297-8271-550

DMS-100 Family

RSC-SONET A

International Maintenance Manual

XPM11 and up Standard 09.01 October 1999

NORTEL NETWORKS

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DMS-100 Family

RSC-SONET A

International Maintenance Manual

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About this document

When to use this document

This Remote Switching Center-SONET (RSC-S) for international applications maintenance reference manual provides: overview and hardware information for understanding the RSC-S product and operation; recovery procedure for returning to service an RSC-S from a completely out-of-service condition; alarm clearing procedures for clearing an RSC alarm condition at the MAP; card replacement procedures for removing and replacing hardware modules in the RSC-S as part of maintenance, verification, or acceptance procedures; trouble locating and clearing information for locating and clearing problems beyond the scope of other maintenance procedures.

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.

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References in this document

The following documents are referred to in this document:

- *Alarm Clearing Procedures*
- *Card Replacement Procedures*
- *Product Documentation Directory,* 297-8991-001
- *Operational Measurements Reference Manual*
- *PMDEBUG User Guide, TAM-1001-004*
- *RSC-S International Related Logs*
- *Recovery Procedures*
- *Translations Guide*

What precautionary messages mean

The types of precautionary messages used in Nortel 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.
```

Maintenance overview

This chapter contains the following sections:

- functional description
- fault conditions
- automatic maintenance
- escalation to manual maintenance

The functional description contains a summary of the components that comprise the Remote Switching Center-Synchronous Optical Network (RSC-S) configurations. The functional description describes remote center offshore #2 (RCO2) components. This section also describes how software processes affect RCO2 components, and highlights voice and message flows.

Fault conditions can occur in components like a card or power supply or links that connect the components. Fault conditions can also occur on software that controls the voice and message flow.

The RSC-S, the Remote Switching Center (RSC), the Digital Multiplex System (DMS) switch, and the Data Packet Network (DPN) find fault conditions. The system attempts to locate the fault and correct the fault automatically. If the fault requires action, the system produces trouble indicators.

The RSC-S automatic maintenance includes the output of trouble indicators. Refer to the “Automatic maintenance” section for this information.

Functional description

This section describes the components of the RSC-S, and includes a description of the RCO2.

Remote Switching Center-SONET

The RSC-S uses common peripheral module (CPM) architecture and not XMS-based peripheral module (XPM) architecture.

A CPM requires the following changes:

- change in the channel supervision message (CSM) connections in the CPM
- direct connection of channels to the enhanced D-channel handler (EDCH) circuit card or D-channel handler (DCH) card
- enhancement of the matrix card (NTMX75)
- creation of the pulse code modulation (PCM) circuit card (NTMX82) to concentrate every signaling function in one circuit card
- modification of how the pulse code modulation 30 (PCM-30) signaling bits (A, B, C, D) are handled
- addition of downloadable firmware to the Unified Processor (UP) card (NTMX77), Cellular Access Processor (CAP) card (NTAX74) and PCM Signaling Processor (SIGP) card (NTMX73)

  Note: An RCO2 that has the optional NTAX74 CAP does not support the Peripheral/Remote Loader-16 (NT7X05) functionality.

- in the RCO2 the AB scanner in the SIGP uses a 3 ms interrupt to perform a scan.

In this architecture, the primary components of the RSC-S that can be assembled are the remote center offshore #2 (RCO2) or dual RCO2 (DRCO2). The RCO2 can be installed with or without the services of the integrated services digital network (ISDN) or emergency stand-alone (ESA). The following sections describe these components according to functional areas. Each functional area highlights the functions of specific cards and presents the other RSC-S components.

Note: The two RSC-S configuration is not available with this release.

In-service firmware downloading

In-service firmware downloading permits XPM firmware loading in an XPM unit while the unit is in service (InSv). This feature reduces the amount of time one unit of the XPM is out-of-service (OOS). In-service firmware downloading supports NTMX77 and NTAX74 processors.

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 XPM unit out of service (OOS).

This feature introduces 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 XPM, 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.

XPM Firmware Loader Robustness CM Component disables the firmware option of the LOADPM command. 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 XPM. 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 a by-unit basis, perform a switch of activity (SwAct) followed by the RTS command. Execute the LOADFW command with the UPGRADE option on the now inactive unit.

The next 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.

Remote center offshore #2

The RCO2 is the primary operations device for the RSC-S. The operating areas of the RCO2 include the following:

- card specific functions
- speech and message paths in the RCO2
- routine exercise (REX) test
- switch of activity (SWACT)
- update of static data (not ESA)
- enhanced data sync (EDDS)
- enter and exit emergency stand alone (ESA) mode
- return the RCO2 to service

Note: The figure "Functional block diagram of the RCO2," appears later in this section. The figure relates to the description of the RCO2 that follows.

Cards

The following sections use RCO2 cards:

- host communication
- processor
- speech bus
- peripheral communication

Host communication cards

These cards translate between the 16 host PCM-30 ports and the parallel speech bus. The RCO2 host communication cards include the Quad Frame Carrier (NTMX87) and the Enhanced Matrix (NTMX75).

The Quad Frame Carrier provides an interface between the RSC-S and the host. The Quad Frame Carrier can have a maximum of four packlets. These packlets can be a dual PCM-30 (NTMX82AA) or a filler plate (NTMX83AA). The dual PCM-30 packlets support the features, maintenance functions, and performance counters that the NT6X50AB provides.

The Enhanced Matrix NTMX75 card combines the functions of the formatter card (NT6X72) and the time switch (NT6X44). The remote cluster controller (RCO2) for RSC applications uses this card and time switch. The NTMX75 card is nonblocking and performs the switching functions the RCO2 shelf and the extension shelf require. The Enhanced Matrix card is a single-stage time switch with 2528 channels. These channels that are split between input (C-side) and output (P-side). A channel can connect through a switch to a free channel.

The AB bit control software on the NTMX75 performs the following functions:

- enable
- disable
- inversion

Processor cards

The RCO2 can be provisioned with the Unified Processor (UP) card or the optional Cellular Access Processor card. The UP card is NTMX77 with 68020 CPU. The Cellular Access Processor card is NTAX74 with 16Mb memory.

> ***Note:*** When an RCO2 is provisioned with the optional NTAX74 CAP, the RCO2 does not support Peripheral/Remote Loader-16 (NT7X05) functionality.

NTMX77 Unified Processor The UP card controls RCO2 activities. Memory for the UP consolidates on the card and provides 8Mb of memory with a possible expansion to 16Mb. The UP provides electrically erasable programmable read-only memory (EEPROM), and has two FLASH EEPROMs. Each FLASH EEPROM has a 256Kbyte chip that can be programmed. Firmware can be loaded separately of RAM load on a manually-busied (ManB) RCO2 or RCO2 unit. To load the firmware, enter the following command string:

>LOADFW PM

or

>LOADFW UNIT unit_no

or

>LOADFW INACTIVE

The NTMX77 UP increases real time and replaces several cards in each unit of the RCO2. This replacement results in reduction of power use.

Note: The NTMX77 is required to support NT7X05 functionality.

NTAX74AA (Cellular Access Processor card) The optional Cellular Access Processor (CAP) card is in slots 3 and 25 of the RCO2 shelf. The CAP consists of the NTAX74 motherboard and an NTNX4814 microcontroller subsystem (MCS) daughterboard. The MCS daughterboard has a 68040 processor and 16 Mbytes of memory to support downloadable firmware capability. The CAP has direct read/write access to the matrix card, SIGP, EISP, CMR, UTR, and MSG and CSM card. The NTAX74 provides call processing functions, like

- digit collection (pulse)
- channel assignment
- message processing

Real-time call processing functions include

- send and receive messages
- controlling the enhanced time switch
- supervising channels
- switching activity and reset control

Note: When an RCO2 has the optional NTAX74 CAP, the RCO2 does not support Peripheral/Remote Loader-16 (NT7X05) functionality is not supported.

You can download the NTAX74 firmware can download separately of RAM load on a manually-busied (ManB) RCO2 or RCO2 unit. To download the firmware, enter the following command string:

>LOADFW PM

or

>LOADFW UNIT unit_no

or

>LOADFW INACTIVE

Speech bus cards

The speech bus consists of two speech busses. The two speech busses include a send XPCM to the C-side and a receive RPCM to the P-side. The cards include the following:

- NT6X69
- NT6X92

- NTMX75
- NTMX73
- NTMX76
- NT6X78
- NT7X05

  Note: When the RCO2 is provisioned with the NTMX77 UP, the RCO2 supports the NT7X05. When the RCO2 has the optional NTAX74 CAP, the RCO2 does not support the NT7X05 functionality.

The NT6X69 card provides an interface between and processes signaling and control messages between the RCO2 and the central control (CC).

The NT6X92 card is available in universal and global versions.

ATTENTION

For peak performance, do not install the Universal Tone Receiver (UTR) and Global Tone Receiver (GTR) on the same RCO2. A method to determine which receiver interprets tones is not available. Call processing tones, for use with a GTR, can degrade.

Universal tone receiver The UTR (NT6X92BB, BC, CA) identifies and processes DTMF, MF, MF-socotel, and CMF-forward and backward tones. The UTR identifies and processes the tones in 32 channels on the parallel speech bus.

Global tone receiver The GTR (NT6X92EA) identifies and processes DTMF, MF, MF-socotel, CMF-forward and backward tones in 64 channels on the parallel speech bus.

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

The NTMX73 circuit card (SIGP) supports the low-level signaling tasks and provides the system clock. The NTMX73 circuit pack replaces the card types NT6X86, NT6X80, and NT6X28. Software for the maintenance of synchronization with the network is on the NTMX73 circuit pack. When an RCO2 SWACT occurs, the inactive unit clock is disabled. To prevent reset of the inactive unit, the active unit clock is enabled. One of the bits on the SIGP output port controls the clock enable/disable flag.

The NTMX73 circuit card provides PCM-30 maintenance and the maintenance interface for the NTMX82 circuit pack. The NTMX73 circuit pack distinguishes between domestic and international environments by straps on the backplane of the RCO2 shelf. The NTMX73 card read only memory (ROM) is the same in local and international applications.

The NTMX73 card performs the following functions:

- ABCD bit signaling
- AB bit scan (do a scanner initialization. Send the SIGP an initialization message)
- clock synchronization and disabling
- transfer of control information from P-side and C-side interface cards to the UP
- provides a common ram shared with the UP and hardware to act as an incoming and outgoing signal buffer

The NTMX73AB version also provides the following hardware sensing capabilities to enable a hardware fast SWACT in response to error detection.

- NTMX73 card removal
- P-side DS30A NTMX74AB errors that include:
  - — card removal
  - — fuse blown
  - — power down
  - — clock failure
  - — frame pulse failure
- mate RCO2 clock failure
- mate RCO2 power failure
- detect presence of new type backplane

The NTMX76, message and tone card, is the interface between the UP and a maximum of 32 data links. The card allows HDLC protocol with full duplex messaging, windowing, equal treatment and performance features, or DMS-X half duplex messaging. The message and tone card functions of the NTMX76 include:

- send and receive DS30 control messages between nodes
- generate ROM and RAM tones and send the tones out on a speech bus
- setup, maintain, and terminate calls

- checks parity and PCM path integrity

The card has direct communication with the UP, parallel busses, the direct message link, and with intermodule communication (IMC) links.

Pack diagnostics allow the UP to conduct several different levels of testing on the NTMX76 card. These tests are destructive and not destructive.

Destructive tests originate from the PMDEBUG and include:

- Tone diagnostics
- Message tests
- Receive ASIC test
- Transmit ASIC test

Not-destructive tests are HDLC tests and include:

- Card presence
- Memory tests
- HDLC messaging system test
- IMC test

The NT6X78 custom local area signaling services (CLASS) modem resource card (CMR) supports calling number delivery.

The NT7X05 provides local storage of XPM loads and images in a nonvolatile, nonmechanical based memory card.

> ***Note:*** When the RCO2 has the NTMX77 UP, the RCO2 supports NT7X05. When the RCO2 has the optional NTAX74 CAP, the RCO2 does not support NT7XO5 functionality.

Peripheral/remote Loader-16, (PRL) reduces XPM simplex time. The PRL allows XPM software loads to transfer to the XPM and be stored in a local XPM unit. The PRL allows the transfer while the unit is in service. A newer loadfile can replace a current loadfile. When you replace a loadfile, the last image remains available for recovery actions. The NT7X05 circuit pack provides local storage. To transfer the software, instruct an XPM unit to self load from the NT7X05 card. To transfer the software, use the enhanced LOADPM command ,while ManB, and the following parameters:

>LOAD [PM] LOCAL LOADFILE
[INACTIVE]
[UNIT]

The PRL uses imaging technology to improve peripheral loading. The CM monitors when changes occur that can restart survivable objects. This CM monitoring provides a high level of imaging control. Restart survivable objects are static data and code in the form of patches. The PRL makes a copy of NTMX77 RAM in an in-service (InSv), active or inactive, XPM unit. The PRL copies the unit to the NT7X05. If the XPM must reload, the image is restored from the NT7X05 to the UP RAM.

Loadfiles are created on the NT7X05 card when the XPM is InSv. Use the enhanced PM MAP level command, LOADPM, to create loadfiles on the NT7X05 card. Use the following parameters:

>XPMSTOR [PM] CC [load_file_name]
[ACTIVE]
[INACTIVE]

Note: The file_name must be the name of the file entered in field, LOAD, in the inventory table RCCINV.

When the NT7X05 card is first installed, the loadfile is invalid. Load the loadfile with the XPMSTOR parameter. Operating company personnel use the enhanced QUERYPM command with the FILES option to view the status of files on the NT7X05. The following is an example of the QUERYPM command:

>QUERYPM FILES

Press the Enter key.

Example of a MAP response:

```
Unit 0:
   NT7X05 load File: ** Mismatch **
   NT7X05 Image File:
   CMR LOAD:  CMR03A
Unit 1:
   NT7X05 load File: ** Mismatch **
   NT7X05 Image File:
   CMR LOAD:  CMR03A
```

Before loading, the CM checks if the NT7X05 is entered. If NT7X05 is entered, a software load, called the recovery software loader (RSL), is transferred from the CM to the UP. The name of the desired load file must be transferred from the CM to the UP. Information that indicates if the image or loadfile must be loaded is also transferred from the CM to the UP. The RSL verifies the loadfile name on the NT7X05. If the load name test passes, the RSL restores the image or load to the UP. The system checks the

image/loadfile integrity in the restore/loading process. You can use the enhanced QUERYPM command again to view the status of files on the NT7X05. An example of a MAP response follows:

>QUERYPM FILES

Example of a MAP response:

```
Unit 0:
   NT7X05 load File: KRI05AU
   NT7X05 Image File:
   CMR LOAD:  CMR03A
Unit 1:
   NT7X05 load File: KRI05AU
   NT7X05 Image File:
   CMR03A
```

Note: Refer to the *Translations Guide* for entry requirements for NT7X05

Peripheral communication cards

The cards in this section translate between the 54 P-side ports and the parallel speech bus. The cards are:

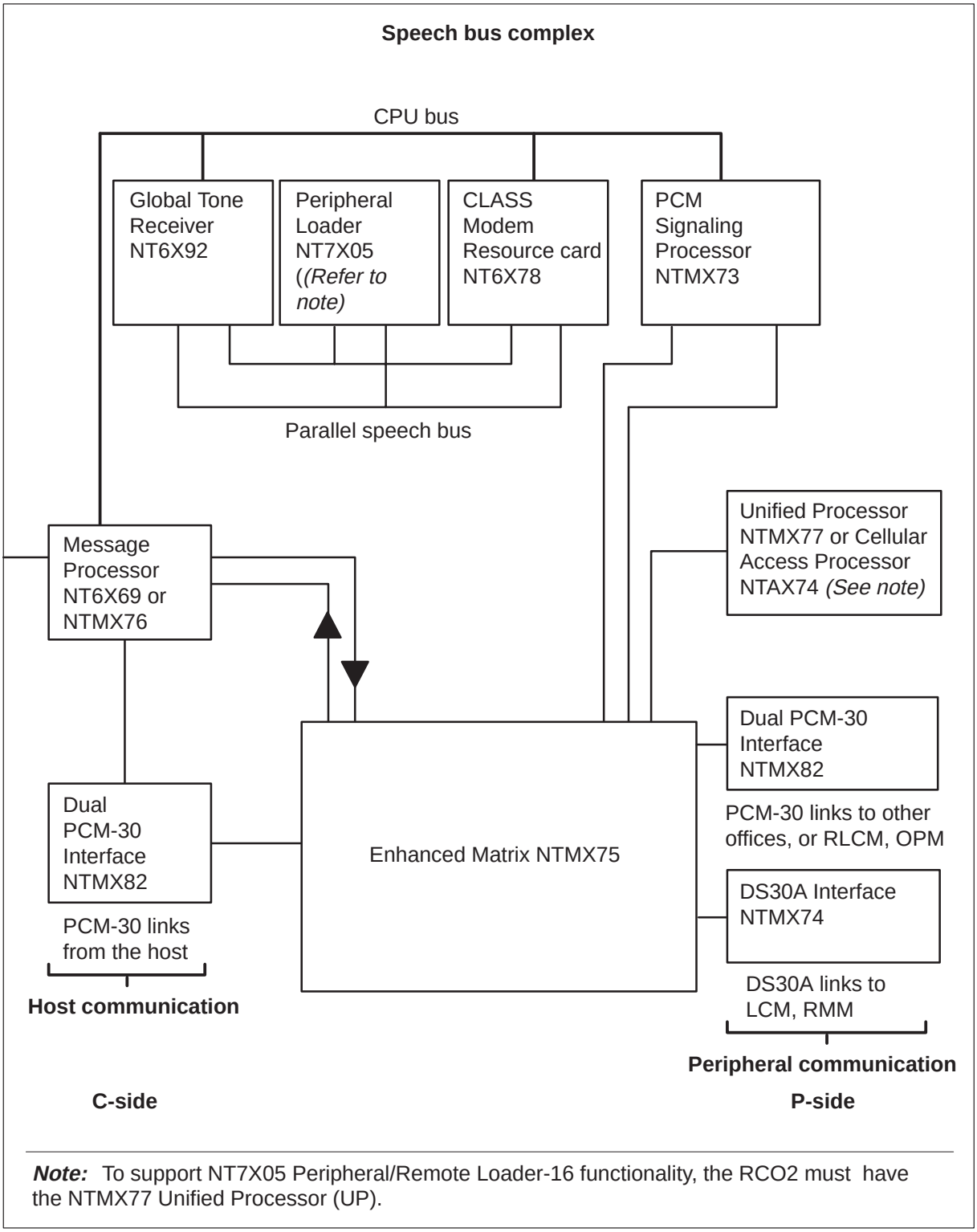
- NTMX75
- NTMX87
- NTMX82
- NTMX74

The Host communications section describes the functions of the NTMX75 card. The NTMX75 card combines the functions of the formatter card and the time switch card. The NTMX75 card controls the switching functions required for the RCO2 P-side and extension cabinets.

The Quad Frame Carrier (NTMX87) provides an interface between RSC-S peripherals and collocated transmission equipment like channel banks. The octal PCM-30 circuit pack contains four dual PCM-30 packlets (NTMX82). The dual PCM-30 packlets provide and support the feature and maintenance functions of the NT6X50. The packlets also provide and support the performance counters of the NT6X50.

The DS30A (NTMX74) card provides 32 DS30A links for the of termination line concentrating modules (LCM) and remote maintenance modules (RMM) on the RSC-S. The following figure displays a functional block diagram of the RCO2.

Operating block diagram of the RCO2



Note: To support NT7X05 Peripheral/Remote Loader-16 functionality, the RCO2 must have the NTMX77 Unified Processor (UP).

Each interface (I/F) chip on the NTMX74 card serves four DS30A links. Separate Message (MS) links by a minimum of four links when you enter data in table LCMINV to prevent a single chip failure. A single chip failure can cause a T1 outage. The following chart displays the link-to-chip relationship.

DS30A link relationship

Chip number	DS30A link numbers
1	22, 23, 24, 25
2	26, 27, 28, 29
3	30, 31, 32, 33
4	34, 35, 36, 37
5	38, 39, 40, 41
6	42, 43, 44, 45
7	46, 47, 48, 49
8	50, 51, 52, 53

Speech and message paths in the RCO2

The parallel speech bus consists of a transmit bus and a receive bus. The voice and message paths go between the two RCO2 units in a dual configuration. The voice and message paths go from the RCO2 to the host.

The RCO2 requires good communication between the RCO2 units. For example, the inactive unit can take over call processing. The RCO2 units communicate over the intermodule communication links (IMC).

Emergency stand-alone operation

Emergency stand-alone (ESA) operation provides for maintenance operations and a minimum set of call processing activities on the RCO2. To enable ESA operation capability, set the ESA field in table RCCINV for the RCO2 to Y.

The RCO2 communicates with the host over links 0 and 2. If the two message links fail, the RCO2 cannot communicate with the host and the RCO2 enters ESA. An RCO2 can enter ESA and maintain synchronization with the network. The RCO2 maintains synchronization when the RCO2 enters ESA because the RCO2 loses messaging to the host or the CC. Messaging can be lost when the CC undergoes a warm restart and does not respond to the message audit. Normally, the RCO2 enters ESA because the RCO2 loses every link.

The limits on call processing in ESA are

- The system drops calls on secondary telephone of ISDN and MBS.
- The system does not support warm ESA entry and exit for trunk calls.
- The system does not support remote-off-remote.
- The system does not support billing operations during warm ESA entry or exit.

During ESA operation the system handles most intraswitched calls, like POTS and primary ISDN calls, normally. The system drops netswitched calls that require CC interruption.

This activity addresses the increased functionality required in the XPM03 Delivery Release Unit (DRU). The DRU supports the same level of functionality on the RCO2 remote platform. The DRU also supports NI-1 while the RCO2 is in ESA mode. The functionality of NI-1 in ESA is at the same level as the functionality of the NI-1 on the North American RCS-S platform. The exception is ESA Warm Entry/Exit, which the RCO2 does not support. The feature does not support a *dual* RCO2 configuration.

An ESA entry can be cold or warm in a cold entry. The system drops every call and dial tones. In a warm entry, established calls continue and the system drops calls in a transient state. Feature AF5698 provides the RCO2 with warm entry and exit ESA capability. This feature executes cold entry to ESA if a warm entry attempt fails.

When the RCO2 helps restore C-side communications, an ESA exit occurs. An ESA exit can be cold or warm with the same call processing limits as the ESA entry. Before ESA, an exit of the RCO2 eliminates the calls that cannot survive the exit. The system holds calls that originate during the ESA exit until the CC resumes call processing activities.

A warm exit attempts to execute an instant return to service (IRTS) on the active module. The IRTS is a modified version of return to service (RTS). The IRTS queries modules that attach to the RCO2. If the status of the modules indicates that the modules are operational, the system executes an IRTS. The IRTS process allows the RCO2 to exit ESA operation faster. The IRTS exits and does not affect the active intraswitched calls. The inactive module executes a normal RTS .

The CC controls the ESA exit process and determines what type of exit to perform. If a warm ESA exit attempt on the active RCO2 fails a cold exit, the system executes the full RTS on the module. This process also applies to the subtending modules that attach to the RCO2.

In addition to the system-initiated ESA exit, you can perform a manual ESA exit. With the ESA system exit, maintenance of active calls has the highest priority. If a warm ESA exit attempt cannot complete, the module returns to ESA mode. The module returns to the ESA mode until the next system audit begins another attempt. The manual exit tries to preserve call processing and gives the highest priority to return the module to service. If a warm exit is not possible, a cold exit occurs. The cold exit occurs with full RTS. Loss of calls in progress occurs.

Switch of activity

A SWACT occurs when two units of an RCO2 switch activity. The active unit becomes the inactive unit. The inactive unit becomes the active unit and takes over call processing. The processing of active POTS or ISDN BRI calls is maintained during a warm SWACT.

Controlled and uncontrolled SWACT Two types of SWACT are available: controlled and uncontrolled. Manual action can initiate a controlled SWACT. An example of manual action is the entry of the SWACT command. Planned system requests, like the REX schedule, can also start a controlled SWACT. A controlled SWACT can also start when the the active unit is busied when the inactive unit is (InSv). Controlled SWACTs can occur only if the two units are InSv. Controlled SWACTs can also occur if the RCO2 is in-service trouble (ISTb) because of a previous REX failure.

The system starts uncontrolled SWACTS when a hardware fault or a trap is present in the active unit. Examples of events that initiate uncontrolled SWACTs are

- power failure
- clock failure
- extension shelf failure
- power converter failure

Pre- and post- SWACT audits

Feature AN0538, RCO2 Pre-SWACT/Post-SWACT Audit, improves the Warm SWACT operation. This feature does not allow the SWACT when the inactive unit cannot maintain activity or communication with the CC. Under these conditions, feature AN0538 allows a SWACT to occur back to the original active unit. Software drives this feature. The software is the SWACT controller in the CC and a separate capability added to the RCO2 software.

SWACT controller

The system routes the system requests for SWACTs to the SWACT controller in the CC. The SWACT controller polls PM diagnostic history data in the CC and RCO2 status data. Do not confuse status data with static data. According to the data polled, the SWACT controller does not allow the request for a Warm SWACT. According to the same data, the SWACT controller allows a Warm SWACT to proceed. During the SWACT, the new inactive unit stays in service. This unit initiates a process to correct data structures left in not normal states.

Pre-SWACT audit

Before the active RCO2 performs a SWACT, the active RCO2 unit queries the mate RCO2 unit. The RC02 routes the query over the intermodule communication (IMC) links and messages the SWACT controller in the CC. Feature AN0538 improves the test pre-SWACT audit of the inactive unit. This audit includes the state of the unit during the diagnostics. This audit also assigns a weighted value to the results of the diagnostics. A boolean pass or fail occurs as a result of the pre-SWACT audit.

If the SWACT controller does not allow a manual request for a SWACT, the MAP terminal informs the operating company personnel of the denied request. The terminal provides a reason for the denial, and informs the operating company personnel if the operating company personnel can override the SWACT controller. The operating company personnel can enter the SWACT FORCE command string. If the operating company personnel overrides the SWACT controller, a Warm SWACT is attempted without the consultation of diagnostic history or status data.

Post-SWACT audit

After a SWACT, two-way communication can occur with the CC and the new active unit can maintain activity. When this condition occurs, the inactive unit becomes system-busy and returns to service. The previously active unit remains in service. This unit remains in service until the new active unit can verify two-way communication with the CC. This unit also remains in service until the new active unit can verify the capability to maintain activity. If communication fails, or the new active unit cannot maintain activity, a SWACT-back occurs. The RCO2 performs a SWACT-back to the originally active unit.

SWACT-back

If the RCO2 does not receive a gain-acknowledged message from the CC, a SWACT-back occurs. The original active unit of the RCO2 initiates the SWACT-back. During a SWACT-back, the original active unit attempts to regain activity. If successful, the inactive unit becomes system-busy and returns to service. The active unit remains in-service. Steady calls from the original active unit are maintained over the SWACT-back. The system drops

the new calls after the SWACT and before the SWACT-back. If a SWACT-back does not complete, the two units of the RCO2 become system-busy and return to service.

Note 1: Operational measurements and peg counts are not reinitialized following a SWACT-back.

Note 2: The system does not support this feature during RCO2 or CC overload.

The SWACT-back capability is provided for the following SWACT commands that operating company personnel enter:

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

  where

  unit_no is the number of the active unit
- BSY ACTIVE

Note: The SWACT-back capability is provided for the REX test that the REX schedule initiates. For additional information on how this feature interacts with REX tests, refer to Routine exercise test.

Updating static data (not-ESA)

Perform call processing and maintenance on the RCO2 and subtending nodes of the RCO2. The RCO2 must know which cards, ports, execs, and terminals are present. Tables contain this information. This information is static data. This information is static data because the RCO2 does not change the data. The RCO2 uses dynamic data, like call processing connections, that are established when a call is set up.

Static data is downloaded to the RCO2 when the RCO2 peripheral module (PM) is busied and returned to service.

Enhanced Dynamic Data Sync (EDDS)

Dynamic data describes the link and node states in the XPM that support call processing. The states are normally set in the active unit of an XPM through the node and link RTS or state changes. External causes trigger these

changes. These states route to the inactive XPM unit through bulk and individual messages of the XPM data synchronized mechanism.

The EDDS is a necessary component of warm SWACT. A Warm SWACT preserves processing of ISDN and POTS calls. Warm SWACTs occurs when the active unit of an XPM drops activity that an XPM trap or REX test causes. The active unit maintains call and unit states and calls continue without interruption. For a warm SWACT to succeed the inactive unit must be in service (InSV).

Returning the RCO2 to service (RTS)

An RCO2 is RTS if manual maintenance occurs, or a system audit detects a defective component.

Manual maintenance can occur that results in a fault that causes the RCO2 unit or PM to be system busy (SysB). When this condition occurs, the unit is normally busied and tested. Find the defective component. Repair and replace the component. Perform an RTS on the unit or PM.

If a system audit detects a defective component, an audit tries to return the component to service.

If the inactive unit was out of service (OOS) before manually busy (ManB), system busy (SysB), or C-side busy (CBsy), the following occurs during an RTS:

- The inactive unit starts.
- OOS tests are performed on the inactive unit.
- If the inactive unit static data check total is wrong the CM sends new static data and 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.

Feature AF6436 provides EDDS and warm SWACT capabilities for ISDN basic rate interface (BRI) calls on the RCO2.

Performing an RTS without running diagnostics When the FORCE parameter is used with the RTS command, ROM diagnostics are not performed.

Caution
Use the FORCE parameter if directed to do so.
Use the FORCE parameter if directed to do so. Diagnostics that are normally part of the RTS command can find an additional fault.

For example, to return unit 0 of a PM to service, enter the command:

>RTS UNIT 0 FORCE

The MAP terminal displays following sequence:

```
ROM/RAM query
/Clear data
Initializing
/Static Data
Loading:Execs
Initializing
ESA Data Load
```

A dynamic data synchronization occurs, when the synchronization is complete. The unit is RTS.

RSC ESA firewall

An RCO2 enters ESA when communication to the C-side node is lost. When this happens, the RCO2 node is marked CBsy. CBsy indicates that either the C-side node or C-side links are OOS. DMS system actions are not permitted on a CBsy node. This effectively provides a firewall and protects the RCO2 from any detrimental system actions. When communication with the C-side node is restored, the RCO2 is marked SysB, so that the system can restore the node fully to an InSv state, (usually through an ESA warm exit).

When a DS-1 link on the C-side of an RCO2 is broken, the link goes SysB and the unit goes CBsy. If no other message supporting links are available, the node also goes CBsy. This status remains until one or more message supporting links are restored. At that time, the link goes InSv and the RCO2 node or unit goes SysB with a SysB reason of “CSLink RTS”. The node or unit is then RTSed or exits ESA by the DMS system.

Feature AF6240 prevents a CBsy node from going SysB when the C-side links are SysB and futher to prevent a SysB link from going to a state of "OK" without first verifying C-side communications. This feature alters the way in which system maintenance recovers a CBsy RCO2. Instead of the CM forcing a CBsy node to SysB, the system waits for carrier maintenance to recover the DS-1 link(s) and then recovers the RCO2 node or unit.

Feature AF6142 enhances ESA service by the following actions:

- enhancements to the commands at the RCO2 level of the MAP display to prevent detrimental human machine interface (HMI) request to an RCO2 in ESA
- The ESA condition is displayed at the MAP terminal when an RCO2 is found in ESA
- new and modified log reports.

The following enhanced MAP display commands perform an ESA query prior to executing a command to an RCO2 that may be in ESA.

- BSY
- TST
- RTS
- LOADPM
- QUERYPM
- PMRESET
- XPMRESET
- RECOVER

The DMS system response to the above commands provide the operating company personnel better information of the RCO2 ESA status, thus improving RCO2 maintenance and preventing accidential outages through unnecessary maintenance actions.

BSY command

An RCO2 in ESA may still be busied however, the operating company personnel must respond to a new warning such as:

Example of a MAP response:

```
>BSY PM
WARNING – The RCO2 is in ESA.
A manual ESA exit is required if the RCO2 is
busied.

Please confirm (“YES”, “Y”, or “NO”, “N”):
>Y

A manual ESA exit is now required.
To attempt ESA exit, type RTS WARMEXIT
```

Command syntax

```
Parms: <DEVICE> {UNIT <UNIT_NO> {0 TO 1}
                      [<CMR> {CMR}],
                 PM [<CMR> {CMR}],
                 LINK <PSIDE_LINK> {0 TO 63},
                 INACTIVE}
       [<FORCE> {FORCE}]
       [<NOWAIT> {NOWAIT}]
       [<ALL> {ALL}]
```

TST command

If an RCO2 is in an ESA mode, enhancements to the TST command prevents the actions, such as below, from being implemented:

Example of a MAP response:

```
>TST PM
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
```

or

```
>TST UNIT 1
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
```

or

```
>TST UNIT 0
RCO2 0 Unit 0   Request Invalid
                RCO2 is in ESA
```

The CM rejects the test request because this HMI command is detrimental to the service of the RCO2 operating in the ESA mode.

Command syntax

```
Parms: <DEVICE> {UNIT <UNIT_NO> {0 TO 1}
                      [<ROM> {ROM}]
                      [<CMR> {CMR}]
                      [<ALL> {ALL}],
                 PM [<ROM> {ROM}]
                    [<CMR> {CMR}]
                    [<ALL> {ALL}],
                 LINK <PSIDE_LINK> {0 TO 63},
                 REX <REX_ACTION> {ON,
```

RTS command

The enhancements replace the system driven ESA exit with a manual ESA exit driver. It halts processing when an error condition is encountered and better informs the operating company personnel regarding failures and alternative actions. The command syntax and responses are:

Example of a MAP response:

```
>RTS PM COLDEXIT
WARNING
COLDEXIT causes all stable calls to be lost
WARMEXIT allows stable calls to survive ESA exit

            or

>RTS PM EXITBYPASS
WARNING
EXITBYPASS bypasses ESA exit
All stable calls and ESA OM data will be lost
WARMEXIT allows stable calls to survive ESA exit.
```

Command syntax

```
Parms: <DEVICE> {UNIT <UNIT_NO> (0 TO 1)
                    [ <NODATASYNC> (NODATASYNC)]
                    [ <CMR> (CMR)],
                PM  [ <CMR> {CMR}],
                LINK <PSIDE_LINK> (0 TO 63),
                    ACTIVE
                    INACTIVE  [ <NODATASYNC> {NODATASYNC}],
                       SYSB)
        [<FORCE>    {FORCE}]
        [<EXIT>     {WARMEXIT,
                    COLDEXIT,
                    EXITBYPASS}]
        [<NOWAIT>  {NOWAIT}]
        [<ALL>  {ALL}]
```

Three new parameters are added to the RTS command they are:

- WARMEXIT
- COLDEXIT
- EXITBYPASS

Examples of responses to the WARMEXIT parameter include:

Example response to WARMEXIT parameter:

```
>RTS PM WARMEXIT

ESA warm exit passed
```

or

```
Request Invalid
PM not in ESA
```

or

```
Request Invalid
PM does not support warm exit
COLDEXIT option must be used
```

or

```
ESA warm exit failed
No response from PM.
Check MSG LINKS at TRKS;CARRIER level.
Attempt WARMEXIT after links are verified.
```

or

```
ESA warm exit failed
Execs are invalid
COLDEXIT option must be used.
```

or

```
ESA warm exit failed.
Static data was changed.
COLDEXIT option must be used.
```

Examples of responses to the COLDEXIT parameter include:

Example response to COLDEXIT parameter:

```
>RTS PM COLDEXIT
WARNING
COLDEXIT causes all stable calls to be lost
WARMEXIT allows stable calls to survive ESA exit.

Please confirm (“YES”, “Y”, “NO”, or “N”):
>Y

ESA COLD exit passed
```

or

```
Request Invalid
PM not in ESA
```

or

```
ESA COLD exit failed
No response from PM
Check MSG links at TRKS;CARRIER level
Attempt EXIT after links are verified
```

Examples of responses to the EXITBYPASS parameter include:

Example response to EXITBYPASS parameter:

```
>RTS PM EXITBYPASS
WARNING
EXITBYPASS bypasses ESA exit
All stable calls and ESA OM data will be lost
WARMEXIT allows stable calls to survive ESA exit.

Please confirm (“YES”, “Y”, “NO”, or “N”):
>Y

RTS passed
```

or

```
Request Invalid
PM not in ESA
```

or

```
RTS failed
No response from PM
Check MSG links at TRKS;CARRIER level
Attempt EXIT after links are verified
```

LOADPM command

The enhancements prevent a LOADPM command execution on an RCO2 that is known to be in ESA. It also prevents ESA static data from being loaded into an RCO2 operating in simplex mode with valid ESA static sata in the active unit. The command syntax and responses are:

Example of a MAP response:

```
>LOADPM PM
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
RCO2 0 Unit 0   Request Invalid
                RCO2 is in ESA

Try LOADPM INACTIVE to load inactive unit or Try
RTS WARMEXIT tp force PM out of ESA then LOADPM

           or

>LOADPM UNIT 0 CC ESADATA
RCO2 Unit 0     Request Invalid
                Node is ISTb

ESA Data download aborted due to lack of node
redundancy.
Existing ESA static data is valid
```

Command syntax

```
Parms: <DEVICE> {UNIT <UNIT_NO> {0 TO 1},
                 PM,
                 INACTIVE,
                 ACTIVE}
       [<SOURCE> {CC [<MODE> {FULL,
                              DATA,
                              EXEC,
                              ESADATA,
                              CMR,
                              FIRMWARE,
                              XPMSTOR}]
                     [<FILE> STRING],
                  LOCAL [<MODE> {IMAGE,
                                 LOADFILE}]
                        [<FILE> STRING]}]
       [<FORCE> {FORCE}]
       [<NOWAIT> {NOWAIT}]
       [<ALL> {ALL [<RFILE> STRING]}]
```

QUERYPM command

The enhancement adds a new parameter to the QUERYPM command of ESA. The enhancement also denies QUERYPM CNTRS request when the RCO2 is in ESA. This prevents the reset sent down to query the counters if the RCO2 is SysB. The enhancement also display the current ESA status information and office parameters configuration from the office engineering table, OFCENG.

Example of a MAP response:

```
>QUERYPM CNTRS
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
RCO2 0 Unit 0   Request Invalid
                RCO2 is in ESA
```

or

```
>QUERYPM ESA
RCO2 ESA Subsystem Status

ESA static data is valid
Expected ESA exit is Warm
Dual ESA entry force down is Enabled
RCO2 0 is in ESA

OFCENG RSC_ESA Office Parm Configuration

Nightly ESA static data downloading is Enabled
Nightly ESA static data download at 1 am
ESA exit requires manual intervention
ESA exit will be performed by the system
ESA exit timer set at 60 seconds
ESA dial tone notification is Enabled
```

Command syntax

```
Parms: [<OPTION>    {ESA,
                     FLT,
                     CNTRS,
                     FILES,
                     DIAGHIST [<OPTHIST>     {DIAG,
                                              CARD,
                                              RESET}]}]
```

PMRESET command

The enhancement allows the PMRESET command to bypass the ESA firewall on the RCO2 that is known to be in ESA. Resetting an RCO2 in ESA drops all stable calls for the ESA exit procedure.

Example of a MAP response:

```
>PMRESET PM
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
RCO2 0 Unit 0   Request Invalid
                RCO2 is in ESA

Use EXITBYPASS option to force reset PM in ESA.

            or

>PMRESET PM EXITBYPASS
WARNING
EXITBYPASS allows the RCO2 in ESA to be reset.
The PMRESET will drop the RCO2 out of ESA.
All stable calls and ESA OM data will be lost.

Please confirm (“YES”, “Y”, “NO”, or “N”):
>Y
```

Command syntax

```
Parms: <DEVICE> {UNIT <unit_no> {0 TO 1},
                      PM}
        [<OPTION>   {NORUN,
                     NODATA,
                     EXITBYPASS}]
```

XPMRESET command

The enhancement allows the XPMRESET command to bypass the ESA firewall on the RCO2 that is known to be in ESA. Resetting an RCO2 in ESA drops all stable calls and discards all ESA operational measurements data for the ESA exit procedure.

Example of a MAP response:

```
>XPMRESET PM
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
RCO2 0 Unit 0   Request Invalid
                RCO2 is in ESA

Use EXITBYPASS option to force reset PM in ESA.

           or

>XPMRESET PM EXITBYPASS
WARNING
EXITBYPASS allows the RCO2 in ESA to be reset.
The XPMRESET will drop the RCO2 out of ESA.
All stable calls and ESA OM data will be lost.

Please confirm (“YES”, “Y”, “NO”, or “N”):
>Y
```

Command syntax

```
Parms: <DEVICE> {UNIT <unit_no> {0 TO 1},
                 PM}
        [<OPTION>   {NORUN,
                     NODATA,
                     EXITBYPASS}]
```

RECOVER command

The enhancement allows the RECOVER command to bypass the ESA firewall on the RCO2 that is known to be in ESA. Recovering an RCO2 in ESA drops all stable calls and discards all ESA OM data for the recover procedure. If the RCO2 has NT6X45BA hardware or later this command can determine if the RCO2 has been loaded since power up. If the RCO2 has not been loaded since power up, it will be loaded and returned to service. If the RCO2 is in ESA and the EXITBYPASS option is not specified, an ESA exit is attempted. Otherwise an RTS is executed.

Example of a MAP response:

```
>RECOVER
RCO2 0 Unit 1   Request Invalid
                RCO2 is in ESA
RCO2 0 Unit 0   Request Invalid
                RCO2 is in ESA

Use EXITBYPASS option to force reset PM in ESA.

           or

>RECOVER PM EXITBYPASS
WARNING
EXITBYPASS allows the RCO2 in ESA to be reset.
The RECOVER will drop the RCO2 out of ESA.
All stable calls and ESA OM data will be lost.

Please confirm ("YES", "Y", "NO", or "N"):
>Y
```

Command syntax

```
Parms: [<NOWAIT> {NOWAIT}]
        [<ALL> {ALL}]
        [<EXITBYPASS> {EXITBYPASS}]
```

Enhanced PM log reports

Some enhancements are made to the logs generated by the ESA exit process, refer to the DMS-100 Logs Reference Manual and the Extended Peripheral Module Logs Reference Manual (DS-1) for detailed information on these log enhancements.

RSC ESA Exit simplification and recovery of the inactive unit

Feature AF6244 improves the reliability and reduses down time of single and dual RCO2s by:

- Restructuring and simplifying the RSC ESA exit procedures.
- Providing a new interface to the ESA exit procedures for the RSC ESA HMI.
- Giving the single RSC ESA exit drivers the ability to recover an inactive unit prior to an ESA exit.

The ESA exit procedure and the ESA exit drivers are restructured such that the manual ESA exit driver, the system ESA exit driver and the dual ESA exit driver use the same ESA exit procedures.

A manual ESA exit driver, which uses the restructured common RSC ESA exit procedures, is provided to support the improvements to the RSC ESA exit HMI. This manual driver also returns additional error information so the RSC ESA HMI can determine what has occurred when the ESA exit fails so the operating company personnel can be advised as to what should be done next.

The ability to recover an at task inactive unit of the RCO2 prior to an ESA exit, permits a system warm ESA exit to proceed. When communication has not been restored to the active unit, an ESA warm SwAct is not possible. After the inactive unit is recovered an ESA warm SwAct to warm exit is possible. The RCO2 can be returned to service without an outage and without waiting for the message link to the active unit to be restored.

This feature also RTSes the inactive unit of the RCO2 when, the only unit of the RCO2 that the CM can communicate with, is at ROM level. After being RTSed, the ESA state of the RCO2 should be determinate. If the RCO2 is found in ESA it performs a warm exit from ESA and return the RCO2 to service without an outage. Previously the RCO2 would remain in ESA until manual actions recovered the RCO2.

When the single or dual RCO2 is in ESA, it is queried every ten seconds as long as it remains in ESA. After it has been queried for the amount of time specified in the Office Parm RSC_XPMESAEXIT, the exit is initiated. For cold ESA exit, this is simply requesting that the ESA exit message be sent and the ESA OMs collected. The single RCO2 is then turned over to Base XPM Maintenance to be RTSed.

For a warm ESA exit, the instant RTS of the single or dual RCO2 and its subtending nodes is initiated. Once the single or dual RCO2 and subtending nodes are in service, the procedure to setup the ESA calls is run. The ESA OMs are then requested and the RCO2 is turned over to Base XPM Maintenance to be RTSed if required.

Fault conditions

The next section in this chapter describes automatic maintenance. Automatic maintenance detects fault conditions. This section describes fault conditions for the RSC-S according to the configurations.

RCO2

Fault conditions for the RCO2 include processor card errors and errors that do not occur on processor cards.

The following errors can occur in the RCC processor cards:

- parity faults
- traps
- software errors (SWERR)

Parity faults

On NTMX77-based CPMs, a parity system accuracy checks the main memory systems. Parity adds 1 bit of data to each byte stored. This process allows the hardware that maintains this additional bit to detect a single bit memory fault. The parity hardware, which contains the memory, is on the NTMX77.

A parity fault is an indication of a memory accuracy fault. If the execute code encounters a fault, the CPM is insane. The CPM must immediately drop activity and go out-of-service. The parity audit starts an interrupt instead of a bus error. This action allows the parity audit to identify memory faults before code execution hits the faults. When possible, the CC handles parity faults to allow the RTS to perform quickly.

Three types of parity faults are available:

- Intermittent faults occur when the RCO2 detects a fault but does not find an error. The RCO2 detects the fault when the RCO2 rereads the location.
- Soft faults occur when the system detects a parity error. The system finds the error when the RCO2 reads the location again. The system does not find an error when the RCO2 writes to the location. The error can occur in the program store or memory store.

- Hard faults occur when the RCO2 detects a fault and cannot reread or write to the memory location.

When a parity fault occurs, the CM determines the action that must occur on the RCO2 unit. The action depends on the status of the unit that reports the fault (active or inactive). The same CM handles the three types of faults.

When the CM detects a parity fault in the active unit of the RCO2, the CM sets the unit ISTb with a reason of 'parity'. The CM recovers the unit during a maintenance window. The maintenance window that recovers 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. An audit checks if the active unit of the XPM has an ISTb of 'parity'. If an ISTb is present, the CM SWACTs and reloads the RCO2 if dependencies are not present. This action clears the ISTb 'parity' fault and the short term failure (STF) parity fault peg. The action also resolves the parity fault in the RCO2.

When the active unit reports the parity fault, the system generates a PM181 log to notify operating company personnel of the problem. The CM performs recovery actions. The CM performs a SWACT of the XPM and loads the new inactive unit with the XPM software load. The corresponding inventory table defines the XPM load. The CM considers this load 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 a REX test to occur

- on a P-side or C-side node of the XPM on which a recovery from a parity fault occurs from a parity fault
- on the XPM if a P-side or C-side node on which a recovery from a parity fault occurs

The CM does not allow two XPMs to perform parity reloads that are in the same configuration. A P-side node cannot perform a parity load again at the same time as the C-side node. A C-side parity reload cannot occur at the same time as the P-side node of the C-side. This restriction makes sure that one XPM in a configuration is in simplex at a time.

The CM informs operating company personnel of a parity fault through PM181 log reports. This log is the primary trouble indicator. Operating company personnel can also check for associated logs, like as the PM128, to understand what actions the CM takes. The section provides examples of the messages that associate with the PM181 and PM128 logs.

The RCO2 unit can be set ISTB with multiple reasons at the same time. You can perform a QUERYPM FLT at the MAP level. When you perform this

action, the reasons that occur on the unit, and are not clear, appear on the MAP display.

Hard parity fault When the active unit of the RCO2 reports a hard parity fault to the CM, the system generates a PM181 log. This log notifies operating company personnel that:

- the active unit has a parity fault, and the unit is set ISTb
- the CM reloads the unit during the next XPM REX test window

To clear the ISTb and the parity fault, perform a manual SWACT and reload.

The following is example of a PM181 log report:

```
PM181 JUL23 23:29:16 7700 INFO RCO2 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   CRSC 00  18  RCO2 : 000   3    AX74
```

When a unit changes state to ISTb of UP RAM parity fault, the system generates a PM128 log report. This log informs operating company personnel that the unit changes status.

The following is an example of a PM128 log:

```
*PM128 MAY09 09:49:56 9000 TBL ISTB SMA2 1
 Node: ISTb (Unit ISTb)
 Unit0 Inact: InSv
 Unit1   Act: ISTb (UP RAM Parity)
```

To display the faults on a posted RCO2, use the command string QUERYPM FLT. The following example MAP response indicates a hard parity fault is present in unit 1 of the posted XPM:

```
>querypm flt
Node is ISTb
    One or both Units inservice trouble
Unit 0
    no fault exists
Unit 1
    The following inservice troubles exists:
        Parity audit has detected a hard parity fault.
        A reload is required to clear this fault.
        The system will autoload this unit during the next
        XPM REX test window.
```

CM action: The CM SWACTs and reloads the RCO2 during the next XPM REX test window. After the reload, the RCO2 clears ISTb fault.

User action: There is no action required. Operating company personnel can initiate a manual SWACT and reload to clear the parity fault.

Parity fault handler improvements

The Parity Improvements feature allows the CPM to collect and report additional information on parity trap faults. This feature improves faults that parity audits detect to provide more information. This new information includes the address of the fault, and if the fault is in code. This feature also updates interfaces to the log (PM189) and trap (PM185) reporting to include this new information. The Parity Improvements feature depends on features AF5682 XPM Code Protection, and AF5680 XPM Exception Traceback Enhancements.

Parity fault handles improvements feature AN0741 provides:

- unify the parity audit and parity trap handlers
- improve the data the new handler captures and saves to
  - — use the information stored in the card status register (SR)
  - — localize the parity fault to byte address
  - — perform hard/soft/intermittent fault categorization
  - — query to determine if the fault is in code
- update interfaces to the PM189 and PM185 log reporting systems, to include the new information

Parity interrupt handler

The interrupt handler generates data on a memory fault. The interrupt handler stores the data in the appropriate area for reporting and action. This function has the following requirements:

- Define a single entry point that can be bound as an interrupt handler.
- Always be available and handle interrupts correctly. Start from the time the interrupt handler is bound.
- Distinguish between the two conditions, the interrupt can raise, if the interrupt handler is entered or not from parity audit.
- Localize the fault to a byte address.
- Place the fault in the low-level categories (hard/soft/intermittent). The interrupt source does not determine category choice.
- Determine if the fault address is in code space.
- Leave the fault indication in place if the fault is not corrected.
- Save the fault data according to the original location of the interrupt.
- Exit the handler according to original location of the interrupt.

XPM Code Protection (AF5682)

The parity audit process examines protected and not-protected memory areas. Feature AF5682 allows writing to a write-protected memory area. This process allows pattern tests to occur on a parity fault location byte. Feature AF5682 also allows queries if a physical address is in loaded code. The parity exception handler determines if the parity fault occurs in execution space. This action allows the parity exception handler to initiate the best recovery process.

Memory allocation (AF5391)

Feature AF5391 addresses memory management issues. This feature provides more flexibility in memory use. This flexibility allows for the protection of code and critical data from defects that errant software causes. This flexibility also reduces the risk of outages.

Protected memory is allocated for protected patches when protected memory is not available. If protected memory allocation fails, use not protected memory to store the patch. When possible, do not store local patches non-DMA memory. More non-DMA is allocated in the unified processor (UP).

System component interactions The following system components interact with the XPM exception processing system to recover from error exceptions. These components also report and display information about the error exceptions.

- CC
- PMDEBUG
- XPM maintenance

If the system detects a fatal error, local maintenance action occurs. The local action occurs to drop activity (active unit only) and to reset, or restart the unit. When the XPM unit is in an InSv state the XPM unit reports exception errors to the CC in unsolicited messages. The XPM unit also generates a report for each exception in the trap buffer that is not reported separately. The CC receives the report, acknowledges the message, and logs PMDEBUG to extract the exception information. The CC also generates a PM185 log report. The system component, PMDEBUG, allows you to view and delete exceptions data from the trap buffer at the task level.

Exception Recovery Action Exception recovery consists of three operations:

- severity (fatal or able to recover)
- process fatal trap
- recover task (not-fatal trap)

When the recovery process is complete, the exception report system is notified that new trap data is available and exception handling is complete. The recovery process sets up the trapped task for recovery and allows the task to resume. The recovery process can initiate a maintenance action to restart or reset the unit.

If the trap is not fatal, the convicted is restored to a point of execution that allows the task to restore to a known state. The task is not started again in the process of recovery. The process of recovery forces the task to perform a multilevel exit back to the task mainline. The task recovery model specifies that a task provide a mainline. The mainline is a do-forever loop that calls the main body of the steady state code. An optional call to a recovery procedure follows this loop. When the task resumes, after a recoverable trap, the task is forced to return to an instruction. The task is forced to return to next instruction that follows the call to the main body of code. The next instruction must be a call to a recovery procedure. A task uses this procedure to realize the task has a fault. The recovery procedure allows the task to take special recovery action, or branch back to the start of the loop.

An enhancement to exception recovery deals with the Direct Memory Access Memory Management Unit (NTMX77 DMA MMU). Take special action when you attempt to recover from an NTMX77 DMA MMU error. Before this feature, when a DMA MMU error occurred, the exception processing system convicted the interrupted task. This action occurred even when the software on the NTMX77 did not relate to the error. The determination that an error is fatal depends on the task that was convicted. An MMU error is not always fatal. The results of the fatal evaluation depends on the trapped task.

The processor that causes the fault does not detect that a problem occurred. If the access is for a read from the NTMX77 memory, the external processor receives invalid data. If the access is to write to NTMX77 memory, data is not written. Consider the trap fatal. Maintenance action begins to restart, or reset the unit.

System component interaction

The system components interact with the exception processing system to recover from error exceptions. These components report and display information about the following error exceptions:

- CC
- PMDEBUG
- local maintenance (XPM maintenance)

If the system detects a fatal error, local maintenance starts. This action drops activity for the active unit only and resets, or restarts the unit. When the XPM unit is in an InSv state the XPM unit reports exception errors to the CC. The XPM reports the errors in the form of unsolicited messages. The XPM unit generates a report for each not reported exception in the trap buffer. The CC receives the report and acknowledges the message. The CC logs on to PMDEBUG separately to extract the exception information to generate a PM185 log report. The PMDEBUG allow you to view and delete exceptions data from the trap buffer at the task level.

Exception Traceback Enhancements (AF5680)

An exception is a special condition at the ROM or TASK level that occurs and normal processing does not occur. Internal and external conditions can cause exceptions. Task-level exception processing reports critical information on hardware and software states. Task-level exception processing reports critical information when a hardware or software fault prevents normal operation of the CPM unit. The process restores the task to a known point of execution and allows the task to perform recovery actions. If recovery is not possible, task-level exception processing initiates local maintenance to restart or reset the CPM unit.

Traps (XPM exception handling)

Feature AF5680, XPM Processing System Enhancements, provides improvements in exception handling and in exception services. Exception handling includes the following activities:

- trap detection
- trap data capture
- recovery action

Exception services includes the following activities:

- trap administration
- trap reporting
- trap data access and display

Exceptions

An exception is a special condition at the ROM or TASK level that occurs when normal processing does not occur. Internal and external conditions can cause exceptions.

The following internal conditions can cause an exception:

- not permitted instructions
- address errors
- tracing
- breakpoints
- coprocessor protocol violations

The following external conditions can cause an exception:

- interrupts from external devices
- bus errors
- coprocessor-detected errors
- resets

ROM-level exception processing

When activated, the firmware maps the vectors to local exception handlers to provide:

- minimal error recording and reporting
- establishment of a bootstrap environment
- debugging of utilities
- hardware abstraction

Task-level exception processing

Task-level exception processing reports critical information on hardware and software states. Task-level exception processing reports critical information when a hardware or software fault prevents normal operation of the XPM unit. The process restores the task to a known point of execution and allows the task to perform recovery actions. If recovery is not possible, the task-level exception processing initiates local maintenance to restart or reset the XPM unit.

Exception data structure improvements

Changes occur to the processing system data structure to support:

- a task to eliminate loss of trap data when multiple traps occur in a 10s period
- accurate capture of trap-specific data
- guaranteed survival of trap data over restarts and reloads
- capture of administrator and user stacks at exception time
- circular buffer management at exception time
- enhanced trap administration functions
- expanded trap-specific error information to accommodate parity fault requirements
- exception processing system that reports parity faults to the parity audit instead of the central control (CC)
- save the trap system version for every trap

XPM exception use

In the XPM, exceptions indicate error conditions for faults that need service and also normal non-error interrupts that indicate types of work that the CPU must perform.

The following examples are exceptions that are also normal events:

- 10ms clock tick
- message frame pulse
- UART transmit and receive
- trap instructions (software interrupt)
- activity gain
- reset

Exceptions that are error conditions and require service appear in the following table.

XPM error type and description

Type	Fatal	Description
1	No	Value range error
2	No	Segment not present
3	No	Exit uncalled procedure
4	No	Stack overflow
5	No	Floating point
6	No	Division by zero
7	No	Nil pointer reference
8	No	<Not Used>
9	No	<Not Used>
10	No	I/O Error - Result of system procedure IOCHECK
11	No	String
12	No	String indexing
13	No	Set error
14	No	Bad CSP (unimplemented standard procedure
15	Yes	Bad P-code instruction
16	No	Task error
17	Yes	Request for Reset – Trap 7

—continued—

XPM error type and description (continued)

Type	Fatal	Description
18	No	<Not Used>
19	Yes	Parity error
20	No	Addressing error
21	No	Not permitted instruction
22	Yes	Interrupt not correct
23	No	Bus error
24	No	MMU – error
25	No	<Not Used>
26	No	Privilege problem
27	Yes	Sanity time-out

—end—

System component interactions

The following system components interact with the XPM exception processing system to recover from error exceptions. These components report and display information about error exceptions:

- CC
- PMDEBUG
- local maintenance (XPM maintenance)

If the system detects a fatal error, local maintenance initiates action to drop activity for the active unit only. Local maintenance also includes reset or restart of the unit. When the XPM unit is in an InSv state, the XMP unit reports exception errors to the CC in unsolicited messages. The unit also generates a report for each not reported exception in the trap buffer. The CC receives the report, and acknowledges the message. The CC logs on to PMDEBUG separately to extract the exception information. The CC generates a PM185 log report. The PMDEBUG allows you to view and delete exceptions data from the trap buffer at the task level. Changes occur in the display routines to reflect data capture differences for required enhancements. An example of the PMDEBUG debug Trapinfo level display appears in the following figure. At the ROM level, exception data can only appear as a hex dump.

Example exception display with required enhancements

```
Ram Load name = NLT02WY
MP rom name= XPMRKA03, SP rom name = XPMRKA03
trap in MP : Div by 0
Trap was Recoverable.  Unit was Active/Busy
Task:  BASEMON 0009 0009 Trap Sequence #: 1 Current load
PP Time : 00:00:22:04.70
Occurred at : 001951DF DEBUG   21 DOZERODI 115 Offset:  #21
Called from : 000D8A80 BASEMON 18 TDRIVBOD  30 Offset: #228
  000D8B8C BASEMON 18 TERMDRIV 11 Offset: #18
PC:000010AA SR=2100 US=0001FEB2 SS=001ABFF6 TCB=0001F00C
D0 =0000FFFF  D1 =00090000  D2 =FFFF0101  D3 =0000FF00
D4 =000100FF  D5 =FFFF0009  D6 =00000B0D  D7 =001A0000
A0 =0001F924  A1 =0001F92C  A2 =0001FEB2  A3 =001951DF
A4 =000A6F6E  A5 =0001FEC2  A6 =000F9BC2  A7 =001ABFF6
System Stack
0017ABFF6:  0004 0000 0006 0001 F00c 000A 000A 0998
0017AC006:  0004 0000 0006 0001 F00c 000A 000A 0998
User Stack:
0001FEB2:   0004 0000 0006 0001 F00c 000A 000A 0998
0001FEC2:   0004 0000 0006 0001 F00c 000A 000A 0998
0001FED2:   0004 0000 0006 0001 F00c 000A 000A 0998
```

Errors that do not apply to processor cards

The following error types do not only apply to processor cards of the RCO2:

- static data mismatch faults
- intermodule communication faults

Static data is data that defines the RSC-S configuration and does not change as calls connect and disconnect. When the static data in the host and the RCO2 does not match, data corruption can result. One possible result of a mismatch is the host detects a that line is present. To the RCO2 the line is not present. This mismatch causes loss of calls to occur.

When two RCO2 units cannot communicate because of intermodule communication faults, a Warm SWACT is not possible. A warm SWACT is not possible because one unit does not know what the other unit processes.

Dual RCO2

With the DRCO2 available at a future BCS release, the main fault that can occur involves corruption of the interlinks. When this damage occurs over the messaging interlinks (0 and 8), the peripherals cannot communicate, and interswitched calls cannot occur.

RCO2 with ISDN

The RCO2 with ISDN can have the same faults as the RCO2 without ISDN. Problems with the transmission and reception of data packets and call control messages can be present. Problems normally relate to the operation of the (E)DCH card.

Automatic maintenance

This section shows how audits and system actions identify the fault conditions. The system can be prepared to adjust the fault or the system can produce a log that identifies the problem.

This section describes the REX and SWACT process. This section also describes the audits and system actions that identify fault conditions in terms of RSC-S components.

Routine exercise test (REX)

A REX test includes a series of tests performed on an XPM unit. The system scheduler can initiate a REX test daily. Operating company personnel can initiate a REX test manually. The REX test combines the diagnostic and functional routines available on XPMs. Results of the REX test are divided in four classes:

- not performed
- passed
- failed
- aborted by manual action

  Note: Maintenance action with FORCE parameter or with the ABTK command from another MAP terminal with the XPM posted causes an abort.

All four classes generate a log or display a message at the MAP terminal. The system stores passed and failed REX tests in the maintenance record. Failure reasons are available for failed REX tests.

The REX state machine (or controller) performs the sequence of events in the following enumeration:

1 Test the inactive unit (includes InSv tests only).

2 SysB the inactive unit.

3 RTS the inactive unit (includes out-of-service [OOS] 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 Maintain call processing capability on previously active unit.

8 Perform a post-SWACT audit.

9 SWACT back to the previously active unit if necessary.

10 SysB the newly inactive unit.

11 RTS the inactive unit.

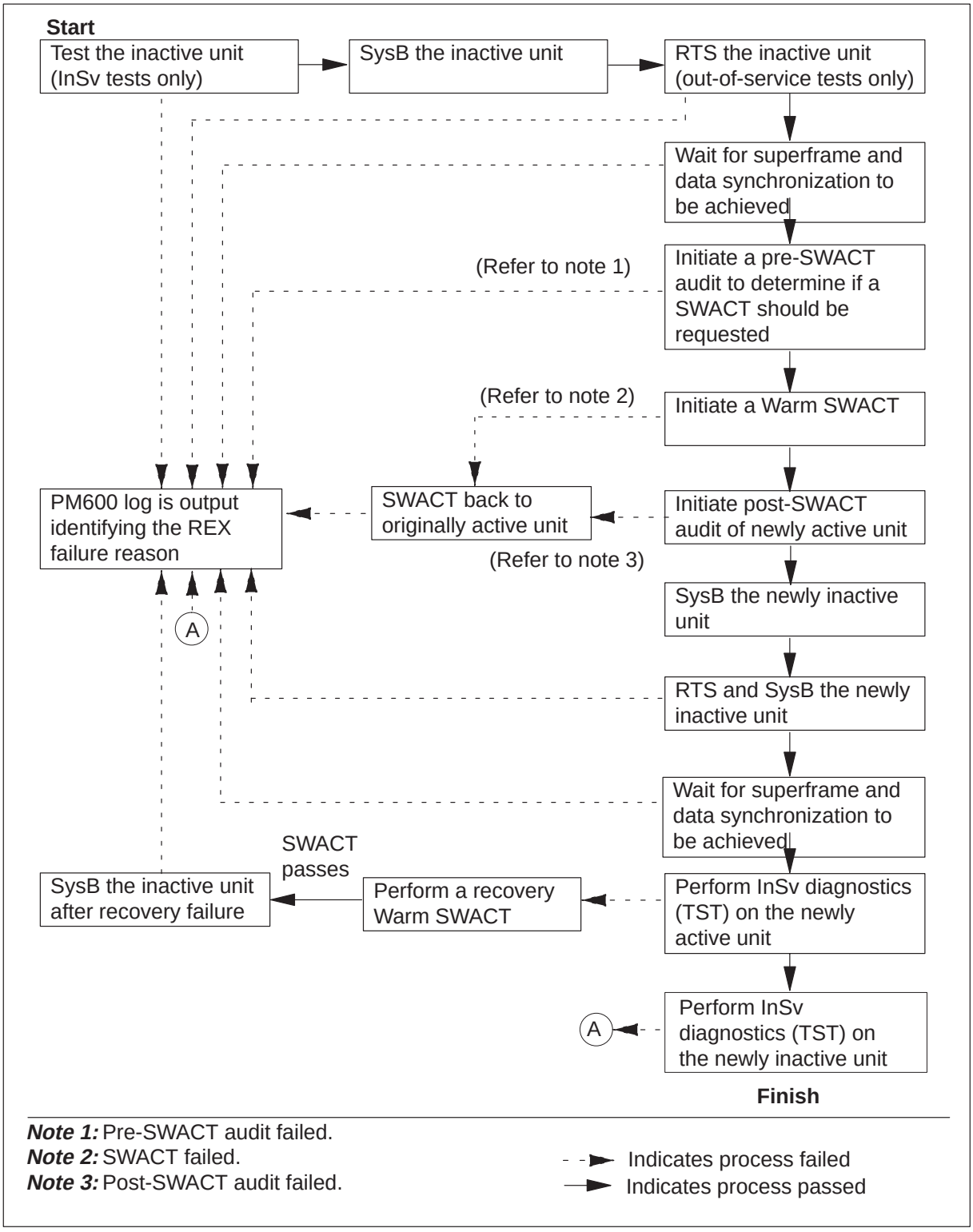
12 Wait for the system to achieve superframe and data synchronization.

13 Run InSv diagnostics (TST) on the newly active unit.

14 Run InSv diagnostics (TST) on the inactive unit**.**

The following figure shows 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 failed the REX test. The major alarm appears at the MAP terminal under the PM banner at the top of the display.

If an InSv or OOS diagnostic test fails, the REX failure reason includes the mnemonic of the diagnostic that failed. The REX failure reason also includes the unit that failed (0 or 1). The mnemonic is an easy to remember abbreviation.

The PM600 log details the start time of each step the REX test executed. The PM6000 log also details the unit the REX step affects and the failure reason. The REX steps in the log after the failed step are recovery actions that REX initiates as a result of the failure. The unit number is included only if the REX action is unit-specific (BSY unit, RTS unit, TST unit, sync). The unit number is not included if the action affects the node (SWACT, BSY both units). The auxiliary log data consists of a card list and a mnemonic of the failed diagnostic.

The QUERYPM command and QUERYPM FLT and TST REXCOV QUERY command strings contain information about the last REX. Manually and system-initiated REXs store and display a new date/time and status (passed/failed) in the REX maintenance record. Passed means that the REX completed without errors. Failed means that the REX did not complete because of an error. This information is available through the QUERY PM and TST REX QUERY command strings. If the REX fails, the user performs a manual RTS, a manual REX or an automated REX to RTS the XPM. The user RTSs the XPM from ISTb.

The system stores a REX maintenance record for each XPM that contains the following information:

- REX scheduler, if the XPM is in the system
- date and time and result (passed/failed) of the last REX
- failure reason, diagnostics failures and a list of defective cards, if the last REX failed
- date and time of an previous failed REX
- date and time of first passed REX following previous failure

The following restrictions apply to REX tests:

- The system REX controller runs REX on only one XPM at a time if the office uses the NT-40 processor. SuperNode supports REX testing at the same time for a maximum of ten XPMs with the same REX test class.
- A maximum of four LCM_REX_TEXTs can run the same time. The HOST XPM the LCM_REX_TEXTs subtend cannot be undergoing REX tests.
- The SREX scheduler schedules the LCM_REXCOV test for converter and ringing voltages in LCM separately.
- For REX to run, the node must be InSv, ISTb because of a REX failure. The node can also be ISTb because P-side PCM-30 links are OOS.
- If a Warm SWACT is not possible, REX terminates. The REX does not perform a cold SWACT.
- After successful completion of REX, the XPM has a new active unit because of the SWACT.
- If a restart occurs when REX is in progress, the system does not generate a PM600 log. The restart de-allocates the temporary data store used to build the PM600 log.
- The SWACT controller override is not provided for manual REX.

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

The REX state machine (or controller):

- calls the pre-SWACT audit, messages the other unit. You can perform warm SWACT if the audit passes.
- accounts for SWACT denial and failure reasons
- terminates a REX test if a SWACT is denied
- terminates a REX test if a SWACT-back occurs. The active unit of the XPM remains the same from the time the REX test began. The REX performs the recovery which consists of a BSY and an RTS of the inactive unit.
- displays the failure reason for a SWACT denial or failure performed during a manual REX at the MAP terminal as REX failed. To obtain the detailed reason for the failure for the posted XPM, type

  >TST REX QUERY

  or

  >TST REXCOV QUERY

The REX state machine (or controller) generates a PM600 log report that details the REX failure reason.

System REX Controller (AF3771)

Feature AF3771, System REX Controller for XPM Maintenance, provides the SuperNode switch with an S/DMS System REX test (SREX) controller. The SREX controller coordinates all system REX tests under a common REX scheduler. The RSC-S REX tests can be scheduled while other REX tests are in progress. The SREX controller makes the process to REX the whole switch, including all peripherals, easier. The RSC-S is an example of a peripheral. Feature AF3771 allows for the earlier finding and resolution of REX test failures. This action reduces failures in the field. The SREX controller allows operating company personnel to perform the following:

- change the order in which the system tests peripherals
- coordinate between manually initiated and system-initiated REX tests
- receive alarms for the RSC-S not being REXed in a time limit set, with use of table REXSCHED

The SREX scheduler allows entry of the CI-level command REXTEST and the following parameters:

- SUSPEND, which suspends REX testing for one maintenance window. A maintenance window is the period between the REX START and STOP times entered in table OFCVAR under the NODEREXCONTROL parameter.
- RESUME, which resumes REX testing after the suspension of REX tests
- QUERY, which returns the status of the REX test (active or suspended)
- HELP, which returns a description of the REX test

Note: The maximum number of XPM REX tests of each type that can run at the same time is ten.

The following is the REX test order for feature AF3771:

- critical nodes like CM and MS
- the number of days from the last system or manual REX test
- the order of internal PM (RSC-S) number

Table REXSCHED must have datafill to establish the REX schedule for the RSC-S. This table contains information that the REX coordinator requires to schedule tests according to operating company specifications. Enter data in table REXSCHED to disable the test. For more information on table REXSCHED, refer to the *Translations Guide*.

The SREX controller generates the IOAU112 log report for LCMs if the following occurs:

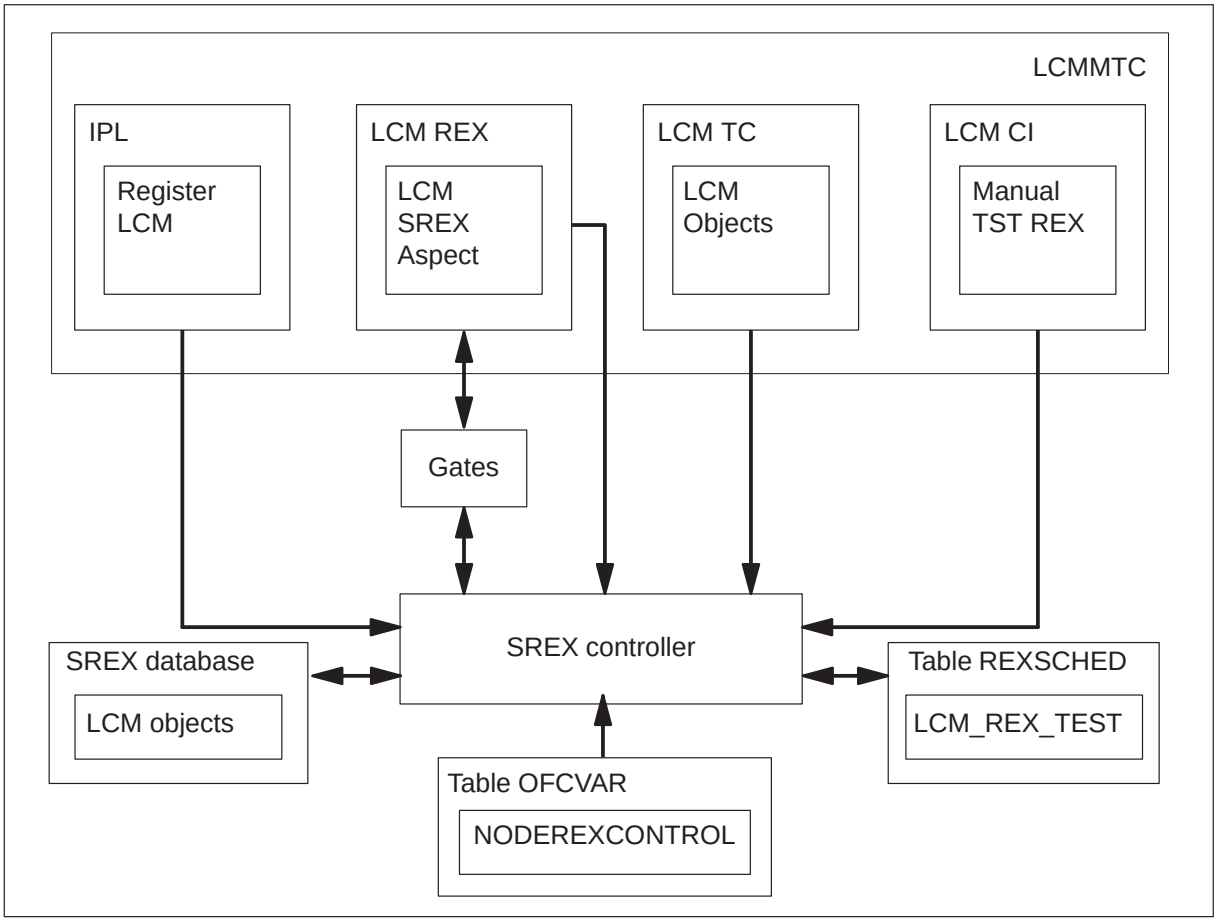
- the LCM has not been REX tested in the previous seven days
- REX test takes longer than specified
- REX test did not start after a defined number of attempts

Extended line concentrating module (LCM) REX test results

Table REXSCHED controls scheduling of system REX (SREX) tests for LCMs. The LCM_REX_TEST task SREX can execute at the same time in multiples of four. This task can execute at the same time as REX tests of XPMs. The LGC, LTC and RCC XPMs can be hosts to LCMs. Problems occur when an XPM scheduled for REX tests is the host of an LCM scheduled for REX tests.

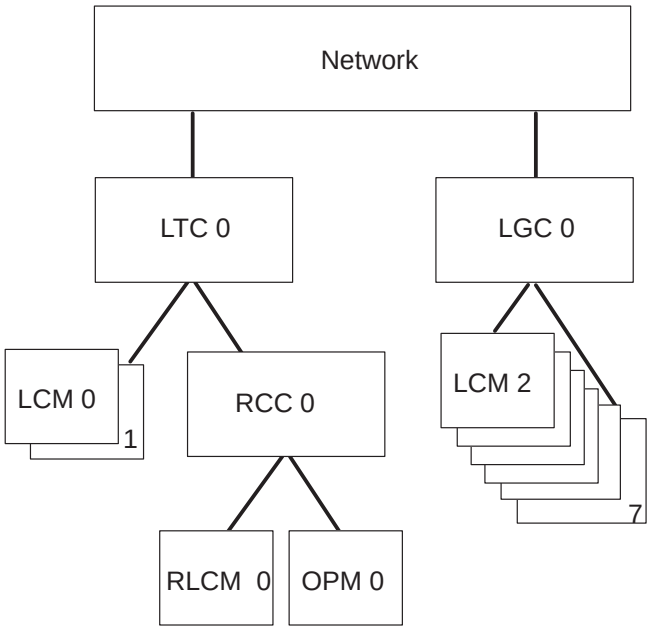
To avoid problems, the SREX controller handles all REX tests of XPMs and LCMs that occur at the same time. The LCM SREX subsystem registers the LCM_REX_TEST class and identifies dependencies with other REX_TEST types during initial program load (IPL). As LCM nodes are added to the SREX database, the controller enters data with defaults in table REXSCHED.

SREX system dependencies



The converter voltage and ring test sections of LCM_REX_TEST require wait states and different test resources. The requirements cause delays in SREX main task execution that are not acceptable. The LCMCOV_REX_TEST, that runs at a lower priority, implements these tests separately from the LCM_REX_TEST. The LCMCOV_REX_TEST requires logical test unit (LTU) connections in the maintenance line card. An LCM unit can only access the single LTU when the other unit is OOS. This resource limit does not allow LCMCOV_REX_TEST at the same time. The entry of the PARALLEL execution field for LCMCOV_REX_TEST, in table REXSCHED, allows a maximum of one test.

SREX scheduling



Note 4: The REX tests can run on LCM 0 and LCM 1 at the same time as REX tests. These REX tests run on RCC 0 and LGC 0.

Note 5: The REX tests can run on LCM 2 through LCM 7 if a REX test runs on LGC 0.

The separation of the LCM_REX_TEST and the LCMCOV_REX_TEST allows faster completion of site REX_TEST coverage. The LCM_REX_TESTs work without restrictions of the converter voltage and ring tests. The LCM_REX_TESTs can run at the same time as the LCMCOV_REX_TEST. Schedule the tests separately for best execution periods.

Note: Performance of LCMCOV_REX_TEST occurs on LCMs, XLCMs, OPMs and RLCMs.

The feature AF3234 provides the following REX test improvements for LCM peripherals and variants of the LCM peripherals:

- ESA REX test
- LCM and ESA-independent REX test
- MAP command for manual REX test
- fault indicators
- REX test maintenance record
- MAP commands to access REX test failures

Emergency stand-alone REX test

The ESA REX tests the ability of RLCM units to enter and exit ESA. The ESA REX tests also test the ability of RLCM units to message the ESA processor when in ESA. The ESA REX test begins after the LCM REX test is complete.

MAP commands for manual REX tests

The XLCM diagnostics provide the ability to implement a manual LCM REX test. The addition of a REX or REXCOV parameter to the TST command at the PM level of the MAP display allows a manual REX test. Examples of this command are as follows:

>MAPCI;MTC;PM;POST LCM <site><frame><unit>

Note: Post the LCM

>QUERYPM

Note: Displays information about the LCM node. Feature AF5898 adds information about the LCMCOV REX test.

To set manual control of scheduled LCM or LCMCOV REX tests when the LCM is posted, type

>TST REX [ON] [OFF]

Note: The REX test of the posted LCM is enabled or disabled.

or

>TST COVREX [ON] [OFF]

Note: The COVREX test of the posted LCM is enabled or disabled.

To set LCM REX tests for immediate execution, type

>TST REX NOW

Note: Performs LCM_REX_TEST on the posted LCM.

or

>TST COVREX NOW

Note: Performs LCMCOV_REX_TEST on the posted LCM.

The following message appears when you enter the TST COVREX NOW command.

