297-8253-550

DMS-100 Family

Subscriber Carrier Module-100 Access (MVI-20)

Maintenance Manual

XPM13 and up Standard 08.01 February 2000

NORTEL NETWORKS

How the world shares ideas.

DMS-100 Family

Subscriber Carrier Module-100 Access (MVI-20)

Maintenance Manual

Publication number: 297-8253-550
Product release: XPM13 and up
Document release: Standard 08.01
Date: February 2000

Printed in the United States of America

Contents

About this document

When to use this document

This Subscriber Carrier Module-100 Access (SMA) MVI-20 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:

- *XPM Translations Reference Manual*
- *Product Documentation Directory, 297-8991-001*

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 remote digital terminal (RDT). The term SMA refers to DMS-100 XMS-based peripheral module (XPM) hardware and software that provide the interface. The SMA complies with Bellcore Standard TR-TSY-000303 (TR-303). The Bellcore Standard TR-TSY-000303 establishes standards for multi-vendor interface (MVI).

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

The SMA system describes the SMA component and additional components like:

- current operations systems (OS) interfaces
- maintenance and provisioning software
- DMS-core software to support the object-oriented operations interface
- user interfaces at the MAP terminal
- test and service circuits for signal processing
- line tests

This document focuses on the maintenance of the SMA. Many maintenance functions are integrated in the MAP terminal. This document also includes maintenance information for the SMA system.

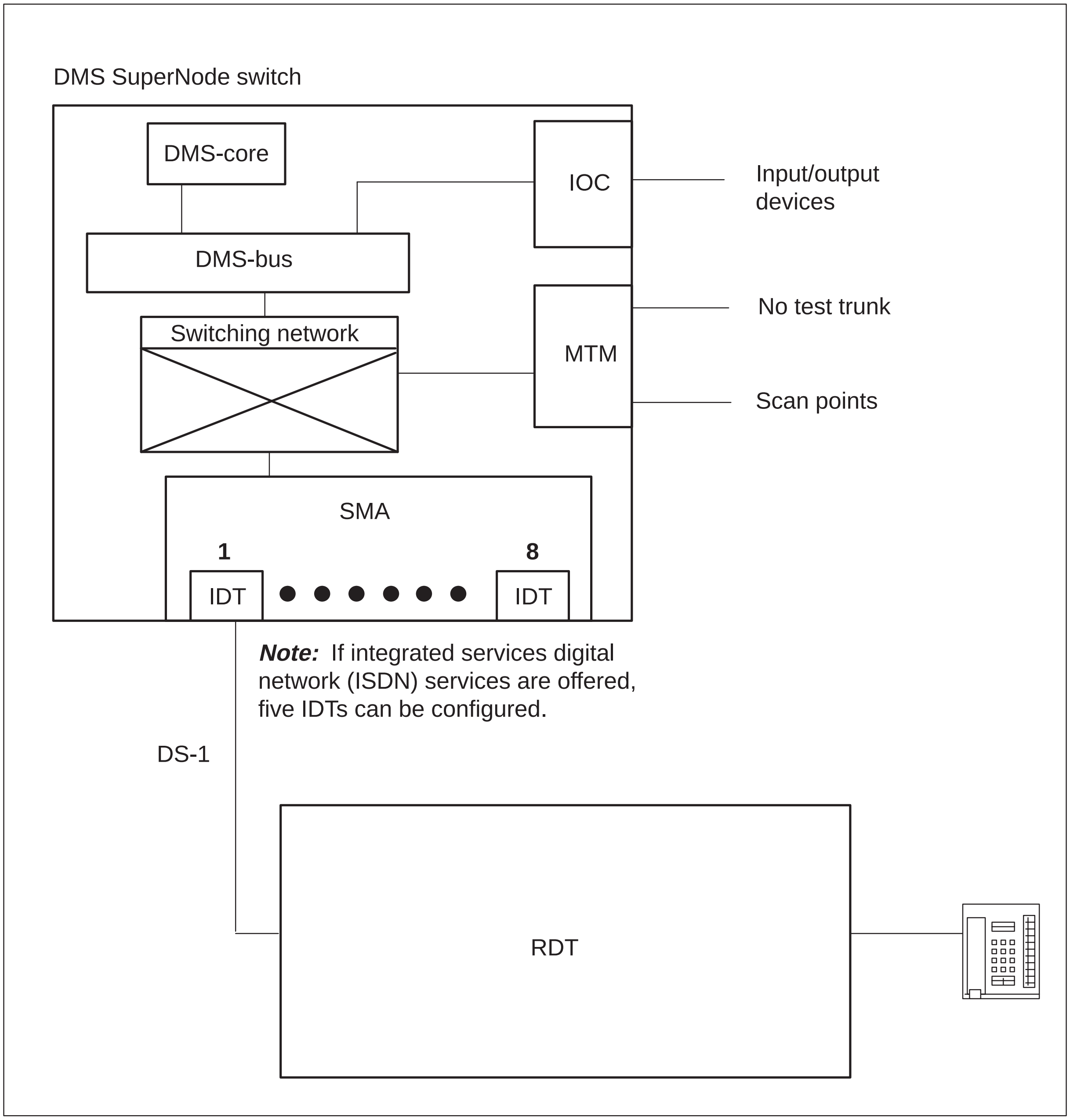
Functional description

This chapter provides a physical and operational summary of the SMA configuration. The reader can study these two areas to understand how maintenance software attempts to connect faults. The reader can also understand how the software produces trouble indicators when manual help is required to solve the problem.

Physical Summary of the SMA system

The following figure describes the basic SMA system configuration and identifies the main physical components.

Summary of the SMA system configuration (physical)



Remote digital terminal

The remote digital terminal (RDT) connects terminal devices, which transmit voice or data or voice and data, to the DMS SuperNode switch. The RDT that connects to the DMS SuperNode switch is an integrated digital loop carrier (IDLC). The RDT connects a maximum of 672 subscriber lines from different terminal devices. The RDT normally resides at a remote site. The RDT (in TR-303) refers to the remote digital terminal equipment of a vendor. The equipment complies with the TR-303 specification.

DMS SuperNode switch

The DMS SuperNode switch is the local digital switch (LDS) interface to the remote.

Subscriber Carrier Module-100 Access The SMA is the key component that connects the RDT to the DMS switching network. The P-side of the SMA can use a maximum of 20 DS-1 links to connect to the RDT. On the C-side, the SMA connects to the switching network. The SMA uses one DS512 optical 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 RDT. The SMA interface allows a maximum of eight IDTs that do not have ISDN, or a maximum of five IDTs that have ISDN.

DS-1 links These links carry subscriber traffic and message channels for a maximum of eight RDTs. Chapter 3, SMA signaling and communications, contains additional information on these channels.

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

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

Maintenance trunk module The maintenance trunk module (MTM) contains test and service circuits for signal processing. These service circuits include signal distribution (SD), scan cards, MTUs, LTUs, and MTA cards.

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

Operational summary of the SMA system

A operational summary describes the distribution of software subsystems across the hardware components. Refer to the figure Summary of the SMA system configuration (operational). This figure describes the SMA system and the location of the software that perform these functions.

The SMA system configuration contains the following:

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

The following sections explain these operational areas in additional detail.

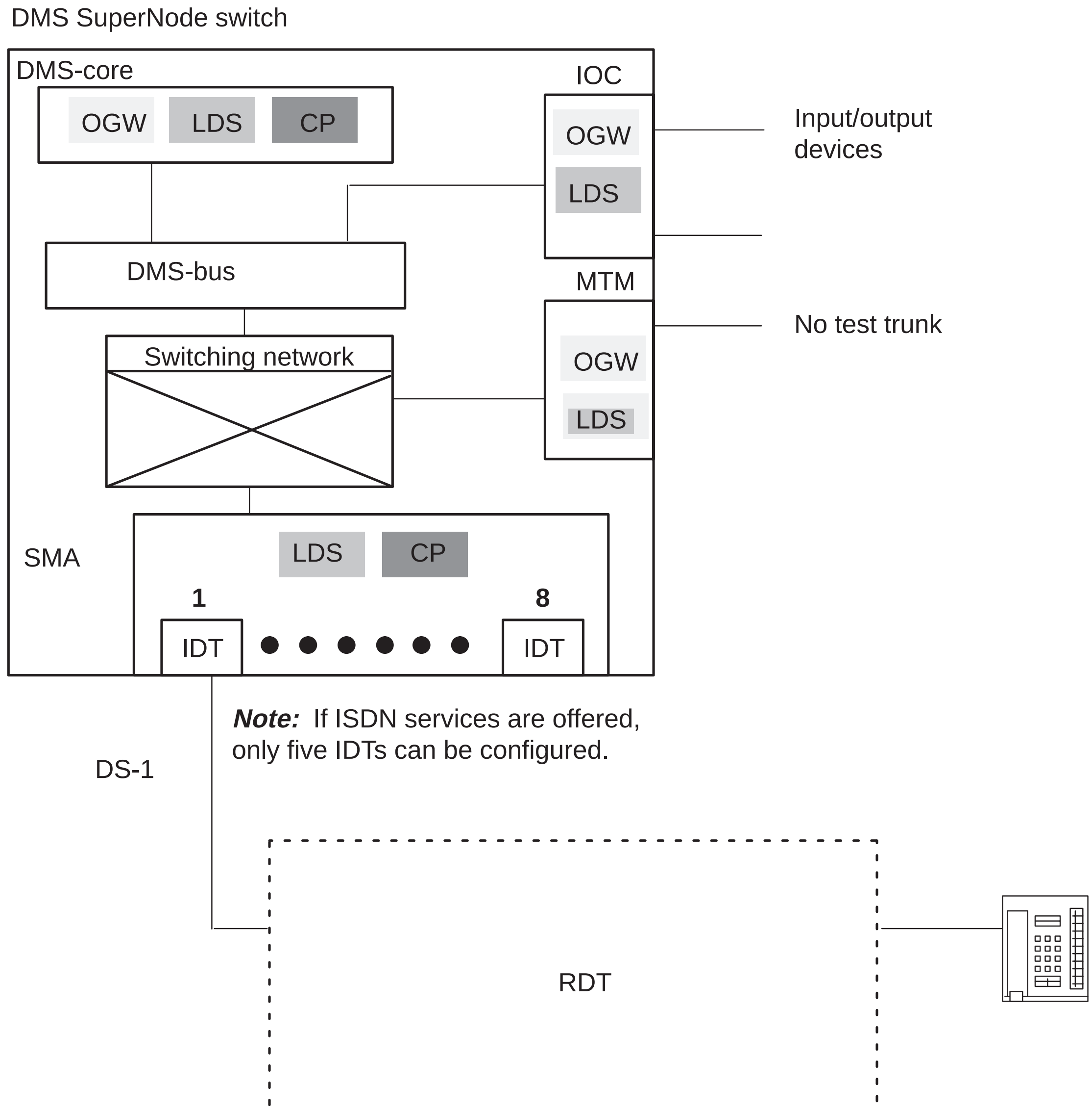
Integrated digital terminal (IDT)

For the DMS SuperNode switch to comply with the TR-303 requirements and maintain resources, an IDT associates with each RDT. The SMA functionally consists of IDTs. An IDT

- is a logical entity that contains the dedicated switch resources for the provisioning, tests, and maintenance of an RDT that connects 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 about the RDT the switch must retain.
- serves as the SMA interface to each RDT. Each SMA has a maximum of eight configured IDTs that have ISDN or a maximum of five that have 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 the P-side.

Summary of the SMA system configuration (operational)



CP	- call processing
OGW	- operations gateway
LDS	- local digital switch
IOC	- input/output controller
MTM	- maintenance trunk module
IDT	- integrated digital terminal
RDT	- remote digital terminal

Local digital switch

An LDS is any class 5 digital central office switch. For SMA software, the LDS is the software that provides the table control and maintenance routines for the DMS SuperNode switch. This software supports the DMS SuperNode switch end of the integrated digital loop carrier (IDLC). This software sets up the IDT.

Operations gateway

The operations gateway function is distributed across the DMS-core, IOC, and MTM. The operations gateway provides the protocol translation and routing capabilities that connect a number of RDTs to set of operations interfaces. These interfaces include the 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, through data entries, can set an external alarm (minor, major, or critical) for each RDT. When the system raises an alarm, 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 test allows external line test systems to include the subscriber lines off the RDT.

Call processing

The call processing (CP) function performs the low-layer call processing tasks. The CP translates between the internal DMS protocol for communication with the DMS switch and the Q.921/Q.931-based protocols for communication with the RDT. This software allows the DMS call processing logic to interface with the TR303-based messages and procedures. The CP software provides the translation and control functions required to establish, maintain, and take down calls. These calls originate from, or end to an integrated digital loop carrier (IDLC)-based RDT.

The CP software can process calls from the following service areas:

- plain old telephone service (POTS)
- coin
- Meridian Digital Centrex (MDC)

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:

- equipment frame
- dual shelf module
- circuit cards

The following sections describe the characteristics and capabilities of each component.

Equipment frame

The SMA, a peripheral module (PM) that resides in a line trunk equipment (LTE) frame (NT6X01AD) in a central office, appears in the following figure. This frame can house two SMA modules. The frame is composed of:

- four shelves used for circuit cards
- a frame supervisory panel (FSP) (NT0X28EB)
- a cooling unit (NT3Z90AC)
- a common framework (NT0X25AA)

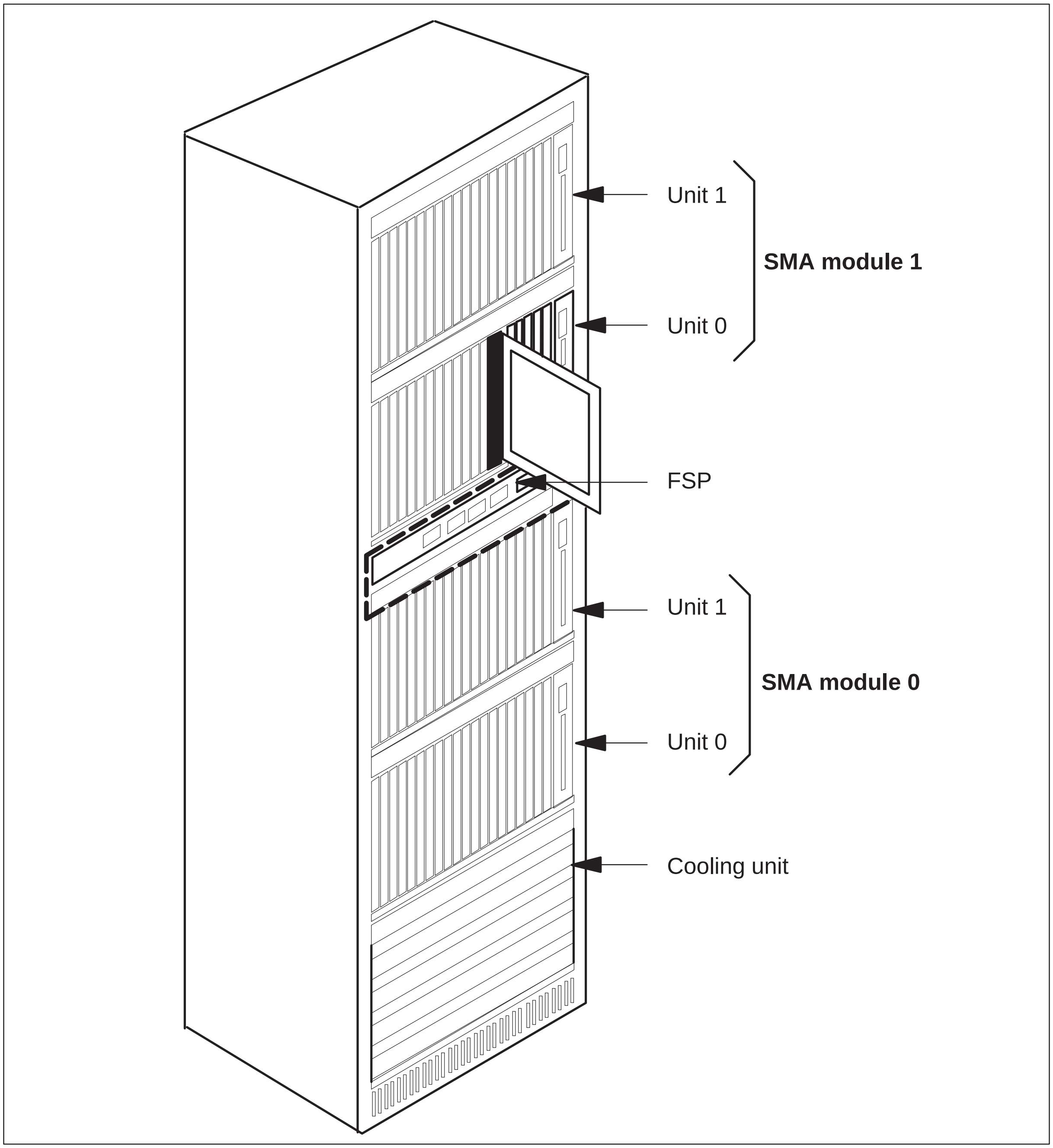
Each SMA module comprises two shelves of equipment. The SMA modules are consecutively numbered and start in the lower shelf of the first frame. The SMA name on the frame is SAEI which represents SMA equipment integrated services digital network (ISDN).

Dual shelf module

Each SMA appears in a two-shelf configuration. This configuration allows the control complex in either shelf to control call processing in the SMA. Each shelf contains a control complex made up of a cellular access processor (CAP), an ISDN signaling preprocessor (ISP), and associated memory. In addition, each shelf provides a duplicated DS30 interface. A maximum of

16 DS30 ports are enabled to the network. The next figure is a display of the SMA frame.

Equipment frame



Two to ten DS-1 interface cards are distributed across both shelves of an SMA module. The interface cards provide a maximum 20 DS-1 ports that service DS-1 links for one or more RDTs. The SMA provides an interface for ISDN through the Enhanced D-channel handler (EDCH) card.

The EDCH and the DS-1 interface cards share a location in the SMA module. An EDCH displaces a DS-1 interface card and reduce the number of DS-1 ports by two.

Circuit cards

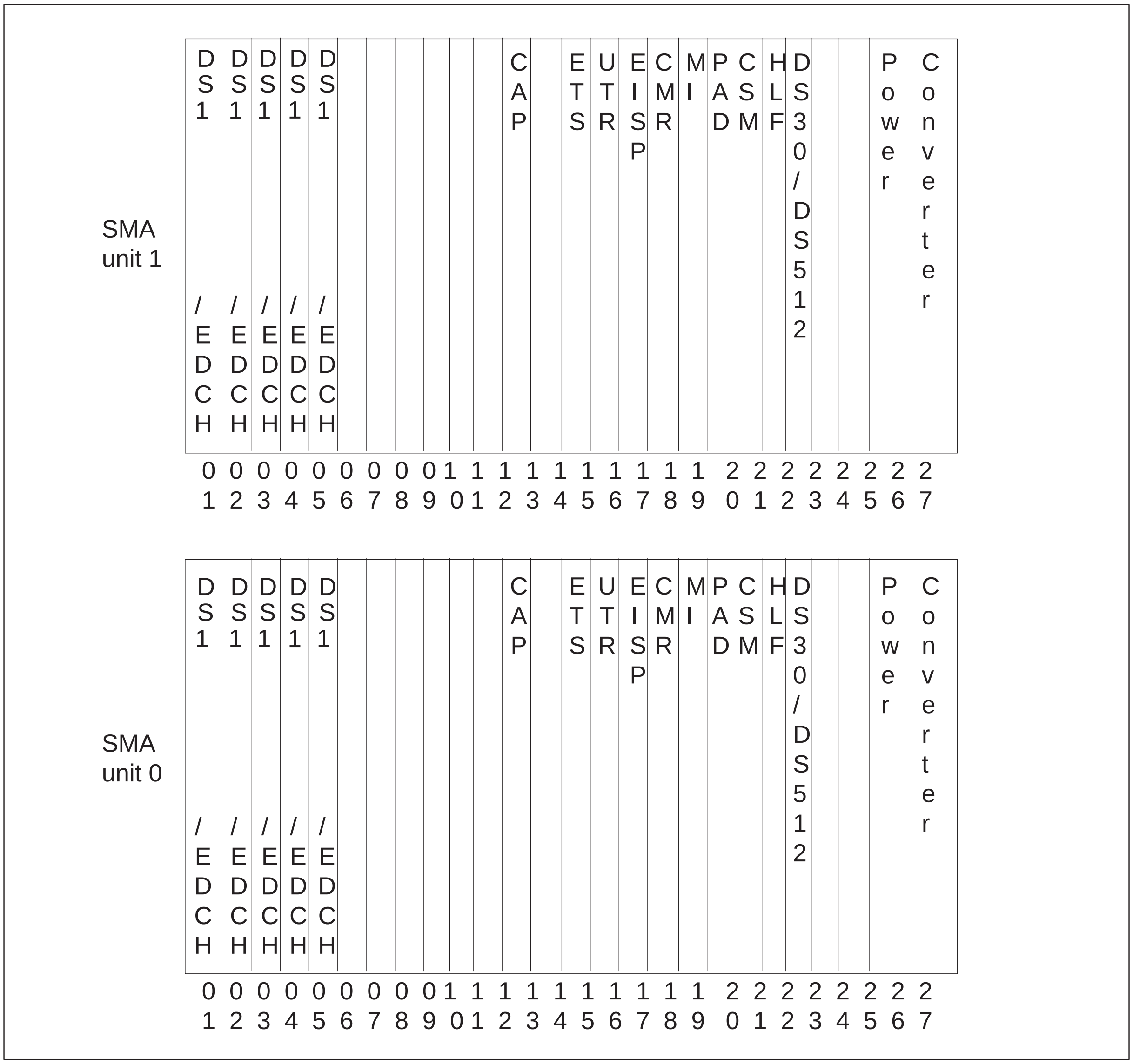
The PEC of all the circuit cards in an SMA, the location and the abbreviations appear in the following table.

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 6X40DA	22a paddleboard	DS512 paddleboard (DS30)
NT2X70AE	25–27	Power converter

The SMA shelf configuration appears in the following figure.

SMA shelf configuration



Host communication cards

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

NT6X40 Speech from the network is received in the DS30 or DS512 interface cards.

The network connects to the SMA with up to 16 pairs of DS30 links or one pair of DS512 links. These links connect in the SMA to two DS30 interface cards (NT6X40AC) or to two DS512 interface cards (NT6X40FA). One link connects in shelf 0 and one link connects in shelf 1.

Each NT6X40AC card supplies 16 DS30 ports and provides a maximum of 32 (0 through 31) ports on a fully equipped SMA. Sixteen ports are dedicated to network plane 0 and 16 ports to plane 1. Port assignments are distributed between the two DS30 cards. Even-numbered links are assigned to plane 0 and odd-numbered links to plane 1. A minimum of three ports for each SMA (three pairs of duplicated links) is required for interface with the network module.

Each DS30 or DS512 card synchronizes the incoming information that comes in with the SMA. The synchronized information provides 512 channels for each plane to the formatter cards in units 0 and 1. This action provides a duplicated path through the currently active control complex.

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

To enable the enhanced diagnostics of the NT6X40AD and FB cards, enter NT6X40AD or FB in field PEC6X40. A PM777 log that contains a card list indicates faults.

NT6X41 The host link formatter, also known as the speech bus formatter card, NT6X41AA or AC, 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. These channels are converted to a 640-channel, (512 plus 128), bus to the SMA control complex.

Speech bus cards

The speech bus cards are along the speech bus that function as two speech buses to send and receive.

NT6X42 The NT6X42 is the channel supervisory message (CSM) card. The CSM card extracts the channel supervisory message and checks for parity errors. The SMA works with odd parity and makes sure of an odd number of pulse code modulation (PCM) pulses for each 10-bit channel. Incorrect parity indicates that a bit was altered during transmission from one PM to another PM.

The CSM is a 40-bit message that contains 24 synchronization bits, 8 integrity bits and 8 data bits. The complete message is transferred 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 which integrity value to expect. The integrity check makes sure of a correct path from one PM to another PM. The 8-bit data byte relays data about call setup, maintenance and other PM data.

NT6X80 This card is the PCM loss addition card and is part of the speech bus circuit. The NT6X80 card receives the PCM speech signal from the formatter card. The card modifies the PCM and injects the PCM signal again on the speech bus. This card provides controlled digital attenuation (0 to 7 dB) of the PCM speech signal on each channel.

NTAX78 This card is the improved time switch card. The improved time switch card performs the following functions:

- converts between the serial stream received from, or transmitted to, the DS-1 interface card and the parallel stream used on the internal bus
- associates the DS30 or DS-1 channels with any of the time slots on the parallel bus. The signaling processor controls this function.
- transfers data between the associated channel and the time slot

NT6X69 This card is the message protocol and tone generator. The message protocol card provides an interface for signaling and control messages between the SMA and the DMS SuperNode switch.

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 can not know which receiver interprets tones. Call processing tones can be degraded if designed for use with a GTR.

The NT6X92EA global tone receiver (GTR) identifies and processes the following on the parallel speech bus:

- dual-tone multifrequency (DTMF)
- MF
- MF-socotel

- CMF-forward and backward tones in 64 channels (32 from the P-side and 32 from the C-side)

The GTR complies with the LSSGR (LATA switching systems general requirements) and CCITT (International Telegraph and Telephone Consultative Committee). The GTR can replace all national and international versions of the UTR.

NTBX01 This card is the enhanced ISDN signaling preprocessor (EISP) card. The EISP uses direct memory access (DMA) to communicate with the CAP card. This arrangement allows the EISP to access the memory on the CAP card. The EISP converts the signaling on the TMCs and the embedded operations channels (EOCs) which allows the CAP to communicate with the 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 CAP also contains a 68040 processor and 16 Mbytes of memory to support the download of firmware ability. The NTAX74 call processing functions include digit collection (pulse), channel assignment and message processing. The NTAX74 real-time call processing functions send and receive messages, control the enhanced time switch and supervise channels. The CAP provides dynamic random access memory (DRAM) and a direct memory access (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 and provides the interface to DS-1 links that connect to the RDT.

NTBX02 This card is the Enhanced D-channel Handler. The Enhanced D-channel Handler:

- provides interface to ISDN links that connect to the RDT
- communicates with the EISP over a high level data link controller (HDLC) to transfer signaling and maintenance data
- passes packet data to and from the DMS Data Packet Network (DPN) through Bd channel links

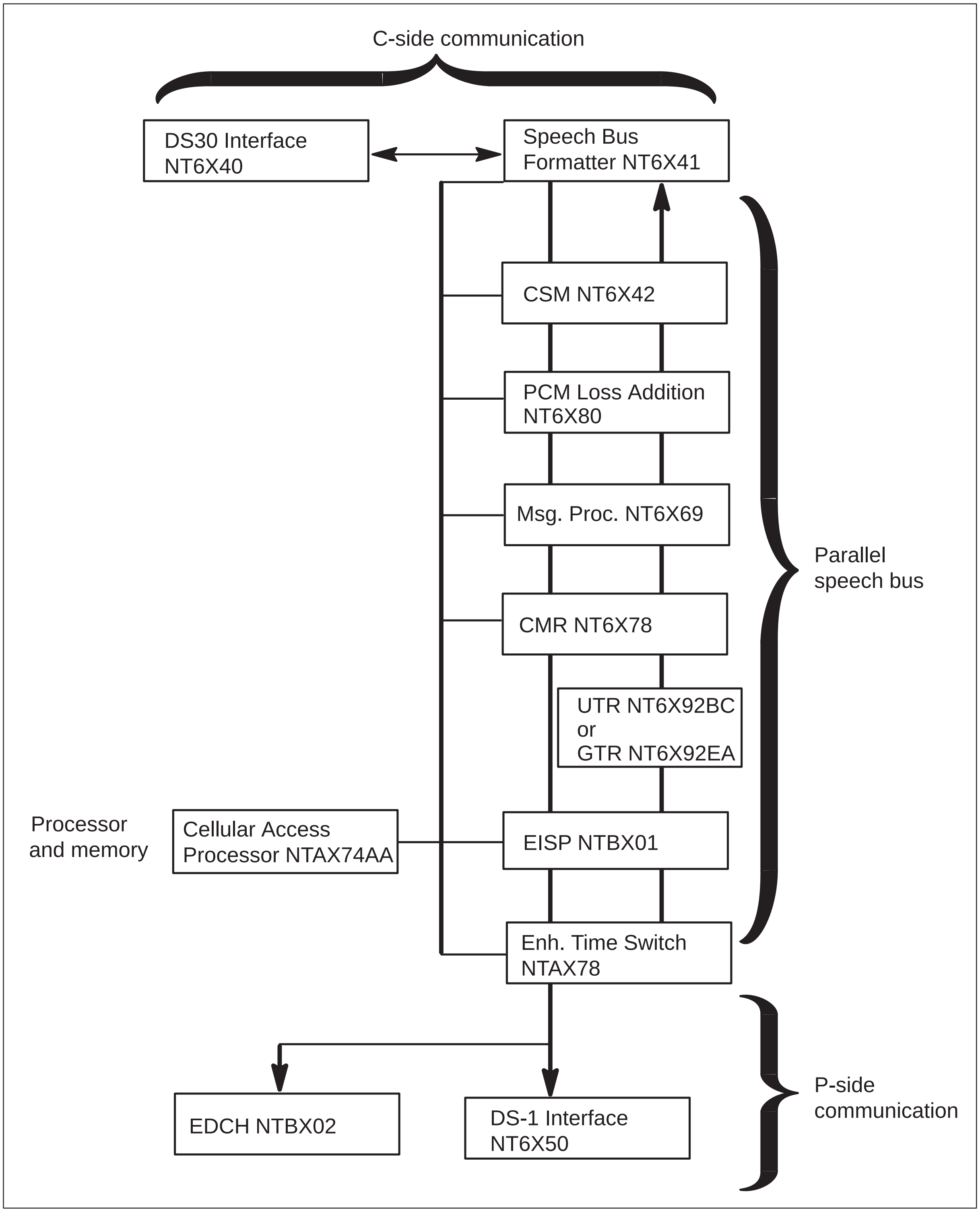
- performs terminal endpoint identification (TEI) management and operational measurement (OM) collections

An Enhanced D-channel Handler can replace one DS-1 interface card and reduce the number of ports by two.

SMA functional block diagram

This section addresses the specific cards and how the cards perform the software functions of the SMA system. The order of the cards in the SMA appears in the following figure.

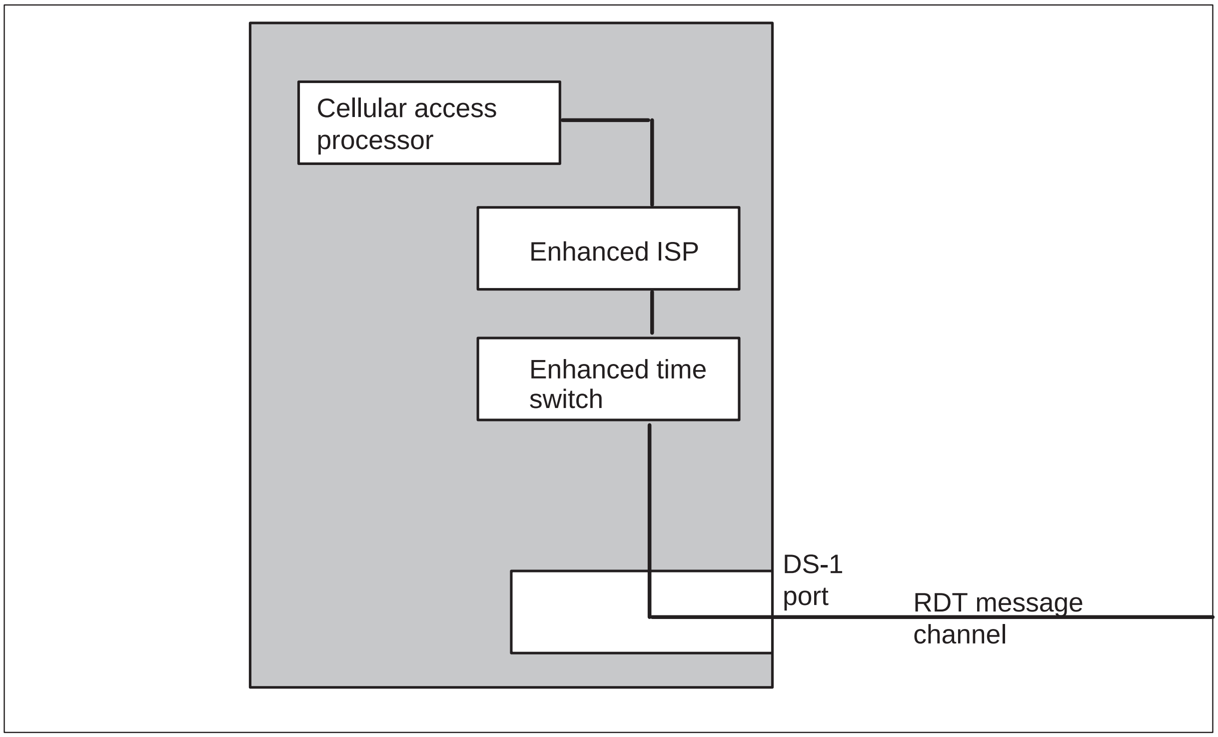
SMA functional block diagram



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. The cellular access processor processes the translated message.

Message channel routing in the SMA



SMA system functionality

Introduction

This section describes 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. This aspect is functional only. The SMA does not support stimulus signaling.
- Analog Display Services Interface (ADSI) tones and compatible voiceband data that complies to Bellcore standards
- path protection switching
- communications protocols
- call processing
- service capabilities

Voice and data communications

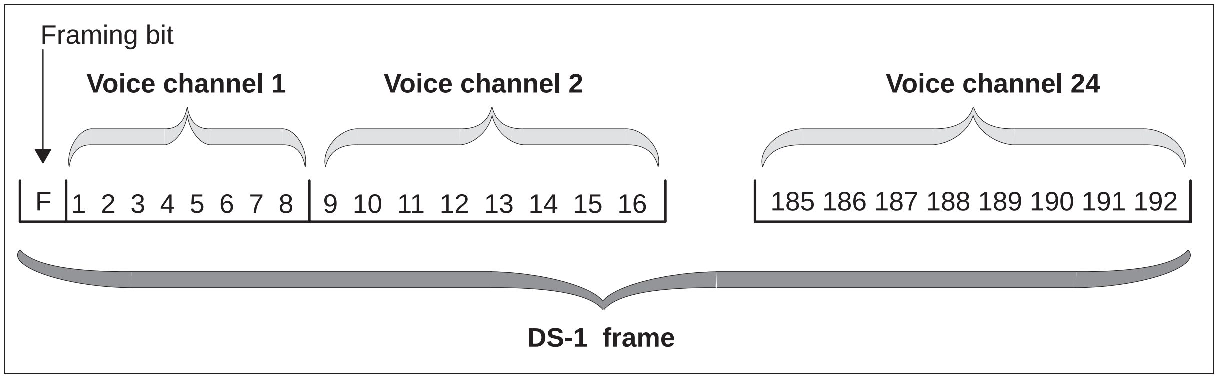
The system uses extended superframe format (ESF) signaling to transfer voice and data calls between the RDT and the SMA through DS-1 links.

DS-1 frame format

The SMA and RDT exchange information over DS-1 links. The 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 in 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. The RDT or SMA can receive a framing bit. When this event occurs, the system notifies the RDT or SMA if the following 8 bits contain information from time slot one. Frame alignment in the extended superframe alignment requires the framing bit.

Extended superframe format signaling

Extended superframe format (ESF) signaling monitors DS-1 link performance and maintenance functions. The ESF signaling allows ABCD bits to represent the messages. The ESF signaling does not allow AB bits to represent the messages. This change improves robbed bit signaling messages.

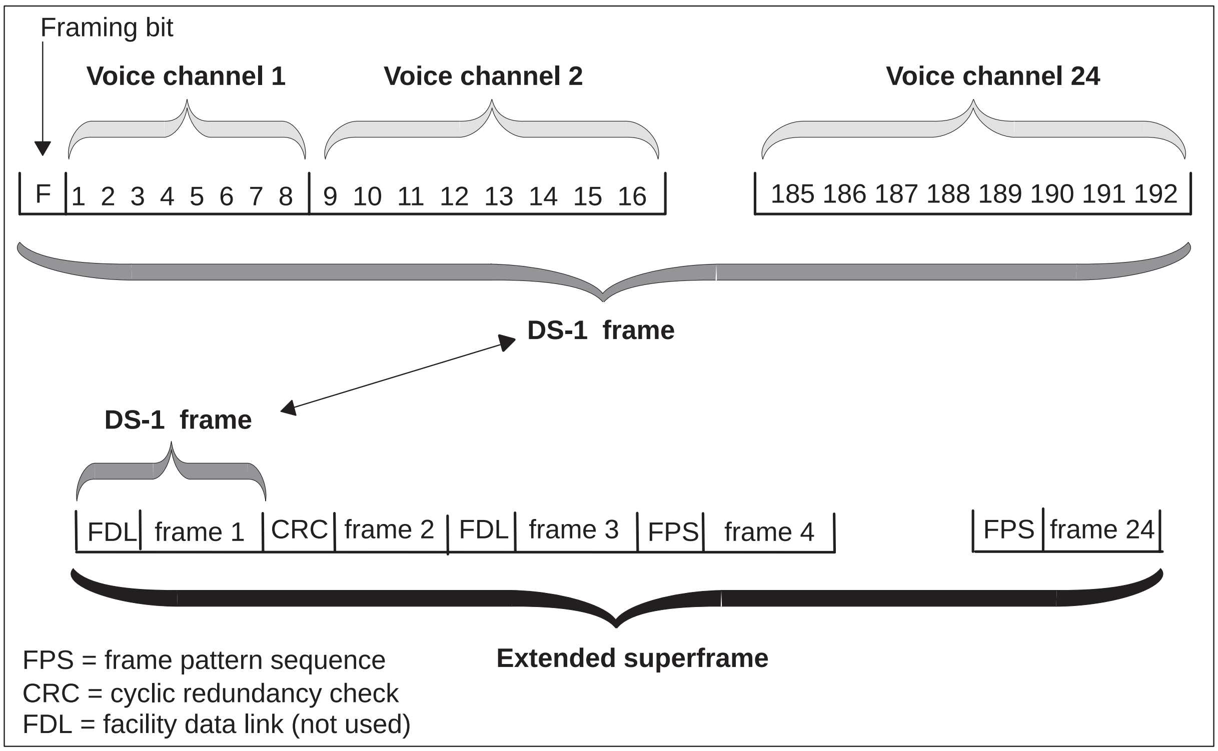
The ESF consists of 24 DS-1 frames. In ESF, the framing bits form a 24-bit pattern. One framing bit is present for each 24-channel frame. The 24-bit pattern provides three types of information.

- frame pattern sequence (FPS)—The framing bit carries an FPS value of 001010. The FPS begins at the fourth frame and occurs at intervals of four frames. The FPS uses the framing bits to perform this process. Together with the cyclic redundancy check (CRC), the FPS defines an in-frame condition.
- facility data link (FDL) performance—The SMA does not use this functionality. The FDL 4 is a Kb/s message. The FDL begins at the first frame and occurs after every other frame. The FDL uses the framing bits to perform this process. 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 at intervals of four frames. The CRC uses the framing bits to perform this process. In an extended superframe, the CRC checks a block check field six times. The CRC-6 check detects bits that emulate an FSP bit. The CRC-6 determines if 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 describes the extended superframe alignment pattern.

Extended 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

Generic RDTs use TR-303 hybrid signaling for call setup, call take-down, and call monitoring signals. This type of signaling consists of:

- robbed bit signaling (RBS).
- time-slot management channel (TMC) signaling.

The sections that follow describe these two signaling types.

TR-303 hybrid signaling

TR-303 hybrid signaling uses two types of signaling:

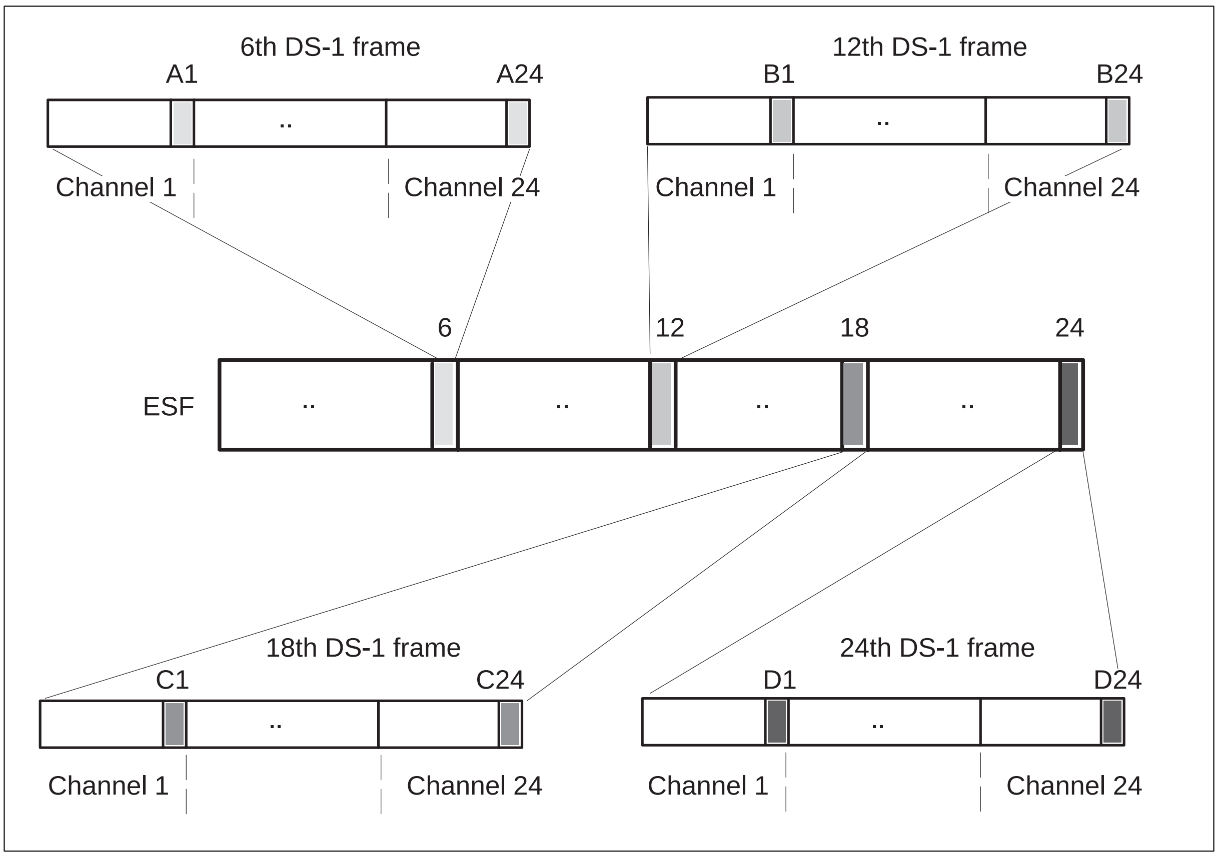
- in-band signaling
- out-of-band signaling

Integrated digital loop carrier (IDLC) call processing requires TR-303 hybrid signaling.

Robbed bit signaling

Another term for robbed ABCD bit signaling is robbed bit signaling (RBS). Call supervision, ringing, and dial pulse (DP) digit transmission between the IDT and the RDT over the assigned time slot requires RBS. The ABCD bits are the bits extracted from the ESF least significant bits. Each 8-bit channel in the 6th, 12th, 18th, and 24th frames contains the ESF least significant bits. The collection of A, B, C, and D bits can define a maximum of 16 different codes in each direction. For example, RDT to IDT and IDT to RDT. The following figure illustrates four ABCD bits extracted for time slot 1 of a DS-1 ESF. In-band (ABCD) signaling occurs for separate channels.

ABCD bits extracted from a DS-1 ESF



The ABCD bits facilitate the exchange of call supervisory information between the IDT and the RDT. The IDT uses TMC to set up a clear time slot connection at the RDT.

The ABCD signaling provides the following functions:

- scan for hook state changes

  The signaling process scans and filters hook state changes for answer, disconnect, or flash signals from customer lines.

- IDT ringing control to send ringing patterns to the RDT

  The IDT provides ringing cadences and schedules. The RDT provides ringing to customer lines.

- service to IDT call processing for loop signaling and supervision

  Allows the system to send and receive ABCD codes for loop signaling and supervision.

- service to IDT coin call processing to perform coin control functions and tests for coin lines

  Coin control functions include coin collect and coin return. Coin tests include coin presence and coin partial presence.

- service to IDT call processing for automatic numbering identification (ANI) test for two-party lines

  This test identifies which party of a two-party line originates the call. This identification is for billing purposes.

- dial pulse (DP) digit collection

  When DP digits are dialed, the system generates hook status transients on the line. The ABCD signaling detects and checks the hook status transients for valid dialed digits.

- DP digit outpulsing

  The DP digit outpulsing provides digit outpulsing to customer premises equipment.

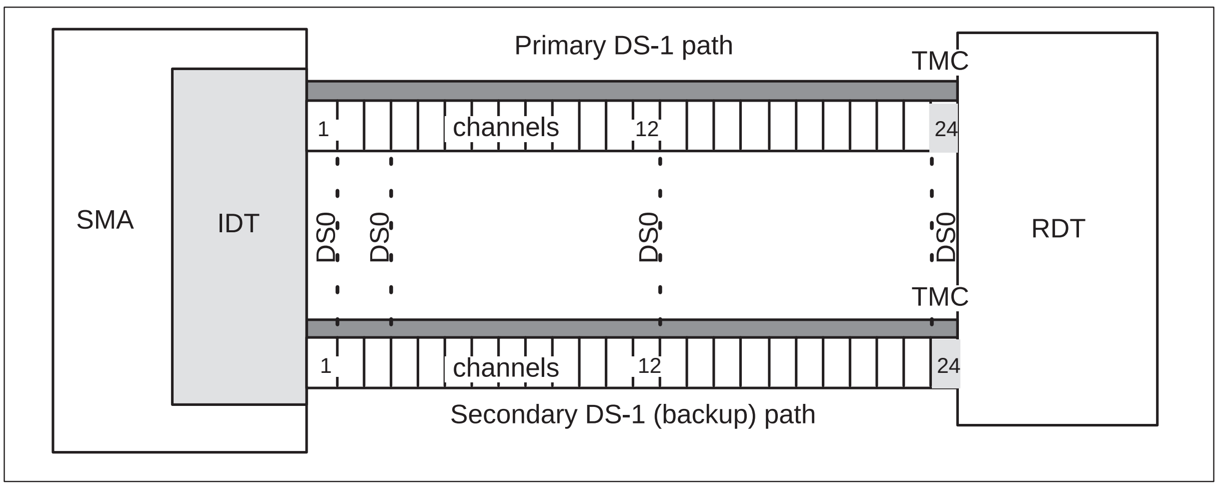
Time-slot management channel signaling

Time-slot management channel (TMC) signaling is called out-of-band signaling. The TMC signaling is message-oriented signaling which signals the connection and disconnection of timeslots between the IDT and RDT. The TMC sets up and takes down calls in an MVI RDT. 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 32 octets (an octet is 1 byte that contains 8 bits).

Signaling between an SMA and an RDT over a DS-1 link appears in the following diagram. The system transmits the TMC channel of this type of signaling over channel 24.

SMA to RDT connectivity



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

The system transmits OAM&P messages over embedded operations channel (EOC) message channels for an SMA and a generic TR-303. This section describes the EOC message signaling.

EOC message signaling

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

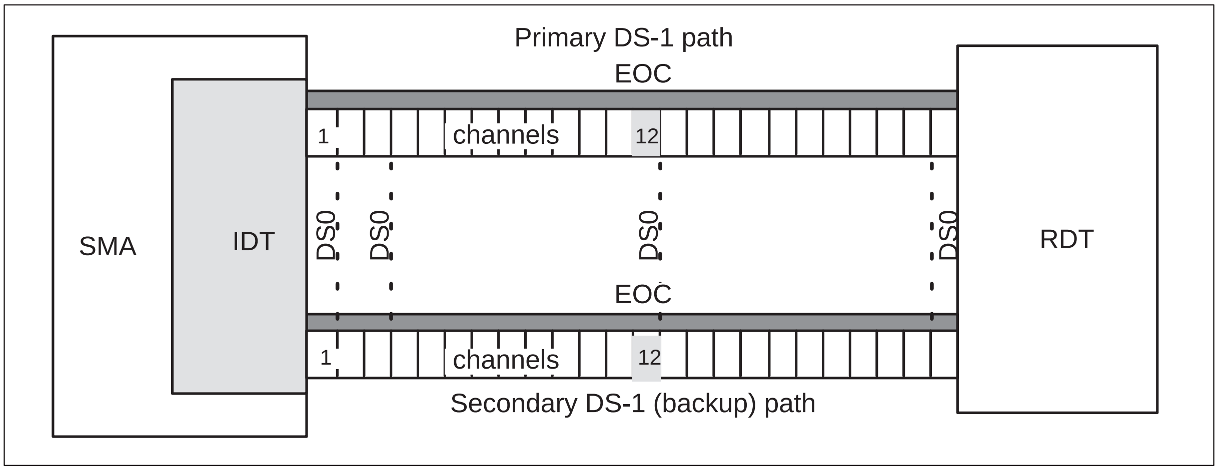
The SMA communicates EOC messages between the IDT and the RDT to:

- initialize and maintain object-oriented static data at the RDT.
- provide line test position (LTP) capabilities 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.

Signaling between an SMA and an RDT over a DS-1 link appears in the following diagram. The system transmits the EOC channel for this type of signaling over channel 12

SMA to RDT signaling over the EOC channel



The following DMS applications use EOC message signaling:

- DMS line provisioning. This application controls the entry of subscriber services. Line provisioning refers to hardware provisioning and to service provisioning.
- DMS line maintenance and automatic line testing (ALT). This application provides the ability to control and monitor subscriber line states from the MAP terminal. The DMS line maintenance and ALT allows diagnostic tests of the lines.
- logs and alarms. Logs and alarms allow the system to report alarms and events to the DMS MAP terminal and to the operations support system. The operations support system connects to the RDT.

- node maintenance. Node maintenance provides the control of voice and data channels between the DMS CM and peripheral devices. The peripheral devices include the SMA and the RDT.

ISDN BRI signaling

Integrated services digital network basic rate interface (ISDN BRI) is often called 2B+D. This signaling consists of two 64-kbit B-channels for voice and data and a 16-kbit D-channel for signaling and packet data. The two types of ISDN BRI signaling are functional and stimulus.

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

The ISDN BRI consists of two B-channels for voice and packet data and a D-channel for signaling. The TMC messages for voice and data allow the system to assign B-channels. The D-channel is nailed up at the time of provisioning. This method provides permanent assignment of network connection for the D–channel. 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 expands the BRI service options available to end users. To access the enhanced ISDN capabilities described in this section, the operating company must purchase software optionality control (SOC) NI000050 in NA007.

- Two B-channel access—This functionality allows a specified terminal to use one terminal endpoint identifier to access both B-channels at the same time. This terminal supports voiceband information (VI) and circuit mode data (CMD), or VI or CMD. This capability 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 capability supports one non-initializing terminal on a BRI interface provisioned with the default logical terminal. An NIT is a current class of BRI terminal that does not initialize Layer 3. An NI does not require a service profile identifier (SPID). An SPID is an identification number. A terminal in the initialization process uses an SPID.

- Assignment of fixed feature keys to the default logical terminal for NITs. This capability allows the assignment of call forwarding, message waiting, conference calling, call transfer, and call drop to the nit. The NIT uses dial-access procedures or feature key management procedures to access these features.

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

- This feature changes how additional call offering (ACO) operates for terminals with the access privilege entered for two B-channel access. The terminal can have a call active and one B-channel free when a termination occurs. When a termination occurs, the terminating SETUP contains the channel identifier information element (CID IE). This element is encoded to the value of the free B-channel. For terminals that do not have the two B-channel access privilege, this message has the CID IE encoded to no-channel.
- Flexible calling can be active on a 2B FIT/NIT conference controller. When flexible calling is active, additional VI terminations are offered to the terminal with the CID IE encoded to 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. A line with the DSCWID option can have an active call. A second call can attempt to terminate to the line. In this event, the SMA provides one of two types of alerting signals or tones as follows:

- a subscriber alerting signal (SAS)—The SAS is the tone the subscriber recognizes as the call waiting tone.
- a SAS and a customer premises equipment (CPE) alerting signal (CAS)—The CAS alerts the CPE that data is present. These signals are necessary to trigger an ADSI compatible CPE to display the DSCWID options. A CAS must follow the SAS. The CAS tone prepares the CPE to receive caller identification (CID) data.

The DSCWID CPE generates an acknowledge (ACK) tone to indicate readiness to receive DSCWID data. If the CPE is ADSI compatible, the CPE sends a DTMF A ACK signal in response to the CAS. If the CPE is a SCWID CPE, the CPE sends a DTMF D ACK signal in response to the CAS. When SMA sends alerting tones, the subscriber can control disposition of the incoming call. The subscriber must use the CPE softkeys if the CPE is ADSI. The subscriber must use hard-coded keys if the CPE is a SCWID or a 2500 set to control the incoming call.

A T-tone timer sets the maximum amount of time between the time a CPE sends flash and the DTMF digit on an ADSI set. The SMA receives a flash signal from the ADSI compatible CPE of the subscriber. The SMA starts a T-tone timer. The value of T-tone is 600 ms. The speech path is muted during this time. The first option of a DSCWID call requires the T–tone timer. The type of the CPE does not affect this action. Additional DSCWID options on an ADSI set use the T-tone timer.

Additional DSCWID options on a SCWID or 2500 use a current timer (T-flash). The system uses the T-flash after the customer answers the call. The T-flash provides the customer with time to select an option after a flash. This action occurs when the customer uses SCWID or 2500 sets. The system uses this current timer when a subscriber cannot flash and dial a DTMF digit in less than 600 ms. T-flash is a timer set from 1 s to 8 s. The default value is 1.5 s. The SMA starts the T-flash timer when the NON-ADSI field is set to Y. The SMA receives a flash signal from the SCWID or 2500 set that belongs to the customer. The SMA receives this signal from the customer during the held or conference call state. If the SMA cannot attach a UTR in less than 400 ms, the SMA applies the RETURN option.

Note: For Bellcore TR-416 compliance, the SMA must provide options if the SMA detects a flash and cannot attach a UTR. To comply with this requirement, the SMA sends a flash to the CC. This action occurs if the SMA cannot attach to a UTR in less than 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 transmission of data to the CPE. Failure of the CPE to receive all of the data results in an ADSI call that is not stable.
- After a warm SWACT, an additional transmit to the CPE set causes the active ADSI session to drop.
- A busy return to service of the CMR circuit card can occur when an application session is active. This condition causes an ADSI call that is not stable.
- A busy of the CMR circuit card on the active unit of the XPM prevents the operation of specified CLASS services. These services use the CMR card circuit.

ADSI restriction

A successful ADSI session requires a CPE that is compatible with the ADSI. Only ten ADSI sessions can be active on a CMR circuit card.

ADSI hardware requirements

Hardware requirements to support ADSI capability include the following:

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

Path protection switching

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

Automatic or manual action can initiate path protection switching. The SMA or the RDT initiate automatic path protection switching when the SMA or RDT detects a fault. For maintenance purposes, manual action can initiate path protection switching through the integrated digital terminal (IDT) level of the MAP terminal.

The following terms relate to protection switching:

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

The following rules apply to protection switching:

- The IDT or RDT must be able to detect a failure and initiate a protection switch.
- A failure on a channel and protection switching can occur. When the cause of the failure clears, a switch back to the original active or inactive configuration does not occur.
- When possible, the system keeps a standby path in multiple-frame operation.

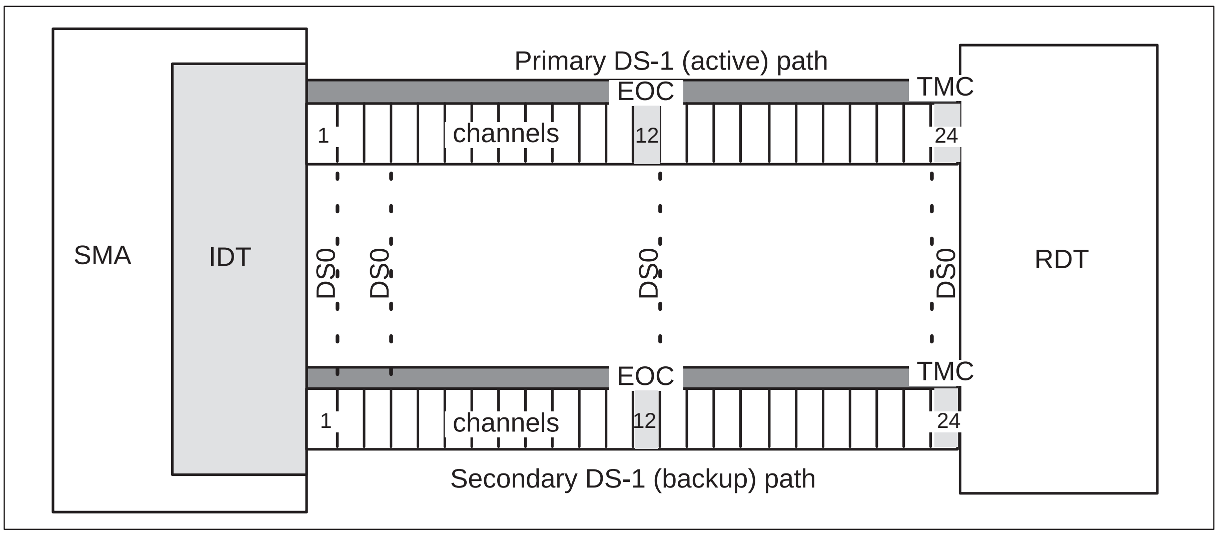
SMA to generic RDT path protection switching

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

The implementation of path protection switching depends on the configuration of the SMA and the datafill in the associated tables. The first link assignment in table RDTINV of field LINKTAB is the primary link that carries TMC and EOC messaging. Field RDTPPLNK defines the secondary link that carries TMC and EOC messaging. The secondary link can have a value from 2 to 28 assigned at the RDT.

The TMC and EOC path protection appears in the following figure.

DS-1 control channels



Manual path protection switching control

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

- initiate a protection switch for the EOC and TMC channel.
- initiate a forced protection switch for the TMC or the EOC channel
- inhibit a standby EOC or TMC path from becoming active.
- allow a standby EOC or TMC to become active, if this action is necessary.

Automatic path protection switching

The DS-1 links between the SMA and a generic RDT contain primary and secondary TMCs and EOCs. If an active TMC or EOC fails, an automatic switch to the protection channel occurs.

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

- detection of failures through Q.921 protocol. A failure to maintain multiple-frame operation is an example of a detected failure. This type of failure occurs when message frame retransmissions exceed the message frame retransmissions N200 LAPD counter.
- manual intervention causes the system to receive a switch message from the computing module(CM).
- The system receives a switch message from the RDT.

Manual and automatic protection switching restrictions

The following restrictions apply to manual and automatic protection switching:

- If you inhibit the activation of a path that is currently active, you do not cause a protection switch.
- A manual or automatic switch to a path that you inhibit cannot occur.
- A forced switch to a path that you inhibit cannot occur.

Communication protocols

The RDT communicates with the DMS SuperNode switch over DS-1 links that terminate on the SMA. To provide subscriber services from an RDT and to 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 that a higher layer protocol sends.
- receives information for delivery to a higher layer protocol

The Q.921 protocol transmits the following messages:

- TMCmessages for RDTs.
- EOC messages.

The user can configure Q.921 protocol parameters through table RDTINV. If you require an adjustment of the LAPD parameters, change the two parameters on the RDT and DMS ends at the same time.

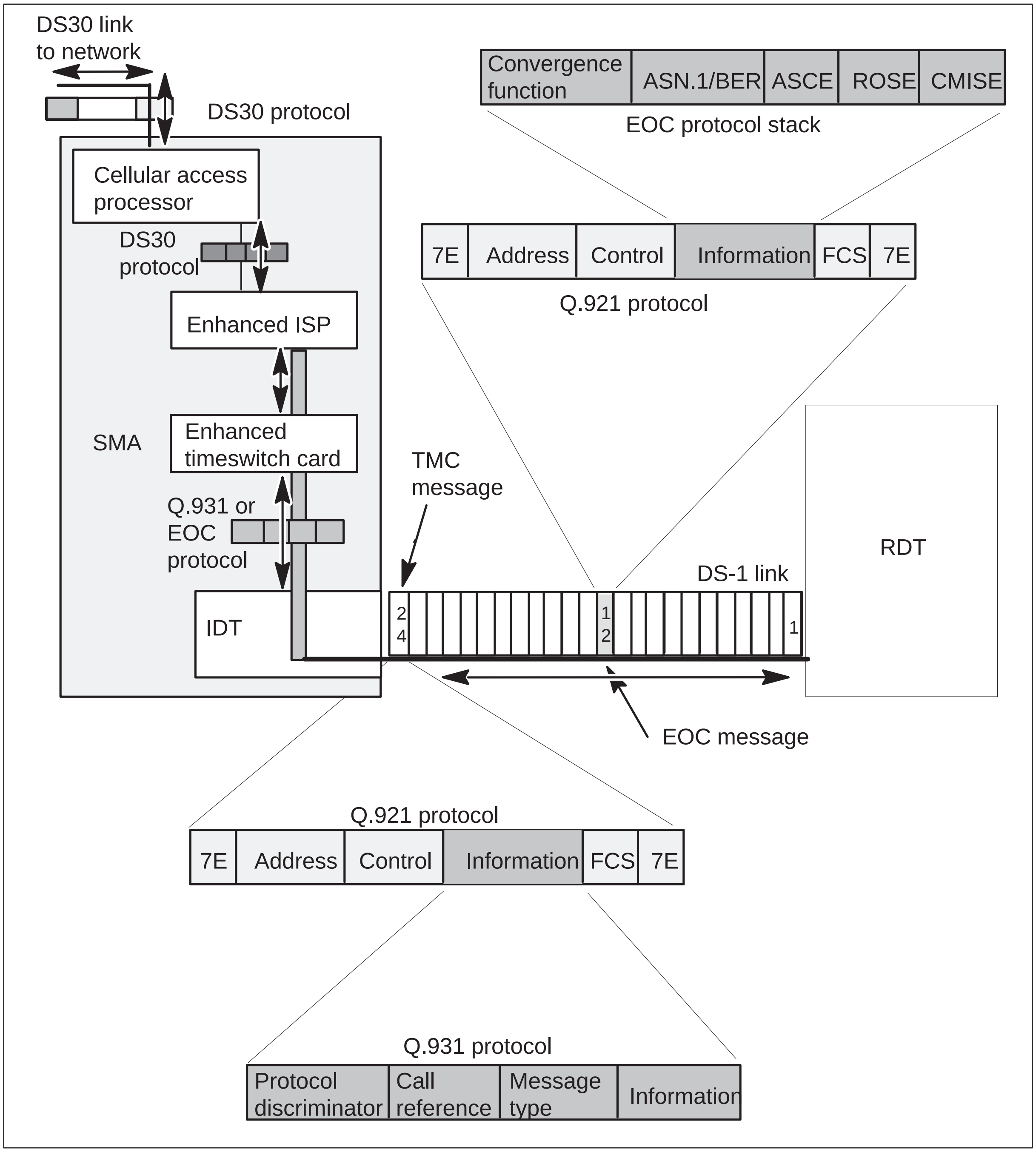
Table RDTINV LAPD parameters

Parameter	Description
Maximum number of unacknowledged frames (K)	The maximum number of unacknowledged message frames that remain that can transfer 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 acknowledgement for one frame (T200)	The maximum length of time in milliseconds (ms) a data link layer entity waits for acknowledgement (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 RDT. The RDT sends Q.931 generic–based signaling messages. The SMA must translate the Q.931 to a message format the host can understand. The reverse order applies. Signal flow from the RDT through the SMA appears in the following figure.

Message channel routing in the SMA



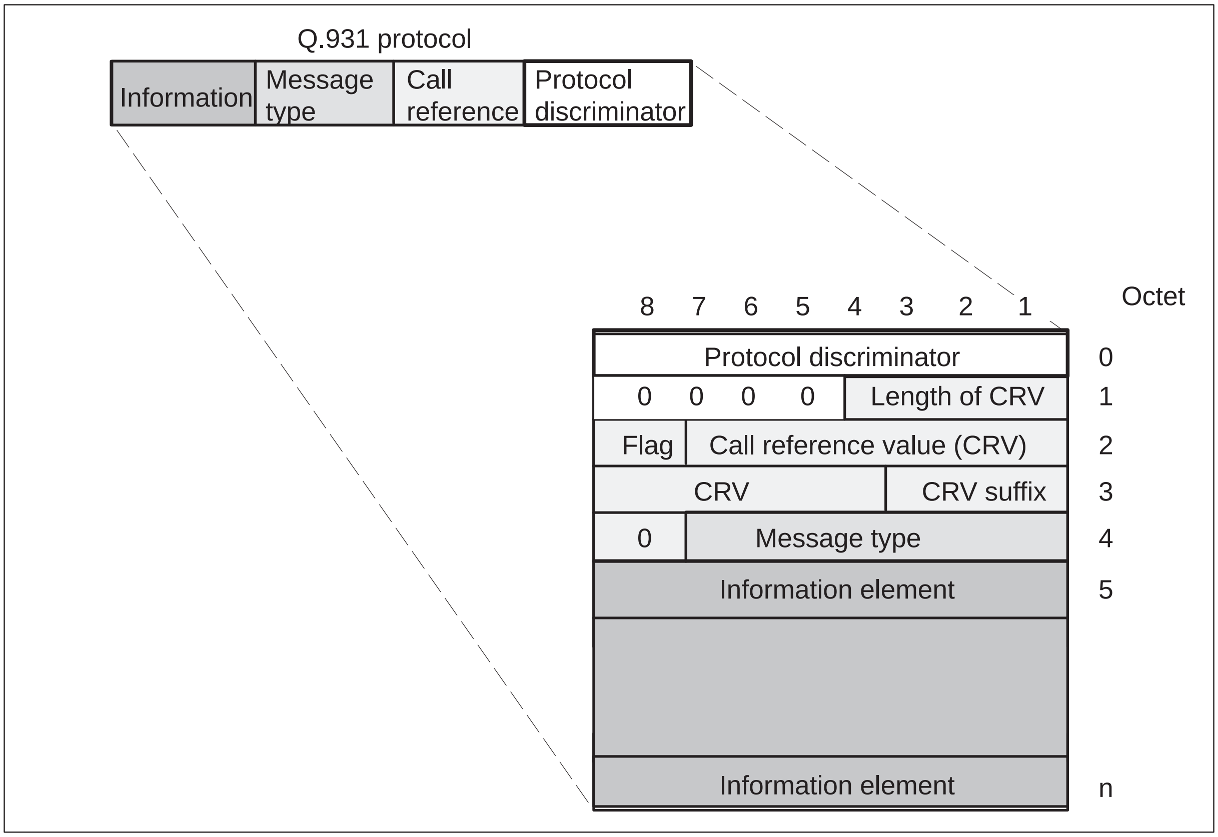
Q.931 protocol message structure

The Q.931 protocol message composition is highly structured. Each message contains the following components in the order listed:

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

The information element is optional for some messages. The Q.931 message structure appears in the following figure.

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. For ISDN, call reference identifies the basic rate access (BRA) B-channel termination.

The call reference length value is 2 octets. This value cannot change. This value 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 identifies the line termination. The call reference values are bits 1 through 7 of octet 2 and bits 4 through 8 of octet 3.

The call reference suffix supports ISDN BRA line terminations. A suffix of 000 indicates a line termination of only 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.

The two groups of messages for time slot assignment are messages for call establishment and messages for call take-down or disestablishment.

The Q.931 protocol message types and the different message type identifiers appear in the following table.

Q.931 protocol message types and identifiers

Message type	Identifier	Bit sequence
Establishment message	Call proceeding	00000010
Disestablishment messages	Disconnect	01000101
	Release	01001101
	Release complete	01011010
Messages for signaling	Connect	00000111
	Information	01111011

—continued—

Q.931 protocol message types and identifiers (continued)

Message type	Identifier	Bit sequence
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 does not always occur.

Each information element is highly structured. Each information element is different. The only structural element that is the same for each information element is the information element identifier.

The following table lists the names and functions of Q.931 message information elements.

Q.931 message information element names and functions

Message element name	Function
Bearer capability	Indicates information transfer capability, 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 messages and provides diagnostic information
Channel identification	Identifies a time slot in the interface that the Q.931 message controls.

Q.931 message descriptions

The following table contains a description of each Q.931 message. The table includes a list of the information elements that each Q.931 message contains.

Q.931 message descriptions

Q.931 message	Description	Information element
Call proceeding	This 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.
Connect	The RDT sends this message to the IDT. This message indicates a connected time slot, and that the terminating party answered a call. The IDT sends this message to the RDT at the end of digit collection. This message indicates that the IDT received a complete network address. The RDT sends this message in response to a setup message with an alerting OFF pattern in the signal element.	This action occurs for ISDN. The message contains the channel identification information element.
Disconnect	The IDT sends this message to the RDT when the IDT determines the system must clear the call. The RDT sends the message to the IDT to report that the subscriber is on-hook.	This message contains the cause information element.
Information	The RDT or the IDT sends this message to indicate addressing information, feature activation or both. The message indicates signaling information.	This message contains information elements: keypad facility, switch hook, and signal.
Release Release complete	The RDT or IDT sends these messages. The messages indicate that the equipment that sent 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.
Setup	This RDT or IDT sends the message to initiate the start of a call. This message contains the channel identification, keypad facility, and signal information elements when the IDT sends the message.	This message contains only the bearer capability information element when the RDT sends the message.

—continued—

Q.931 message descriptions (continued)

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

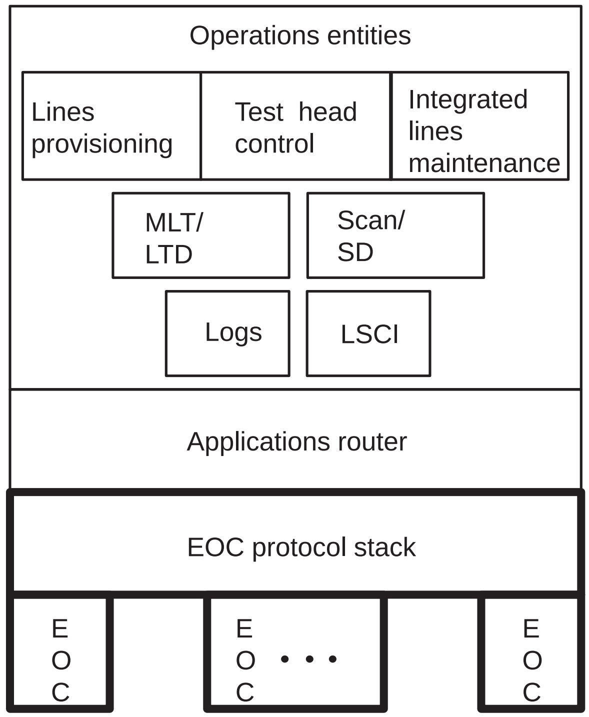
EOC communication protocol

The RDT and the SMA use the EOC communications channel to communicate. This communication occurs over a dedicated DS-0 through the use of the Q.921 LAPD protocol that ISDN D-channels use. The DMS SuperNode switch and the RDT transmit messages to each other. The EOC communications channel uses the operations gateway (OGW) software. This software provides the protocol translation and routing capabilities necessary to connect RDTs to operations entities. The OGW contains 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

The figure and text that follow describe these elements.

OGW software functional elements



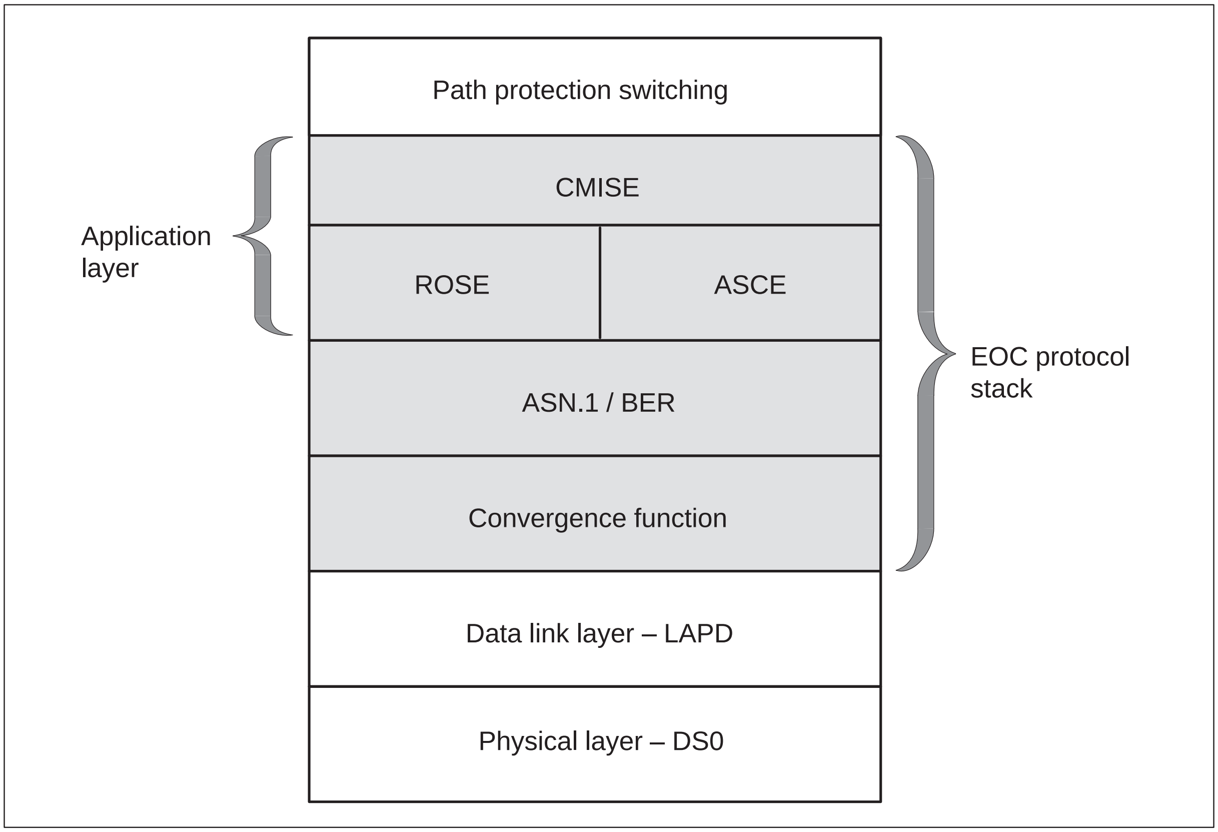
LSCI = local switch craft interface
LTC = line trunk controller
MLT = mechanized loop test
SD = signal distribution

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

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

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

EOC communication protocol functional areas



The encoding and decoding of line test EOC messages occurs in the SMA. Encoding and decoding in the SMA instead of the CM improves real time performance for line testing. The following components require encoding and decoding of line test EDC messages:

- 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 that communicates operations, administration, maintenance, and provisioning information. The EOC protocol stack transmits this information between the IDT and the SMA and the RDT over the EOC communications channel. The EOC protocol stack that appears in the figure EOC communication protocol functional areas consists of the following three layers:

- convergence function layer—performs the segmentation and re-assembly 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—contains the following functionalities. These functionalities allow two application processes to communicate:
  - common management information services (CMISE). CMISE exchanges information and commands to manage the SMA system.
  - remote operations service element (ROSE). ROSE supports communication between communicating application users.
  - association control services element (ASCE). ASCE controls application associations.
- abstract syntax notation one (ASN.1) layer—uses basic encoding rules (BER) to parse and format 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. The applications and devices are the source or end point of operations messages between the SMA and the RDT. The operations entities use the services of the EOC protocol stack to communicate over the EOC with the RDT.

