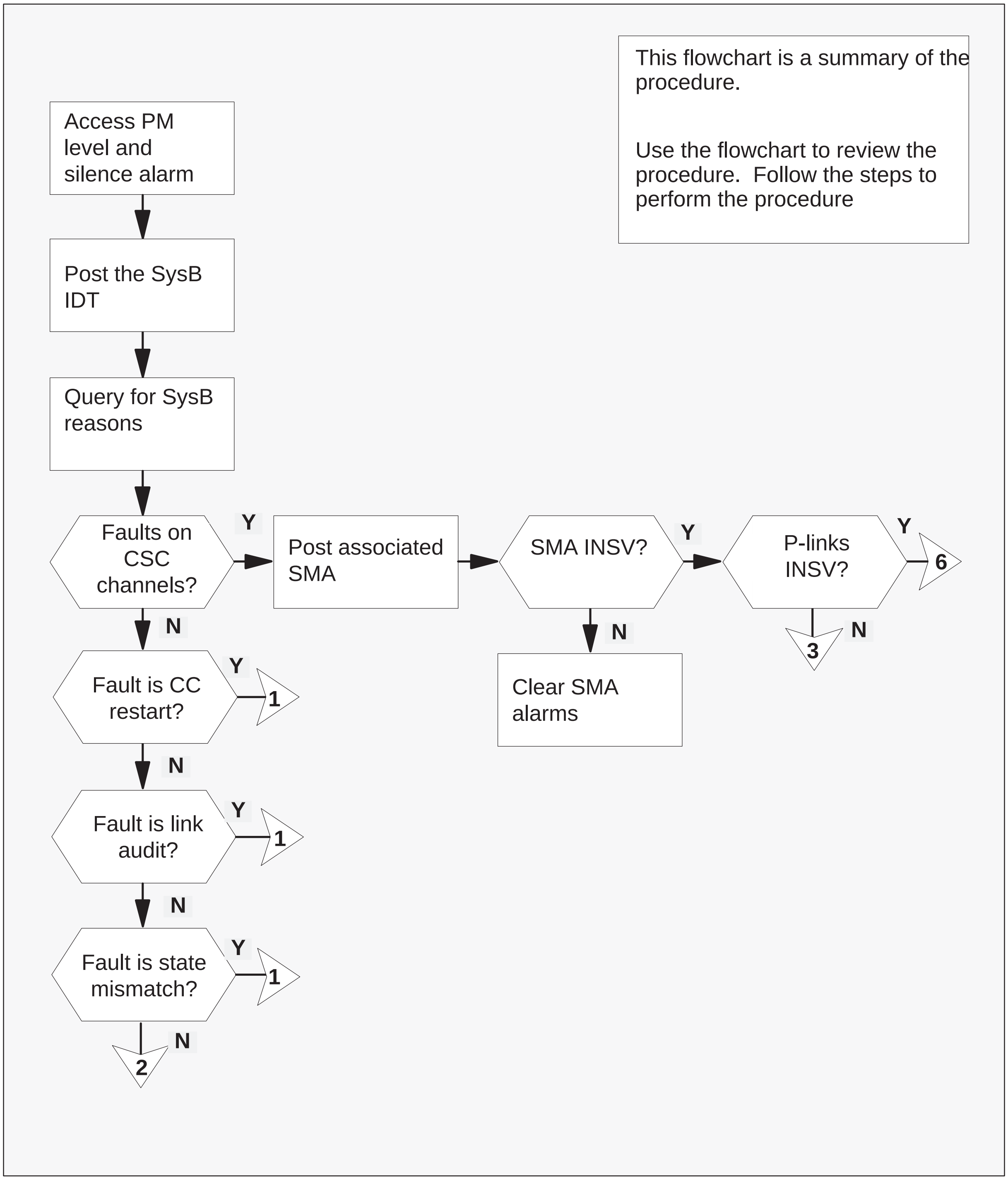
There are no common procedures.

Action

This procedure includes a summary flowchart and a series of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

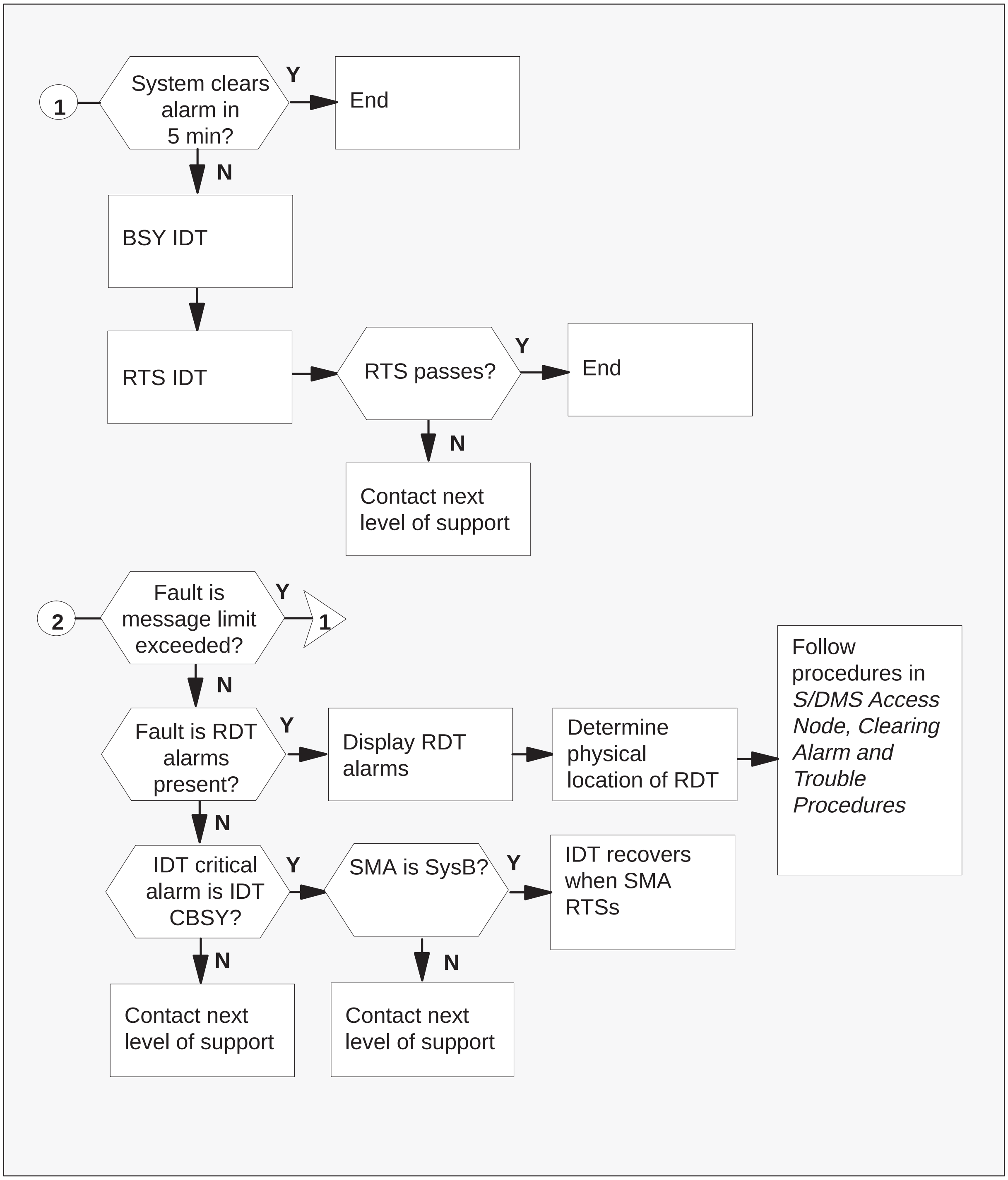
PM IDT
critical (continued)

Summary of clearing a PM IDT alarm



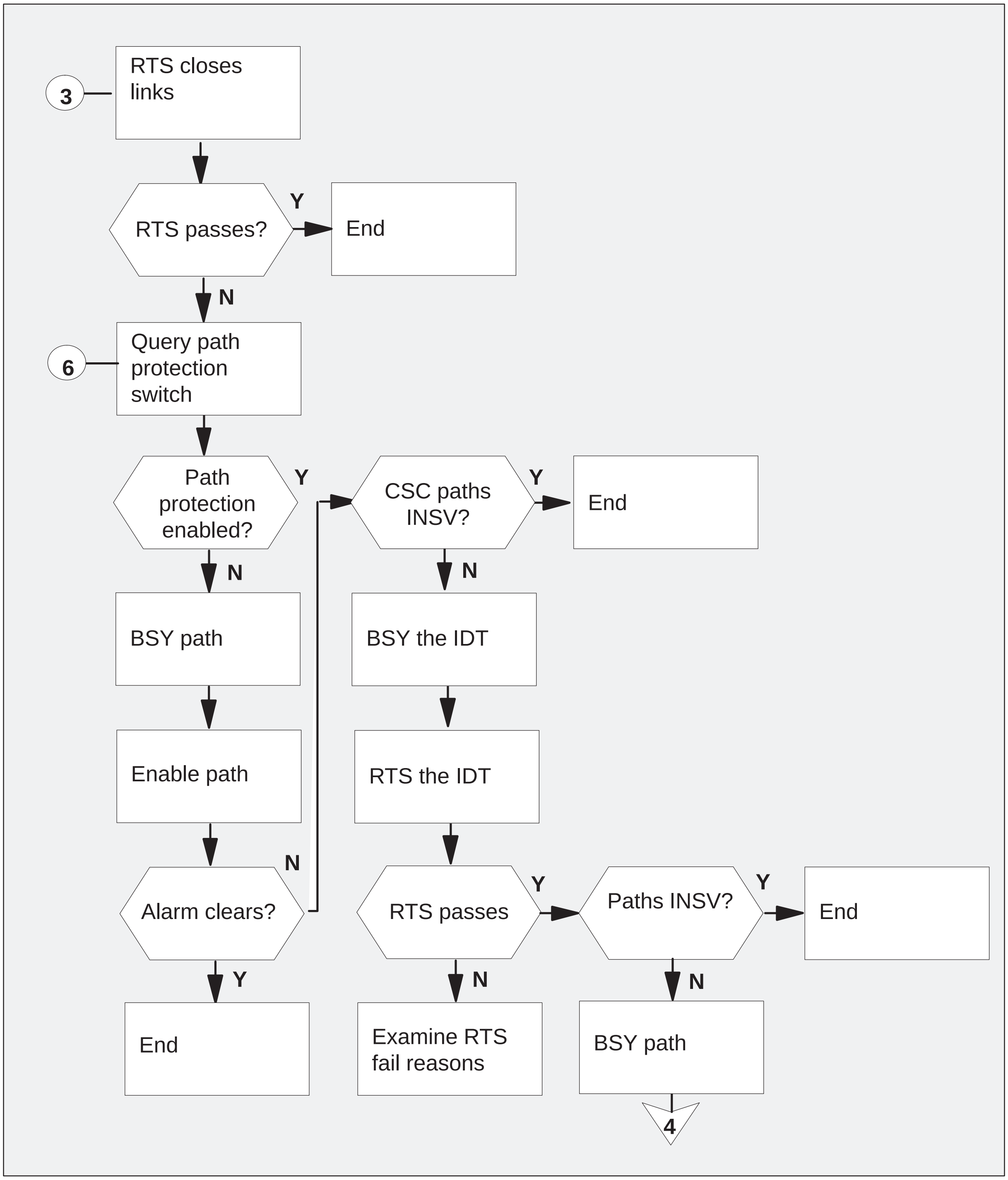
PM IDT
critical (continued)

Summary of clearing a PM IDT alarm (continued)



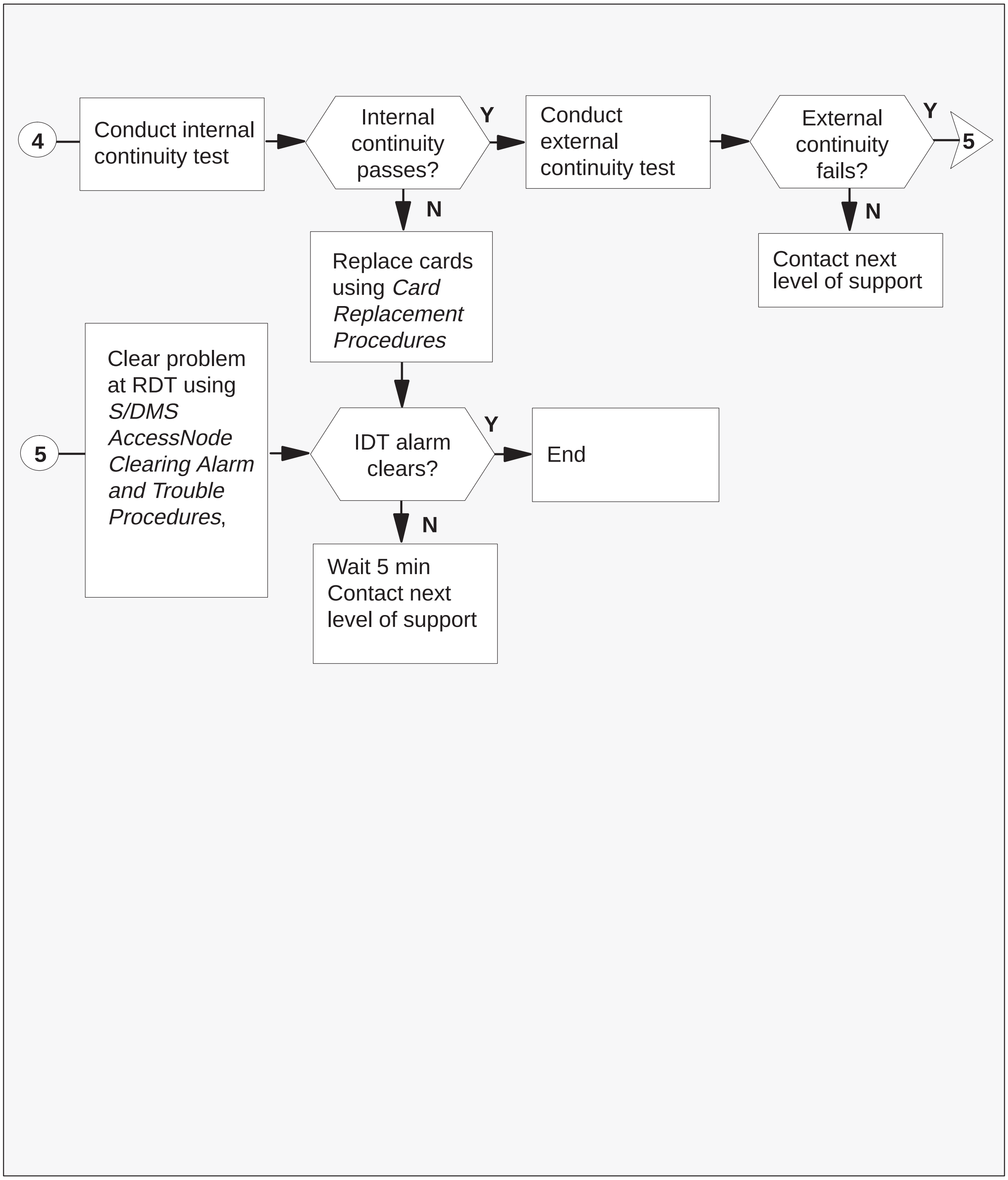
PM IDT
critical (continued)

Summary of clearing a PM IDT alarm (continued)



PM IDT
critical (continued)

Summary of clearing a PM IDT alarm (continued)



PM IDT
critical (continued)

Clearing a PM IDT critical alarm

At the MAP display

1 To access the PM level of the MAP display and silence the alarm, type:

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

2 To display the system busy (SysB) IDT, type:

>DISP STATE SYSB IDT
and press the Enter key.

Example of a MAP display response:

```
SysB IDT: 1
```

3 To access the SysB IDT, type:

>POST IDT idt_no
and press the Enter key.

where

idt_no is the number of the IDT displayed in step 2

Example of a MAP display response:

```
        SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    IDT    1     0    0     0     0     5

IDT 14 SysB  Links_OOS:  0
```

4 To check for fault indicators, type:

>QUERYPM FLT
and press the Enter key.

5 Identify the SysB message reported in step 4.

If SysB reason is	Do
fault occurred on common signaling channel (CSC) channels	step 6
central control (CC) restart	step 49
link audit	step 50
state mismatch	step 51
unsolicited message limit exceeded	step 52
RDT alarms present	step 53
no message reported IDT C-side busy (CBsy)	step 55
none of the above	step 56

6 To identify the subscriber carrier module-100 access (SMA) for the posted IDT, type:

>QUERYPM
and press the Enter key.

Example of a MAP display response:

```
PM type: IDT PM No: 14 Int. No: 7 Node No: 38
Prot–Switch: Available
SMA Name: SMA 7
RDT Name: RDT 14 0
```

PM IDT
critical (continued)

7 To post the SMA identified in step 6, type:

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA displayed in step 6
Example of a MAP display response:

```
SMA       SysB  ManB  Offl  CBsy  ISTb  InSv
    PM       3     0     1     0     2    13
    SMA    0     0     0     0     1     7

SMA 7 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

8 Verify the SMA identified in step 6 is in-service (INSV).

If SMA	Do
is INSV	step 9
is not INSV	step 10

9 Verify the peripheral-side (P-side) links that appear in step 7 are INSV.

If P-side links	Do
are INSV	step 16
are not INSV	step 11

10 SMA alarms are present. To clear the SMA alarms, use SMA *Alarm Clearing Procedures*, and return to this point.

If IDT critical	Do
clears	step 57
does not clear	step 11

11 To display information about the P-side message links, type:

>TRNSL MSG P
and press the Enter key.

Example of a MAP display response:

```
Link 0: IDT 3  0;Cap; MS:Status:OK   ;MsgCond;OPN
Link 1: IDT 3  1;Cap; MS:Status:OK   ;MsgCond;OPN
Link 7: IDT 14 0;Cap; MS:Status:OK   ;MsgCond;OPN
Link 8: IDT 14 1;Cap; MS:Status:OK ,P;MsgCond;CLS
```

If message links	Do
CLS	step 12
OPN	step 15

12 To return-to-service (RTS) the closed link, type:

>BSY LINK link_no
and press the Enter key

where

link_no is the number of the closed link in step 11

13 To RTS the closed link, type:

>RTS LINK link_no
and press the Enter key.

where

link_no is the number of the closed link in step 11

If the RTS command	Do
passes	step 15
fails	step 14

14 SMA alarms are present. To clear the SMA alarms, use SMA *Alarm Clearing Procedures* and return to this point.

PM IDT
critical (continued)

15 Determine if the IDT alarm cleared.

If IDT critical	Do
cleared	step 57
did not clear	step 16

16 To post the SysB IDT, type:

>POST IDT idt_no
and press the Enter key.

where

idt_no is the number of the IDT displayed in step 2
Example of a MAP display response:

```
        SysB  ManB  Offl  CBsy  ISTb  InSv
PM        3     0     1     0     2    13
IDT       1     0     0     0     0     5

IDT 14 SysB  Links_OOS:  0
```

17 To display information about the state of the channels between the IDT and the RDT, type:

>PPS QUERY
and press the Enter key.

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
CSC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

18 Determine if path protection is active for all channels.

If	Do
one or both CSC channels are inhibited	step 19
one or both CSC channels are active	step 21

PM IDT
critical (continued)

19 To activate path protection on an inhibited CSC or embedded operation channel (EOC) message channel, type:

>PPS ENA path
and press the Enter key.

where

path is the inhibited CSC1, CSC2, EOC1, or EOC2

20 Repeat step 19 for each channel that is inhibited.

21 Determine if the CSC message channels are INSV.

If CSC channels	Do
are INSV	step 28
are out-of-service (OOS)	step 22

22 To busy (BSY) the IDT, type:

>BSY
and press the Enter key.

where

idt_no is the IDT experiencing the fault

23 To RTS the IDT, type:

>RTS
and press the Enter key.

where

idt_no is IDT busied in step 22

If the RTS command	Do
passes	step 25
fails	step 24

24 Examine RTS fail reasons.

PM IDT
critical (continued)

25 Determine if the IDT alarm cleared.

If IDT critical	Do
cleared	step 57
did not clear	step 26

26 To display information about the state of the channels between the IDT and the RDT, type:

>PPS QUERY
and press the Enter key.

Example of a MAP display response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
CSC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

27 Determine if the channels are INSV.

If CSC and EOC channels	Do
are INSV	step 57
are OOS	step 28

28 To BSY the channel that has faults, type:

>BSY path
and press the Enter key.

where

path is CSC1, CSC2, EOC1, or EOC2 that has faults

29 To return the channel that has faults to service, type:

>RTS path
and press the Enter key.

where

path   is CSC1, CSC2, EOC1, or EOC2 that has faults

If the RTS command	Do
passes	step 30
fails	step 31

30 Determine if the IDT alarm cleared.

If IDT critical	Do
cleared	step 57
did not clear	step 31

31 To BSY the channel that has faults, type:

>BSY path
and press the Enter key.

where

path   is CSC1, CSC2, EOC1, or EOC2 that has faults

32 To test the channel that has faults for internal continuity, type:

>CONT path INT
and press the Enter key.

where

path   is CSC1, CSC2, EOC1, or EOC2 that has faults

If CONT path INT	Do
passes	step 44
fails	step 33

PM IDT
critical (continued)

33 To post the SMA for the IDT that has a critical alarm, type:

>POST SMA sma_no
and press the Enter key.

where

sma_no   is the number of the SMA

34 To BSY the inactive unit, type:

>BSY UNIT unit_no
and press the Enter key.

where

unit_no   is the number of the inactive unit

35 To test the inactive unit, type:

>TST UNIT unit_no
and press the Enter key.

where

unit_no   is the number of the inactive unit

If test	**Do**
passes	step 41
fails	step 36

36 Determine if card list appears.

If card list	**Do**
appears	step 37
does not appear	step 56

37 Check the card list that displays at the MAP terminal.

Example of a MAP display response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    16  BX01
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

38 To replace the cards on the list go to *Card Replacement Procedures* and return to this point.

39 To load the inactive SMA unit, type:

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit busied in step 34

If load	Do
passes	step 40
fails	step 56

40 To test the inactive SMA unit, type:

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit loaded in step 39

If TST	Do
passes	step 41
fails	step 56

41 To return the inactive unit to service, type:

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If RTS	Do
passes	step 42
fails	step 56

PM IDT
critical (continued)

42 To post the IDT, type:

>POST IDT idt_no
and press the Enter key.

where

idt_no is the IDT with the fault

43 To RTS the defective channel, type:

>RTS path
and press the Enter key

where

path is the busied CSC1, CSC2, EOC1, or EOC2

Go to step 57.

44 To post the IDT, type:

>POST IDT idt_no
and press the Enter key.

where

idt_no is the IDT with the fault

45 To RTS the channel with the fault, type:

>RTS path
and press the Enter key.

where

path is the busied CSC1, CSC2, EOC1, or EOC2

46 Set up a loopback path at the S/DMS AccessNode fiber central office terminal (FCOT) to prepare for an external continuity test. Refer to procedure Setting or releasing a loopback on a DS-1 facility, in *S/DMS AccessNode Provisioning and Operations Procedures*.

PM IDT
critical (continued)

47 To test the active CSC channel that has faults for external continuity, type:

>CONT path EXT
and press the Enter key.

where

path is the busied CSC1, CSC2, EOC1, or EOC2

Note: Conduct the external continuity test on an active path.

If CONT	Do
fails	step 48
passes	step 56

48 The problem is at the S/DMS AccessNode. Go to *S/DMS ClearAccessNode Alarm and Trouble Clearing Procedures,* for information on how to clear the problem. Return to this point.

Go to step 57.

49 Monitor the alarm. System action can correct the alarm condition. This message occurs when the CC unit starts again.

If after 15 min	Do
alarm clears	step 57
alarm does not clear	step 56

50 Monitor the alarm. System action can correct the alarm condition. This message occurs when message links on an INSV IDT go OOS.

If after 15 min	Do
alarm clears	step 57
alarm does not clear	step 56

PM IDT
critical (continued)

51 Monitor the alarm. System action can correct the alarm condition. This message occurs when the state of the IDT in the SMA does not match the state of the IDT in the switch.

If after 15 min	Do
alarm clears	step 57
alarm does not clear	step 56

52 Monitor the alarm. System action can correct the alarm condition. This message occurs when the SMAs internal maintenance component sends more than 100 messages during a 10 min time period.

If after 15 min	Do
alarm clears	step 57
alarm does not clear	step 56

53 To determine the number and type of critical RDT alarms, type:

>RDTALARM
and press the Enter key.

Example of a MAP display response:

```
RDTalarm
RDT Name:  RDT 1 03 0
Network Element:  3 RALEIGH_AMEX_B13

ACTIVE ALARMS :  Fac     Eqp   Env    Sfw    Svc
-----------------------------------------------------
Critical      :  2       0     0      0      0
Major         :  0       0     0      0      0
Minor         :  0       0     0      0      0
Warning       :  0       0     0      0      0
```

54 To correct the fault conditions at the RDT identified in step 53 , use *S/DMS Clear AccessNode Alarm and Trouble Clearing Procedures*. The IDT INSV problem indication stops after the alarm clears at the RDT.

Go to step 57.

PM IDT
critical (end)

55 The SMA is SysB. The IDT returns to an INSV condition from the CBSY condition when the SMA RTSs. To correct the problem on the SMA, refer to the following procedures in this document:

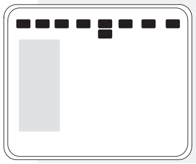
- SMA critical alarm clearing procedures
- SMA major alarm clearing procedures
- SMA minor alarm clearing procedures

56 For additional help, contact the next level of support.

57 The procedure is complete.

PM IDT major

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nIDT**	.	.	.	.	.
				M					

Indication

The integrated digital terminal (IDT) alarm code appears under the PM header in the MAP subsystem display. This code indicates that an alarm condition is present in the IDT. The symbol *n* indicates the number of IDT modules with alarms. The *M* that appears below the alarm indicates the alarm class is major.

Meaning

The alarm indicates a fault with messaging channels between the remote digital terminal (RDT) and the IDT. This alarm can also indicate RDT alarms.

Note: Remote digital terminal (RDT) is a generic term. The S/DMS AccessNode remote fiber terminal (RFT) is a specific type of RDT. In an integrated S/DMS AccessNode configuration, the term RDT always means RFT.

Result

A major alarm class code indicates the IDT has an in-service trouble (ISTb) condition. The IDT continues to process calls, but a fault condition that can affect service is present in the system. To reduce the effect on subscriber service, isolate and correct the fault condition as directed by the procedure that follows.

Common procedures

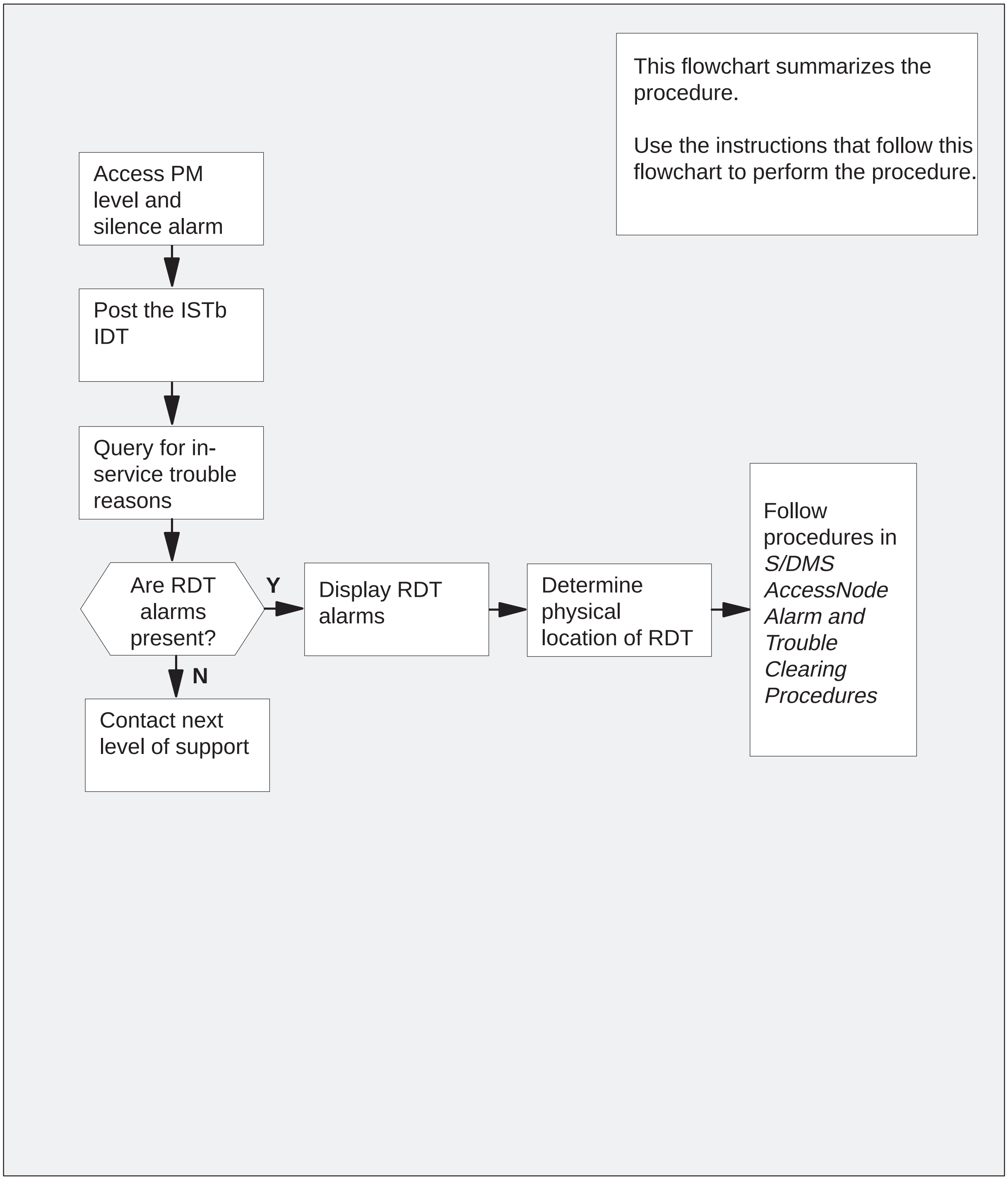
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM IDT
major (continued)

Summary of clearing a PM IDT alarm



PM IDT
major (continued)

Clearing a PM IDT alarm

At the MAP display:

1 When the system detects a fault the system triggers an audible alarm. To access the PM level of the MAP and silence the alarm, type

>MAPCI;MTC;PM;SIL
and press the Enter key

2 To display the in-service trouble IDT, type

>DISP STATE ISTB IDT
and press the Enter key

Example of a MAP response:

```
ISTb IDT: 1
```

3 To access the in-service trouble IDT, type

>POST IDT idt_no
and press the Enter key

where

idt_no   is the displayed IDT number

Example of a MAP response:

```
        SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    IDT    0     0    0     0     1     5

IDT 14 ISTb  Links_OOS:  0
```

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key

5 Identify the in-service trouble message reported.

If in-service trouble reason	Do
is RDT alarms present	step 6
is not RDT alarms present	step 8

PM IDT
major (end)

6 To determine the number and cause of the alarms, type

>RDTALARM
and press the Enter key

Example of a MAP response:

```
RDTalarm
RDT Name:  RDT 1 03 0
Network Element:  3 RALEIGH_AMEX_B13

ACTIVE ALARMS :  Fac     Eqp   Env    Sfw    Svc
-----------------------------------------------------
Critical      :  2       0     0      0      0
Major         :  0       0     0      0      0
Minor         :  0       0     0      0      0
Warning       :  0       0     0      0      0
```

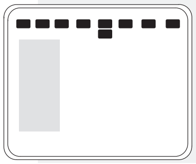
7 Correct the fault conditions at the RDT. Use the *S/DMS AccessNode Alarm and Trouble Clearing Procedures*. The system will cancel the IDT in-service trouble indication after the alarm clears at the RDT.

8 For additional help, contact the next level of support.

9 This procedure is complete.

PM IDT minor

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nIDT**	.	.	.	.	.

Indication

The integrated digital terminal (IDT) alarm code appears under the PM header in the MAP subsystem display. This alarm code indicates that an alarm condition is present in the IDT. The *n* indicates the number of IDT modules with alarms. The blank that appears under the alarm indicates the alarm class is minor.

Meaning

This alarm normally indicates a problem with messaging channels between the remote digital terminal (RDT) and the IDT. This alarm can also indicate RDT alarms.

Note: Remote digital terminal (RDT) is a generic term. The S/DMS AccessNode remote fiber terminal (RFT) is a type of RDT. In an integrated S/DMS AccessNode configuration, the term RDT refers to an RFT.

Result

A minor alarm class code indicates the IDT has an in-service trouble (ISTb) condition. The IDT continues to process calls. A fault condition that affects service is present. To reduce the potential effect on subscriber service, isolate the fault condition. Correct the fault condition as directed in the following procedure.

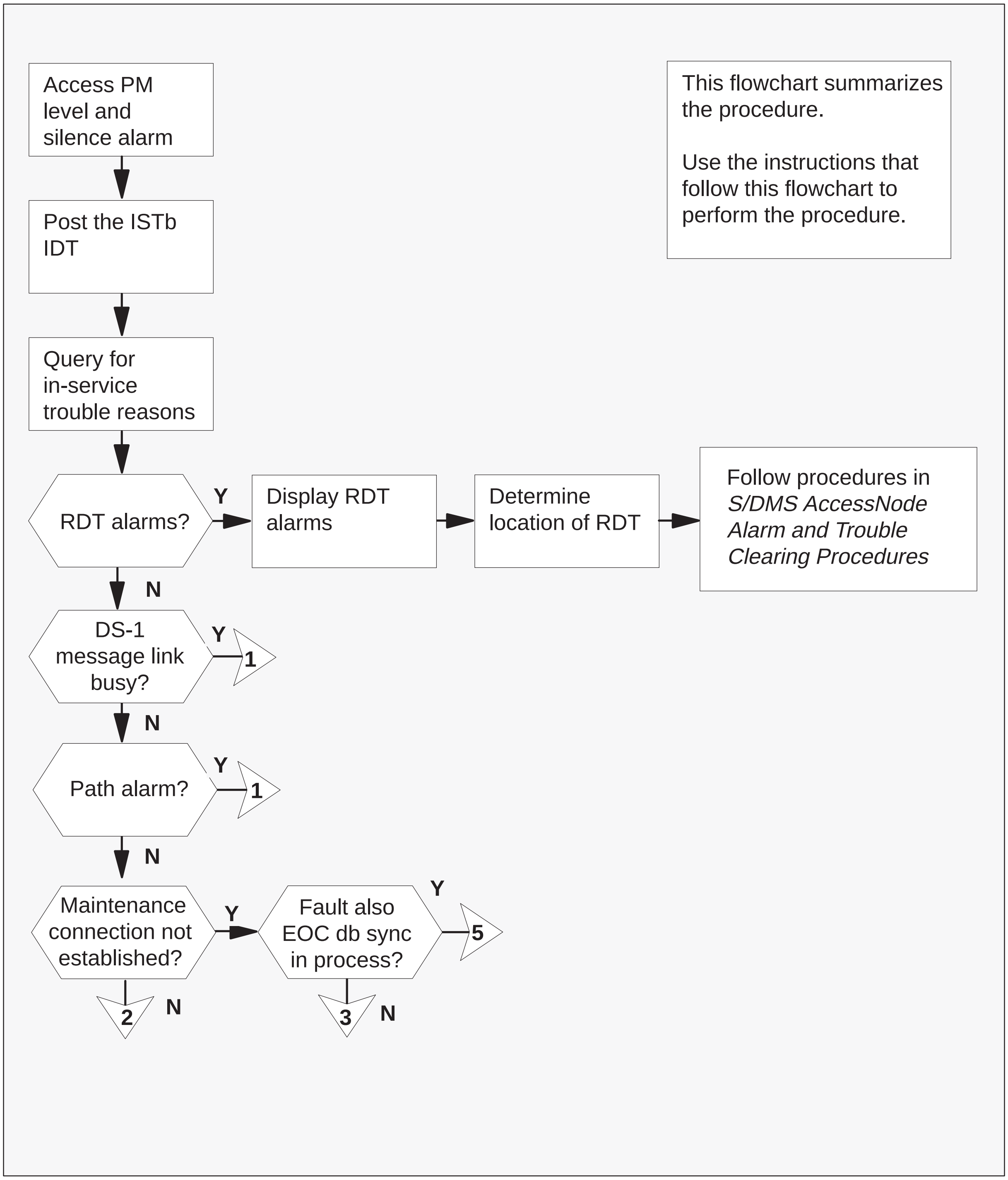
Common procedures

There are no common procedures.

Action

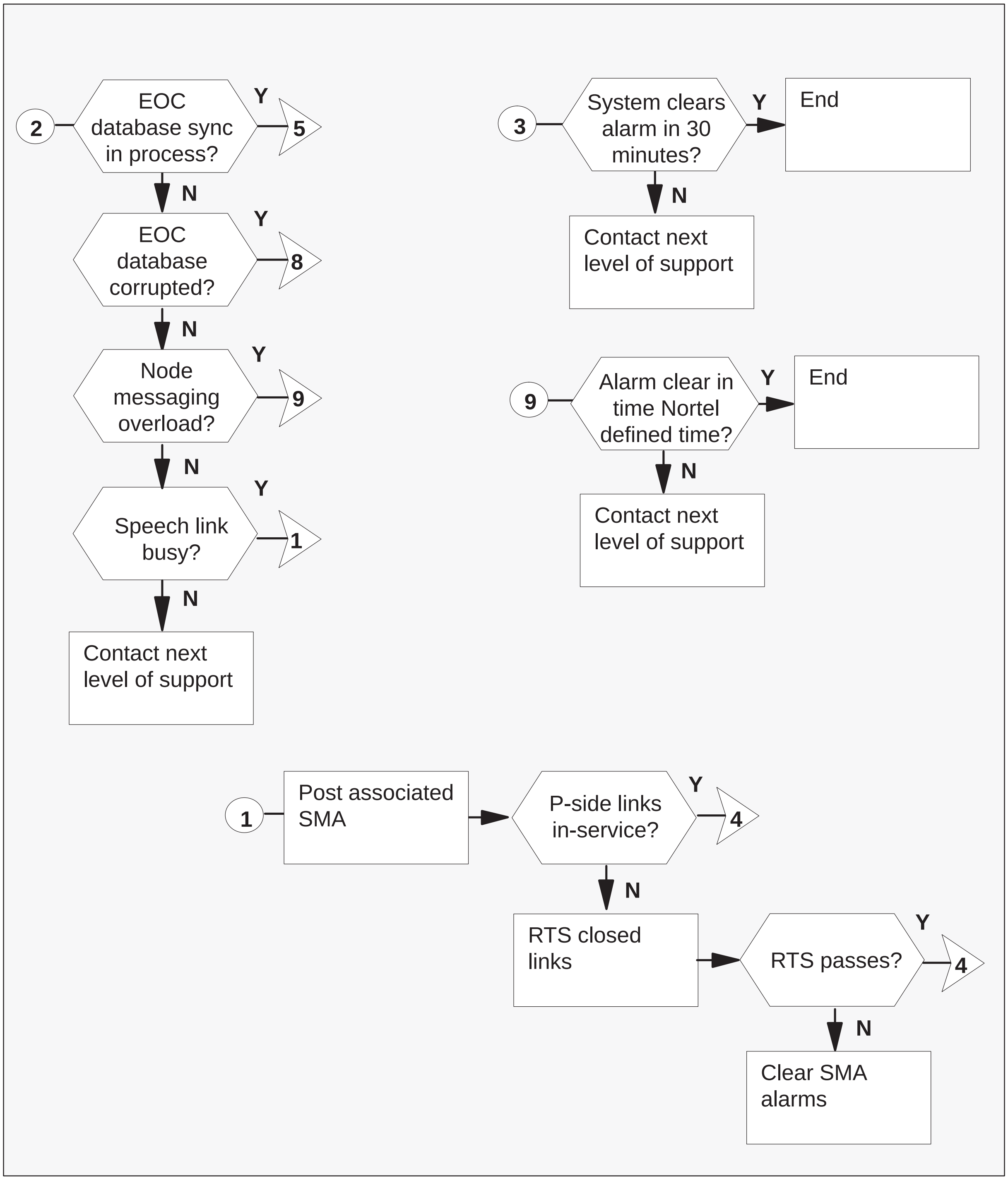
The following flowchart is a summary of the procedure. Use the instructions in the procedure to clear the alarm.

Summary of clearing a PM IDT alarm



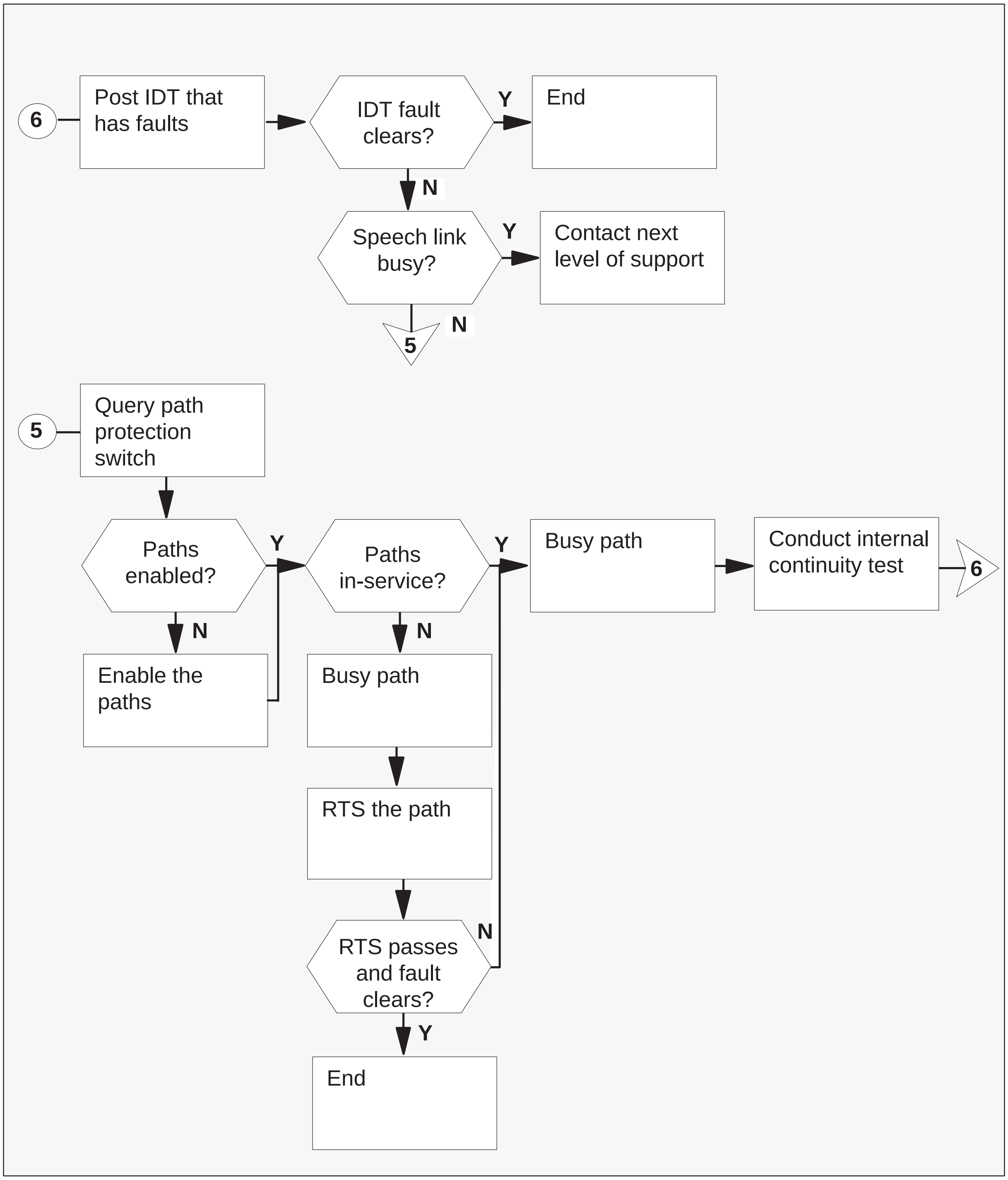
PM IDT
minor (continued)

Summary of clearing a PM IDT alarm (continued)



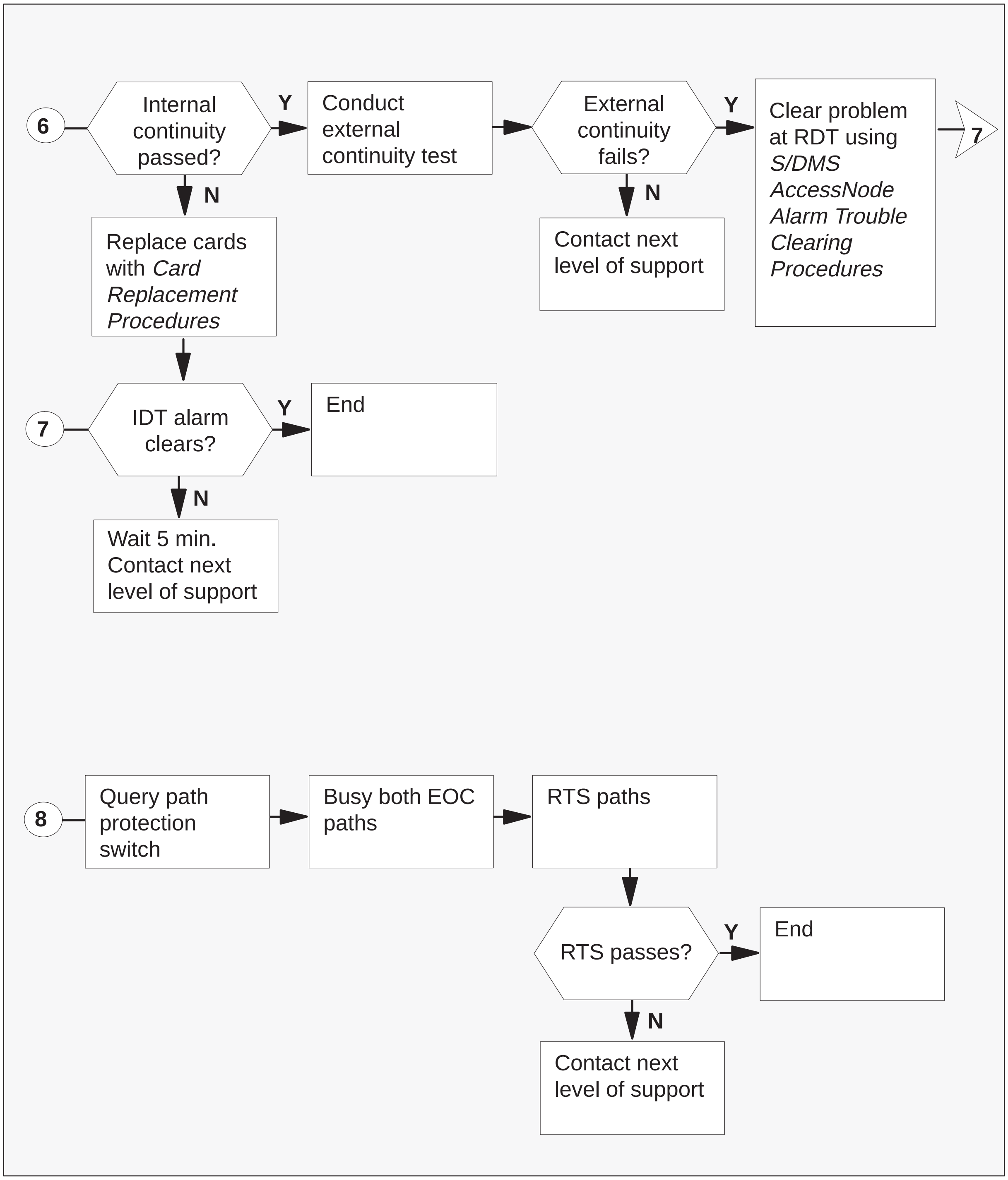
PM IDT
minor (continued)

Summary of clearing a PM IDT alarm (continued)



PM IDT
minor (continued)

Summary of clearing a PM IDT alarm (continued)



PM IDT
minor (continued)

Clearing a PM IDT alarm

At the MAP terminal

1 When the system detects a fault, the system can trigger an audible alarm. Access the PM level of the MAP display. To silence the alarm, type

>MAPCI;MTC;PM;SIL
and press the Enter key

2 To display the in-service trouble IDT, type

>DISP STATE ISTB IDT
and press the Enter key

Example of a MAP response:

```
ISTb IDT: 1
```

3 To access the in-service trouble IDT, type

>POST IDT idt_no
and press the Enter key

where

idt_no is the number of the IDT displayed in step 2

Example of a MAP response:

```
        SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0     1     0     2    13
    IDT    0     0     0     0     1     5

IDT 14 ISTb  Links_OOS:  2
```

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key

PM IDT
minor (continued)

5 Identify the in-service trouble message reported in step 4.

If system-busy reason	Do
is speech link busy	step 6
is DS-1 message link busy	step 6
is path alarm	step 6
is maintenance connection not established	step 43
is embedded operation channel (EOC) database synchronization in progress	step 70
is EOC database corrupted	step 71
is common signaling channel (CSC) peripheral-side (P-side) node messaging overload	step 76
is EOC P-side node messaging overload	step 76
is P-side node messaging system overload on SMA	step 76
is RDT alarms present	step 78

6 To identify the SMA associated with the posted IDT, type

>QUERYPM
and press the Enter key

Example of a MAP response:

```
PM type: IDT PM No: 14 Int. No: 7 Node No: 38
Prot–Switch: Available
SMA Name: SMA 7
RDT Name: RDT 14 0
```

7 To post the SMA identified in step 6, type

>POST SMA sma_no
and press the Enter key

where

sma_no is the number of the SMA displayed in step 6
Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    SMA    0     0    0     0     1     7

SMA 7 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

8 To verify the SMA P-side links are in-service (InSv), type

>TRNSL P
and press the Enter key

Example of a MAP response:

```
Link 1 IDT 17  0;Cap MS;Status:OK ,P;MsgCond;OPN
Link 2 IDT 17  1;Cap MS;Status:OK ,P;MsgCond;OPN
Link 3 IDT 17  2;Cap  S;Status:OK ,P;
Link 4 IDT 17  3;Cap  S;Status:SysB
```

If P-side links	Do
are in-service	step 16
are not in-service	step 9

9 To busy the system-busy link, type

>BSY LINK link_no
and press the Enter key

where

link_no is the number of the system-busy link displayed in step 8

PM IDT
minor (continued)

10 To test the busied link, type

>TST LINK link_no
and press the Enter key

where

link_no is the number of the link busied in step 9

If test	Do
passes	step 13
fails	step 11

11 Check the card list that appears at the MAP display.

Example of a MAP response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    12  AX74
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

If you	Do
replaced all the cards	step 80
did not replace all the card	step 12

12 Refer to the *Card Replacement Procedures* in this document for the next card on the list. Return to this point.

13 To return the link to service, type

>RTS LINK link_no
and press the Enter key

Go to the next step.

14 To access the in-service trouble IDT, type

>POST IDT idt_no
and press the Enter key

where

idt_no   is the number of the IDT that appears in step 3
Example of a MAP response:

```
       SysB  ManB  Offl  CBsy  ISTb  InSv
  PM     3     0    1     0     2    13
  IDT    0     0    0     0     1     5

IDT 14 ISTb  Links_OOS:  2
```

15 To determine if the IDT alarm cleared, type

>QUERYPM FLT
and press the Enter key

If the	Do
speech link busy did not clear	step 80
DS-1 message link busy or path alarm did not clear	step 17
speech link busy, DS-1 message link busy, or path alarm cleared	step 81

16 To post the in-service trouble IDT, type

>POST IDT idt_no
and press the Enter key.

where

idt_no   is the number of the IDT displayed in step 2

```
       SysB  ManB  Offl  CBsy  ISTb  InSv
  PM     3     0    1     0     2    13
  IDT    0     0    0     0     1     5

IDT 14 ISTb  Links_OOS:  2
```

PM IDT
minor (continued)

17 For information about the state of the message channels between the IDT and the RDT, type

>PPS QUERY
and press the Enter key.

Example of a MAP response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
CSC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

If any channels	Do
are inhibited	step 18
are enabled	step 25

18 To enable path protection on a disabled CSC message channel, type

>PPS ENA path
and press the Enter key

where

path is CSC1, CSC2, EOC1, or EOC2

19 Repeat step 18 for all disabled channels.

20 Determine if the message channels are in-service.

If channels	Do
are in-service	step 24
are out-of-service (OOS)	step 21

21 To busy the out-of-service message channel, type

>BSY path
where

path is CSC1, CSC2, EOC1, or EOC2

PM IDT
minor (continued)

22 To return to service (RTS) the busied CSC channels, type

>RTS path
and press the Enter key.

where

path   is CSC1, CSC2, EOC1, or EOC2

If RTS	Do
passes	step 24
fails	step 26

23 Repeat steps 21 and 22 for all out-of-service channels.

24 Determine if an active CSC and EOC message channel is present.

If a channel	Do
is active	step 25
is not active	step 26

25 To determine if the DS-1 message path alarm cleared, type

>QUERYPM FLT

If alarm	Do
cleared	step 81
did not clear	step 50

26 To busy the channel that has faults, type

>BSY path
and press the Enter key.

where

path   is defective CSC1 or CSC2

PM IDT
minor (continued)

27 To test the CSC channel that has faults for internal continuity, type

>CONT path INT
and press the Enter key.

where

path is CSC1 or CSC2 busied in step 26

If CONT	Do
passes	step 39
fails	step 28

28 To post the SMA associated with the IDT that has a minor alarm, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA

29 To busy the inactive unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

30 To test the inactive unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If test	Do
passes	step 80
fails	step 31

31 Determine if the system generates a card list.

If the system	Do
generates a card list	step 32
does not generate a card list	step 80

32 Check the card list displayed at the MAP display.

Example of a MAP response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    16  BX01
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

33 Go to *Card Replacement Procedures* in this document to replace the cards on the list. Return to this point.

34 To load the inactive SMA unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit busied in step 29

If load	Do
passes	step 35
fails	step 80

35 To test the inactive SMA unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit loaded in step 34

If TST	Do
passed	step 36
failed	step 80

PM IDT
minor (continued)

36 To return the inactive SMA unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit tested in step 35

If RTS	Do
passes	step 37
fails	step 80

37 To post the in-service trouble IDT posted in step 26, type

>POST IDT idt_no
and press the Enter key.

where

idt_no is the number of the IDT displayed in step 16

38 To return-to-service (RTS) the busied channel, type

>RTS path
and press the Enter key.

where

path is CSC 1 or CSC2 identified in step 26
Go to step 81.

39 To return-to-service the channel that has faults, type

>RTS path
and press the Enter key.

where

path is CSC1 or CSC2 identified in step 26

40 Set up a loopback path at the S/DMS AccessNode fiber central office terminal (FCOT) to prepare for an external continuity test. Refer to the procedure Setting or releasing a loopback on a DS-1 facility. This procedure is in *S/DMS AccessNode Provisioning and Operations Procedures*.

41 To test the active CSC channel that has faults for external continuity, type

>CONT path EXT
and press the Enter key.

where

path is CSC1 or CSC2 identified in step 26

Note: Conduct the external continuity test on an active path.

If CONT	Do
passes	step 42
fails	step 80

42 The problem is at the S/DMS AccessNode. Refer to *S/DMS AccessNode Alarm and Trouble Clearing Procedures* for instructions on how to identify and correct the problem. Return to this point.

Go to step 81.

43 To post the IDT that has faults, type

>POST IDT idt_no
and press the Enter key.

where

idt_no is the number of the IDT that has faults

44 For information on the state of the message channels between the IDT and the RDT, type

>PPS QUERY
and press the Enter key.

Example of a MAP response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active;Enable
CSC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

If any channels	Do
are inhibited	step 45
are enabled	step 47

PM IDT
minor (continued)

45 To enable path protection on a disabled CSC message channel, type

>PPS ENA path
and press the Enter key.

where

path is CSC1, CSC2, EOC1, or EOC2

46 Repeat step 45 for all disabled channels.

47 Determine if the message channels are in-service.

If	Do
an EOC is out-of-service	step 48
both EOCs are in-service and one EOC is in-service and active	step 50

48 To busy EOC channel, type

>BSY path
and press the Enter key.

where

path is EOC1 or EOC2

49 To busy one EOC channel, type

>RTS path
and press the Enter key.

where

path is EOC1 or EOC2

If RTS	Do
passes	step 50
fails	step 52

PM IDT
minor (continued)

50 Wait 5 min to establish the maintenance connection again.

If the system	Do
establishes the connection again	step 81
does not establish the connection again	step 51

51 Determine if the maintenance path not established alarm cleared

>QUERYPM FLT
and press the Enter key.

If alarm	Do
cleared	step 81
did not clear	step 52

52 To busy the EOC channel, type

>BSY path
and press the Enter key.

where

path is EOC1 or EOC2 that has faults

53 To test the EOC channel that has faults for internal continuity, type

>CONT path INT
and press the Enter key.

where

path is EOC1 or EOC2

If CONT	Do
passes	step 66
fails	step 54

PM IDT
minor (continued)

54 To post the SMA associated with the IDT that has the minor alarm, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA

55 To busy the inactive unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

56 To test the inactive unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If test	Do
passes	step 80
fails	step 57

57 Determine if the system generates a card list.

If the system	Do
generates a card list	step 58
does not generate a card list	step 80

58 Check the card list that appears.

Example of a MAP response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    16  BX01
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

PM IDT
minor (continued)

59 Refer to the *Card Replacement Procedures* in this document to replace the cards on the list. Return to this point.

60 To load the inactive SMA unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit busied in step 55

If load	Do
passes	step 61
fails	step 80

61 To test the inactive SMA unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SMA unit loaded in step 60

If TST	Do
passes	step 62
fails	step 80

62 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If RTS	Do
passes	step 63
fails	step 80

PM IDT
minor (continued)

63 To post the IDT that has faults, type

>POST IDT idt_no
and press the Enter key.

where

idt_no is the number of the IDT posted in step 43
Example of a MAP response:

```
        SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    IDT    0     0    0     0     1     5

IDT 14 ISTb  Links_OOS:  2
```

64 For information about the state of the message channels between the IDT and the RDT, type

>PPS QUERY
and press the Enter key.

Example of a MAP response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
CSC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

65 To return to service the EOC that has faults, type

>RTS path
and press the Enter key.

where

path is the busied EOC1 or EOC2

Go to step 81.

66 To RTS the CSC that has faults, type

>RTS path
and press the Enter key.

where

path is the busied EOC1 or EOC2

67 Set up a loopback path at the S/DMS AccessNode fiber central office terminal (FCOT) to prepare for an external continuity test. Refer to the procedure Setting or releasing a loopback on a DS-1 facility. This procedure is in *S/DMS AccessNode Provisioning and Operations Procedures*.

PM IDT
minor (continued)

68 To test the active CSC channel that has faults for external continuity, type

>CONT path EXT
and press the Enter key.

where

path   is the busied CSC1 or CSC2

If CONT	Do
fails	step 69
passes	step 80

69 The problem is at the S/DMS AccessNode. Refer to *S/DMS AccessNode Alarm and Trouble Clearing Procedures* for instructions on how to identify and correct the problem. Return to this point.

Go to step 81.

70 Wait 30 min. During the 30 min span of time, the system conducts two audits. The audits attempt to synchronize the databases.

If alarm condition	Do
clears	step 81
does not clear	step 80

71 To busy one EOC channel, type

>BSY path
and press the Enter key.

where

path   is EOC1 or EOC2

72 To busy the other EOC channel, type

>BSY path
and press the Enter key.

where

path   is EOC1 or EOC2 and not the EOC busied in step 71

PM IDT
minor (continued)

73 To return-to-service the EOC busied in step 71, type

>RTS path
and press the Enter key.

where

path   is EOC1 or EOC2 busied in step 71

74 To return-to-service the EOC busied in step 72, type

>RTS path
and press the Enter key.

where

path   is EOC1 or EOC2 busied in step 72

If RTS	Do
passes	step 75
fails	step 80

75 Wait for a maximum of 30 min. The system displays the following message:
`EOC synchronization in progress.`

If alarm condition	Do
clears	step 81
does not clear	step 80

76 Wait until overload conditions clear. Refer to the local operating procedures for the required length of time to wait.

If overload conditions	Do
clear within time frame	step 81
do not clear within time frame	step 77

77 An engineering problem on the RDT can cause the congestion.

Go to step 80.

PM IDT
minor (end)

78 To determine the number and type of the alarms, type

>RDTALARM
and press the Enter key.

Example of a MAP response:

```
RDTalarm
RDT Name:  RDT 1 03 0
Network Element:  3 RALEIGH_AMEX_B13

ACTIVE ALARMS :  Fac     Eqp   Env    Sfw    Svc
-----------------------------------------------------
Critical      :  2       0     0      0      0
Major         :  0       0     0      0      0
Minor         :  0       0     0      0      0
Warning       :  0       0     0      0      0
```

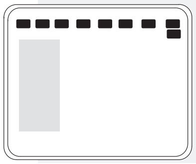
79 Correct the fault conditions at the RDT identified in step 78 and *S/DMS AccessNode Alarm and Trouble Clearing Procedures*. The system retires the IDT in-service trouble indication after the alarm clears at the RDT.

80 For additional help, contact the next level of support.

81 The procedure is complete.

Appl OSIstk critical

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	.	.	.	.	.	**OSIstk**
									C

Indication

The abbreviation for an Open Systems Interconnect (OSI) stack alarm appears under the Appl header in the MAP subsystem display. This alarm indicates that an alarm condition exists with the OSI stack. The *C* appearing under the alarm indicates the alarm class is critical.

Meaning

This alarm indicates a condition in which the DMS switch can not communicate maintenance and provisioning information to the S/DMS AccessNode over the embedded operation channel (EOC) because of a problem with the OSI communications protocol stack. This alarm does not indicate a failure in call processing capabilities.

> ***Note:*** Remote digital terminal (RDT) is a generic term. A specific type of RDT is the S/DMS AccessNode remote fiber terminal (RFT). In an integrated S/DMS AccessNode configuration, the term RDT always means RFT.

Impact

Impact is always critical.

Common procedures

Not applicable

Action

Contact Northern Telecom and report all related logs and software errors (SWERRs).

Ext RDT critical/major/minor

Alarm display

CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nIDT**	.	.	.	**nMin.**	.
				C				***C***	

CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nIDT**	.	.	.	**nMin.**	.
				M				**M**	

CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nIDT**	.	.	.	**nMin.**	.

Indication

The abbreviation for the most important external alarm appears under the Ext header in the MAP subsystem display. This alarm indicates that an alarm condition is present in an external unit connected to the switch.

The *n* indicates the number of alarms with the indicated seriousness. The **C** that appears under the alarm indicates that the alarm class is critical. The *M* that appears under the alarm indicates the alarm class is major. A blank below the alarm indicates the alarm class is minor.

Meaning

These alarms indicate alarm conditions in an external unit like an S/DMS AccessNode Remote Digital Terminal (RDT). Operating company personnel must investigate to determine if the alarm is related to RDT. If an Ext alarm is related to RDT, an alarm in the RDTs corresponding Integrated Digital Terminal (IDT) is also in-service trouble (ISTb).

> ***Note:*** Remote digital terminal (RDT) is a generic term. A type of RDT is the S/DMS AccessNode remote fiber terminal (RFT). In an integrated S/DMS AccessNode configuration, the RDT always means RFT.

Ext RDT critical/major/minor (continued)

Impact

The type and seriousness of the problem on the RDT raising the alarm determines the impact. The *S/DMS AccessNode Alarm and Trouble Clearing Procedures* explains the impact of each S/DMS AcceddNode RDT alarm.

Common procedures

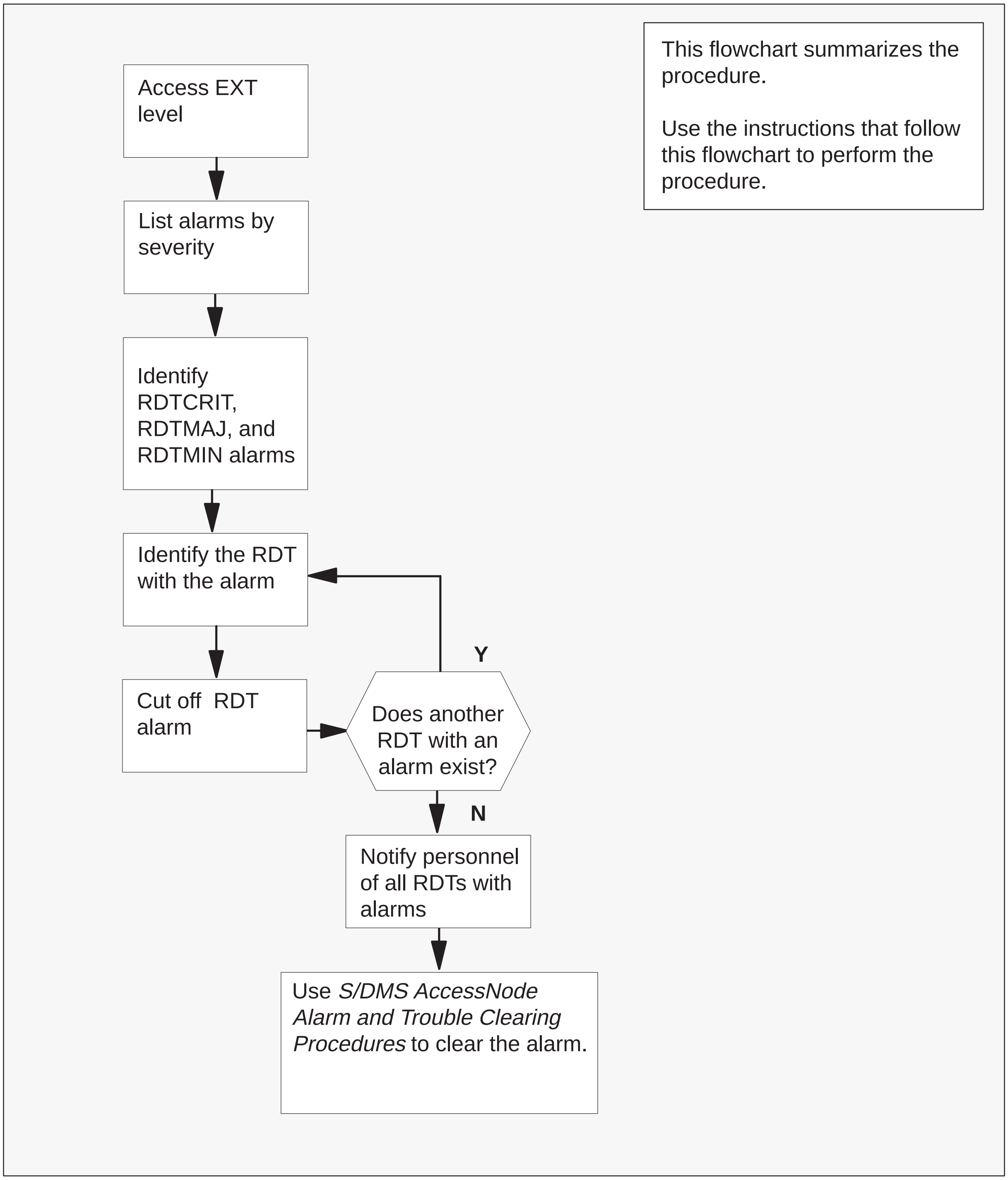
Therre are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Ext RDT critical/major/minor (continued)

Summary of clearing an Ext RDT alarm



Ext RDT critical/major/minor (continued)

Clearing an Ext RDT alarm

At the MAP display:

1 When the system detects a failure in an external unit, the system raises a critical alarm. The alarm appears at the EXT level of the MAP display. To access the EXT level, type

>MAPCI;MTC;EXT
and press the Enter key.

2 When the system detects a fault, the fault can trigger an audible alarm. To silence the alarm, type

>SIL
and press the Enter key.

3 Determine the severity of the Ext alarm.

If Ext alarm is	Do
Crit	step 4
Maj	step 5
Min	step 6

4 To determine if the external critical alarms are related to an RDT, type

>LIST CRIT
and press the Enter key.

If RDTCRIT is	Do
displayed	step 8
not displayed	step 5

5 To determine if the external major alarms are related to an RDT, type

>LIST MAJ
and press the Enter key.

If RDTMJ is	Do
displayed	step 8
not displayed	step 6

Ext RDT
critical/major/minor (continued)

6 To determine if the external minor alarms are related to an RDT, type

>LIST MIN
and press the Enter key.

If RDTMN	Do
displayed	step 8
not displayed	step 7

7 An S/DMS AccessNode is not the external unit that caused the Ext alarm. Identify the unit that caused the alarm. Refer to correct documentation to correct the problem.

Ext RDT critical/major/minor (continued)

8 Determine which signal distribution alarm points operate for each alarm. To determine which signal distribution alarm points operate for each alarm, type

>DISP SDALARM

and press the Enter key.

A series of signal distribution (SD) points that correspond to the location of the RDT appear. Signal distribution points that correspond to the status of the active alarm also appear. The system displays only SD points for one RDT at a time. The RDT that appears is the RDT with the most important condition.

Example of a MAP display response:

```
 CM    MS     IOD      Net     PM    CCS      Lns       Trks      Ext  APPL
                                                             2 Crit
  *    *      *         *        *     *         *         *  *C*

 Ext
  0 Quit        Ext Alarms     Crit FSP  Major     Minor    NoAlm
  2             EXT:             1    0     0         0       0
  3
  4             disp sdalarm
  5             SD POINT IN ALARM STATE:
  6             RDTSD1
  7 List_       RDTSD3
  8 TstDSAlm    RDTSD8
  9 SetSD_      RDTCRIT
 10 SetSC_
 11 Disp_
 12
 13 _Crit
 14 _FSP
 15 _Maj
 16 _Min
 17 _NoAlm
 18
    userid
 Time  hh:mm >
```

9 Record all the RDT signal distribution points (RDTSDn) associated with each RDTCRIT alarm. For example, in the MAP display shown in step 8, record RDTSD1, RDTSD3 and RDTSD8 in association with the RDTCRIT alarm. The system displays signal distribution points (RDTSDn) that identify each RDT in table RDTINV.

The RDTALRMCO function allows the user to re-enable RDT alarms that the user cutoff earlier. The system displays new alarms. The status of the cutoff does not affect the display of new alarms.

Ext RDT critical/major/minor (continued)

10 To cut off the alarm, type

>SETSC RDTALRMCO OP;SETSC RDTALRMCO REL
and press the Enter key.

The scan point for the RDT alarm cut off operates and releases. When there are other RDTs with alarms, the system displays the next RDT with the most severe alarm. The system displays signal distribution points for a minimum of 20 s. When a more critical alarm occurs or the alarm cutoff is active, the system does not display the signal distribution points.

If	Do
other RDT alarms are present	step 3
other RDT alarms are not present	step 11

11 To access table RDTINV, type

>TABLE RDTINV
and press the Enter key.

Example of a MAP display response:

```
TABLE:  RDTINV
```

12 To display table RDTINV headings, type

>HEADING
and press the Enter key.

Example of a MAP display response:

```
RDTNAME      ADNUM      IDTNAME                  NENAME
             PRIMOPC                             BACKOPC
                            VARTYPE    CLAPDFLT
                                                 MTSTACPT
PROT         POTSPADG       EOC
                                                 SDPOINTS
                                                 RDTDN
```

Ext RDT critical/major/minor (end)

13 To display the tuple that contains the pattern identified in step 9, type

>LIST ALL (SDPOINTS EQ 'sdpoint_name sdpoint_name')
and press the Enter key.

where

sdpoint_name   is the signal distribution points pattern identified in step 8

The tuple that contains the specified pattern appears.

Example of a MAP display response:

```
RDTNAME     ADNUM       IDTNAME                NENAME
            PRIMOPC                            BACKOPC
                             VARTYPE       CLAPDFLT
                                               MTSTACPT
                                               LINKTAB
PROT        POTSPADG        EOC
                                               SDPOINTS
                                               RDTDN
________________________________________________________
REM3 01 0   10          SMA 1 3   $          AccessNode
           BRTPY205                              $
                              RFT 1 7 1 96  Y    $
                                                 $
                            (1 0) (2 3) (4 5 )   $
N         STDLN             S
RDTSD1 RDTRSD3 RDTSD8
(NETWORK_ID 1) (SYSTEM_ID 1) (NETWORKELEMENT_ID 14)
(EQUIPMENT_ID 1 )   $
```

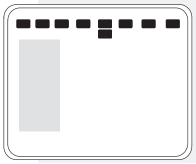
14 Identify the name of the RDT with the critical alarm. For example, the name of the RDT in step 13 is REM3.

15 Notify operating company personnel each time an RDT experiences an alarm.

16 To clear the RDT alarm, refer to the *S/DMS AccessNode Alarm and Trouble Clearing Procedures* for details.

PM SMA critical

Alarm display



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

Indication

The SMA alarm appears under the PM header in the MAP subsystem display. This alarm indicates an alarm condition in the SMA. The *n* indicates the number of SMA modules with alarms. The **C** that appears under the alarm indicates the alarm class is critical.

Meaning

This alarm normally indicates that a minimum of common peripheral controller cards in the SMA is defective.

Result

A critical alarm class code indicates the SMA cannot process calls.

Common procedures

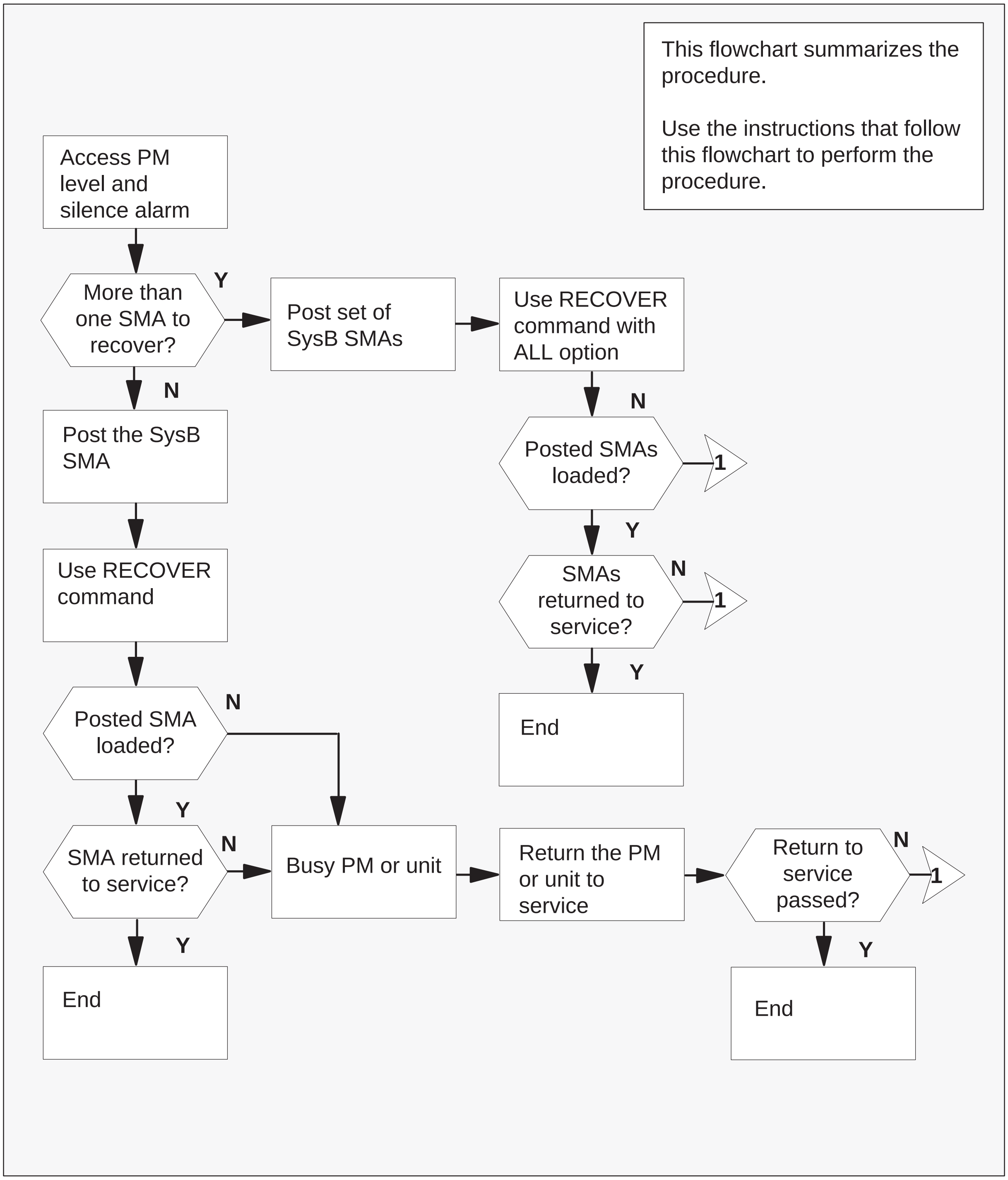
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

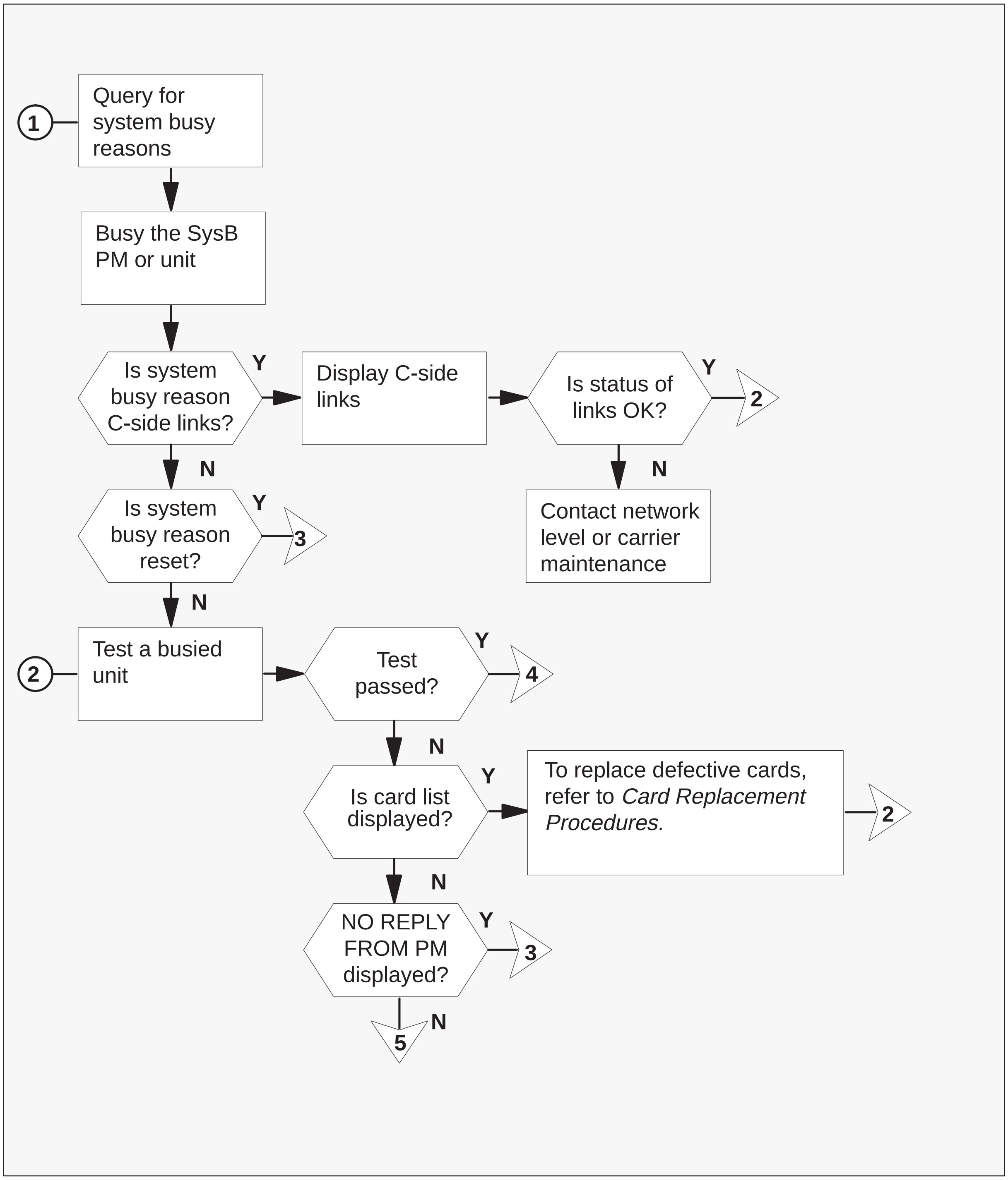
PM SMA
critical (continued)

Summary of clearing a PM SMA alarm



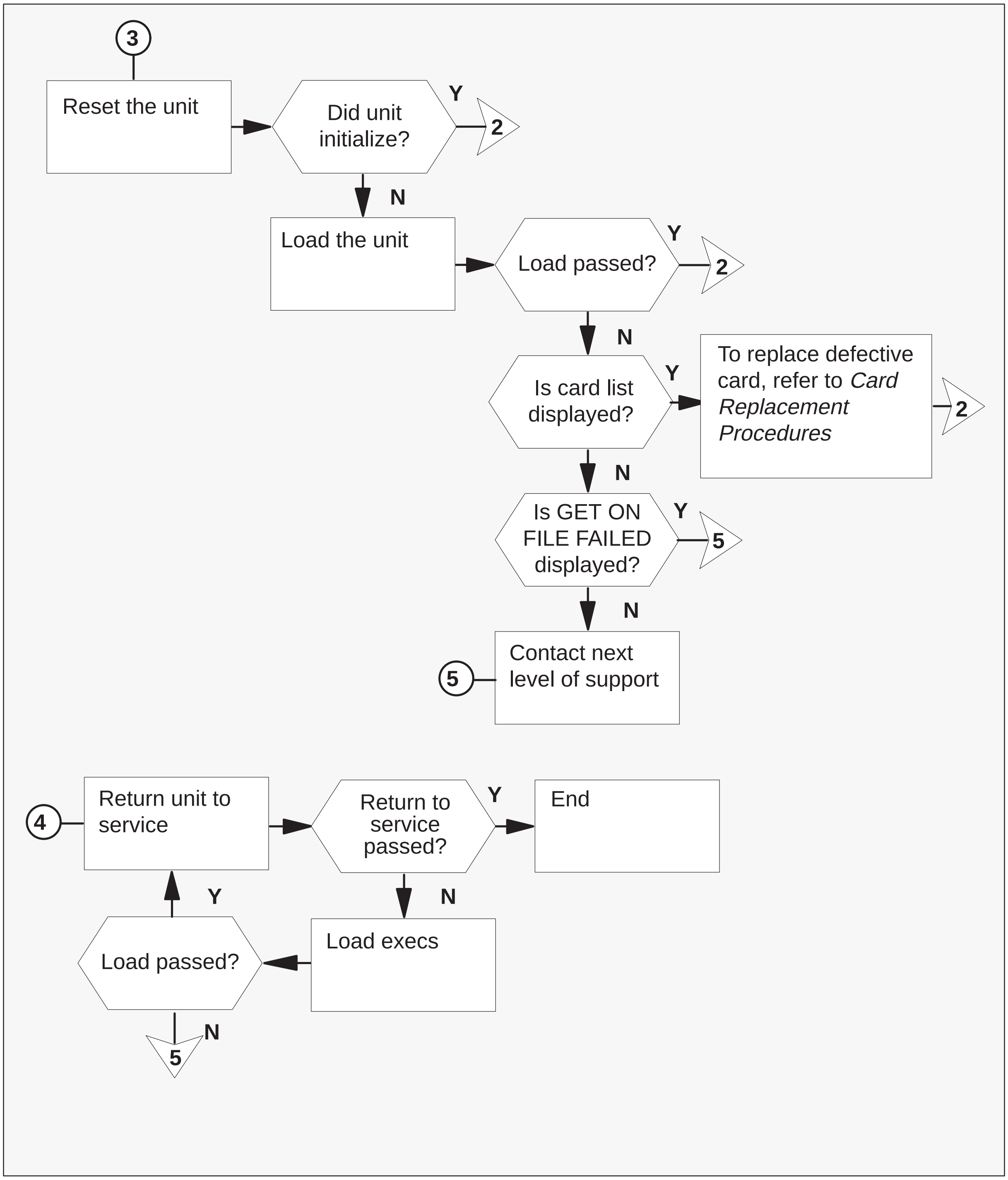
PM SMA
critical (continued)

Summary of clearing a PM SMA alarm (continued)



PM SMA
critical (continued)

Summary of clearing a PM SMA alarm (continued)



Clearing a PM SMA alarm

At the MAP terminal:

1 When the system detects a fault, the system can trigger an audible alarm. To access the PM level of the MAP display and silence the alarm, type

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

2 To display the system-busy (SysB) SMA, type

>DISP STATE SYSB SMA
and press the Enter key.

Example of a MAP terminal response:

```
SysB SMA: 0
```

If	Do
one SMA is system-busy	step 5
more than one is SMA system-busy	step 3

3 To access the set of system-busy SMAs, type

>POST SMA SYSB
and press the Enter key.

Example of a MAP terminal response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM      3     0     1     0     2    13
    SMA     2     0     0     0     0     7

SMA 0 SysB  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   SysB
Unit1:  Inact SysB
```

PM SMA
critical (continued)

4 To recover system-busy SMAs with the peripheral module (PM) recovery tool, type

>RECOVER ALL
and press the Enter key.

Example of a MAP terminal response:

```
This operation will be executed on n SMAs.
Please Confirm (“YES” or “NO”):
```

Note: In the MAP terminal response, n is the number of all SMAs in the posted set.

Go to step 7.

5 To access the system-busy SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA displayed in step 2

Example of a MAP terminal response:

```
SMA     SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     3     2    13
    SMA    1     0    0     3     0     7

SMA 0 SysB  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   SysB
Unit1:  Inact SysB
```

6 To recover system-busy SMAs with the PM recovery tool, type

>RECOVER
and press the Enter key.

Example of a MAP terminal response:

```
This operation will be executed on 1 SMA.
Please Confirm (“YES” or “NO”):
```

Note: In the MAP terminal response, 1 is the posted SMA.

PM SMA
critical (continued)

7 Determine if all SMAs are recovered.

If	Do
all SMAs recover	step 38
one or more SMAs did not recover	step 8

8 Record the SMAs or SMA units that were not recovered.

9 Work on the SMAs that have both units out of service (OOS) first. Work on SMAs that only have one unit out of service second.

If the system	Do
cannot load one or more SMAs and both units are out-of-service	step 10
cannot load or return to service one unit of a SMA	step 13

10 To post the system-busy SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of a SMA recorded in step 8

11 To busy the system-busy SMA, type

>BSY PM
and press the Enter key.

12 To return-to-service (RTS) the system-busy SMA, type

>RTS PM
and press the Enter key.

If RTS	Do
passes on both units	step 36
fails on one or both units	step 16

PM SMA
critical (continued)

13 To post the system-busy SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of an SMA recorded in step 8

14 To busy the system-busy unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the SMA unit number recorded in step 8

Note: If maintenance has begun, allow maintenance to complete before attempting to busy the unit.

15 To return the system-busy SMA to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the SMA unit number recorded in step 8

If RTS	Do
passes	step 36
fails	step 14

16 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

17 Determine if one or both units require recovery.

If	Do
both units require recovery	step 19
one unit requires recovery	step 18

18 To busy the system-busy unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the SMA unit number that did not return to service

Go to step 20

19 To busy the system-busy SMA, type

>BSY PM
and press the Enter key.

20 Identify the system-busy message reported in step 16.

If system-busy reason	Do
is activity dropped	step 21
is not system-busy or in-service trouble	step 21
is CC audit	step 21
is diagnostics failed	step 21
is PM audit	step 21
is self test failed	step 21
is trap	step 21
is unsol exceeded	step 21
is reset	step 25
is central-side (C-Side) links	step 33
is other than listed here	step 37

PM SMA
critical (continued)

21 To return the unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit busied in step 18

If RTS	Do
passes	step 38
fails for first time	step 22
fails again	step 37

22 To load unit again, type

>LOADPM UNIT unit_no CC FORCE
and press the Enter key.

where

unit_no is the number of the unit that did not return to service in step 21

If LOADPM	Do
passes	step 21
fails	step 37

23 Identify the test failure message.

If display	Do
is `NO REPLY FROM PM`	step 24
is `FAIL MESSAGE RECEIVED FROM PM`	step 27
is a card list	step 28

24 Determine if the `NO REPLY FROM PM` message already occurred.

If `NO REPLY FROM PM` message	Do
occurred before	step 37
did not occur before	step 25

25 To set the unit again, type

>PMRESET UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit returned to service in step 21

Note: During reset, the MAP display must indicate the reset events in order. These events occur in the order that appears in the MAP terminal response below.

Example of a MAP terminal response:

```
RESET
STATUS
RUN
INITIALIZE
STATIC DATA
```

If unit	Do
does not initialize	step 30
initializes	step 26

26 Determine if the `NO REPLY FROM PM` message appears.

If `NO REPLY FROM PM`	Do
appears	step 37
does not appear	step 27

PM SMA
critical (continued)

27 Determine if the `NO WAI AFTER RESET` message appears.

If `NO WAI AFTER RESET`	Do
appears	step 28
does not appear	step 21

28 Check the card list displayed at the MAP display.

Example of a MAP terminal response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    12  AX74
HOST  00  M07  LTE 00  51  SMA : 000    12  AX74
```

If you	Do
replaced all the cards	step 37
did not replace all the cards	step 29

29 Go to *Card Replacement Procedures* in this document for the next card on the list.

Complete the card replacement procedures and go to step 21 of this procedure.

30 To load the unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit to load

If LOADPM	Do
passes	step 21
fails	step 31

31 Identify the failed load reported in step 30.

If message displayed	Do
is `NO WAI AFTER RESET`	step 28
is `FAIL ROM DIAG`	step 28
is `GET ON FILE FAILED`	step 32
is other than listed here	step 37

32 The message `GET ON FILE FAILED` indicates a problem with the storage device. Go to step 37.

33 To display the status of C-side links, type

>TRNSL C
and press the Enter key.

Example of a MAP terminal response:

```
LINK0 ENET0 0 30 00  0;Cap:MS;Status:OK  ;MsgCond:OPN,Restricted
LINK1 ENET1 0 30 00  0;Cap:MS;Status:SBsy;MmgCond:CLS,Restricted
LINK2 ENET0 0 30 00  1;Cap:MS;Status:OK
LINK3 ENET1 0 30 00  1;Cap:MS;Status:OK
```

34 Record the numbers and conditions of the links.

If	Do
MS link condition is CLS	step 35
state of all links is not OK	step 35
state of all links is OK	step 21

35 The network interface card or the ENET port interface card can cause this problem. Contact the network level maintenance group.

PM SMA
critical (end)

36 Recover the next SMA unit or next SMA PM recorded in step 8.

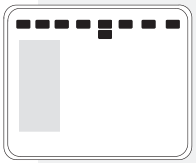
If	**Do**
another SMA unit or SMA PM requires recovery	step 10
all SMA units and SMA PMs are recovered	step 38

37 For additional help, contact the next level of support.

38 This procedure is complete. If other alarms appear, refer to the appropriate procedures to clear the indicated alarms.

PM SMA
major

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nSMA**	.	.	.	.	.
				M					

Indication

The SMA alarm code, under the peripheral module (PM) header in the MAP subsystem display indicates an alarm condition is present in the SMA.

The *n* indicates the number of SMA modules with alarms. The letter M under the alarm indicates the alarm class is major.

Meaning

This alarm normally indicates that one or more common peripheral controller cards in the SMA has faults.

Result

A major alarm class code indicates that the SMA has an in-service trouble (ISTb) condition. The SMA continues to process calls, but a potential service-affecting fault condition is present.

To reduce the potential impact to subscriber service, isolate the fault condition to the component that has faults. Use the following procedure to replace the component

Common procedures

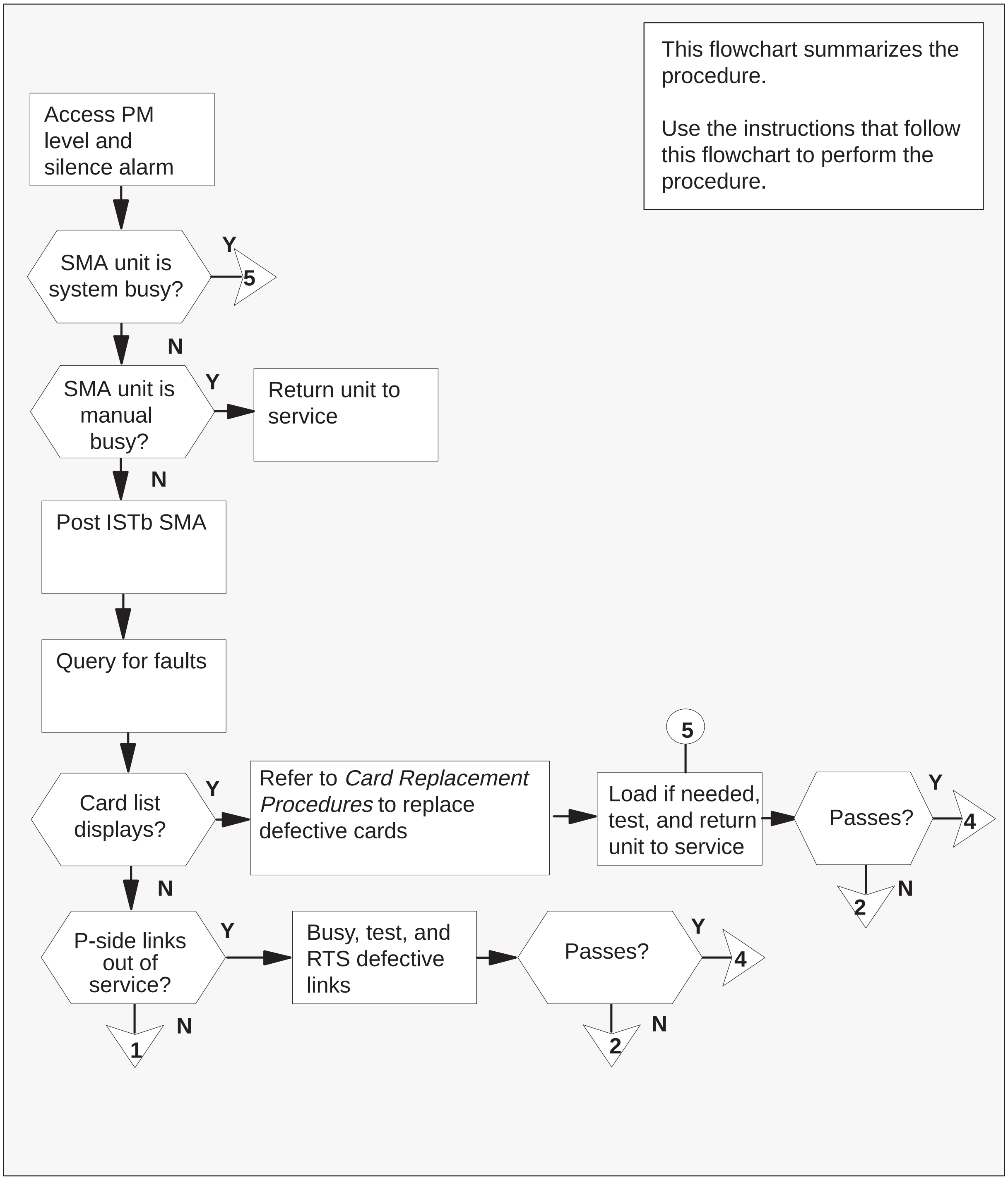
There are no common procedures.

Action

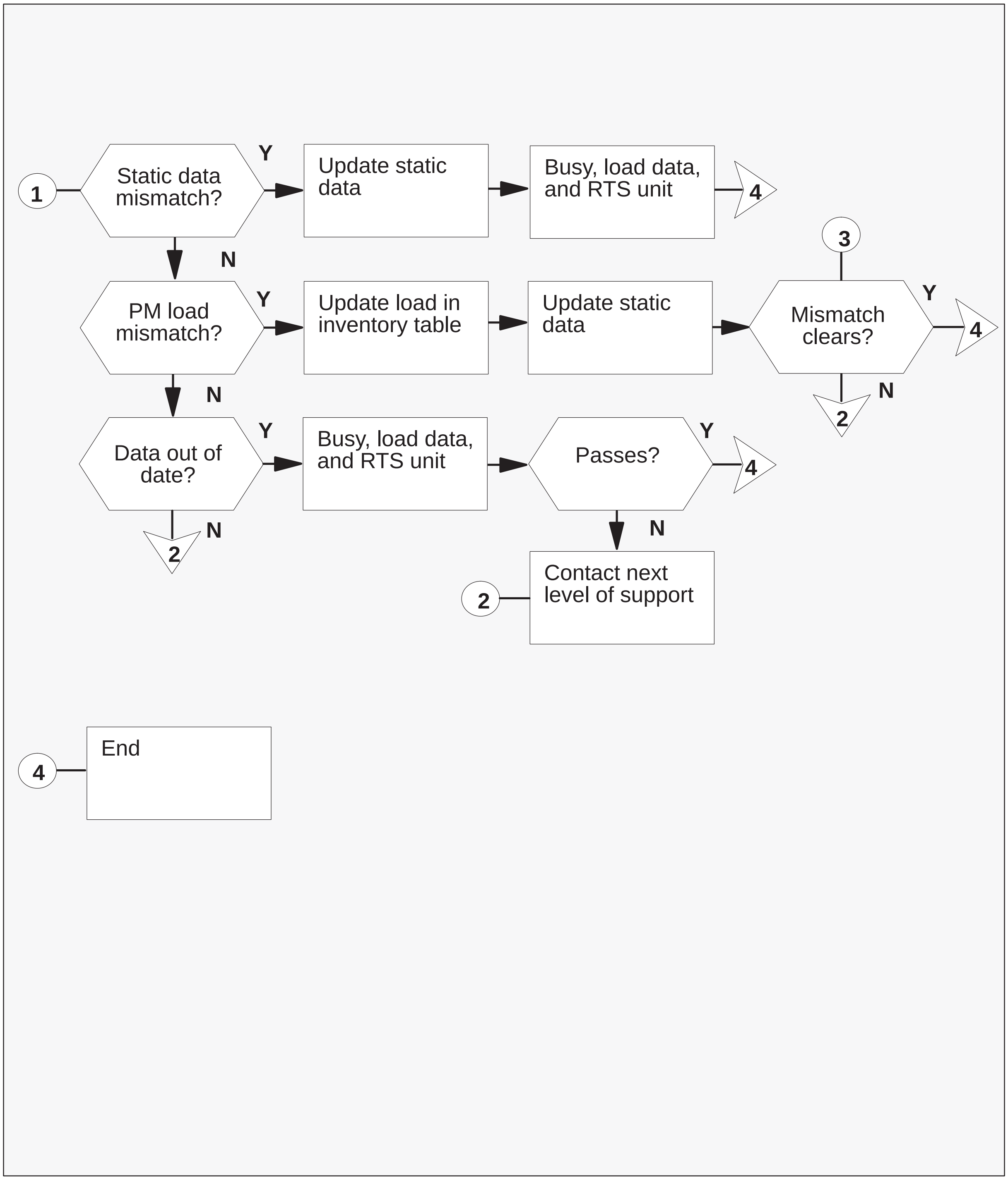
The procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM SMA
major (continued)

Summary of clearing a PM SMA alarm



Summary of clearing a PM SMA alarm (continued)



PM SMA
major (continued)

Clearing a PM SMA alarm

At the MAP terminal:

1 When the system detects a fault, the system can trigger an audible alarm. To access the PM level of the MAP terminal and silence the alarm, type

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

2 To determine which SMAs are system-busy (SysB), type

>DISP STATE ISTB SMA
and press the Enter key.

Example of a MAP response:

```
ISTb SMA:  4
```

3 To determine which SMAs are in-service trouble(ISTb), type

>DISP STATE ISTB SMA
and press the Enter key.

Example of a MAP response:

```
ISTb SMA:  1
```

4 To determine which SMAs are manual-busy (ManB), type

>DISP STATE MANB SMA
and press the Enter key.

Example of a MAP response:

```
ManB SMA:  0
```

5 To access the SMA that has faults, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA displayed in step 3
Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    SMA    0     0    0     0     1     7

SMA 1 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   ISTb
Unit1:  Inact InSv
```

If	Do
one unit is SysB	step 24
one unit is ManB	step 6
both units are ISTb	step 11
one unit is ISTb and inactive	step 11
one unit is ISTb and active	step 7

6 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If RTS	Do
passes	step 39
fails	step 28

PM SMA
major (continued)

7 To switch the activity of the units, type

>SWACT
and press the Enter key.

A confirmation prompt for the SwAct command appears on the MAP terminal.

If SwAct	Do
cannot continue	step 8
can continue	step 9

8 To reject the prompt to switch the activity of the units, type

>NO
and press the Enter key.

The system stops the switch of activity.

Return to step 7 during a period of low traffic.

9 To confirm the system prompt, type

>YES
and press the Enter key.

The system runs a pre-SwAct audit to determine if the inactive unit can accept activity.

Note: A maintenance flag (`Mtce`) appears when maintenance tasks are in progress. Wait until the flag disappears before you proceed with the next maintenance action.

If the message	Do
is `SwAct passed`	step 11
is `SwAct failed. Reason: XPM SwAct failed.`	step 10
is `SwAct refused by SwAct Controller`	step 10

10 The inactive unit cannot establish two-way communication with central control (CC) and switches activity back to the original active unit.

Clear all faults on the inactive unit before you attempt to clear the alarm condition on the active unit.

Go to step 44.

11 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Example of a MAP response:

```
Node is ISTb
  One or both units inservice trouble
Unit 0
The following inservice troubles exist:
   Static data mismatch with CC
Unit 1
The following inservice troubles exist:
   Static data mismatch with CC
```

If the inactive unit fault	Do
is peripheral-side (P-side) links are out-of-service (OOS)	step 32
is static data mismatch with CC	step 13
is PM load mismatch with inventory table	step 17
is data is out of date	step 13
is none of the above	step 12

12 The system detects a problem because of the attempt to SwAct to the inactive unit in step 7. Clear the fault condition on the inactive unit before you clear the alarm condition on the active unit.

Check the alarm banner for new alarms, and refer to the appropriate alarm clearance procedures for the indicated alarms.

Clear the alarm and return to this step.

13 To busy the inactive unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

PM SMA
major (continued)

14 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If RTS	Do
passes	step 16
fails	step 15
continues to fail	step 28

15 To load the inactive unit, type

>LOADPM UNIT unit_no CC DATA
and press the Enter key.

where

unit_no is the number of the inactive unit

If LOADPM	Do
passes	step 14
fails	step 44

16 Update the static data. To determine if the fault is cleared, type

>QUERYPM FLT
and press the Enter key.

If fault	Do
clears	step 39
does not clear	step 44

17 To determine which load the SMA that has faults can use, type

>QUERYPM CNTRS
and press the Enter key.

Example of a MAP response:

```
UNSOLICITED MSG LIMIT = 250, UNIT0 = 0, UNIT1 = 0

UNIT 0:
RAM LOAD:  XSC07BH
EPRom Version:  AA04
EEPRom Load:  Loadable:  AX74XD01, Executable:  AX74XE01
CMR LOAD:  CMR07A
CMR Definers:  0
UP:  AX74AA
IP: BX01

UNIT 1:
RAM LOAD:  XSC07BH
EPRom Version:  AA04
EEPRom Load:  Loadable:  AX74XD01, Executable:  AX74XE01
CMR LOAD:  CMR07A
CMR Definers:  0
UP:  AX74AA
IP: BX01
```

Note: The current SMA load appears on the right of the `RAM LOAD:` header.

18 To access table LTCINV, type

>TABLE LTCINV
and press the Enter key.

19 To position on the tuple for the SMA that has faults, type

>POS SMA sma_no
and press the Enter key.

where

sma_no   is the number of the SMA that has faults

20 To change the load name, type

>CHA LOAD
and press the Enter key.

Example of a MAP response:

```
LOAD:  XSC07BH
```

PM SMA
major (continued)

21 To enter the correct load name, type

>load_name
and press the Enter key.

where

load_name is the load name you identify in step 17

Note: The name you enter must be present in table PMLOADS.

Example of a MAP response:

```
TUPLE TO BE CHANGED:
   SMA 0
       1006 LTEI  0  51  3  C  11  6X02TE  XSC07BH
                       (     POTS   POTSEX)(   KEYSET  KSETEX)$
(0 30 1 0) (0 30 1 1) (0 30 1 2) (0 30 1 3) (0 30 1 4) (0 30 1 5)
(0 30 1 6)  (0 30 1 7)  (0 30 1 8)  (0 30 1 9)  (0 30 1 10)
(0 30 1 11)  (0 30 1 12)  (0 30 1 13)  (0 30 1 14)  (0 30 1 15)$
    (ISP) (UTR15)  ( MSG6X69 )  (  CMR17 CMR07A) $
   NORTHAM   AX74AA AX74AA AX74XE01  $
   6X40AC

ENTER Y TO CONFIRM, N TO REJECT, OR E TO EDIT.
```

22 To confirm the request, type

>Y
and press the Enter key.

23 To leave table LTCINV, type

>QUIT
and press the Enter key.

Go to step 13.

24 To busy the inactive unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

PM SMA
major (continued)

25 To return the unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If the RTS	**Do**
passes	step 38
fails	step 26

26 To load the inactive unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If the load	**Do**
passes	step 27
fails	step 44

27 To test the inactive unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If	**Do**
passes	step 31
fails	step 28

PM SMA
major (continued)

28 Determine if the system generates a card list.

If the system	Do
generates a card list	step 29
does not generate a card list	step 44

29 Check the card list that appears at the MAP display.

Example of a MAP response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    01  BX02
HOST  00  M07  LTE 00  51  SMA : 000    05  BX02
```

If you	Do
replaced all the cards in the list	step 44
did not replace all the cards in the list	step 30

30 Refer to *Card Replacement Procedures* in this document for the next card on the list and return to this point.

Go to step 26.

31 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive unit

If RTS	Do
passes	step 39
fails	step 44

32 To display information about the P-side links, type

>TRNSL P
and press the Enter key.

Example of a MAP response:

```
Link 1 IDT 17  0;Cap MS;Status:OK ,P;MsgCond;OPN
Link 2 IDT 17  1;Cap MS;Status:OK ,P;MsgCond;OPN
Link 3 IDT 17  2;Cap  S;Status:OK ,P;
Link 4 IDT 17  3;Cap  S;Status:SysB
```

33 To busy the system-busy link, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the SysB link displayed in step 32.

34 To test the link busied in step 33. type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link busied in step 33.

If test	Do
passes	step 37
fails	step 35

35 Check the card list that appears at the MAP display.

Example of a MAP response:

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    12  AX74
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

If you	Do
replaced all the cards on the list	step 44
did not replace all the cards on the list	step 36

PM SMA
major (continued)

36 Refer to *Card Replacement Procedures* in this document for the next card on the list and return to this point.

Go to step 32.

37 To return the link to service, type

>RTS LINK link_no
and press the Enter key.

where

link_no is the number of the link tested in step 34.

If RTS	Do
passes	step 39
fails	step 44

38 Perform a QUERYPM FLT. Wait for the static data update to finish before you proceed.

39 You returned the inactive unit to service. Determine if the active unit is in-service (InSv).

If the active unit	Do
is in-service	step 45
is in-service trouble and static data finished update	step 40

40 To switch the activity of the units, type

>SWACT
and press the Enter key.

A confirmation prompt for the SwAct command displays at the MAP terminal.

If SwAct	Do
cannot continue	step 41
can continue	step 42

PM SMA
major (end)

41 To reject the prompt to switch the activity of the units, type

>NO
and press the Enter key.

The system discontinues the switch of activity.

Return to step 40 during a period of low traffic.

42 To confirm the system prompt, type

>YES
and press the Enter key.

The system runs a pre-SwAct audit to determine if the inactive unit can accept activity.

Note: A maintenance flag (`Mtce`) appears when maintenance tasks are in progress. Wait until the flag disappears before you proceed with the next maintenance action.

If the message	Do
is `SwAct passed`	step 43
is `SwAct failed. Reason: XPM SwActback`	step 44
is `SwAct refused by SwAct Controller`	step 44

43 To clear the alarm condition on the newly inactive unit, go to step 11.

44 For additional help, contact the next level of support.

45 The procedure is complete. If other alarms occur, refer to the appropriate alarm clearing procedures for the indicated alarms.

PM SMA
minor

Alarm display

CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**nSMA**	.	.	.	.	.

Indication

The subscriber carrier module-100 access (SMA) alarm appears under the peripheral module (PM) header in the MAP subsystem display. This alarm indicates an alarm condition in the SMA. The n indicates the number of SMA modules with alarms. The blank below the alarm indicates a minor alarm class.

Meaning

This alarm normally indicates that one or more common peripheral controller cards in the SMA is defective. This alarm can indicate that message links on the network side are out-of-service (OOS).

Impact

A minor alarm class code indicates that the SMA has an in-service trouble (ISTb) or central-side busy condition (CBsy).

If ISTb, the SMA continues to process calls, but there is a fault condition that can affect service. To reduce the potential impact to subscriber service, isolate the fault condition to the defective component. Replace the component as this procedure directs.

If CBsy, the SMA cannot process calls. You must return at least one message link on the SMA network side to service.

Common procedures

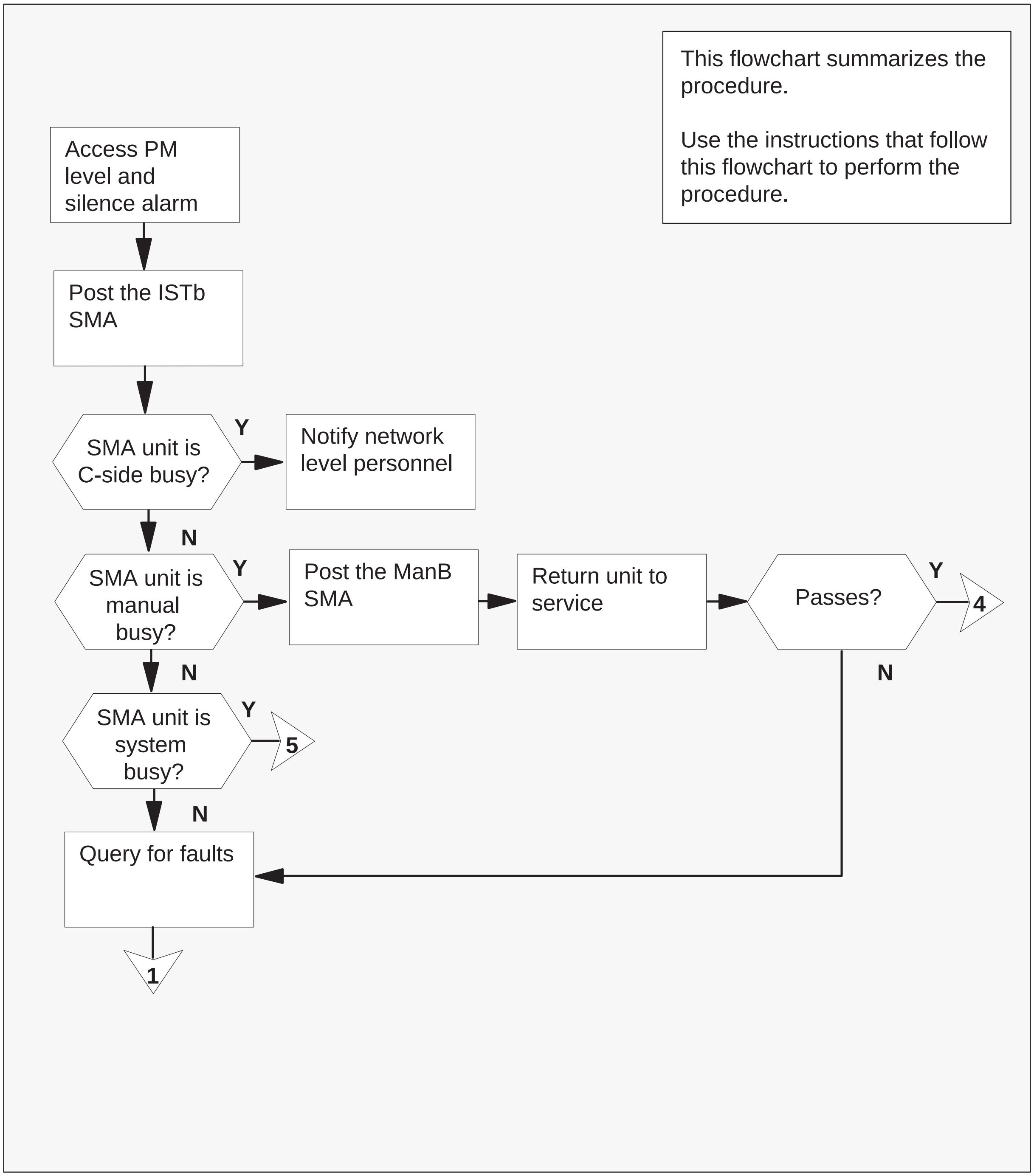
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

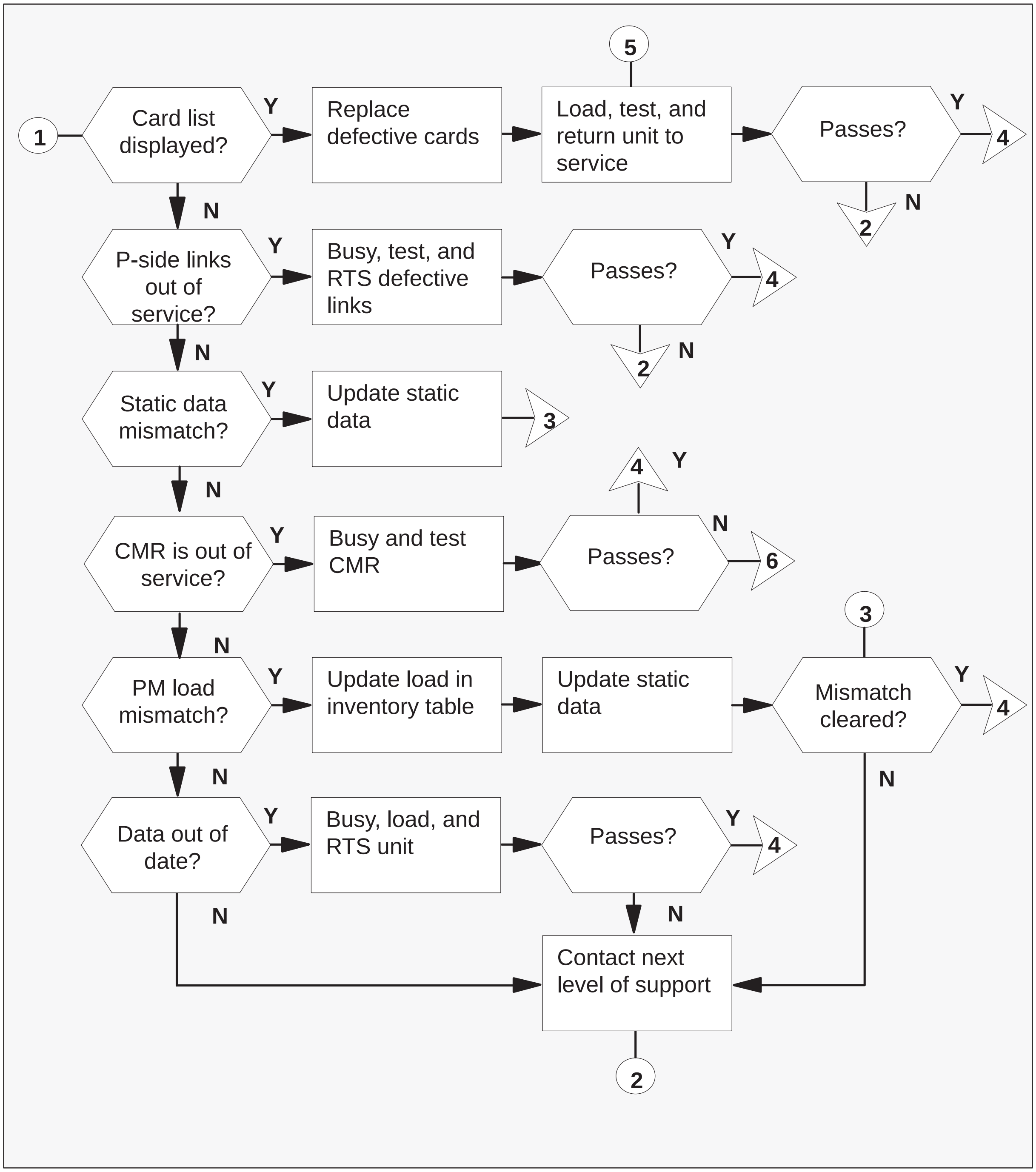
PM SMA
minor (continued)

Summary of clearing a PM SMA minor alarm



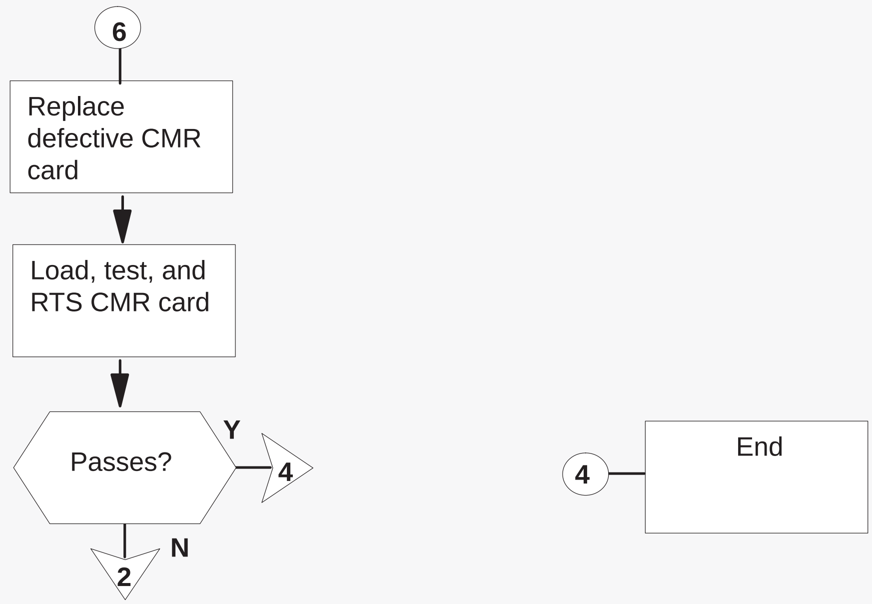
PM SMA
minor (continued)

Summary of clearing a PM SMA minor alarm (continued)



PM SMA
minor (continued)

Summary of clearing a PM SMA minor alarm (continued)



PM SMA
minor (continued)

Clearing a PM SMA minor alarm

At the MAP terminal

1 When the system detects a fault, the system can trigger an audible alarm. To silence the alarm and access the PM level of the MAP, type

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

2 To display the SMA that is in-service trouble, type

>DISP STATE ISTB SMA
and press the Enter key.

Example of a MAP response

```
ISTb SMA:  0
```

3 To post the in-service trouble SMA, type

>POST SMA ISTB
and press the Enter key.

Example of a MAP response

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM      3     0     1     0     2    13
    SMA     0     0     0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   ISTb
Unit1:  Inact InSv
```

4 To determine if the posted SMA is central-side busy, look for the state of unit 0 and unit 1 on the MAP display.

If SMA	Do
is central-side busy	step 15
is not central-side busy	step 7

PM SMA
minor (continued)

5 To display the SMA C-side links, type

>TRNSL C
and press the Enter key.