```
LCM HOST 00 0 will be put into takeover mode during the
COV REX
Do you want to continue with the COV REX test
Please confirm (“YES”, “Y”, “NO”, or “N”)
```

Line concentrating module and ESA-independent REX test

The scheduler initiates REX tests on an LCM. When the REX tests are complete, the scheduler initiates the ESA REX test. A manually implemented LCM REX test does not implement an ESA REX test. As a result of an REX test that is not successful, the LCM is set ISTb. This event occurs if InSv diagnostics fail or SysB if OOS diagnostics fail.

Fault indicators

A REX test that is not successful sets the LCM unit ISTb or SysB with a reason of REX failed. The system performs LCM audits every 10 min and InSv tests run. The ISTb flag remains with a REX failed reason. If the audit is not successful and the system detects additional failure conditions, the audit contributes to the ISTb list. If the LCM is SysB and performance of a successful system RTS occurs, the unit is set ISTb. The unit is set ISTb with the REX failed reason. The unit is not set ISTb. To remove the ISTb state, the LCM must complete a successful manual RTS or a successful manual or scheduled REX test.

NAG command

The CI level NAG command allows you to display all out-of-service nodes. The MAP response to the NAG command is like the response that the NAG400 log report presents. The command and log report are part of the node assessment graph (NAG) feature. The feature provides a snapshot of nodes in the system that are OOS or have a REX issue. You can enter the command string NAG ALL to include the offline nodes in the output. Enter

the command string NAG ON or NAG OFF to turn the log report function on and off. The log report function runs hourly.

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

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

You can also include nodes that failed, aborted or did not complete the last REX test. If a node does not have a REX problem, the string ATP appears in the REX column. This string indicates that all tests pass.

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

```
Front End Load: FSL37AO
Level   Node        Status  REX INFO        UNTI 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   ----             --      --
    :       :         :       :              :       :
    :       :         :       :              :       :
   SMSR     5        SYSB   ATP             SYSB    SYSB
   LTC      0        ISTB   ATP             ISTB    ISTB
   LTC      1        ISTB   ATP             ISTB    ISTB
   SMA      1        ISTB   ATP             ISTB    ISTB
   IDT      37       ISTB   ---              --      --
   IDT      38       ISTB   ---              --      --
   SMA2     0        ISTB   ATP             ISTB     .
   RCC2     1        ISTB   ATP             ISTB    ISTB
    :       :         :       :              :       :
    :       :         :       :              :       :
   LCM KRCM 03  0     .     PASS:   ----      .       .
Offline Node count:  3
```

The REX_INFO field of log NAG400 displays the results of the latest REX test. For LCMs, the LCM_REX_TEST result appears first. A colon separates the LCM_REX_TEST result from the LCMCOV_REX_TEST result. For more information about NAG400 logs, refer to the *RSC-S International Related Logs* section of this document

REX maintenance records

The system generates a maintenance record from a REX test. The record indicates results of recent REX tests for each LCM that contains datafill. This information is available at the PM level of the MAP display for a posted LCM.

> ***Note:*** Following a reload restart, the system erases the maintenance record for each LCM.

SWACTs

The SWACTs can be controlled or uncontrolled. Controlled SWACTs are implemented because of manual action. The input of the SWACT command or planned system requests like the REX schedule are examples of manual action. Planned system requests, also implement controlled SWACTs. The active unit busied when the inactive unit is InSv is an example of a planned system request.

If both units are InSv, a controlled SWACT can occur. If the RCO2 is ISTb because of a previous REX failure, a controlled SWACT can occur.

The system implements uncontrolled SWACTs when a hardware fault or a trap in the active unit is present. The PM181 log messages tell operating company personnel the reason the active unit dropped activity.

In a controlled SWACT, the following message interchange occurs:

- The CC messages the active unit of the RCO2 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. The system initiates a warm SWACT based on the audit results.
- The originally active unit stays InSv and clears unstable data.
- The newly active unit sends 5 gain messages to the CC.
- The CC sends 5 gain-acknowledge messages to the RCO2.
- The RCO2 sends 3 gain-acknowledge received messages to the CC.
- The CC tells the originally active unit to drop activity.
- The originally active unit sends the CC a drop message and the CC expects to receive this message.

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

- The CC messages the active unit of the RCO2 to start an audit of the inactive unit.
- The system implements the pre-SWACT audit.
- Based on the audit results, the system initiates a warm SWACT.
- The originally active unit stays InSv and clears unstable data.
- The newly active unit does not send messages to the CC.
- The wait time of 5 s for the originally active unit expires and a SWACT-back occurs.
- The originally active unit sends a SWACT failed message to the CC.
- The CC system busies and RTS the inactive RCO2 unit.
- If the CC does not receive any messages, the CC forces a cold SWACT, SysB and RTS both units of the RCO2.

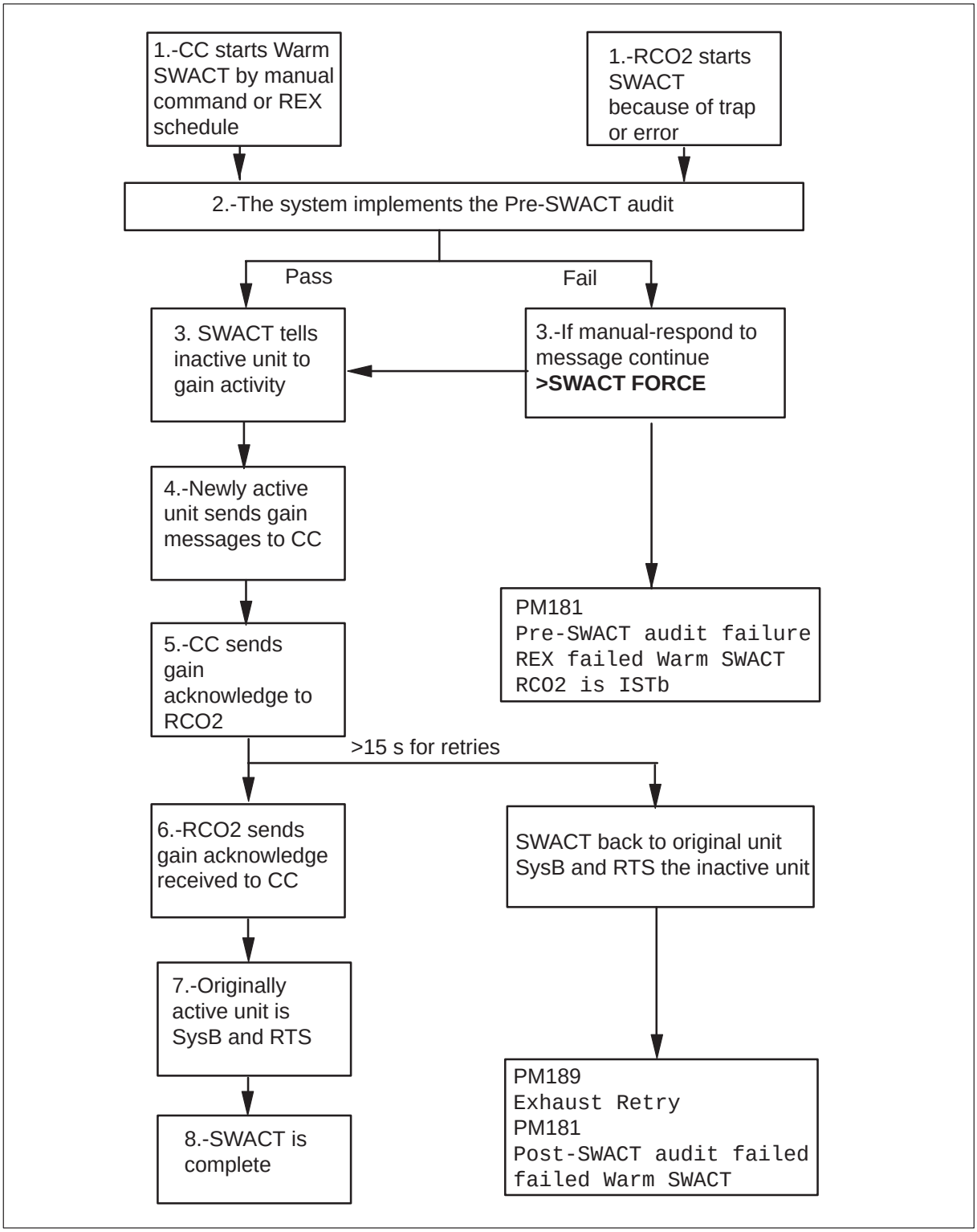
In an uncontrolled SWACT, the RCO2 initiates the pre-SWACT audit. The sequence of messages follows:

- The RCO2 active unit messages the inactive unit to start a pre-SWACT audit.
- The system implements the pre-SWACT audit.
- Based on the audit results, the system initiates a warm SWACT.
- The newly active unit messages the CC that an unsolicited gain occurred.

- The originally active unit stays InSv and clears unstable data.
- The newly active unit sends 5 gain messages to the CC.
- The CC sends 5 gain-acknowledge messages to the RCO2.
- The RCO2 sends 3 gain-acknowledge received messages to the CC.
- The CC tells the originally active unit to drop activity.
- If the CC does not receive any messages, the CC forces a cold SWACT, SysB and RTS both units of the RCO2.

The following figure shows SWACT sequence.

SWACT sequence



For controlled and uncontrolled SWACTs, consider the SWACT complete when the CC receives the gain message from the newly active unit. The SWACT must also acknowledge that gain to the originally active unit.

When a SWACT occurs, the CC and the RCO2 exchange a series of drop and gain messages. The messages make sure that the CC and the RCO2 can process the events that occur. The following table describes common phrases in these messages.

Message phrases that describe CC and RCO2 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 CC. The message tells the CC that the newly active unit has gained activity
Gain acknowledge message	The message CC sends to originally active unit. The message confirms the newly active unit is sending messages
Gain acknowledge received	Message originally active unit sends to CC. The message confirms the newly active unit passes the post-SWACT audit
Drop message	Message the originally active unit (unit 0) sends to the CC. The message tells the CC that the originally active unit dropped activity

Note: The CC can solicit and request these drop and gain messages. The messages can be unsolicited, as in the case of uncontrolled SWACTs.

Manual SWACT

After you 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”)
```

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

Uncontrolled SWACT

The state of the units and the reason for the activity drop determine the sequence of events during an uncontrolled SWACT. An uncontrolled SWACT can occur during the following:

- 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 result in a different SWACT condition

A hardware fault occurred and the system produced a PM181 log. The log can contain messages that indicate the following:

- The unit has an activity timeout.
- The CC links are not present. The message links to the CC or host XPM are broken and messaging cannot occur.
- The system found a duplicate fault. A critical hardware fault occurred with both units OOS.
- The unit jammed, meaning the unit cannot change state from (active/inactive).
- The unit is ready for ESA. This message also deals with the RCO2, in which case a loss of all CC messaging occurred. If the originally inactive unit does not send a drop message during a time period, the RCO2 enters ESA.
- The unit has static data corruption.
- The originally active unit sends a drop message to the CC.
- The newly active unit should send a gain message.

As with controlled SWACTs, the XPM continues to resend the gain message for a maximum of 15 s.

An uncontrolled SWACT can also occur if the originally active unit is InSv and the originally inactive unit is ISTb. The critical factor in this situation causes the inactive unit to be ISTb. If the reason is data synchronization, the situation is the same as when the active and inactive units are InSv. If loss of data synchronization causes the ISTb, the originally active unit drops synchronization and the RCO2 initializes again.

If the originally active unit is InSv for less than 3 min, the unit will RTS without OOS diagnostics. The reason is that a previous SWACT was present. If the previous SWACT occurred in the previous 3 min, the active unit must have had OOS diagnostics run at that time. If the original unit has been active more than 3 min, the active unit will RTS with OOS diagnostics.

The active unit attempts to come back up again in all types of RTS. If the active unit cannot come back up, both units are now SysB and the entire XPM is SysB.

Components

The following section describes diagnostics and REX results for the extended line concentrating module (XLCM). This section details the identification and resolution of fault conditions for the three major RSC-S components that can be assembled. These components are the RCO2, the RCO2 with ISDN and the DRCO2.

XLCM diagnostics

The XLCM diagnostics implement the CC and the XLCM software. The CC and XLCM software are necessary to test tip/ring reversal relay on each bus interface card (BIC), NT6X54, of a given LCM. Performance of the test occurs on each logical drawer condition. The system can implement the test manually from the MAP display level. The system can also schedule the test to run automatically. The XLCM diagnostics apply to the LCM and do not operate on the LCME.

The XLCM diagnostics implement the following:

- scheduling the BIC test
- activation/deactivation of the test
  - — BICRELAY command
- test operation
  - — system test, runs according to a user-defined schedule
  - — manual test, initiated from the LCM MAP display level over a single drawer of an LCM
- test results
  - — new LCM node ISTb reason
  - — PM132 log report
  - — PM181 log report

The BIC acts as an interface between the 64 line cards in a drawer and the digroup control card (DCC), NT6X52, in the LCM. Each BIC consists of two identical halves that connect a maximum of 32 line cards (0-31). The

two identical halves form a drawer pair. Consider each drawer of the pair to be a logical drawer or digroups 0 or 1. Each LCM has ten BICs in ten physical drawers. Each LCM contains 20 logical drawers.

The system uses two relays for ringing distribution on each half of the BIC. The first relay selects between the ringing voltage and the ANI/coin voltage. The ringing voltage consists of ac ringing voltages to a phone. The ANI/coin voltages consist of dc voltages that perform coin-activated functions. The second relay is the tip/ring reversal relay. This relay switches ringing voltages from tip to ring and ring to tip. This relay is for multiparty ringing.

This feature tests the reversal relay. The XLCM diagnostics allow a user to schedule the system BRT. The user can schedule the system BRT over a given set of LCMs and the associated drawers of the LCMs. This procedure is the scheduled BRT. You can also run a manual BRT on individual logical drawers.

Use information from two new office parameters in table OFCVAR to accomplish BTY scheduling. The parameters are

- BICRELAY_XLCM_TEST_SCHEDULE
- BICRELAY_MUM_SIMUL_TESTS

The parameters allow for flexibility to perform the following:

- schedule the BRT from one to seven days a week
- define the window size
- define how many tests (LCM-level) can run at the same time

The XLCM diagnostics implement tests at the office level, the LCM level and the drawer level. The office-level test loops over each LCM in the schedule. The system runs a single BRT on each drawer of the LCM. The results of the tests appear in a report that combines the results of each drawer test.

The scheduled BRT runs the LCM-level test. The test selects an LCM that did not have drawers tested during the BRT window that the office parameters define. The test runs a BRT on each drawer of this LCM. This BRT is a single LCM drawer test run from the LCM-level test. This BRT can also occur manually from the LCM MAP display level. The office-level test loops over the LCMs in an office and performs the LCM-level test. The LCM-level test loops over each drawer of a given LCM and performs the drawer-level test that forms a BRT.

The system provides a new command to enable, disable, reset or query the BRT for the entire office. The BICRELAY command has one parameter that can be ON, OFF, RESET or QUERY:

- ON allows the test to begin at the scheduled window.
- OFF disables any drawer-level tests scheduled now and disallows the new start of the office-level test.
- RESET restarts office-level tests if tests of the LCMs did not occur.
- QUERY displays the following:
  - — the current on or off status of an office-level test
  - — the number of LCM-level tests in progress
  - — the next LCM to test in the scheduled BRT
- An example of the BICRELAY command follows:

  >BICRELAY ON

The system BRT displays the results of each LCM-level test in log report PM132. A combined report of each drawer-level test in a given LCM appears in this report.

The following limits apply:

- The system test performs a ManB on the logical drawer before the system runs the relay test. If lines are in a call-processing busy state, the system skips over the drawer for this test cycle.
- Before the system runs the manual BRT on a single drawer, maintenance personnel must make sure the drawer is ManB.
- If a minimum of one NT6X17 line card does not have datafill in each logical drawer, the system does not test the drawer.
- This test does not run on an LCM at the same time as the following:
  - — automatic line test (ALT)
  - — REX test
- The BRTST_START_TIME and BRTST_STOP_TIME fields of the BICRELAY_XLCM_TEST_SCHEDULE office parameter cannot have data entered with the same value. A 10 min period of time must be present between the start and stop times.

The XLCM diagnostics use the following to complete testing:

- test access bus
- metallic test equipment (MTE)
- an NT6X17 card in each drawer

The ALT and the BRT can run at the same time. This action can cause a delay in both tests. If the system already started a REX test on an LCM, the BRT is not run on that LCM. The LCM remains in its current state. The system generates a PM181 log which indicates that the BRT did not run because of a REX test in progress.

XLCM REX results

Performance of REX tests occur to provide an early indication of faults that can impact service. The REX tests allow operating company personnel to take correcting measures. An office parameter controls system-initiated REX tests for LCMs to determine the interval to perform a REX on the LCM. The LCMs are REX tested one at a time, in the order in which the user entered the LCMs. A REX test involves OOS and InSv tests run on both units of the LCM.

> ***Note:*** Before this feature, only the system scheduler initiated REX tests on an LCM. A manual REX was not available.

This feature generated changes to the system REX. These changes do not change the functionality of the current diagnostic subtests.

Improvements to the REX process for LCM peripherals and variants of the LCM peripherals follow:

- ESA REX
- LCM/ESA-independent REX
- MAP command for manual REX
- fault indicators
- REX maintenance record
- MAP commands to access REX failures

Emergency stand-alone REX

The system performs ESA REX on ESAs that are subtended for RLCMs. The ESA REX tests the ability of RLCM units to enter and exit ESA. The ESA REX also tests the ability of RLCM units to message to the ESA processor when in ESA. Before this feature, a system or manual request initiated the ESA REX test. This functionality does not change. XLCM diagnostics have changed the sequencing order of the system REX. The system implements ESA REX after the system LCM REX is complete, and not as a subtest.

LCM/ESA-independent REX

Before this feature, the system scheduler initiated an ESA REX test as part of the LCM REX subtests. With this feature, the scheduler initiates REX

tests on an LCM. When these tests are complete, the system initiates ESA REX test. A manually implemented LCM REX test does not implement an ESA REX test. When a REX is not successful, the LCM is put in an ISTb state. This event occurs if InSv diagnostics fail or into a SysB state if OOS diagnostics fail.

MAP command for manual REX

The XLCM diagnostics allow you to implement a manual LCM REX test. Add a REX parameter to the TST command at the PM level of the MAP display. This action accomplishes a manual REX test. This command string follows:

```
>TST REX QUERY
```

Note: All subcommands are performed on one posted LCM.

Fault indicators

An unsuccessful REX test sets the LCM unit ISTb or SysB with a reason of REX failed. Performance of audits that run InSv tests on LCMs occur every 10 min. Before this feature, a successful audit clears the ISTb flag. This feature affects only a successful audit. The ISTb flag remains with a reason for REX failure. If the audit is not successful and the system detects additional failure conditions, the audit contributes to the ISTb list. If the LCM is SysB and a successful system RTS is performed, the unit is set ISTb with a reason of REX failed. The unit is not set InSv. Operating company personnel now notice a failed REX test. To remove the ISTb state, the LCM must complete a successful manual RTS or a successful manual or scheduled REX.

REX maintenance record

The system generates a maintenance record from a REX. The system stores the record in an internal database. The record indicates the results of recent REX tests for each LCM entered with data. When REX activity is present, the system updates the maintenance record. This information is available at the PM level of the MAP display for a posted LCM.

> ***Note:*** Following a reload-restart the system erases the maintenance record for each LCM.

MAP commands to access REX failures

The QUERYPM FLT command indicates an LCM unit is in an ISTb or SysB state. This condition is present because a REX failure has a reason of REX failed.

The TST REX QUERY command string can provide the test ID of the subtest. The command string also provides the card list that causes the REX to fail for each unit.

RCO2

The most common way operating company personnel test the RCO2 is to issue the TST command. The types of test depend on two factors. The factors are the state of the RCO2 and the parameters in the TST command.

The following examples determine fault conditions for the RC02:

- overload indicators (PM128, QUERYPM)
- REX
- audits of the IML links
- parity errors in the RCO2

Overload resources

The traffic load on the LCM is the amount of call processing greater than the LCM processor cards can handle. In this event, the LCM accepts calls at a slower rate until the overload is clear. Normally, in processing calls, the LCM queues the call requests and assigns the call requests priorities in the LCM data store. As the data store fills close to capacity, the LCM overload controls can slow the rate of load acceptance. The LCM overload process can also halt the call process until store is available.

Overload control in the LCM occurs for C-side communication and line scanning.

The LCM processor cards decrease the rate at which the cards scan for messages on the C-side. The LCM processor cards can slow or stop C-side communication. The demand for data store decreases as the LCM processor cards slow the incoming workload. The LCM processor cards slow MAP display queries of LCM status and C-side responses to LCM-supported terminals.

During overload, the LCM processor cards also stop scanning the BIC until sufficient data store is available. This action prevents incoming work from the P-side. The system queues this work in the output buffers of the BIC. When the buffers are full, the system does not accept more work. The results are partial dials or ignored keys on business sets.

Display of overload state

When the LCM becomes overloaded, the LCM status display changes to in-service trouble (ISTb) while both units show InSv. When you enter the QUERYPM FLT command at the LCM level, the response includes the phrase `LCM Overloaded`.

Overload indicators (PM128, QUERYPM)

When the RCO2 enters overload, the system produces a PM128 log (RCO2 is ISTb) with the following message:

```
PM Overloaded
```

At the PM level of the MAP display, posting the RCO2 and entering the QUERYPM FLT command gives the same message.

When this event occurs, operating company personnel must immediately collect all important OMs that track the amount and types of traffic. The reason for the RCO2 entering overload can relate to a maintenance area, like network faults. In some cases the reasons can relate to a capacity capability of the RCO2 configuration. Forward the OM reports to maintenance and engineering personnel for analysis.

Log reports PM128 and PM181 indicate the overload condition in the LCM. When call processing resumes, the system generates PM128 with the phrase `LCM out of Overload`.

Current XLCM overload controls

The XLCM has a set number of small, medium and large memory blocks, all of a fixed size. Domestic LCMs and XLCMs use only small and large memory blocks to receive external messages and to send messages. The system also uses small memory blocks (SMB) for utility purposes, like timer control blocks. The system uses medium memory blocks (MMB) for Call Data Blocks (CDB). The CDB hold data associated with active lines.

In the current XLCM implementation, the system can report an overload. The system reports an overload when the XLCM cannot receive an external message (DMSX or Inter-Unit Communication [IUC]). The system can report an overload when not enough small or large memory blocks are present. Some service degradation occurs before the system enters the overload.

The XLCM now has four levels of throttling to prevent overload. The number of available SMBs provides the base for three of these levels. These levels are designed to conserve SMBs. The system weights the levels of throttling to give terminating calls priority over originations.

The following is a description of the four levels of throttling:

1 The XPM throttles messages to the XLCM to a maximum of two every 50 ms. This restriction helps to control small peaks of very heavy traffic. Sustained messaging at this rate can drive the XLCM far into overload.

2 The XLCM appends the number of SMBs that the XLCM has available for external messages to each POTS origination message. The XLCM appends the number of SMBs for all messages that originate from P-phones. This number equals the total available SMBs without the number of SMB reserve. When this number is under 20, the XPM delays processing the origination until this number is over 20.

3 The total number of SMBs available for external messages is less than 15. The total available SMBs subtract the number of SMB reserve is less than 15. When this event occurs, the XLCM does not send call processing updates to the XLCM mate.

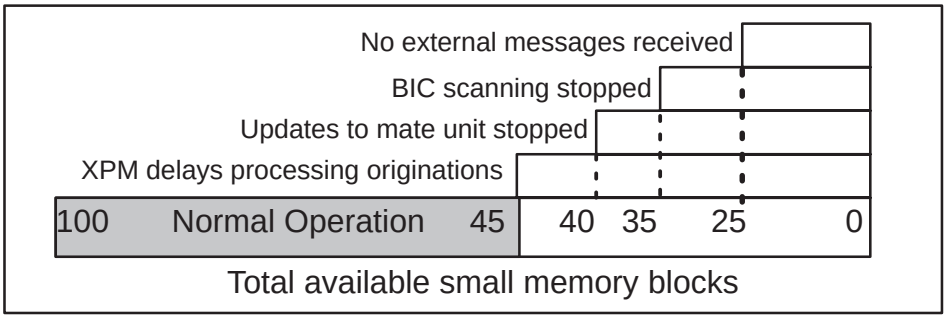
4 The total number of SMBs available for external messages is less than 10. The total available SMBs subtract the number of SMB reserve is less than 10. The XLCM does not scan the bus interface cards (BIC) for line scan changes.

To protect the XLCM when in overload, the XLCM holds a reserve of small memory blocks. The reserve is memory blocks that are not in use to receive external messages. This reserve guarantees that the XLCM can enter extremely heavy overload. In this event, the reserve makes sure internal processes always have enough small memory blocks to finish tasks. The total number of SMBs available is less than or equal to the size of the SMB reserve. In this event, the system rejects external messages that require SMBs, except for maintenance or monitor messages. At this point, the XLCM sends an overload report to the computing module (CM).

The overload protection system is static because the throttle levels are constant and non-reactive. The overload protection system can also be characterized as distributed. A single place is not present where overload is monitored and protective measures are initiated and controlled.

The XLCM Overload Protection System appears in the following figure.

XLCM Overload Protection System

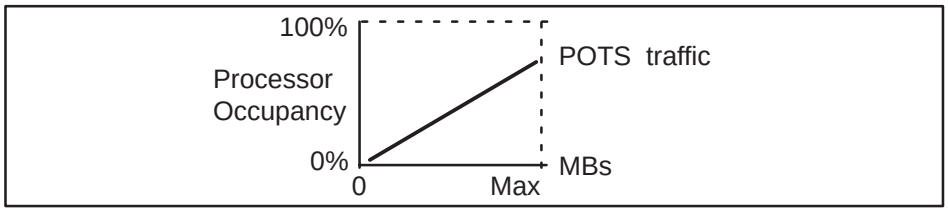


Early POTS models of the small-memory LCM (64k), show capacity of this LCM to be memory-block limited. The LCM ran out of small memory blocks before the LCM ran out of real-time use. LCM design depends on

this condition. Memory block limited is an LCM characteristic carried over to XLCMs.

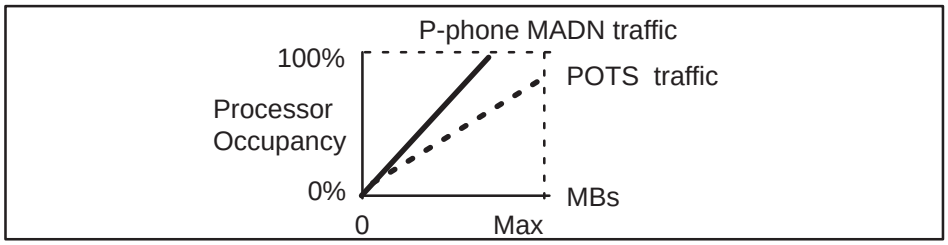
The XLCM overload system works with POTS traffic. The processor is memory-block limited with POTS traffic. The selection for the number of SMBs is 100 and the size of the SMB reserve is 25. The processor runs out of SMBs before the processor runs out of real-time use. The following rough graph shows processor occupancy or real-time use versus memory block use.

Memory-block use



The XLCMs have more memory blocks than small-memory LCMs. Extra messaging requirements to accommodate P-phones are present. The P-phones are richly provisioned with features like displays and MADN. The XLCM can run out of real-time before the XLCM runs out of memory blocks. This condition is a real-time overload condition that appears in the following figure.

MDC memory-block use



The XLCM is designed to be memory block limited. The XLCM is not equipped to handle real-time overload. This can result in outages caused by the following:

1 The system does not send an overload report because the XLCMs does not detect real-time overload. This problem causes the CM to not suspend functions that require a response from the XLCM. The CM suspends functions when the system reports an overload. If the XLCM does not respond in time, the CM system busies the XLCM.

2 The XLM cannot handle lack of memory, when lower priority tasks do not get to run. This problem can lead to traps or serious software errors. These errors cause the CM to system busy the XLCM.

Improvements to the overload protection system

The improved XLCM overload protection system performs the following additional functions:

- detects when the XLCM is in real-time overload
- reports an overload to the CM
- takes protective measures to insure XLCM sanity

These protective measures will be active for as short a time as possible to retain the XLCMs call processing capacity.

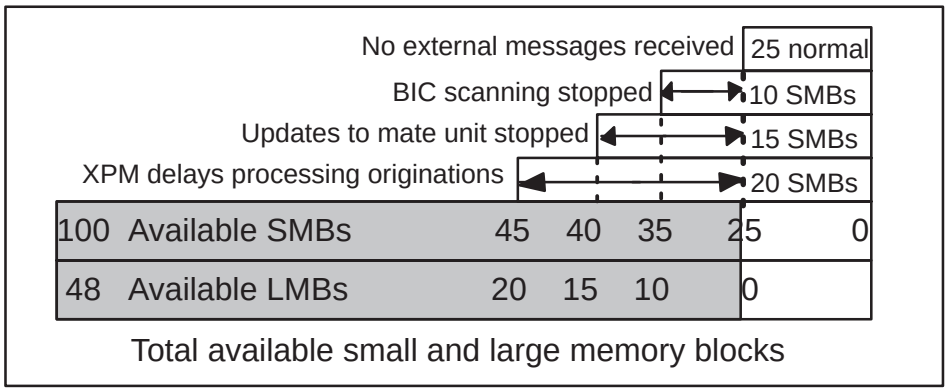
The system adds three new components to the current overload protection system. The overload protection system is modified to accommodate these components.

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

2 Real-time data analysis component analyzes the data in the depository and outputs an easy-to-read processor occupancy status. This status is not a percentage. This status is a distress rating. The system does not use percentages because percentages are too complex to work with when real-time is scarce. Percentages do not supply all of the information the control component needs. The control component uses and reports the distress rating to the CM when the XLCM reports overload. The data analysis component also provides indication of component activity, if the component has run regularly. This component runs at a high priority.

3 The real-time overload control component looks at the distress rating output by the data analysis component. If the output indicates real-time overload, the control component adjusts parameters in the overload protection system. This adjustment recovers some real-time and keeps memory-block limits ahead of XLCM real-time limits. The following figure indicates this result. If the data does not indicate trouble, the control component restores overload protection system parameters to allow maximum call processing. This component runs at a very high priority.

XLCM Overload Protection System new variable thresholds



Changes to the real-time subsystem

The real-time subsystem changes memory block system parameters to keep the memory block limits ahead of the real-time limits. Improvements to the real-time subsystem include the following:

1 Memory block reduction preserves real-time. The reduction of memory blocks and all associated throttles recovers some real-time usage.

2 Define real-time overload as a processor occupancy rate of 75 percent or more for a minimum amount of time. In the XLCM, the calculation of percentages is very real-time intensive. This method is not flexible. This method can result in early reaction if the XLCM is not in severe real-time trouble.

3 Monitor the time required to process some key maintenance request at high levels. Do not monitor 100 percent occupancy. Monitor the required time to make sure the XLCM responds to these requests before the CM times out or enters overload. Benchmark the average time to process these key requests. If the process takes longer than this benchmarked average, assume real-time overload.

4 Monitor idle task activity and enter real-time overload if an idle task does not run for a set period of time.

5 Characterize the timer task slip counter at a high occupancy, but not at 100 %. If the timer task slips at more than the normal high occupancy rate, enter real-time overload.

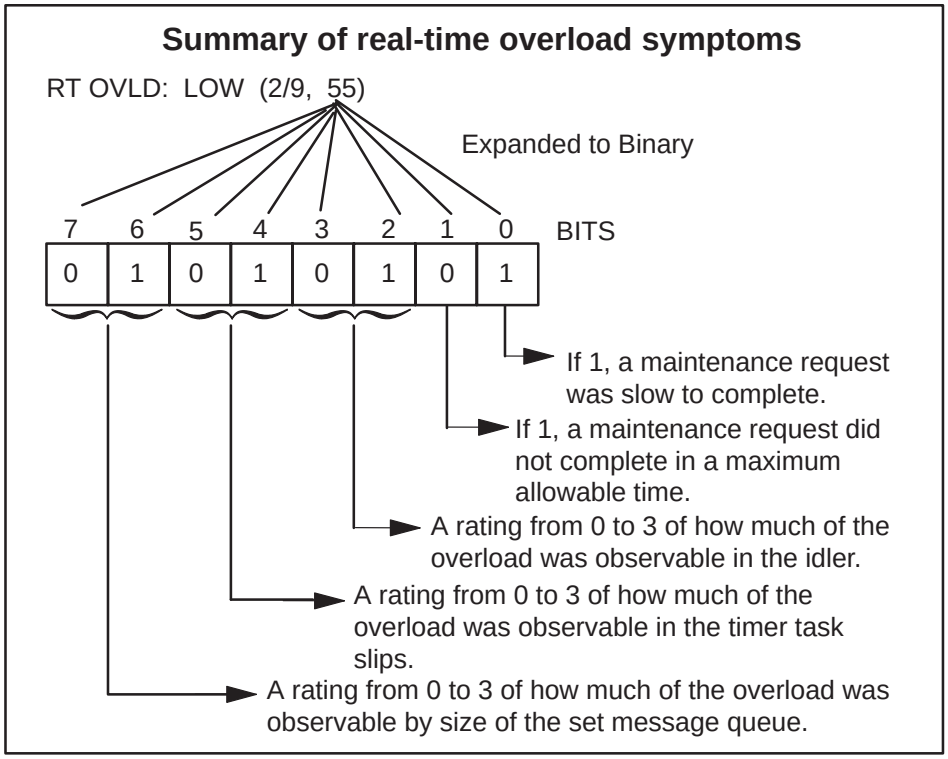
6 Monitor the size of the set message queue. If the set message queue gets too high (40 or above) the XLCM is very near real-time overload.

7 Include large memory blocks (LMB) in the memory block reduction component in order to be completely effective for recovering real-time.

XLCM log report appendages

The XLCM appends a new field to the current overload messages sent to the CM. The XLCM performs this action to reflect how extensive the real-time overload has become. If the CM is at CCM04 or later, this new information appears in the modified PM180 LCM Enters Overload log. This information also appears in the modified PM180 LCM Overloaded log. The new field contains a ratio of the maximum real-time distress reached before the system generated the overload report. The ratio values are zero to nine. The new field also contains a ratio of the maximum possible level of real-time distress. The ratio values are five to nine. A real-time overload symptoms summary byte in hexadecimal form appears in the following figure.

PM180 Real-time overload ratio and distress rating



The XLCM maintains data about overload that provides a summary about the overload period. This summary appears in figure PM180 Real-time overload ratio and distress rating. This summary is appended to the current overload exit message to the CM. If the CM is at CCM04 or later, a modified PM180 LCM out of Overload log reflects this information.

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

This feature detects real-time overload. This feature allows overload status to be reported to the CM. This feature preserves enough real-time to make sure the XLCM can function according to the operating model, memory block limited.

The real-time overload detection and protection subsystem will be integrated into the current memory block overload system. When in real-time trouble, the system will begin memory block reduction. The system changes memory block overload system parameters to reduce the amount of memory blocks available for new work. This aspect of the design makes the new overload system dynamic. The system adjusts to allow very high processor occupancy under any traffic configuration.

REX

For the REX sequence to occur, both units must be InSv. The REX test does not run under the following conditions:

- One unit is SysB and the PM is ISTb.
- Both units are SysB and the PM is SysB.
- The PM is in overload.
- The PM is ISTb.

  Note: If the PM is ISTb because of a previous REX test, the REX test runs again.

The system will abort the REX test upon receipt of a TST REX NOW command. When this event occurs, the system returns a message that informs operating company personnel the reason the REX test terminated.

Audits of the IML links

An audit runs sanity tests on IML links to make sure the data passed on those links is not lost or corrupt. The audit runs on inactive and active units. When the system detects a fault, only the active InSv unit reports the fault to the CC. When the system detects a fault on the IML link or links, the following occurs:

- The link is closed.
- The RCO2 status changes to ISTb.
- The RCO2 units do not continue to communicate over the links. A warm SWACT cannot occur.
- The system generates a PM128 log.
- At the RCO2 level, the QUERYPM FLT command contains the following message:

```
NON-CRITICAL HARDWARE FAULT
```

DRCO2

The maintenance functions provided for the PCM-30 interlinks are the same as those provided for the PCM-30 links. The PCM-30 links connect to the host PM. These functions include the following:

- detects if the card is present
- monitors the PCM-30 circuits. Conditions reported include the following:
  - — slips
  - — frame loss
  - — bipolar violation (BpV)
  - — remote carrier group alarms (RCGA)
  - — local carrier group alarms (LCGA)
- reports the state of the link

Note: The DRCO2 configuration will be available at a future BCS release.

RCO2 with ISDN

If an EDCH card goes OOS, you can configure the RCO2 with a spare EDCH. The spare EDCH gains control of the current D-channel processing without loss of D-channel service. You can use the SWITCH command to manually implement this functionality.

Escalation to manual maintenance

With the RSC-S, automatic maintenance includes the output of the appropriate trouble indicators. Information normally in this section is in the "Automatic maintenance" section of this maintenance guide.

RSC-S hardware

Hardware components

The development phases of the Remote Switching Center-Synchronous Optical Network (SONET) (RSC-S) produce hardware and software components. The following table lists the hardware component products.

Hardware componentproducts

Hardware	Product Engineering Code (PEC)
Cellular Access Processor with 16-Mbyte Memory (*See note 1*)	NTAX74AA
Frame supervisory panel (FSP) for cabinetized Remote Switching Center (CRSC) and cabinetized extension module (CEXT)	NTMX26BA
Power converter	NTMX72AA
Pulse code modulation (PCM) signaling	NTMX73AB
32-port DS30A	NTMX74AA
Enhanced matrix	NTMX75AA
HDLC/DMSX messaging interface card	NTMX76AB
Processor with 8-Mbyte digital recorded announcement machine (DRAM) (*See note 2*)	NTMX77AA
DS60 extender and power supply	NTMX79AA
Dual pulse code modulation 30 (PCM-30) packlet	NTMX82AA

Note 1: The NTAX74AA is an optional processor. The NTAX74AA does not support functionality for the NT7X05 Peripheral/Remote Loader-16.
Note 2: The NTMX77AA supports the functionality for the NT7X05 Peripheral/Remote Loader-16.

—continued—

Hardware componentproducts

Hardware	Product Engineering Code (PEC)
Filler packlet	NTMX83AA
Common peripheral module (CPM) shelf	Not available
Extension (EXT) shelf	Not available
Quad frame carrier	NTMX87AA
Cabinetized extension module (CEXT) cabinet	NTMX88BA
CRSC cabinet with enhanced line concentrating module (LCME)	NTMX89BA
CRSC cabinet with line concentrating module (LCM)	NTMX89FA
Note 1: The NTAX74AA is an optional processor. The NTAX74AA does not support functionality for the NT7X05 Peripheral/Remote Loader-16. ***Note 2:*** The NTMX77AA supports the functionality for the NT7X05 Peripheral/Remote Loader-16.	
—end—	

The hardware includes nine circuit cards and the main shelf in the cabinetized Remote Switching Center (CRSC) cabinet. The hardware includes the cabinetized extension module (CEXT) cabinet is also included. In addition to these cabinets, the hardware introduced the frame supervisory panel (FSP) for the CRSC and the CEXT.

The RSC-S packaging

The RSC-S hardware component packaging differs from normal Remote Switching Center (RSC) packaging. The RSC-S is in cabinets and houses many hardware units. The configuration for these cabinets and the separate components of the cabinets determines the services that the RSC-S can offer. Nortel (Northern Telecom) offers RSC-S in a single-cabinet and multicabinet configuration.

Single-cabinet RSC-S configuration

The single-cabinet RSC-S configuration requires only the CRSC cabinet. The CRSC cabinet provides facilities for the following components:

- the RCO2, a master controller, that controls associated line concentrating modules (LCM), RMMs, remotes, and digital trunks. The host directs the RCO2.
- the 480 lines for each enhanced line concentrating module (LCME) that can support combined services

LCMEs can support services like ISDN, two binary one quaternary (2B1Q), POTS, and MDC.

- maintenance and service circuits that the RMM provides.
- the FSP
- ringing generators (RG)

Provisioning options for the single-cabinet configuration include the following:

- central side (C-side) links for communication with the host
- peripheral side (P-side) PCM-30 links to trunk from the RSC-S

The RSC-S Model B does not affect P-side and C-side port requirements for the CRSC and CEXT.

Cabinetized Remote Switching Center

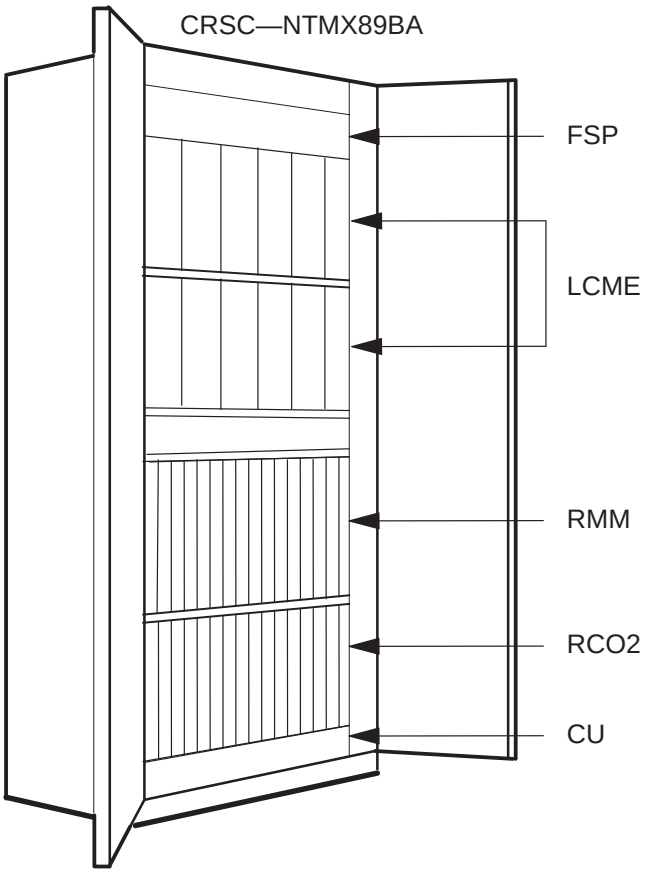
The CRSC is a single-cabinet RSC-S that supports service and maintenance circuits and PCM-30 links to the host. The maximum distance is 160.9 km (100 mi). The single CRSC C-side connects PCM-30 links to a PCM-30 line group controller (PLGC)/line group controller offshore (LGCO) host peripheral. A single-configuration RSC-S can have one CRSC cabinet with one of the following components:

- RCO2 shelf (always provisioned)
- RMM served by dedicated DS30A links
- LCME or LCM

- FSP

The following diagrams show the CRSC components. The section that follows the diagram describes the components.

The CRSC cabinet with LCME



FSP—NTMX26BA
RCO2—Not available
LCME—NTBX3118
CU—NTNX27A
RMM—NT6X13EA

Remote center offshore-2 The RSC-S is based on the remote center offshore-2 (RCO2). The RCO2 acts as the master controller for all peripherals of the RSC-S. The host directs the RCO2 to control associated LCMs, RMMs, remotes, and digital trunks. The host PLGC/LGCO controls the RCO2.

The RCO2 is the remote office unit of the common peripheral module (CPM). The RCO2 is a single-shelf, module based on 68020 or 68040 that contains two units. Units 0 and 1 are the two units. The RCO2 units 0 and 1 run in an active and standby mode of operation.

An RCO2 shelf contains the following components:

- duplicated RCO2 processor cards with a 68020-based or 68040 processor (NTMX77 or NTAX74, in the order given). The 68040 NTAX74 CAP is an optional upgrade replacement for the 68020 NTMX77 UP. The CAP increases extended multiprocessor system (XMS)-based peripheral module (XPM) capacity, real-time availability, and memory. An RCO2 that has the CAP requires the following components to support NTAX74 functionality:

  — NTBX01*BA* or NTBX01*AC* ISDN Signaling Preprocessor

  — NTBX02*BA* Enhanced D-Channel Handler

  Note 1: The NTMX77 supports functionality for the NT7X05 Peripheral/Remote Loader-16.

  Note 2: An RCO2 with NTAX74 requires the NTBX01*BA* or NTBX01*AC* ISDN Signaling Preprocessor and the NTBX02*BA* Enhanced D-Channel Handler.

- duplicated expanded time switch (a high capacity switch matrix)
- duplicated messaging interface circuit cards that contain the interface to both C-side and P-side message channels
- duplicated power converters to power the above circuit cards
- a pulse code modulation (PCM) signaling card that supports all low-level PCM signaling tasks
- the PCM-30 interface cards (eight PCM-30 links for each card) for host-directed, PCM-30 links for P-side link requirements
- a DS30A interface card. The card provides 32 DS30A links for interface to LCMs, RMMs. The card in the future releases will provide 2 links for Subscriber Carrier Module-100S Remotes (SMS-R), located at the RSC-S
- a selection of the following service circuit cards:

  — global tone receiver (GTR) or universal tone receiver (UTR)

  — custom local area signaling service (CLASS) modem resource (CMR)

  — D-channel handler (DCH)

  — enhanced ISDN signaling preprocessor (EISP)

The RCO2 houses RSC-S processor and memory cards for normal and emergency stand-alone (ESA) modes. The RCO2 also houses time switches, tone generators, and power converters. The RCO2 supports /GTRUTR for lines and trunks in normal and ESA modes. The RCO2 also provides local switching for the following call types:

- host-directed calls, which connect LCMs
- line calls internal to the RSC-S supported under the intraswitching feature
- intraswitched calls during ESA when the ESA feature is in use

Sixteen C-side ports and 54 P-side ports support the features of the present RSC and the RSC with increased ISDN capacity. An RCO2 peripheral allows C-side to P-side, P-side to C-side, P-side to P-side, and C-side to C-side connections. The C-side ports support host-to-remote capabilities.

An RCO2 performs the following termination functions:

- the C-side links from the host PLGC/LGCO with a maximum of 16 PCM-30 links. The C-side links are for PCM-30 electrical links and provide a maximum of 480 channels
- the P-side DS30A links from LCMs and RMMs
- the P-side PCM-30 links used for digital trunking to community dial offices (CDO) and private branch exchanges (PBX)

Remote maintenance module The RMM is based on the DMS-100 switch maintenance trunk module (MTM). Each RSC-S site requires one or more RMM to perform diagnostic and line tests, and monitor alarm conditions. Each RCO2 can have a maximum of two RMMs. Each RMM has one dedicated DS30A P-side port. The RMM can contain the following:

- one RMM control card
- one group coder-decoder (CODEC) card
- two power converters
- a maximum of 14 service circuit cards, including scan, signal distribution (SD), metallic test access (MTA), test trunk, and line test unit

Enhanced line concentrating module The LCME is a part of the CRSC. An additional LCME can connect to the RSC-S. Use the LCME shelf to extend the capabilities of the CRSC. The LCME provides the subscriber interface of the RCS-S for a maximum of 480 lines. The LCME consists of two ISDN line concentrating array (LCAI) shelves.

Each LCAI shelf contains the following equipment:

- eight line drawers that contain line cards
- two power converters
- two digroup control cards
- one processor card

Additional LCMEs connect to the P-side of the RCO2 through 2 to 18 DS30A links. Operating company traffic requirements determine the number of DS30A links for each LCME. The RCO2 P-side links can define a maximum of two LCMEs.

Line concentrating module The LCM can be part of the CRSC. The LCM provides the subscriber line interface of the RSC-S for a maximum of 640 lines. The LCM connects to the P-side of the RCO2 through 2 to 6 DS30A links. The LCM consists of two line concentrating array (LCA) shelves. Each LCM shelf contains the following equipment:

- a maximum of five line drawers that contain 64 line cards for each drawer
- one digroup controller
- one LCM processor card
- one power converter

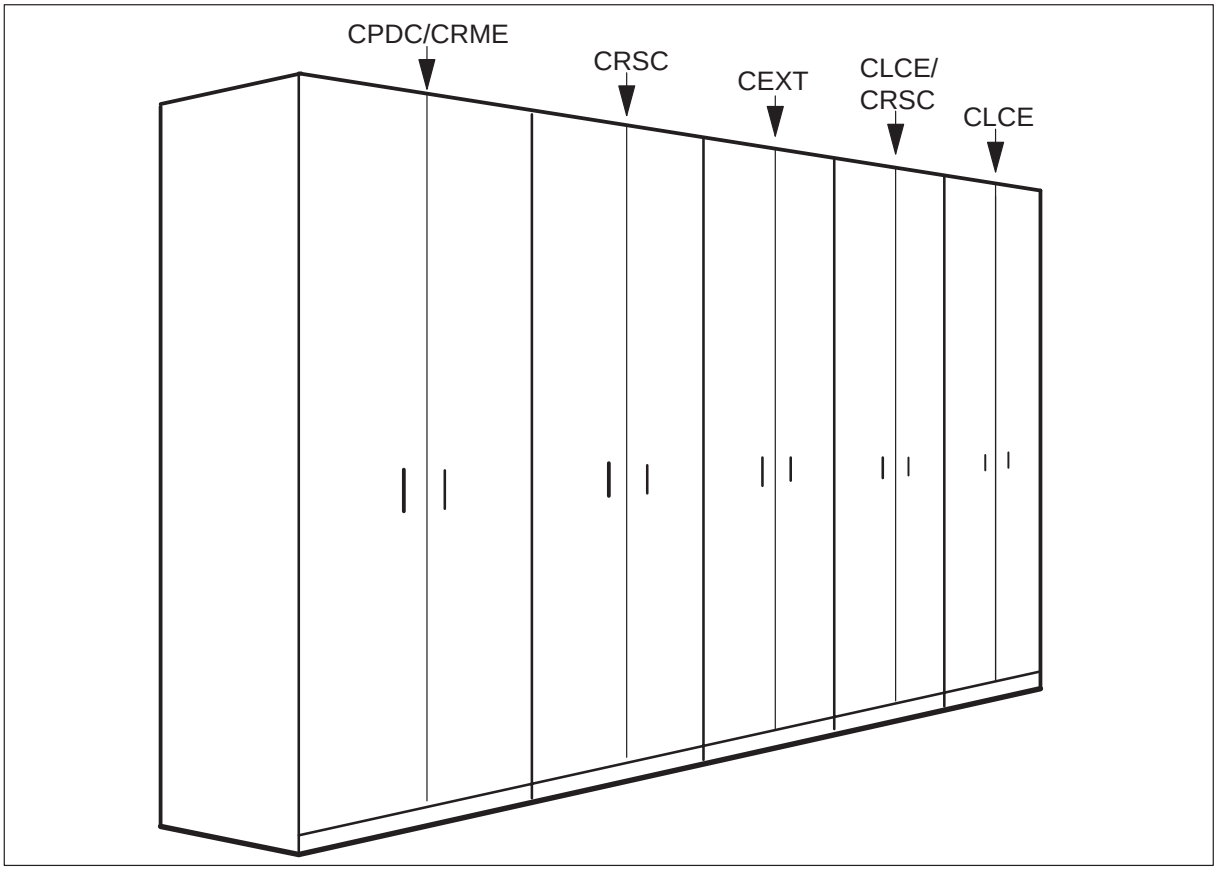
Frame supervisory panel (FSP) The FSP is for power, control, and alarm circuits.

Multicabinet RSC-S configuration

The multicabinet configuration requires a cabinetized power distribution cabinet (CPDC), or cabinetized remote miscellaneous equipment (CRME) cabinet in addition to the CRSC. The configuration can also use a CEXT cabinet.

A CEXR can have a maximum of five cabinetized line concentrating equipment (CLCE) cabinets and an LCME provisioned. This provisioning increases the physical maximum size of the line. An EXT provides additional RCO2 capacity. This configuration can include a cabinetized miscellaneous equipment cabinet (CMIS) to store equipment that the customer specifies. A cabinetized miscellaneous spares storage (CMSS) cabinet can provide spare card storage. The following diagram shows a multicabinet configuration.

Multicabinet RSC-S configuration



The following provisioning options are also available for the multicabinet configuration:

- the P-side PCM-30 links for trunking
- the C-side links for communication with the host

The following sections describe the cabinets and the cabinet components.

Cabinetized line concentrating equipment

A single configuration RSC-S can have a maximum of five CLCE cabinets. Each CLCE cabinet can support one or two completely duplicated LCMs. Each CLCE cabinet can provide 640-line card capacity.

Use the CLCE for POTS applications. Connect the CLCE to the RCO2 through 2 to 6 DS30A links. A maximum of ten LCMs can connect to the RCO2 in a single RCO2 configuration.

Each CLCE cabinet contains the following equipment:

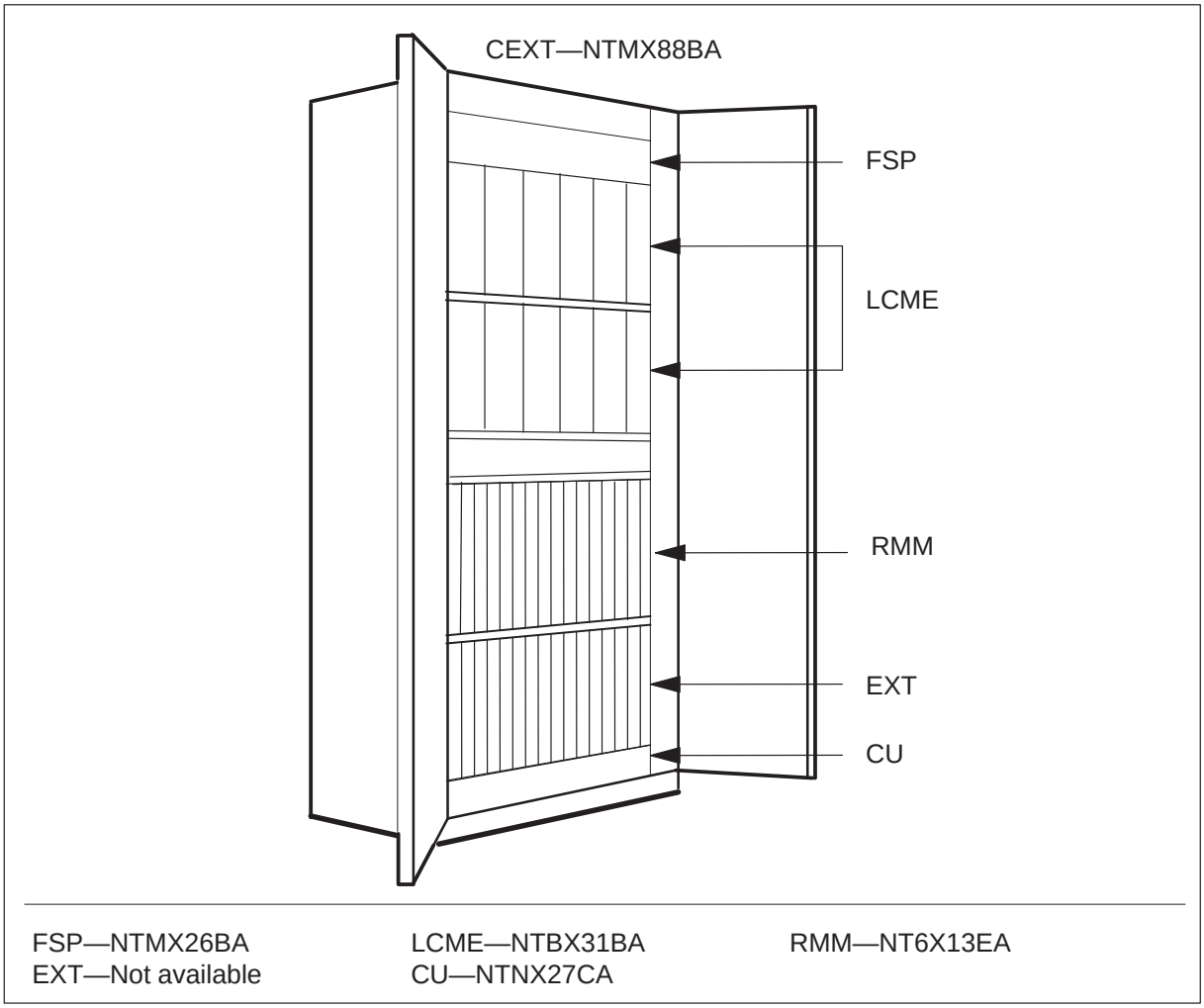
- one or two completely duplicated LCMs to terminate subscriber lines
- one FSP for power, control, two RGs, and alarm circuits

Cabinetized extension module cabinet (CEXT)

The CEXT contains an EXT, an FSP, an RMM shelf, and an LCME, to provide power, service, maintenance circuits, and 480 more lines. This cabinet has additional ISDN DCHs or PCM-30 interfaces. The EXT shelf has one ISDN LCM also.

The following diagram shows the CEXT components. The section that follows the diagram describes the diagram.

The CEXT cabinet



The CEXT provides room for additional PCM-30 interfaces and DCH cards. Each side of the CEXT (unit 1 and unit 2) requires the DS60 card. The DS60 card provides the DS60 links to the CRSC. The extension card contains 12 DS60 links that connects the extension card to the RCO2 shelf. The EXT shelf contains two extension cards.

Extension shelf The EXT shelf contains two extension half shelves. Each half of the EXT shelf supports one RCO2 shelf. One CEXT can support two CRSC cabinets, which each have an RCO2.

The EXT shelf provides additional PCM-30 links or supports additional DCHs for ISDN line requirements. The EXT shelf works with the RCO2 shelf. The EXT shelf connects to the RCO2 shelf through a DS60 plus power card.

Mounted on the CEXT, the EXT shelf houses the following:

- 0-3 octal PCM-30 interface cards (up to 24 PCM-30 links)
- 0-10 DCH cards
- DS60 extension cards

Other CEXT components The FSP, RMM, and LCM for the CEXT perform the same functions as the CRSC. The duplication of functions provides greater RSC-S capabilities.

Cabinetized line module ISDN cabinet

A single-configuration RSC-S can have one cabinetized line module ISDN (CLMI) cabinet to house a maximum of two ISDN 2B1Q line modules.

Cabinetized miscellaneous equipment cabinet

A single-configuration RSC-S can have one CMIS cabinet to house customer-specified equipment.

Cabinetized miscellaneous spares storage

A single-configuration RSC-S can have one CMSS cabinet for spare card storage.

Additional components

The RSC-S with ISDN requires the following additional components for ISDN basic rate interface (BRI) services:

- the RCO2 with ISDN
  - — DCH card
  - — EISP card
- the LCME
  - — host
  - — operation, administration, and maintenance (OAM) processor
- customer premises equipment (CPE)

The RCO2 with ISDN

For the RSC-S to support ISDN services, perform the following actions:

- Use P-side PCM-30 slots for provisioning of DCH circuit cards.
- Change the FSP to support DCH cards.
- Add the software loads.

The DCH card

The DCH card functions like the DCH for a host ISDN office. The following lists describe the DCH and functions:

- provision of service access point identifier (SAPI) discrimination function at layer 2 (Q.921 link access procedure on the D-channel [LAPD])
- termination of SAPI signaling frames and routes the signaling frames to the EISP card
- statistical multiplexing of SAPI 16 (packet) frames and transmission of frames to the packet handler (PH). The statistical multiplex ratio is a maximum of 64:1
- reflection of SAPI 17 user-to-user loop-around frames back to the user

The EISP card

The EISP card functions like the EISP for a host ISDN office. The following list describes the EISP card functions:

- provision of a communication channel between the signaling processor (SP), master processor (MP) and the DCH cards
- processing of SAPI 0 call control messages received from the DCH card

The LCME

The LCME provides the subscriber with BRI, through the 2B1Q U-loop interface. Through 2B + D channels, and six maintenance channels (M) located throughout the 2B1Q superframe, Norel provides the North American Standard 2B1Q U-loop interface.

Packet handler

Based on the Data Packet Network-100 (DPN-100) Family of packet switches, the packet handler (PH) consists of the following main components:

- digital interworking unit (DIU)
- access module (AM)
- resource module (RM)

The DIU takes the B-channel and D-channel packets received in PCM-30 format from the DMS-100 switch controller peripheral. The controller can be the RCO2, or other peripheral compatible with ISDN. The DIU converts the channel packets into the V.35 format for the AM. For data going in the opposite direction, the DIU changes data from the V.35 format to the PCM-30 format.

The AM provides access to the RMs of the DPN from local subscriber packet lines and from the DIU.

The RM performs the following functions:

- packet switching operations on data packets sent from the AM, or from digital trunks, in the packet-switched network
- return of switched packets to the AM for format conversion and distribution to the correct destination. The RM also can return the packets to terminals in the packet-switched network through a digital trunk

The OAM processor

The ISDN OAM processor helps to achieve central OAM. The OAM processor allows information to transfer to and from the PH from the MAP terminal at the exchange termination (ET).

Customer premises equipment

For BRI, the CPE consists of the following components:

- S/T bus
- ISDN terminals
- ISDN Universal Terminal Adapter (UTA)
- network termination one (NT1)
- U-loop

The S/T bus is the part of the ISDN BRI where ISDN terminals connect.

The ISDN terminals include the T2317, M5209T/TD, and M5317T/TD telephone sets, which provide voice and data features.

The ISDN UTA provides a connection to the S/T bus for a personal computer.

The NT1 converts the proprietary loop protocol on the network side to the CCITT standardized protocols on the user side. The BRI requires NT1 when an ISDN U-line card terminates a line.

The U-loop is the part of the BRI that converts the NT1. The NT1 converts to an ISDN U-line card in the exchange termination (ET) ISDN switch.

RSC-S signaling

Signaling for RSC-S

This section describes the signaling in use by the Remote Switching Center-SONET (RSC-S) and the Remote Switching Center Equipment (RSCE) subsystems. The following subsections describe RSC-S signaling format, signaling protocols, and features the format and protocols support.

Signaling and communications protocols

The RSC-S uses the DMS-X and high-level data link control (HDLC) protocol for communications with the host switch. The HDLC and DMS-X protocols can work in parallel on host XPMs.

The DMS-X is a half-duplex, byte-oriented protocol, which uses a full duplex message channel. These channels are PCM-30 or DS-30A links. The RSC-S processor handles the DMS-X message protocol on RSC-S message channels to the host, remote, or co-located equipment. The delay ability of a remote peripheral from the host is 2 ms during the use of DMS-X protocol.

The HDLC protocol is a full duplex message protocol based on the CCITT level 2 Signaling System 7 (Q.703). The system supports this protocol between the PCM-30 Line Group Controller (PLGC) and Remote Center Offshore 2 (RCO2) peripherals when the NTMX76 card is installed at the host and remote. Operating company personnel must enter the NTMX76 for HDLC on that link.

C-side links

The RSC-S and the host central controller (CC) use a multiframe format to exchange information over 2 to 16 PCM-30 C-side links. PCM-30 links operate at a rate of 2.048 Mbit/s with a sample frequency of 8000 frames each second.

The PCM-30 link consists of 32 channels. Each channel contains 8 bits of pulse code modulation (PCM) data. Thus, 256 bits of information are sent during each 32 channel sequence.

Thirty PCM-30 channels carry speech or data information. One channel transmits signaling information. Another channel is used for framing and maintenance.

As part of normal carrier maintenance operation, software checks for PCM-30 link instability. Local loss of frame alignment (LLFA) or local loss of multiframe alignment (LLMA) is detected after 3 seconds of loss of frame or multiframe alignment. Three seconds is the default value for entry as the time filter value in table CARRMTC. If the loss of alignment is detected, the CC sets the link to system busy (SysB). Carrier maintenance software monitors for remote frame alarms indication (RFAI) and remote multiframe alarm indication (RMAI) alarms, along with the other standard PCM-30 alarm and error count thresholds.

Besides providing trunking off PCM-30 digital trunk controllers (PDTC), PCM-30 links are used between host XPMs and remote XPMs such as the RCO2 and the international remote line concentrating modules (IRLCM) and PCM-30 remote line concentrating modules (PRLCM). The XPM's messaging system performs another check for link instability by measuring the number of rebounded messages caused by protocol errors. The CC sets the link to SysB if the link exceeds the threshold of nine rebounded messages within a ten second sliding window. If the message link is to the active unit, the system executes a warm switch of activity (Warm SWACT) so the inactive unit takes the activity.

Note: With DMS-X protocol, if a bit errored message is negatively acknowledged (NACK'ed) by the receiver, it is then retransmitted. If the same message is again bit errored and NACK'ed a second time, it is rebounded and is counted as a single rebound toward the nine rebounded messages in ten threshold.

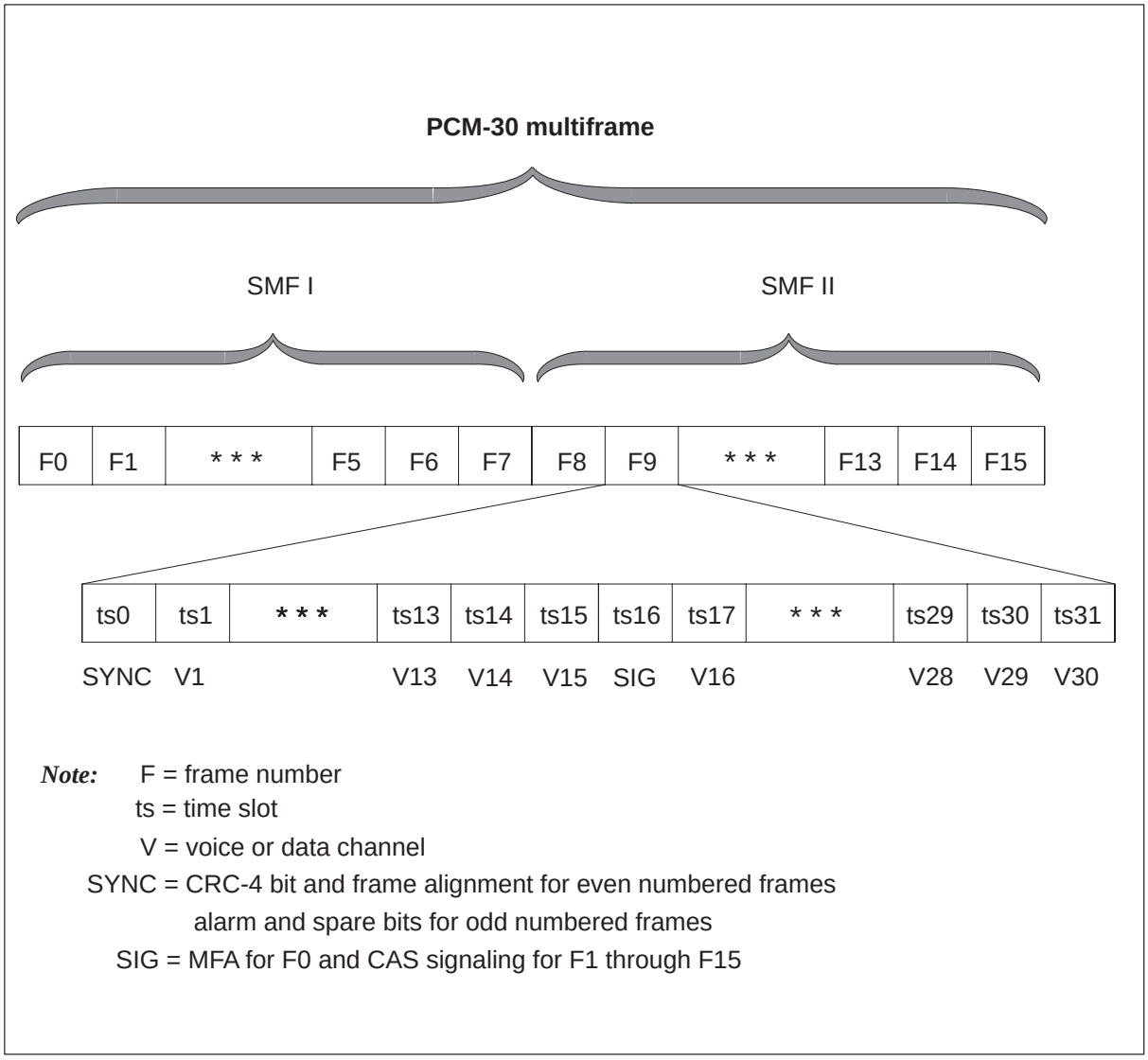
Multiframe format

The PCM-30 multiframe format has two sub-multiframes (SMF) of eight frames each. The PCM-30 multiframe uses both channel associated signaling (CAS) and cyclic redundancy checking (CRC-4). CAS is a form of circuit state signaling in which the circuit state is indicated by one or more bits of signaling status sent repetitively and associated with that specific circuit. CRC-4 verifies that data transmits error free. The bits for these functions are as follows:

- the first bit from time slot zero of the even frames from each SMF are used for a CRC-4 code word
- the remaining seven bits from time slot zero of the even frames from each SMF are used for a frame alignment signal
- eight bits from time slot 16 of frame zero contain a multiframe alignment word and a set of spare and alarm bits
- eight bits from time slot 16 of frames one through fifteen are used for CAS

The following figure is the format for a PCM-30 frame and a multiframe. A multiframe consists of 2 sub-multiframes or 16 frames.

PCM-30 frame format



Note: F = frame number
ts = time slot
V = voice or data channel
SYNC = CRC-4 bit and frame alignment for even numbered frames
alarm and spare bits for odd numbered frames
SIG = MFA for F0 and CAS signaling for F1 through F15

Signaling additions

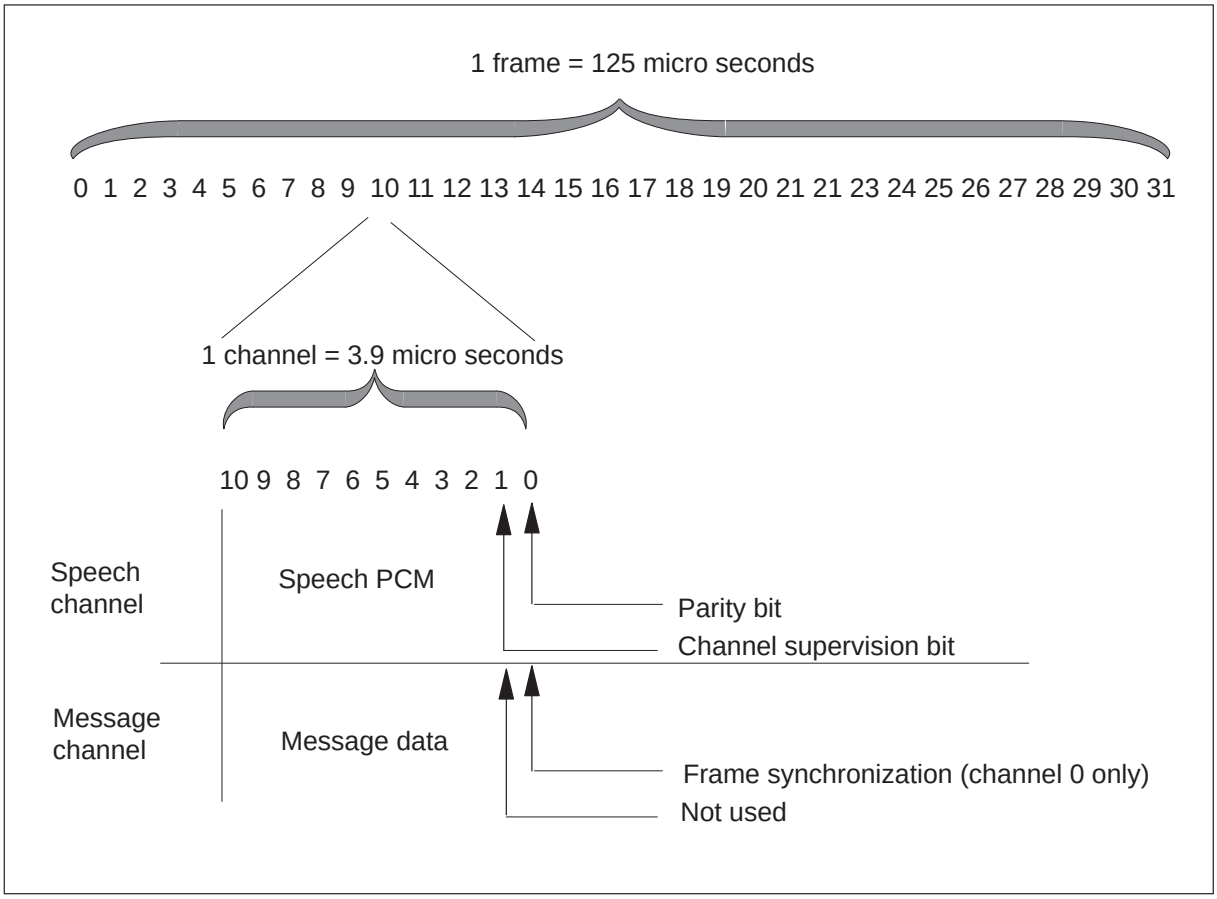
As a part of the international signaling, the MELCAS V5.2 protocol adds a facility data link.

P-side links

The RSC-S supports a maximum of 60 P-side links although only 54 are used for speech. The operating company can configure different mixes of DS-30As and D-channel handlers (DCH). A maximum of 32 DS-30As or ten DCHs may be provided in different configurations. Other P-side links are reserved for remote maintenance modules (RMM) and extension shelves (EXT). The P-side DS-30A links can connect to co-located equipment like line concentrating modules (LCM) or RMMs.

The DS-30A channel frames carry speech information or message information. The following figure is the format for a DS-30A frame. The DS-30A links operate at a rate of 2.56 Mbit/s with a sample frequency of 8000 frames each second. The DS-30A link frame has 32 channels. Each channel contains 10 bits of pulse code modulation (PCM) data.

DS-30A frame format



A frame synchronization bit is at channel 0 bit 0. The location of the bit allows the remote cluster controller (RCC) and the LCM or RMM to recognize the start of each frame sequence.

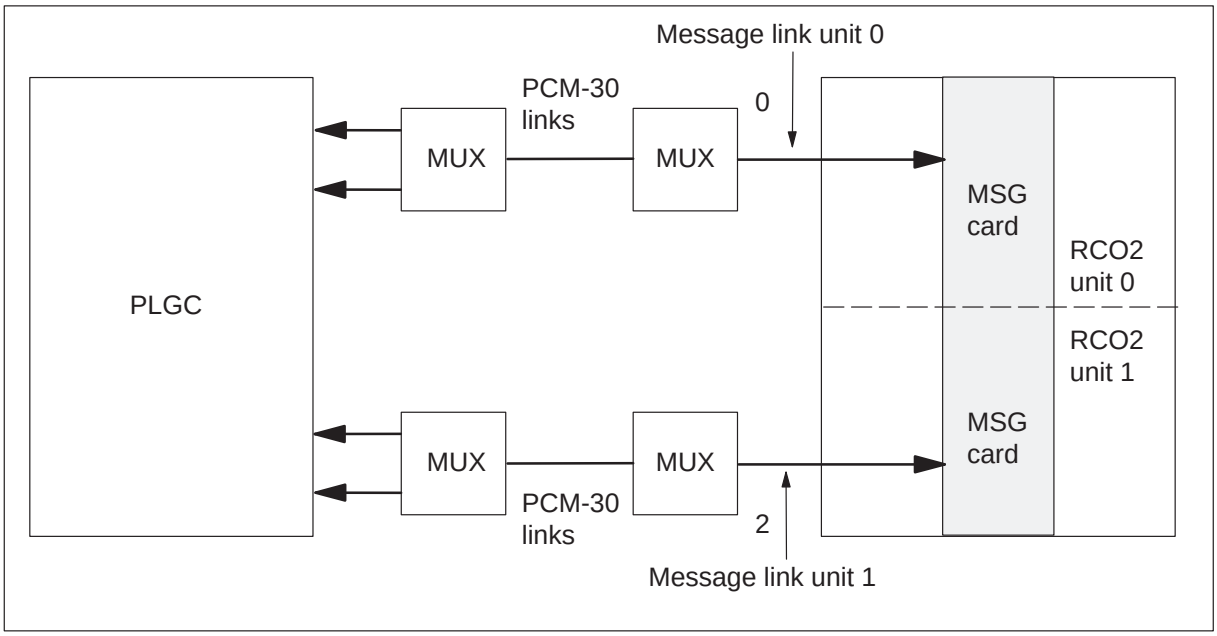
Message links

The RSC-S and host use dedicated message links to exchange system control information. The host uses system control messages to transfer call processing, initialization and maintenance information to the RSC-S. The RSC-S uses system control messages to tell the host of the RSC-S activities. System control messages contain time slot assignments to off-hook subscriber lines, test requests, and alarm status information.

One message channel time slot is for the active unit message link. The other message channel is for the inactive unit message link. The active unit message link is not limited and can transmit call processing and maintenance messages. The inactive unit message link is limited to maintenance messages.

The host monitors both links for maintenance messages. The host responds to call processing messages from the active unit only.

RCO2 message links



Message channels

Communication links between the RCO2 and the host peripherals on the C-side use the DMS-X protocol. The communication links between the RCO2 and peripherals on the P-side use the DMS-X protocol.

The CC sends messages to the host PCM-30 line group controller (PLGC) first and then to the RCO2. The host PLGC acknowledges that the message is for the host PLGC P-side node. The XPM messaging software system sends the message to its destination through a message channel between the two nodes.

The XPM messaging software system includes these layers:

- The link layer (level 1) provides the mechanism required to transfer the data bits from one node to another node. In this occurrence, the required mechanism is the PCM-30 link that connects the host XPM P-side interface card and the RCO2 C-side interface card.
- The data link layer (level 2) provides the mechanism required to transfer messages from one node to another node. These nodes connect to the mechanism. The transfer of messages uses the route selected by the network layer. The data link layer:

  — performs error detection and notification

  — maintains sequential order of messages

  — allows the activation and deactivation of message supporting links

  The RCO2 converts two standard PCM-30 frames into one internal DS-60 frame. The system removes timeslot 1 of links 0 and 2 from the PCM-30 interface. The timeslots are wired to the first network message interface (NMIF) channel in the valid RCO2 message card. The speech bus interface (SBIF) routes messages along the speech bus until the messages reach the messaging card. Each timeslot on the speech bus can be a messaging channel to the C-side or P-side of the shelf. Use channel 1 on each link for DMS-X protocol.

- The network layer (level 3) provides the mechanism required to send a message from one node to another in the network. Application software uses this mechanism. The network layer selects a route and starts the required service from the message link layer. The route sends the message to the destination node.

DMS-X applications

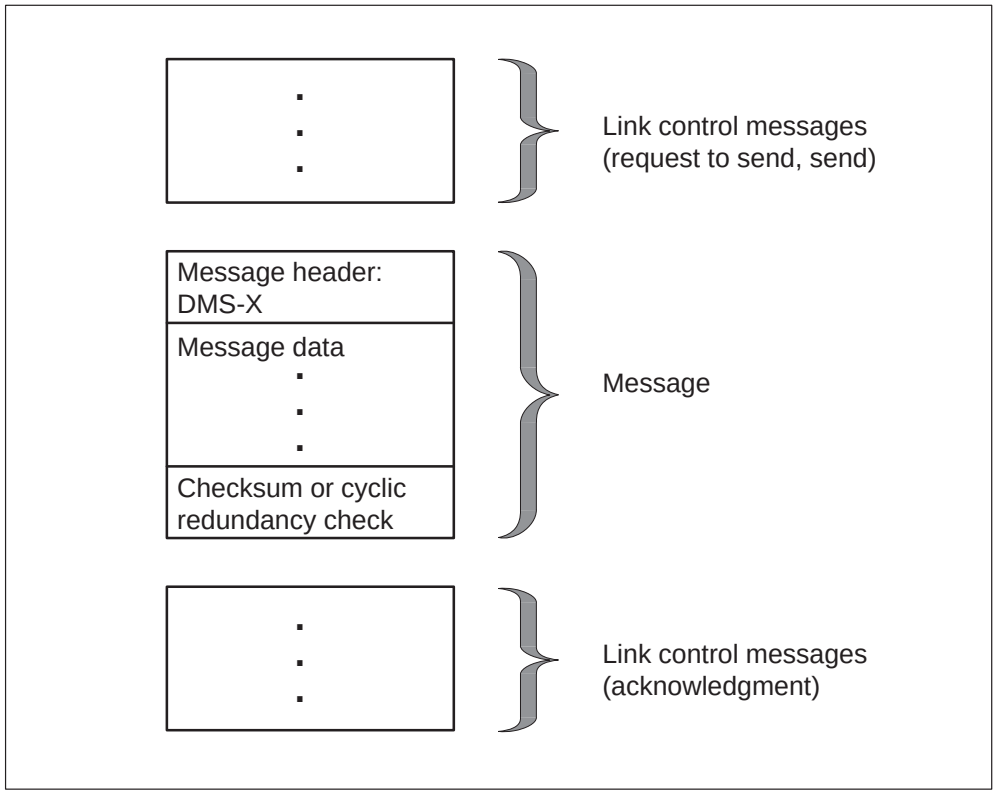
The DMS-X is the data link protocol between the PLGC and the RCO2. The C-side of the RCO2 or the P-side of the PLGC is a timeslot. To apply a data link protocol to the valid timeslot, assign the channel as a data_link. Assign this data_link to a specified node_entity.

DMS-X protocol

A full duplex message channel, like the PCM-30 links, starts the DMS-X half-duplex, byte-oriented protocol.

The DMS-X protocol is a state-driven code that requires handshake messaging between the RSC-S and host at each stage of data transfer. The handshake messaging allows the communicating terminals to delay the message transfer if one or both terminals are not ready.

DMS-X handshaking protocol



Message time-out, message checksum or CRC calculation perform message error detection. When protocol, checksum or CRC failure on an outgoing message occurs, the sending node performs the send sequence again.

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

PCM-30 message format

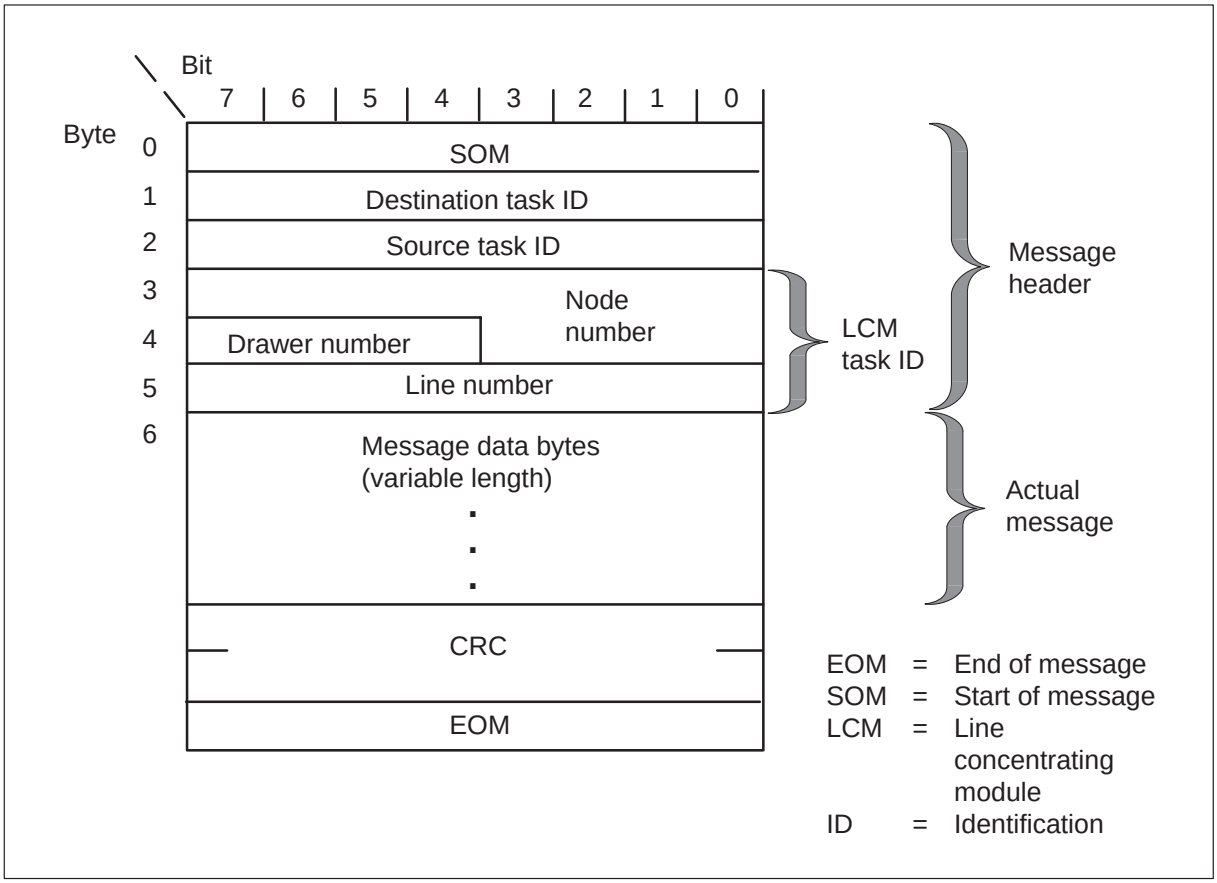
The DMS-X PCM-30 message header is the first six bytes as follows:

- The first byte is the start of message.