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

- line provisioning. This application controls the datafill of subscriber services.
- line maintenance. This application allows you to control and monitor subscriber line states from the MAP terminal, and permits diagnostic tests of the lines.

- logs and alarms. This application allows the system to report alarms and events at the MAP terminal and external operating systems.
- node maintenance. This application provides for the control of voice and data channels between the CM and the SMA and RDT

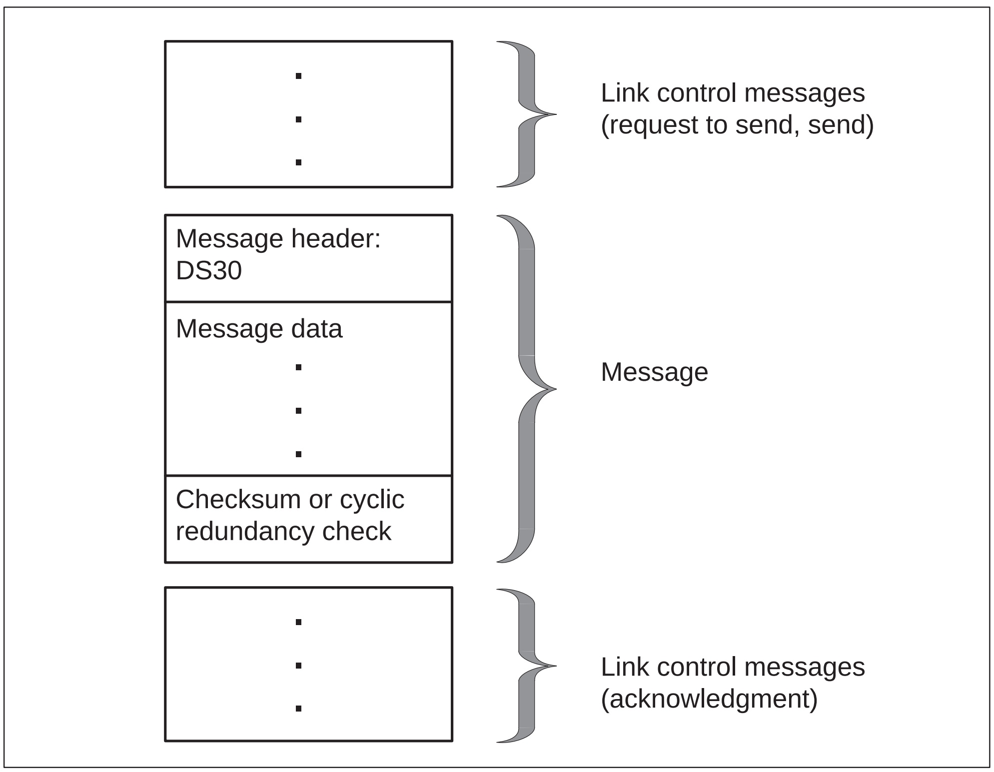
The IDT software communicates with an RDT over an LAPD channel.

DS30 protocol

The DS30 protocol is a half-duplex protocol which DS30 or DS512 links use. The DS30 protocol includes a message checksum for error detection.

The DS30 protocol is a form of handshaking protocol. Handshaking protocol allows message transfer between nodes. The nodes can inform each other of the current condition of a node as the condition relates to messaging. A general form of handshaking protocol appears in the following diagram.

Handshaking protocol



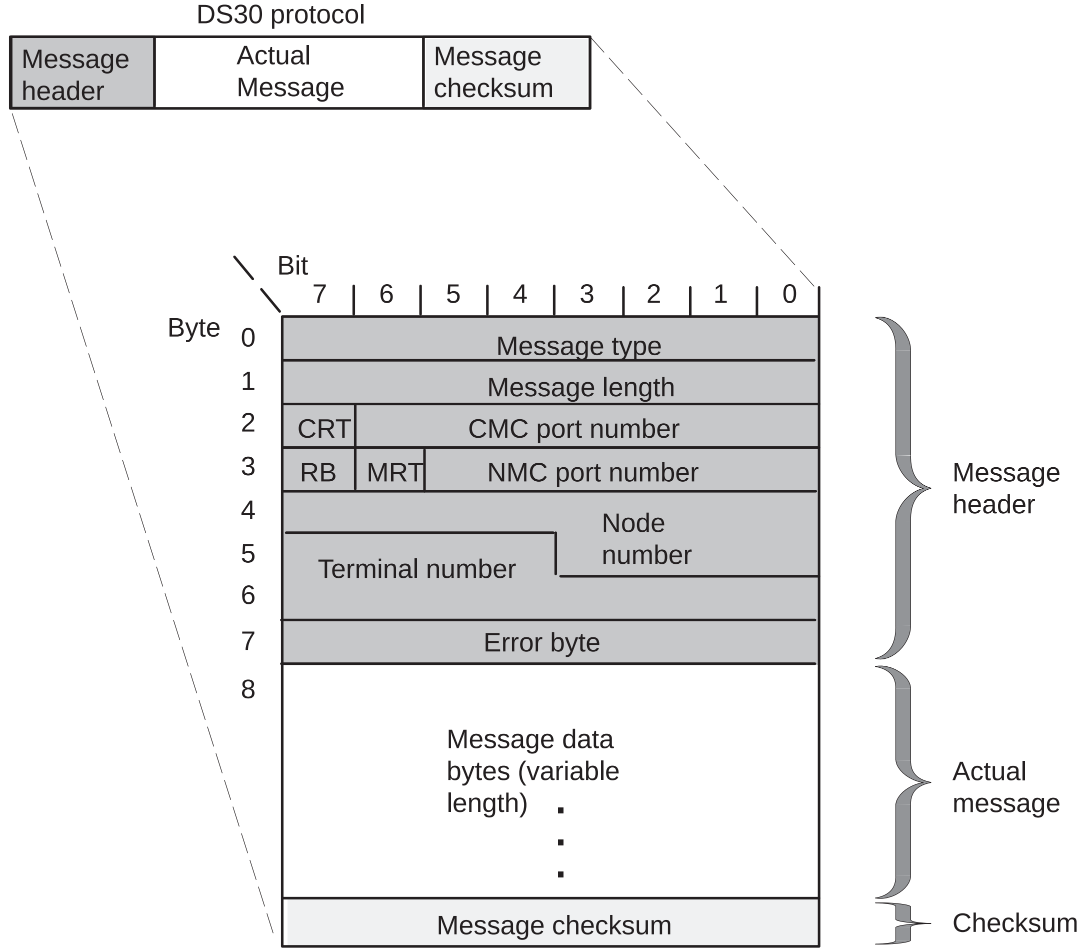
Message time-out, message checksum or CRC calculation perform message error detection. In the event of protocol, checksum, or CRC failure on an outgoing message, the sending node attempts the send sequence again.

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

The system transmits the DS30 message over a link with link control messages that precede and follow the DS30 message. Messaging occurs between programs that operate in the SMA and programs that operate in the CM. Many software tasks or processes use messages over the DS30 links to communicate with other tasks or processes.

The design of DS30 messages appears in the following 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 DS30 message header is the first eight bytes.

- The first byte specifies the message type
  - — control, which is 1 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. This field specifies the preferred message switch (0 or 1).
  - MRT. This field specifies the preferred network plane

  Incoming messages use the CRT and the MRT fields. The CRT and MRT fields 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. The TID identifies the origination node and terminal number for incoming messages.
- The last byte is the message checksum byte field. The message checksum field contains a checksum over all bytes in the message. The last byte detects transmission errors.

The number of bytes in the current message or data varies.

ADSI protocol

Analog Display Services Interface (ADSI) permits application software to download softkey information to a CPE. The ADSI provides communication between the DMS SuperNode switch and a CPE in two directions. These capabilities require ADSI protocol. The ADSI protocol uses standard dual-tone multifrequency (DTMF) signaling and standard modem-based technology. This protocol transmits caller_id information from a DMS SuperNode switch to a CPE.

The SMAs act as a message transfer agent between the CM and the CMR circuit card in ADSI protocol. The SMA and CMR act as an interface between CM application software and an ADSI compatible CPE. The SMA forwards any message the CM sends to the SMA to support ADSI to the CMR. The CMR forwards the correct information to the CPE. The following features use the ADSI protocol:

- 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 that TR-NWT-000030 (TR-30) defines.
- the ADSI interface and protocol that TR-NWT-001273 (TR-1273) defines.

The TR-1273 divides the ADSI protocol into three layers. The layers are the 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 checks for error detection and correction.

Message layer

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

Call processing

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

Call processing can originate from the RDT or from calls from remote users. These calls terminate on an RDT that subtends 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 recognizes.

Call processing (RDT to IDT)

The following call processing description traces the call from the RDT to the DMS SuperNode switch through the IDT. The description applies to POTS/COIN calls. The ISDN calls can be different from the POTS/COIN calls.

Time slot request

When the original subscriber goes off-hook, a loop closure occurs. Current flows in the loop and exceeds a set threshold. The RDT line card detects this current. Coin calls made from coin first equipment only have loop closure when the caller deposits a coin.

The RDT uses the TMC message channel to send a setup message to the IDT. The call state is call-initiated. This message contains the call reference and bearer capability associated with the subscriber line that is 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 IDT. If a response does not occur in the specified time lapse, the RDT transmits the setup message again. If the IDT does not respond again, the RDT sets a delay timer. The RDT continues to transmit the 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 back to the RDT in the setup acknowledge message.

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

When the RDT establishes the connection, the IDT sends dial tone over the connected channel. The system places the call in the overlap sending state.

If channels are not available, the IDT sends a release complete message to the RDT. The message contains the reason specified in the cause information element. The IDT returns the call to a null state.

Sending addressing information The system collects the digits by one of two methods. The subscriber loop can use dial pulse or dual-tone multifrequency dialing (DTMF). The type of dialing the loop uses determines digit collection.

- If the RDT receives dial pulse input, the RDT sends an information message to the IDT with this address information. The RDT uses keypad facility information elements to perform this action.
- If the RDT receives DTMF input, the RDT sends this information to the IDT in-band. The universal tone receiver interprets this information.

The IDT in-band forwards this addressing information to the CM in the DMS SuperNode switch.

Tone generation

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

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

The CM can determine that the addressing information is not valid, or that the CM cannot establish a connection through the network. In this event, the channel remains open to allow the DMS SuperNode switch to provide in-band call progress information to the subscriber.

The message and tones card in the SMA generates dial tone. The time switch card switches the tone to the correct DS-1 channel. The enhanced ISDN signaling pre-processor (EISP) card directs this action. If the called line is busy, the message and tones card generates a busy tone. The originating party receives this tone. Originating subscribers can receive other treatments, like reorder tone and announcements. The conditions present at the time the subscriber places the call determine if the subscriber receives these treatments.

Call disconnection

The IDT and RDT continuously monitor the call for new messages. In a system that has flash disabled, one end can go on-hook without flash detection for a minimum of 250 ms. In this event, the IDT or RDT sends a disconnect message to the far end to release the time slot and call reference. If a system has flash enabled, the on-hook signaling bit pattern must continue. The pattern must continue for a minimum of 1200 ms to trigger a disconnect message. The IDT or RDT sends this message. When this action occurs, a timer is set at the disconnect-message end. If the IDT begins call clearing, the system places the call in a disconnect indication state. If call clearing begins at the RDT, the state of the call becomes disconnect request.

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

The end does not always receive a release message before the disconnect-message end timer expires. In this event, the end that sent the disconnect message sends a release message and sets a timer. The end does not always receive a release complete message before this current release-message end timer expires. In this event, the end sends a second release and starts the timer again. If the second release does not generate a response, the end releases the call reference and time slot.

Flash detection

An off-hook subscriber can go on-hook for less than 250–ms. An off-hook on a system with flash active can follow. In this event, the system treats the call as a glitch. The call connection remains. The subscriber can go on-hook for between 250 ms and 360 ms and go off-hook before 1200 ms expire. When this condition occurs, the system treats the sequence as a flash 1200 ms from the time the subscriber first goes on-hook.

The system uses dial pulse and DTMF at the RDT to detect a flash on lines. The system uses the keypad facility information element to encode the flash to an information message. The system sends the information message to the IDT. The IDT processes the information while the call remains active.

The caller can have call transfer or three-way calling. The RDT sends the same information message when the system detects a flash. The system places the call in an overlap sending state to allow for additional digit collection. The message exchange to set up the second call is the same as for a simple end-to-end call. The system can reach the second party and the IDT can receive a second flash information message. If this condition occurs, the system transfers or bridges the call.

The system can detect a flash in the overlap sending state. This action occurs when a subscriber activates features that do not require the establishment of a call. An example of this type of feature is 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 normally occurs during maintenance. User entry of a MAP command from the LTP level to test a line is an example of this process.

Call processing (IDT to RDT)

The following call processing description traces the call from the DMS SuperNode switch through the IDT to the RDT. The description applies to POTS/COIN calls. The ISDN calls are different from this model.

Time slot request

The IDT uses the TMC message channel to send a setup message to the RDT. The call is in a call present state. The setup message contains the following information:

- the call reference and bearer capability associated with the subscriber line that originated the call
- channel identification
- the signal information element

The setup message does not always include the information element.

After 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. If a response does not occur in the specified time lapse, the IDT transmits the setup message. If a response does not occur, the IDT releases the call reference and channel. The IDT sends a release complete message to the RDT. This message contains the reason specified in the cause information element. The IDT returns the call to a null state.

Network busy call treatment

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

Channel selection

The IDT uses the channel identification information element to indicate the channel that call connection must use. If the channel is not available, the RDT sends a release complete message back to the IDT.

If 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 that the IDT reserves for the call.

If the called line is busy, the message and tone card in the SMA generates a busy tone. The originating party receives this tone.

Alerting

The RDT can receive a setup message with alerting information encoded to the signal information element. If the RDT receives this message, the RDT sends the alerting message back to the IDT. An alerting message indicates that the called party is alerted. The system places the call in the call received state. While a called line rings, the originator receives a ringback tone.

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

The following table lists the ringing cadences that the SMA supports.

SMA-supported ringing cadences

	Ringing cadences (in seconds)					
Ring types	**On**	**Off**	**On**	**Off**	**On**	**Off**
single party	2	4				
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 message trips the ringing. This process places the call in a call active state.

On-hook transmission

On-hook transmission allows the network to transmit information, like a 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) If the RDT receives a setup message, the RDT responds with an alerting message. The system places the call in the call received state. The system provides 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 message trips the ringing. The system places the call in the call active state.

Loss padding

Padding or attenuation of pulse code modulation (PCM) samples take place in the ring/pad card. This process compensates 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. The NTAX74AA cellular access processor (CAP) circuit card directs the ring/pad card to perform this function. The ring/pad card introduces the padding to the correct channels.

Call disconnection

The IDT and RDT continuously monitor the call for new messages. An end on a system with flash disabled can go on-hook for a minimum of 250 ms. When this action occurs, the system sends a disconnect message to the far end to release the time slot and call reference.

On-hook signaling must continue for a minimum of 1200 ms on a system with flash active to trigger a disconnect message. The IDT or RDT sends a disconnect message. The system sets a timer at the disconnect-message end at the same time as the IDT or RDT sends the message. If the IDT begins call clearing, the system places the call in the disconnect indication state. If the clearing begins at the RDT, the call is in the disconnect request state.

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

The end does not always receive the release message before the disconnect-message end timer expires. If the end does not receive the message, the end that sent the disconnect message sends a release message and sets a timer. The end does not always receive a release complete message before the timer release-message end expires. In this event, the end sends a second release and starts the timer again. If the second release does not generate a response, the system releases the call reference and time slot.

Flash detection

An off-hook subscriber can go on-hook for a maximum of 250 ms. An off-hook on a system with flash active can follow. If the off-hook follows these events, the system treats the call as a glitch. The call connection remains. The subscriber can go on-hook for a minimum of 360 ms and go off-hook before 1200 ms expire. The system treats the sequence as a flash 1200 ms from the time the subscriber first goes on-hook.

The system uses dial pulse and DTMF to detect a flash on lines. The IDT processes the flash while the call remains active.

If the caller has call transfer or three-way calling, the system places the call in an overlap sending state. This action allows additional digit collection to occur. The message exchange to set up the second call is the same as the message exchange to set up a simple end-to-end call. After the second party is reached, and the IDT receives a second flash, the system transfers or bridges the call.

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 normally occurs during maintenance. User entry of a MAP command from the LTP level to test a line is an example of this process.

Call processing coin operation

Coin commands

The following are coin commands:

- coin collect
- coin return
- coin presence
- coin partial presence. This command applies to local coin overtime.

Coin collect This command directs a coin first (CCF) or coin dial tone first (CDF) telephone to collect coins that the caller deposits for a telephone call. When the caller deposits the coins, the coins go to the hopper. The hopper is a temporary holding location that stores coins before coin collect or coin return. When the telephone receives the coin collect command, the coins drop from the hopper to the coin vault.

For coin telephones that require a flat rate, the telephone collects the coins when the call is complete. For coin telephones that connect to a switching system that supports local coin overtime (LCO), the telephone collects the coins every few minutes.

Coin return After the caller deposits coins, a coin return command directs the coin telephone to return the coins the caller deposited. This command applies when the calling party on a coin telephone hangs up before the terminating party answers.

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 checks for stuck coins in CCF telephones.

An operator monitors tones that the telephone station generates to process long distance calls on CCF and CDF telephones.

Coin partial presence The CCF and CDF telephones that support LCO use this command. The coin partial presence test checks for coins that the caller deposits 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 to prevent communication between the calling and called parties. This command performs the following operations:

- resets the telephone totalizer, an electromechanical device that totals initial rate deposits.
- prepare a telephone station for calling.
- signal coin denominations to the operator.

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

Subscriber line signaling

If subscriber lines that associate with the RDT use in–band multifrequency analog signaling, the SMA transports these coin commands. When this event occurs, the SMA transports the coin commands.

Changes to the electrical condition on the loop (metallic signaling) can determine the signaling that the subscriber lines that subtend the RDT use. The IDT must translate the coin commands to 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 cause the coin station to initiate actions or to collect a deposit.

Coin operation limits and interactions The following limit applies to coin functions. The caller cannot initiate coin telephone calls during a warm switch of activity (SWACT) or call processing (CP) switchover. The system does not allow the calls because the SWACT inhibits messaging between the SMA and RDT.

> ***Note 1:*** If a DS-1 link fails, the system causes channel reassignment. A coin line call can occupy a channel on the failed link and the system cannot reassign the call. In this event, the SMA sends a coin return message to the RDT. The telephone station user receives the deposited coins.
>
> ***Note 2:*** When a warm SWACT occurs, the system cannot add any call that just entered the talking state to the records of the newly active unit. The system drops the call and returns the coins to the telephone station user after the user reoriginates and hangs up.

SMA service capabilities

This section describes the services the SMA supports. Only switched services terminate on the SMA. The system uses the tandem DS-1 links at the RDT to direct nonswitched and nonlocally switched services.

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 types of coin calls:

- coin first (CCF).
- coin dial-tone first (CDF).

Coin first

Coin first (CCF) service activates when the user places a pay station telephone off hook and deposits coins. When these conditions occur, the DMS SuperNode switch supplies the station dial tone.

For CCF telephones, the call must deposit the correct coinage before the system detects the off-hook at the RDT.

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 on the line. This action causes the coin station to home the coin station totalizer. The coin station reports the coins that the station collects.

If the user deposits the correct coins, the RDT sends the IDT a notify message. This message contains coin ground information in the notification indicator information element and informs the CM the caller 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. If the called party is on the telephone, the IDT sends a disconnect message. An information message follows the disconnect message. The information message allows ringback.

If toll charges do not apply to the call number, the IDT sends a notify message. This message provides the timed negative coin control information encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to return the deposited coins.

For toll calls, additional coin functions do not occur until the CCF line goes on-hook. When the call is complete, the IDT sends a notify message. This message provides the timed positive coin control information 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 coin dial-tone first (CDF) service, the DMS SuperNode switch supplies dial tone when an off-hook condition occurs at the station. The call fails to connect unless the calling party deposits the correct number of coins before the end of 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 a coin, the RDT responds to the request. The RDT sends the IDT a notify message that contains coin ground information in the notification indicator information element. This information informs the CM that the caller deposited a coin.

If toll charges do not apply to the calling number, the IDT sends a notify message. This message provides the timed negative coin control information encoded in the notification indicator information element. When the RDT receives this message, the RDT signals the coin station to return the deposited coins.

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

Coin call functionality

Several coin call messages process coin calls from CCF and CDF telephones. The CCF telephones use ground start and CDF use loop start. Ground start and loop start messages are as follows:

- Ground start telephones require an initial deposit before the telephone provides dial tone.
- Loop start telephones allow the caller to receive dial tone without a deposit. Loop start telephones allow the caller to dial the following types of calls without charge:
  - special assistance calls (n11 calls, like 911 and 411)
  - inward wide area telephone service (INWATS)
  - operator assistance calls

  The CCF telephones provide these calls without charge, but the caller must first deposit a coin. When the call is complete, the telephone returns the coin.

Meridian business set messaging

The Meridian business set (MBS) is a generic term that describes multiple Nortel (Northern Telcom)-proprietary customer premises equipment models. These models support features like hands-free communication, volume control, and key-driven feature activation. Refer to *DMS-100 Business Set Feature Description and Operation*. for a description MBS feature services

The MBS is a Nortel product that normally connects to a line concentrating module (LCM). The DMS SuperNode switch and MBS use a proprietary protocol to communicate when MBS sets connect to an MVI RDT.

The SMA2 uses this proprietary protocol discriminator and message type to support MBS communication. This MBS communication is the same MBS communication used when the MBS configuration is off an LCM. The MBS supports the same feature set.

The MBS on MVI RDT supports Q.931 messages. The EBS messages use the #4F (hex) message to differentiate EBS messages from standard TR-303 messages. The system invokes processing for the proprietary MBS protocol.

The default values for TMC LAPD parameters can support a proprietary EBS INFORMATION message sent over the TMC for MBS. The MBS lines are provisioned on a TR-303 RDT for this reason. The electronic business set (EBS) information message allows the RDT to pass signaling and feature-related information between the DMS and MBS.

The TMC signaling handles proprietary MBS messaging that relates to calls. The system disables all ABCD bit inband signaling for MBS channels because MBS sets require a clear channel.

Universal tone receiver services

The operating company must provision universal tone receiver (UTR) circuit pack (NT6X92) in slot 15 in the SMA. The UTR card provides a dedicated channel for digit collection during call setup. This channel unloads a part of the call setup responsibility from the network. Table LTCINV must contain the UTR to activate the UTR feature on the SMA. Refer to the *XPM Translations Reference Manual* for more information.

Custom local area signaling service

The SMA subsystem supports CLASS features when the optional CMR card is provisioned. Calling number delivery (CND) is a CLASS feature. This feature provides single-party subscribers and Meridian Digital Centrex (MDC) customers the ability to receive the following information:

- the number of the incoming calling party.
- the time of the call.
- the date of the call.

These customers receive this information on the customer premises equipment (CPE).

If the operating company requires that lines off the RDT have CND, the following requirements apply:

- Operating company personnel must provision the CMR card (NT6X78AB) in the SMA. This card transmits the CND data.
- Table LTCINV must contain the CMR card. Refer to the *XPM Translations Reference Manual* for more information.

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

The SMA configuration supports all current MDC features. The SMA does not support trunks. The MDC features that require trunks cannot terminate on the SMA because of this limit.

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 arrangements can occur.

- Multiple call arrangement (MCA) allows each group member to be active with different group members.
- Single call arrangement (SCA) only allows one active member in a group at any time.
- Multi-bridged arrangement (MBA) allows only one active call in a group at any one time. The MBA does allow other group members to bridge the call.
- Single bridged arrangement (SBA) only allows one call to be set up with an external party and allows one other member to bridge the call.
- Extension bridging (EXB) only allows one call to be set up with an external party. The EXB does allow other group members to bridge the call for a three-way conference call.

Off-premise extension (bridged service)

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

Private branch exchange (PBX) central office access

The SMA configuration supports connection of a PBX to a central office that normally 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 in two ways. The user can access the attendant. The attendant connects the station to an access line. The station user can bypass the attendant and dial an outside number directly. To dial the outside number, the station user must use the direct outward dial (DOD) facility. The user must receive permission to use DOD.

Residential services

The SMA supports residential services that include features available with plain old telephone service (POTS). The SMA supports additional line features that were only available on MDC lines. Residential services includes the essential line (ELN) services feature.

Secretarial line

The SMA supports secretarial lines. A secretarial line provides an answering service when the called party cannot answer calls. The system bridges called party lines to the secretarial line.

Teen service

The SMA supports teen service. Teen service provides multiple directory numbers 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 SMA allows the system to charge a fixed number of toll calls in a specified geographical area to a subscriber at a fixed monthly rate. The WATS lines provide incoming service (INWATS), outgoing service (OUTWATS), or both incoming and outgoing service (two-way WATS).

800 service

The SMA configuration supports 800 services. The called party subscribes to the 800 service and pays for the toll calls made to a specified number. Offices configured with SSP support Enhanced 800 service switching point (SSP).

ISDN services

An integrated services digital network (ISDN) provides voice and data services through the following cards:

- a minimum of one NTBX02 enhanced D-channel handler (EDCH) circuit cards.
- an NTBX01 enhanced ISDN signaling pre-processor (EISP) circuit card.

ISDN voice services include the following:

- plain old telephone service (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).
- different, 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 system can process the following dialing codes:

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

Tones

The following tones are available:

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

Deluxe Spontaneous Call Waiting Identification

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

- receive caller identification (CID) information from a call that waits for connection, while the subscriber is off-hook.
- control the disposition of incoming calls while an off-hook stable call is in progress

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

- ADSI set—a screen based ADSI CPE. The ADSI set can display options.
- SCWID set—CPE that is not ADSI and can deliver CID data.
- 2500 set—CPE that is not ADSI and can signal DTMF, but cannot deliver CID data when off-hook.

The SMA requires the NT6X78AB, the NT6X69AD, and the NT6X92BB cards to comply to ADSI protocol to support the DSCWID feature. The ADSI protocol supports CLASS features that provide information based display like DSCWID. These CLASS features provide information to subscribers with a CPE that is compatable with ADSI. The cards function as follows:

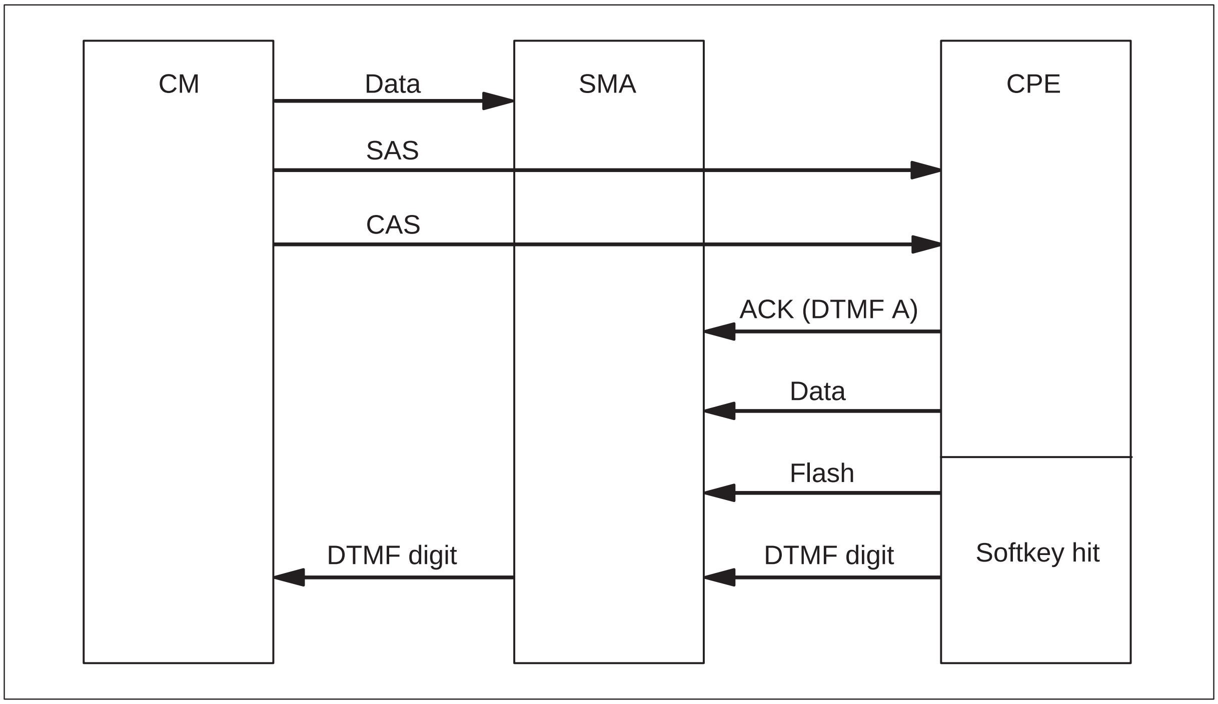
- The NT6X92BB UTR card identifies and processes tones for channels on the parallel speech bus.
- The NT6X78 CLASS modem resource (CMR) card supports calling number delivery (CND) and other CLASS services. The CMR card provides the ADSI protocol. The protocol helps to transmit CLASS data between the CC and the CPE that complies to ADSI standards.
- The NT6X69AD tone ROM card contains the ADSI tone which TR-30 defines.

The CM sends tones to alert the DSCWID subscriber of a pending call. The tones alert the CPE of pending caller data. A line with the DSCWID option can have an active call. A second call can attempt to terminate to the line. If this event occurs, the CM provides one of two types of alerting signals or tones. These signals are a subscriber alerting signal (SAS), or an SAS that a CPE alerting signal (CAS) follows. The SAS is the tone the subscriber recognizes as the call waiting tone (CWT). The CAS alerts the CPE that data is present if the subscriber line has the CID feature.

In response to alerting tones the DSCWID CPE generates an acknowledgement (ACK) tone. This tone indicates readiness to receive DSCWID data. The UTR circuit card in the SMA collects the ACK tone. If the CPE is ADSI compatible, the DSCWID CPE sends a DTMF A ACK signal in response to the CAS.

Examples of responses from an ADSI-compatible set appear in the following figure.

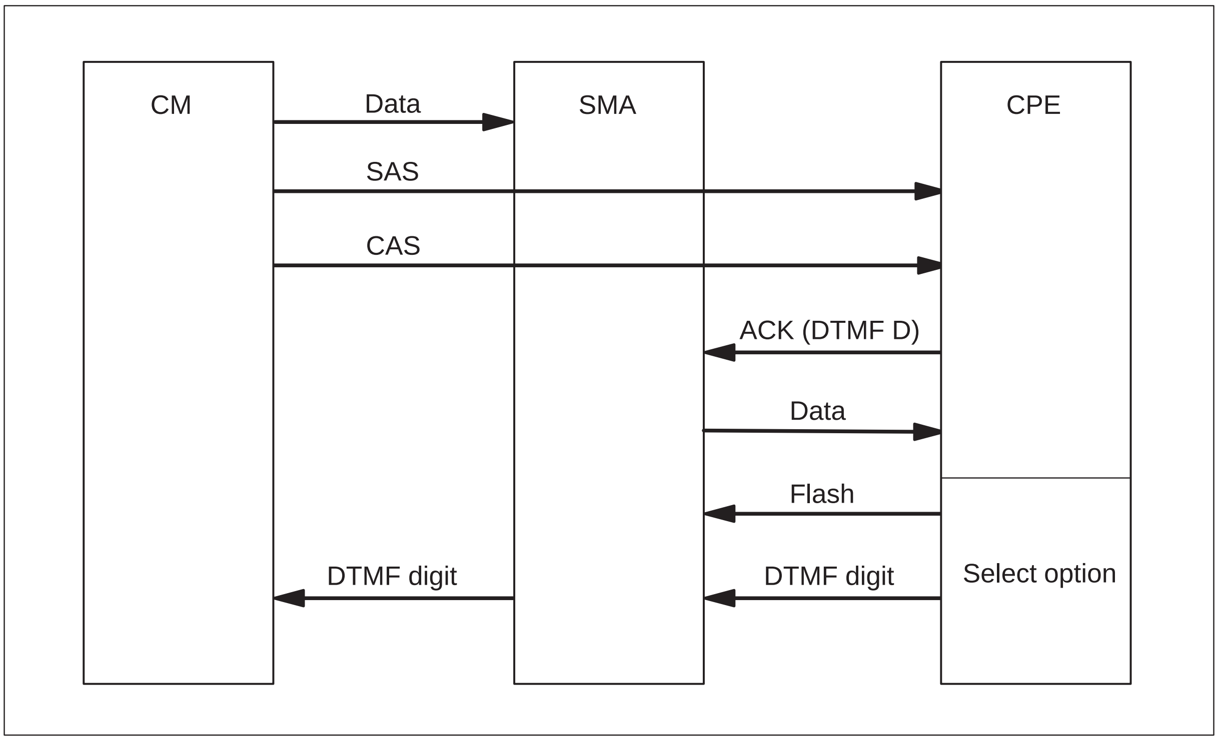
Example of a DSCWID call on an ADSI set



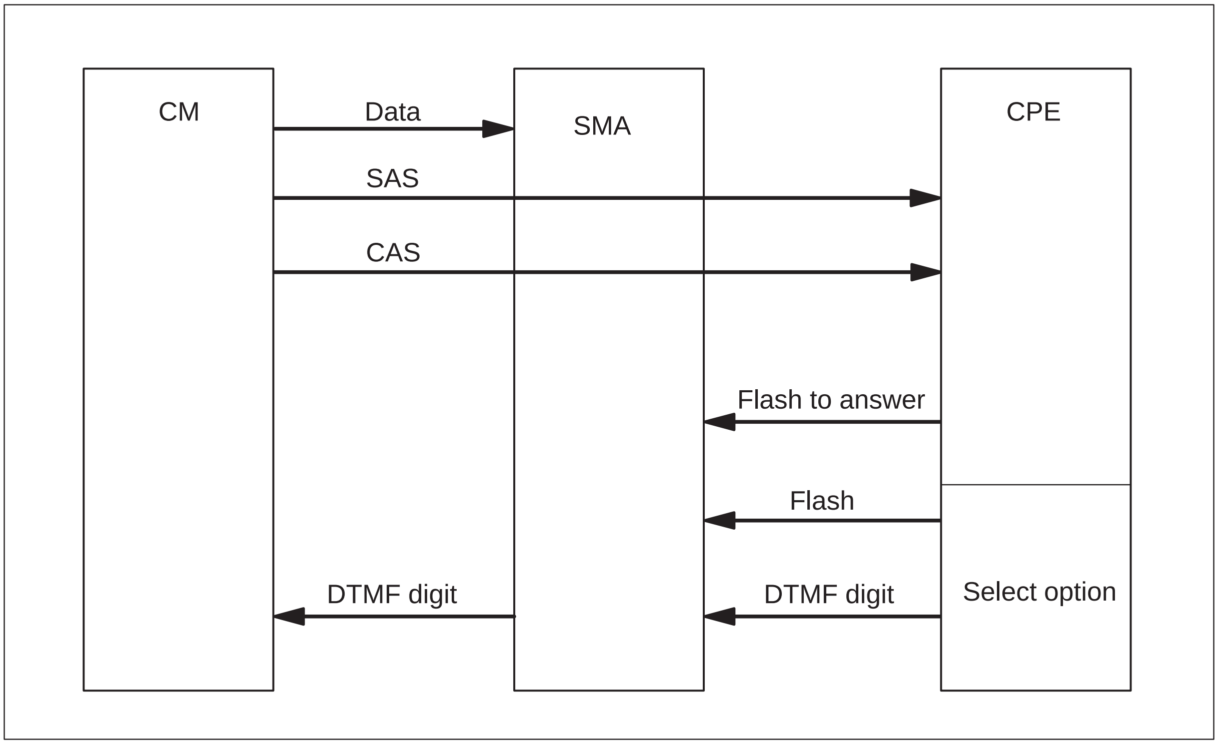
If the CPE is a SCWID CPE, the CPE sends a DTMF D ACK signal in response to the CAS. When the system sends alerting tones, the subscriber can control disposition of the incoming call. To respond, the subscriber can use the softkeys if the CPE is ADSI. The subscriber can use hard-coded keys if the CPE is a SCWID, or a 2500 set. If the CPE does not respond with an acknowledgment tone, the system treats the CPE as a 2500 set.

Examples of responses from a SCWID set and a 2500 set appear in the following figures.

Example of a DSCWID call on a SCWID set



Example of a DSCWID call on a 2500 set



The system sends the alerting signals to the CPE when a UTR channel is not available. If UTR channels are not available, the system does not send data to the CPE. To comply to Bellcore requirements, the DMS SuperNode switch must provide options. Options are necessary if the system detects a flash and cannot attach a UTR. To comply with this requirement the SMA sends a flash to the CM. The SMA sends a flash to the CM if the SMA cannot attach a UTR in less than 400 ms. The CM does not always acknowledge the first notification of a pending call in under 10 s. In this event, the SMA sends a second alerting signal. The system does not send display data to the CPE when UTR channels are not available. If the system does not send the display data the system holds the data and sends the data again if re-alerting occurs.

After the SMA receives a flash signal from the ADSI compatible CPE of the customer, the SMA starts a T-tone timer. The T-tone timer times for the maximum amount of time allowed between sending a flash and the DTMF digit on an ADSI set. The timeout value is 600 ms. The system mutes the speech path during this time. The T-tone timer starts for the first option selection during a DSCWID call. The CPE type does not affect the timer. Additional ADSI DSCWID option selections start the T-tone timer.

Additional DSCWID option selections on a SCWID or 2500 set use a T-flash timer. The system uses the T-flash timer after a caller with SCWID and 2500 sets answers a call. The T-flash timer provides the customer with enough time to select an option after a flash. The SCWID or 2500 sets use the T–flash timer. These sets use this timer because a subscriber does not have the time required to flash and dial a DTMF digit in under 600 ms.

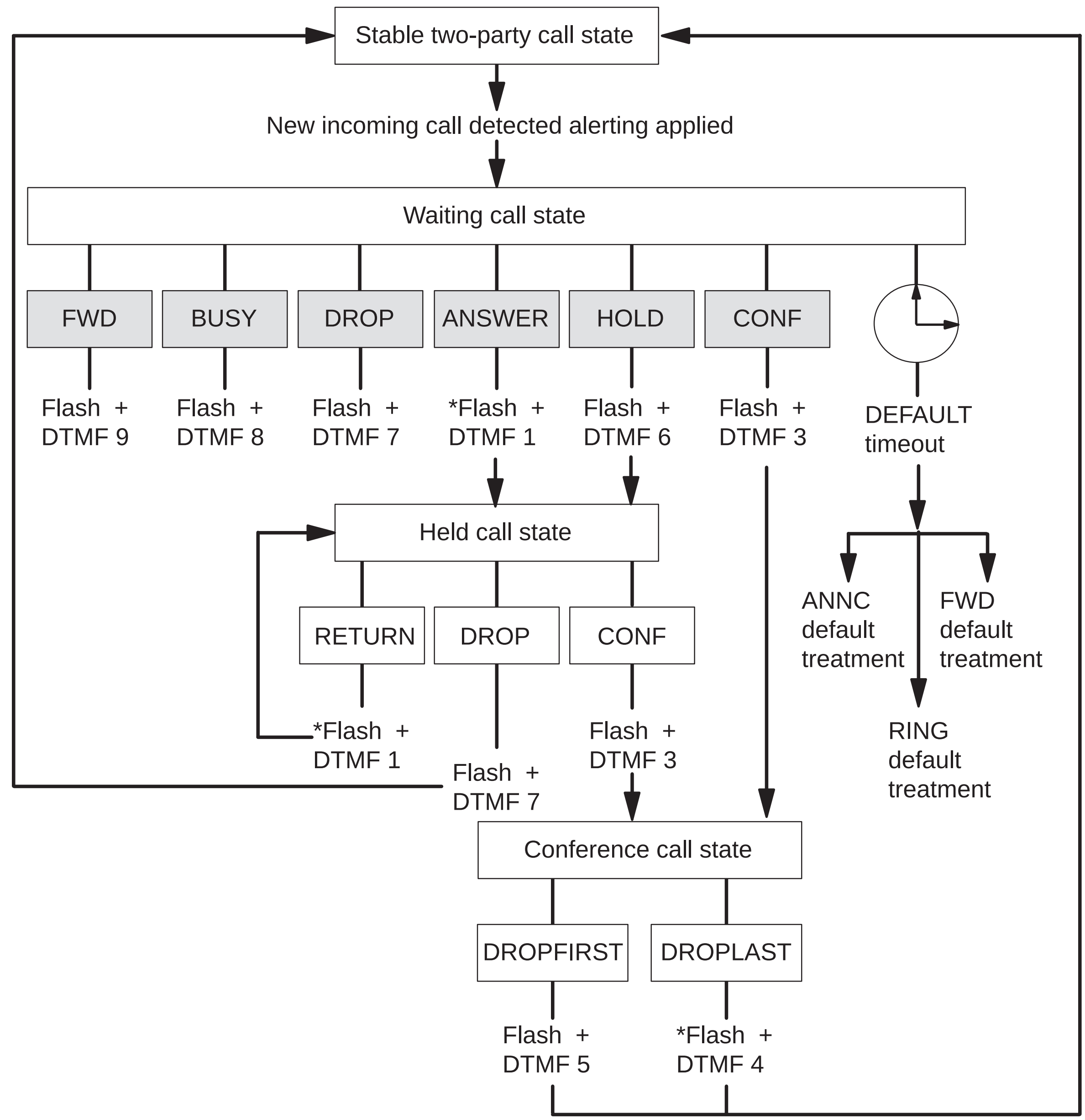
The operating company can set the T-flash timer for between 1 s to 8 s. The default time is 1.5 s. The SMA starts the T-flash timer when the following conditions are present. The NONADSI field in table DSCWDTYP is set to Y and the SMA receives a flash signal from a customers SCWID or 2500 set during the held or conference call state. The SMA must record the DSCWID call state and the type of CPE. The type of timer used depends on this information. If the SMA cannot attach a UTR in under 400 ms, the SMA applies the RETURN option.

The CM attempts to stay synchronized with the CPE at all times. This action prevents problem conditions in the CPE. A problem in the CPE occurs when the CPE recognizes a function as complete. The DMS SuperNode switch does not recognize the completion of the function and does not process the option. The switch does not process the option because of the call state. The DSCWID call waiting disposition options are as follows:

- 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 the call connects to a hold announcement.
- conference the new call with the current call.

The actions between the ADSI set dispositions appear in the following diagram.

DSCWID with ADSI set dispositions



Note 1: An asterisk indicates the user can perform a flash to accomplish the same function as the transmission the DTMF code for that digit.

Note 2: A set that is not ADSI can be configured for hard-coded keys to perform DSCWID dispositions. The subscriber can provide a DTMF-digit in under 600 ms. When this event occurs, dispositions are available if NONADSI = Y in table DSCWDTYP for the specified DSCWID type.

SMA 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). The maintenance software includes software audits and diagnostics that identify problems in hardware or software. The audits run for the LTC are also run for the SMA. The sections that follow highlight audit types and the failure conditions the audits detect. This section discusses diagnostics later.

The description of automatic maintenance software operations in this chapter refers to the name 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, this chapter implies SMA.

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.

The system can attempt to recover from the trap. In this event, the trap-handling software loops back through all the software modules. This loopback 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 pre-drop audit in the XPM responds to this query. The audit informs the CC if the active unit can drop the activity.

Pre-gain audit

The pre-gain audit monitors the XPM status data in the inactive unit. The pre-gain 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 system 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. The pre-drop audit allows 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 for a short time before the unit initializes. 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 the 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 TMC establishes a multiframe state again. The warm SWACT audit includes the following events:

- The unit begins a state mismatch audit for each IDT. This audit compares the IDT TR303 terminal states with the 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. 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 occurs and the system takes the call down.
- The SMA sends a RELEASE COMPLETE message to the RDT.
- When the audit completes on all terminals in the active state, the audit runs on in-service terminals in the null 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 TMC 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 can initiate path detection. The IDT of the LDS, or the RDT can originate a path switch. The system generates logs and alarms to provide notification. The system notifies internal system interfaces.

The following terms apply to protection switching:

- path—a message channel, which relates to TMC or EOC messaging
- active path—the path or channel in the active state. The active path carries TMC or EOC messages and messages for protection switching.
- standby path—the path in the standby state. The standby path carries only messages that allow the standby to become the active channel.
- protection switch—what occurs when the active path changes state to standby, and the standby changes 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 TMC 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 two parts of the DLCI are the service access point identifier (SAPI) and the terminal equipment identifier (TEI). The TMC 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 TMC and EOC path types contain a logical link on the DS-0 channels referred to as the path protection link. The path protection link uses SAPI=1 and TEI=0 as the DLCI.

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

The active paths of the EOC and TMC can be present on DS-1 number 1 on the DS-1 configured for path protection. When the TMC is active, the DS-1 that has the active TMC 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 system maintains the following state information 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 able to carry the traffic of the application
- inhibited or enabled
  - — if path protection procedures are disallowed from switching activity

Path protection switching triggers

The system monitors LAPD links 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

From the MAP terminal, operating company personnel can perform the following to control protection switches:

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

Inhibit status protection switching interact as follows:

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

Path switch completion

If the IDT or RDT requires a path switch, that end determines if the standby path is ready to takeover transmission. If the standby is available, the system sends a request message on the active and standby links. The system sends the message for that path type (EOC or TMC). The receiver verifies the state of the standby link. The receiver and sends an acknowledge message on both paths. The acknowledge message depends on the condition of the standby link. The sender receives a positive acknowledgment that indicates the switch is complete. The sender makes the requested path active.

Notification

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

If an automated path switch is required, the system notifies IDT maintenance to generate a log. This process occurs when the standby link is not available.

If an active path receives the inhibit attribute, a MAP terminal response appears to indicate the occurrence.

A path protection switch request can receive the force option, and the result can be a path failure. If these events occur, the system notifies IDT maintenance to produce log report.

When an IDT node is in-service, and activity of either path type (EOC or TMC) 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 time slot and logical terminal data. This audit detects, reports and corrects any static data mismatch between the CAP, EISP, and EDCH processors.

The CAP is data protected and controls the audit. To begin 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. The system generates a PM180 log to warn 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 EDCH data with the audit data. The EDCH reports a fail or pass message to the EISP. The EISP forwards the message 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 where the system detects congestion on a minimum of one resource. Service to the affected RFT can degrade. The system activates overload control mechanisms to minimize service degradation. Overload control for congestion that affects a single IDT consists of the following actions:

- a report of the congestion
- control of the congestion

The following sections describe system actions.

Congestion reporting

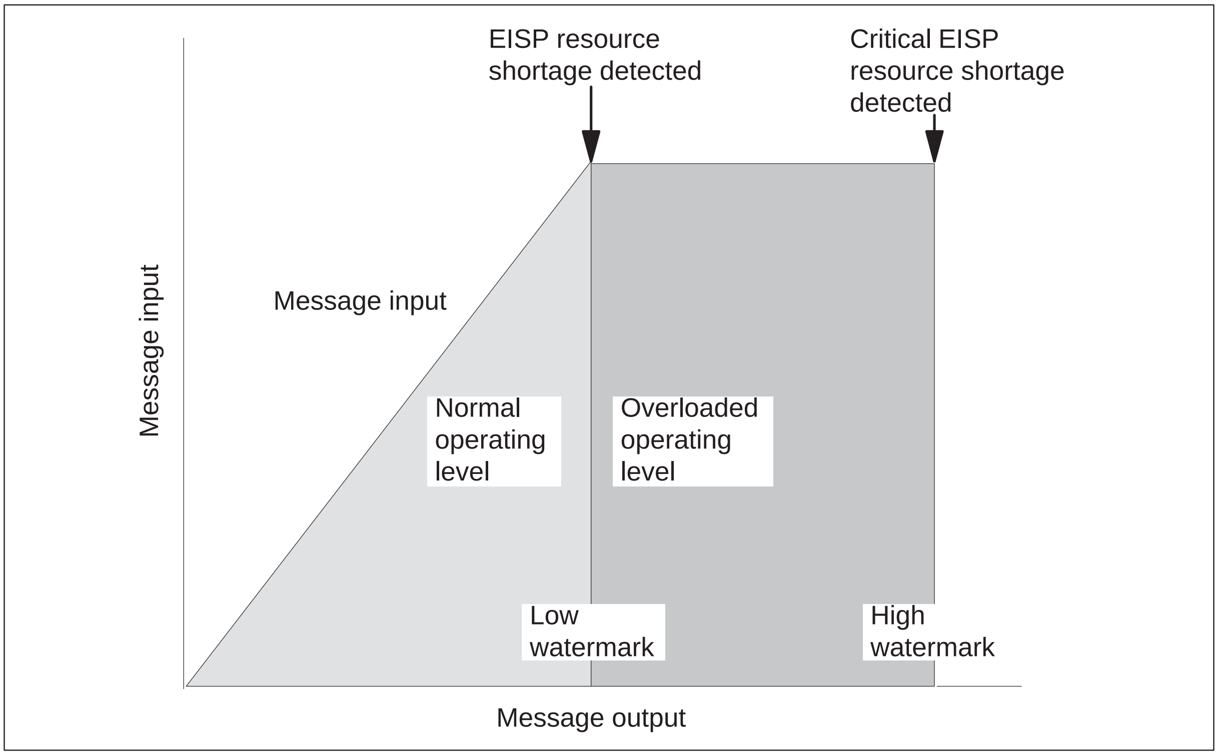
When the system detects an overload condition in the EISP, the system places the affected IDT in an in-service trouble state. The system generates a PM128 log to indicate a messaging overload condition on the TMC or EOC. Enter the QUERYPM FLT command to access this information at the IDT level of the MAP terminal. When the congestion clears, the system returns the IDT to an in-service (InSv) state.

The congestion can occur on a resource common to all IDTs associated with an SMA. The system places the SMA in the in-service trouble state. The system generates a PM128 log to indicate the messaging system for the peripheral-side (P-side) node is in overload. The P-side node is the SMA. The system places all IDTs associated with the affected SMA in an in-service trouble state. All IDTs associated with the affected SMA are placed in an in-service trouble state. When the congestion clears, the system returns the SMA and the associated IDTs to the in-service state.

Congestion control

A series of mechanisms can control congestion. These mechanisms must restrict the use of common resources for any EOC or TMC channel or link. These mechanisms only activate during overload conditions. The mechanisms minimize the service impact that heavy message traffic has on other RDTs associated with the SMA. These mechanisms automatically discard messages that are delayed for more than a specified time period. This action makes sure that the system does not waste common resources on the transmission of invalid messages. The next diagram illustrates the overload control mechanisms that minimize service degradation to P-side nodes.

EISP overload control for the IDT



When the system reaches the *low watermark* for resource congestion, the EISP enters the overloaded operating level. The system places 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 The RNR state reduces the number of incoming messages.

When the system reaches the *high watermark* for resource congestion, the EISP the maximum overloaded operating level that the system allows. The system disables EOC channels. The system places logical links on the TMC,in the RNR state. The exception is the logical link used for protection switch control. The RNR state reduces the number of incoming messages.

When congestion reduces, the system restores service to the channels. The EISP gradually returns to a normal operating level.

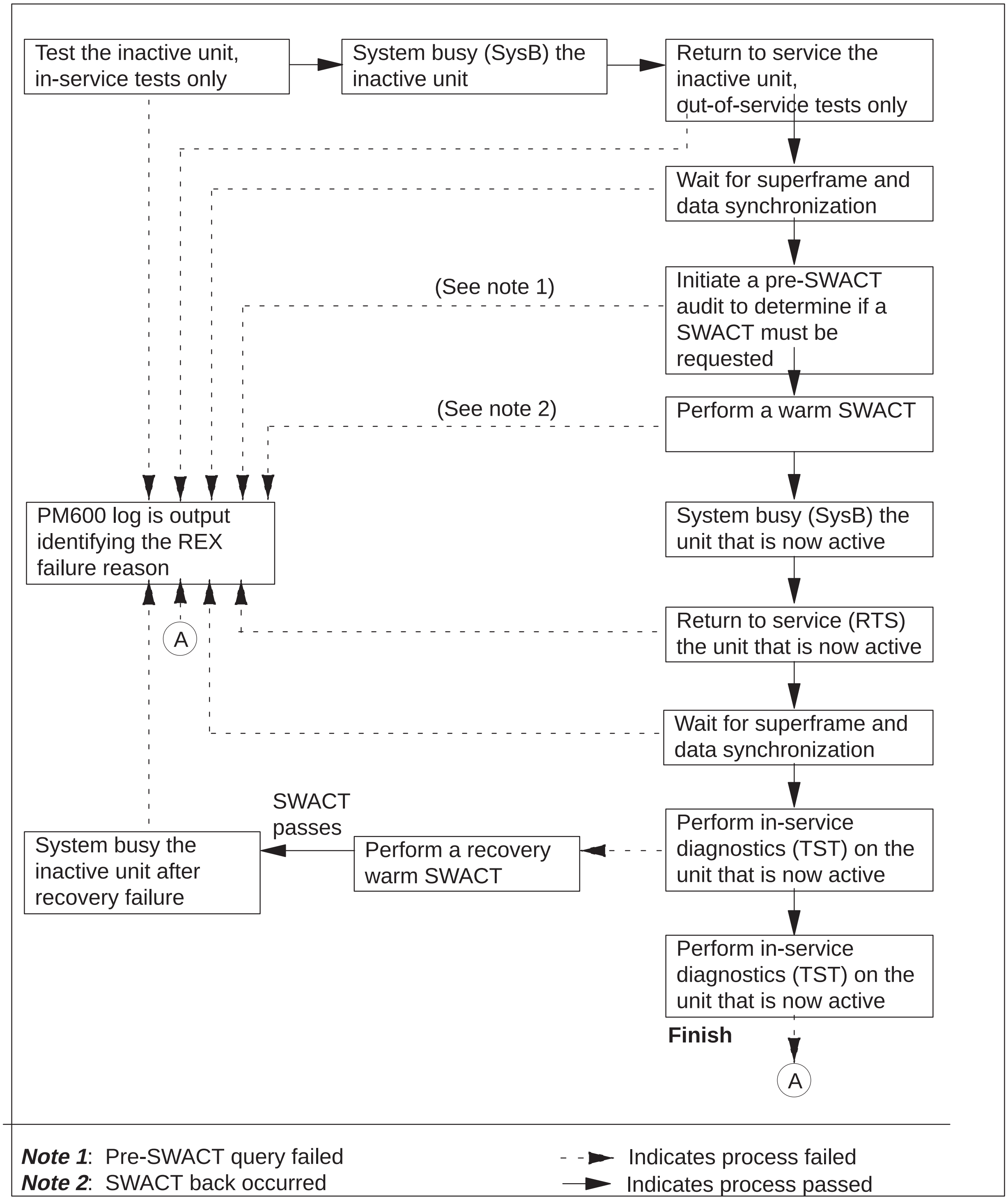
Routine exercise tests

The system scheduler can initiate the REX series of tests on an SMA one time each 24 h. Operating company personnel also can initiate the tests manually. The REX test sequence under the best conditions follows:

1. Test the inactive unit (includes in-service tests only).
2. System busy the inactive unit.
3. Return-to-service the inactive unit (includes out-of-service tests only).
4. Wait for the system to achieve superframe and data synchronization.
5. Perform a pre-SWACT audit.
6. Perform a warm SWACT.
7. System busy the unit that is now inactive.
8. Return-to-service the inactive unit.
9. Wait for the system to achieve superframe and data synchronization.
10. Run in-service diagnostics (TST) on the unit that is now active.
11. Run in-service diagnostics (TST) on the inactive unit.

The following figure shows the REX state machine (controller) actions.

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 fails 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 (an easy-to-remember abbreviation) of the diagnostic that fails and the unit that fails (0 or 1).

The PM600 log reports the following information:

- the start time of each step that the REX test executes
- the unit that the REX step affects
- the reason the test fails
- recovery actions that the REX initiates
- the unit number if the REX action is unit specific (BSY unit, RTS unit, TST unit, sync). The PM 600 does not report an action that does not affect the node (SWACT, BSY both units)

The auxiliary data of the log contains a cardlist and the 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
TONE DG	Tone Diag
TS DIAG	Time Switch Diag
UTR DIAG	UTR Card

The QUERYPM command and command strings QUERYPM FLT and TST REX QUERY contain information about the last REX. The system initiated REXs store and display a new date/time and status (passed/failed) in the REX maintenance record. The manually initiated REXs also store and display a new date/time and status (passed/failed) in the REX maintenance record. *Passed* means the REX completes without 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 performs a manual return-to-service or a manual REX. The user can also perform an automated REX to return the XPM to service from an in-service trouble state.

The system stores a REX maintenance record for each SMA. The maintenance record 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 fails
- the date/time of last REX that fails
- the date/time of first REX that passes after the REX that fails

The following limits apply to REX tests:

- For REX to be run, the node must be in-service trouble because of a REX failure. For REX to be run, the node may also be in-service trouble because P-side DS-1 links are out-of-service.
- If a warm SWACT is not possible, REX terminates.
- After the REX completes, the SMA has a new active unit because of the SWACT.
- If a restart occurs while REX is in progress, the system does not generate the PM600 log. The log is not output because the restart deallocates the temporary data store used to build the PM600 log.
- The system provides 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) allows the SWACT controller to refuse a SWACT attempt.

The REX controller performs the following functions:

- calls the SWACT controller during the pre-SWACT step, before the system initiates the SWACT request. The SWACT controller determines if the system can attempt a SWACT. The controller uses the diagnostic history of the unit maintained in the diagnostic history database, to determine whether to attempt a SWACT. The controller uses the result of the last SWACT attempt to the inactive unit. The controller also uses the XPM returns in the pre–SWACT opening message to attempt a SWACT. An XPM can fail the pre–SWACT step of REX and not show the failure in the DiagHist level of the MAP display. The system does not display the reason the pre–SWACT step fails if the reason does not include diagnostic failures.
- accounts for the reasons aSWACT is denied or fails.
- terminates a REX test if the system denies a SWACT
- terminates a REX test if a SWACT occurs and the active unit of the XPM does not change. The active unit of the XPM does not change from the time the REX test began. If the system supports an XPM PRE-SWACT/POST-SWACT Audit, REX terminates without recovery actions. The REX terminates without recovery actions because the SWACT code initiates a BSY/RTS of the inactive unit.
- displays the reason the SWACT is denied or fails during a manual REX at the MAP terminal. Displays the reason as *REX failed*. Use the command string TST REX QUERY for the posted XPM to obtain the detailed reason the SWACT fails. The system generates a PM600 log report that details the REX failure reason.

Intermodule communication link audit

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

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

- the system reports the fault to the CC
- the system closes the link and SMA status changes to in-service trouble
- the SMA processors no longer use the link
- the system prevents SWACTs

Static data integrity audit

An integrity audit verifies the accuracy of the static data in the SMA. An integrity audit calculates the checksum value of the static data in SMA memory. An integrity audit also verifies that the static data 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.

When the SMA returns to service, the system bypasses the static data loading if the audit determines the static data are already correct. The static data loading is part of the full return–to–service sequence.

RDT alarm audit

The operating company personnel can enter data in field SD points in table RDTINV to set points for each RDT. An audit queries the RDTs for the current alarm conditions, one time every 10 min. If the system raises an alarm condition, or an alarm of greater severity, the scan point activates. An alarm appears at the EXT level of the MAP terminal.

RDT lines audit

The RDT lines audit

- runs automatically one time each 24 hours in response to the RDTLNAUD command
- synchronizes the line states that the RDT and the DMS-100 switch detect
- makes sure that DMS-100 call processing features depend on correct DMS-100 knowledge of the line state to operate correctly

The RDT audit lines only audit lines the DMS SuperNode switch provides. If the system locates a problem, this audit generates an RDT601 log and attempts to correct the problem. If the system cannot fix the problem, the system generates the RDT306 log. The system schedules the audit to run each day at 2 a.m. The audit does not run if the last audit is not complete.

The data the RDT lines audit includes some of the features of object instances that relate to the following:

- analog lines – if the RDT does not contain data for known object creation, the audit audits the analog line instances
- ISDN lines – the audit audits both access (RDT P-side) and transport (RDT C-side) sides. If the RDT contains data for inherent object creation, the audit only audits the transport side.
- nailed up B channels of MVI RDT ISDN line

The RDT monitors and changes the state of the lines connected 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. In this event, the RDT also informs the DMS-100 switch of the change in state of the line. The DMS-100 switch responds to the state change messages from the RDT. The DMS–100 response changes the view of the DMS-100 line state to line module busy (LMB) or idle (IDL). The state of the line indicated in the message to match the RDT determines if the DMS–100 changes the line state.

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

Diagnostic tests

Diagnostic tests pinpoint hardware faults to a replaceable card level. The system can initiate diagnostic tests automatically or operating company personnel can initiate diagnostics tests manually. The system initiates diagnostics when internal counters exceed fixed levels. Use manually initiated diagnostics when log reports indicate a common equipment problem or when the system detects alarms. Use manually initiated diagnostics when OMs show high error counts.

ROM diagnostic

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

> ***Note:*** Reload the unit after this diagnostic runs.

The diagnostic tests the following memory card circuits:

- memory circuitry
- parity circuitry
- holding registers

The diagnostic tests the following processor card circuits:

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

A- and B-bit diagnostic

The A- and B-bit diagnostic tests the A- and B-bit circuitry on the NTAX78 enhanced timeswitch card. This diagnostic tests the global loop-around of the time switch card. This diagnostic also 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. This diagnostic tests the time switching function of the timeswitch, and tests the generation and reception of A-bits and B-bits. This diagnostic also tests the enable-disable function of the AB bit receive memory.

The diagnostic uses the following XPM hardware components:

- 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 that transmits, receives, and uses the CSM. Most of this hardware is on the NT6X42 CSM card.

The CSM diagnostic tests the following components:

- all the memories on the NT6X42 card
- all the memories on the NT6X41 formatter card
- 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.
- 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 diagnostics involve the following XPM hardware components:

- 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 checks that the network framing interrupts, C-side messaging, and P-side messaging function correctly. This diagnostic also checks the integrity of the speech bus connection and message memories. Both are on the NT6X69 message card.

This diagnostics involves the following XPM hardware components:

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

Message diagnostic

The message diagnostic tests the hardware on the NT6X69 message card. This diagnostic checks that the on-board processor time slice processes and the speech bus interface function correctly. This diagnostic also checks that the IMC link, and the cyclic redundancy check (CRC) ROM function correctly. This diagnostics checks that the integrity of the message buffer memory and P- and C-side messaging.

This diagnostics involves the following two XPM hardware components:

- 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 the checksums agree with the checksums in the tone read-only memory (ROM). The tone ROM is on the NT6X69 message card. This diagnostic also checks the speech bus connection memory for all channels (except 0 and 16) of ports 16 and 17. The check makes the tones are enabled on the speech bus.

This diagnostic involves the following XPM hardware components:

- NT6X69 message and tone card
- speech bus

Speech path diagnostic

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

The diagnostic involves the following XPM hardware components:

- 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 speech, control, and supervisory signals. The SMA switches these processes from the C-side to the P-side of the SMA. The C–side is toward the switch and the P–side is away from the switch.

The A- and B-bit signaling diagnostic (ABDIAG) verifies the signaling bit control circuitry in the SMA operates correctly. This diagnostic runs as part of CC link audits. This diagnostic runs when an action at the MAP terminal tests or returns to service from the MAP terminal. The diagnostics are more complete when the SMA is out of service. Diagnostics are 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, performs memory tests, and verifies the ring/pad interrupt. This diagnostic also performs on the pad ROM and dc voltages. The diagnostics tests only the the NT6X80 card on the XPM.

DS-1 card diagnostic

The DS-1 card diagnostic verifies that DS-1 cards operate correctly. The diagnostics can check the DS-1 link during diagnostics. The method used to initiate this diagnostic determines if this diagnostic tests the DS–1 line. The DS-1 card diagnostic runs during CC link audits. This diagnostics runs when the SMA or a DS-1 link returns to service from the MAP terminal. This diagnostics also runs when link tests originate from the MAP terminal. The PCM looping tests occur during the test of the DS-1 link from the MAP terminal.

There are two link audits. 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 the SMA and the associated RDT are InSv. Enter the command TST LINK link_no.