Example of a MAP response

```
LINK 0 ENET 0 1 30 00 0;Cap MS;Status SysB;MsgCond: CLS, Unrestricted
LINK 1 ENET 1 1 30 00 0;Cap MS;Status OK;MsgCond:OPN Unrestricted
LINK 2 ENET 0 1 30 00 1;Cap MS;Status OK
LINK 3 ENET 1 1 30 00 1;Cap MS;Status OK
LINK 4 ENET 0 1 30 00 2;Cap MS;Status OK;MsgCond:OPN Restricted
LINK 5 ENET 1 1 30 00 2;Cap MS;Status OK;MsgCond:OPN Restricted
```

6 Note the numbers and conditions of the links. Report this information to network level maintenance personnel.

7 To determine if the posted SMA is manual-busy (ManB), look for the state of unit 0 and unit 1 on the MAP display.

If SMA	Do
is manual-busy	step 8
is not manual-busy	step 9

8 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where:

unit_no is the number of the inactive unit

If RTS	Do
passes	step 39
fails	step 28

PM SMA
minor (continued)

9 To determine if the posted SMA has a system-busy (SysB) unit, look for the state of unit 0 and unit 1 on the MAP display.

If SMA	Do
is system-busy	step 16
is not system-busy	step 9

10 To determine if both units in the posted SMA in-service trouble, look for the state of unit 0 and unit 1 on the MAP display.

If	Do
both units are in-service trouble	step 14
one unit is in-service trouble and inactive	step 14
one unit is in-service trouble and active	step 10

11 To switch the activity of the units, type

>SWACT
and press the Enter key.

The system displays a confirmation prompt for the SWACT command at the MAP terminal.

If SWACT	Do
cannot continue at this time	step 11
can continue at this time	step 12

12 To reject the prompt to switch the activity of the units, type

>NO
and press the Enter key.

The system discontinues the switch of activity.

Return to step 10 during a period of low traffic.

PM SMA
minor (continued)

13 To confirm the system prompt, type

>YES
and press the Enter key.

The system runs a pre-SwAct audit to determine the ability of the inactive unit to accept activity correctly.

Note: A maintenance flag (`Mtce`) appears when maintenance tasks are in progress. Wait until the flag disappears before you proceed with the next maintenance action.

If the message	Do
is `SwAct passed`	step 14
is `SwAct failed Reason: XPM SwActback`	step 14
is `SwAct refused by SwAct Controller`	step 14

14 The inactive unit could not establish two-way communication with central control (CC) and switched activity back to the originally active unit. You must clear all faults on the inactive unit before you attempt to clear the alarm condition on the active unit.

Go to step 44.

PM SMA
minor (continued)

15 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Example of a MAP response

```
Node is ISTb
  One or both units inservice trouble
Unit 0
The following inservice troubles exist:
   Static data mismatch with CC
Unit 1
The following inservice troubles exist:
   Static data mismatch with CC
```

If the fault on the inactive unit	Do
is peripheral-side (P-side) links are out-of-service	step 33
is static data mismatch with CC	step 16
is PM load mismatch with inventory table	step 20
is CMR is out of service	step 34
is other than listed here	step 15

16 The system detected a problem as a result of your attempt to SwAct to the inactive unit in step 10. You must clear the fault condition on the inactive unit before you clear the alarm condition on the active unit.

Check the alarm banner for new alarms, and refer to the appropriate alarm clearing procedures for the indicated alarms.

Clear the alarm, then return to this step.

17 To busy the inactive unit, type

>BSY UNIT unit_no
and press the Enter key.

where:

unit_no is the number of the inactive unit

PM SMA
minor (continued)

18 To load the inactive unit, type

>LOADPM UNIT unit_no CC DATA
and press the Enter key.

where:

unit_no is the number of the inactive unit

If LOADPM	Do
passes	step 18
fails	step 27

19 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where:

unit_no is the number of the inactive unit

If RTS	Do
passes	step 19
fails	step 44

20 After you update static data, determine if the system cleared the fault. Type

>QUERYPM FLT
and press the Enter key.

If the system	Do
cleared the fault	step 39
did not clear the fault	step 44

PM SMA
minor (continued)

21 To determine which load the defective SMA can use, type

>QUERYPM CNTRS
and press the Enter key.

Example of a MAP response

```
UNSOLICITED MSG LIMIT = 250, UNIT0 = 0, UNIT1 = 0

UNIT 0:
RAM LOAD:  XSC07BH
EPRom Version:  AA04
EEPRom Load:  Loadable:  AX74XD01, Executable:  AX74XE01
CMR LOAD:  CMR07A
CMR Definers:  0
UP:  AX74AA
IP: BX01

UNIT 1:
RAM LOAD:  XSC07BH
EPRom Version:  AA04
EEPRom Load:  Loadable:  AX74XD01, Executable:  AX74XE01
CMR LOAD:  CMR07A
CMR Definers:  0
UP:  AX74AA
IP: BX01
```

Note: The current SMA load appears to the right of the `RAM LOAD:` header.

22 To access table LTCINV, type

>TABLE LTCINV
and press the Enter key.

23 To position on the tuple for the defective SMA, type

>POS SMA sma_no
and press the Enter key.

where:

sma_no is the number of the defective SMA

24 To change the load name, type

>CHA LOAD
and press the Enter key.

Example of a MAP response

```
LOAD:  XSC07BH
```

25 To enter the correct load name, type

>load_name
and press the Enter key.

where:

load_name   is the load name identified in step 20

> ***Note:*** The name entered must appear in table PMLOAD.

Example of a MAP response

```
TUPLE TO BE CHANGED:
   SMA 0
       1006 LTEI  0  51  3  C  11  6X02TE  XSC07BH
                       (  POTS   POTSEX)(  KEYSET  KSETEX)$ (0 30 1 0)
(0 30 1 1) (0 30 1 2) (0 30 1 3) (0 30 1 4) (0 30 1 5) (0 30 1 6)
(0 30 1 7) (0 30 1 8) (0 30 1 9)  (0 30 1 10) (0 30 1 11) (0 30 1 12)
(0 30 1 13) (0 30 1 14) (0 30 1 15)$
   (ISP)  (UTR15)  ( MSG6X69 )  (  CMR17 CMR07A) $
   NORTHAM  AX74AA AX74AA AX74XE01  $
   6X40AC

ENTER Y TO CONFIRM, N TO REJECT, OR E TO EDIT.
```

26 To make a positive response to the confirmation request, type

>Y
and press the Enter key.

27 To leave table LTCINV, type

>QUIT
and press the Enter key.

Go to step 17.

28 To load the inactive SMA unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where:

unit_no   is the number of the inactive unit

If load	**Do**
passes	step 28
fails	step 44

PM SMA
minor (continued)

29 To test the inactive SMA unit, type

>TST UNIT unit_no
and press the Enter key.

where:

unit_no is the number of the inactive unit

If test	**Do**
passes	step 32
fails	step 29

30 Determine if card list appears.

If card list	**Do**
appears	step 30
does not appear	step 44

31 Observe the card list displayed at the MAP display.

Example of a MAP response

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    12  AX74
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

If all cards in the card list	**Do**
are replaced	step 44
are not replaced	step 31

32 Go to *Card Replacement Procedures* in this document for the next card on the list, then return to this point.

Go to step 27.

PM SMA
minor (continued)

33 To return the inactive unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where:

unit_no is the number of the inactive unit

If RTS	Do
passes	step 39
fails	step 44

34 To manually busy the inactive unit, type

>BSY UNIT unit_no CMR
and press the Enter key.

where

unit_no is the number of the inactive unit
Go to step 35.

35 To test the card, type

>TST UNIT unit_no CMR
and press the Enter key.

where

unit_no is the number of the unit that contains the defective card

If test	Do
passes	step 36
fails and the following message appears: `CMR Tst failed No reply from PM`	step 37

PM SMA
minor (continued)

36 To return the CMR card to service, type

>RTS UNIT unit_no CMR
and press the Enter key.

where

unit_no is the number of the unit that contains the defective CMR card

If RTS	Do
passes	step 39
fails	step 44

37 To load the CMR card, type

>LOADPM UNIT unit_no CC CMR
and press the Enter key.

where

unit_no is the number of the unit that contains the defective CMR card

If load	Do
passes	step 36
fails	step 38

38 Observe the card list displayed at the MAP terminal.

Example of a MAP display:

If the NT6X78 card in the card list	Do
is replaced	step 44
is not replaced	step 39

39 Go to the *Card Replacement Procedures* for the first (or next) card on the list. After you return from the card replacement procedures, go to step 36 of this procedure.

40 To display information about the P-side links, type

>TRNSL P
and press the Enter key.

Example of a MAP response

```
Link 1 IDT 17  0;Cap MS;Status:OK  ,P:MsgCond;OPN
Link 2 IDT 17  1;Cap MS;Status:OK  ,P:MsgCond;OPN
Link 3 IDT 17  2;Cap  S;Status:SysB
Link 4 IDT 17  3;Cap  S;Status:SysB
```

41 To busy the system-busy link, type

>BSY LINK link_no
and press the Enter key.

where:

link_no is the number of the system-busy link displayed in step 33

Note: Busy each link that is not in service.

42 To test the busied link, type

>TST LINK link_no
and press the Enter key.

where:

link_no is the number of the link busied in step 34

Note: Test each link that is not in-service (InSv).

If test	Do
passes	step 38
fails	step 36

PM SMA
minor (continued)

43 Observe the card list displayed at the MAP display.

Example of a MAP response

```
Site Flr RPos  Bay_id Shf Description Slot EqPEC
HOST  00  M07  LTE 00  51  SMA : 000    01  6X50
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

If all cards	Do
are replaced	step 44
are not replaced	step 37

44 Go to *Card Replacement Procedures* in this document for the next card on the list, then return to this point.

Go to step 35.

45 To return the link to service, type

>RTS LINK link_no
and press the Enter key.

where:

link_no is the number of the link tested in step 35

If RTS	Do
passes	step 39
fails	step 44

46 After you return the inactive unit to service, determine if the active unit is in-service.

If the active unit	Do
is in-service	step 45
is in-service trouble	step 40

PM SMA
minor (continued)

47 To switch the activity of the units, type

>SWACT
and press the Enter key.

The system displays a confirmation prompt for the SWACT command at the MAP terminal.

If SwAct	Do
cannot continue at this time	step 48
can continue at this time	step 43

48 To reject the prompt to switch the activity of the units, type

>NO
and press the Enter key.

The system discontinues the switch of activity.

Return to step 40 during a period of low traffic.

49 To confirm the system prompt, type

>YES
and press the Enter key.

The system runs a pre-SwAct audit to determine the ability of the inactive unit to accept activity correctly.

> ***Note:*** A maintenance flag (`Mtce`) appears when maintenance tasks are in progress. Wait until the flag disappears before you proceed with the next maintenance action.

If the message	Do
is `SwAct passed`	step 45
is `SwAct failed Reason: XPM SwActback`	step 44
is `SwAct refused by SwAct Controller`	step 44

50 Go to step 14 to clear the alarm condition on the newly inactive unit.

51 For additional help, contact the next level of support.

PM SMA
minor (end)

52 This procedure is complete. If the system displays other alarms, refer to the correct alarm clearing procedures for the indicated alarms.

Load a PM

Application

Use this procedure to load a PM following a LOADPM failure.

Action

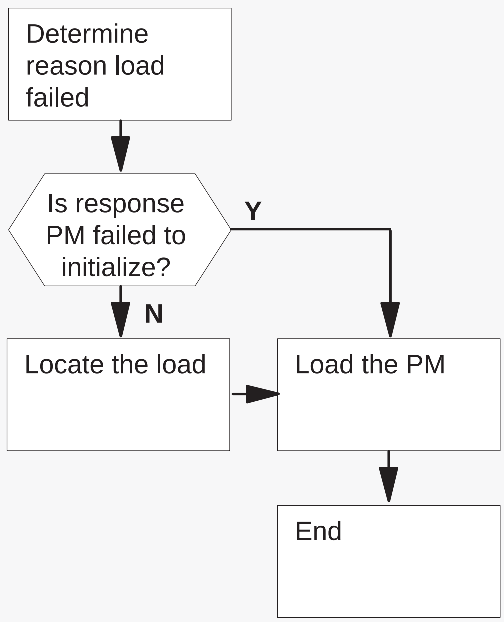
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Load a PM (continued)

Summary of clearing a Loading PM alarm

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.



Load a PM

At your current location

1

> **CAUTION**
> **Possible loss of service**
> Perform this procedure during periods of low traffic to avoid loss of service or service degradation.

Only proceed if a step in a maintenance procedure directed you to this procedure. Separate use of this procedure can cause equipment damage or loss of service.

2 Follow the correct procedure according to the reason for the load failure.

If the load failed	Do
the MAP response is `Load File not in directory`	step 6
the MAP response is `PM Failed to Initialize`	step 3
the system generates a card list	step 4

3 Go to step 23 to apply the LOADPM command again.

4 Record the locations and product equipment codes, including suffixes, of the cards on the card list.

5 Go to the correct procedure in *Card Replacement Procedures* in this document to change the first card on the list. Return to step 23 in this procedure.

6 Determine the type of device on which the PM load files are located.

If the location of the load files	Do
is on a tape	step 7
is on an IOC disk	step 14
is a SLM disk	step 19

7 Locate the tape that contains the PM load files.

8 Mount the tape on a magnetic tape drive.

Load a PM (continued)

At the MAP display:

9 To download the tape, type

>Mount tape_no
and press the Enter key.

where

tape_no is the number of the tape that contains the PM load files

10 To list the contents of the tape in your user directory, type

>LIST Ttape_no
and press the Enter key.

where

tape_no is the number of the tape

Go to step 23.

11 Record the results from the LOADPM command. Demount the tape

>DEMOUNT Ttape_no
and press the Enter key.

where

tape_no is the number of the tape

12 Remove the tape from the magnetic tape drive.

13 Determine the results from the loadpm command.

If	**Do**
passed	step 30
failed, and the reason is different from the first time LOADPM failed	step 2
failed, but the reason is the same as the first time LOADPM failed	step 29
failed, and you did not replace all the cards in the list in step 4	step 28
failed, and you replaced all the cards in the list in step 4	step 29

14 From office records, determine and note the input/output controller (IOC) disk and volume number that contains the PM load files.

15 To access the disk utility level, type

>DSKUT
and press the Enter key.

16 To list the IOC file names in your user directory, type

>LISTVOL vol_name ALL
and press the Enter key.

where

vol_name is the name of the volume that contains the loads

17 To exit the disk utility, type

>QUIT
and press the Enter key.

18 Go to step 23 and continue as directed.

19 From office records, determine and note the system load module (SLM) disk and volume number that contains the PM load files.

20 To access the disk utility level, type

>DISKUT
and press the Enter key.

21 To list the SLM file names in your user directory, type

>LISTFL file_name
and press the Enter key.

where

file_name is the name of the file that contains the loads

22 To exit the disk utility, type

>QUIT
and press the Enter key.

23 Proceed as follows.

If you	Do
load a single-unit PM or a DCH card	step 24
load a dual-unit PM	step 25
load a CMR card	step 26
load an STC card	step 27

Load a PM (continued)

24 To load the PM, type

>LOADPM
and press the Enter key.

If the LOADPM command	Do
passed	step 30
failed, and the reason is different from the first time LOADPM failed	step 2
failed, and the reason is the same as the first time LOADPM failed	step 29
failed, and did not replace all the cards in the list in step 4	step 28
failed, and you replaced all the cards in the list in step 4	step 29
loaded from tape	step 11

25 To load the PM unit, type

>LOADPM UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit to load (0 or 1)

If	Do
passed	step 30
failed, and the reason is different from the first time LOADPM failed	step 2
failed, but the reason is the same as the first time LOADPM failed	step 29
failed, and you did not replace all the cards in the list in step 4	step 28
failed, and you replaced all the cards in the list in step 4	step 29
loaded from tape	step 11

26 Load the CMR card

LOADPM UNIT unit_no CMR
and press the Enter key.

where

unit_no is the number of the unit that contains the CMR card to load (0 or 1)

If	Do
passed	step 30
failed, and the reason is different from the first time LOADPM failed	step 2
failed, but the reason is the same as the first time LOADPM failed	step 29
failed, and you did not replace all the cards in the list in step 4	step 28
failed, and you replaced all the cards in the list in step 4	step 29
loaded from tape	step 11

27 To load the STC, type

>STCLOAD UNIT unit_no A stc_loadname
and press the Enter key.

where

unit_no is the number of the MSB unit (0 or 1)
stc_loadname is the name of the STC load

If the LOADPM command	Do
passed	step 30
failed, and the reason is different from the first time LOADPM failed	step 2
failed, but the reason is the same as the first time LOADPM failed	step 29
failed, and you did not replace all the cards in the list in step 4	step 28
failed, and you replaced all the cards in the list in step 4	step 29
loaded from tape	step 11

Load a PM (end)

28 Go to the correct procedure in *Card Replacement Procedures* in this document to change the next card on the list. This list is the list that the system generated. Return to this procedure.

29 For additional help, contact the next level of support.

30 The procedure is complete. Return to the main procedure that sent you to this procedure and continue as directed.

SMA card replacement procedures

This section contains card replacement procedures for the Subscriber Carrier Module-100 Access (SMA). These procedures describe the removal and replacement of faulty cards and are intended for use by maintenance engineering and field maintenance personnel.

NT2X70
SMA

Application

Use this procedure to replace an NT2X70 card in an SMA.

PEC	Suffixes	Name
NT2X70	AE	Power Converter (5V/12V)

Common procedures

The following procedures are referenced in this procedure:

- "Removing and inserting cards in an SMA"
- "Locating a faulty card in an SMA"
- "Unseating a card in an SMA"
- "Reseating a card in an SMA"
- "Returning a card for repair or replacement"

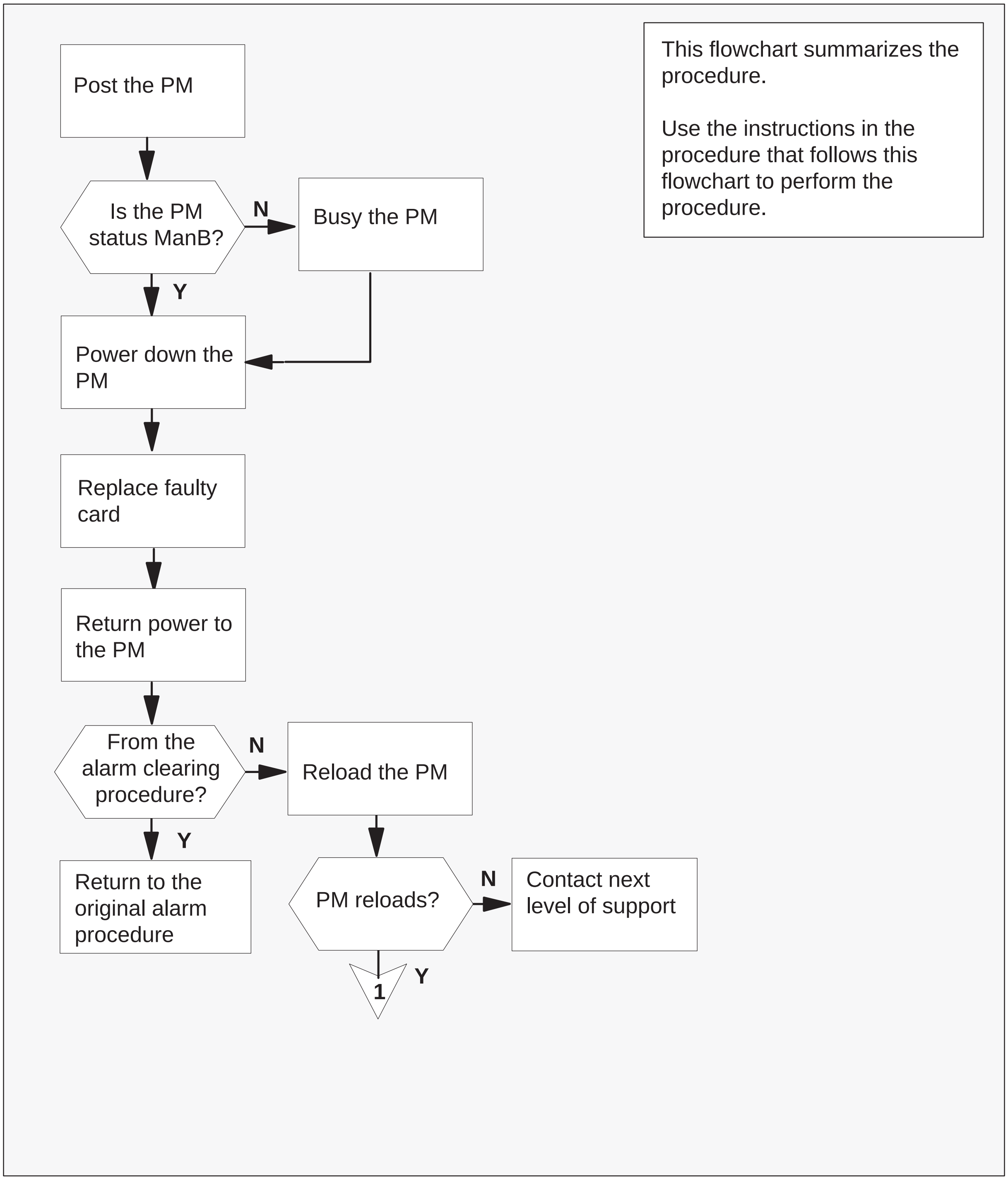
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

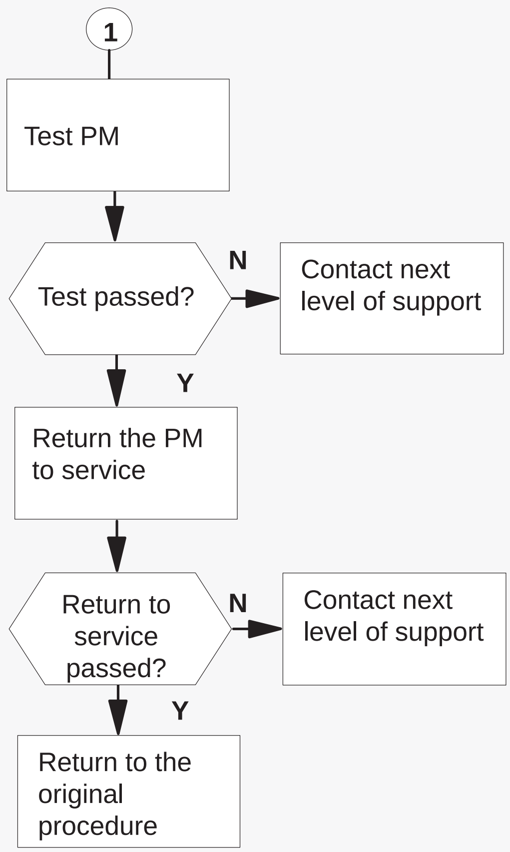
NT2X70
SMA (continued)

Summary of card replacement procedure for an NT2X70 card in an SMA



NT2X70
SMA (continued)

Summary of card replacement procedure for an NT2X70 card in an SMA (continued)



NT2X70
SMA (continued)

Replacing a NT2X70 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure that you replace the card in the inactive unit and the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level, and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no   is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    SMA   0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact SysB
```

NT2X70
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 11

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
cannot continue at this time	step 8
can continue at this time	step 9

8 Reject the prompt to switch the activity of the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

9 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 11
`SWACT failed Reason: XPM SWACTback`	step 10
`SWACT refused by SWACT Controller`	step 10

10 The inactive unit could not establish two-way communication with the central control (CC) and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 25.

At the equipment frame

11 Hang a sign on the active unit bearing the words: **Active unit–Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

12 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`SysB, CBsy, ISTb, or InSv`	step 13
`ManB`	step 15

NT2X70
SMA (continued)

At the equipment frame

13 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

14

WARNING
Static electricity damage
Wear a strap connected to the wrist strap grounding point on the frame supervisory panel (FSP) while handling cards. This strap protects the cards against damage caused by static electricity.

Unseat but do not remove the NT6X69 Message Interface card and the NT6X80 PCM Loss Addition card using the procedure “Unseating a card in an SMA.”

15 Power down the unit by setting the ON/OFF switch on the power converter faceplate slots 25 through 27 to the OFF position.

Both the converter FAIL LED and FRAME FAIL lamps on the frame supervisory panel (FSP) turn ON. An audible alarm may sound.

If an alarm does sound, silence it by typing

>SIL
and pressing the Enter key.

16 Perform the procedure “Removing and inserting cards in an SMA.”

17 Power up the power converter in the inactive SMA unit as follows:

a. Ensure the power 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 on the power converter faceplate to the ON position.

18 Press the RESET button while setting the circuit breaker to the ON position.

Both the converter FAIL LED and FRAME FAIL lamps on the FSP turn OFF.

19 Reseat the NT6X69 Message Interface card and the NT6X80 PCM Loss Addition card using the procedure “Reseating a card in an SMA.”

20 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 23
other	step 21

At the MAP terminal

21 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit busied in step 13

If load	Do
passes	step 22
fails	step 25

22 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit tested in step 21

If RTS	Do
passes	step 23
fails	step 25

At the equipment frame

23 Remove the sign from the active SMA unit.

24 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 26.

NT2X70
SMA (end)

25 For further assistance, contact the personnel responsible for the next level of support.

26 You have completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X40
SMA

Application

Use this procedure to replace an NT6X40 card in a Subscriber Carrier Module-100 Access (SMA) as identified in the following table.

ATTENTION
Replacement restrictions apply to certain versions of the NT6X40 card. Carefully read the caution and note following the equipment chart before removing or installing any cards.

PEC	Suffixes	Name
NT6X40	AC, AD	DS30 C-side interface card
NT6X40	FA, FB, FC	DS512 link controller card
NT6X40	GA	DS512 link paddle board

WARNING
Possible service disruption or loss of diagnostic functionality when installing or replacing NT6X40 cards versions AD, FB, or FC
NT6X40AD, FB, or FC cards must not be mismatched with other versions between the two units of an XPM if table LTCINV is datafilled with interface card types of NT6X40AD or NT6X40FB. For example, you cannot have an AC version of the card in unit 0 and an AD version in unit 1. A PM777 log is generated citing the mismatch and the XPM is put in an ISTb state. For more information read the following notes.

Note: The NT6X40AD, NT6X40FB, and NT6X40FC cards provide enhanced diagnostic capabilities. If table LTCINV datafill is set to the NT6X40AC or NT6X40FA version of the card, cards can be mismatched but the new diagnostics capabilities will not be initiated. The CM will treat the interface as NT6X40AC/NT6X40FA regardless of the card installed. For more information see the section on datafilling table LTCINV in the data schema section of the *Translations Guide.*

NT6X40
SMA (continued)

Common procedures

The following common procedures are referenced:

- “Manually busying SMA C-side links”
- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

Do not go to a common procedure unless directed to do so in the step-action procedure.

Action

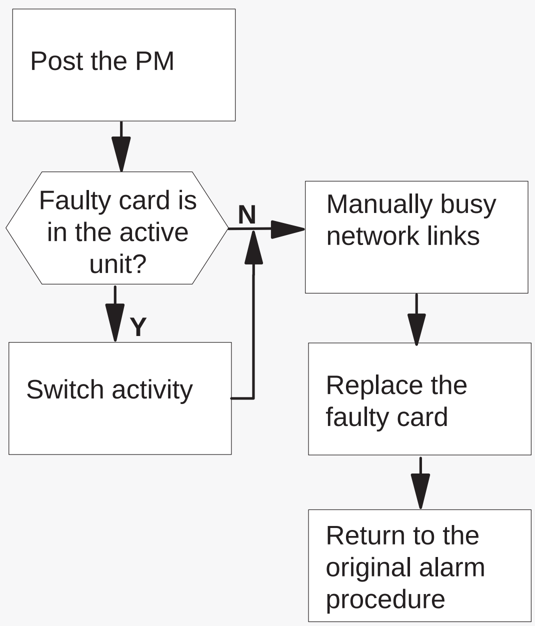
The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X40
SMA (continued)

Summary of Replacing NT6X40 SMA

This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.



NT6X40
SMA (continued)

Replacing an NT6X40 SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
When replacing a card in the SMA, ensure the unit in which you are replacing the card is *inactive* and the mate unit is *active*.

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

NT6X40
SMA (continued)

At the MAP terminal

5 Access the peripheral module (PM) level of the MAP display and post the SMA with the faulty card by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response:

```
SMA       SysB  ManB  Offl  CBsy  ISTb  InSv
    PM       3     0    1     0     2    13
    SMA      0     0    0     0     1     7

SMA 0  ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

6 Determine the state and activity of the XPM unit in which the card you replacing is provisioned.

If the state of the PM unit is	Do
ISTb, InSv, SysB, or CBsy, and active	step 7
ISTb, InSv, SysB, or CBsy, and inactive	step 11
ManB	step 11
OffL	step 37

7 From the MAP display, determine the state of the mate PM unit.

If the SMA unit is	Do
ISTb or InSv	step 8
any other state	step 40

NT6X40
SMA (continued)

8 Switch activity by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 9
cannot continue at this time	step 42

9 Confirm the command by typing

>YES
and pressing the Enter key.

Note: A maintenance flag (Mtce) may appear, indicating that system-initiated maintenance tasks are in progress. Wait until the flag disappears from the status lines for both PM units before proceeding to the next step.

If the MAP response is	Do
`SWACT passed`	step 11
`SWACT failed Reason: XPM SWACTback`	step 10
`SWACT refused by SWACT Controller`	step 10

10 The inactive unit could not establish two-way communication with the central control (CC) and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 40.

11 A maintenance flag (Mtce) may appear, indicating that system-initiated maintenance tasks are in progress. Wait until the flag disappears from the status lines for both PM units before proceeding to the next step.

12 Manually busy all C-side links associated with the inactive PM unit you are working on using the procedure “Manually busying SMA C-side links” in this document. When you have completed the procedure, return to this point.

NT6X40
SMA (continued)

At the equipment frame

13 Hang a sign on the active unit bearing the words: **Active unit–Do not touch.** This sign should not be attached by magnets or tape.

14 Determine the suffix of the faulty card.

If you are replacing an	Do
GA	step 15
AC, AD, FA, FB, or FC	step 28

At the front of the shelf

15

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Unseat the NT6X40 card in the inactive unit.

At the backplane of the shelf

16

DANGER
Risk of electrocution
Voltage is present on the backplane. Remove all jewelry before continuing with this procedure. Do not touch pins or terminals except as instructed.

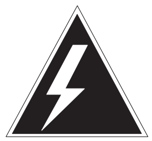
Locate the circuit card to be replaced.

Note: NT6X40 circuit cards are located in slot 22.

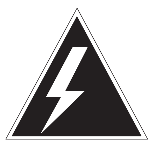
17 Label each connector to the NT6X40 card.

NT6X40
SMA (continued)

18



WARNING
Avoid contaminating the fiber tip surface
Do not touch the tip of the fiber. Dirt or oil from the skin transferred to the fiber tip surface degrades fiber performance.



WARNING
Fiber cable may become damaged
Take care when handling fiber cables. Do not crimp or bend fiber cables to a radius of less than 25 mm (1 in.).

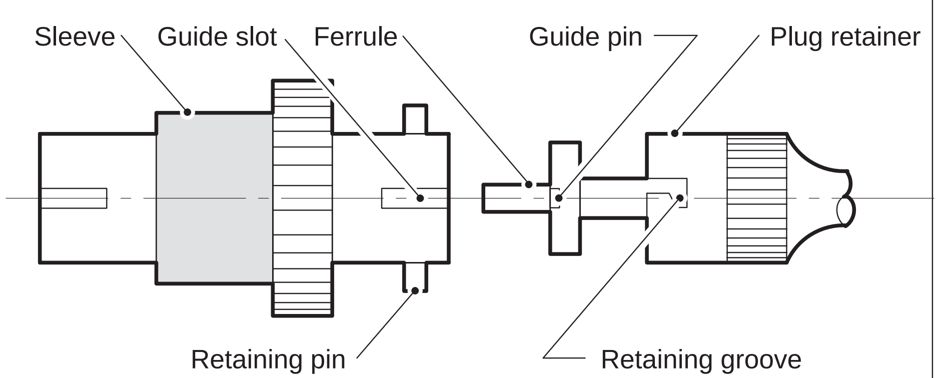
Disconnect the fiber optic cables by performing the following steps:

a. Twist the plug retainer to unlock the retaining pin from the retaining groove

b. Rotate the plug retainer so the retaining pin enters the guide slot.

c. Gently pull on the plug retainers, moving the guide pin along the slot to remove the ferrule from the sleeve.

d. Fit dust caps to the open ends of the fiber links.



NT6X40
SMA (continued)

19

> **WARNING**
> **Protect backplane pins**
> Do not allow screws to drop onto or touch the backplane pins. When removing and replacing the screws for the card, the backplane pins above and below must be protected to prevent shorting out. Use of a magnetic screw or nut driver is recommended.

Protect exposed backplane pins in one of the following ways:

- Wrap electrical tape around a group of pins. Do not bend the pins.
- Cover the pins with NOMEX paper.

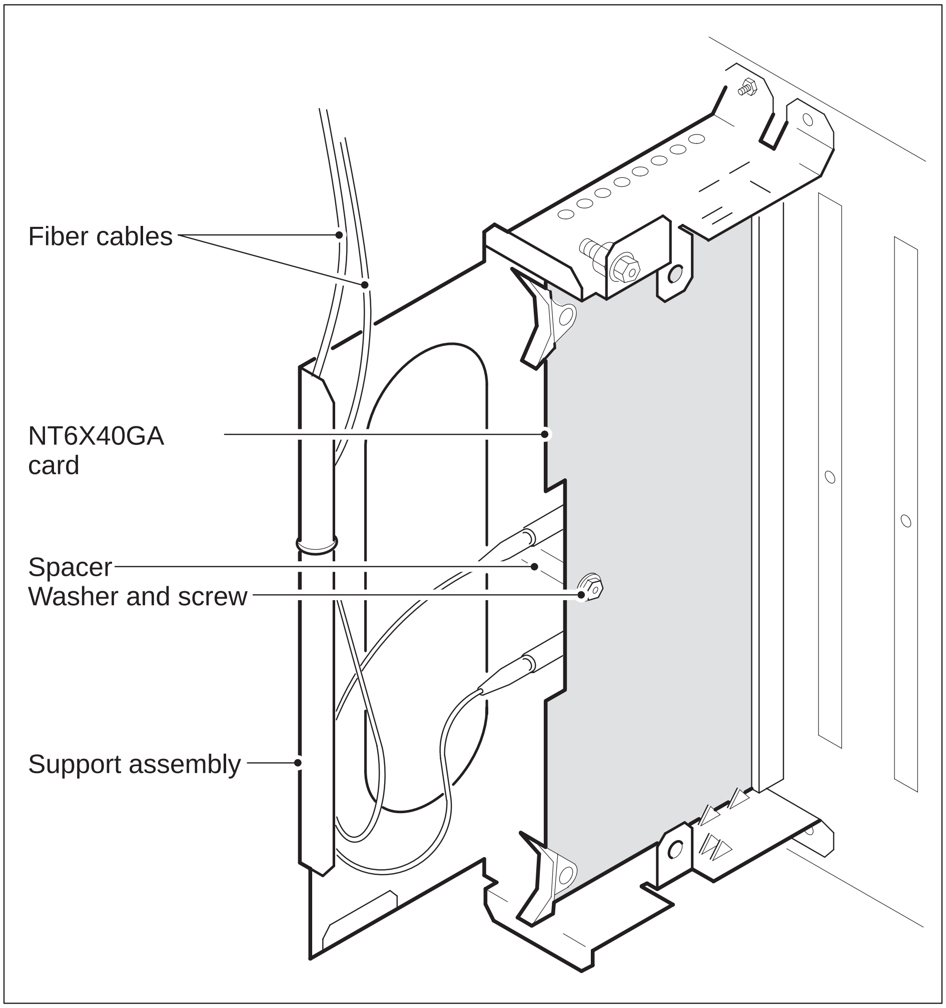
NT6X40
SMA (continued)

20 Remove the screw that holds the card to the support assembly by performing the following steps:

a. Locate the screw positioned half-way down the outer edge of the card.

b. Remove the washer holding the screw in place.

c. Remove the screw and the spacer located between the card and the support assembly.



21 Using the levers located at the top and bottom of the 6X40 card, remove the card from the support assembly by firmly pulling horizontally until the connector pin socket on the card has cleared the connector pins on the backplane.

NT6X40
SMA (continued)

22 Place the card just removed in an electrostatic discharge protective container.

Note: If the card you are replacing has switches, ensure the switches on the replacement card have the same settings.

23 Line up the replacement card with the slots in the support assembly.

24 Using the levers located at the top and bottom of the 6X40 card, firmly press the connector pin socket on the card onto the connector pins on the backplane.

25 Secure the card to the support assembly by performing the following steps:

a. Locate the screw hole positioned half-way down the outer edge of the card.

b. Position the spacer at the screw hole between the card and the support assembly.

c. Insert the screw, moving it in the direction of the support assembly, through the spacer to the outer surface of the support assembly.

d. Fasten the washer to hold the screw in place.

26 Reconnect the fiber optic cables by performing the following steps. See the illustration in step 18.

a. Remove the dust caps from the ends of the fiber links.

b. Gently insert the ferrule into the sleeve so the guide pin enters the guide slot.

c. Rotate the plug retainer so the retaining pin enters the retaining groove.

d. Push the connectors together and twist the plug retainer to lock the retaining pin into the retaining groove.

NT6X40
SMA (continued)

At the front of the shelf

27

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Reseat the NT6X40 card unseated in step 15. Go to step 29.

28 Perform the procedure "Removing and inserting cards in an SMA." When you have completed the procedure, return to this point.

At the MAP terminal

29 The next action depends on the type of network in the office.

If you are working on	Do
JNET	step 30
ENET	step 32

30 Return to service one of the network links by typing

>RTS plane_no link_no
and pressing the Enter key.

where

plane_no is the number of the plane (0 or 1) for the link
link_no is the link number (0 to 63)

If the link	Do
returned to service and there are more manual-busy links	step 31
returned to service and there are no more manual-busy links	step 33
did not return to service	step 40

NT6X40
SMA (continued)

31 Repeat step 30 for each manually busy C-side link. When you have successfully returned all C-side links to service, go to step 33.

32 Return the network link to service by typing

>RTS plane_no LINK link_no
and pressing the Enter key.

where

plane_no	is the number of the plane (0 or 1) for the link
link_no	is the link number (0 to 3)

Example of a MAP response:

```
Request to RTS ENET Plane:0 Shelf:00 Slot:32 Link:01 submitted.
Request to RTS ENET Plane:0 Shelf:00 Slot:32 Link:01 passed.
```

If the link	Do
returned to service	step 33
did not return to service	step 40

33 Post the SMA you are working on by typing

>PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no	is the SMA number (0 to 255)

34 Determine the status of the XPM unit containing the NT6X40 circuit card you replaced by typing

>QUERYPM

and pressing the Enter key.