- The second byte is the destination task identification (ID) of the message. Use this ID in an outgoing message to identify the process to receive the message.
- The third byte is the source task ID. Use this ID in an incoming message to identify the process that sent the message.
- The last three bytes are the task ID number.

The number of bytes in the sent message or data varies. The CRC occupies two bytes and detects transmission errors. The end of message occupies one byte. The DMS-X message format appears in the following figure.

DMS-X message format



DS-30A message format

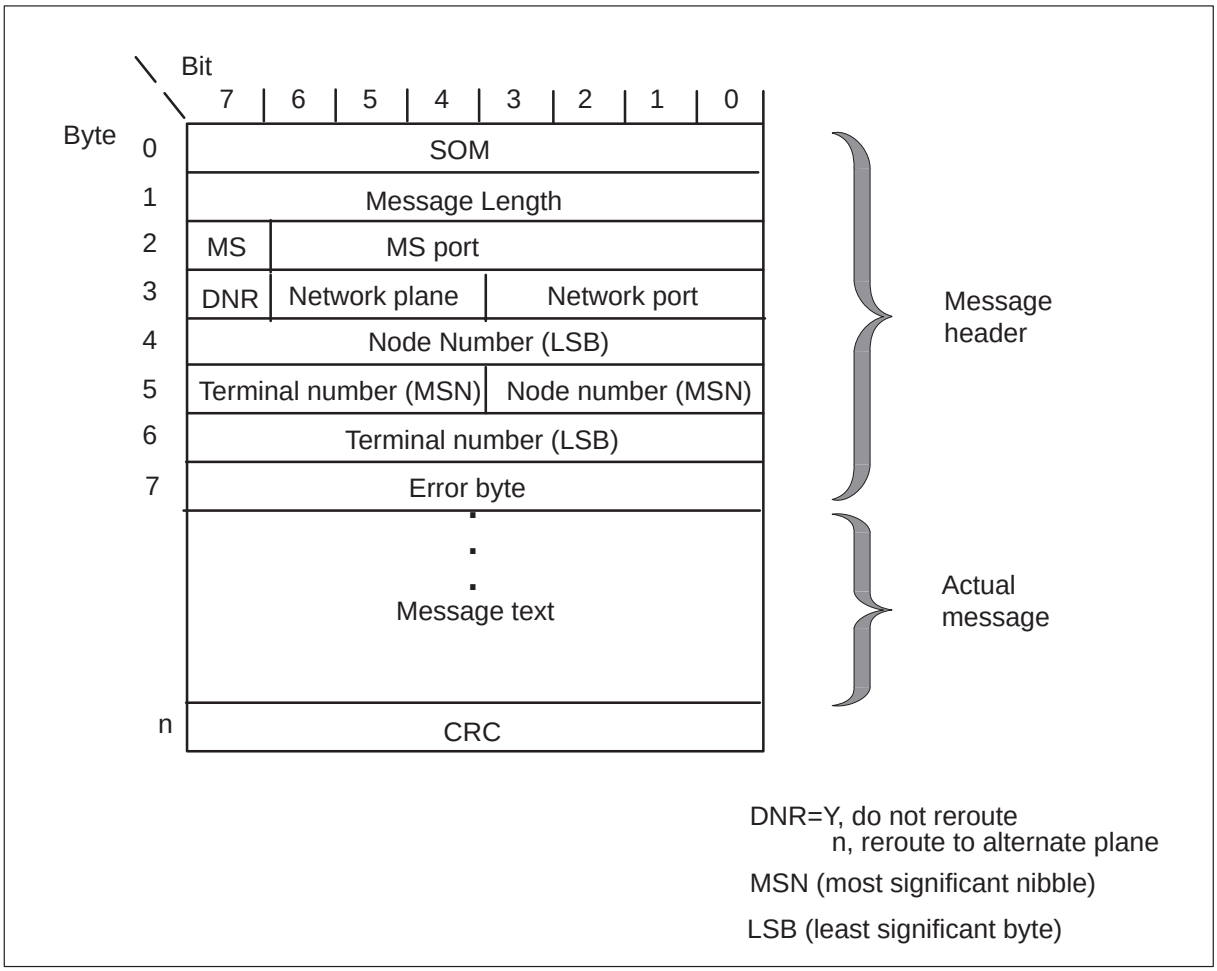
The DS30A message header is the first eight bytes as follows:

- The first byte is the start of message.
- The second byte is the message length.

- The third byte is the route message switch (MS) and port identifier.
- The fourth byte contains message network routing information.
- The fifth, sixth, and seventh bytes contain message destination node and terminal information.
- The eighth byte contains the message error emulation byte.

The number of bytes in the sent message or data varies. The checksum occupies one byte and detects transmission errors.

DS-30A message format



MBS signaling

Meridian Business Set (MBS) signaling allows call processing software to communicate with the MBS terminal. An above-voice frequency, low-speed data channel transports the sent MBS messaging over the loop to the host.

The data channel is an 8-kHz signal. Communicate the data if this signal is present or not available. The following MBS features are supported for the RSC-S:

- Automatic Answer Back
- Automatic Dial
- Automatic Line
- Executive Busy Override
- Call Back Queuing
- Call Forward All Calls
- Call Park
- Call Pickup
- Call Waiting
- End-to-End signaling
- Group Intercom
- Individual Business Line
- Intercom
- Listen on Hold
- Make Set Busy
- Malicious Call Hold
- Multiple Appearance DN
- On-Hook Dialing
- Privacy Release
- Ring Again
- Speed Calling
- 3-Way Call/Call Transfer
- 6-Port Conference
- Feature Display
- Display Called Number
- Display Calling Number
- Query Time
- Business Set Inspect Key
- Automatic Inspect Mode
- Business Set Call Forward Universal Per Key

- Call-Request Enhancement
- Direct Station/Busy Lamp Field for MBS
- Station Camp-On for MBS
- Group Intercom All Call
- MADN Cut-Off on Disconnect (COD)
- MADN Bridging – Three-Way Call
- Multiple Executive Message Waiting Keys for each DN

Global and universal tone receiver (GTR/UTR) features

ATTENTION

Do not install the Universal Tone Receiver (UTR) and Global Tone Receiver (GTR) on the same RCO2 unit. Presently, there is no way of knowing which receiver interprets tones. Some call processing tones can degrade if designed for use with a GTR.

Note: For the following paragraphs related to UTR/GTR, the abbreviation CAS represents customer premises equipment (CPE) alerting signal.

Subscriber lines that terminate on an RSC-S can use the global tone receiver (GTR) or universal tone receiver (UTR) feature. This feature starts in the PM.

With the GTR/UTR feature, the RSC-S performs all digit collection functions at the location of the originating terminal. The functions included are:

- the allocation of a free receiver
- determining a path to the receiver
- the collection and processing of digits
- the deallocation of the receiver

With a GTR/UTR, the RSC-S goes through the following steps:

1 Request a GTR/UTR channel.

2 Instruct the GTR/UTR to monitor tones.

3 When monitoring starts, the RSC-S is informed of digits and sends the digits to the CM.

4 When the receiver is not required, the RSC-S frees the allocated GTR/UTR channel.

Note: A receiver request is required to start the sequence.

The RSC-S creates alerting tones to support the Deluxe Spontaneous Call Waiting Identification (DSCWID) feature. A line with the DSCWID option can establish a call and a second call can try to terminate to that line. In this occurrence, the RSC-S provides one of two types of alerting signals. The two types of signals are a subscriber alerting signal (SAS) and a SAS followed by a customer premises equipment (CPE) alerting signal (CAS). The tones alert the DSCWID subscriber of the pending call and the DSCWID CPE of pending caller data.

The subscriber identifies the SAS as the call waiting tone. The CAS alerts the CPE of incoming data. The CAS must follow the SAS to trigger an Analog Display Services Interface (ADSI) compatible CPE to display the DSCWID options. The CAS tone prepares the CPE to receive caller identification (CID) data.

The DSCWID CPE generates an acknowledge (ACK) tone to indicate the DSCWID CPE can 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. The subscriber can use the CPE softkeys to control disposition to the incoming call when the alerting tone is sent. The CPE must be ADSI for the subscriber to change the ADSI. If the CPE is a SCWID or a 2500 set, the subscriber can use hard-coded keys.

T-tone timers set the maximum amount of time between a sent flash and the DTMF digit on an ADSI set. The RSC-S starts a T-tone timer. This event occurs after the RSC-S receives a flash signal from the ADSI compatible CPE of the customer. The value of T-tone is 600ms. The speech path is silent during the T-tone. The first option of a DSCWID call uses the T-tone timer. The CPE type does not change this action. Additional DSCWID options on an ADSI set also use the T-tone timer.

Additional DSCWID options on a SCWID or 2500 use a new timer (T-flash). These options use T-flash after a call is answered, with SCWID and 2500 sets. The use of T-flash provides the customer with time to select an option after a flash. The T-flash was introduced because subscribers were unable to flash and dial a DTMF digit in 600ms. The T-flash is an operating company controlled timer that the operating company sets from 1 to 8 seconds. The default value is 1.5 seconds. The RSC-S starts the T-flash

timer if the NON-ADSI field is set to Y. The RSC-S receives a flash signal from the SCWID or 2500 set of the customer. The RSC-S receives the signal during the held or conference call state. The RETURN option applies if the RSC-S cannot attach a GTR/UTR before 400ms.

Custom Local Area Subscriber Services

Custom Local Area Subscriber Services (CLASS) provide capabilities for call handling and the delivery and display of information. CLASS services can assign to the different intergrated business network (IBN) line types supported by the DMS-100 switch in the same way as Meridian Digital Centrex features.

Support for CLASS services depends on the ability to transmit digital information over an analog line. The NT6X78 (CLASS Modem Resource card) provides this ability for standard IBN lines. Note that the Meridian Business Set (P-Phone) line has dedicated out-of-band signaling capability and does not require the CMR card.

The RCO2 uses P-side to P-side connections for intraswitched calls. The Class Modem Resource card (CMR) requires a C-side channel to transmit the data but this channel is not available for intraswitched calls. CLASS calls that use the CMR cannot be intraswitched in the RCO2. The network switch handles these calls.

The North American version of the RCO2, the RCC2, uses DS-1 signaling protocol. Each RCC2 or RCO2 C-side link can carry 31 channels. However, DS-1 signaling protocol uses 24 channels. The seven spare channels per C-side link handle all the RCC2 intraswitched CLASS calls. For the RCO2, which uses PCM-30, there are no free C-side channels for C-side intraswitching.

Links between the CMR and the host switch remain active after the call has been set up. Plan and engineer PCM-30 equipment between the RCO2 and the host switch for this condition.

Extended Distance Capability

An RCO2 unit can be located an extended distance from the host. HDLC and the addition of the NTMX76 card allow EDC (extended distance capability).

RCO2s can operate beyond the present 2ms delay limit. The operating company must change the protocols used by the RCO2 and the host. These modifications increase the allowed one-way signal delay to 6.5ms. For RCO2s greater than 2ms delay from the host and for fiber-optic ring applications, the increased transmission delay does not depend on the actual distance.

The operating company can provide the increased delay when the operating company changes the DMS-X protocol to HDLC. The HDLC controller can then send messages over 32 P–side channels. The host and the remote peripheral equipment use four channels for messaging (per PM), two for HDLC, and two for DMS-X.

The maximum number of channels available for voice and static trunk is 476 for PCM-30 links. The operating company can use EDC over any transmission medium, provided no RCO2 specification (for example, jitter or bit error rate) is in error. The RCO2s with EDC require an XPM-PLUS equipped peripheral installed with the HDLC messaging packs. These packs are NTMX76AA-EDC only, or NTMX76AB-EDC with ADSI/SCWID feature. For the host PLGC to support RCO2-EDC capability, the host PLGC must support ISDN and use an ISDN PLGC software load. RCO2-EDC does not work with a non-ISDN PLGC.

The HDLC and DMS-X protocols can only work in parallel on host XPMs. The operating company can define the protocols for each remote. Each remote can have its own protocol. A subscriber defines the message card for extended distance ability. The subscriber selects DMS-X or HDLC protocol in table RCCINV at the remote. Refer to *Extended Peripheral Module International Translations Reference Manual*, 297-8331-815 for entry examples.

A- and B-bit signaling

The RSC-S basic call processing supports software for basic call processing, CLASS services, and ESA. To support these activities, the RSC-S and host must transfer system control messages over the PCM-30 message channel. Separate channel signaling messages use A-bits and B-bits from specified speech channels. The A- and B-bits are transported on timeslot 16 of frames one through fifteen.

The A-bits and B-bits are signaling bits that provide the following supervisory information:

- status of subscriber lines (on-hook or off-hook)
- ringing
- dial pulses

Use the A-bits and B-bits, each with a value 0 or 1, for signaling. The type of line card that receives or sends the bits determines how the bits are read. For dial pulses, a series of makes and breaks are sent on the subscriber loop. A=1 is a make and A=0 is a break.

Coin lines use A-bits and B-bits in specified speech channels for separate channel signaling. The coin lines use 8-bit patterns in appropriate speech

channels for supervision. Use the A-bits and B-bits and 8-bit coin signaling patterns to perform supervision. The coin line card handles ground start or loop start supervisory signaling.

The following eight areas are essential to call processing:

- origination and channel allocation
- tone generation with dial tone speed recording
- digit collection
- ringing
- automatic number identification
- loss padding
- messaging loss to host
- busy/return to service of lines

The RSC-S uses the following protocols for communications and subscriber services:

- HDLC

  HDLC is a full duplex message protocol based on the CCITT level 2 Signaling System 7 (Q.703). Support this protocol between PLGC+ and RCO2 peripherals.

Protocol change from DMS-X to HDLC

Features AN1548 and AN0979, In-service upgrade DMS-X to HDLC, support the upgrade of PCM-30 links between the PLGC and the RCO2. Change the messaging protocol and the remote can be in-service. Download static data from the CC. A dynamic update occurs in the host and the remote peripherals.

When the HDLC protocol applies dynamically, the system scans for current calls on channels dedicated to HDLC messaging. If established calls are not present on these channels, the system displays a warning that active calls are dropped. The system prompts the user to reject or confirm that these calls be dropped. Free channels are channels that calls do not occupy. Reserve these channels for HDLC until the protocol is changed or until the user refuses the change.

The following is an example MAP display of this process:

```
Enter Y to confirm, N to reject or E to edit
>Y
2 existing calls will be dropped
```

```
Please confirm (“Yes”, “Y”, “NO”, or “N”)
>Y
```

In the example, two calls are active. The operating company allows the two calls to be dropped and to continue the DSM-X to HDLC protocol change. As a result, the following occur:

- static data is sent from the CC to the PLGC and the RCO2
- RCO2 nailed-up connections for the HDLC message channels are set
- creates and binds data and network links into the messaging system
- it sets the PM to ISTb until all HDLC links are synchronized

The NTMX76 firmware (layer) synchronizes HDLC. The link synchronizes when the sides of the link host and remote communicate with each other. The NTMX76 audit process verifies if the new HDLC links are synchronized.

When a minimum of one HDLC link synchronizes for each unit, the audit activates the HDLC link for messaging. A message that is not solicited is sent to the CC. The system generates a PM181 log when each HDLC link synchronizes. When all HDLC message links of an RCO2 unit synchronize again, the ISTb state caused by the synchronization problem clears.

When a link fails to synchronize or loses synchronization:

- each remote unit sends a message to the CC that is not solicited. To prevent problems in the one-night-process (ONP), each remote unit sends the message after the version registry check.
- the system generates a PM181 log and indicates that the valid link is not synchronized

If all HDLC links lose synchronization to the active RCO2 unit, the RCO2 attempts to SWACT. If the SWACT fails, the RCO2 enters ESA. All HDLC message links of an RCO2 unit must be synchronized after the dynamic upgrade. If the message links are not synchronized, the RCO2 unit works in the DMS-X mode.

RCO2 with ISDN

The RCO2 can be configured with ISDN services for RSC-S. The functional areas of the RCO2 with ISDN include the following:

- cards
- speech and message paths
- host ISDN peripherals
- enhanced LCM (LCME)

Note: The figure "Operating block diagram of the RCO2 with ISDN" relates to the following functional description of the RCO2 with ISDN.

Cards

The RCO2 with ISDN is based on the RCO2 with the addition of two cards: the enhanced ISDN signaling preprocessor (EISP) and the enhanced D-channel handler (EDCH).

The EDCH card provides the primary interface to D-channels, and performs Q.921 link access procedure on D-channel (LAPD) layer 2 processing. The EDCH permanently connects to an ISDN loop and receives or sends messages on the signaling/packet data channel.

The EISP card provides a communication channel between the UP and the EDCH cards.

The PCM-30 cards (the NTMX82) provide the 64-Kbps clear channels required to process D-channels.

Speech and message paths

The speech and message paths of the RCO2 with ISDN are like the RCO2 without ISDN. The addition of the EDCH, EISP, and PCM-30 (NTMX82) cards allows the RCO2 to process calls from ISDN terminals.

The EDCH cards provide the Q.921 function and the physical processing. The EDCH provides these functions for the D-channels from the ISDN loops that end on ISDN line cards.

Enhanced D-Channel Handler (EDCH)

Feature AJ3453 provides for integration of the Enhanced D-Channel Handler (EDCH) card, NTBX02BA, in the RCO2. Feature AJ3453 improves the capability on the RCO2 for a host of ISDN features that relates to National ISDN (NI-1) compliance.

Requirements required for feature AJ3453 to integrate the EDCH card, NTBX02BA, in an RCO2 follow:

- The RCO2 must have an NTMX77 Unified Processor card.

  Note: When an RCO2 is provisioned the optional NTAX74 CAP (with WRI software load), Peripheral/Remote Loader-16 (NT7X05) functionality is not supported.

- The RCO2 must have an NTBX01BA Enhanced ISDN Processor card.

  Note: The NTBX01*BA* is required to support NTAX74 CAP functionality.

- The NTX750AD software package is required to RTS an EDCH on a RCO2.

The following restrictions apply to an RCO2 with the EDCH cards:

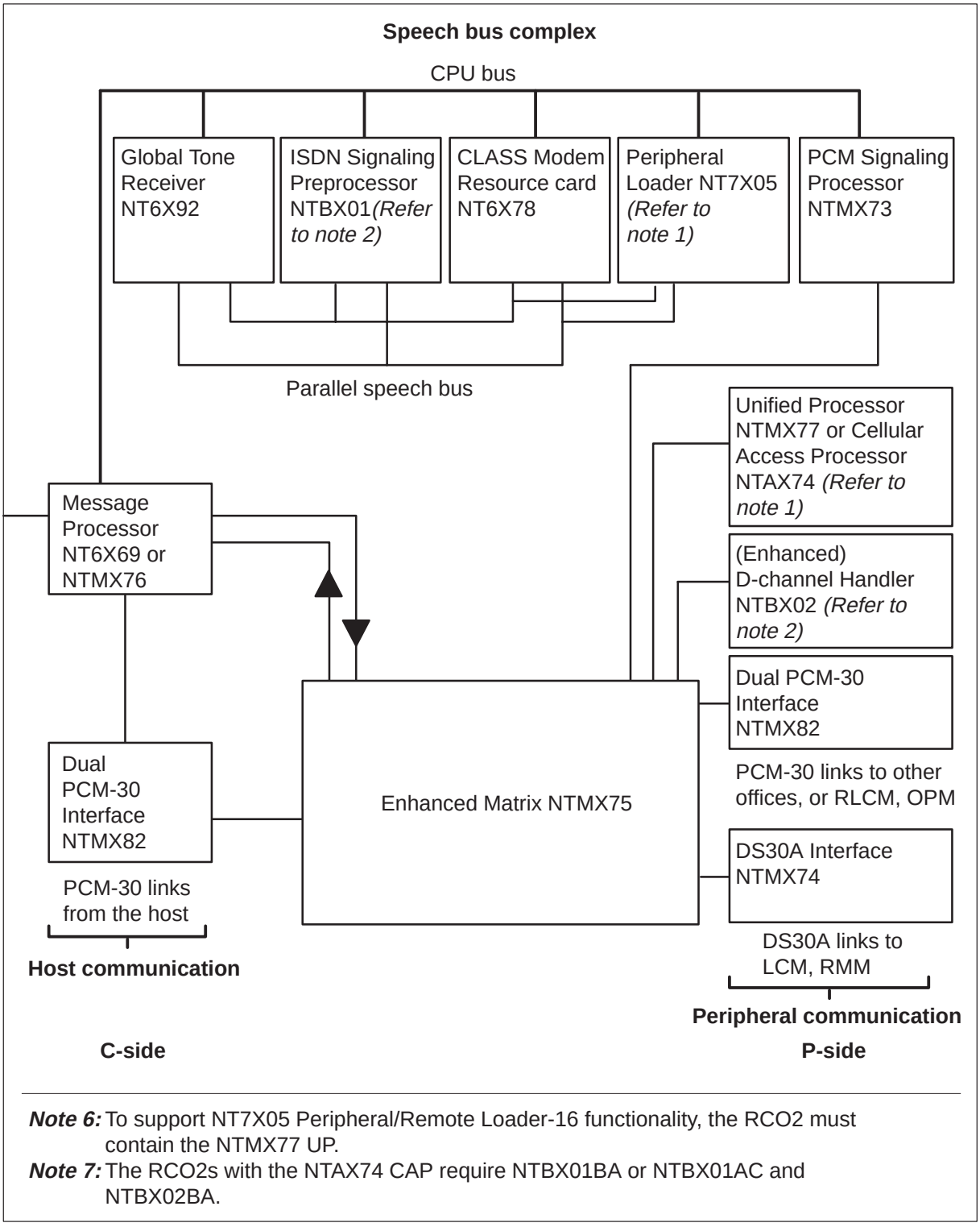
- In table DCHINV, the system does not allow an attempt to change the PEC for a DCH with an attached ISDN service group (ISG). The DCH must become a spare DCH before the tuple changes.
- Loading a DCH circuit pack with an EDCH load can pass, but the RTS fails.
- The system does not allow sparing from an EDCH circuit pack with an EDCH load to a DCH circuit pack.
- The system only allows sparing between EDCH cards during a takeover from a DCH load to an EDCH load. One of the EDCH cards must have a different load. Sparing from an EDCH to an EDCH with the same load is acceptable.

LCME

The LCME provides the subscriber with BRI, through the two binary one quaternary (2B1Q) U-loop interface. Nortel Networks provides this interface with 2B + D-channels and six maintenance channels throughout the 2B1Q superframe.

An operating block diagram of the RCO2 with ISDN appears in the following figure.

Operating block diagram of the RCO2 with ISDN



Note 6: To support NT7X05 Peripheral/Remote Loader-16 functionality, the RCO2 must contain the NTMX77 UP.

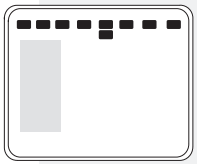
Note 7: The RCO2s with the NTAX74 CAP require NTBX01BA or NTBX01AC and NTBX02BA.

RSC-S recovery procedures

This chapter contains the recovery procedure for the DMS-100 group Remote Switching Center-SONET (RSC-S) for international applications. Maintenance personnel use this procedure to return to service (RTS) an RSC-S from an out-of-service condition. This condition can be an emergency stand-alone (ESA) condition.

Recovering an RCO2

Alarm display



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nRCO2**	.	.	.	.	.
				C					

Application

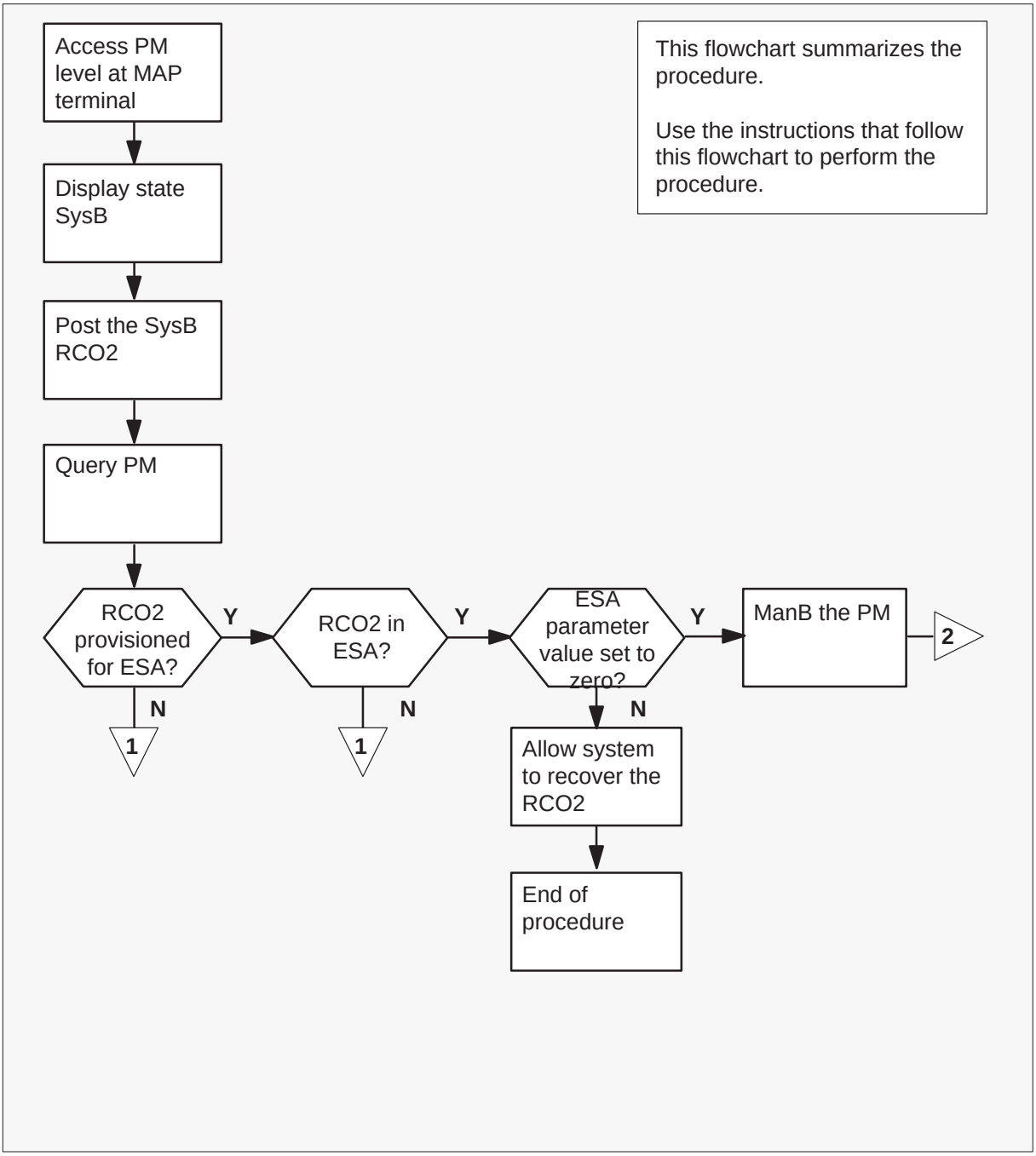
Use this procedure to restore call processing under central control (CC) on an RCO2.

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.

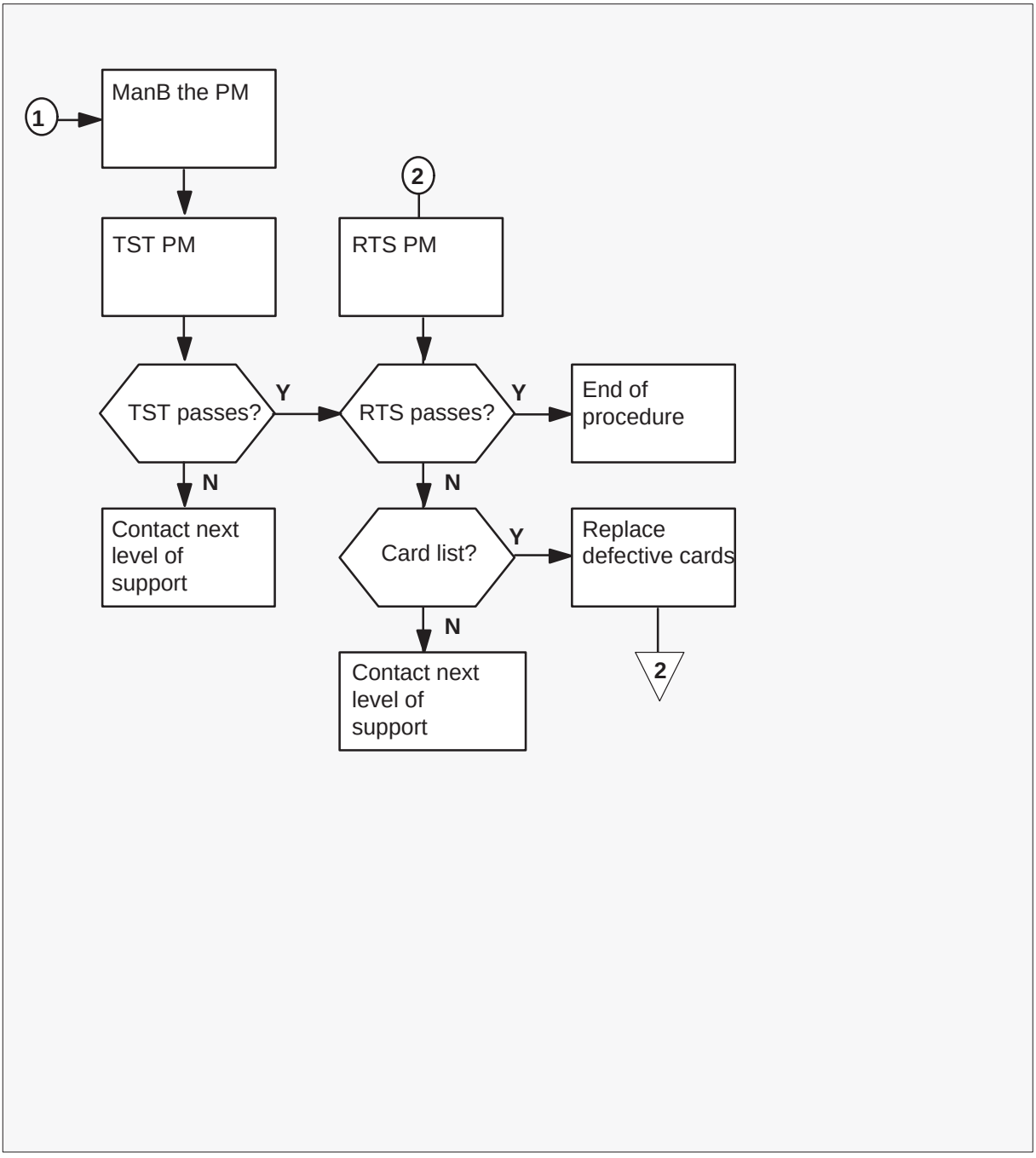
Recovering an RCO2 (continued)

Summary of recovering an RCO2



Recovering an RCO2 (continued)

Summary of recovering an RCO2 (continued)



Recovering an RCO2 (continued)

To recover a PM RCO2

At the host office

1 Proceed if:

- an *Alarm Clearing Procedure* procedure directed you to this procedure
- your maintenance support group directed you to this procedure

At the MAP terminal

1 To silence an audible alarm, type

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

2 To access the peripheral module (PM) level of the MAP display and identify the identify RCO2, type

>PM;DISP STATE SYSB RCO2
and press the Enter key.

3 To post the RCO2 with the alarm condition, type

>POST RCO2 SYSB
and press the Enter key.

4 To determine the fault condition, type

>QUERYPM FLT
and press the Enter key.

Example of a MAP response:

```
Unit 0
System busy reason:  Link Audit
Unit 1
System busy reason:  Link Audit
```

Recovering an RCO2 (continued)

5 To determine if the RCO2 is equipped with emergency stand-alone (ESA), type

>QUERYPM
and press the Enter key.

Example of a MAP response:

```
PM Type: RCO2  PM No.: 0  PM Int. No.: 1  Node_No.: 203
PMs Equipped: 309  Loadname: ESR07AT EEPRom Load: MX77NH08
ESA equipped: YES IntraSwitching is ON
WARM SWACT is supported and available.
RCO2 0 is included in the REX schedule.
Last REX date was FRI. 1995/03/10 at 12:25:07; PASSED.
Node Status: {OK, FALSE}
Unit 0   Act, Status: {SysB, TRUE}
Unit 1 Inact, Status: {SysB, TRUE}
Site Flr RPos  Bay_id   Shf  Description    Slot    EqPEC
 RCO20  01  A00  RCE 00  18    RCO2 : 000           6X12AA
```

Note: For RCO2s with the optional NTAX74AA Cellular Access Processor (CAP) the EEPROM load name reflects NTAX74AA. For RCO2s with the NTMX77AA Unified Processor (UP), the EEPROM load name reflects NTMX77AA. If the RCO2 is provisioned with NTAX74AA, an example EEPROM load name is AX74XE01. In the example, the EEPROM load name is MX77NH08.

If the RCO2	Do
is equipped with ESA	step 6
is not equipped with ESA	step 15

6 Determine if the ESA exit time is set for manual recovery from ESA. To access table OFCENG, type

>TABLE OFCENG
and press the Enter key.

7 To check the RCO2 ESA exit time, type

>POS RCO2_XPMESAEXIT
and press the Enter key.

Example of a MAP response:

```
PARMNAME                                    PARMVAL

                    RCO2_XPMESAEXIT           0
```

If the PARMVAL	Do
is set to zero	step 8
is more than zero	Allow the system to recover the RCO2. Go to step 36.

8 To quit table OFCENG and remain at the POST level of the MAP display, type

>QUIT
and press the Enter key.

9 To examine PM181 log reports that this RCO2 generates, type

>LOGUTIL;OPEN PM 181;BACK ALL
and press the Enter key.

Example of a PM181 log report:

```
PM181  MAR14  14:33:54  7534  INFO  RCO20  RCO2  0  UNIT 0
 Node:SysB, Unit 0 Act:SysB, Unit 1 Inact:SysB
 PM in ESA, Communication restored, ready to be RTSed
```

Note: The system generates this log when the value for XPMESAEXIT in table OFCENG is equal to 0.

10 To quit Logutil and remain at the POST level of the MAP display, type

>QUIT
and press the Enter key.

Recovering an RCO2 (continued)

11 Before manually restoring the RCO2 from ESA, check if links to the RCO2 are stable. To find the link numbers for this RCO2, type

>TRNSL C
and press the Enter key.

Example of a MAP response:

```
                        ┌─Host XPM P-side link number
                        ▼
Link  0: PLGC 1    0;Cap MS;Status:OK  P;MsgCond:CLS, Restrict
Link  1: PLGC 1    2;Cap MS;Status:OK  P;MsgCond:CLS, Unrestricted
Link  2: PLGC 1    4;Cap  S;Status:OK
Link  3: PLGC 1    5;Cap  S;Status:OK
```

12 To access the CARRIER level of the MAP display, type

>TRKS;CARRIER
and press the Enter key.

13 To post the host XMS-based PM peripheral- side (XPM P-side) links that interface the RCO2 in ESA and to check link conditions for slips and framing errors, type

>POST pm_type pm_no link_no
and press the Enter key.

where

pm_type	is a line group controller (LGC) or line trunk controller (LTC)
pm_no	is the number of the LGC/LTC (0 to 255)
link_no	is the number of the link for the host XPM identified in step 11

Note: Repeat the POST command for each link that interfaces the RCO2 in ESA mode.

Example of a MAP response:

```
                    ┌─ Host XPM P-side link number
                    ▼
N CLASS  SITE PLGC CK D ALRM SLIP FRME  BER   ES  SES STATE
0  REMOTE HOST  1  0 C         0    0 <-7.    0    0 INSV
```

If the link conditions	Do
have a high number of SLIP and FRME errors	Leave the RCO2 in ESA. Go to step 35.
have a low number of SLIP and FRME errors	step 14

Recovering an RCO2 (continued)

14 To access the PM level of the MAP terminal and post the RCO2, type

>PM;POST RCO2 rcO2_no
and press the Enter key.

where

rcO2_no is the number of the RCO2 identified in step 3

15 To manually busy (ManB) the PM, type

>BSY PM
and press the Enter key.

16 To test the RCO2, type

>TST PM
and press the Enter key.

If the system response	Do
is `TEST PASSED`	step 17
is `TEST FAILED` with reason, C-side links not available	step 23
is `TEST FAILED` and the system generated a card list	step 33

Recovering an RCO2 (continued)

17 To return the PM to service, type

>RTS PM
and press the Enter key.

MAP response example of an RCO2:

```
RCO2 rco2_no UNIT unit_no IN ESA MODE.
THIS ACTION WILL CAUSE ESA EXIT with n ACTIVE CALLS
A COLD EXIT WILL BE ATTEMPTED.
ALL CALLS WILL BE ABORTED.
PLEASE CONFIRM (“YES” OR “NO”)
```

or

```
RCO2 rco2_no UNIT unit_no IN ESA MODE.
THIS ACTION WILL CAUSE ESA EXIT with n ACTIVE CALLS
A WARM EXIT WILL BE ATTEMPTED.
SOME CALLS MAY BE ABORTED.
PLEASE CONFIRM (“YES” OR “NO”)
```

If the system response	Do
is RTS PASSED	step 36
is RTS FAILED and the RCO2 is configured with an NTMX77AA processor	step 18
is RTS FAILED and the RCO2 is configured with an NTAX74AA processor	step 20

Note: The system generates a PM171 log during ESA EXIT. This procedure details the call processing operational measurements (OM) during ESA.

Recovering an RCO2 (continued)

18 The peripheral loader card (NT7X05) allows local loading of the RCO2 data. Local data loading reduces recovery time. To check if the NT7X05 card is provisioned, type

>QUERYPM FILES

and press the Enter key.

Example of a MAP display:

```
   CM   MS   IOD   Net    PM    CCS    LNS    Trks    Ext    APPL
    .    .     .    .    1RCO2   .      .       .      .      .
                          *C*
 RCO2            SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM      2        0        2        0        2       25
 2 Post     RCO2    1        0        0        0        0        1
 3 ListSet
 4          RCO2      0 ISTb  Links_OOS:  CSide  0,  PSide   0
 5 TRNSL_   Unit 0:  Inact SysB
 6 TST_     Unit 1:  Inact SysB
 7 BSY_
 8 RTS_     QUERYPM files
 9 OffL        Unit 0:
10 LoadPM_        NT7X05 load File: KRI07AU
11 Disp_          NT7X05 Image File:
12 Next_       Unit 1:
13 SwAct          NT7X05 load File: KRI07AU
14 QueryPM        NT7X05 Image File:
15                CMR Load: CMR03A
16 IRLINK
17 Perform
18
```

Note: If the NT7X05 card is not provisioned, the MAP response is:

```
Nt7X05 not datafilled,  QueryPm files invalid
```

If the NT7X05 card	Do
is provisioned	step 19
is not provisioned	step 20

Recovering an RCO2 (continued)

19

WARNING
Possible service interruption
The LOCAL LOADFILE option of the LOADPM command has a parameter of [<file> string}]. The LOADPM command does not patch the loadfile when you use this parameter. Do not use this parameter unless you need to use the NOPATCH option of the loadfile.

To load the RCO2 from the local loadfile, type

>LOADPM PM LOCAL LOADFILE
and press the Enter key.

If the load	Do
passes	step 21
fails	step 20

20 To load the RCO2 from the CC, type

>LOADPM PM
and press the Enter key.

If the load	Do
passes	step 21
fails	step 35

21 To return the PM to service, type

>RTS PM
and press the Enter key.

If the system response	Do
is `RTS PASSED`	step 22
is `RTS FAILED`	step 35

Recovering an RCO2 (continued)

22 Check for dial tone according to local operating company procedures.

If the dial tone	Do
is not restored	step 35
is restored	step 36

23 To identify central-side (C-side) links to the host PM that are system busy (SysB), type

>TRNSL C
and press the Enter key.

Example of a MAP response:

```
LINK    0:  PLGC 1 0;CAP MS;SysB;MSGCOND:CLS,Restricted
LINK    1:  PLGC 1  1;CAP  S;STATUS:OK
LINK    2:  PLGC1 2;CAPMS;SysB;MSGCOND:CLS,Unrestricted
LINK    4:  PLGC1   4;CAP   S;STATUS:OK
```

Recovering an RCO2 (continued)

24 To post the host PM identified in step 23, type

>POST host_pm host_pm_no
and press the Enter key.

where

host_pm is an LGC or an LTC
host_pm_no is the number of the LGC or LTC

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .     .      .     nRCO2   .      .       .      .      .
                             *C*
LTC              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       3        0        1        0        4        12
 2 Post_   PLGC     0        0        2        0        2         9
 3 ListSet
 4         LTC    1 ISTb  Links_OOS:  CSide  0, PSide   2
 5 Trnsl_  Unit0:   Inact   InSv
 6 Tst_    Unit1:   Act     InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17 Perform
18
```

25 To identify the defective P-side links, type

>TRNSL P
and press the Enter key.

Example of a MAP response:

```
LINK 0:   RCO2 1    0;CAP MS;STATUS;    SysB;MSGCOND:CLS,Restricted
LINK 1:   RCO2 1    1;CAP  S;STATUS:    OK
LINK 2:   RCO2 1    2;CAP MS;STATUS     SysB;MSGCOND:CLS,Unrestricted
LINK 4:   RCO2 1    3;CAP  S;STATUS:    OK
LINK 5:   RCO2 1    4;CAP  S;STATUS:    OK
LINK 6:   RCO2 1    5;CAP  S;STATUS:    OK
LINK 7:   RCO2 1    6;CAP  S;STATUS:    OK
```

26 To busy the defective link, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the defective P-side link identified in step 25

27 To test the defective link, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link manually busied in step 26

Note: Perform this step for each manually busy (ManB) link.

If the system response	Do
is `TEST PASSED`	step 28
is `TEST FAILED`	step 35

28 To return the link(s) to service, type

>RTS LINK link_no
and press the Enter key.

where

link_no is the number of the link tested in step 27

Note: Perform this step for each ManB link.

If the system response	Do
is `RTS FAILED`	step 35
is `RTS PASSED`	step 29

29 To post the RCO2, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the ManB RCO2

Recovering an RCO2 (continued)

30 To return the RCO2 to service, type

>RTS PM
and press the Enter key.

If the system response	Do
is `RTS PASSED` on both units	step 36
is `RTS FAILED` on both units	step 35
is `RTS FAILED` on one unit	step 31

31 To test the ManB RCO2 unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the ManB RCO2 unit (0 or 1) that did not RTS

If the system response	Do
is `TST PASSED`	step 32
is `TST FAILED`	step 35

32 To return the tested RCO2 unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit tested in step 31

If the system response	Do
is `RTS PASSED`	step 36
is `RTS FAILED`	step 35

Recovering an RCO2 (end)

33 Check the card list in the MAP display, that results from step 16.

For RCO2s with the optional NTAX74AA Cellular Access Processor (CAP) the card list in the MAP response reflects AX74 in slot 03. For RCO2s with the NTMX77AA Unified Processor (UP), the card list reflects MX77. Both configurations appear in the following examples.

Example of a MAP response for RCO2s configured with the NTMX77AA Unified Processor:

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSCS0      01        A00 RCE    00  32       RCO2 :  000   :03    MX77
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :08    6X69
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :11    MX73
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :15    MX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :17    MX73
```

Example of a MAP response for RCO2s configured with the optional NTAX74AA Cellular Access Processor:

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSCS0      01        A00 RCE    00  32       RCO2 :  000   :03    AX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :08    6X69
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :11    MX73
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :15    MX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :17    MX73
```

If all of the cards on the list	Do
are replaced	step 35
are not replaced	step 34

34 If the system indicates other defective cards, go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures and go to step 16.

35 For additional help to clear this alarm, contact the next level of support.

36 This procedure is complete. If the system displays other alarms, refer to the appropriate alarm clearing procedures in the *Clearing an Alarm Procedures*.

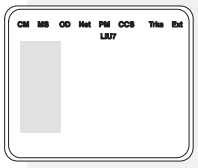
RSC-S alarm clearing procedures

This chapter contains the alarm clearing procedures for the DMS-100 Remote Switching Center-SONET (RSC-S). Maintenance personnel use these procedures to clear alarms as the alarms appear at the MAP terminal display.

Procedures in this chapter correspond to the alarms as the alarms appear at the MAP display. These procedures are in alphanumeric order to allow maintenance personnel to locate the procedures easily.

PM LCME critical

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	EIO
.	.	.	.	**1LCME**	.	.	.	.	.
				C					

Indication

A 1 enhanced line concentrating module (LCME) *C* under the peripheral module (PM) subsystem header at the maintenance (MTC) level of the MAP indicates a critical condition in the LCME.

Meaning

The indicated number of LCME units are in the system-busy (SysB) state.

Result

Call processing ceases if all LCME units fail. There is no call processing support.

Common procedures

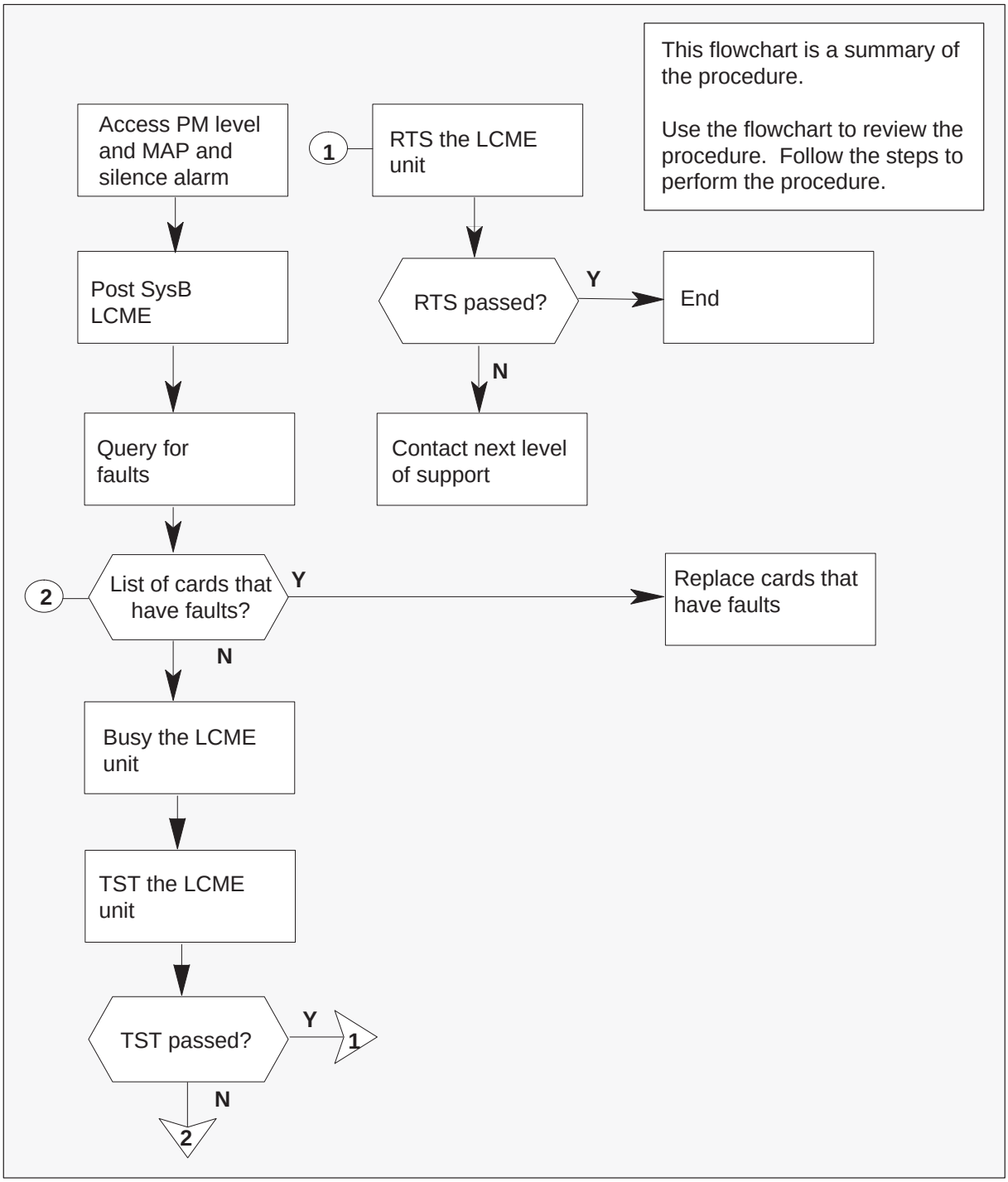
There are no common procedures.

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 LCME critical (continued)

Summary of clearing a PM LCME critical alarm



PM LCME
critical (continued)

Clearing a PM LCME critical alarm

At the MAP terminal

1

ATTENTION

Enter this procedure from a PM system-level alarm clearing procedure step that identified an LCME-associated fault.

To silence the alarm, if required, type:

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

2 To identify the LCME that has faults, type:

>DISP STATE SYSB LCME
and press the Enter key.

Standard response on the MAP display:

```
SysB  LCME  : 2
```

3 To post the SysB LCME identified in step 2, type:

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME equipment frame
lcme_no	is the number of the LCME that has faults

Standard response on the MAP display:

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


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

PM LCME
critical (continued)

4 To check for fault indicators, type:

>QUERYPM FLT
and press the Enter key.

Standard response on the MAP display:

```
CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
 .       .        .        .    1LCME      .        .         .        .
                                  *C*
LCME                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit      PM        1         0         2         0         2         12
 2 Post_     LCME      0         0         2         0         2          9
 3 ListSet
 4 SwRG      LCME   RSC-S 14 1 SysB  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_    Unit0:   SysB                 /RG: 1
 6 Tst_      Unit1:   SysB                 /RG: 1
 7 Bsy_                                 11  11  11  11  11  RG:Pref 1 InSv
 8 RTS_   Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 InSv
 9 OffL             ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_  QUERYPM FLT
11 Disp_    Node inservice troubles exist:
12 Next         One or both Units inservice trouble
13          LCME   UNIT 0  Out of Service Troubles Exist:
14 QueryPM  LCME   UNIT 1  Out of Service Troubles Exist:
15
16          SITE  FLR   RPOS   BAY_ID  SHF   DESCRIPTION   SLOT  EQPEC
17          RSCS0  01    A00   LCME 00  32   LCME   : 000  : 21   BX34
18          RSCS0  01    A00   LCME 00  32   LCME   : 000  : 19   BX35
            RSCS0  01    A00   LCME 00  32   LCME   : 000  : 20   BX35
```

If system	Do
indicates a card that has faults	step 16
does not indicate a card that has faults	step 5

5 To manually busy (ManB) the LCME posted in step 3, type:

>BSY PM
and press the Enter key.

6 To test the ManB LCME, type:

>TST PM
and press the Enter key.

Standard response on the MAP display:

```
Test Passed
    or
Test Failed
```

If TST	Do
passed	step 19
failed	step 16
was not able to test central-side busy (CBsy)	step 7

7 To identify central-side (C-side) links that are busied by the system, type:

>TRNSL C
and press the Enter key.

Standard response on the MAP display:

```
LINK 0    RCO2 2 ;CAP MS;STATUS:   SYSB,;MSGCOND:CLS
LINK 1    RCO2 2  CAP S; STATUS:   OK
LINK 2    RCO2 2  CAP S; STATUS:   OK
LINK 3    RCO2 2  CAP S; STATUS:   OK
LINK 4    RCO2 2 ;CAP MS;STATUS:   SysB,;MSCOND:cls,
```

If links are	Do
SysB	step 8
open	step 20

PM LCME
critical (continued)

8 To post the RCO2 unit associated with the LCME, type:

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the RCO2 unit identified in step 7

Standard response on the MAP display:

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

RCO2                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM         3         0         1         0         4         12
 2 Post_    RCO2       0         0         2         0         2          9
 3 ListSet
 4          RCO2    1 ISTb  Links_OOS:  CSide  0, PSide   2
 5 Trnsl_   Unit0:    Act     InSv
 6 Tst_     Unit1:    Inact   InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17
18
```

9 To identify the peripheral-side (P-side) links that have faults, and choose a link that has faults, type:

>TRNSL P
and press the Enter key.

Standard response on the MAP display:

```
LINK 23:LCME   1    0;CAP MS;STATUS:    SYSB;MSGCOND:CLS
LINK 24:LCME   1    1;CAP  S;STATUS:    OK
LINK 25:LCME   1    2;CAP  S;STATUS:    OK
LINK 26:LCME   1    3;CAP  S;STATUS:    OK
LINK 27:LCME   2    0;CAP  MS;STATUS:   SysB;MSGCOND:CLS
LINK 28:LCME   2    1;CAP  S;STATUS:    OK
LINK 29:LCME   2    2;CAP  S;STATUS:    OK
```

10 To busy the link that has faults, type:

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the P-side links chosen in step 9

11 To test the ManB link, type:

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link manually busied in step 10

If system	Do
indicates a card that has faults	step 16
does not indicate a card that has faults	step 12

12 To return the ManB 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 11

If RTS	Do
passed	step 13
failed	step 20

Note: If you identify other lines that have faults, perform steps 10 through 12 for each link. Continue until all links are busied, tested, and returned to service (RTS).

PM LCME
critical (continued)

13 To post the LCME identified in step 2, type:

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME
lcme_no	is the number of the LCME that has faults

14 To test the LCME, type:

>TST PM
and press the Enter key.

If TST	Do
passed	step 19
failed	step 16

15 To return the ManB LCME to service, type:

>RTS PM
and press the Enter key.

If RTS	Do
passed	step 21
failed	step 20

16 Check the card listing as it appears in the following MAP display:

Standard response on the MAP display:

```
SITE      FLR   RPOS  BAY_ID        SHF  DESCRIPTION     SLOT    EQPEC
RSCS0      01   A00   LCME    00     32  LCME   :000     : 19     BX35
RSCS0      01   A00   LCME    00     32  LCME   :000     : 20     BX35
RSCS0      01   A00   LCME    00     32  LCME   :000     : 21     BX34
```

If you	Do
replaced all the cards on the list	step 17
did not replace all the cards on the list	step 19

17 The trouble can be the NTMX74 DS30A interface card in the RCO2. This card connects to the links that have faults identified in step 9.

If you	Do
replaced the NTMX74 card	step 20
did not replace the NTMX74 card	step 18

Note: If the system indicates the NTMX74 card, check if one or more links have faults Repeat clearing procedure as necessary.

PM LCME
critical (end)

18 Each interface (I/F) chip on the NTMX74 card serves 4 DS30A links. The following chart illustrates the link-to-chip relationship.

Separate message (MS) links with a minimum of four links when you enter data in table LCMINV.

Chip number	DS30A Links
1	22, 23, 24, 25
2	26, 27, 28, 29
3	30, 31, 32, 33
4	34, 35, 36, 37
5	38, 39, 40, 41
6	42, 43, 44, 45
7	46, 47, 48, 49
8	50, 51, 52, 53

Go to the card replacement procedure for the NTMX74 circuit card in *Card Replacement Procedures*. When you finish with the card replacement procedures, go to step 11 of this procedure.

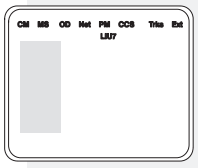
19 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. When you finish with the card replacement procedures, go to step 14 of this procedure.

20 Contact the personnel responsible for higher level support for additional information on how to clear this alarm.

21 This procedure is complete. If other alarms appear, refer to the correct alarm clearing procedures for the alarms that the system indicates.

PM LCME major

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	EIO
.	.	.	.	**1LCME M**	.	.	.	.	.

Indication

A 1LCME alarm code under the PM subsystem header at the MTC level of the MAP display indicates an alarm involving an LCME. The letter M under the alarm code indicates the alarm class is major.

Meaning

The indicated number of LCME units are in the in-service (InSv) or system-busy (SysB) state.

Result

This alarm affects subscriber service. Local LCME backup is not available if the other LCME units fail.

Common procedures

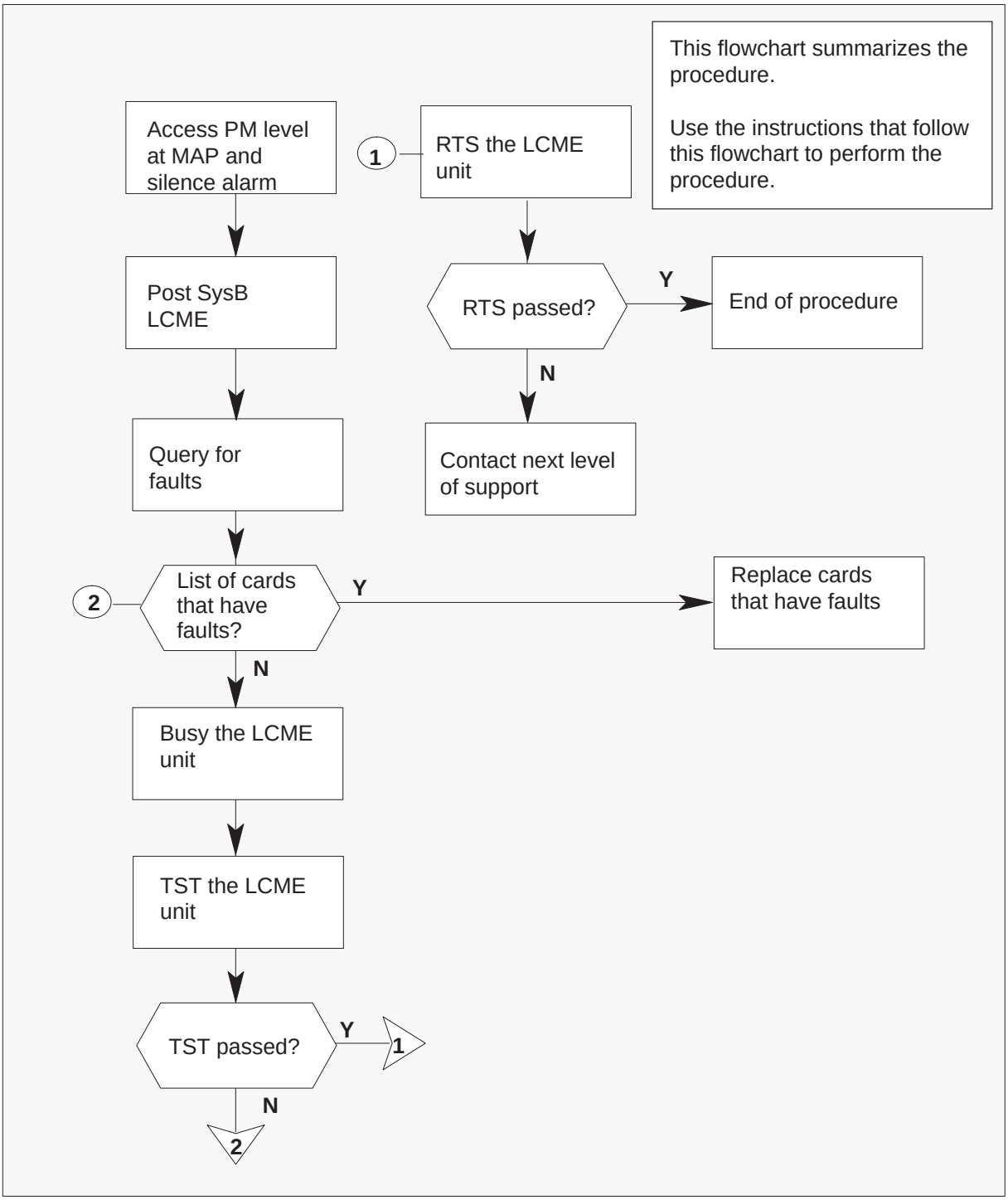
There are no common procedures.

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 LCME
major (continued)

Summary of clearing a PM LCME major alarm



PM LCME
major (continued)

Clearing a PM LCME major alarm

At the MAP terminal

1

ATTENTION

You must enter this procedure from a step in a PM system-level alarm clearing procedure that identified an LCME-associated fault.

To silence the alarm, type

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

2 To identify the SysB LCME, type

>DISP STATE ISTB LCME
and press the Enter key.

Example response on the MAP display:

```
SysB  LCME : 2
```

PM LCME
major (continued)

3 To post the SysB LCME identified in step 2, type

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME equipment frame
lcme_no	is the number of the LCME that has faults

Example response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
 .       .        .        .     1LCME      .        .         .         .
                                    M

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

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Example response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
  .       .        .        .    1LCME      .        .         .        .
                                     M

LCME                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit      PM        1         0         2         0         2         12
 2 Post_     LCME      1         0         2         0         2          9
 3 ListSet
 4 SwRG      LCME   RSCS 14 1 ISTb  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_    Unit0:   InSv  Takeover        /RG: 1
 6 Tst_      Unit1:   SysB                  /RG: 1
 7 Bsy_                                   11  11  11    RG:Pref 1 InSv
 8 RTS_      Drwr:  01  23  45  67  89  01  23  45       Stby 0 InSv
 9 OffL             ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_   QUERYPM FLT
11 Disp_     Node inservice troubles exist:
12 Next          One or both Units inservice trouble
13           LCME   UNIT 0  Inservice No Troubles Exist:
14 QueryPM   LCME   UNIT 1  Out of service Troubles Exist:
15
16        SITE  FLR   RPOS   BAY_ID     SHF   DESCRIPTION   SLOT  EQPEC
17        RSCS0  01    A00   LCME   00   32   LCME   : 000  : 19   BX35
18        RSCS0  01    A00   LCME   00   32   LCME   : 000  : 20   BX35
```

If the MAP display	Do
indicates a card that has faults	step 16
does not indicate a card that has faults	step 5

5 To manually busy the LCME posted in step 3, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SysB LCME

PM LCME
major (continued)

6 To test the LCME, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit manually busied in step 5

Example response on the MAP display:

```
Test Passed
    or
Test Failed
```

If TST	Do
passes	step 15
fails	step 16
cannot test CBsy links	step 7

7 To identify C-side links that are in a SysB condition, type

>TRNSL C
and press the Enter key.

Example response on the MAP display:

```
LINK 0    RCO2 2 ;CAP MS;STATUS:   SYSB,;MSGCOND:CLS
LINK 1    RCO2 2  CAP S; STATUS:   OK
LINK 2    RCO2 2  CAP S; STATUS:   OK
LINK 3    RCO2 2  CAP S; STATUS:   OK
LINK 4    RCO2 2 ;CAP MS;STATUS:   OK,;MSCOND:OPN,
```

If links	Do
are SysB	step 8
are open	step 20

8 To post the RCO2 unit associated with the LCME, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the RCO2 unit identified in step 7

Example response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
  .       .        .        .    1LCME      .        .         .        .
                                     M

RCO2                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM         3         0         1         0         4         12
 2 Post_    RCO2       0         0         2         0         2          9
 3 ListSet
 4          RCO2   1 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_   Unit0:   Act InSv
 6 Tst_     Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17
18
```

9 To identify the P-side links that have faults, and to choose a link that has faults, type

>TRNSL P
and press the Enter key.

Example response on the MAP display:

```
LINK 23:LCME   1    0;CAP MS;STATUS:    SYSB;MSGCOND:CLS
LINK 24:LCME   1    1;CAP  S;STATUS:    OK
LINK 25:LCME   1    2;CAP  S;STATUS:    OK
LINK 26:LCME   1    3;CAP  S;STATUS:    OK
LINK 27:LCME   2    0;CAP MS;STATUS:    OK;MSGCOND:OPN
LINK 28:LCME   2    1;CAP  S;STATUS:    OK
LINK 29:LCME   2    2;CAP  S;STATUS:    OK
```

PM LCME
major (continued)

10 To busy the damaged link, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the P-side link chosen in step 9

11 To test the ManB link, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link manually busied in step 10

If the MAP display	Do
indicates a card that has faults	step 16
does not indicate a card that has faults	step 12

12 To return the ManB 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 11

Note: If the MAP display identifies other links that have faults, perform the procedures in steps 10 through 12. Perform these procedures until you busy, test, and return to service all links.

If RTS	Do
passes	step 21
fails	step 20

13 To post the LCME identified in step 2, type

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME
lcme_no	is the number of the LCME that has faults

14 To test the LCME unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit posted in step 13

If TST	Do
passes	step 15
fails	step 16

15 To return the LCME to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME tested in step 14

If RTS	Do
passes	step 21
fails	step 20

PM LCME
major (continued)

16 Check the card listing that appears in the following MAP display.

Example response on the MAP display:

```
SITE   FLR     RPOS   BAY_ID        SHF      DESCRIPTION    SLOT   EQPEC
RSCS0   01      A00   LCME   00      32      LCME  :000      : 21   BX34
RSCS0   01      A00   LCME   00      32      LCME  :000      : 19   BX35
RSCS0   01      A00   LCME   00      32      LCME  :000      : 20   BX35
```

Note: If the system does not generate a card list, check the logs. Go to step 20 to move to a higher level of maintenance support.

If you	Do
replaced all cards on the list	step 17
did not replace all cards on the list	step 19

17 The NTMX74 DS30A interface card in the RCO2 can cause the problem. This interface card connects to the links that have faults that appear in step 9.

If you	Do
replaced the NTMX74 card	step 20
did not replace the NTMX74 card	step 18

Note: If the MAP display indicates the NTMX74 card, determine if one link or several links have faults. Repeat clearing procedure as necessary.

18 Each interface (I/F) chip on the NTMX74 card serves four DS30A links. The following chart illustrates the link to chip relationship. You must separate Message (MS) links by a minimum of 4 when you enter data in table LCMINV.

Chip number	DS30A Links
1	22, 23, 24, 25
2	26, 27, 28, 29
3	30, 31, 32, 33
4	34, 35, 36, 37
5	38, 39, 40, 41
6	42, 43, 44, 45
7	46, 47, 48, 49
8	50, 51, 52, 53

Go to the card replacement procedure for the NTMX74 circuit card in *Card Replacement Procedures*. Complete the card replacement procedures and go to step 11 of this procedure.

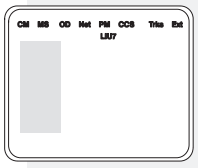
19 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures and go to step 14 of this procedure.

20 For additional help, contact the next level of support.

21 This procedure is complete. If other alarms appear, refer to the correct alarm clearing procedures for the indicated alarms.

PM LCME(RG)
Major

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	EIO
.	.	.	.	**1LCME M**	.	.	.	.	.

Indication

The alarm code 1LCME M indicates a major alarm involving an LCME ringing generator. The alarm code appears under the PM subsystem header at the MTC level of the MAP display.

Meaning

One ringing generator unit is in the in-service trouble (ISTb) state. The other ringing generator is system-busy (SysB).

Result

This alarm affects subscriber service. The system does not provide ringing to the subscribers.

Common procedures

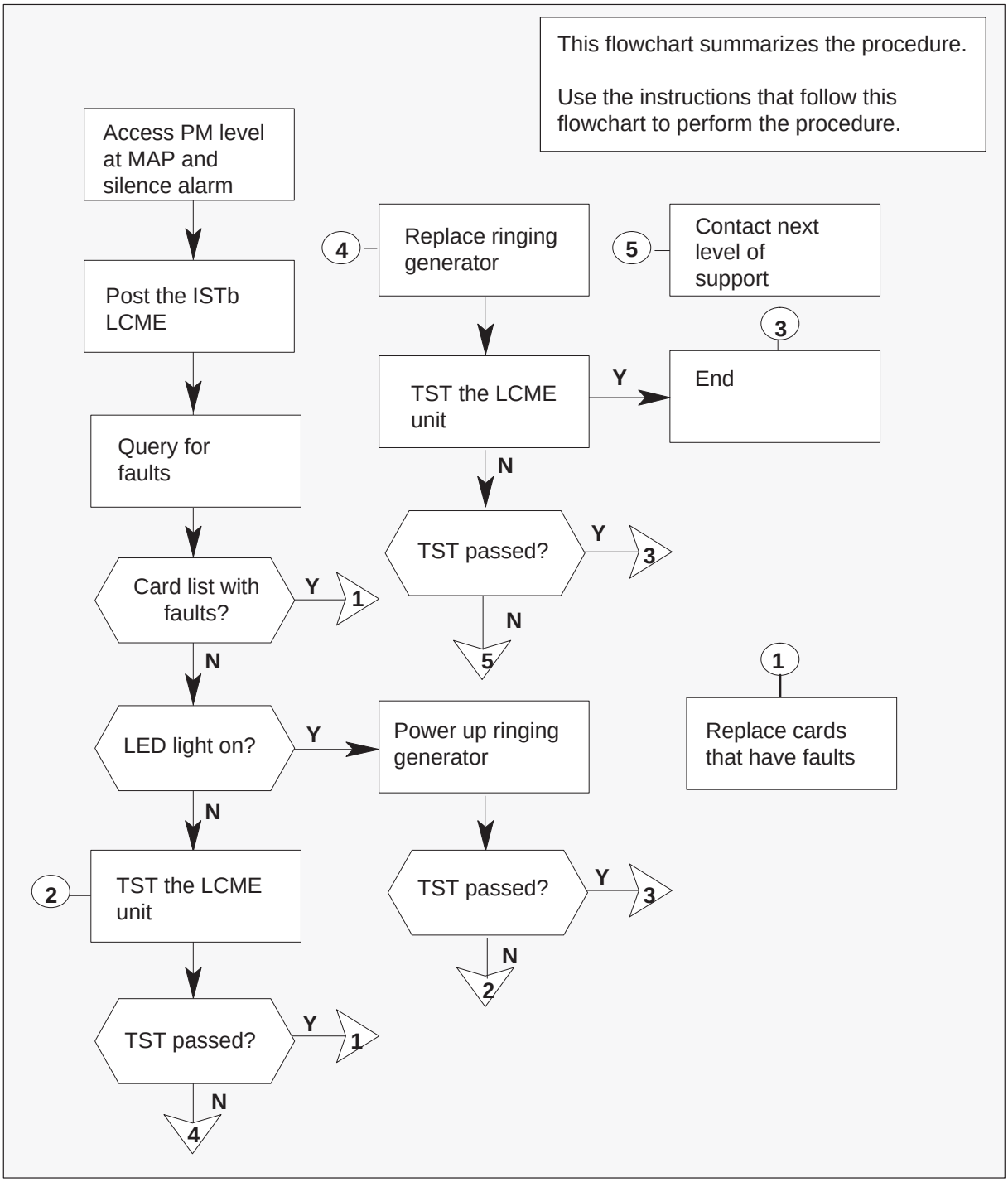
There are no common procedures.

Action

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

PM LCME(RG)
Major (continued)

Summary of clearing a PM LCME(RG) major alarm



PM LCME(RG)
Major (continued)

Clearing a PM LCME(RG) major alarm

At the MAP terminal

1

ATTENTION

Enter this procedure from a PM system-level alarm clearing procedure step that identified an LCME-associated fault.

To silence the alarm, type

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

2 To identify the LCME that has faults, type

>DISP STATE ISTB LCME
and press the Enter key.

Standard response on the MAP display:

```
ISTB  LCME : 1
```

3 To post the ISTb LCME identified in step 2, type

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME equipment frame
lcme_no	is the number of the LCME that has faults

Sample response on the MAP display:

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

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

PM LCME(RG)
Major (continued)

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Sample response on the MAP display:

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

LCME               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit     PM        1        0        2        0        1        12
 2 Post_    LCME      1        0        2        0        1         9
 3 ListSet
 4 SwRG     LCME   RSCS 14 1 ISTb  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   ISTb                /RG: 1
 6 Tst_     Unit1:   SysB                /RG: 1
 7 Bsy_                                11  11  11  11  11  RG:Pref 1 ISTb
 8 RTS_  Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 ISTb
 9 OffL           ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_  QUERYPM FLT
11 Disp_    Node inservice troubles exist:
12 Next         One or both Units inservice trouble
13          LCME   UNIT 0  Inservice Troubles Exist:
14 QueryPM  Ringing Generator Failure :Ring Generator in Excess load
15          LCME   UNIT 1  Inservice Troubles Exist:
16          Ring Generator in Excess load
17
18
```

If the system	Do
indicates a card that has faults	step 10
does not indicate a card that has faults	step 5

At the LCME

5 Make a visual inspection of the ringing generator. Check the LED.

If the LED	Do
is ON	step 6
is OFF	step 7

6 To power up the ringing generator, move the power switch to the ON position. The LED goes off. These switches are identified as RG 0 and RG 1.

If	Do
turning ON the RG restores power	step 15
turning ON the RG does not restore power	step 7

At the MAP terminal

7 To manually busy the LCME unit that is ISTb, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit posted in step 3

8 To test the ManB LCME, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit manually busied in step 7

Sample response on the MAP display:

```
LCME      RSCS0     14   1         Unit 1    OSVCE Test Initiated
LCME      RSCS0     14   1         Unit 1    Tst Failed: (Reason for
failure)
                      or
LCME      RSCS0     14   1    Unit 1    OSVCE Test Initiated
LCME      RSCS0     14   1    Unit 1    Tst passed
```

If TST	Do
passes	step 9
fails	step 10

PM LCME(RG)
Major (continued)

9 To return the ManB LCME to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME tested in step 8

If RTS	Do
passes	step 15
fails	step 14

10 Check the card list. The card list results from step 8.

Sample response on the MAP display:

```
SITE      FLR  RPOS BAY_ID         SHF  DESCRIPTION         SLOT   EQPEC
RSCS0      01  A00  LCME   00      32   LCME  :000          : 20    BX35
RSCS0      01  A00  LCME   00      32   LCME  :000          : 21    BX34
```

If you	Do
replaced all the cards on the list	step 11
did not replace all the cards on the list	step 13

11 Determine if the NT6X30 circuit card was replaced.

If you	Do
replaced the NT6X30 circuit card	step 14
did not replace the NT6X30 circuit card	step 12

12 Go to the card replacement procedure for the NT6X30 circuit card in *Card Replacement Procedures*. Complete procedure. Go to step 8 of this procedure.

13 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete procedure. Go to step 8 of this procedure.

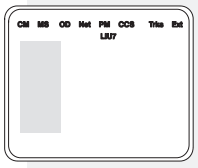
PM LCME(RG)
Major (end)

14 For additional help to clear this alarm, contact the next level of support.

15 The procedure is complete. If other alarms are displayed, reference the correct alarm clearing procedures for the indicated alarms.

PM LCME minor

Alarm display



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	APPL
.	.	.	.	**1LCME**	.	.	.	.	.

Indication

The alarm code 1LCME under the PM subsystem header at the MTC level of the MAP display indicates an enhanced-line concentrating module (LCME) minor alarm.

Meaning

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

Result

This ISTb state does not affect subscriber service. You do not have local backup if the other LCME units fail.

Common procedures

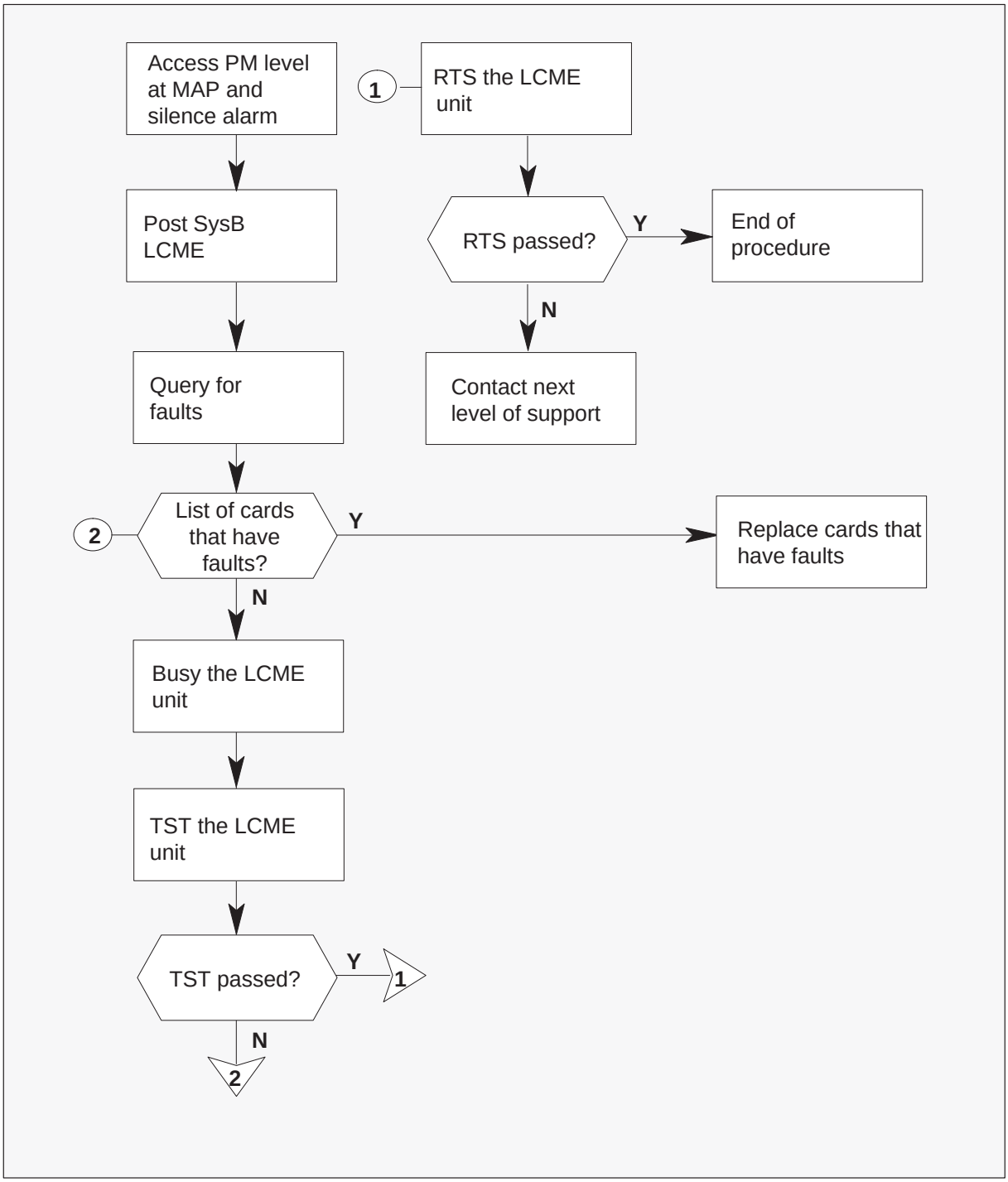
There are no common procedures.

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 LCME
minor (continued)

Summary of clearing a PM LCME minor alarm



PM LCME
minor (continued)

Clearing a PM LCME minor alarm

At the MAP terminal

1

ATTENTION

Enter this procedure from a PM system-level alarm clearing procedure step that identified an LCME-associated fault.

To silence the alarm, type

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

2 To identify the LCME that has faults, type

>DISP STATE ISTB LCME
and press the Enter key.

Sample response on the MAP display:

```
ISTb  LCME : 2
```

3 To post the ISTb LCME identified in step 2, type

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME equipment frame
lcme_no	is the number of the LCME that has faults

Sample response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS     Lns     Trks     Ext  APPL
 .       .        .        .     1LCME      .       .        .         .


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

PM LCME
minor (continued)

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Sample response on the MAP display:

```
 CM     MS     IOD     Net    PM    CCS    Lns    Trks    Ext   APPL
 .      .       .       .    1LCME    .      .      .       .     .