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

If the PCM loopback test fails, the DMS switch generates reports PM181, PM183, and PM128 logs. The system busies the failed link and places the associated SMA ISTb. Examples of log reports PM181, PM183, and PM128 follow:

```
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 becomes InSv. The SMA becomes InSv if no other faults are present. The DMS switch generates report PM106 if no other faults are present. The DMS generates report PM128 log if any faults are present. The DMS switch generates report PM184 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 performs self–diagnosis. The card contains on-board firmware which provides the actual card level diagnostic. The diagnostic detect faults that affect service as soon as possible.

This diagnostic provides the SMA with in-service and out-of-service diagnostics. This diagnostic also provides a CMR audit. The CMR audit runs the in-service diagnostic on a specified basis. This feature provides a diagnostic interface to report CMR failures.

The in-service diagnostic provides an interface with on-board firmware diagnostics. The in-service diagnostic also controls on-board firmware diagnostics. On-board firmware diagnostics test different critical components of the CMR card on a continuous basis. This diagnostic runs one time each minute as requested by an in-service audit. In addition, operating company personnel can also request the in-service diagnostic at the MAP terminal. These diagnostic triggering techniques provide complete in-service coverage 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 test of all resources than normal in-service traffic and time control do not allow.

The CMR audit runs this audit on a normal basis. The repetition time of the facility audit normally used for this purpose is 7.5 min. This repetition time is too low to provide enough detection time for the CMR card. A new audit created for this feature provides enough detection time.

Results of the CMR diagnostic test are logged as a PM181 audit exception report. The PM181 audit exception report lists the failed card list and the CMR diagnostic detects the fault.

EISP diagnostic

The ROM and RAM diagnostics are for the enhanced ISDN signaling preprocessor (EISP) card. These diagnostics detect and isolate defective hardware. This diagnostic determines if the EISP can function correctly and download. This diagnostic also diagnoses write protection circuitry. The EISP diagnostic runs when the processor is reset.

SMA reliability

Computing module datasync

Extended peripheral modules (XPM) have several requirements to maintain system sanity. One requirement is that the node and port tables in both units remain synchronized. The same internal indexes must reference tuples common to both units. The common tuples must contain the same data. Identical indexes in both units allow processes to communicate between units. Active processes continue to function after a warm switch of activity (SWACT).

Data is set in the active unit of an XPM through the node and link, return-to-service and outside state changes. Use of the following propogates data to the inactive XPM unit through the volume and separate messages of the XPM datasync mechanism

- an IMC filter that blocks all separate 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 data for the SMA and any associated P-side nodes in the SMA on which a SWACT occurs.

Coordinate management of node table synchronization in the XPM. Force the inactive unit to order the node table. The active unit sends a map of the active node table during a download of configuration data. The inactive unit uses the map to enter data in the node table of the inactive unit as the unit receives from the CM.

The inactive unit does not use the node map to write dynamic updates. The inactive unit receives data in the same order that the active unit receives data. When the inactive unit runs, the node and port tables of the inactive unit remain in synchronization with the active unit. Units can lose synchronization if one unit loses an earlier dynamic update. The active unit can contain a temporary inter-processor message link (IPML). The active unit uses IPML for broadcast loading in the node table during a dynamic update. The tables are out of synchronization temporary IPMLs are added only to 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 system maintains synchronization between the CM and the tables in active and inactive XPM units. The XPMs with the enhanced node table management system no longer use mapping information sent from the active unit to synchronize.

These enhancements introduce new software. The new component is configuration data table (CDT) management. The CDT bind interface allows XPM applications to bind an aspect with XPM application procedures to a CDT during initial program load (IPL). An 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 five minutes to initiate the XPM node data audit in the XPMs.

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

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

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

Note: When an office receives the first software load with the new node table management system. The CM gains control of compatible XPM node and terminal tables. The CM gains control during the next scheduled CDT/XPM node data audits. The CM does not take control until the CDT/XPM audits convert an XPM to the CDT management system. The CM does not take control until the CDT/XPM audits align the CM tables with the node tables. The CM does not of whether the system takes an XPM out–of–service (OOS).

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

checksums of the node and port table data synchronize XPM nodes under the CDT management system. To calculate the checksums, regenerate each tuple in the XPM table. After a tuple is formatted, calculate the checksum for that tuple and add the checksum to the table checksum for that XPM. Extended peripheral module checksums are verified against corresponding checksums generated in the CM. The two methods to confirm XPM synchronization are mate unit synchronization or CM control. An out-of-synchronization condition causes that unit to be set in-service trouble. If the unit checksum coincides with the CM checksum during the next audit cycle, the in-service trouble condition clears.

The NODATASYNC option with the RTS command inhibits the data synchronization of two XPM units. Before enhanced XPM node table synchronization, the node table in the XPM was compressed. The node table was compressed when a unit of a XPM was RTSed with the NODATASYNC option.

The CM table management does not compress the node table when an XPM unit is RTSed with the NODATASYNC option. The CM compresses the XPM node table and the port table, when both units of an XPM are taken out-of-service. The CM compresses these table when the system downloads new configuration data. This compression allows the CM to manage the node and port tables more effectively.

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

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

- The XPM does not derive node table data from a subset of data sent from the CM. The CM specifies all the data contained in the node and port tables. The XPM stores the data as the XPM receives the data.
- The CM notifies operating company personnel if resources are not available on a XPM when inventory tables change. The CM provides notification even if the XPM is manually busied or out of service when the inventory tables change.
- The XPM does not compare node tables between units. The CM makes sure the node tables in each unit match because the CM controls the content of each table. If an inactive unit returns to service with the NODATSYNC option the RTS does not cause a configuration download from the CM. Configuration download only occurs when both units are taken out-of-service, and RTSed at the same time.
- Node and port table aspect and access routines allow applications to access the data. Applications have read-only access. The CM continues to update tuples in XPM tables while the XPM is in-service.
- The XPM contains 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 collisions.
- An enhanced messaging interface includes status information between the CM and XPM. The new interface contains:
  - the ability to detect lost messages. The interface adds a sequence number from 1 to 255 in the header.
  - a byte of data transfer status information to inform 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. Leaves the current node table management software in the XPM until XPM06 to maintain backward compatibility.

Two new PMDEBUG commands allow operating company personnel to determine which tables are bound into the CDT data distribution. These commands also allow display tuples in those tables.

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

>SHOWTBLS
without parameters

To display one or more tuples in a table bound to 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 an 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

All tuples are listed if you provide only the table identification. To abort the list, press the RETURN key.

Enhanced Dynamic Data Sync (EDDS)

Dynamic data describes the link and node states in the XPM that support call processing. These states are set in the active unit of an XPM. The node and link RTS or state changes from outside the XPM set the link and node states. These states spread to the inactive XPM unit through the group and separate messages of the XPM data sync mechanism.

Enhanced dynamic data sync (EDDS) is a component of warm switch of activity (SWACT). A warm SWACT maintains the processing of ISDN and POTS calls. Warm SWACTs occur when the active unit of an XPM drops activity. An XPM trap, REX test or other causes can cause a warm SWACT. Warm SWACTs preserve call and unit states so that calls continue without interruption. The inactive unit must be in service (InSV) for a warm SWACT to complete.

The following can occur when an inactive unit returns to service. The inactive unit was out of service (OOS), either manually busy (ManB), system busy (SysB), or C–side busy (CBsy).

- The system starts the inactive unit.
- The system runs OOS tests on the inactive unit.
- If the inactive unit static data check sum is not correct, the CM sends new static data. The CM marks the inactive unit in-service trouble (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 status. The unit that handles call processing becomes the inactive unit. The inactive unit becomes the active unit and takes over call processing. This ability to switch activity confirms SMA reliability.

A SWACT can be controlled or uncontrolled. The following section describes controlled and uncontrolled SWACTs.

Controlled SWACT

A manual action like the SWACT command starts a controlled SWACT. An example of a manual action is entering the SWACT command. A planned system request like the Rex test schedule can also start a controlled SWACT. Another example of manual action is when the active unit is busied while the inactive is InSv. If the active unit is busied while the inactive unit is InSv a controlled SWACT begins.

A controlled SWACT can occur if both units are InSv. A controlled SWACT can also occur if the SMA is ISTb because an earlier REX test fails.

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 the pre-SWACT audit results back to the active unit. A warm SWACT based on the audit results starts.
- The original active unit stays InSv and clears data that is not stable.
- The unit that is newly active 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 waits for the drop 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 system implements the pre-SWACT audit.
- A warm SWACT is initiated based on the audit results starts.
- 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 5 s wait time of the original active unit expires and a SWACT-back occurs.
- The original active unit sends a SWACT-failed message to the CM.
- The CM SysB and RTS the inactive SMA unit.

Uncontrolled SWACT

The system starts an uncontrolled SWACT when a hardware fault or a trap in the active unit is present. The system generates PM181 log messages to notify the operating company personnel why the active unit drops 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 system implements the pre-SWACT audit.
- A warm SWACT based on the audit results stars.
- The new active unit messages the CM that a gain not requested occurs.
- The original active unit remains InSv and clears data that is unstable.
- The new active unit sends five gain messages to the CM.
- The CM sends five gain-acknowledged messages to the SMA.
- The SMA sends three acknowledge-received messages to the CM.
- The CM tells the originally active unit to drop activity.

Controlled and uncontrolled SWACTs complete when the CM receives the gain message from the newly active unit. The CM acknowledges the gain to the originally active unit. If a SWACT back does not complete, both units of the XPM are system-busied and returned to service.

SWACT operation

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

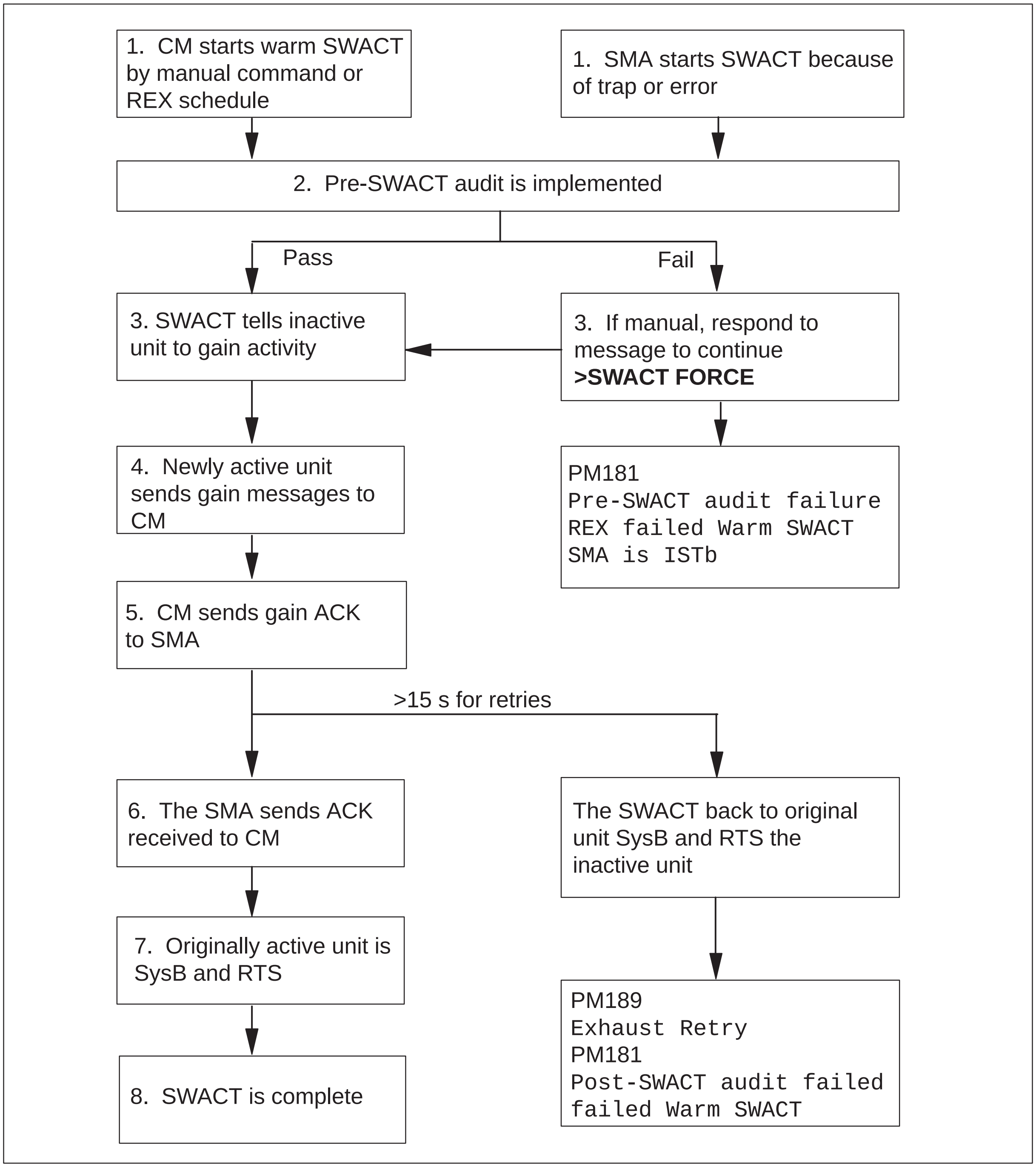
When a SWACT occurs, CM and the SMA exchange a series of drop and gain messages. This action allows the CM and the SMA to detect what occurs. Common phrases found in these messages appear in the following table.

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 newly active unit (unit 1) sends to the CM that tells the CM the CM activity increased
Gain acknowledge message	The message the CM sends to originally active unit to confirm the newly active unit sends messages
Gain acknowledge received	Message original active unit sends to CM to confirm the newly active unit passed the post-SWACT audit
Drop message	Message the original active unit (unit 0) sends to the CM to tell the CM to drop activity

The sequence for a controlled and uncontrolled SWACT and the SWACT-back operation appears in the following diagram. This section also describes the SWACT-back feature.

SWACT sequence



Pre- and post-SWACT audits

The SMA pre-SWACT/Post-SWACT audits improve the warm SWACT operation. The SMA denies the SWACT when the SMA determines the inactive unit cannot maintain activity or communication with the CM. When these conditions occur, 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. The other software that drives this feature is an autonomous capability added to the 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 are routed to the SWACT controller in the CM. The SWACT controller polls PM diagnostic history data in the CM and SMA status data. Do not confuse the SMA status data with static data. Based on the data polled, the SWACT controller denies the request for a warm SWACT. The SWACT can also allow a warm SWACT to proceed. During the SWACT, the newly inactive unit stays in service. The newly inactive unit starts a process to clean up data structures left in not normal states.

Pre-SWACT audit Before the SWACT executes, the active SMA unit queries the mate SMA unit over the intermodule communication (IMC) links. The active SMA 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.

The SWACT controller denies a manual request for a warm SWACT. A message appears on the MAP terminal to inform operating company personnel that the system denies the request. The message provides a detailed reason for the denial. Operating company personnel can enter the SWACT FORCE command string to supersede the SWACT controller. If operating company personnel override the SWACT controller, the system attempts a warm SWACT and does not consult diagnostic history or status data.

Post-SWACT audit After a SWACT, two-way communication is available with the CM. The new active unit maintains activity. The inactive unit is system-busied and returned to service. The previously active unit remains in service. The new active unit can verify two-way communication with the CM and the capability to maintain activity. If communication fails, or the newly active unit cannot maintain activity, the SMA executes a SWACT–back to the originally 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 switch, the active unit becomes inactive. The formerly inactive unit gains control and becomes active.

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

A controlled warm SWACT occurs when operating company personnel enter the SWACT command from the PM level of the MAP terminal. A controlled warm SWACT also occurs when a scheduled diagnostic like the routine exercise (REX) test occurs.

When a warm SWACT occurs, calls in the talking state are maintained. Calls in transient states like digit collection or ringing are dropped. Subscribers receive a dial tone after the call is dropped. Subscribers must originate the call again. For established calls, the newly active unit continues to supervise the call. In TR-303, an established call is one that is in the active state. For idle terminals, the warm SWACT is transparent. In TR-303, an in-service idle terminal is in the null state.

For a warm SWACT to occur, both SMA units must be in service. After a reload or a restart, the system automatically enables the warm SWACT feature.

Warm SWACT supports POTS and coin services.

A warm SWACT operates transparently. This transparency makes sure that when the system requires a warm SWACT, the inactive unit has the necessary data to maintain established calls. This inactive unit also has the necessary data to process new calls when the unit becomes the active unit. The unit requires several types of data to take over call processing when necessary. The following section describes these data types.

A SWACT can occur on SMA that supports a subscriber line with an active Deluxe Spontaneous Call Waiting Identification (DSCWID) session. When this event occurs between the alert tones plus the timer default seconds after re-alert and before the incoming call is acknowledged, the system drops all parties.

Static data Static data is the set of tables which are sent from the CM to the SMA. This set of tables defines the configuration and functionality of the SMA hardware and software. The configuration and functionality cause line data and the association between each IDT and the associated RDT. This data is stored in inventory tables accessible through a table editor from the MAP terminal. The classes of data handled include call processing data, configuration data, and maintenance data. The methods for transferring static data are bulk download, dynamic table, and tuple update.

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

Dynamic data Dynamic data updates occur continuously as the changing data in the active unit updates in the inactive unit. Information in this data transfer includes subscriber states, channel assignment or reassignment, and port statuses.

Limits to a warm SWACT

The following limits apply to a warm SWACT.

Established calls can be dropped To communicate, the SMA units send messages over the IMC link. The bandwidth of the IMC link is 64 kbit/s, but processor real time limits the transmission rate. Dynamic updates occur at a low priority. During heavy traffic periods real time is spent on call processing. The inactive unit does not always receive dynamic data updates. If a warm SWACT occurs during this heavy traffic period, the system drops some established calls .

Established calls cannot use hook flash An established call maintained over an uncontrolled warm SWACT loses hook-flash capability to initiate flash-activated subscriber features. Flash–activated subscriber features include call transfer, three-way calling, conference calls, call parking, and executive busy override. The system loses the capability to initiate features for the remainder of the call. The system ignores the hook flash.

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

Coin calls can be taken down If a warm SWACT occurs during heavy traffic, the system takes down a coin call, like other calls.

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 active line service options, can disable the enhanced warm SWACT feature. The line service options that do not disable the enhanced warm SWACT feature appear in the following table. Any active line service option not in the following table can disable enhanced warm SWACT.

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 enabled only for controlled warm SWACTs. This event occurs when operating company personnel enter the SWACT command. Another example is when a SWACT occurs as part of the REX test sequence.

Examples of enhanced warm SWACT The following examples clarify 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 connected to subscriber A because of a scheduled REX test. The system maintains the speech path over the SWACT. Subscriber A flashes the hookswitch to set up a three-way call. Subscriber A receives a dial tone dials the third party number. The third party answers and subscriber A flashes the hookswitch to connect subscriber B. This action completes the three-way call. In this example, the enhanced warm SWACT feature remained enabled because 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 who receives indication of the waiting call. A controlled warm SWACT occurs on the XPM connected to subscriber A. When subscriber A attempts to place subscriber B on hold to access the waiting call, the system maintains the hook flash and maintains the speech path between subscribers A and B. In this example, the system disables the enhanced warm SWACT feature and loses hook-flash capability because an incompatible line service option was active during the SWACT.

Pre-SWACT and post SWACT enhancements

To increase the number of pre-SWACT checks on the inactive unit enhances pre-SWACT and post SWACT activities. To increase the diagnostics run on the newly active unit immediately after the SWACT also enhances these SWACT activities.

The coverage current pre-SWACT and post-SWACT tests provide expands when new checks are added to the pre-SWACT query. The coverage also expands when diagnostics are added to the post SWACT audit. New checks and diagnostics detect additional problems that can cause the unit to fail. The tests detect problems before you attempt the SWACT or while a SWACT back to the originally active unit is still possible.

The following functionalities are added to the pre-SWACT query:

- For a manual warm SWACT, the pre-SWACT query is enhanced to include the number of traps in the inactive unit. If the inactive unit has traps, the site displays a warning message at the MAP terminal.
- The pre-SWACT query is enhanced to include static data mismatch in the decision to SWACT. When the active unit is in-service and the inactive unit is in-service trouble with static data mismatch. The pre-SWACT query fails.

The following functionality is added to the post-SWACT audit. The post-SWACT audit is enhanced to include a part of in-service diagnostics on the newly active unit. This inclusion is in addition to the current check for two-way communication with the computing module (CM). In-service diagnostics allow detection of hardware problems on the newly active unit before the SWACT-back interval expires. This permits a return of activity to the originally active unit and prevents an outage.

The system can deny a warm SWACT request if the inactive unit has a history of failures. The system can also deny a request if the inactive unit is experiences problems at the time of the SWACT request. If the system denies a request, the reasons for failure appear at the MAP terminal. Two categories of failure reasons are present. The first category is a list of the history of failures by unit diagnostic and otherwise. The second category is a list of the current diagnostic failure reports by unit. Reasons in these categories appear as the SWACT refusal reason text as follows:

```
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 synchronization failures
- inactive unit cannot activity last time
- dropping activity due to <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 damage
- 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 starts a SWACT-back. During a SWACT back, the originally active unit attempts to regain activity. If the unit gains activity, the inactive unit is system-busied and returned to service, and the active unit remains in-service. Steady ISDN and POTS calls from the originally active unit are preserved over the SWACT-back. All new calls made after the SWACT and before the SWACT-back are dropped. If a SWACT back is not successful, both units of the XPM are system-busied and returned to service.

> ***Note 1:*** Operational measurements and peg counts do not start again after a SWACT back.
>
> ***Note 2:*** This feature is not supported during XPM or CM overload.

The user can use the SWACTback capability for the following SWACT commands:

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

> ***Note:*** The REX scheduler also has the SWACT back capability. For more information on how this feature interacts with REX testing, 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. After operating company personnel enter the SWACT command, 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)
```

Do not proceed with the default because the newly inactive unit can take over call processing again.

Uncontrolled switch of activity

An uncontrolled SWACT can occur when

- both units are 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 allows a different SWACT condition. The state of the units and the reason for the activity drop determine the sequence of events.

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

- activity time-out
- no CM links—The message links to the CM or host XPM are broken, so messaging cannot occur.
- duplicate fault—A critical hardware fault occurs.
- jammed—The unit has jammed. This message indicates that the state of the unit cannot change.
- static data corruption
- The original active unit sends a drop message to the CM.
- The new active unit should send a gain message.

As with controlled SWACTs, the XPM attempts to send the gain message again for a maximum of 15 s.

An uncontrolled SWACT can occur if the original active unit is InSv and the original inactive unit is ISTb. The critical factor in this condition is the reason the inactive unit is ISTb. The reason can be data sync. When this condition occurs, the condition is the same as when the active and inactive units are InSv. If the ISTb is because of data sync, the original active unit drops sync and the XPM reinitializes.

If the original active unit is in InSv for a maximum of 3 min, the unit will RTS without the OOS diagnostics. This event occurs because a SWACT occurred less than 3 min ago. The active unit must have had OOS diagnostics run when the SWACT occurred. If the original unit is active for a minimum of 3 min, the active unit will RTS with OOS diagnostics.

The active unit will attempt to return to service. The type of RTS does not affect this action. If the active unit cannot RTS, both units will be SysB and the whole XPM is SysB.

SMA system user interface

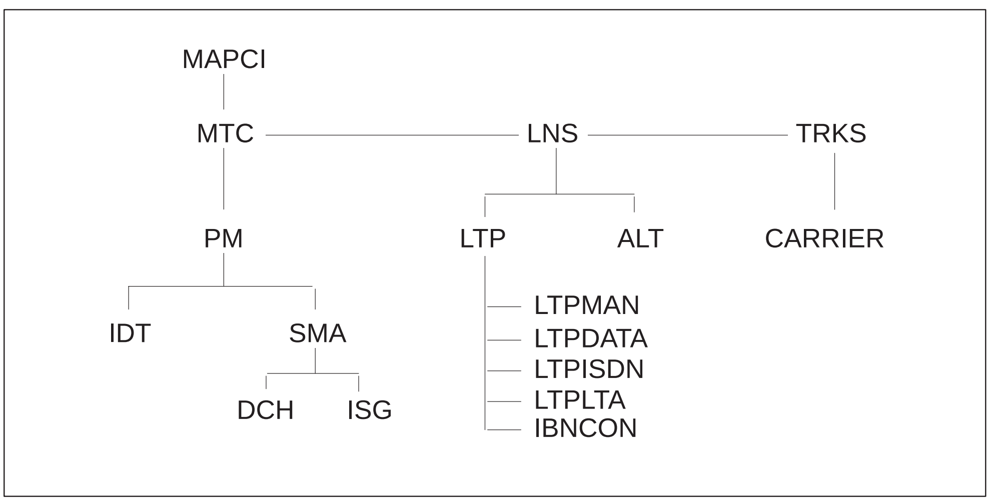
Introduction

This section introduces commands that maintain and troubleshoot the SMA system.

In the descriptions of user interface that appear in this chapter, the name extended peripheral module (XPM) is used in a generic sense to refer to any peripheral module like the SMA. The name XPM implies SMA.

The following figure shows the directory structure for the command levels. The command levels monitor and maintain elements of the SMA system. These elements of the SMA are at the MAP terminal.

MAP directory structure



Getting help at the MAP terminal

To get online help information for commands, datafill H or HELP and the command name for which you need help. Enter these commands on the command line at the MAP terminal. Online help provides the following information for a command:

- description of the function of the command
- defaults for information not shown
- 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 standard command entry sequence is as follows:

- command
- required parameter
- optional parameter

Online help provides information for parameters that use the following special format and symbols:

- parameters appear on separate lines
- square brackets [ ] indicate an optional parameter
- 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 on the accepted values for the parameter follow the name of the parameter

CI level user interface

Display all nodes not in service using NAG command

The command interpreter (CI) level NAG command displays all nodes that are not in service. The MAP response to the node assessment graph (NAG) command is like the one the NAG400 log report gives. The command and log report are part of the NAG feature that provides a snapshot of nodes in the system. The snapshots occur for nodes in the system that are not in service or have a REX issue. Operating company personnel can enter the command string NAG ALL to include the offline nodes in the output. Entry of the command string NAG ON or NAG OFF turns the hourly log report function on and off.

For the output or log report to include a mode, the node must be in one of the following states:

- system busy (SysB)
- C-side busy (CBsy)
- in-service trouble (ISTb)
- manually busy (ManB)

The output or log report also includes the node if a node fails, aborts or does not complete the last REX test. The system can indicate that the node does not have a REX problem. When this condition occurs, the string ATP appears in the REX column to indicate that all tests passed.

The following output depicts an abbreviated report in response to the NAG command.

```
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
```

Display the host IDT using QUERYRDT command

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

For example, when operating company personnel enter QUERYRDT RALG 00 0, the response can be

```
IDT 5
```

This response indicates 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 are 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

When the DMS SuperNode switch receives an event report from the RDT that indicates a software problem with corrupt data, autoprovisioning occurs. The RDT requests the switch to reprovision the RDT with line data from the switch. An RDT can lose communication with the SMA at the host office. In this occurrence, provisioning changes that the system initiates at the host office do not propagate to the RDT.

Purpose of RDTPROV level commands

Operating company personnel can update provisioning changes needed between the RDT and the switch. Personnel can achieve this update with the RDT line reprovisioning (RDTPROV) tool. The RDTPROV tool is available at the CI level of the MAP terminal. The RDTPROV tool allows reprovisioning of all failed lines on an RDT or all failed lines on all RDTs. Failed lines are defined as follows:

- For POTS, EBS, and coin lines, a failed line is a line that has tuples in Table LNINV. A failed line does not have an associated tuple in Table RDTLT.
- For ISDN lines, three occurrences of failed ISDN lines are available where a tuple is available in Table LNINV, and:
  - an associated tuple is not available in Table RDTLT. When this condition occurs, access side provisioning fails.
  - the STATUS field is equal to WORKING and the associated tuple in Table RDTLT has field TRANSP equal to TRANSP_NIL. When this condition occurs, consider the transport side provisioning as a failure.

— an associated tuple is available in Table RDTLT. A tuple in Table SPECCONN has B1 or B2 channels of the ISDN LEN. These channels of the ISDN LEN are in the ENDPT1 or ENDPT2 field. The associated field NAILUP1 or NAILUP2 in Table RDTLT is equal to NAILUP_NIL. When this condition occurs, consider nailup provisioning a failure.

Note: Operating company personnel must make sure that the RDT clears or deletes ISDN line objects on which the FORCE command has an effect. The ISDN line objects must be clear before the FORCE command reprovisions the range of affected lines. Clear the ISDN line objects through maintenance access at the RDT. If this deletion does not occur, the lines fail to provision, and must be cleared manually at the RDT. The REPROV command can run without 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 line is entered in table LNINV. The RDTPROV commands are used when the original object provisioning request failed. Reasons for provisioning failures vary. Two possible reasons are as follows:

- an attempt occurs to provision an integrated digital loop carrier (IDLC) line in a slot already provisioned for universal digital loop carrier (UDLC) service. An IDLC is a line that provides digital access from the RDT to the central office switch without analog-to-digital conversion. A UDLC is a line that requires analog-to-digital conversion through different access vehicles to the central office switch.
- an attempt occurs to provision a line on a shelf without an installed line interface card (LIC)

When the system resolves the condition that caused the provisioning failure, the RDTPROV level commands can 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 pressing the Enter key.

The system sends a request to provisioning all the failed lines to the specified RDT. 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 a line provisioning failure message is received for the line, the user should check RDT306 logs. After the condition that caused the provisioning failure is resolved, 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.

Control of RDT line data audits using RDTLNAUD level

The RDT line audit tool is available from the CI level of the MAP terminal through the RDTLNAUD level. From the RDTLNAUD level, operating company personnel can start or stop the RDT line data audit. Operating company personnel can query audit status and can query the audit history with the following commands:

The DMS SuperNode switch runs the RDT lines audit automatically every 24 hours. This audit makes sure that the RDT receives up-to-date transmitted data. This audit also allows the system to refresh line data. The user can refresh line data when the line date managed between the IDT and the RDT is not matched. Chapter 4, SMA automatic maintenance, describes the RDT lines audit.

Note: Only three manual audits can run at any one time.

Summary 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.
QUERY	There is no parameter	Queries the status of manual and system RDT line audit processes.
HISTORY	The name of the RDT (site, frame, unit) you want to audit.	Displays the start time of the last audit that ran on the given RDT and the status of the audit for this RDT.

HISTORY command

The HISTORY command provides the time of the last audit and the status of the audit for the RDT under examination. An example of the table of information that appears 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 did not start for this RDT
- awaiting—the user can start the audit 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 is complete for this RDT

QUERY command

The QUERY command takes a snapshot of all audits that run in the system at the time the system starts the command. The system can manually audit a maximum of seven RDTs and a maximum of three RDTs. In response, 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
```

Access the IDT maintenance connection with IDTMCC level

Use the IDTMCC level to monitor and control 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 maintenance connection carries maintenance commands and messages. To access the IDT maintenance connection, enter IDTMCC at the CI level of the MAP.

The following table lists commands and parameters available at the IDTMCC level.

Summary of IDTMCC level commands

Command	Parameters	Description
SUMMARY	There are no parameters	Lists all IDTs that Table RDTINV defines and the SMA to which the IDT is attached. Summary also lists the state of the maintenance connection, 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 statistics information for a specified IDT or all IDTs.
CLEAR	The number of the IDT from 0 to 255 or all	Clears statistics 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 for a specified IDT or all IDTs. ***Note:*** The customer cannot get direct access the SETUP command because the command is password protected.

—continued—

Summary 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 with a timer value of 1 to 120. A selection of timer unit of seconds or minutes is also available	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. A selection of timer unit of seconds or minutes is also available	Starts, stops, or queries an IDT audit.

RELEASE	The number of IDTs, or all IDTs on which maintenance actions are to conduct	Aborts the connection of one IDT.
		
		Note: When the 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—

Summary of IDTMCC level commands (continued)

Command	Parameters	Description
SIMUL	The number of IDTs, or all IDTs on which maintenance actions are to conduct. What action to perform, like ADD, REMOVE, or ISTB.	Simulates IDT maintenance actions.
MCCIPC	The number of the IDT. 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 the responses to commands the user enters at the IDTMCC level of the MAP terminal are.

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          Generic TMC     Up
  3     SMA     0       Up          Generic TMC     Up
 12     SMA     1       Up          Generic TMC     Up
 24     SMA     1       Up          Generic TMC     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

The PM level directories and commands in this section monitor and perform maintenance on the SMA system.

PM states

The following table lists PM states that appear at the MAP terminal.

Summary of PM states

PM state	Code	Description
Central side busy	CBsy	The PM cannot communicate with the central control (CC). The network interface links, that carry messages between PM and the DMS SuperNode network are not available.
In service	InSv	The PM is in-service and can support any intended process, like call processing.
In-service trouble	ISTb	The PM is in-service and has a minor fault.
Manual busy	ManB	The PM is busy because the user enters the BSY command at the MAP terminal.
Offline	Offl	Remove the PM from service for commissioning tests or, on a temporary basis, hold the SMA out of service.
System busy	SysB	System maintenance removes the PM from service.

SMA level user interface

Use the SMA level to monitor and maintain the SMA.

The system integrates the SMA into the peripheral module (PM) level MAP display. To access information on an SMA, post the SMA. The following figure shows a standard response at the MAP display terminal when the user posts an SMA.

Posting an SMA at the MAP display terminal

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

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

Summary 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 used with the STATE option. Displays diagnostic history of the SMA used with the DIAGHIST option.
ISG	ISG sublevel	Accesses the ISDN services group (ISG) sublevel for ISG maintenance. Available on SMAs that provide ISDN.
LISTSET	Lists posted set	Lists the contents of the posted set.

—continued—

Summary of SMA commands (continued)

Command	Function	Description
LOADFW (non-menu)	Load firmware	Loads firmware into an SMA or an SMA 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 in 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 a 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 information on the performance and activity of the posted SMA.
QUERYPM	Query PM	Displays information on a posted SMA, that includes location, node number, associated peripheral load name, and associated faults. Use with the FLT option to display information on faults. Use with the DIAGHIST option to display information on the diagnostic history.
QUIT	Quit	Quits the current PM level of the MAP terminal or cancels an SMA selection.
RECOVER	Recover SysB PM	To recover a system busy SMA the command determines if the PM is loaded. The command returns the PM to service.
RTS	Return to service	Returns 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. The faults or earlier performance of the inactive unit determines the action of the SWACT controller.
TRNSL	Translate	Displays information on the interface links between the SMA and network or on 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.
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.

Examples of SMA commands

The following section provides examples for SMA (XPM) level commands.

Example of SWACT command

The user enters the command SWACT without parameters for a posted SMA, and the following response appears at the MAP.

```
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 and the following message appears at the MAP.

```
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 enters the SWACT command with the FORCE option to override the SwAct controller. The following response appears at the MAP.

```
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 and the following message appears at the MAP.

```
SwAct Failed
Reason:  XPM SwActback
```

The MAP response indicates the SWACT failed and the originally active unit regained activity.

The system adds additional responses to the history text and XPM text for the SWACT command. Operating company personnel enters the SWACT command and the following responses appear at the MAP.

```
A Warm SwAct will be performed after data
sync of active terminals.
Please confirm (“YES” or “NO”):
```

When operating company personnel confirm the request the following message appears at the MAP.

```
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

Two options of the DISP command are available. One option of the DISP command is STATE. Use this option with an valid state like SysB. Use this option to request a list of all PMs in the specified state. Use this option with a PM to display all XPMs of the requested type, like SMA.

The following is an example of the DISP command that uses the STATE option with a selected PM. The system lists all XPMs of the state and PM type requested in response.

>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. This feature captures diagnostic results that indicate the sanity of the XPM. 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 inter-related features. The two other features are XPM PreSwact/Post Swact Audit, and XPM REX Control and Trouble Notification Improvements. The XPM PreSwact/Post Swact Audit uses a subset of diagnostic results with past REX tests and SWACT results. The XPM PreSwact/Post Swact Audit uses these features to determine if a SWACT must be performed. The functionality the XPM PreSwact/Post Swact Audit introduces is known in this text as the *SWACT controller.* The XPM REX Control and Trouble Notification Improvements. This functionality modifies the XPM REX test to use the *SWACT controller* and provide log improvements.

An XPM executes diagnostics to test the functionality of the hardware. Diagnostics run because of CC or XPM requests. Diagnostics the XPM performs are normally part of XPM audits. The *SWACT controller* and operating company personnel use the diagnostic results the Extended Peripheral Modules Diagnostics History provides for system analysis.

An option of the DISP command is DIAGHIST. The default for this option is to display all supported XPMs. Or, use the command with an valid PM to display all XPMs of the requested type.

If the system does not support the requested PM, the system displays the following message.

```
Diagnostic history is not supported
for this PM type.
```

If peripherals on the requested PM are not present, the system displays the following message.

```
None.
```

The following is an example of the DISP command and the DIAGHIST option with a selected PM. The system displays the diagnostic history for all XPMs of the PM requested in response.

>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 DIAGHIST option with the QUERYPM command displays the history of diagnostic failures for the posted peripheral. The system displays the following information for the posted SMA when the user enters the command string QUERYPM DIAGHIST:

- short-term and long-term failure counts appear for each unit
- last reset date and time for short term failure counters displays for each unit
- last reset date and time for long-term failure counters displays for the whole node

The system allows reset of long term failure counters from this level. The last diagnostic failure that occurred on the unit is the last diagnostic failure time. The command string QUERYPM DIAGHIST provides a summary of diagnostic failures and the cards hardware faults. These hardware faults are identical to the format the command string DISP DIAGHIST displays. The MAP responses in this text are for example purposes only.

If the system does not support the requested PM, the IDT for example, the system displays the following message:

```
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.
```

Three optional parameters are added to this option:

- reset
  - — allows long-term failure counters to be reset to zero. The system generates a PM601 log that 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 failed by each unit of an XPM. The count 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 and does not contain diagnostic information.

Note 1: The reset parameter is not for frequent use. Reset changes long-term failure counters to zero.

Note 2: The card parameter provides an asterisk (*) next to any card a diagnostic on the mate unit in the XPM reports.

Examples of the command string QUERYPM DIAGHIST used with and without optional parameters follow.

>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 default response shows the failed diagnostics and associated cards. This display shows that on unit 0, the ABDIAG failed twice from the last time unit 0 gained activity. The last activity period was at 12:28 A.M. on 3/29. The 2 in the STF column indicates the two failures of the ABDIAG. The numbers under the 1 indicate the cards involved. The ABDIAG failed a total of three times from the LTF reset time that occurred at 8:44 A.M. on 3/24.

When you read this display, remember that a single test can result in one or more diagnostic failures. Remember that a single test can also result in zero or more associated cards. The total of card counts from this display is not always the accurate number of times a diagnosis fails. Also, the cards can be on one unit or the mate unit. Only certain diagnostics report failures on the mate unit. This display shows the cards on the same unit where the diagnostic runs.

The user enters the following command strings at the command line with the posted SMA. These command strings identify additional command syntax to use with the QUERYPM DIAGHIST command.

>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*. The system provides a set of query procedures for applications that desire the information. The *SWACT controller* determines if a SWACT is correct. Short-term data for a given unit includes both diagnostic and audit failure counts. Short-term data are the counts 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. The system categorizes this data by the number of failures that occur and the defective cards. The MAP commands provide display data for a given XPM or for all XPMs this feature supports. The two sets of data available through the use of MAP commands are short-term failure counts and long term failure counts.

Short term failure counts are stored from the last time a unit correctly gained activity. This data can help operating company personnel to guide maintenance activities and to support organizations for power failure analysis. If a power failure occurs, include the XPM Diagnostic History data for that peripheral with other important data.

Long term failure counts are stored from the last time long–term failure counts are reset. Manual action or Product Computing-Module Load (PCL) application accumulate long-term failure counts. Long-term failure counts last for the life of the PCL. The system channels this data to the design community to provide data for additional diagnostic system improvements.

Description of diagnostics

Different diagnostics run on every type of PM because different PMs contain different hardware. Approximately 75 diagnostics are present for XPMs. Only a part of the 75 diagnostics run on any given PM. This feature captures failures for the following types of diagnostics:

- in service
- out of service
- single diagnostic
- facility audit

- other audits

Each diagnostic associates zero or more cards determined by the XPM. The CC does not always generate card lists for the0 MAP or in logs. The system generates a list of card failures. Any card an XPM diagnostic or audit connects and reports to CC appears on this failure list.

> ***Note:*** Extended Peripheral Modules Diagnostics History records only cards an XPM connects and not record cards the CC generates.

The system can group diagnostics and run the diagnostics as a set of diagnostics or as a single test. Defined sets 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 system only runs these tests as a result of a CC request. The CC requests to test an XPM unit. The CC tests an XPM unit with the manual TST command, manual or system RTS, SWACT, BSY or REX commands. When the CC tests an XPM unit, the XPM runs a set of diagnostics. The diagnostics included in the set vary according to certain types. These types include the PM type of the XPM, the state of the XPM unit, and the activity of the XPM unit. If the unit is in-service, the XPM runs a set of in-service diagnostics. If the unit is out of service, the XPM runs a set of out of service diagnostics.

The results of separate diagnostics are returned to CC with a final result for the complete set. If defective cards are present, the system generates a card list. This card list transfers to CC at the termination of the set of tests.

Facility audit

The facility audit is a set of diagnostics the XPM runs at intervals as a test. If problems occur, the system sends a message to the CC that indicates the problem with 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 the CC.

ROM diagnostics

If the XPM is at ROM level, the user can start a set of ROM diagnostics.

This feature does not capture failures, or the cards associated by mate and ROM diagnostics. For each diagnostic, the system generates a card list 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 this feature supports. The diagnostics are classified as *solicited*, *audit*, or *both*. Diagnostics required by the *SWACT controller* are identified.

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 supported by this feature.

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 diagnostics are stored

This feature stores diagnostic results in the form of counters. Each unit of each peripheral this feature supports has a set of counters. Counters are kept for diagnostic failures and for defective cards. Three types of counters are kept:

- diag
  - — the number of times a diagnostic fails
- card
  - — the number of times the system reports a card as defective
- diag and card group
  - — the number of times a diagnostic and card group occurs

The two subcounters for each of the three counters are a short-term failure counter, and a long-term failure counter. The XPM PreSwact/Post Swact Audit uses the short-term failure counters. The short-term failure counters determine if the system needs a SWACT. Short-term failure counters are reset often through the PCL cycle. Long-term failure counters record the diagnostic history of a peripheral or office over a extended period of time. Long-term failure counters are reset with the QUERYPM DIAGHIST RESET command or with a PCL application.

A single test failure can report a minimum of one diagnostic failures and a minimum of zero defective cards. A diagnostic that runs in one unit can report cards in the unit and in the mate unit. When a diagnostic fails, each diagnostic routine sends the failure information to the history database.

Resets and timestamps

The history database stores five timestamps 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

When a unit correctly gains activity, short-term counters are internally reset to zero on a unit basis. This gain of activity can occur because of an RTS or SWACT command. Long-term counters are reset on a node basis from an

XPM posted at the MAP terminal. When long-term counters are reset, the system generates a log. This log includes a summary of the data collected for the node before the reset.

A PCL application resets all diagnostic history data. The data includes short-term and long-term failure counts. In this position, 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 system integrates the DCH level into the peripheral module (PM) level MAP display. The next two tables describe DCH-level and ISG-level commands.

Summary 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
RTS FORCE	Return to service	Returns a specified EDCH to service, and 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

—continued—

Summary of DCH commands (continued)

Command	Function	Description
TST ROM	TestROM	The TST ROM runs a set of ROM diagnostics that are not defective on the specified EDCH. The TST ROM DESTR runs a load defective test on the EDCH. The EDCH does not need to be loaded first.
TST ROM DESTR	TestROM	As with TST ROM, destructive memory, and address tests on the whole 4 Mbyte 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 on 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. The IDT corresponds to the part of the switch dedicated to 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

- show the IDT MAP level
- give a summary of the commands in a table
- highlight fixed commands to show how the commands work. Included in this highlight are key parameters.
- list different plans to show how the commands are used
- list possible responses to commands in a table

The following figure shows the response at the MAP when posting an IDT.

Posting an IDT at the MAP display

```
   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        8              0     25
3  Listset       IDT     0       1        1       0      0      5
4
5  Trnsl         IDT 17   ManB      LINKS_OOS: 0      RDT_TYPE: GENTMC
6
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 Summary of IDT level commands table gives an summary of all IDT commands.

Summary of IDT level commands

Command	Parameters	Description
BSY	None or the message channel, like EOC1 or TMC1	Busies the IDT or a message channel. You cannot busy the last in-service time-slot management channel (TMC) path for an IDT that is in-service. If you busy the last embedded operations channel (EOC), the maintenance interface with the RDT is lost.
CONT	The message channel and the type of test, INT or EXT	Allows a continuity test to run on an IDT path.
DISP	State (DIAGHIST does not function 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 specified 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	FLT or parameters are not available	Use without parameters to display information about the IDT and the RDT name. Use with the FLT (fault) parameter to give in-service trouble (ISTb) reasons. The primary operations controller (OPC) id is suppressed if the IDT and RDT are of type GENTMC. The backup OPC id is suppressed if the IDT and RDT are of type GENTMC.
QUIT	There are no parameters	Leaves the current PM level of the MAP terminal or cancels an IDT selection.

—continued—

Summary of IDT level commands (continued)

Command	Parameters	Description
RDTALARM	There are no parameters	Provides a count of active alarms on the RDT associated with the IDT, sorted by category and force. The primary OPC id and backup OPC id do not appear for difference type GENTMC. Alarm categories of threshold alert and not determined appear.
RESOURCE	There are no parameters	This non-menu command displays the number of lines allocated for the posted IDT. This non–menu command also displays the total number of lines allocated on the host SMA.
RTS	The message path or there are no parameters	Returns to service the IDT or a message channel. The IDT or message channel must be manually busy.
TRNSL	There are no parameters	Displays the link and channel connectivity for the IDT.
	—end—	

How specified IDT commands are used

The following sections highlight the IDT level commands. Included is a section on the relationship between busying and returning to service the TMC channel and the associated IDT.

BSY the IDT

Use this command to manually busy the IDT. The DMS-core performs the following:

1. tells the SMA to update the 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 the 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 start 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, steps 2, 3, and 4 do not perform.

BSY the message channels

To busy the specified message channel only, use the busy command with the message channel parameter. Operating company personnel must know of the following results of busying a message channel:

- If you busy one of two TMCs or EOCs, the IDT becomes ISTb and a PM128 log results.
- If you attempt to busy the last TMC available, a message appears that indicates the system does not permit this action. This action is not permitted because call processing stops.
- If you busy the last EOC, maintenance interface is not available to the RDT.

CONT

The CONT command allows the continuity path to run. Specify the type of channel, like EOC1. A parameter specifies the location of the loopback. One possible value, INT (internal loopback), sets the loopback point at the EISP. The system automatically sets up the loopback. When the system finishes the test, the system takes the loopback down. The EXT value assumes the system already set up a loopback point at the remote end. The EXT (external) parameter runs the continuity test from the EISP to the loopback point. Take this loopback down manually at the far-end.

To run the CONT test, the IDT must be in-service, but the message channel must be manually busy.

LOOPBK

The LOOPBK command sets up, releases, or queries an external loopback on a path toward the RDT. The possible paths include the EOC or TMC. When the system sets up the path, continuity tests like the CONT command can run on the path.

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 allow 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. Also informs the SMA of the lines of the associated RDT that are active for call processing.
5. tells the SMA to update the 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 start a RTS, the SMA and the P-side links 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 a TMC channel returns to service, the IDT must already be ISTb. This restriction is one of many that control the links of TMCs and the associated IDT. The next section explains these restrictions.

How BSY and RTS interact for TMCs and IDTs

An IDT requires that a minimum of one TMC be InSv to allow call processing. The following rules are present which regulate how the states of the IDT and its associated TMC or TMCs interact:

- When an IDT goes out-of-service, the system marks the TMCs as out-of-service (OOS). If operating company personnel busy the IDT, the TMC paths remain OOS. If operating company personnel want to busy the TMCs, the paths must be made manually busy. Operating company personnel can use the PPS QUERY command to view the status of these channels.
- When an IDT returns to service, a manually busied TMC does not become InSv. This sequence makes sure that the system does not return a possible defective TMC to service with the IDT. The TMCs that are OOS and not made manually busy are included in the return-to-service (RTS) sequence.
- An OOS TMC can RTS if
  - — 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 are the capabilities available:

- the ability to query the status of all paths that attach the IDT
- the ability to set and clear the inhibit attribute for paths that attach the ID.
- the ability to start protection switching with the parameter ACT

The following table explains the parameters for the PPS command.

Parameters of the PPS command

Parameter	Function	Path	Options
ACT	Activates a path. This function performs a protection switch.	EOC1, EOC2, TMC1, or TMC2 (see note)	FORCE
ENA	Allows protection switching to occur to a path	EOC1, EOC2, TMC1, or TMC2 (see note)	There are no options.
INH	Does not allow protection switching from occurring to a path	EOC1, EOC2, TMC1, or TMC2 (see note)	There are no options.
QUERY	Shows how the EOCs and TMCs are configured	Does not apply	There are no options.

Note: For protection switching to occur, two of each type of path must be present.

PROGRESS

The PROGRESS command is a nonmenu command that provides access to a field to display the steps of maintenance tasks as the steps occur. The PROGRESS command must help operating company personnel understand the sequence of system events for a maintenance task.

For example, the 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 on alarm counts at the RDT. The RDTALARM command also provides information on where to track the alarms. To track the alarms, provide the RDT name, network element number, and network element name. To start the RDTALARM command, initiate messaging between the DMS switch and the RDT. This action retrieves the current alarm counts. If messaging fails, the system displays an error message. The system can show the last known alarm counts. The type of error message determines this condition. A description of the error messages received appears later in this section. The system stores the alarms table per IDT. The alarms table provides the number of alarms of each type and force last known to be active at the RDT. The response to this command depends on on the type of IDT posted. The next figure is a 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: GENTMC
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: The system receives a summary of active RDT alarms if the RDT supports the Alarm Count List object class.

The next figure is a example of a failure condition for a GENTMC RDT, after the user issues the RDTALARM command.

Active alarms table failure for GENTMC RDT

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     Appl
   .      .       .       .     1IDT     .       .       .      2Crit
    IDT                          *C*                             *C*
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: GENTMC
6               RDTalarm
7  Bsy          RDT Name:  RDT1 03 0
8  RTS          Network Element:   24 Unnamed
9  Offl
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 messaging to the RDT failed, 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 problem is corrected.
- Temporary resource allocation problem. The system cannot allocate a needed system resource. The problem can be transient. Operating company personnel must execute the command again.
- A response is not received from RDT. The DMS switch has not received a response message with the active alarms counts. A problem can be present with the maintenance connection, or a failure at the RDT.
- Messaging failure. A problem is present with the messaging protocol between the DMS switch and the RDT. This problem can indicate of a software load mismatch, or a software error in the DMS switch or RDT.
- Software error – check logs. A software error occurred that was not planned. Check the DMS switch log system for SWERR logs.
- The RDT does not support alarm counting. The RDT queried does not support the Alarm Count List object class.

- Alarm counting is not configured on RDT. The Alarm Count List object class is not created. The LDS is responsible for the creation of the object on the RDT.

Note: The DMS SuperNode switch does not report alarm conditions of the generic TR-303 RDT in the Alarm banner at the MAP. If this condition occurs when the user enters the RDTAlarm command, one of the following two conditions apply. The first condition means the generic TR-303 RDT connected to your SMA does not support the Alarm Count list function. The second condition means the RDT software is upgraded to support the Alarm Count List. The function is not allowed at the DMS SuperNode switch. If a RDT software upgrade occurs and is not allowed at the switch, follow the procedure in the section in this chapter. The title in this chapter is Remote digital terminal alarm reporting. This procedure allows the Alarm Count List report and subsequent update of the alarm banner of the MAP.

Example plans at the IDT level

The following examples show the different uses of commands that relate to SMA maintenance.

Finding link and channel information

When the user enters the TRNSL command, the following information appears:

- the IDT P-side link number
- the RDT name and its C-side link number
- capabilities (Cap) of the link (messaging, speech, or both)
- status of the IDT P-side link, which can be one of the following:
  - OK
  - ManB
  - SysB
  - OK, P
  - OK, C, P
- condition of the message link, which can be one of the following:
  - OPN
  - CLS
  - MTC
- SMA name, external number, SMA P-side port, and the channel on the port that associates with the control channel.

Refer to the next figure for an example of a MAP for the translate (TRNSL) 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: GENTMC
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 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: GENTMC
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         TMC1: SMA 0  5  24; CSPORT: 13; TMCHAN: 10
13               EOC1: SMA 0  5  12; CSPORT: 13; TMCHAN: 11
14  QueryPM      TMC2: 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

When the user enters the QUERYPM command, the system gives 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 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: GENTMC
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 the user enters the command string QUERYPM FLT at the IDT level, the system identifies the IDT state in response. 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 is not established—several reasons are available as to why the maintenance connection is not established in the system:
  - — setup requirements are not present. For example, the IDT is offline, the EOC1 and EOC2 are manually busy.
  - — SMA SWACT
  - — abort request was received from the RDT
  - — a loss of SMA to CM communication.
- maintenance connection—transient reject. The system adds reject reasons to this ISTb reason like XPM SWACT, stack error, and abort from remote.

- maintenance connection—permanent reject. The only reason a permanent rejection occurs is because an object model (OM) is incompatible.

The following figure provides an example of a MAP for the QUERYPM FLT command, with 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: GENTMC
 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 works. The path protection switching (PPS) LAPD logical link does not work. When this condition occurs, the data LAPD logical link is multi-frame established (MFE). The user enters the command string QUERYPM FLT at the IDT level for a posted IDT. The following ISTb reasons appears for an ISTb state in response to the command string:

- DS-1 message link busy
- path alarm
- maintenance connection not established
- EOC database synchronization in progress
- EOC database not synchronized

- TMC 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 enter

>PPS QUERY

the next figure displays the results.

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: GENTMC
6
7  Bsy
8  RTS          TMC 1: SMA 4  3  24;InSv;Active;Enable
9  Offl         EOC 1: SMA 4  3  12;InSv;Active;Enable
10              TMC 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>
```

Traffic activity must be restored on the last active path in the event of a PPS failure. Traffic activity is EOC or call processing. Traffic activity can be restored when the data LAPD logical link is MFE. Restore traffic activity without regard to the PPS LAPD logical link state. To provide accurate feedback information to operating company personnel, the path is ISTb. 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 and the PPS LAPD logical link is not MFE

Operating company personnel enter the command string PPS QUERY. When this action occurs, the state of the paths appear based on the three path states listed earlier. The information that appears is also based on the state of a path and if the path is allowed. The 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 or cannot be MFE. Several causes for the LAPD to not be MFE:

- DS-1 problem
- remote LAPD end point refuses to set up the connection
- LAPD parameters are incompatible between each end of the connection

The following figure provides an example of a MAP for the PPS QUERY command.

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: GENTMC
 5  Trnsl
 6              PPS QUERY
 7  Bsy         TMC 1: SMA 0 0 24;ISTb;Active;Enable
 8  RTS         EOC 1: SMA 0 0 12;InSv;Active;Enable
 9  Offl        TMC 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 earlier example, path TMC1 is ISTb. This condition indicates 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.

Operating company personnel want to make TMC2 the active channel. The following command string causes this condition to occur:

>PPS ACT TMC2

The TMC2 channel becomes the active channel and TMC1 becomes the standby channel. Operating company personnel must not activate a channel inhibited earlier. If this condition occurs, the activation fails and a message informs operating company personnel of this failure.

Operating company personnel must consider with caution the use of the FORCE option. When in use with the ACT parameter, the system makes the channel active without regard to the state of the channel. The state of 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: Operating company personnel cannot use the FORCE option on an inhibited path.

Responses to IDT level commands

The following table lists responses to IDT level commands, what the responses mean, and the action to take 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. Confirm (“YES” or “NO”)`	The system halts all maintenance actions in progress.	Respond. If YES, maintenance (Mtce) flag is removed.
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. Confirm (Y/N):`	An attempt to busy the last TMC channel occurs when the associated IDT is in service.	Busy the IDT first, and busy the last TMC channel.
	`Calls on the IDT will be affected. Confirm (“YES” or “NO”)`	Attempt to busy the last in-service EOC channel. If the channel is made busy, you cannot perform maintenance tasks on the RDT.	Respond to the prompt. Realize that when you busy the last EOC channel, the system loses maintenance messaging with the RDT.

—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 must go 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 distance 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.
	`Path must be ManB`	Attempt 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`	Attempt 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 and the EISP.
	`LOOPBK SETUP failed – no response from XPM`	The SMA does not respond to the request.	Troubleshoot the SMA and the EISP.
PROGRESS	`Progress field is active`	Input PROGRESS QUERY.	Use the ON or OFF parameters to start or cancel PROGRESS.
RTS	***Note:*** The following responses are for IDT.		

—continued—

Responses to IDT level command (continued)

Command	Response	What the response means	What to do
	`IDT 55 Rts Passed`	The IDT returns 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 when a previous maintenance request was in progress.	Wait until earlier maintenance request completes or use ABTK to abort maintenance in progress.
RTS (continued)	`RTS failed: no active TMC`	A TMC must be in-service to RTS the IDT.	RTS a minimum of one TMC
	`RTS Rejected: Aborted`	PM180, PM181	
	`path failed – LAPD failure`	The system cannot bring the LAPD cannot in-service.	Check the status of the RDT and the EIS.
	`path failed – Channel Failure`	The DS-1 carrier fails.	Check the carrier.
	`Request invalid: path is loopbacked toward far end`	A LOOPBK SETUP already occurred on this path.	Release the loopback (LOOPBK RLS). Attempt the RTS again.

—continued—

Responses to IDT level command (continued)

Command	Response	What the response means	What to do
	`Request invalid: IDT must be InSv for TMC to RTS`	The IDT must be in-service before the TMC returns to service.	RTS the IDT. Use the RTS command without parameters.
TRNSL	`Request invalid: IDT is not equipped`	An IDT was deleted from Table RDTINV. When the IDT was posted, status is unequipped (Uneq).	Enter tuple for IDT again in Table RDTINV.
—end—			

LNS level user interface

User interface for RDT lines maintenance

Remote digital terminal (RDT) lines maintenance involves the use of commands from different MAP levels. The different MAP levels in use depend on the type of tests used. The different MAP levels used do not always depend on the type of line the user tests.

Access to subscriber line tests and associated maintenance occurs through the LNS subsystem and sub-levels. Test all types of Multi Vendor Interface (MVI) RDTs from the LNS subsystem and sub-levels.

The following engineering restrictions are present. Messaging bandwidth limits between the SMA and RDT cause the following engineering limits:

- The user must attempt a maximum of six simultaneous line maintenance command on a given SMA.
- The central processing unit (CPU) time allotted to 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. As a result, a line maintenance test can fail. The failure does not always indicate a fault.
- The user must test the suspected line or circuit again during off peak hours. Observe faults of this type when CPU use exceeds 80%.

Remote digital terminal diagnostic tests

The following table lists diagnostic tests for subscriber lines at the RDT.

RDT diagnostics

Test	POTS	COIN	Multi-party
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	
Coin return test		x	
Reverse battery		x	
Negative tip party ring			x
Positive ring party ring			x
Positive tip party ring			x

Note 1: The coin collect test includes the coin partial presence test.
Note 2: The coin return test includes the coin presence test.
Note 3: The negative tip party ring test on a multi-party multi-vendor interface (MVI) line type includes the automatic number identification (ANI) test.

Line testing for MBS lines from a TR-303 RDT

The system supports line test commands for MBS lines that terminate on MVI RDTs with the following exceptions:

- The TR-303 MBS lines can be executed on the SDIAG command, available from the ALT level. The SDIAG indicates a successful test even if the test cannot run in response.
- The LTA IN command, available at the LTPLTA level, is equipped for TR-303 RDTs with Table RDTINV, field BRIDGING, entered as Y. The BRIDGING field is entered as Y if the RDT supports a bridge to the line.

The following table identifies the result on the MBS phone set volume setting when the listed line test commands are executed. Datafill in Table RDTINV, field BRIDGING determine the table contents.

Supported TR-303 MBS line tests

Level	Test	Causes volume setting loss when BRIDGING = Y	Causes volume setting loss when BRIDGING = N
LTP level	DIAG	No	Yes
LTPLTA level	MONLTA	No	Yes
	TALKLTA	No	Yes
	LNTST	No	Yes
	VDC	No	Yes
	VAC	No	Yes
	RES	No	Yes
	CAP	No	Yes
	LTA IN	No	Not supported
	LTA OUT	No	Yes
LTPMAN level	TONEGEN METALLIC	Yes	Yes
	JACK METALLIC	Yes	Yes
	CKTTST	No	No
	SUSTATE	No	No
ALT level	DIAG	No	Yes
	CKTTST	No	No
	LIT	No	Yes
NTT level	BASIC	Yes	Yes
	MLT	Yes	Yes
Subscriber premise	DSCKT	Yes	Yes
	SSMAN	Yes	Yes
	STRG	No	No

LTP level

The operating company can use the line test position (LTP) level of the MAP, to run different tests on lines off the RDT.

Note: The shelf and slot subfields of a multi-vendor interface RDT LEN do not represent the location of a line card. The use of option D (drawer) disables the commands POST and NEXT.

The DMS SuperNode switch line state appears at the LTP MAP level. The DMS state does not always match the state of the line card and line termination object at the MVI RDT. A field at the LTP level of the MAP displays the RDT line state. This RDT line state is for lines posted at the LTP MAP level. This field clears when an MVI RDT is posted in the control position at the LTP MAP level. This MVI RDT does not support line state reporting. The field also clears when operating company personnel leave the LTP MAP level. The field clears when a line is moved from the control position to the hold position. New RDT lines are not posted in the control position. An audit process updates all RDT lines posted in the control position every 5 min. This audit process displays the latest remote line state.

The following table lists the remote line states that appear the DMS MAP for RDT lines. These states appear for those RDT vendors supporting line state that report to the DMS-100 switch.

RDT 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 processes 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 system takes the posted line at the RDT out of service for testing and the user cannot perform call processing.
IS–TST@RDT	In-service test at RDT	Indicates the line at the RDT undergoes tests initiated from the RDT, and is not accessible from the DMS switch

—continued—

RDT line states seen at the LTP MAP level (continued)

Remote line state	Meaning	Description
UNEQP@RDT	Unequipped at RDT	Indicates the line card at the RDT is not available
UNK@RDT	Unknown at RDT	Indicates that the line state at the RDT is not known at this time. After UNK@RDT appears at the time of the initial post, a background process is started 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 reflect the actual RDT remote line state.
	—end—	

The following figure shows a normal response to a line posted at the LTP level. In this occurrence, the line is posted at the LTP level with the remote line state field for RDT lines.

LTP MAP level display with the remote line state field for a posted RDT 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
 10 CktLoc
 11 Hold
 12 Next
 13
 14
 15
 16 Prefix
 17 LCO_
 18 Level_
    userid
 TIME  hh : mm>
```

Other remote line states that are presented in this field include:
IS@RDT
IS-CPB@RDT
IS-TBL@RDT
OOS@RDT
OOS-TST@RDT
UNEQP@RDT
IS-TST@RDT
UNK@RDT

The LTP level commands table lists the commands available at the different MAP levels for line maintenance. Each command is described in terms of if the system supports the command and if a the system requires specified configuration.

Plain old telephone service (POTS), coin, MBS, and integrated services digital network (ISDN) lines can support the command. When all three services support the command, the word *All* appears in the *Line types* column.

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. Use option D to disable this command for multi-vendor interface RDT lines.	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).
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 line circuit 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. Use option D to disables this command for multi-vendor interface RDT lines.	Does not apply.

—continued—

LTP level commands (continued)

Command	Line types	Description	Configuration notes
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 apply.
FRLS	All	Disconnects the line circuit with force from test equipment or another circuit and changes the line state to manually busy (MB).	Does not apply.
POTSDIAG	None	Allows fixed POTS lines to connect to the multiline test unit (MTU) for loss test.	Not supported. This test requires the RDT to apply a termination that is not standard to the line card under test.
RECORD_DTSR	All	Enables, disables, or queries dial-tone speed recording.	Does not apply.
—end—			

Access to remote line location information for RDTs is available using the CKTLOC command. If the RDT 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. 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 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
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. POTS, coin, and ISDN lines can 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 the commands.

LTPMAN level commands

Command	Supported?	Line types	Configuration Dependent?
QUIT	Yes	All	No
POST	Yes	All	No
LOSS (Note 1)	Yes	All, except ISDN	Yes

LTPMAN level commands (continued)

Command	Supported?	Line types	Configuration Dependent?
NOISE (Note 1)	Yes	All, except ISDN	Yes
TONEGEN (Note 1)	Yes	All, except ISDN	Yes
TONEGEN METALLIC (Note 1)	Yes	All	Yes
JACK (Note 2)	Yes	All, except ISDN	Yes
JACK METALLIC (Note 2)	Yes	All, except ISDN	Yes
TSTRING	No	Does not apply	Does not apply
BAL (Note 3)	No	Does not apply	Does not apply
RLSCONN (Notes 1 and 4)	Yes	All	No
HOLD	Yes	All	No
NEXT	Yes	All	No
CKTTST	Yes	ISDN	No
SUSTATE	Yes	ISDN	No
DCHCON	Yes	ISDN	No
SETLOOPBK	No	Does not apply	Does not apply

Note 1: Uses external equipment.

Note 2: Test the subscriber lines between the attendant console. The RDT requires a trunk module.

Note 3: The RDT balance network and pad group functions are not included in the functionality of this command for the MVI RDT.

Note 4: Use RLS CONN for clean up and release of the line under test. The RLS CONN uses EOC messaging.

—end—

LTPLTA level

The following table contains a list of LTPLTA commands. This level of the MAP 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 (Note 1)	Yes	POTS, Coin	Yes
TALKLTA (Note 1)	Yes	POTS, Coin	Yes
ORIG	Yes	POTS, Coin	Yes
LNTST	Yes	All	Yes
VDC	Yes	All	Yes
VAC	Yes	All	Yes
RES	Yes	All	Yes
CAP	Yes	All	Yes
HOLD	Yes	All	No
NEXT	Yes	All	No
LTA (Note 2)	Yes	All	No
BALNET (Note 3)	No	Does not apply	Does not apply
COIN	Yes	Coin	Yes
RING	Yes	POTS, Coin	Yes
DGTTST	Yes	POTS, Coin	Yes

Note 1: The commands MONLTA and TALKLTA are also supported for POTS and COIN lines through a PCM connection. When this condition occurs, the commands are not configuration dependent. Use of the ORIG command cannot occur with A PCM MONLTA or TALKLTA connection.

Note 2: The parameters for this command match what the RDT supports.

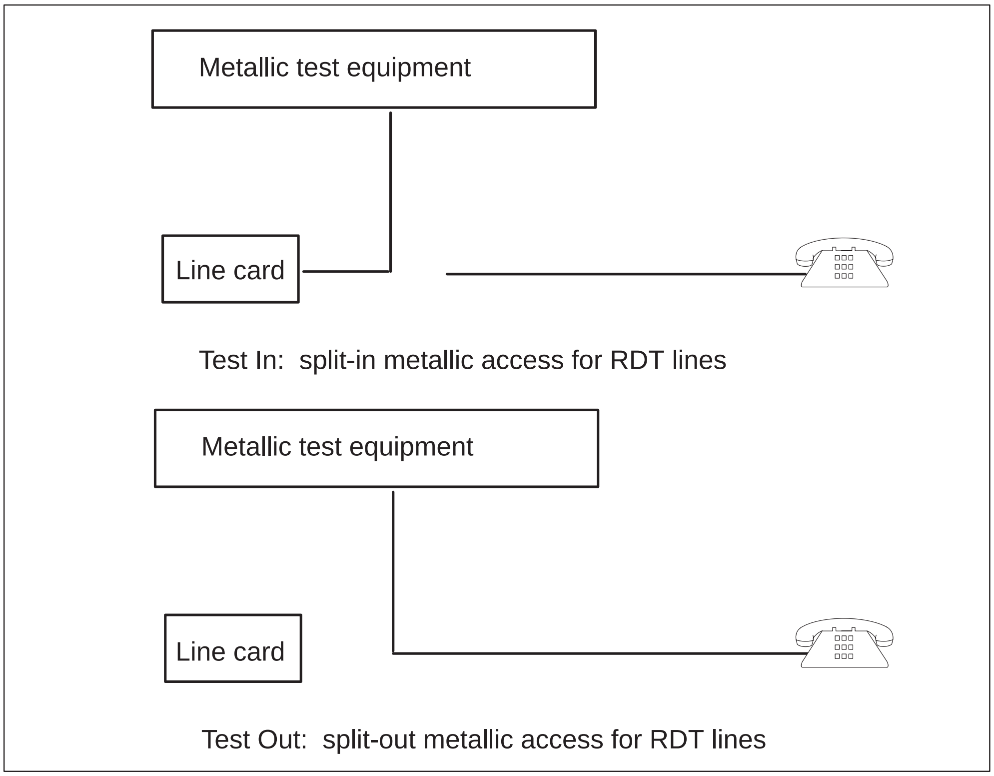
Note 3: The balance network and pad group functions are not included in the functionality of this command for the MVI RDT.

The LTA command at the LTPLTA level changes the metallic configuration of the line in the control position. The command has one optional parameter that indicates the desired configuration (IN, OUT, RLS). The system does not always use a parameter with the LTA command. This condition toggles the metallic configuration for the line in the control position between the test-in and test-out configuration.

Full support of the LTA command for RDT lines requires split-in metallic access. This access uses an MTAU with a split access capability of nonsimFullSplit. The RDT sends the split access capability.

The following figure indicates 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	Does not apply	Does not apply
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 (Note)	Yes	ISDN	No
QPHINFO	No	Does not apply	Does not apply
RLAYER (Note)	Yes	ISDN	No
TEST	No	Does not apply	Does not apply
L1BLMALM (non-menu)	Yes	ISDN	No

Note: Only layer two options are valid. Layer one performance monitoring is now not supported.

MVI ISDN maintenance

This section covers improvements to layer 1 loop status monitoring, ISDN line test and maintenance, and ISDN data link layer monitor capabilities.

Nailed-up MVI ISDN B channels

Support for nailed-up MVI ISDN B channels includes the following:

- line test support for nailed-up MVI ISDN B channels
- the ability to perform a bit error rate test (BERT) of a nailed-up B channel

Layer 1 status monitoring

Layer 1 loop status monitoring provides the following capabilities:

- process the change of overhead bit reports from RDT ISDN lines. These reports can cause the DMS switch to update the computing module (CM) view of line state. The report can cause the system to generate a LINE145 or LINE147 log.
- inhibit or enable loop status log generation on a line by line basis. The L1BLMALM non-menu command affects loop status log generation. This log generation occurs for a line posted at the LTPISDN level of the MAP display.
- retrieve the ISDN line state when the user enters the SUSTATE command. The line state is for a line posted at the LTPISDN level of the MAP.

  This feature retrieves the loop status of an MVI ISDN line with the m_get Common Management Information Service (CMIS) request. This feature uses the CMIS request to retrieve attributes specified when the system requests the SUSTATE command.

In IDLC systems, the RDT sends the change of overhead bit reports to the Local Digital Switch (LDS) to identify changes in ISDN loop status. The LINE 145 and LINE 147 logs report the change of overhead bit reports.

The change of overhead bit report contains old and new states of the superframe overhead bits. The DMS switch examines the overhead bit report, determines the loop status change, and take the correct action.

ISDN line test and maintenance

The ISDN line test and maintenance capabilities provide procedures. These procedures communicate line test actions from the DMS switch to the RDT over the EOC. These line test actions occur in response to test commands entered for an MVI ISDN line posted at the line test position (LTP) level of the MAP display.

The MVI event handler receives autonomous reports the RDT sends over the EOC. Applications register with the MVI event handler to receive specified reports. The RDT sends the change of overhead bit reports when an ISDN line experiences changes in U-loop synchronization. The RDT also sends the reports when an ISDN line experiences changes in NT1 test mode status. The reports trigger the LDS to generate logs and update the DMS view of line state.

The TR303-specified m_actions are specified for ISDN Framed Path Termination objects. These m_actions operate and release ISDN loopbacks, and generate corrupted cyclic redundancy checks (CRCs). The system performs these actions at the ISDN line card or network termination 1 (NT1).

ISDN data link layer control

The following capabilities are provided:

- The daily audit of layer 2 performance includes SMA ISDN lines.
- The system generates ISDN200, ISDN201, and ISDN203 logs during the layer 2 audit. These logs include information from SMA ISDN lines.

A daily CM audit retrieves transmission performance, protocol abnormality, and service disruption data from each D-Channel Handler (DCH). A daily CM audit records the layer 2 problems of separate lines. The audit reports the layer 2 performance of the DMS SuperNode switch and resets layer 2 control counters in the DCH.

The QLAYER and RLAYER commands allow the query and reset of performance data for an ISDN line. This ISDN line is posted at the LTPISDN level of the MAP. For SMA, the user can only access layer 2 data with the QLAYER and RLAYER commands.

Posting ISDN lines with the POST DK command

Activation of the following POST command parameters can occur if the customer purchases the SOC NI000050 2B-FIT/NIT feature:

POST DK dn_number [<key#>| ‘all’]

The POST DK command displays a DN appearance on the specified key on an ISDN terminal indicated in the following figure. If DN appearance is active, the key number of the DN appearance and the bearer capability of the call appear. The system also displays the far-end information.

LTP MAP level display with a posted ISDN line with key number and bearer capability displayed

```
  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                                         Bearer capability
8
9  AlmStat                                Key number
10 CktLoc
11 Hold
12 Next
13
14
15
16 Prefix
17 LCO_
18 Level_
   userid
TIME  hh : mm>
```

The user enters the POST DK command to post the ISDN line. The line under the control position displays the key number and bearer capability. In the earlier example, the CPE has DN 621-5986 assigned to key 33, and has a speech call active. 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 every second and the display updated.

Responses to LTP level commands

The following table shows command responses at the LTP level.

Responses to LTP level command

Command	Response	What the reponse 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 system finds the mismatch, 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 system establishes maintenance connection and a service mismatch condition is available with the line that returns to service.	Replace the line card with a card that supports the supplied service.
POST	`Option NI000050 is not enabled`	The user attempts to use the POST DK command and did not enable 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 system issues the POST DK command on a non-ISDN line. This command is only valid for ISDN lines.	Enter the command again on an ISDN line, or use a different POST command.
	The system displays `NO EQUIPMENT` in the LEN field and `NEQ` in the STAtus field in response.	The system assigns the posted DN to an LTID that is not mapped to a LEN in Table LTMAP.	Map the LTID to a LEN with the SLT ATT command before you post the DN.

—continued—

Responses to LTP level command (continued)

Command	Response	What the reponse 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`	Post a DN Appearance that has AFC or ACO supplied. When this condition occurs, the DN Appearance is a member of a group of Appearances for the DN. The key numbers in use for these DNs are not always the same as the keys on the ISDN set. This condition is because the Q.931 message protocol initially refers to the DN without reference to the key number in use. The user or the ISDN set determines the key to use for a call. The CM or XPM does not receive the information.	This response is for 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 it 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 system finds the mismatch, the system automatically attempts to correct the problem.

Responses to LTPLTA level commands

The following table shows command responses specified ISDN tests at the LTPLTA level.

Responses to LTPLTA level command

Command	Response	What it 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 system finds the mismatch, the system automatically attempts to correct the problem.

ALT level

The automatic line test (ALT) runs tests on lines. The operating company in table ALTSCHED defines the schedule for these tests. These tests are available at the ALT level of the MAP. The following table lists the commands available at this level.

> ***Note:*** Specified commands at the ALT level involve tests. These commands are SDIAG, DIAG, LIT, CKTTST, and BAL. These ALT commands set the schedule to run these tests. The tests run 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	Does not apply	Does not apply
CKTTST	Yes	No

RDT line tests at the subscriber premises

Tests from the subscriber premises do not involve central office personnel. These tests are:

- silent switchman
- station ringer
- dialable short circuit
- dialable cable pair locator
- digitone detection

RDT subscriber line tests from no test trunk (NTT)

The remote maintenance center can initialize subscriber loop tests for RDT lines from the remote maintenance center with different loop test systems. The loop test systems connect to the local digital switch (LDS) with the no test trunk interface. RDTs do not support test trunk line tests. The abbreviation NTT refers to a standard protocol that 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 a special access code is dialed to gain access to the subscriber loop. The switch runs the extended diagnostic on the line under test and the test results are reported to the test equipment.

POTS, coin, and multiparty line tests with MLT and test desk The system supports MLT and test desk testing only on POTS, coin, and multiparty lines. When the test system seizes the line under test, a 56.2 kΩ load, equivalent to the on-hook dc signature, is applied between the tip and ring of the test trunk. This 56.2 kΩ load is equivalent to the on-hook dc signature. This load indicates the following to the test system that:

- the line is idle
- the dialed number is in a loop carrier system
- through the test trunk, the test system sends a metallic access to that line

The test system prepares to receive the diagnostic results from the switch through DC voltage signatures.

EBS or ISDN line tests with MLT and test desk For EBS or ISDN lines, the SuperNode switch disables the dc signature to indicate that test system does not receive the diagnostic results. This condition indicates that only metallic access of that line is given. An RDT can serve a group of POTS, coin, multiparty, EBS, and ISDN lines. When this condition occurs, the dc signature is provided for only POTS, coin, and multiparty lines and is disabled 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 system receives the test results for a metallic connection for EBS and ISDN lines.

The user enters Table RDTINV, field NTTOPT to control the NTT dc signature:

- If the NTTOPT field is N, the NTT signature is disabled for all line types that RDT serves.
- If the NTTOPT field is Y, the NTT dc signature is allowed for POTS, coin, and multiparty lines. During software upgrades from an old release to a new release, the field is Y.

Control of the NTT dc signature occurs on an separate RDT basis. The NTT signature can be disabled for all line types on an separate RDT basis.

EXT level user interface

The EXT MAP level tracks active RDT alarms. The user enters the EXT MAP level and types the LIST CRIT, LIST MAJ, LIST MIN, or LIST NOALM commands to list active alarms. To display active RDT signal distribution (SD) points, the user types the DISP SDALARM command at the EXT MAP level.

The following figure illustrates the EXT level example of RDT alarm seen 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            RDTSD1
  7  List      RDTSD3
  8  TstDSAlm_ RDTSD5
  9  SetSD_    RDTCRIT
  10 SetSC_
  11 Disp_
  12
  13 _Crit
  14 _FSP
  15 _Maj
  16 _Min
  17 _NoAlm
  18
     userid
  TIME  hh : mm>
```

TRKS level user interface

Use the TRKS;CARRIER level to monitor, isolate faults, and conduct repair verification on DS-1 links between the RDT and the SMA. Use the CARRIER level commands to 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 tests determine if a DS-1 problem resides in the SMA or in external equipment.

Periodic monitoring of DS-1 links can detect performance directions that indicate equipment failure. These directions allow the network provider to take action before a service power failure occurs. This condition facilitates this type of maintenance and helps diagnose link failures. The SMAs support many performance statistics related to DS-1 links. This information can be accessed from the CARRIER level of the MAP and includes the following parameters:

- loss of frame count
- estimated bit error rate (BER)
- severe errored seconds (SES)
- slip count
- errored seconds (ES)
- alarm count

The user can define thresholds entered in Table CARRMTC to trigger an alarm when a performance parameter reaches a pre-determined point. Thresholds can also automatically remove a DS-1 link from service if performance reaches a level that is not acceptable.

The CARRIER level of the MAP posts the carriers for the DS-1 links on the P-side of the SMA. The CARRIER level of the MAP is part of the TRKS subsystem. When the SMA is at the carrier level, post the SMA the same way other PM types are posted.

The following figure provides a sample of a CARRIER level MAP.

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_
 7  Bsy_      N CLASS SITE SMA CKT D ALRM SLIP FRME BER ES SES STATE
 8  RTS_      0 REMOTE HOST   0   0 C         1    0 1.0 2   0  INSV
 9  Offl_     1 REMOTE HOST   0   1 C         1    0 1.0 2   0  INSV
 10 DispOpt   2 REMOTE HOST   0   2 C         0    0 1.0 1   0  INSV
 11 Disp_     3 REMOTE HOST   0   3 C         1    0 1.0 1   0  INSV
 12 Next      4 REMOTE HOST   0   4 C         1    0 1.0 1   0  INSV
 13
 14 Detail_   SIZE OF POSTED SET  :   5
 15
 16
 17
 18
     userid
 TIME   hh : mm>
```

SMA manual maintenance

This chapter includes descriptions of faults, test configurations, and test tools for Subscriber Carrier Module-100 Access (SMA) manual maintenance.

SMA system trouble indicators

The SMA maintenance software reports faults through trouble indicators. The trouble indicators can include the following:

- operational measurements
- log reports
- alarms

Operational measurements

Operational measurements (OM) consist of monitoring and counting events in the system. The OMs detect current and possible system troubles. Use the OM threshold feature to monitor and report key SMA activity. Report this activity as a routine. These reports can help detect problems in the system. Log reports and alarms are the primary methods of trouble detection.

Log reports

Analyze the log reports to provide detailed information for call errors, diagnostic results, and system status. The log reports can indicate the following trouble conditions:

- sudden increase in volume of logs
- reports generated for messages not printed
- large number of like logs

Alarms

Audible and visual alarms indicate a problem that requires action. The level of the alarm indicates the severity of the alarm. The alarm levels are minor, major, and critical. The following table describes alarm conditions.

Alarm description

Alarm	PM banner	Description
Minor	blank	Does not affect service
Major	M	Indicates a condition that can cause service to degrade
Critical	*C*	Indicates a service outage or potential service outage

Follow these guidelines when you respond to alarms:

- If the MAP display shows more than one alarm of the same severity, clear the alarms. Clear the alarms on the screen from left to right.
- If an alarm of a greater severity occurs while you fix an alarm, respond to the new alarm. Do not continue attempts to clear the less severe alarm.

Remote digital terminal alarm reporting

The Digital Multiplex System (DMS) SuperNode switch monitors and records alarm reports from the remote digital terminal (RDT). The switch returns alarm information in log reports, signal distribution (SD) points, and DMS MAP (maintenance and administration position) level displays. An alarm cutoff function masks alarms with the highest alarm state. The SD point displays the next highest level of alarm state. The system can display all RDT alarms in a sequence with a single telemetry interface.

Alarms are sent from the RDT to the DMS switch if the conditions that follow occur:

- Embedded operations channel (EOC) messaging is active between the RDT and DMS switch.
- An event at the RDT causes type event report. The problem type is one of the following:
  - equipment–RDT302
  - transmission (facility)–RDT301
  - environmental–RDT303
  - software–RDT304
  - service–RDT305
  - threshold alert–RDT308
  - indeterminate–RDT309
- The notification corresponds to a single alarm.

The DMS SD and scan (SC) points provide a telemetry interface for RDT alarms. The SD points that support RDT alarms total 13. Eight SD points indicate the RDT with the highest severity. The eight SD points are RDTSD1 through RDTSD8. The eight SD points reference the RDT. To find the the RDT with the highest severity, find the tuple with the SDPOINTS field that matches in in table RDTINV. The matching tuple contains the name of the RDT referenced by the SDPOINTS in field RDTNAME.

Four SD points indicate the alarm severity of the RDT. The categories of alarm severity are as follows:

- critical
- major
- minor
- warning

Four software alarms indicate the alarm severity for RDTs as follows:

- The RDTCRIT operates when the RDTCRIT is active.
- The RDTMJ operates when the RDTMAJOR is active.
- The RDTMN operates when the RDTMINOR is active.
- The RDTWRN operates when the RDTWARN is active.

  Note: The system enters these alarms in table software alarm (SFWALRM).

The SD point RDTACO indicates when the RDT alarm cutoff function becomes active. The RDTACO function indicates that active RDT alarms do not appear because the alarm cutoff is active. The alarm cutoff function disables alarms with the most severe states. When the alarm cutoff function masks the more severe alarms, the system displays the *next* most severe alarms. To enable the alarm cutoff function, there must be a data entry for the SC function RDTALRMCO in table alarm scan (ALMSC). The RDT alarms cut off before can be enabled again. When no RDT alarms display through SD points, the RDTALRMCO function enables all RDT alarms again. The alarm cutoff applies to EXT software alarms and the SD points that correspond to the alarms.

If more than one RDT is in use, the system displays the RDT with the most severe alarm state. The severity level of the alarms that are present, not the number of alarms, determines the alarm state.

Note: The TR-TSY-000303 (TR-303) requires that the SD points remain active for a minimum of 20 s. If an alarm with a more severe state occurs before the 20 s expires, the system displays the more severe alarm.

The external alarms maintenance system (EXT) of the MAP display uses SC and SD points to report and monitor alarms. The EXT MAP level tracks active RDT alarms. If any RDT alarm is active, the SD point(s) that correspond to the RDT are also active.

When the RDT reports an alarm to the DMS switch, the switch raises an alarm of the same severity. The switch raises the alarm against the integrated digital terminal (IDT) that corresponds to the RDT. The IDT state becomes in-service trouble (ISTb). The QUERYPM FLT command can determine if the IDT is ISTb because of RDT alarms. Use the RDTALARM command at the IDT MAP level to view the RDT alarm counts by type and severity.

Note: The IDT becomes ISTb if the alarm severity is critical, major, or minor. Alarm severities of warning or indeterminate do not cause the IDT to become ISTb.

The alarm types in the IDT MAP level for TR303 RDTs are as follows:

- facility [transmission] (Fac)
- equipment (Eqp)
- environmental (Env)
- software (Sfw)
- service (Svc)
- threshold (Thr)
- indeterminate (Ind)

The RDT stores the current alarms counts. The alarm count indicates the number of alarms for each severity for each alarm type. The RDTALARM command retrieves the current alarms counts from the RDT. The alarm count updates the IDT maintenance status, the EXT software alarms, and the SD and SC points. Use the Alarm Count List object class to retrieve RDT alarms by problem type. If the RDT does not support the Alarm Count List object class, the system displays the message that follows. Only DMS switch log reports report alarms when the RDT does not support the Alarm Count List.