```
PM Type: SMA  PM No.: 0  PM Int. No.:11 Node_No.: 192
 PMs Equipped: 139 Loadname: XSC07BH
 WARM SWACT is supported and available.
 SMA 0 is included in the REX schedule.
 REX on SMS 0 has not been performed.
 Node Status: {OK, FALSE}
 Unit 0   Act, Status: {OK, FALSE}
 Unit 1 Inact, Status: {OK, FALSE}
 Site Flr RPos  Bay_id  Shf Description Slot EqPEC
 HOST  01  E31  LTE  01  18     SMA :   000  6X02AA
```

If the inactive unit status is	Do
InSv	step 35
anything else	step 40

35 The next action depends on your reason for performing this procedure.

If you were	Do
directed to this procedure from a maintenance procedure	step 36
not directed to this procedure from a maintenance procedure	step 39

36 Return to the maintenance procedure that sent you to this procedure and continue as directed.

37 Consult office personnel to determine why the component is offline. Continue as directed by office personnel.

38 Remove the sign from the active SMA unit.

39 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 41.

NT6X40
SMA (end)

40 For further assistance, contact the personnel responsible for the next level of support.

41 You have completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

42 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X41
SMA

Application

Use this procedure to replace a NT6X41 card in an SMA.

PEC	Suffixes	Name
NT6X41	AA, AC	Speech bus formatter

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

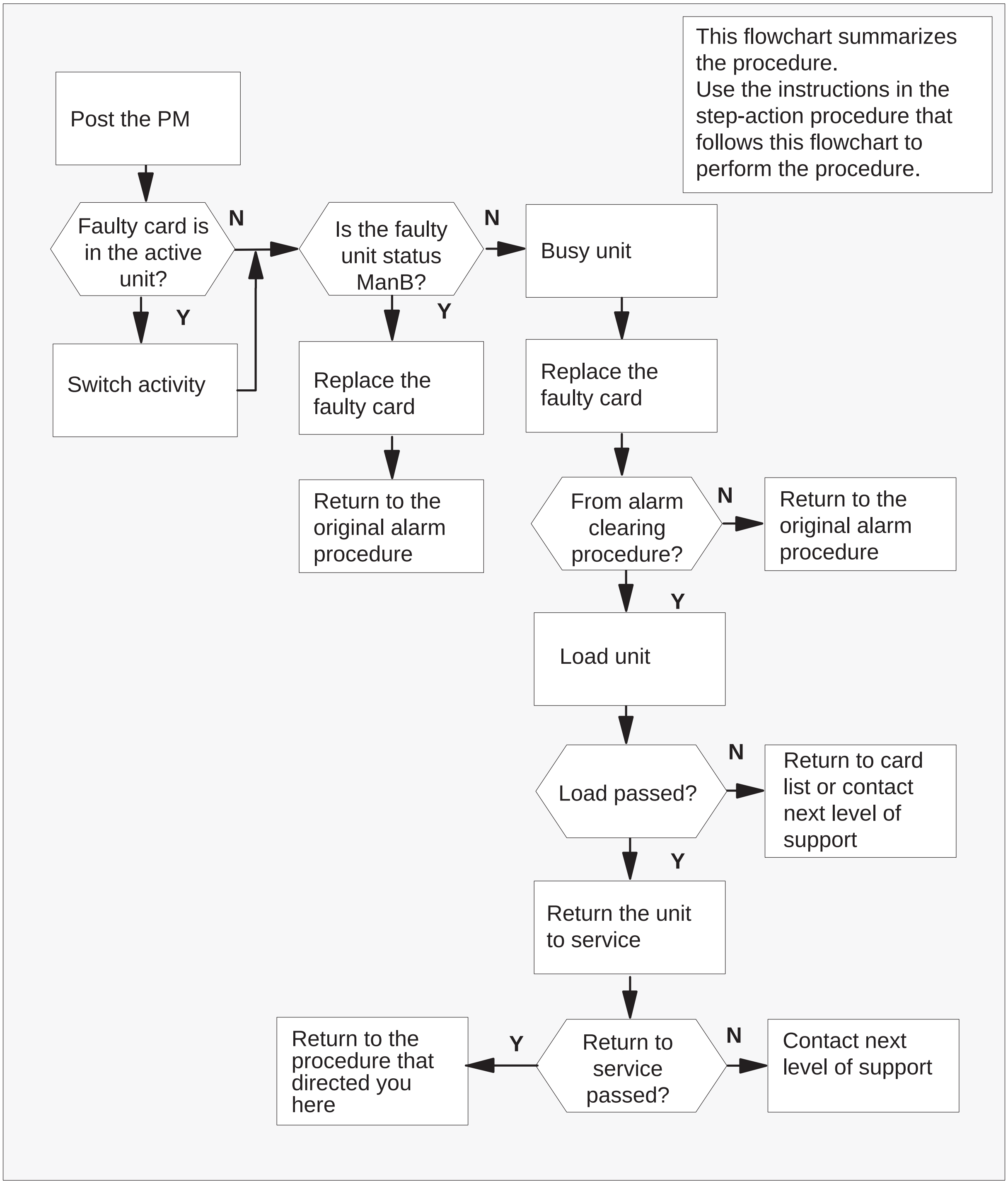
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X41
SMA (continued)

Summary of card replacement procedure for an NT6X41 card in an SMA



NT6X41
SMA (continued)

Replacing an NT6X41 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

> **CAUTION**
> **Loss of service**
> Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    SMA   0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

NT6X41
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	**Do**
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	**Do**
can continue at this time	step 8
cannot continue at this time	step 22

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	**Do**
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NT6X41
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 20.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the inactive SMA unit (0 or 1)

13 Reset the inactive PM unit to inhibit messaging by typing

>PMRESET UNIT unit_no NORUN
and pressing the Enter key.

where

unit_no   is the number of the inactive SMA unit (0 or 1)

At the equipment frame

14

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedure “Removing and inserting cards in an SMA.”

NT6X41
SMA (continued)

15 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 18
other	step 16

At the MAP terminal

16 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If load	Do
passed	step 17
failed	step 20

17 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 16

If RTS	Do
passed	step 18
failed	step 20

At the equipment frame

18 Remove the sign from the active SMA unit.

19 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 21.

NT6X41
SMA (end)

20 For further assistance, contact the personnel responsible for the next level of support.

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

22 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X42
SMA

Application

Use this procedure to replace an NT6X42 card in an SMA.

PEC	Suffixes	Name
NT6X42	AA	Channel Supervision Message

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting card in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

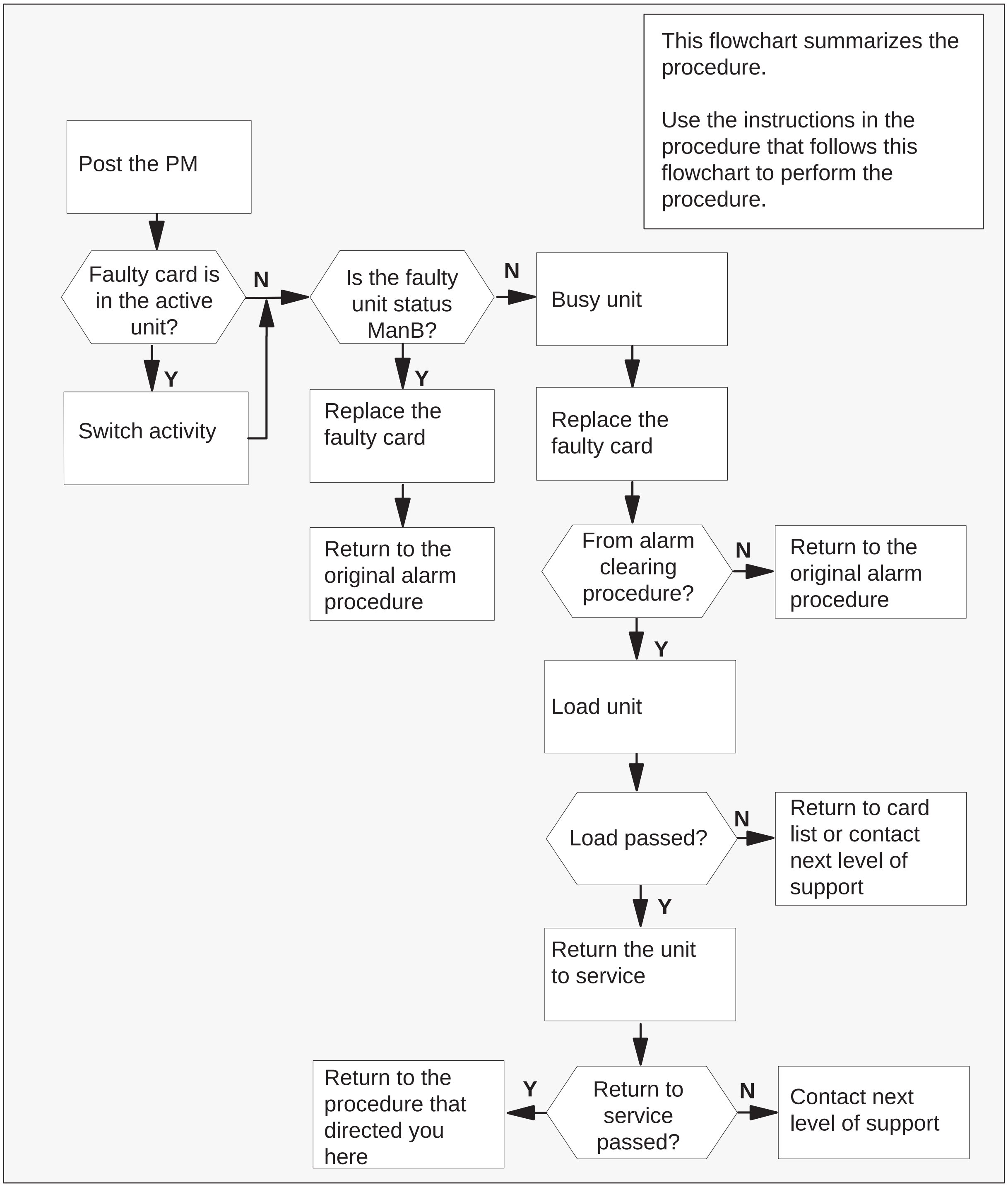
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X42
SMA (continued)

Summary of card replacement procedure for an NT6X42 card in an SMA



Replacing an NT6X42 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0     1     0     2    13
    SMA   0     0     0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact SysB
```

NT6X42
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT

and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 21

8 Confirm the system prompt by typing

>YES

and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NT6X42
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. All faults on the inactive unit must be cleared before attempting to clear the alarm condition on the active unit.

Go to step 19.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the inactive SMA unit (0 or 1)

13 Perform the procedure "Removing and inserting cards in an SMA."

14 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 17
other	step 15

At the MAP terminal

15 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the busied SMA unit

If load	Do
passed	step 16
failed	step 19

16 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the SMA unit loaded in step 15

If RTS	Do
passed	step 17
failed	step 19

At the equipment frame

17 Remove the sign from the active SMA unit.

18 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 20.

19 For further assistance, contact the personnel responsible for the next level of support.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X42
SMA (end)

21 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X44
SMA

Application

Use this procedure to replace the following card in an SMA identified in the following table.

PEC	Suffixes	Name
NT6X44	CA	Time Switch

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting card in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

Do not go to the common procedure unless directed to do so in the step-action procedure.

Action

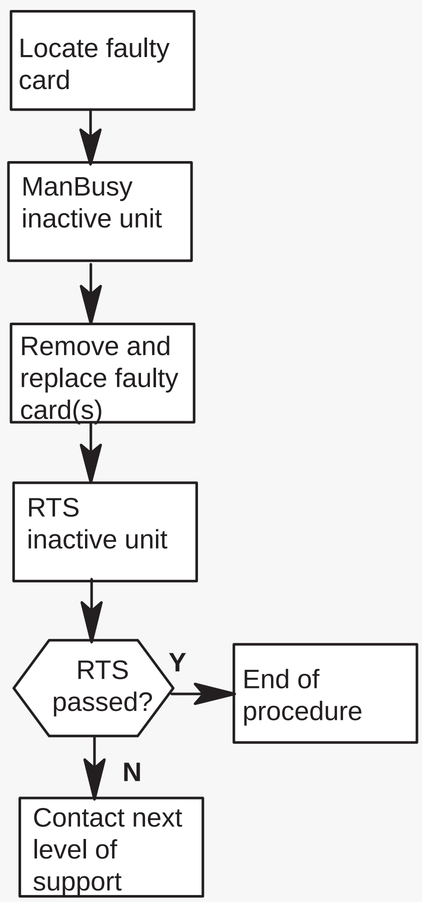
The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X44
SMA (continued)

Summary of card replacement procedure for an NT6X44 card in an SMA

This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.



NT6X44
SMA (continued)

Replacing an NT6X44 card in an SMA

At your current location

1 Proceed only if you were 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

> **CAUTION**
> **Loss of service**
> When replacing a card in the SMA, ensure that the unit in which you are replacing the card is inactive and that the mate unit is active.

Obtain a replacement card. Verify that the replacement card has the same product engineering code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Access the PM level of the MAP display by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA to be posted

Example of a MAP response:

```
SMA 3   INSV    LINKS_OOS    CSIDE 0     PSIDE 0
   Unit0      Act      InSv
   Unit1     InAct     ISTb
```

4 By observing the MAP display, ensure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 8

5 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 6
cannot continue at this time	step 19

6 Switch the activity of the unit by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SwAct passed`	step 8
`SwAct failed  Reason: XPM SwActback`	step 7
`SwAct refused by SwAct controller`	step 7

7 The inactive unit could not establish two-way communication with the central control and has switched activity back to the originally active unit. All faults on the inactive unit must be cleared before attempting to clear the alarm condition on the active unit.

Go to step 17.

At the equipment frame

8 Hang a sign on the active unit with the words: **“Active unit—Do not touch.”** This sign should not be attached by magnets or tape.

NT6X44
SMA (continued)

At the MAP terminal

9 Observe the MAP display and determine the state of the inactive unit. The example in step 3 shows the status of the PM as in-servcie on the active unit and in-service trouble on the inactive unit.

If state is	Do
`ManB`	step 11
`SysB, CBsy, ISTb, or InSv`	step 10

10 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the faulty SMA unit

At the equipment frame

11

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedures "Removing and inserting cards in an SMA."

12 Use the following information to determine the next step in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 16
other	step 13

NT6X44
SMA (end)

At the MAP terminal

13 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the faulty SMA unit

If RTS	Do
passes	step 14
fails	step 17

At the equipment frame

14 Remove the sign from the active SMA unit.

15 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 18.

16 Return to *Alarm Clearing Procedures* section of this manual or other procedure 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.

17 Obtain further assistance in replacing this card by contacting personnel responsible for a higher level of support.

18 You have successfully completed this procedure. Remove the sign from the active unit and return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

19 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X50
SMA

Application

Use this procedure to replace an NT6X50 card in an SMA.

PEC	Suffixes	Name
NT6X50	AB	DS-1 Interface

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

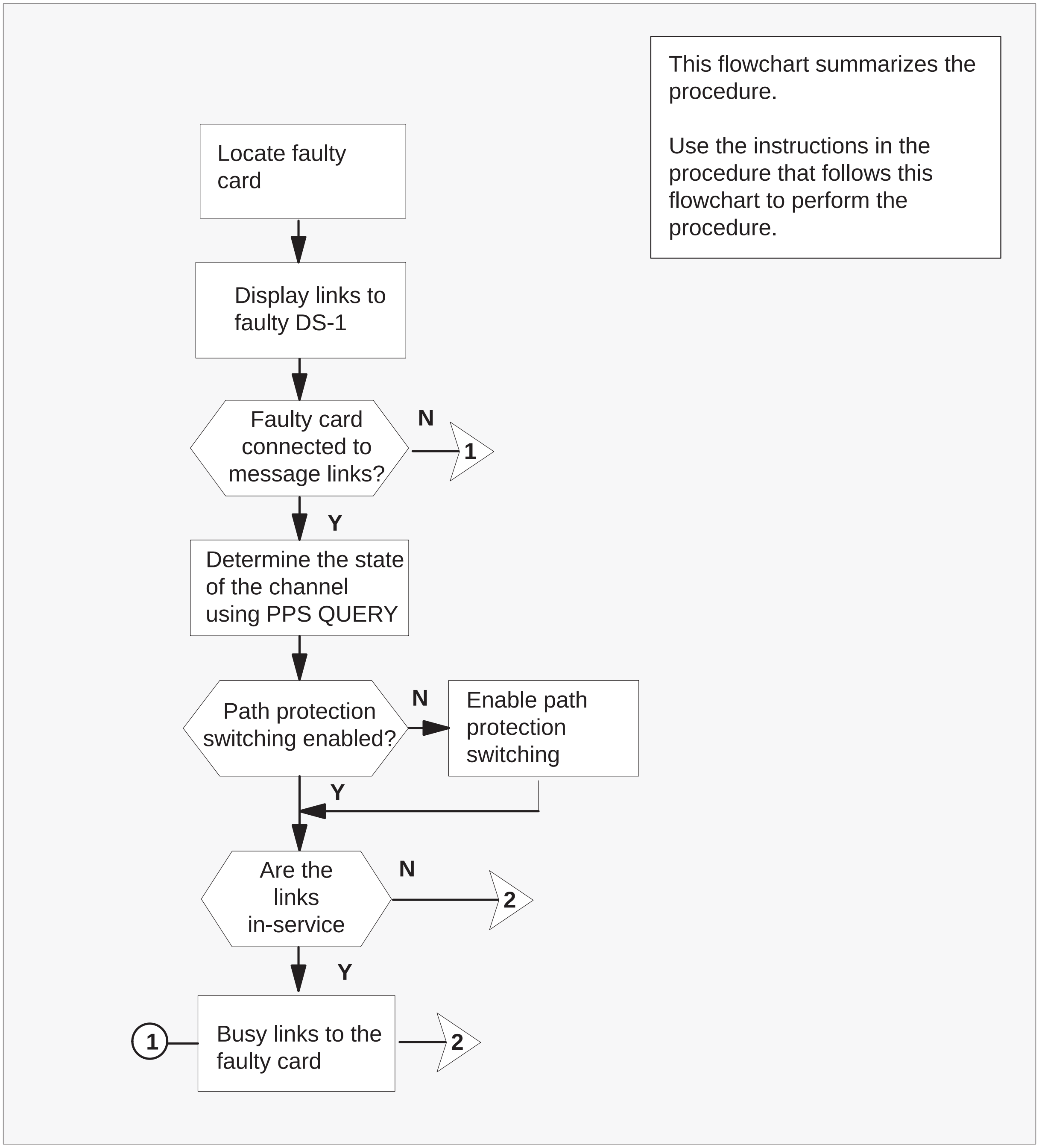
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is a summary of this procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

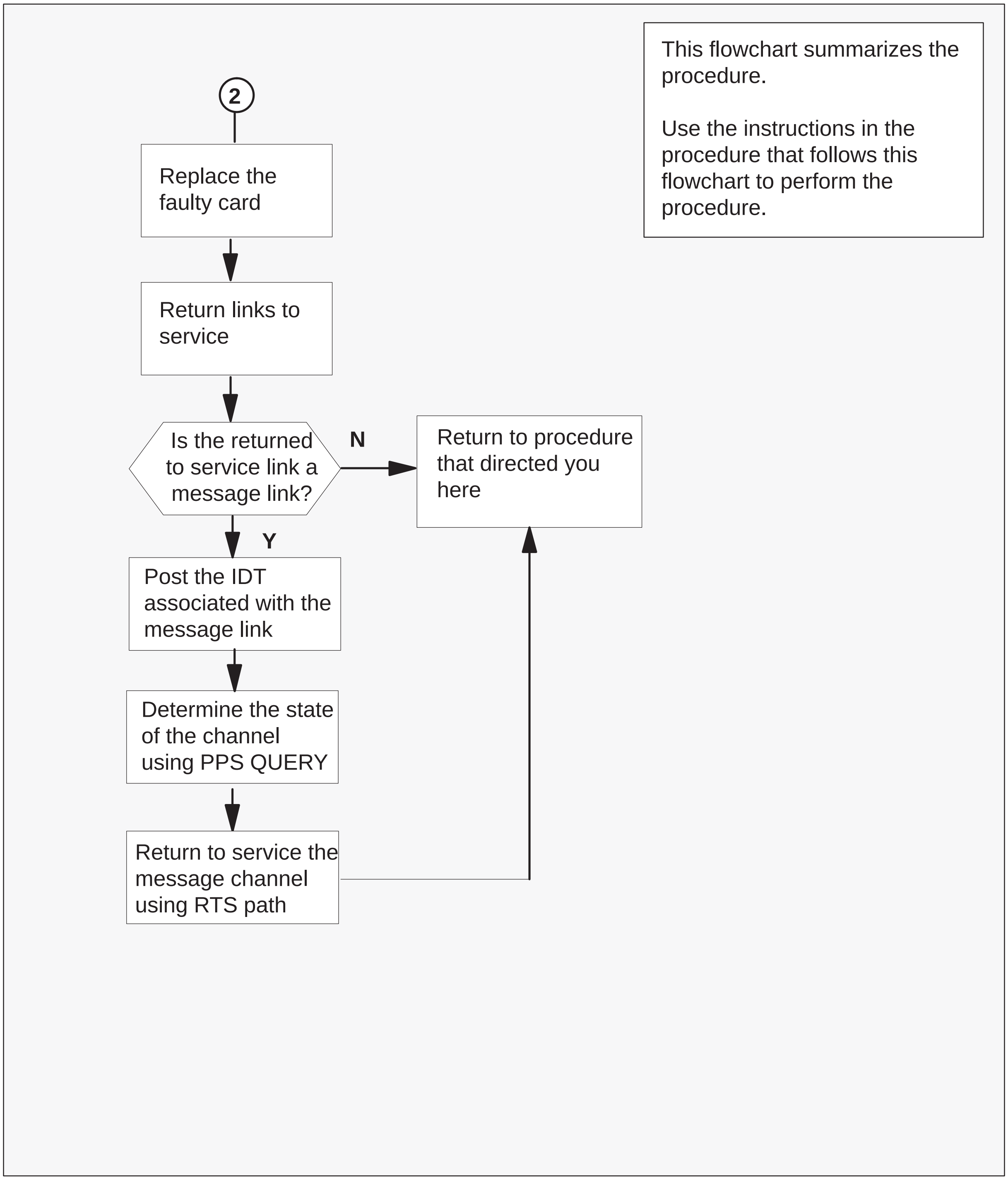
NT6X50
SMA (continued)

Summary of card replacement procedure for an NT6X50 card in an SMA



NT6X50
SMA (continued)

Summary of card replacement procedure for an NT6X50 card in an SMA (continued)



NT6X50
SMA (continued)

Replacing an NT6X50 card in an SMA

At your current location

1

> **CAUTION**
> **Service disruption: calls may be dropped!**
> Perform this card replacement activity only during a period of low traffic. All calls being handled by the links connected to the DS-1 interface card being replaced will be dropped.

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

> **CAUTION**
> **Loss of service**
> Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

NT6X50
SMA (continued)

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no   is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    SMA   0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 11

7 Switch the activity (SWACT) of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
cannot continue at this time	step 8
can continue at this time	step 9

8 Reject the prompt to switch the activity of the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT. Go to step 48.

9 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 11
`SWACT failed Reason: XPM SWACTback`	step 10
`SWACT refused by SWACT Controller`	step 10

10 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 48.

At the equipment frame

11 Hang a sign on the active unit bearing the words: **Active unit–Do not touch**. This sign should not be attached by magnets or tape.

NT6X50
SMA (continued)

At the MAP terminal

12 Display the links to the faulty DS-1 Interface card (NT6X50) by typing

>TRNSL P
and pressing the Enter key.

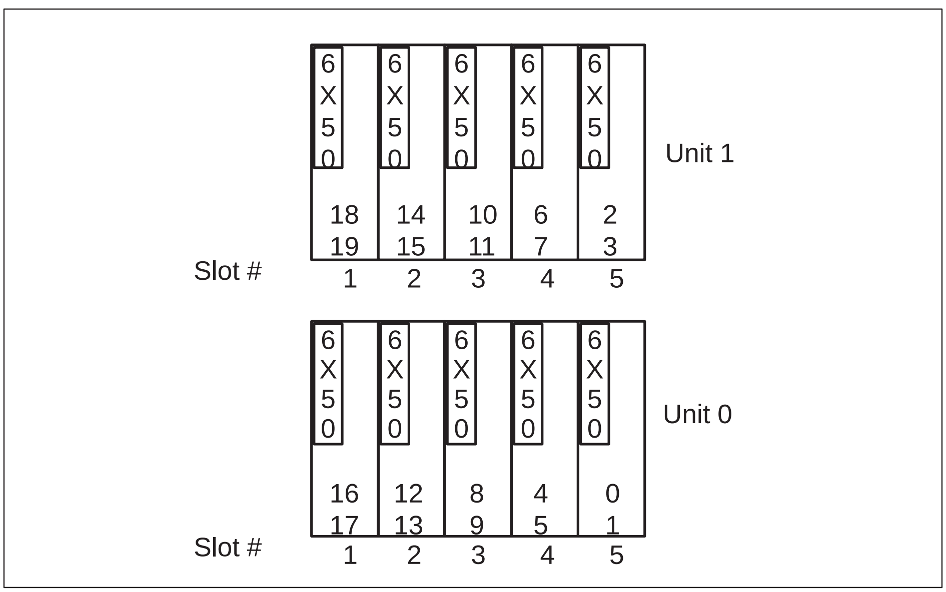
Example of a MAP response:

```
LINK3: IDT 1   3;Cap:MS; Status:OK; MsgCond:OPN
LINK4: IDT 1   4;Cap:MS; Status:OK; MsgCond:CLS
LINK5: IDT 1   Carrier of CLASS – Trunk;Status:SBusy
LINK6: IDT 1   Carrier of CLASS – Trunk;Status:SBusy
LINK7: IDT 2   0;Cap:MS; Status:OK; MsgCond:OPN
LINK8: IDT 2   1;Cap:MS; Status:SBsy; MsgCond:OPN
```

The first line indicates that DS-1 link 3 is connected to IDT1 at C-side link 3.

Record the link numbers, IDT number, and capability (CAP) of the links connected to the NT6X50 card to be replaced.

13 Use the following example to determine the numbers of the peripheral-side (P-side) links connected to the faulty NT6X50 card. Each card is connected to two links. The link 8, shown in step 12, corresponds to the NT6X50 card in slot 3 of unit 0.



14 If the NT6X50 to be replaced is connected to IDT message links, then the appropriate message channels (CSC and EOC) must be busied.

If the link has a CAP of	Do
MS, as identified in step 12	step 15
S, as identified in step 12	step 24

15 Post the IDT associated with the DS-1 link to be taken out of service, as recorded in step 12, by typing

>POST IDT idt_no
and pressing the Enter key.

where

idt_no   is the number of the IDT being posted

Example of a MAP response:

```
IDT      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    IDT   0     0    0     0     1     7

IDT 2 ISTb  Links_OOS:1
```

16 Display information about the state of the channels between the IDT and the RDT by typing

>PPS QUERY
and pressing the Enter key

Example of a MAP response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12; OOS;Standby ;Enable
CSC2: SMA 7  8 24;InSv;Active;Enable
EOC2: SMA 7  8 12;InSv;Active;Enable
```

NT6X50
SMA (continued)

17 Determine if path protection is enabled for all channels.

If one or both CSC or EOC channels are	Do
inhibited	step 18
enabled	step 20

18 Enable path protection on an inhibited CSC or EOC message channel by typing

>PPS ENA path
and pressing the Enter key.

where

path is the inhibited CSC1, CSC2, EOC1, or EOC2

19 Determine if path protection switching must be enabled on additional CSC or EOC message channels.

If	Do
additional channels must be enabled	step 18
all channels are enabled	step 20

20 Determine if the CSC or EOC message channels for the link to be taken out of service are in-service.

If CSC or EOC channels are	Do
in-service	step 21
out-of-service (OOS)	step 23

21 Busy the CSC or EOC message channel associated with the link to be taken out of service by typing

>BSY path
where

path is CSC1, CSC2, EOC1, or EOC2

22 Determine if there are additional CSC or EOC message channels to be taken out of service.

If	Do
more channels must be taken out of service	step 21
no more channels are to be taken out of service	step 23

23 Determine if an additional link, as recorded in step 12, must be taken out of service associated with the NT6X50 to be replaced.

If	Do
an additional link must be taken out of service	step 14
no more links are to be taken out of service	step 24

24 Post the SMA identified in step 5 by typing

>POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    SMA   0     0    0     0     1     7

SMA 7 ISTb  Links_OOS:  CSide 0, PSide 1
Unit0:  Act   InSv
Unit1:  Inact InSv
```

NT6X50
SMA (continued)

25

> **CAUTION**
> **Service disruption: calls may be dropped!**
> If you are prompted to confirm a BSY LINK command, perform this activity only during a period of low traffic. All calls being handled by the busied link will be dropped.

Busy one of the links connected to the faulty NT6X50, as recorded in step12, by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no   is the number of the link connected to the faulty NT6X50 card

A confirmation prompt for the BSY command is displayed at the MAP terminal

Example of a MAP response:

```
bsy link 0
Any active call may be lost
Please confirm (“Yes”, “Y”, “No”, or “N”):
```

If	Do
cannot continue at this time	step 26
can continue at this time	step 33

26 Reject the prompt to BSY the link by typing

>NO
and pressing the Enter key.

The system discontinues the BSY command.

27 Determine if the link is a message link

If the link has a CAP of	Do
MS	step 28
S	step 48

NT6X50
SMA (continued)

28 Post the IDT associated with the link by typing

>POST IDT idt_no
and pressing the Enter key.

where

idt_no   is the number of the IDT being posted

Example of a MAP response:

```
IDT      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0     1     0     2    13
    IDT   0     0     0     0     1     7

IDT 2 ISTb  Links_OOS:1
```

29 Display information about the state of the channels between the IDT and the RDT by typing

>PPS QUERY
and pressing the Enter key

Example of a MAP response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12; 00S;Active ;Enable
CSC2: SMA 7  8 24;InSv;Standby;Enable
EOC2: SMA 7  8 12;InSv;Standby;Enable
```

30 Determine if there are any CSC or EOC message channels for the link to be returned to service.

If CSC or EOC channels are	Do
all in-service	step 48
out-of-service (OOS)	step 31

31 Return to service the message channels which were taken out of service in step 21 by typing

>RTS path
where

path   is CSC1, CSC2, EOC1, or EOC2

NT6X50
SMA (continued)

32 Determine if there are additional CSC or EOC message channels to be returned to service.

If there are	Do
more channels to be returned to service	step 31
no more channels to be returned to service	step 48

33 Confirm the system prompt by typing

>YES
and pressing the Enter key.

Go to step 34.

34 Determine if there are additional links on the NT6X50 to be taken out of service.

If	Do
there is another link to be taken out of service with a CAP of S	step 25
there is another link to be taken out of service with a CAP of MS and the associated IDT message channel has not been taken out of service	step 15
all links have been taken out of service	step 35
there is another link to be taken out of service with a CAP of MS and the associated IDT message channel has been taken out of service	step 25

At the equipment frame

35

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedure “Removing and inserting cards in an SMA.”

36 Ensure the switches on the replacement card are set to the same settings as those on the card you have just removed.

Refer to the following table for information on release numbers related to cable length and switch settings.

Switch settings for NT6X50 cards

Card	Length of cable	Close these switch contacts and leave all others open
NTX6X50AB, release number 39 or lower	0m to 91 m (0 ft to 299 ft)	SW1
	91 m to 137 m (299 ft to 449 ft)	SW2 SW5 SW7
	137 m to 200 m (449 ft to 655 ft)	SW3 SW6 SW8
NT6X50AB, release numbers 40 to 59	0 m to 91 m (0 ft to 299 ft)	SW4
	91 m to 137 m (299 ft to 449 ft)	SW3 SW6 SW8
	137 m to 200 m (449 ft to 655 ft)	SW1 SW5 SW7

—continued—

NT6X50
SMA (continued)

Switch settings for NT6X50 cards (continued)

Card	Length of cable	Close these switch contacts and leave all others open
NT6X50AB, release numbers 60 or higher	0 m to 41 m (0 ft to 133 ft)	SW1
	41 m to 81 m (133 ft to 266 ft)	S2 S3
	81 m to 122 m (266 ft to 399 ft)	S2
	122 m to 163 m (339 ft to 533 ft)	S3
	163 m to 200 m (533 ft to 655 ft)	None, all contacts are to be open

—end—

At the MAP terminal

37 Post the SMA identified in step 5 by typing

>POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    SMA   0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

38 Return to service one of the two busied links by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of the link connected to the NT6X50 card

If RTS	Do
passed	step 39
failed	step 48

39 Determine if the link that was returned to service is a messaging link.

If the link has a CAP of	Do
MS, as identified in step 12	step 41
S, as identified in step 12	step 40

40 Determine if additional links are to be returned to service

If	Do
an additional link must be returned to service	step 38
no more links are to be returned to service	step 46

NT6X50
SMA (continued)

41 Post the IDT associated with the DS-1 link that has been returned to service by typing

>POST IDT idt_no
and pressing the Enter key.

where

idt_no is the number of the IDT being posted

Example of a MAP response:

```
IDT      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0     1     0     2    13
    IDT   0     0     0     0     1     7

IDT 1 SysB  Links_OOS:0
```

42 Display information about the state of the channels between the IDT and the RDT by typing

>PPS QUERY
and pressing the Enter key

Example of a MAP response:

```
CSC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
CSC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

43 Return to service the message channels which were taken out of service in step 21 by typing

>RTS path
where

path is CSC1, CSC2, EOC1, or EOC2

44 Determine if there are additional CSC or EOC message channels to be returned to service.

If there are	Do
more channels to be returned to service	step 43
no more channels to be returned to service	step 45

NT6X50
SMA (end)

45 Determine if there are additional links on the NT6X50 to be returned service.

If	Do
there is another link to be returned to service	step 37
all links have been returned to service	step 46

At the equipment frame

46 Remove the sign from the active SMA unit.

47 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 49.

48 For further assistance, contact the personnel responsible for the next level of support.

49 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X69
SMA

Application

Use this procedure to replace an NT6X69 card in an SMA.