LCME               SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM        1        0        2        0        2       12
 2 Post_    LCME      0        0        2        0        2        9
 3 ListSet
 4 SwRG     LCME   RSCS 14 1 ISTb  Links_OOS:  CSide  1   PSide   0
 5 Trnsl_   Unit0:   InSv  Takeover       /RG: 1
 6 Tst_     Unit1:   ISTb                 /RG: 1
 7 Bsy_                                 11  11  11    RG:Pref 1 InSv
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45       Stby 0 InSv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_  QUERYPM FLT
11 Disp_    Node inservice troubles exist:
12 Next         One or both Units inservice trouble
13          LCME   UNIT 0  Inservice No Troubles Exist:
14 QueryPM  LCME   UNIT 1  Inservice Troubles Exist:
15
16
17
18
```

If the system	Do
indicates a card that has faults	step 17
does not indicate a card that has faults	step 5

5 To manually busy the LCME posted in step 3, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the ISTb LCME unit

6 To test the ManB LCME, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit manually busied in step 5

Sample response on the MAP display:

```
Test Passed
    or
Test Failed
```

If TST	Do
passed	step 16
failed	step 17
was not able to test CBsy	step 7

7 To identify C-side links in a SysB condition, type

>TRNSL C
and press the Enter key.

Sample response on the MAP display:

```
LINK 0    RCO2 2 ;CAP MS;STATUS:   OK,;MSGCOND:OPN
LINK 1    RCO2 2  CAP S; STATUS:   SysB
LINK 2    RCO2 2  CAP S; STATUS:   OK
LINK 3    RCO2 2  CAP S; STATUS:   OK
LINK 4    RCO2 2 ;CAP MS;STATUS:   OK,;MSCOND:OPN,
```

If links	Do
are SysB	step 8
are open	step 21

PM LCME
minor (continued)

8 To post the RCO2 unit associated with the LCME, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the RCO2 unit identified in step 7

Sample response on the MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns    Trks    Ext  APPL
 .      .       .       .    1LCME     .       .       .       .    .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        4        12
 2 Post_   RCO2      0        0        0        0        2         9
 3 ListSet
 4         RCO2   2 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17
18
```

9 To identify the P-side links that have faults and to choose a link that has faults, type

>TRNSL P
and press the Enter key.

Sample response on the MAP display:

```
LINK 23:LCME   1    0;CAP MS;STATUS:    OK;MSGCOND:OPN
LINK 24:LCME   1    1;CAP  S;STATUS:    SysB
LINK 25:LCME   1    2;CAP  S;STATUS:    OK
LINK 26:LCME   1    3;CAP  S;STATUS:    OK
LINK 27:LCME   2    0;CAP MS;STATUS:    OK;MSGCOND:OPN
LINK 28:LCME   2    1;CAP  S;STATUS:    OK
LINK 29:LCME   2    2;CAP  S;STATUS:    OK
```

10 To busy the link that has faults, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the P-side link manually busied in step 9

11 To test the ManB link, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link manually busied in step 10

If TST	Do
passed	step 16
failed	step 12

12 To determine the next step, read the following table.

If the system	Do
indicates a card that has faults	step 17
does not indicate a card that has faults	step 13

PM LCME
minor (continued)

13 To return the ManB 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 11

If RTS	Do
passed	step 22
failed	step 21

Note: The system can identify other links that have faults. Perform the procedures in steps 10 through 13 for each link until the system busies, tests, and returns to service all links.

14 To post the LCME identified in step 2, type

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name is the site name for the LCME that has faults
lcme_frame_no is the number of the associated LCME
lcme_no is the number of the LCME that has faults

15 To test the LCME unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit posted in step 14

If TST	Do
passed	step 16
failed	step 17

16 To return the LCME unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit tested in step 15

If RTS	Do
passed	step 22
failed	step 21

17 Check the card listing in the MAP display.

Sample response on the MAP display:

```
SITE      FLR  RPOS BAY_ID    SHF       DESCRIPTION    SLOT      EQPEC
RSCS0      01   A00 LCME   00  32       LCME  :000      : 19      BX35
RSCS0      01   A00 LCME   00  32       LCME  :000      : 20      BX35
RSCS0      01   A00 LCME   00  32       LCME  :000      : 21      BX34
```

If you	Do
replaced all the cards on the list	step 18
did not replace all the cards on the list	step 20

18 The trouble can be the NTMX74 DS30A interface card in the RCO2 connected to the links that have faults listed in step 9.

If you	Do
replaced the NTMX74 card	step 21
did not replace the NTMX74 card	step 19

Note: If the system indicates the NTMX74 card, check to see if one link or several links have faults. Repeat the alarm clearing procedure as required.

PM LCME
minor (end)

19 Each interface (I/F) chip on the NTMX74 card serves 4 DS30A links. The following chart shows the Link to chip relationship. You must separate message (MS) links by a minimum of four when you enter data for table LCMINV.

Chip number	DS30A Links
1	22, 23, 24, 25
2	26, 27, 28, 29
3	30, 31, 32, 33
4	34, 35, 36, 37
5	38, 39, 40, 41
6	42, 43, 44, 45
7	46, 47, 48, 49
8	50, 51, 52, 53

Go to the card replacement procedure for the NTMX74 circuit card in *Card Replacement Procedures*. Complete the card replacement procedures. Go to step 11 of this procedure.

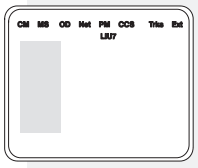
20 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 15 of this procedure.

21 For additional help, contact the next level of support.

22 The procedure is complete. If the system does not display other alarms, reference the correct alarm clearing procedures for the indicated alarms.

PM LCME(RG) minor

Alarm display



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	EIO
.	.	.	.	**1LCME**	.	.	.	.	.

Indication

The alarm code 1LCME under the PM subsystem header indicates a minor alarm that involves an LCME ringing generator. This alarm code is at the MTC level of the MAP display.

Meaning

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

Result

This ISTb state does not affect service. The system automatically switches to a backup ringing generator (SwRG). If the backup ringing generator fails, the system does not produce ringing.

Common procedures

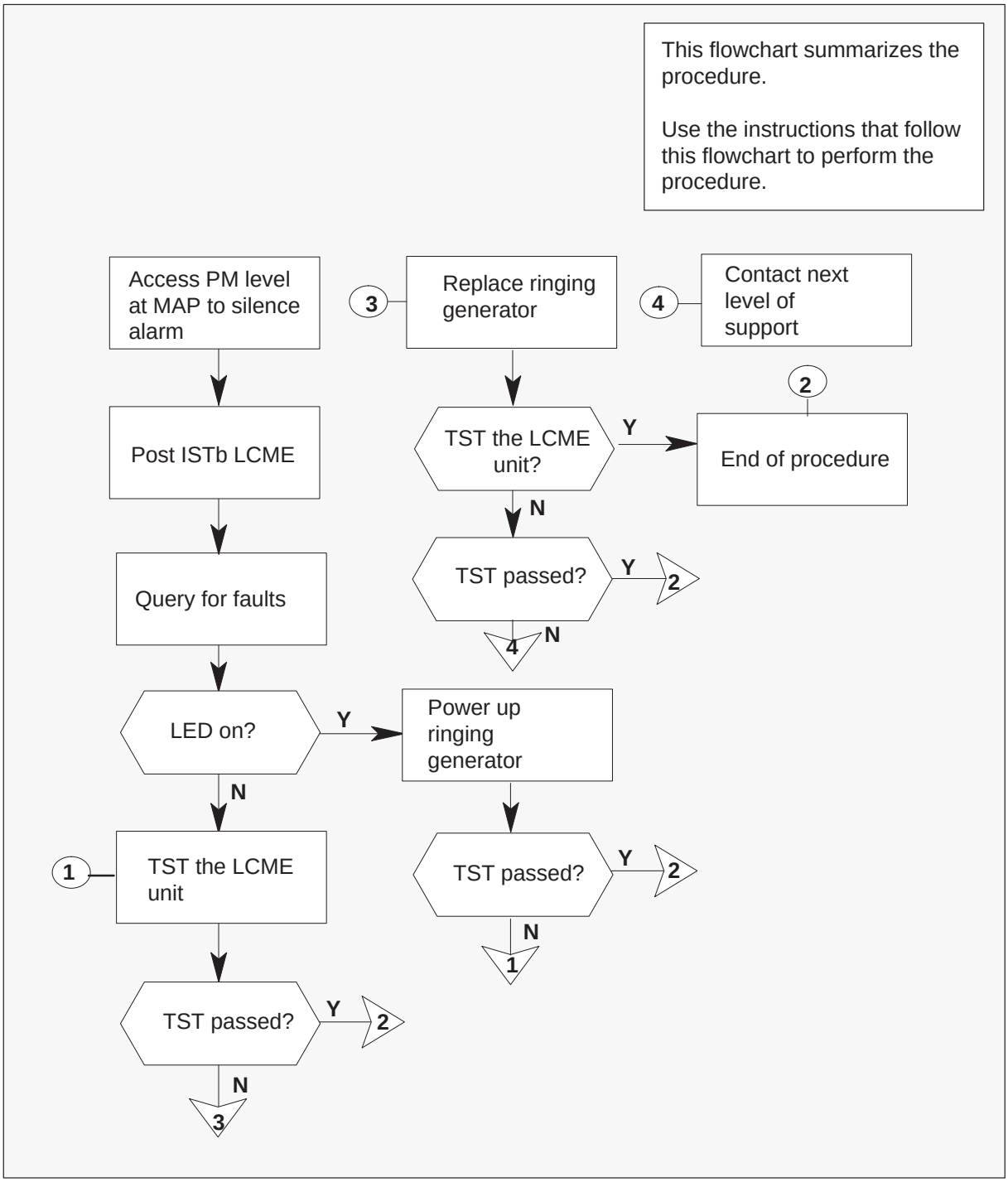
There are no common procedures.

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 LCME(RG)
minor (continued)

Summary of clearing a PM LCME(RG) minor alarm



PM LCME(RG) minor (continued)

Clearing a PM LCME(RG) minor alarm

At the MAP display

1

ATTENTION

Enter this procedure from a PM system-level alarm clearing procedure step that identified an LCME-associated fault.

To silence the alarm that, type

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

2 To identify the LCME that has faults, type

>DISP STATE ISTB LCME
and press the Enter key.

Sample response on the MAP display:

```
ISTb     LCME     :  2
```

PM LCME(RG)
minor (continued)

3 To post the ISTb LCME identified in step 2, type

>POST LCME lcme_site_name lcme_frame_no lcme_no
and press the Enter key.

where

lcme_site_name	is the site name for the LCME that has faults
lcme_frame_no	is the number of the associated LCME equipment frame
lcme_no	is the number of the LCME that has faults

Sample response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
  .       .        .        .    1LCME      .        .        .         .


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

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Sample response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
 .       .        .        .     1LCME    .        .        .         .


LCME                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit      PM        1         0         2         0         1         12
 2 Post_     LCME      0         0         2         0         1          9
 3 ListSet
 4 SwRG      LCME   RSCS   14 1 ISTb  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_    Unit0:   InSv   Takeover       /RG: 1
 6 Tst_      Unit1:   ISTb                 /RG: 1
 7 Bsy_                                 11  11  11  11  11  RG:Pref 1 InSv
 8 RTS_  Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 ISTb
 9 OffL          ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_  QUERYPM FLT
11 Disp_    Node in-service troubles exist:
12 Next         One or both Units in-service trouble
13          LCME   UNIT 0  In-service Troubles Exist:
14 QueryPM  Ringing Generator Failure :Ring Generator in Excess load
15          LCME   UNIT 1  In-service Troubles Exist:
16          Ring Generator in Excess load
17
18
```

If the system	Do
indicates a card that has faults	step 10
does not indicate a card that has faults	step 5

At the LCME

5 Make a visual inspection of the ringing generator. Check to see if the LED is on.

If LED	Do
is ON	step 6
is OFF	step 7

PM LCME(RG)
minor (continued)

6 To power up the ringing generator (RG), move the power switch to the ON position. The LED goes OFF. The switches are identified as RG 0 and RG 1.

If	Do
switching ON the RG restores power	step 15
switching ON the RG does not restore power	step 14

At the MAP display

7 To manually busy the LCME unit that is ISTb, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit posted in step 3

8 To test the ManB LCME, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME unit manually busied in step 7

Sample response on the MAP display:

```
LCME      RSCS0     14   1         Unit 1    InSvce Test Initiated
LCME      RSCS0     14   1         Unit 1    Tst Failed: (Reason for
failure)
                      or
LCME      RSCS0     14   1         Unit 1    InSvce Test Initiated
LCME      RSCS0     14   1         Unit 1    Tst passed
```

If TST	Do
passed	step 9
failed	step 10

9 To return the ManB LCME to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the LCME tested in step 8

If RTS	Do
passed	step 15
failed	step 14

10 Check the card listing in the MAP display.

Sample response on the MAP display:

```
 SITE     FLR  RPOS BAY_ID      SHF     DESCRIPTION      SLOT    EQPEC
RSCS0      01   A00 LCME   00   32      LCME  :000       : 21     BX34
RSCS0      01   A00 LCME   00   32      LCME  :000       : 19     BX35
RSCS0      01   A00 LCME   00   32      LCME  :000       : 20     BX35
```

If you	Do
replaced all cards on the list	step 11
did not replace all cards on the list	step 13

11 Determine if card replacement occurred for the NT6X30 circuit card.

If you	Do
replaced the NT6X30 card	step 14
did not replace the NT6X30 card	step 12

12 Go to the card replacement procedure for the NT6X30 circuit card in *Card Replacement Procedures*. Complete the card replacement procedures. Go to step 8 of this procedure.

13 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 8 of this procedure.

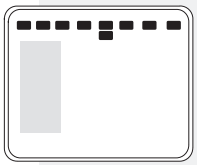
PM LCME(RG)
minor (end)

14 For additional help to clear this alarm, contact the next level of support.

15 The procedure is complete. If the system displays other alarms, reference the correct alarm clearing procedures for the indicated alarms.

PM RCO2 critical

Alarm display



CM	MS	IOD	Net	**PM**	Lns	Trks	Ext	APPL
.	.	.	.	**nRCO2**	.	.	.	.
				C				

Indication

The nRCO2 *C* under the PM subsystem header at the MTC level of the MAP indicates a RCO2 critical alarm.

Meaning

Both RCO2 units are in the system-busy (SysB) or in the C-side busy (CBsy) state.

Result

Call processing ceases. The RCO2 can be in emergency stand-alone (ESA).

Common procedures

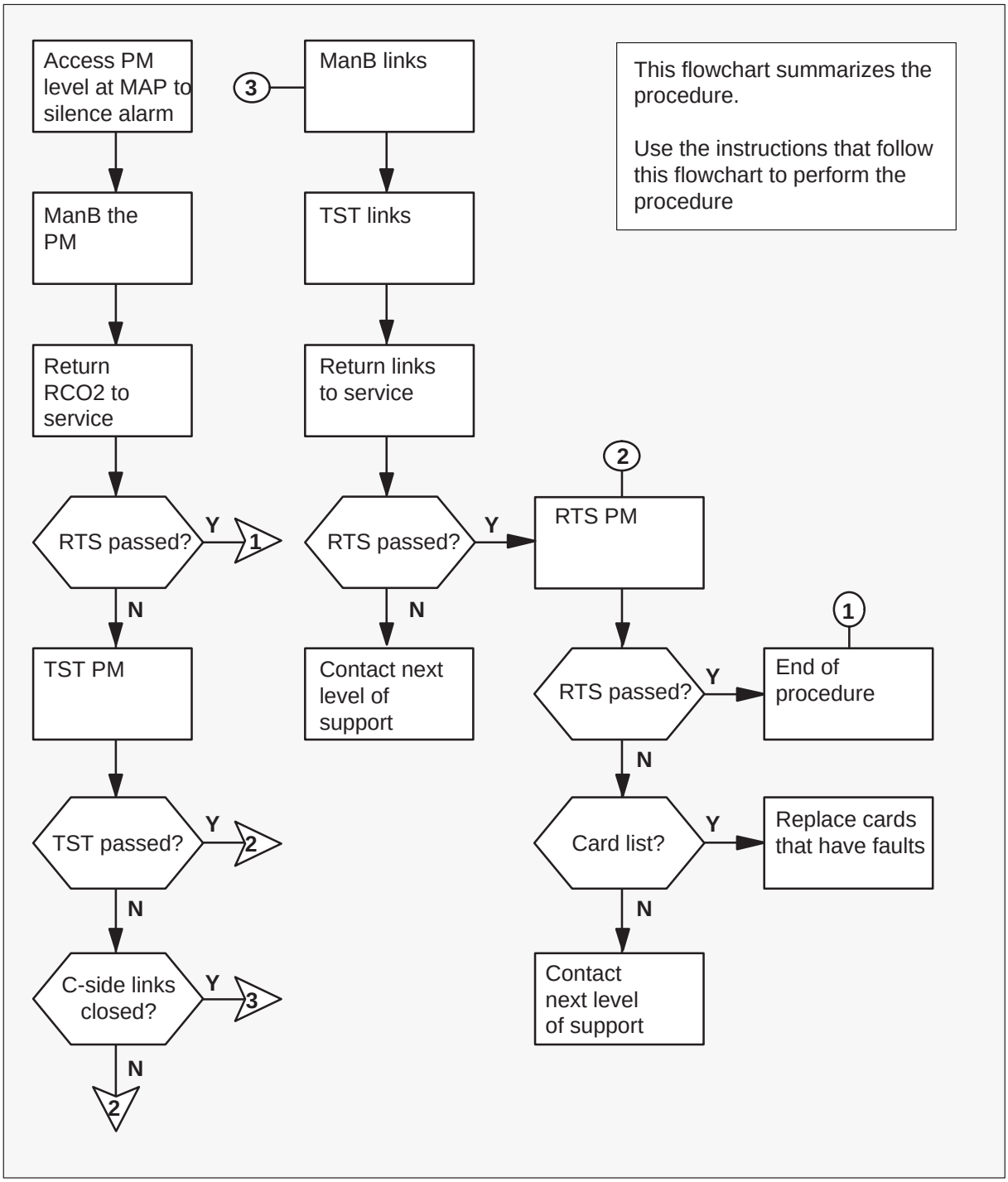
There are no common procedures.

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 RCO2
critical (continued)

Summary of a PM RCO2 critical alarm



PM RCO2 critical (continued)

Clearing a PM RCO2 critical alarm

At the MAP display

1

ATTENTION

Enter this procedure from the PM system-level alarm clearing procedure step that identified an RCO2-associated fault.

To silence the alarm type

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

2 To identify the RCO2 that has faults type

>PM;DISP STATE CBSY RCO2
and press the Enter key.

Example of a MAP response:

```
CBsy  RCO2: 2
   or
None
```

if None appears on the MAP screen, display the SysB RCO2. Type

>DISP STATE SYSB RCO2
and press the Enter key.

Example of a MAP response:

```
SysB  RCO2: 2
```

3 To post the CBsy or SysB RCO2, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 displayed in step 2

Example of a MAP response:

```
RCO2          SysB    ManB    Offl    CBsy    ISTb    InSv
     PM          3       0       1       1       4      12
     RCO2        0       0       2       1       2       9
```

PM RCO2
critical (continued)

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Example of a MAP display:

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

RCC                SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit     PM        1        0        1        2        4        12
 2 Post_    RCO2      1        0        2        2        2         9
 3 ListSet
 4          RCO2    0 CBsy  Links_OOS:  CSide  1, PSide   0
 5 TRNSL_   Unit0:   Act   CBsy
 6 Tst_     Unit1:   Inact CBsy
 7 Bsy_     QUERYPM FLT
 8 RTS_           Unit0  Static data not updated
 9 OffL           Unit1  Reset
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

5

WARNING
The RCO2 can be in ESA
A CBsy indicator can change to a SysB indicator if the RCO2 is in emergency stand-alone (ESA) mode. The system generates PM180 and PM181 logs to indicate ESA. The system only supports local calls.

Use the following information to determine the next step.

If the RCO2 is	Do
SysB	step 6
CBsy	step 15

PM RCO2
critical (continued)

6 Check for PM180 and PM181 logs. The logs indicate the RCO2 is in emergency stand-alone (ESA). Perform this check according to local operating company policy and according to the type of device that generates log reports.

If log reports	Do
are available	step 10
are not available	step 7

7 To activate the LOGUTIL database, type

>QUIT ALL;LOGUTIL PM
and press the Enter key.

8 To display PM180 and PM181 log reports, type

>WHILE (BACK)(SLEEP 2)
and press the Enter key.

9 The MAP display scrolls PM181 and PM180 log reports and other types of log reports. Check these reports for reasons for the critical alarm in the RCO2. When the MAP display stops scrolling and you have the necessary information, return to the CI command level. To return to the CI command level, type:

>QUIT
and press the Enter key.

10 To post the RCO2 again, type

>MAPCI;MTC;PM;POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 displayed in step 2

If the PM logs	Do
indicate ESA	step 35
do not indicate ESA	step 11

11 To manually busy the RCO2, type

>BSY PM
and press the Enter key.

PM RCO2
critical (continued)

12 To restore PM service, type

>RTS PM FORCE
and press the Enter key.

Example of a MAP response:

```
UNIT unit_no in ESA MODE.
THIS ACTION WILL CAUSE ESA EXIT AND ABORT n CALLS
PLEASE CONFIRM (“YES” OR “NO”)
```

where

unit_no	is the number of the RCO2 identified in step 2
n	is the number of calls now in progress

13 To confirm the command in step 12, type

>YES
and press the Enter key.

If RTS PM FORCE	Do
passes for both units	step 37
fails for both units	step 14
fails for one unit	Refer to the alarm clearing procedures for an RCO2 ISTb major alarm.

14 To perform an in-service test on the ManB RCO2, type

>TST PM
and press the Enter key.

Example of a MAP response:

```
Test Passed
    or
Test Failed
```

If TST	Do
passes	step 12
fails because C-side links are closed	step 15
fails and the system generates a card list	step 31

15 To identify C-side links to the host PM that are CBsy, type

>TRNSL C
and press the Enter key.

Note: A host PM is a PCM-30 line group controller (PLGC).

Example of a MAP response:

```
LINK 0: PLGC    1 0;CAP MS;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 1: PLGC    1 1;CAP  S;STATUS:  OK
LINK 2: PLGC    1 2;CAP MS;STATUS: OK,;MSGCOND:OPN,Unrestricted
LINK 4: PLGC    1 4;CAP  S;STATUS:  CBsy
LINK 5: PLGC    1 4;CAP  S;STATUS:  OK
LINK 6: PLGC    1 4;CAP  S;STATUS:  OK
LINK 7 :PLGC    1 4;CAP  S;STATUS:  OK
```

PM RCO2
critical (continued)

16 To post the host PM identified in step 15, type

>POST host_pm host_pm_no
and press the Enter key.

where

host_pm is the PLGC
host_pm_no is the number of the PLGC

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .      .      .   1RCO2    .      .       .      .      .
                            *C*
LTC              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       3        0        1        1        4        12

 2 Post_   PLGC     0        0        2        1        2         9
 3 ListSet
 4         PLGC    1 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17 Perform
18
```

17 To identify the P-side links that have faults and choose a link that has faults, type

>TRNSL P
and press the Enter key.

Example of a MAP response:

```
LINK 0: RCO2    1 0;CAP MS;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 1: RCO2    1 1;CAP  S;STATUS:  OK
LINK 2: RCO2    1 2;CAP MS;STATUS:  OK,;MSGCOND:OPN,Unrestricted
LINK 4: RCO2    1 4;CAP  S;STATUS:  ISTb
LINK 5: RCO2    1 4;CAP  S;STATUS:  OK
LINK 6: RCO2    1 4;CAP  S;STATUS:  OK
LINK 7 :RCO2    1 4;CAP  S;STATUS:  OK
```

18 To busy the link that has faults, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the P-side link indicated in step 17

19 To test the link that has faults, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link manually made busy in step 18

If TST	Do
passes and the alarm clears	step 25
fails	step 20

20 To display any trunks that have faults, type

>TRKS;CARRIER;POST REMOTE
and press the Enter key.

Example of a MAP response:

```
CLASS ML OS ALARM SYSB  MANB UNEQ OFFL CBSY PBSY    INSV
TRUNKS 0 0  0     0     0    0    0    0    0       0
REMOTE 0 0  0     5     1    0    0    1    0       10

NO CLASS SITE RCO2 CKT D ALARM SLIP FRAME BER SES STATE
0  TRUNKS BRSC 0     2 C       0     0  <-.7   0  INSV
1  REMOTE BRSC 0    12 C       0     0  <-.7   0  INSV
2  REMOTE BRSC 0    13 C       0     0  <-.7   0  MANB

                                                MORE...
```

Note: The `MORE ...` at the bottom of the display indicates you can observe more links. To observe more links, type

>NEXT
and press the Enter key.

PM RCO2
critical (continued)

21 Perform the procedure to repair or correct the trunk that has faults indicated by the MAP display in step 20.

Note: If the MAP display indicates message links that have faults, ManB these links before you return to service (RTS) the links.

22 To test the ManB link, type

>TST link_no
and press the Enter key.

where

link_no is the number of the ManB link. The NO column in the MAP display in step 20 lists this link number. The number for the ManB link in the example is 2.

If TST	Do
passes and the alarm clears	step 23
fails	step 36
fails and the system generates a card list	step 31

23 To post the host PM, type

>PM;POST host_pm host_pm_no
and press the Enter key.

where

host_pm is the host PM PLGC posted in step 16
host_pm_no is the number of the host PM PLGC

24 To check the status of the P-side links, type

>TRNSL P
and press the Enter key.

Example of a MAP response:

```
LINK 0: RCO2    1 0;CAP MS;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 1: RCO2    1 1;CAP  S;STATUS:  OK
LINK 2: RCO2    1 2;CAP MS;STATUS:  OK,;MSGCOND:OPN,Unrestricted
LINK 4: RCO2    1 4;CAP  S;STATUS:  OK
LINK 5: RCO2    1 4;CAP  S;STATUS:  OK
LINK 6: RCO2    1 4;CAP  S;STATUS:  OK
LINK 7 :RCO2    1 4;CAP  S;STATUS:  OK
```

25 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 identified in step 17

Note: Perform this step for each link that has faults that was made busy.

26 To post the *inactive* RCO2, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 identified in step 2

Note: This RCO2 should be SysB.

27 To return the *inactive* PM unit to service, type

>RTS PM
and press the Enter key.

If RTS for both RCO2 units	Do
passes	step 37
fails	step 28

28 To manually busy the *inactive* RCO2 unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the *inactive* RCO2 unit from step 26

PM RCO2
critical (continued)

29 To perform an out of service (OOS) test on the *inactive* RCO2 unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit manually busied in step 28

If TST	Do
passes	step 30
fails	step 31

30 To return the *inactive* RCO2 unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 tested in step 29

If RTS	Do
passes	step 37
fails	step 36

31 Check the card list on the MAP display.

For RRO2s provisioned with the NTMX77AA Unified Processor (UP), the card list the MAP response displays reflects MX77 in slot 03. For RCO2s provisioned with the NTAX74AA Cellular Access Processor (CAP), the list the MAP response displays reflects AX74 in slot 03.

Example of a MAP response for RCO2s configured with the NTMX77AA Unified Processor:

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSCS0      01        A00 RCE    00  32       RCO2 :  000   :03    MX77
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :08    6X69
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :11    MX73
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :15    MX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :17    MX73
```

Example of a MAP response for RCO2s configured with the optional NTAX74AA Cellular Access Processor:

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSCS0      01        A00 RCE    00  32       RCO2 :  000   :03    AX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :08    6X69
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :11    MX73
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :15    MX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :17    MX73
```

If you	Do
replaced all the cards on the list	step 32
did not replace all the cards on the list	step 34

PM RCO2
critical (end)

32 Check if the NTMX81 circuit card was replaced.

If you	Do
replaced the NTMX81 card	step 36
did not replace the NTMX81 card	step 33

33 Go to the card replacement procedure for the NTMX81 circuit card in *Card Replacement Procedures*. When you finish the card replacement procedures, go to step 23 of this procedure.

34 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. When you finish the card replacement procedures, go to step 29 of this procedure.

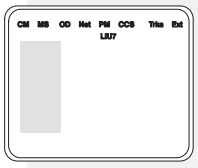
35 Go to *Recovery Procedures* for instructions on recovering the RCO2. When you finish the recovery procedure, return to step 4 and complete the alarm clearing procedure.

36 For additional help, contact the next level of support.

37 This procedure is complete. If the system displays other alarms , see the correct alarm clearing procedures for the indicated alarms.

PM RCO2 Major

Alarm display



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	EIO
.	.	.	.	**1RCO2 M**	.	.	.	.	.

Indication

The alarm code 1RCO2 M under the PM subsystem header at the MTC level of the MAP display indicates an RCO2 major alarm.

Meaning

The indicated number of RCO2 units are in the system-busy (SysB) or C-side busy (CBsy) state.

Result

This condition does not affect subscriber service. If both RCO2 units fail, subscriber service ends.

Common procedures

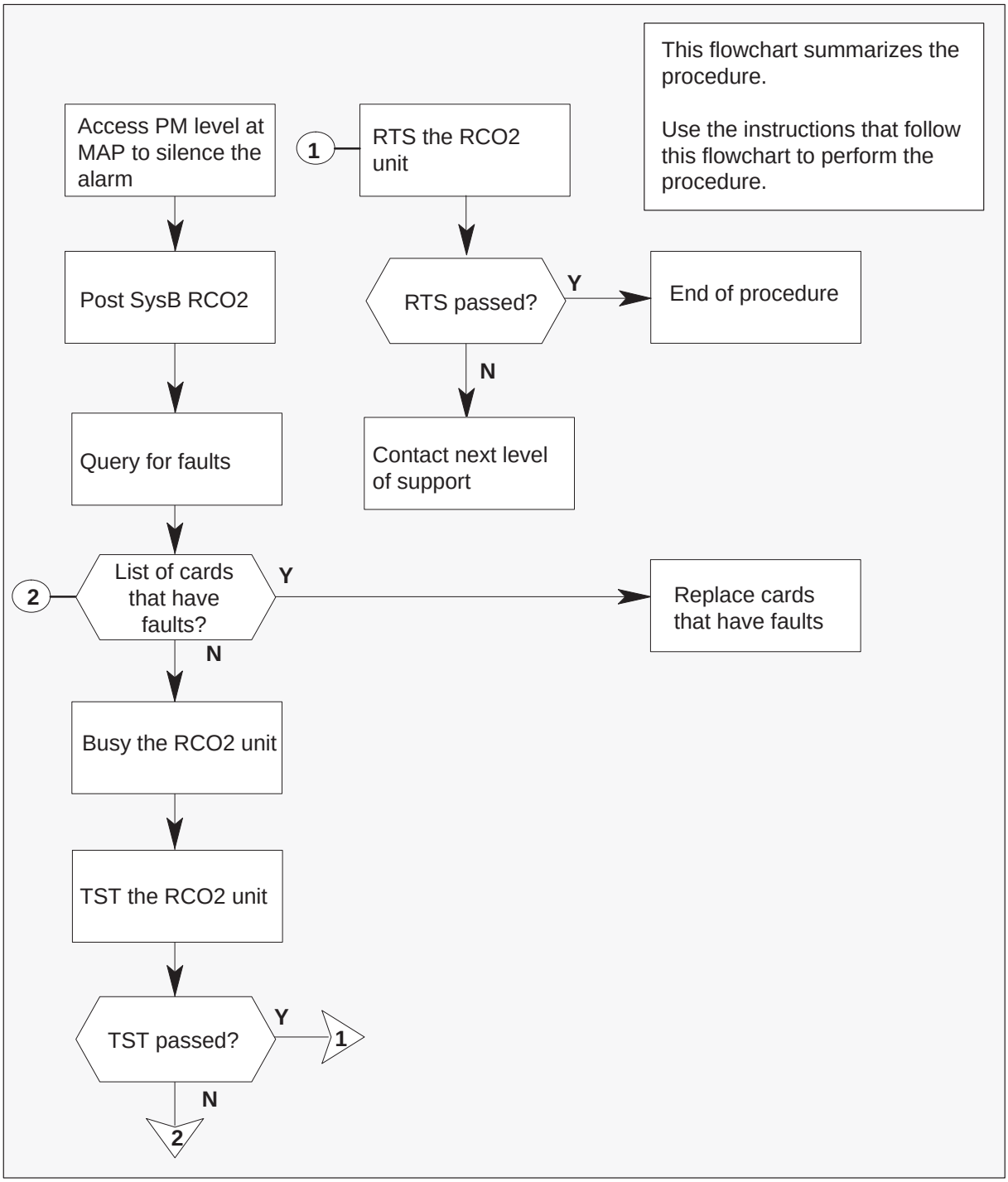
There are no common procedures.

Action

This section provides a summary flowchart of the procedure to clear an alarm. A detailed step-action procedure follows the flowchart.

PM RCO2
Major (continued)

Summary of clearing a PM RCO2 major alarm



PM RCO2
Major (continued)

Clearing a PM RCO2 major alarm

At the MAP display

1

ATTENTION

Enter this procedure from a PM system-level clearing an alarm procedure step. This PM system-level clearing an alarm procedure step identifies an RCO2-associated fault.

To silence the alarm, if required, type

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

2 To identify the RCO2 that has faults, type

>DISP STATE SYSB RCO2
and press the Enter key.

Sample response on the MAP display:

```
SysB  RCO2 : 2
```

3 To post the SysB RCO2, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 displayed in step 2

Sample response on the MAP display:

```
RCO2  2     SysB    ManB    Offl    CBsy    ISTb    InSv
        PM     3       0       1       0       4      12
        RCO2   1       0       2       0       2       9
```

PM RCO2
Major (continued)

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

Sample response on the MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks      Ext
 .      .       .       .    1RCO2   .       .       .         .
                              M
RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        1        0        1        0        0        12
 2 Post_   RCO2      1        0        2        0        0         9
 3 ListSet
 4         RCO2  2  ISTb   Links_OOS: CSide  0, PSide   0
 5 TRNSL_  Unit0:   Act    InSv
 6 Tst_    Unit1:   Inact  SysB
 7 Bsy_    QUERYPM FLT
 8 RTS_         Unit0  Static data not updated
 9 OffL         Unit1  Reset
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

If the system indicates	Do
cards that have faults	step 25
no cards have faults	step 5

5 To manual busy the SysB RCO2 unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the SysB RCO2 indicated in step 4

6 To test the ManB RCO2, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit manually busied in step 5

Sample response on the MAP display:

```
Test Passes
    or
Test Fails
```

If TST	Do
passes	step 24
fails, and the system produces a card list	step 25
fails, and a card list is not produced	step 7

7 To identify C-side links to the host PM that are in a SysB condition, type

>TRNSL C
and press the Enter key.

Note: A host PM is a PCM-30 line group controller (PLGC).

Sample response on the MAP display:

```
LINK 0:   PLGC      1 0;CAP MS;STATUS:  OK,;MSGCOND:OPN,Restricted
LINK 1:   PLGC      1 1;CAP  S;STATUS:  OK
LINK 2:   PLGC      1 2;CAP MS;STATUS:  SysB,;MSGCOND:CLS,Unrestricted
LINK 4:   PLGC      1 4;CAP  S;STATUS:  ISTb
LINK 5:   PLGC      1 4;CAP  S;STATUS:  OK
LINK 6:   PLGC      1 4;CAP  S;STATUS:  OK
LINK 7:   PLGC      1 4;CAP  S;STATUS:  OK
```

If link	Do
is not busy	step 29
is a message link or a speech link	step 8

PM RCO2
Major (continued)

8 To post the host PM, type

>POST host_pm host_pm_no
and press the Enter key.

where

host_pm is a PLGC
host_pm_no is the number of the PLGC

Sample response on the MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext
 .      .       .       .    1RCO2     .       .       .        .
                               M
PLGC              SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit    PM        1        0        1        0        1       12
 2 Post_   PLGC      0        0        2        0        1        9
 3 ListSet
 4         PLGC   1 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17 Perform
18
```

9 To identify the P-side links that have faults, type

>TRNSL P
and press the Enter key.

Sample response on the MAP display:

```
 LINK 0:   RCO2  2   0;CAP MS;STATUS:OK,;MSGCOND:OPN,Restricted
 LINK 1:   RCO2  2   1;CAP  S;STATUS:OK
 LINK 2:   RCO2  2   2;CAP MS;STATUS:SysB,;MSGCOND:CLS,Unrestricted
 LINK 4:   RCO2  2   4;CAP  S;STATUS:ISTb
 LINK 5:   RCO2  2   4;CAP  S;STATUS:OK
 LINK 6:   RCO2  2   4;CAP  S;STATUS:OK
 LINK 7:   RCO2  2   4;CAP  S;STATUS:OK
```

10 To busy the link that has faults, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of P-side links that have faults chosen in step 9

11 To test the link that has faults, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link manually busied in step 10

If TST	Do
passes and alarm continues	step 29
passes and alarm clears	step 16
fails	step 12

12 To display any links that have faults, type

>TRKS;CARRIER;POST MANB
and press the Enter key.

Sample response on the MAP display:

```
CLASS ML  OS  ALARM    SYSB   MANB    UNEQ   OFFL CBSY   PBSY    INSV
TRUNKS 0  0    0        0      0       0      0    0      0       0
REMOTE 0  0    0        5      1       0      0    0      0      10

NO  CLASS   SITE    RCC  CKT  D   ALARM   SLIP    FRAME BER SES  STATE
0   TRUNKS  BRSCS    0    0   C              0       0  <-.7  0   INSV
1   REMOTE  BRSCS    0    1   C              0       0  <-.7  0   INSV
2   REMOTE  BRSCS    0    2   C              0       0  <-.7  0   MANB

                                                      MORE . . .
```

Note: The MORE . . . at the bottom of the display indicates the user can see more links. To see these links, type

>NEXT
and press the Enter key.

PM RCO2
Major (continued)

13 To test the ManB link, type

>TST link_no
and press the Enter key.

where

link_no is the number of the ManB link. The NO column that appears in the MAP display in step 12 contains this link number. The number for the ManB link in the example is 2.

If TST	Do
passes and alarms clears	step 15
fails	step 29

14 Perform the corrective procedure on the link indicated on the MAP display in step 12.

Note: The system can indicate message links that have faults. These links must be in the ManB state before the links can return to service (RTS).

15 To post the host PM, type

>PM;POST host_pm host_pm_no
and press the Enter key.

where

host_pm is the PLGC posted in step 8
host_pm_no is the number of the PLGC

16 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 identified in step 9

If RTS	Do
passes	step 17
fails	step 29

17 To post the RCO2, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 identified in step 2

Note: This RCO2 must be SysB.

18 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 RCO2 posted in step 19

If RTS	Do
passes	step 19
fails	step 29

19 To switch activity (SwAct) of the RCO2 units, to make sure the unit being tested is inactive, type

>SWACT
and press the Enter key.

Sample response on the MAP display:

```
RCO2   2    A Warm SwAct will be performed
Please confirm (“YES” or “NO”)
```

If the prompt indicates	Do
the system performs a warm SwAct	step 21
the system performs a cold SwAct	step 20

PM RCO2
Major (continued)

20

CAUTION
Loss of service
All calls that this PM handles end, including data calls. Perform this step during a period of low traffic only.

Refer to the next step to continue this procedure.

21 To confirm the SwAct initiated in step 19, type

>YES
and press the Enter key.

After both units are in-service, use the following information to determine where to go next in this procedure.

If SWACT	Do
passes	step 22
fails	step 29

22 To busy the inactive RCO2 unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the *inactive* RCO2 unit

23 To perform an out-of-service (OOS) test on the *inactive* RCO2 unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit busied in step 22

If TST	Do
passes	step 24
fails	step 25

24 To return the *inactive* RCO2 unit to service, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit tested in step 23

If RTS	Do
passes	step 30
fails	step 29

25 Check the card listing that appears in the following MAP display.

For the RCO2s provisioned with the optional NTAX74AA Cellular Access Processor (CAP) and not the NTMX77AA Unified Processor (UP), the card list the MAP response contains reflects AX74 in slot 03. The card list the MAP response contains reflects AX74 in slot 03 and not MX77. The following examples show this process.

Example of a MAP response for RCO2s configured with the NTMX77AA Unified Processor:

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSCS0      01        A00 RCE    00  32       RCO2 :  000   :03    MX77
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :08    6X69
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :11    MX73
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :15    MX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :17    MX73
```

Example of a MAP response for RCO2s configured with the optional NTAX74AA Cellular Access Processor:

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSCS0      01        A00 RCE    00  32       RCO2 :  000   :03    AX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :08    6X69
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :11    MX73
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :15    MX74
RSCS0      01        A00 RCE    00  32       RCO2 :  000    :17    MX73
```

If all cards on the list	Do
are replaced	step 26
are not replaced	step 28

PM RCO2
Major (end)

26 Determine if the user replaced the NTMX81 circuit card.

If the NTMX81 card	Do
is replaced	step 29
is not replaced	step 27

27 Refer to the card replacement procedure for the NTMX81 circuit card in *Card Replacement Procedures*. When you complete the card replacement procedures, go to step 13 of this procedure.

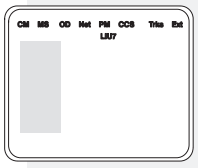
28 Refer to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. When you complete the card replacement procedures, go to step 23 of this procedure.

29 For further assistance on clearing this alarm, contact the next level of support.

30 This procedure is complete. When other alarms appear, refer to the correct clearing an alarm procedure for the indicated alarms.

PM RCO2 minor

Alarm display



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	EIO
.	.	.	.	**1RCO2**	.	.	.	.	.

Indication

At the MTC level of the MAP display, a 1RCO2 under the PM subsystem header indicates an RCO2 minor alarm.

Meaning

The indicated number of RCO2 units are in the in-service trouble (ISTb) state.

Impact

This condition does not affect subscriber service.

Common procedures

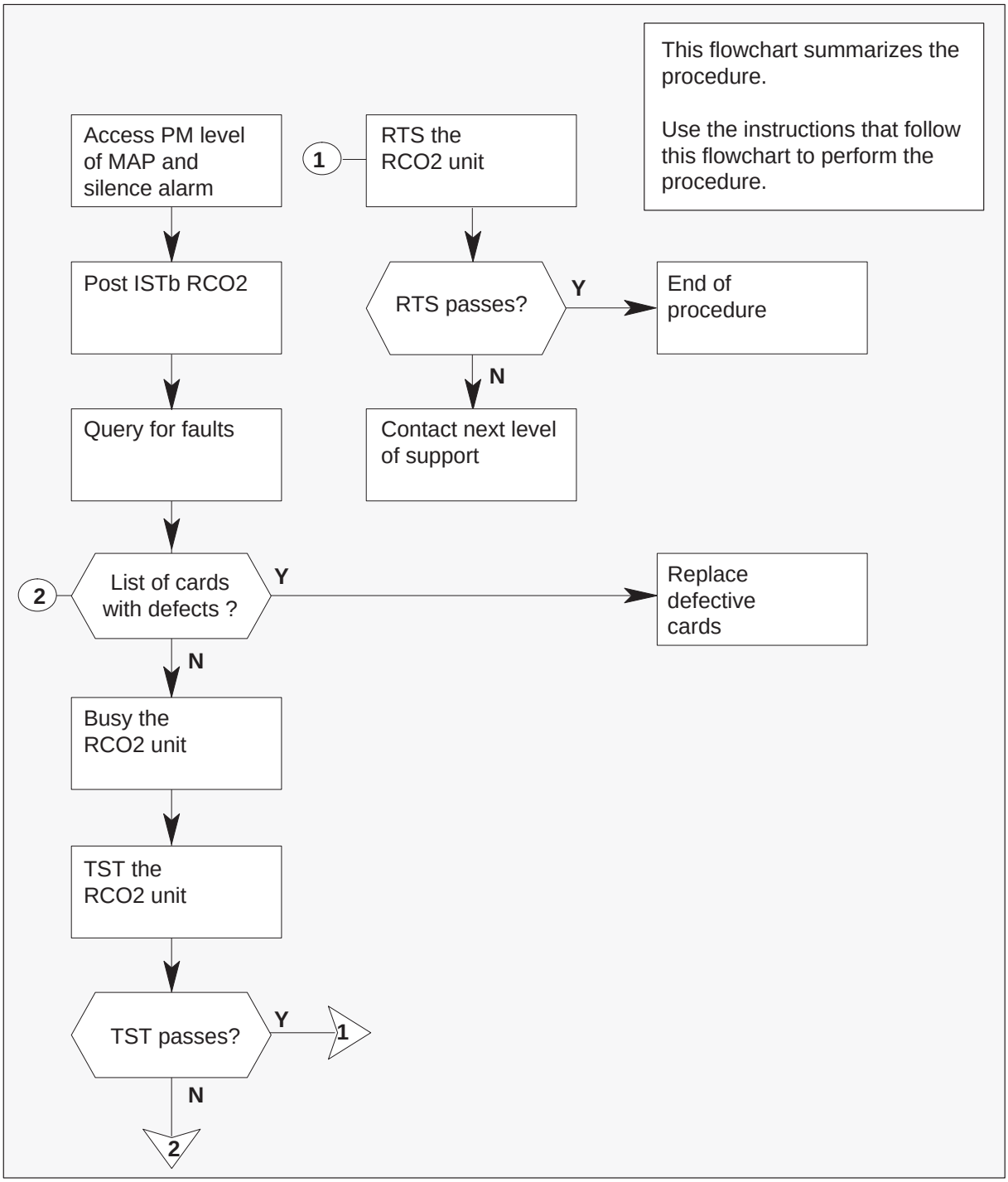
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM RCO2
minor (continued)

Summary of clearing a PM RCO2 minor alarm



PM RCO2
minor (continued)

Clearing a PM RCO2 minor alarm

At the MAP display

1

ATTENTION

Enter this procedure from a peripheral module (PM) system-level alarm clearing procedure step that identified an RCO2-associated fault.

To silence the alarm, if required, type

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

2 To identify the defective RCO2, type

>DISP STATE ISTB RCO2
and press the Enter key.

Typical response on the MAP display:

```
ISTb  RCO2 : 2
```

3 To post the ISTb RCO2, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 in step 2

Typical response on the MAP display:

```
RCO2            SysB      ManB      Offl      CBsy      ISTb      InSv
      PM         0         0         1         0         4        12
      RCO2       0         0         2         0         2         9
```

4 To check for fault indicators, type

>QUERYPM FLT
and press the Enter key.

PM RCO2
minor (continued)

Typical response on the MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks      Ext
 .      .       .       .    1RCO2     .       .       .         .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        1        0        1        12
 2 Post_   RCO2      0        0        2        0        1         9
 3 ListSet
 4         RCO2   2 ISTb  Links_OOS:  CSide  1, PSide   0
 5 TRNSL_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact ISTb
 7 Bsy_    QUERYPM FLT
 8 RTS_         Unit0  InSv
 9 OffL         Unit1  C-side links out of service
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

If the system	Do
indicates a card that has defects	step 26
does not indicate a card that has defects	step 5

5 To manually busy (ManB) the ISTb RCO2 unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the ISTb RCO2 in step 4

6 To test the ManB RCO2, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit manually busied in step 5

Typical response on the MAP display:

```
Test Passed
    or
Test Failed
```

If TST	Do
passes	step 25
fails and the system produces a card list	step 26
fails and the system does not produce a card list	step 7

7 To identify central–side (C-side) links to the host PM that are busied by the system (SysB), type

>TRNSL C
and press the Enter key.

Note: The host PM is a PCM-30 line group controller (PLGC).

Typical response on the MAP display:

```
LINK 0:   PLGC      1    0;CAP MS;STATUS:    OK,;MSGCOND: OPN,Restricted
LINK 1:   PLGC      1    1;CAP  S;STATUS:    OK
LINK 2:   PLGC      1    2;CAP MS;STATUS:    OK,;MSGCOND:OPN,Unrestricted
LINK 4:   PLGC      1    4;CAP  S;STATUS:    SysB
LINK 5:   PLGC      1    4;CAP  S;STATUS:    OK
LINK 6:   PLGC      1    4;CAP  S;STATUS:    OK
LINK 7:   PLGC      1    4;CAP  S;STATUS:    OK
```

PM RCO2
minor (continued)

8 To post the host PM, type

>POST host_pm host_pm_no
and press the Enter key.

where

host_pm is the PLGC
host_pm_no is the number of the PLGC

Typical response on the MAP display:

```
 CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext
 .       .        .        .     1RCO2      .        .        .         .

PLGC                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM        0         0         1         0         4         12
 2 Post_    PLGC      0         0         2         0         2          9
 3 ListSet
 4          PLGC   1 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_   Unit0:   Act InSv
 6 Tst_     Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17 Perform
18
```

9 To identify peripheral–side (P-side) links that have defects, type

>TRNSL P
and press the Enter key.

Typical response on the MAP display:

```
LINK 0:   RCO2      2    0;CAP MS;STATUS:    OK,;MSGCOND: OPN,Restricted
LINK 1:   RCO2      2    1;CAP  S;STATUS:    OK
LINK 2:   RCO2      2    2;CAP MS;STATUS:    OK,;MSGCOND:OPN,Unrestricted
LINK 4:   RCO2      2    4;CAP  S;STATUS:    ISTb
LINK 5:   RCO2      2    4;CAP  S;STATUS:    OK
LINK 6:   RCO2      2    4;CAP  S;STATUS:    OK
LINK 7:   RCO2      2    4;CAP  S;STATUS:    OK
```

10 To busy the link that has defects, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the P-side link identified in step 9

11 To test the link that has defects, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link that has defects manually busied in step 10

If TST	Do
passes and alarm continues	step 30
passes and alarm clears	step 17
fails	step 12

12 To display any links that can have defects, type

>TRKS;CARRIER;POST;MANB
and press the Enter key.

Typical response on the MAP display:

```
CLASS ML  OS   ALARM     SYSB  MANB     UNEQ  OFFL     CBSY  PBSY  INSV
TRUNKS 0  0    0         0     0        0     0        0     0     0
REMOTE 0  0    0         5     0        0     0        0     0     10

NO  CLASS  SITE     RCC  CKT  D  ALARM  SLIP FRAME     BER  SES   STATE
0   TRUNKS BRSCS    0    0    C         0    0         <-.7  0     INSV
1   REMOTE BRSCS    0    1    C         0    0         <-.7  0     INSV
2   REMOTE BRSCS    0    2    C         0    0         <-.7  0     MANB
                                                    MORE . . .
```

Note: The `MORE . . .` at the bottom of the display indicates that you can observe more links. To observe more links, type

>NEXT
and press the Enter key.

PM RCO2
minor (continued)

13 To test the ManB link, type

>TST link_no
and press the Enter key.

where

link_no is the number of the ManB link. This link number appears under the NO column as indicated in the MAP display in step 12. The number for the ManB link in the example is 2.

If TST	Do
passes and alarm clears	step 16
fails	step 30

14 Carry out the repair/corrective procedure the MAP display indicates in step 12.

Note: If the system indicates defective message links, these links must be in a ManB state before these links can be returned to service (RTS).

15 To post the host PM, type

>PM;POST host_pm host_pm_no
and press the Enter key.

where

host_pm is the PLGC in step 8
host_pm_no is the number of the PLGC

16 Use the information displayed in step 7 to determine which RCO2 unit associates with the SysB link. The unit identified must be *inactive* to continue.

If RCO2 unit	Do
is inactive	step 27
is active	step 17

PM RCO2
minor (continued)

17 To RTS the link, type

>RTS LINK link_no
and press the Enter key.

where

link_no is the number of the link in step 9

18 To post the RCO2, type

>POST rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 in step 2

Note: This RCO2 must be SysB.

19 To RTS the *inactive* unit, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 in step 18

20 To post the host PM, type

>POST host_pm host_pm_no
and press the Enter key.

where

host_pm is the PLGC
host_pm_no is the number of the PLGC

PM RCO2
minor (continued)

21 To switch activity (SwAct) of the RCO2 units to make sure that the one you want to test is *inactive*, type

>SWACT
and press the Enter key.

Typical response on the MAP display:

```
RCO2   2    A Warm SwAct will be performed
Please confirm ("YES" or "NO")
```

If the prompt	Do
indicates that a warm SwAct will be performed	step 22
indicates that a cold SwAct will be performed	step 22

22

CAUTION
Loss of service
All calls this PM handles, including data calls, will be lost. Perform this step only during a period of low traffic.

Refer to the next step to continue this procedure.

23 To confirm the SwAct initiated in step 21, type

>YES
and press the Enter key.

After both units are in-service, read the following table to determine where to proceed.

If SWACT	Do
passes	step 23
fails	step 30

PM RCO2
minor (continued)

24 To busy the *inactive* RCO2 unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the *inactive* RCO2 unit (from step 19)

25 To perform an out-of-service (OOS) test on the *inactive* RCO2 unit, type

>TST UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit busied in step 23

If TST	Do
passes	step 25
fails	step 26

26 To RTS the *inactive* RCO2 unit, type

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the RCO2 unit tested in step 24

If RTS	Do
passes	step 31
fails	step 30

PM RCO2
minor (end)

27 Observe the card listing as indicated in the following MAP display.

Typical response on the MAP display:

```
 SITE     FLR       RPOS BAY_ID         SHF  DESCRIPTION    SLOT EQPEC
RSCS0      01        A00 RCE    00       32  RCO2 :  000    : 09  MX82
RSCS0      01        A00 RCE    00       32  RCO2 :  000    : 08  6X69
RSCS0      01        A00 RCE    00       32  RCO2 :  000    : 11  MX73
RSCS0      01        A00 RCE    00       32  RCO2 :  000    : 15  MX74
RSCS0      01        A00 RCE    00       32  RCO2 :  000    : 17  MX73
```

If all cards on the list	Do
are replaced	step 27
are not replaced	step 29

28 Determine if the NTMX81 circuit card was replaced.

If the NTMX81 card	Do
is replaced	step 30
is not replaced	step 28

29 Perform the card replacement procedure for the NTMX81 circuit card in *Card Replacement Procedures*. Finish the card replacement procedures and go to step 24.

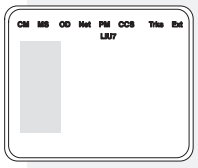
30 Perform the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Finish the card replacement procedures and go to step 24.

31 For additional help, contact the next level of support.

32 This procedure is complete. If the system displays other alarms, perform the appropriate alarm clearing procedures.

PM RMM major

Alarm display



CM	MS	IOD	Net	PM	Lns	Trks	Ext	APPL
.	.	.	.	1SysB M	.	.	.	.

Indication

At the MTC level of the MAP, the alarm code 1SysB under the PM subsystem header indicates an alarm involving a remote maintenance module (RMM). The letter *M* below the code indicates that the alarm class is major.

Meaning

The indicated number of RMM units are in the system busy (SysB) state.

Result

If the RMM unit fails, the system discontinues maintenance and line testing. This condition does not affect subscriber service.

Common procedures

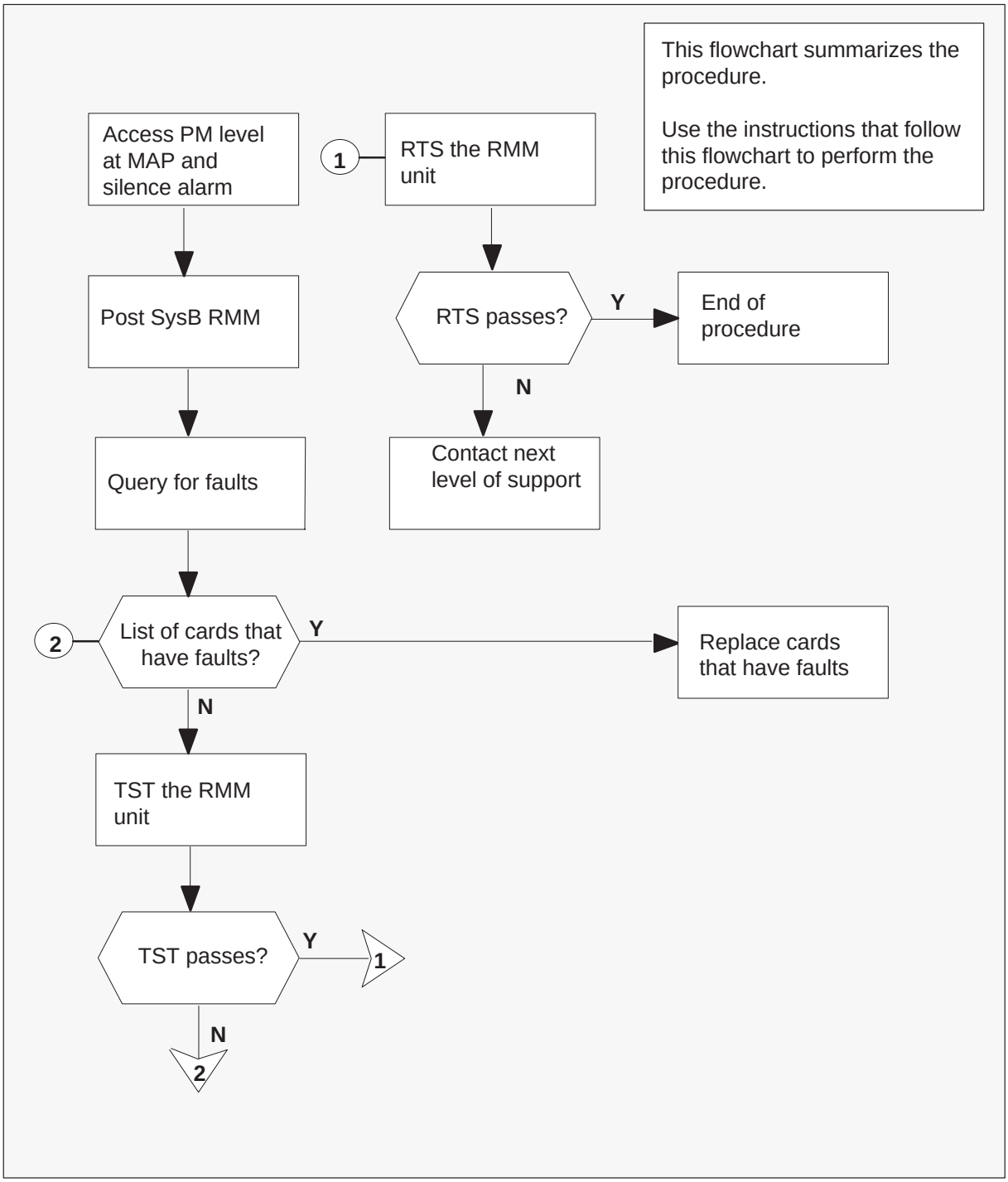
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM RMM
major (continued)

Summary of clearing a PM RMM major alarm



PM RMM
major (continued)

Clearing a PM RMM major alarm

At the MAP terminal

1

ATTENTION

Enter this procedure from a PM system-level alarm clearing procedure step that identified an RMM-associated fault.

To silence the alarm, type

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

2 To identify the RMM that has faults, type

>DISP STATE SYSB RMM
and press the Enter key.

Example of a MAP response:

```
SysB    RMM    2
```

PM RMM
major (continued)

3 To post the SysB RMM from step 2, type

>POST RMM rmm_no
and press the Enter key.

where

rmm_no is the number of the RMM that has faults

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .      .      .   1SysB    .      .       .      .      .


RMM            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM     3        0        1        1        4        12
 2 Post_   RMM    0        0        2        1        2         9
 3
 4         RMM    2     SysB
 5 Trnsl_
 6 Tst_
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 To check for fault indicators or cards that have faults, type

>QUERYPM FLT
and press the Enter key.

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .      .      .   1SysB    .      .       .      .      .


RMM            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM     3        0        1        1        4        12
 2 Post_   RMM    0        0        2        1        2         9
 3
 4         RMM 2 SysB
 5 Trnsl_
 6 Tst_
 7 Bsy_    QUERYPM FLT
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

If the system	Do
indicates a card that has faults	step 16
does not indicate a card that has faults	step 5

5 To manually busy the RMM in step 3, type

>BSY
and press the Enter key.

PM RMM
major (continued)

6 To perform an in-service test on the RMM that has faults, type

>TST
and press the Enter key.

Example of a MAP response:

```
Test Passed
    or
Test Failed
```

If TST	Do
passes	step 15
fails because of the C-side links	step 7
fails and the system generates a card list	step 16

7 To identify C-side links to the RCO2 in a busy condition, type

>TRNSL C
and press the Enter key.

Example of a MAP response:

```
LINK 22:  RCO2 2    0;CAP S;STATUS:     OK,;MSGCOND:   OPN,Restricted
LINK 23:  RCO2 2    1;CAP S;STATUS:     SYSB
```

8 To post the RCO2 unit associated with the RMM, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 unit from step 7

Example of a MAP display:

```
  CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .      .      .   1SysB    .      .       .      .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      3        0        1        1        4         12
 2 Post_   RCO2    0        0        2        1        2          9
 3 ListSet
 4         RCO2   2 ISTb  Links_OOS:  CSide  0, PSide   1
 5 TRNSL_  Unit0:   Act ISTb
 6 TST_    Unit1:   Inact InSv
 7 BSY_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17
18
```

9 To identify the P-side links that have faults, type

>TRNSL P
and press the Enter key.

Example of a MAP response:

```
LINK 22:  RMM  2    0;CAP MS;STATUS:    OK,;MSGCOND:   OPN,Restricted
LINK 23:  RMM  2    1;CAP  S;STATUS:    SYSB
```

10 To choose and busy a link that has faults, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the link (22 or 23) from step 9

PM RMM
major (continued)

11 To test the ManB link, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link (22 or 23) manually busied in step 10

If TST	Do
passes	step 12
fails	step 20

12 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 (22 or 23) tested in step 11

If RTS	Do
passes	step 13
fails	step 16

Note: The system can identify other links that have faults. Perform steps 11 through 13 for each link until the links are busied, tested, and returned to service.

13 To post the ManB RMM, type

>POST RMM rmm_no
and press the Enter key.

where

rmm_no is the number of the RMM busied in step 5

14 To test the RMM unit, type

>TST
and press the Enter key.

If TST	Do
passes	step 15
fails	step 16

15 To return the ManB RMM to service, type

>RTS
and press the Enter key.

If RTS	Do
passes	step 21
fails	step 20

16 Check the card listing on the MAP display.

Example of a MAP display:

```
SITE FLR  RPOS BAY_ID      SHF     DESCRIPTION         SLOT      EQPEC
RSC0  01   A00 RCE    00   32      RMM:000             : 00       6X23
RSC0  01   A00 RCE    00   32      RMM:000             : 04       6X51
RSC0  01   A00 RCE    00   32      RMM:000             : 05       6X52
RSC0  01   A00 RCE    00   32      RMM:000             : 16       6X23
```

If you	Do
replaced all the cards on the list	step 17
did not replace all the cards on the list	step 19

PM RMM
major (end)

17 Determine if the NTMX74 circuit card was replaced.

If you	Do
replaced the NTMX74 circuit card	step 20
did not replace the NTMX74 circuit card	step 18

Note: If the display indicates the NTMX74 card, check if one link or several links have faults. Repeat the alarm clearing procedure.

18 Perform the card replacement procedure for the NTMX74 circuit card in *Card Replacement Procedures*. Finish with the card replacement procedures. Go to step 11.

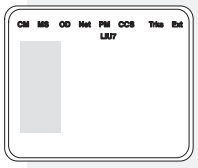
19 Perform the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Finish with the card replacement procedures. Go to step 14.

20 For additional help, contact the next level of support.

21 The procedure is complete. If other alarms appear at the MAP, perform the appropriate alarm clearing procedures.

PM RMM minor

Alarm display



CM	MS	IOD	Net	PM	Lns	Trks	Ext	APPL
.	.	.	.	**1CBsy**	.	.	.	.

Indication

At the maintenance (MTC) level of the MAP display, the 1CBsy under the peripheral module (PM) subsystem header indicates a minor alarm associated with an remote maintenance module (RMM).

Meaning

The indicated number of units are in the central-side busy (CBsy) state.

Result

The condition does not affect subscriber service. Local RMM backup is not available if the unit (or both units if the remote controller equipment (RCE) contains two RMMs) fails.

Common procedures

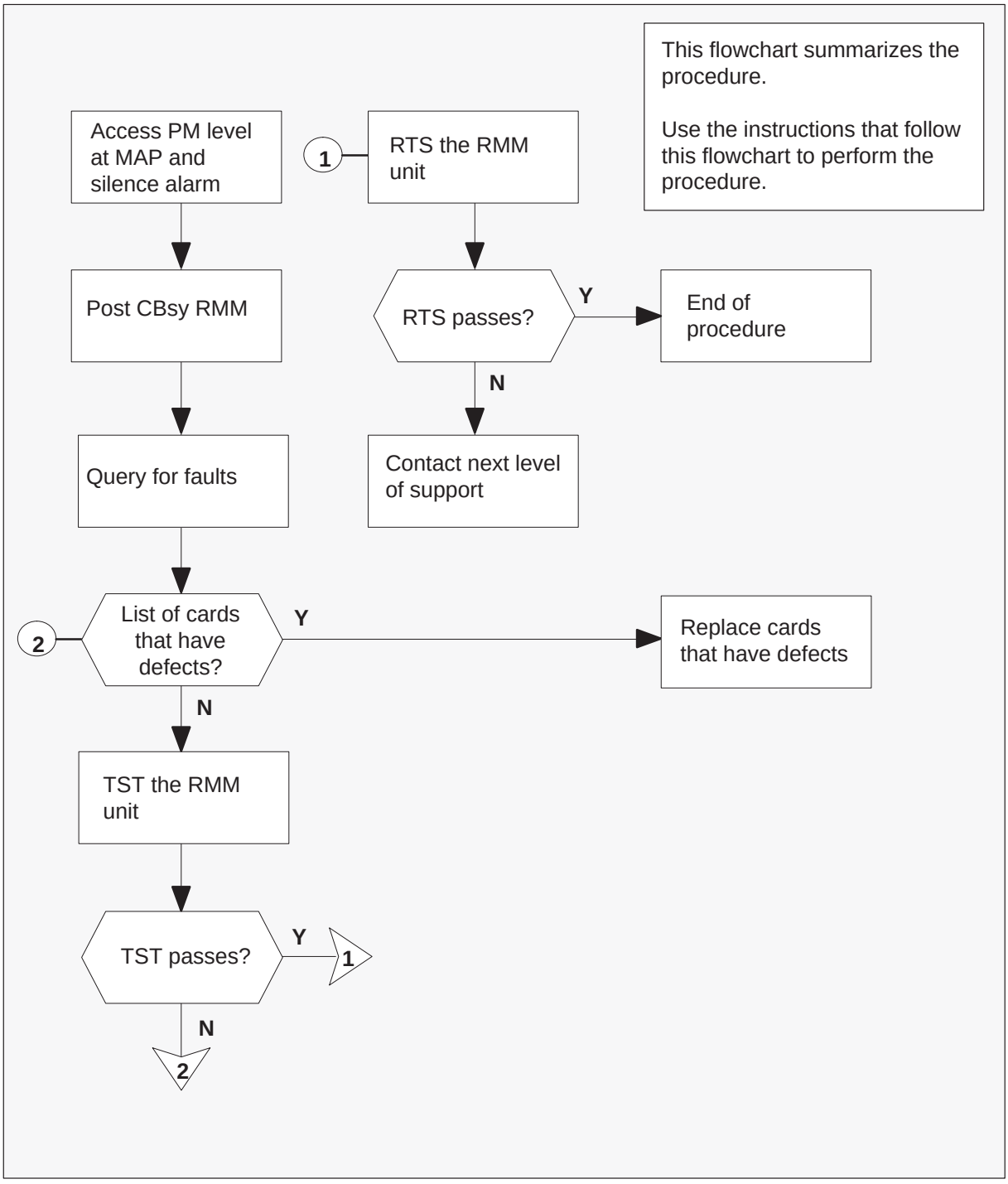
There are no common procedures.

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 RMM
minor (continued)

Summary of clearing PM RMM minor alarms



PM RMM
minor (continued)

Clearing PM RMM minor alarms

At the MAP display

1

ATTENTION

Enter this procedure from a PM system-level alarm clearing procedure step that identifies an RMM-associated fault.

To silence the alarm, type

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

2 To identify the RMM that has defects, type

>DISP STATE CBSY RMM
and press the Enter key.

Example of a MAP response:

```
CBsy    RMM: 1
```

PM RMM
minor (continued)

3 To post the CBsy RMM identified in step 2, type

>POST RMM rmm_no
and press the Enter key.

where

rmm_no is the number of the RMM that has defects

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .      .      .   1CBsy    .      .       .      .      .


RMM            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM     3        0        0        1        4        12
 2 Post_   RMM    0        0        0        1        2         9
 3
 4         RMM    1     CBsy
 5 Trnsl_
 6 Tst_
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 To check for fault indicators or cards that have defects, type

>QUERYPM FLT
and press the Enter key.

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .      .      .   1CBsy    .      .       .      .      .


RMM            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM     3        0        0        0        4        12
 2 Post_   RMM    0        0        0        0        2         9
 3
 4         RMM    1    CBsy
 5 Trnsl_
 6 Tst_
 7 Bsy_    QUERYPM FLT
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

If the system	Do
indicates a card that has defects	step 16
does not indicate a card that has defects	step 5

5 To busy the RMM posted in step 3, type

>BSY
and press the Enter key.

PM RMM
minor (continued)

6 To perform an in-service test on the RMM that has defects, type

>TST
and press the Enter key.

Example of a MAP response:

```
Test Passed
    or
Test Failed
```

If TST	Do
passes	step 15
fails because of the C-side links	step 7
fails and the system generates a card list	step 16

7 To identify busy C-side links to the RCO2, type

>TRNSL C
and press the Enter key.

Example of a MAP response:

```
LINK 22:  RCO2 2 0;CAP  S;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 23:  RCO2 2 1;CAP  S;STATUS:  CBSY
```

8 To post the RCO2 unit associated with the RMM, type

>POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the RCO2 unit identified in step 7

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
   .     .      .      .   1CBsy    .      .       .      .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0        0        0        4         12
 2 Post_   RCO2    0        0        0        0        2          9
 3 ListSet
 4         RCO2   2 ISTb  Links_OOS:  CSide  0, PSide   1
 5 TRNSL_  Unit0:   Act ISTb
 6 TST_    Unit1:   Inact InSv
 7 BSY_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17
18
```

9 To identify the peripheral-side (P-side) links that have defects, type

>TRNSL P
and press the Enter key.

Example of a MAP response:

```
LINK 22:  RMM  1    0;CAP MS;STATUS:    OK,;MSGCOND:   OPN,Restricted
LINK 23:  RMM  1    1;CAP  S;STATUS:    CBSY
```

10 To choose and busy a link that has defects, type

>BSY LINK link_no
and press the Enter key.

where

link_no is the number of the link identified in step 9 (22 or 23)

PM RMM
minor (continued)

11 To test the manually busied (ManB) link, type

>TST LINK link_no
and press the Enter key.

where

link_no is the number of the link (22 or 23) manually made busy in step 10

If TST	Do
passes	step 12
fails	step 16

12 To return the ManB link to service, type

>RTS LINK link_no
and press the Enter key.

where

link_no is the number of the link (22 or 23) tested in step 11

If RTS	Do
passes	step 13
fails	step 16

Note: If the system identifies other links that have defects, perform the procedures in steps 10 through 12 for each link. Perform these procedures until the system busies, tests and returns all links to service.

13 To post the ManB RMM, type

>POST RMM rmm_no
and press the Enter key.

where

rmm_no is the number of the RMM made busy in step 5

14 To test the RMM unit, type

>TST
and press the Enter key.

If TST	Do
passes	step 15
fails	step 16

15 To return the ManB RMM to service, type

>RTS
and press the Enter key.

If RTS	Do
passes	step 21
fails	step 20

16 Check the card list in the following MAP display.

Example of a MAP response:

```
SITE      FLR  RPOS   BAY_ID      SHF   DESCRIPTION    SLOT      EQPEC
RSCS0      01  A00    RCE    00    32   RMM:000        : 00       6X23
RSCS0      01  A00    RCE    00    32   RMM:000        : 04       6X51
RSCS0      01  A00    RCE    00    32   RMM:000        : 05       6X52
RSCS0      01  A00    RCE    00    32   RMM:000        : 16       6X23
```

If all cards on the list	Do
are replaced	step 17
are not replaced	step 19

PM RMM
minor (end)

17 Determine if the NTMX74 circuit card is replaced.

If the NTMX74 card	Do
is replaced	step 20
is not replaced	step 18

Note: If the system indicates the NTMX74 card, verify if one link or several links that have defects. Repeat the alarm clearing procedure as required.

18 Perform the card replacement procedure for the NTMX74 circuit card in *Card Replacement Procedures*. Complete the card replacement procedures and go to step 11.

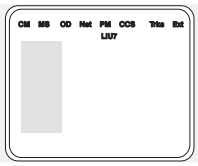
19 Perform the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures and go to step 14.

20 For additional help, contact the next level of support.

21 The procedure is complete. If other other alarms appear, perform the appropriate alarm clearing procedures.

CPDC single power feed failure
CPDC frame Major

Alarm display



CM	MS	IOD	Net	PM	CCS	Lns	Trks	Ext	APPL
.	.	**.**	**.**	**nRCC2**				**nFSP**	
				M	**.**			**M**	

Indication

At the MTC level of the MAP display, FSP preceded by a number appears under the EXT header of the alarm banner and indicates an external frame supervisory panel (FSP) major alarm. Also, an RCC2 preceded by a number appears under the PM header of the alarm banner and indicates an RCC2 major alarm exist as well as the FSP alarm.

Meaning

One or more frames in the remote switching center-sonet (RSC-S) site has a power fault and the fault affects the RCC2 and all subsidiary peripheral modules (PM).

The number of frames affected is indicated by the number (n) preceding FSP under the EXT header of the alarm banner. The number of RCC2s affected is indicated by the number (n) preceding RCC2 under the PM header of the alarm banner.

Note: All LCME, LCM, RMM and talk battery alarms generated are masked by the RCC2 major alarm.

Impact

There is a loss of call processing with a major alarm indication when there is a talk battery failure in one unit of each LCME/LCM.

The ISTb state does not directly affect service, because one unit of the RCC2 is still providing service. However, there is no local back-up. If the other unit of the RCC2 fails, service is interrupted.

Common procedures

Not applicable

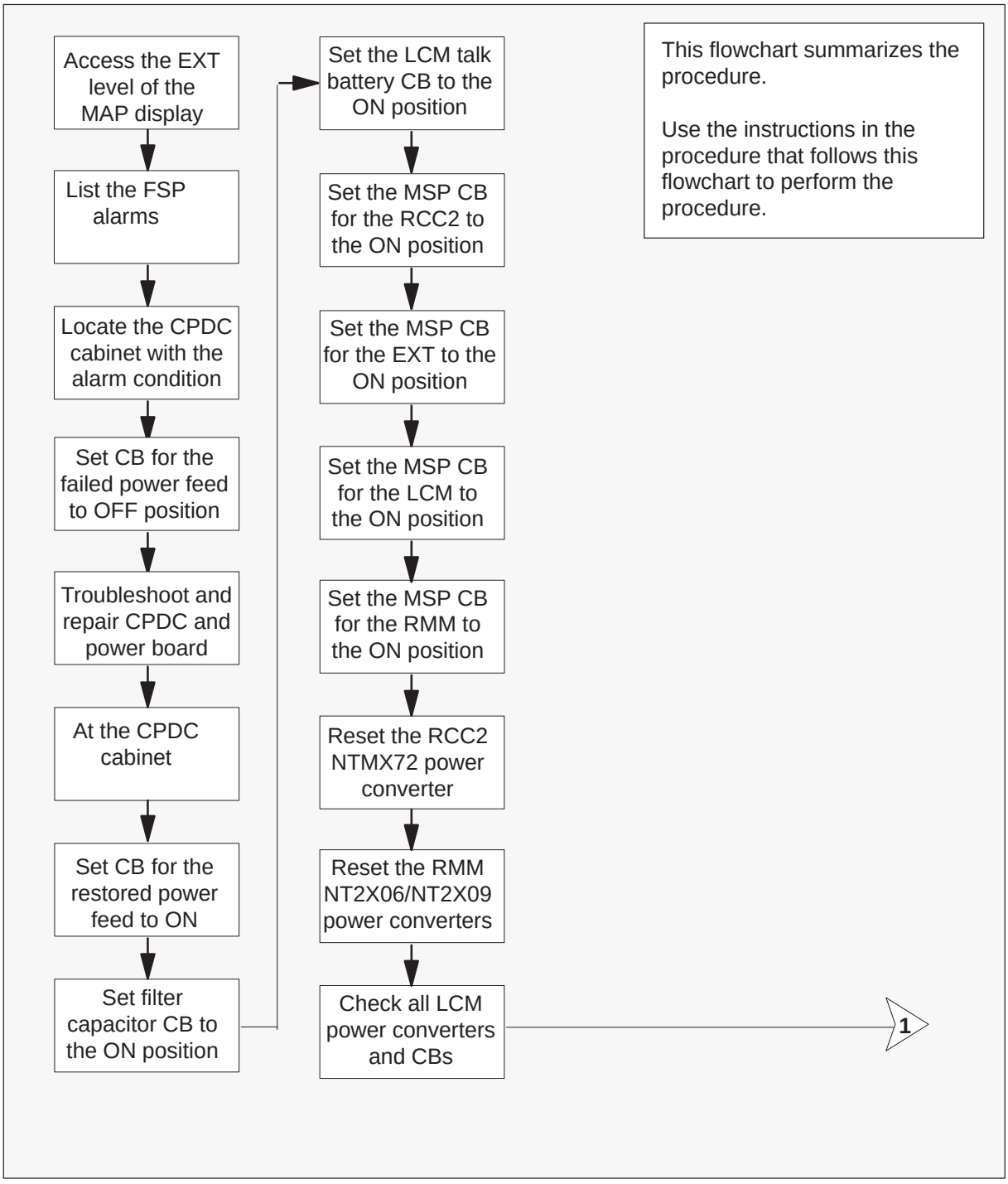
CPDC single power feed failure
CPDC frame Major (continued)

Action

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

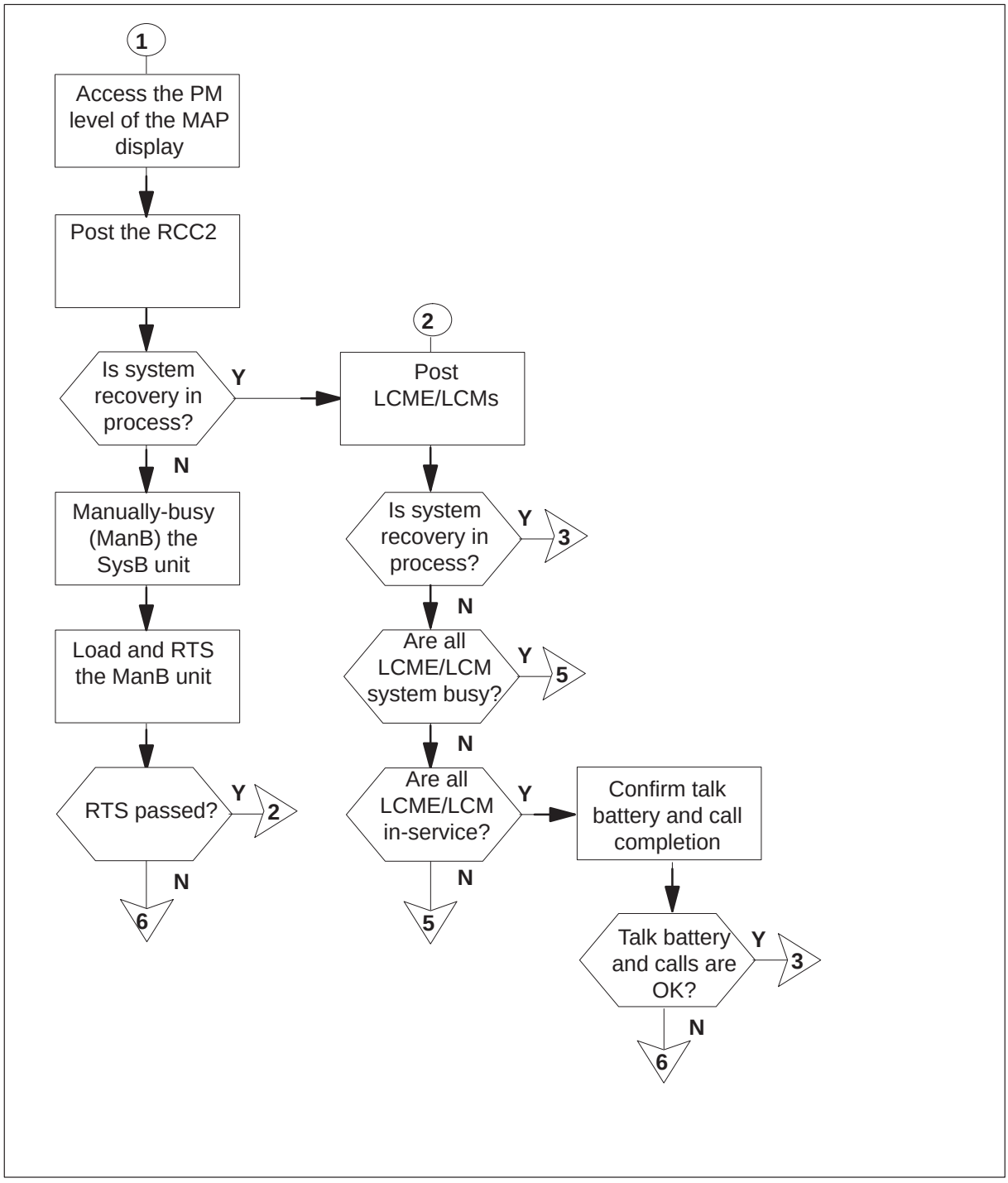
CPDC single power feed failure
CPDC frame Major (continued)

Summary of clearing a CPDC single power feed failure alarm



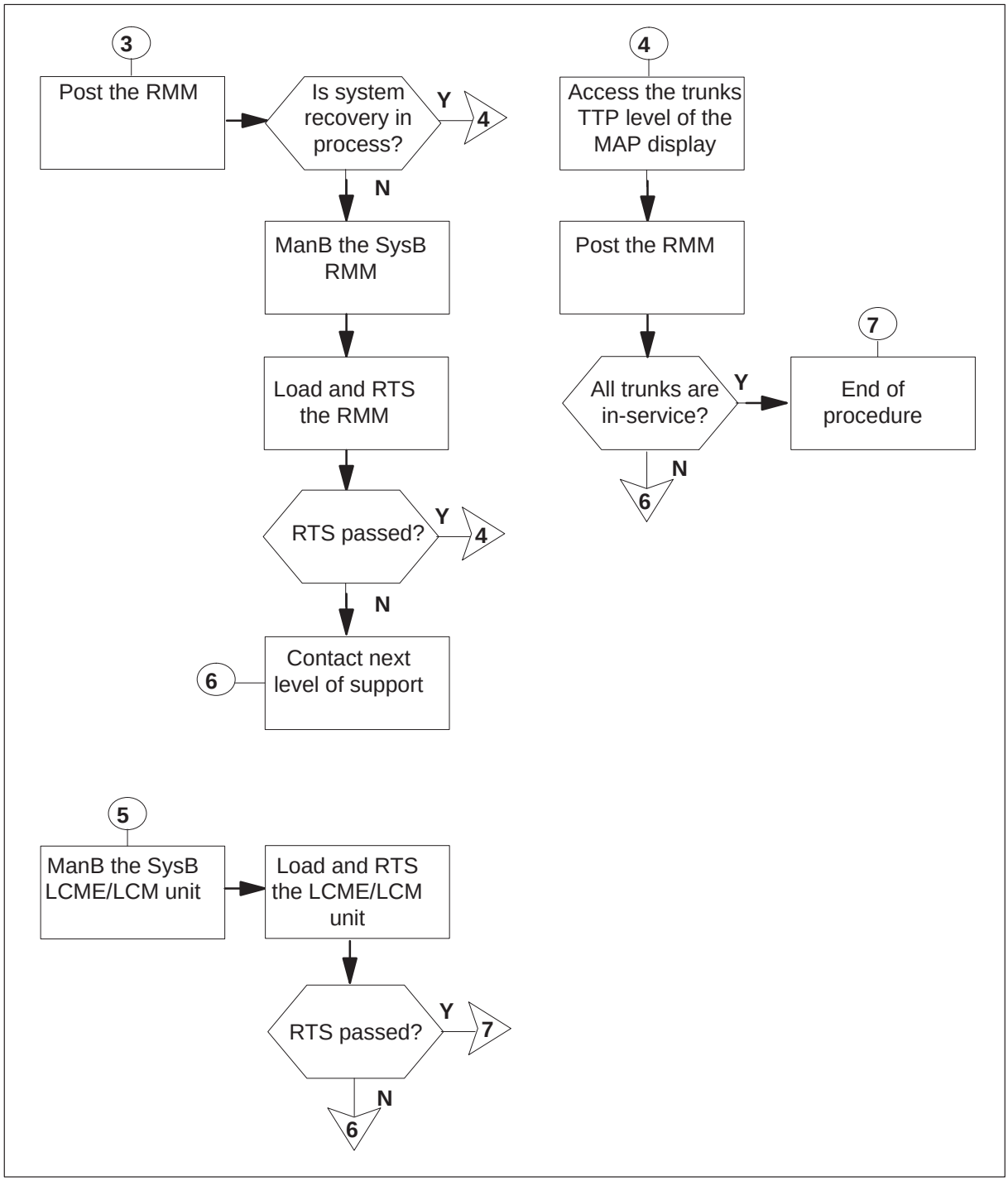
CPDC single power feed failure
CPDC frame Major (continued)

Summary of clearing a CPDC single power feed failure alarm (continued)



CPDC single power feed failure
CPDC frame Major (continued)

Summary of clearing a CPDC single power feed failure alarm (continued)



CPDC single power feed failure
CPDC frame Major (continued)

Clearing a/an CPDC single power feed failure alarm

At the MAP terminal

1 If an alarm is audible, silence it by typing

>MAPCI;MTC;SIL

2 Access the EXT level of the MAP display and examine the alarm banner by typing

>EXT

3 List the FSP alarm by typing

>LIST FSP
Example of a MAP display:

```
 CM      MS     IOD     Net      PM     CCS     Lns     Trks    Ext     APPL
  .      .       .       .     1RCC2     .       .       .     1 FSP     .
                                 M                               M
 Ext          Ext Alarms    Crit    FSP   Major  Minor  NoAlm
  0 Quit                      0      4      2      1      6
  2           List FSP
  3           FSPAISK
  4           FSPBISK
  5           FSPCISK
  6
  7 List_
  8 TstDSAlm_
  9 SetSD_
 10 SetSC_
 11 Disp_
 12
 13 _Crit
 14 _FSP
 15 _Maj
 16 _Min
 17 _NoAlm
 18
  CMAP11
Time  15:03   >
```

Note: In the example above, a PM alarm is also generated which may be created as a result of the FSP alarm. Work on the FSP alarm first.