```
Alarm counting not configured on RDT
```

The DMS MVI stack processes event reports from the RDT with service access point identifier/terminal endpoint identifier (SAPI/TEI) addresses SAPI = 1 and TEI = 4. Alarm reporting capabilities that use RDT event reports require an active EOC messaging channel.

If the RDT supports the Alarm Count List object class, the system performs an audit of the TR303 RDT alarm counts. The system performs the count every 10 min if the RDT does not send any alarm indications. The audit information indicates the alarm counts by severity and problem type.

Computing module (CM) restarts affect the data stored at the DMS switch. The DMS switch provides RDT alarm reports and alarm control functions for RDTs. The DMS switch enables all RDT alarms and resets the alarm cutoff indicator after a restart of any type. After a restart cold or a restart reload, the DMS switch clears all RDT EXT software alarms and SD point. The DMS switch activates the highest alarm counts for each RDT.

Enabling the alarm count list support at the DMS SuperNode switch

The EOC channel communicates problems at the RDT to the LDS. The DMS SuperNode switch recognizes event reports for remote failures and generates RDT3xx logs. Operating company personnel expect audible and visual indications of serious conditions in the alarm banner at the MAP terminal. The DMS SuperNode switch can report RDT problems in the alarm banner, if the RDT supports the alarm count list object.

The DMS SuperNode switch can report alarm conditions of the generic TR-303 RDT in the alarm banner at the MAP display. If the switch does not report alarm conditions or the user enters the RDTALARM command, one of the following two conditions applies:

- The generic TR-303 RDT that connects to the SMA does not support the alarm count list function.
- The RDT software upgrade supports the alarm count list but the DMS SuperNode switch did not enable the function.

A generic TR-303 RDT can upgrade from a software load that does not support the alarm count list object. When the generic TR-303 RDT upgrades to a load that supports the object, perform the following procedure. This procedure enables the alarm count list reporting and the update of the alarm banner of the MAP terminal.

1 Upgrade the RDT with the new software load that supports the alarm count list function. Follow the recommendations of the RDT manufacturer.

2 Post the RDT at the PM, IDT level.

3 Enter the RDTALARM command. The response at the MAP terminal indicates that this RDT does not support the RDTALARM command.

Note: When you busy the maintenance channels you disable OAM&P messages between the SMA and RDT for a short time.

4 To busy (BSY) the maintenance channels to the RDT that you upgrade, type

BSY EOC2

BSY EOC1

5 To return to service (RTS) the maintenance channels, type

RTS EOC1

RTS EOC2

6 Enter the RDTALARM command. The MAP response indicates that the RDT supports the command and displays the alarm count list summary. If the RDT indicates alarms, the system updates the banner every 10 min.

DS-1 carrier alarm reporting

The system initiates audits on carriers. The following processes perform the audits:

- The peripheral audit audits the carriers on a specified peripheral. The peripheral audit process accumulates OMs from the peripheral. The peripheral audit process takes action when the counters exceed the thresholds.
- The carrier audit audits all carriers in the system in a single audit cycle. The carrier audit process checks that hardware and software states are in agreement and corrects the states as required. The carrier audit process also resets the CM OM counts at midnight and takes the correct actions.

When a fault occurs on an SMA carrier, one of the DS-1 alarms is detected and generated. The DS-1 maintenance examines the correct peripheral to obtain the alarms.

Fault conditions

The SMA system components can contain several types of faults. In the host office, the central side (C-side) links from the SMA to the network can fail. Defective network links can cause a loss of subscriber service and messaging from the central control (CC). A defective DS30 or DS512 card in the SMA also can cause defective communication with the CC.

Any circuit card in the SMA, including the power converter card, can be defective and can affect subscriber service. Other SMA equipment can become defective.

The SMA peripheral side (P-side) links toward the subscriber carry messages that are important to the maintenance of subscriber service. A defective P-side link can affect subscriber service.

The sections that follow discuss faults that include the XPM parity fault and data mismatch. These sections also include the fault types that can occur in SMA components and the interfaces between SMA components.

SMA faults

Fault conditions in the SMA require a maintenance action. The fault can occur in any SMA component. Operating company personnel use fault isolation procedures to determine the component that causes the fault. The operating company personnel use fault isolation procedures to remove the fault condition. The personnel can report the fault condition to maintenance support.

The following sections describe the fault conditions in the SMA.

Parity fault

The CC handles parity faults to make sure the return to service occurs immediately.

There are three types of parity faults:

- hard, which requires operating company personnel to intervene manually
- soft, which the CC can clear
- intermittent, which the CC can clear

A PM181 identifies the type of parity fault. Other logs, like PM128 and PM106, tell operating company personnel the action that the CC performs. These logs also indicate if the CC clears the fault. The QUERYPM FLT command determines the type of parity fault.

Data mismatch

Three types of updates provide the inactive unit of the SMA provided with the data to control maintenance and call processing:

- static data
- bulk data
- dynamic data

Static data update The IDTs and the subtending RDTs must know the cards, ports, execs and terminal types that are present. The IDTs and the subtending RDTs need the information to perform call processing and maintenance on the SMA. Inventory tables store this information. The name for this information is static data because the SMA does not change this data. (The SMA can change data for tasks like establishing a connection when a switched call is set up.)

A process called *dynamic* static data update can update some of the static data in the inventory tables. This event does not affect service to subscribers. The following static data updates can become in-service SMA modules without service interruption:

- the C-side link reconfiguration
- the P-side link reconfiguration
- the IDT reconfiguration
- the time slot management channel (TMC) link access procedure for D-channels (LAPD) parameter changes
- the EOC and EOC LAPD parameter changes
- ringing data changes
- speech and message link reconfiguration

When operating company personnel alter the following type of static data, the system sets the SMA to in-service trouble. The system informs operating company personnel that a static data mismatch occurs. The system provides information for the required action.

- the OPTCARD in table LTCINV
- the TONESET in table LTCINV
- the PEC6X40 in table LTCINV
- the OPTATTR in table LTCINV

The system can prompt operating company personnel to busy the inactive unit and return the unit to service. Operating company personnel return the unit to service and perform a switch of activity.

Static data are downloaded to the SMA under the following conditions:

- The SMA is made busy and returned to service. This event occurs if the static data changed from the time of the last data download.
- The inactive unit is made busy and returned to service. This event occurs if the static data changed form the time of the last data download.

- the SMA is PMRESET

Bulk data update A bulk data update transfers information from the active SMA unit to the inactive unit. The bulk data update transfers the following information when the inactive unit returns to service:

- RDT status (in-service or busy)
- subscriber states (idle or busy)

A bulk data update updates the inactive unit of the SMA to the active unit.

Dynamic data update A dynamic data update occurs as changing data in the active unit are updated in the inactive unit. Dynamic data updates include the following information:

- RDT status (in service or busy)
- subscriber states
- channel reassignment
- port status
- DS-1 link information

Trap

A trap involves a software error that halts normal processing. A corrupt task identification (task_id) is an example of this type of software error. Hardware detected traps like bus, address, or parity errors also can halt processing.

The state of the peripheral determines the method the system uses to report a trap. If the peripheral remains in-service 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 correct monitor level. If the peripheral goes out-of-service during the trap, the CC queries the peripheral for traps not reported. This process occurs after the next return-to-service sequence. The PM185 log report contains the trap information.

Software error

Software errors (SWERRs) are errors produced from software code to flag the execution of a specified code path. Normally, a SWERR indicates a deviation from the normal or expected path.

The system stores SWERRs in a buffer. View the SWERRs through the SWERR monitor, which is available at the extended multiprocessor-system (XMS) peripheral module (XPM) main monitor level. The PM180 log report contains information on SWERRs.

Errors not specific to processor cards

The errors that follow are not specific to processor cards of the SMA:

- static data mismatch faults
  - — Static data defines the SMA configuration and does not change as calls are connected and disconnected. Data corruption can occur when static data in the host and the SMA do not match. The mismatch can cause the host to recognize that a line exists while the SMA does not recognize the line. This data mismatch can cause loss of calls.
- unit node table mismatch faults
- Each XPM unit has tables that contain information about the nodes that the unit connects to and terminals that the unit uses. The two systems that determine unit table mismatches are as follows:
  - — Mate unit matching compares the inactive unit tables with the active unit. The matching also sets the XPM ISTb if a mismatch occurs. 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 computing module (CM) table PMNODES. To prevent differences in datafill for the XPM units, the CM maintains all node information.

Node Table Sync Redesign introduces the error handling changes that follow:

- Table Control applications, which change inventory tables, reject tuples that are not supported. This event occurs when a peripheral does not have the necessary resources available.
- The node table audit raises an ISTb condition on an XPM that has a node table mismatch with the CM. Busy and RTS the XPM to clear the ISTb condition manually.
- A download of the configuration data table (CDT) node or port information can occur during a bulk download. A negative acknowledgment from the XPM during this process causes the loading or the RTS process to abort.
- A download of the node CDT or port CDT data can occur during a dynamic configuration update. A negative acknowledgment from the XPM during this process raises an ISTb condition on the XPM.

- The Node Table Sync Redesign creates two new PMDEBUG commands. One command allows operating company personnel to determine the tables that are bound into the CDT data distribution. The other command allows operating company personnel to display tuples in those tables. The syntax of the commands is as follows:
  - To list the XPM data tables bound into 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, 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 the tuple to display
R	is a range of tuples to display
begtuple	is the first tuple of the range
endtuple	is the last tuple of the range
all	is display all tuples in the table

If you specify only the table identification, the display lists all tuples. To abort the list of all tuples, press the RETURN key.

Handling a SysB SMA unit

When the system busies an SMA unit, the unit is not in service. The SMA unit cannot process calls. If the busy unit is the active unit, the system attempts a warm SWACT.

Enter the command string QUERYPM FLT to display the reason the SMA unit is SysB. Some of the reasons are as follows:

- activity dropped
- CC audit
- diagnostic failed
- PM audit
- self-test failed

- trap
- unsol (unsolicited messages) exceeded
- reset
- C-side links

C-side link problems are outside the range of PM-level maintenance.

Standard troubleshooting methods require the test of a unit of a SysB SMA. If the unit passes the tests and returns to service, the SysB fault clears. When a test fails, a list of SMA cards that can be defective can appear. An example of a list follows:

```
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 listed. Continue to test the unit until the identified fault clears.

When a test fails, a message like *No Reply From PM* can appear. Set the SMA again with the PMRESET command to clear the fault. If the reset fails, a list of cards that can be defective can appear. Replace the cards one at a time. The replacement of a defective card can clear the SysB problem.

To clear faults in a SysB SMA, the system can require a reload of the SMA software.

If a reset, reload, or card replacement fails to clear the SysB, the fault can be a software problem in the SMA. Contact your maintenance support group.

Handling an ISTb SMA unit

When an SMA becomes in-service trouble (ISTb), one or both units has a fault. The SMA can continue to process calls. Some responses to the QUERYPM FLT command entered at the SMA level follow:

- `Data out of date` Reload the PM
- `Static data mismatch with CC` Download the static data to the SMA. Busy the SMA and return the SMA to service, or busy and return the inactive unit to service. Perform SWACT FORCE. This action causes a loss of service.
- `P-side links out of service` The DS-1 link requires maintenance.

- `Load mismatch with CC` You must change the load entered in table LTCINV to match the load that the SMA uses. The command QUERYPM CNTRS shows the SMA load.

A unit of the SMA can require a test. To clear a fault in an ISTb SMA, reset, reload or replace the defective cards in the SMA.

Handling data mismatch

When data mismatches, like a static data mismatch with the CC, the SMA becomes ISTb. Busy the inactive unit of the SMA, RTS the inactive unit, and perform a switch of activity (SwAct) to clear the mismatch. If the SwACT completes, busy and RTS the new inactive unit. This action clears the ISTb alarm. Perform this action during periods of low traffic activity only. The PM is in simplex mode when you RTS the inactive unit.

Handling an IMC link fault

When the IMC link audit detects data loss or corruption of messages over IMC links, the SMA becomes ISTb. The system generates a PM128 log. If operating company personnel enters QUERYPM FLT, the following statement appears in the response:

```
NON-CRITICAL HARDWARE FAULT
```

Operating company personnel must perform the steps that follow:

1. Test both units to confirm the audit result.
2. Busy the inactive unit. Set the unit to offline. Replace the defective cards in the list.
3. Return the inactive unit to service.

The node can remain ISTb for more than 5 min. If this condition occurs and the response to QUERYPM FLT does not change, the fault is in the active unit. If the RTS of the inactive unit completes, perform the following steps:

1. Switch the activity of the units.
2. Busy the new inactive unit.
3. Test the inactive unit.
4. Set the unit with the defective cards to offline. Replace the defective cards.
5. Return the inactive unit to service.

Handling a parity error fault

The correction of parity faults does not always cause loss of service. This section provides information on the types of parity faults. The section describes how the CM handles parity faults. The section also describes the actions that operating company personnel must take to clear a parity fault.

Three types of parity faults can occur:

- An intermittent fault occurs when the XPM detects a fault, but the reread of the location does not find an error.
- A soft fault occurs when the XPM detects a parity error. The XPM rereads the location and finds the error. The XPM cannot find the error when the XPM tries to write to the location. The error can occur in the memory or program store.
- A hard fault occurs when an XPM detects a fault and cannot reread the fault. The XPM cannot write to the location.

When a parity fault occurs, the CM determines the action to perform on the XPM unit. The action depends on the status of the unit that reports the fault (active or inactive). The same CM handles all three types of faults.

When the CM detects a parity fault in the active unit of the XPM, the CM sets the unit ISTb. The CM sets the unit ISTb with a reason of ‘parity.’ The CM recovers the unit during a maintenance window. The maintenance window to recover a parity fault on the active unit is the XPM REX test window. The time for the XPM REX test window can be the same as the current time of the switch. If this condition occurs, an audit checks if the active unit of the XPM has an ISTb of ‘parity’. If an ISTb exists, the CM will SWACT and reload the XPM if no dependencies are present. This action clears the ISTb ‘parity’ fault and the short term failure (STF) parity fault peg to resolve the parity fault in the XPM.

When the active unit reports a parity fault, the system generates a PM181 log. The PM181 log notifies operating company personnel of the problem. The CM recovery actions include a SWACT of the XPM. The CM also loads the newly inactive unit with the XPM software load defined in the corresponding inventory table. The CM considers the loading action an autoload. A manual or CM or mate reload of the XPM software to the affected unit clears the ISTb.

The CM does not allow routine exercise (REx) tests for the following:

- a P-side or C-side node of the XPM that recovers from a parity fault
- the XPM if a P-side or C-side node recovers from a parity fault

The CM does not let two XPMs in the same configuration to perform a parity reload. A P-side node cannot perform a parity reload at the same time as the corresponding C-side node. A C-side node cannot reload at the same time as the corresponding P-side node. This restriction ensures that only one XPM in a configuration is in simplex at a time.

The CM uses PM181 log reports to inform operating company personnel of a parity fault. These log reports are the primary trouble indicator for parity faults. Operating company personnel can check for associated logs, like the PM128, to determine the actions that the CM takes. This section provides examples of the messages associated with the PM181 and PM128 logs.

The XPM unit can be set ISTB for more than one reason at the same time. When operating company personnel performs a QUERYPM FLT at the MAP level, the system displays the reasons for the unit. The system displays the reasons for ISTbs that are not cleared.

Hard parity fault When the active unit of the XPM reports a hard parity fault to the CM, the system generates a PM181 log. The PM181 log notifies operating company personnel of the following:

- a parity fault occurs on the active unit, and the unit becomes ISTb
- the CM reloads the unit during the next XPM REX test window

A manual SWACT and reload also can clear the ISTb and the parity fault.

An example of a PM181 log report follows:

```
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 report. The PM128 log indicates to operating company personnel that the unit changes status.

An example of a PM128 log report follows:

```
*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 shows that unit 1 of the posted XPM contains a hard parity fault:

```
>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 will SWACT and reload the XPM during the next XPM REX test window. After the CM reloads the XPM, the ISTb fault clears.

User action: There is no action required by operating company personnel. A user can clear the parity fault with a manual SWACT and reload.

Handling P-side messaging overload

A P-side messaging overload condition can occur on the SMA. Long queuing delays can cause the system to discard messages on TMC or EOCs. This condition can cause service to degrade on all subtending RDTs. The subtending RDTs include the RDT associated with the posted IDT. To prevent 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 TMC or EOC messaging overload.
3. If the system indicates TMC or EOC messaging overload, check that the posted IDT does not have channel or logical link faults. Correct the faults.
4. If the operating company personnel cannot correct the channels or logical links, operating company personnel must manually busy the channel or logical link that fails. Operating company personnel manually busies the channel or link so that the system does not use more resources to maintain the link.
5. If one of the following conditions occurs, an engineering problem can be the cause of the overload:
   - the IDT posted does not have channel or logical link faults

— the steps listed above do not correct the overload

MVI RDT faults

Refer to the maintenance documentation for the MVI RDT installed at your facility. The maintenance documentation lists the fault conditions that can occur in the RDT components.

Locating and clearing faults

This section contains standard detection steps to locate and clear faults:

1 Silence audible alarms that the system raises when the system detects alarm conditions.

2 To isolate the fault, read status displays and trace fault codes to the menu level required to clear the fault.

3 Busy the hardware to deny system access to the defective component. This action allows maintenance activity without system interference.

4 Test the defective component. Identify the card to replace. Replace the defective card. Test the card again.

5 Return the hardware to service.

Fault isolation program

The fault isolation program improves the ability of the XPM to isolate faults and also provides the following diagnostics:

- improved read-only memory (ROM) diagnostics

  These diagnostics allow the SMA to detect a wider range of possible fault that can develop in the processor. The diagnostics also perform better fault isolation, reduced testing time, and safe tests.

- mate diagnostics

  Mate diagnostics allow the central control (CC) to diagnose a defective SMA unit through the mate unit of the SMA. The XPM_MATE_DIAGNOSTICS_AVAILABLE parameter must be set to Y (yes) to activate mate diagnostics.

- intermodule communication (IMC) diagnostics

  The IMC diagnostics provide diagnostic support for both IMC links of an XPM. An IMC audit verifies the accuracy of both IMC links at set intervals. Automatic maintenance begins when an audit fails.

- XPM memory parity audit
- XPM static data audit

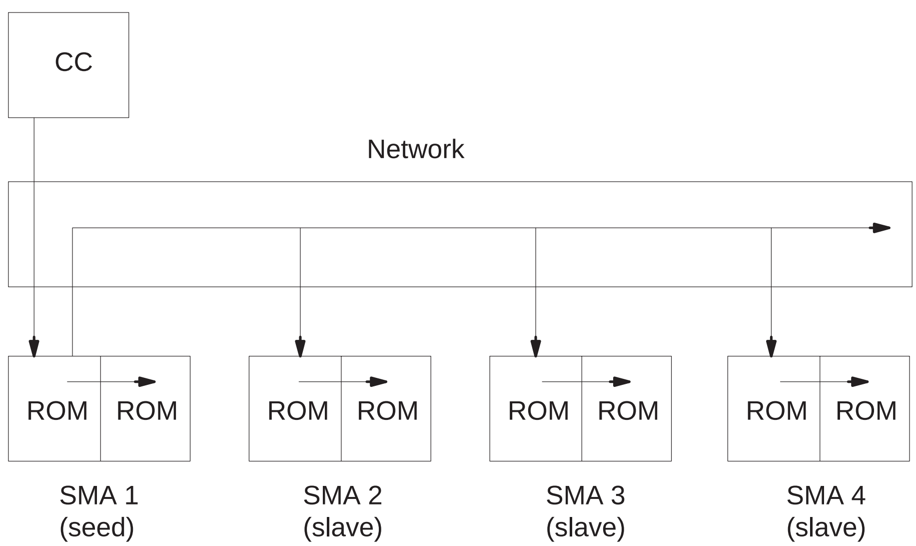
Office recovery program

The office recovery program improves the reliability and performance of all system restarts. The method for office recovery is to return to service (RTS) the maximum number of good nodes. Dual-unit nodes like the SMA require that active units return to service during the recovery process. Recovery of inactive units occurs after all active units are in service.

The office recovery program provides the following system improvements:

- the XPM broadcast mate loading (see SMA broadcast mate loading figure)
- the RECOVER command for manual dead-office recovery
- coordination of hardware and software initialization to improve 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

Changing the line capacity of an RDT

Issues that affect a line capacity change for an RDT

All terminal numbers on an RDT must be next to each other. The addition and deletion of RDTs can fragment the available area into many small spaces. This fragmentation can prevent the addition of an RDT because the spaces are not next to each other. Fragmentation usually does not prevent the addition of an RDT. Change in line size can require you to offline the SMA to recover fragmented space.

Note: The system displays a warning message at the MAP terminal when the RDT line capacity increase is less than 96 lines. This message informs operating company personnel that small increases can cause fragmentation.

Make line size changes to RDTs subtending the SMA in increments of 96. This event prevents fragmentation of the terminal identifier (TID) numbers in the TID table.

Operating company personnel cannot change other fields in table RDTINV when operating company personnel make changes to the MAXLINES field. If operating company personnel attempt changes to table RDTINV at the same time as MAXLINES, the system displays an error message. The error message informs operating company personnel that operating company personnel cannot change field MAXLINES at the same time as other fields.

Enter the RESOURCE command at the IDT level before you change the line capacity of an RDT. The command displays the total number of lines allocated to an SMA, and the number of lines on the posted IDT.

There are two methods to increase the line capacity of an MVI RDT:

- 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.

Before you increase the line capacity of an RDT, verify that all DTA connections are released for the RDT to be resized. The line capacity of an RDT 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 RDT that is to have the line capacity increased.

Releasing digital test access (DTA) connections

The following steps must be followed to determine if DTA connections exist on the RDT 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 LEN will be listed under the MTR and EQUIP headings as 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 RDT, 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 completed this procedure.

Method 1 – use two MAP terminals

Method 1 requires operating company personnel to control two MAP windows and 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 RDT. 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 RDT, verify that all DTA connections are released for the RDT to be resized. The line capacity of an RDT 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 MVI RDT.

Note: Before you change the line capacity of an RDT, 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 RDT 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 RDT 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 RDT datafilled in table RDTINV, for example, RDT1 0 0

3 Change the value of subfield MAXLINES 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.

`>RDTPPLNK`
Press the Enter key.

`>MAXLINES`

Respond to the MAP terminal response by entering the new MAXLINES value

>newmaxlines value
and pressing the Enter key.

where

newmaxlines value is the new RDT line size to be entered in table RDTINV, field MAXLINES.

Respond to the MAP terminal response as follows:

```
>INHLINE
```
Press the Enter key.

```
>BRIDGING
```
Press the Enter key.

The MAP terminal displays the following message

Example of a MAP response

```
ERROR:  MAXLINES field may not be increased while SMA 1 is
INSV.  Busy SMA 1 or delete and re–add the IDT.  WARNING:
System ID is ignored for MVI RDTs.
WARNING:  Equipment ID is ignored for MVI RDTs.
TUPLE TO BE CHANGED:
RDT1 88 0 88 SMA 1 88 ANODE_8_MVI $ $ GENTMC 2 1800 N N Y
$ Y (1 2) (2 3) (3 4) $ N STDLN S $ (NETWORK_ID 1)
(SYSTEM_ID 1) (NETWORKELEMENT_ID 24) (EQUIPMENT_ID 1) $

ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT.
```

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 RDTs and ICBs 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 MAXLINES 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 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 RDT, verify that all DTA connections are released for the RDT to be resized. The line capacity of an RDT 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 RDT that is to have the line capacity increased.

Note 2: Before changing the line capacity of an RDT, 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 MVI RDT:

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 RDT 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 RDT datafilled in table RDTINV, for example, RDT1 0 0

e. **>CHA VARTYPE**

and press the Enter key.

f. **>Y**

and press the Enter key.

g. Enter the existing value datafilled in field RDTVAR, for example

>GENTMC

and press the Enter key.

h. Enter the existing value datafilled in field RDTPPLNK, for example

>2

and press the Enter key.

i. **>newmaxlines value**

where

newmaxlines value is the new RDT line size to be entered in table RDTINV, field MAXLINES.

and press the Enter key.

j. Enter the existing value datafilled in the INHLINE field, for example

>N

and press the Enter key.

k. Enter the existing value datafilled in the BRIDGING field, for example

>N

and press the Enter key.

l. Enter the response to the system confirmation message asking you to confirm the change to MAXLINES as

>Y

and press the Enter key.

m. **>QUIT**

and press the Enter key.

n. **>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**
> **Enty of incorrect values may result in a longer than planned outage.**
> Ensure all values are correct and entered correctly when compiling this store file. If incorrect values are entered, an outage of longer duration than planned could result.

o. **>RTS PM FORCE**

and press the Enter key. This command returns the SMA to service.

p. **>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 RDT 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 RDTs and ICBs 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 RDT 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 completed this procedure.

Increasing the line capacity of an RDT

To increase the line capacity of an RDT, manually busy (ManB) the SMA that connects to the SuperNode switch. Use the command string BSY PM FORCE to manually busy the SMA. If you attempt to increase the line capacity of an RDT in any other state, the system displays an error message. The message indicates that the SMA must be ManB or Offl to change the field.

ATTENTION

Increase the line capacity of an RDT with the command string BSY PM FORCE during periods of low traffic. Increases during periods of low traffic can cause the system to drop active calls. The SuperNode switch views all RDTs connected to the SMA as CBsy during periods of high traffic.

Decreasing the line capacity of an RDT

When the line capacity of an RDT decreases, the SuperNode switch determines if any line equipment number (LEN) appears above the new (lowered) value. Table RDTINV field MAXLINES contains the new LEN value. If a LEN appears above the new value, the system displays an error message. The message informs operating company personnel that the line capacity of the RDT cannot decrease. The line capacity cannot decrease because LENs with values higher than the new LEN value are present on the line.

The operating company personnel require one MAP terminal to decrease the line capacity of an RDT. No outage occurs. When the line capacity decreases, verify table LNINV to make sure that the required number of lines are deleted. Delete the required number of lines before you update table RDTINV, field MAXLINES. Before you delete a tuple from table LNINV, clear the lines from other tables like IBNLINES, KSETLINE, KSETINV, LENLINES, and SPECCONN. Make sure that table RDTLT does not contain tuples.

Note: Remove all LENs with a value greater than the new (lowered) MAXLINES value. This action allows a decrease in the value of the MAXLINES field in table RDTINV.

Perform the following procedure to decrease the line capacity of an RDT.

At the MAP terminal

1 To position on the affected RDT in table RDTINV, type

>TABLE RDTINV;FORMAT PACK;POS rdtname

and press the Enter key.

where

rdtname consists of the site, frame, and unit number of the RDT datafilled in table RDTINV An example is RDT1 0 0.

2 To change the value of subfield MAXLINES, type

>CHA VARTYPE
and press the Enter key.

The following confirmation message appears

```
Enter Y to continue processing or N to quit.
```

To continue, type

>Y
and press the Enter key.

Respond to the MAP terminal response as follows:

`>RDTVAR`
Press the Enter key.

`>RDTPPLNK`
Press the Enter key.

`>MAXLINES`

To respond to the MAP terminal response, enter the new MAXLINES value

>newmaxlines value
and press the Enter key.

where

newmaxlines value   is the new RDT line size to enter in table RDTINV, field MAXLINES.

`>INHLINE`
Press the Enter key.

`>BRIDGING`
Press the Enter key.

3 To confirm the new MAXLINES entry into table RDTINV, type

>Y
and press the Enter key.

4 The procedure is complete.

Line testing functionality

This section reviews the following procedures:

- testing lines off the RDT
- how operating companies set up line test systems
- how operating companies list the different types of test equipment
- how test equipment functions with the SuperNode and SMA system

Operating company line tests

Operating companies use non-integrated and integrated line test systems. Operating company personnel can initiate some tests from the subscriber premises. The tests include 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 for some configurations.

Integrated

In this system, the local switch controls line tests. This system allows more tests of the lines because the local switch can test lines that use proprietary equipment. An example of integrated testing is the line test position (LTP) commands used to test subscriber lines.

Subscriber premises line tests

Operating company personnel can initiate the tests that follow from the premises of the subscriber.

Silent switchman

Isolate the subscriber line from the RDT line card to allow the external test equipment to identify facility faults. When the DMS switch receives a dial-up service code, the switch sends a confirmation tone. The switch disconnects the subscriber line from the RDT line card. Datafill controls the length of time for which the switch keeps the loop disconnected from the line card.

Station ringer test

The station ringer 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 multifrequency (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. The short circuit is applied. Datafill controls the length of time for which the tip and ring are shorted.

Supported non-integrated line testing systems

The SMA system supports different non-integrated test systems. A description of the test systems follows.

Local test desk

The local test desk is 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 the Centralized Automatic Loop Reporting System/Enhanced Line Test Unit (CALRS/ELTU). The CALRS/ELTU is a non-integrated system.

3703 local test cabinet

The cabinet is a series 3703 local test cabinet.

Mechanized loop test

Most Bell operating companies use the mechanized loop test (MLT) system.

Reliance Telecommunications Electronics Company (RTEC)

The MITS70 system is from the Reliance Telecommunications Company (RTEC). The MITS70 system consists of the following components:

- the T-9/15 or T-9/SX central office unit
- the T-916 remote test unit (RTU) selector
- the T-9/X RTU

Teradyne

The 4-Tel system from Teradyne consists of the computer control unit (CCU) and the RMU230 test head.

Shared metal bypass procedure

Operating companies that configure RDTs to share a common metal bypass pair for line tests must include an inhibit lead. The inhibit lead blocks access to the bypass pair that both RDTs share.

To set up a shared metal bypass in a DMS-100 central office environment, perform the following procedure:

1 Define pairs of scan points (SC) and scan distribution points (SD) points for each RDT that shares the same bypass pair.

2 Define SC and SD in tables SDGRP and SCGRP, as shown in the following examples:

```
TABLE: SDGRP:
0    MTM    1      20    2X57AA

TABLE: SCGRP:
0    MTM    3       8    0X10AA
```

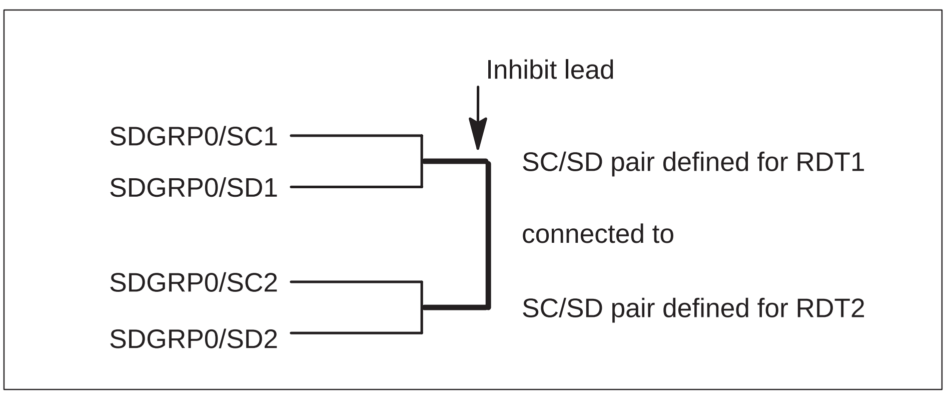
Note: Refer to *XPM Translations Reference Manual* for help to enter data in tables SCGRP, SDGRP, and RDTINV. You must enter data in these tables to support a shared metal bypass inhibit lead configuration.

3 Add the group and point numbers of an SC and SD to the RDT in table RDTINV. This action reserves an SC and an SD point as an inhibit lead for an RDT.

An example of the entry for table RDTINV follows:

```
TABLE: RDTINV:
RDT1 101 0 101 SMA 1 101 $ $ $ GENTMC 2 671 N Y (TBP BOTH
4 TAP1 Y 0 1 0 1) $ (1 6) (2 7) $ N STDLN S $ (NETWORK_ID
1)(NETWORKELEMENT_ID 100) $
```

4 Connect the defined SC and SD points together to function as an inhibit lead as follows:



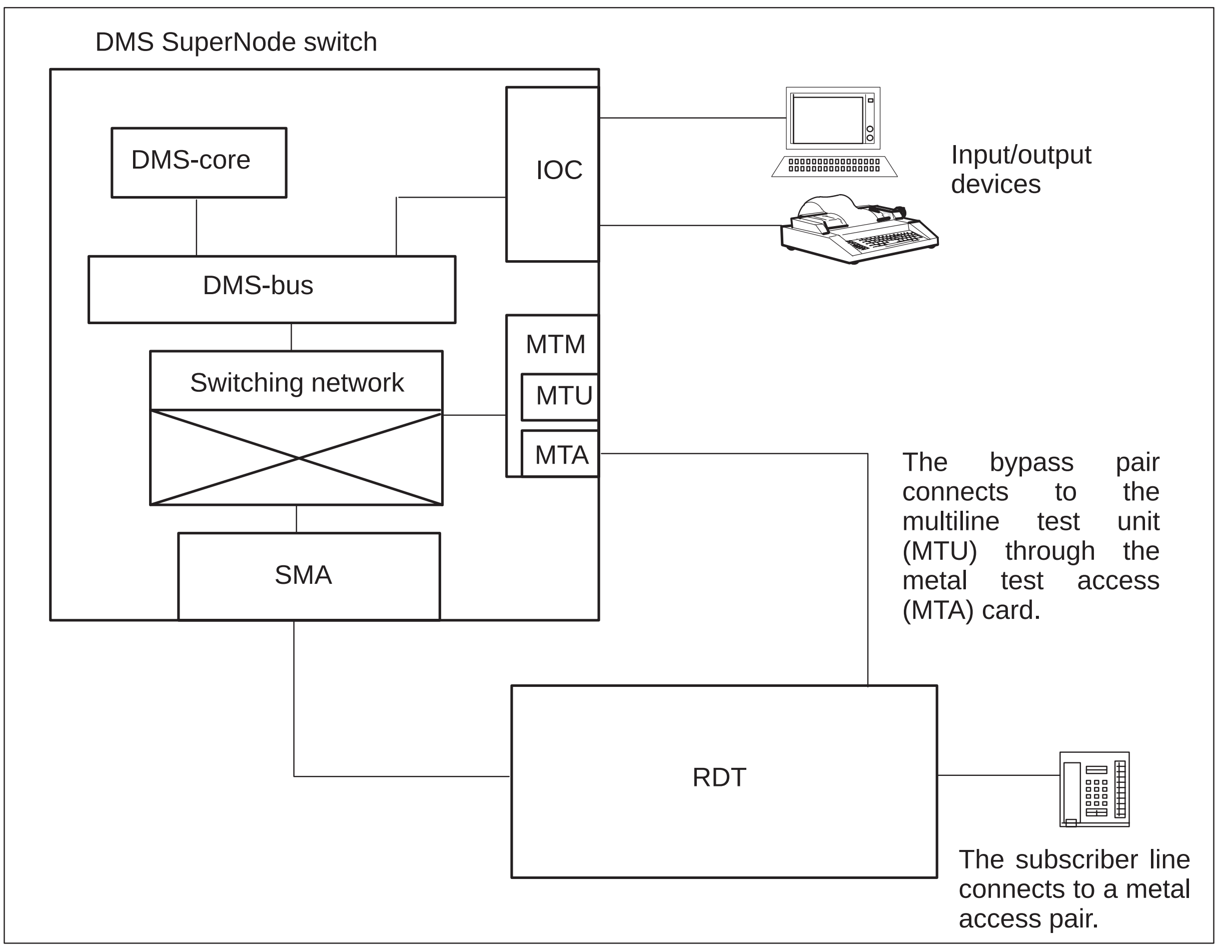
Summary of line test configurations

The following sections describe the configurations used for the different types of line tests. A figure describes each type of configuration. In each figure, areas of text explain how the test is set up. The areas of text also explain the sequence of events that occur when the test runs.

The subscriber line test (DIAGNOSE, LNTST)

Many tests of subscriber lines are used to make different measurements on the subscriber line. The tests bypass the line card. The commands that run these tests are LNTST, DIAGNOSE and the station ringer test (ground check). The LIT, VDC, VAC, and CAP commands perform a subset of the LNTST command. In the SMA configuration, operating company personnel can use a metal bypass to perform the tests. The following figure shows the metal bypass configuration.

Subscriber line test with a metal bypass

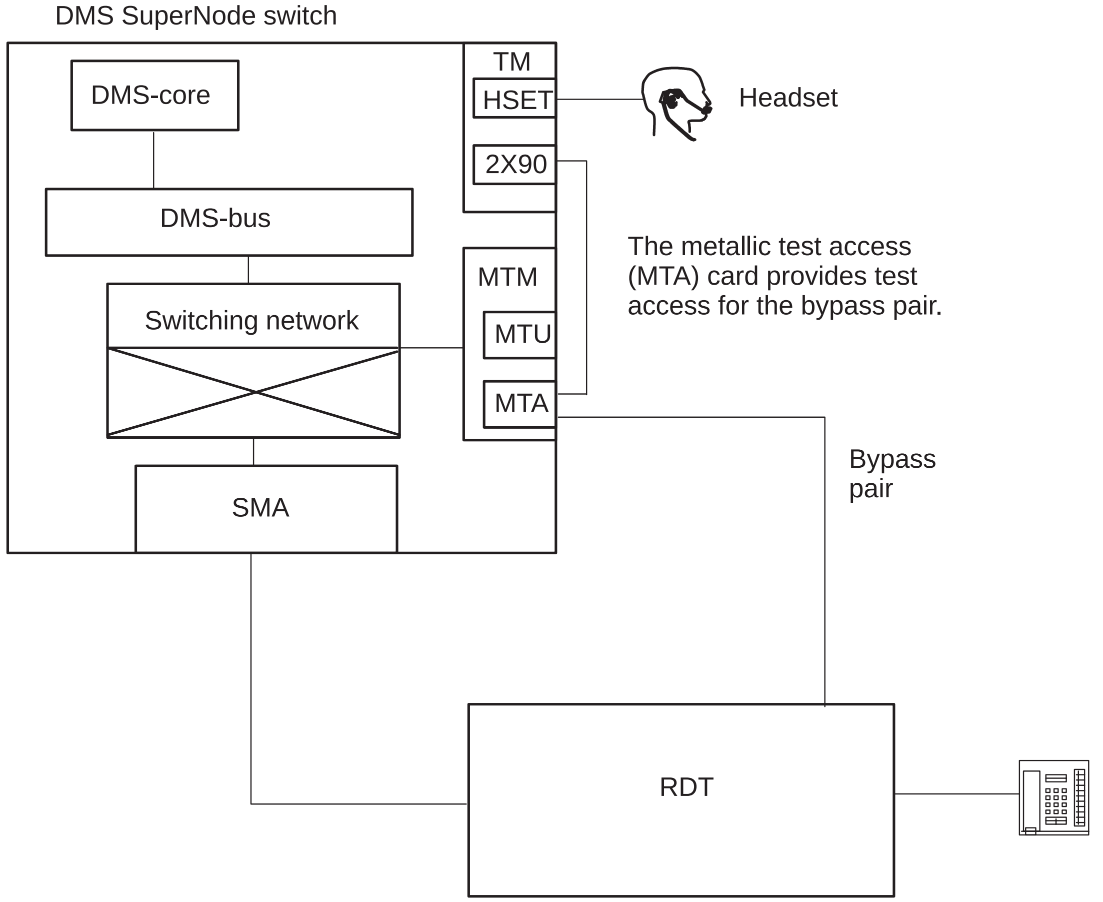


Monitoring the subscriber line (MONLTA)

The MONLTA command connects a headset circuit to a subscriber line to allow operating company personnel to listen to a line. Perform these tests with a metal bypass. The following figure shows the metal bypass configuration.

> ***Note:*** This configuration must have monitor mode capabilities for metal connection.

MONLTA

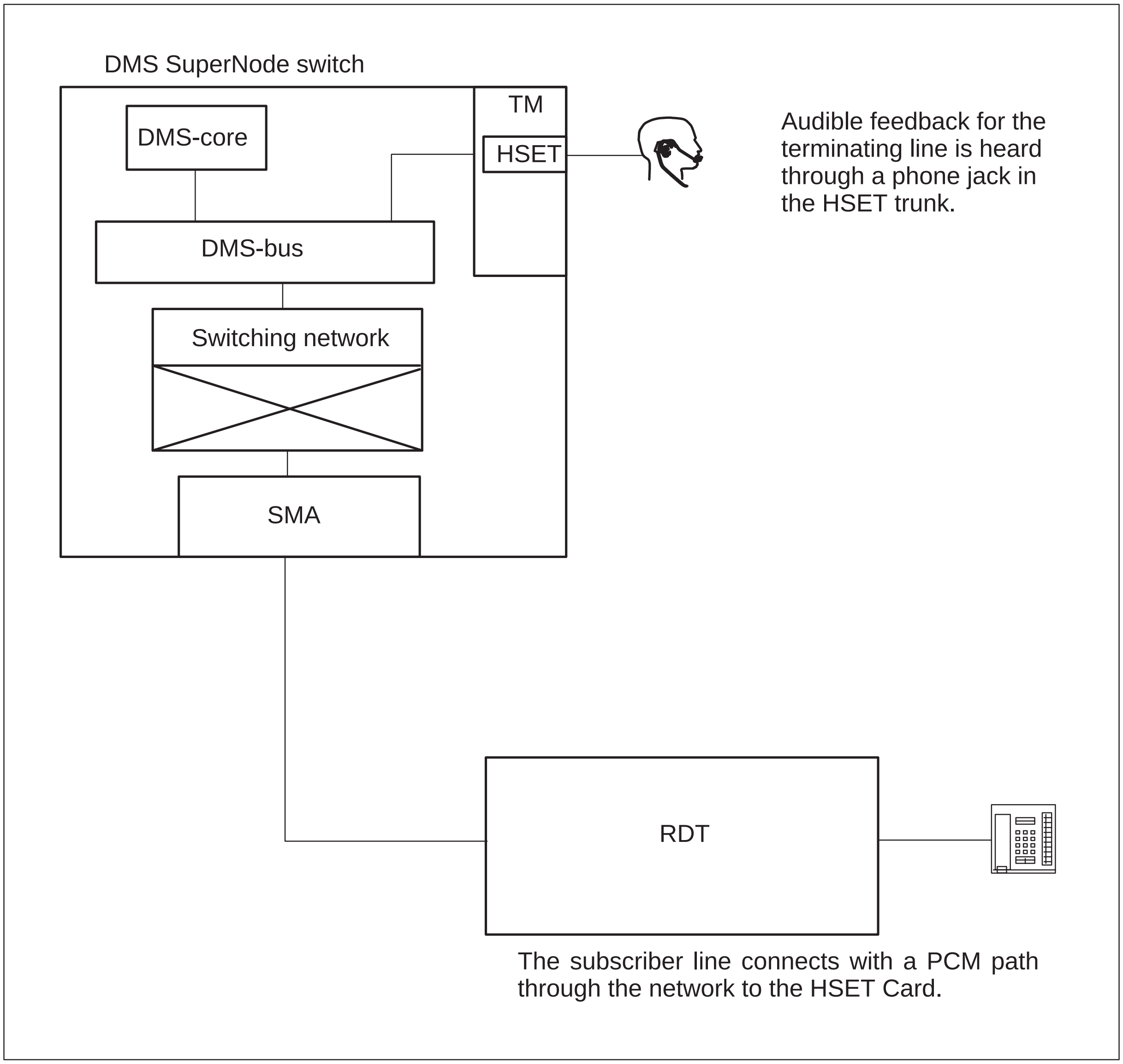


The subscriber line connects with a PCM path through the network to another subscriber line or interoffice trunk. The subscriber line bridge to a bypass pair that connects to a 101 communication test line circuit (HSET) through the NT2X90 test trunk.

The line signaling tests (TALKLTA, COIN, RING, DGTTST)

These tests are like the ORIG test. This test requires a headset to test for signaling conditions. The test uses terminal equipment. The following figure shows the configuration used.

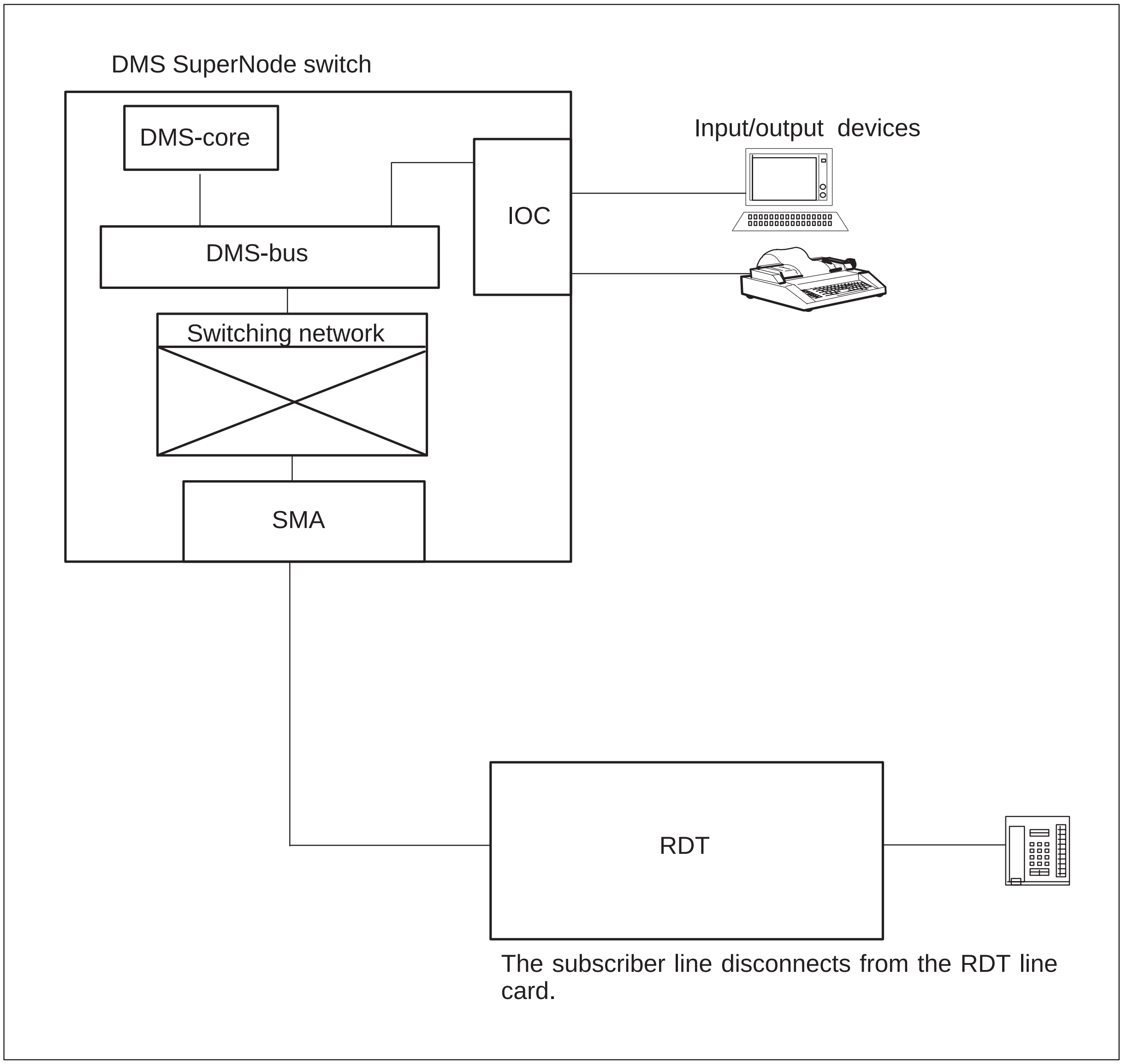
Configuration of the line signaling test



The station ringer test

The station ringer test compares the digits received at the central office (CO) with known digits transmitted at the station. The ringer test allows the confirmation of the station equipment of the subscriber. Tests include dial pulse collection and dual-tone multifrequency (DTMF) collection. The following figure shows the configuration.

The station ringer test

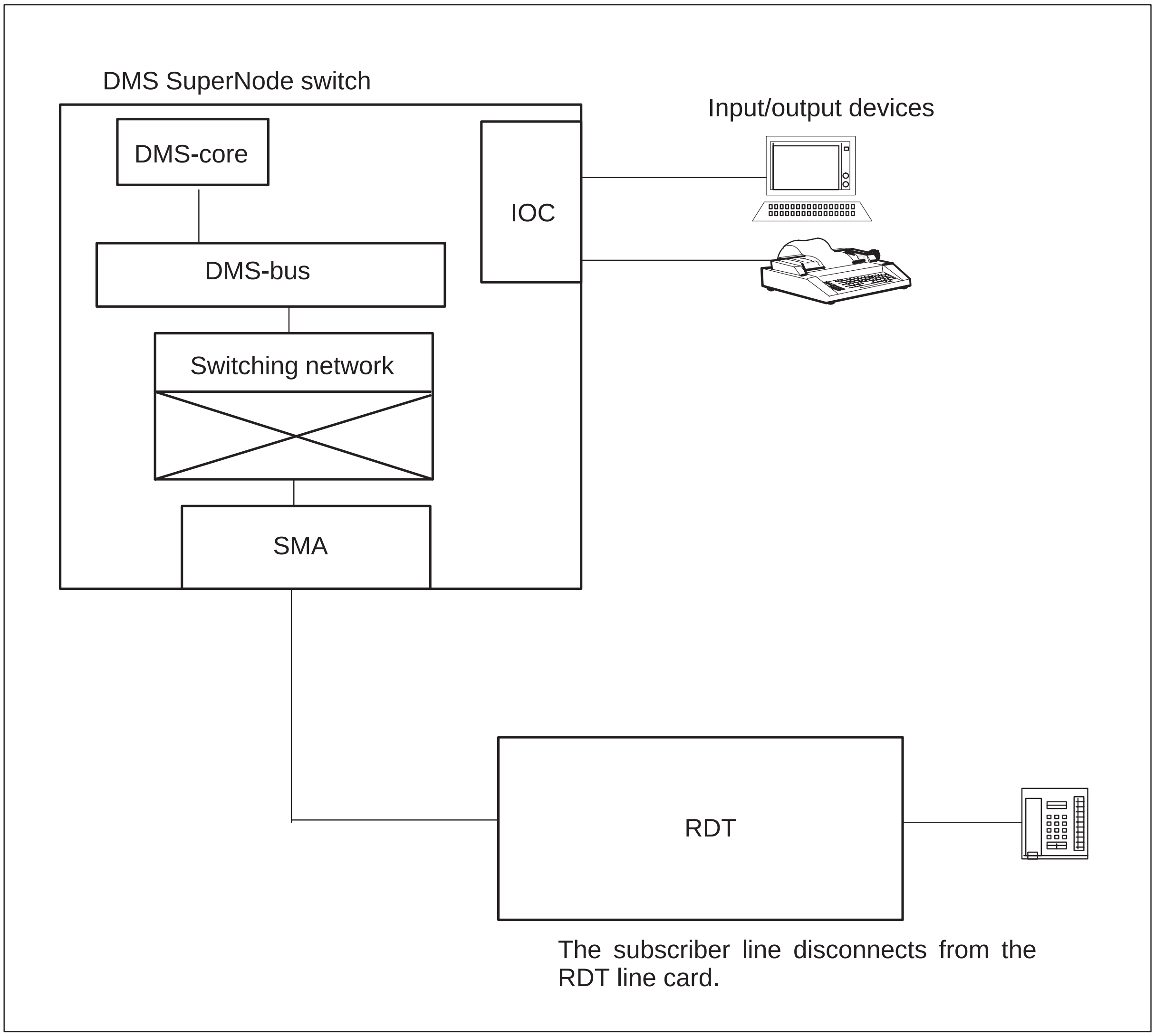


The silent switchman configuration

Outside plant personnel can check the subscriber loop for facility faults with the silent switchman. Personnel isolate the subscriber line from the RDT so that external test equipment can identify facility faults.

The outside plant personnel dial a service code or a seven-digit directory number (DN) to test circuit. When the system receives a dial-up service code, the system returns a confirmation tone. The system disconnects the subscriber line for a defined interval to allow outside operating personnel to check facility faults. The following figure shows the configuration.

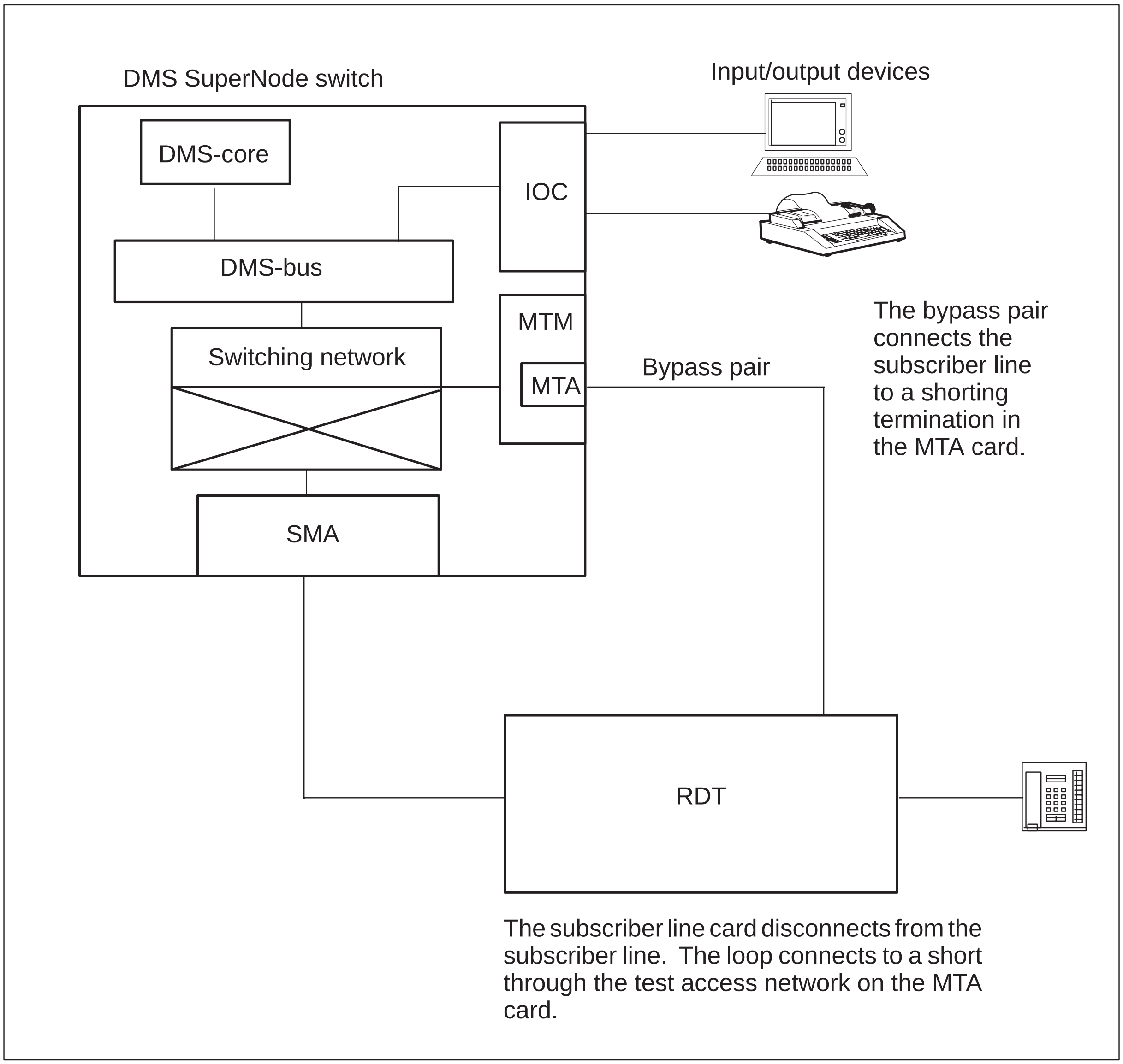
Silent switchman configuration



The dialable short circuit configuration

In this test, the tip and ring leads of the line under test are shorted together. The DMS SuperNode switch receives a dial-up service code from the subscriber premises. The switch returns a confirmation tone and applies the short circuit. In the SMA configuration, operating company personnel can use a metal bypass to perform these tests. The following figure shows the metal bypass configuration.

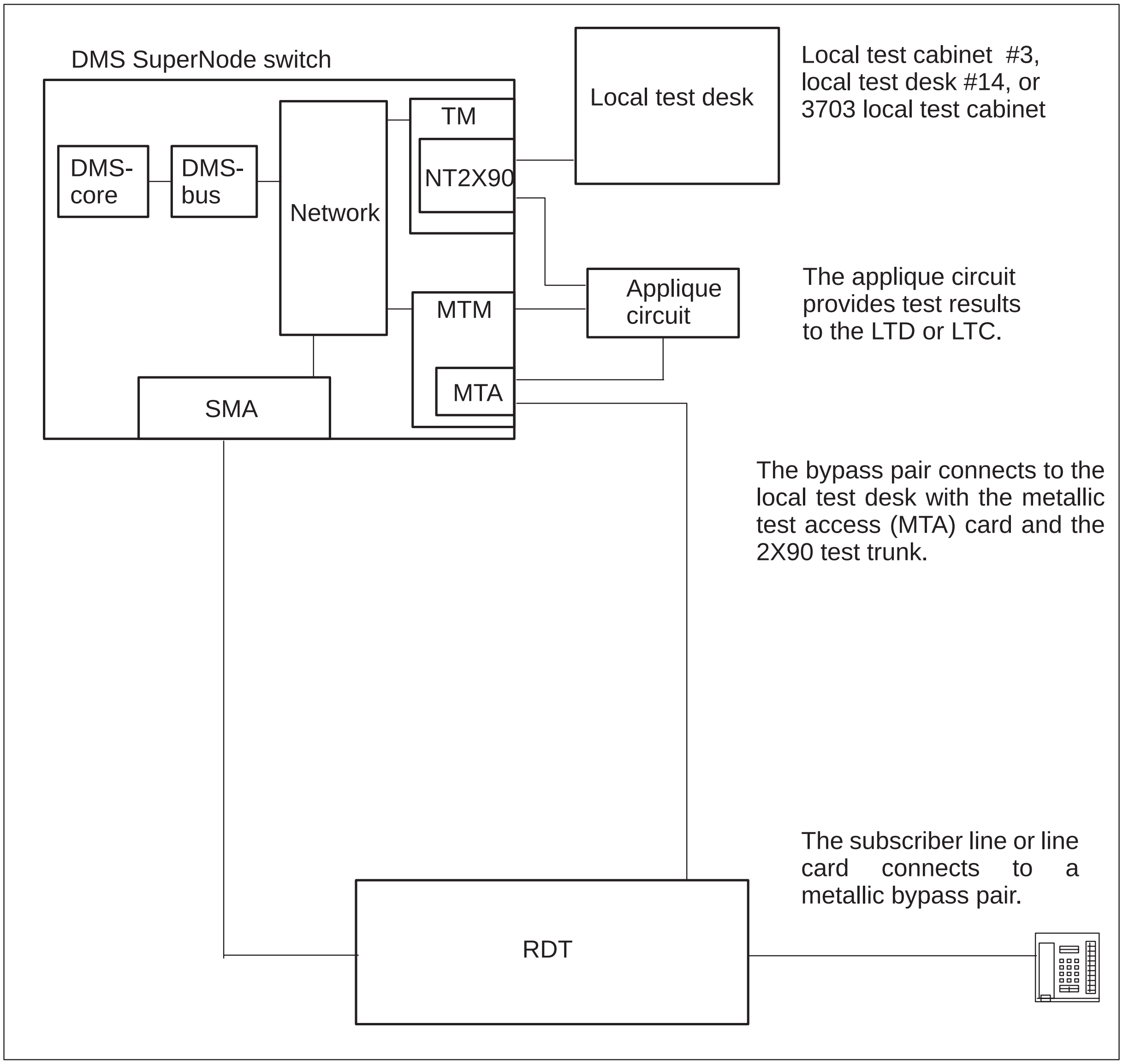
Dialable short circuit



The local test desk configuration

Examples of local test desks (LTD) are the local test cabinet (LTC) #3, LTD #14, and 3703 LTC. To perform these tests can, operating company personnel can use a metal bypass as shown in the following figure.

Local test desk

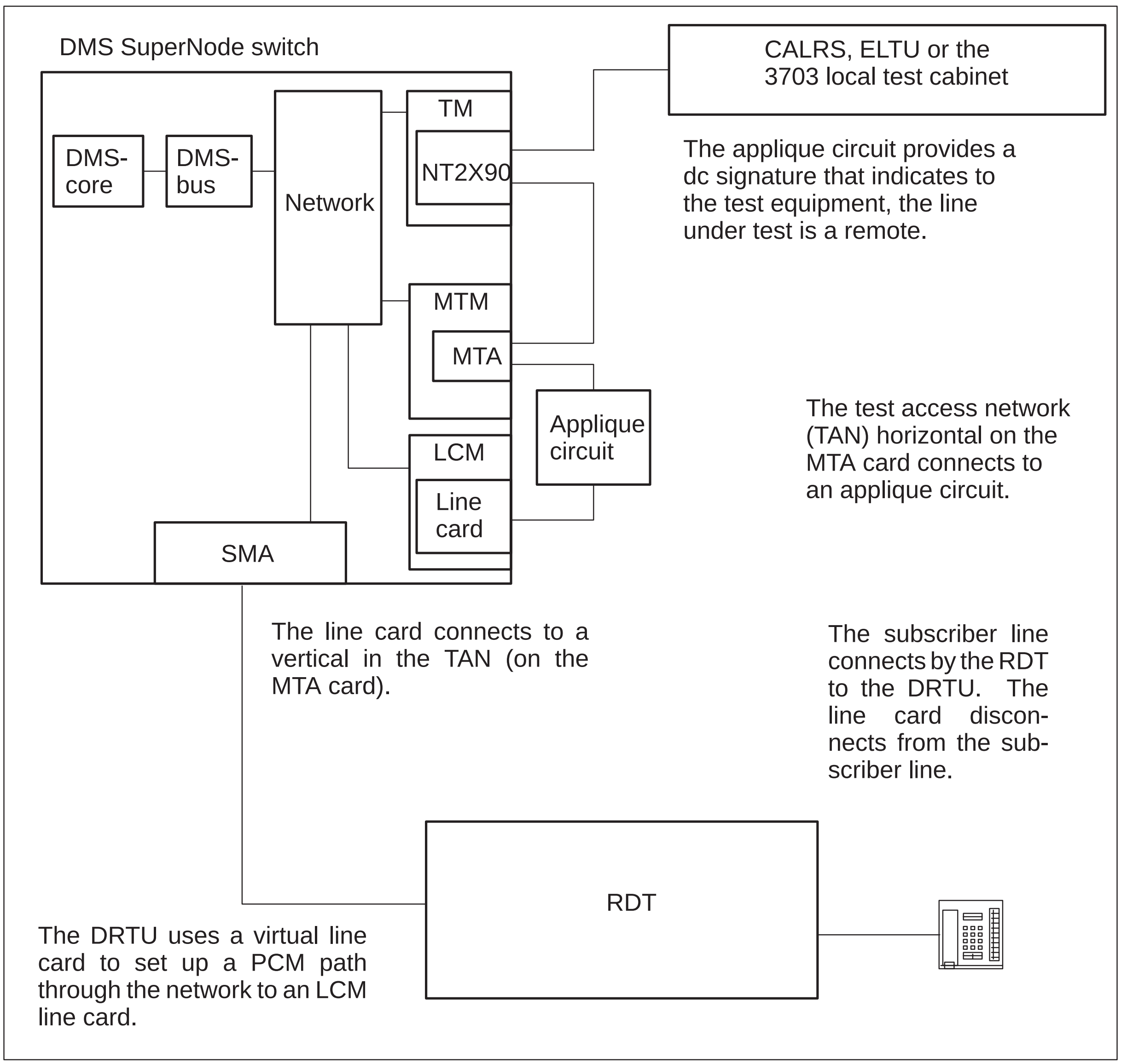


The CALRS and ELTU configuration

External test systems include the Centralized Automated Loop Reporting System (CALRS) and the external line testing unit (ELTU). To perform tests, operating company personnel can use the digital-remote test unit (DRTU) and a metal bypass. The following figure shows the configuration.

> ***Note:*** This configuration is also for the 3703 local test cabinet.

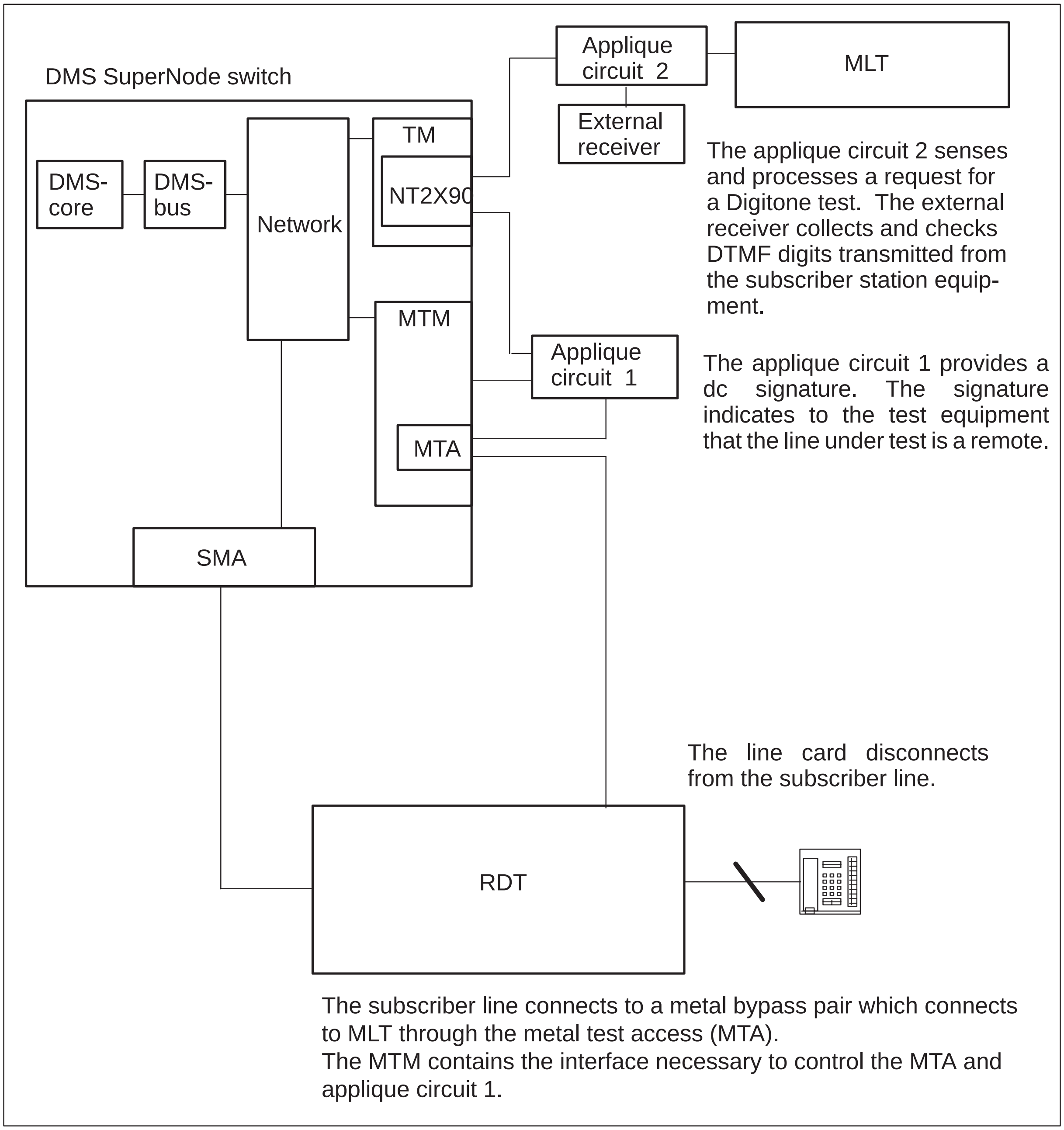
CALRS or ELTU



The mechanized loop tester configuration (without the RMU)

In the SMA configuration, operating company personnel can perform these tests with or without the remote measurement unit (RMU). The following figure shows the configuration without the RMU.

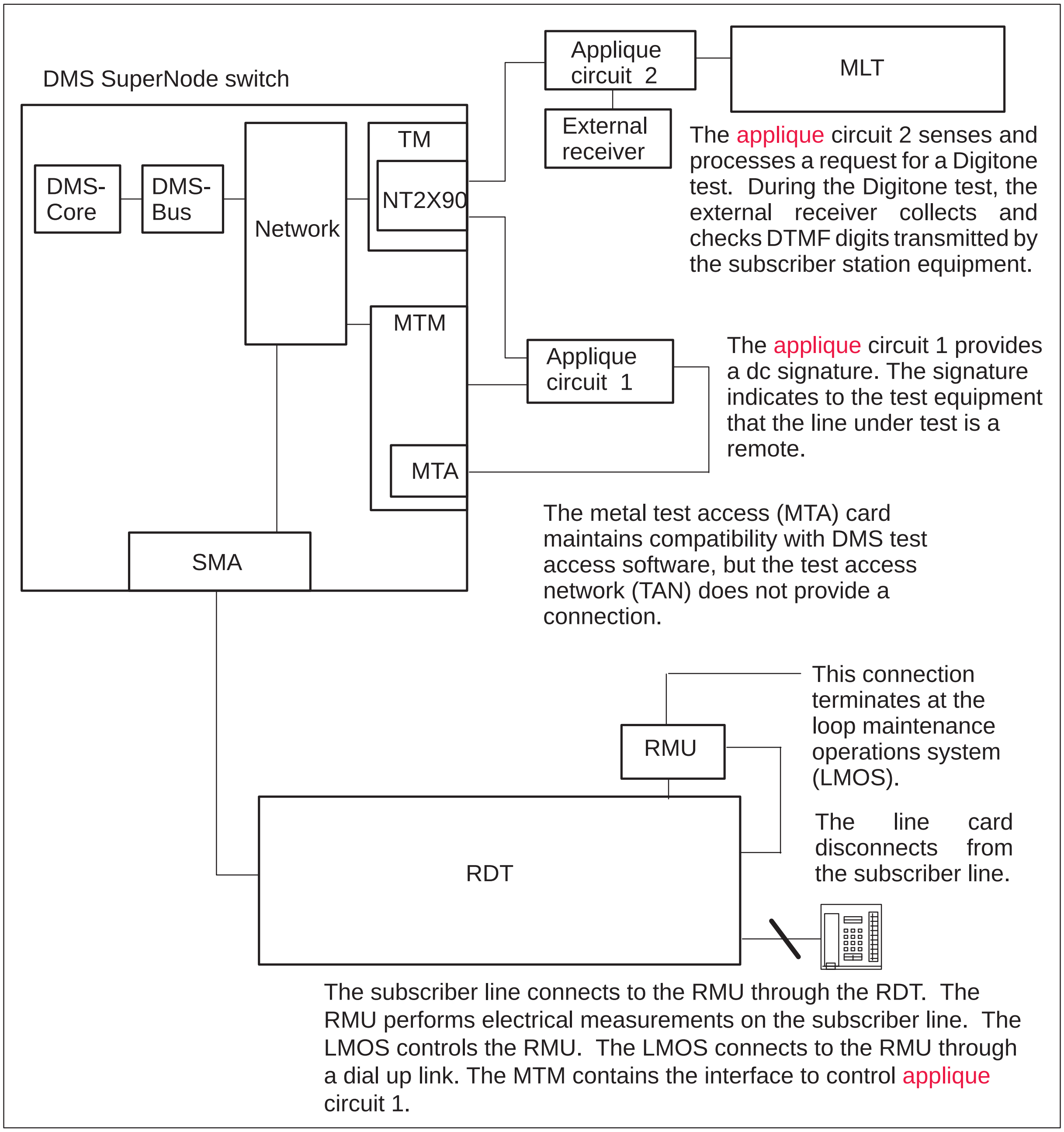
The MLT set up (without RMU)



The mechanized loop tester configuration (with the RMU)

In the SMA configuration, operating company personnel can perform tests that use the mechanized loop tester (MLT) with or without the RMU. The following figure shows the configuration with the RMU.

The MLT set up (with RMU)



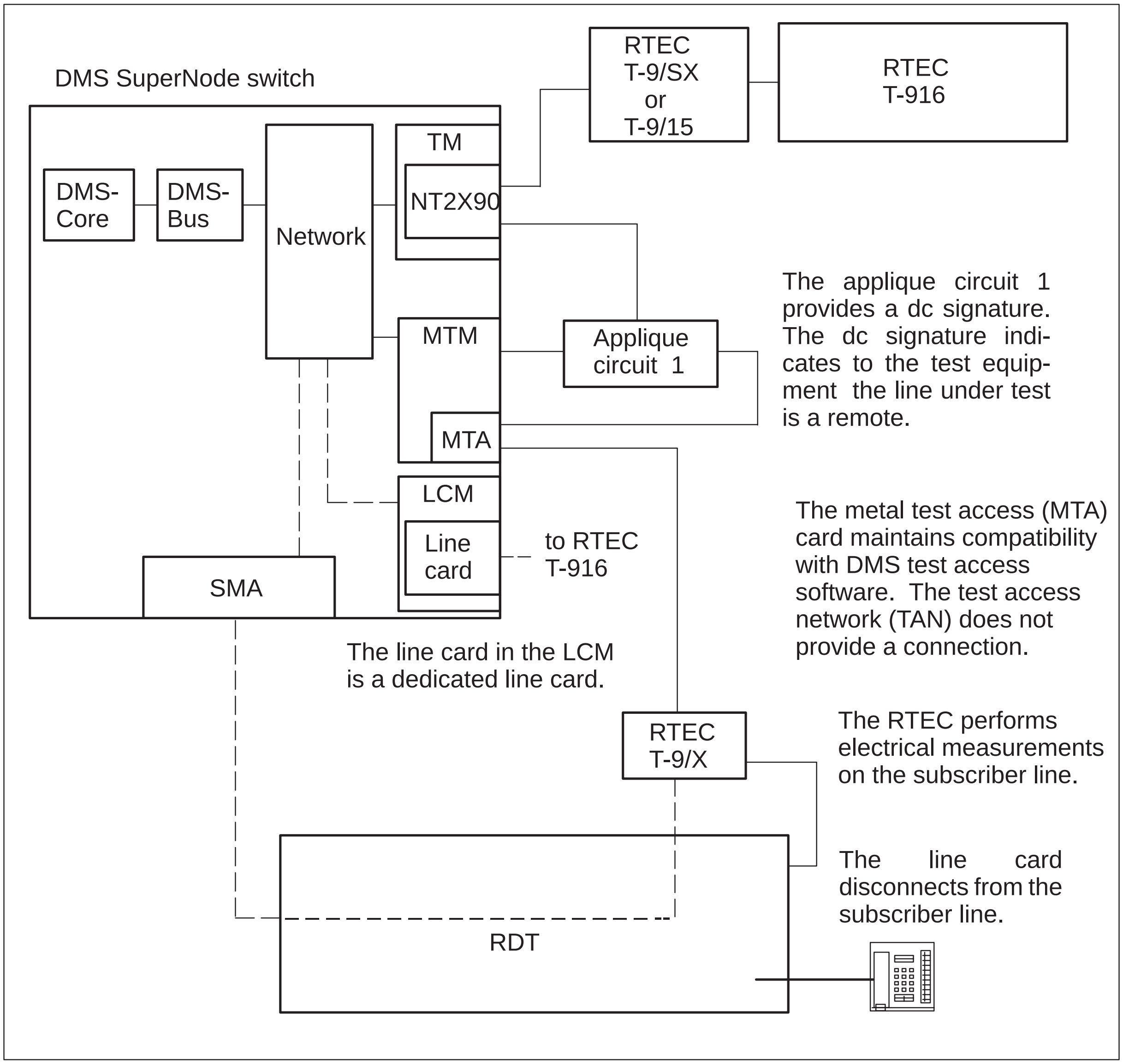
The line test configuration with RTEC

Reliance Telecommunication Electronics Company (RTEC) provides an MITS system. The MITS system consists of the following components:

- the T-9/15 or T–9/SX central office unit
- the T-916 RTU selector
- the T-9/X remote test unit

The following figure shows the configuration. The section that follows this section describes the configuration in more detail.

Line test with RTEC equipment



How the RTEC configuration works

The RDT connects the subscriber line to the RTEC T-09/X.

The Version 6 Y-9/SX Remote Test System of the T-9/15 Automatic Line Test System controls the T-9/X. Both are located in the central office.

The T-9/X uses a dial-up control path established at the beginning of each test to communicate with the T-9/X host controller. The T-9/X maintains the dial-up control path until the test completes. This dial-up path contains the following links:

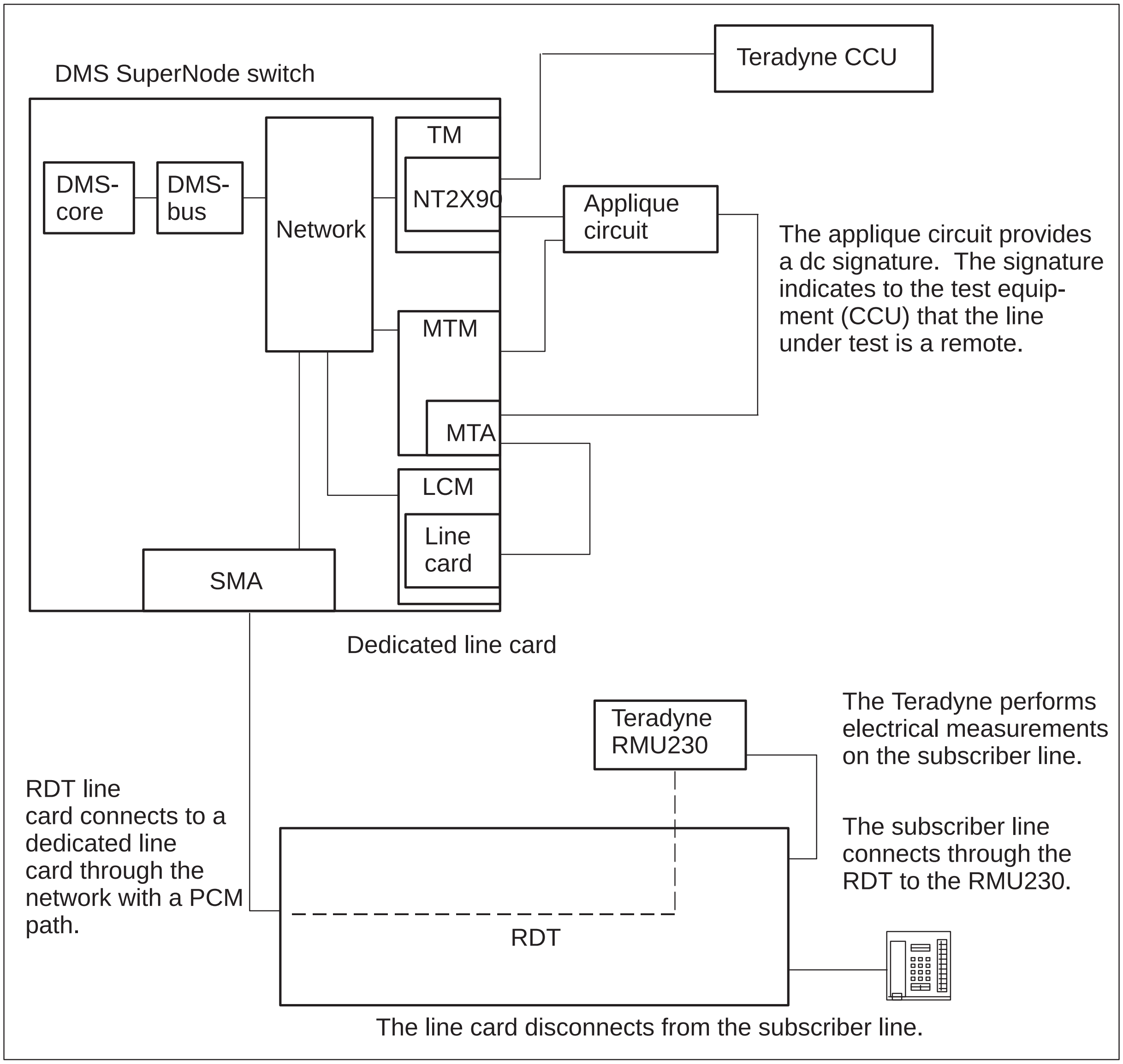
- from the T-/X to a dedicated RDT line card
- from the dedicated line card to a dedicated line card in a line concentrating module (LCM). When the T-9/X detects that the test access occurs, the T–9/X places a call to a dedicated line card in a host LCM.
- from the LCM line card to the T-916 RTU selector. The T-916 answers the call for 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 perform interactive tests. Interactive tests include tests like talk, ring, or monitor. The tests require a direct metal path between the T-9/SX or T-9/15 and the subscriber line.

The line test configuration with Teradyne

The following figure shows the configuration for the Teradyne test system.

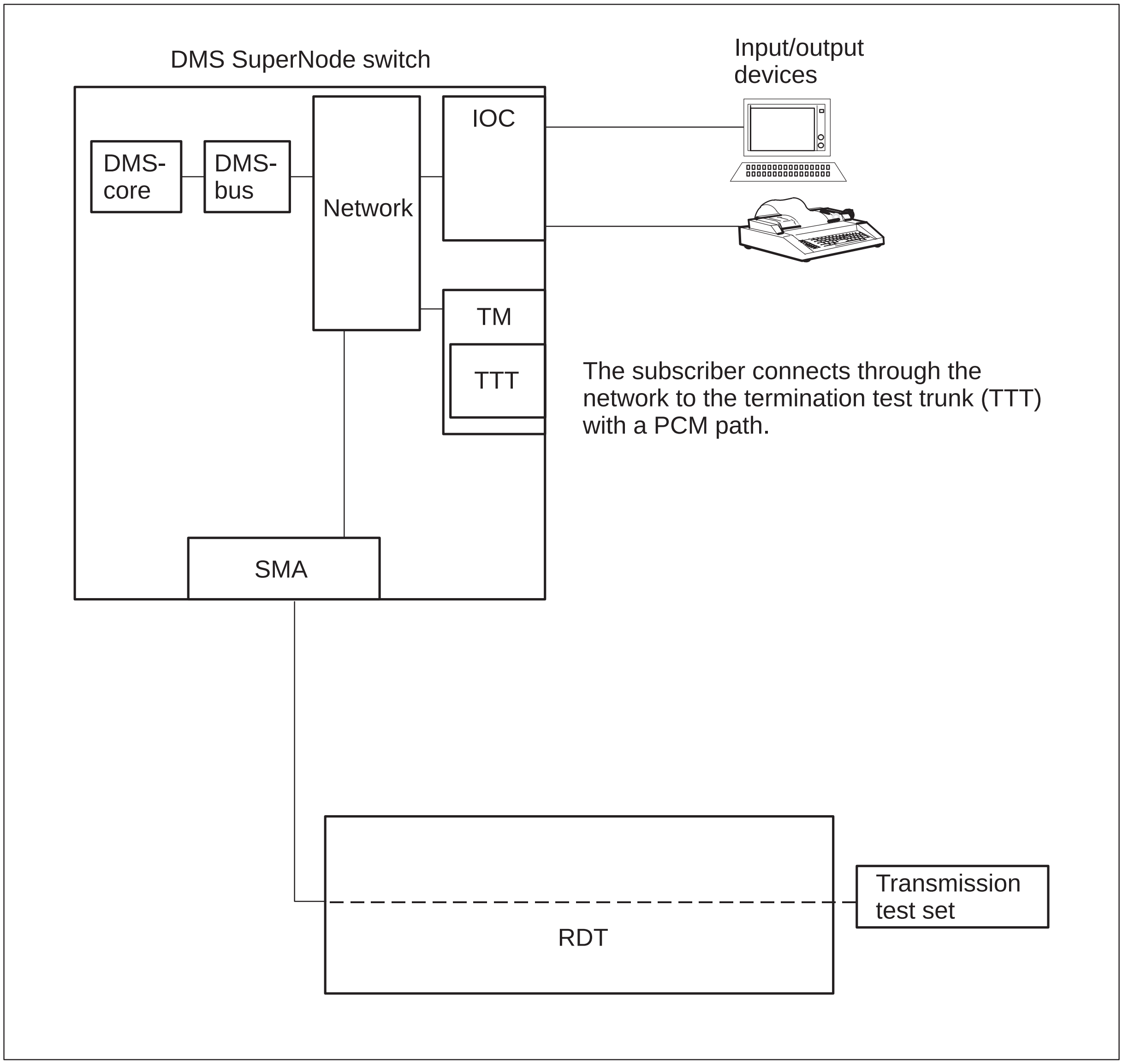
Line test with Teradyne



The transmission test set

A transmission test set sends voice frequency signals through the network. The user enters LOSS, NOISE, and TONEGEN commands at the MAP terminal to make measurements through the network. The following figure illustrates the test configuration used.

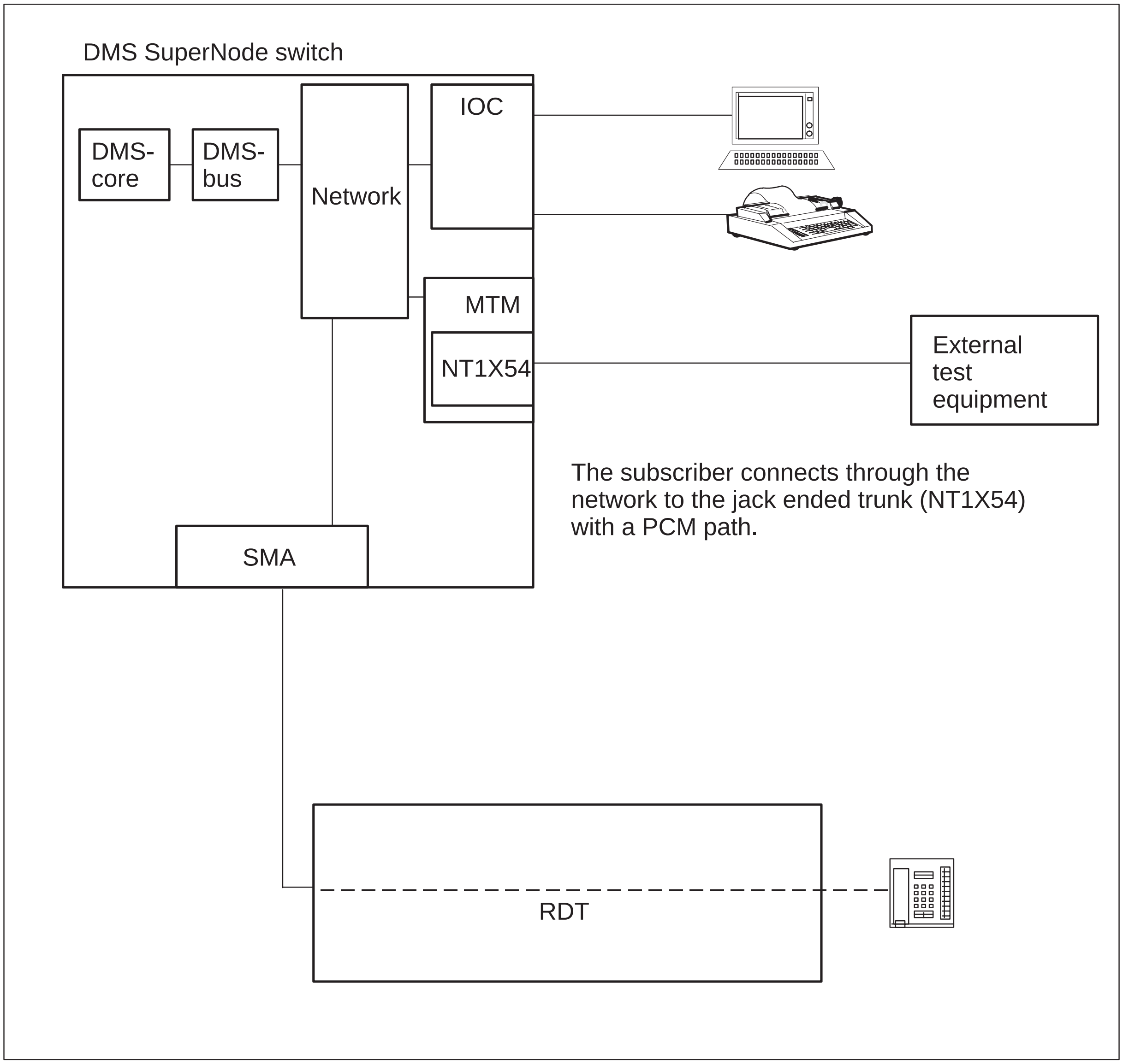
Line test with a transmission test set



Using a jack to connect external equipment

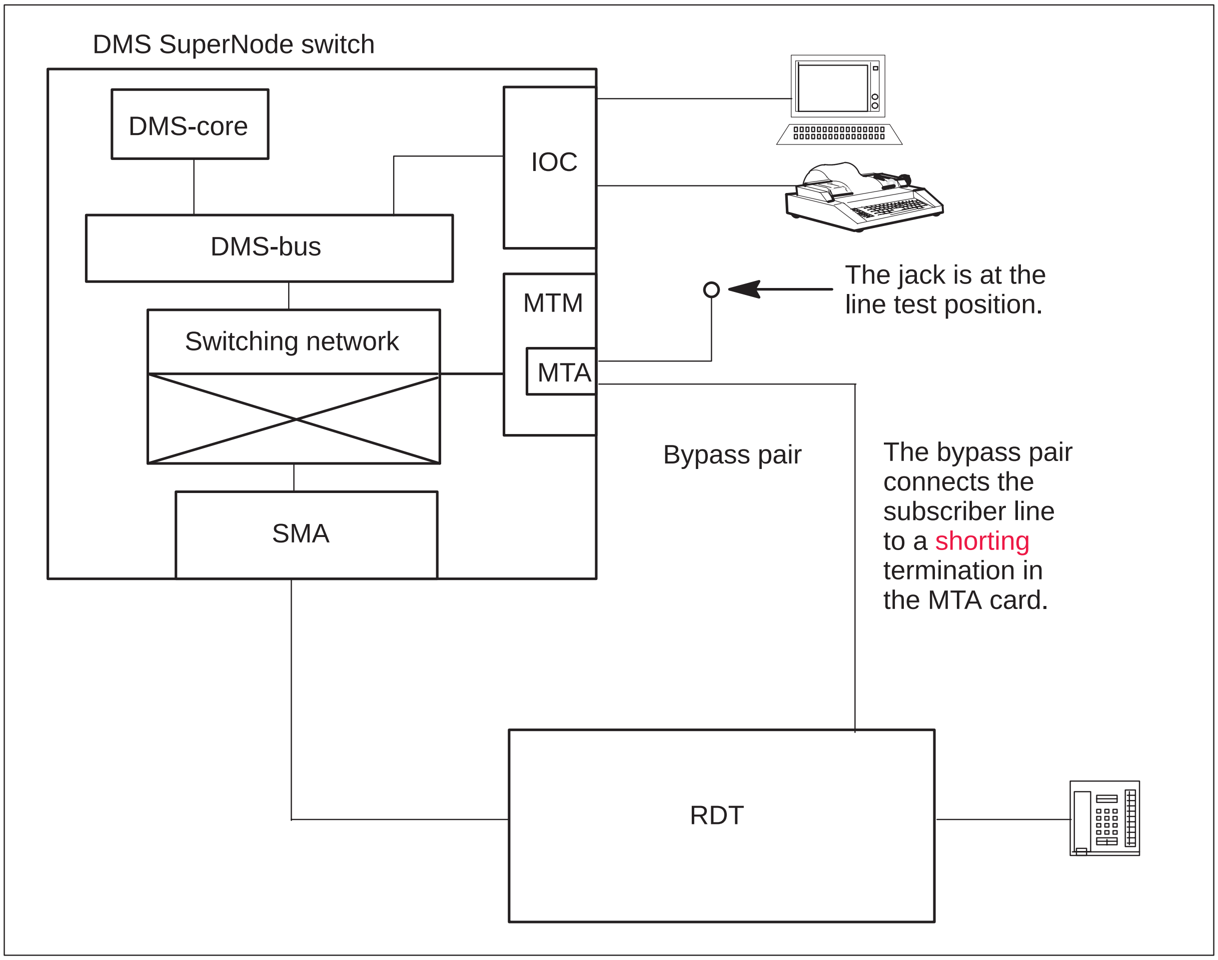
The following figure shows a jack that connects external test equipment for line tests.

Line test with external test equipment



The following figure illustrates the configuration that operating company personnel use to enter the command string JACK METALLIC at the MAP terminal.

JACK METALLIC configuration



Product-specific test tools

This section describes test tools for the SMA.

CALLTRAK

The CALLTRAK is a general-purpose, call processing tool environment that provides detailed information on calls. The CALLTRAK allows operating company personnel to select one or more terminals (line or trunk). The CALLTRAK collects information on calls made from the selected terminal or terminals. The information collected depends on the enabled CALLTRAK tools.

Enable the CALLTRAK tool TIMECALL in CALLTRAK after the terminals are selected. To select the terminals, you can type CALLTRAK from the CI prompt. The TIMECALL lists the following:

- call events
- the real time cost of the call events
- 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 the terminal. The SELECT command supports options TID, DN, and ALL for RDT lines.

MSGTRC

The message trace (MSGTRC) facility provides a sublevel to the master processor (MP) monitor where operating company personnel can obtain information from Q.931 messages. Operating company personnel obtain information from Q.931 messages as the messages are sent from one EISP task to another task. The user can use commands available at the MSGTRC sublevel to tailor the trace.

For example, the user can use the VERBOSE option to display the integrated digital loop-carrier (IDLC) subset of Q.931 in a more readable format with the VERBOSE option. The following figure shows a display with a missing information element or with 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 advantage of the MSGTRC tool depends on the selection of standards used to perform the trace. The more narrow the message trace selection, the better the trace becomes. To limit the trace to the IDLC part of Q.931 messages, the protocol discriminator and message type bytes must have values recognized as the IDLC part of Q.931 messages. See the following tables and the figure that follow the table 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

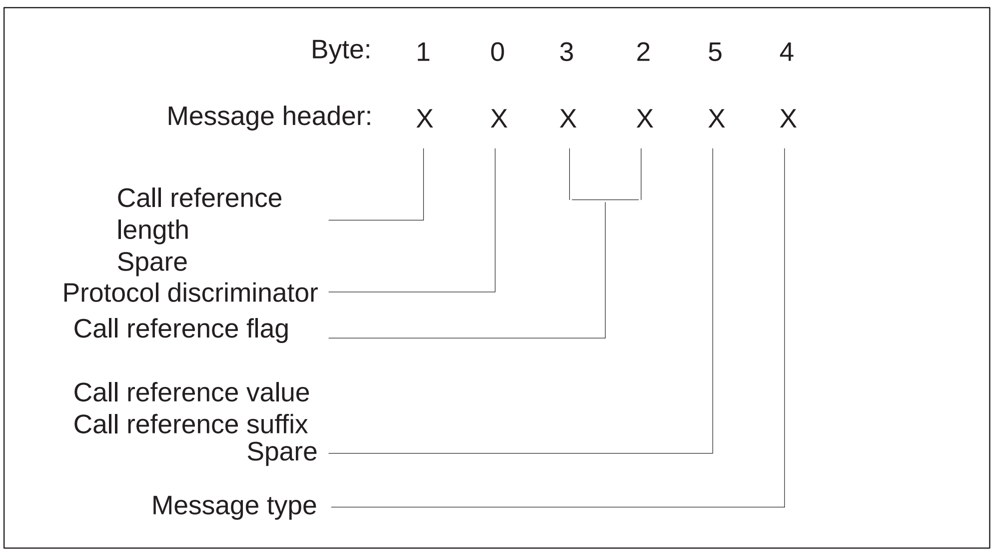
Hex	Call supervision messages
7B	INFOrmation
6E	NOTIFY

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 that 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 faulty SMA again. 8 Return SMA to service.
—continued—		

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
SMA Major	Defective card cause 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 the SMA again, if required. RTS the SMA.
SMA Minor	Defective card cause 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 Return-to-service 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 the cards again. 4 If test passes, return links to service.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
SMA Minor (continued)	Central-side (C-side) links out-of-service, cause some degradation of service.	Proceed as follows: 1 Display C-side links at the MAP terminal. 2 Busy and test SysB links. 3 If test fails, replace cards in card list. Test the 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, load and 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 time slot management channels (TMC).	Proceed as follows: 1 Identify and post the SMA with 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 return-to-service closed link. 4 If return-to-service fails, post the system-busy IDT. Display P-side message channels. 5 If TMC is not active, busy, and return the TMC to service. 6 If TMC alarm continues, make sure path protection is activated for both TMCs. 7 If TMC remains out-of-service, busy the TMC. Return-to-service the IDT. 8 If alarm continues, busy. Test the defective TMC for internal continuity. 9 If the internal continuity test fails, post the SMA associated with the defective IDT. 10 Busy and test the inactive unit. Replace displayed cards in a card list. 11 Load, test, and return-to-service the inactive SMA unit. 12 Return-to-service the TMC and set up an external loopback at the remote digital terminal (RDT).

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
IDT Critical (continued)	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 must clear the alarm condition.
	RDT alarms present.	Proceed as follows: 1 Determine the number and type of RDT alarms. 2 Clear the fault conditions at the RDT.
	SMA is system-busy.	The IDT remains 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 alarm. 4 If IDT alarm continues, display SMA P-side message links. 5 Attempt to return system-busy link to service. 6 If return-to-service fails, post the ISTb IDT and display C-side links. 7 Display message channels and identify message channels on the defective link. 8 Busy the TMC and embedded operation channel (EOC) on the defective link. Test continuity for both channels. 9 Return the TMC and EOC to service.

—continued—

Clearing an SMA alarm (continued)

Alarm condition	Possible cause	Action
IDT Major and Minor (continued)	Maintenance connection not established TMC P-side node messaging overload. EOC P-side node messaging overload. P-side node messaging system overload on SMA.	Proceed as follows: 1 Identify the defective IDT. 2 Post the SMA with the IDT. 3 Identify and post the defective IDT. 4 Display the C-side links. If messaging links are closed, post the SMA. Return the appropriate links to service. 5 At the IDT level, display message channel information. 6 If the EOC and TMC are not active, activate EOC and TMC paths. 7 Return EOC and TMC paths to service. 8 If overload conditions continue, check RDT engineering parameters.
—end—		

SMA power up and power down procedures

Powering up the SMA

The SMA unit is part of the host office. The general host office power–up procedure describes the power-up procedure of the SMA unit. Perform the following steps to power up the SMA only:

1 Unseat the NT6X80 (PCM Loss Addition) card in slot 19.

2 Set the switch on the power converter to the ON position.

3 Hold the RESET button on the power converter in. Flip the parallel circuit breaker up, but do not hold the circuit breaker up. If you apply power to the SMA unit, the circuit breaker remains in the *up* position. If a power problem exists, the breaker returns to the off *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 to power-up, type

>MAPCI;MTC;PM;POST SMA sma_number

7 To busy both SMA units, type

>BSY PM

8 To identify the name of the PM load data file, type

>QUERYPM

Note: The display provides the name of the load file. Cross-reference the name to the disk volume name on the PMLoad File Office Record, or to the 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

>QUERYPM 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 unit. To test the SMA 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

Perform the following steps to power down the SMA:

1 To assign 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 the system requests a confirmation. Enter *Yes* to confirm.

5 Repeat steps 3 and 4 for all network module pairs that end links from the SMA.

6 To return to the PM level of the MAP display, and assign the SMA, 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, type

>BSY PM

9 To set to offline the SMA that was 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.

11 The power down procedure for the SMA is complete.

SMA recovery procedures

This section contains recovery procedures for the Subscriber Carrier Module-100 Access (SMA) and references to recovery procedures. These procedures describe how to recover an SMA manually. Maintenance engineering and field maintenance personnel use these procedures.

Recovering an out of service SMA

Application

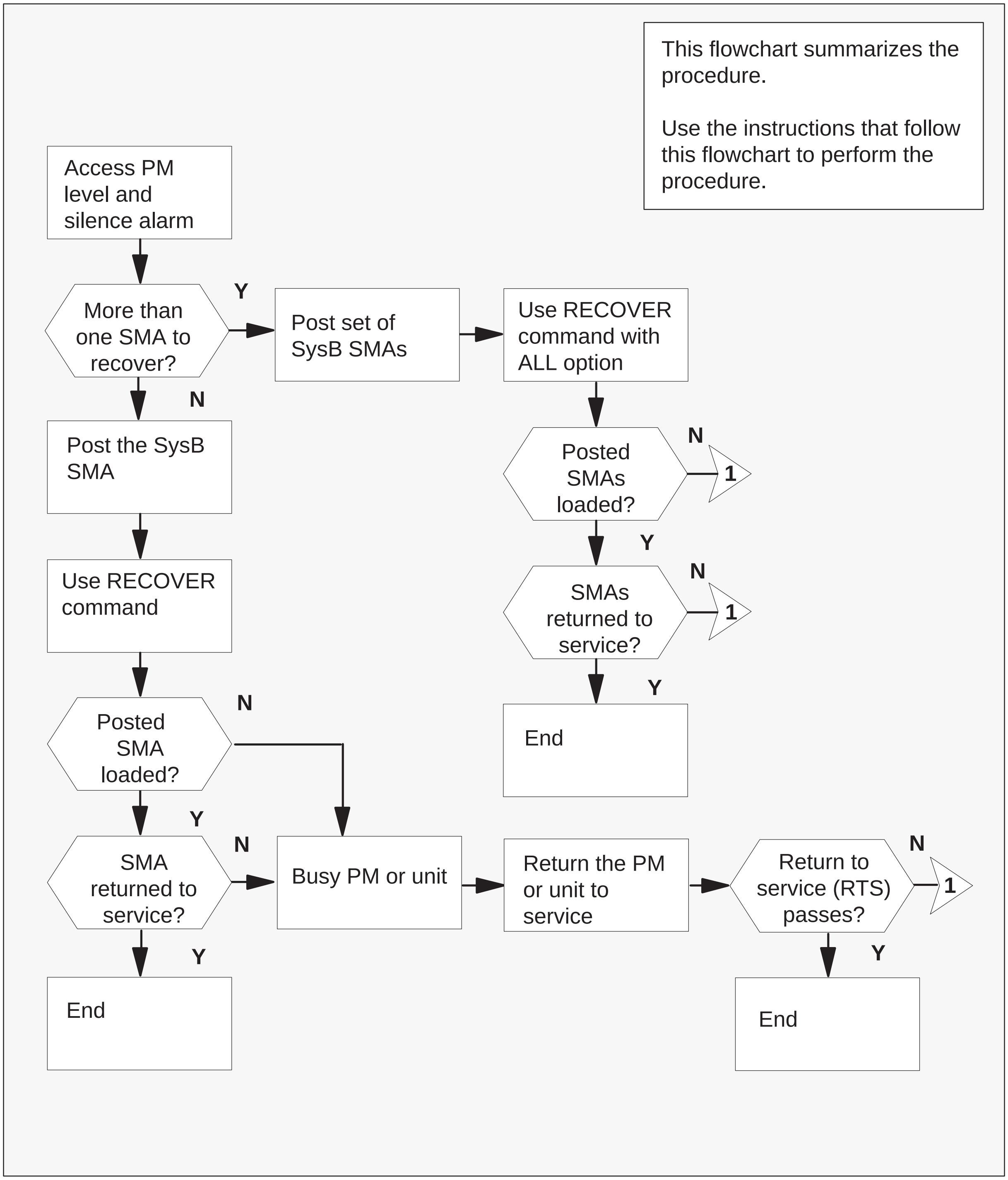
Use this procedure to return a system busy (SysB) SMA to service.

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 procedure.

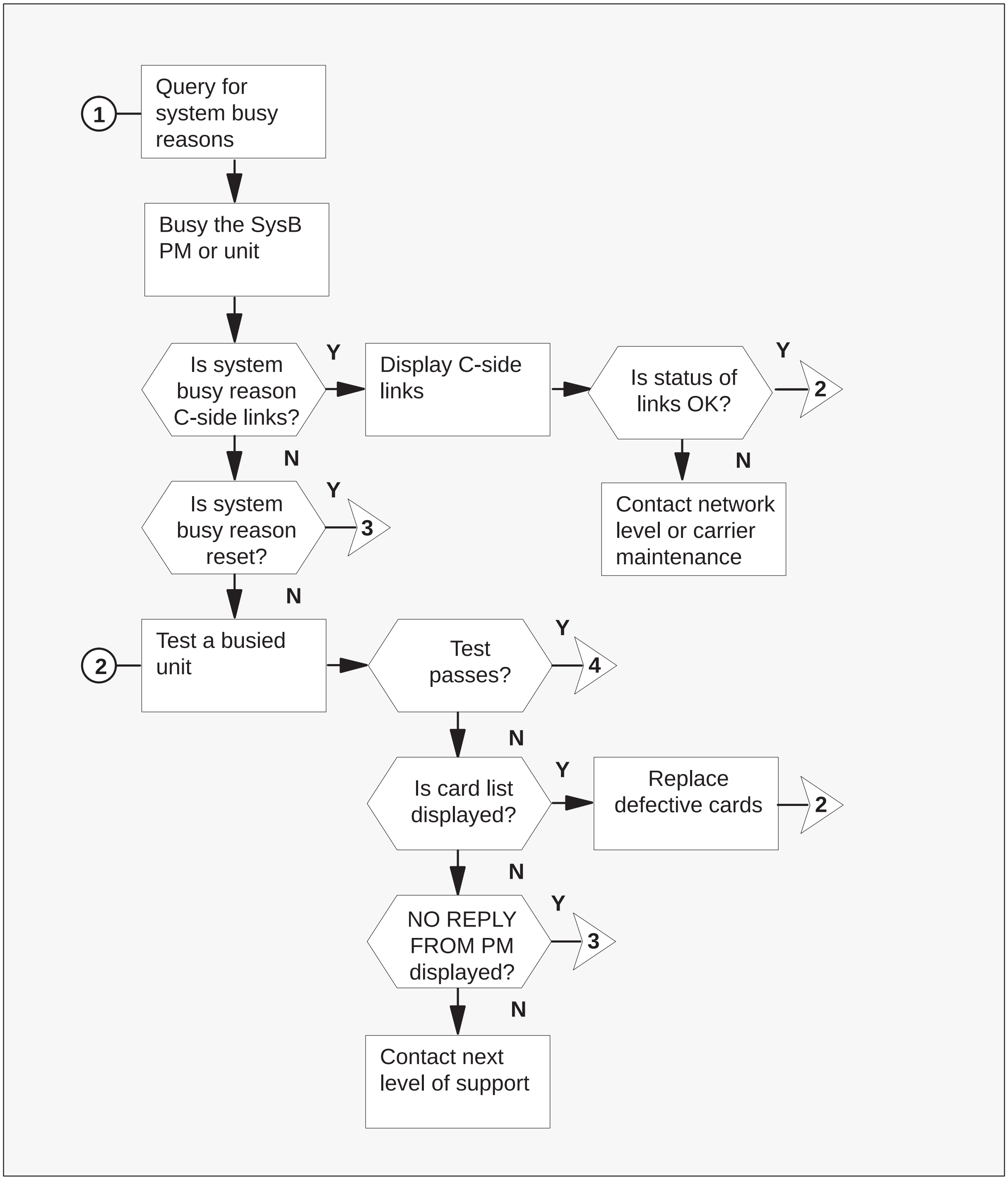
Recovering an out of service SMA (continued)

Summary of Recovering an out of service SMA



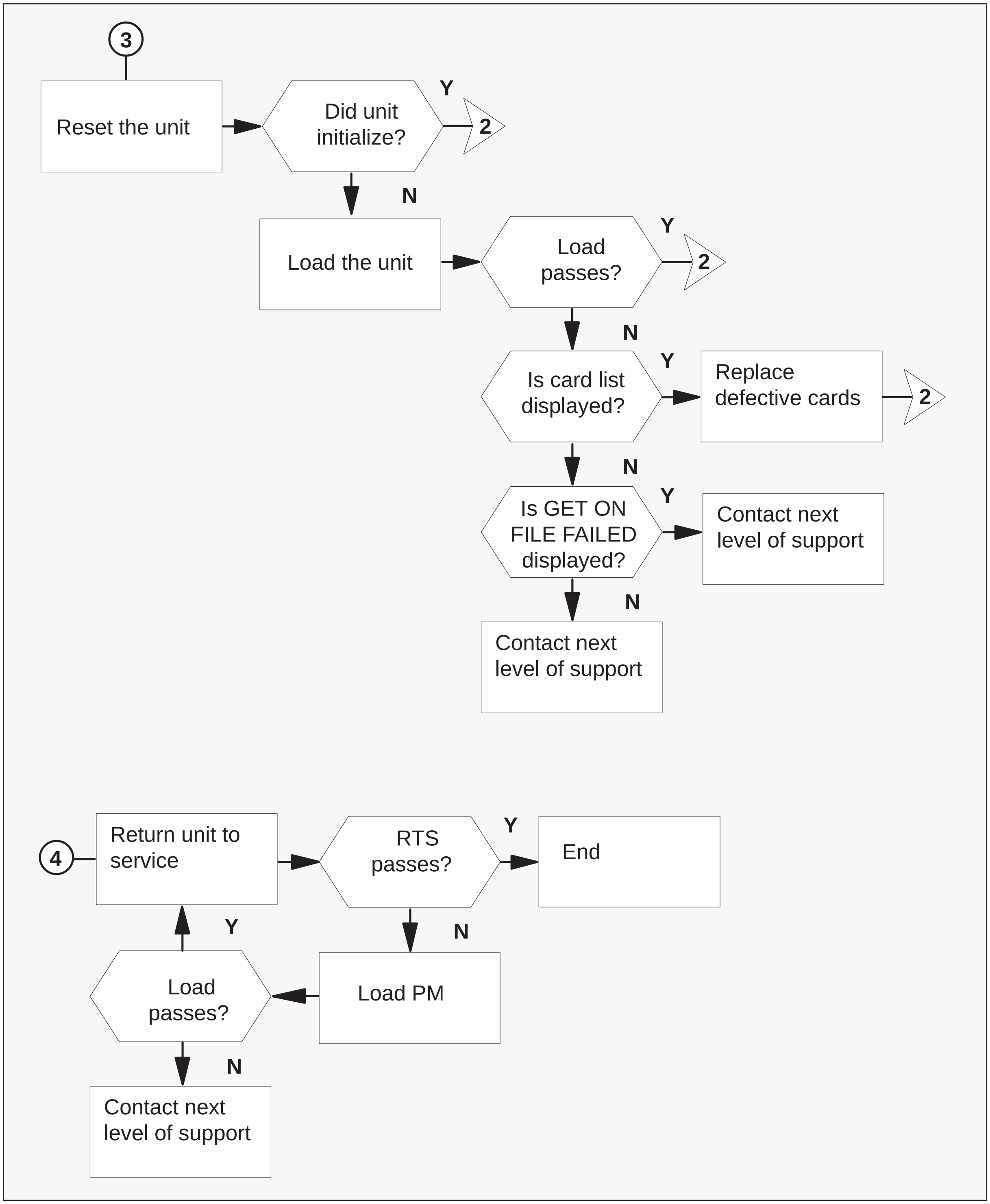
Recovering an out of service SMA (continued)

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. Access the peripheral module (PM) level of the MAP display. To silence the alarm, type

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

2 To display the SysB SMA, type

DISP STATE SYSB SMA
and press the Enter key.

Example of a MAP response:

```
SysB SMA: 0
```

If	Do
one SMA is SysB	step 6
more than one SMA is SysB	step 3

3 To access the set of SysB 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 the SysB 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”):
```

5 To confirm the need for the recovery operation, type

>YES
and press the Enter key.

Note: In the MAP terminal response, *n* is the number of all SMAs in the posted set.

Go to step 8.

6 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 identified 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
```

7 To recover the SysB SMAs with the PM recovery tool, type

>RECOVER
and press the Enter key.

Example of a MAP response:

```
recover
SMA 0 Recover request submitted
```

Recovering an out of service SMA (continued)

8 The following is an example of a recovery request for each posted SMA. The recovery tool submits the recovery request.

Example of a MAP response:

```
SMA 0 Recover request submitted
 SMA 1 Recover request submitted
  .
 SMA n Recover request submitted
```

The recovery tool determines which of the posted SMAs need recovery. For each SMA that needs recovery, the recovery tool attempts to load the PM units 0 and 1. For each SMA loaded and all other SMAs that need recovery, the recovery tool attempts to RTS the active unit.

The following actions occur in the example:

- SMA 0 is loaded and returned to service.
- SMA 1 is returned to service.
- SMA 2 failed to load unit 0, and loaded unit 1. SMA 2 returns unit 1 to service.
- 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
```

The recovery tool provides a summary of the operation. The following example displays the summary.

Example of a MAP terminal response:

```
Summary:
3 passed
1 failed
```

Recovering an out of service SMA (continued)

9 Determine if all SMAs recovered.

If	**Do**
all SMAs recover	step 34
one or more SMAs did not recover	step 10

Note: The recovery process places one unit InSv and one unit ManB. To complete the recovery process, refer to the appropriate alarm clearing procedure in *Alarm Clearing Procedures*.

10 Record the SMAs that cannot be recovered.

11 Work on the SMAs with both units out-of-service. Use the *Alarm Clearing Procedures* to clear any SMAs with one unit out-of-service.

If	**Do**
one or more SMAs cannot be loaded and both units are out-of-service	step 12
one unit of an SMA cannot be loaded or RTS	step 34

12 To post the SysB SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of a SMA recorded in step 9

13 To busy the SysB SMA, type

>BSY PM
and press the Enter key.

Recovering an out of service SMA (continued)

14 To return the SMA to service, type

>RTS PM
and press the Enter key.

Note: The system can respond with instructions to RTS one unit after an RTS PM fails. In this event, ignore this message and follow the If-Do table below.

If RTS	Do
passes on both units	step 33
fails on one or both units	step 15

15 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

16 Determine if one or both units need recovery.

If recovery is needed	Do
on both units	step 17
on one unit	step 34

17 Identify the error message reported in step 15.

If the error reason is	Do
activity dropped	step 18
CC audit	step 18
diagnostics failed	step 18
PM audit	step 18
self test failed	step 18
trap	step 18
unsol exceeded	step 18
reset	step 22
central-side (C-Side) links	step 30

—continued—

Recovering an out of service SMA (continued)

If the error reason is	Do
load fails	step 19
none of the above	step 35
—end—	

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 made busy in step 13.

If RTS	Do
passes	step 36
fails one time	step 19
fails more than one time	step 20

19 To reload the unit, type

>LOADPM UNIT unit_no CC
and press the Enter key.

where

unit_no is the number of the unit that did not RTS in step 18

If LOADPM	Do
passes	step 17
fails	step 20

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
indicates a load failure	step 27

21 Determine if the `NO REPLY FROM PM` message appeared.

If `NO REPLY FROM PM` message	**Do**
appeared earlier	step 35
did not appear earlier	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 18

Note: The MAP terminal indicates the reset events, as the events occur, when the unit is reset. These events occur in the order that appears in the following MAP response.

Example of a MAP response:

```
RESET
 STATUS
 RUN
 INITIALIZE
 LOADING DATA
```

If unit	**Do**
fails to initialize	step 23
initializes	step 27

Recovering an out of service SMA (continued)

23 Determine if the `NO REPLY FROM PM` message appeared.

If **`NO REPLY FROM PM`**	**Do**
appeared	step 35
does not appear any more	step 24

24 Determine if the `NO WAI AFTER RESET` message appeared.

If **`NO WAI AFTER RESET`**	**Do**
appeared	step 25
does not appear	step 18

25 Observe the card list 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 Refer to *Card Replacement Procedures* for the next card on the list. Check *Card Replacement Procedures* and go to step 18.

Recovering an out of service SMA (continued)

27 To load the unit, type

>LOADPM UNIT unit_no CC
and press the Enter key.

where

unit_no is the number of the unit you want to load

If LOADPM	Do
passes	step 18
fails	step 28

28 Identify the failed load reported in step 27.

If message that appears	Do
is `NO WAI AFTER RESET`	step 25
is `FAIL ROM DIAG`	step 25
is `GET ON FILE FAILED`	step 29
is none of the above	step 35

29 The message `GET ON FILE FAILED` indicates a problem with the storage device. Go to step 35.

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 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 18

32 A problem with the network interface card or the ENET port interface card is the probable cause. Contact the network level of support.

33 Recover the next SMA PM recorded in step 10.

If	Do
another SMA PM needs recovery	step 12
all SMA PMs are recovered	step 36

34 To determine the steps to take, refer to the appropriate alarm clearing procedure in the *Alarm Clearing Procedures* section.

35 For additional help, contact the next level of support.

36 This procedure is complete. If other alarms appear, perform the appropriate alarm clearing procedures.

Recovering an RDT

Application

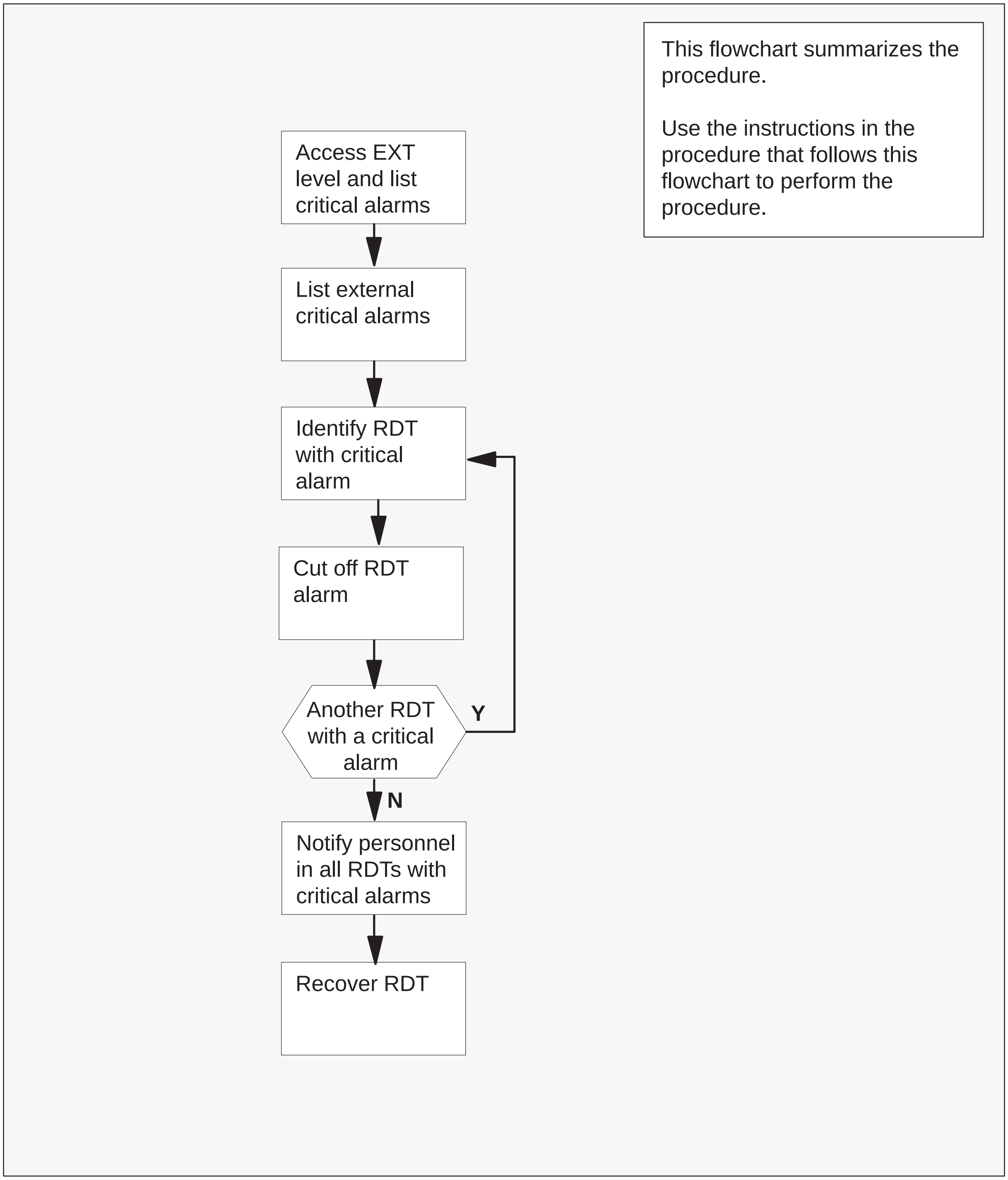
Use this procedure to return to service a RDT busied by the system (SysB).

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 RDT (continued)

Summary of Recovering an RDT



Recovering an RDT (continued)

Recovering an RDT

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 is	Do
displayed	step 5
not displayed	step 4

4 Identify the unit that causes the alarm and refer to the appropriate documentation to correct the problem.

5 To determine which signal distribution (SD) alarm points operate for each critical alarm, type

>DISP SDALARM
and press the Enter key.

A series of SD points corresponding to the location of the RDT appears. A single SD point corresponding to the status of the active alarm also appears. The system only displays SD points for one RDT at a time. The RDT with the most severe condition is the one that appears.

Recovering an RDT (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              RDTSD1
 6              RDTSD3
 7 List_        RDTSD8
 8 TstDSAlm     RDTCRIT
 9 SetSD_
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:

- RDTSD1
- RDTSD3
- RDTSD8

in association with the RDTCRIT alarm. The SD points (RDTSDn) displayed identify each RDT in table RDTINV.

Recovering an RDT (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. If other RDTs with alarms are present, the system displays the RDT with the most severe alarm. The system displays signal distribution points for a minimum of 20 s unless a more critical alarm occurs or the alarm cutoff is activated.

If there are	Do
other RDT alarms	step 3
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
                                               MTSTACPT
                                                LINKTAB
PROT       POTSPADG            EOC
                                                SDPOINTS
                                                   RDTDN
```

Recovering an RDT (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
                                            MTSTACPT
                                             LINKTAB
      PROT    POTSPADG       EOC
                                          SDPOINTS
                                               RDTDN
------------------------------------------------------
 REM3  0 1   3     SMA 0 0                    $
          $                                $
                              GENTMC   7 96  Y  Y
                                                 $
                                    (1 0) (2 1)  $
 N        STDLN         S         C              $
                                                 $
(NETWORK_ID 1) (NETWORKELEMENT_ID 14)            $
```

11 Identify the name of the RDT that experiences the critical alarm. For example, the name of the RDT in step 10 is REM3.

12 Contact operating company personnel at each RDT that experiences a critical alarm.

13 Refer to appropriate RDT documentation to record the RDT.

SMA alarm clearing procedures

This section contains alarm clearing procedures for the Subscriber Carrier Module-100 Access (SMA). These 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 initializes after the PM restarts 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.

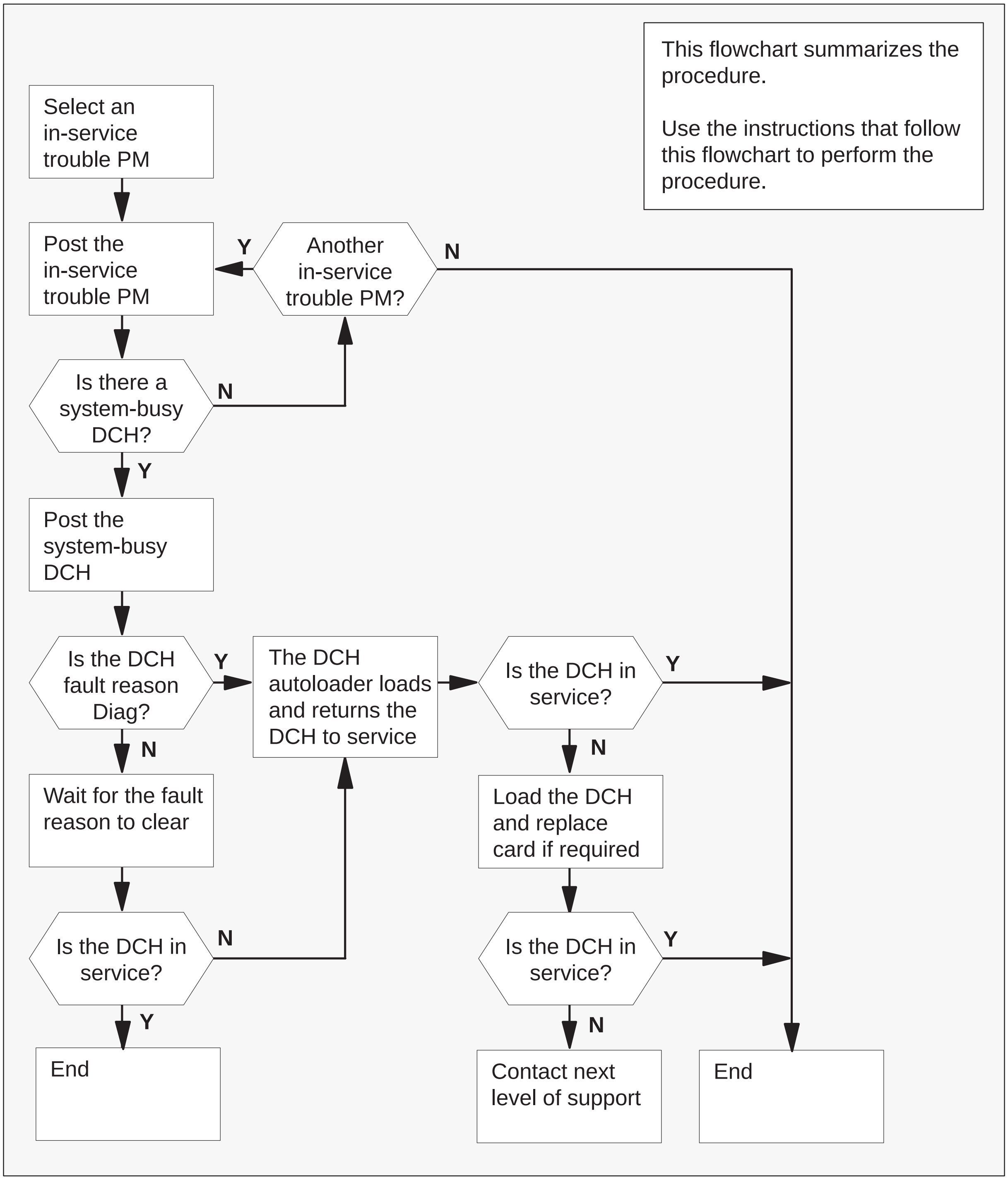
PM DCH
major (continued)

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



Clearing a PM DCH majoralarm

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 response:

```
              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 response:

```
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 response:

```
           SysB    ManB    OffL    CBsy    ISTb    InSv
PM            8       0      19      19       3      13
LTC           0       0       0       0       3

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 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           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 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            2       1       0       0       2       1
DCH  82 ISG 200 SysB LTC    0 port  3 Access error
```

Note: When two or more DCHs are included in the posted set, the system displays each DCH one at a time. The system begins the display 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`	The DCH autoloader loads and RTSs the DCG. Go to 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.

PM DCH
major (continued)

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 response:

```
Request submitted on DCH 82
DCH 82  load Passed : EDH07BH
```

If the LOADPM command	Do
passes	step 17
fails	step 14

14 Perform the common procedure Loading a PM in this document. Complete the procedure and return to this point.

15 Determine your next step.

If the procedure Loading a PM	Do
is successful	step 17
is not successful	step 16

PM DCH
major (continued)

16 Perform the correct procedure in *Card Replacement Procedures* to change the DCH (NTBX02) circuit card. Complete the procedure and return to this point.

17 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
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 where you are working:

- 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, and worked on all system-busy DCHs, and returned all DCHs to service	step 24
posted all in-service trouble PMs, and 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

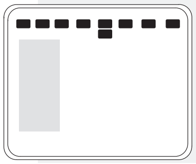
Go to step 5.

23 For additional help, contact the 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 of 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
- the ISDN service group (ISG) channels for a DCH are manual busy or system busy
- the DCH product engineering code (PEC), load, or sparing problems
- the 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 preceding the alarm code indicates the number of affected DCHs.

Result

This alarm does not affect service.

PM DCH
minor (continued)

Common procedures

The common procedure *Loading a PM* appears in this procedure.

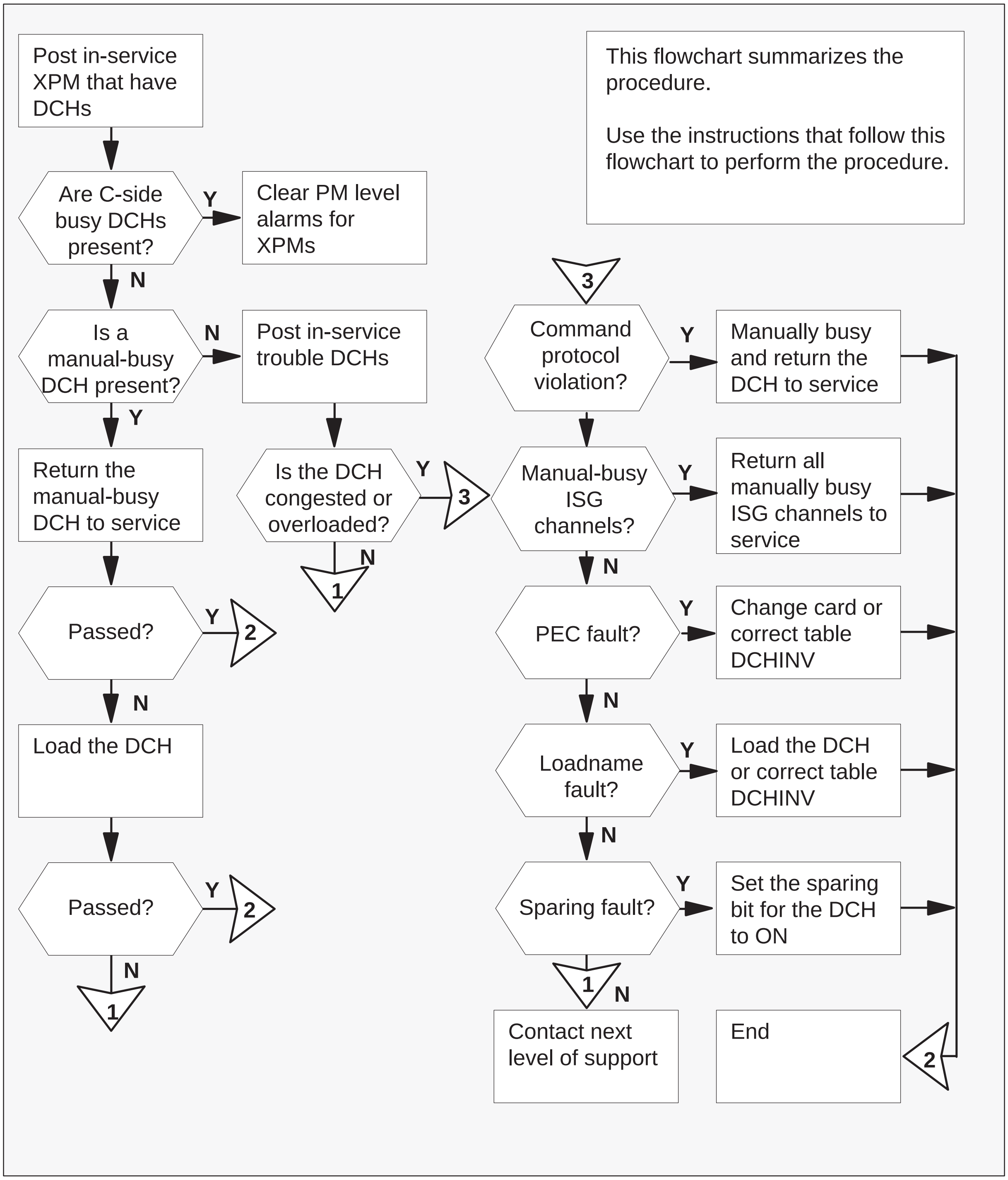
Do not go to the common procedure unless the step-action procedure directs you to.

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 response:

```
               SysB    ManB    OffL    CBsy    ISTb    InSv
PM                8       0      19      19       3      13
```

2 To display all in-service (InSv) peripheral modules (PM), type

>DISP STATE INSV
and press the Enter key.

Example of a MAP 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 DCHs. For additional help, consult office records or office personnel.

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 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 you recorded at step 3
pm_no is the PM number you recorded at step 3

Example input:

>POST LTC 3

Example of a MAP 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 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 last line of the MAP display.

PM DCH
minor (continued)

6 Determine from the MAP display if central-side busy DCHs are present.

If central-side busy DCHs are	Do
present	step 7
not present	step 8

7 The fault occurs in the PM or on the central-side (C-side) of the PM. The C-side of the PM contains the DCH. To clear other PM-related alarms, perform the correct alarm clearing procedure in this document. Complete the procedure. Return to this point.

8 Determine from the MAP display if manual-busy DCHs are present.

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 and 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 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 first member of the posted set appears first.

PM DCH
minor (continued)

10 Determine from office records or from office personnel why the DCH is manual-busy. Also determine if the DCH can return-to-service (RTS).

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 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
passed	step 16
passed or failed, and central-side busy DCHs for the posted PM are present	step 7
failed, and central-side busy DCHs for the posted PM are not present	step 12

PM DCH
minor (continued)

12 To load the DCH, type

>LOADPM
and press the Enter key.

Example of a MAP response:

```
Request submitted on DCH 82
DCH 82  load Failed : S00DTEMP
Failed To Open File
```

If the LOADPM command	Do
passed	step 14
failed	step 13

13 To change the ISDN D-channel handler card, perform the correct procedure in *Card Replacement Procedures.* Complete the procedure. Return to this point.

14 To return the DCH to service, type

>RTS
and press the Enter key.

If the RTS command	Do
passed, and the DCH is in-service or in-service trouble	step 16
failed	step 15

15 Record the information that follows about the DCH you are working on:

- the PM type and number
- the DCH number
- the original fault reason (manual-busy)

Return to service the maximum number of manual-busy DCHs. Provide the next level of support with this information.

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 Determine from the MAP display 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 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 a posted set, the DCHs appear one at a time. The first member of the posted set appears first.

PM DCH
minor (continued)

19 Determine the fault reason for the DCH displayed.

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 is	**Do**
Congested	step 20
`CPV`	step 22
`DCH Chnls BSY`	step 27
`Sparing Off`	step 37
Incorrect PEC	step 40
`Loadname`	step 72
`Overloaded`	step 20

20 A DCH provisioning problem is present. Record the following information about the DCH:

- PM type and number
- DCH number
- fault reason obtained at step 19

Return to service the maximum number of DCHs. Provide the next level of support with this information.

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 response:

```
DCH 50 Bsy Passed
```

24 To return the DCH to service, type

>RTS
and press the Enter key.

Example of a MAP 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
passed	step 26
failed	step 25

25 Record the information that follows about the DCH:

- PM type and number
- DCH number
- original fault reason (and the current fault reason if different from the original)

Clear in-service trouble fault reasons for the maximum number of DCHs. Provide the next level of support with this information.

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 set.

Note: The DCH number appears on the right side of the DCH header on the last line of the MAP display. The ISG number appears on the right side of the ISG header on the last line of the MAP display.

Example of a MAP 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) that you recorded at step 27

Example of a MAP 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 associated with the DCH you are working on.

If one or more channels are	Do
manual-busy and no channels are in another out-of-service state	step 31
in any other out-of-service 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 (RTS)	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 use.

Note: The state of the DCH appears on the left side of the ISG number on the last line of the MAP display.

If the state of the DCH	Do
is in-service	step 36
is any other state	step 35

35 Record the information that follows about the DCH you are working on:

- PM type and number
- DCH
- original fault reason (and the current fault reason if different from the original)

Clear the in-service trouble fault reasons for the maximum number of DCHs. Provide the next level of support with this information.

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 response:

```
DCH 50 Enable Takeover Passed
```

If the SPARING command	Do
passed	step 39
failed	step 38

38 Record the information that follows about the DCH you are working on:

- the PM type and number
- the DCH number
- the original fault reason (Sparing off)

Clear in-service trouble fault reasons for the maximum number of DCHs. Provide the next level of support with this information.

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 correct PEC and PEC suffix for the DCH from office records or from office personnel.

PM DCH
minor (continued)

41 To determine the PEC datafilled for the DCH, type

>QUERYPM
and press the Enter key.

Example of a MAP 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
: 18
```

Note: The PEC appears under the EqPEC header on the MAP display. In this example, the PEC entered for the DCH is NTBX02. The display does not contain the prefix NT.

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 MAP display:

43 Locate the DCH. Record the PEC and 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 extent of the PEC mismatch.

If the PEC obtained from office personnel or from office records	Do
matches the datafilled PEC obtained at step 41, but 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, but does not match the datafilled PEC obtained at step 41	step 53
does not match the datafilled PEC obtained at step 41, and does not match the PEC on 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 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 response:

```
DCH 50 Bsy Passed
```

47 To replace the DCH with a DCH that has the correct PEC and PEC suffix, perform the correct procedure in *Card Replacement Procedures,*. Complete the procedure. Return to this point.

48 To test the DCH that you just replaced, type

>TST
and press the Enter key.

Example of a MAP 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 and PEC suffix of the card on the list. Obtain a good card before proceeding.

Go to step 47.

PM DCH
minor (continued)

50 To load the DCH, type

>LOADPM
and press the Enter key.

Example of a MAP response:

```
Request submitted on DCH 50
DCH 50  load Failed : S00DTEMP
Failed To Open File
```

If the LOADPM command	Do
passed	step 52
failed	step 51

51 Perform the common procedure *Loading a PM.* The procedure is 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 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 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 where you are working, type

>POST dch_no
and press the Enter key.

where

dch_no is the number of the in-service trouble DCH that you 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 that you recorded at step 57

60 To access table DCHINV, type

>TABLE DCHINV
and press the Enter key.

Example of a MAP 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) where you work

Example of a MAP response:

```
   50        LTC    0 BX02AA  EDH07BH    3
```

PM DCH
minor (continued)

62 To change the PEC datafilled for the DCH to match the PEC for the installed card, type

>CHA DCHPEC
and press the Enter key.

Example of a MAP 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 that you recorded at step 43

Example of a MAP response:

```
TUPLE TO BE CHANGED:
   50        LTC    0 BX02AA  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 Determine from the MAP display the state of the DCH where you work.

Note: The state of the DCH where you are working appears on the right side of the ISG number. The state appears on the last line of the MAP display.

If within 3 minutes the state of the DCH	Do
is in-service	step 69
is any other state	step 68

68 Record the information that follows about the DCH where you are working:

- PM type and number
- DCH number
- original fault reason and the current fault reason if different from the original
- cards replaced (if you replaced any cards)
- PEC obtained from office records or from office personnel

Clear in-service trouble fault reasons for the maximum number of DCHs. Provide the next level of support with this information.

69 To post all DCHs that are in-service trouble, 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 have worked on the displayed DCH.

If you have	Do
worked on the DCH and recorded the reason that the DCH is in-service trouble	step 71
not worked on the DCH	step 19

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 Determine from office records or from office personnel the correct load for the DCH.

73 To determine the load datafilled for the DCH and the load that runs on the DCH, type

>QUERYPM
and press the Enter key.

Example of a MAP 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 that runs on the DCH appears on the right of the DCH header. In this example, the loadnames are EDH07BH and DCH01CV.

PM DCH
minor (continued)

74 Determine the extent of the loadname mismatch.

If the loadname obtained from office personnel or from office records	Do
matches the datafilled loadname obtained at step 73, but does not match the name of the load that runs on the DCH	step 75
matches the name of the load that runs on the DCH, but does not match the datafilled loadname obtained at step 73	step 80
does not match the datafilled loadname obtained at step 73, and does not match the name of the load that runs on the DCH	step 88

75 To manual-busy the DCH, type

>BSY
and press the Enter key.

Example of a MAP 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 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 response:

```
Request submitted on DCH 50
DCH 50  load Failed : S00DTEMP
Failed To Open File
```

If the LOADPM command	Do
passed	step 79
failed	step 78

78 Perform the common procedure *Loading a PM.* The procedure is in this document. Complete the procedure. Return to this point.

79 To return the DCH to service, type

>RTS
and press the Enter key.

Example of a MAP 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 response:

```
TABLE: DCHINV
```

PM DCH
minor (continued)

81 To position on the datafill 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 response:

```
    50        LTC    3 BX02AA  EDH07BH    3
```

82 To change the loadname datafilled for the DCH to match the loadname that runs on the DCH, type

>CHA LOAD
and press the Enter key.