PEC	Suffixes	Name
NT6X69	AC, AD, QA	Message Protocol and Tone Interface

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

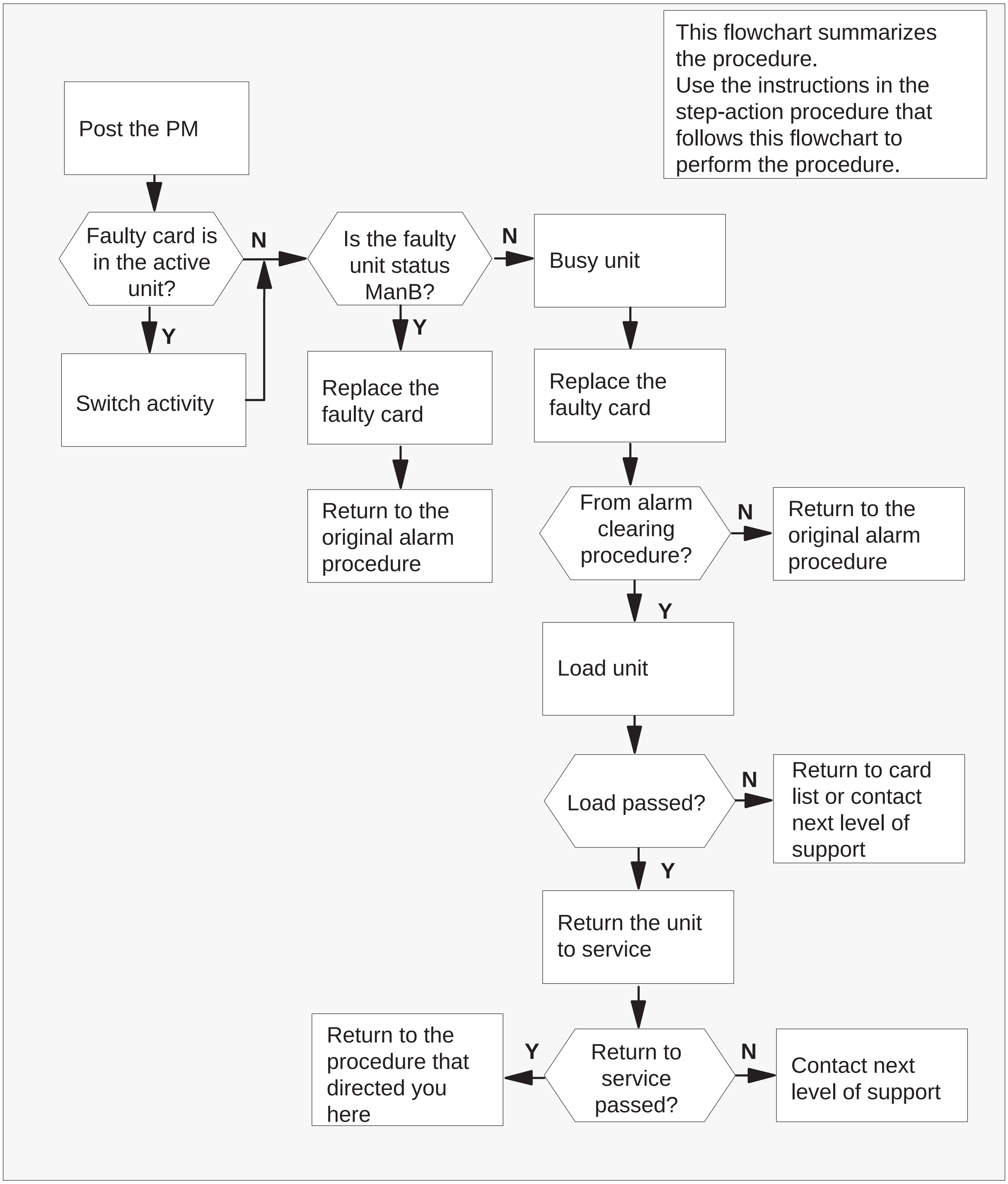
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X69
SMA (continued)

Summary of card replacement procedure for an NT6X69 card in an SMA



NT6X69
SMA (continued)

Replacing an NT6X69 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0    1     0     2    13
    SMA   0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact SysB
```

NT6X69
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT

and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 22

8 Confirm the system prompt by typing

>YES

and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NT6X69
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 20.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

13 Reset the inactive PM unit to inhibit messaging by typing

>PMRESET UNIT unit_no NORUN
and pressing the Enter key.

At the equipment frame

14

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedure “Removing and inserting cards in an SMA.”

NT6X69
SMA (continued)

15 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 18
other	step 16

At the MAP terminal

16 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If load	Do
passed	step 17
failed	step 20

17 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 16

If RTS	Do
passed	step 18
failed	step 20

At the equipment frame

18 Remove the sign from the active SMA unit.

19 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 21.

NT6X69
SMA (end)

20 For further assistance, contact the personnel responsible for the next level of support.

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

22 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X78
SMA

Application

Use this procedure to replace an NT6X78 card in a Subscriber Module AccessNode (SMA).

PEC	Suffixes	Name
NT6X78	AB, BA	CLASS Modem Resource (CMR)

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

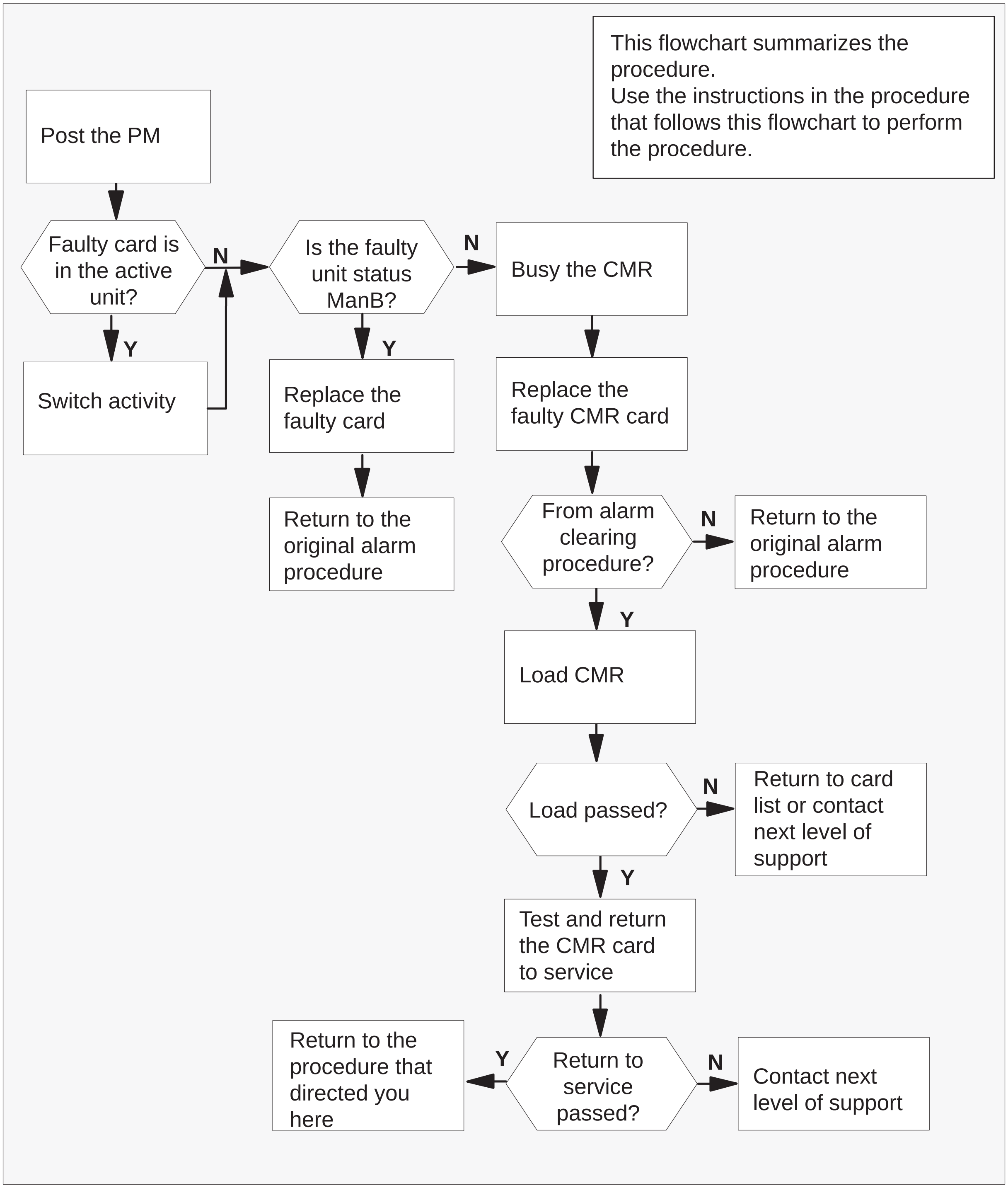
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X78
SMA (continued)

Summary of card replacement procedure for a NT6X78 card in a SMA



Replacing an NT6X78 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the peripheral module (PM) level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM    3     0     1     0     2    13
    SMA   0     0     0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact SysB
```

NT6X78
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 21

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACT back`	step 9
`SWACT refused by swact controller`	step 9

NT6X78
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 19.

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch**. This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12 Busy the CMR card in the inactive unit by typing

>BSY UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the equipment frame

13

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedure “Removing and inserting cards in an SMA.”

14 Use the following information to determine the next step.

If your were directed here from	Do
alarm clearing procedures	step 17
other	step 15

NT6X78
SMA (continued)

At the MAP terminal

15 Load the CMR in the inactive SMA unit by typing

>LOADPM UNIT unit_no CC CMR
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If LOAD	**Do**
passed	step 16
failed	step 19

16 Test and return to service the CMR in the inactive SMA unit by typing

>RTS UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 15

If RTS	**Do**
passed	step 17
failed	step 19

At the equipment frame

17 Remove the sign from the active SMA unit.

18 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 20.

19 For further assistance, contact the personnel responsible for the next level of support.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X78
SMA (end)

21 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X80
SMA

Application

Use this procedure to replace an NT6X80 card in an SMA.

PEC	Suffixes	Name
NT6X80	AB, BB	Pulse Code Modulation (PCM)/Addition

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting card in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

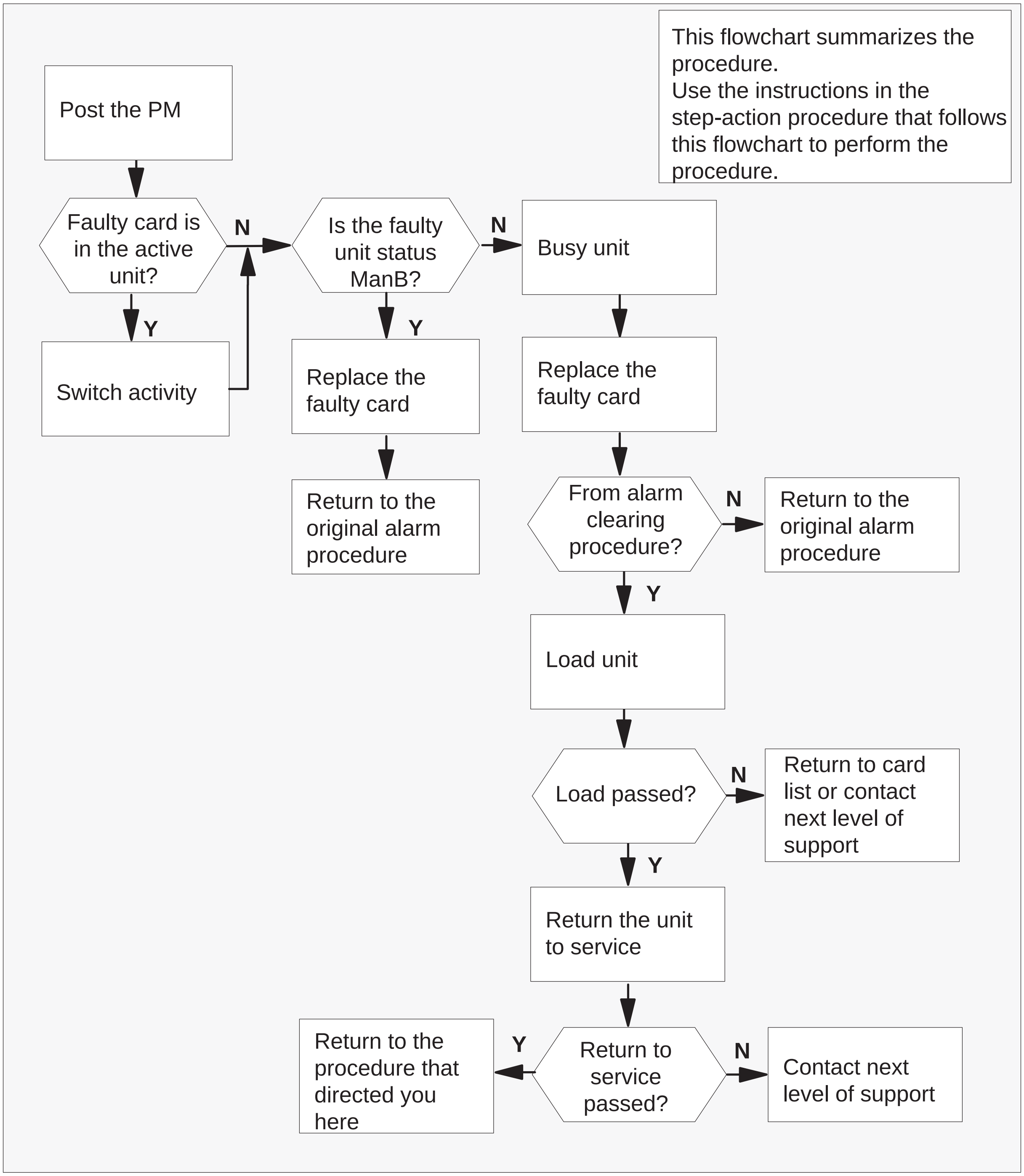
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X80
SMA (continued)

Summary of card replacement procedure for an NT6X80 card in an SMA



NT6X80
SMA (continued)

Replacing an NT6X80 in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

> **CAUTION**
> **Loss of service**
> Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0     1     0     2    13
    SMA    0     0     0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 21

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NT6X80
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 19.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the equipment frame

13 Perform the procedure “Removing and inserting cards in an SMA.”

NT6X80
SMA (continued)

14 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 17
other	step 15

At the MAP terminal

15 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If load	Do
passed	step 16
failed	step 19

16 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 15

If RTS	Do
passed	step 17
failed	step 19

At the equipment frame

17 Remove the sign from the active SMA unit.

18 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 20.

NT6X80
SMA (end)

19 For further assistance, contact the personnel responsible for the next level of support.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

21 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NT6X92
SMA

Application

Use this procedure to replace an NT6X92 card in an SMA.

ATTENTION
To ensure peak performance, do not install the UTR and GTR on the same SMA. Presently, there is no way of knowing which receiver is used to interpret tones. Some call processing tones may be degraded if designed for use with a GTR.

PEC	Suffixes	Name
NT6X92	BB	Universal Tone Receiver (UTR)
NT6X92	EA	Global Tone Receiver (GTR)

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

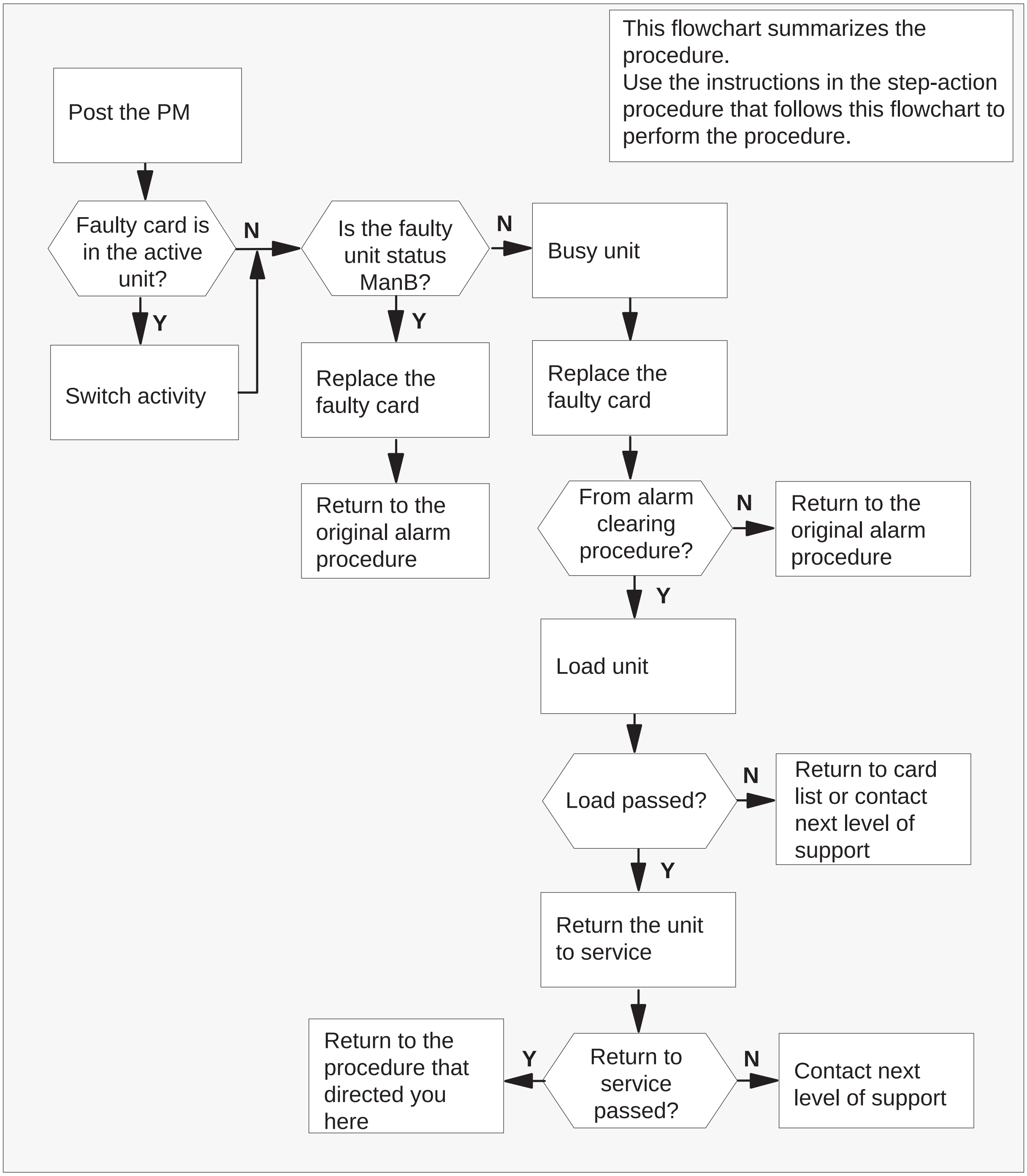
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NT6X92
SMA (continued)

Summary of card replacement procedure for an NT6X92 card in an SMA



Replacing an NT6X92 in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM      3     0    1     0     2    13
    SMA    0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact SysB
```

NT6X92
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 21

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

9 The inactive unit could not establish two-way communication with the central control and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 19.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit–Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12 Busy the inactive PM unit by typing

>BSY INACTIVE
and pressing the Enter key

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the equipment frame

13

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedure “Removing and inserting cards in an SMA.”

NT6X92
SMA (continued)

14 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 17
other	step 15

At the MAP terminal

15 Load the inactive SMA unit by typing

>LOADPM INACTIVE
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If load	Do
passed	step 16
failed	step 19

16 Return the inactive SMA unit to service by typing

>RTS INACTIVE
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 15

If RTS	Do
passed	step 17
failed	step 19

At the equipment frame

17 Remove the sign from the active SMA unit.

18 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 20.

NT6X92
SMA (end)

19 For further assistance, contact the personnel responsible for the next level of support.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

21 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NTAX74
SMA

Application

Use this procedure to replace an NTAX74 card in an SMA.

PEC	Suffixes	Name
NTAX74	AA	Cellular Access Processor with 16Mb Memory

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Unseating a card in an SMA”
- “Reseating a card in an SMA”
- “Returning a card for repair or replacement”

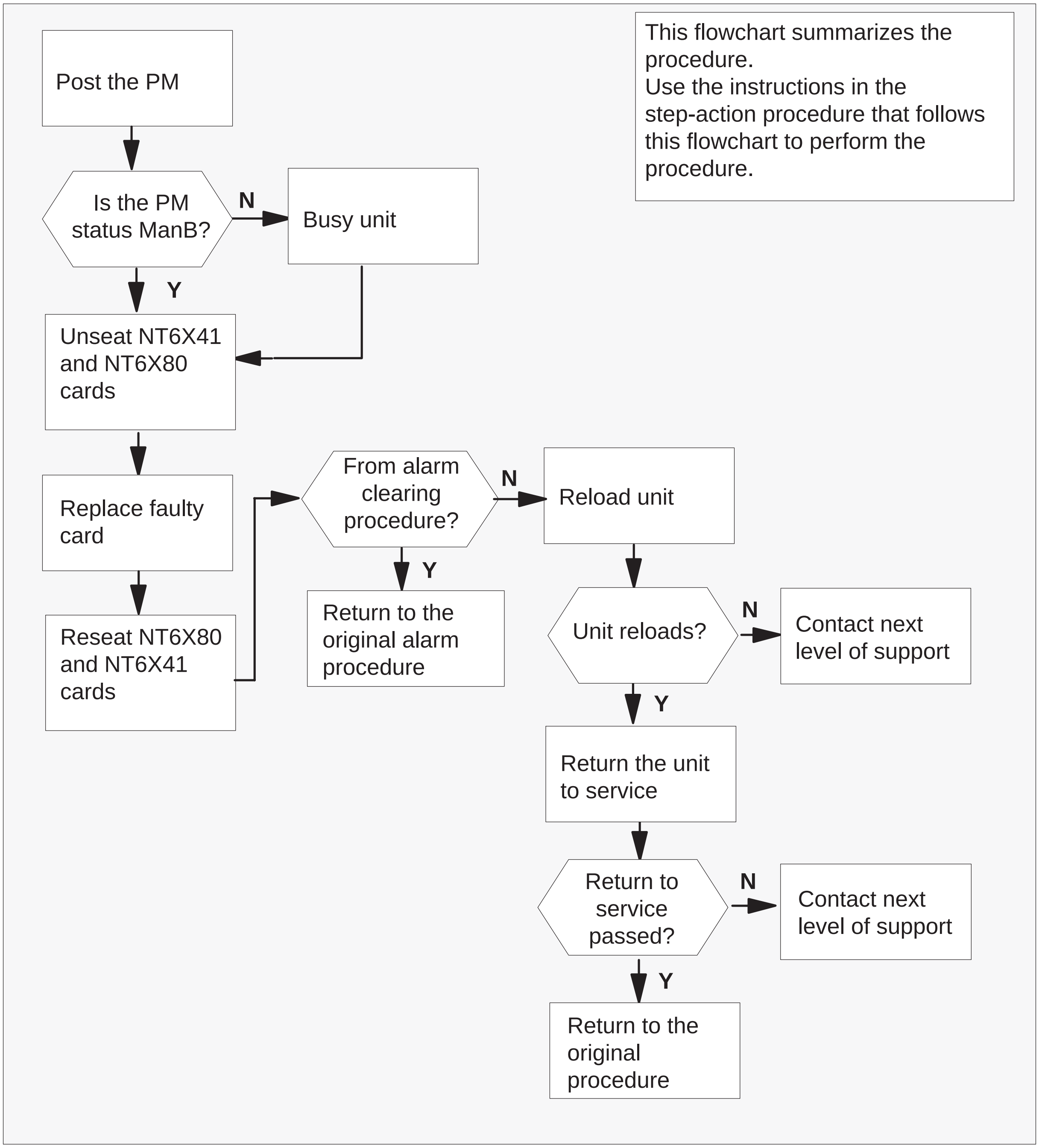
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTAX74
SMA (continued)

Summary of card replacement procedure for an NTAX74 card in an SMA



NTAX74
SMA (continued)

Replacing an NTAX74 card in an SMA

At your Current Location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no   is the number of the SMA being posted

Example of a MAP response

```
SMA     SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    SMA    0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact SysB
```

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT

and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 46

8 Confirm the system prompt by typing

>YES

and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NTAX74
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 44.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`SysB, CBsy, ISTb, or InSv`	step 12
`ManB`	step 13

12 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the inactive SMA unit (0 or 1)

At the equipment frame

13

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Unseat but do not remove the NT6X41 Host Link Formatter circuit card, and the NT6X80 PCM Loss Addition circuit card using the procedure “Unseating a card in an SMA.”

14 Remove the faulty NTAX74 card using the procedure “Removing and inserting cards in an SMA.”

15

> **WARNING**
> **Possible loss of P-side nodes**
> Monitor the LEDs on the faceplate of the replacement NTAX74 circuit card.
> 1. The INSV and ESA LEDs will come ON and remain ON until loading begins.
> 2. The ACT LED may come ON and light for less than one second. If the ACT LED remains ON for more than 1 second, immediately remove the NTAX74 circuit card, obtain a new NTAX74 circuit card, and return to this step. If the NTAX74 circuit card is allowed to remain with both units having an active processor, a condition of dual activity exists, which results in the loss of P-side nodes.

Insert the new NTAX74 card using the procedure “Removing and inserting cards in an SMA.”

16 Reseat the the NT6X80 PCM Loss Addition circuit card, and NT6X41 Host Link Formatter circuit card using the procedure “Reseating a card in an SMA.”

17 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 43
other	step 18

NTAX74
SMA (continued)

18 After replacing the faulty card, load the inactive unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive unit

If	Do
message `loadfile not found in directory` is received	step 19
load passes	step 38
load fails	step 44

19 Determine the type of device where the PM load files are located.

If load files are located on	Do
tape	step 20
IOC disk	step 26
SLM disk	step 31

20 Locate the tape that contains the PM load files.

21 Mount the tape on a magnetic tape drive.

At the MAP terminal

22 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

23 List the contents of the tape in your user directory by typing

>LIST Ttape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

24 Demount the tape drive by typing

>DEMOUNT Ttape_no
and pressing the Enter key.

where

tape_no is the number of the tape drive containing the PM load files

25 Go to step 36.

26 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.

27 Access the disk utility level of the MAP display by typing

>DSKUT
and pressing the Enter key.

28 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 26.

29 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

30 Go to step 36.

31 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.

32 Access the disk utility level of the MAP display by typing

>DISKUT
and pressing the Enter key.

NTAX74
SMA (continued)

33 List the SLM disk volumes by typing

>LV CM
and pressing the Enter key.

34 List the SLM file names into your user directory by typing

>LISTFL 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 31.

35 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

36 After listing the PM load files, load the inactive SMA unit by typing

>LOADPM INACTIVE
and pressing the Enter key.

If load	Do
passed	step 38
failed	step 44

37 Determine the name of the firmware load file by typing

>QUERYPM CNTRS
and pressing the Enter key.

Cross-reference this name to the disk volume name on the PMLoad File Office Record (or similar list of all PM load files maintained in your office).

If the firmware load file name displayed is	Do
the same	step 40
different	step 38

NTAX74
SMA (continued)

38 Load the NTAX74 firmware by typing

>LOADFW INACTIVE
and pressing the Enter key.

If load	Do
passed	step 39
failed	step 44

39 To upgrade the firmware on the inactive unit type

>LOADFW INACTIVE UPGRADE
and pressing the Enter key.

If LOADFW UPGRADE	Do
passed	step 40
failed	step 44

40 Return the inactive SMA unit to service by typing

>RTS INACTIVE
and pressing the Enter key.

If RTS	Do
passed	step 41
failed	step 44

At the equipment frame

41 Remove the sign from the active SMA unit.

42 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 45.

NTAX74
SMA (end)

43 Return to the *Alarm Clearing Procedure* or other 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 procedure for that card in this manual.

44 For further assistance, contact the personnel responsible for the next level of support.

45 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

46 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NTAX78
SMA

Application

Use this procedure to replace an NTAX78 card in an SMA.

PEC	Suffixes	Name
NTAX78	AB	Enhanced Time Switch

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

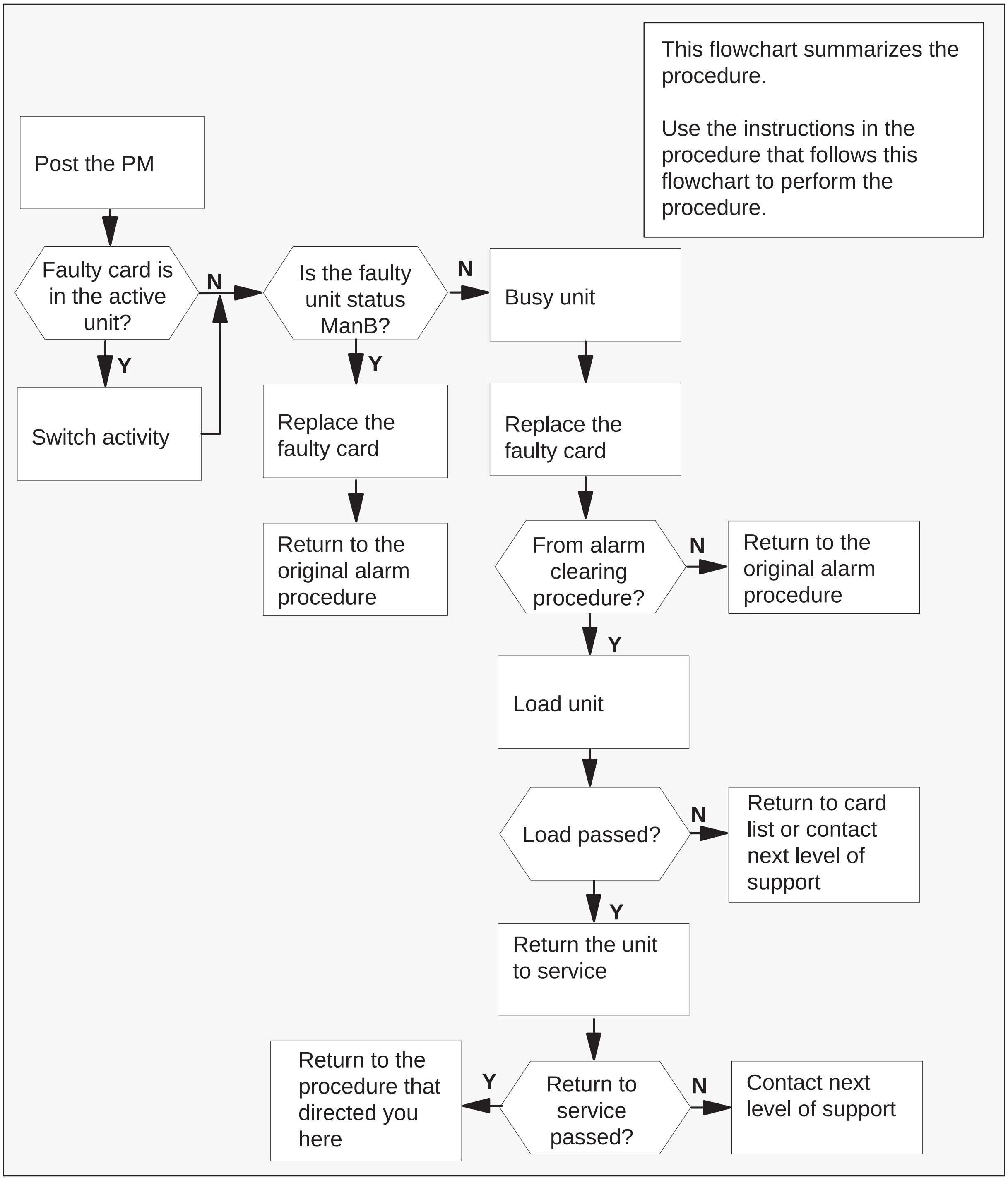
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTAX78
SMA (continued)

Summary of card replacement procedure for an NTAX78 card in an SMA



NTAX78
SMA (continued)

Replacing an NTAX78 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If	Do
known	step 4
unknown	step 3

3 Perform the procedure "Locating a faulty card in an SMA."

4

> **CAUTION**
> **Loss of service**
> Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At your MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;,MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no   is the number of the SMA being posted

Example of a MAP response:

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0     1     0     2    13
    SMA    0     0     0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

NTAX78
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If faulty card is on	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 23

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM,SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NTAX78
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 21.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch**. This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	**Do**
Manb	step 14
SysB, CBsy, ISTb, or InSv	step 12

12 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

13 Reset the unit by typing

>PMRESET UNIT unit_no NORUN
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the equipment frame

14

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Perform the procedure “Removing and inserting cards in an SMA.”

NTAX78
SMA (continued)

15 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 19
other	step 16

16 Reset the unit by typing

>PMRESET UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the MAP terminal

17 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If load	Do
passed	step 18
failed	step 21

18 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 17

If RTS	Do
passed	step 19
failed	step 21

NTAX78
SMA (end)

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 22.

21 For further assistance, contact the personnel responsible for the next level of support.

22 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

23 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NTBX01
SMA

Application

Use this procedure to replace an NTBX01 card in an SMA.

PEC	Suffixes	Name
NTBX01	AB	Enhanced ISDN Signal Pre-processor

Common procedures

The following procedures are referenced in this procedure:

- "Removing and inserting cards in an SMA"
- "Locating a faulty card in an SMA"
- "Returning a card for repair or replacement"

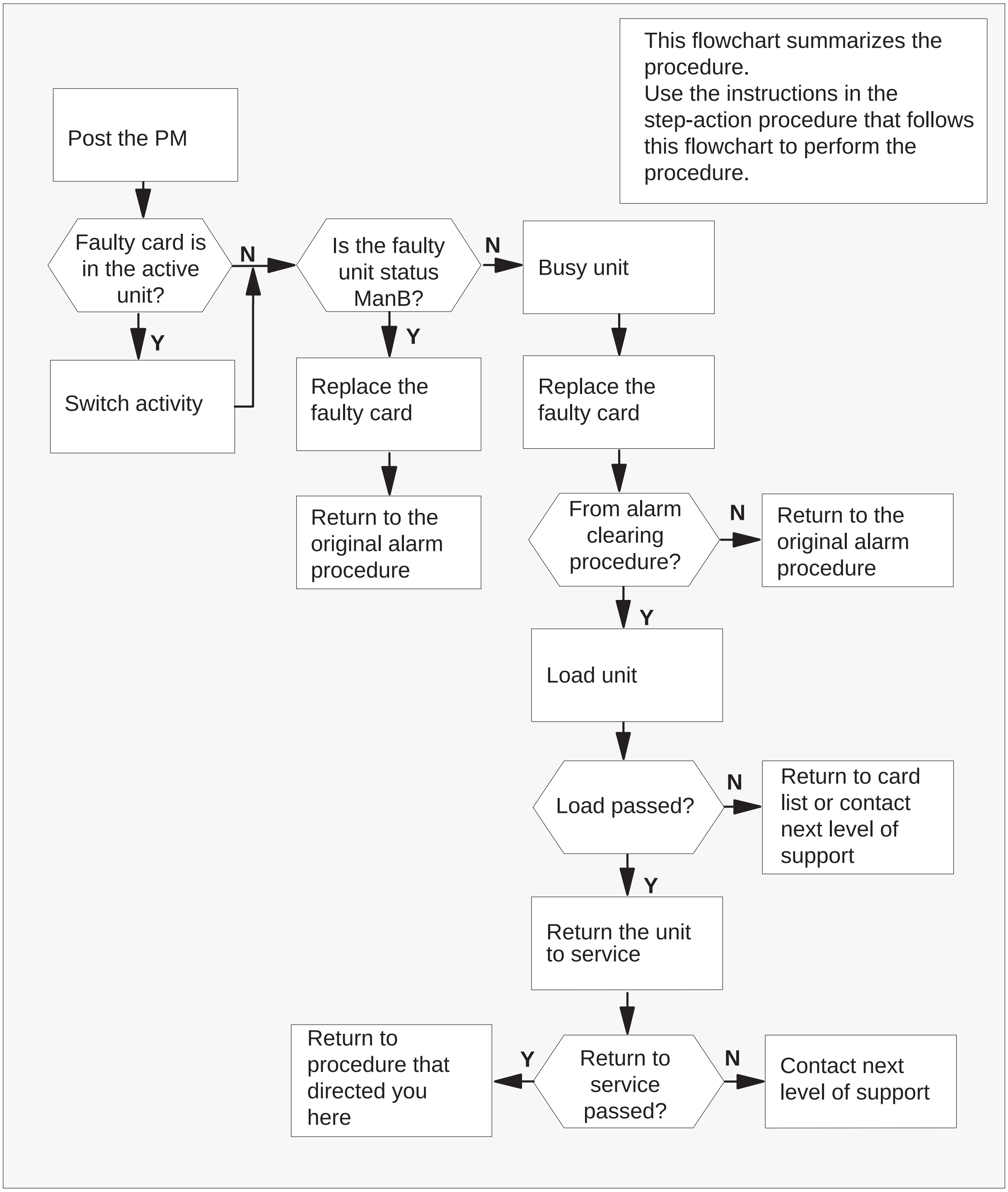
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTBX01
SMA (continued)

Summary of card replacement procedure for an NTBX01 card in an SMA



NTBX01
SMA (continued)

Replacing an NTBX01 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response

```
          SysB  ManB  Offl  CBsy  ISTb  InSv
     PM     3     0    1     0     2    13
     SMA    0     0    0     0     1     7

 SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
 Unit0:  Act   InSv
 Unit1:  Inact ISTb
```

NTBX01
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT

and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 21

8 Confirm the system prompt by typing

>YES

and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed` `Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT` `Controller`	step 9

NTBX01
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 19.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If the state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the equipment frame

13 Perform the procedure “Removing and inserting cards in an SMA.”

NTBX01
SMA (continued)

14 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 17
other	step 15

At the MAP terminal

15 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the busied SMA unit

If LOADPM	Do
passed	step 16
failed	step 19

16 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 15

If RTS	Do
passed	step 17
failed	step 19

At the equipment frame

17 Remove the sign from the active SMA unit.

18 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 20.

NTBX01
SMA (end)

19 For further assistance, contact the personnel responsible for the next level of support.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

21 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NTBX02
SMA

Application

Use this procedure to replace an NTBX02 card in an SMA.

PEC	Suffixes	Name
NTBX02	BA	Enhanced D-Channel Handler (DCH) card

Common procedures

The following procedures are referenced in this procedure:

- “Removing and inserting cards in an SMA”
- “Locating a faulty card in an SMA”
- “Unseating a card in an SMA”
- “Reseating a card in an SMA”
- “Returning a card for repair or replacement”

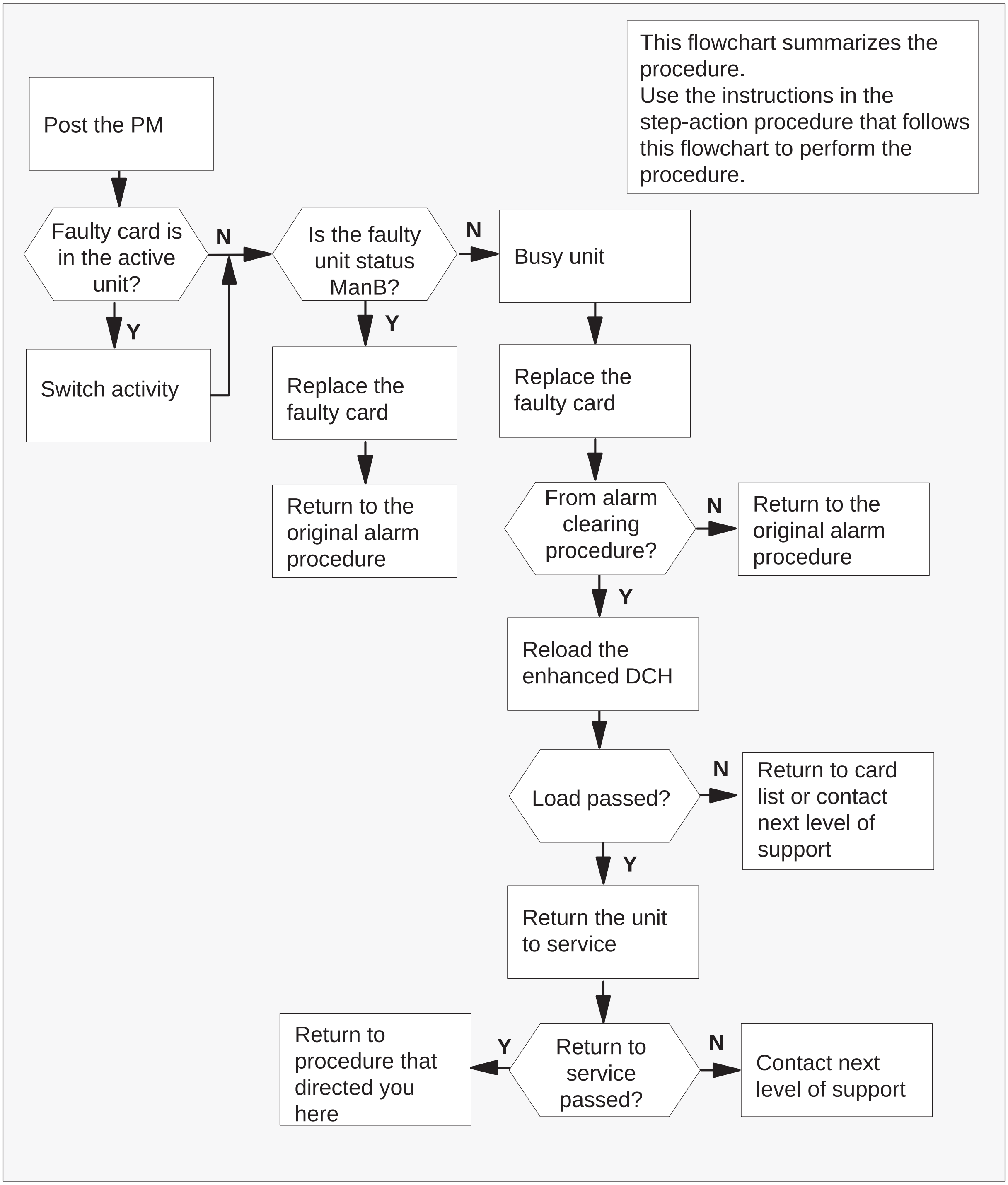
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTBX02
SMA (continued)

Summary of card replacement procedure for an NTBX02 card in an SMA



Replacing an NTBX02 card in an SMA

At your Current Location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4 **CAUTION**
Loss of service
Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA to be posted

Example of a MAP response

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    SMA    0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

NTBX02
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT

and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 25

8 Confirm the system prompt by typing

>YES

and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

9 The inactive unit could not establish two-way communication with the central control and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 23.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit–Do not touch.** This sign should not be attached by magnets or tape.

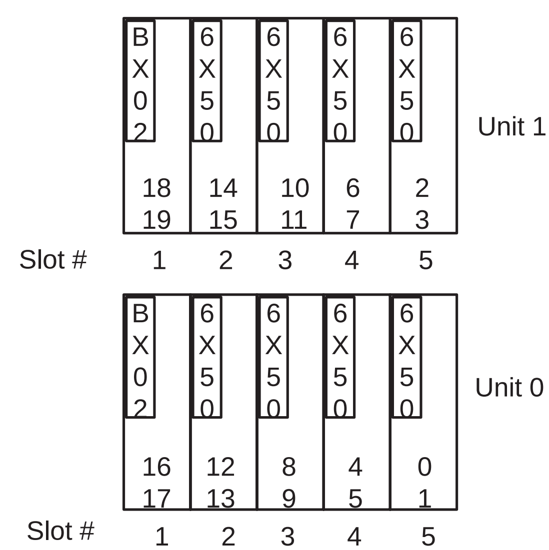
At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If the state is	Do
`ManB`	step 12
`SysB, CBsy, ISTb, or InSv`	step 13

12 Identify all D-channel handler (DCH) cards (NTBX02) with ports connected to the busied unit using the following diagram.

Table LTCPSINV shows the card type for each slot. Table DCHINV associates DCH numbers with slots.



NTBX02
SMA (continued)

13 Go to the DCH level of the MAP terminal by typing

>DCH
and pressing the Enter key.

14 Post the faulty DCH card (NTBX02) by typing

>POST dch_no
and pressing the Enter key.

Table DCHINV details the physical P-side link, which maps the logical DCH number to the physical location.

15 Busy the link to the faulty DCH card by typing

>BSY dch_no
and pressing the Enter key.

where

dch_no is one of the cards with ports connected to the busied unit

At the equipment frame

16

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the frame supervisory panel (FSP). This protects the equipment against damage caused by static electricity.

Repeat steps 14 and 15 for each DCH card (NTBX02) with ports connected to the busied unit.

17 Replace the faulty NTBX02 card using the procedure “Removing and inserting cards in an SMA.”

At the MAP terminal

18 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 24
other	step 19

NTBX02
SMA (end)

19 Load the replaced DCH card by typing

>LOADPM
and pressing the Enter key.

If load	Do
passed	step 20
failed	step 23

20 Return to service one of the DCH cards with ports connected to the inactive unit by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 21
failed	step 23

At the equipment frame

21 Remove the sign from the active SMA unit.

22 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 24.

23 For further assistance, contact the personnel responsible for the next level of support.

24 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

25 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

NTMX71
SMA

Application

Use this procedure to replace an NTMX71 card in an SMA.

PEC	Suffixes	Name
NTMX71	AA	XPM Plus Terminator Paddleboard

Common procedures

The following procedures are referenced in this procedure:

- “Locating a faulty card in an SMA”
- “Returning a card for repair or replacement”

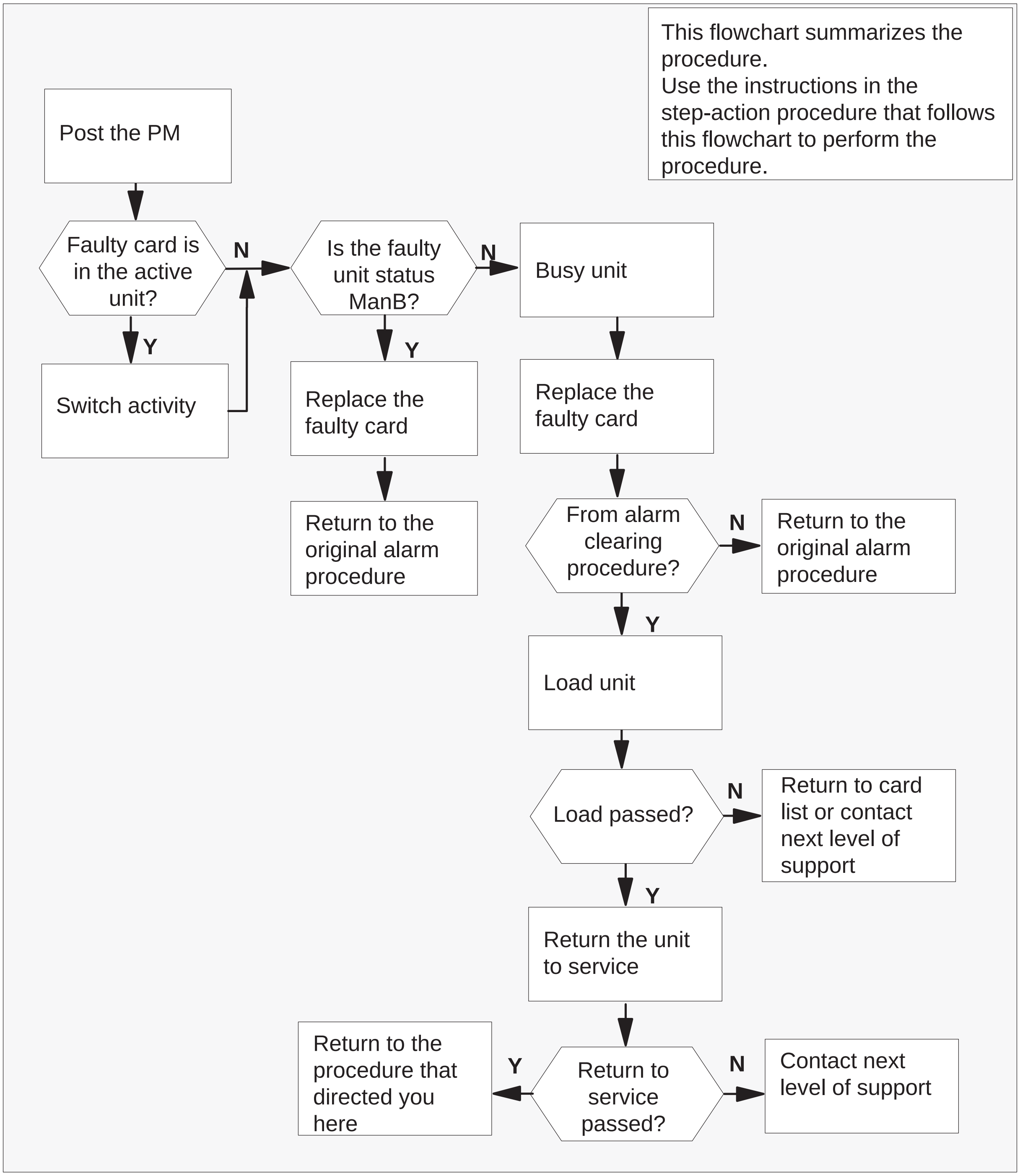
Do not go to the common procedures unless directed to do so in the step-action procedure.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

NTMX71
SMA (continued)

Summary of card replacement procedure for an NTMX71 card in an SMA



NTMX71
SMA (continued)

Replacing an NTMX71 card in an SMA

At your current location

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 Ensure you know the physical location of the faulty card.

If card location is	Do
known	step 4
unknown	step 3

3 Perform the procedure “Locating a faulty card in an SMA.”

4

CAUTION
Loss of service
Ensure that you replace the card in the inactive unit and verify the mate unit is active.

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

At the MAP terminal

5 Ensure the current MAP display is at the PM level and post the SMA by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA being posted

Example of a MAP response

```
SMA      SysB  ManB  Offl  CBsy  ISTb  InSv
    PM     3     0    1     0     2    13
    SMA    0     0    0     0     1     7

SMA 0 ISTb  Links_OOS:  CSide 0, PSide 0
Unit0:  Act   InSv
Unit1:  Inact ISTb
```

NTMX71
SMA (continued)

6 Observe the MAP display and determine if the faulty card is in the active or the inactive unit.

If the faulty card is in the	Do
active unit	step 7
inactive unit	step 10

7 Switch the activity of the units by typing

>SWACT
and pressing the Enter key.

A confirmation prompt for the SWACT command is displayed at the MAP terminal.

If SWACT	Do
can continue at this time	step 8
cannot continue at this time	step 29

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
`SWACT passed`	step 10
`SWACT failed Reason: XPM SWACTback`	step 9
`SWACT refused by SWACT Controller`	step 9

NTMX71
SMA (continued)

9 The inactive unit could not establish two-way communication with CC and has switched activity back to the originally active unit. You must clear all faults on the inactive unit before attempting to clear the alarm condition on the active unit.

Go to step 27.

At the equipment frame

10 Hang a sign on the active unit bearing the words: **Active unit—Do not touch.** This sign should not be attached by magnets or tape.

At the MAP terminal

11 Observe the MAP display and determine the state of the inactive unit.

If state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 12

12 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive SMA unit (0 or 1)

At the equipment frame

13

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap connected to the wrist strap grounding point on the frame supervisory panel (FSP). This strap protects the cards against damage caused by static electricity.

> **WARNING**
> **Equipment damage**
> Take the following 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.

Unseat the NT6X41 card in slot 21.

14 Unseat the NTAX74 card in slot 12.

15

> **DANGER**
> **Risk of eye or facial injury**
> When removing the NTMX71 card, do not jerk the paddleboard from the backplane pins. Instead, gently rock the paddleboard off the backplane pins.

Using a slot screwdriver, remove the screws from the two brackets that secure the card to the backplane at slot 19.

16 Gently remove the card from the backplane pins.

Note: A paddleboard extraction tool is available to ease removal of the NTMX71 card from the backplane pins. The tool can be purchased from Northern Telecom by using the following ordering information:

NPS Spec.	NPS50897–61
AO code	AO643786

17 Place the card you have removed in an electrostatic discharge (ESD) protective container.

NTMX71
SMA (continued)

18 Line up the holes on the brackets of the replacement card with the holes with the holes on the back plane at slot 19.

19 Using a slot screwdriver, secure the card to the backplane with the screws that were removed in step 15. Ensure the fiber washer is between the brackets of the replacement card and the backplane before tightening the screws.

20 Reseat the NTAX74 card in slot 12.

21 Reseat the NT6X41 card in slot 21.

22 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 25
other	step 23

At the MAP terminal

23 Load the inactive SMA unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the busied SMA

If load	Do
passed	step 24
failed	step 27

NTMX71
SMA (end)

24 Return the inactive SMA unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 23

If RTS	Do
passed	step 25
failed	step 27

At the equipment frame

25 Remove the sign from the active SMA unit.

26 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 28.

27 For further assistance, contact the personnel responsible for the next level of support.

28 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

29 For further assistance with switch of activity, contact the personnel responsible for the next level of support.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

Returning a card for repair or replacement in an SMA

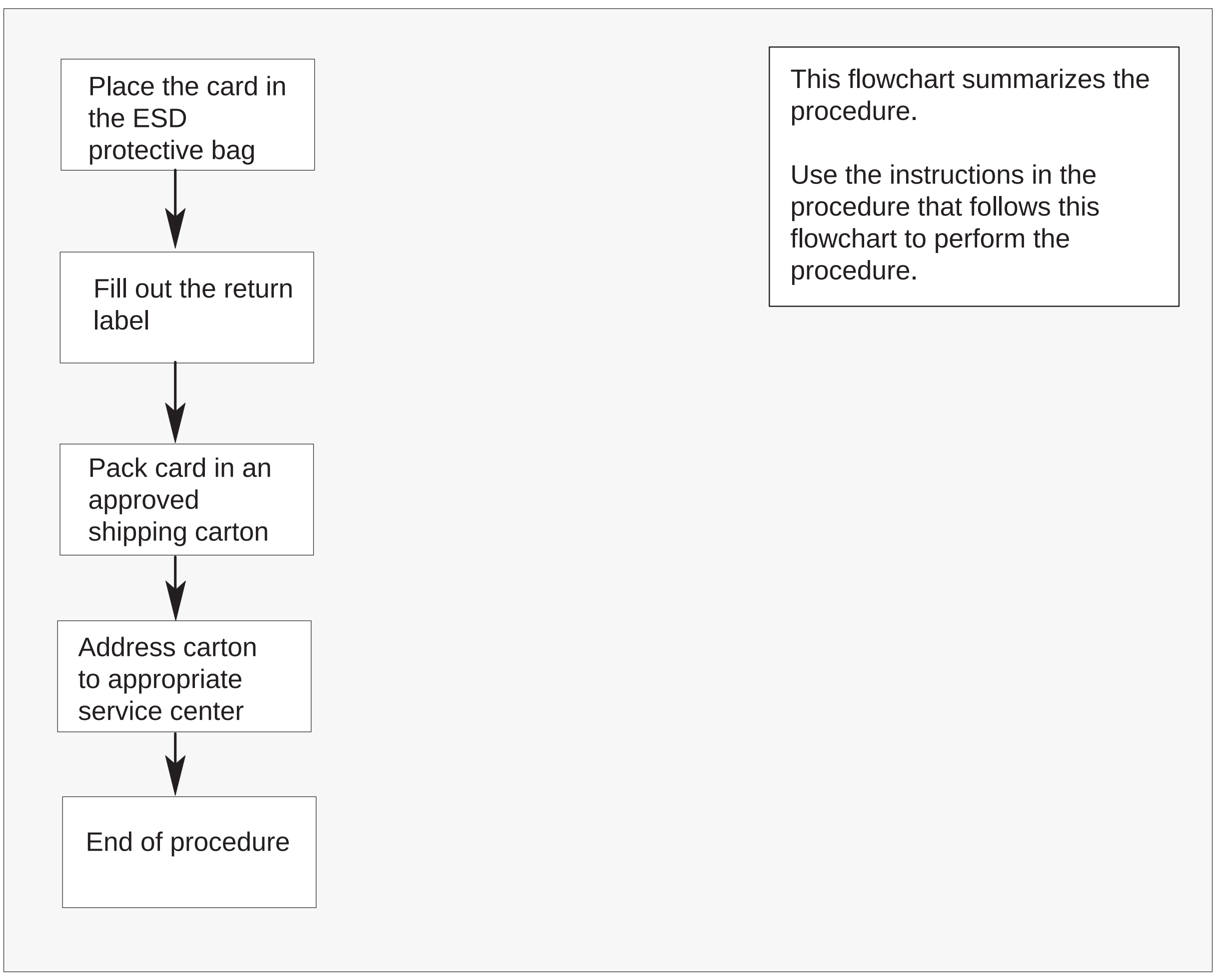
Application

Use this procedure to return a circuit card, such as a power converter, to Nortel (Northern Telecom) for repair or replacement. The documents you must fill out and the address where you must return the card depend on your location, Canada or the United States, and in some cases the company where you work.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

Summary of card replacement procedure for Returning a card for repair or replacement in an SMA



Returning a card for repair or replacement in an SMA (continued)

Returning a card for repair or replacement in an SMA shelf

At your current location

1 Place the card in an electrostatic discharge (ESD) protective bag.

If your location is in	Do
Canada	step 6
the United States	step 2

2 Fill in a return label for each card you are returning. If you require assistance filling out the label, dial Nortel at 1-800-347-4850.

Be sure to include the following information:

- return authorization number from customer service
- NT product engineering code (PEC)
- serial number
- release number
- BCS release software being used at the time of replacement
- peripheral module load name
- description of the failure and action taken to repair
- fault code that best describes the fault (see the bottom of the tag)
- name of your company
- office identifier code
- your name
- site name

3 Pack the card or assembly in a Nortel card shipping carton and seal it.

If a Nortel card shipping carton is not available, use any carton but ensure that each card or assembly is:

- enclosed in packing paper
- surrounded in bubble pack or foam
- secured tightly in the carton so that it cannot shift

4 Address and mail the carton to:

Northern Telecom Incorporated
Spare Parts Center
4600 Emperor Blvd.
Morrisville, North Carolina 27560

Returning a card for repair or replacement in an SMA (continued)

5 Go to step 11.

6 Fill in one return tag (form 24–115) for each card or assembly you are returning.

Be sure to include the following information:

- return authorization number from customer service
- NT product engineering code (PEC)
- serial number
- release number
- PCL release software being used at the time of replacement
- peripheral module load name
- description of the failure and action taken to repair
- fault code that best describes the fault (see the bottom of the tag)
- name of your company
- office identifier code
- your name
- site name

If you require help in filling out the tag, call 905-454-2808, or in the case of an emergency, 905-457-9555.

7 Attach one copy of the card tag to one of the card latches.

8 Keep the other copies of the tag for your records.

9 Pack the card or assembly in a Nortel card shipping carton and seal it.

If a Nortel card shipping carton is not available, use any carton but ensure that each card or assembly is

- enclosed in packing paper
- surrounded in bubble pack or foam
- secured tightly in the carton to prevent any movement

10 Address and mail the carton to:

Nortel Customer Operations
c/o Wesbell Transport
1630 Trinity Road
Unit #3 Door #4
Mississauga, Ontario
L5T 1L6

Returning a card for repair or replacement in an SMA (end)

11 You have successfully completed this common procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Locating a faulty card in an SMA

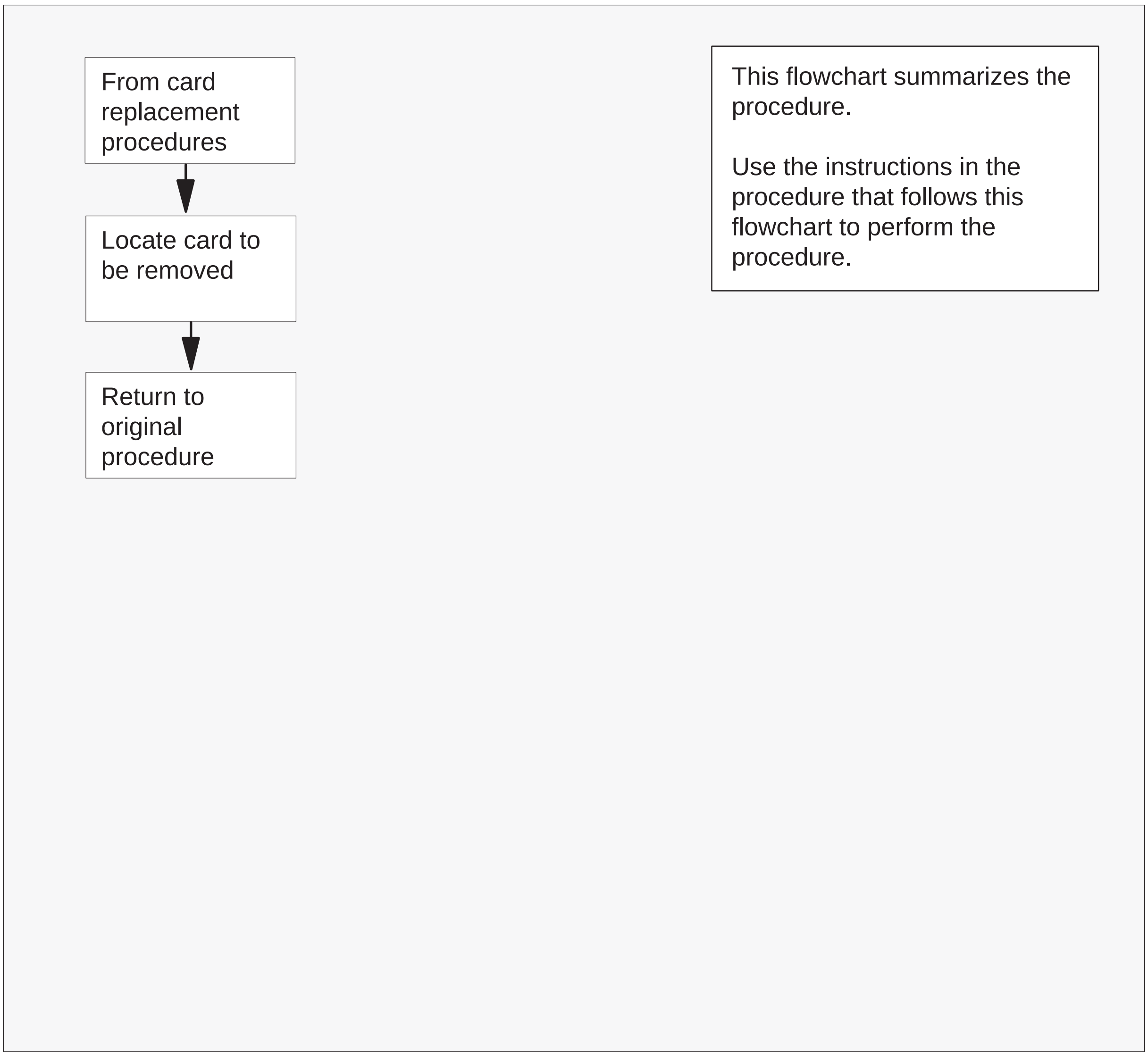
Application

Use this procedure to locate a card in an SMA shelf.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

Summary of card replacement procedure for Locating a faulty card in an SMA



Locating a faulty card in an SMA (continued)

Locating a faulty card in an SMA

At the MAP terminal

1 Post the SMA with the faulty card by typing

>MAPCI;MTC;PM;POST SMA sma_no
and pressing the Enter key.

where

sma_no is the number of the SMA with the faulty card

2 Locate the building, frame, and shelf of the posted SMA module by typing

>QUERYPM
and pressing the Enter key.

Example of a MAP response:

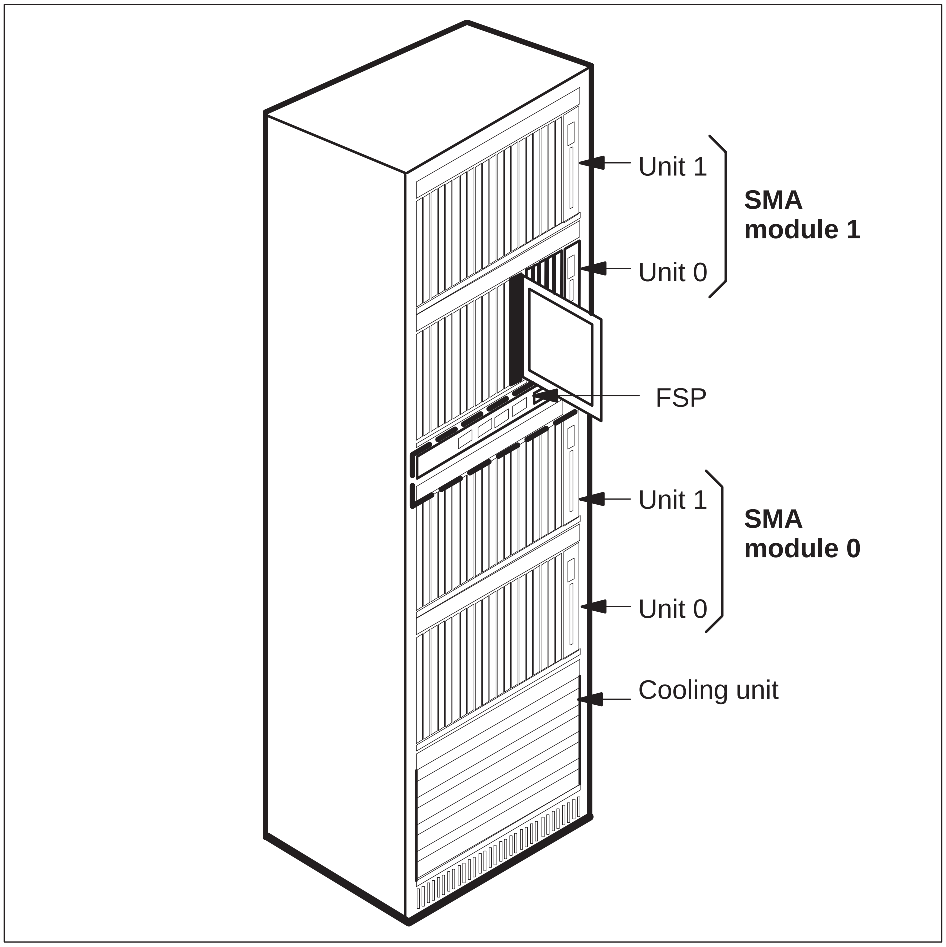
```
Site  Flr   RPos   Bay–id     Shf
HOST   03    B12    LTEI 00   18
```

At the LTE frame

3 Locate the unit in which the faulty card resides. Unit 0 is the lower shelf. Unit 1 is the upper shelf.

Locating a faulty card in an SMA (continued)

4 Use the following diagram to locate the position of an SMA module within a frame and an SMA unit within a module.



5 Determine the slot assignments for the card.

If card is	Do
6X50AB	step 7
other	step 6

Locating a faulty card in an SMA (continued)

6 Locate the slot of the faulty card using the following table:

Card locations

Card PEC	Slot #
AX74AA	12
AX78AB	14
6X92BC	15
BX01AB	16
6X78AB	17
6X69AC	18
6X80BA	19
MX71AA	19a paddleboard
6X42AA	20
6X41AA	21
6X40AC or 6X40FA	22
6X40GA or 6X40DA	22a paddleboard
2X70AE	25–27
6X50AB	1 to 5
BX02BA	1 to 5

Go to step 7.

At the MAP terminal

7 Access the line trunk controller P-side inventory (LTCPSINV) table from the CI level of the MAP display by typing

>TABLE LTCPSINV
and pressing the Enter key.

Example of a MAP response:

```
TABLE:  LTCPSINV
```

Locating a faulty card in an SMA (continued)

8 Display the tuple for the SMA module that contains the faulty card, for example, SMA 0, SMA 1, or SMA 2, by typing

>HEADING;POS SMA sma_no
and pressing the Enter key.

where

sma_no   is the number of the posted SMA

Example of a MAP response:

```
XPMTYPE  XPMNO
                                                     PSLNKTAB
-------------------------------------------------------
SMA          0
     (0 NILTYPE) (1 DS1 DEFAULT N) (2 DS1 DEFAULT N)
     (3 DS1 DEFAULT N) (4 DS1 DEFAULT N) (5 DS1 DEFAULT N)
     (6 DS1 DEFAULT N) (7 DS1 DEFAULT N) (8 DS1 DEFAULT N)
     (9 DS1 DEFAULT N) (10 DS1 DEFAULT N) (11 DS1 DEFAULT N)
     (12 DS1 DEFAULT N) (13 DS1 DEFAULT N) (14 DS1 DEFAULT N)
     (15 NILTYPE) (16 NILTYPE) (17 DCH) (18 NILTYPE) (19 DCH)
```

Each bracket identifies the link number and card type.

If card type is	Do
DCH	step 9
other	step 11

9 To find the DCH numbers of the DCH cards, access the DCHINV table from the CI level of the MAP by typing

>TABLE DCHINV
and pressing the Enter key.

Example of a MAP response :

```
TABLE:  DCHINV
```

Locating a faulty card in an SMA (end)

10 List all DCH numbers, with headings, by typing

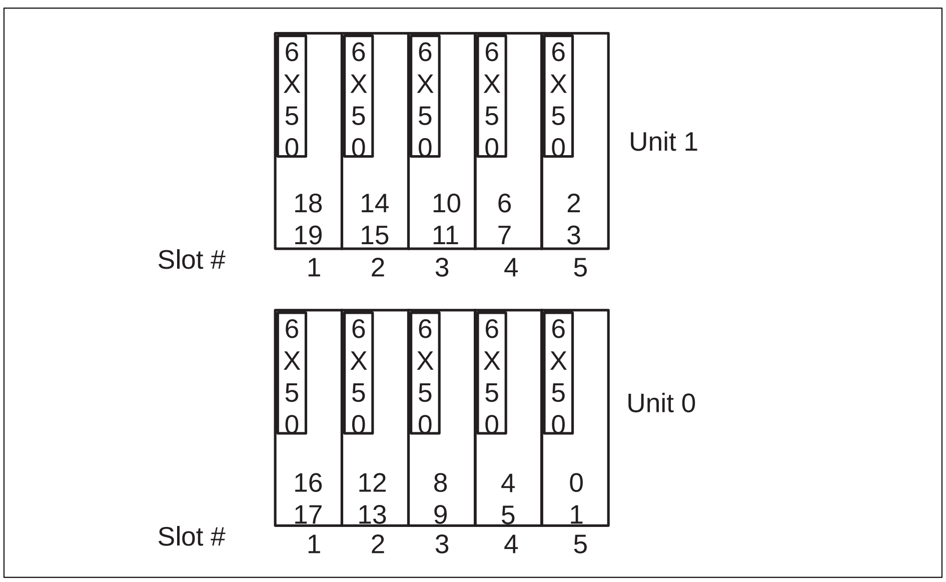
>LIST ALL
and pressing the Enter key.

Example of a MAP response