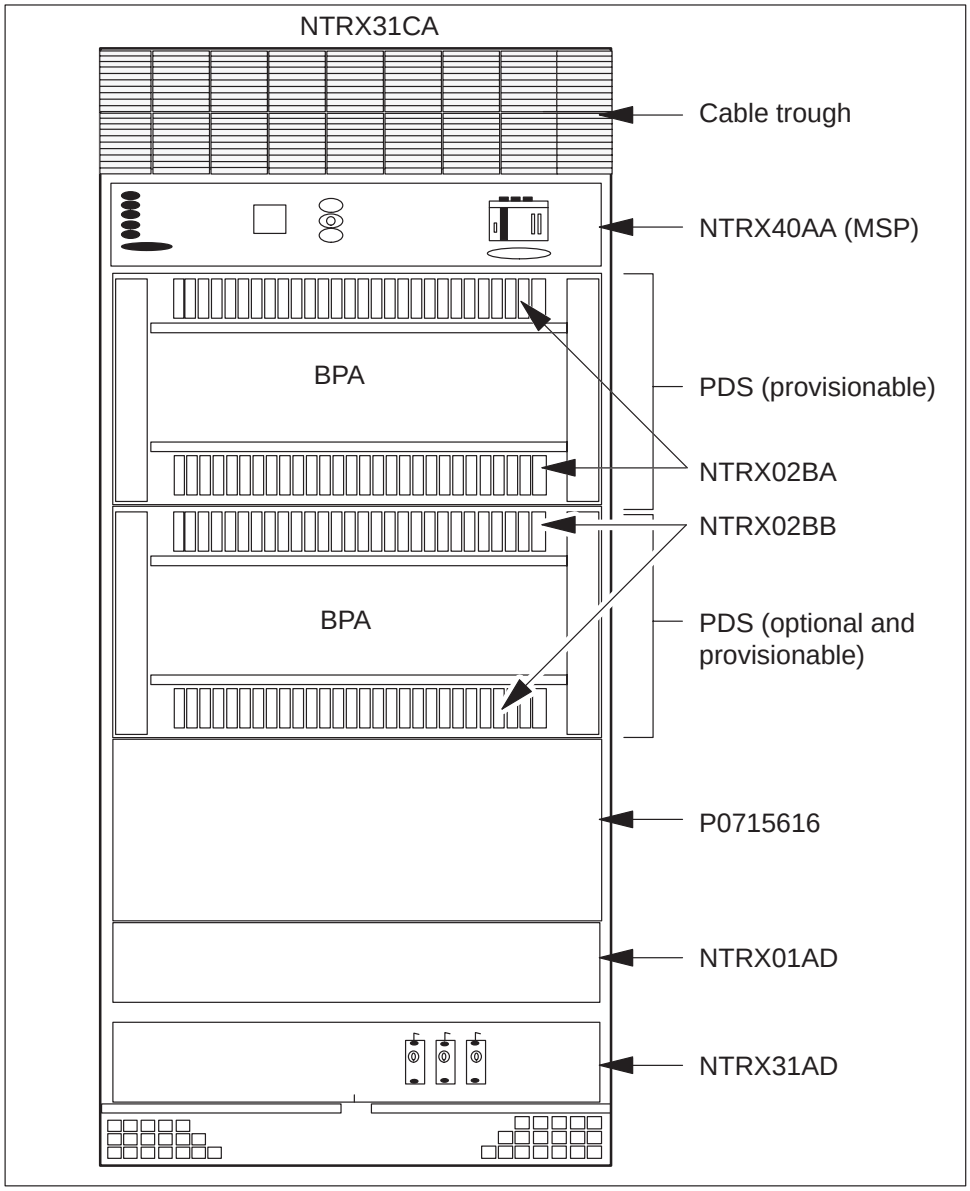
4 Record the aisles generating an FSP alarm identified in step 3.

CPDC single power feed failure
CPDC frame Major (continued)

At the CPDC cabinet on the remote site

5 Locate and set to the OFF position all circuit breakers (CB) associated with the failed power feed, starting from left to right. Set one CB at a time until all CBs for the RCC2, EXT, RMM, LCME, LCM, talk battery and filter capacitors are in the OFF position.

Note: You are powering down the circuit breakers associated with the failed power feed only.



CPDC single power feed failure
CPDC frame Major (continued)

6 Check and troubleshoot the rectifiers and power board with manufactor provided documentation.

7 When rectifiers/power board are repaired and power is restored to the powered down feed, go to step 8

8 Set the following CBs associated with the restored power feed to the ON position in the order specified below:

1	Filter capacitor
2	Talk battery
3	RCC2/EXT
4	LCME
5	LCM
6	RMM

At the CRSC/CEXT cabinets on the remote site

9 Refer to the following table to restore power to the CRSC RCC2 .

If the NTMX72 card has a suffix of	**Do**
AA	step 10
AB	step 11

10 Set and hold the POWER switch in the RESET position while setting the circuit breaker on the MSP to the ON position. Release the POWER switch to the ON position.

11 Set the CB for the NTMX72AB power converter to the ON position.

12 Set the CB for the ringing generator associated with the restored power feed to the ON position.

13 If the RMM was powered down, then set the NT2X06 and NT2X09 toggle switches to the ON position. Press and hold the reset button on the NT2X06 while setting the CB for the RMM to the ON position, release the reset boutton.

14 Check the LCME/LCM and ringing generator to see if power is restored.

If power is	Do
restored	step 19
not restored	step 15

15 Set the CB for the LCME/LCM unit associated with the failed power feed to the ON position.

At the CLCE cabinet on the remote site

16 Check the LCMs and ringing generators to see if power is restored.

If power is	Do
restored	step 19
not restored	step 17

17 Set the CB for the LCM unit associated with the restored power feed to the ON position.

18 Set the CB for the ringing generator associated with the restored power feed to the ON position.

CPDC single power feed failure
CPDC frame Major (continued)

At the MAP terminal

19 Access the PM level of the MAP display by typing

>PM

20 Post the RCC2 by typing

>POST RCC2 rcc2_no
and pressing the Enter key.

where

rcc2_no is the number of the RCC2 associated with the restored power feed

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS    Lns    Trks     Ext   APPL
 .      .      .      .    1RCC2   .      .       .       .      .
                            M
RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        1        0        1        0        0        12
 2 Post_   RCC2      1        0        2        0        0         9
 3 ListSet
 4         RCC2  2  ISTb   Links_OOS: CSide  0, PSide   0
 5 TRNSL_  Unit0:   Act    InSv
 6 Tst_    Unit1:   Inact  SysB    mtce system recovery
 7 Bsy_                                 loading: 4150
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16 IRLINK
17 PERFORM
18
```

21 Examine the screen display, if the DMS system is recovering the RCC2 Inactive unit:

DMS system is	Do
recovering	step 28
not recovering	step 22

22 Manually-busy (ManB) the SysB unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no — is the number of the RCC2 unit (0 or 1) associated with the restored power feed

23 The peripheral/remote loader-16 card (NT7X05) allows local loading of RCC2 data, which reduces recovery time. Check to see the NT7X05 card is provisioned by typing:

>QUERYPM FILES
and pressing the Enter key.

Example of a MAP display:

```
   CM   MS   IOD   Net    PM    CCS    LNS    Trks    Ext    APPL
    .    .     .    .    1RCC2   .      .       .      .      .
                          M
RCC2           SysB     ManB     OffL     CBsy     ISTb     InSv
0 Quit     PM     0        0        2        0        2       25
2 Post     RCC2   1        0        0        0        0        1
3 ListSet
4          RCC2     0 ISTb  Links_OOS:  CSide  0,  PSide   0
5 TRNSL_   Unit 0:  Inact InSv
6 TST_     Unit 1:  Inact ManB
7 BSY_
8 RTS_     QUERYPM files
9 OffL     Unit 0:
10 LoadPM_     NT7X05 load File: CRI08AZ
11 Disp_       NT7X05 Image File:
12 Next_       CMR Load:  CMR03A
13 SwAct   Unit 1:
14 QueryPM     NT7X05 load File: CRI08AZ
15             NT7X05 Image File:
16 IRLINK      CMR Load:  CMR03A
17 Perform
18
```

Note: If the NT7X05 card is not provisioned the MAP response is:
`NT7X05 not datafilled,  QueryPm files invalid`

If the NT7X05 card is	Do
provisioned	step 24
not provisioned	step 26

CPDC single power feed failure
CPDC frame Major (continued)

24 Load the RCC2 from the local image file by typing

>LOADPM UNIT unit_no LOCAL IMAGE
and pressing the Enter key.

where

unit_no — is the number of the RCC2 unit (0 or 1) associated with the restored power feed

If the loadpm command	Do
passed	step 27
failed	step 25

25

WARNING
Possible service interruption
The LOCAL LOADFILE option of the LOADPM command has a parameter of [<file> string}]. When this parameter is used, the loadfile named in the parameter is not patched. Do not use this parameter unless the NOPATCH option of the loadfile is desired.

Load the RCC2 from the local loadfile by typing

>LOADPM UNIT unit_no LOCAL LOADFILE
and pressing the Enter key.

where

unit_no — is the number of the RCC2 unit (0 or 1) associated with the restored power feed

If the loadpm command	Do
passed	step 27
failed	step 26

26 Load the RCC2 from the CC by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no — is the number of the RCC2 unit (0 or 1) associated with the restored power feed

If the loadpm command	Do
passed	step 27
failed	step 44

27 Return the PM to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no — is the number of the RCC2 unit (0 or 1) associated with the restored power feed

If RTS command	Do
Passed	step 28
Failed	step 44

Note: Repeat steps 20 through step 27 for all other RCC2s affected by the failed power feed, located at this site.

CPDC single power feed failure
CPDC frame Major (continued)

28 Post the LCME at the site and if necessary, start returning them to duplex operation by typing

>POST LCME lcme_site_name lcme_frame_no lcme_no
and pressing the Enter key.

where

lcme_site_name	is the site name for the LCME associated with the restored power feed
lcme_frame_no	is the number of the LCME equipment frame (0 to 511)
lcme_no	is the number of the LCME (0 or 1)

Example of a MAP display:

```
  CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
   .     .     .      .      .     .      .       .      .       .

 LCME              SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM        0        0        0        0        0      130
 2 Post_    LCME      0        0        0        0        0        9
 3 ListSet
 4 SwRG     LCME   RSCS 14 1 InSv  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   InSv                /RG: 1
 6 Tst_     Unit1:   InSv                /RG: 1
 7 Bsy_                                 11  11  11    RG:Pref 1 InSv
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45       Stby 0 InSv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

Note: The LCME unit may be restored or in the process of being restored to duplex operation by the DMS system, in which case no maintenance action is required.

If LCME unit is	Do
restored	step 32
not restored	step 29

29 Manually busy the SysB LCME unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SysB LCME unit (0 or 1)

30 Load the LCME unit by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the ManB LCME unit (0 or 1)

If the loadpm command	Do
passed	step 31
failed	step 44

31 Attempt to return the LCME unit to service by typing

>RTS UNIT lcme_unit
and pressing the Enter key.

where

lcme_unit is the LCME unit loaded in step 30

If RTS	Do
passed	step 32
failed	step 44

Note: Repeat steps 28 through step 31 for all other LCMEs affected by the failed power feed, located at this site.

CPDC single power feed failure
CPDC frame Major (continued)

32 Post the LCM at the site and if necessary, start returning them to duplex operation by typing

>POST LCM lcm_site_name lcm_frame_no lcm_no

and pressing the Enter key.

where

lcm_site_name	is the site name for the LCM associated with the restored power feed
lcm_frame_no	is the number of the LCM equipment frame (0 to 511)
lcm_no	is the number of the LCM (0 or 1)

Example of a MAP display:

```
 CM    MS    IOD    Net    PM   CCS   LNS   Trks    Ext    Appl
  .     .     .      .      .    .     .      .      .       .

LCM            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM    0        0        0        0        0        130
 2 Post_   LCM   0        0        0        0        0          8
 3
 4 SwRg          LCM   RSCS  14 2 ISTb   Links_OOS: CSide 0 PSide 0
 5 Trnsl         Unit-0:  InSv  Mtce              /RG:  0
 6 Tst           Unit-1:  InSv  Mtce              /RG:  0
 7 Bsy                                 11 11 11 11 11 RG:Pref:0 InSv
 8 RTS           Drwr: 01 23 45 67 89 01 23 45 67 89    Stby:1 InSv
 9 OffL                .. .. .. .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

Note: The LCM unit may be restored or in the process of being restored to duplex operation by the DMS system, in which case no maintenance action is required.

If LCM unit is	Do
restored	step 36
not restored	step 33

33 Manually busy the SysB LCM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the SysB LCM unit (0 or 1)

34 Load the LCM unit by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the ManB LCM unit (0 or 1)

If the loadpm command	Do
passed	step 35
failed	step 44

35 Attempt to return the LCM unit to service by typing

>RTS UNIT lcm_unit
and pressing the Enter key.

where

lcm_unit is the LCM unit loaded in step 34

If RTS	Do
passed	step 36
failed	step 44

Note: Repeat steps 32 through step 35 for all other LCMs affected by the failed power feed, located at this site.

CPDC single power feed failure
CPDC frame Major (continued)

36 Post the RMM by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM associated with the restored power feed

Example of a MAP display:

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
   .      .       .       .    1SysB     .       .        .       .       .
                                  M
RMM                   SysB     ManB      OffL      CBsy      ISTb       InSv
 0 Quit          PM     3        0         0         0         4        130
 2 Post_         RMM    0        0         0         0         0          9
 3
 4          RMM    1     SysB
 5 Trnsl_
 6 Tst_
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

Note: The RMM may be restored by the DMS system, in which case no maintenance action is required.

If RMM is	Do
restored	step 40
not restored	step 37

37 ManB the RMM by typing

>BSY
and pressing the Enter key.

38 Load the RMM by typing

>LOADPM
and pressing the Enter key.

If the loadpm command	Do
passed	step 39
failed	step 44

39 Return the ManB RMM to service by typing

>RTS
and pressing the Enter key.

If the RTS command	Do
passed	step 40
failed	step 44

CPDC single power feed failure
CPDC frame Major (continued)

40 Access the TRKS;TTP level of the MAP display and post the RMM circuits by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM shelf affected by the failed power feed

Example of a MAP response:

```
LAST CIRCUIT = 14
POST CKT IDLED
SHORT CLLI IS:  LTU
OK, CLLI POSTED

POST  13   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG TESTEQ RMM 0 0       LTU 0         IDL
```

>NEXT

Note: Repeat the NEXT command until you have confirmed all circuits assigned to this RMM are in-service.

If RMM circuits are	Do
InSv	step 42
not-InSv	step 41

41 Return the RMM trunk circuits to service by typing

>BSY;RTS;NEXT
and pressing the Enter key.

If the BSY/RTS command	Do
passed on all circuits	step 42
failed on all or some circuits	step 44

CPDC single power feed failure
CPDC frame Major (end)

42 Confirm talk battery is operational by using telephone test set to draw dial tone.

If talk battery is	Do
operational	step 45
not-operational	step 44

43 Go to the appropriate procedure in the *Alarm Clearing Procedure* to clear an RMM minor alarm. When you have completed that procedure, return to step 45.

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

45 You have successfully completed this procedure. If other alarms are displayed, reference the appropriate alarm clearing procedures for the indicated alarms in the *Alarm Clearing Procedures*.

RSC-S card replacement procedures

This document contains the card replacement procedures for the DMS–100 remote switching center-SONET (RSC-S) for international applications. These procedures are used by maintenance personnel to remove and replace circuit packs.

NT0X10 in RSC-S RMM

Application

Use this procedure to replace an NT0X10 card in an RSC-S RMM.

PEC	Suffixes	Name
NT0X10	AA	Miscellaneous Scan Card (MSC)

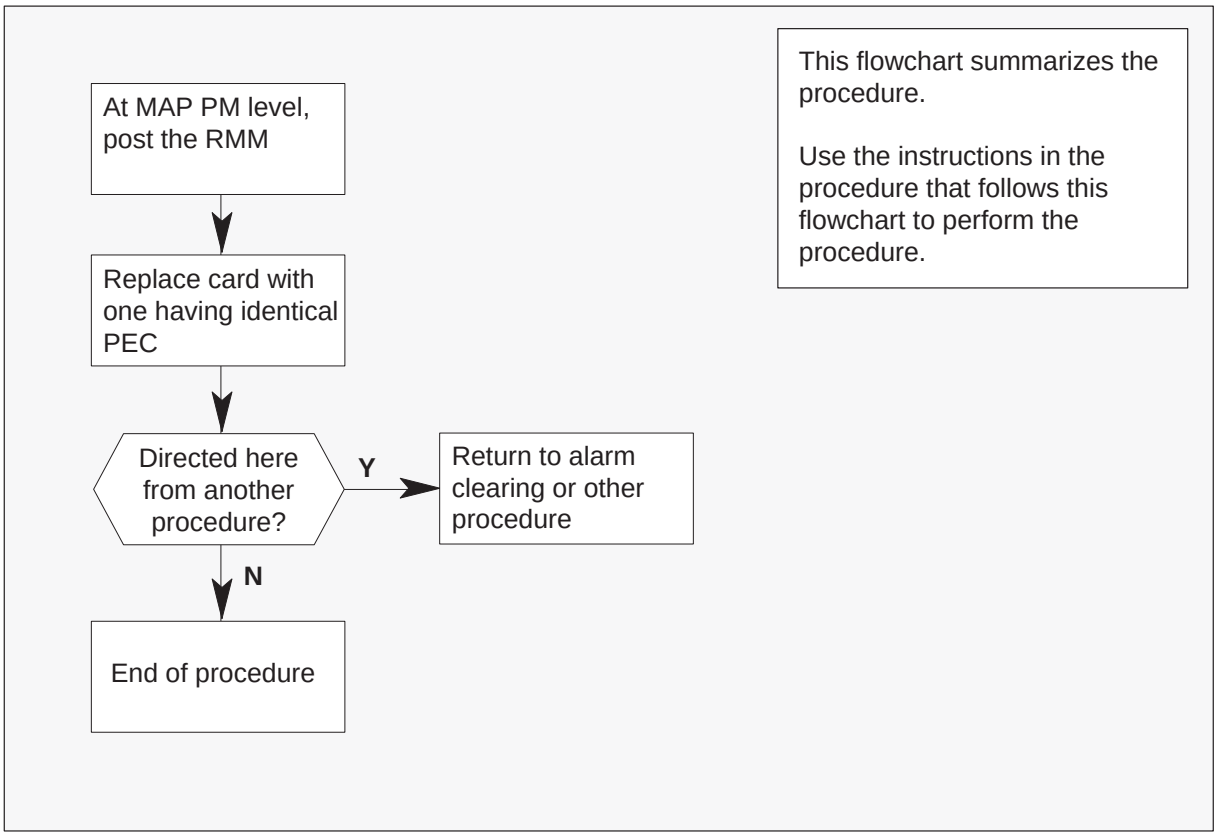
Common procedures

None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

Summary of card replacement procedure for an NT0X10 card in RSC-S RMM



NT0X10 in RSC-S RMM (continued)

Replacing an NT0X10 card in RSC-S RMM

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 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Access the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM from which the card is to be removed

Example of a MAP display:

```
CM     MS     IOD     Net    PM    CCS    LNS    Trks     Ext   Appl
 .      .       .       .      .     .      .      .         .     .
RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        0        0        0       130
 2 Post_   RMM      0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT0X10
in RSC-S RMM (continued)

4 Busy the RMM by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

```
CM      MS      IOD      Net     PM     CCS     LNS     Trks      Ext    Appl
 .       .        .        .    1ManB    .       .       .        .       .      .
RMM                SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM         4         0        10         0         0        130
 2 Post_    RMM        0         1         0         0         0          0
 3
 4          RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

WARNING

Static discharge may cause damage to circuit packs

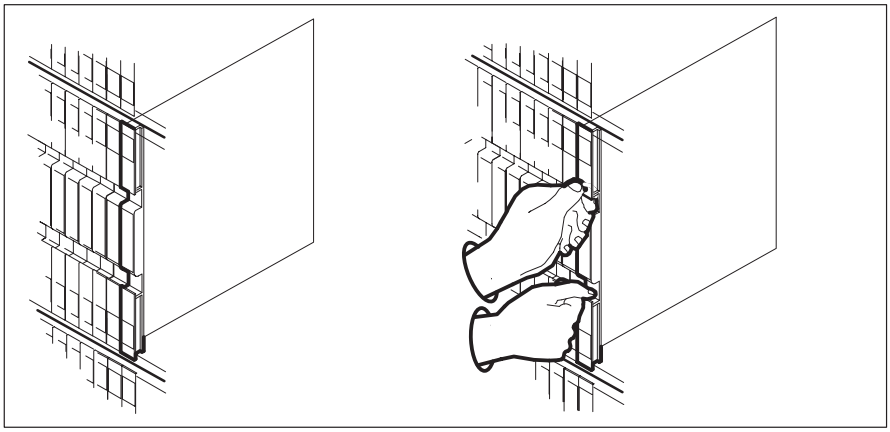
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

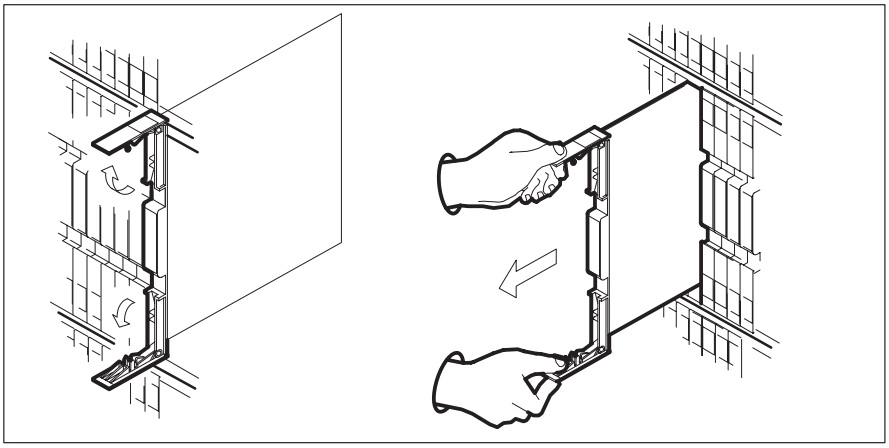
NT0X10
in RSC-S RMM (continued)

6 Remove the NT0X10 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

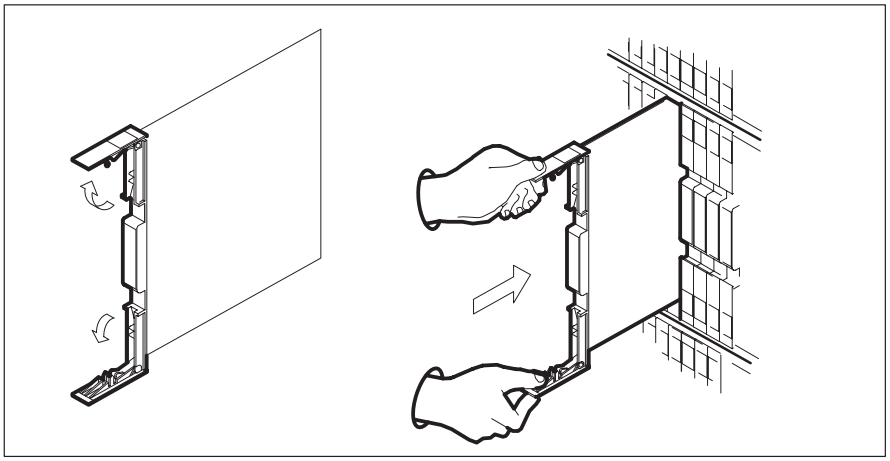
d. Set the switch settings on the card to match those of the card you are replacing.

NT0X10 in RSC-S RMM (continued)

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



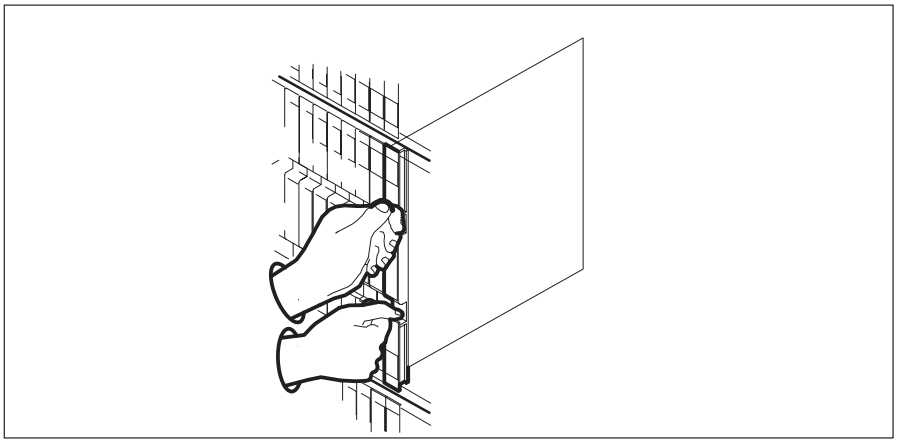
8

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



9 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 12
other	step 10

10 Send any faulty cards for repair according to local procedure.

11 Record the date the card was replaced, the serial number of the card, and the symptoms prompted by replacement of the card. Go to step 14.

12 Return to the 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.

13 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

14 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X06 in RSC-S RMM

Application

Use this procedure to replace an NT2X06 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X06	AB	5V/40A Power Converter

Common procedures

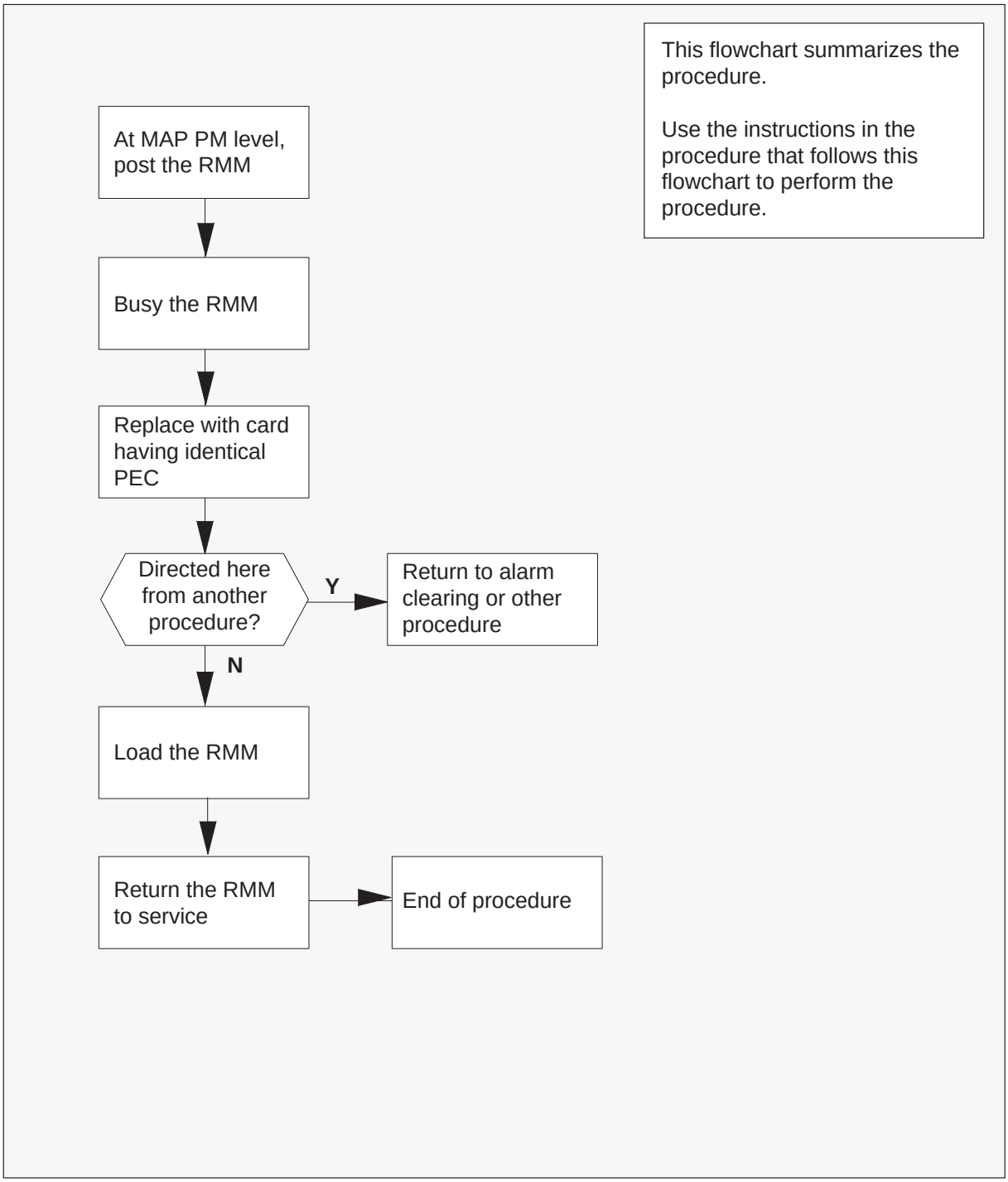
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X06
in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X06 card in RSC-S RMM



NT2X06 in RSC-S RMM (continued)

Replacing an NT2X06 card in RSC-S RMM

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 Obtain an NT2X06 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Set the MAP display to PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no

and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS    LNS      Trks      Ext    Appl
  .      .      .      .     .      .      .         .        .       .
RMM              SysB     ManB     OffL     CBsy     ISTb       InSv
 0 Quit    PM       4        0       10        3        3        130
 2 Post_   RMM      0        1        1        0        0          2
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net    PM     CCS    LNS    Trks     Ext    Appl
 .      .       .       .     1ManB   .      .       .       .       .
RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        4        0       10        0        0       130
 2 Post_   RMM       0        1        0        0        0         0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

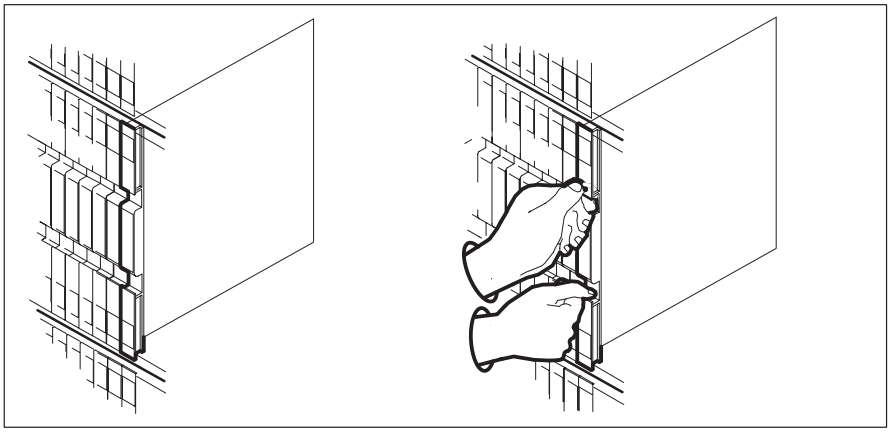
6 Power down the unit by setting the ON/OFF switch on the power converter faceplate to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the frame supervisory panel (FSP) will be ON. An audible alarm may sound. If an alarm does sound, return to the MAP terminal and silence the alarm by typing

>SIL
and pressing the Enter key.

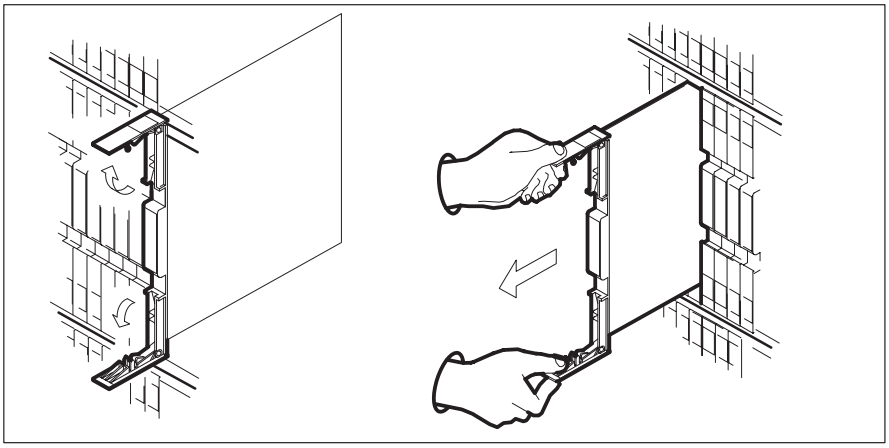
NT2X06
in RSC-S RMM (continued)

7 Remove the NT2X06 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

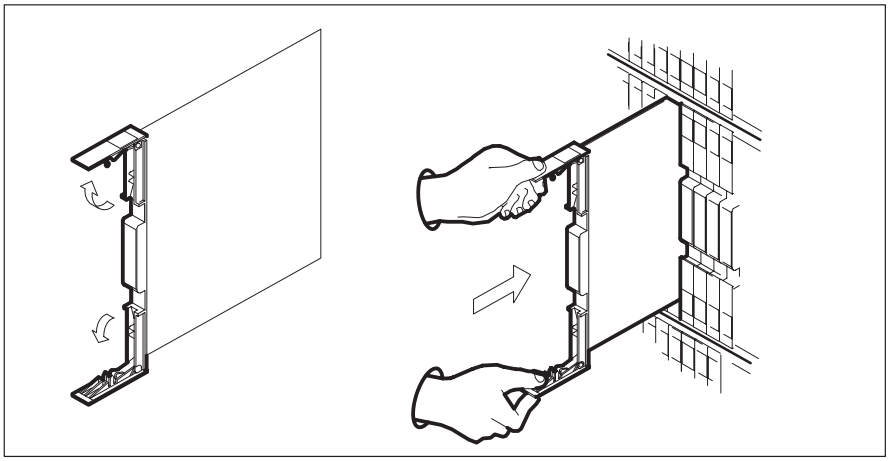


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

8 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



9

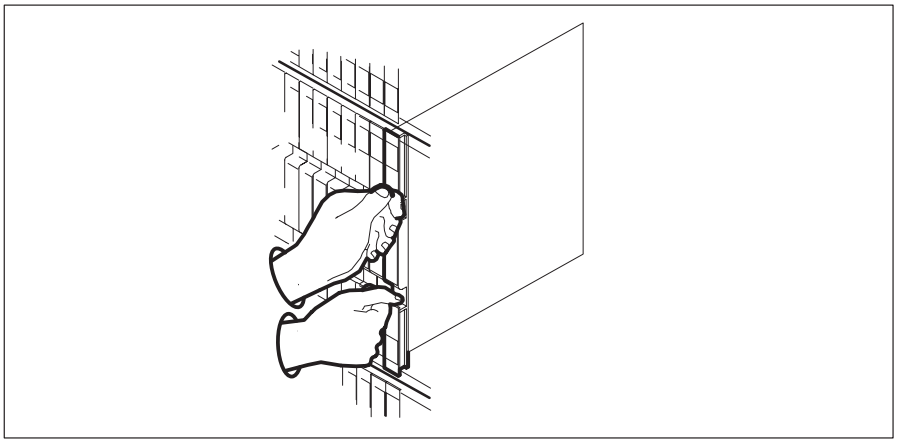
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

NT2X06 in RSC-S RMM (continued)

b. Close the locking levers.



10 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 23
other	step 11

At the RMM shelf

11 Power up the RMM as follows:

a. Ensure the converter (NT2X06) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch to the ON position.

If FSP is equipped with	Do
fuses	step 12
circuit breakers	step 13

12 Press and hold the RESET button for 1 s. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be OFF.

Go to step 14.

13 Press the RESET button while setting the circuit breaker to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be ON.

Go to step 14.

At the MAP terminal

14 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

If	Do
message `loadfile not found in directory` is received	step 15
load passes	step 19
load fails	step 24

15 Use the following information to determine where to proceed.

If system load module	Do
version 1	step 16
version 2	step 17

16 List the loadfile in the directory by typing

>DSKUT;LISTVOL D000 file_name ALL
and pressing the Enter key.

or

>DSKUT;LISTVOL D010 file_name ALL
and pressing the Enter key.

where

file_name is the name of the loadfile

Local operating company policy determines where disk D000 or D010 is located.

Proceed to step 18.

NT2X06 in RSC-S RMM (continued)

17 List the loadfile in the directory by typing

>DISKUT;LV S00D
and pressing the Enter key.

>LF S00D file_name
and pressing the Enter key.

or

>DISKUT;LV S01D
and pressing the Enter key.

>LF S01D file_name
and pressing the Enter key.

where

file_name is the name of the loadfile

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

Return to step 14.

19 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 20
failed	step 23

20 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 21
failed	step 24

NT2X06 in RSC-S RMM (end)

21 Send any faulty cards for repair according to local procedure.

22 Record the date the card was replaced, the serial number of the card, and the symptoms prompted by replacement of the card. Go to step 25.

23 Return to the 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.

24 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

25 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X09 in RSC-S RMM

Application

Use this procedure to replace an NT2X09 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X09	AA	Power Converter

Common procedures

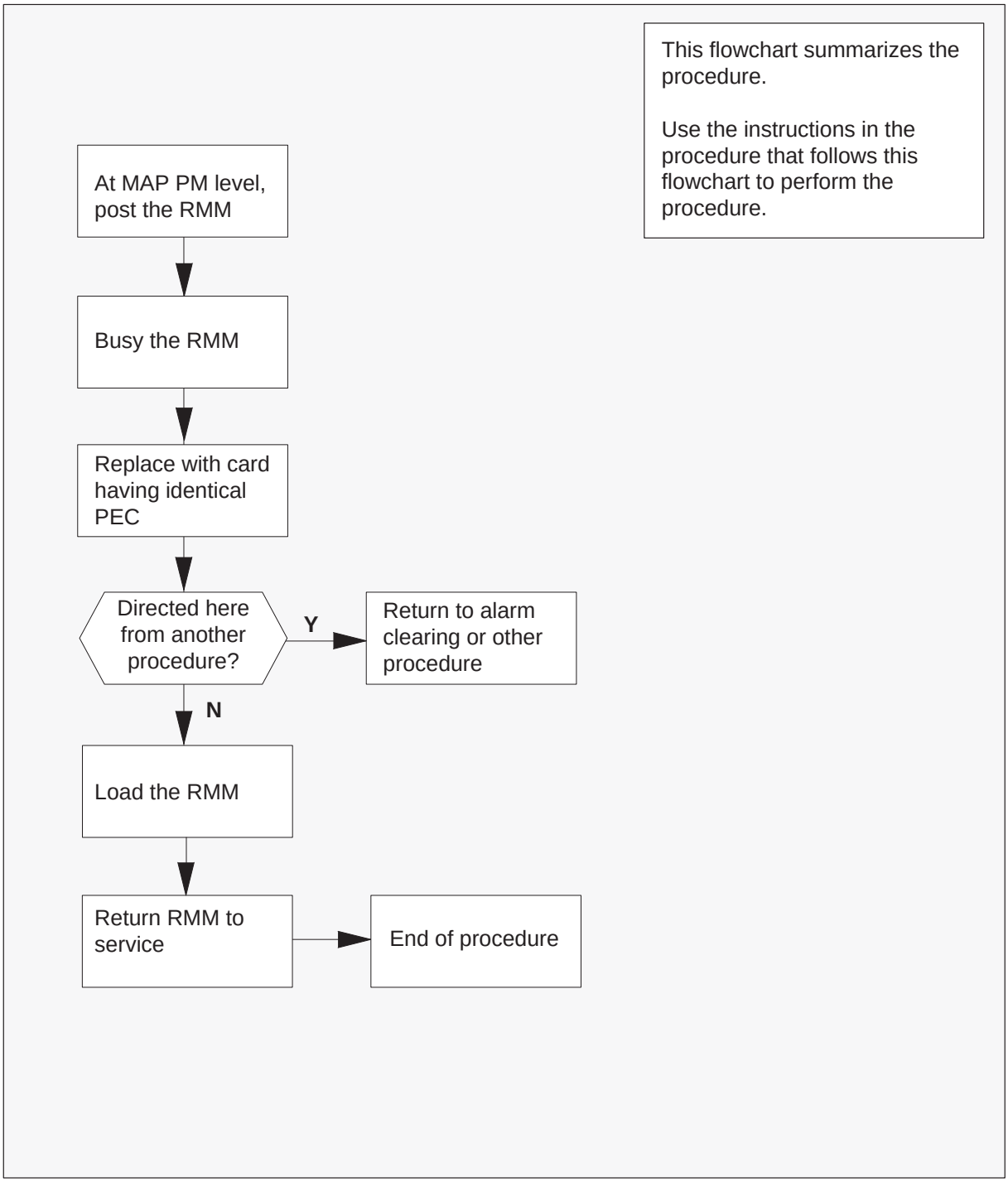
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X09
in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X09 card in RSC-S RMM



NT2X09 in RSC-S RMM (continued)

Replacing an NT2X09 card in RSC-S RMM

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 Obtain an NT2X09 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Set the MAP display to PM level by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM unit where the card is to be removed

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     LNS    Trks     Ext   Appl
 .      .       .       .      .      .       .      .        .      .
RMM               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      4        0        10       3        3        130
 2 Post_   RMM     0        1         1       0        0          2
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS     IOD    Net     PM     CCS    LNS     Trks     Ext    Appl
 .     .      .      .     1ManB    .      .       .        .      .
RMM              SysB     ManB     OffL     CBsy     ISTb       InSv
 0 Quit    PM      4        0       10       0        0         130
 2 Post_   RMM     0        1        0       0        0           0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

5

CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

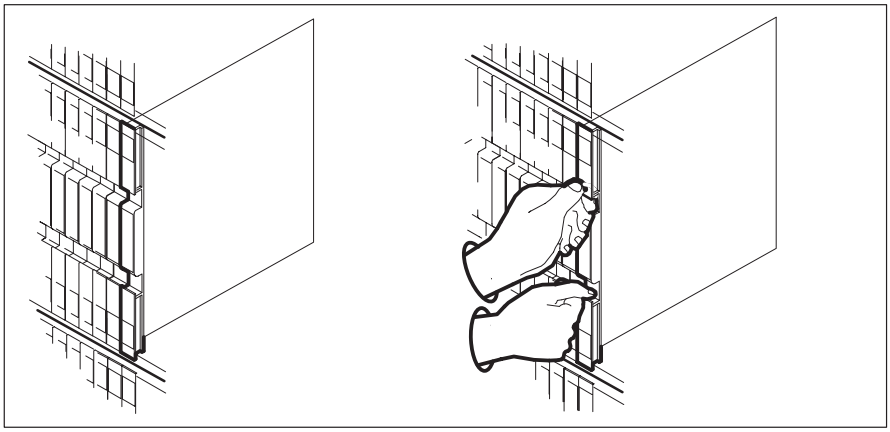
6 Power down the unit by setting the ON/OFF switch on the power converter faceplate to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the frame supervisory panel (FSP) will be ON. An audible alarm may sound. If an alarm does sound, return to the MAP terminal and silence the alarm by typing

>SIL
and pressing the Enter key.

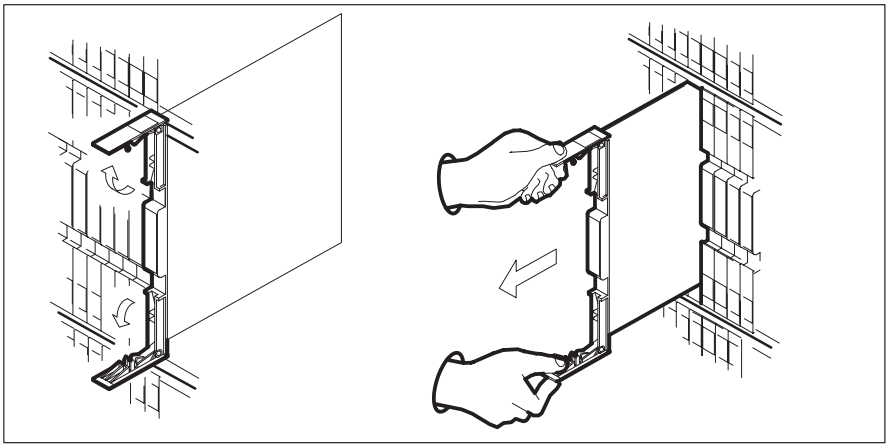
NT2X09 in RSC-S RMM (continued)

7 Remove the NT2X09 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

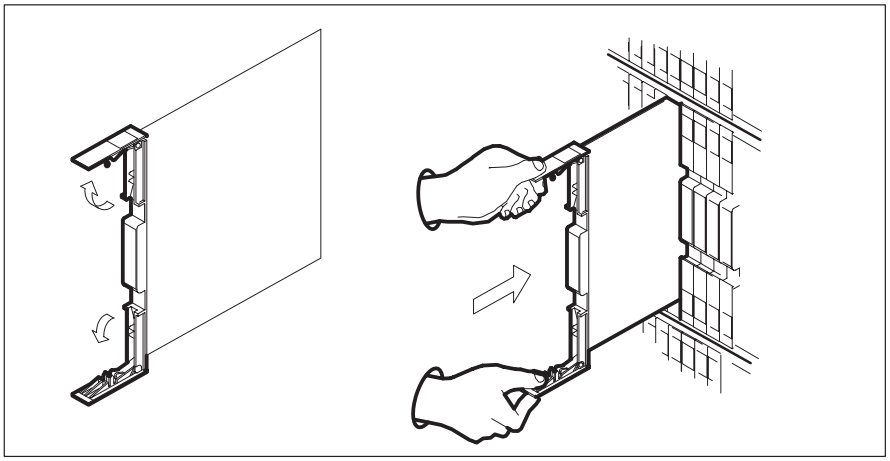


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

8 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



9

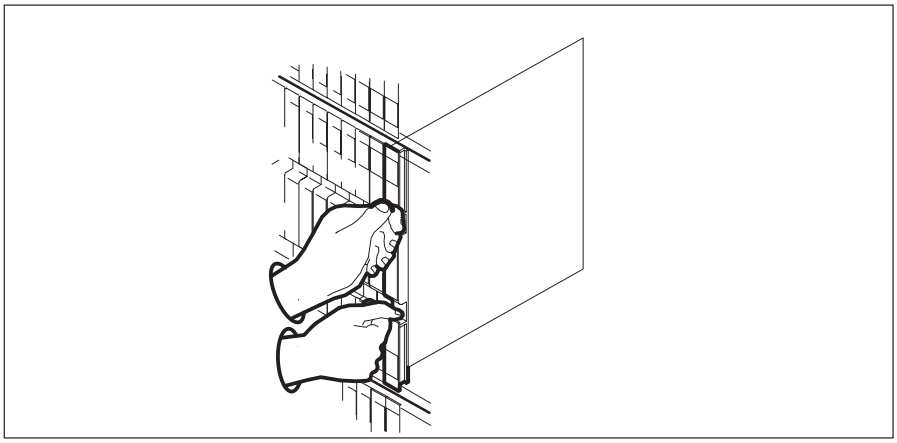
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

NT2X09 in RSC-S RMM (continued)

b. Close the locking levers.



10 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 23
other	step 11

11 Power up the RMM unit in the following sequence:

a. Ensure the converter (NT2X09) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch to the ON position.

If FSP is equipped with	Do
fuses	step 12
circuit breakers	step 13

12 Press and hold the RESET button for 1 s. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be OFF. Go to step 14.

13 Press the RESET button while setting the circuit breaker to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be ON.

At the MAP terminal

14 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

If	Do
message `loadfile not found in directory` is received	step 15
load passes	step 19
load fails	step 24

15 Use the following information to determine where to proceed.

If system load module	Do
version 1	step 16
version 2	step 17

16 List the loadfile in the directory by typing

>DSKUT;LISTVOL D000 volume_name ALL
and pressing the Enter key.

or

>DSKUT;LISTVOL D010 volume_name ALL
and pressing the Enter key.

where

volume_name is the name of the loadfile

Local operating company policy determines where disk D000 or D010 is located.

Proceed to step 18.

NT2X09 in RSC-S RMM (continued)

17 List the loadfile in the directory by typing

>DISKUT;LV S00D
and pressing the Enter key.

>LF S00D file_name
and pressing the Enter key.

or

>DISKUT;LV S01D
and pressing the Enter key.

>LF S01D file_name
and pressing the Enter key.

where

file_name is the name of the loadfile

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

Return to step 14.

19 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 20
failed	step 23

20 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 21
failed	step 24

NT2X09 in RSC-S RMM (end)

21 Send any faulty cards for repair according to local procedure.

22 Record the date the card was replaced, the serial number of the card, and the symptoms prompted by replacement of the card. Go to step 25.

23 Return to the 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.

24 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

25 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X10 in RSC-S RMM

Application

Use this procedure to replace an NT2X10 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X10	BA	Line Test Unit (analog)

Common procedures

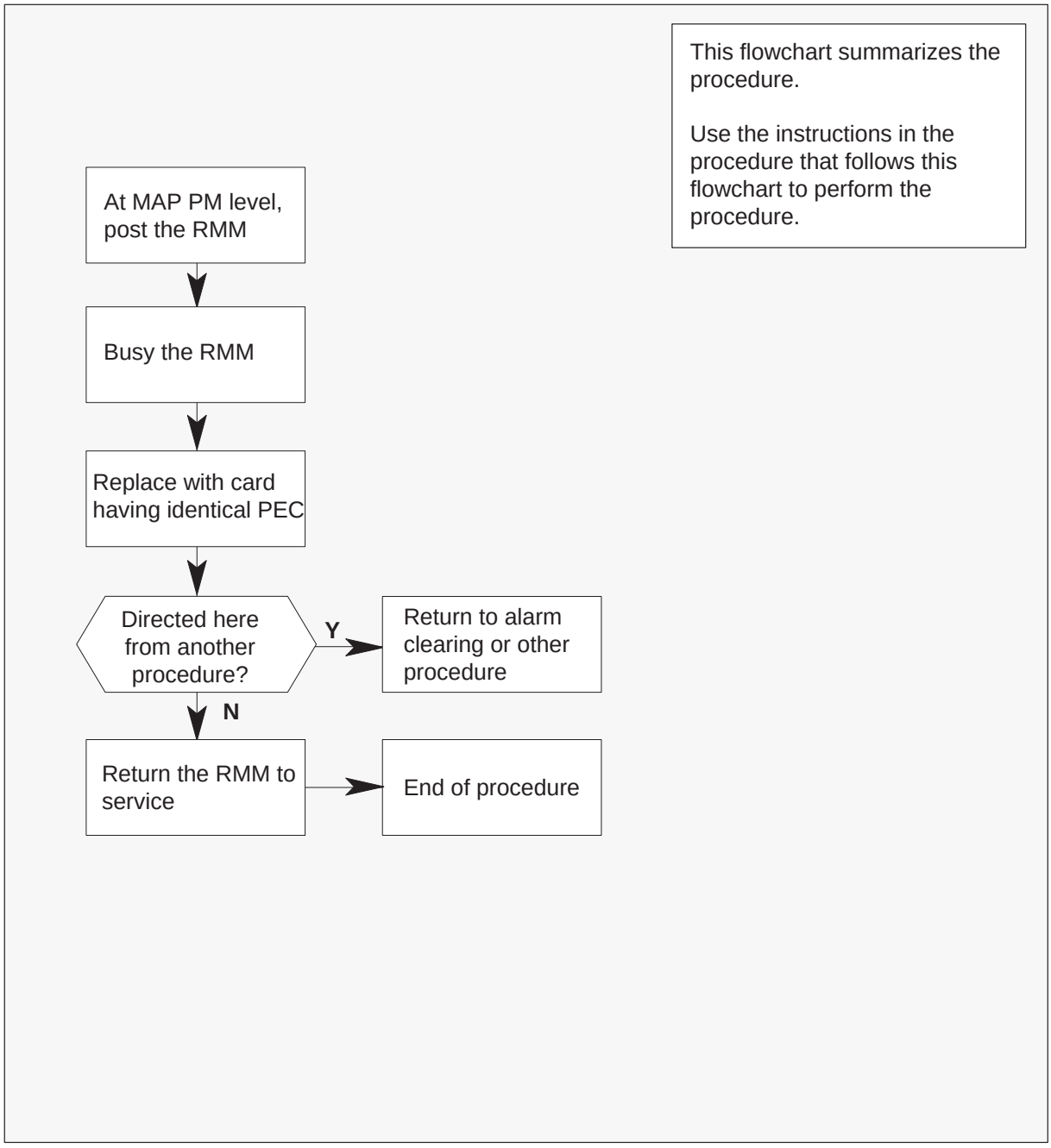
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X10 in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X10 card in RSC-S RMM



NT2X10 in RSC-S RMM (continued)

Replacing an NT2X10 card in RSC-S RMM

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 Obtain an NT2X10 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no

and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of MAP display:

```
 CM    MS     IOD     Net     PM     CCS     LNS    Trks     Ext    Appl
 .      .       .       .       .      .       .       .       .       .
RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0       130
 2 Post_   RMM       0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net    PM    CCS    LNS    Trks     Ext      Appl
 .      .       .       .    1ManB   .      .       .        .         .
RMM              SysB     ManB     OffL     CBsy     ISTb       InSv
 0 Quit    PM       4        0       10        0        0        130
 2 Post_   RMM      0        1        0        0        0          0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

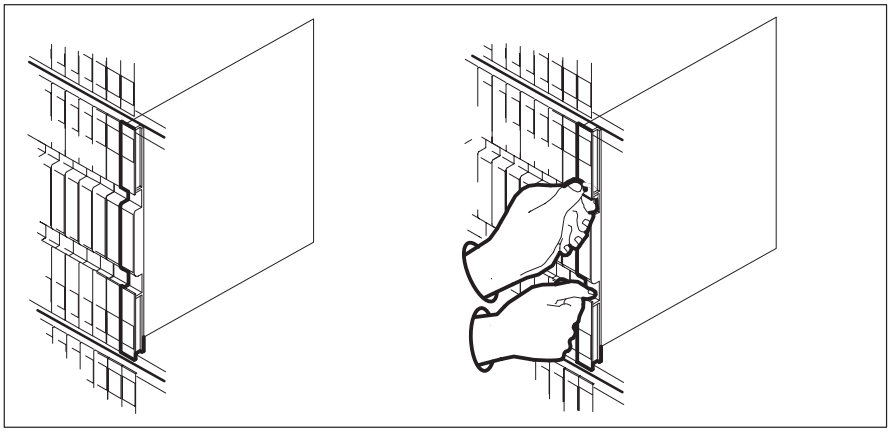
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

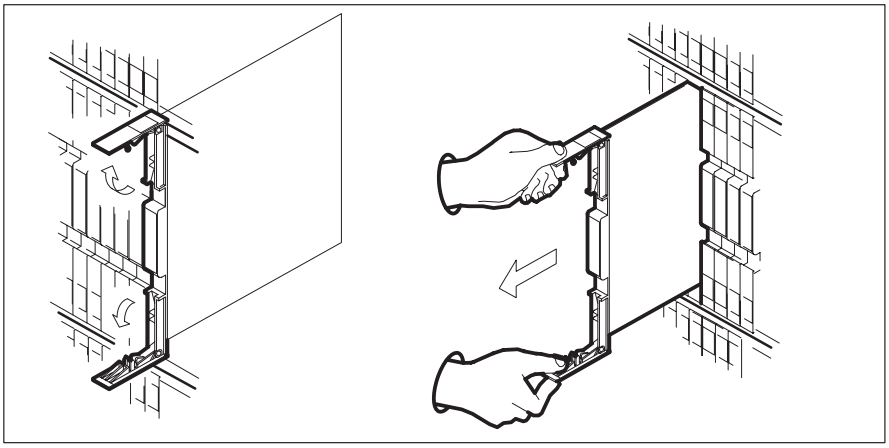
NT2X10 in RSC-S RMM (continued)

6 Remove the NT2X10 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

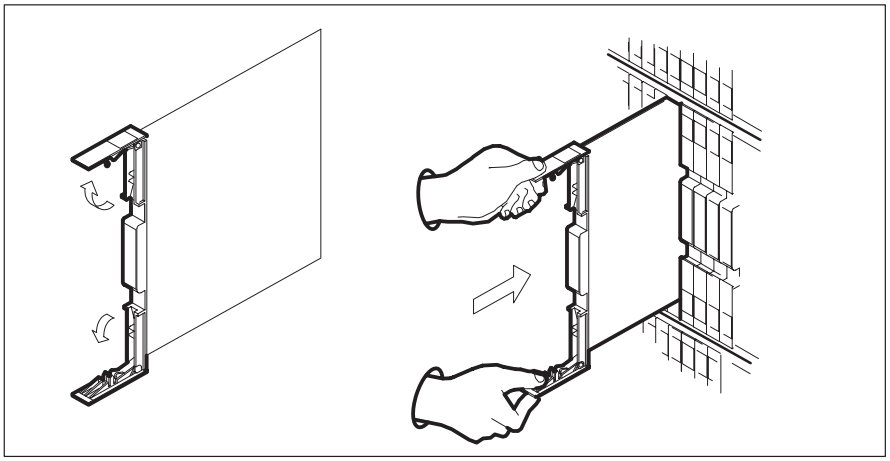


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



8

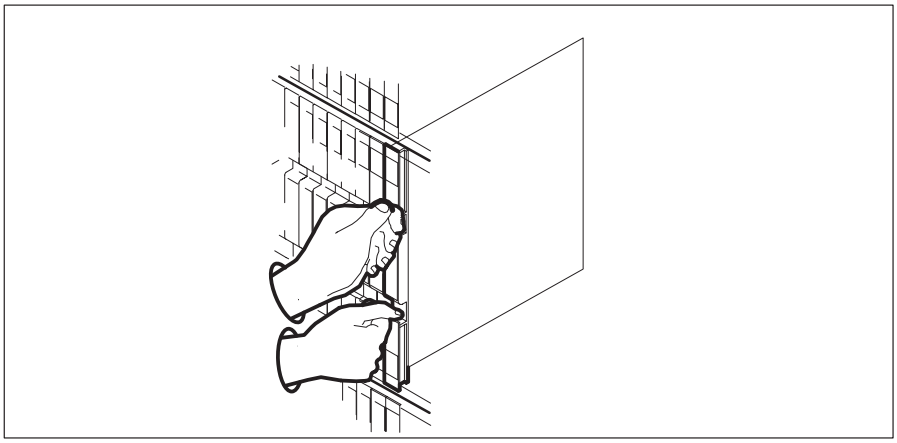
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

NT2X10 in RSC-S RMM (continued)

b. Close the locking levers.



9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 11
failed	step 14

NT2X10 in RSC-S RMM (end)

11 Return the RMM to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms the prompted replacement of the card. Go to step 16.

14 Return to the 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.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X11 in RSC-S RMM

Application

Use this procedure to replace an NT2X11 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X11	BA	Line Test Unit (digital)

Common procedures

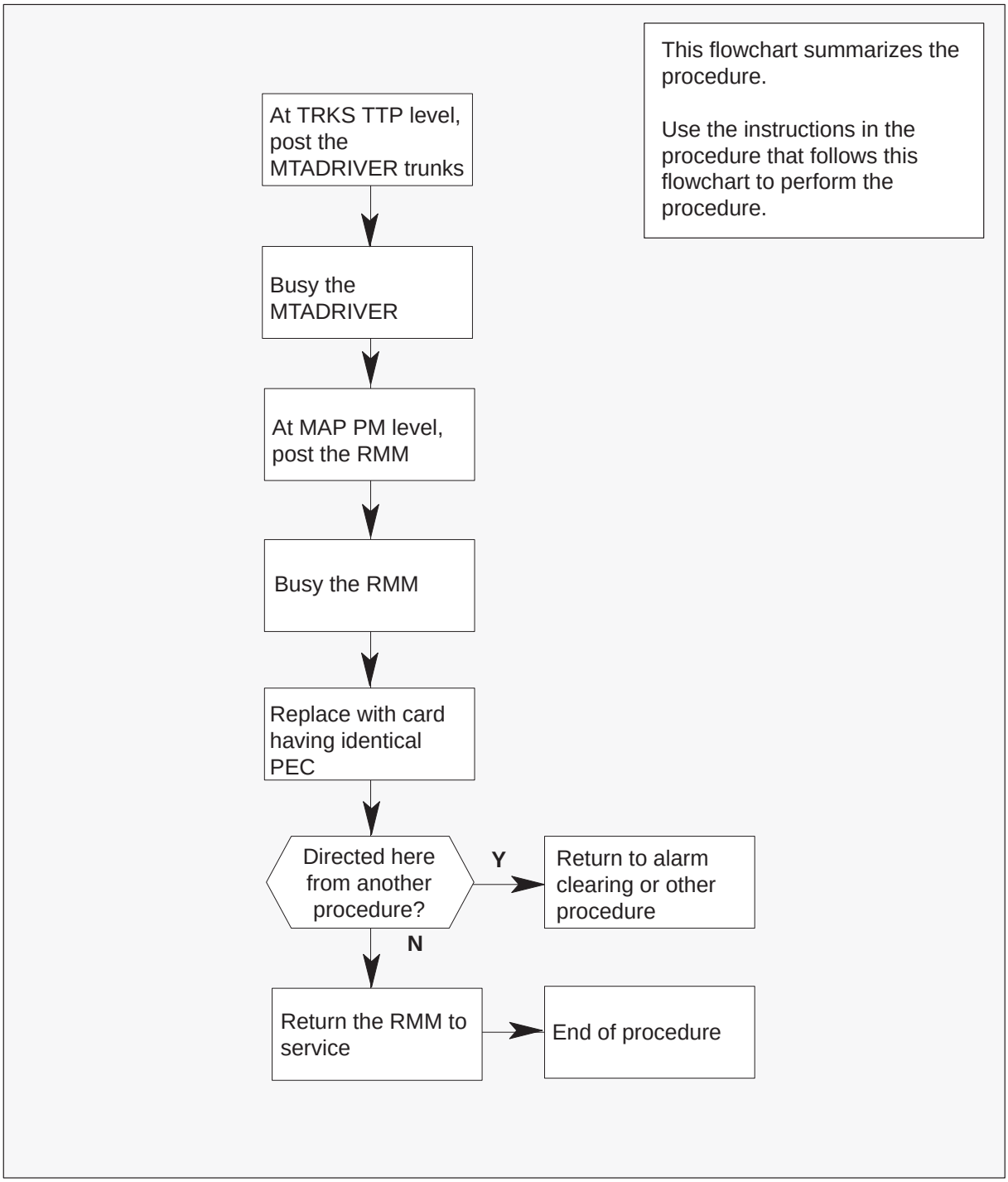
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X11 in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X11 card in RSC-S RMM



NT2X11 in RSC-S RMM (continued)

Replacing an NT2X11 card in RSC-S RMM

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 Obtain an NT2X11 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to TTP level and post the RMM by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM with the faulty MTADRIVER card
ckt_no is the number of the faulty MTADRIVER card

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks    Ext   Appl
  .      .       .       .       .      .      .       .      .      .
TTP
 0 Quit       POST    1            DELQ         BUSYQ          DIG
 2 Post_      TTP    6-009
 3 Seize_     CKT TYPE    PM NO.  COM LANG     STA  S  R  DOT TE RESULT
 4            MISC   RMM  0  16   MATDRIVER  0 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      NO CKT, SET IS EMPTY
13 Rls_       TTP:
14 Ckt_       LAST CKTN  =  1
15 Trnslvf_   SHORT CLLI IS:  MTADRI
16 Stksdr_    OK, CKT POSTED
17 Pads_
18 Level_
```

4 Busy the MTADRIVER by typing

>BSY;BSY INB
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks   Ext    Appl
 .      .       .       .       .      .      .      .      .      .
TTP
 0 Quit       POST    1            DELQ         BUSYQ          DIG
 2 Post_      TTP    6-009
 3 Seize_     CKT TYPE    PM NO. COM LANG     STA  S  R  DOT TE RESULT
 4            MISC   RMM  0  16  MATDRIVER  0 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      NO CKT, SET IS EMPTY
13 Rls_       TTP:
14 Ckt_       LAST CKTN  =  1
15 Trnslvf_   SHORT CLLI IS:  MTADRI
16 Stksdr_    OK, CKT POSTED
17 Pads_
18 Level_
```

NT2X11 in RSC-S RMM (continued)

5 Set the MAP display to the PM level and post the RMM by typing

>PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks    Ext   Appl
  .      .      .       .       .     .      .      .       .     .
RMM               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0       130
 2 Post_   RMM       0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

6 Busy the RMM by typing

>BSY
and pressing the Enter key.

NT2X11
in RSC-S RMM (continued)

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks   Ext   Appl
 .      .       .       .     1ManB   .      .       .     .     .
RMM               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        4        0       10        0        0       130
 2 Post_   RMM       0        1        0        0        0         0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

7

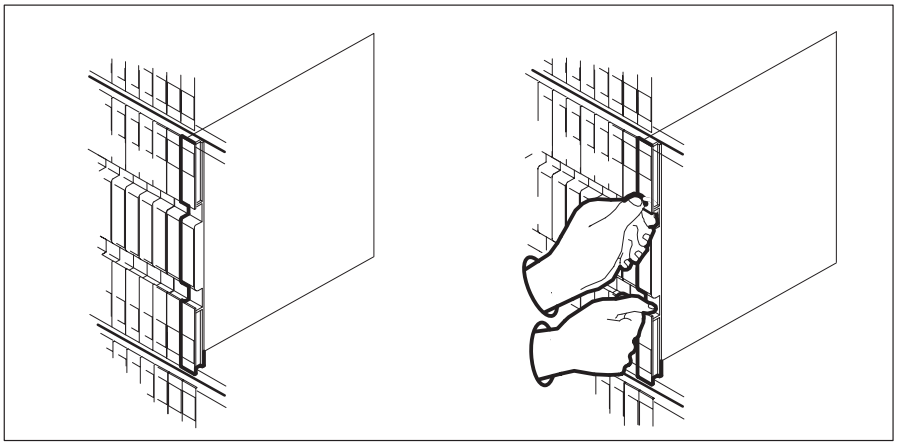
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

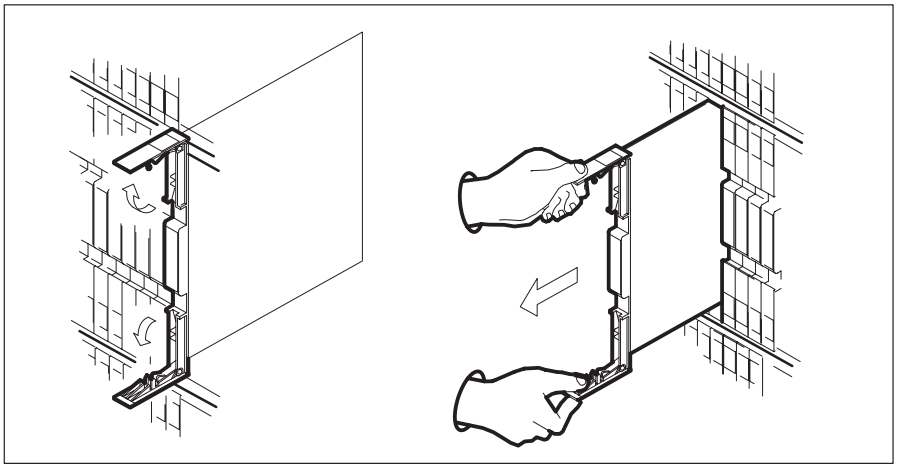
8 Remove the NT2X11 card as shown in the following figures.

NT2X11
in RSC-S RMM (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

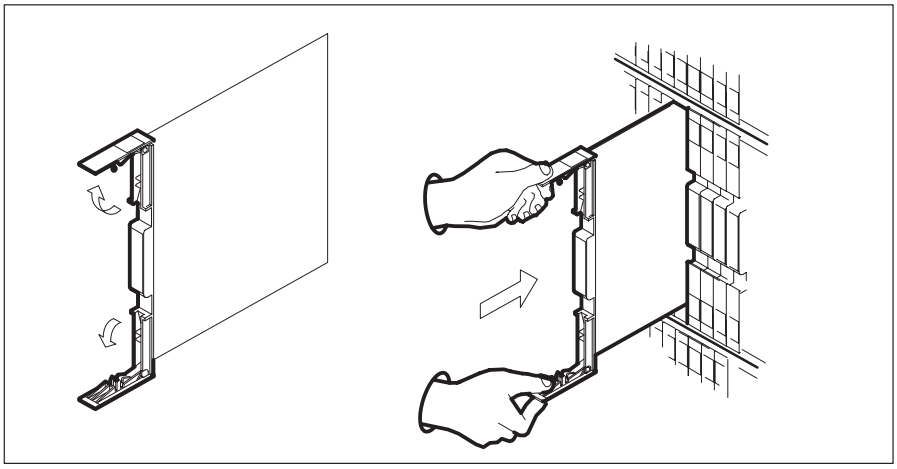


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

9 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



10

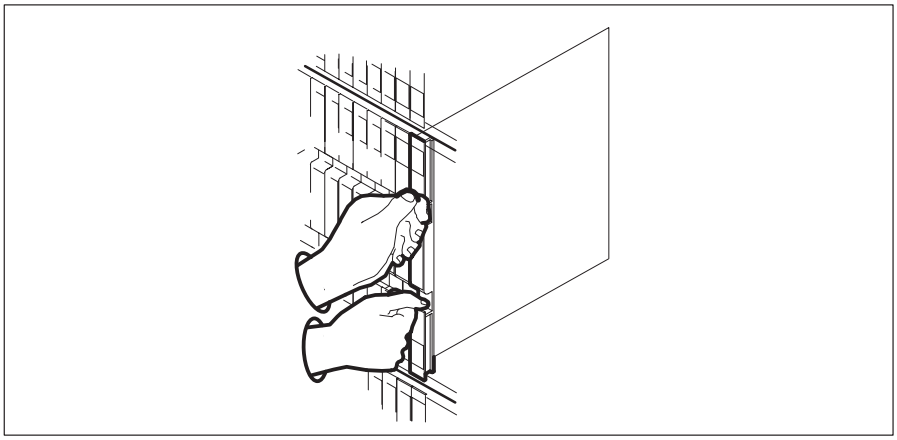
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

NT2X11 in RSC-S RMM (continued)

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 18
other	step 12

At the MAP terminal

12 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 13
failed	step 18

13 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 14
failed	step 19

14 Post the MTADRIVER by typing

>TRKS;TTP;POST P RMM rmm_no ckt_no
where

rmm_no is the number of the RMM with the new MTADRIVER card
ckt_no is the number of the new MTADRIVER card
and pressing the Enter key.

15 Return the MTADRIVER to service by typing

>BSY ALL;RTS ALL
and pressing the Enter key.

16 Send any faulty cards for repair according to local procedure.

17 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 20.

18 Return to the **Alarm Clearing Procedures** that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

19 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X57 in RSC-S RMM

Application

Use this procedure to replace an NT2X57 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X57	AA	Signal Distribution

Common procedures

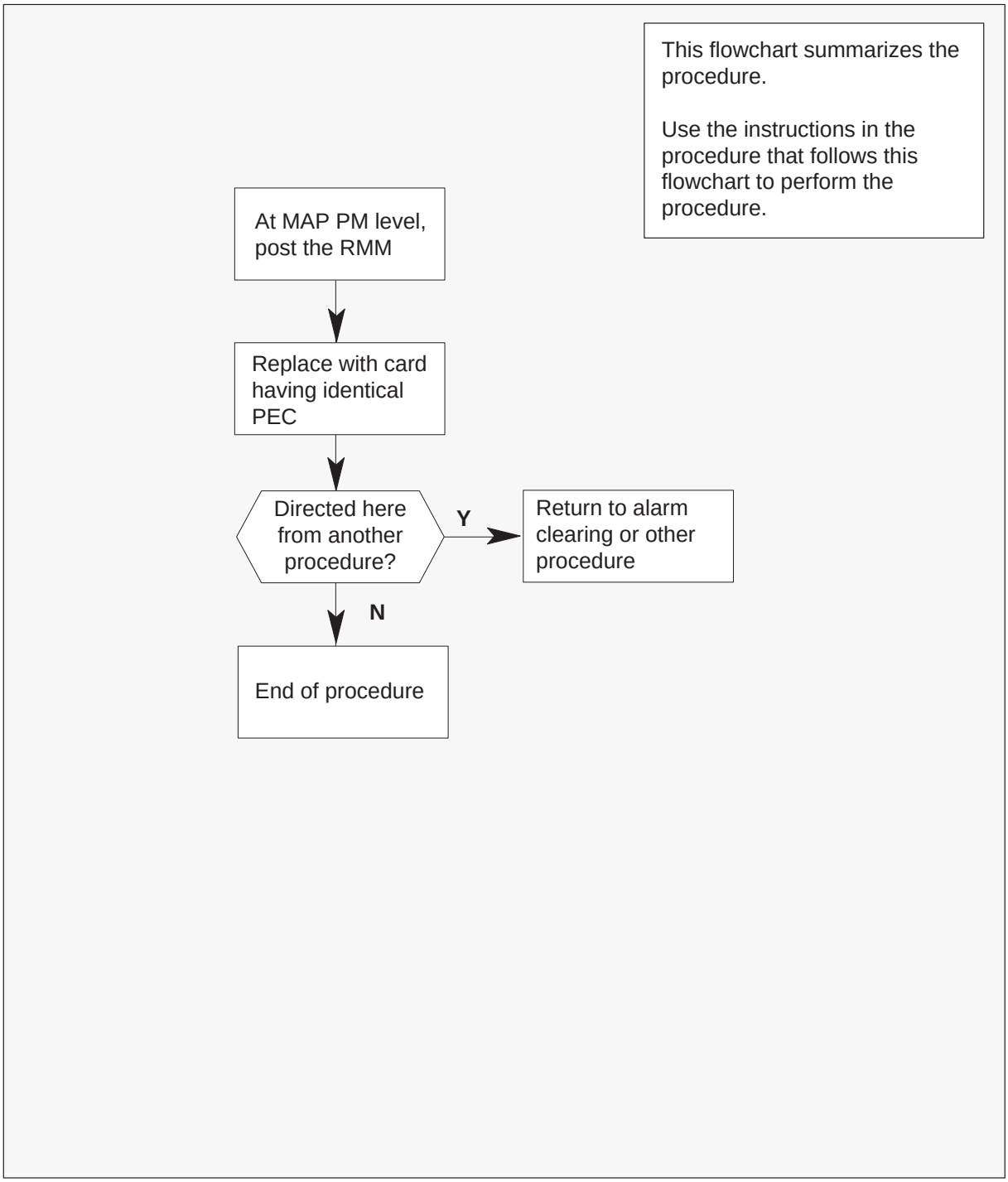
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X57 in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X57 card in RSC-S RMM



NT2X57 in RSC-S RMM (continued)

Replacing an NT2X57 card in RSC-S RMM

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 Obtain an NT2X57 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext   Appl
 .      .      .      .      .     .      .      .       .      .
RMM            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit   PM      0        0        0        0        0       130
 2 Post_   RM     0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

NT2X57
in RSC-S RMM (continued)

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     1ManB   .      .      .       .      .
RMM              SysB     ManB     OffL     CBsy    ISTb     InSv
 0 Quit    PM       4        0       10        0       0      130
 2 Post_   RMM      0        1        0        0       0        0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

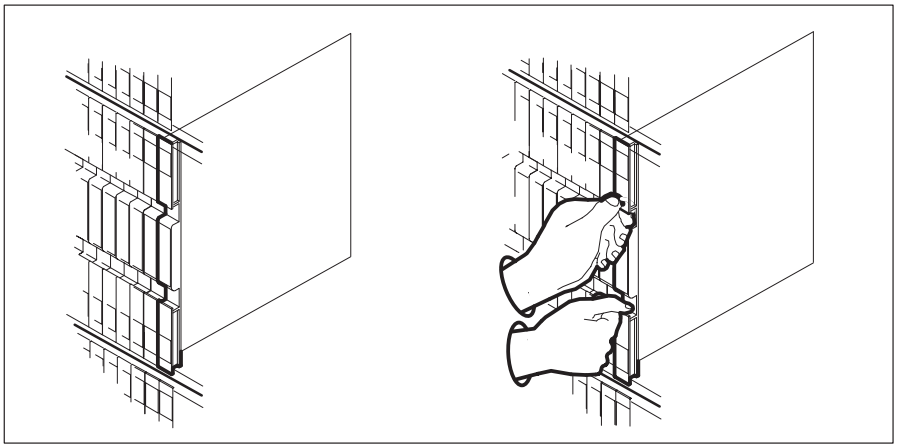
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

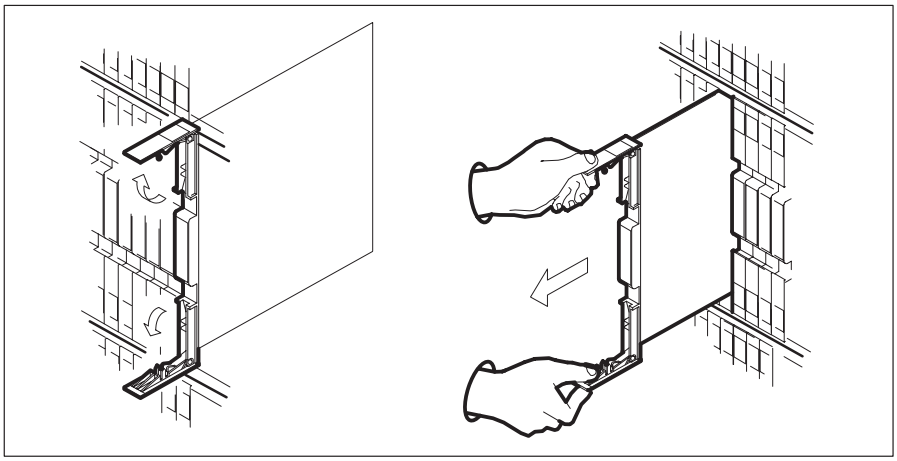
6 Remove the NT2X57 card as shown in the following figures.