Example of a MAP 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 that you recorded at step 72

Example of a MAP response:

```
TUPLE TO BE CHANGED:
   50        LTC    0 BX02AA  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 where you are working.

Note: The state of the DCH where you are working appears to the right of the ISG number on the last line of the MAP display.

If within 3 min the state of the DCH	Do
is in-service	step 89
is any other state	step 88

88 Record the information that follows about the DCH where you are working:

- PM type and number
- DCH number
- original fault reason (Loadname)
- load name obtained from office records or from office personnel

Clear in-service trouble fault reasons for the maximum number of DCHs. Provide your next level of support with this information.

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 Use the table that follows to 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 you cannot return-to-service all DCHs	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 that you recorded at step 3
pm_no is the PM number that you recorded at step 3

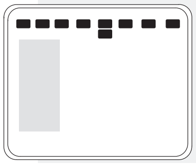
Go to step 5.

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 class.

Meaning

This alarm indicates a problem with messaging channels between the remote digital terminal (RDT) and the IDT.

Result

A critical alarm class code indicates the IDT cannot process calls.

Common procedures

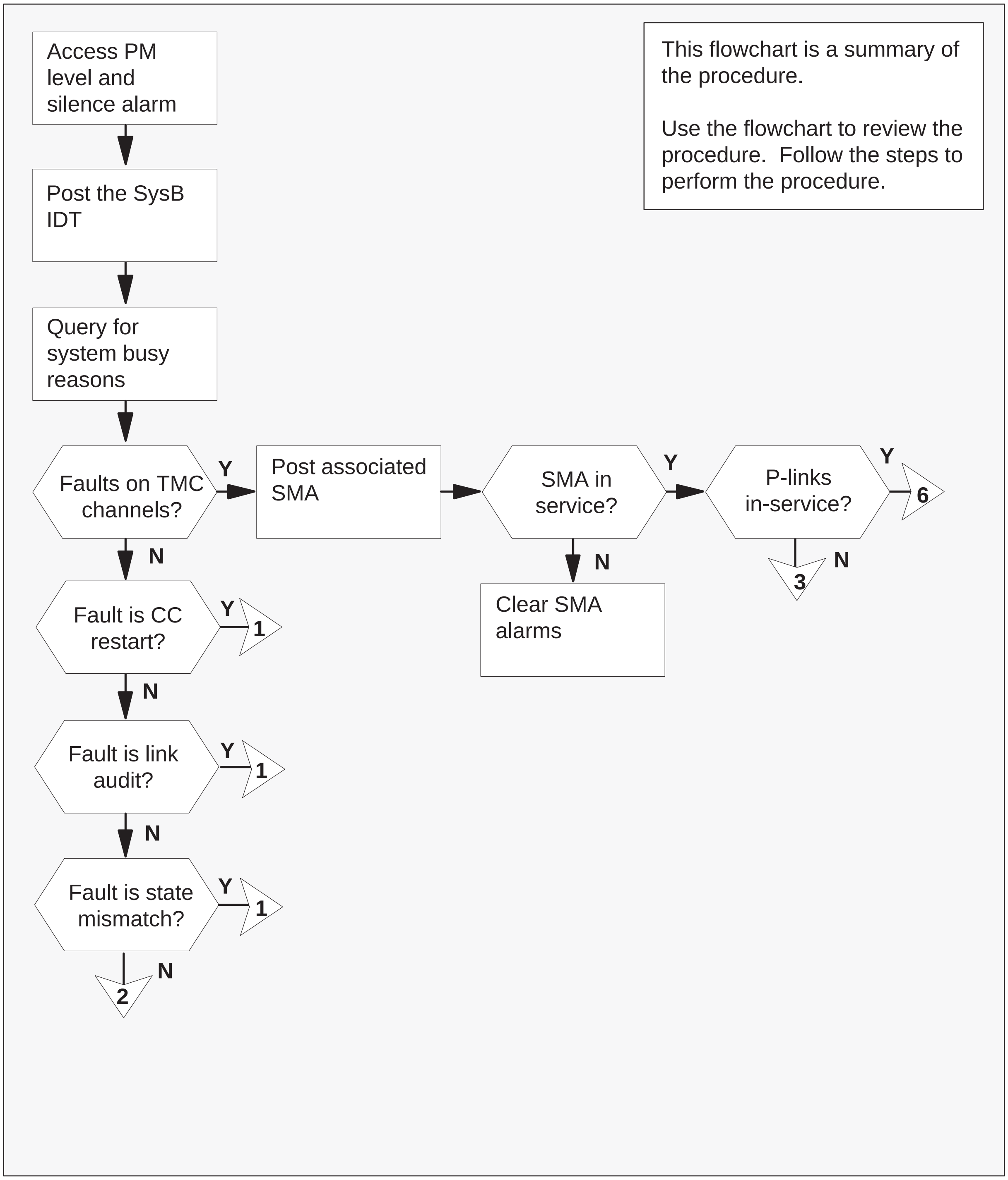
There are no common procedures.

Action

This procedure contains a summary flowchart and a series of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

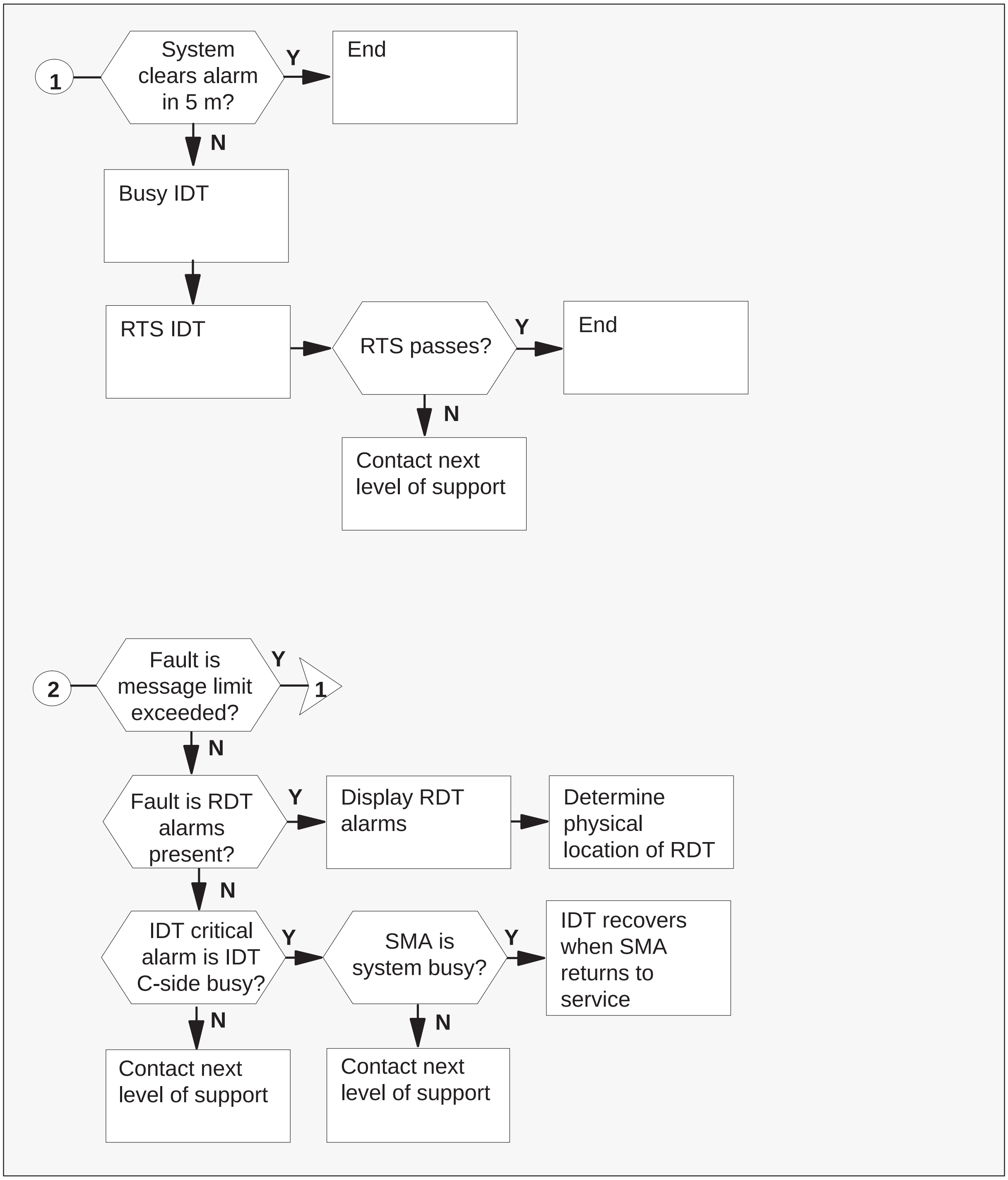
PM IDT
critical (continued)

Summary of clearing a PM IDT alarm



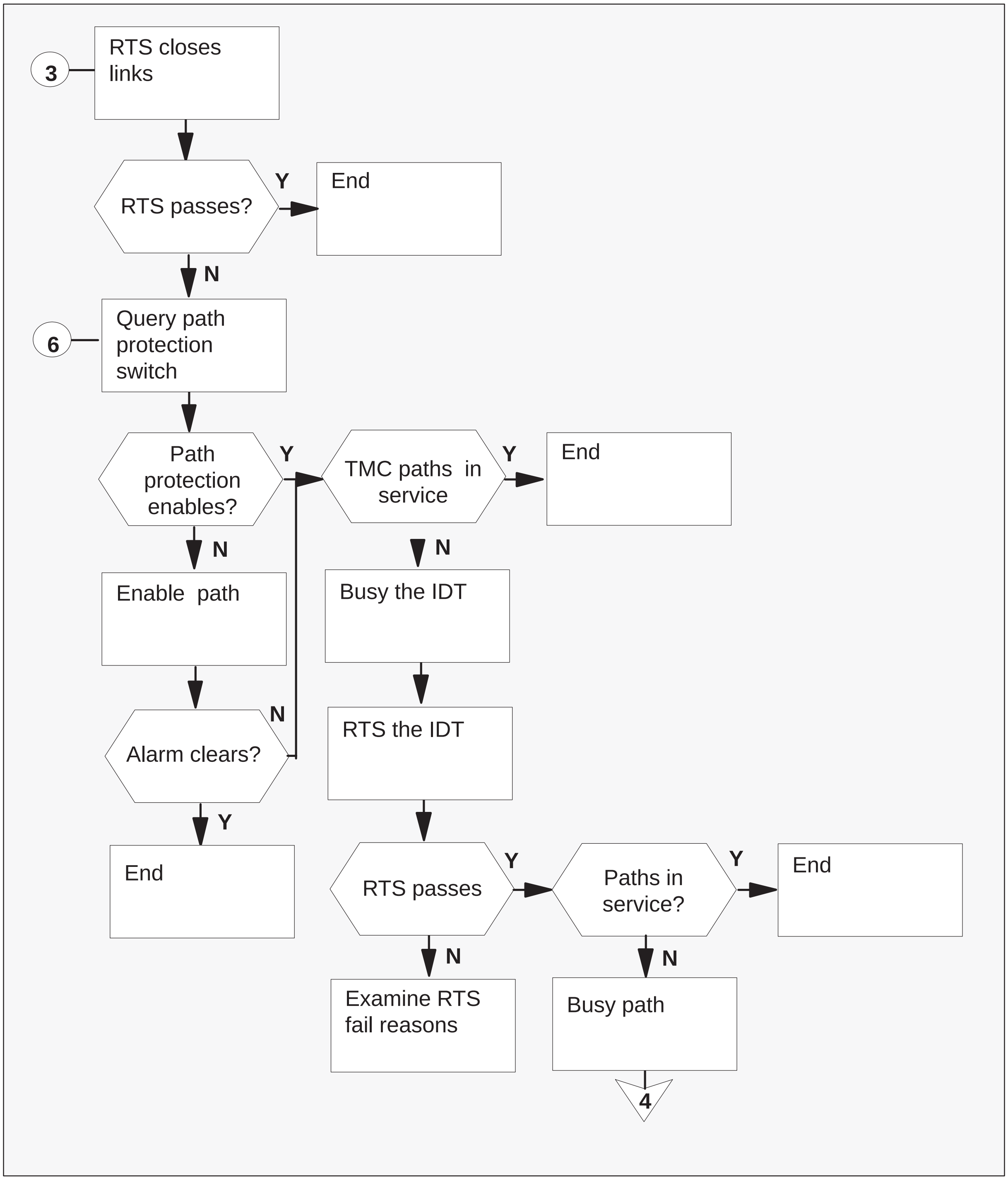
PM IDT
critical (continued)

Summary of clearing a PM IDT alarm (continued)



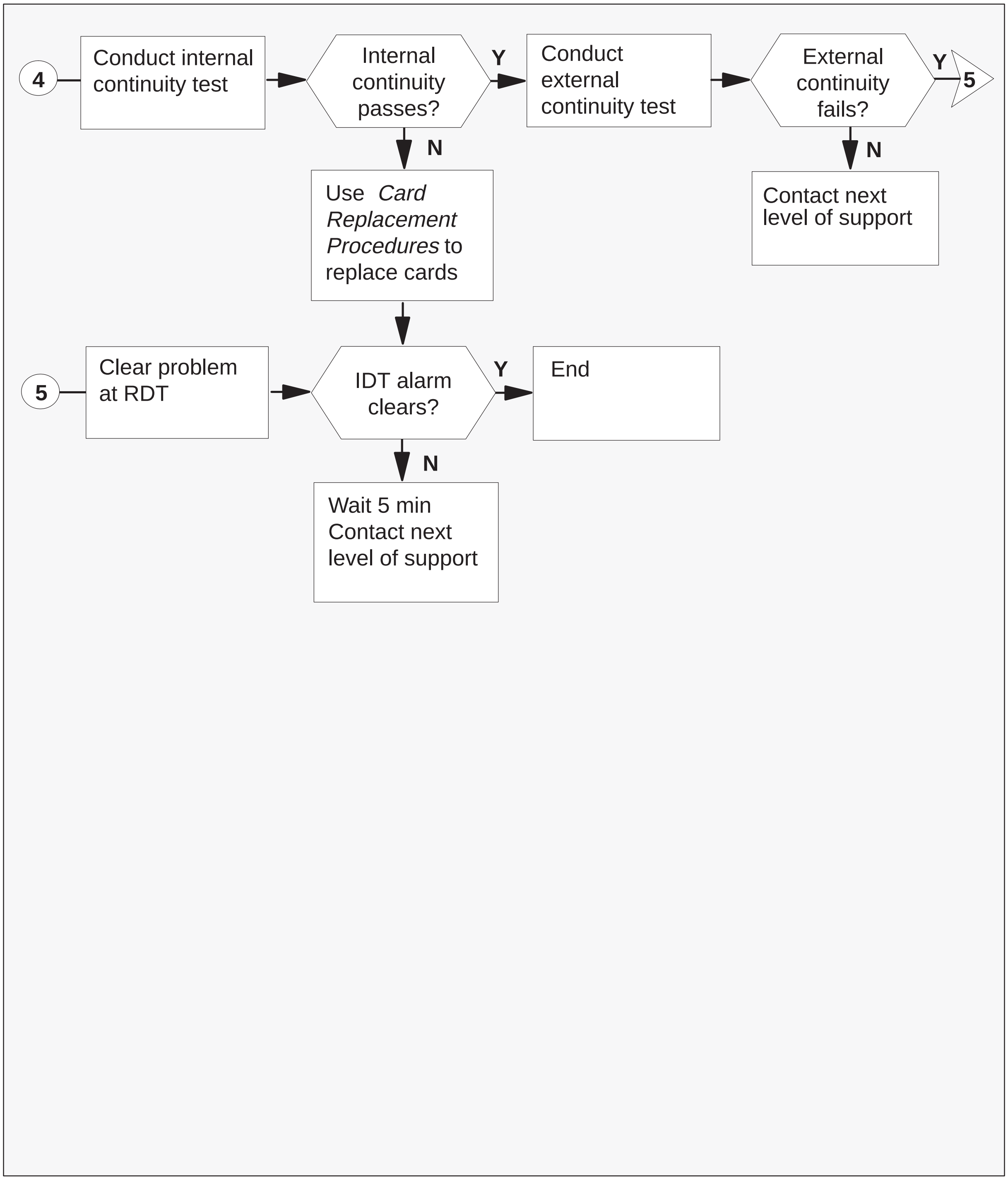
PM IDT
critical (continued)

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 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) IDT, type:

>DISP STATE SYSB IDT
and press the Enter key.

Example of a MAP 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 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.

PM IDT
critical (continued)

5 Identify the SysB message reported in step 4.

If SysB reason is	Do
fault occurs on time management channel (TMC) channels	step 6
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 central-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 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 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 is	Do
INSV	step 9
not INSV	step 10

9 Verify the peripheral-side (P-side) links that appear in step 7 are INSV.

If P-side links are	Do
INSV	step 16
not INSV	step 11

10 The SMA2 alarms are present. To clear the SMA2 alarms use *Alarm Clearing Procedures*, and return to this point.

If IDT critical is	Do
clears	step 57
does not clear	step 11

PM IDT
critical (continued)

11 To display information about the P-side message links, type:

>TRNSL MSG P
and press the Enter key.

Example of a MAP 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 The SMA2 alarms are present. To Clear the SMA2 alarms use *Alarm Clearing Procedures*, and return to this point.

PM IDT
critical (continued)

15 Determine if the IDT clears.

If IDT critical	Do
clears	step 57
does 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 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

Example of a MAP response:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
TMC2: 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 one or both TMC channels are	Do
one or both TMC channels are inhibited	step 19
one or both TMC channels are active	step 21

19 To activate path protection on an inhibited TMC or embedded operation channel (EOC) message channel, type:

>PPS ENA path
and press the Enter key.

where

path is the inhibited TMC1, TMC2, EOC1, or EOC2

20 Repeat step 19 for each inhibited channel.

21 Determine if the TMC message channels are INSV.

If TMC channels	Do
are INSV	step 28
are out-of-service (OOS)	step 22

22 To busy the IDT, type:

>BSY
and press the Enter key.

where

idt_no is the IDT that has 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 clears.

If IDT critical	Do
clears	step 57
does 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 response:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
TMC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; OOS;Standby;Enable
```

27 Determine if the channels are in-service.

If TMC and EOC channels are	Do
INSV	step 57
OOS	step 28

28 To busy the channel that has faults, type:

>BSY path
and press the Enter key.

where

path   is TMC1, TMC2, EOC1, or EOC2 that has faults

PM IDT
critical (continued)

29 To RTS the channel that has faults, type:

>RTS path
and press the Enter key.

where

path is TMC1, TMC2, EOC1, or EOC2 that has faults

If the RTS command	Do
passes	step 30
fails	step 31

30 Determine if the IDT alarm clears.

If IDT critical	Do
clears	step 57
does not clear	step 31

31 To busy the channel that has faults, type:

>BSY path
and press the Enter key.

where

path is TMC1, TMC2, 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 TMC1, TMC2, 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 with a critical alarm, type:

>POST SMA sma_no
and press the Enter key

where

sma_no is the number of the SMA

34 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

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 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    16  BX01
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

PM IDT
critical (continued)

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 RTS the inactive unit, 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 that has the fault

43 To RTS the channel that has faults, type:

>RTS path
and press the Enter key.

where

path   is the busied TMC1, TMC2, 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 that has the fault

45 To RTS the channel that has faults, type:

>RTS path
and press the Enter key.

where

path   is the busied TMC1, TMC2, EOC1, or EOC2

46 Set up a loopback path at the RDT to prepare for an external continuity test. Refer to RDT documentation to set or release a loopback on a DS-1 facility.

PM IDT
critical (continued)

47 To test the active TMC channel that has faults for external continuity, type:

>CONT path EXT
and press the Enter key.

where

path is the busied TMC1, TMC2, EOC1, or EOC2

Note: You must conduct the external continuity on an active path.

If CONT	Do
fails	step 48
passes	step 56

48 The problem is at the RDT. Go to RDT documentation for information on how to clear the problem, and return to this point.

Go to step 57.

49 Monitor the alarm. System action can correct the alarm condition. This message occurs when the central control (CC) unit starts again.

If after 15 min the alarm	Do
clears	step 57
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 m the alarm	Do
clears	step 57
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 is not compatible. The state of the IDT in the SMA does not match the state of the IDT in the switch.

If after 15 m the alarm	Do
clears	step 57
does not clear	step 56

52 Monitor the alarm. System action can correct the alarm condition. This message occurs when SMA internal maintenance component sends more than 100 unsolicited messages during a 10 m period.

If after 15 m the alarm	Do
clears	step 57
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 response

```
RDTalarm
RDT Name:  RDT 1 03 0
Network Element:  3 RALEIGH_AMEX_B13

ACTIVE ALARMS :  Fac    Eqp   Env    Sfw    Svc    Thr    Ind
--------------------------------------------------------------
Critical      :  2      0     0      0      0      0      0
Major         :  0      0     0      0      0      0      0
Minor         :  0      0     0      0      0      0      0
Warning       :  0      0     0      0      0      0      0
```

Note: For multi-vendor interface (MVI) RDTs, this display does not always appear.

54 To correct the defective conditions at the RDT in step 53, refer to RDT procedures to clear alarms. The IDT in-service-trouble 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 RTS. To correct the problem on the SMA, refer to the correct procedure in this document:

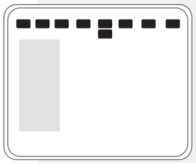
- SMA critical alarm clearing procedures
- SMA major alarm clearing procedures
- SMA minor alarm clearing procedures

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 peripheral module (PM) header in the MAP subsystem display. This code indicates that an alarm condition is present in the IDT. The digit *n* indicates the number of IDT modules with alarms. The letter *M* that appears under the alarm indicates the alarm class is major.

Meaning

This alarm normally indicates a fault with messaging channels between the remote digital terminal (RDT) and the IDT. This alarm can also indicate RDT alarms.

Result

A major alarm class code indicates the IDT has an in-service trouble (ISTb) condition. The IDT continues to process calls, but a potential service-affecting fault condition is present. To reduce the potential effect on subscriber service, isolate the fault condition. Correct the fault condition as directed by the procedure that follows.

Common procedures

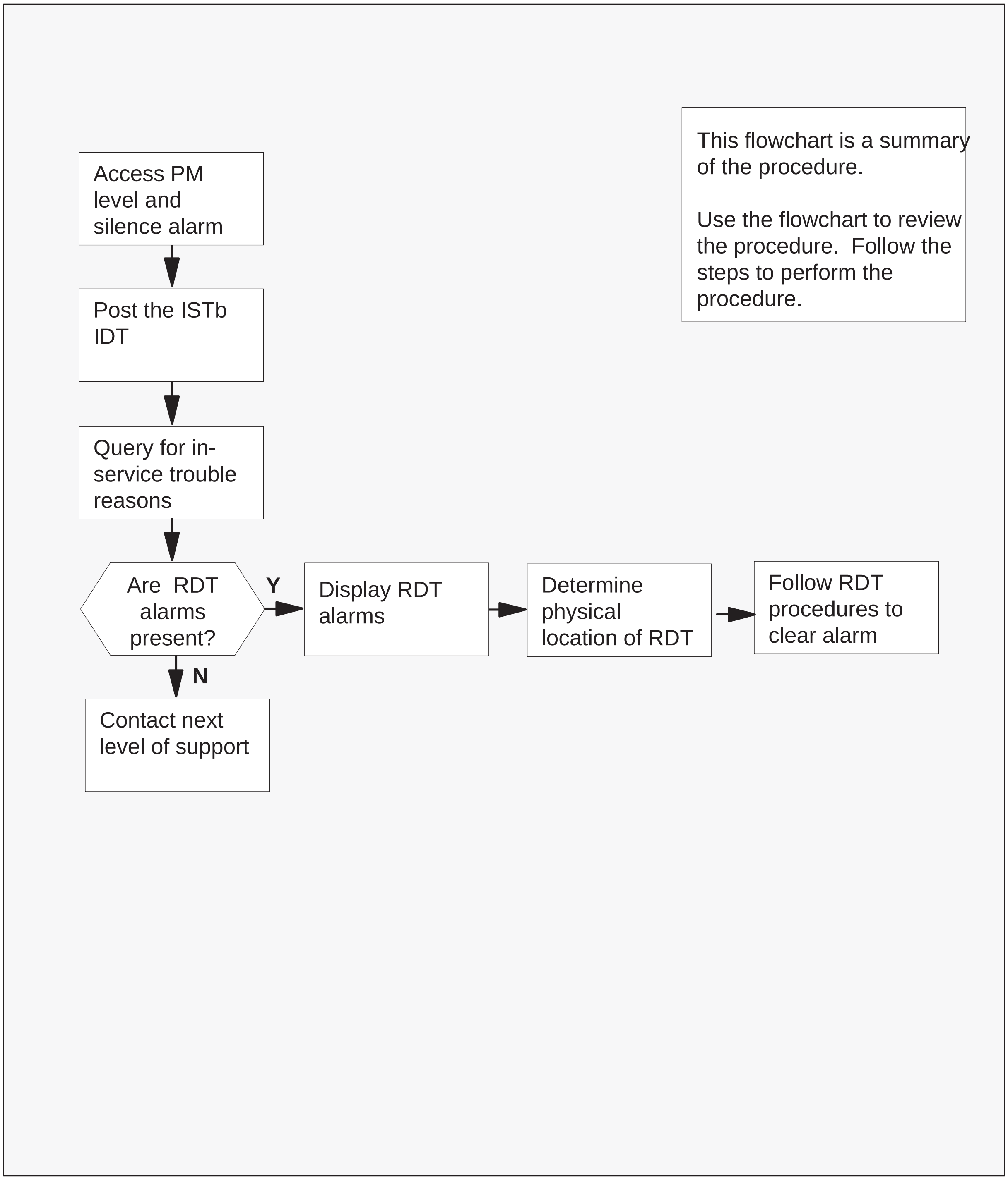
There are no common procedures.

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 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 ISTb IDT, type:

>DISP STATE ISTB IDT
and press the Enter key

Example of a MAP response:

```
ISTb IDT: 1
```

3 To access the ISTb IDT, type:

>POST IDT idt_no
and press the Enter key.

where

idt_no   is the number of the IDT displayed

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 ISTb message reported.

If ISTb 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 type of 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    Thr    Ind
-------------------------------------------------------------
Critical      : 2       0     0      0      0      0      0
Major         : 0       0     0      0      0      0      0
Minor         : 0       0     0      0      0      0      0
Warning       : 0       0     0      0      0      0      0
```

Note: For multi-vendor interface (MVI) RDTs, this display can appear.

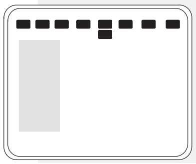
7 To correct the fault conditions at the RDT, refer to RDT procedures for clearing alarms. The IDT ISTb indication stops after the alarm clears at the RDT.

8 For additional help, contact the personnel responsible for the next level of support.

9 The 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 code indicates an alarm condition 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.

Result

A minor alarm class code indicates the IDT has an in-service trouble (ISTb) condition. The IDT continues to process calls, but a fault condition exists. The fault conditions can can affect service.

To reduce the potential effect on subscriber service, isolate and correct the fault condition. Correct the fault condition as the following procedure directs.

Common procedures

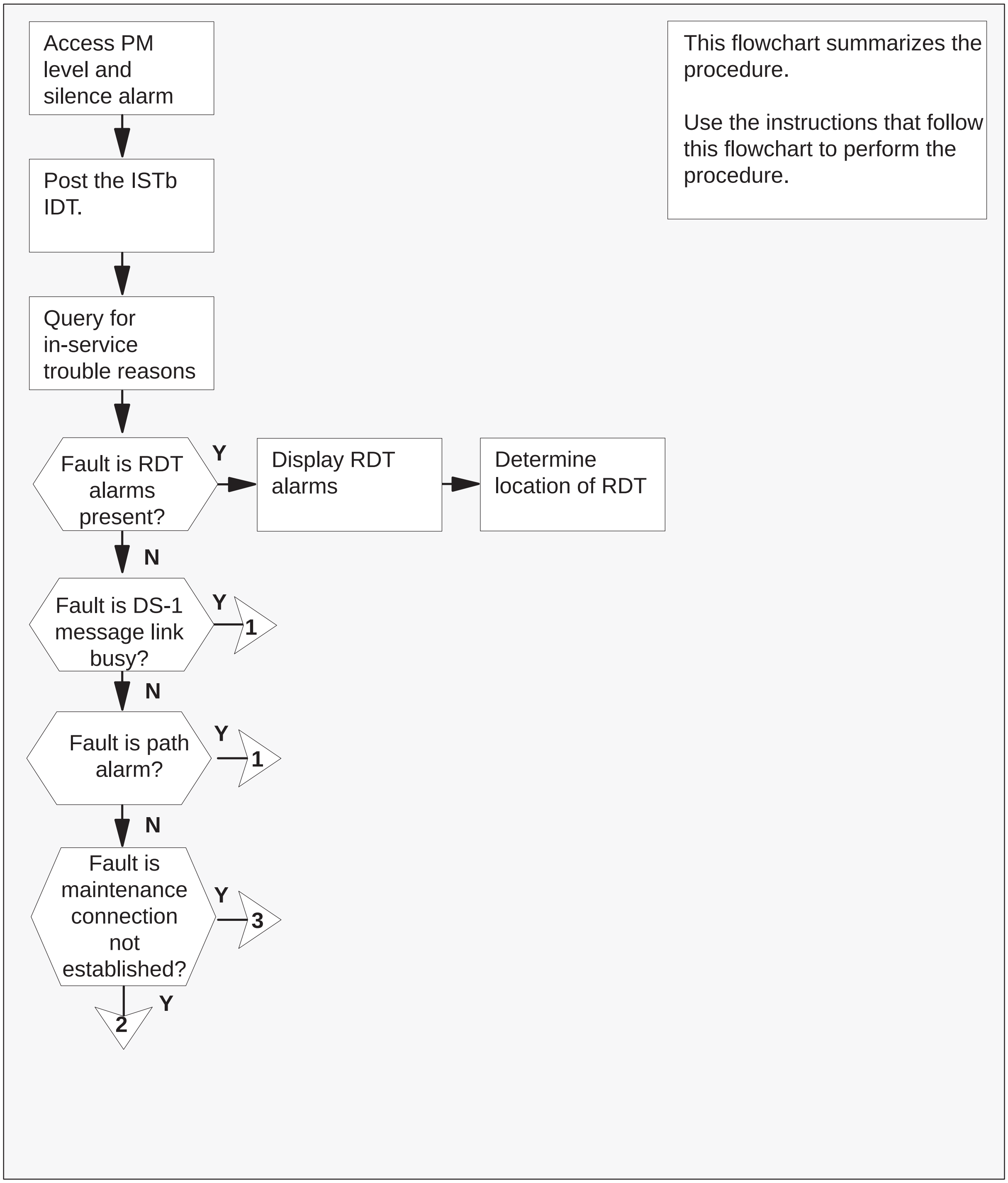
There are no common procedures.

Action

The following flowchart is a summary of the procedure. Use the instructions that follow the flowchart to clear the alarm.

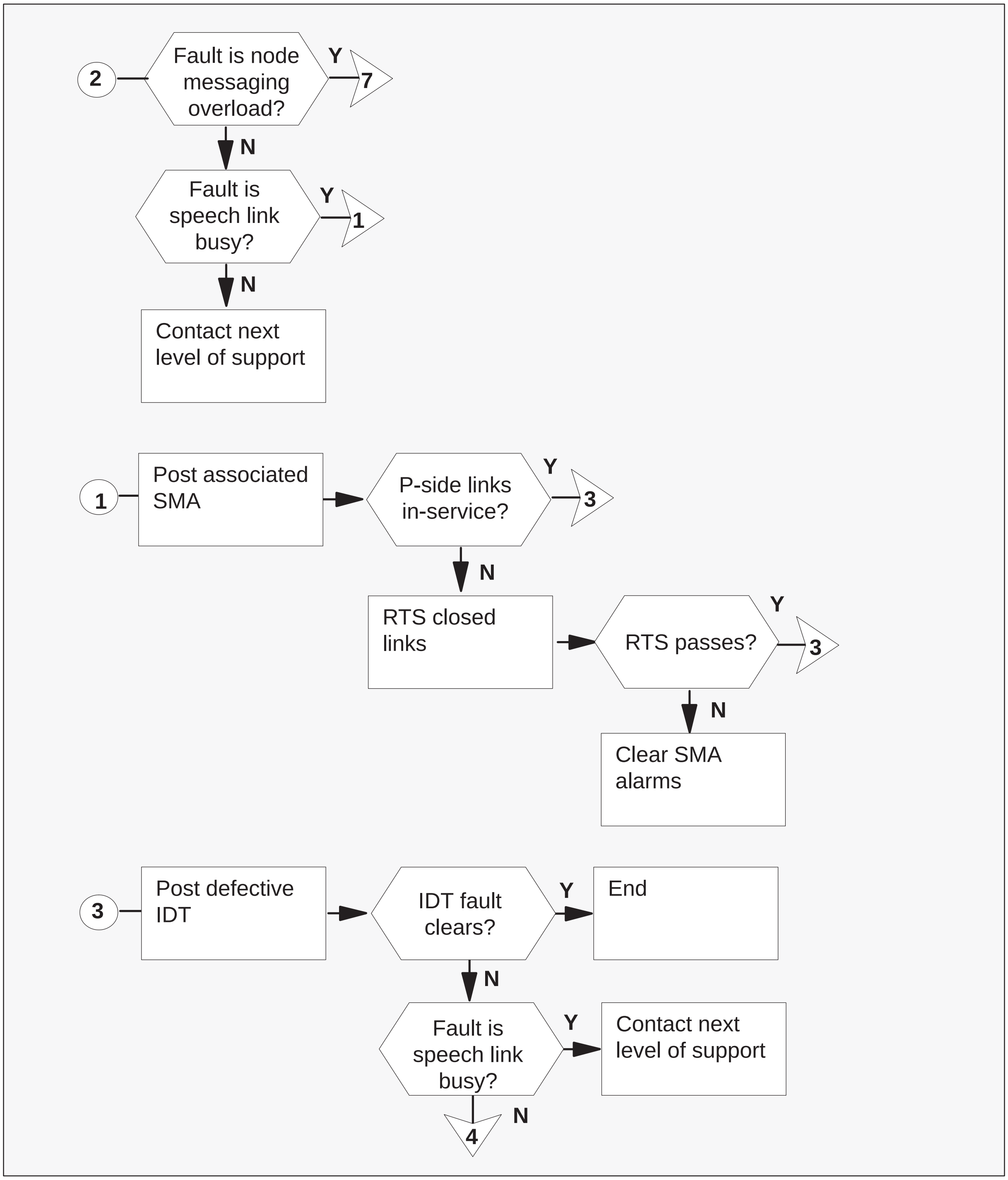
PM IDT
minor (continued)

Summary of clearing a PM IDT alarm



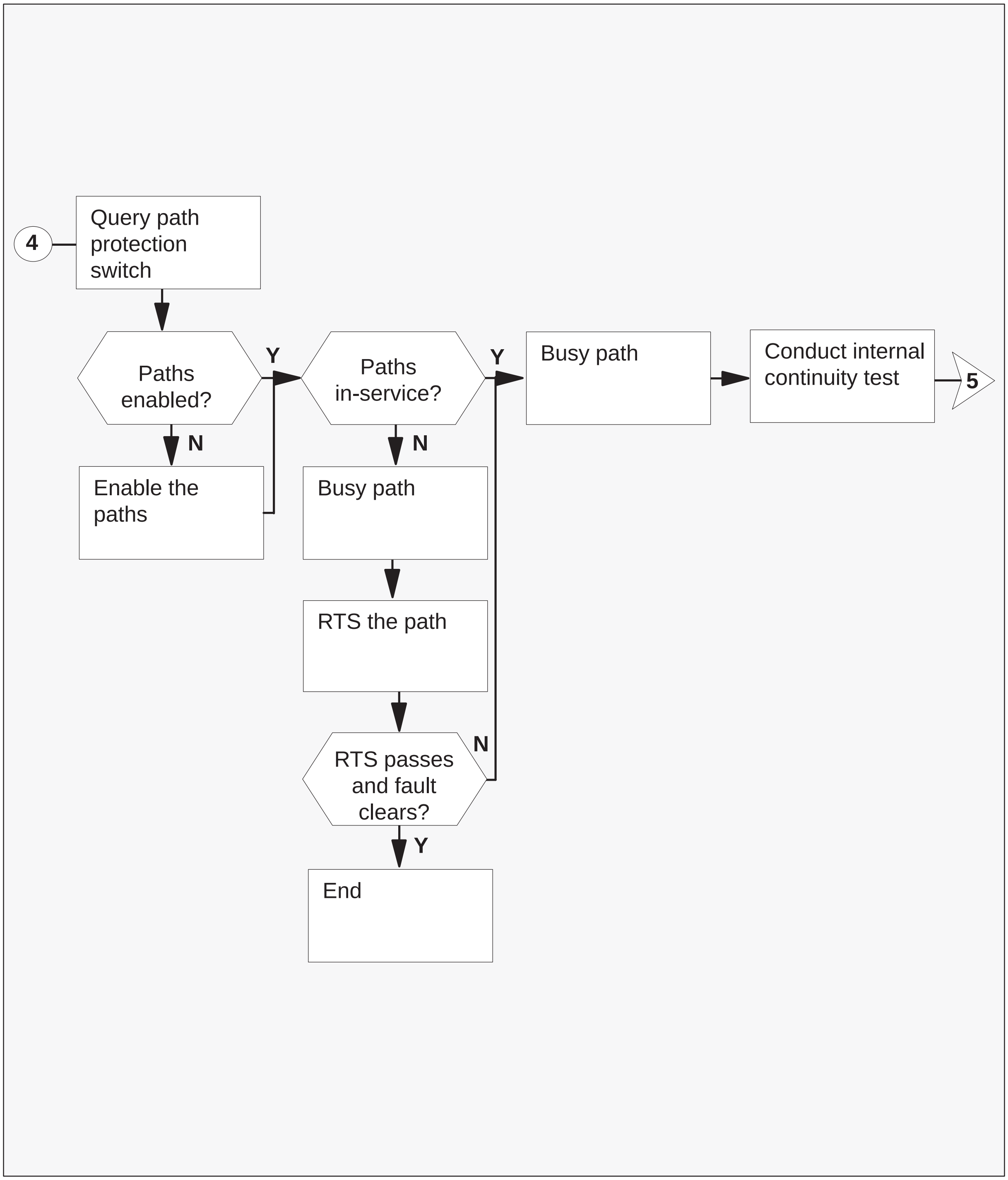
PM IDT
minor (continued)

Summary of clearing a PM IDT alarm (continued)



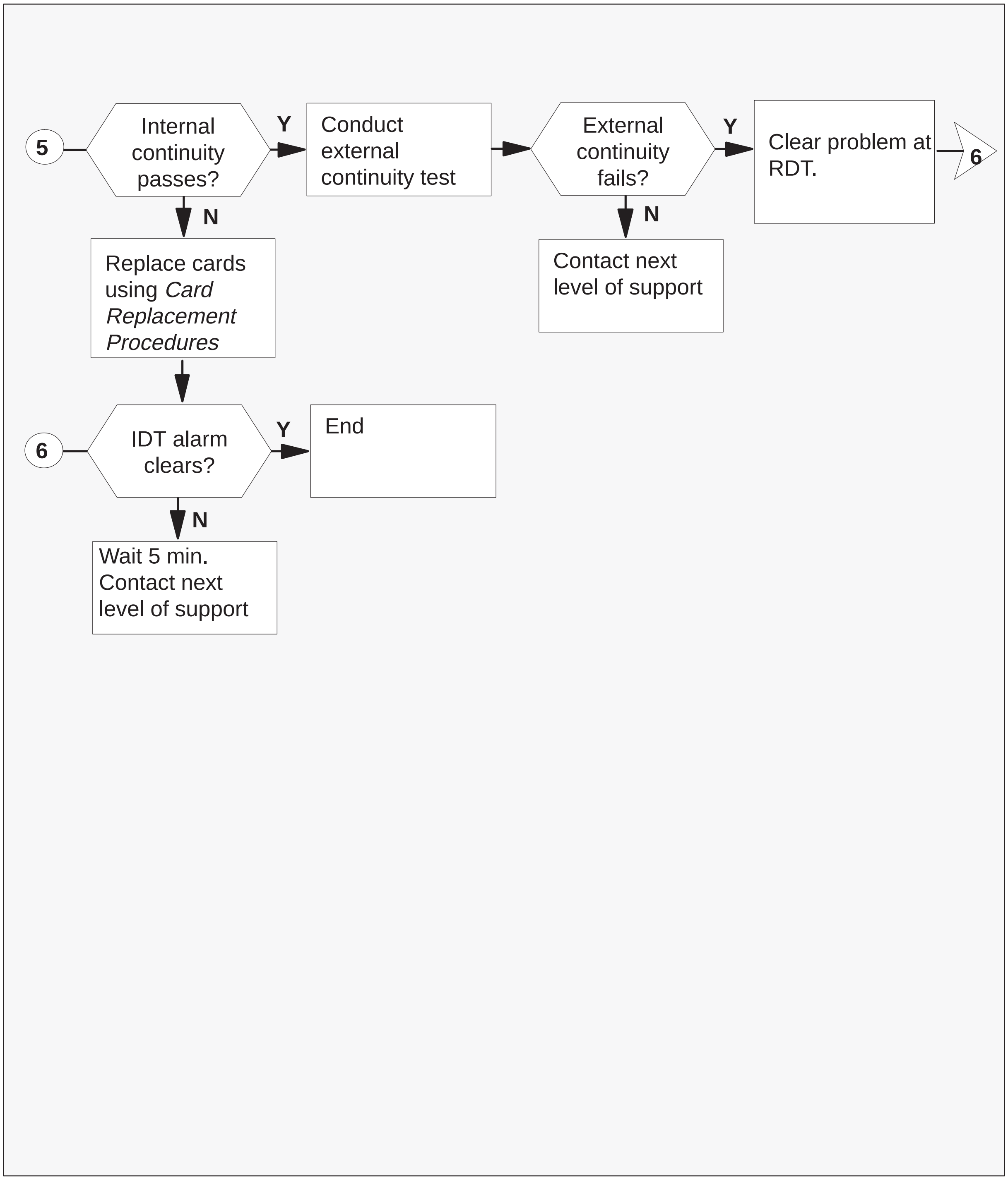
PM IDT
minor (continued)

Summary of clearing a PM IDT alarm (continued)



PM IDT
minor (continued)

Summary of clearing a PM IDT alarm (continued)



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 time management channel (TMC) peripheral-side (P-side) node messaging overload	step 70
is EOC P-side node messaging overload	step 70
is P-side node messaging system overload on SMA	step 70
is RDT alarms present	step 72

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
```

PM IDT
minor (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 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 busied 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 on the list	step 74
did not replace all the cards on the list	step 12

12 Refer to *Card Replacement Procedures* for the procedure to replace 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.

where

link_no is the number of the link tested in step 10

Go to the next step.

PM IDT
minor (continued)

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 displayed 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 is not clear	step 74
DS-1 message link busy or path alarm is not clear	step 17
speech link busy, DS-1 message link busy or path alarm cleared	step 75

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 that appears 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
```

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:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
TMC2: SMA 7  8 24; OOS;Standby;Enable
EOC2: SMA 7  8 12; 00S;Standby;Enable
```

If any channels	Do
are inhibited	step 18
are enabled	step 25

18 To enable path protection on a disabled TMC message channel, type

>PPS ENA path
and press the Enter key.

where

path   is TMC1, TMC2, 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 TMC1, TMC2, EOC1, or EOC2

22 To return-to-service (RTS) busied TMC channels, type

>RTS path
and press the Enter key.

where

path   is TMC1, TMC2, EOC1, or EOC2

If RTS	Do
passes	step 24
fails	step 26

23 Repeat steps 21 and 22 for all channels that are out-of-service.

24 Determine if an active TMC 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 clears, type

>QUERYPM FLT
and press the Enter key.

If alarm	Do
cleared	step 75
did not clear	step 50

26 To busy the channel that has faults, type

>BSY path
and press the Enter key.

where

path   is TMC1 or TMC2 that has faults

PM IDT
minor (continued)

27 To test the TMC channel that has faults for internal continuity, type

>CONT path INT
and press the Enter key.

where

path   is TMC1 or TMC2 you busy 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 74
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 74

32 Check the card list that displays 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* 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 74

PM IDT
minor (continued)

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
passes	step 36
fails	step 74

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 74

37 To post the in-service trouble IDT posted in step 16, type

>POST IDT idt_no
and press the Enter key.

where

idt_no is the number of the IDT that appears in step 16

38 To return-to-service the busied channel, type

>RTS path
and press the Enter key.

where

path is TMC 1 or TMC2 identified in step 26

Go to step 75.

PM IDT
minor (continued)

39 To return-to-service the channel that has defects, type

>RTS path
and press the Enter key.

where

path   is TMC1 or TMC2 identified in step 26

40 Set up a loopback path at the RDT to prepare for an external continuity test. Refer to RDT documentation for setting or releasing a loopback on a DS-1 facility.

41 To test the active TMC channel that has faults for external continuity, type

>CONT path EXT
and press the Enter key.

where

path   is TMC1 or TMC2 identified in step 26

Note: Conduct the external continuity test on an active path.

If CONT	Do
passes	step 42
fails	step 74

42 The problem is at the RDT.

Go to step 75.

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

PM IDT
minor (continued)

44 To display 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:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
TMC2: 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

45 To enable path protection on a disabled TMC message channel, type

>PPS ENA path
and press the Enter key.

where

path   is TMC1, TMC2, 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

PM IDT
minor (continued)

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

50 Wait 5 min to establish the maintenance connection.

If the system	Do
establishes a connection	step 75
does not establish a connection	step 51

51 To determine if the system cleared the maintenance path not established alarm, type

>QUERYPM FLT
and press the Enter key.

If alarm	Do
cleared	step 75
did not clear	step 52

52 To busy the EOC channel, type

>BSY path
and press the Enter key.

where

path is defective EOC1 or EOC2

PM IDT
minor (continued)

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

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 74
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 74

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
```

59 Refer to *Card Replacement Procedures* 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 74

PM IDT
minor (continued)

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 74

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 74

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
```

PM IDT
minor (continued)

64 For information about the state of the message channels between the IDT and the RDT, type

>PPS QUERY
and pres the Enter key.

Example of a MAP response:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
TMC2: 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 pres the Enter key.

where

path   is the busied EOC1 or EOC2

Go to step 75.

66 To return-to-service the TMC that has faults, type

>RTS path
and press the Enter key.

where

path   is the busied TMC1 or TMC2

67 Set up a loopback path at the RDT to prepare for an external continuity test. Refer to RDT documentation.

68 To test the active TMC channel that has faults for external continuity, type

>CONT path EXT
and press the Enter key.

where

path   is the busied TMC1 or TMC2

If CONT	Do
fails	step 69
passes	step 74

PM IDT
minor (end)

69 The problem is at the RDT.

Go to step 75.

70 Wait until overload conditions clear. Refer to the local operating procedures for the required length of time to wait.

If overload conditions	Do
clear in time frame	step 75
do not clear after time frame	step 71

71 An engineering problem at the RDT can cause congestion.

Go to step 74.

72 To determine the number and type of critical RDT 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    Thr    Ind
-------------------------------------------------------------
Critical      : 2       0     0      0      0      0      0
Major         : 0       0     0      0      0      0      0
Minor         : 0       0     0      0      0      0      0
Warning       : 0       0     0      0      0      0      0
```

Note: For multi-vendor interface (MVI) RDTs, this display can appear.

73 To correct the fault conditions at the RDT identified in step 72, refer to RDT procedures to clear alarms. The system retires the IDT in-service-trouble after the alarm clears at the RDT. Go to step 75.

74 For additional help, contact the next level of support.

75 The procedure is complete.

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 an alarm condition 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 that the alarm class is major. A blank below the alarm indicates that the alarm class is minor.

Meaning

These alarms indicate alarm conditions in an external unit like an S/DMS Remote Digital Terminal (RDT). Operating company personnel must investigate to determine if the alarm is related to RDT. When an Ext alarm is related to RDT, an alarm in the corresponding Integrated Digital Terminal (IDT) also becomes in-service trouble (ISTb).

Impact

The type and seriousness of the problem on the RDT that raises the alarm determines impact.

Ext RDT critical/major/minor (continued)

Common procedures

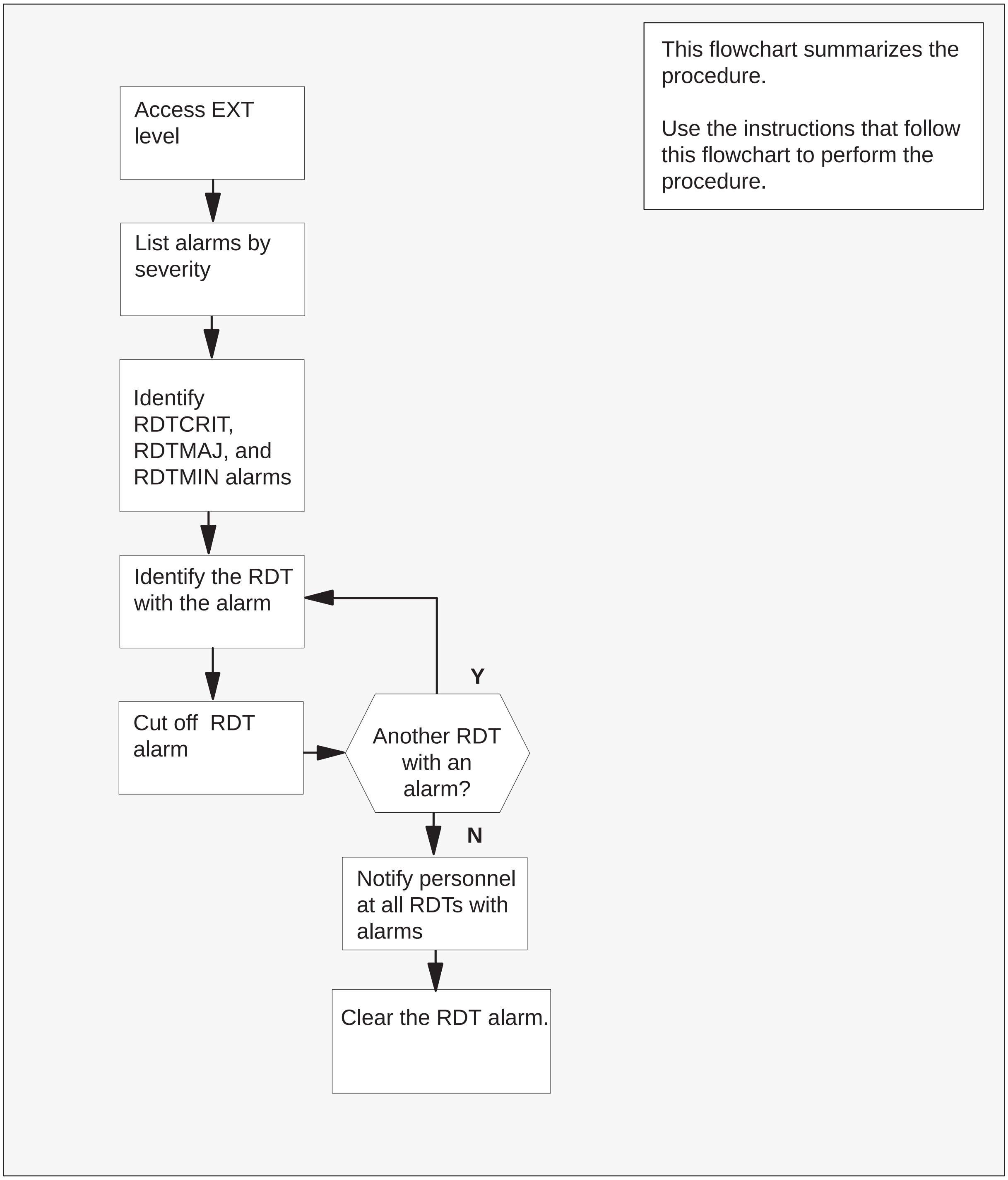
There are no common procedures.

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.

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 at the EXT level of the MAP display. To access the EXT level when the system raises an 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 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	Do
is displayed	step 8
is not displayed	step 5

Ext RDT critical/major/minor (continued)

5 To determine if the external major alarms are related to a RDT, type

>LIST MAJ
and press the Enter key.

If RDTMJ	**Do**
is displayed	step 8
is not displayed	step 6

6 To determine if the external minor alarms are related to an RDT, type

>LIST MIN
and press the Enter key.

If RDTMN	**Do**
is displayed	step 8
is not displayed	step 7

7 Identify the unit that caused the alarm. To correct the problem, refer to the correct documentation.

Ext RDT critical/major/minor (continued)

8 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 appears. Signal distribution point(s) corresponding to the status of the active alarm also appear. The system only displays SD points for one RDT at a time. The RDT that appears is the RDT with the most severe condition.

Example of a MAP display:

```
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               RDTSD1
 6               RDTSD3
 7 List_         RDTSD8
 8 TstDSAlm      RDTCRIT
 9 SetSD_
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 signal distribution points (RDTSDn) that the system displays identify each RDT in table RDTINV.

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. If there are other RDTs with alarms, the system displays the next RDT with the most severe alarm.

The RDTALRMCO function allows the user to re-enable RDT alarms that the user cut off earlier. The status of the cutoff does not affect the display of the new alarms. The system displays signal distribution points for a minimum of 20 s. The system displays the signal distribution points. When a more critical alarm occurs or the user activates the alarm cutoff, the system does not display the signal distribution points.

If	Do
other RDT alarms occur	step 3
other RDT alarms do not occur	step 11

11 To access table RDTINV, type

>TABLE RDTINV
and press the Enter key.

Example of a MAP display:

```
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
                                                  MTSTACPT
                                                  LINKTAB
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:

```
RDTNAME     ADNUM       IDTNAME        NENAME
            PRIMOPC                    BACKOPC
                                            VARTYPE
                                                MTSTACPT
                                                LINKTAB
   PROT  POTSPADG       EOC
                                                SDPOINTS
                                                RDTDN
___________________________________________________
REM3 01 0   10          SMA 1 3           $
              $                           $
                              GENTMC  7  96  Y Y $
                                                 $
                            (1 0) (2 1 ) (3 4 )  $
N         STDLN             S         C
         (NETWORK_ID 1) (NETWORKELEMENT_ID 14)   $
```

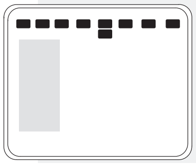
14 Identify the name of the RDT with the critical alarm. For example, the name of the RDT in step 13 is REM3.

15 Notify operating company personnel each time an RDT has an alarm.

16 To correct the fault conditions at the RDT, refer to RDT procedures for clearing alarms.

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* indicates the alarm class is critical.

Meaning

This alarm normally indicates that one or more common peripheral controller cards in the SMA has faults.

Result

A critical alarm class code indicates the SMA cannot process calls.

Common procedures

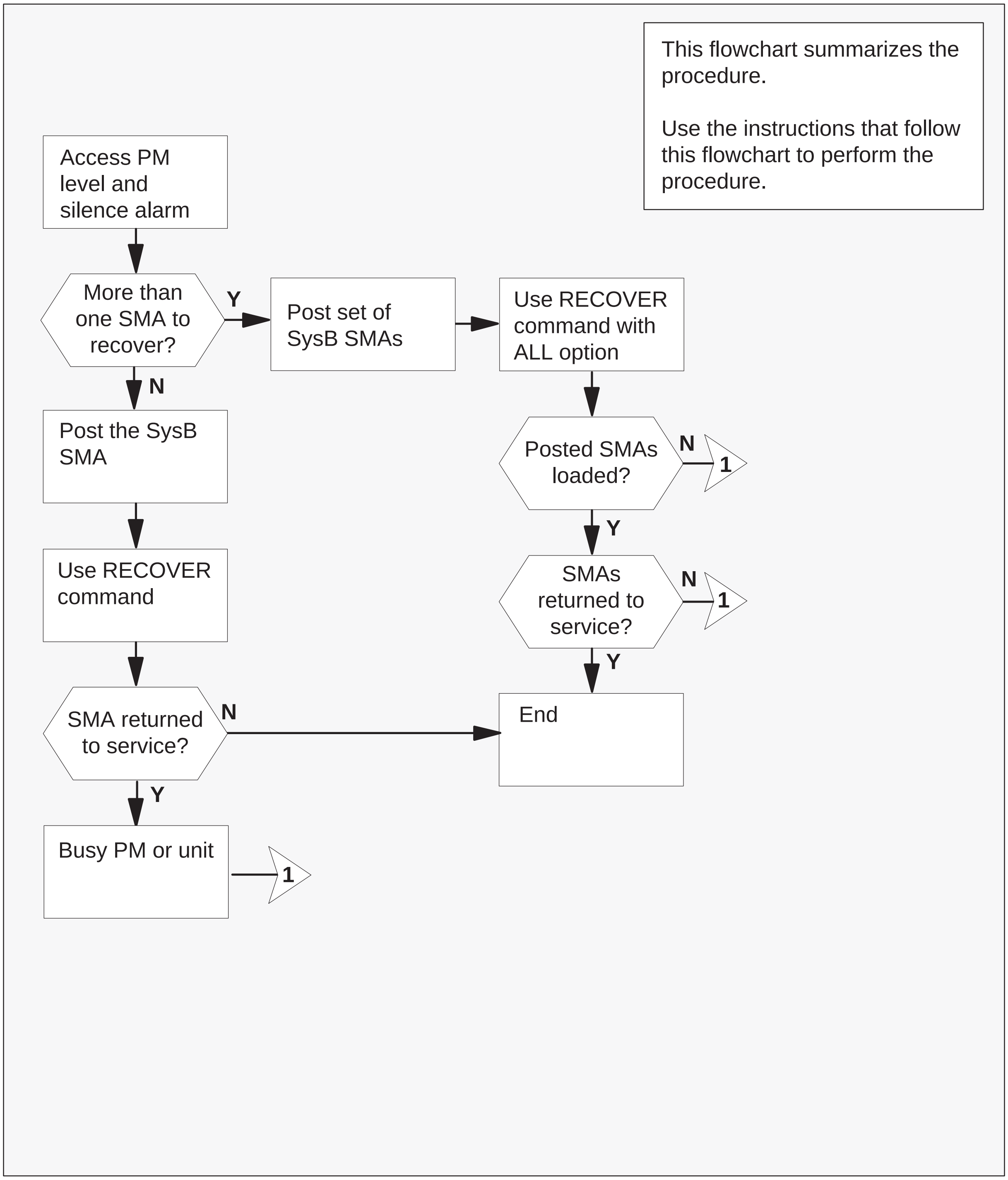
There are no common procedures.

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.

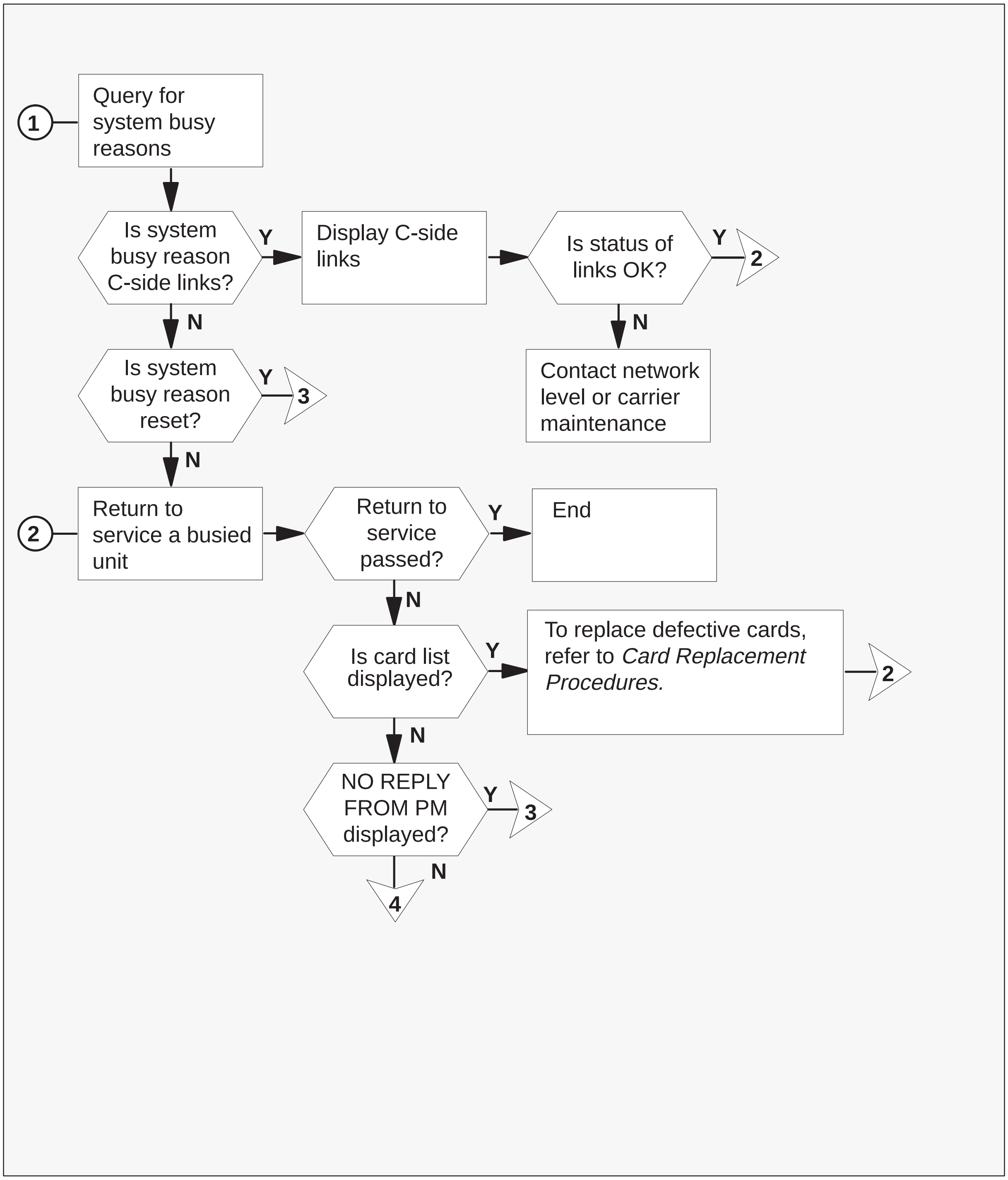
PM SMA
critical (continued)

Summary of clearing a PM SMA alarm



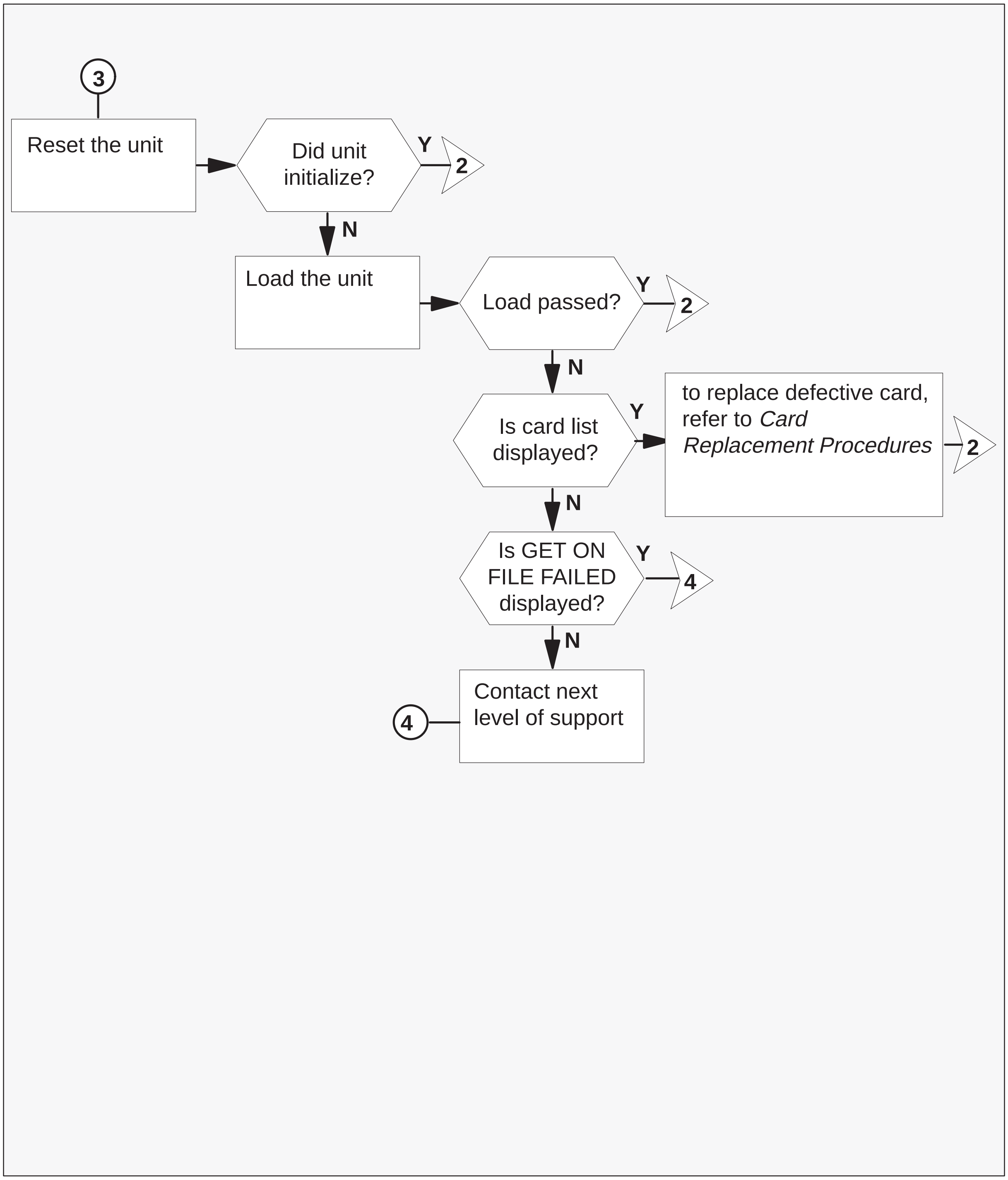
PM SMA
critical (continued)

Summary of clearing an PM SMA alarm (continued)



PM SMA
critical (continued)

Summary of clearing an PM SMA alarm (continued)



PM SMA
critical (continued)

Clearing an 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 response:

```
SysB SMA: 0
```

If	Do
one SMA is system-busy	step 6
more than one SMA is 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     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 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.

5 To confirm recovery, type

>YES
and press the Enter key.

Go to step 8.

6 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
```

7 To recover system-busy SMAs with the PM recovery tool, type

>RECOVER
and press the Enter key.

Example of a MAP response:

```
recover
SMA 0 Recover request submitted
```

PM SMA
critical (continued)

8 The following example of a MAP response describes a recover request that the recovery tool submits for each posted SMA.

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 require recovery. For each SMA that requires recovery, the tool attempts to load the PM units 0 and 1. For each SMA the system loads, and for all other SMAs that require recovery tool, the tool attempts to return the active unit to service.

In the following example:

- the system loads SMA 0 and returned SMA 0 to service.
- SMA 1 returns to service.
- SMA 2 did not load unit 0, but did load unit 1, and returned to service unit 1.
- SMA 3 did not 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
```

PM SMA
critical (continued)

The following example describes the summary of the operation the tool provides :

Example of a MAP response:

```
Summary:
3 passed
1 failed
```

9 Determine if all the SMAs are recovered.

Note: The recovery process places one unit InSv and one unit ManB. If the recovery process cannot recover these units, the recovery process leaves both units in a ManB state.

If	Do
all SMAs recover	step 31
one or more SMAs do not recover	step 10

10 Record the SMAs that did not recover.

11 To post the ManB SMA, type

>POST SMA sma_no
and press the Enter key.

where

sma_no is the number of an SMA recorded in step 10

12 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

13 Identify the failure message reported in step 12.

If the failure reason	Do
is reset	step 17
is Central-side (C-side) links	step 25
is other than listed here	step 14

14 To select a unit to work on and return the unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit to return to service

If RTS	Do
passes	step 28
fails	step 15

15 Identify the return to service failure message.

If display	Do
is `NO REPLY FROM PM`	step 16
is `FAIL MESSAGE RECEIVED FROM PM`	step 29
is a card list	step 20

16 Determine if the `NO REPLY FROM PM` message already occurred.

If `NO REPLY FROM PM` message	Do
occurred before	step 29
did not occur before	step 17

PM SMA
critical (continued)

17 To set the unit again, type

>PMRESET UNIT unit_no
and press the Enter key.

where

unit_no is the number of the unit selected in step 14

Note: During reset, the MAP display must indicate the reset events in the order described in the following MAP response.

Example of a MAP response:

```
RESET
STATUS
RUN
INITIALIZE
STATIC DATA
```

If unit	Do
does not initialize	step 22
initializes	step 18

18 Determine if the `NO REPLY FROM PM` message appears.

If `NO REPLY FROM PM`	Do
appears	step 29
does not appear	step 19

19 Determine if the `NO WAI AFTER RESET` message appears.

If `NO WAI AFTER RESET`	Do
appears	step 20
does not appear	step 14

20 Check 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  51  SMA : 000    12  AX74
```

If you	Do
replaced all the cards	step 29
did not replace all the cards	step 21

21 Go to *Card Replacement Procedures* for the next card on the list. Return to this point.

If you	Do
replaced the card because a LOADPM failure occurred	step 22
replaced the card because a RTS failure occurred	step 14

22 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 14
fails	step 23

PM SMA
critical (continued)

23 Identify the failed load reported in step 22.

If message displayed	Do
is a card list	step 20
is not a card list	step 29
is GET ON FILE FAILED	step 24
is other than listed here	step 30

24 The message GET ON FILE FAILED indicates a problem with the storage device. Go to step 30.

25 To display the status of C-side links, type

>TRNSL C
and press the Enter key.

Example of a MAP 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
```

26 Record the numbers and conditions of the links.

If	Do
MS link condition is CLS	step 27
state of all links is not OK	step 27
state of all links is OK	step 14

27 Problems with the network interface card or the ENET port interface card can cause this condition. Contact the network level maintenance group.

PM SMA critical (end)

28 Recover the next SMA unit or next SMA PM recorded in step 10.

If	Do
another SMA requires recovery	step 11
all SMAs are recovered	step 31

29 Determine the next step.

If you attempted to recover	Do
only one unit, attempt to recover the next unit	step 14
both units, and both units failed	step 30

30 For additional help, contact the next level of support.

31 The recovery process places one unit INSV and one unit ManB. Go to the appropriate procedure to clear the alarm in the *Alarm Clearing Procedures* section to complete the recovery process.

32 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 appears under the peripheral module (PM) header in the MAP subsystem display. This alarm code indicates an alarm condition is present in the SMA.

The *n* indicates the number of SMA modules with alarms. The letter M that appears under the alarm code indicates the alarm class is major.

Meaning

This alarm normally indicates that one or more common peripheral controller cards in the SMA have faults.

Result

A major alarm class code indicates 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 that has faults.

Common procedures

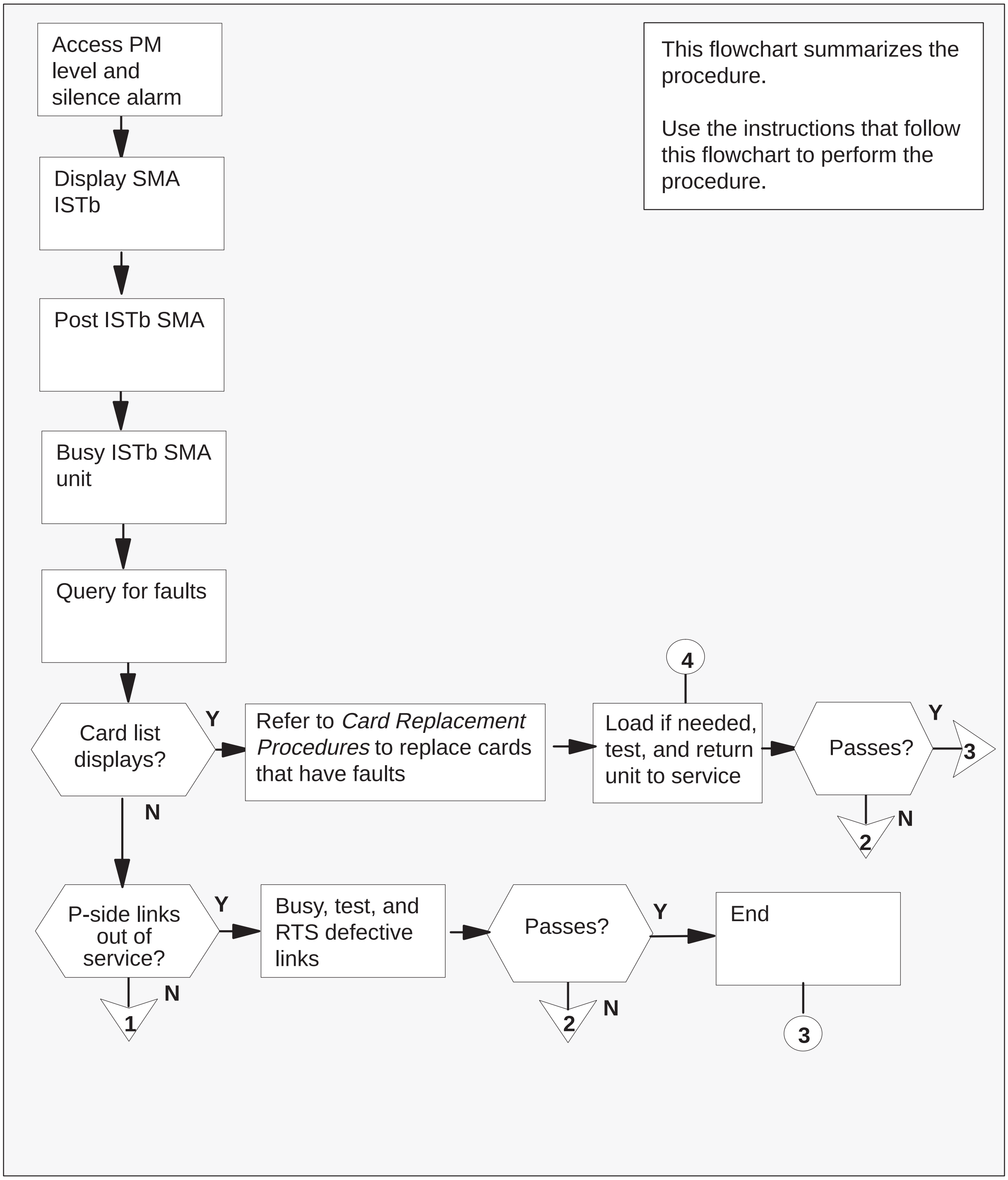
There are no common procedures.

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.

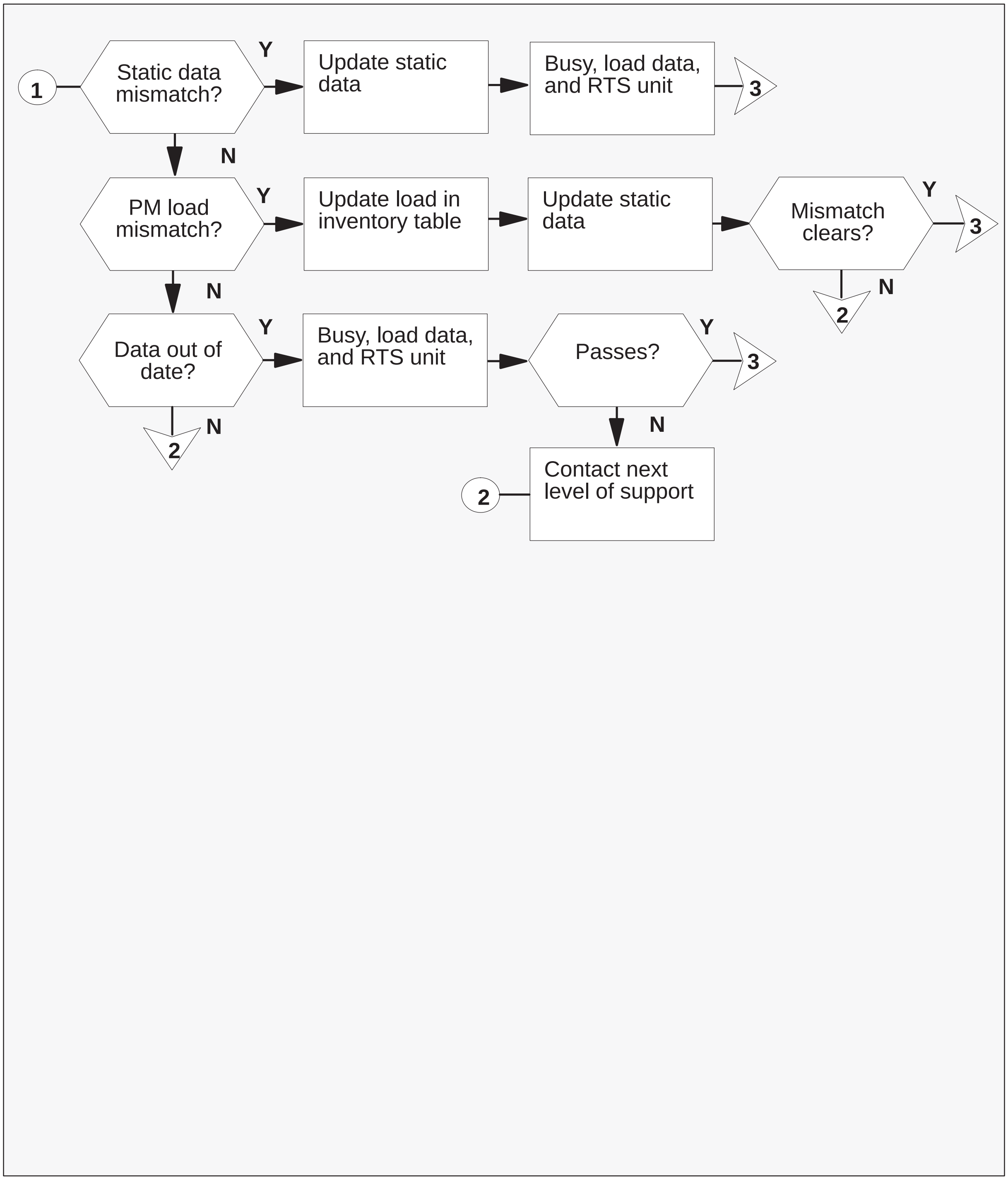
PM SMA
major (continued)

Summary of clearing a PM SMA alarm



PM SMA
major (continued)

Summary of clearing a PM SMA alarm



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 and silence the alarm, type

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

2 To determine which SMAs are ISTb, type

>DISP STATE ISTB SMA
and press the Enter key.

Example of a MAP response:

```
ISTb SMA:  4
```

3 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 2
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 one unit	Do
is SysB	step 4
is central side busy (CBsy)	step 15

4 To busy the inactive unit, type

>BSY INACTIVE
and press the Enter key.

PM SMA
major (continued)

5 To return the inactive unit to service, type

>RTS INACTIVE
and press the Enter key.

If RTS	Do
passes	step 9
fails, and the system does not generate a card list	step 6
fails, and the system generates a card list	step 7

6 To load the inactive unit, type

>LOADPM INACTIVE
and press the Enter key.

If the load	Do
passes	step 5
fails, and the system does not generate a card list	step 17
fails, and the system generates a card list	step 7

7 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 17
did not replace all the cards on the list	step 8

PM SMA
major (continued)

8 Refer to *Card Replacement Procedures* for the next card on the list and return to this point.

Determine if the card is replaced as a result of a LOADPM or RTS failure.

If you	Do
replace the card because of a LOADPM failure	step 6
replace the card because of an RTS failure	step 5

9 Perform a QUERYPM FLT. Wait for the static data update to finish before you proceed.

If the active unit	Do
stays in an ISTb condition	step 17
is in-service	step 10

10 You return the inactive unit to service. Determine if the active unit is in-service.

If the active unit	Do
is in-service	step 18
is in-service trouble and static data finished the update	step 5

11 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 6
can continue	step 7

PM SMA
major (continued)

12 To reject the prompt to SWACT the units, type

>NO
and press the Enter key.

The system stops the SWACT.

Return to step 11 during a period of low traffic.

13 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 14
is `SwAct failed because XPM SwActback`	step 17
is `SwAct refused by SwAct controller`	step 17

14 Determine the condition of the unit that is now inactive.

If the newly inactive unit	Do
stays in an ISTb condition	step 4
is in service	step 18

PM SMA
major (end)

15 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
```

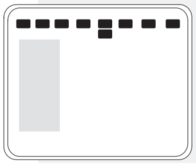
16 Note the numbers and conditions of the links. Report this information to the personnel responsible for network level maintenance.

17 For additional help, contact the next level of support.

18 The procedure is complete. If other alarms display, refer to the correct 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 maintenance module-100 access (SMA) alarm indicates an alarm condition in the SMA. This alarm appears under the peripheral module (PM) header at the MAP display. The n indicates the number of SMA modules with alarms. The blank under the alarm indicates a minor alarm.

Meaning

This alarm normally indicates one or more common peripheral controller cards in the SMA has defects. 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) condition. The SMA continues to process calls, but a possible service-affecting fault condition is present. To reduce the possible impact to subscriber service, isolate the fault condition to the defective component. Replace the component according to the procedure.