```
DCHNO  PMTYPE  PMNO  DCHPEC      LOAD    PORT
-------------------------------------------------
   0      SMU     0  BX02AA   EDH07BH     17
   1      SMU     0  BX02AA   EDH07BH     19
   2      SMA     1  BX02AA   EDH07BH     17
   5      SMU     0  BX02BA   EDH07BH     13
   6      SMU     0  BX02BA   EDH07BH     15
  10      SMA     0  BX02AA   EDH07BH     19
```

11 Record each link and card name (and DCH number) associated with it.

12 Use the diagram below to determine the physical location of the slot of the faulty card and the peripheral-side (P-side) links that connect to it. Each card is connected to two links.



13 You have successfully completed this common procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Reseating a card in an SMA

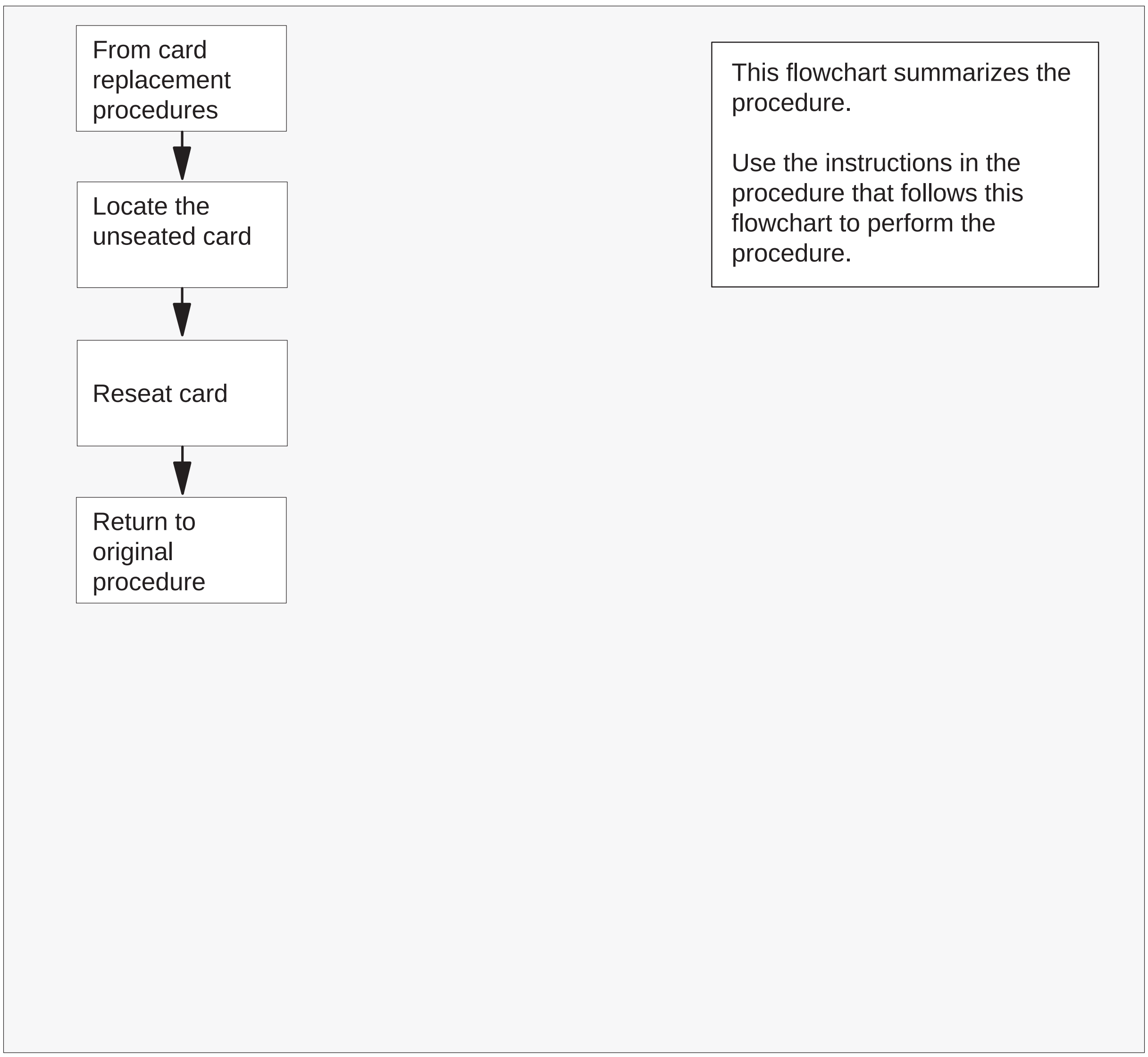
Application

Use this procedure when reseating a card in an SMA shelf.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

Summary of card replacement procedure for Reseating a card in an SMA



Reseating a card in an SMA (continued)

Reseating a card in an SMA shelf

At the LTE frame

1

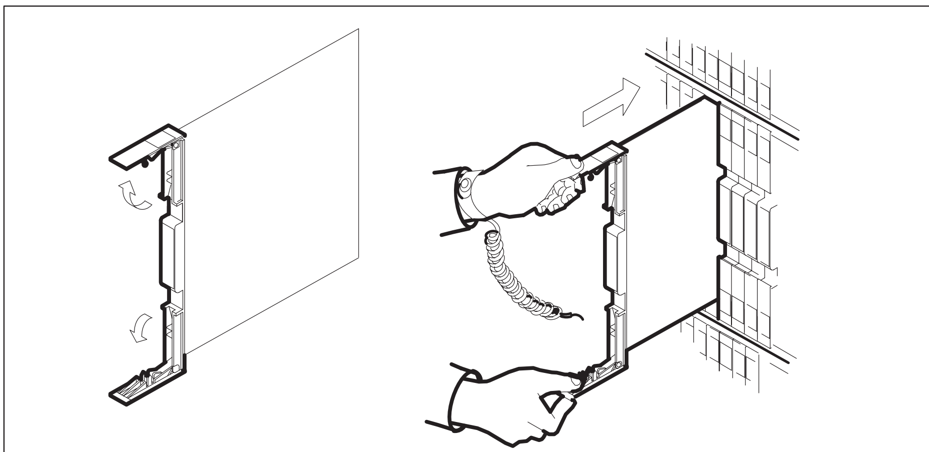
> **WARNING**
> **Equipment damage**
> Take the following precautions when removing or inserting a card:
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

> **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 SMA. This strap protects the equipment against damage caused by static electricity.

Put on a wrist strap.

2 Locate the unseated card on the appropriate shelf.

3 Open the locking levers on the unseated card. Gently slide the card back into the shelf.

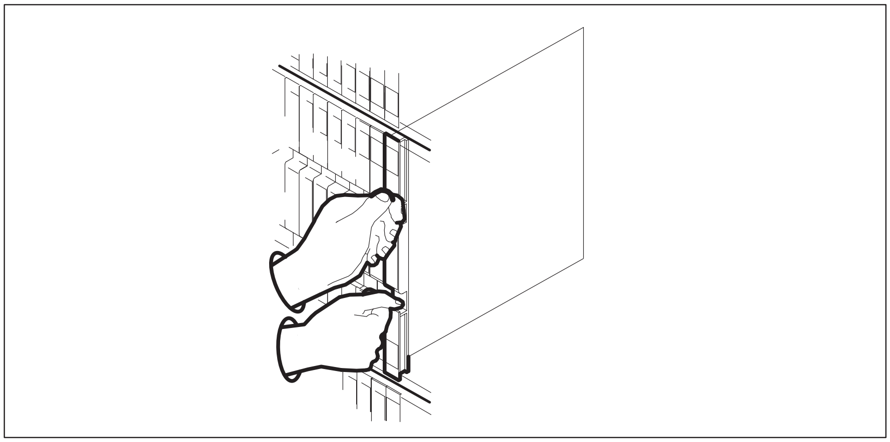


Reseating a card in an SMA (end)

4 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.



5 You have successfully completed this common procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Unseating a card in an SMA

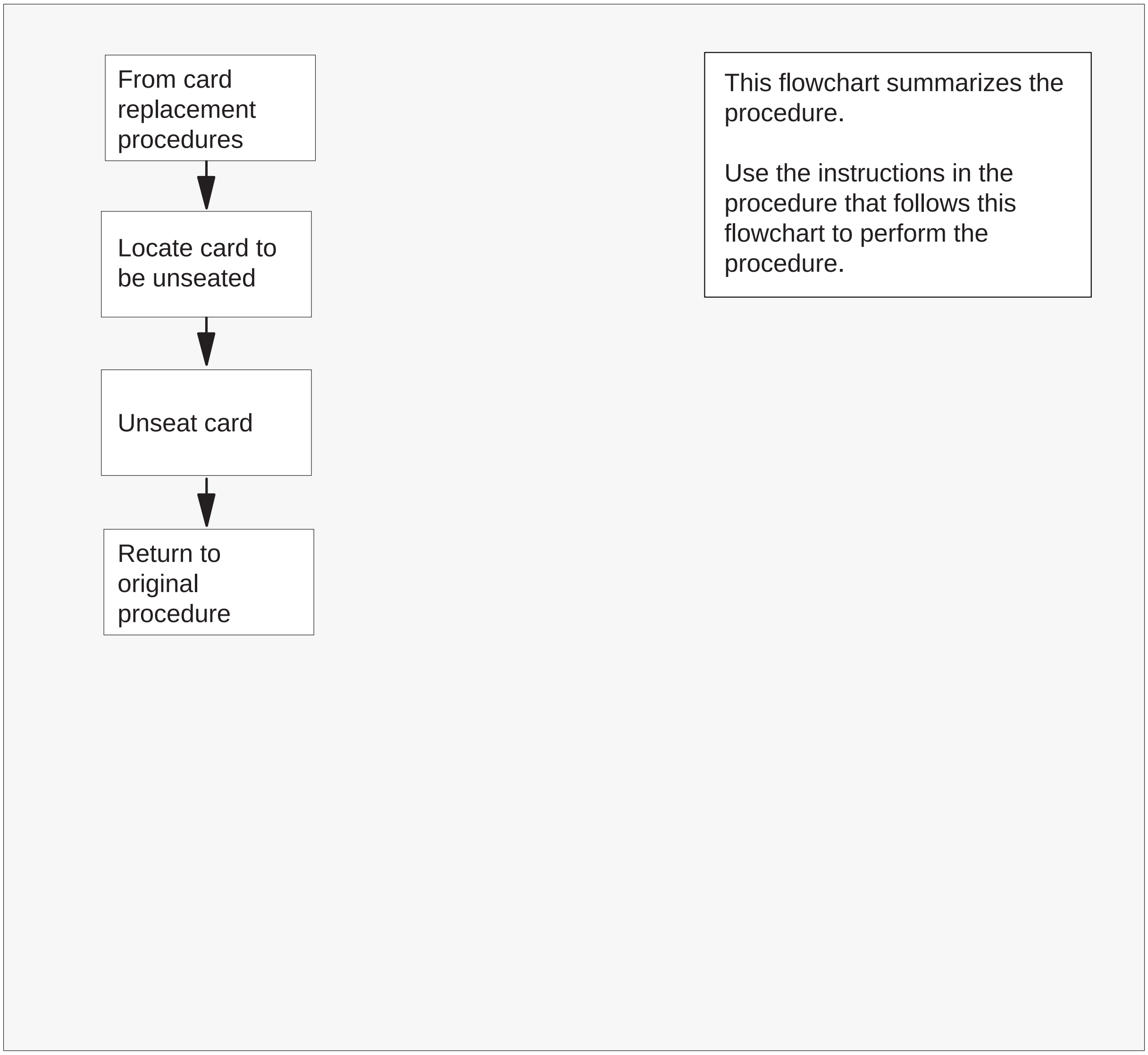
Application

Use this procedure to unseat but not remove a card from an SMA.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

Summary of card replacement procedure for Unseating a card in an SMA



Unseating a card in an SMA (continued)

Unseating a card in an SMA shelf

At the LTE frame

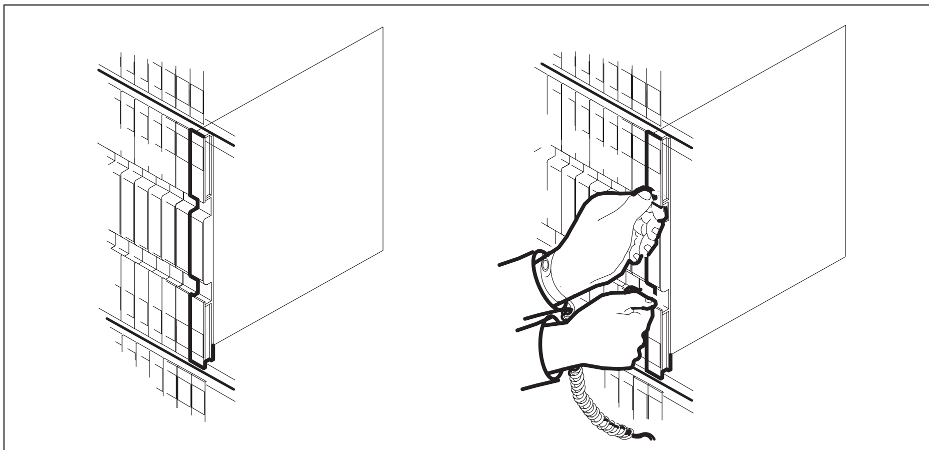
1

> **WARNING**
> **Equipment damage**
> Take the following 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.

> **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 SMA. This strap protects the equipment against damage caused by static electricity.

Put on a wrist strap.

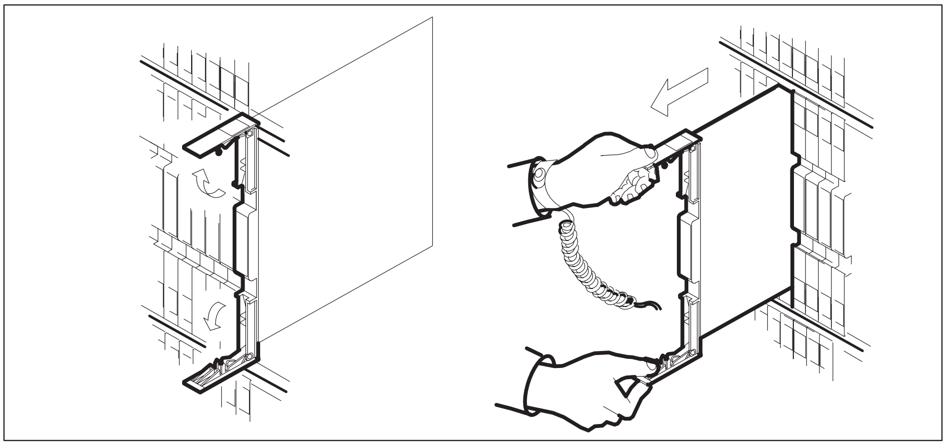
2 Locate the card to be removed on the appropriate shelf.



3 Open the locking levers on the faulty card. The top locking lever opens up and the bottom locking lever opens down.

Unseating a card in an SMA (end)

4 Gently pull the card toward you a few inches, but not so far that it clears the shelf.



5 You have successfully completed this common procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Removing and inserting cards in an SMA

Application

Use this procedure when removing a card from an SMA shelf and inserting a replacement.

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

Summary of card replacement procedure for Removing and inserting cards in an SMA

Removing and inserting cards in an SMA (continued)

Removing and inserting cards in an SMA shelf

At the LTE frame

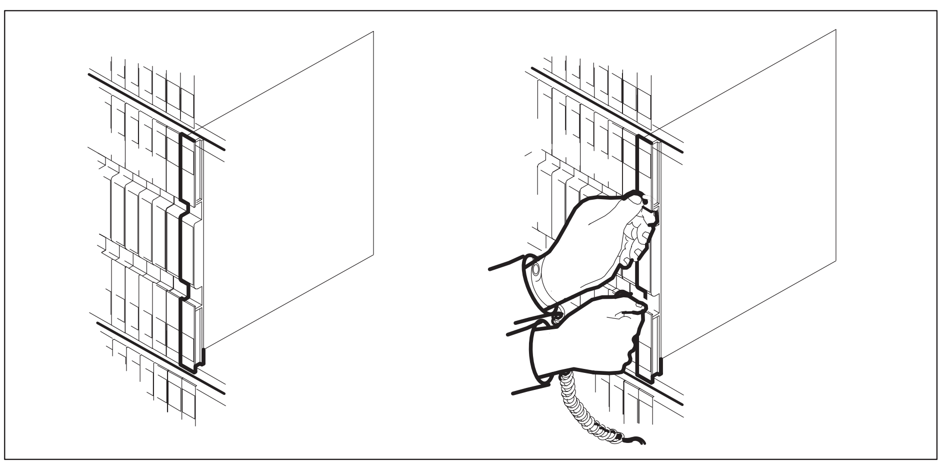
1

> **CAUTION**
> **Equipment damage**
> Take the following 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.

> **WARNING**
> **Static electricity damage**
> Wear a strap connected to the wrist strap grounding frame supervisory panel (FSP) while handling cards. This strap protects the cards against damage caused by static electricity.

Put on a wrist strap.

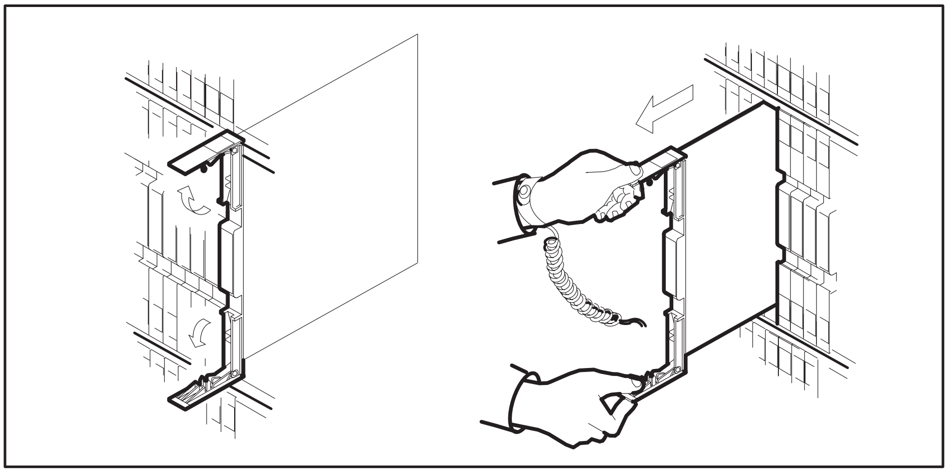
2 Locate the card to be removed on the appropriate shelf.



Removing and inserting cards in an SMA (continued)

3 Open the locking levers on the faulty card. The top locking lever opens up and the bottom locking lever opens down.

Gently pull the card toward you until it clears the shelf.



4 Place the card you have removed in an electrostatic discharge (ESD) protective container.

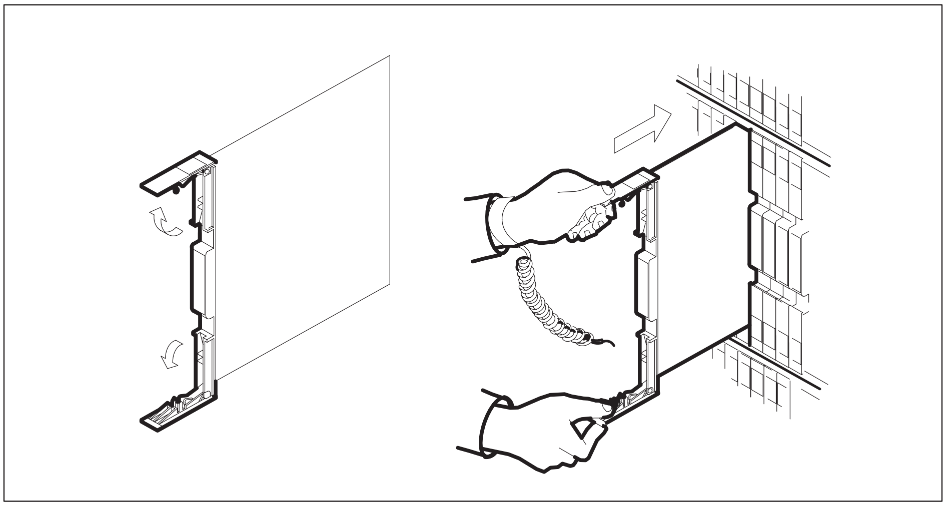
5 Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

6 Visually inspect the replacement card for damage. Return the card if damage is found and obtain another replacement card. Send any damaged card for repair according to local procedure.

7 Ensure that all the DIP switch settings are the same as those on the card you just removed.

Removing and inserting cards in an SMA (end)

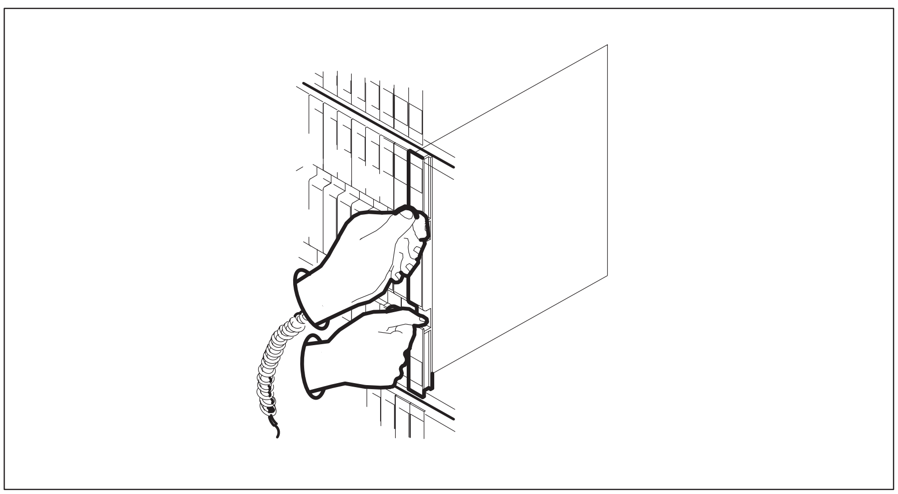
8 Open the locking levers on the replacement card. Align the card with the slots in the shelf and gently slide the card into the shelf.



9 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



10 You have successfully completed this common procedure. Return to the main procedure that sent you to this procedure and continue as directed.

Manually busying SMA C-side links

Application

Use this procedure to remove from service C-side links between an XPM and the network. This procedure is used for both junctored networks (JNET) and enhanced networks (ENET).

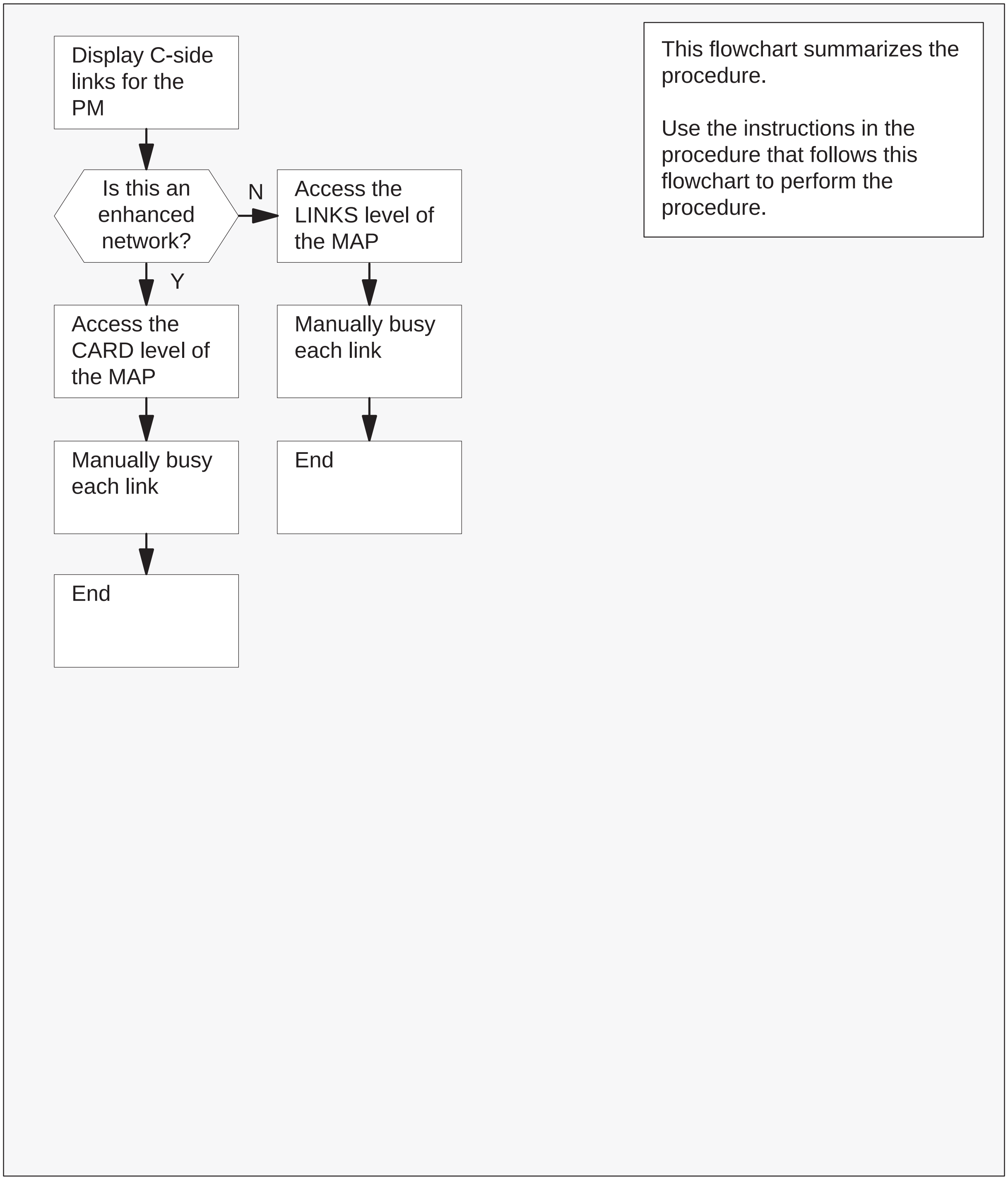
This procedure assumes that the PM is posted and available for query. Instructions in the main procedure direct you to re-post the PM after you have completed this common procedure.

Action

The following flowchart is only a summary of the procedure. To perform this procedure, use the instructions in the step-action procedure that follows the flowchart.

Manually busying SMA C-side links (continued)

Summary of Manually busying SMA C-side links



Manually busying SMA C-side links (continued)

Manually busying SMA C-side links

CAUTION
Loss of service.
Proceed only if you have been directed here from a step in a maintenance procedure. This procedure removes from service C-side links between the Series II PM and the network. Calls may be dropped.

At the MAP terminal

1 Display a list of C-side links by typing

>TRNSL C
and pressing the Enter key.

Example #1 of a MAP response:

```
Link  0: NET 0  1 18;Cap MS;Status:OK      ;MsgCond:OPN,Unrestrict
Link  1: NET 1  1 18;Cap MS;Status:OK      ;MsgCond:OPN,Unrestrict
Link  2: NET 0  1 22;Cap  S;Status:OK
Link  3: NET 1  1 22;Cap  S;Status:OK
Link  4: NET 0  1 26;Cap MS;Status:OK      ;MsgCond:OPN,Restrict
Link  5: NET 1  1 26;Cap MS;Status:OK      ;MsgCond:OPN,Restrict
Link  6: NET 0  1 30;Cap  S;Status:OK
Link  7: NET 1  1 30;Cap  S;Status:OK
```

Example #2 of a MAP response:

```
Link  0: ENET 0  0 32 01  0;Cap MS;Status:OK    ;MsgCond:OPN,Restrict
Link  1: ENET 1  0 32 01  0;Cap MS;Status:OK    ;MsgCond:OPN,Restrict
Link  2: ENET 0  0 32 01  1;Cap  S;Status:OK
Link  3: ENET 1  0 32 01  1;Cap  S;Status:OK
Link  4: ENET 0  0 32 01  2;Cap MS;Status:OK    ;MsgCond:OPN,Unrestrict
Link  5: ENET 1  0 32 01  2;Cap MS;Status:OK    ;MsgCond:OPN,Unrestrict
Link  6: ENET 0  0 32 01  3;Cap  S;Status:OK
Link  7: ENET 1  0 32 01  3;Cap  S;Status:OK
```

If the network is a	Do
junctor network (JNET)	step 2
enhanced network (ENET)	step 7

Manually busying SMA C-side links (continued)

2 Record the network plane, pair, and link for each C-side link for the XPM shelf associated with the card you are replacing.

Note 1: C-side links for network plane 0 are connected to the shelf for PM unit 0; C-side links for network plane 1 are connected to the shelf for PM unit 1. All C-side links interface to the active PM unit.

Note 2: The network plane, pair, and link are listed in columns 4, 5, and 6 of the response to a TRNSL command at the PM level, as shown in *Example #1 of a MAP response:* in step 1. For example, C-side link 7 is on network plane 1, pair 1, link 30.

3 Access the NET level of the MAP display by typing

>NET

and pressing the Enter key.

Example of a MAP display:

```
Net                  11111  11111  22222  22222  33
Plane  01234  56789  01234  56789  01234  56789  01
   0    L..
   1    ...
```

4 Access the LINKS level of the MAP display by typing

>LINKS pair_no

and pressing the Enter key.

where

pair_no is the number of the pair (0 to 31) to which the XPM C-side links are connected

Example of a MAP display:

```
Net                  11111  11111  22222  22222  33
 Plane  01234  56789  01234  56789  01234  56789  01
   0    L..
   1    ...
Net   1  Links              11  1111  1111  2222  2222  2233
       Plane   0123  4567  8901  2345  6789  0123  4567  8901
         0     ....  ....  ..P.  ....  .P..  .P..  .P..  .P..
         1     ....  ....  ..P.  ....  .P..  .P..  .P..  .P..
        Links  3333  3333  4444  4444  4455  5555  5555  6666
       Plane   2345  6789  0123  4567  8901  2345  6789  0123
         0     .P..  .P..  .P..  .P..  ..P.  ..-.  ..-.  ..-.
         1     .P..  .P..  .P..  .P..  ..P.  ..-.  ..-.  ..-.
```

Manually busying SMA C-side links (continued)

5 Busy one of the links you recorded in step 2 by typing

>BSY plane_no link_no
and pressing the Enter key.

where

plane_no	is the number of the plane for the link (0 or 1)
link_no	is the link number (0 to 63)

Example of a MAP response:

```
BSY 0 30
OK
```

6 Repeat step 5 for all C-side links for the XPM unit you are working on.

Go to step 13.

7 Record the network plane, shelf, card, and link for the C-side links for the XPM shelf associated with the card you are replacing.

Note 3: C-side links for network plane 0 are connected to the shelf for PM unit 0; C-side links for network plane 1 are connected to the shelf for PM unit 1. All C-side links interface to the active PM unit.

Note 4: The network plane, shelf, card, and link are listed in columns 4, 5, 6, and 7 of the response to a TRNSL command at the PM level, as shown in *Example #2 of a MAP response:* in step 1. For example, C-side link 7 is on network plane 1, shelf 0, card 32, and link 1.

8 Access the NET level of the MAP display by typing

>NET
and pressing the Enter key.

Example of a MAP display:

```
ENET     System   Matrix  Shelf 0 1 2 3
 Plane 0 CSLink     .           F – – –
 Plane 1 CSLink     .           F – – –

ENET:
```

Manually busying SMA C-side links (continued)

9 Access the SHELF level of the MAP display by typing

>SHELF shelf_no
and pressing the Enter key.

where

shelf_no is the number of the shelf (0 to 7) to which the XPM C-side links are connected

Example of a MAP display:

```
ENET     System   Matrix  Shelf 0 1 2 3
 Plane 0 CSLink     .           F – – –
 Plane 1 CSLink     .           F – – –

SHELF 00  Slot         1111111 11122222 22222333 333333
            123456 78 90123456 78901234 56789012 345678
Plane 0    .  .   IF ....–––– –––––––– ––––.... .  .
Plane 1    .  .   IF ....–––– –––––––– ––––.... .  .
```

10 Access the CARD level of the MAP display by typing

>CARD card_no
and pressing the Enter key.

where

card_no is the number of the card (1 to 38) to which the XPM C-side links are connected

Example of a MAP display:

```
ENET     System   Matrix  Shelf 0 1 2 3
 Plane 0 CSLink     .           F – – –
 Plane 1 CSLink     .           F – – –

SHELF 00  Slot         1111111 11122222 22222333 333333
            123456 78 90123456 78901234 56789012 345678
Plane 0    .  .   IF ....–––– –––––––– ––––.... .  .
Plane 1    .  .   IF ....–––– –––––––– ––––.... .  .

 CARD 32   Front:     Back:   DS–512 Links
           Xpt        I/F    0 1 2 3
 Plane 0    .          .     . . . –
 Plane 1    .          .     . . . –
```

Manually busying SMA C-side links (end)

11 Busy the link you recorded in step 7 by typing

>BSY plane_no LINK link_no
and pressing the Enter key.

where

plane_no	is the number of the plane (0 or 1) for the link
link_no	is the link number (0 to 18 for DS512) or (0 to 15 for DS30)

Example of a MAP response:

```
Request to MAN BUSY ENET Plane:0 Shelf:00 Slot:32 Link:01 submitted.
Request to MAN BUSY ENET Plane:0 Shelf:00 Slot:32 Link:01 passed.
```

If	Do
the links are DS30s and you have not manually busied all links	step 12
the links are DS30s and you have manually busied all links	step 13
the link is a DS512	step 13

12 Repeat step 11 for each DS30 link recorded in step 7.

13 You have completed this procedure. Return to the main procedure that sent you to this procedure and continue as directed.

SMA routine maintenance procedures

This section contains routine maintenance procedures for the Subscriber Carrier Module-100 Access (SMA). These procedures describe tasks that maintenance engineering and field maintenance personnel must perform at normal intervals.

Filters – Inspecting and cleaning cooling unit filters SMA

Application

Use this procedure to inspect cooling unit filters in frame cooling units.

Interval

Perform this procedure once every 2 weeks.

Common procedures

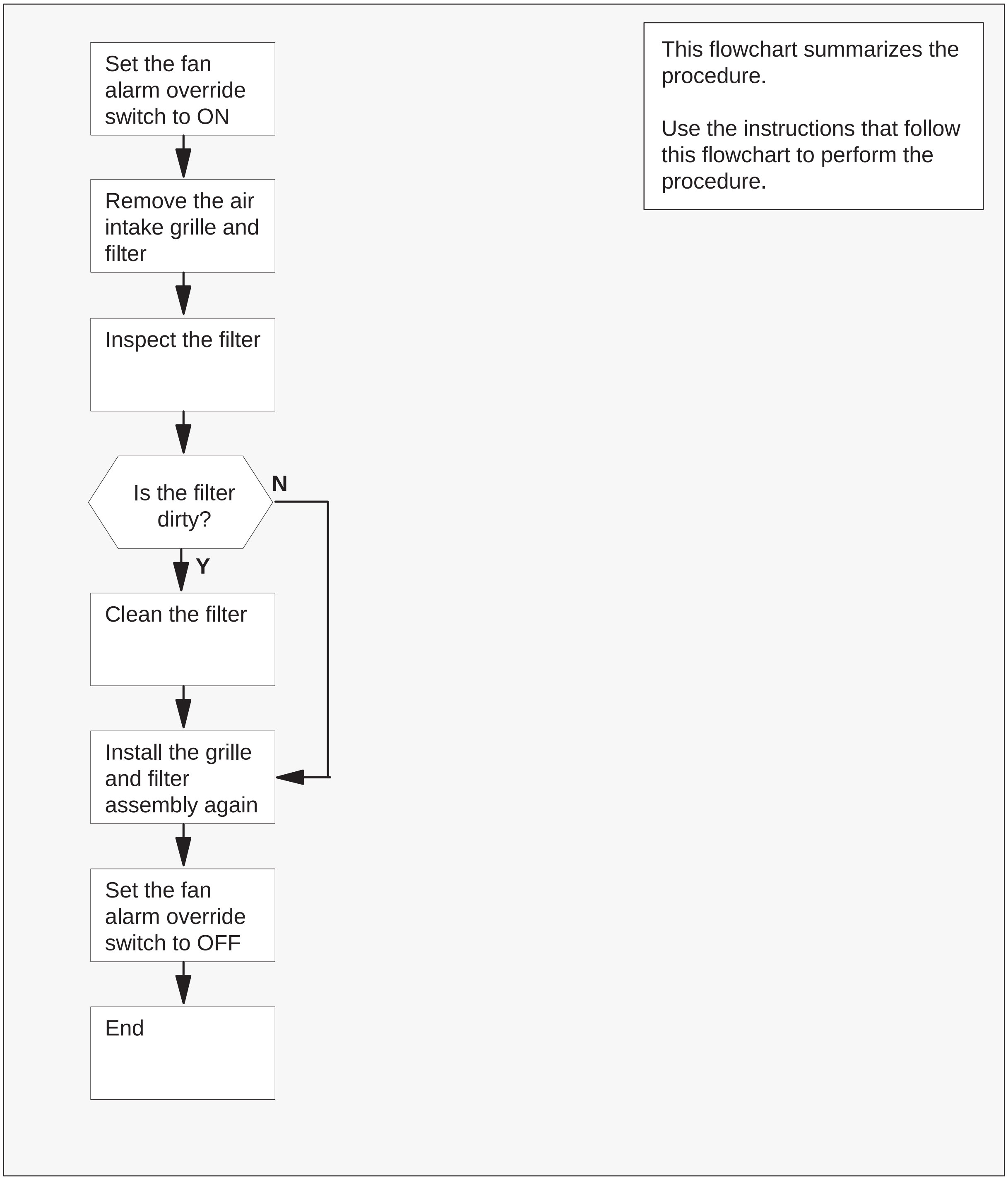
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Filters – Inspecting and cleaning cooling unit filters
SMA (continued)

Summary of Filters – Inspecting and cleaning cooling unit filters



Filters – Inspecting and cleaning cooling unit filters
SMA (continued)

Filters – Inspecting and cleaning cooling unit filters

At the FSP:

1 On the frame supervisory panel (FSP), set the fan alarm override switch to ON (pointing right).

2

DANGER
Rotating fan blades
Do not reach in more than 15 cm (6 in) beyond the upper lip of the air intake grille. You risk injury because your fingers can contact the rotating blades of the cooling unit fans.

Carefully pry the upper half of the grille away from the frame to remove the grille.

3 To remove the filter from the grille, slide the filter away from the latches on the inside of the grille door.

4 Observe the state of the filter.

If filter surfaces	Do
appear dirty	step 5
appear clean	step 9

5 Shine a trouble light through the filter.

If light	Do
is visible through the filter	step 6
is not visible through the filter	step 7

In another room:

6 Vacuum the filter. Go to step 9.

7 Wash the filter in cleaner and water.

8 Rinse the filter. Allow the filter to dry before installation.

Filters – Inspecting and cleaning cooling unit filters SMA (end)

9 Return the filter to the grille. Slide the filter up and under the latches on the inside of the grille door.

At the FSP:

10 Reseat the lower edge of the grille in the frame. Carefully push the upper half of the grille into place.

11 On the front of the FSP, set the fan alarm override switch to OFF (pointing left).

12 The procedure is complete.

Filters – Replacing cooling unit filters SMA

Application

Use this procedure to replace cooling unit filters in frame cooling units.

Interval

Perform this procedure every three months.

Common procedures

There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform this procedure.

Filters – Replacing cooling unit filters
SMA (continued)

Summary of Filters – Replacing cooling unit filters

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

Set the fan alarm override switch to ON

↓

Remove the air intake grille and filter

↓

Replace the filter

↓

Install the grille and filter assembly again

↓

Set the fan alarm override switch to OFF

↓

End

Filters – Replacing cooling unit filters
SMA (end)

Filters – Replacing cooling unit filters

At your Current Location

1 Obtain a replacement cooling unit filter.

At the FSP:

2 On the frame supervisory panel (FSP), set the fan alarm override switch to ON (pointing right).

3

DANGER
Rotating fan blades

Carefully pry the upper half of the grille away from the frame to remove the grille.

4 To remove the filter from the grille, slide the filter away from the latches on the inside of the grille door.

5 To insert the new filter in the grille, slide the filter up and under the latches on the inside of the grille door.

6 Reseat the lower edge of the grille in the frame. Carefully push the upper half of the grille into place.

7 On the front of the FSP, set the fan alarm override switch to OFF (pointing left).

8 The procedure is complete.

Power Converter – Testing power converter voltages SMA

Application

Use this procedure to test power converter voltages for all power converters in the subscriber module equipment frame.

Interval

Perform this procedure one time every 6 months.

Common procedures

There are no common procedures.

Action

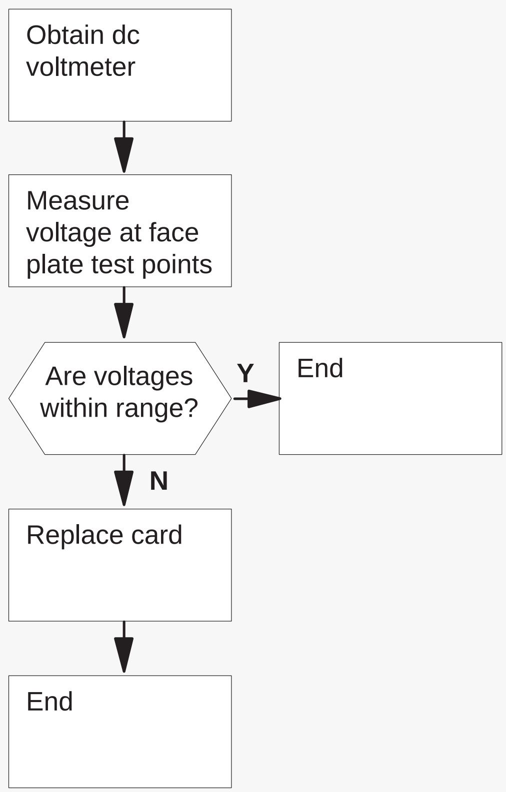
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Power Converter – Testing power converter voltages
SMA (continued)

Summary of Power Converter – Testing power converter voltages

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.



Power Converter – Testing power converter voltages SMA (end)

Power Converter – Testing power converter voltages

At your Current Location

1 Obtain a dc voltmeter.

At the equipment frame:

2 Use the voltmeter to measure the voltage at the test points on the faceplates. These faceplates are the faceplates of all NT2X70 power converters in the SMA equipment frame.

3 Compare the voltages measured in step 2 with the acceptable voltage ranges given below (the voltage ranges are approximately 2% of the nominal values printed on the NT2X70 faceplate).

Test Point voltage	Acceptable range
+12 V	+11.64 V through +12.36 V
– 12 V	– 12.36 V through –11.64 V
+ 5.15 V	+5.05 V through +5.25 V
–5 V	–5.2 V through –4.8 V

If test point voltages	Do
are within acceptable range	step 5
are not within acceptable range	step 4

4 Follow the directions in *Card Replacement Procedures* to replace the NT2X70 power converter. Return to this step.

5 This procedure is completed

Wrist strap – Testing wrist strap grounding cords SMA

Application

Use this procedure to verify that the resistance of the wrist strap grounding cords is at the correct level. The resistance must be low enough to allow static electricity to discharge from a person. The resistance must be high enough to protect the wearer from electrocution if the equipment short circuits.

Interval

Perform this procedure each month.

Common procedures

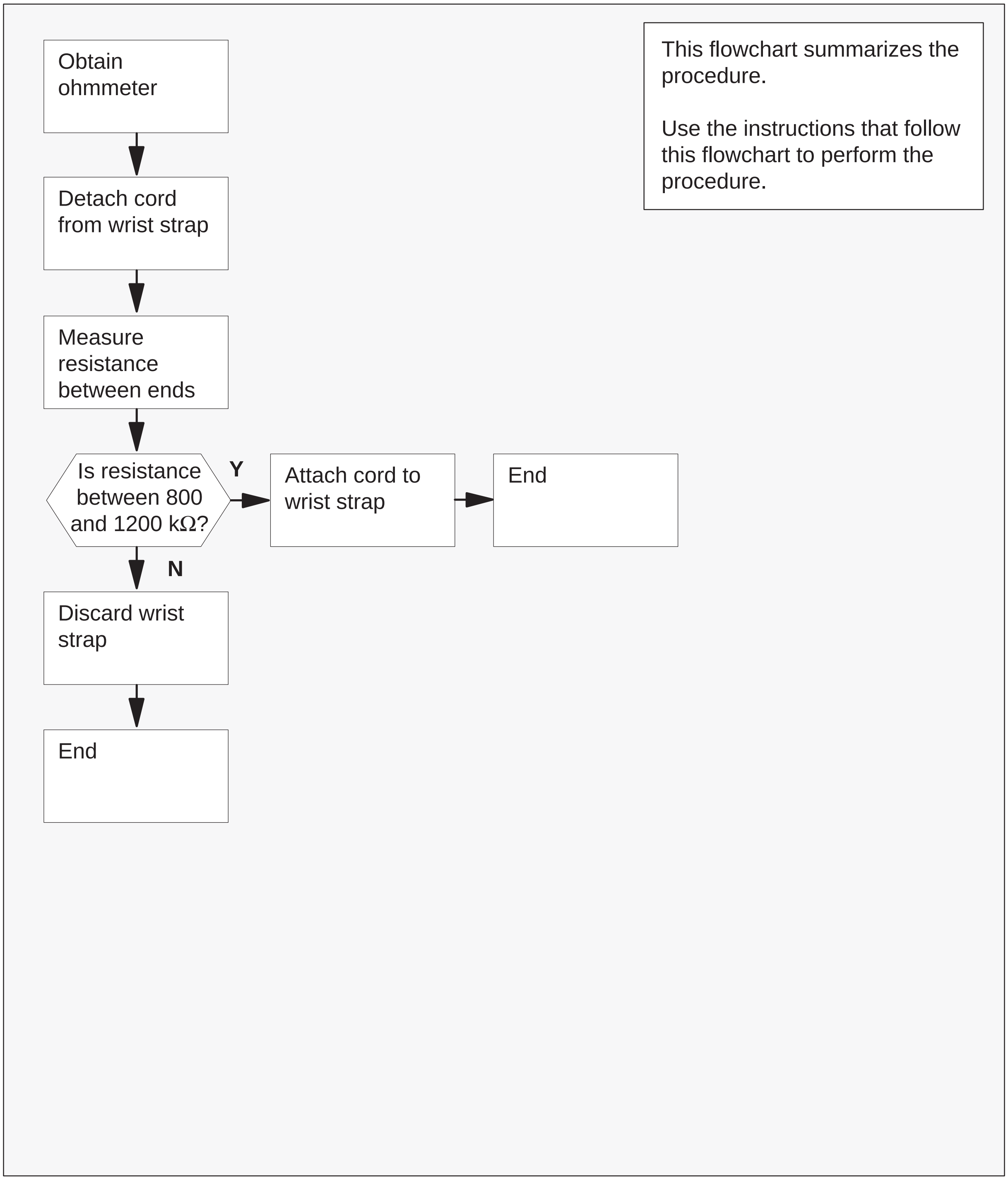
Does not apply

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Wrist strap – Testing wrist strap grounding cords
SMA (continued)

Summary of Wrist strap – Testing wrist strap grounding cords



Wrist strap – Testing wrist strap grounding cords
SMA (end)

Wrist strap – Testing wrist strap grounding cords

At your current location

1 Obtain an ohmmeter.

2 Detach the grounding cord from the wrist strap.

3 Measure the resistance of the grounding cord with the ohmmeter. If you do not understand how to use this test equipment, refer to manufacturer instructions.

If resistance	Do
is between 800 kΩ and 1200 kΩ	step 4
is not between 800 kΩ and 1200 kΩ	step 5

4 The grounding cord and wrist strap assembly is safe to use. Assemble the wrist strap to the grounding cord.

Go to Step 6.

5

DANGER
Risk of electric shock
The grounding cord is safe to use if resistance measures higher than 800 kΩ. A lower resistance exposes the wearer to the risk of electrocution if equipment short-circuits.

CAUTION
Risk of equipment damage
A grounding cord that has a resistance higher than 1200 kΩ cannot conduct static charges to ground adequately. The cord does not protect sensitive electronic equipment against buildups of static charges that can cause damage.

Discard the assembly. *Do not use the assembly!*

6 The procedure is complete.

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DMS-100 Family

Subscriber Carrier Module-100 Access

Maintenance Manual

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