NT2X57
in RSC-S RMM (continued)

a. Locate the card to be removed on the appropriate shelf.



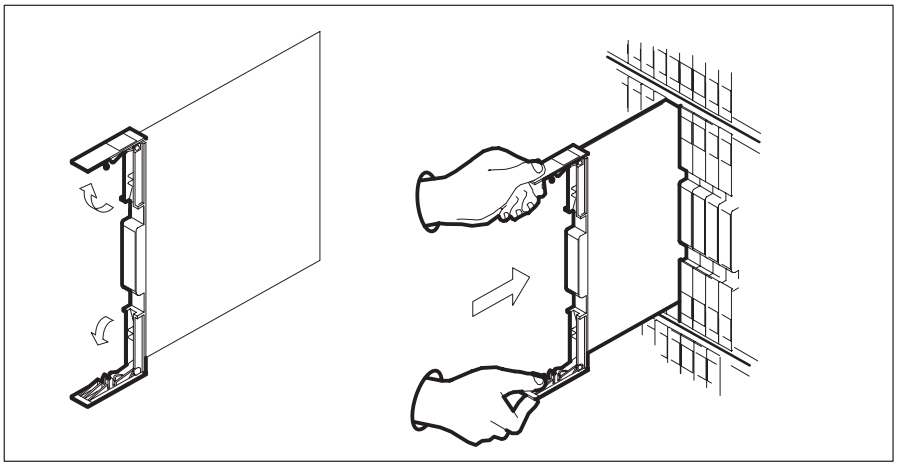
b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

d. Set the switch settings on the card to match those of the card you are replacing.

7 Open the locking levers on the replacement card. Align the card with the slots in the shelf. Gently slide the card into the shelf.



8

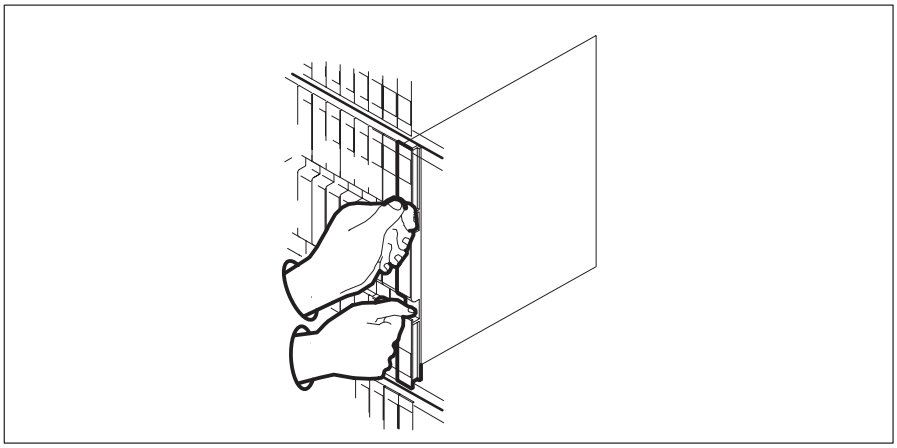
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

NT2X57 in RSC-S RMM (continued)

b. Close the locking levers.



9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step11
failed	step 15

NT2X57 in RSC-S RMM (end)

11 Return the RMM to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

14 Return to the 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.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X59 in RSC-S RMM

Application

Use this procedure to replace an NT2X59 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X59	AA	Group Codec

Common procedures

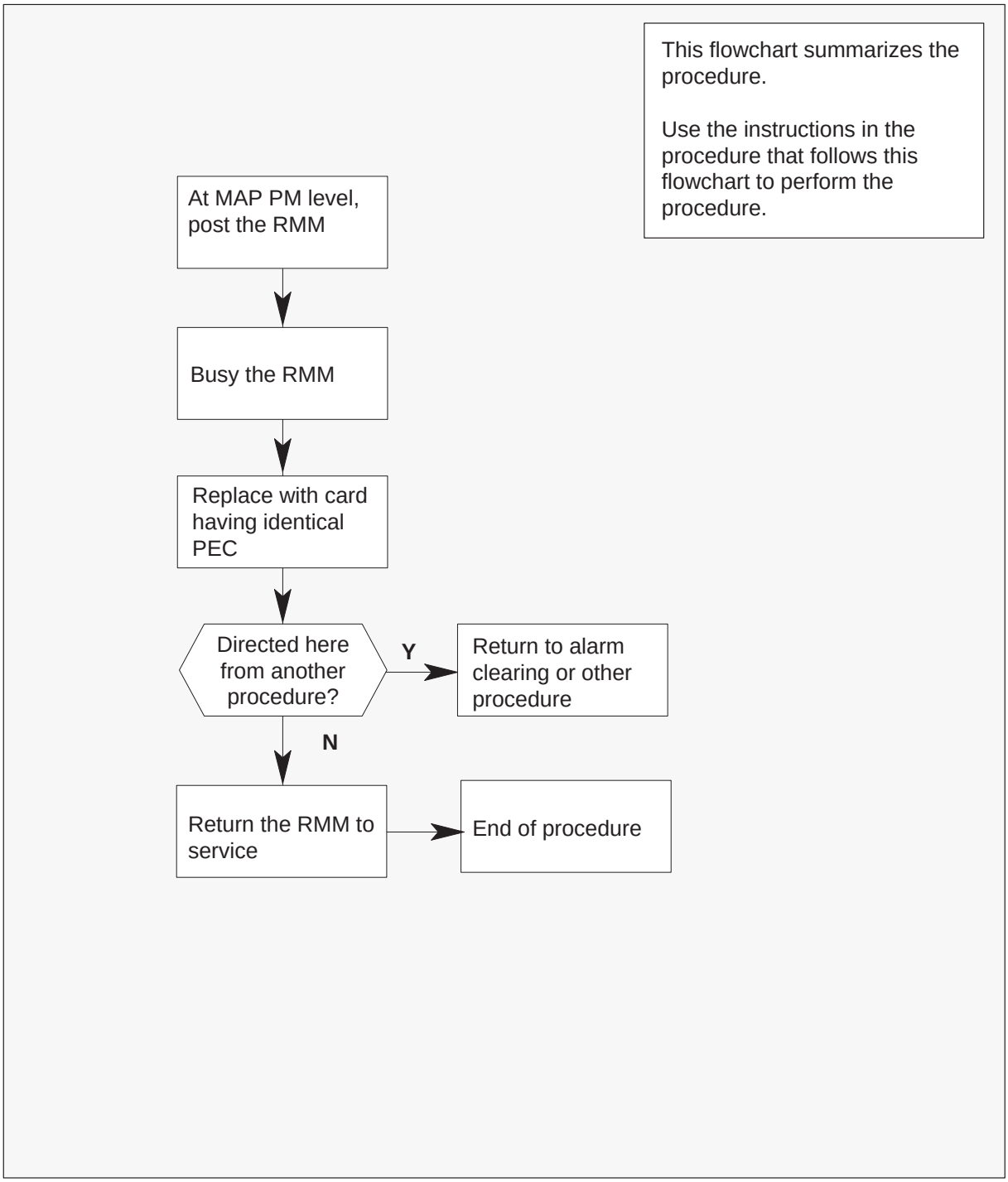
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X59
in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X59 card in RSC-S RMM



NT2X59 in RSC-S RMM (continued)

Replacing an NT2X59 card in RSC-S RMM

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 Obtain an NT2X59 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext   Appl
 .     .      .      .     .      .      .       .       .     .
RMM           SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit    PM     0        0        0        0        0      130
 2 Post_   RMM   0        0        0        0        0        0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

NT2X59
in RSC-S RMM (continued)

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     1ManB   .      .      .       .      .
RMM              SysB     ManB     OffL     CBsy    ISTb     InSv
 0 Quit    PM       4        0       10        0       0      130
 2 Post_   RMM      0        1        0        0       0        0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

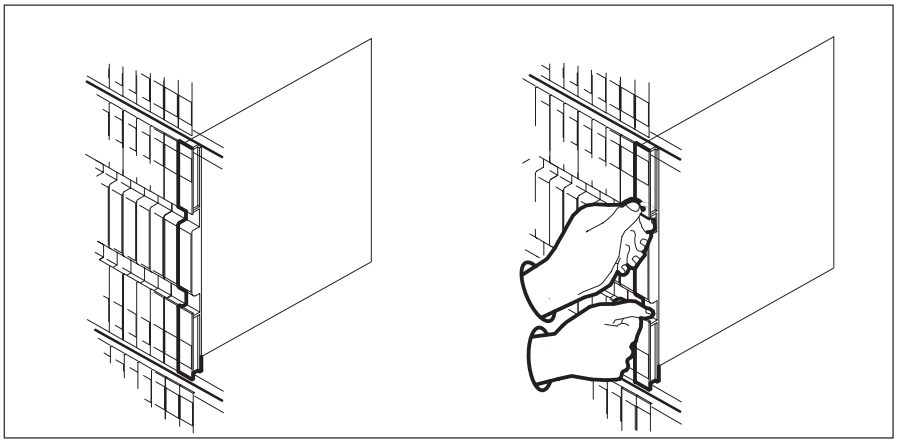
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

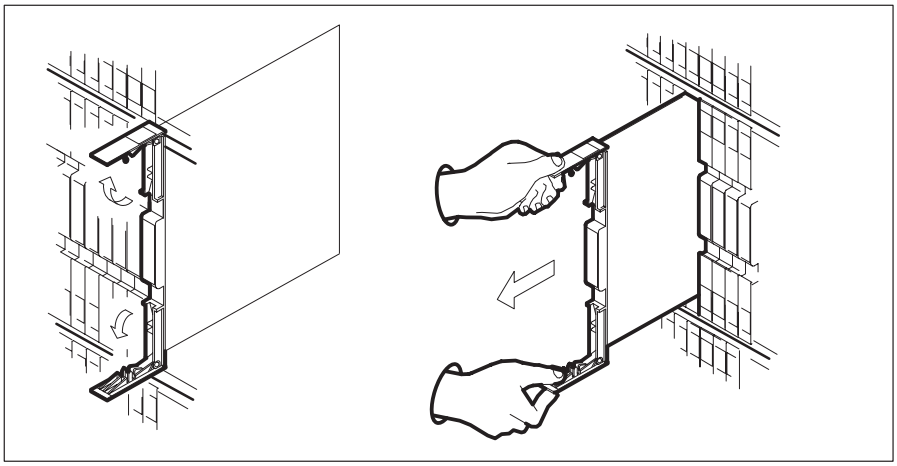
6 Remove the NT2X59 card as shown in the following figures.

NT2X59 in RSC-S RMM (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

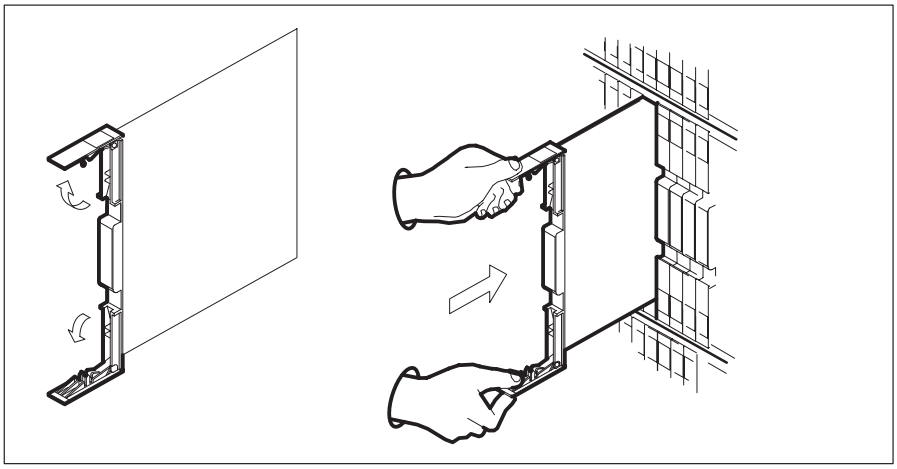


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



8

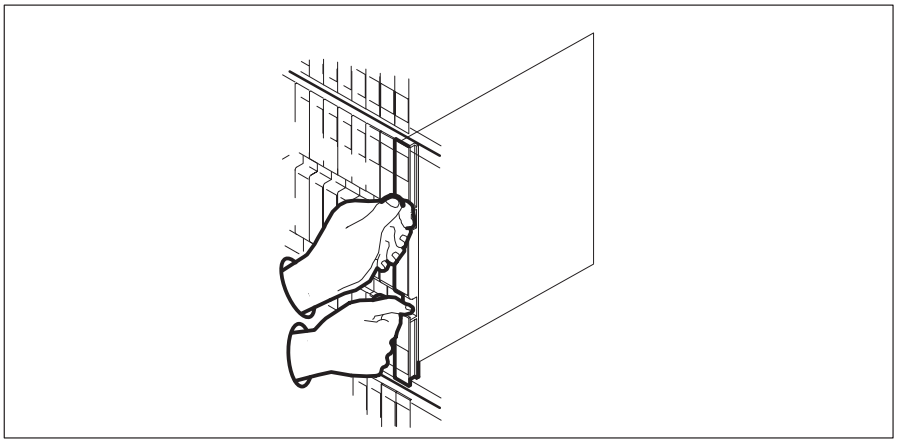
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

NT2X59 in RSC-S RMM (continued)

b. Close the locking levers.



9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 11
failed	step 14

NT2X59 in RSC-S RMM (end)

11 Return the RMM to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

14 Return to the 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.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT2X90 in RSC-S RMM

Application

Use this procedure to replace an NT2X90 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X90	AD	Test Trunk Circuit

Common procedures

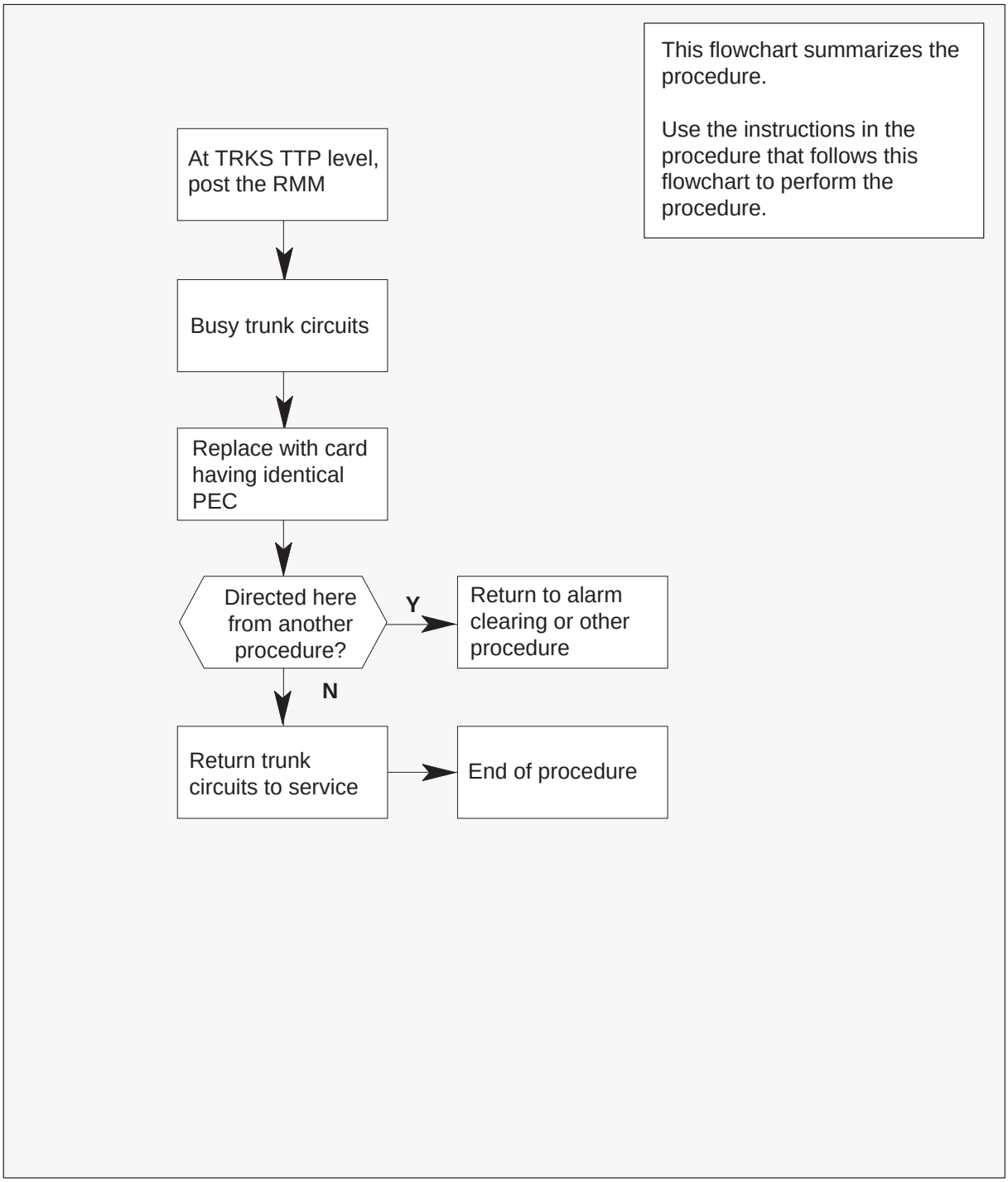
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT2X90
in RSC-S RMM (continued)

Summary of card replacement procedure for an NT2X90 card in RSC-S RMM



NT2X90 in RSC-S RMM (continued)

Replacing an NT2X90 card in RSC-S RMM

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 Obtain an NT2X90 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the TRKS level and post the RMM by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     .     .       .     .               .
TTP
 0 Quit     POST                DELQ         BUSYQ          DIG
 2 Post_    TTP    6-018
 3 Seize_   CKT TYPE   PM NO.  COM LANG   STA  S  R  DOT TE RESULT
 4          OG      RMM  0  20      MLT          0 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold
12 Next_
13 Rls_
14 Ckt_
15 Trnslvf_
16 Stksdr_
17 Pads_
18 Level_
```

4 Busy the trunk circuit on the RMM by typing

>BSY;BSY;INB;ALL
and pressing the Enter key.

NT2X90
in RSC-S RMM (continued)

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     .     .       .       .       .      .
TTP
 0 Quit     POST               DELQ       BUSYQ        DIG
 2 Post_    TTP    6-018
 3 Seize_   CKT TYPE   PM NO.    COM LANG   STA  S  R  DOT TE RESULT
 4            OG      RMM  0  20      MLT          0 INB
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold
12 Next_
13 Rls_
14 Ckt_
15 Trnslvf_
16 Stksdr_
17 Pads_
18 Level_
```

At the RMM shelf

5

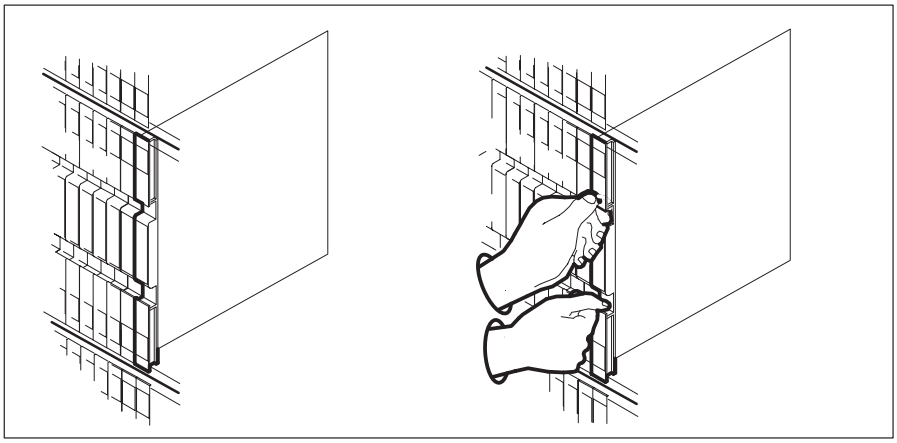
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

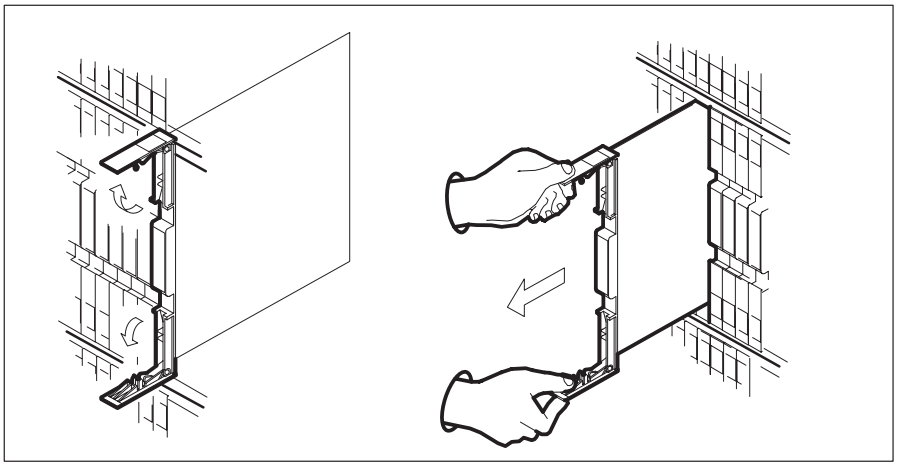
6 Remove the NT2X90 card as shown in the following figures.

NT2X90
in RSC-S RMM (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

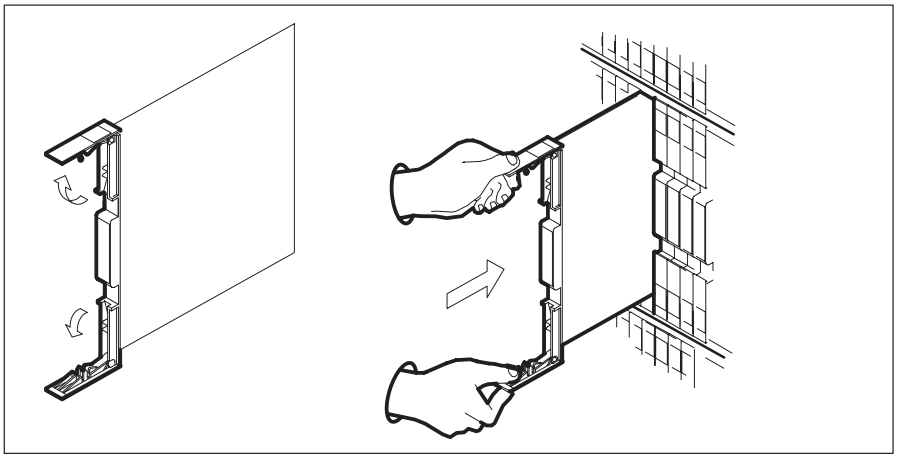


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



8

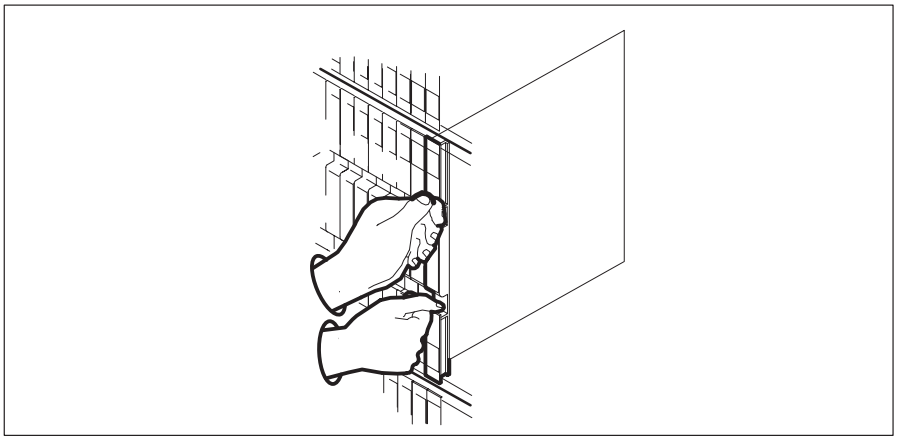
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

NT2X90 in RSC-S RMM (continued)

b. Close the locking levers.



9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 11
failed	step 14

NT2X90 in RSC-S RMM (end)

11 Return the RMM to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

14 Return to the 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.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT3X09 in RSC-S RMM

Application

Use this procedure to replace an NT3X09 card in an RSC-S RMM.

PEC	Suffixes	Name
NT3X09	BA	Remote Metallic Test Access

Common procedures

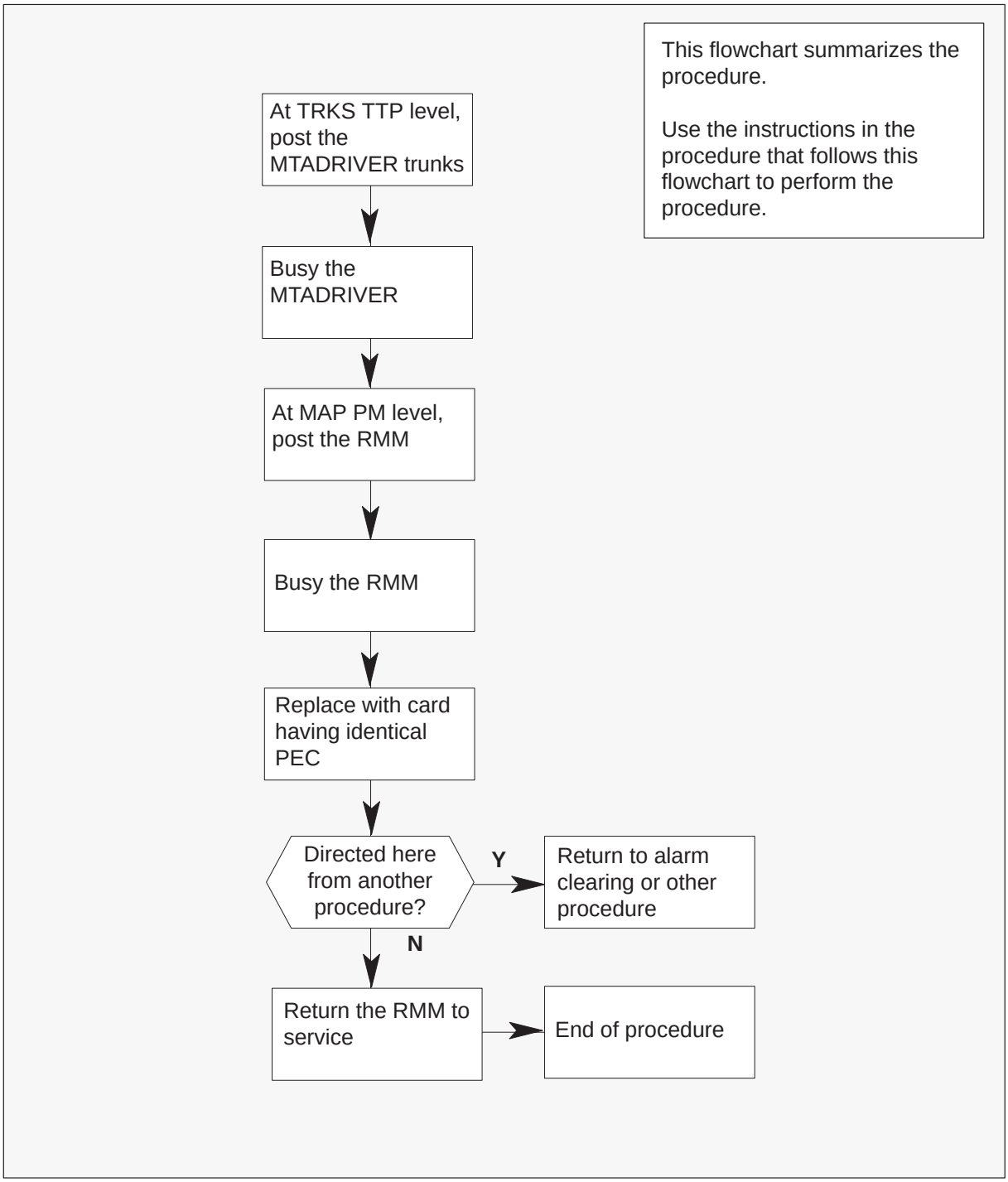
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT3X09 in RSC-S RMM (continued)

Summary of card replacement procedure for an NT3X09 card in RSC-S RMM



NT3X09 in RSC-S RMM (continued)

Replacing an NT3X09 card in RSC-S RMM

At the MAP

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT3X09 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the TTP level and post the trunk by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM with the faulty MTADRIVER card
ckt_no is the number of the faulty MTADRIVER card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .      .      .      .      .       .      .
TTP
 0 Quit     POST    1           DELQ         BUSYQ          DIG
 2 Post_   TTP    6-009
 3 Seize_  CKT TYPE    PM NO. COM LANG  STA  S  R  DOT TE RESULT
 4         MISC   RMM  0  16    MATDRIVER    0 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      NO CKT, SET IS EMPTY
13 Rls_       TTP:
14 Ckt_       LAST CKTN  =  1
15 Trnslvf_   SHORT CLLI IS:  MTADRI
16 Stksdr_    OK, CKT POSTED
17 Pads_
18 Level_
```

4 Busy the MTADRIVER by typing

>BSY;BSY INB
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD     Net    PM   CCS   LNS   Trks    Ext    Appl
 .      .      .      .      .     .     .     .       .      .
TTP
 0 Quit    POST    1            DELQ         BUSYQ          DIG
 2 Post_   TTP    6-009
 3 Seize_  CKT TYPE  PM NO.  COM LANG  STA  S  R  DOT TE RESULT
 4            MISC    RMM  0  16      MATDRIVER    0 INB
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      NO CKT, SET IS EMPTY
13 Rls_       TTP:
14 Ckt_       LAST CKTN  =  1
15 Trnslvf_   SHORT CLLI IS:  MTADRI
16 Stksdr_    OK, CKT POSTED
17 Pads_
18 Level_
```

5 Set the MAP display to the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

NT3X09 in RSC-S RMM (continued)

Example of a MAP display:

```
 CM    MS   IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .     .      .      .     .      .      .       .       .
RMM           SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit   PM      0        0        0        0        0       130
 2 Post_  RMM     0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

6 Busy the RMM by typing

>BSY
and pressing the Enter key.

NT3X09
in RSC-S RMM (continued)

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
   .     .     .      .    1ManB   .      .       .       .       .
  RMM           SysB     ManB     OffL     CBsy     ISTb      InSv
   0 Quit  PM       4        0       10        0        0       130
   2 Post_ RMM      0        1        0        0        0         0
   3
   4         RMM
   5  ManB
   5 Trnsl
   6 Tst
   7 Bsy
   8 RTS
   9 OffL
  10 LoadPM
  11 Disp_
  12 Next
  13
  14 QueryPM
  15
  16
  17
  18
```

At the RMM shelf

7

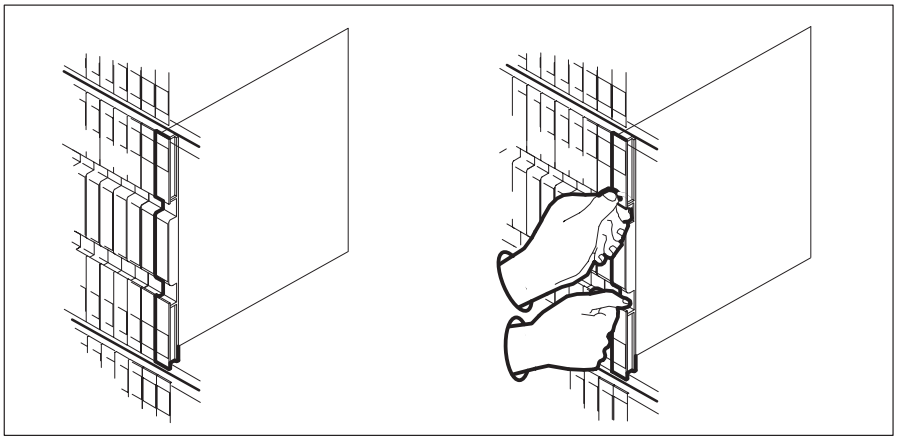
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

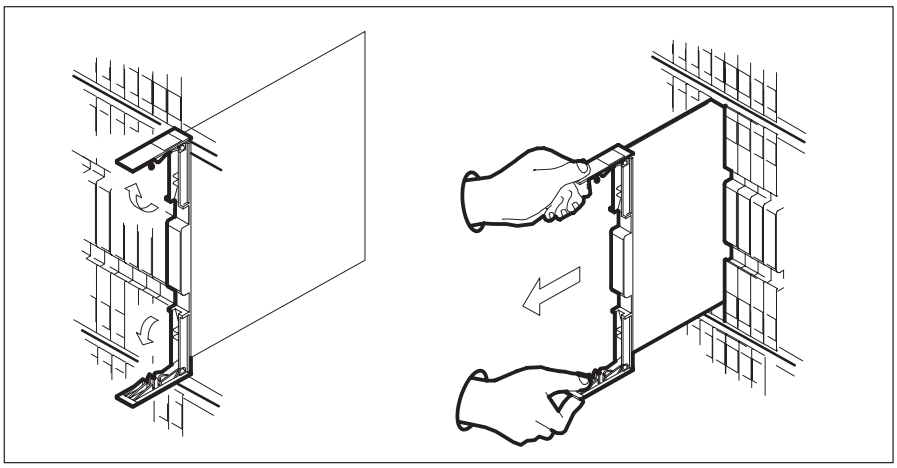
8 Remove the NT3X09 card as shown in the following figures.

NT3X09
in RSC-S RMM (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



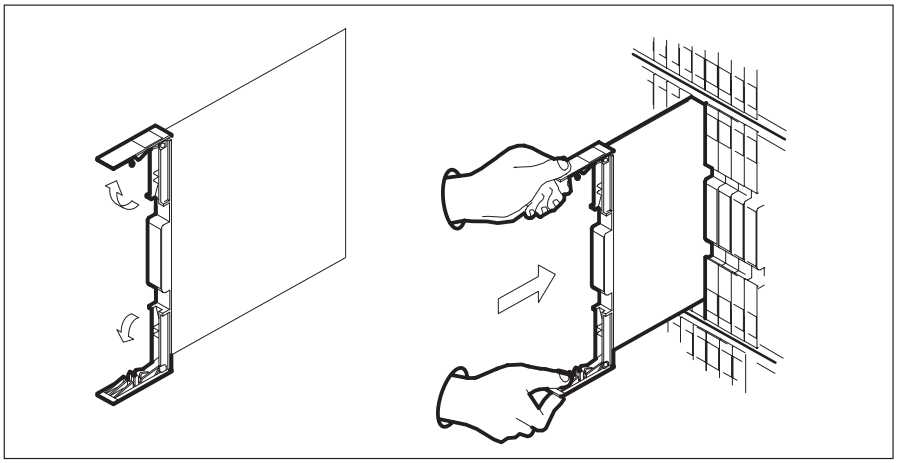
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

9 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

NT3X09
in RSC-S RMM (continued)

b. Gently slide the card into the shelf.



10

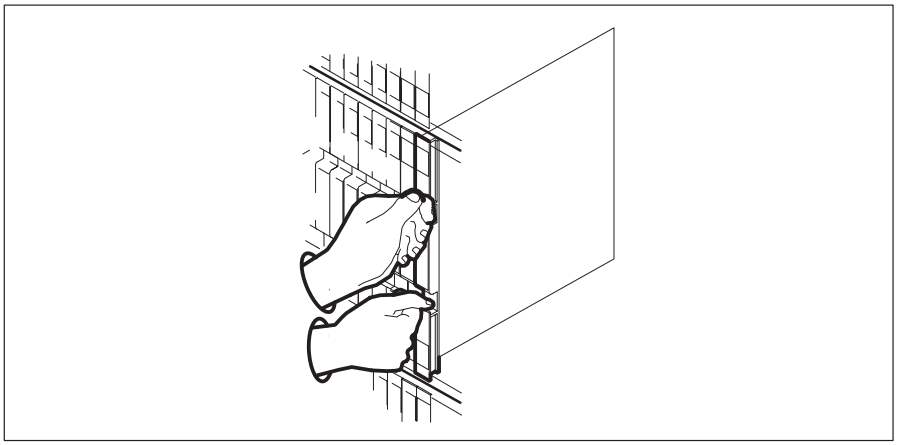
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

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.

NT3X09 in RSC-S RMM (continued)

b. Close the locking levers.



11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 18
other	step 12

At the MAP terminal

12 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 13
failed	step 18

13 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 14
failed	step 19

14 Post the MTADRIVER by typing

>TRKS;TTP;POST P RMM rmm_no ckt_no
and pressing the Enter key.

where

rmm_no is the number of the RMM with the new MTADRIVER card
ckt_no is the number of the new MTADRIVER card

15 Return the MTADRIVER to service by typing

>BSY ALL;RTS ALL
and pressing the Enter key.

16 Send any faulty cards for repair according to local procedure.

17 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 20.

18 Return to the 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 operating company maintenance personnel.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT4X97 in RSC-S RMM

Application

Use this procedure to replace an NT4X97 card in an RSC-S RMM.

PEC	Suffixes	Name
NT4X97	AA	Line Test Unit (analog)

Common procedures

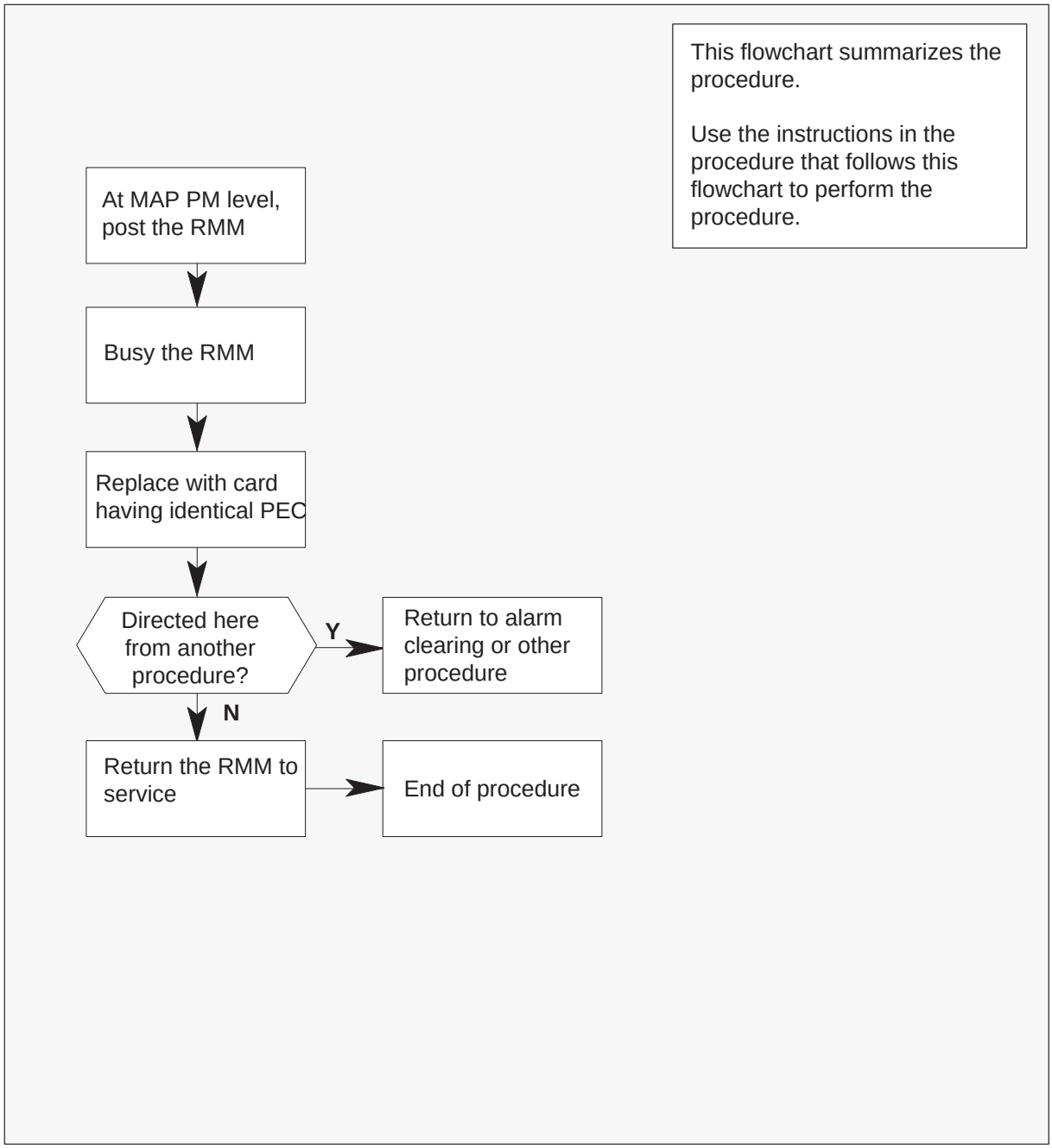
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT4X97
in RSC-S RMM (continued)

Summary of card replacement procedure for an NT4X97 card in RSC-S RMM



NT4X97 in RSC-S RMM (continued)

Replacing an NT4X97 card in RSC-S RMM

At the MAP

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT4X97 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of MAP display:

```
 CM    MS     IOD     Net     PM     CCS     LNS    Trks    Ext   Appl
 .      .       .       .       .      .       .       .      .      .
RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0       130
 2 Post_   RMM       0        0        0        0        0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .       .       .    1ManB  .      .       .       .      .
RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       4        0       10        0        0       130
 2 Post_   RMM      0        1        0        0        0         0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

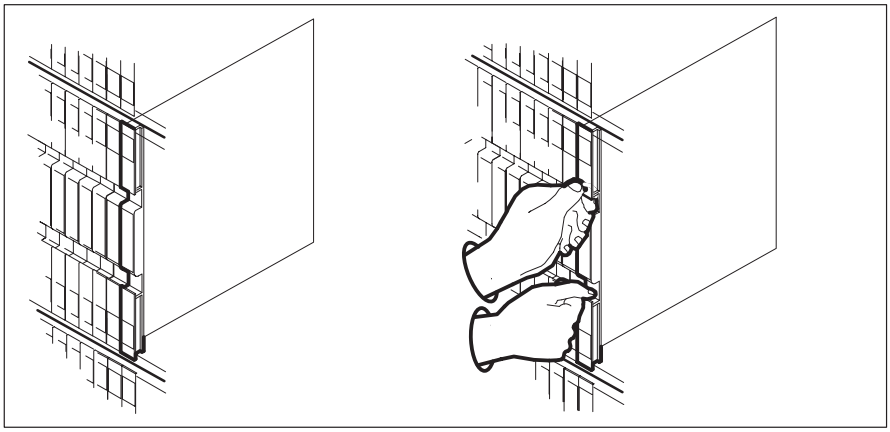
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

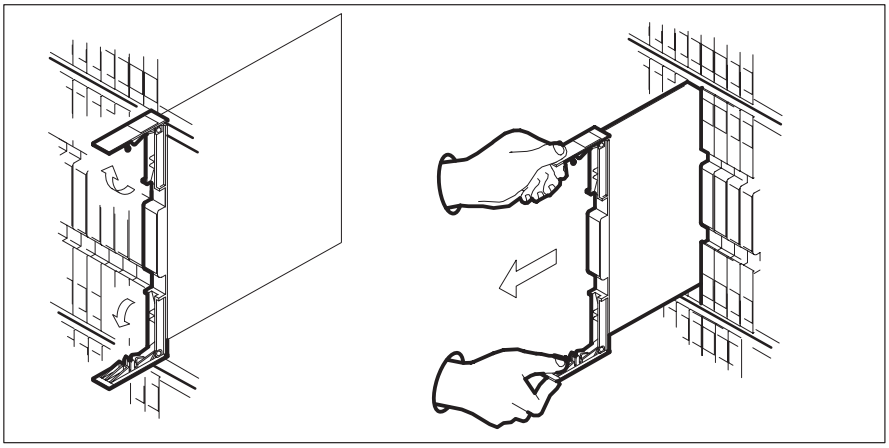
NT4X97
in RSC-S RMM (continued)

6 Remove the NT4X97 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

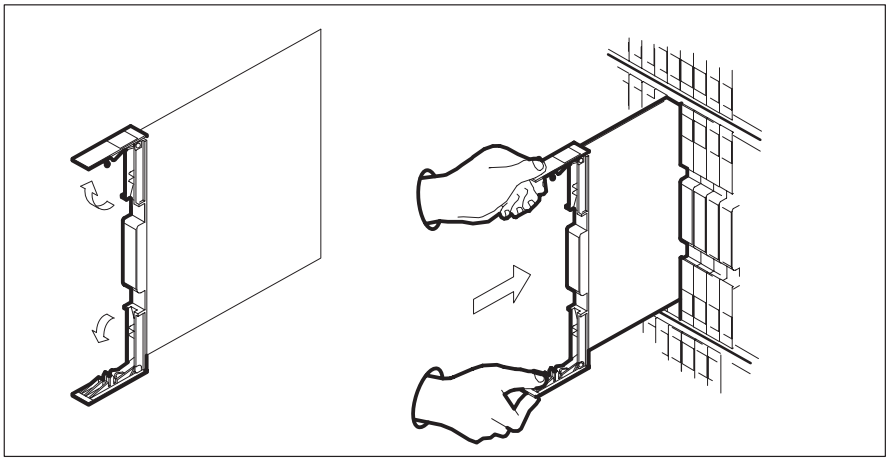


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



8

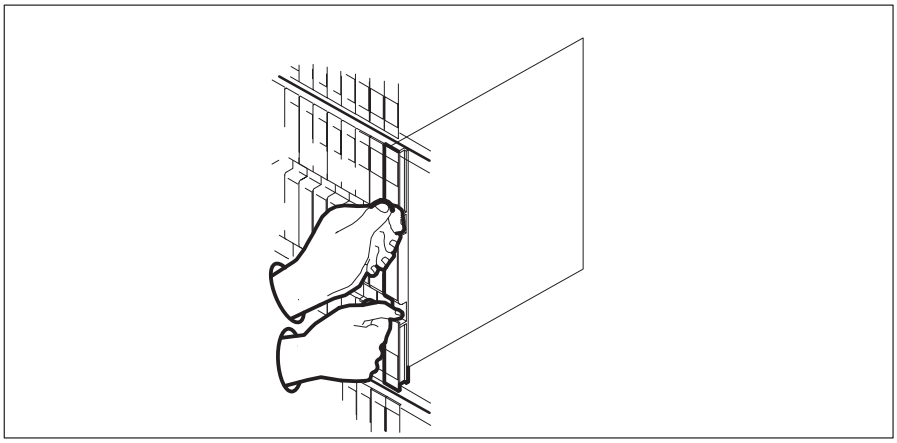
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

NT4X97 in RSC-S RMM (continued)

b. Close the locking levers.



9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 11
failed	step 14

11 Return the RMM to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms the prompted replacement of the card. Go to step 16.

14 Return to the *Alarm Clearing Procedures* that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT4X98 in RSC-S RMM

Application

Use this procedure to replace an NT4X98 card in an RSC-S RMM.

PEC	Suffixes	Name
NT4X98	AA	Line Test Unit (digital)

Common procedures

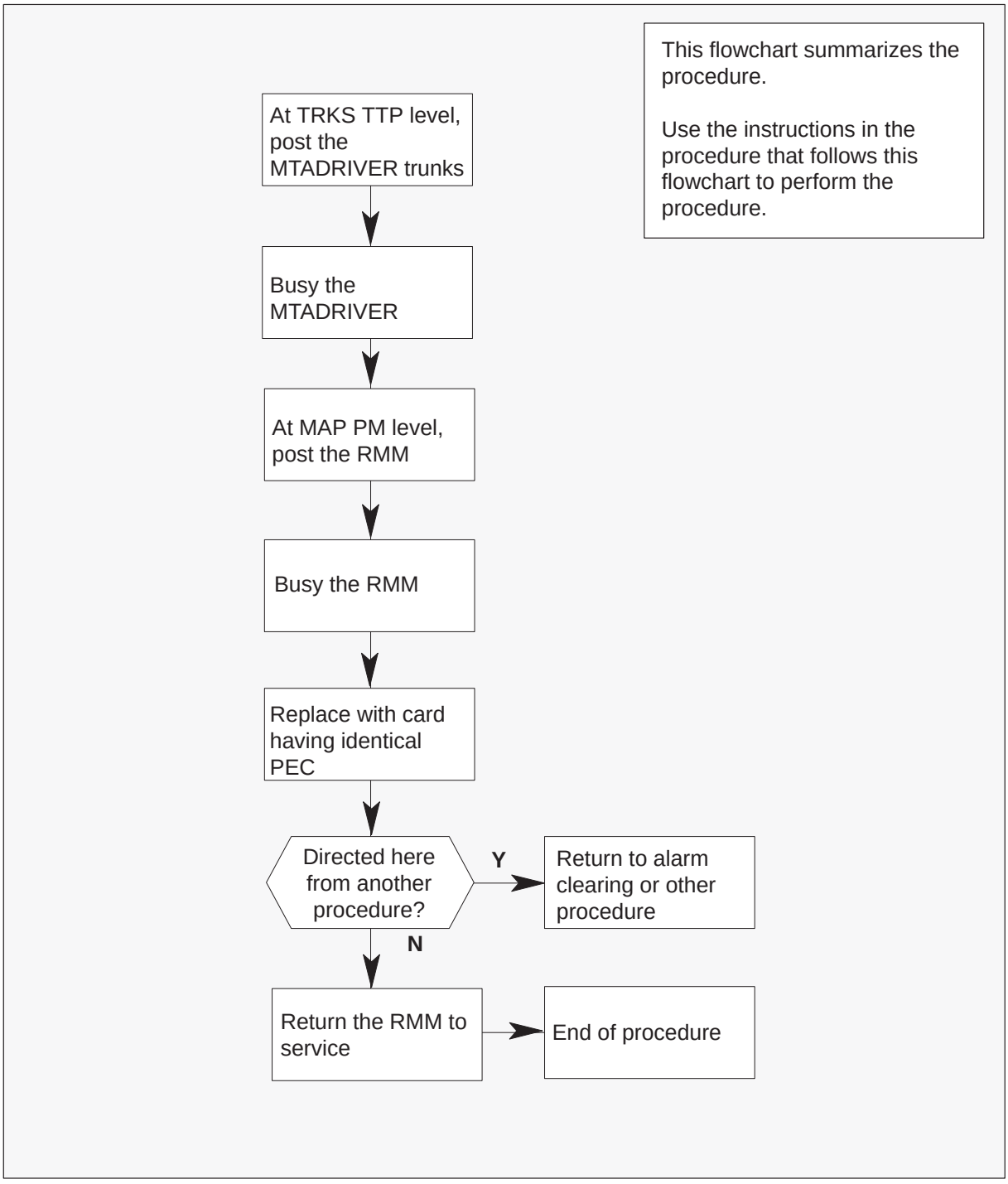
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT4X98
in RSC-S RMM (continued)

Summary of card replacement procedure for an NT4X98 card in RSC-S RMM



NT4X98 in RSC-S RMM (continued)

Replacing an NT4X98 card in RSC-S RMM

At the MAP

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT4X98 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to PM level and post the RMM by typing

>MAPCI;MTC;TRKS;TTP;POST P RMM rmm_no ckt_no

where

rmm_no is the number of the RMM with the faulty MTADRIVER card

ckt_no is the number of the faulty MTADRIVER card

and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks    Ext   Appl
  .      .       .       .      .      .      .       .      .      .
TTP
 0 Quit       POST    1            DELQ         BUSYQ          DIG
 2 Post_      TTP    6-009
 3 Seize_     CKT TYPE    PM NO.  COM LANG     STA  S  R  DOT TE RESULT
 4            MISC   RMM  0  16   MATDRIVER  3 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      TTP:
13 Rls_       LAST CKTN  =  1
14 Ckt_       SHORT CLLI IS:  MTADRI
15 Trnslvf_   OK, CKT POSTED
16 Stksdr_
17 Pads_
18 Level_
```

4 Busy the MTADRIVER by typing

>BSY; BSY INB
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks   Ext    Appl
 .      .       .       .       .     .      .      .      .      .
TTP
 0 Quit       POST    1            DELQ         BUSYQ          DIG
 2 Post_      TTP    6-009
 3 Seize_     CKT TYPE    PM NO. COM LANG     STA  S  R  DOT TE RESULT
 4            MISC   RMM  0  16  MATDRIVER  3 IDL
 5 Bsy_
 6 RTS_
 7 Tst_
 8
 9 CktInfo
10 CktLoc
11 Hold       TTP ID IS:   6-009
12 Next_      TTP:
13 Rls_       LAST CKTN  =  1
14 Ckt_       SHORT CLLI IS:  MTADRI
15 Trnslvf_   OK, CKT POSTED
16 Stksdr_
17 Pads_
18 Level_
```

NT4X98 in RSC-S RMM (continued)

5 Set the MAP display to the PM level and post the RMM by typing

>PM;POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM where the card is to be removed

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks    Ext   Appl
  .      .      .       .      .      .      .      .       .     .
RMM              SysB    ManB    OffL    CBsy    ISTb      InSv
 0 Quit    PM       0       0       0       0       0       130
 2 Post_   RMM      0       0       0       0       0         0
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

6 Busy the RMM by typing

>BSY
and pressing the Enter key.

NT4X98
in RSC-S RMM (continued)

Example of a MAP display:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks   Ext   Appl
 .      .       .       .     1ManB   .      .       .     .     .
RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       4        0       10        0        0       130
 2 Post_   RMM      0        1        0        0        0         0
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

7

CAUTION

Static discharge may cause damage to circuit packs

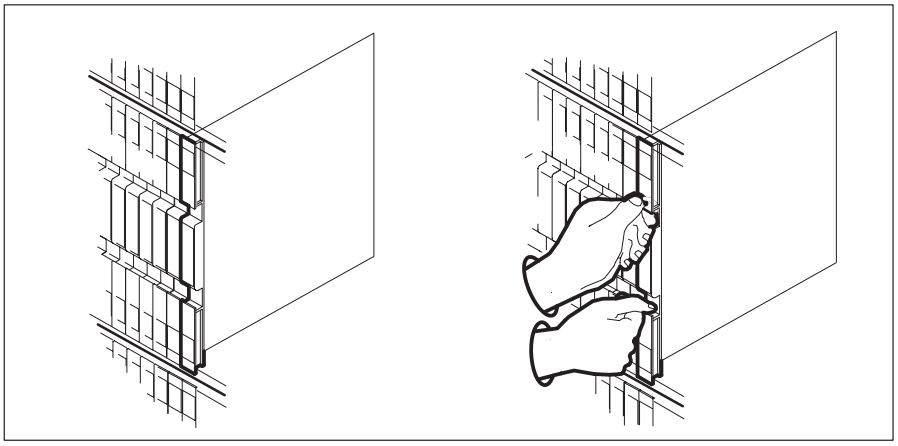
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

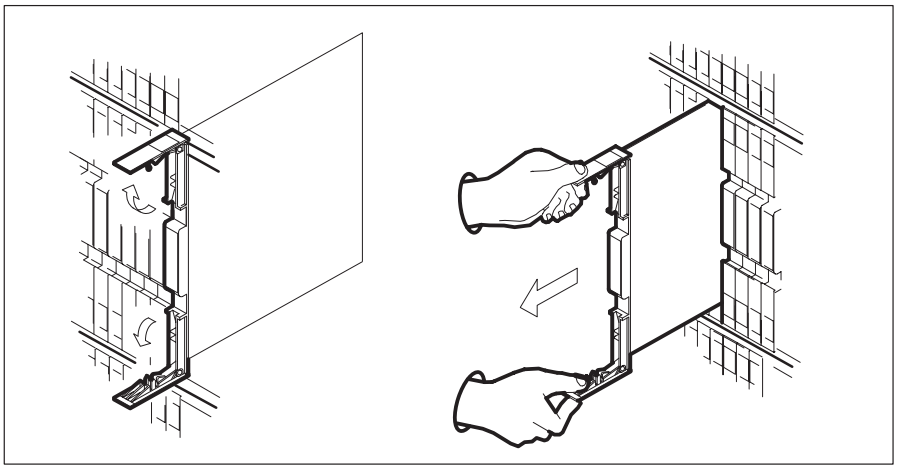
NT4X98
in RSC-S RMM (continued)

8 Remove the NT4X98 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

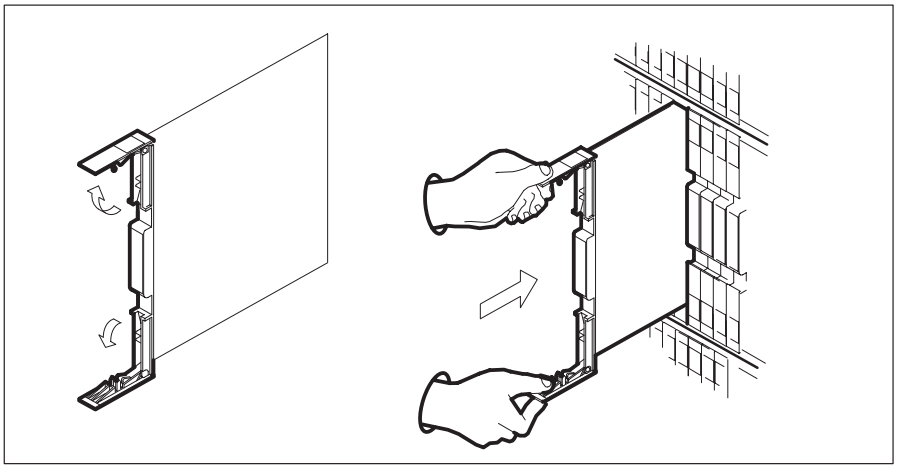


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

9 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



10

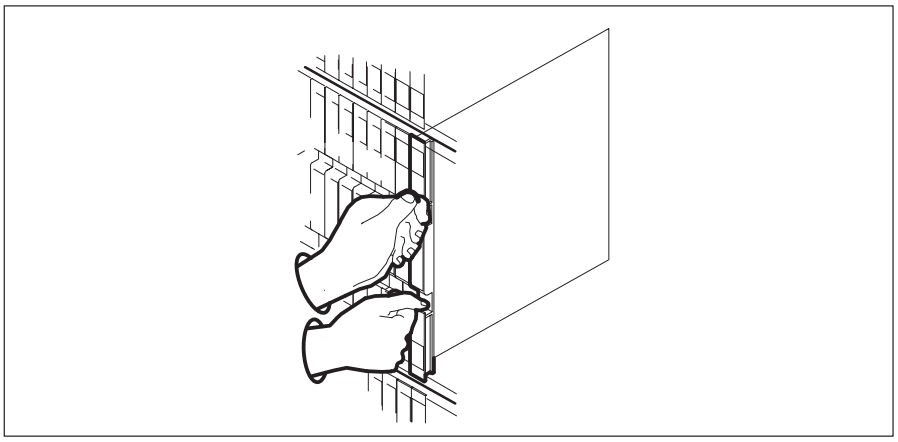
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Seat and lock the card.

NT4X98 in RSC-S RMM (continued)

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 18
other	step 12

At the MAP terminal

12 Test the RMM by typing

>TST
and pressing the Enter key.

If TST	Do
passed	step 13
failed	step 18

13 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 14
failed	step 19

14 Post the MTADRIVER by typing

>TRKS;TTP;POST P RMM rmm_no ckt_no
where

rmm_no is the number of the RMM with the new MTADRIVER card
ckt_no is the number of the new MTADRIVER card
and pressing the Enter key.

15 Return the MTADRIVER to service by typing

>BSY ALL;RTS ALL
and pressing the Enter key.

16 Send any faulty cards for repair according to local procedure.

17 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 20.

18 Return to the *Alarm Clearing Procedures* that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

19 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X17 in RSC-S LCME

Application

Use this procedure to replace an NT6X17 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X17	AA, AB, AC	Standard Line Card Type A (POTS)
NT6X17	BA	World Line Card Type A

The NT6X17BA World Line Card Type A replaces the following cards:

- NT6X17AC, North America
- NT6X93AA, Turkey, Belize
- NT6X93BA, Caribbean
- NT6X93CA, China
- NT6X93EA, Australia
- NT6X99AA, UK ScopeDial
- NTMX29AA, British Telephone

Common procedures

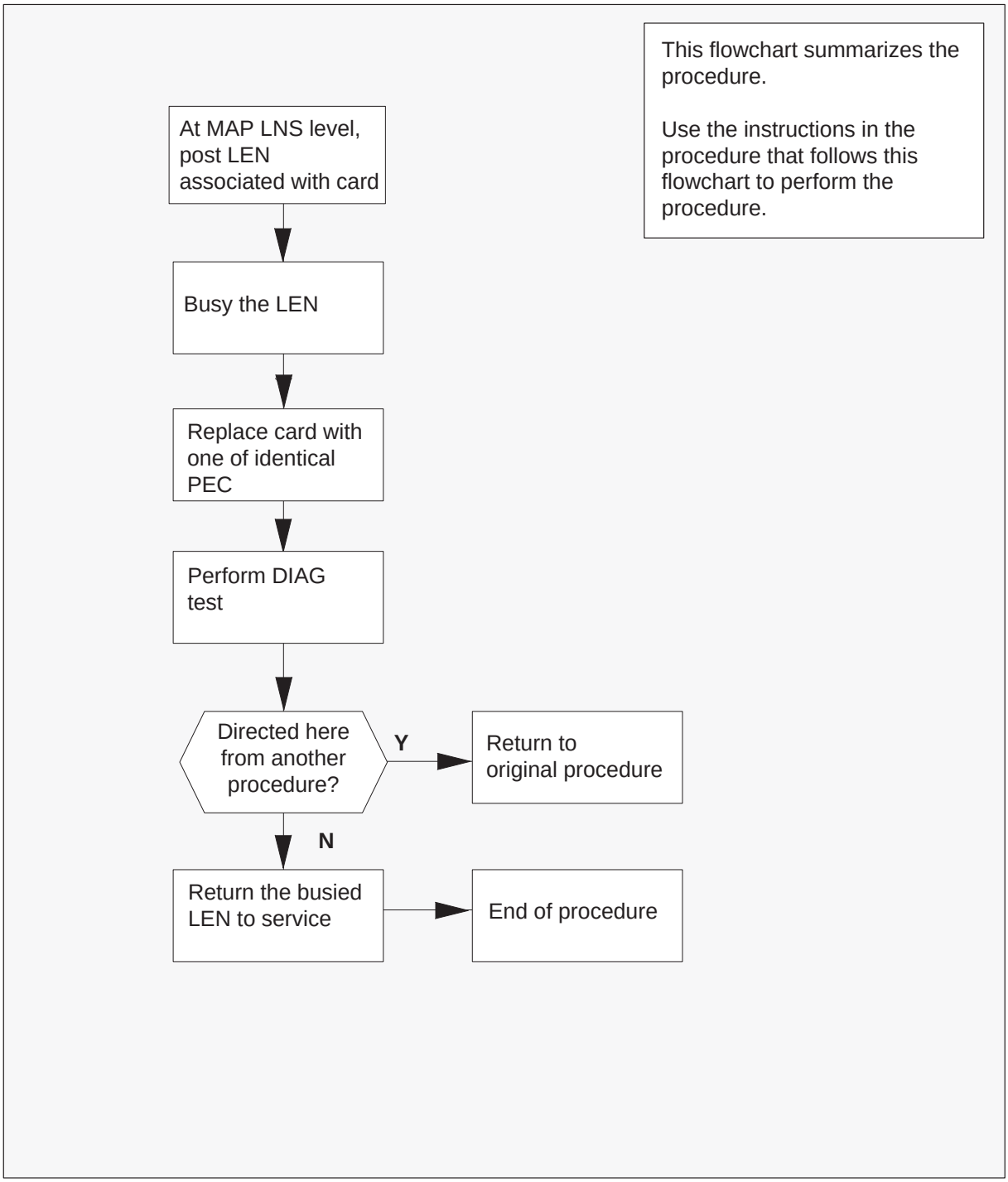
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X17
in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X17 card in RSC-S LCME



NT6X17 in RSC-S LCME (continued)

Replacing an NT6X17 card in RSC-S LCME

At the MAP terminal

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT6X17 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no

and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .     .      .      .     .      .      .       .      .
LTP
 0 Quit  Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3       LCC PTY RNG...LEN....DN   STA  F  S  LTA  TE  RESULT
 4       1FR HOST 00 0 03 03 4931082 IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

4 Busy the NT6X17 line card by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks     Ext     Appl
 .      .      .      .     .     .      .      .        .       .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN......DN     STA F S LTA TE RESULT
 4            1FR HOST 00 0 03 03 4931082 MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.
When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).
Store and transport circuit cards in an ESD protective container.

NT6X17
in RSC-S LCME (continued)

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) of the LCME. This protects the equipment against damage caused by static electricity.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, refer to the following notes.

Refer to the following table for description of card shrouds.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

Put on a wrist strap.

6

DANGER
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

Prepare to remove the faulty card determined in step1 by opening the line drawer and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer nearest the shelf with your left hand to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by using the following substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

NT6X17 in RSC-S LCME (continued)

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card using the following substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the NT6X17 line card by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 14

11 Return the NT6X17 card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

14 Return to the 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.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X18 in RSC-S LCME

Application

Use this procedure to replace an NT6X18 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X18	AA, AB	Line Card Type B (POTS)
NT6X18	BA	World Line Card Type B

The NT6X18BA World Line Card Type B replaces the following cards:

- NT6X18AA, North America
- NT6X94AB, Turkey, Belize, Guyana
- NT6X94BB, Caribbean
- NT6X94CA, China
- NT6X94DA, Morocco
- NT6X33AA, Japan Type A

Common procedures

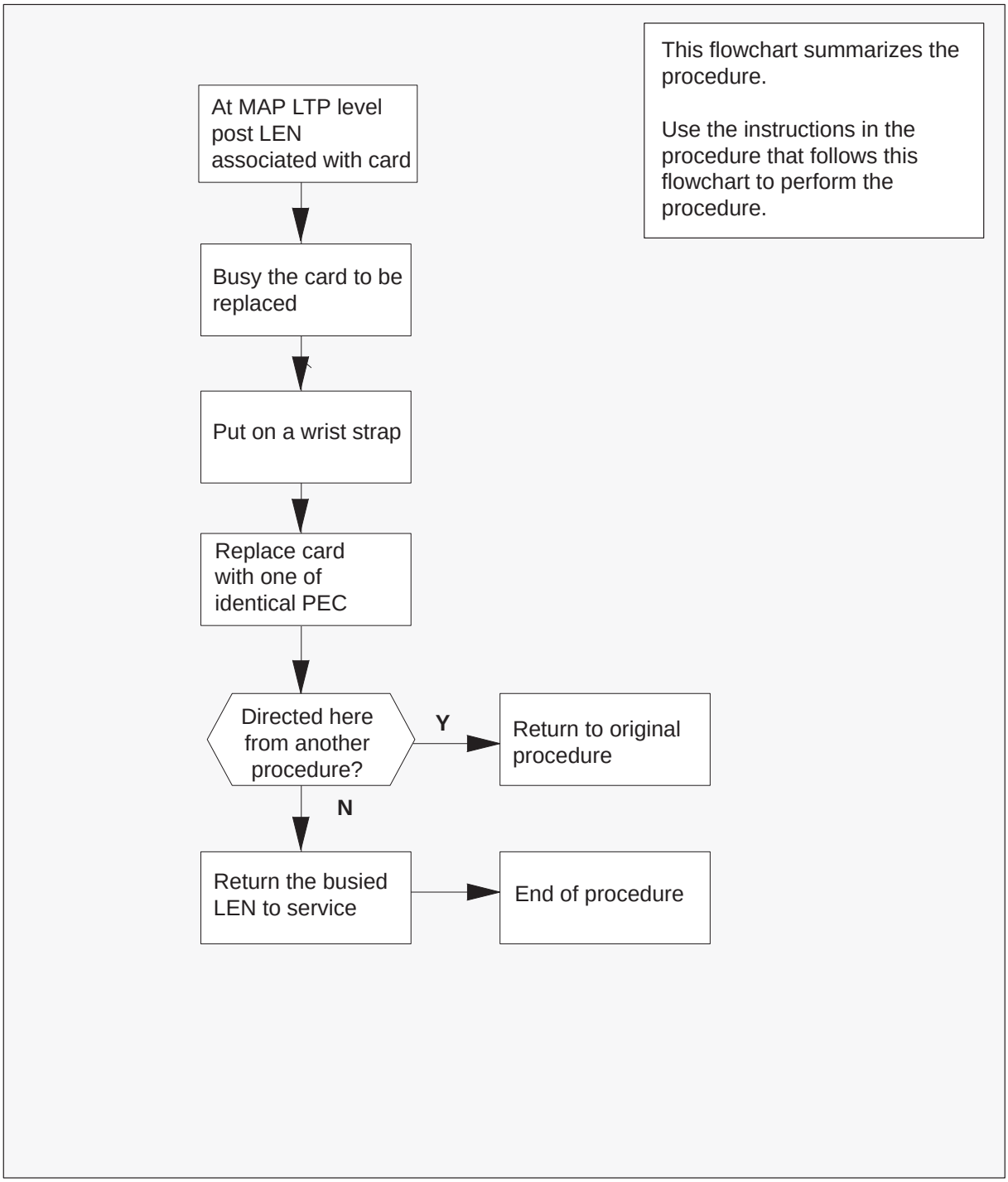
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X18 in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X18 card in RSC-S LCME



NT6X18 in RSC-S LCME (continued)

Replacing an NT6X18 card in RSC-S LCME

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 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .     .       .     .      .       .      .       .      .
LTP
 0 Quit   Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3        LCC PTY RNG....LEN......    DN   STA F S LTA TE RESULT
 4        CKT TYPE FL    HOST 00 0 03 03  NO DIRN  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

4 Busy the NT6X18 line card by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     .      .      .       .      .      .
LTP
 0 Quit    Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3         LCC PTY RNG....LEN......  DN     STA F S LTA TE RESULT
 4         CDF FL    HOST 00 0 03 03 4931082 MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.
When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame.
Store and transport circuit cards in an ESD protective container.

NT6X18
in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into the slot.

Put on a wrist strap.

6

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers.

Descriptions of these shrouds follow.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

NT6X18
in RSC-S LCME (continued)

Remove the faulty card by opening the line drawer that was determined in step 1 and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull out the drawer until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position push the bottom of the drawer, nearest the shelf with your left hand to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by using the following substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card using the following substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

NT6X18 in RSC-S LCME (continued)

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the NT6X18 line card by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 14

11 Return the NT6X18 card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 13

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

NT6X18 in RSC-S LCME (end)

14 Return the 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.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X19 in RSC-S LCME

Application

Use this procedure to replace an NT6X19 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X19	AA	Message Waiting Line Circuit

Common procedures

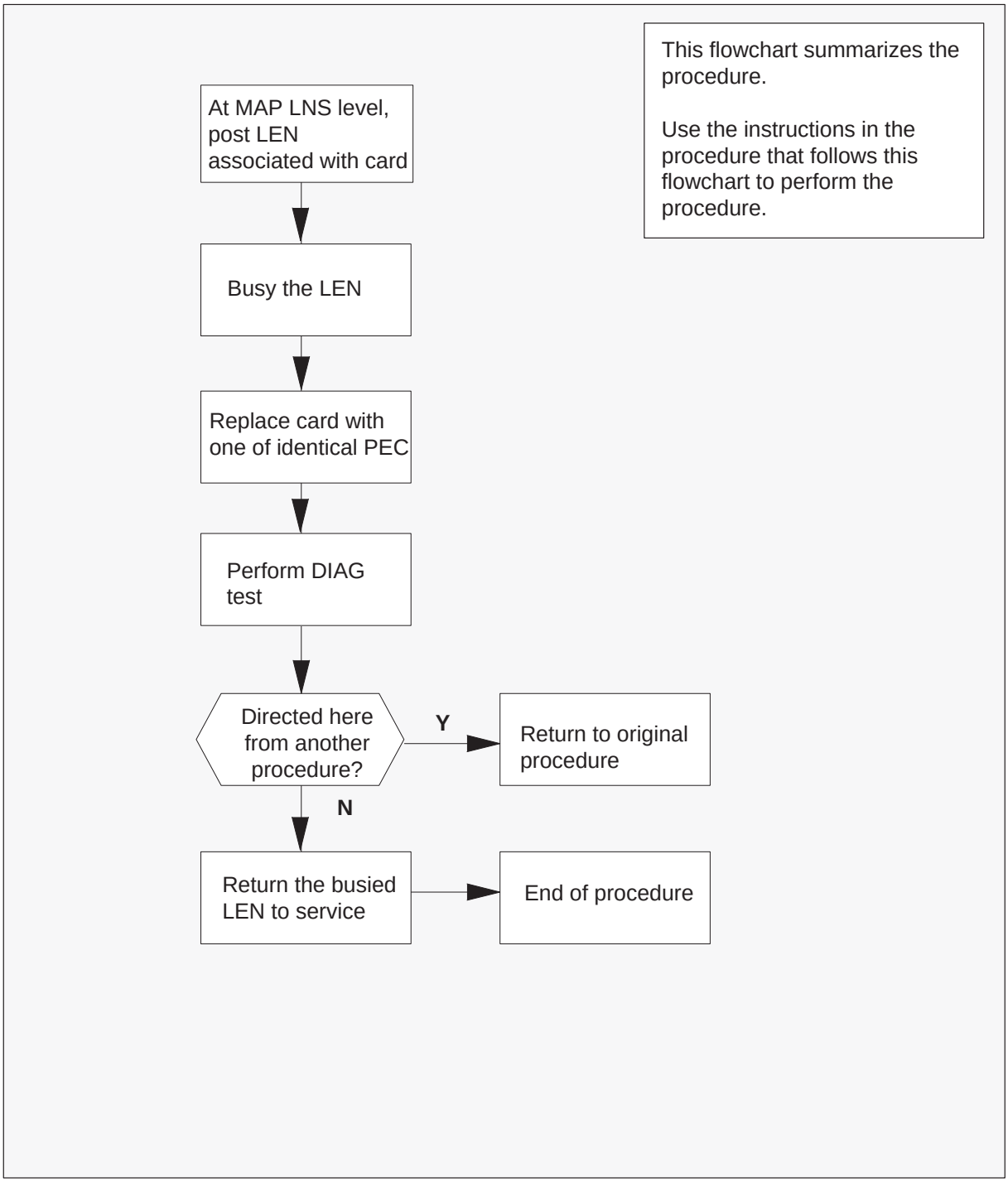
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X19
in RSC-S LCME (continued)

Summary of card replacement procedure for NT6X19 card in RSC-S LCME



NT6X19 in RSC-S LCME (continued)

Replacing an NT6X19 in RSC-S LCME

At the MAP

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT6X19 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .     .       .     .      .       .      .       .      .
LTP
 0 Quit   Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3        LCC PTY RNG....LEN......    DN   STA F S LTA TE RESULT
 4        CKT TYPE FL    HOST 00 0 03 03  NO DIRN  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

4 Busy the NT6X19 line card by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     .      .      .       .      .      .
LTP
 0 Quit    Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3         LCC PTY RNG....LEN......  DN     STA F S LTA TE RESULT
 4         CKT TYPE FL  HOST 00 0 03 03 NO DIRN  MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

NT6X19
in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

6

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, see the following notes.

Descriptions of these shrouds follow.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

NT6X19
in RSC-S LCME (continued)

Prepare to remove the faulty card by opening the line drawer, determined in step 1, and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb, and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand, and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by using the following substeps.

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer until the card becomes unplugged.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card using the following substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

NT6X19 in RSC-S LCME (continued)

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

At the MAP terminal

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

10 Test the NT6X19 line card by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step14

11 Return the NT6X19 card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 16

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

NT6X19
in RSC-S LCME (end)

14 Return to the procedure that directed you to this procedure. If necessary, go to the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X20 in RSC-S LCME

Application

Use this procedure to replace an NT6X20 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X20	AA	Message Waiting Converter

Common procedures

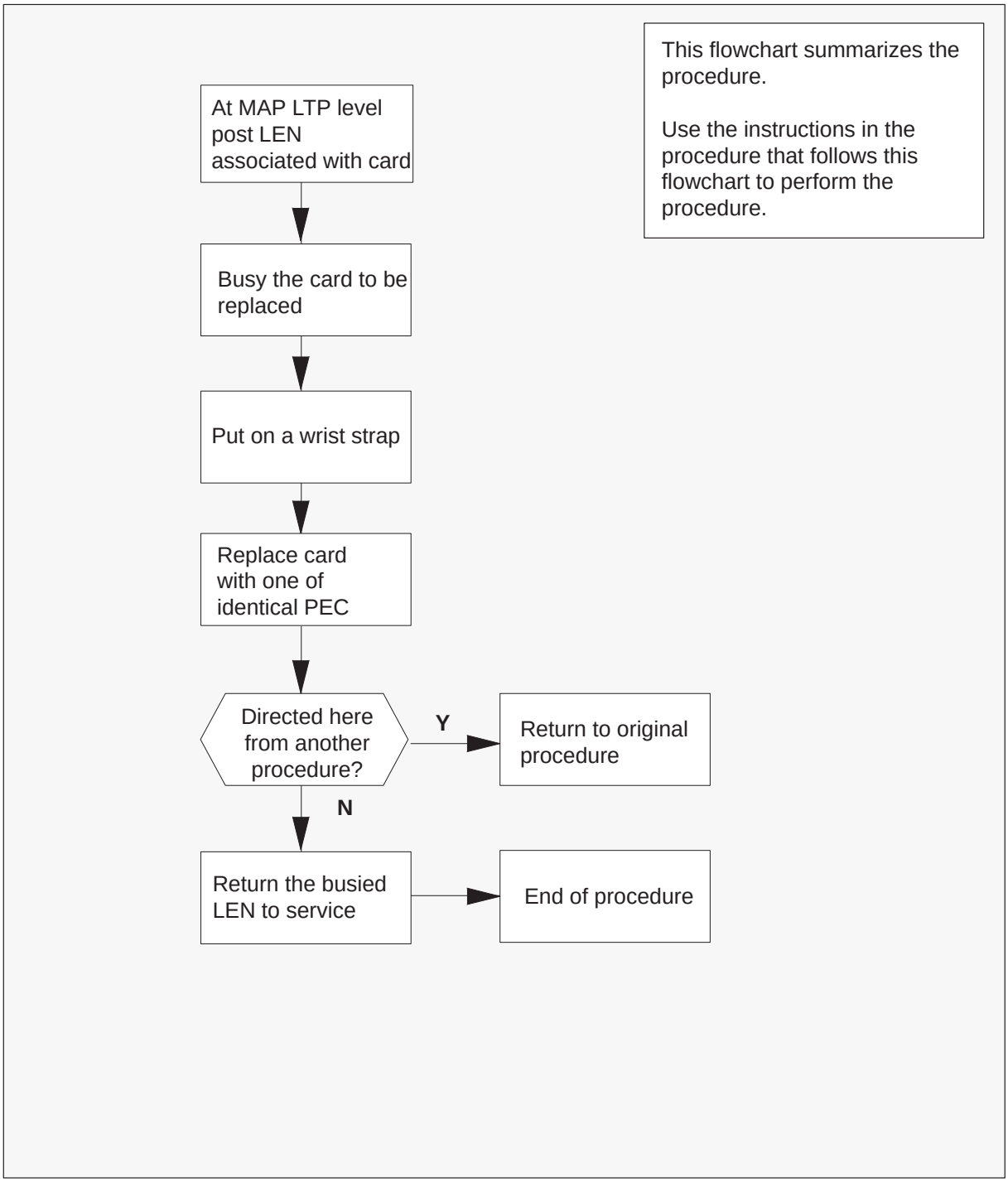
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X20
in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X20 card in an RSC-S LCME



NT6X20 in RSC-S LCME (continued)

Replacing an NT6X20 card in an RSC-S LCME

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 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST LCME site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .     .       .     .      .       .      .       .      .
LTP
 0 Quit   Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3        LCC PTY RNG....LEN......    DN   STA F S LTA TE RESULT
 4        CKT TYPE FL    HOST 00 0 03 03  NO DIRN  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

4 Busy the NT6X20 line card by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     .      .      .       .      .      .
LTP
 0 Quit    Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3         LCC PTY RNG....LEN......  DN     STA F S LTA TE RESULT
 4         CKT TYPE FL  HOST 00 0 03 03 NO DIRN  MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

NT6X20
in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, see the following notes.

Put on a wrist strap.

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, as shown in the following table.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available, as shown in the following table.

Card removal tool for	Apparatus code	Common product code
3—4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

6 Prepare to remove the faulty card by opening the line drawer, determined in step 1, and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb, and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer until the card becomes unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

NT6X20 in RSC-S LCME (continued)

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card using the following substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 11
other	step 14

At the MAP terminal

10 Test the NT6X20 line card by typing

>DIAG

and pressing the Enter key.

If DIAG	Do
passed	step 12
failed	step 15

NT6X20 in RSC-S LCME (end)

11 Return the NT6X20 card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

14 Return to the procedure that directed you to this procedure. If necessary, go to the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X21 in RSC-S LCME

Application

Use this procedure to replace an NT6X21 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X21	AA, AB, AC	Line Card Type C (IBN Electronic Business Set)
NT6X21	AD	Enhanced EBS Line Card for Universal Digital Loop Carriers

Common procedures

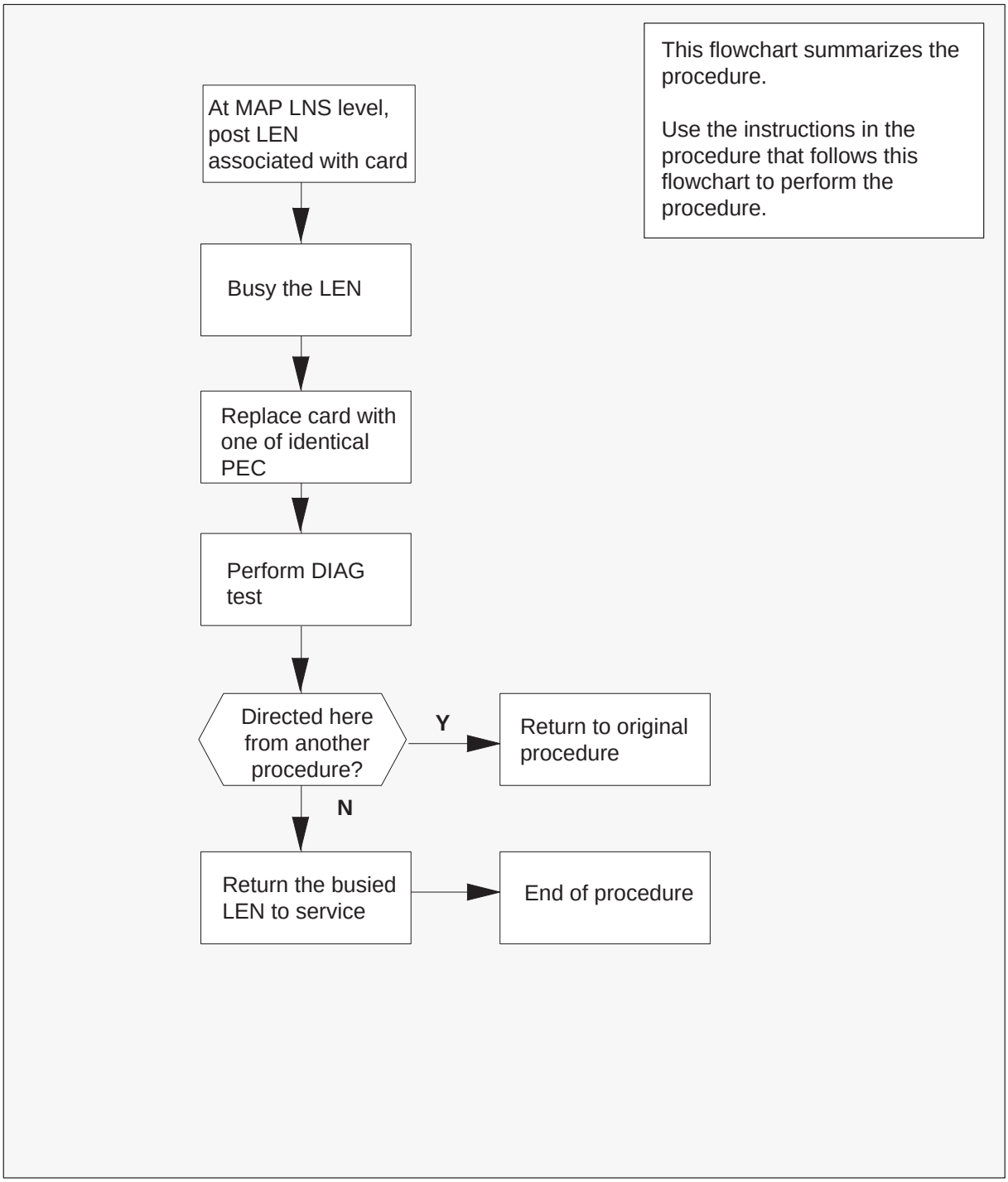
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X21 in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X21 card in RSC-S LCME



NT6X21 in RSC-S LCME (continued)

Replacing an NT6X21 card in an RSC-S LCME

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 Obtain an NT6X21 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .     .       .     .      .       .      .       .      .
LTP
 0 Quit   Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3        LCC PTY RNG....LEN......    DN   STA F S LTA TE RESULT
 4        CKT TYPE FL    HOST 00 0 03 03  NO DIRN  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

4 Busy the NT6X21 line card by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .     .      .      .       .      .      .
LTP
 0 Quit    Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3         LCC PTY RNG....LEN......  DN     STA F S LTA TE RESULT
 4         CKT TYPE FL  HOST 00 0 03 03 NO DIRN  MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

NT6X21
in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

6

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, see notes below.

Descriptions of these shrouds are as follows.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

Prepare to remove the faulty card by opening the line drawer and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer until the card becomes unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card using the following substeps:

NT6X21 in RSC-S LCME (continued)

a. Remove the replacement card from the ESD container.

If the line card suffix is	Do
AA, AB, or AC	step c.
AD	step b.

b. Make DIP switch changes to the new replacement NT6X21AD line card to match the DIP switch settings of the card being replaced, or as defined in the following table.

NT6X21
in RSC-S LCME (continued)

Recommended NT6X21AD S1 DIP switch settings

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

Note: dB=decibel, NL = non-loaded, Vpp=voltage peak to peak, EML= estimated measured loss, as defined in NTP 297–2011–180 BCS35 version 01.02

c. Slide the card in the shroud guide slots toward the drawer backplane.

d. Hold the front cover of the line drawer with your left hand to steady it.

NT6X21 in RSC-S LCME (continued)

e. Grasp the top and bottom edges of the card with the fingers of your right hand.

f. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the NT6X21 line card by typing

>DIAG

and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 15

11 Return the NT6X21 card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step16.

NT6X21
in RSC-S LCME (end)

14 Return to the procedure that directed you to this procedure. If necessary, go to the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X30 in RSC-S LCME

Application

Use this procedure to replace an NT6X30 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X30	HA	Ringing Generator

Common procedures

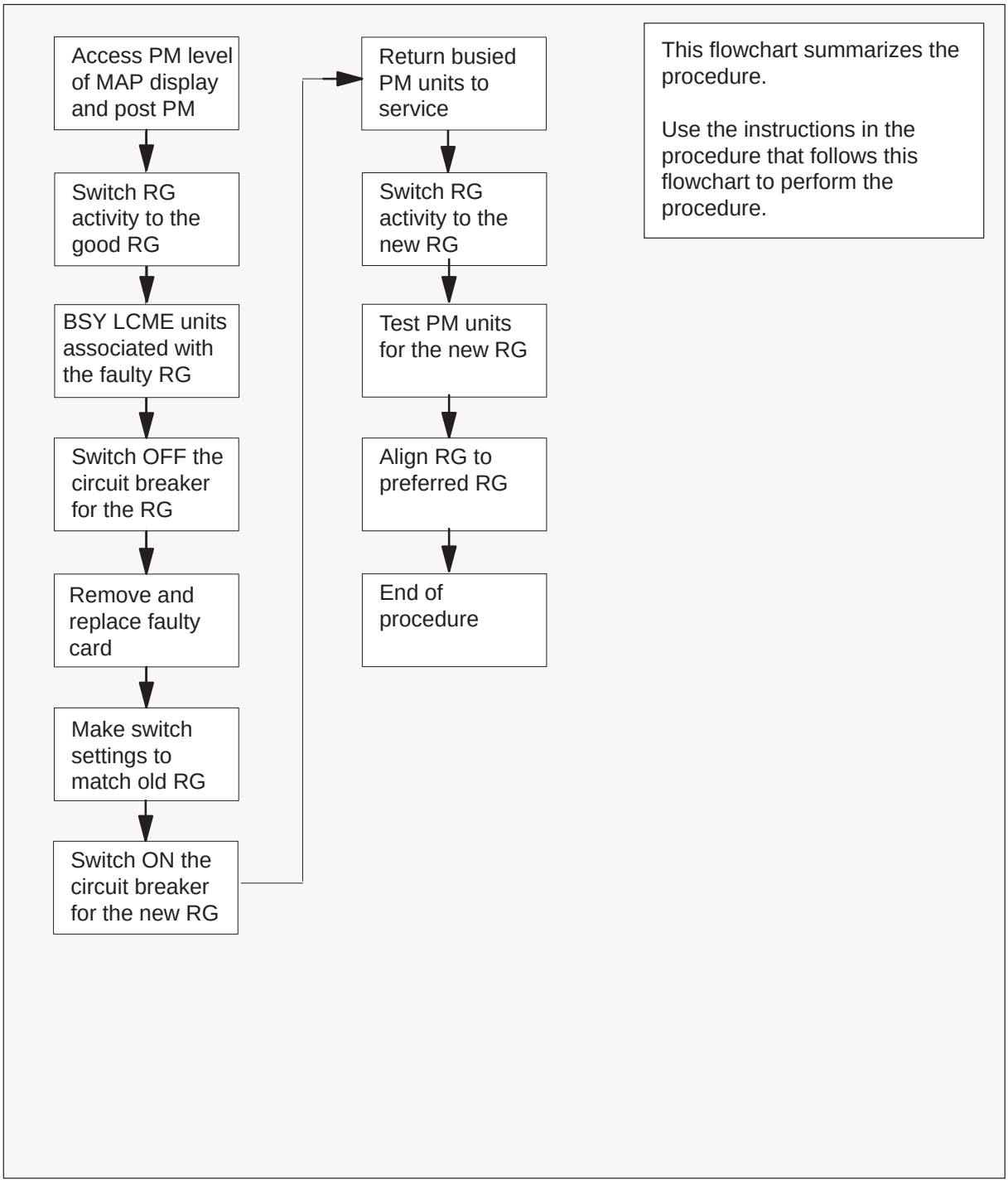
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X30 in RSC-S LCME (continued)

Summary of replacing an NT6X30 card in RSC-S LCME



NT6X30 in RSC-S LCME (continued)

Replacing an NT6X30 in RSC-S LCME

At your Current Location

1

CAUTION
Loss of service
This procedure includes directions to manually busy one or more peripheral module (PM) units. Since manually busying a PM unit can cause service degradation, perform this procedure only if necessary to restore out-of-service components. Otherwise, carry out this procedure during periods of low traffic.

Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Access the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME lcme_site_name lcme_frame_no lcme_no
and pressing the Enter key.

where

lcme_site_name	is the name of the site at which the LCME is located
lcme_frame_no	is the number of the frame in which the LCME is located
lcme_no	is the number of the LCME with the faulty card

Example of a MAP display