Common procedures

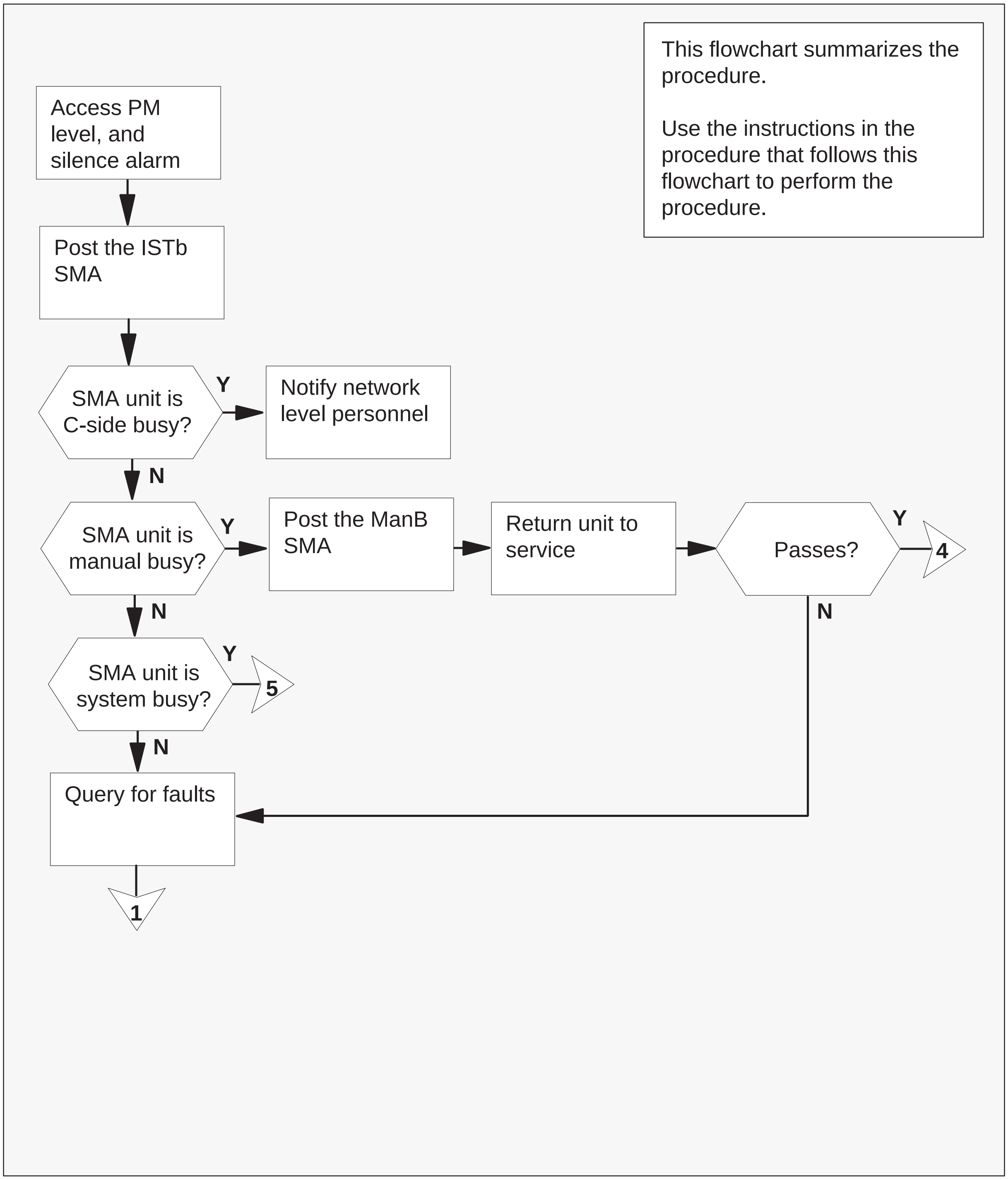
There are no common procedures.

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.

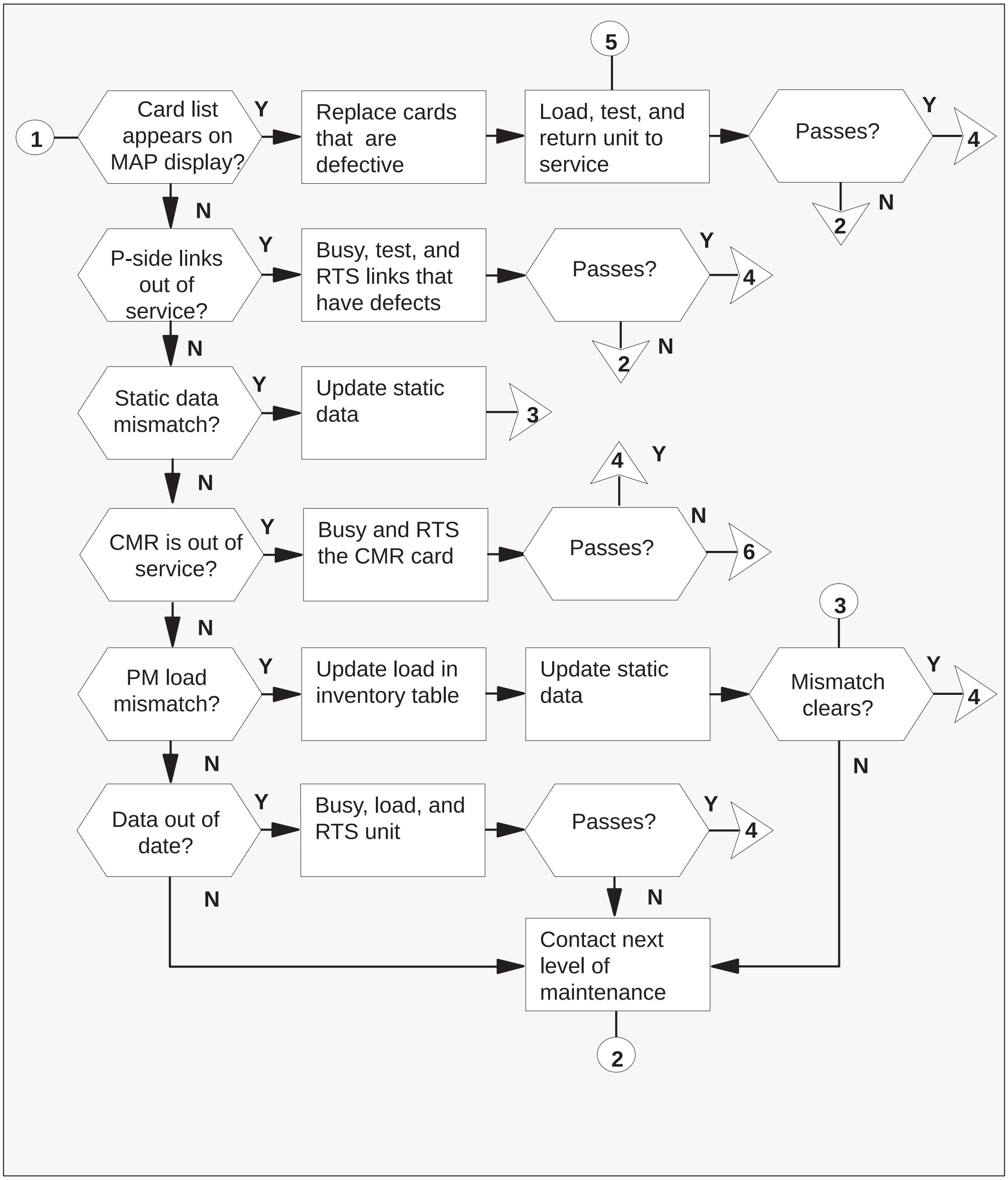
PM SMA
minor (continued)

Summary of clearing a PM SMA minor alarm

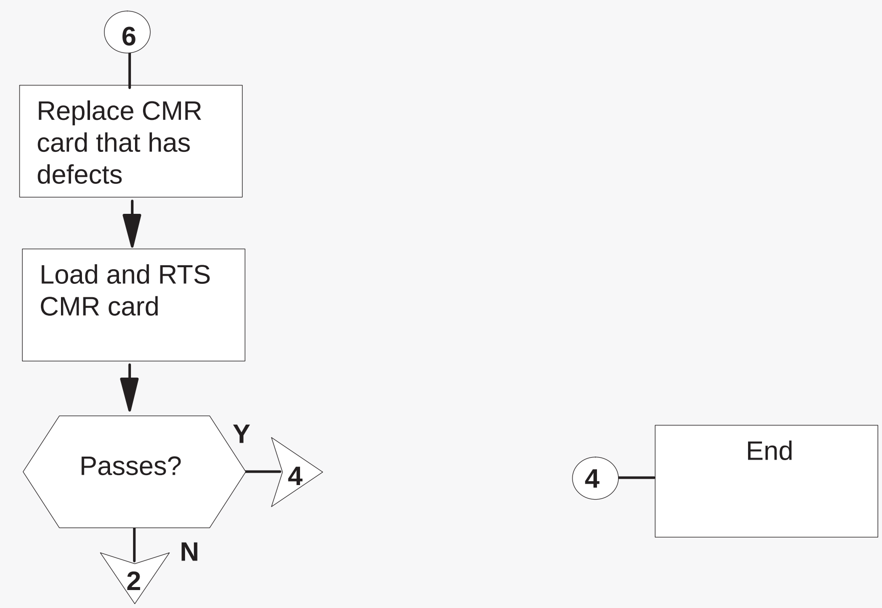


PM SMA
minor (continued)

Summary of clearing a PM SMA minor alarm (continued)



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 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 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 manual-busy (ManB), look for the state of unit 0 and unit 1 on the MAP display.

If SMA	Do
is ManB	step 8
is not ManB	step 9

PM SMA
minor (continued)

5 To return the inactive unit to service, type

>RTS INACTIVE
and press the Enter key.

If RTS	Do
passes	step 50
fails, and the system does not produce a card list	step 6
fails, and the system produces a card list	step 7

6 To load the inactive unit, type

>LOADPM INACTIVE
and press the Enter key.

If the load	Do
passes	step 8
fails, and the system does not produce a card list	step 44
fails, and the system produces a card list	step 7

7 Observe 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  06 SMA : 001  03  AX74
HOST  00  M07  LTE  00  06 SMA : 001  12  MX81
```

If the cards in the card list	Do
are replaced	step 44
are not replaced	step 9

PM SMA
minor (continued)

8 Go to *Card Replacement Procedures* for the next card on the list and return to this point.

If the card	Do
was replaced because of a LOADPM failure	step 6
was replaced because of a RTS failure	step 8

9 Determine if the two units in the posted SMA are in-service trouble. Look for the state of unit 0 and unit 1 on the MAP display.

If	Do
the two units are ISTb	step 14
one unit is ISTb and inactive	step 14
one unit is ISTb and active	step 10

10 To switch the activity of the units, type

>SWACT
and press the Enter key.

A confirmation prompt for the SWACT command appears at the MAP terminal.

If SWACT	Do
cannot continue	step 11
can continue	step 12

11 To reject the prompt to SWACT the units, type

>NO
and press the Enter key.

The system discontinues the SWACT.

Return to step 10 in a period of low traffic.

12 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.

> ***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 because XPM SWACTback`	step 14
is `SWACT refused by SWACT Controller`	step 14

13 The inactive unit cannot establish two-way communication with central control (CC). The inactive unit switches activity back to the unit that was first active. Clear the 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)

14 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 out of service	step 43
is central-side (C-side) links out of service	step 15
is static data mismatch with CC	step 16
is PM load mismatch with inventory table	step 24
is CLASS modem resource card (CMR) out of service	step 38
is none of the above	step 44

15 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
```

16 Note the numbers and conditions of the links. Report this information to the personnel responsible for network level maintenance.

PM SMA
minor (continued)

17 To busy the inactive unit, type

>BSY INACTIVE
and press the Enter key.

18 To load the inactive unit, type

>LOADPM INACTIVE CC DATA
and press the Enter key.

If LOADPM	Do
passes	step 18
fails	step 29

19 To return the inactive unit to service, type

>RTS INACTIVE

If RTS	Do
passes	step 19
fails	step 29

20 Determine if card list appears.

If card list	Do
appears	step 30
does not appear	step 44

PM SMA
minor (continued)

21 Observe 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 the cards in the card list	Do
are replaced	step 44
are not replaced	step 22

22 Go to *Card Replacement Procedures* for the next card on the list and return to this point.

If the card	Do
was replaced because of a LOADPM failure	step 17
was replaced because of an RTS failure	step 18

23 After updating static data, determine if the fault is cleared. To determine if the fault is cleared, type:

>QUERYPM FLT
and press the Enter key.

If the fault	Do
is cleared	step 50
is not cleared	step 44

PM SMA
minor (continued)

24 To determine the correct load name for the SMA, check the PM Load File Office Record. You can also check the same list of all PM load files in your office.

25 To determine the load name entered in table LTCINV for the posted SMA, type

>QUERYPM

If the office record	Do
matches the entry in table LTCINV	step 27
Does not match the entry in table LTCINV	step 26

26 To access table LTCINV, type

>TABLE LTCINV
and press the Enter key.

27 To position on the tuple for the SMA that has defects, type:

>POS SMA sma_no
and press the Enter key.

where

sma_no is the number of the SMA that has defects

28 To change the load name, type

>CHA LOAD
and press the Enter key.

Example of a MAP response:

```
LOAD:  XSC07BH
```

PM SMA
minor (continued)

29 To enter the correct load name, type

>load_name
and press the Enter key.

where

load_name is the load name from step 24

Note: The name entered must be present 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.
```

30 To give a positive response to the confirmation request, type

>Y
and press the Enter key.

31 To leave table LTCINV, type

>QUIT
and press the Enter key.

Go to step 39.

32 To manually busy the inactive SMA unit, type

>BSY INACTIVE
and press the Enter key.

PM SMA
minor (continued)

33 To load the inactive SMA unit, type

>LOADPM INACTIVE
and press the Enter key.

If load	Do
passes	step 28
fails	step 35

34 To return the inactive unit to service, type

>RTS INACTIVE
and press the Enter key.

If RTS	Do
passes	step 50
fails	step 35

35 Determine if card list appears.

If card list	Do
appears	step 36
does not appear	step 44

36 Observe the card list 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  6X50
HOST  00  M07  LTE 00  51  SMA : 000    05  6X50
```

If the cards in the card list	Do
are replaced	step 44
are not replaced	step 31

PM SMA
minor (continued)

37 Go to *Card Replacement Procedures* for the next card on the list and return to this point.

If the card	Do
was replaced because of a LOADPM failure	step 27
was replaced because of an RTS failure	step 28

38 To manually busy the CMR card in the inactive unit, type

>BSY INACTIVE CMR
and press the Enter key.

39 To return the CMR card to service, type

>RTS INACTIVE CMR
and press the Enter key.

If RTS	Do
passes	step 50
fails and the following message appears: `CMR Tst failed No reply from PM`	step 40
fails, and a card list appears	step 41
fails, and a card list does not appear	step 44

40 To load the CMR card, type

>LOADPM INACTIVE CC CMR
and press the Enter key.

If load	Do
passes	step 39
fails, and a card list appears	step 41
fails, and a card list does not appear	step 44

PM SMA
minor (continued)

41 Observe the card list that appears at the MAP terminal.

If the NT6X78 card in the card list	Do
was replaced	step 44
was not replaced	step 42

42 Go to the *Card Replacement Procedures* for the first (or next) card on the list and return to this step.

Determine if the card was replaced because of a LOADPM or RTS failure.

If the card	Do
was replaced because of a LOADPM failure	step 40
was replaced because of an RTS failure	step 39

43 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
```

Record the links that are not in an OK state.

44 To busy the SysB link recorded in step 43, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the system-busy link that appears in step 43

PM SMA
minor (continued)

45 To return the busied link to service, type

>RTS LINK link_no
and press the Enter key.

where

link_no is the number of the link busied in step 34

If test	Do
passes	step 38
fails, and a card list appears	step 46
fails, and no card list appears	step 44

46 Observe the card list that appears at the MAP screen.

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 the cards	Do
are replaced	step 44
are not replaced	step 37

47 Go to *Card Replacement Procedures* for the next card on the list and return to this point.

Return to step 35.

48 Determine if additional links are not in-service as recorded in step 43.

If	Do
additional links are not in service	step 34
the links are in service	step 39

49 Determine the state of the two units of the SMA.

If both units	Do
are in-service	step 45
are in-service trouble	step 14

50 The inactive unit is RTS. Determine if the active unit is in-service.

If the active unit	Do
is in-service	step 45
is in-service trouble	step 40

51 To switch the activity of the units, type

>SWACT
and press the Enter key.

A confirmation prompt for the SWACT command appears at the MAP terminal.

If SWACT	Do
cannot continue	step 52
can continue	step 43

52 To reject the prompt to SWACT the units, type

>NO
and press the Enter key.

The system discontinues the SWACT.

Return to step 40 in a period of low traffic.

PM SMA
minor (end)

53 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.

> ***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 54
is `SWACT failed because XPM SWACTback`	step 44
is `SWACT refused by SWACT controller`	step 44

54 Determine if the newly inactive unit is in service.

If the newly inactive unit	Do
is not in service	step 14
is in service	step 45

55 For additional help, contact the next level of maintenance.

56 The procedure is complete. If other alarms appear at the MAP display, refer to the appropriate alarm clearing procedures.

Loading a PM

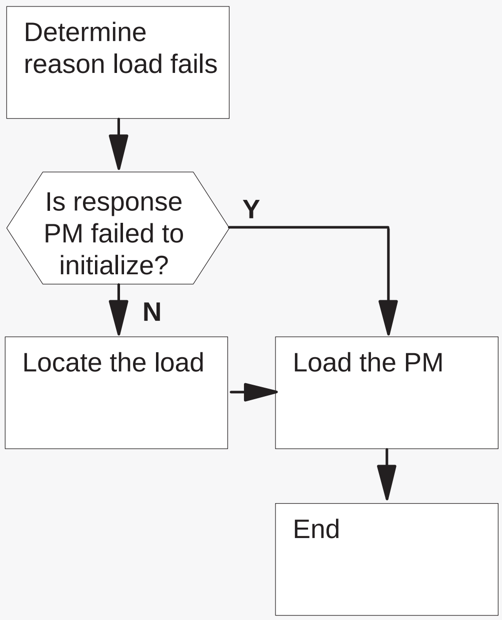
Application

Use this procedure to load a peripheral module (PM) after a LOADPM failure.

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.

Loading a PM (continued)

Summary of Loading a PM



This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

Loading a PM

At the MAP display:

1

> **CAUTION**
> **Possible loss of service**
> Make sure to perform this procedure in periods of low traffic to avoid loss of service or service degradation.

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 appropriate procedure according to the reason the load fails.

If the load fails and	Do
the MAP response is `Load File not in directory`	step 5
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 (PEC) of the cards on the card list. These locations and PECs include suffixes.

5 Go to the appropriate procedure in *Card Replacement Procedures* to change the first card on the list. Return to step 23 in this procedure.

6 Determine the type of device in which the PM load files are located.

If load files	Do
are on a tape	step 7
are on an input/output controller (IOC) disk	step 14
are on a system load module (SLM) disk	step 19

7 Locate the tape that contains the PM load files.

Loading a PM (continued)

8 Mount the tape on a magnetic tape drive.

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. To demount the tape, type

>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 LOADPM	Do
passes	step 30
fails, and the reason is different from the first time LOADPM fails	step 2
fails, but the reason is the same as the first time LOADPM fails	step 29
fails, and you did not replace every card in the list in step 4	step 28
fails, and you replace every card in the list in step 4	step 29

14 From office records, determine and note the 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 according to the procedure.

19 From office records, determine and note the SLM disk and volume number that contain 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 What you load determines your next action.

If you	Do
load a single-unit PM or a D-channel handler (DCH) card	step 24
load a two-unit PM	step 25

Loading a PM (continued)

If you	Do
load a CLASS modem resource (CMR) card	step 26
load an signaling terminal controller (STC) card	step 27

24 To load the PM, type

>LOADPM
and press the Enter key.

If the LOADPM command	Do
passes	step 30
fails, and the reason is different from the first time LOADPM fails	step 2
fails, but the reason is the same as the first time LOADPM fails	step 29
fails, and you did not replace every card in the list in step 4	step 28
fails, and you replaced every card in the list in step 4	step 29
is 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 be loaded (0 or 1)

If the LOADPM UNIT unit_co command	Do
passes	step 30
fails, and the reason is different from the first time LOADPM fails	step 2
fails, but the reason is the same as the first time LOADPM fails	step 29

Loading a PM (continued)

If the LOADPM UNIT unit_co command	Do
fails, and you did not replace every card in the list in step 4	step 28
fails, and you replaced every card in the list in step 4	step 29
is loaded from tape	step 11

26 To 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 you must load (0 or 1)

If the LOADPM UNIT unit_co CMR command	Do
passes	step 30
fails, and the reason is different from the first time LOADPM fails	step 2
fails, but the reason is the same as the first time LOADPM fails	step 29
fails, and you did not replace every card in the list in step 4	step 28
fails, and you did replace every card in the list in step 4	step 29
is loaded from tape	step 11

—end—

Loading a PM (end)

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	Do
passes	step 30
fails, and the reason is different from the first time LOADPM fails	step 2
fails, but the reason is the same as the first time LOADPM fails	step 29
fails, and you did not replace every card in the list in step 4	step 28
fails, and you did replace every card in the list in step 4	step 29
is loaded from tape	step 11

28 Refer to the appropriate procedure in *Card Replacement Procedures* to change the next card on the list that the system generates. Return to this procedure.

29 For additional help, contact the next level of maintenance.

30 The procedure is complete. Return to the main procedure that directed you to this procedure. 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”

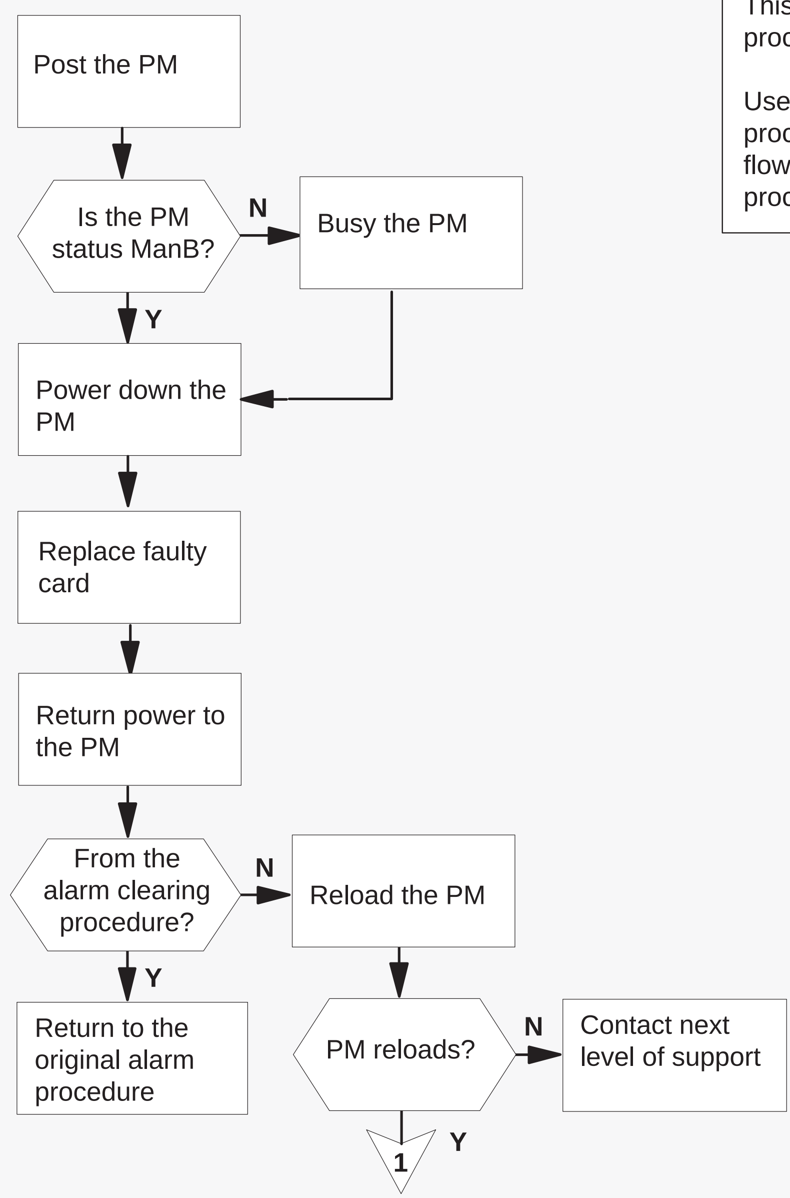
Do not go to the common procedures unless directed to do so in the step-action procedure.

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

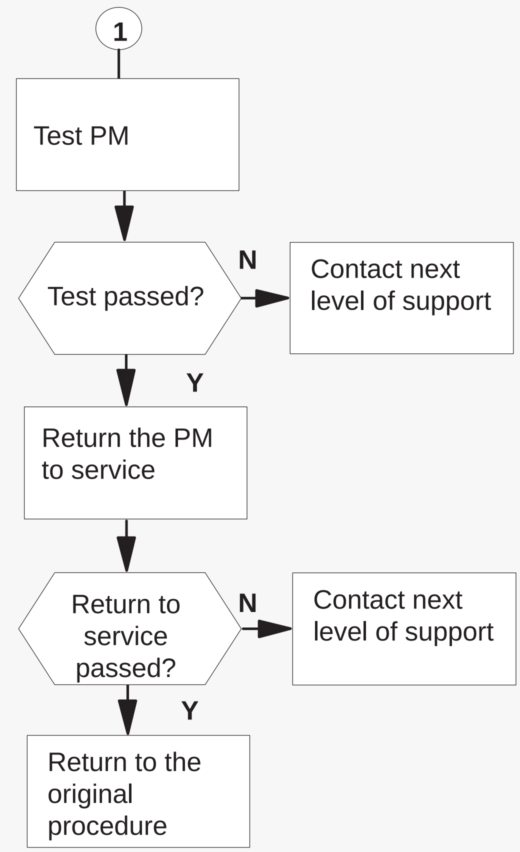


This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

NT2X70
SMA (continued)

Summary of card replacement procedure for an NT2X70 card in an SMA (continued)



Replacing an NT2X70 card in an SMA

At the equipment frame

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 SWACT 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 SWACT 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 27.

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
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 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.”

NT2X70
SMA (continued)

20 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 24
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 27

22 Test the inactive SMA unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 21

If TST	Do
passes	step 23
fails	step 27

NT2X70
SMA (end)

23 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 22

If RTS	Do
passes	step 24
fails	step 27

At the equipment frame

24 Remove the sign from the active SMA unit.

25 Send any faulty cards for repair according to local procedure.

26 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

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.

NT6X40
SMA

Application

Use this procedure to replace an NT6X40 card in a Subcriber 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

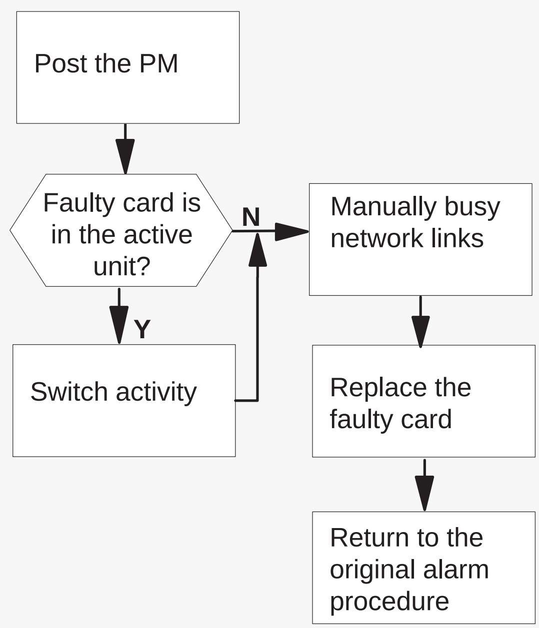
The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

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 12
ManB	step 12
OffL	step 38

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 41

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
cannot continue at this time	step 9
can continue at this time	step 10

9 Reject the prompt to SWACT of the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

Return to step 8 during a period of low traffic.

10 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 12
`SWACT failed Reason: XPM SWACTback`	step 11
`SWACT refused by SWACT Controller`	step 11

11 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 41.

NT6X40
SMA (continued)

12 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.

13 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.

At the equipment frame

14 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.

15 Determine the suffix of the faulty card.

If you are replacing an	Do
GA	step 16
AC, AD, FA, FB, or FC	step 29

At the front of the shelf

16

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

17

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.

NT6X40
SMA (continued)

18 Label each connector to the NT6X40 card.

19

> **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.).

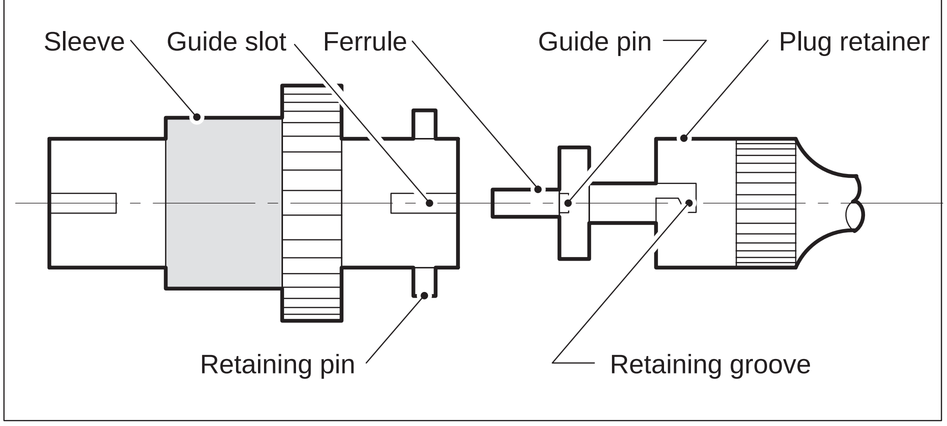
Disconnect the fiber optic cables by performing the following steps:

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)

20

> **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.

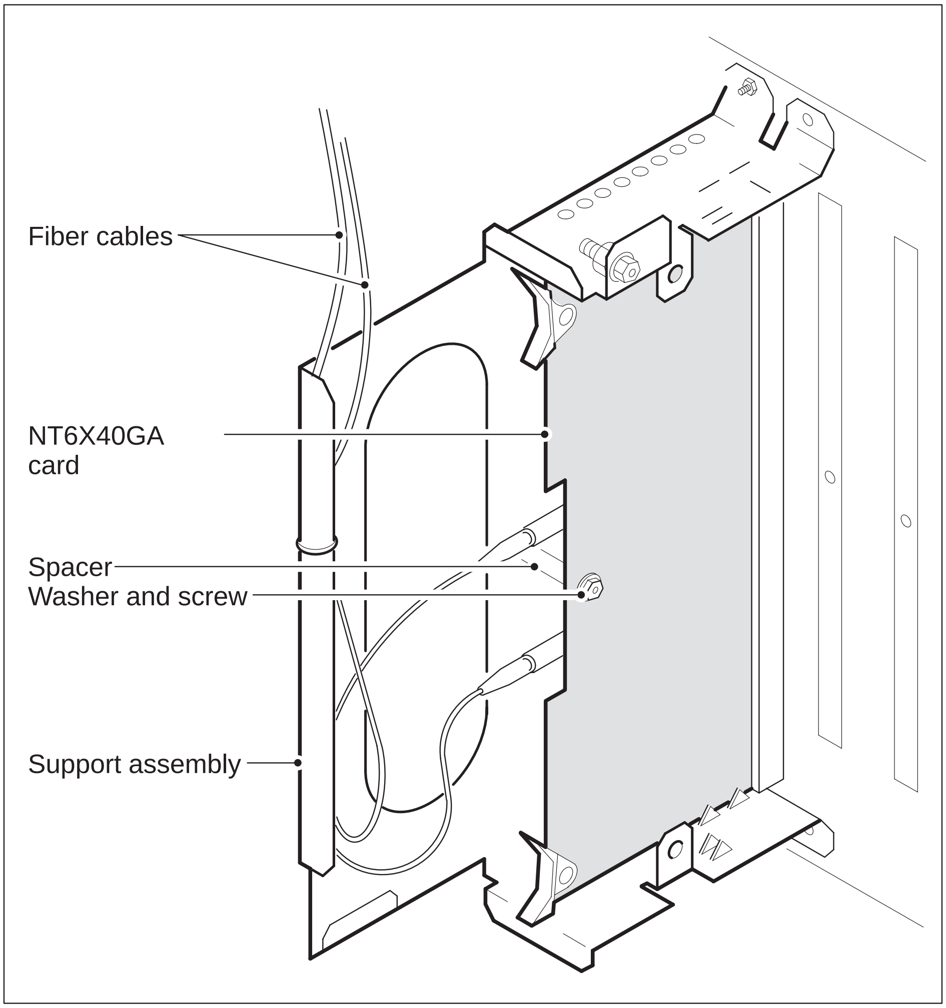
NT6X40
SMA (continued)

21 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.



22 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)

23 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.

24 Line up the replacement card with the slots in the support assembly.

25 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.

26 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.

27 Reconnect the fiber optic cables by performing the following steps. See the illustration in step 19.

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

28

> **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 16. Go to step 30.

29 Perform the procedure "Removing and inserting cards in an SMA." When you have completed the procedure, return to this point.

At the MAP terminal

30 The next action depends on the type of network in the office.

If you are working on	Do
JNET	step 31
ENET	step 33

31 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 32
returned to service and there are no more manual-busy links	step 34
did not return to service	step 41

32 Repeat step 31 for each manually busy C-side link. When you have successfully returned all C-side links to service, go to step 34.

33 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 34
did not return to service	step 41

34 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)

NT6X40
SMA (continued)

35 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 36
anything else	step 41

36 The next action depends on your reason for performing this procedure.

If you were	Do
directed to this procedure from a maintenance procedure	step 37
not directed to this procedure from a maintenance procedure	step 40

37 Return to the maintenance procedure that sent you to this procedure and continue as directed.

38 Consult office personnel to determine why the component is offline. Continue as directed by office personnel.

39 Remove the sign from the active SMA unit.

40 Go to the common procedure “Returning a card for repair or replacement” in this section.

Go to step 42.

NT6X40
SMA (end)

41 For further assistance, contact the personnel responsible for the next level of support.

42 You have completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X41
SMA

Application

Use this procedure to replace an 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”

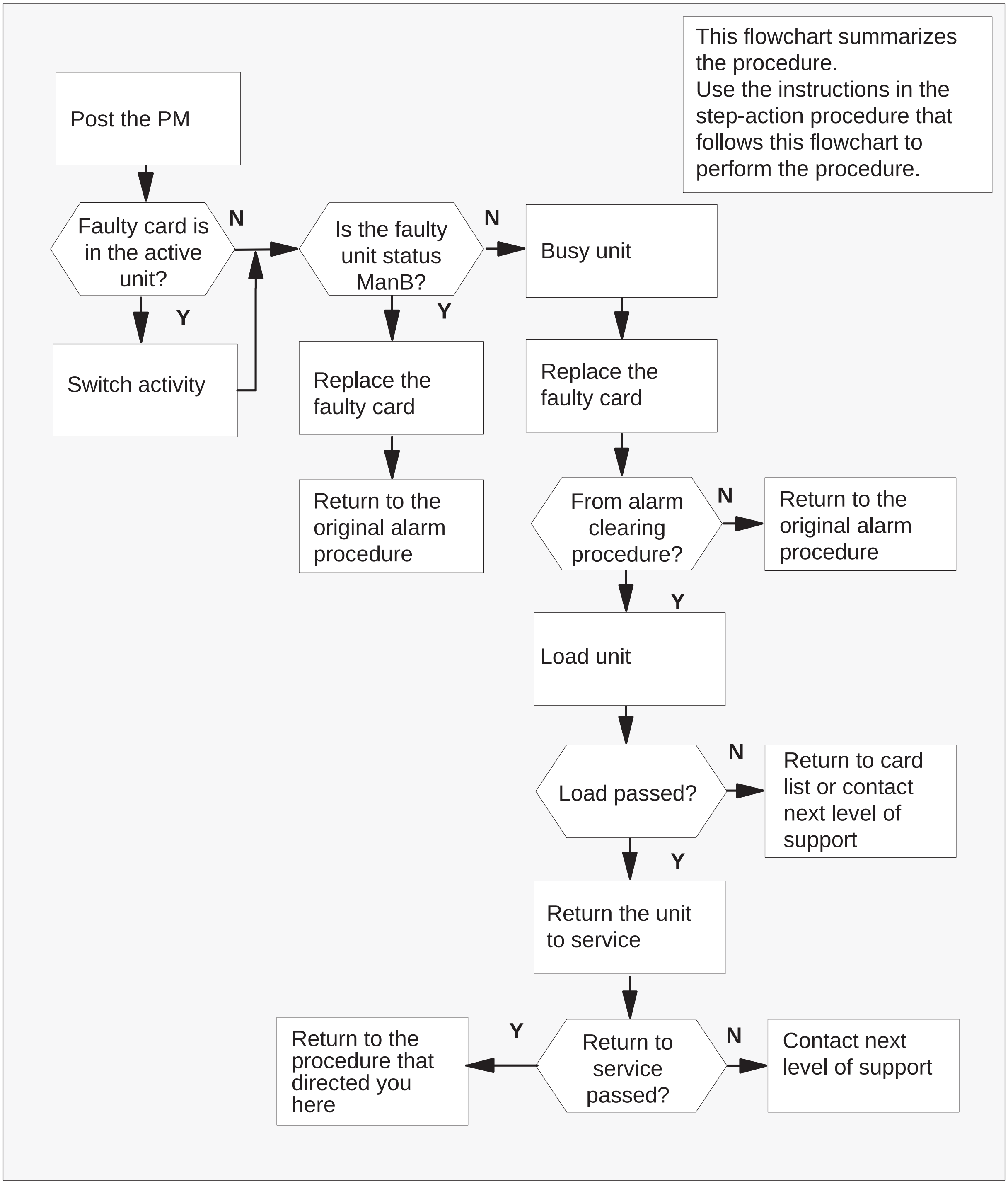
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 the equipment frame

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 11

7 Perform a 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 SWACT the units by typing

>NO

and pressing the Enter key.

The system discontinues the SWACT.

NT6X41
SMA (continued)

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 22.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

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 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

15

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.”

16 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 19
other	step 17

NT6X41
SMA (continued)

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 22

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 22

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Send any faulty cards for repair according to local procedure.

21 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 For further assistance, contact the personnel responsible for the next level of support.

NT6X41
SMA (end)

23 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

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”

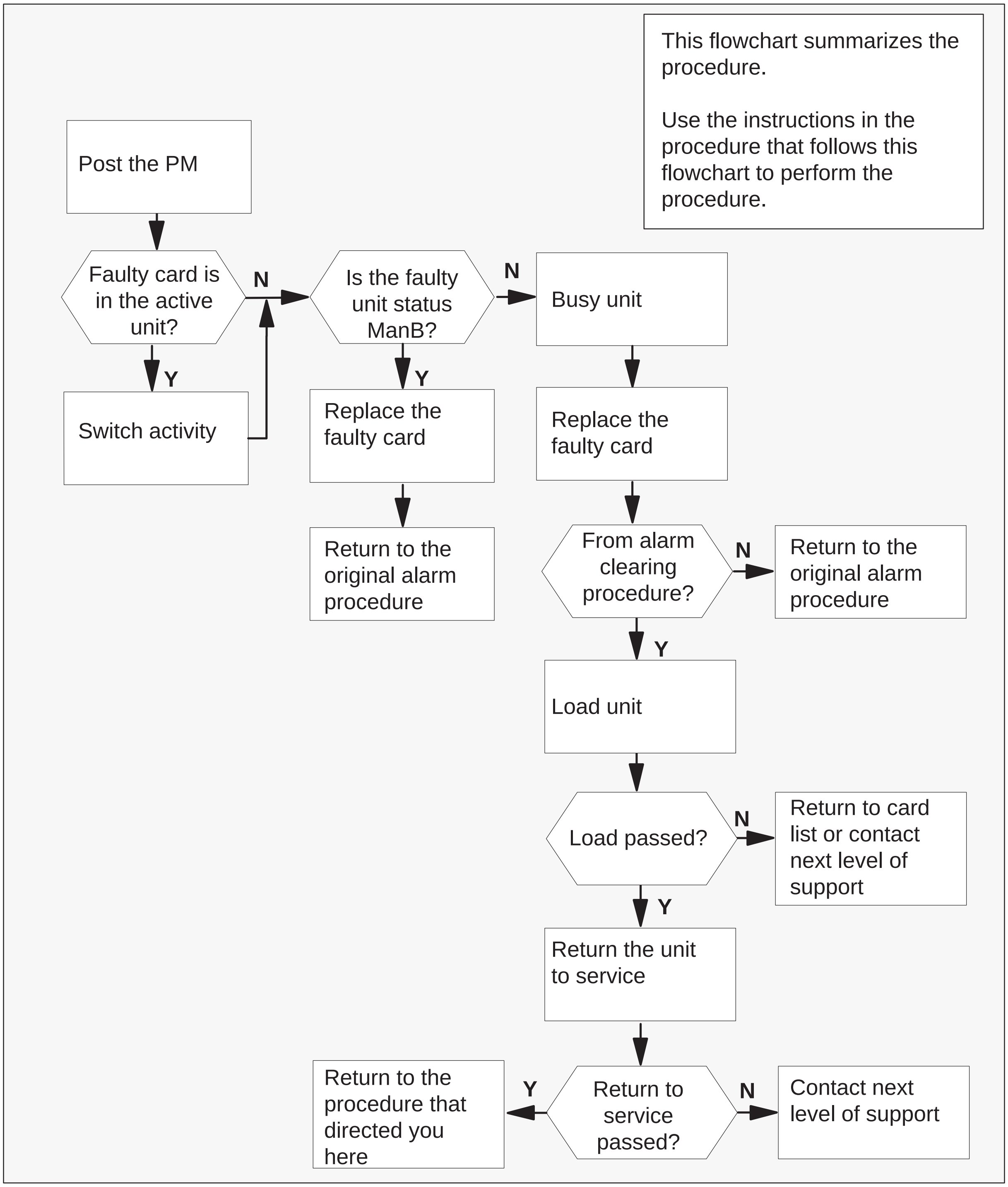
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 a NT6X42 card in an SMA



NT6X42
SMA (continued)

Replacing a NT6X42 card in an SMA

At the equipment frame

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 11

7 SWACT 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NT6X42
SMA (continued)

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 22.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

NT6X42
SMA (continued)

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.

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 Perform the procedure “Removing and inserting cards in an SMA.”

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

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 22

NT6X42
SMA (continued)

17 Test the inactive SMA unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 16

If test	Do
passed	step 18
failed	step 22

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 tested in step 17

If RTS	Do
passed	step 19
failed	step 22

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Send any faulty cards for repair according to local procedure.

21 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 For further assistance, contact the personnel responsible for the next level of support.

NT6X42
SMA (end)

23 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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”

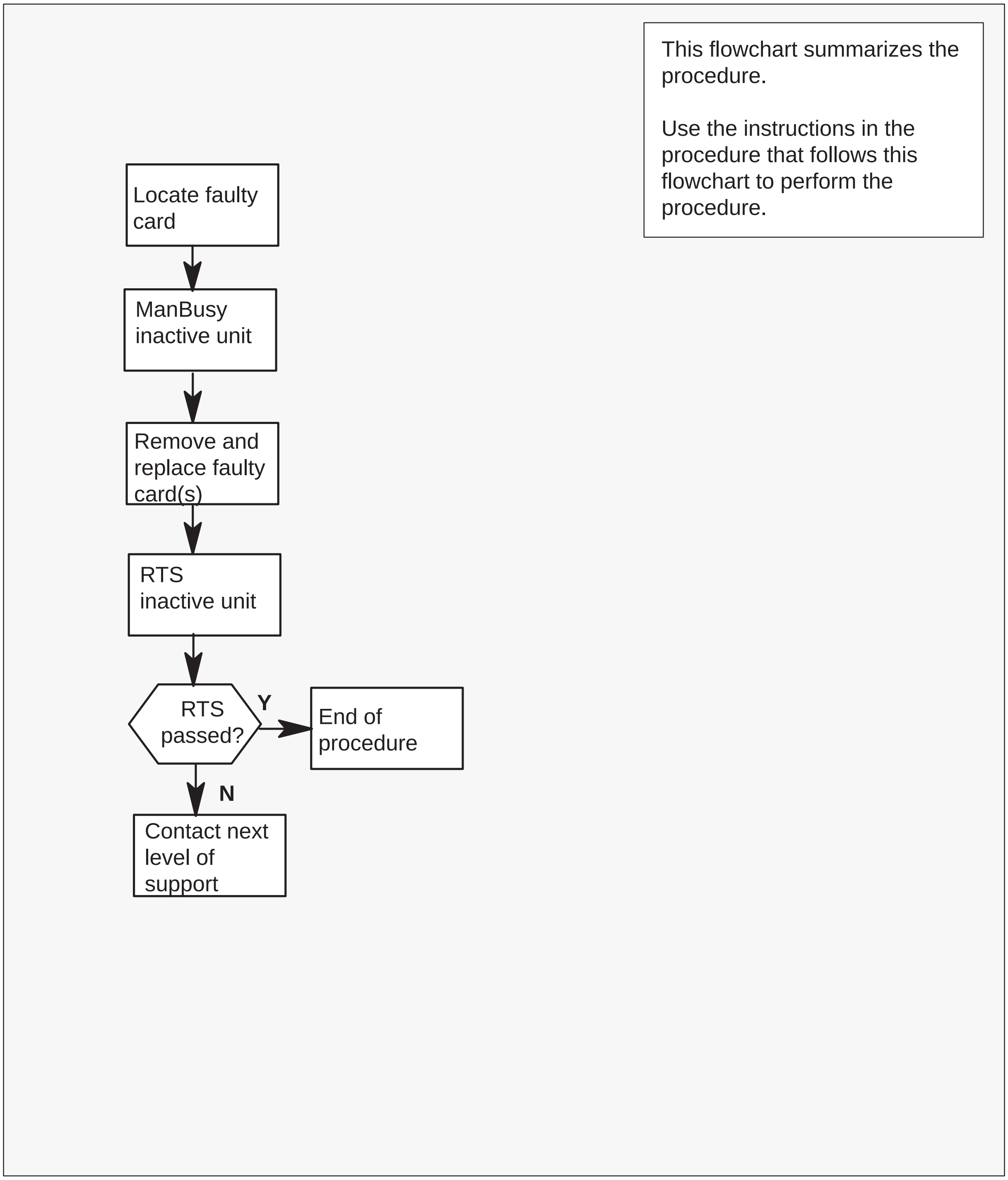
Do not go to the common procedures unless directed to do so in the step-action procedure.

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.

NT6X44
SMA (continued)

Summary of card replacement procedure for an NT6X44 card in an SMA



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 9

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
cannot continue at this time	step 6
can continue at this time	step 7

6 Do not switch activity of the units. Reject the switch by typing

>NO
and pressing the Enter key.

The system discontinues the switch of activity. Return to step 5 during a period of low traffic.

7 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 9
`SwAct failed  Reason: XPM SwActback`	step 8
`SwAct refused by SwAct controller`	step 8

8 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 19.

NT6X44
SMA (continued)

At the equipment frame

9 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.

At the MAP terminal

10 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 12
`SysB, CBsy, ISTb, or InSv`	step 11

11 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

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.

Perform the procedures “Removing and inserting cards in an SMA.”

13 Use the following information to determine the next step in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 18
other	step 14

NT6X44
SMA (end)

At the MAP terminal

14 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 15
fails	step 19

At the equipment frame

15 Remove the sign from the active SMA unit.

16 Send any faulty cards for repair according to local procedure.

17 Record the following items in office records according to local policy:

- the date the card was replaced
- the serial number of the card
- the symptoms that prompted replacement of the card

Go to step 20.

18 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.

19 Obtain further assistance in replacing this card by contacting personnel responsible for a higher level of support.

20 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.

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”

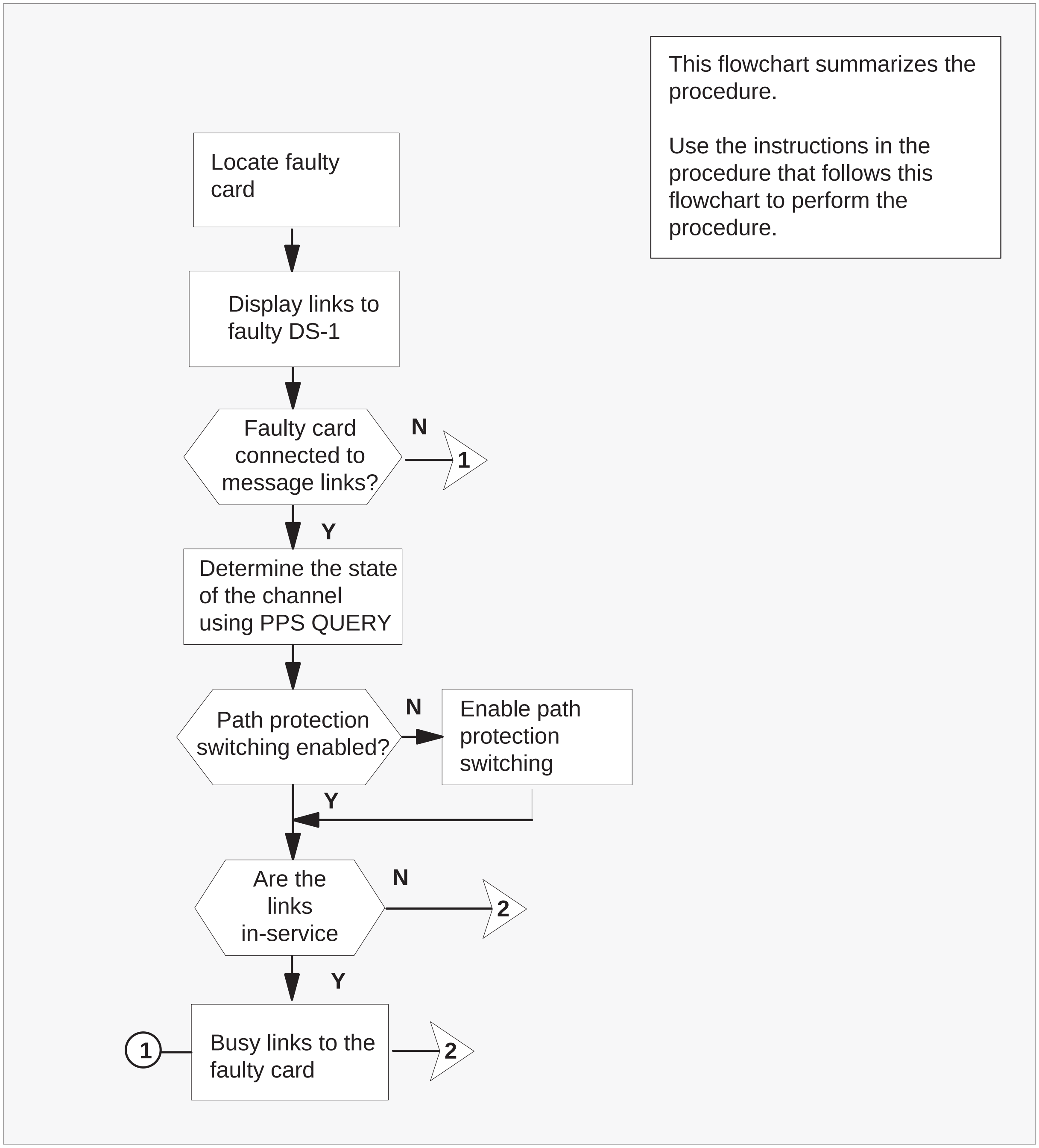
Do not go to the common procedures unless directed to do so in the step-action procedure.

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.

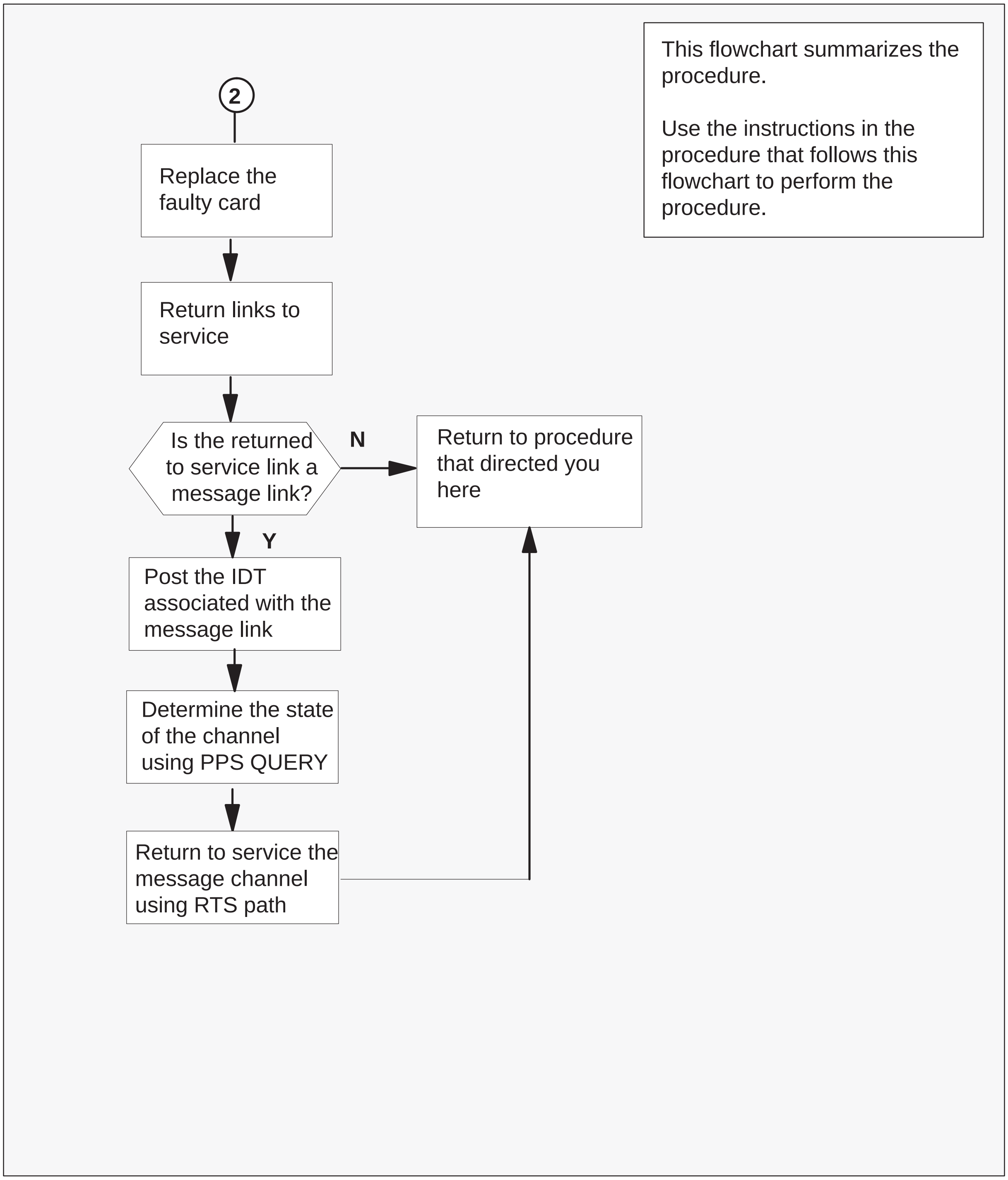
NT6X50
SMA (continued)

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 the equipment frame

1

> **CAUTION**
> **Service disruption: calls may be dropped!**
> Perform this card replacment 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 7 ISTb  Links_OOS:  CSide 0, PSide 1
Unit0:  Act   InSv
Unit1:  Inact InSv
```

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

NT6X50
SMA (continued)

8 Reject the prompt to SWACT 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.

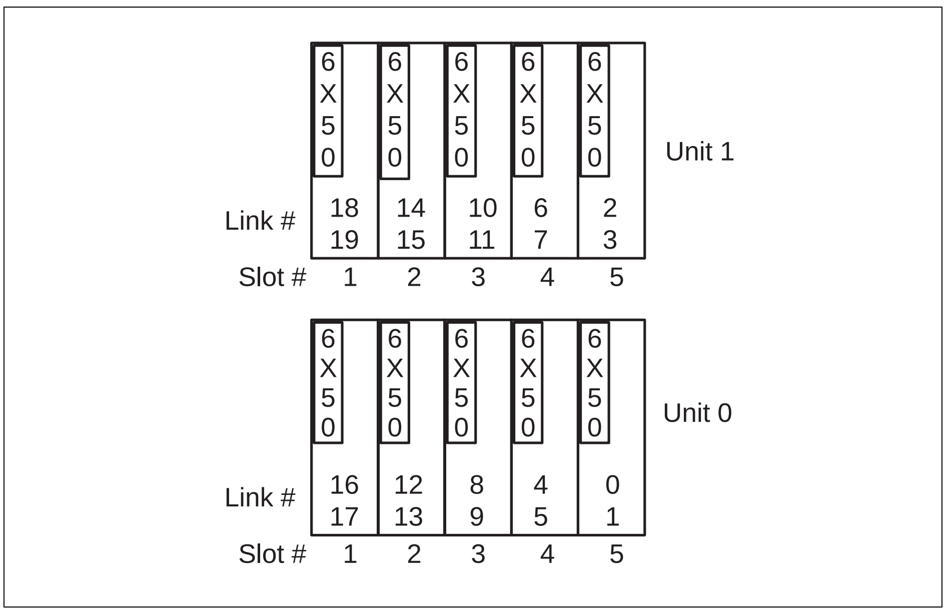
Example of a MAP response:

```
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:SBsy; MsgCond:OPN
LINK8: IDT 2   1;Cap:MS; Status:OK; 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. For example, 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 (TMC 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:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12; OOS;Standby ;Enable
TMC2: 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 TMC or EOC channels are	Do
inhibited	step 18
enabled	step 20

18 Enable path protection on an inhibited TMC or EOC message channel by typing

>PPS ENA path
and pressing the Enter key.

where

path   is the inhibited TMC1, TMC2, EOC1, or EOC2

19 Determine if path protection switching must be enabled on additional TMC or EOC message channels.

If	Do
additional channels must be enabled	step 18
all channels are enabled	step 20

20 Determine if the TMC or EOC message channels for the link to be taken out of service are in-service.

If TMC or EOC channels are	Do
in-service	step 21
out-of-service (OOS)	step 23

21 Busy the TMC or EOC message channel associated with the link to be taken out of service by typing

>BSY path
where

path   is TMC1, TMC2, EOC1, or EOC2

NT6X50
SMA (continued)

22 Determine if there are additional TMC 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

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:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12; 00S;Active ;Enable
TMC2: SMA 7  8 24;InSv;Standby;Enable
EOC2: SMA 7  8 12;InSv;Standby;Enable
```

30 Determine if there are any TMC or EOC message channels for the link to be returned to service.

If TMC 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 TMC1, TMC2, EOC1, or EOC2

NT6X50
SMA (continued)

32 Determine if there are additional TMC 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

NT6X50
SMA (continued)

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 and length of cables	Close these switch contacts and leave all others open
NT6X50AB, release number 39 or lower	
Length of cables	
0 m 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	
Length of cables	
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 and length of cables	Close these switch contacts and leave all others open
NT6X50AB, release numbers 60 or higher	
Length of cables	
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
```

NT6X50
SMA (continued)

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:

```
TMC1: SMA 7  7 24; OOS;Standby;Enable
EOC1: SMA 7  7 12;InSv;Active ;Enable
TMC2: 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 TMC1, TMC2, EOC1, or EOC2

44 Determine if there are additional TMC 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”

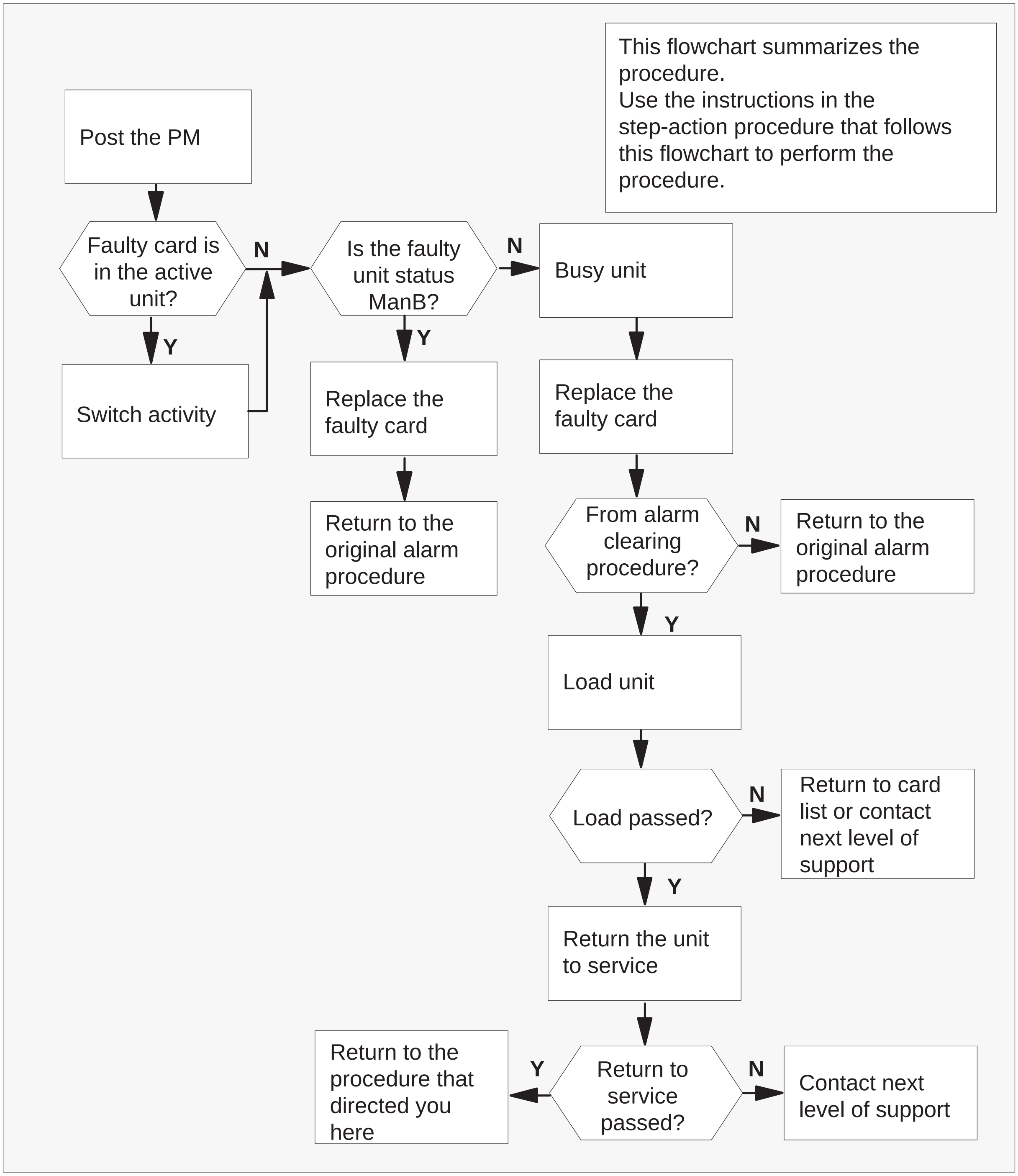
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 the equipment frame

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 11

7 SWACT 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NT6X69
SMA (continued)

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 23.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

NT6X69
SMA (continued)

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 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

15

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.”

16 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 20
other	step 17

NT6X69
SMA (continued)

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 23

18 Test the inactive SMA unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 17

If TST	Do
passed	step 19
failed	step 23

19 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 18

If RTS	Do
passed	step 20
failed	step 23

At the equipment frame

20 Remove the sign from the active SMA unit.

NT6X69
SMA (end)

21 Send any faulty cards for repair according to local procedure.

22 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

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.

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”

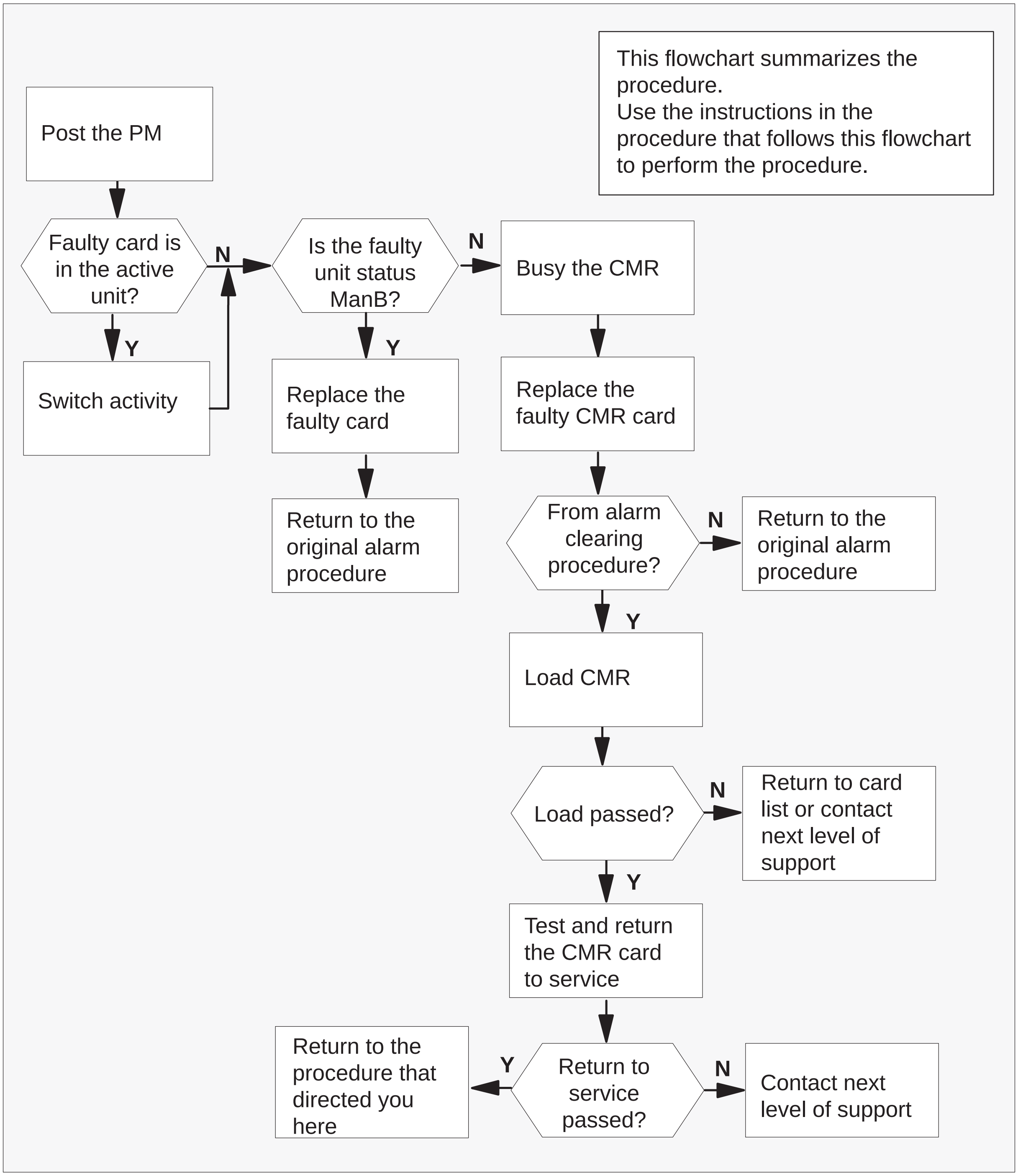
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 an NT6X78 card in an SMA



NT6X78
SMA (continued)

Replacing a NT6X78 card in an SMA

At the equipment

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 that 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 11

7 SWACT (switch activity) 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NT6X78
SMA (continued)

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 22.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

13 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)

NT6X78
SMA (continued)

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."

15 Use the following information to determine the next step.

If your were directed here from	Do
alarm clearing procedures	step 19
other	step 16

At the MAP terminal

16 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 17
failed	step 22

NT6X78
SMA (continued)

17 Test the CMR in the inactive SMA unit by typing

>TST UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 16

If TST	Do
passed	step 18
failed	step 22

18 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 tested in step 17

If RTS	Do
passed	step 19
failed	step 22

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Send any faulty cards for repair according to local procedure.

21 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 For further assistance, contact the personnel responsible for the next level of support.