```
LCME RSC-S 14 0 ISTb Links  OOS: Cside 0 Pside 0
Unit 0: ISTb      /RG:0
Unit 1: InSv      /RG:0
                            11  11  11  RG: Pref 0 ISTb
Drwr:  01  23  45  67  89  01  23  45      Stby 1 InSv
       ..  ..  ..  ..  ..  ..  ..  ..
```

4 Check the state of the PM units.

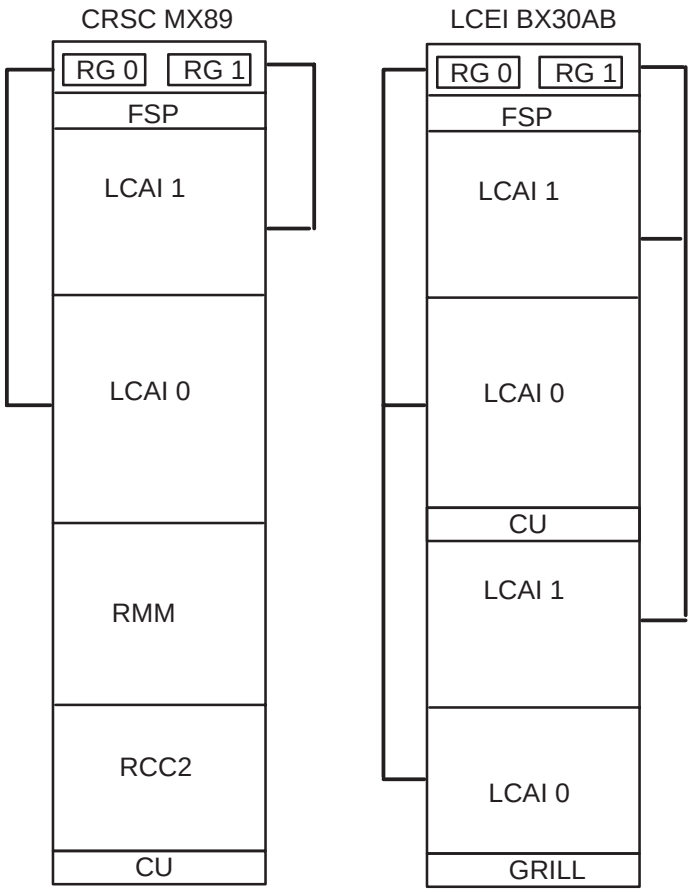
If the PM or PM units are	Do
`offl or SysB`	step 5
One unit is `InSv or ISTb` the other unit is `ISTb or SysB`	step 6

5 Check the state of the other PM in the frame.

If the other PM is	Do
`offl or SysB`	step 37
`InSv or ISTb`	step 6

NT6X30 in RSC-S LCME (continued)

6 Record the numbers of the PM units serviced by the faulty RG you are replacing.



Note: RG 0 is physically associated to unit 0 and RG 1 is physically associated with unit 1.

7 The next action depends on the type of LCM alarm indicated.

If the alarm is	Do
critical	step 9
major or minor	step 8

8 Switch ringing generator activity for the PM unit assigned to the faulty RG by typing

>SWRG UNIT unit_no
and pressing the Enter key.

where

unit_no is the PM unit number (0 or 1) assigned to the faulty RG

If the SWRG command	Do
passed	step 9
failed	step 38

9 Manually-busy (ManB) the PM unit associated with the faulty RG by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the PM unit number (0 or 1) associated with the faulty RG

Note: If clearing a critical alarm choose either unit to work on.

Example of a MAP response:

```
LCME RSC–S 14 0 Unit 0  Bsy Passed
```

Note: Repeat this command for the other PM in the frame.

10 The next action depends on how many LCMEs are provisioned in the equipment frame.

If there	Do
is one LCME provisioned in the frame	step 14
two LCMEs provisioned in the frame, and you have not switched RG activity for both LCMEs	step 11
two LCMEs provisioned in the frame, and you have switched RG activity for both LCMEs	step 12

NT6X30 in RSC-S LCME (continued)

11 Repeat step 3 through step 10 for the other LCME provisioned in the equipment frame.

12 Post both PMs in the frame and ensure all units are now on the good RG by typing

>POST LCME site frame_no lcme_no site frame_no lcme_no
and pressing the Enter key.

where

site	is the PM location (alphanumeric) of the first LCME
frame_no	is the frame number (00 to 511) of the first LCME
lcme_no	is the number of the first LCM (0 or 1) in the frame,
site	is the LCM location (alphanumeric) of the second LCME
frame_no	is the frame number (00 to 511) of the second LCME
lcme_no	is the number of the second LCM (0 or 1) in the frame,

Example of command

>POST LCME RSC–S 14 0 RSC–S 14 1

Example of a MAP display:

```
LCME RSC–S 14 0 ISTb Links  OOS: Cside 0 Pside 0
Unit 0: ISTb      /RG:1
Unit 1: InSv      /RG:1
                           11  11  11  RG: Pref 0 ISTb
Drwr:  01  23  45  67  89  01  23  45      Stby 1 InSv
       ..  ..  ..  ..  ..  ..  ..  ..
```

Examine the other PM in the frame by typing

>NEXT
and pressing the Enter key.

Example of a MAP display:

```
LCME RSC–S 14 1 ISTb Links  OOS: Cside 0 Pside 0
Unit 0: ISTb      /RG:1
Unit 1: InSv      /RG:1
                           11  11  11  RG: Pref 0 ISTb
Drwr:  01  23  45  67  89  01  23  45      Stby 1 InSv
       ..  ..  ..  ..  ..  ..  ..  ..
```

If both PMs are	Do
on the good RG	step 14
not on the good RG	step 13

13 Repeat step 3 through step 12 for the other PM provisioned in the equipment frame.

At the RCE/LCEI 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 left side of the frame supervisory panel (FSP) of the LCME. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

15

DANGER
Risk of personal injury
Ensure that you switch off the correct circuit breaker on the FSP as described in the following steps. Do not proceed until you have located and switched OFF the correct circuit breaker for the RG you are replacing.

Turn the circuit breaker that powers the faulty ringing generator OFF. Ensure that ringing generator 0 is on circuit breaker 03–65–01. Ensure that ringing generator 1 is on circuit breaker 03–65–02.

NT6X30
in RSC-S LCME (continued)

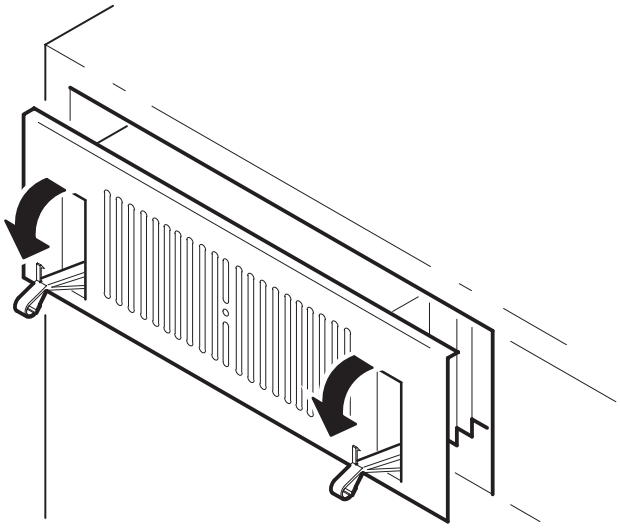
16

WARNING

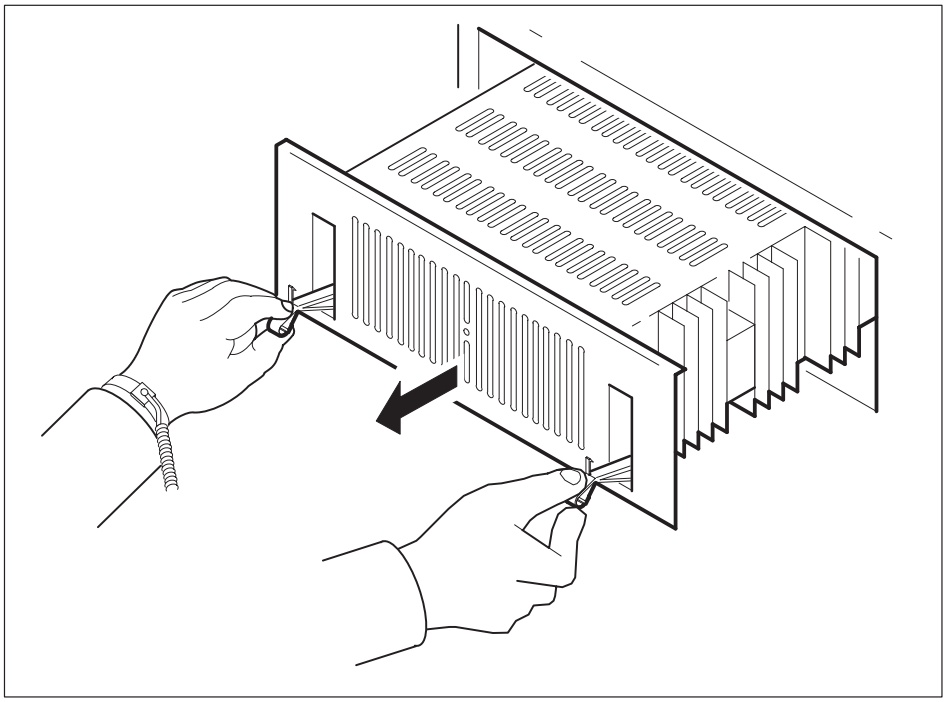
Do not hold the card by the levers only

Holding a card by the locking levers only may break one or both levers. Once the card has been pulled half way out of the shelf, carefully grasp the card underneath for more secure support and continue to remove the card from the shelf. Avoid touching any wires or internal parts on the card.

Open the locking levers on the face of the card.



17 While grasping the locking levers, gently pull the card towards you until it protrudes approximately half-way out of the shelf.



18 While grasping the card by the face plate with one hand and supporting the card from the bottom with the other hand, gently pull the card towards you until it clears the shelf.

19 Place the card you have removed in an electrostatic discharge (ESD) protective container.

20

WARNING
Potential equipment damage
The newer versions of the ringing generator (versions with suffixes BB, CA, DB, HA, or JA) use switch 8. Ensure that switch 8 is in the ON position on the replacement card.

Make Switch settings on the replacement card to match the faulty card just removed.

Ensure that the replacement card has the same PEC, including suffix, as the card you just removed.

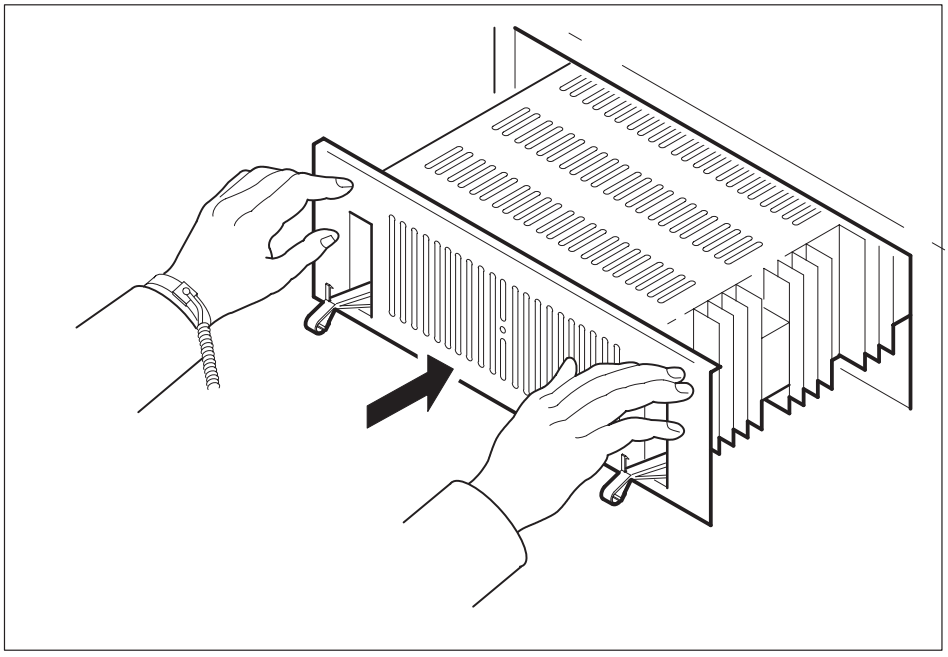
NT6X30 in RSC-S LCME (continued)

Note: If you are replacing an older version of the NT6X30 with a newer version (newer versions have suffixes BB, CA, DB, HA, or JA), switch 8 must be in the ON position on the replacement card. If in doubt, contact your next level of support.

21

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.

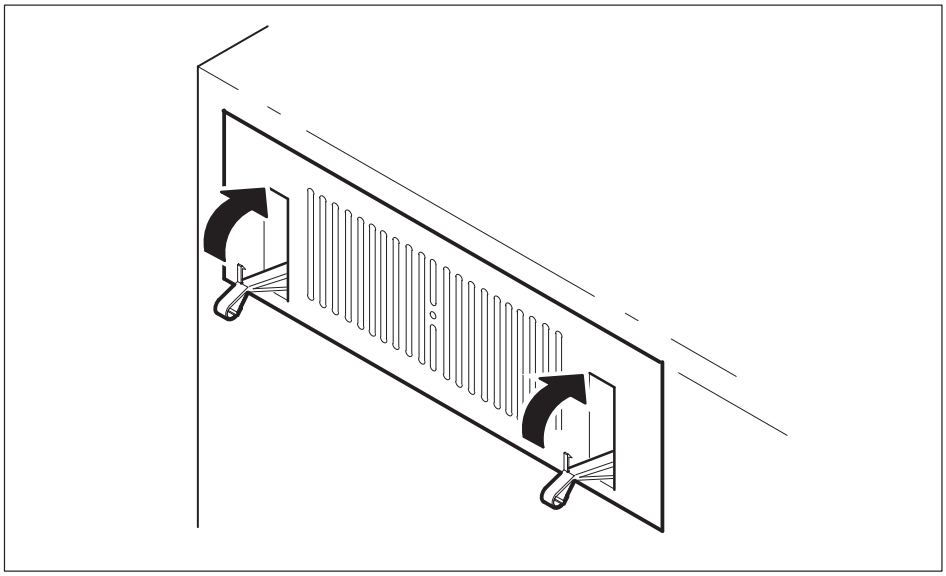
Open the locking levers on the replacement card. Align the card with the right slot in the shelf and gently slide the card into the shelf.



22 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 to secure the card.



23 Turn circuit breakers back ON. Ensure that ringing generator 0 is on circuit breaker 03–65–01. Ensure that ringing generator 1 is on circuit breaker 03–65–02.

If	Do
the circuit breaker remains switched and the LED light on the FSP goes out	step 24
the circuit breaker trips or the LED light on the FSP does not go out	step 38

24 The next action depends on your reason for performing this procedure.

If you were	Do
directed to this procedure from a maintenance procedure	step 25
not directed to this procedure from a maintenance procedure	step 26

NT6X30 in RSC-S LCME (continued)

25 Return to the maintenance procedure that sent you to this procedure and continue as directed.

At the MAP terminal

26 Post an LCME in the frame by typing

>POST LCME site frame_no lcme_no
and pressing the Enter key.

where

site	is the PM location (alphanumeric)
frame_no	is the frame number (00 to 511)
lcme_no	is the number of the LCME unit posted in step 3

27 Wait until there is no system-initiated maintenance on the unit.

28 Return the ManB unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no	is the number (0 or 1) of the LCME unit

29 Switch ringing generator activity to the new NT6X30 card by typing

>SWRG UNIT unit_no
and pressing the Enter key.

where

unit_no	is the PM unit number (0 or 1)

Example of a MAP display:

```
LCME RSC-S 14 0 InSv Links  OOS: Cside 0 Pside 0
Unit 0: InSv      /RG:1
Unit 1: InSv      /RG:1
                           11  11  11  RG: Pref 0 InSv
Drwr:  01  23  45  67  89  01  23  45      Stby 1 InSv
       ..  ..  ..  ..  ..  ..  ..  ..
```

If the SWRG command	Do
passed, and RG activity must be switched for the other unit	step 30
passed, and RG activity is acceptable for both PM units	step 31
failed	step 38

30 Repeat step 29 for the other PM unit.

31 Test the new RG by typing

>TST PM
and pressing the Enter key.

Example of a MAP response:

```
LCME RSC-S 14 0 Unit 1  InSvce Tests Initiated
LCME RSC-S 14 0 Unit 0  InSvce Tests Initiated
LCME RSC-S 14 0 Unit 1  Tst Passed
LCME RSC-S 14 0 Unit 0  Tst Passed
```

If the TST command	Do
passed	step 32
failed	step 35

32 Align RG activity to the preferred RG by typing

>SWRG UNIT unit_no
and pressing the Enter key.

where

unit_no is the PM unit number (0 or 1)

Example of a MAP display:

```
LCME RSC-S 14 0 InSv Links  OOS: Cside 0 Pside 0
Unit 0: InSv      /RG:0
Unit 1: InSv      /RG:0
                           11  11  11  RG: Pref 0 InSv
Drwr:  01  23  45  67  89  01  23  45      Stby 1 InSv
       ..  ..  ..  ..  ..  ..  ..  ..
```

NT6X30 in RSC-S LCME (end)

33 The next action depends on how many LCMEs are provisioned in the equipment frame.

If there	Do
one LCME provisioned in the frame	step 35
two LCMEs provisioned in the frame, and you have not switched RG activity for both LCMEs	step 34
two LCMEs provisioned in the frame, and you have switched RG activity for both LCMEs	step 35

34 Repeat steps 28 to 33 for the other LCME provisioned in the equipment frame.

35 Send any faulty cards for repair according to local procedure.

36 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 39.

37 Consult office personnel to determine why the component is offline. Continue as directed by office personnel.

38 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

39 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X36 in RSC-S FSP for CRSC or CEXT

Application

Use this procedure to replace and NT6X36 card in a cabinetized Remote Switching Center (CRSC) or cabinetized extension shelf (CEXT) cabinet frame supervisory panel (FSP).

PEC	Suffixes	Name
NT6X36	AA, AB	Frame supervisory panel (FSP) alarm card

Common procedures

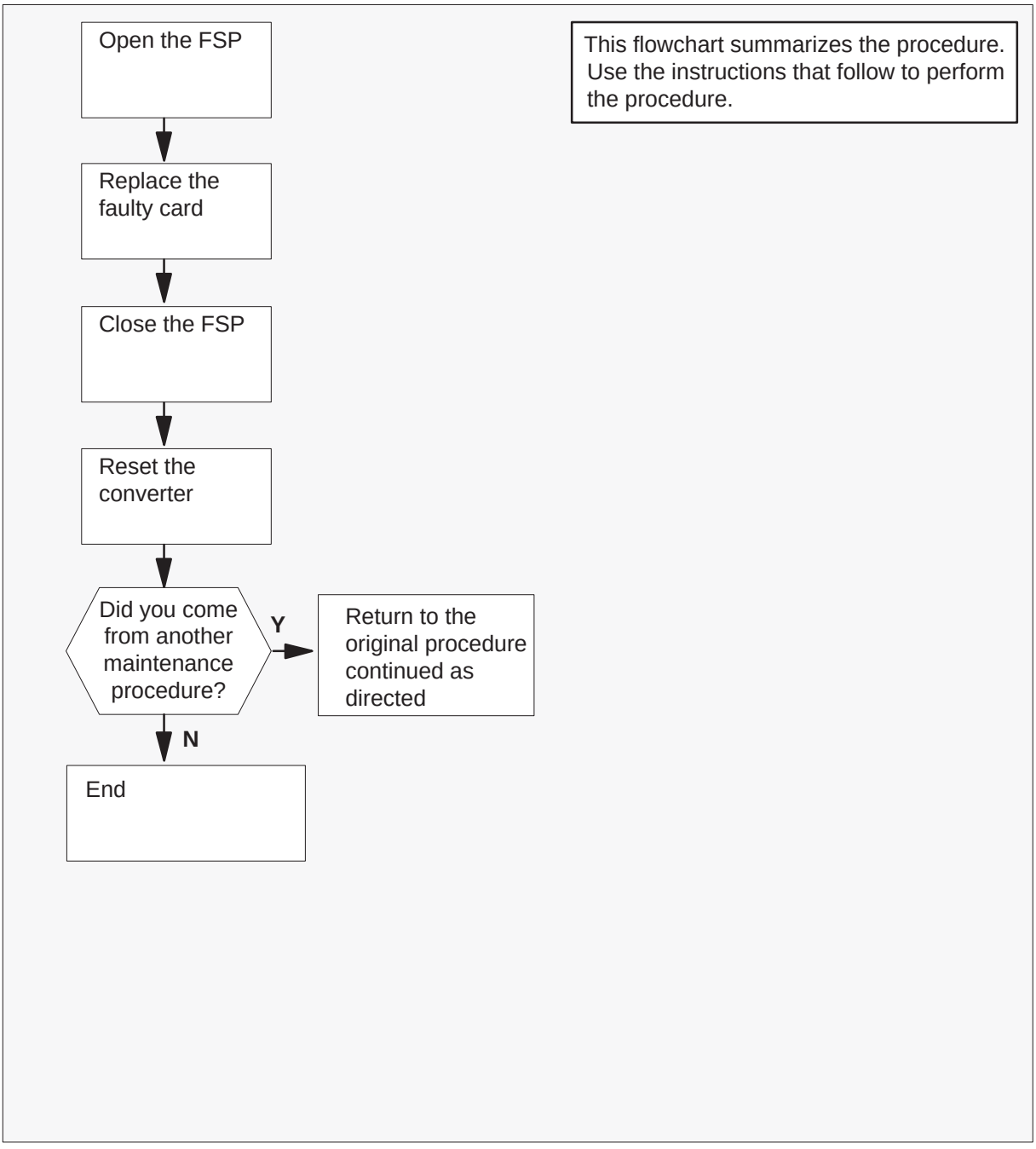
The following procedures are referenced in this procedure:

Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X36
in RSC-S FSP for CRSC or CEXT (continued)

Summary of card replacement procedure for NT6X36 card in an RSC-S FSP for CRSC or CEXT



NT6X36
in RSC-S FSP for CRSC or CEXT (continued)

Replacing an NT6X36 card in an RSC-S FSP for CRSC or CEXT

1

WARNING
Static electricity damage
Wear a wrist strap connected to the wrist-strap grounding point of a frame supervisory panel (FSP) while handling circuit cards. This protects the cards against damage caused by static electricity.

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

Note: CB3 and CB5 will be off and should be left off until instructed to turn them on in step 8.

At the CRSC or CEXT cabinet

2 The converter FAIL LED and FRAME FAIL lamp on the FSP will be ON. If an audible alarm sounds, return to the MAP terminal and silence the alarm by typing

>SIL
and pressing the Enter key.

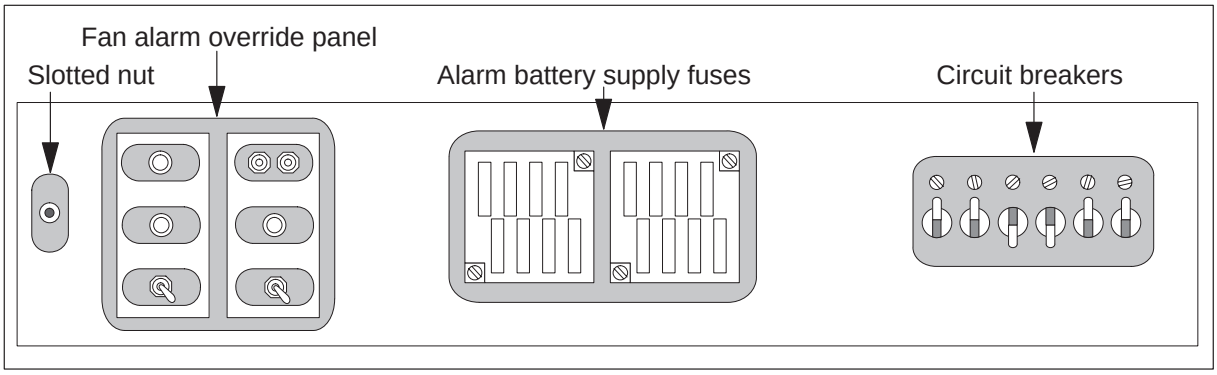
3

DANGER
Risk of electrocution
Some of the terminals inside the frame supervisory panel (FSP) have an electrical potential of -48V dc. Remove all jewelry before replacing a card in the FSP. Do not touch any terminal in the FSP.

Unscrew the slotted nut on the left-hand side of the FSP.

NT6X36
in RSC-S FSP for CRSC or CEXT (continued)

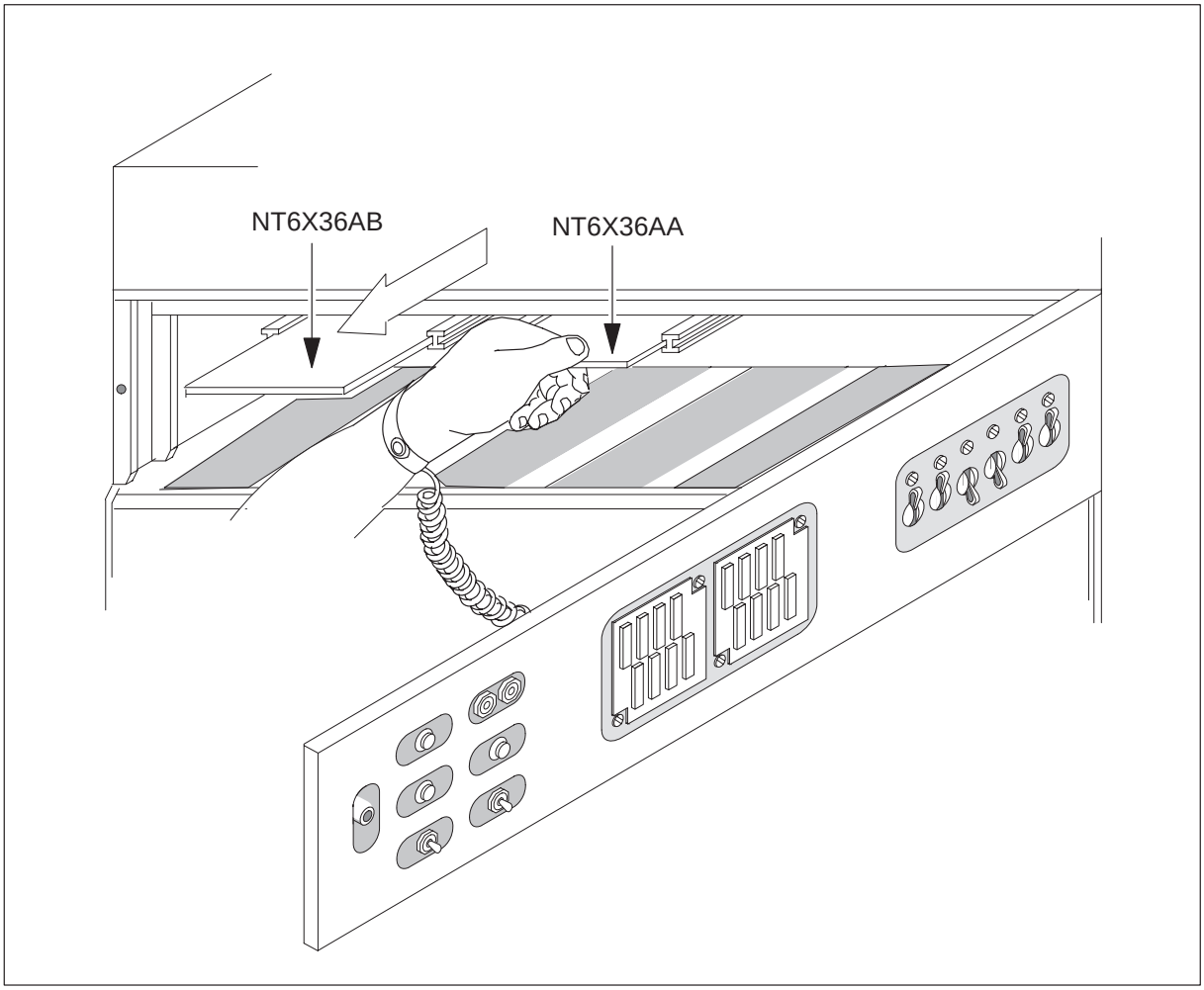
Frame supervisory panel



NT6X36
in RSC-S FSP for CRSC or CEXT (continued)

4 Open the FSP panel and remove the alarm card.

Frame supervisory panel alarm and control cards



NT6X36 in RSC-S FSP for CRSC or CEXT (continued)

5 Insert the replacement alarm card.

6 Close the FSP panel.

7 Tighten the slotted nut on the FSP.

Proceed as follows to reset the converter in each shelf that is controlled by the alarm and control card you have just replaced.

At the CRSC or CEXT cabinet

8 Move the ON/OFF RESET switch on the NTBX72 card to RESET. While still holding the switch at RESET, move the circuit breakers (CB) for the ringing generator (CB3) and the LCME unit (CB5) to the ON position. After moving CB3 and CB5 to the ON position, release the RESET switch.

If the CONVERTER FAIL LED is	Do
lit and the NT6X36 PEC suffix is AA	step 27
lit and the NT6X36 PEC suffix is AB	step 27
not lit and the NT6X36 PEC suffix is AA	step 9
not lit and the NT6X36 PEC suffix is AB	step 24

NT6X36
in RSC-S FSP for CRSC or CEXT (continued)

At the MAP terminal

9 Access the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME site_name cabinet_no lcme_no
and pressing the Enter key.

where

site_name	is the name of the site at which the LCME is located
cabinet_no	is the number of the cabinet in which the LCME is located
lcme_no	is the number of the LCME with the faulty card

10 Monitor the MAP display for system recovery.

Example of MAP display

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     Appl
    .      .       .      .    1LCME     .       .       .       .       .


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

If	Do
there is no System Recovery	step 11
there is System Recovery	step 28

NT6X36 in RSC-S FSP for CRSC or CEXT (continued)

At the MAP terminal

11 Manually busy the LCME unit by typing

>BYS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the SysB LCME unit identified in step 9

12 Return the LCME unit to service by typing

>RTS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit busied in step 11

If the RTS	Do
passed	step 28
failed	step 13

13 Determine the loadnames of each LCME unit by typing

>QUERYPM
and pressing the Enter key.

Example MAP response

```
PM Type: LCME  INT. NO.: 13  STATUS INDEX: 7  NODE_NO 154
Memory Size – Unit 0: 256K, Unit 1: 256K
Loadnames: LCMINV – LCME031D, Unit1: LCME031D
LCME R113 001 is included in the list of LCM types
   scheduled for a REX test
Last RES test was TUE. 1995/02/28 at 02:33:43; PASSED.
Node Status: {OK, FALSE}
Unit 0 Status; {MAN_BUSY, FALSE}
Unit 1 Status: {OK, FALSE}
 Site  Flr RPos  Bay_id  Shf  Description  Slot  EqPEC
 R113   01 AA00  LCEI 00 | 33  LCME 00           BX30AB
Services: ISDN Equipped  |
                         |
                         |
```

(*LCME loadname*)

14 Access the disk utility by typing

>DISKUT
and pressing the Enter key.

15 List the file information for the LCME loadfile volume by typing

>LV CM;LF loadfile_volume
and pressing the Enter key.

where

loadfile_volume is the loadfile volume name

Example MAP display

```
>LV CM;LF S01DPMLOADS
Volumes found on the node CM:
_____________________________

NAME             TYPE     TOTAL    FREE TOTAL  OPEN  ITOC      LARGEST
                         BLOCKS  BLOCKS FILES FILES FILES FREE SEGMENT
_____________________________________________________________________

S00DSTAFFIMG     STD    409589   89377     4     0     2        89377
S00DPMLOADS      STD    153589   57512    35     0     0        27528
S00IMAGE         STD    131061  131061     0     0     0       131061
.
.
S01DPMLOADS      STD    153589  37846     29     0     0         6686
.
.
S01DIMAGE        STD     92095  65294      4     0     0        65294
_____________________________________________________________________

File information for volume S01DPMLOADS:
{Note:  1 BLOCK = 512 BYTES }
_____________________________________________________________________

  LAST FILE O R I O        FILE       NUM OF   MAX     FILE NAME
MODIFY CODE R E T P        SIZE     RECORDS    REC
  DATE      G C O E          IN          IN    LEN
              C N      BLOCKS         FILE
_____________________________________________________________________

940630    0 I F            5334        2667   1020  LRC36CJ
941013    0 O F            4570        2285   1024  NRC03BX
.
.
940921    0 O F             173        1610     55  LCME031D
.
.
941010    0 O F            1452         726   1024  DCH03A
```

NT6X36 in RSC-S FSP for CRSC or CEXT (continued)

16 Quit the disk utility by typing

>QUIT
and pressing the Enter key.

17 Load the LCME unit by typing

>LOADPM UNIT lcme_unit_no CC
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME manually busied in step 11

If the load	Do
passed	step 18
failed	step 27

18 Return the LCME unit to service by typing

>RTS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit loaded in step 17

If the RTS	Do
passed	step 19
failed	step 27

19 Post the RMM by typing

>POST RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM from which the card is to be removed

Example of a MAP display:

```
CM    MS     IOD    Net     PM    CCS    LNS     Trks     Ext    APPL
 .     .      .      .     4SysB   .      .       .        .       .

RMM                 SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM        4        0        10       3        3       130
 2 Post_    RMM       1        0         1       0        0        2
 3
 4          RMM  5  SysB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

20 Determine the state of the RMM.

If the state of the RMM is	Do
SysB	step 21
InSv	step 28

NT6X36 in RSC-S FSP for CRSC or CEXT (continued)

21 Busy the RMM by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
CM    MS     IOD    Net     PM    CCS    LNS     Trks     Ext    APPL
 .     .      .      .     4SysB   .      .       .        .       .

RMM                 SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM        4        0       10       3        3       130
 2 Post_    RMM       0        1        1       0        0        2
 3
 4          RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

22 Load the RMM by typing

>LOAD
and pressing the Enter key.

If the load	Do
passed	step 23
failed	step 27

23 Return the RMM to service by typing

>RTS
and pressing the Enter key.

If the RTS command	Do
passed	step 24
failed	step 27

24 The next action depends on your reason for performing this procedure.

If you were	Do
directed to this procedure from a maintenance procedure	step 25
directed to this procedure from an alarm clearing procedure	step 26

25 Return to the maintenance procedure that sent you to this procedure and continue as directed.

26 Return to the alarm clearing procedure that sent you to this procedure and continue as directed.

27 For further assistance, contact the personnel responsible for the next level of support.

28 You have completed this procedure.

NT6X51 in RSC-S LCM

Application

Use this procedure to replace an NT6X51 card in an RSC-S LCM.

PEC	Suffixes	Name
NT6X51	AB, AC	Extended LCM Processor

Common procedures

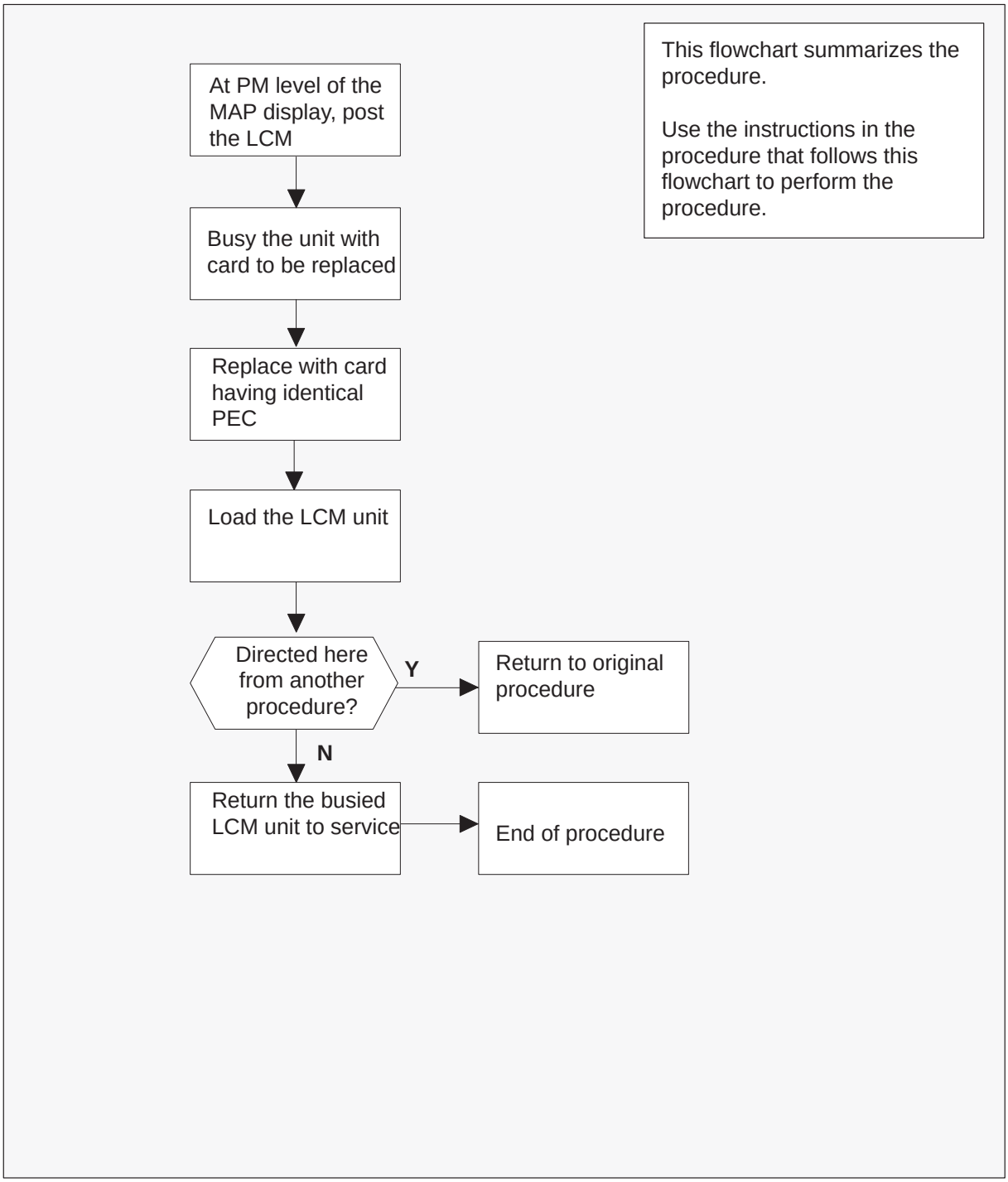
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X51
in RSC-S LCM (continued)

Summary of card replacement procedure for an NT6X51 card in RSC-S LCM



NT6X51 in RSC-S LCM (continued)

Replacing an NT6X51 card in an RSC-S LCM

ATTENTION

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.

At your Current location

1

CAUTION
Loss of service
This procedure includes directions to manually busy one or more peripheral module (PM) units. Since manually busying a PM unit can cause service degradation, perform this procedure only if necessary to restore out-of-service components. Otherwise, carry out this procedure during periods of low traffic.

Obtain an NT6X51 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

2 Set the MAP to the PM level and post the LCM by typing

>MAPCI;MTC;PM;POST LCM lcm_site_name lcm_frame_no lcm_no
and pressing the Enter key.

where

lcm_site_name is the name of the site at which the LCM is located
lcm_frame_no is the number of the frame in which the LCM is located
lcm_no is the number of the LCM with the faulty card

3 Busy the LCM by typing

>BSY UNIT lcm_unit_no
and pressing the Enter key.

where

lcm_unit_no is the number of the LCM unit

Example of a MAP response:

```
LCM    RemL  OO O ISTb   Links_OOS: CSide 1 PSide 0
Unit 0:  InSv  Mtce TakeOver   /RG:  0
Unit 1:  ManB  Mtce            /RG:  0
                     11 11 11 11 11       RG:Pref:0 InSv
Drwr:  01 23 45 67 89 01 23 45 67 89          Stby:1 InSv
       .. .. .. .. .. .. .. .. .. ..
```

At the LCE frame

4

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1–megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

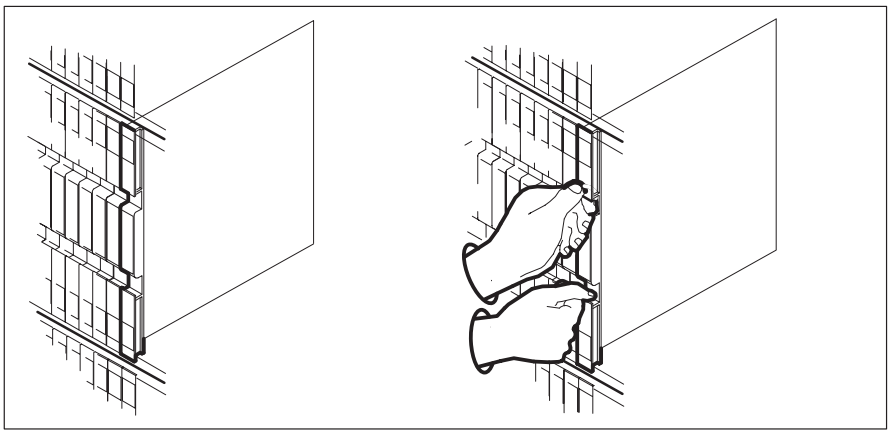
WARNING
Static electricity damage
Before removing any cards, put on a wriststrap and connect it to the wriststrap grounding point on the left side of the frame supervisory panel (FSP) of the LCM. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

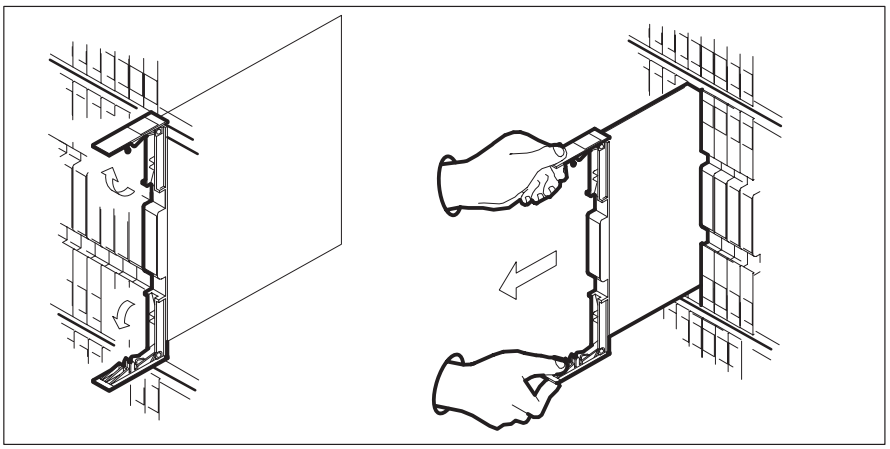
NT6X51
in RSC-S LCM (continued)

5 Remove the NT6X51 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

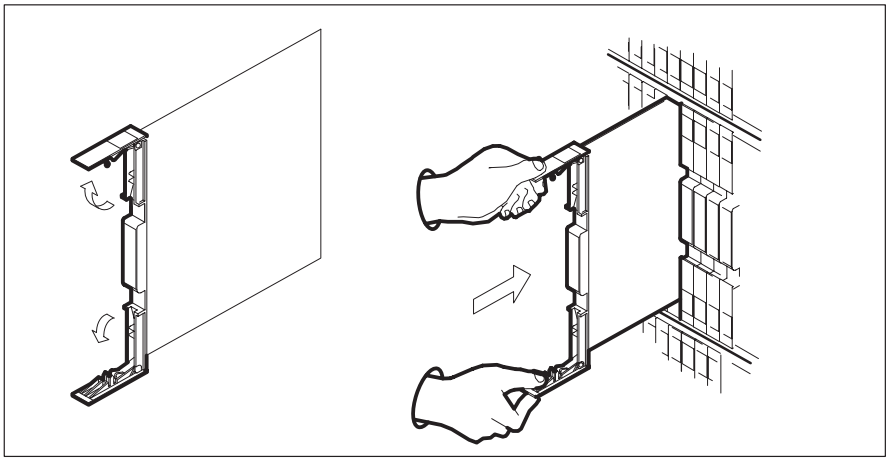


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

6 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



7

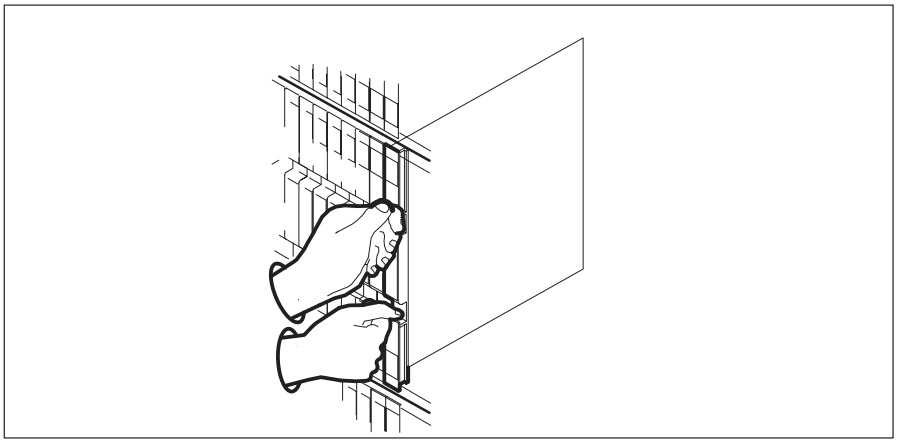
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

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.

NT6X51 in RSC-S LCM (continued)

b. Close the locking levers



8 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 13
other	step 9

At the MAP terminal

9 Load the inactive LCM unit by typing

>LOADPM UNIT lcm_unit_no CC
and pressing the Enter key.

where

lcm_unit_no is the number of the LCM unit busied in step 3

If load	Do
passed	step 10
failed	step 14

10 Return the LCM unit to service by typing

>RTS UNIT lcm_unit_no
and pressing the Enter key.

where

lcm_unit_no is the number of the LCM unit busied in step 3

If RTS	Do
passed	step 11
failed	step 14

11 Send any faulty cards for repair according to local procedure.

12 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 15.

13 Return to the 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 *Card Replacement Procedures*.

14 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

15 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X52 in RSC-S LCME

Application

Use this procedure to replace an NT6X52 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X52	AA	Digroup Control card

Common procedures

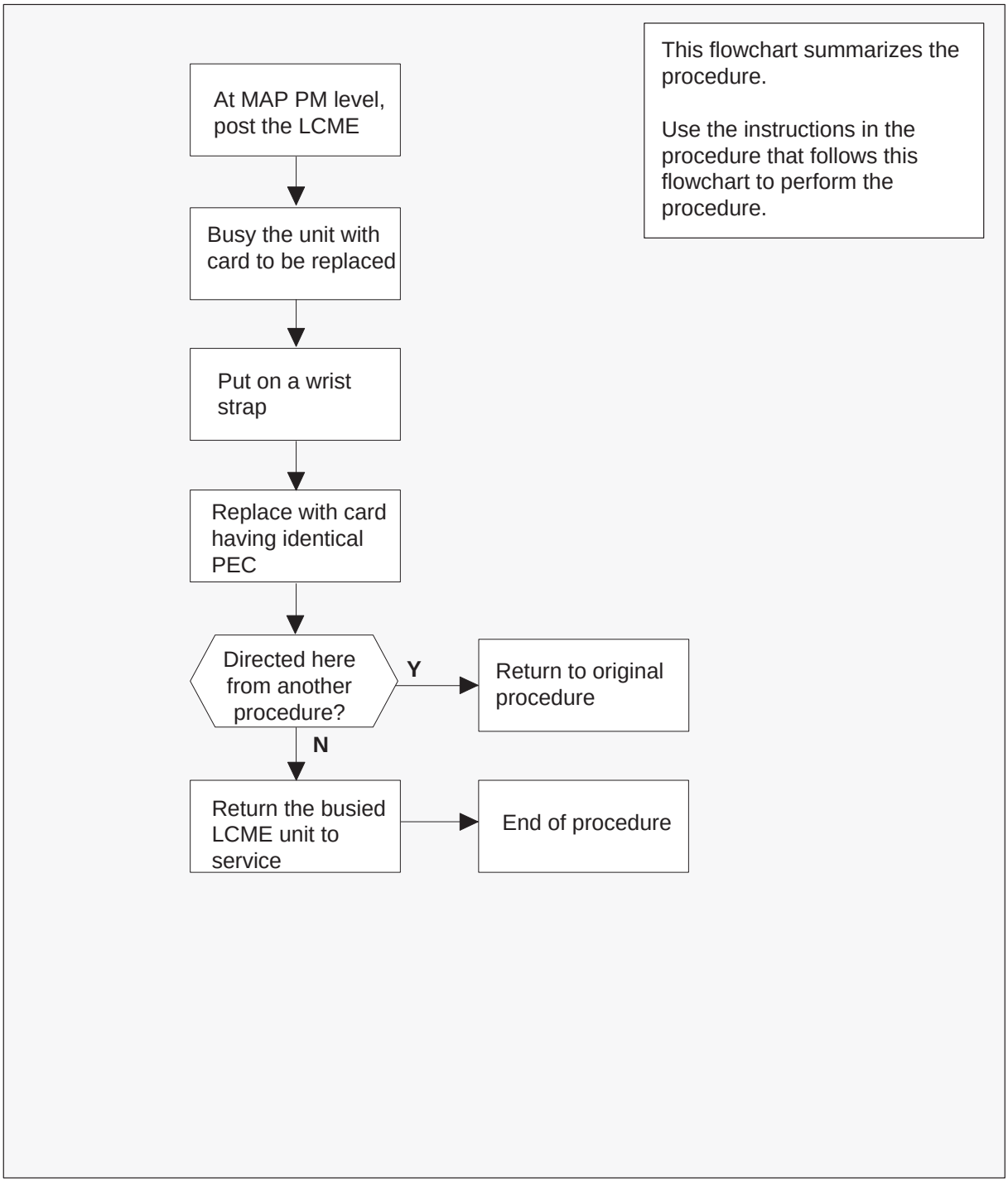
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X52
in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X52 card in RSC-S LCME



NT6X52 in RSC-S LCME (continued)

Replacing an NT6X52 card in RSC-S LCME

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 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP to the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME lcme_site_name lcme_frame_no lcme_no
and pressing the Enter key.

where

lcme_site_name	is the name of the site at which the LCME is located
lcme_frame_no	is the number of the frame in which the LCME is located
lcme_no	is the number of the LCME unit with the faulty card

Example of a MAP response:

```
 CM     MS     IOD    Net    PM    CCS    LNS    Trks    Ext     Appl
 .      .       .      .     .      .      .      .       .       .
LCME             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        0        0        0       130
 2 Post_   LCME     0        0        0        0        0         0
 3
 4 Swrg_           LCME   RemL  OO O Links_OOS:  CSide 0
 5 Trnsl_          Unit 0:  InSv               /RG:  0
 6 Tst_            Unit 1:  InSv               /RG:  1
 7 Bsy_                                 11 11 11       RG:Pref:0 InSv
 8 RTS_            Drwr: 01 23 45 67 89 01 23 45          Stby:1 InSv
 9 OffL_           .. .. .. .. .. ..
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Busy the LCME by typing

>BSY UNIT lcme_unit_no
and pressing the Enter key.

where

lcm_unit_no is the number of the LCME posted in step 3

Example of a MAP response:

```
 CM     MS    IOD    Net    PM     CCS    LNS    Trks   Ext      Appl
 .      .       .       .     1LCME    .       .       .         .
LCME             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        1        0        0        0       130
 2 Post_   LCME     0        1        0        0        0         0
 3
 4 SwRg             LCME  RemL  OO O ISTb Links_OOS: CSide 1 PSide 0
 5 Trnsl            Unit-0:  InSv  Mtce TakeOver   /RG:  0
 6 Tst              Unit-1:  ManB Mtce             /RG:  0
 7 Bsy                                 11 11 11      RG:Pref:0 InSv
 8 RTS              Drwr: 01 23 45 67 89 01 23 45         Stby:1 InSv
 9 OffL             .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT6X52
in RSC-S LCME (continued)

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

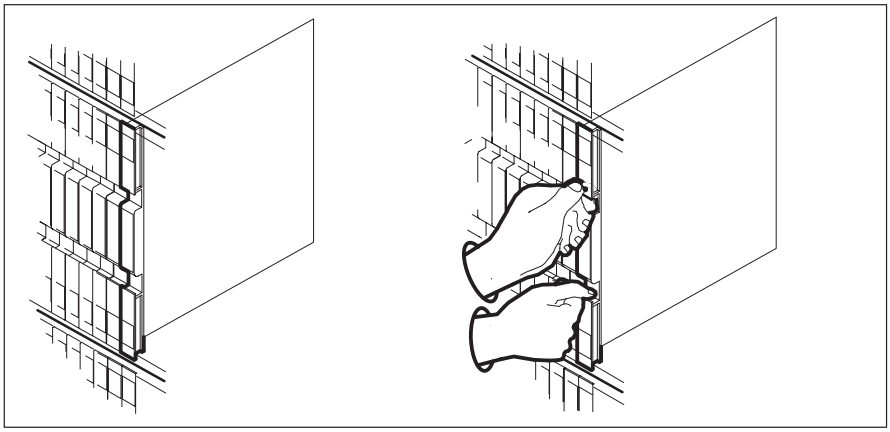
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

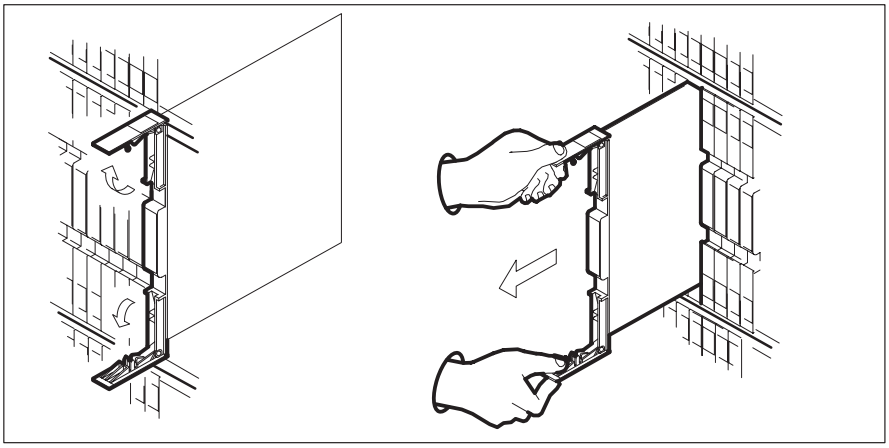
NT6X52
in RSC-S LCME (continued)

6 Remove the NT6X52 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



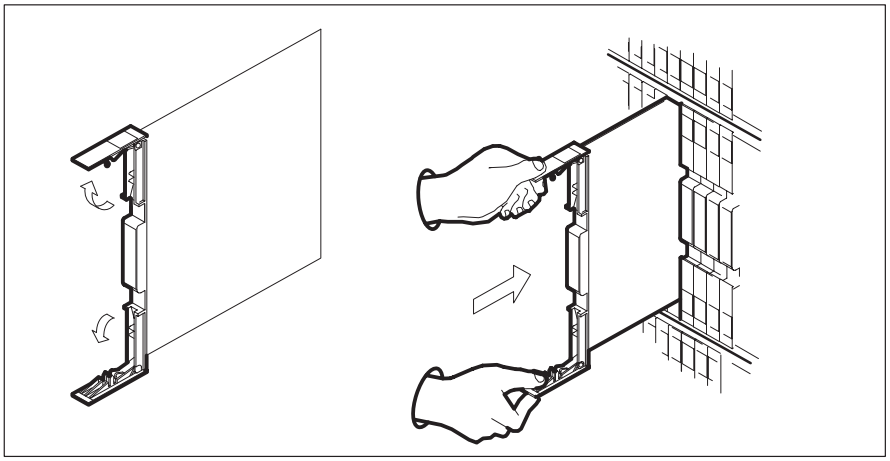
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

NT6X52
in RSC-S LCME (continued)

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



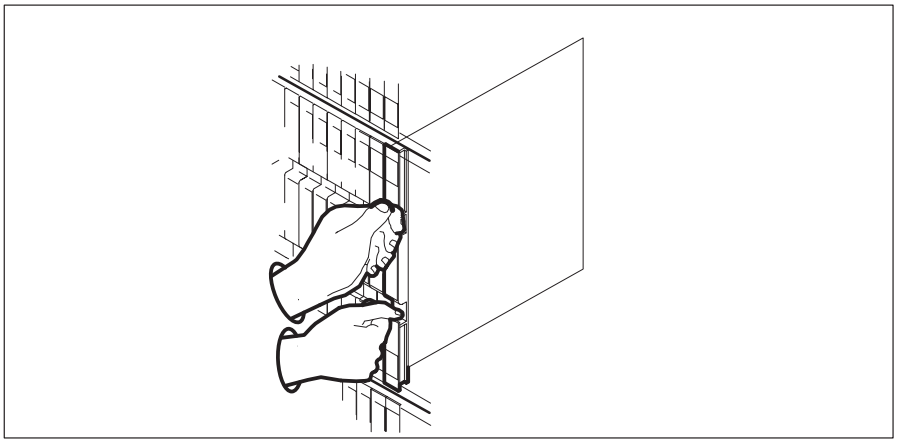
8

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

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



At the MAP terminal

9 Load the inactive LCME unit by typing

>LOADPM UNIT lcme_unit_no CC
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit busied in step 4

If load	Do
passed	step 10
failed	step 16

10 Test the LCME unit by typing

>TST UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit loaded in step 9

If TST	Do
passed	step 11
failed	step 15

NT6X52 in RSC-S LCME (end)

11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 15
other	step 12

12 Return the LCME unit to service by typing

>RTS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit tested in step 10

If RTS	Do
passed	step 13
failed	step 16

13 Send any faulty cards for repair according to local procedure.

14 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 17.

15 Return to the 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 *Card Replacement Procedures*.

16 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

17 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X53 in RSC-S LCM(E)

Application

Use this procedure to replace an NT6X53 card in an RSC-S LCM(E).

PEC	Suffixes	Name
NT6X53	CA	Power Converter

Common procedures

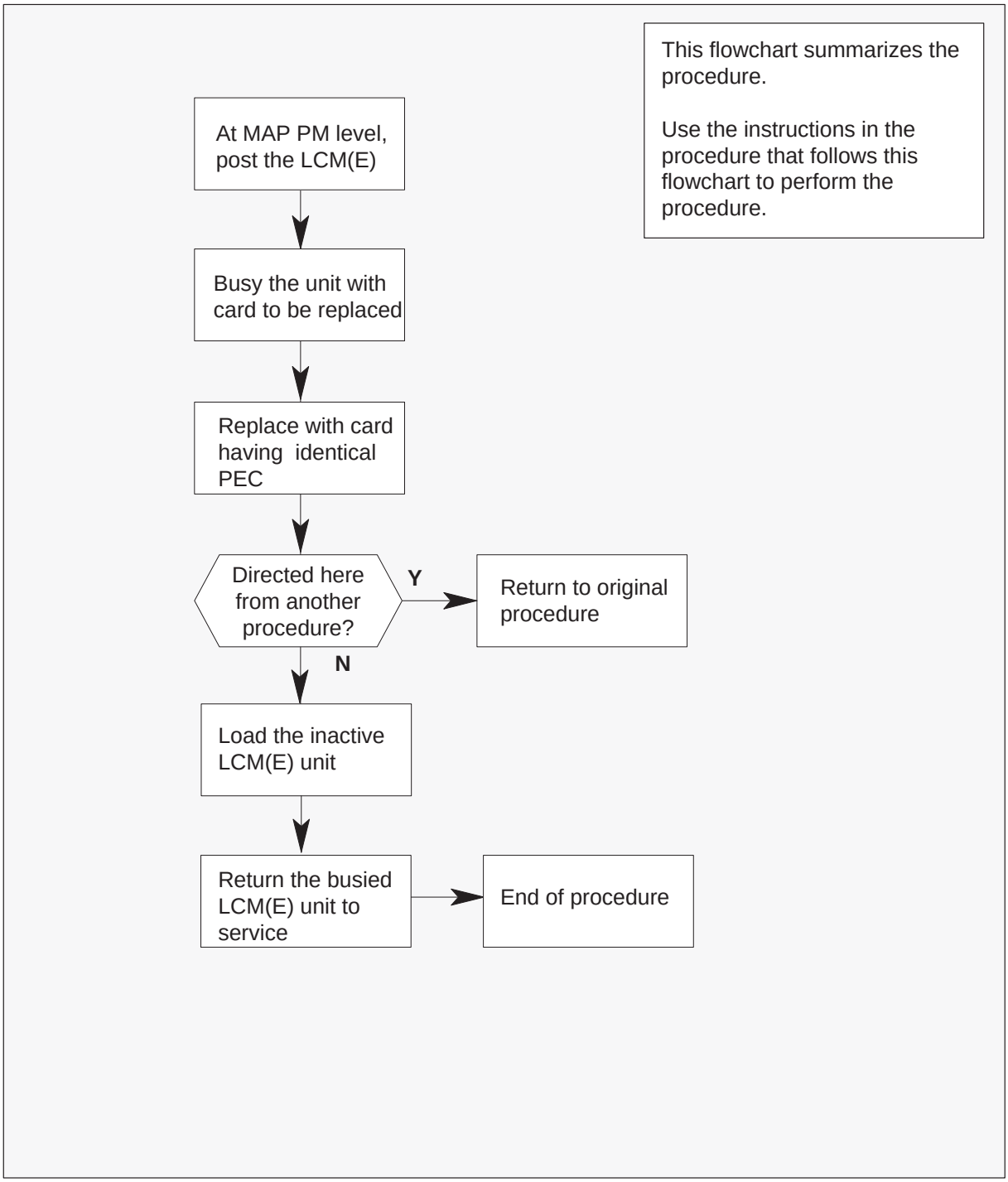
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X53 in RSC-S LCM(E) (continued)

Summary of card replacement procedure for an NT6X53 card in RSC-S LCM(E)



NT6X53 in RSC-S LCM(E) (continued)

Replacing an NT6X53 card in RSC-S LCM(E)

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 Obtain an NT6X53 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the LCM(E) unit by typing

>MAPCI;MTC;PM;POST LCM(E) lcm(e)_site_name lcm(e)_frame_no lcm(e)_no
and pressing the Enter key.

where

lcm(e)_site_name	is the name of the site at which the LCM(E) is located
lcm(e)_frame_no	is the number of the frame in which the LCM(E) is located
lcm(e)_no	is the number of the LCM(E) with the faulty card

Example of a MAP response:

```
 CM     MS     IOD     Net     PM    CCS    LNS    Trks     Ext     Appl
 .      .       .       .      .     .      .       .        .        .
LCME             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       4        0       10        3        3       130
 2 Post_   LCME     1        0        5        0        1         9
 3
 4 Swrg_     LCME   RemL  00 0 ISTb  Links_OOS:  CSide 1
 5 Trnsl_    Unit-0:  InSv                    /RG:  0
 6 Tst_      Unit-1:  InSv                    /RG:  0
 7 Bsy_                            11 11 11            RG:Pref:0 InSv
 8 RTS_      Drwr: 01 23 45 67 89 01 23 45               Stby:1 InSv
 9 OffL_           .. .. .. .. .. .. .. ..
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

NT6X53 in RSC-S LCM(E) (continued)

4 Busy the LCM(E) by typing

>BSY UNIT lcm(e)_unit_no
and pressing the Enter key.

where

lcm(e)_unit_no is the number of the LCM(E) unit

Example of a MAP response:

```
 CM     MS     IOD     Net     PM    CCS     LNS    Trks    Ext     Appl
 .      .       .       .     1LCME    .      .       .       .       .
LCME             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        4        1       10        3        3       130
 2 Post_   LCME      1        1        5        0        1         9
 3
 4 SwRg       LCME   RemL  OO O ISTb   Links_OOS:  CSide 1
 5 Trnsl      Unit-0:  InSv  Mtce TakeOver  /RG:  0
 6 Tst        Unit-1:  ManB Mtce            /RG:  0
 7 Bsy                              11 11 11      RG:Pref:0 InSv
 8 RTS        Drwr: 01 23 45 67 89 01 23 45         Stby:1 InSv
 9 OffL             .. .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

6 Power down the shelf by setting the ON/OFF switch on the circuit breaker shelf to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will be ON. An audible alarm may sound. If an alarm does sound, silence it by typing

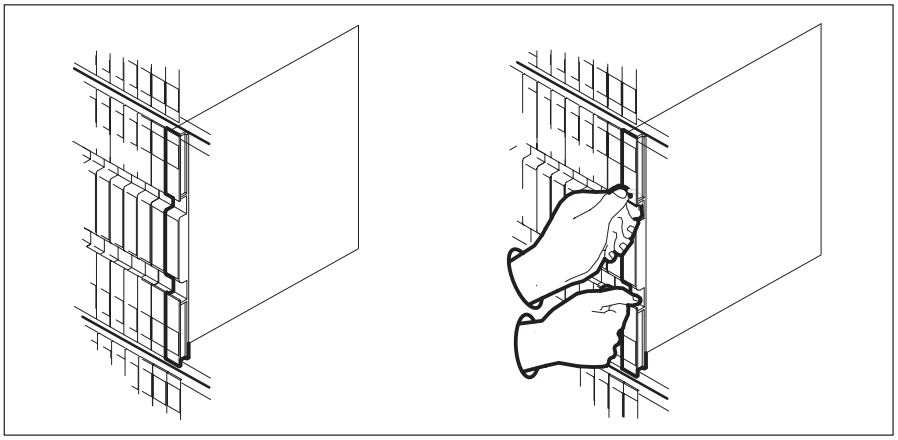
>SIL

and pressing the Enter key.

NT6X53 in RSC-S LCM(E) (continued)

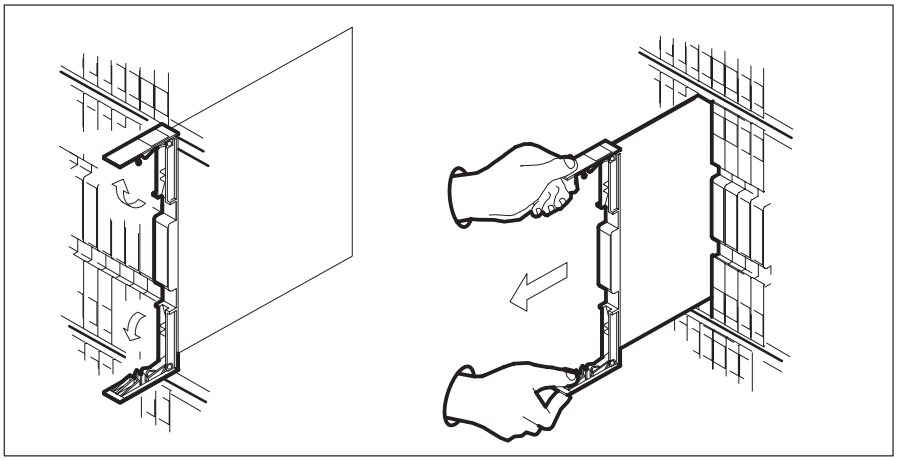
7 Remove the NT6X53 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

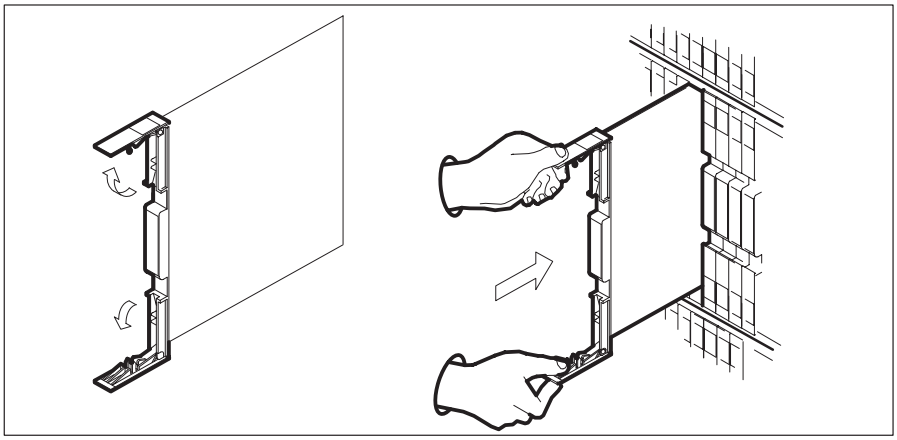
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.



8 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

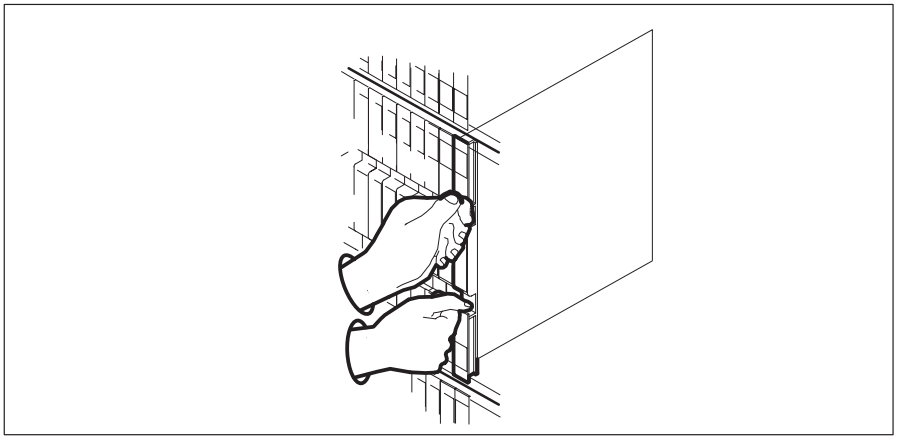
b. Gently slide the card into the shelf.



9 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



NT6X53 in RSC-S LCM(E) (continued)

10 Power up the LCM(E) unit as follows:

a. Ensure the power converter (NT6X53) 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 circuit breaker to the ON position.

At the MAP terminal

11 Load the LCM(E) unit by typing

>LOADPM UNIT lcm(e)_unit_no CC
and pressing the Enter key.

where

lcm(e)_unit_no is the number of the LCM(E) unit busied in step 4

If load	Do
passed	step 12
failed	step 18

12 Test the LCM(E) unit by typing

>TST UNIT lcm(e)_no
and pressing the Enter key.

where

lcm(e)_unit_no is the number of the LCM(E) unit loaded in step 11

If TST	Do
passed	step 13
failed	step 17

13 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 17
other	step 14

14 Return the LCM(E) unit to service by typing

>RTS UNIT lcm(e)_unit_no
and pressing the Enter key.

where

lcm(e)_unit_no is the number of the LCM(E) unit tested in step 12

If RTS	Do
passed	step 15
failed	step 18

15 Send any faulty cards for repair according to local procedure.

16 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 19.

17 Return to *Alarm Clearing Proceduress* or the 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.

18 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

19 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X54 in RSC-S LCM(E)

Application

Use this procedure to replace an NT6X54 card in an RSC-S LCM(E).