NT6X78
SMA (end)

23 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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”

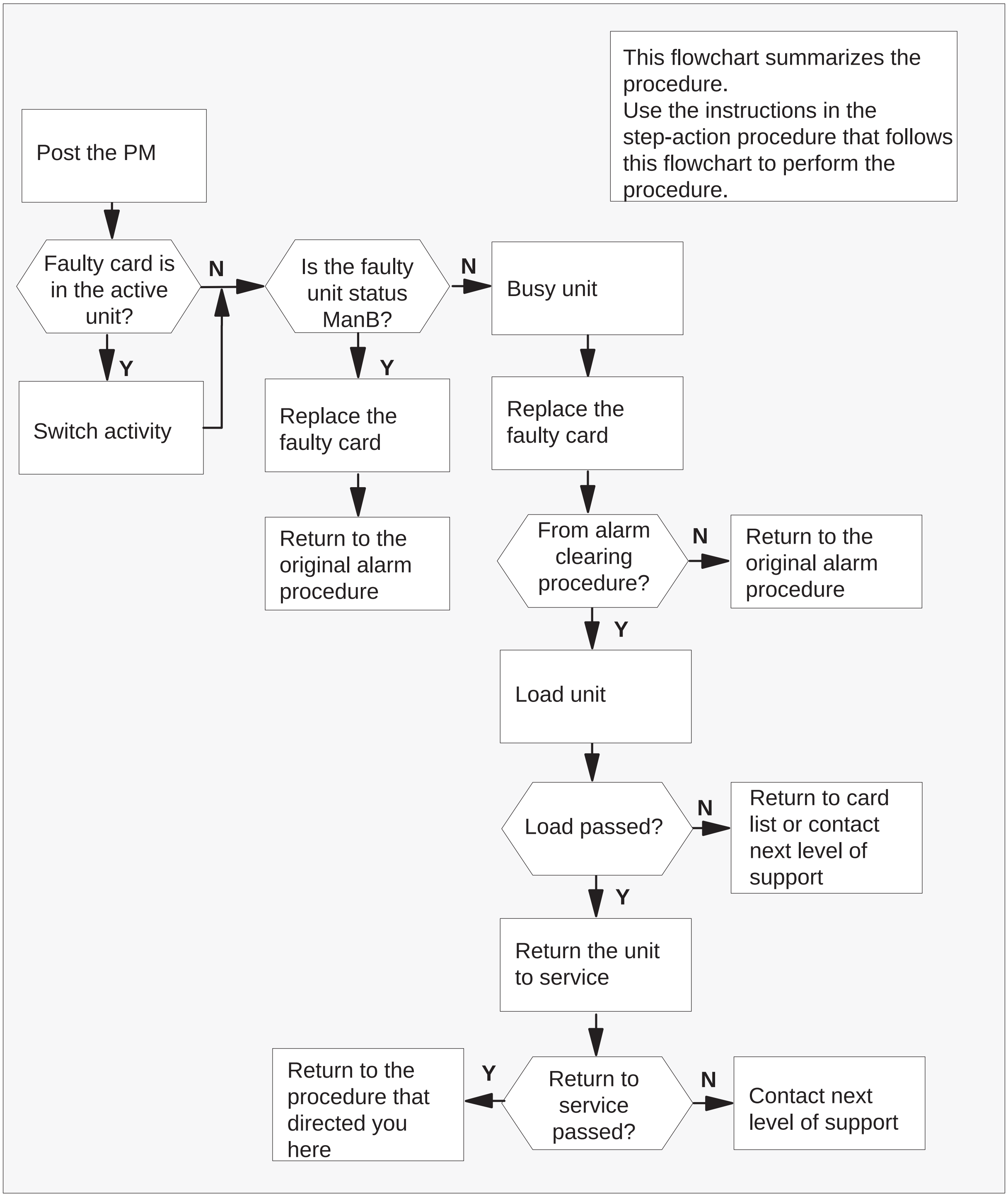
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 the equipment frame

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
```

NT6X80
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 SWACT 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NT6X80
SMA (continued)

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 22.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

NT6X80
SMA (continued)

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.

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

14 Perform the procedure “Removing and inserting cards in an SMA.”

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

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 22

NT6X80
SMA (continued)

17 Test the inactive SMA unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the SMA unit loaded in step 16

If test	Do
passed	step 18
failed	step 22

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 tested in step 17

If RTS	Do
passed	step 19
failed	step 22

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Send any faulty cards for repair according to local procedure.

21 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 For further assistance, contact the personnel responsible for the next level of support.

NT6X80
SMA (end)

23 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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”

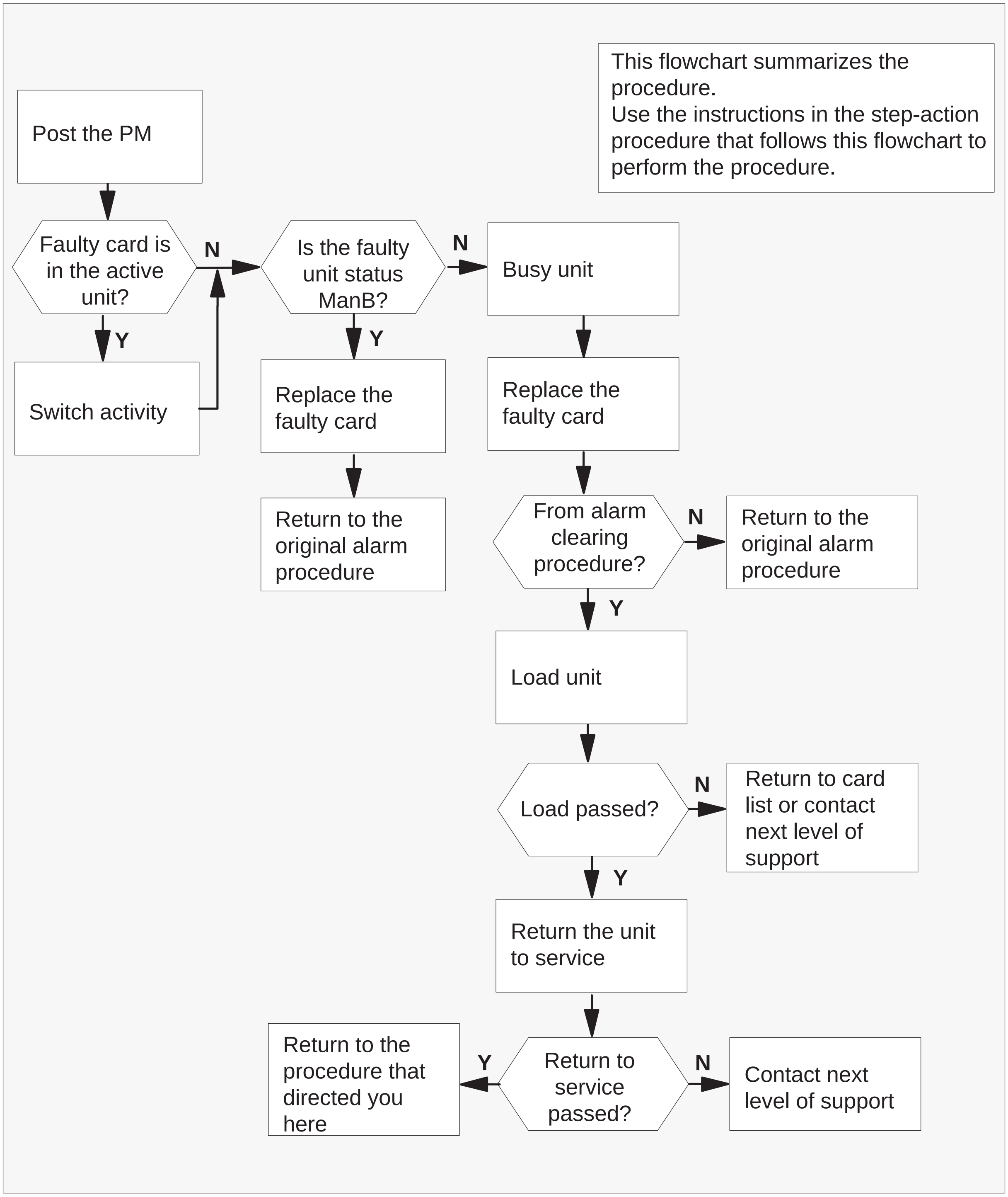
Do not go to the common procedures unless directed to do so in the step-action procedure.

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



NT6X92
SMA (continued)

Replacing an NT6X92 in an SMA

At the equipment frame

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 11

7 SWACT 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NT6X92
SMA (continued)

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 22.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

NT6X92
SMA (continued)

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)

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.”

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

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 22

NT6X92
SMA (continued)

17 Test the inactive SMA unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SMA unit loaded in step 16

If TST	Do
passed	step 18
failed	step 22

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 tested in step 17

If RTS	Do
passed	step 19
failed	step 22

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Send any faulty cards for repair according to local procedure.

21 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 For further assistance, contact the personnel responsible for the next level of support.

NT6X92
SMA (end)

23 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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”

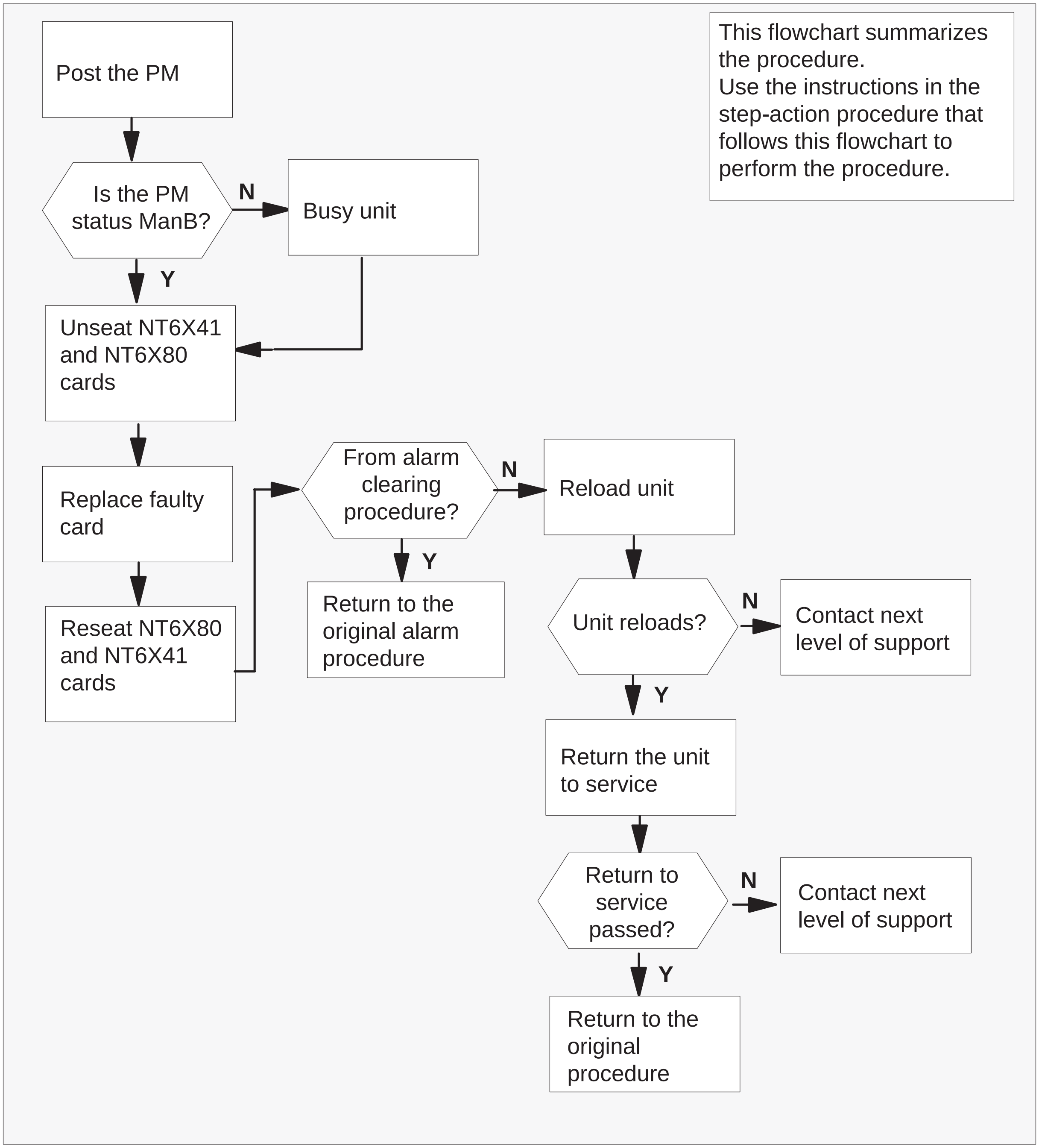
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 the equipment frame

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 an NTAX74AA 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 card is in the active or the inactive unit.

If the 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

NTAX74
SMA (continued)

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 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 47.

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

NTAX74
SMA (continued)

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 Prevent PM traps 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

15

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.

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 SMA.”

16 Remove the faulty NTAX74 card using the procedure “Removing and inserting cards in SMA.”

NTAX74
SMA (continued)

17

> **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 1 second. If the ACT LED remains ON for more than one 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.”

18 Reseat the the NT6X80 PCM Loss Addition circuit card, and NT6X41 Host Link Formatter circuit card using the procedure “Reseating a card in SMA.”

19 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 46
other	step 20

NTAX74
SMA (continued)

20 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 21
load passes	step 40
load fails	step 47

21 Determine the type of device where the PM load files are located.

If load files are located on	Do
tape	step 22
IOC disk	step 28
SLM disk	step 33

22 Locate the tape that contains the PM load files.

23 Mount the tape on a magnetic tape drive.

At the MAP terminal

24 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

NTAX74
SMA (continued)

25 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

26 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

27 Go to step 38.

28 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.

29 Access the disk utility level of the MAP display by typing

>DSKUT
and pressing the Enter key.

30 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 28.

31 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

32 Go to step 38.

33 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.

34 Access the disk utility level of the MAP display by typing

>DISKUT
and pressing the Enter key.

NTAX74
SMA (continued)

35 List the SLM disk volumes by typing

>LV CM
and pressing the Enter key.

36 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 33.

37 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

38 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 39
failed	step 47

39 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 42
different	step 40

NTAX74
SMA (continued)

40 Load the NTAX74 firmware in the inactive unit by typing

>LOADFW INACTIVE
and pressing the Enter key.

If load	Do
passed	step 41
failed	step 47

41 To upgrade the firmware on the inactive unit type

>LOADFW INACTIVE UPGRADE
and pressing the Enter key.

If LOADFW UPGRADE	Do
passed	step 42
failed	step 47

42 Return the inactive SMA unit to service by typing

>RTS INACTIVE
and pressing the Enter key.

If RTS	Do
passed	step 43
failed	step 47

At the equipment frame

43 Remove the sign from the active SMA unit.

44 Send any faulty cards for repair according to local procedure.

45 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 48.

NTAX74
SMA (end)

46 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.

47 For further assistance, contact the personnel responsible for the next level of support.

48 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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”

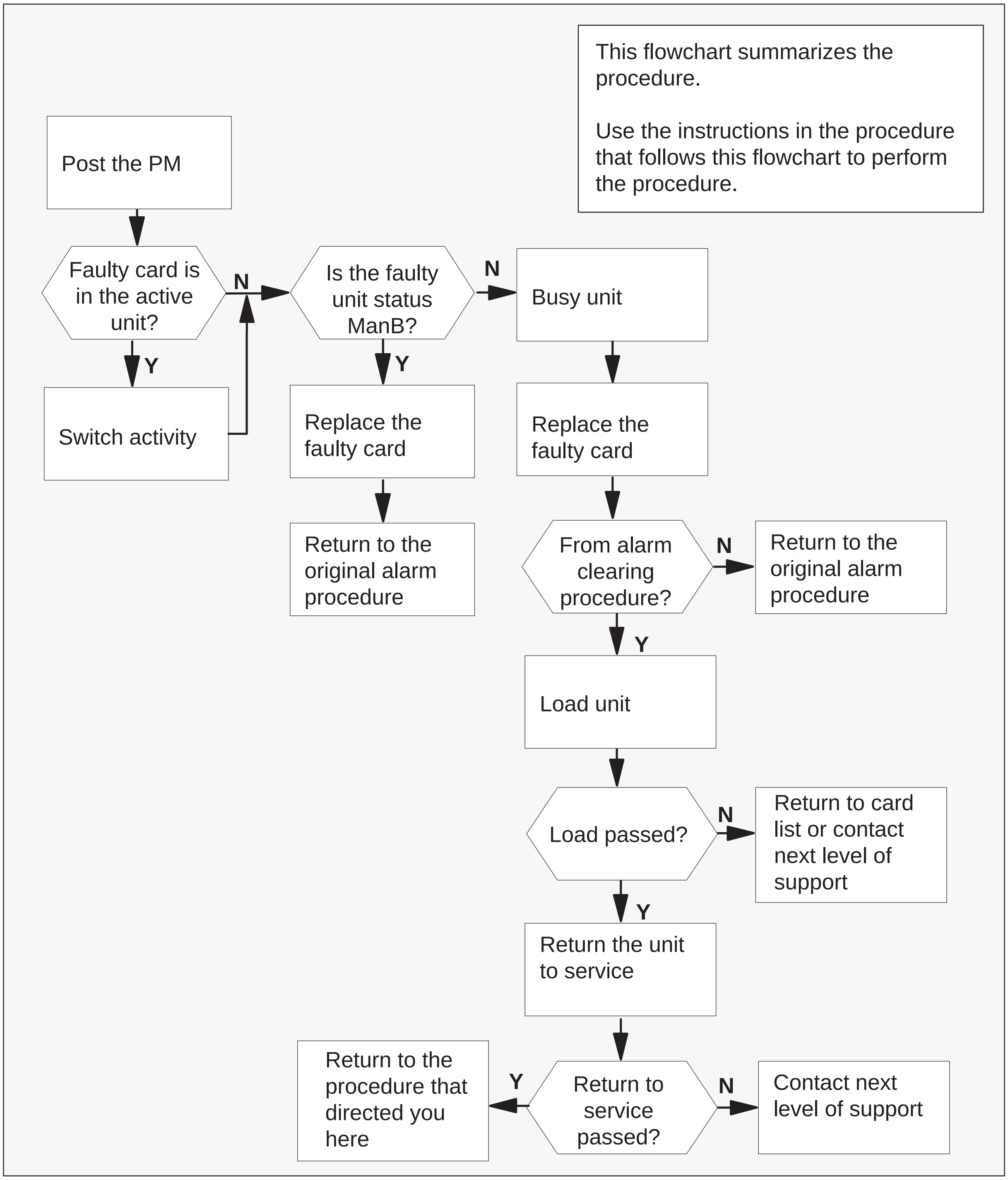
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 the equipment frame

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 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
```

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 11

7 SWACT 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 SWACT the unit by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NTAX78
SMA (continued)

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 23.

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
Manb	step 15
SysB, CBsy, ISTb, or InSv	step 13

NTAX78
SMA (continued)

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 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

15

> **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.”

16 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 20
other	step 17

17 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)

NTAX78
SMA (continued)

At the MAP terminal

18 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 19
failed	step 23

19 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 18

If RTS	Do
passed	step 20
failed	step 23

At the equipment frame

20 Remove the sign from the active SMA unit.

21 Send any faulty cards for repair according to local procedure.

22 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 24.

23 For further assistance, contact the personnel responsible for the next level of support.

NTAX78
SMA (end)

24 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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"

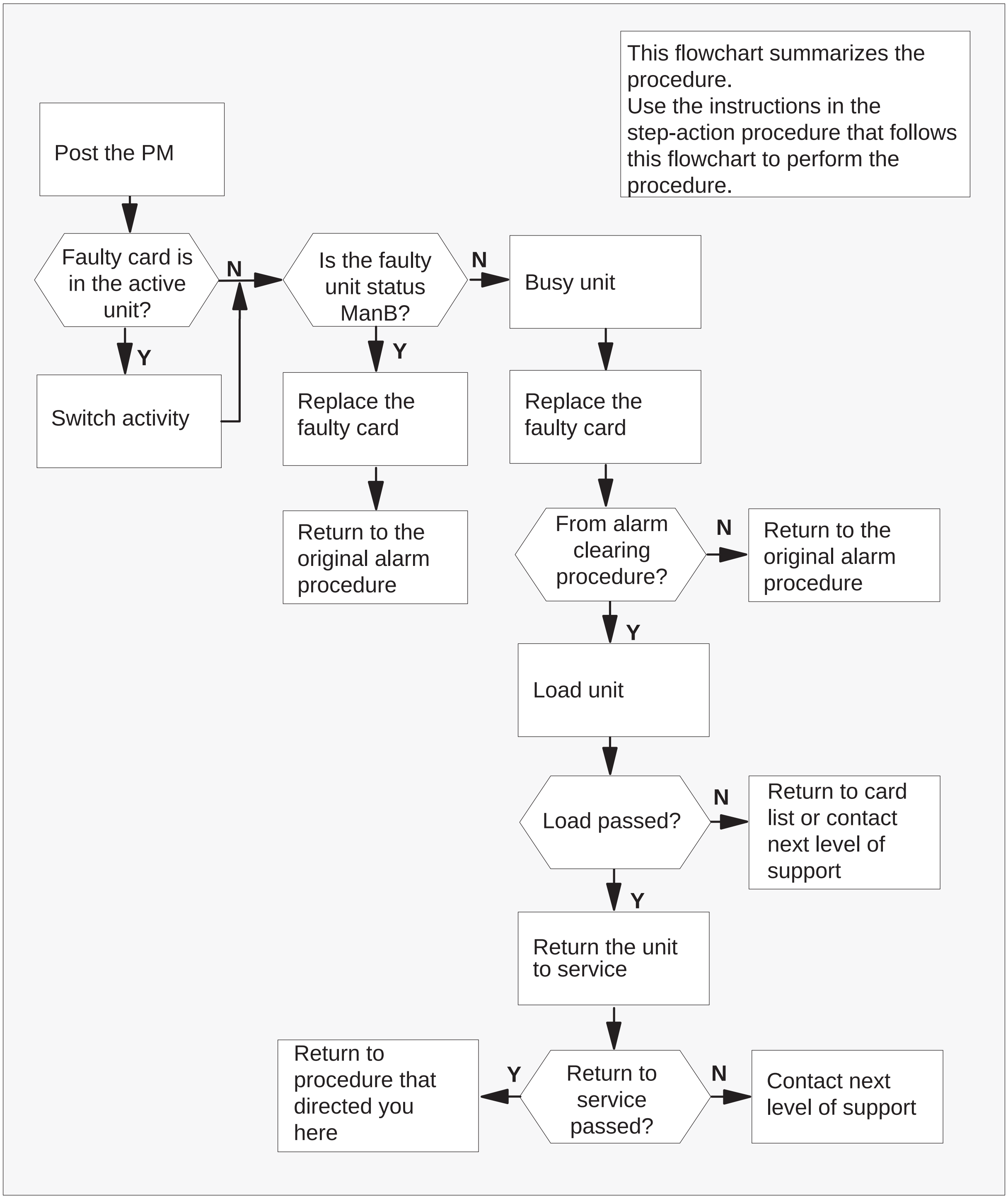
Do not go to the common procedures unless directed to do so in the step-action procedure.

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 the equipment frame

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 11

7 SWACT 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NTBX01
SMA (continued)

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 22.

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 the state is	Do
ManB	step 14
SysB, CBsy, ISTb, or InSv	step 13

NTBX01
SMA (continued)

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.

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

14 Perform the procedure “Removing and inserting cards in an SMA.”

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

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 22

NTBX01
SMA (continued)

17 Test the inactive SMA unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no   is the number of the SMA unit loaded in step 16

If TST	Do
passed	step 18
failed	step 22

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 tested in step 17

If RTS	Do
passed	step 19
failed	step 22

At the equipment frame

19 Remove the sign from the active SMA unit.

20 Send any faulty cards for repair according to local procedure.

21 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 23.

22 For further assistance, contact the personnel responsible for the next level of support.

NTBX01
SMA (end)

23 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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”

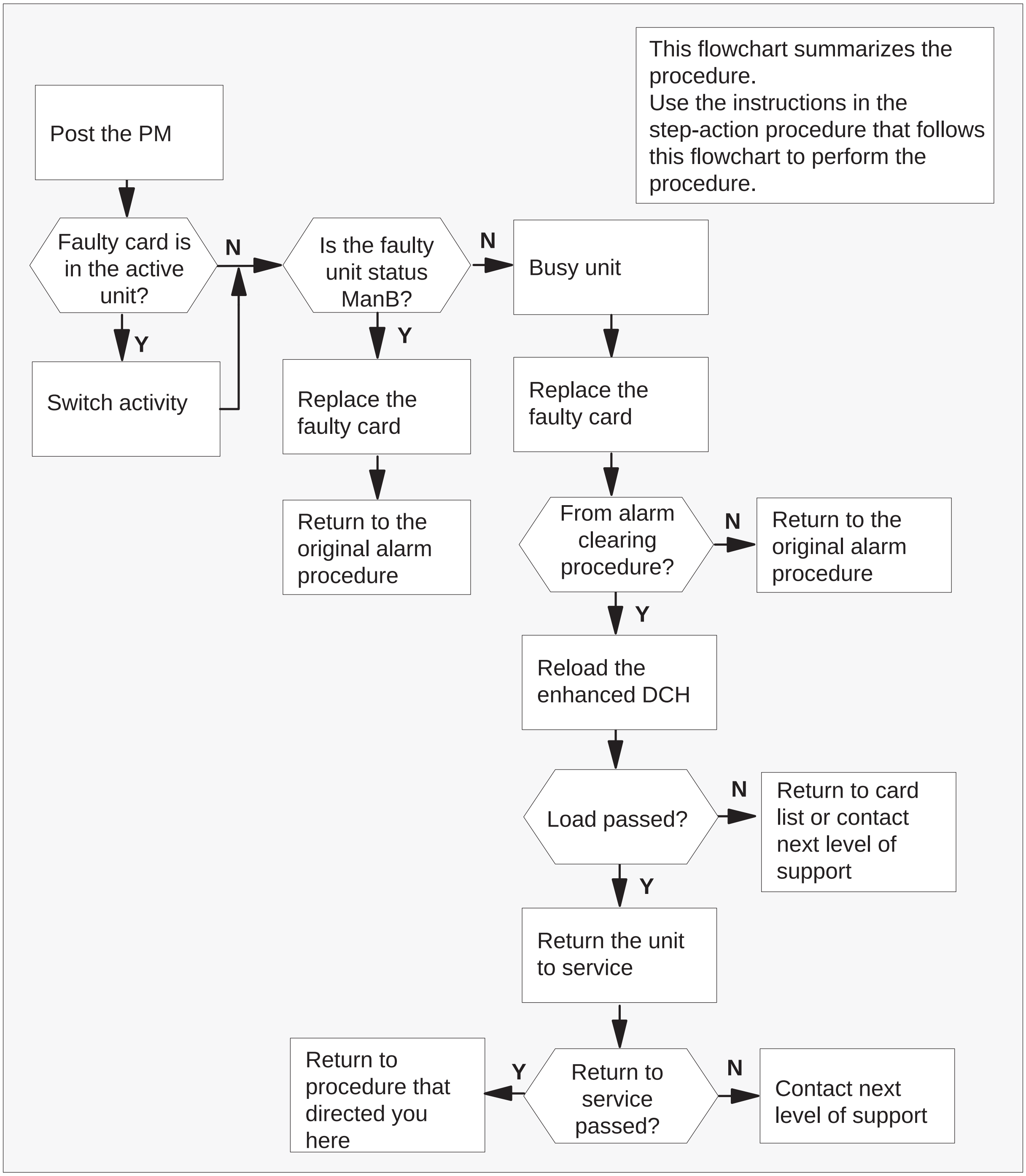
Do not go to the common procedures unless directed to do so in the step-action procedure.

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



NTBX02
SMA (continued)

Replacing an NTBX02 card in an SMA

At the equipment frame

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 11

7 SWACT 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 SWACT the units by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

NTBX02
SMA (continued)

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 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

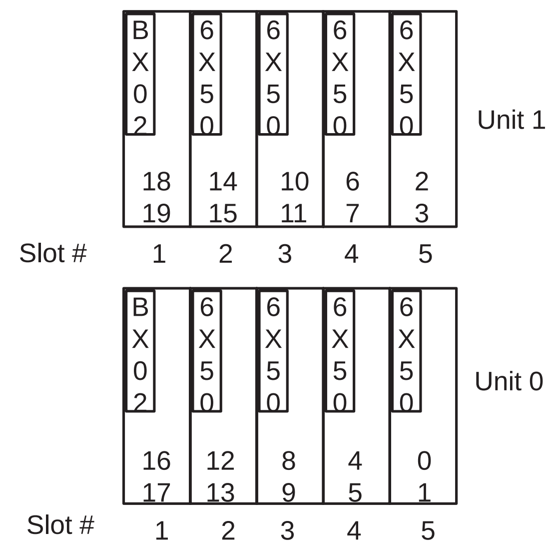
12 Observe the MAP display and determine the state of the inactive unit.

If the state is	Do
`ManB`	step 13
`SysB, CBsy, ISTb, or InSv`	step 14

NTBX02
SMA (continued)

13 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.



14 Go to the DCH level of the MAP terminal by typing

>DCH
and pressing the Enter key.

15 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.

16 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

NTBX02
SMA (continued)

At the equipment frame

17

> **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 15 and 16 for each DCH card (NTBX02) with ports connected to the busied unit.

18 Replace the faulty NTBX02 card using the procedure “Removing and inserting cards in SMA.”

At the MAP terminal

19 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 26
other	step 20

20 Load the replaced DCH card by typing

>LOADPM
and pressing the Enter key.

If load	Do
passed	step 21
failed	step 25

NTBX02
SMA (end)

21 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 22
failed	step 25

At the equipment frame

22 Remove the sign from the active SMA unit.

23 Send any faulty cards for repair according to local procedure.

24 Note in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 26.

25 For further assistance, contact the personnel responsible for the next level of support.

26 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

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

“Locating a faulty card in an SMA” is referenced in this procedure.

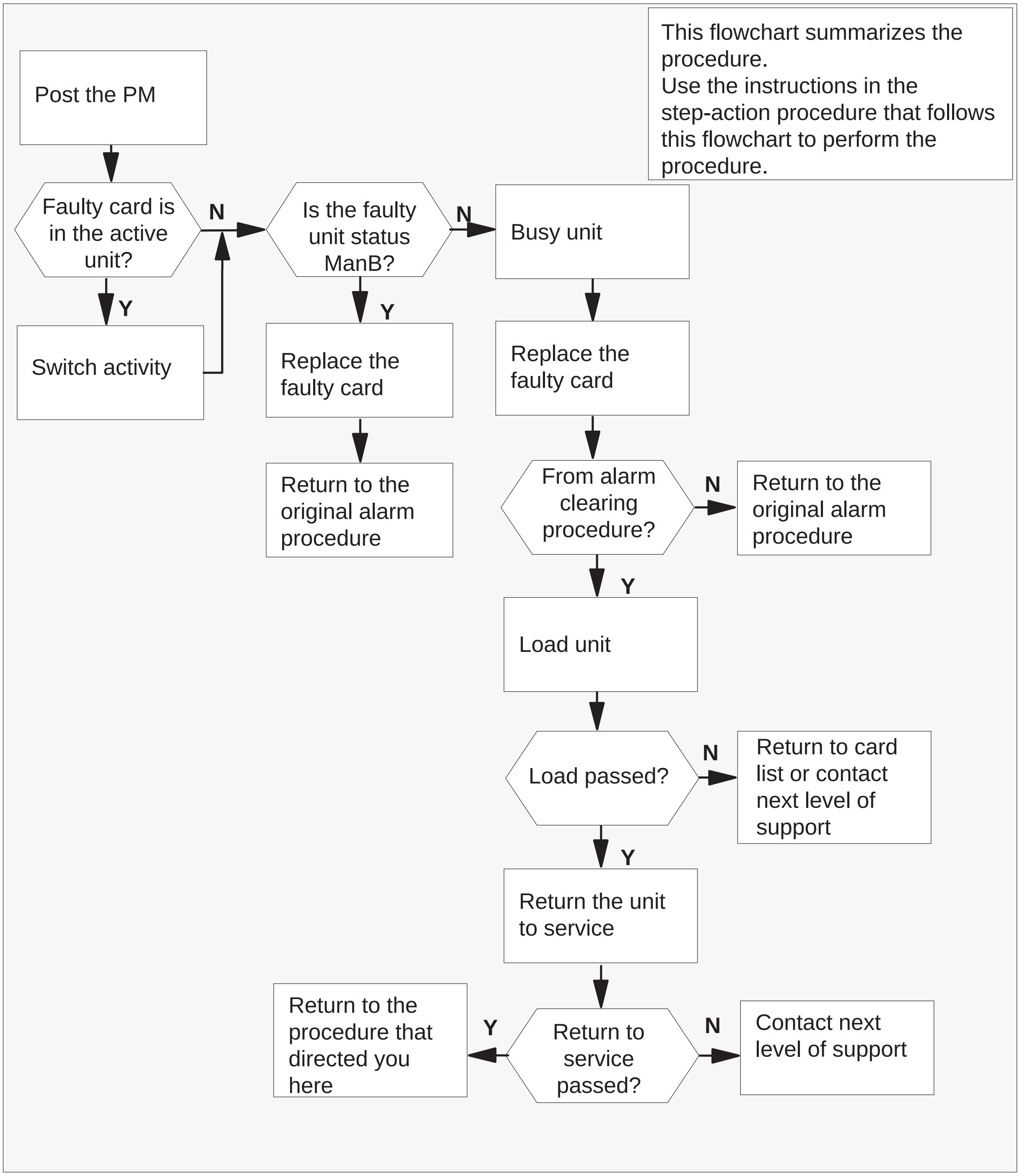
Do not go to the common procedure unless directed to do so in the step-action procedure.

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.

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 the SMA

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 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.

NTMX71
SMA (continued)

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 29.

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
`ManB`	step 14
`SysB, CBsy, ISTb, or InSv`	step 13

NTMX71
SMA (continued)

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)

At the equipment frame

14

> **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.

15 Unseat the NTAX74 card in slot 12.

16

> **WARNING**
> **Personal injury**
> Take the following precautions when removing a backplane card:
> To prevent eye and facial injuries do not jerk the card from backplane pins. Gently rock the card 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.

NTMX71
SMA (continued)

17 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

18 Place the card you have removed in an electrostatic discharge (ESD) protective container.

19 Line up the holes on the brackets of the replacement card with the holes with the holes on the backplane at slot 19.

20 Using a slot screwdriver, secure the card to the backplane with the screws that were removed in step 16. Ensure the fiber washer is between the brackets of the replacement card and the backplane before tightening the screws.

21 Reseat the NTAX74 card in slot 12.

22 Reseat the NT6X41 card in slot 21.

23 Use the following information to determine the next step.

If you were directed here from	Do
alarm clearing procedures	step 26
other	step 24

At the MAP terminal

24 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 25
failed	step 29

NTMX71
SMA (end)

25 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 24

If RTS	Do
passed	step 26
failed	step 29

At the equipment frame

26 Remove the sign from the active SMA unit.

27 Send any faulty cards for repair according to local procedure.

28 Note the following in the office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 30.

29 For further assistance, contact the personnel responsible for the next level of support.

30 You have completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

Returning a card for repair or replacement in an SMA

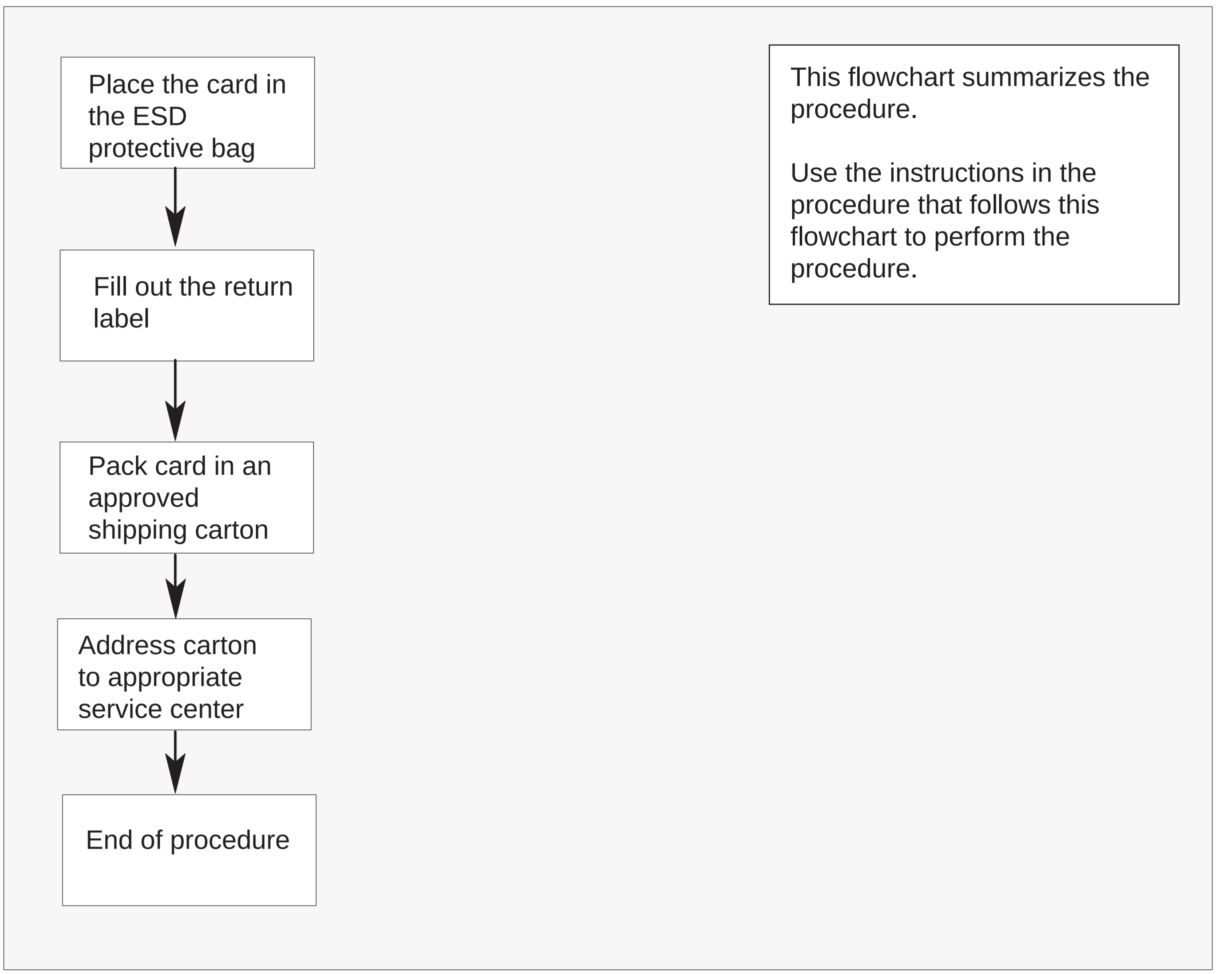
Application

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 shipping carton is not available, use another 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 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

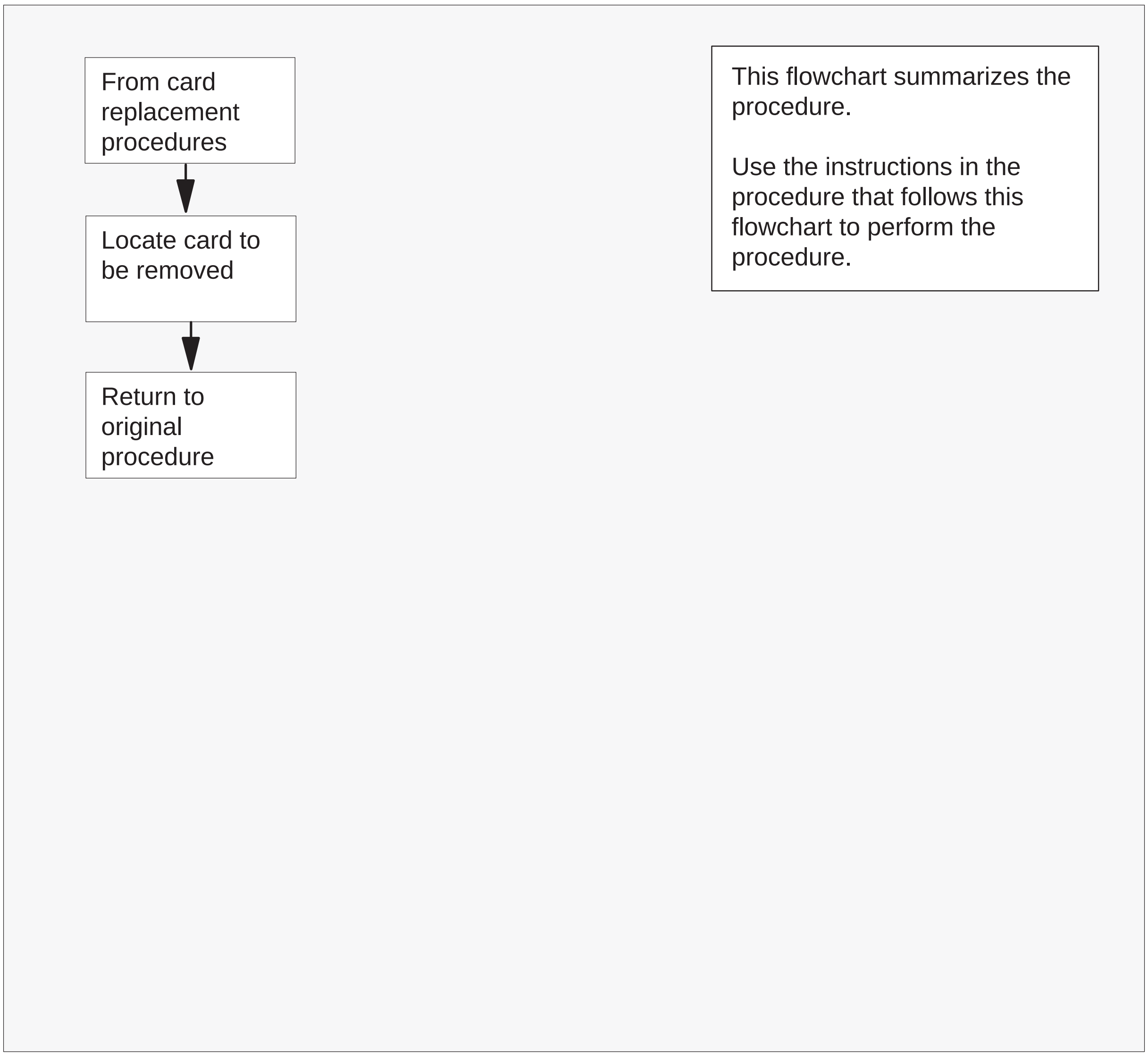
Application

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:

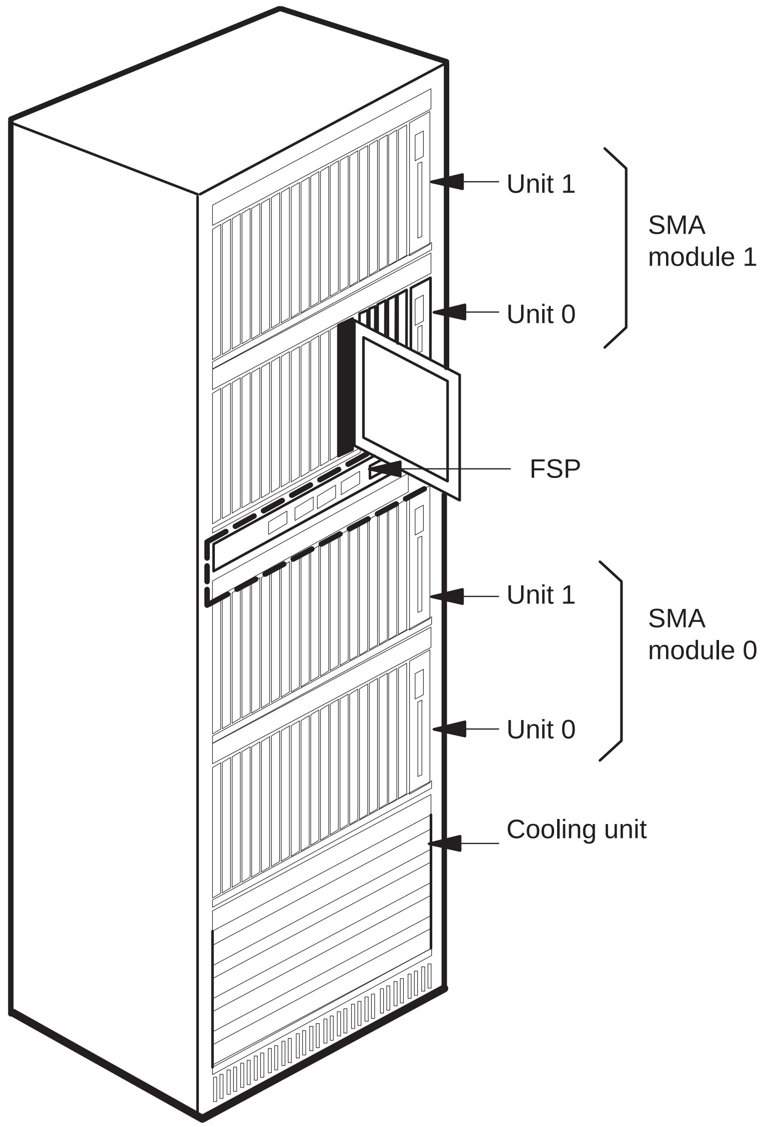
```
Site  Flr   RPos   Bay–id     Shf
HOST   03    B12    LTEI 00   18
```

At the LTE frame

3 Locate the unit where 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 a SMA module within a frame and an SMA unit within a module.



Locating a faulty card in an SMA (continued)

5 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, AD, FA, or FB	22
6X40GA or 6X40DA	22a paddleboard
2X70AE	25–27
6X50AB	1 to 5
BX02BA	1 to 5

Go to step 6.

6 Is the faulty card an NT6X50 or NTBX02?

If card is	Do
NT6X50 or NTBX02	step 7
other	step 13

Locating a faulty card in an SMA (continued)

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
```

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

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.

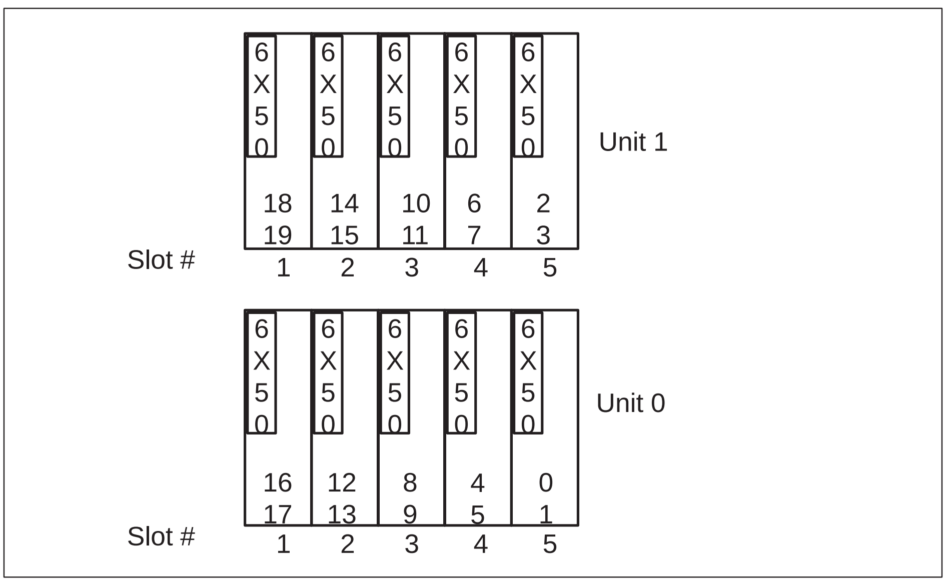
Example of a MAP response

```
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.

Note: 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

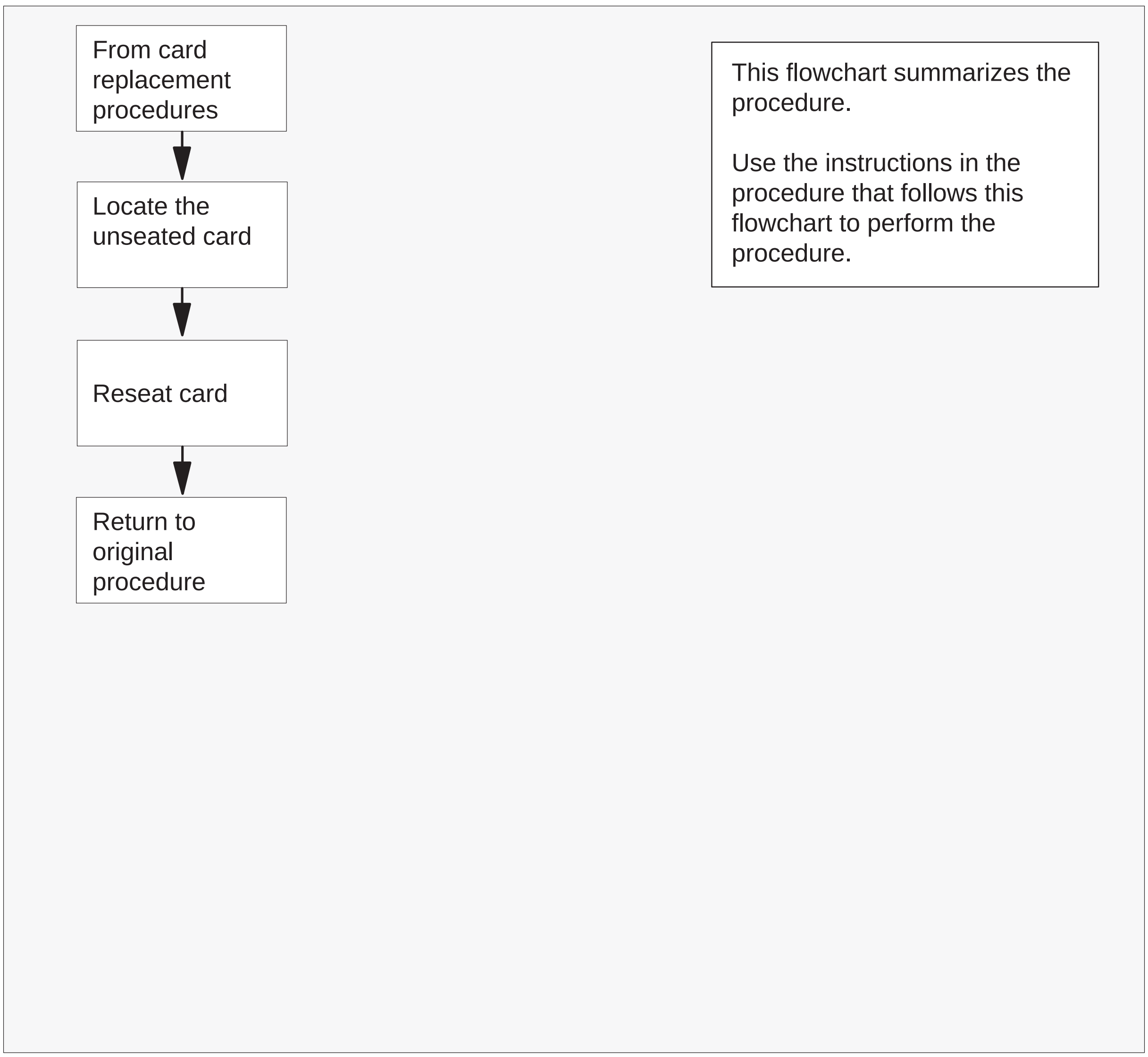
Application

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

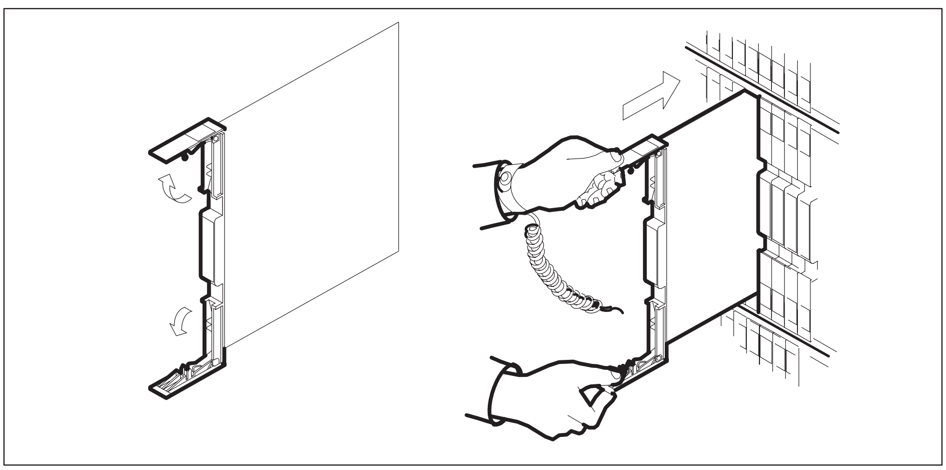
> **WARNING**
> **Equipment damage**
> Take the following precautions when removing or inserting a card:
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

> **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 (FSP). 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.

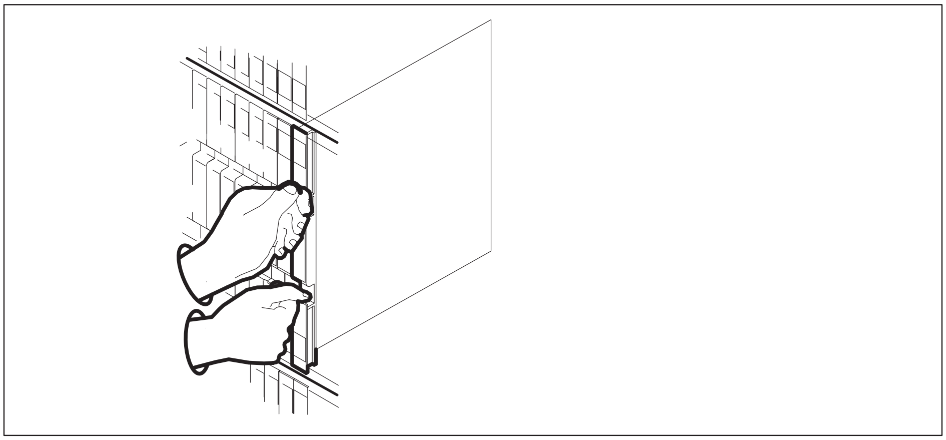


Reseating a card in an SMA (end)

4 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure 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

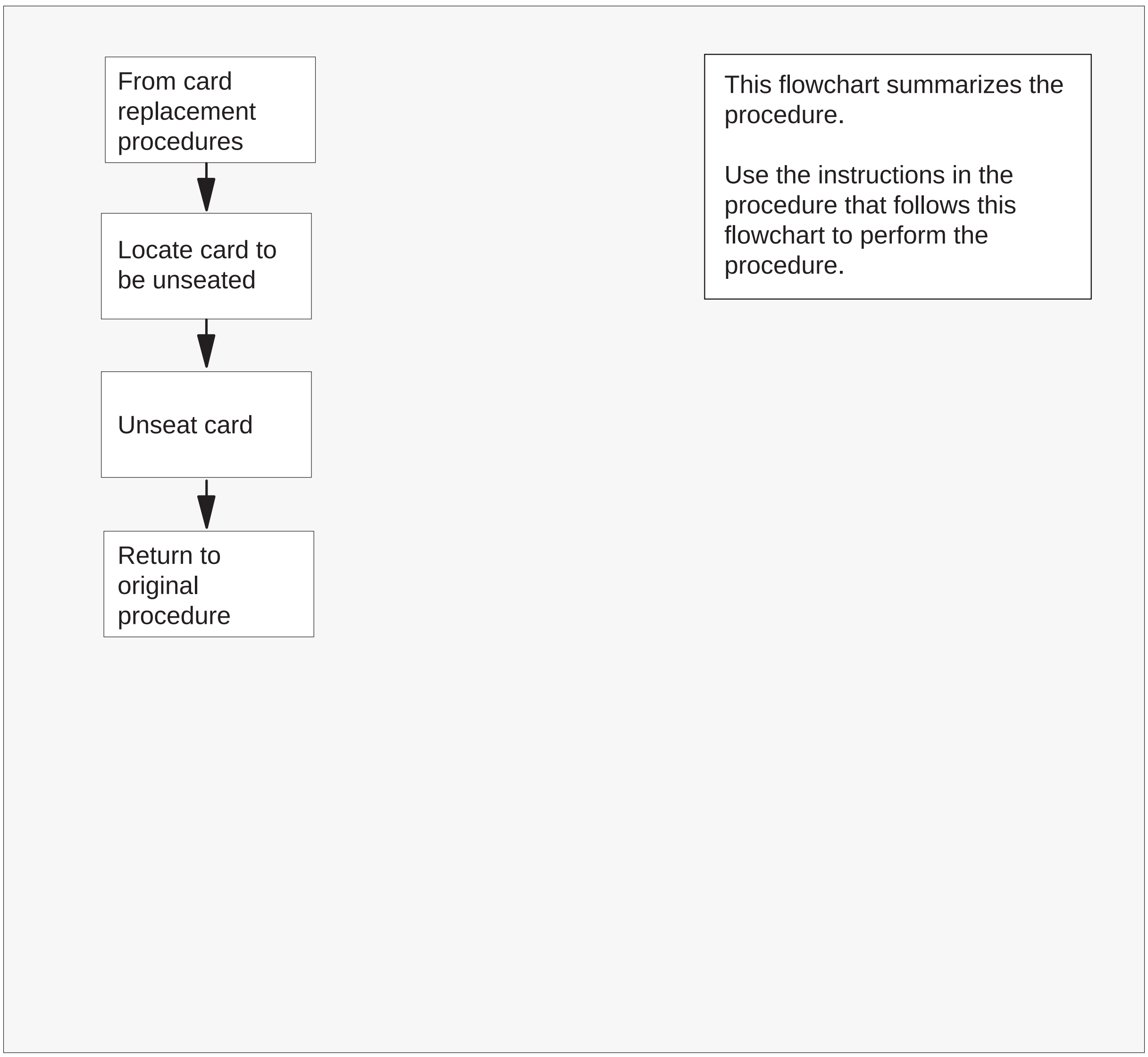
Application

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

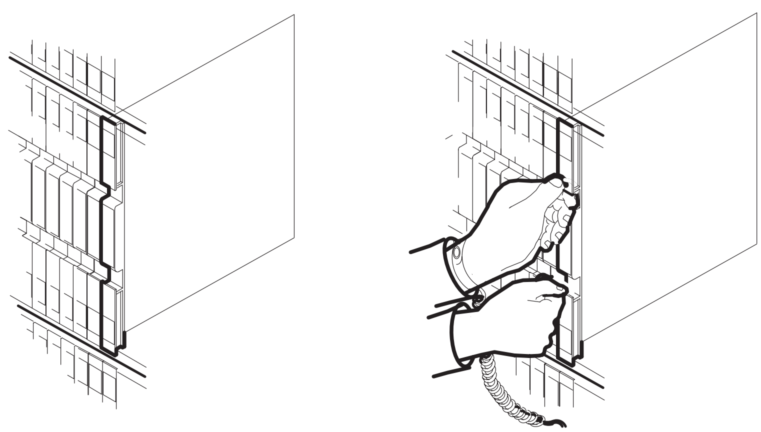
1

> **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 (FSP). This strap protects the equipment against damage caused by static electricity.

Put on a wrist strap.

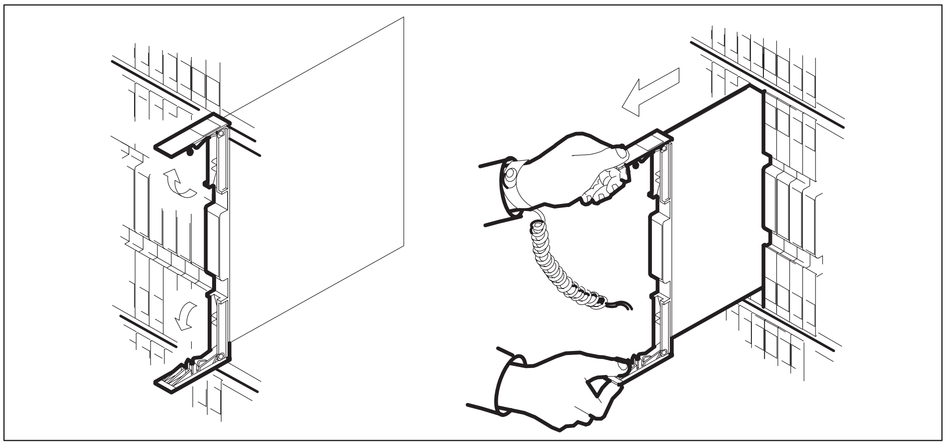
2 Locate the card to be removed on the appropriate shelf.



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

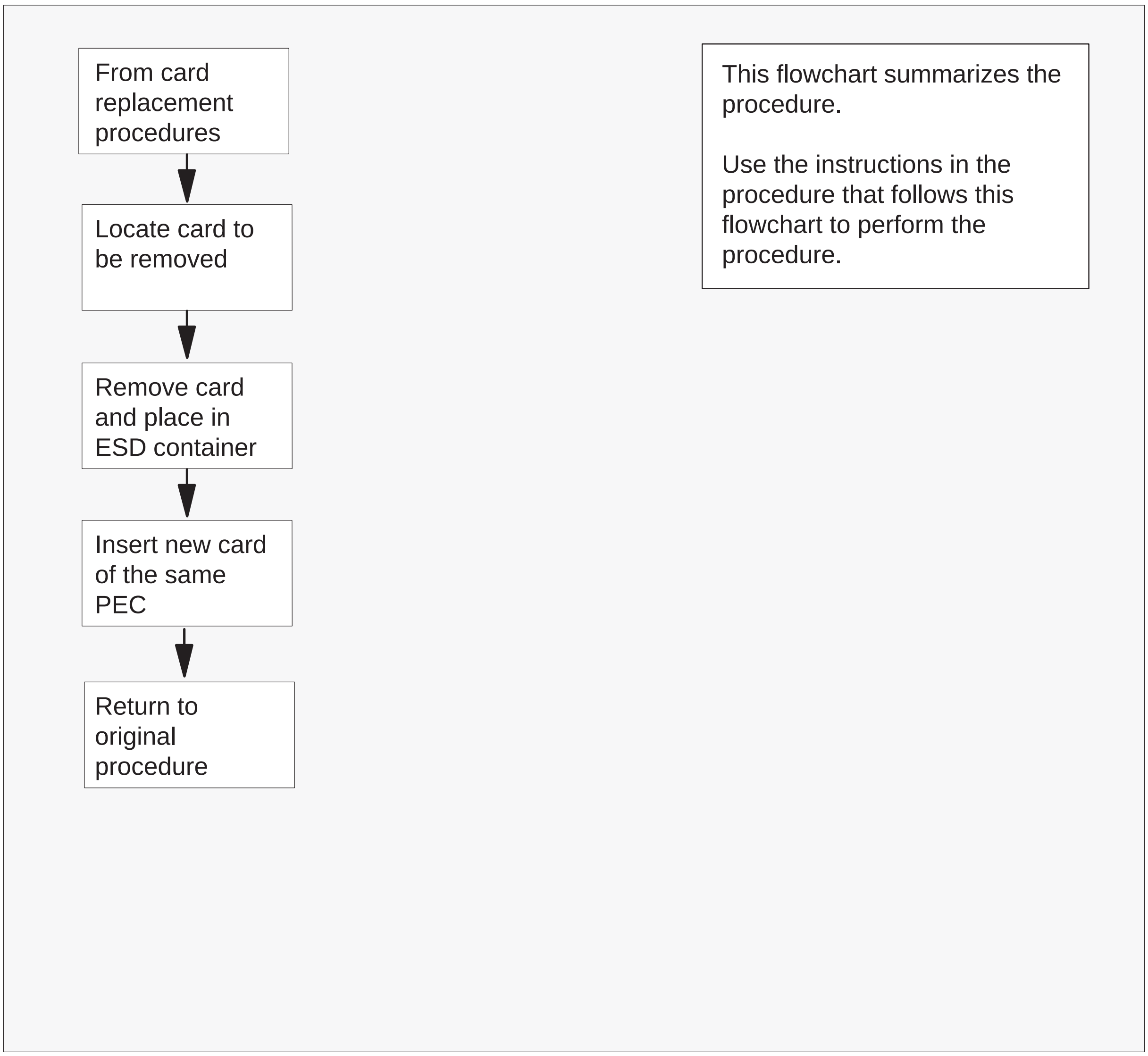
Application

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

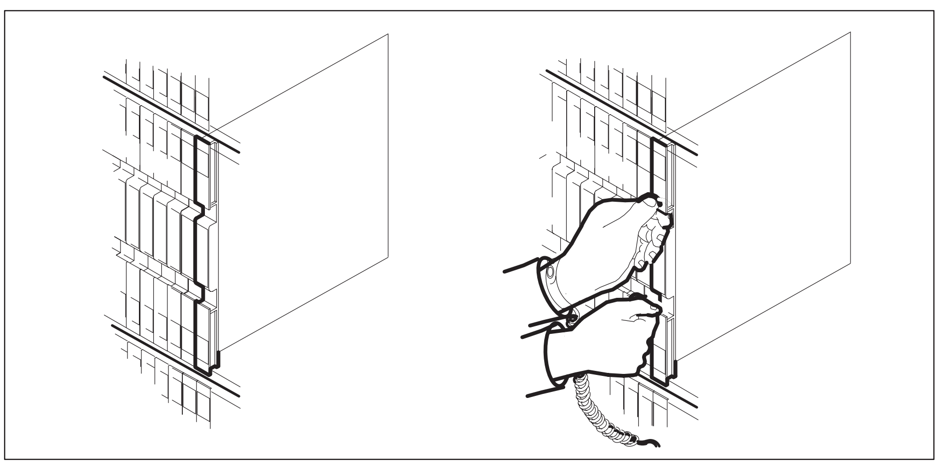
1

> **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**
> 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.

Put on a wrist strap.

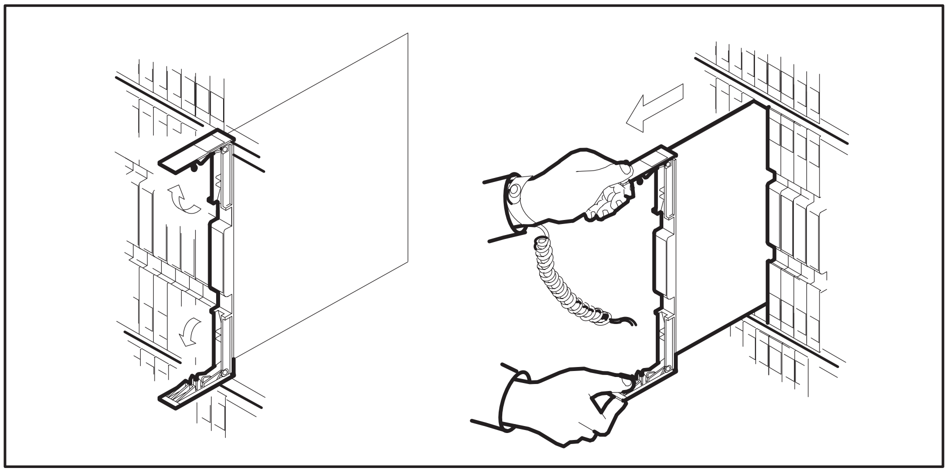
2 Locate the card to be removed on the appropriate shelf.



3 Open the locking levers on the faulty card. The top locking lever opens up and the bottom locking lever opens down.

Removing and inserting cards in an SMA (continued)

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.

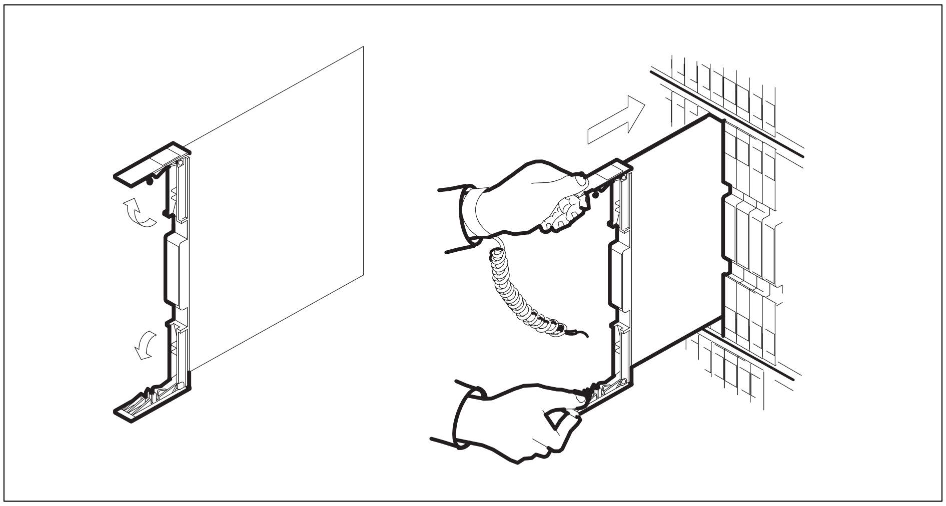
5 Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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)

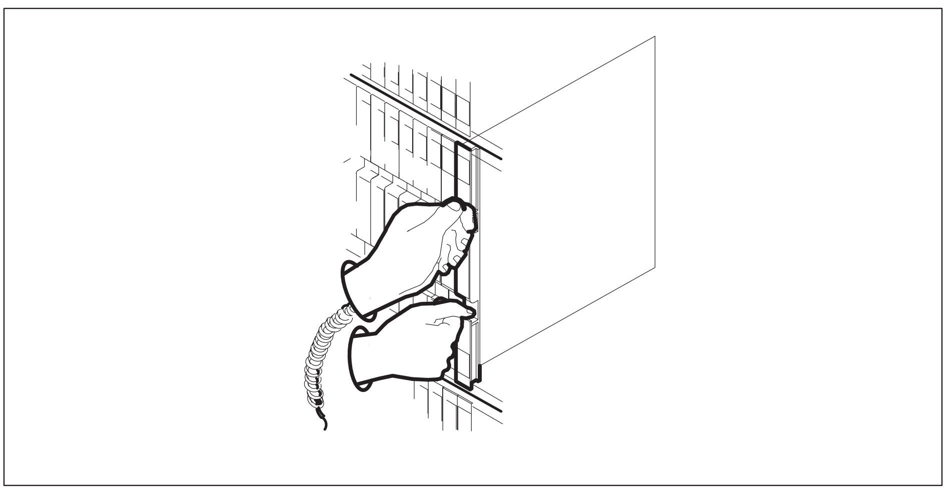
8 Open the locking levers on the replacement card. Align the card with the slots in the shelf and gently slide the card into the shelf.



9 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that 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).

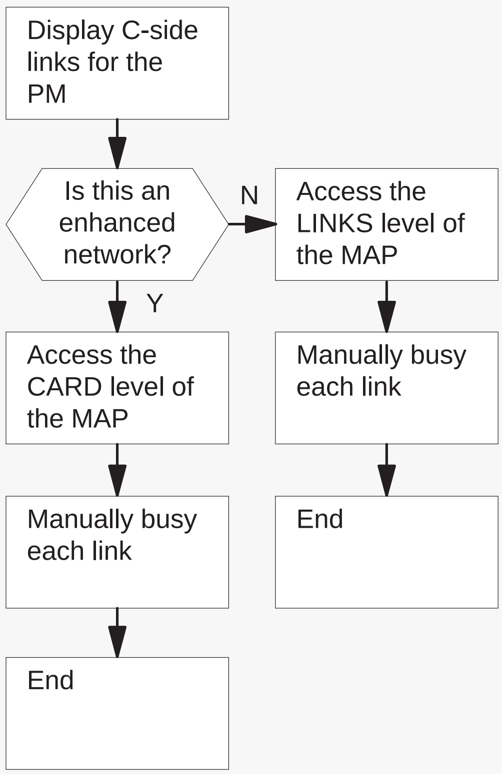
This procedure assumes that the PM is posted and available for query. Instructions in the main procedure direct you to re-post the PM after you have completed this common procedure.

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



This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

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 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, 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 every two weeks.

Common procedures

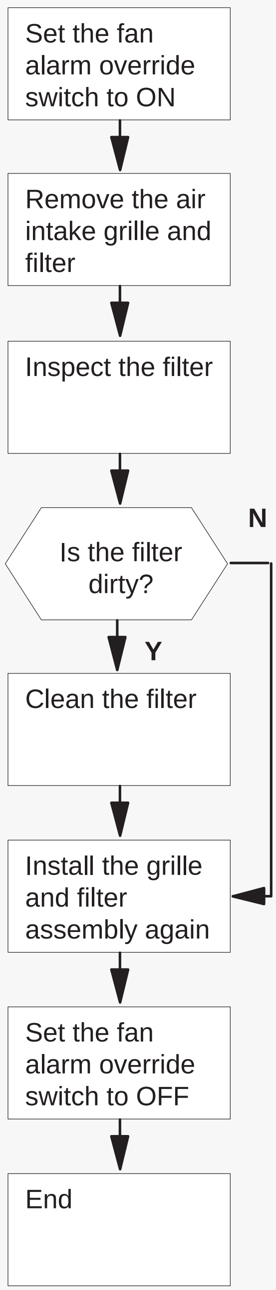
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform this procedure.

Filters – Inspecting and cleaning cooling unit filters
SMA (continued)

Summary of Filters – Inspecting and cleaning cooling unit filters



This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

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. If you reach in more than 15 cm, 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 with cleaner and water.

8 Rinse the filter and allow to dry before you install the filter again.

Filters – Inspecting and cleaning cooling unit filters SMA (end)

9 To 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
Do not reach in more than 15 cm (6 in) beyond the upper lip of the air intake grille. If you reach in more than 15 cm, 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.

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 every 6 months.

Common procedures

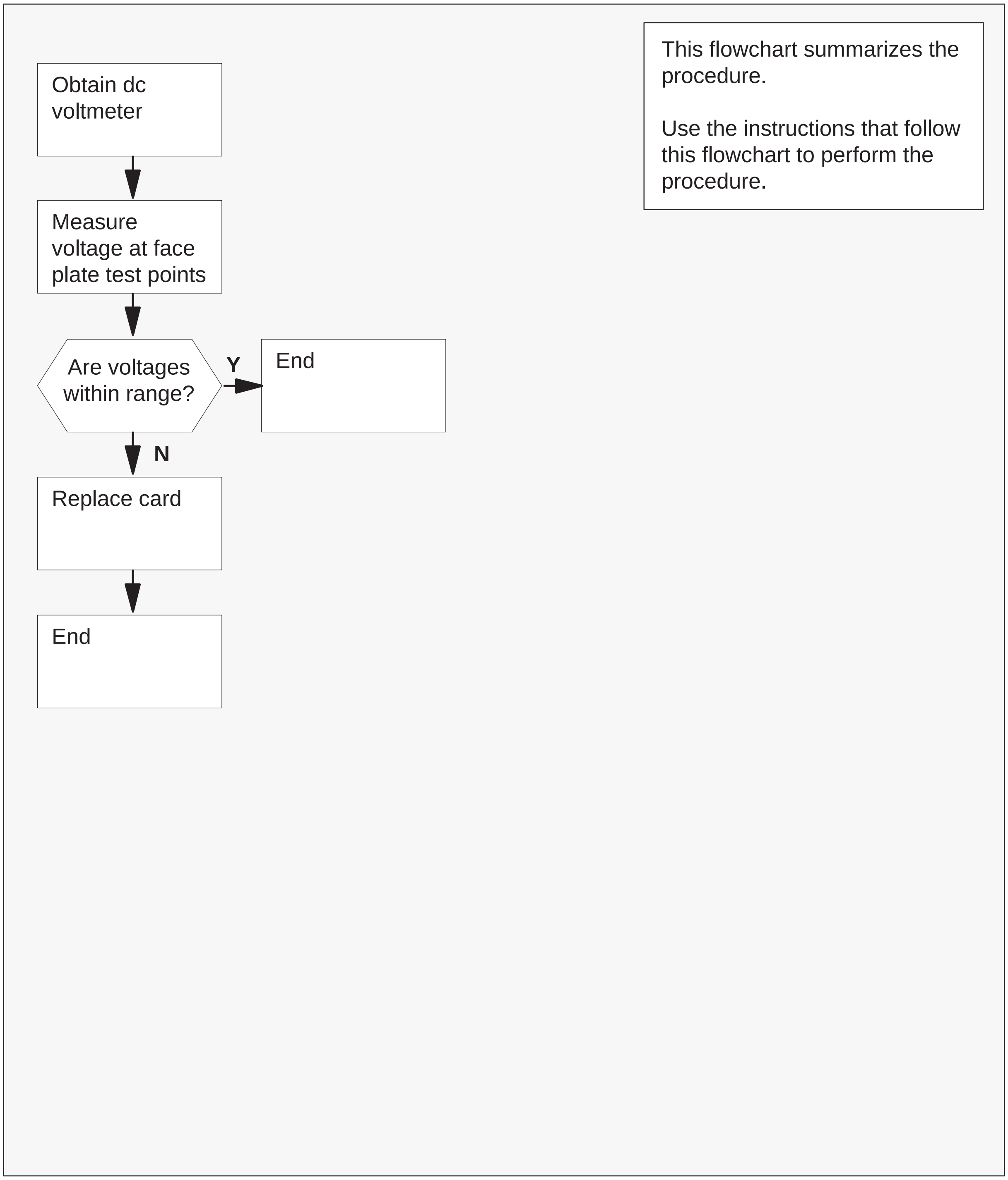
There are no common procedures.

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



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 Measure the voltage at the test points on the faceplates of all NT2X70 power converters in the SMA equipment frame. Use the voltmeter.

3 Compare the voltages measured in step 2 with the acceptable voltage ranges found in the following table. The voltage ranges are approximately 2% of the nominal values printed on the NT2X70 faceplate.

Test Point voltage	Acceptable range
+12V	+11.64V through +12.36V
– 12V	– 12.36V through –11.64V
+ 5.15V	+5.05V through +5.25V
–5V	–5.2V through –4.8V

If test point voltages	Do
are within acceptable range	step 5
are not within acceptable range	step 4

4 Replace the NT2X70 power converter as *Card Replacement Procedures* direct you. When you complete this procedure, return to this step.

5 This procedure is complete.

Wrist strap – Testing wrist strap grounding cords SMA

Application

Use this procedure to verify 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

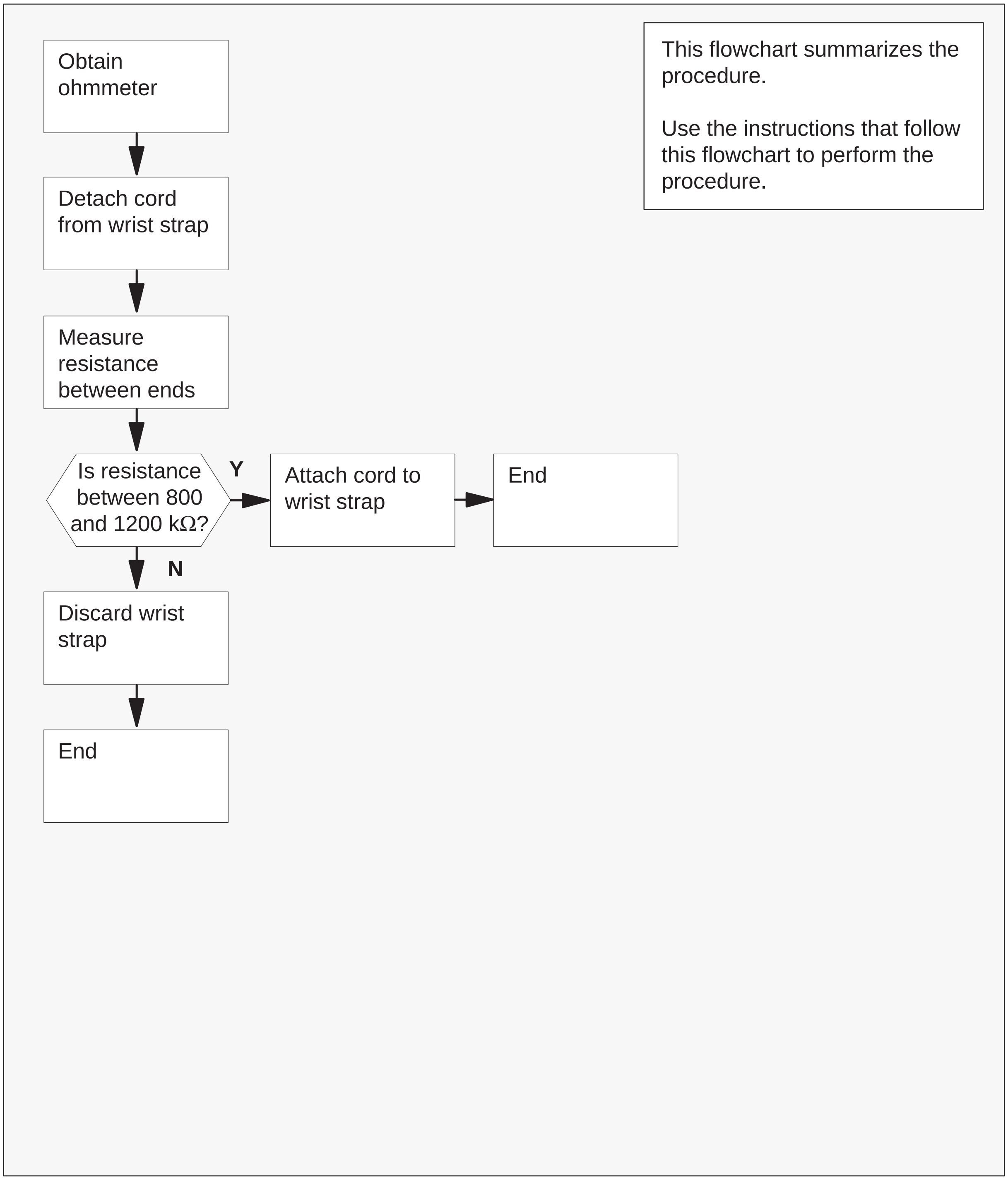
There are no common procedures.

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.

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 for additional help.

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 enough static charges to ground properly. The cord does not protect sensitive electronic equipment against of buildups static charges that can cause damage.

Discard the assembly. *Do not use the assembly.*

6 The procedure is complete.

Index

D

E

F

I

DMS-100 Family

Subscriber Carrier Module-100 Access (MVI-20)

Maintenance Manual

Product Documentation–Dept. 3423
Nortel Networks
P.O. Box 13010
RTP, NC 27709–3010
Telephone: 1–877–662–5669
Electronic mail: cits@nortelnetworks.com

Publication number: 297-8253-550
Product release: XPM13 and up
Document release: Standard 08.01
Date: February 2000
Printed in the United States of America

NORTEL NETWORKS

How the world shares ideas.