PEC	Suffixes	Name
NT6X54	AA	Bus Interface Card (BIC)

Common procedures

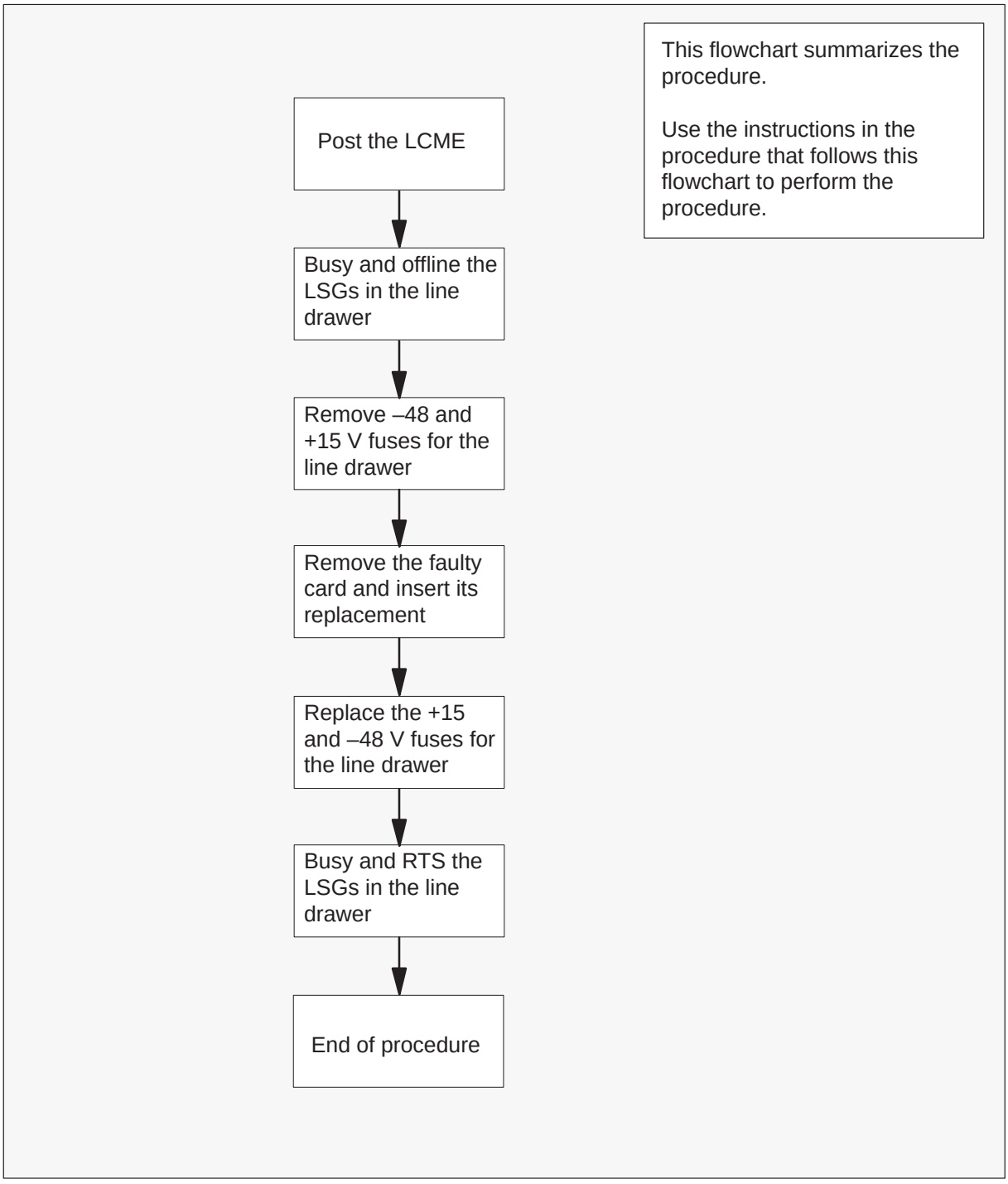
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X54 in RSC-S LCM(E) (continued)

Summary of card replacement procedure for an NT6X54 card in RSC-S LCM(E)



NT6X54 in RSC-S LCM(E) (continued)

Replacing an NT6X54 card in RSC-S LCM(E)

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 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LCME with the LCA shelf containing the card to be replaced by typing

>MAPCI;MTC;PM;POST LCME lcme_site_name lcme_frame_no lcme_no
and pressing the Enter key.

where

lcme_site_name	is the name of the site at which the LCME is located
lcme_frame_no	is the number of the frame in which the LCME is located
lcme_no	is the number of the LCME with the faulty card

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     LNS    Trks     Ext   Appl
 .      .       .       .     1LCM     .       .       .        .     .
LCM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        0        0        0       130
 2 Post_   LCME     0        0        0        0        0         0
 3
 4 SwRg       LCME   RemL  00 0 ISTb   Links_OOS:  CSide 1
 5 Trnsl      Unit0:   InSv                /RG:  0
 6 Tst        Unit1:   InSv                /RG:  0
 7 Bsy                                 11 11 11     RG:Pref 0 InSv
 8 RTS        Drwr: 01 23 45 67 89 01 23 45     RG:Stby:1 InSv
 9 OffL             .. .. .. .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NT6X54
in RSC-S LCM(E) (continued)

4 Busy both line subgroups (LSG) associated with the LCME drawer in which the card is being replaced by typing

>BSY DRWR lsg
and pressing the Enter key.

where

lsg is a line subgroup associated with the drawer

Example of a MAP response:

```
Please confirm (“YES” or “NO”)
```

Confirm the system prompt by typing

>YES
and pressing the Enter key.

Repeat this step for other line subgroups associated with the drawer.

5 Offline the LSGs busied in step 4 by typing

>OFFL DRWR lsg
and pressing the Enter key.

where

lsg is a line subgroup busied in step 4

At the LCE frame

6 Remove the –48V fuse for the line drawer containing the bus interface card (BIC) to be replaced.

7 Remove the +15V fuse for the line drawer containing the BIC to be replaced.

NT6X54
in RSC-S LCM(E) (continued)

8

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch cabinet (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel (FSP) of the LCME. This protects the equipment against damage caused by static electricity.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

9 Open the line drawer by following these substeps:

a. Face the drawer shelf and grasp the lip at the bottom of the drawer.

b. Push up on the drawer latch with your thumb and pull the drawer out approximately 15 cm (about 6 in).

10

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

Remove the BIC to be replaced by following these substeps:

a. Open the locking levers on the BIC.

b. Grasping the open locking levers, remove the card from the line drawer in one steady motion. The card will unplug from its socket.

Note: Do not use a rocking motion to remove the card.

11 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Close the locking levers on the card.

c. Position the card in its backplane socket. In one steady motion, push against the closed locking levers with your thumbs until the card plugs fully into the backplane socket.

Note: Do not use a rocking motion to insert the card.

d. Close the line drawer.

12 Replace the +15V fuse associated with the line drawer.

13 Replace the –48V fuse associated with the line drawer.

14 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
an alarm clearing procedure	step 19
other	step 15

NT6X54 in RSC-S LCM(E) (end)

At the MAP terminal

15 Busy the offline LSGs associated with the LCME drawer by typing

>BSY DRWR lsg
and pressing the Enter key.

where

lsg is a line subgroup associated with the drawer

Repeat this step for other LSGs associated with the drawer.

16 Return the LSGs to service by typing

>RTS DRWR lsg
and pressing the Enter key.

where

lsg is a line subgroup associated with the drawer

If RTS	Do
passed	step 17
failed	step 20

17 Send any faulty cards for repair according to local procedure.

18 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 21.

19 Return to *Alarm Clearing Procedures* or the 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.

20 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X69 in RSC-S RCO2

Application

Use this procedure to replace the following card in an RSC-S RCO2.

PEC	Suffixes	Name
NT6X69	LA, LB	Message and Tone Card

Common procedures

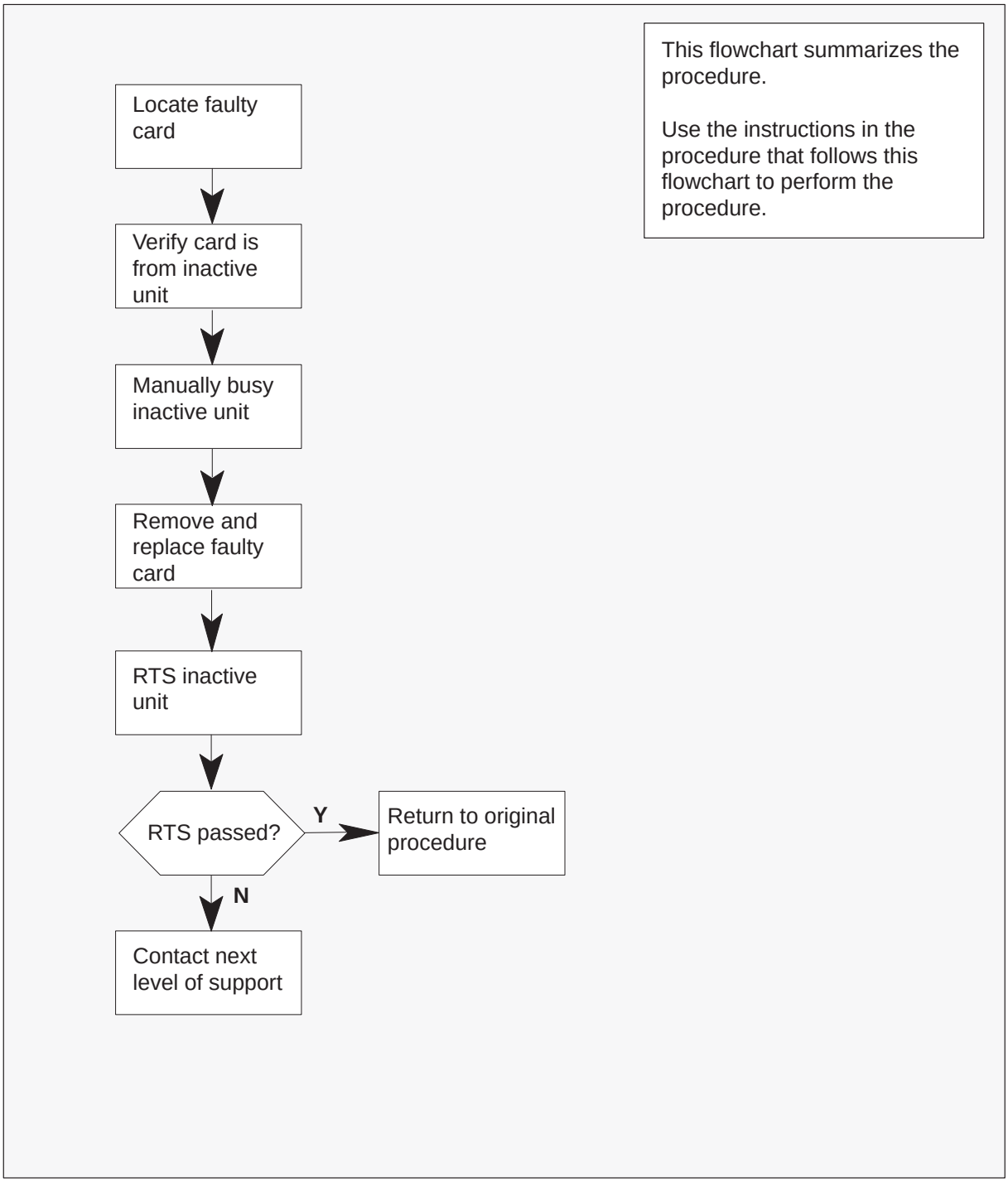
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X69 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NT6X69 card in RSC-S RCO2



NT6X69
in RSC-S RCO2 (continued)

Replacing an NT6X69 in an RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Ensure the PM level of the MAP display is currently displayed by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the rco2 with the faulty card

NT6X69
in RSC-S RCO2 (continued)

Example of a MAP display:

```
CM     MS    IOD    Net     PM     CCS     LNS     Trks    Ext   Appl
 .      .     .      .       .      .       .       .       .     .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0        0        0        0         25
 2 Post_   RCO2    0        0        0        0        0          0
 3 ListSet
 4         RCO2    0 InSv  Links_OOS:
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 By observing the MAP display, be sure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 7

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in service, proceed to the next step.

NT6X69
in RSC-S RCO2 (continued)

At the RCE

7 Put 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

8 Busy the inactive PM unit by typing

>BSY UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

9 Set the PM to the ROM level and inhibit messaging by typing

>PMRESET UNIT rco2_unit_no NORUN
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

At the RCE

10

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 modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

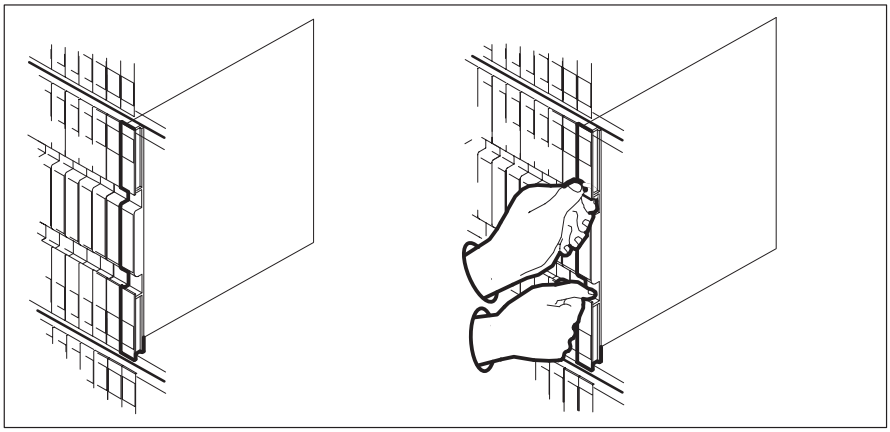
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Put on a wrist strap.

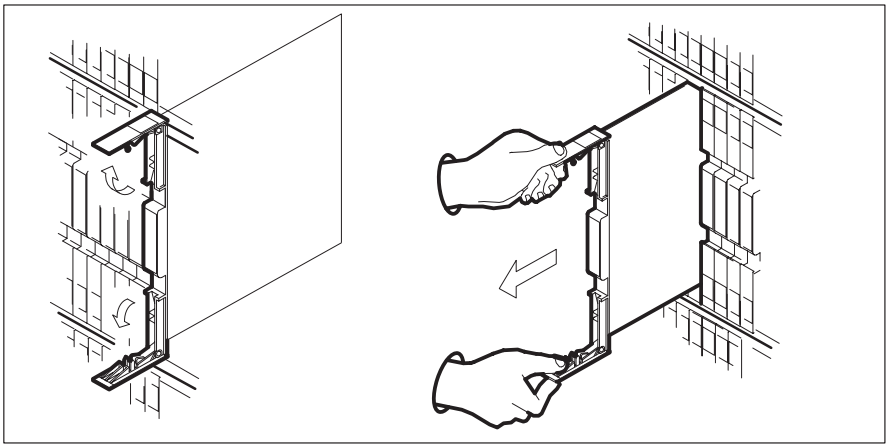
11 Remove the NT6X69 card as shown in the following figures.

NT6X69
in RSC-S RCO2 (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

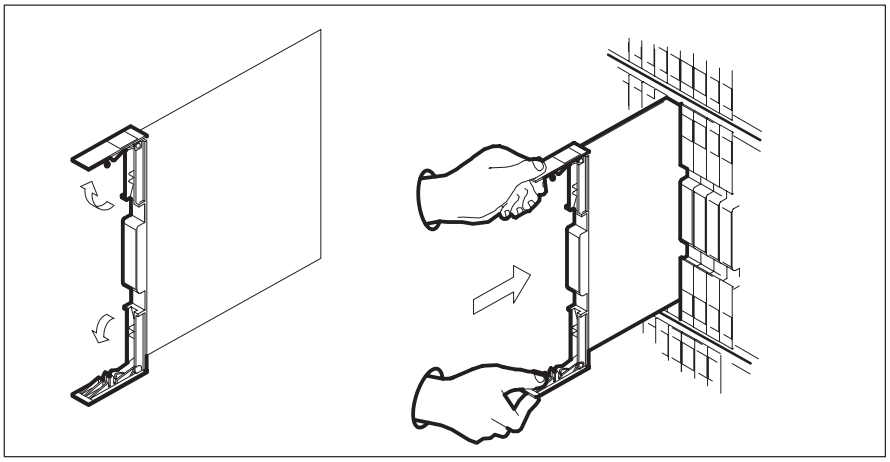


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

12 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



13

CAUTION
Loss of subscriber service
Subscriber service may be lost in the active unit when reseating the NT6X69 card.

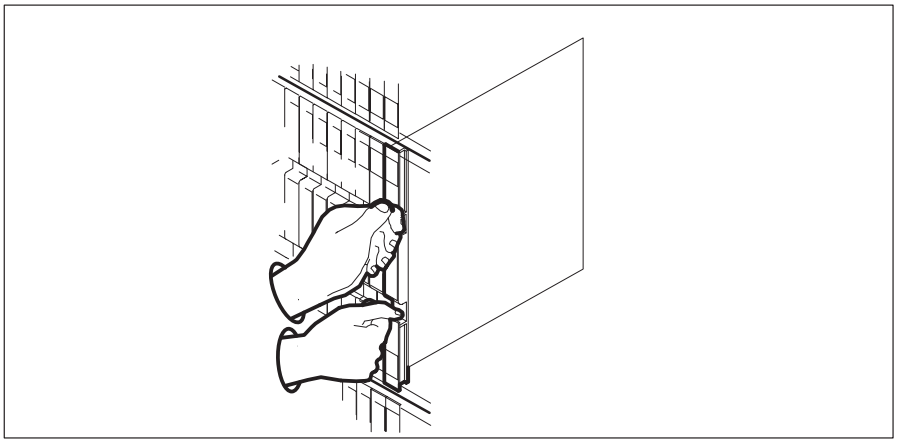
It is recommended that this procedure be performed during low traffic periods.

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.

NT6X69
in RSC-S RCO2 (continued)

b. Close the locking levers.



At the MAP terminal

14 Perform a full reset of the inactive unit by typing

>PMRESET UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

If PMRESET	Do
passed	step 17
fails, try reloading this unit	step 15
fails with a card list	step 20

15 Load the inactive unit by typing

>LOADPM UNIT rco2_unit_no CC
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

If LOADPM	Do
passed	step 16
failed	step 21
fails with a card list	step 20

16 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 20
other	step 17

17 Return the inactive RCO2 unit to service by typing

>RTS UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

If RTS	Do
passed	step 18
failed	step 21

18 Send any faulty cards for repair according to local procedure.

19 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 22.

20 Return to the 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.

21 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

NT6X69
in RSC-S RCO2 (end)

22 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.

NT6X71 in RSC-S LCME

Application

Use this procedure to replace an NT6X71 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X71	AA, AB	Data Line card (DLC)

Common procedures

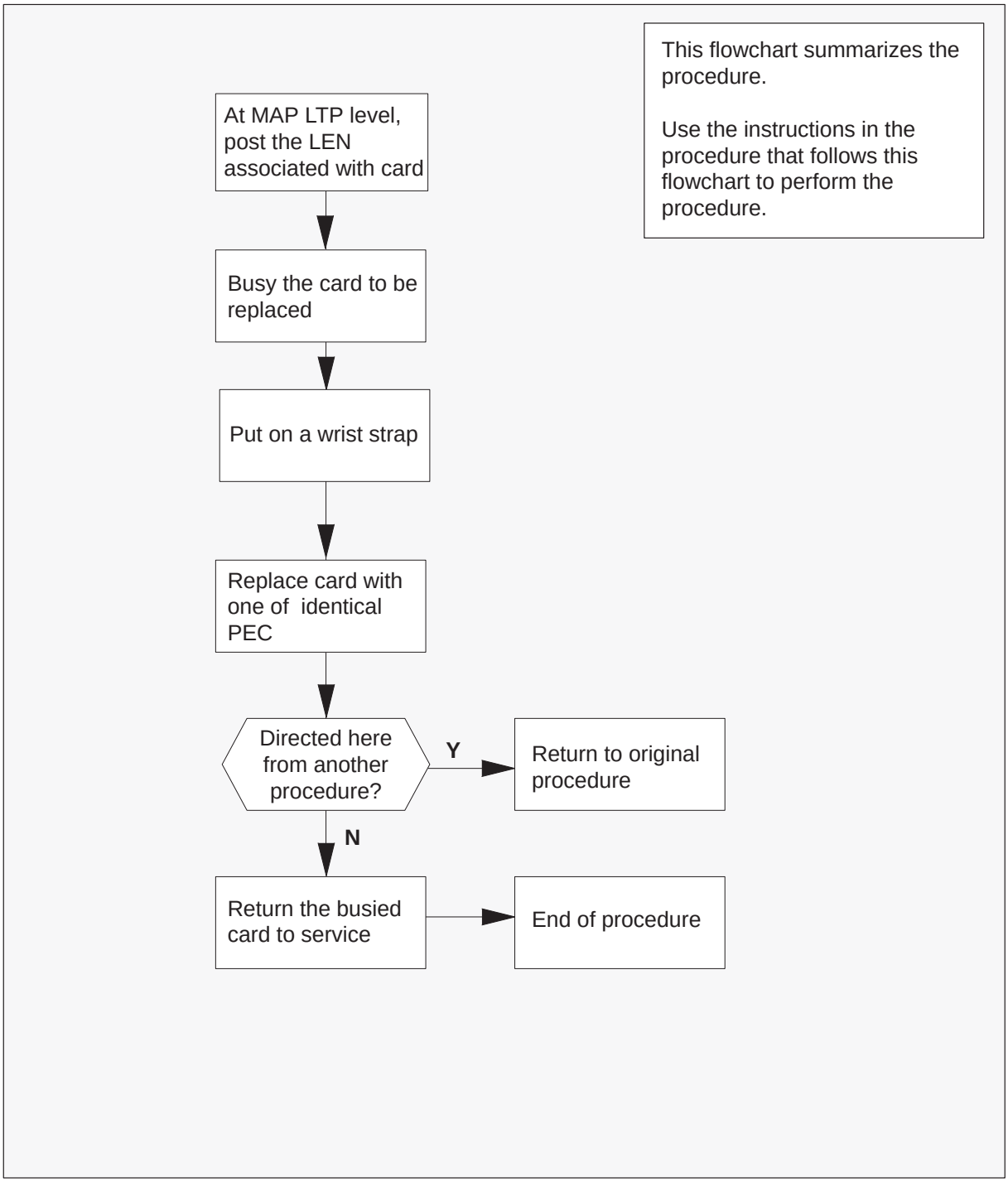
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X71 in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X71 card in RSC-S LCME



NT6X71 in RSC-S LCME (continued)

Replacing an NT6X71 card in RSC-S LCME

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 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS    LNS    Trks     Ext     Appl
 .      .      .      .      .     .      .      .        .       .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN...     DN      STA F S LTA TE RESULT
 4            CKT TYPE FL    HOST 00 0 03 03  4931082  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

NT6X71 in RSC-S LCME (continued)

4 Busy the NT6X71 line card by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS    LNS    Trks     Ext      Appl
 .      .      .      .      .     .      .      .        .        .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN.....   DN      STA F S LTA TE RESULT
 4            CKT TYPE FL  HOST 00 0 03 03 4931082  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING

Card damage—transport

Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame.

Store and transport circuit cards in an ESD protective container.

NT6X71
in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers.

Put on a wrist strap.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

NT6X71
in RSC-S LCME (continued)

6 Prepare to remove the faulty card by opening the line drawer, determined in step 1, and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the removed card into the ESD container and store using local procedures.

8 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the NT6X71 line card by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 14

11 Return the NT6X71 card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

NT6X71
in RSC-S LCME (end)

14 Return to *Alarm and Clearing Procedures* or another procedure that directed you to this procedure. If necessary, go to the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X74 in RSC-S RMM

Application

Use this procedure to replace an NT6X74 card in an RSC-S RMM.

PEC	Suffixes	Name
NT6X74	AB	RMM Control Card (RMMC)

Common procedures

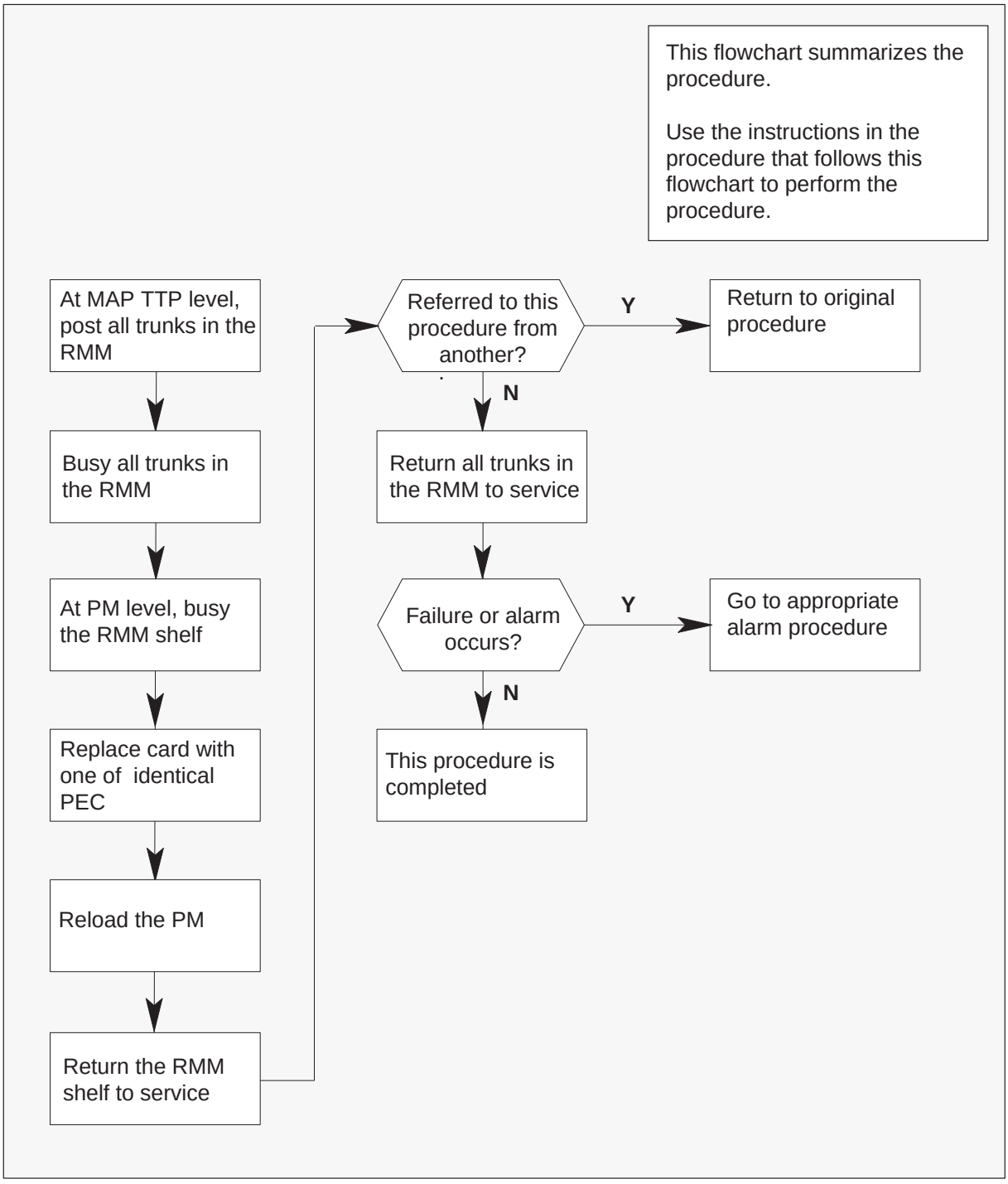
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X74 in RSC-S RMM (continued)

Summary of card replacement procedure for an NT6X74 card in RSC-S RMM



NT6X74 in RSC-S RMM (continued)

Replacing an NT6X74 card in an RSC-S RMM

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards or have been directed to this procedure by your maintenance support group.

At the MAP terminal

2 Set the MAP display to the PM level and post the RMM by typing

>MAPCI;MTC;TRKS;TTP;POST TM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM in which the card is to be replaced

3 Busy all trunks in the RMM by typing

>BSY INB ALL
and pressing the Enter key.

4 At the PM level, busy the RMM shelf by typing

>PM;POST RMM rmm_no;BSY
and pressing the Enter key.

where

rmm_no is the number of the RMM in which the card is to be replaced

NT6X74
in RSC-S RMM (continued)

Example of a MAP display:

```
CM    MS    IOD    Net     PM    CCS    LNS    Trks     Ext    APPL
 .     .      .      .     4SysB   .      .      .        .      .
RMM               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      4        1        10       3        3         130
 2 Post_   RMM     0        1         1       0        0           2
 3
 4         RMM  5  ManB
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

At the RMM shelf

5

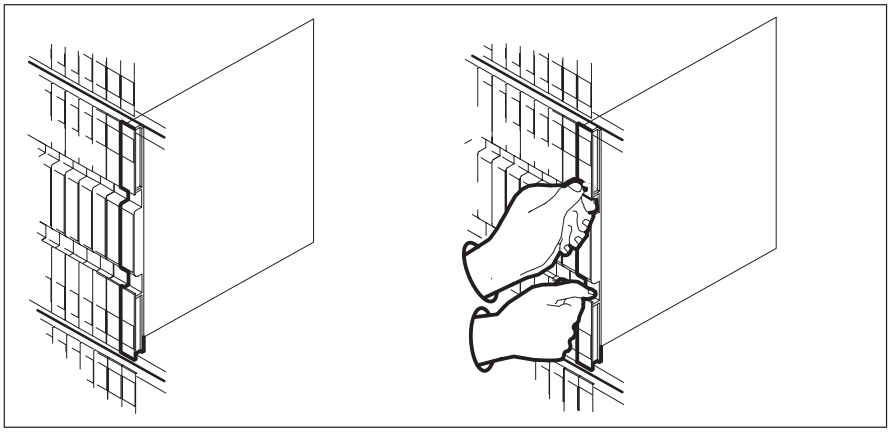
WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel (FSP) of the RMM. This protects the equipment against damage caused by static electricity.

WARNING
Improper insertion may cause damage to circuit packs
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

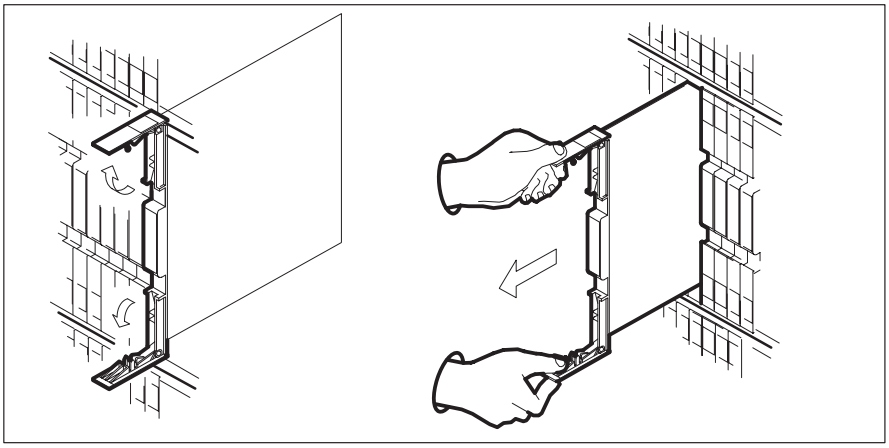
Put on a wrist strap.

6 Remove the NT6X74 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



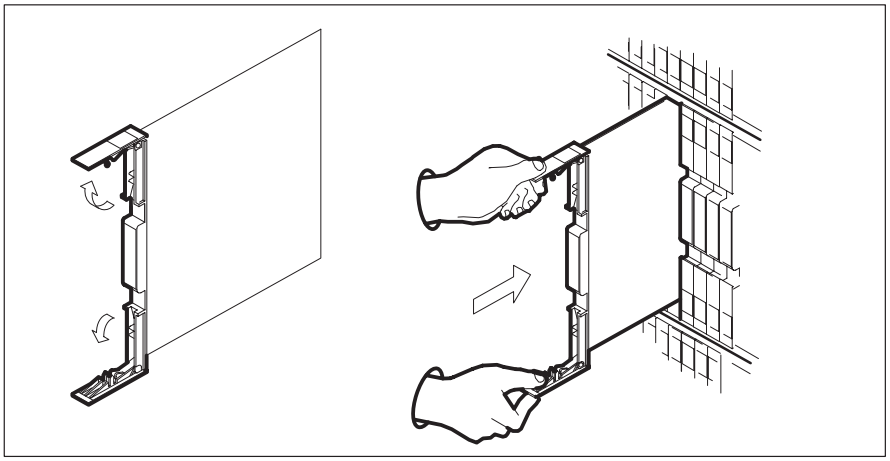
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

NT6X74
in RSC-S RMM (continued)

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



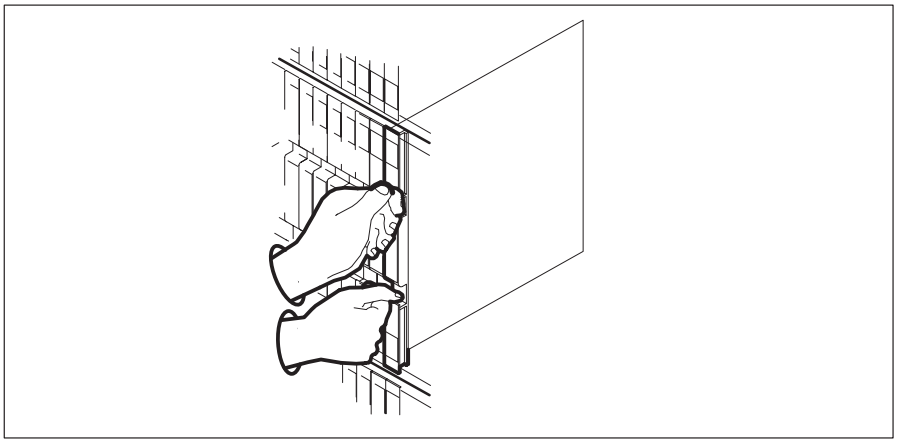
8

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



9 Reload the RMM by typing

>LOADPM
and pressing the Enter key.

10 Use the following information to determine where to proceed.

If	Do
loadfile not found in directory	step 11
load passes	step 15
load fails	step 22

11 Refer to the following table to determine the next step in this procedure.

If the system load module is	Do
version 1	step 12
version 2	step 13

NT6X74
in RSC-S RMM (continued)

12 List the loadfile in the directory by typing

>DSKUT;LISTVOL D000 ALL
and pressing the Enter key.

or

>DSKUT;LISTVOL D010 ALL
and pressing the Enter key.

Local operating company policy determines which disk, D000 or D010, the loadfile will be on.

Proceed to step14.

13 List the loadfile in the directory by typing

>DISKUT;LV S00D
>LF
and pressing the Enter key.

or

>DISKUT;LV S01D
>LF
and pressing the Enter key.

14 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

Return to step 9.

15 Return the RMM shelf to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 16
failed	step 22

16 Continue this procedure depending on where you were directed to this procedure.

If directed to this procedure from	Do
an alarm clearing procedure	step 21
other	step 17

At the MAP terminal

17 Post all trunks in the RMM in order to return to them service by typing

>TRKS;TTP;POST TM RMM rmm_no
and pressing the Enter key.

where

rmm_no is the number of the RMM in which the card has been replaced

18 Busy and return to service all trunks by typing

>BSY ALL;RTS ALL
and pressing the Enter key.

19 Use the following information to determine where to proceed.

If RTS	Do
passed	step 20
failed	step 22

20 Observe the alarm that is produced and go to the appropriate alarm clearing procedure in *Alarm Clearing Procedures.* Go to step 23.

21 Return to the 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 *Card Replacement Procedures*.

22 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

23 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this procedure and continue as directed.

NT6X76 in RSC-S LCME

Application

Use this procedure to replace an NT6X76 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X76	AC	Asynchronous Interface Line card

Common procedures

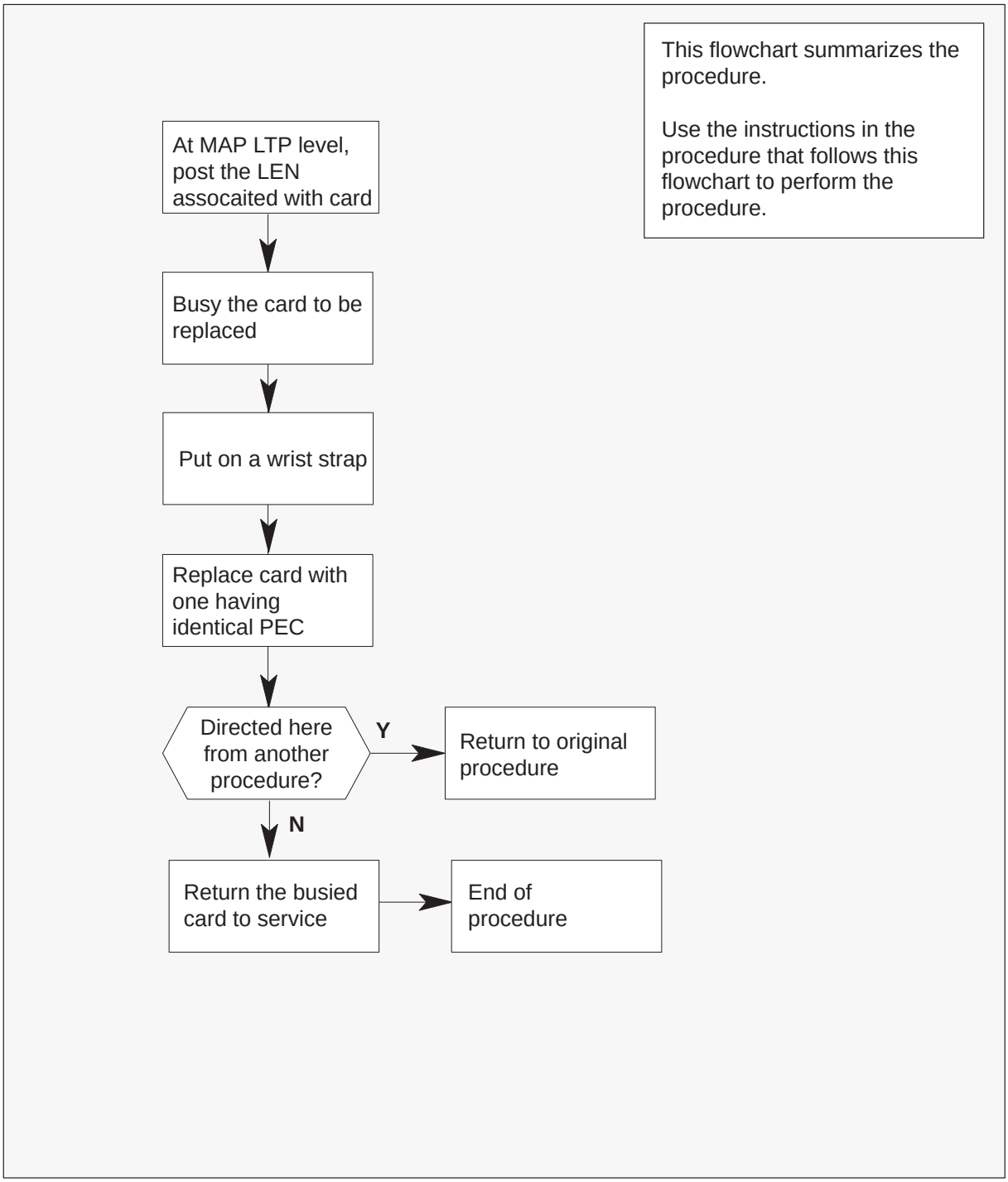
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X76
in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X76 card in RSC-S LCME



NT6X76 in RSC-S LCME (continued)

Replacing an NT6X76 card in RSC-S LCME

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 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST LCME site lcm(e)_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcm(e)_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP response:

```
 CM     MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .      .      .      .     .      .      .       .      .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN...      DN     STA F S LTA TE RESULT
 4            CKT TYPE FL    HOST 00 0 03 03
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

4 Busy the NT6X76 line card by typing

>BSY
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS    LNS    Trks     Ext     Appl
 .      .      .      .      .     .      .      .        .       .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN......   DN     STA F S LTA TE RESULT
 4            CKT TYPE FL  HOST 00 0 03 03
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

NT6X76 in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, see the following notes.

Put on a wrist strap.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

6 Prepare to remove the faulty card by opening the line drawer and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

NT6X76 in RSC-S LCME (continued)

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the NT6X76 line card by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 15

11 Return the NT6X76 card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

14 Return to the procedure that directed you to this procedure. If necessary, go to the point where a faulty card list was produced, identify the next faulty card on the list, and go to the appropriate card replacement procedure for that card in this manual.

15 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X78 in RSC-S RCO2

Application

Use this procedure to replace an NT6X78 card in a Remote Switching Center (RSC)-SONET Remote Switching Center Offshore (RCO)2.

PEC	Suffixes	Name
NT6X78	AA, AB, BA	CLASS Modem Resource (CMR)

Common procedures

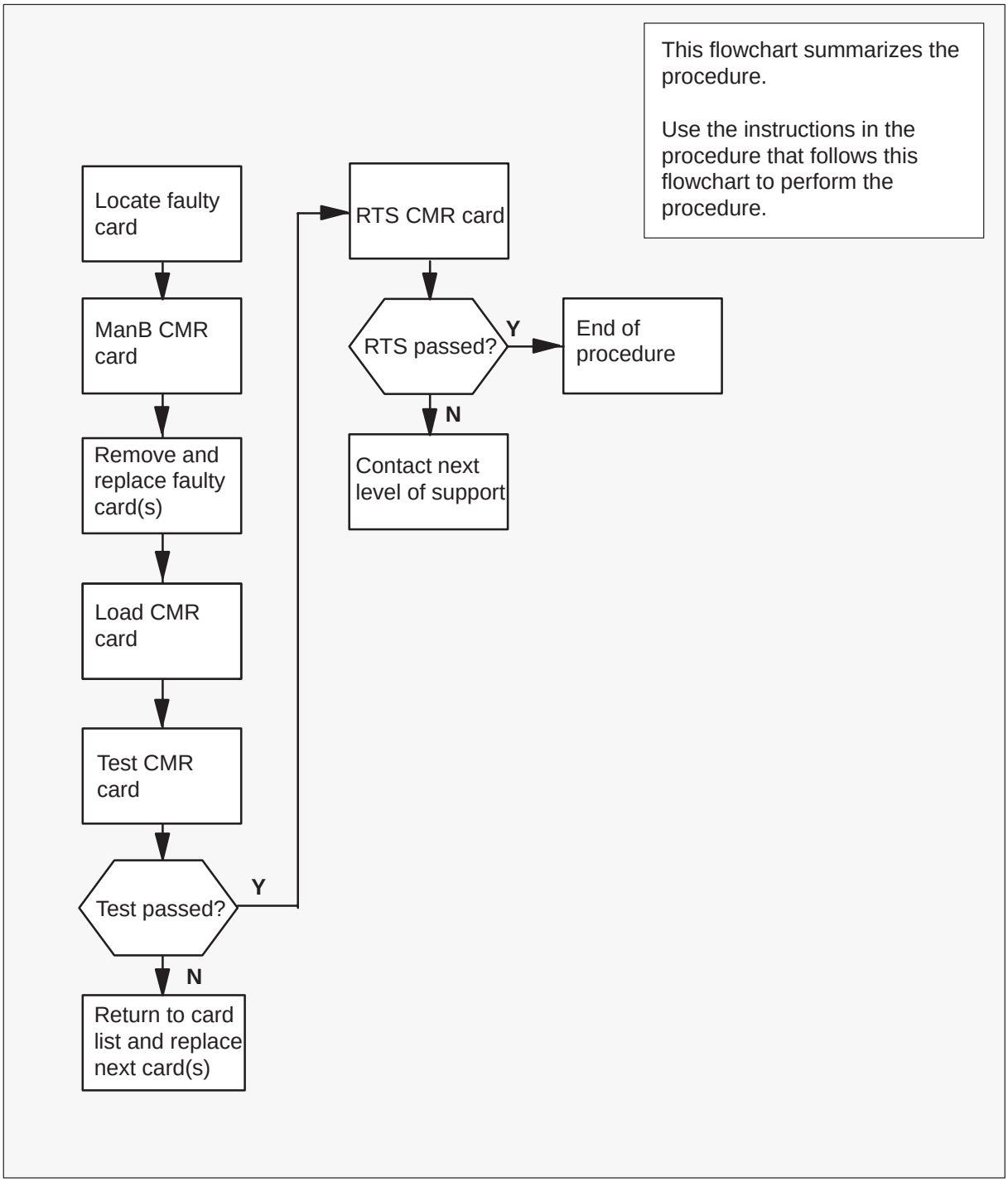
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X78
in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NT6X78 card in RSC-S RCO2



NT6X78 in RSC-S RCO2 (continued)

Replacing an NT6X78 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NT6X78 replacement card. Ensure 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 to find out which RCO2 is ISTb by typing

>MAPCI;MTC;PM;DISP STATE ISTB RCO2
and pressing the Enter key.

4 Access the ISTb RCO2 by typing

>POST RCO2 0–127 or 0–255
and pressing the Enter key.

where

variable is 0–127 range with an NT40 and 0–255 with a DMS SuperNode

5 Busy the CMR card by typing

>BSY UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the unit containing the faulty CMR card

NT6X78
in RSC-S RCO2 (continued)

At the RCE

6

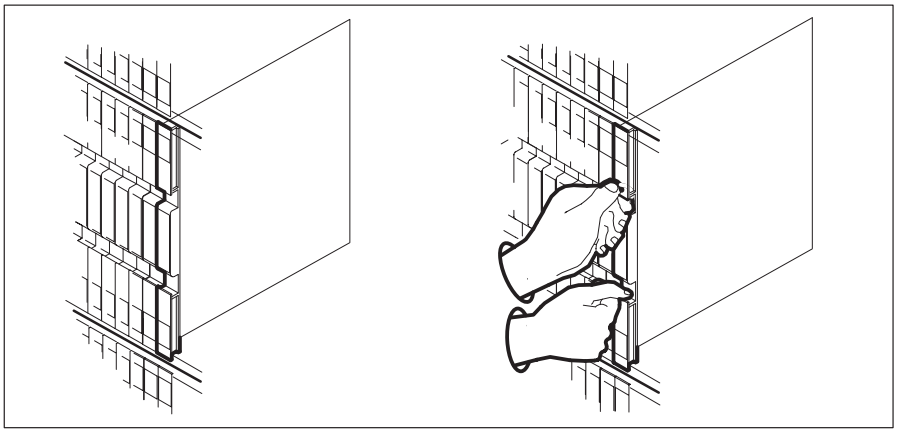
WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

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 card into its slot.

Put on a wrist strap.

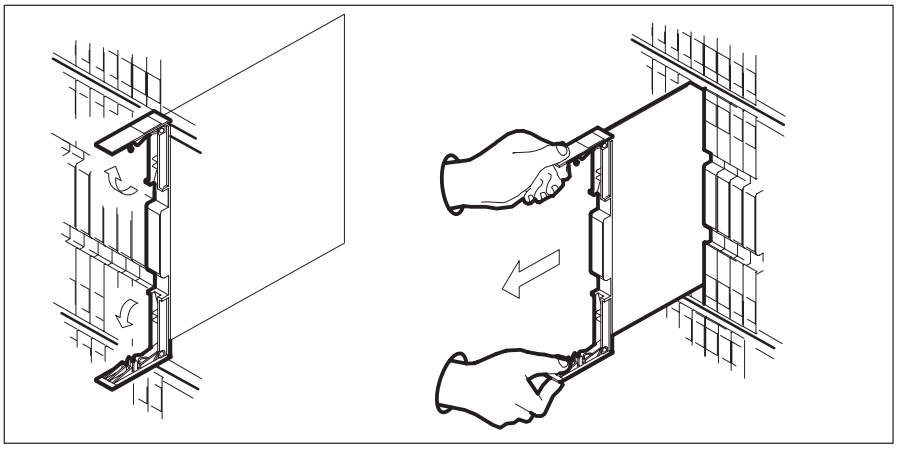
7 Remove the NT6X78 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



NT6X78
in RSC-S RCO2 (continued)

b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

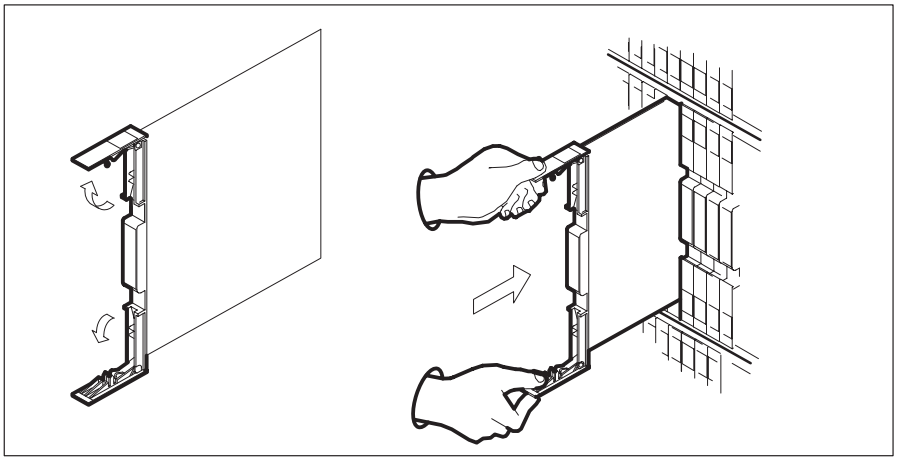


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

8 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

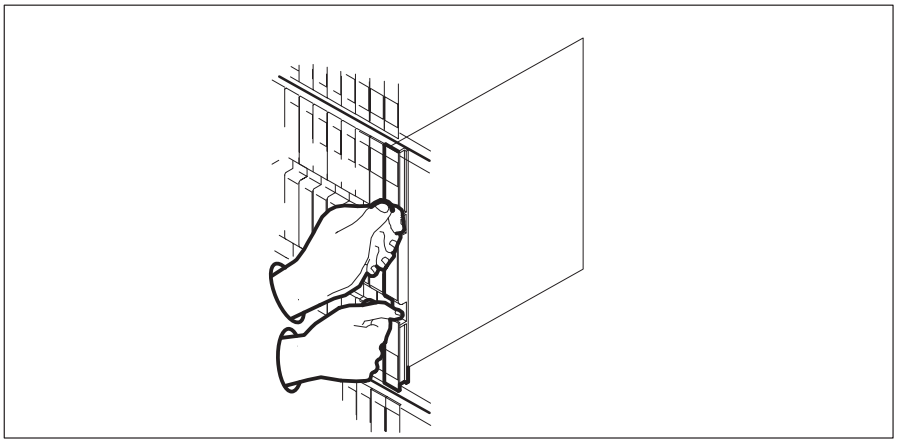
b. Gently slide the card into the shelf.



9 Seat and lock the card.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



At the MAP terminal

10 Load the CMR card by typing

>LOADPM UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the unit containing the faulty CMR card

If LOADPM	Do
passed	step 11
failed	step 17

11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 16
other	step 12

NT6X78 in RSC-S RCO2 (end)

12 Test the CMR card by typing

>TST UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the unit containing the faulty CMR card

If TST	Do
passed	step 13
failed	step 17

13 Return the CMR card to service by typing

>RTS UNIT unit_no CMR
and pressing the Enter key.

where

unit_no is the number of the unit containing the faulty CMR card

If RTS	Do
passed	step 14
failed	step 17

14 Send any faulty cards for repair according to local procedure.

15 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 18.

16 Return to the procedure that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

17 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

18 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X87 in RSC-S LCME

Application

Use this procedure to replace an NT6X87 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X87	AA	Data Voice Line card

Common procedures

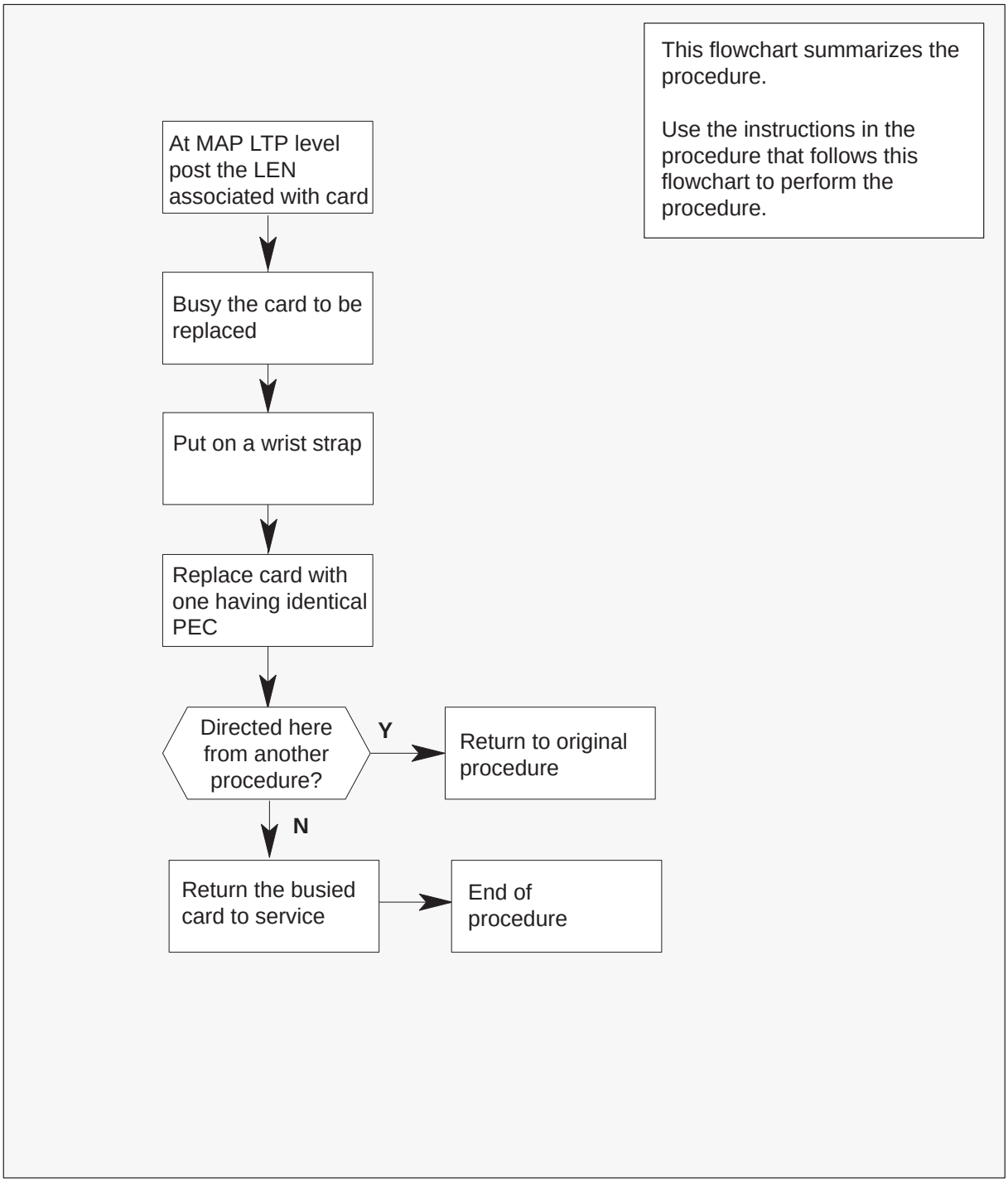
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X87 in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X87 card in in RSC-S LCME



NT6X87
in RSC-S LCME (continued)

Replacing an NT6X87 card in an in RSC-S LCME

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 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the line equipment number (LEN) of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP response:

```
 CM     MS     IOD    Net    PM    CCS    LNS    Trks     Ext    Appl
 .      .       .      .      .     .      .      .        .      .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN......    DN    STA F S LTA TE RESULT
 4            CKT TYPE FL    HOST 00 0 03 03  4931082  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

NT6X87
in RSC-S LCME (continued)

4 Busy the NT6X87 line card by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net     PM    CCS    LNS    Trks     Ext     Appl
 .      .     .      .       .     .      .      .        .        .
LTP
 0 Quit       Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3            LCC PTY RNG....LEN......   DN      STA F S LTA TE RESULT
 4            CKT TYPE FL  HOST 00 0 03 03 4931082  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

WARNING

Card damage—transport

Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

NT6X87
in RSC-S LCME (continued)

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, see the following notes.

Put on a wrist strap.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

NT6X87
in RSC-S LCME (continued)

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

Prepare to remove the faulty card by opening the line drawer and following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

6 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

7 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

8 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 13
other	step 9

At the MAP terminal

9 Test the NT6X87 line card by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passed	step 10
failed	step 14

NT6X87 in RSC-S LCME (end)

10 Return the NT6X87 card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 11
failed	step 14

11 Send any faulty cards for repair according to local procedure.

12 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 15.

13 Return to procedure that directed you to this procedure. If necessary, go to 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.

14 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

15 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X92 in RSC-S RCO2

Application

Use this procedure to replace an NT6X92 card in an RSC-S RCO2.

ATTENTION

To ensure peak performance, do not install the UTR and GTR on the same RSC-S RC02. 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	CA	Universal Tone Receiver (UTR)
NT6X92	EA	Global Tone Receiver (GTR)

Common procedures

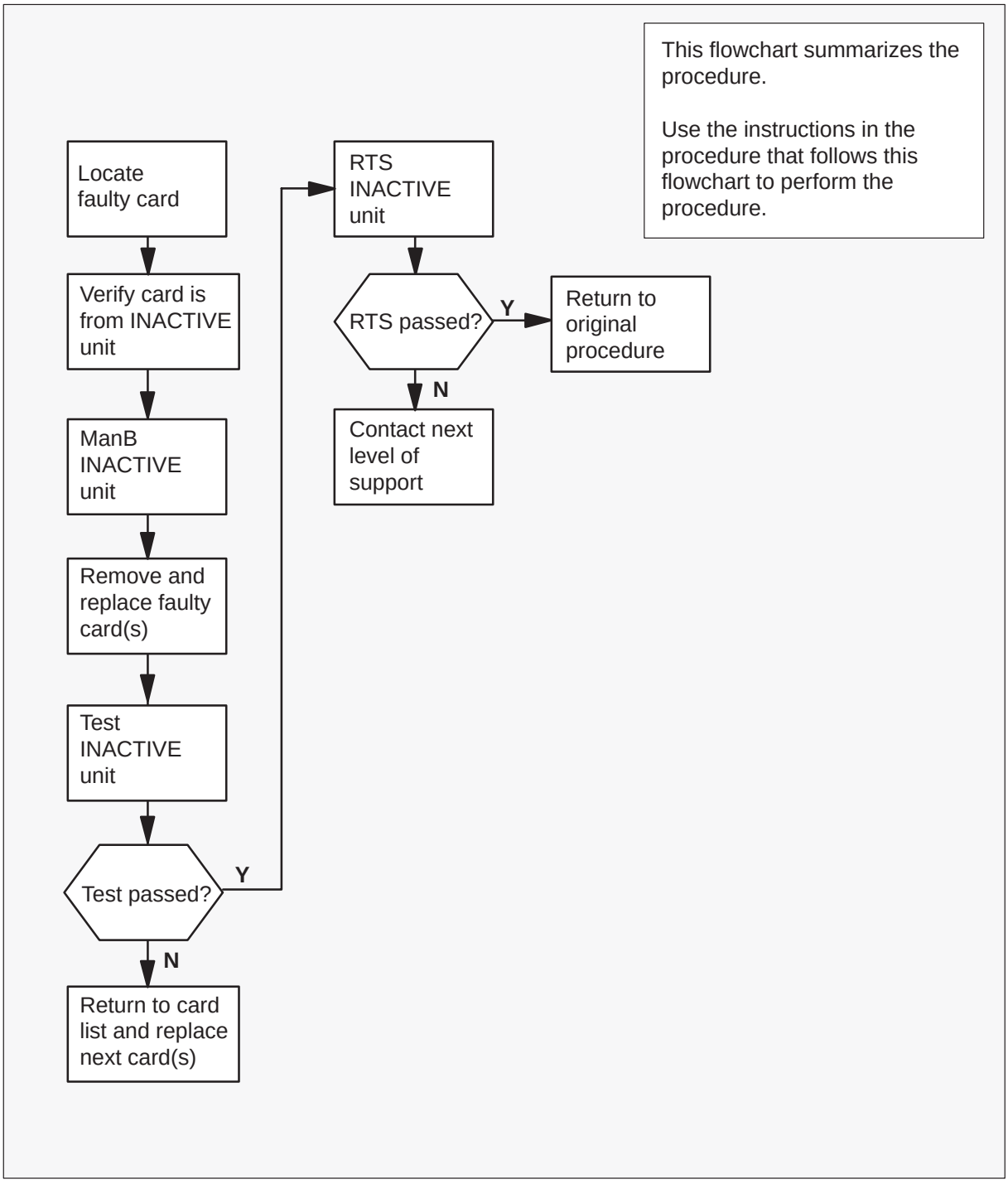
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X92 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NT6X92 card in RSC-S RCO2



NT6X92 in RSC-S RCO2 (continued)

Replacing an NT6X92 card in an RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NT6X92 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

3 Ensure the PM level of the MAP display is currently displayed and the RCO2 is posted by typing

>MAPCI;MTC;PM;POST RCO2 rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 with the faulty card

NT6X92 in RSC-S RCO2 (continued)

Example of a MAP display:

```
CM     MS     IOD    Net     PM     CCS    LNS    Trks    Ext   Appl
 .      .      .      .    1RCO2    .      .       .      .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        2        0        2        25
 2 Post_   RCO2      0        0        0        0        1         1
 3 ListSet
 4         RCO2    0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 By observing the MAP display, be sure the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 7
inactive unit	step 5

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

If prompt indicates a	Do
warm SWACT will be performed	step 7
cold SWACT will be performed	step 6

6

CAUTION
Loss of service
All calls being handled by this PM will be lost, including data calls. Perform this step during a period of low traffic only.

Answer the prompt by typing

>YES
and pressing the Enter key.

At the RCE frame

7 Put 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

8 Busy the inactive PM unit by typing

>BSY UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

At the RCE frame

9

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 modular supervisory panel of the RCO2. This protects the equipment against damage caused by static electricity.

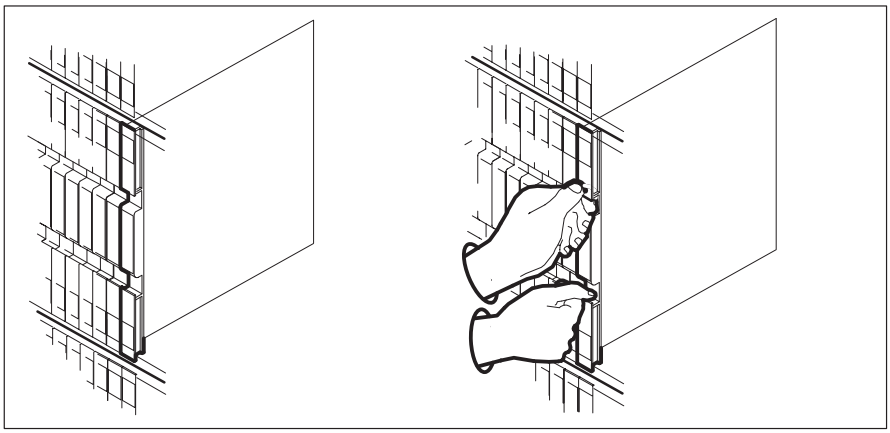
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

NT6X92
in RSC-S RCO2 (continued)

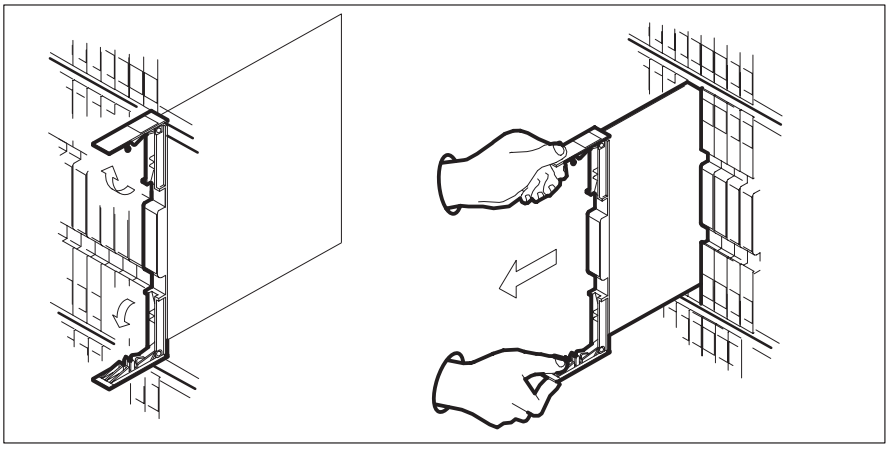
Put on a wrist strap.

10 Remove the NT6X92 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

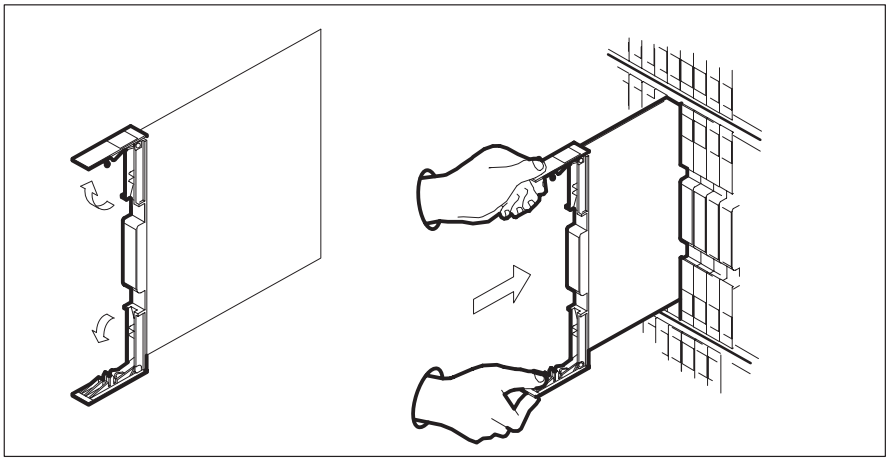


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

11 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

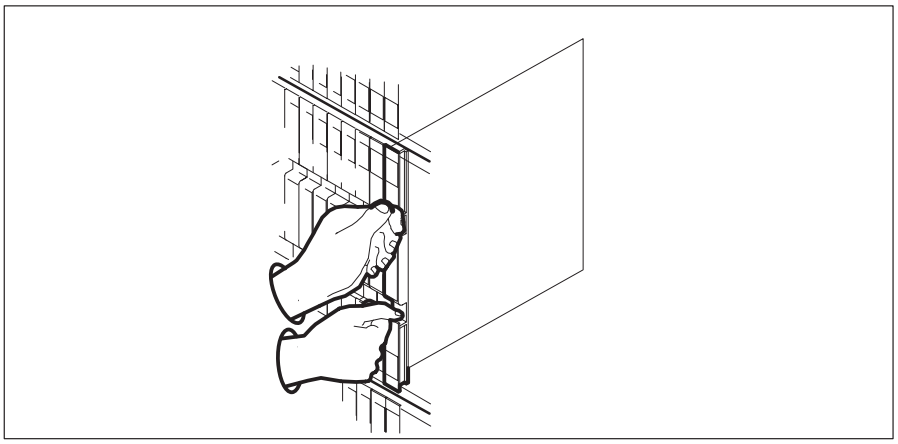
b. Gently slide the card into the shelf.



12 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.



NT6X92 in RSC-S RCO2 (end)

13 Use the following information to determine the next step in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 17
other	step 14

At the MAP terminal

14 Return the inactive RCO2 unit to service by typing

>RTS UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

If RTS	Do
passed	step 15
failed	step 18

15 Send any faulty cards for repair according to local procedure.

16 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 19.

17 Return to the 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.

18 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

19 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.

NT6X99 in RSC-S LCME

Application

Use this procedure to replace an NT6X99 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X99	AA	Datapath Bit Error Rate Tester Line Card

Common procedures

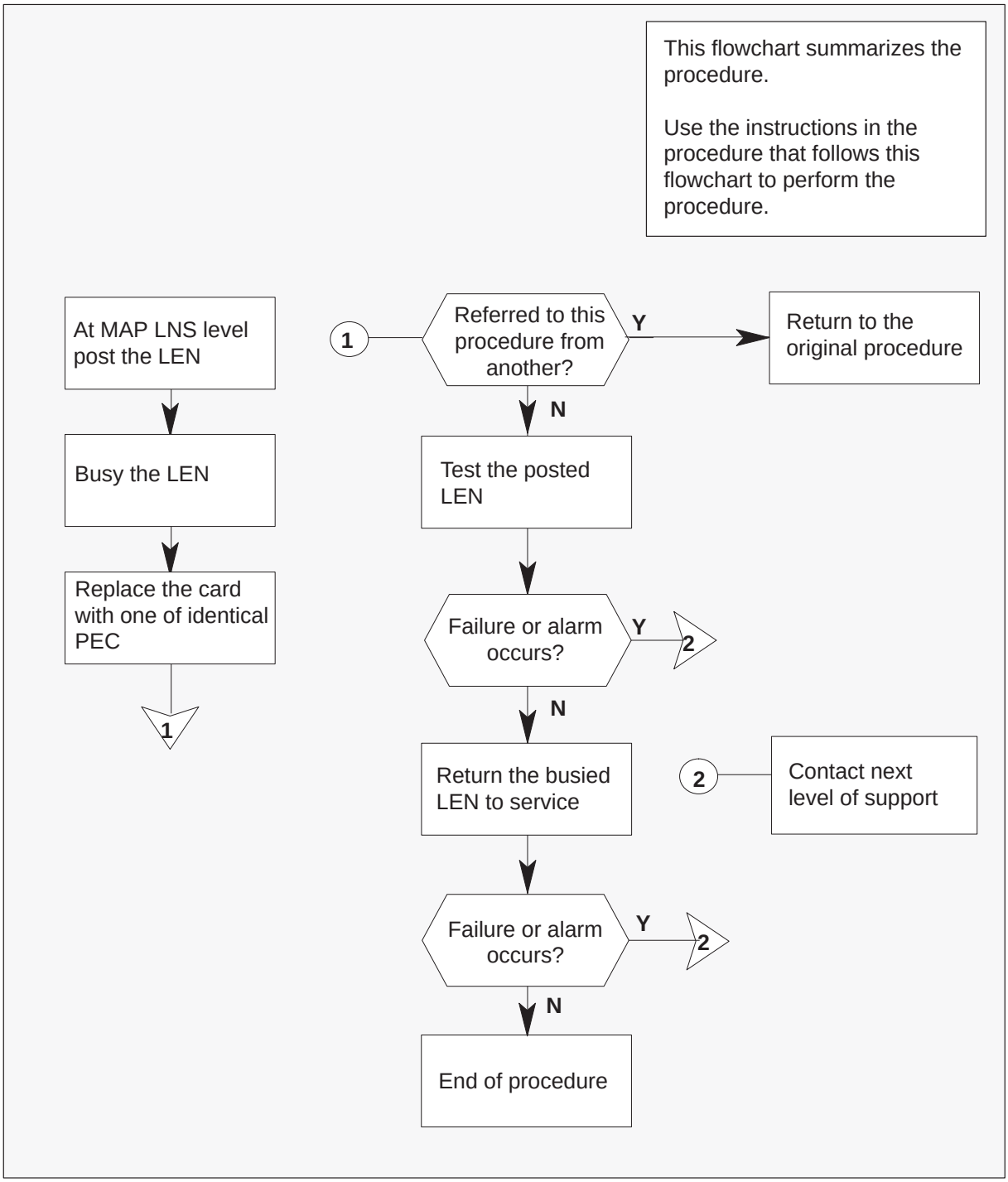
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT6X99 in RSC-S LCME (continued)

Summary of card replacement procedure for an NT6X99 card in RSC-S LCME



NT6X99
in RSC-S LCME (continued)

Replacing an NT6X99 card in RSC-S LCME

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 Obtain an NT6X99 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the line equipment number (LEN) from the line test position by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the site name assigned to the remote location
lcme_no	is the number of the LCME
unit_no	is the number of the LCME unit (0 or 1)
lsg_no	is the number of line subgroup (00–19)
ckt_no	is the circuit number (00–31)

```
 CM     MS    IOD    Net     PM    CCS    LNS    Trks    EXT   Appl
  .      .      .      .      .      .      .      .       .     .
LTP
 0 Quit      POST     DELQ    BusyQ    PREFIX
 2 Post_
 3           LCC     PTY RNG    LEN       DN   STA FS LTA TE RESULT
 4           CKT TYPE FL Host 00 0 03 03 No DIRN Idl
 5 Bsy_
 6 RTS_
 7 Diag_
 8
 9 Almstat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix_
17 LCO_
18 Level_
```

NT6X99 in RSC-S LCME (continued)

4 Busy the LEN posted by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

```
 CM     MS    IOD    Net     PM    CCS    LNS    Trks     Ext   Appl
  .      .      .      .      .      .      .      .        .      .
LTP
 0 Quit
 2 Post_        POST     DELQ    BusyQ    PREFIX
 3
 4              LCC     PTY RNG    LEN      DN    STA FS LTA TE RESULT
 5 Bsy_         CKT TYPE FL Host 00 0 03 03 No DIRN MB
 6 RTS_
 7 Diag_
 8
 9 Almstat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix_
17 LCO_
18 Level_
```

At the LCE frame

5

WARNING

Card damage—transport

Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

NT6X99
in RSC-S LCME (continued)

WARNING
Improper insertion may cause damage to circuit packs
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Possible injury from hot materials
Exercise care when handling the line card. The line feed resistor may be hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, see the following notes.

Put on a wrist strap.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

NT6X99
in RSC-S LCME (continued)

6 Open the line drawer and prepare to remove the faulty card by following these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Continue this procedure depending on where you were when you were directed to this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

10 Test the line card just replaced by typing

>DIAG
and pressing the Enter key.

If DIAG	Do
passes	step 11
fails	step 15

11 Return the line card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passes	step 12
fails	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

NT6X99 in RSC-S LCME (end)

14 Return to the 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.

15 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

16 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT7X05 in RSC-S RCO2

Application

Use this procedure to replace the following card in an RCO2.

PEC	Suffixes	Name
NT7X05	AA	Peripheral/Remote Loader-16

Note: NT7X05 functionality is supported only when the RCO2 is provisioned with the NTMX77 Unified Processor (UP). NT7X05 functionality is *not* supported when the RCO2 is provisioned with the optional NTAX74 Cellular Access Processor (CAP) instead of the NTMX77 UP.

Common procedures

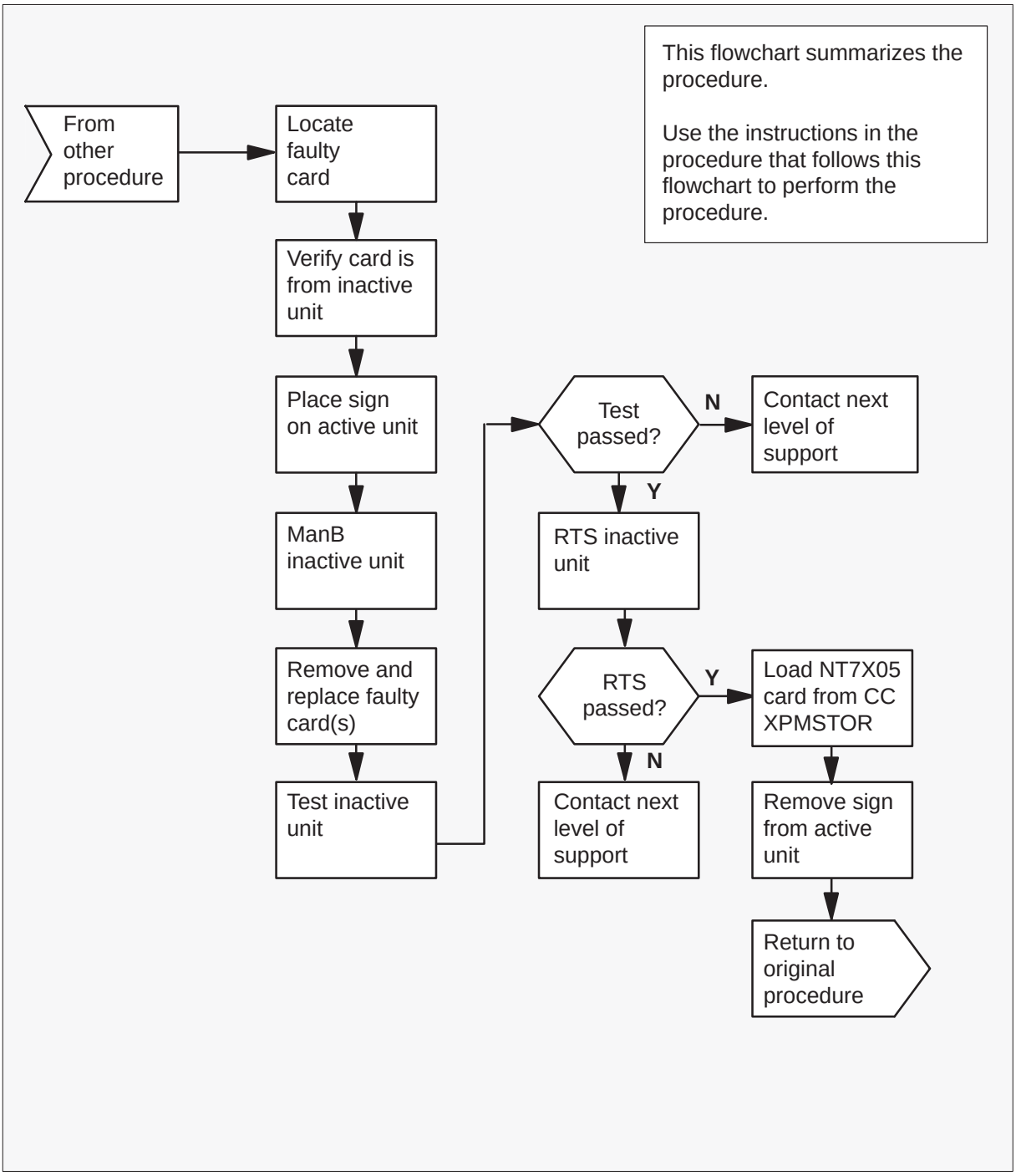
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NT7X05 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NT7X05 card in an RCO2



NT7X05 in RSC-S RCO2 (continued)

Replacing a/an NT7X05 in RSC-S RCO2

At your current location

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure to verify or accept cards, or were directed to this procedure by your maintenance support group.

2

CAUTION
Loss of service
When replacing a card in the RCO2 ensure the unit where 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 equipment code (PEC) including suffix, as the card to be removed.

At the MAP display

3 Access the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 to be busied

NT7X05 in RSC-S RCO2 (continued)

Example of a MAP display:

```
   CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
   .     .      .      .    1RCO2   .      .       .      .      .

RCO2               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM         0        0        2        0        2        25
 2 Post_   RCO2       0        0        0        0        1         1
 3 ListSet
 4          RCO2      0 ISTb  Links_OOS:  CSide  0, PSide   0
 5 TRNSL_   Unit0:   Inact ISTb
 6 TST_     Unit1:   Act   InSv
 7 BSY_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16 IRLINK
17 Perform
18
```

4 By observing the MAP display, be sure the card to be removed is on the inactive unit.

If the faulty card is on an	Do
ACTIVE unit	step 5
INACTIVE unit	step 8

5 Switch the processing activity to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Switch the activity of the unit by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

If the message is	Do
SWACT passed	step 8
SWACT failed	step 7
SWACT failed Reason: XPM SWACTback	step 7
SWACT refused by SWACT controller	step 7

7 Return to the *Alarm Clearing Procedure*, to clear the alarm condition on the inactive unit. When the alarm is cleared, return to step 1 of this procedure.

At the frame

8 Put a sign on the active unit bearing the words **Active unit—Do not touch.**

At the MAP display

9 Busy the inactive RCO2 unit by typing

>BSY INACTIVE
and pressing the Enter key.

NT7X05 in RSC-S RCO2 (continued)

At the frame

10

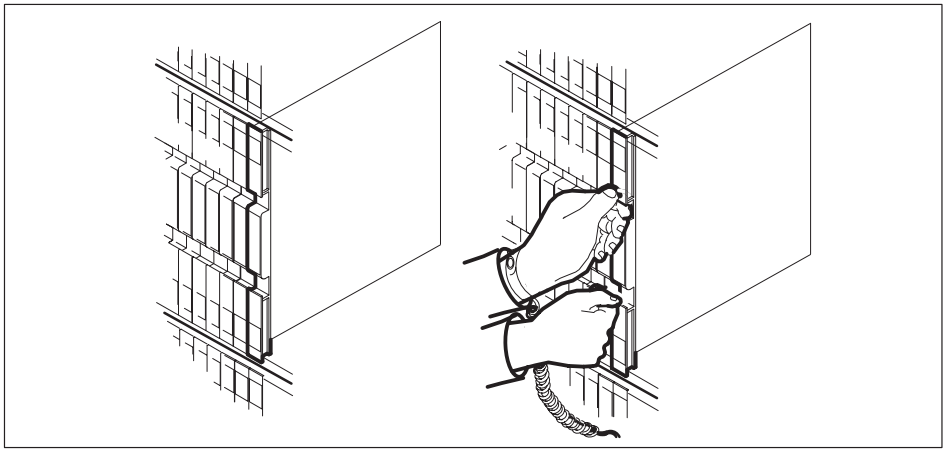
WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel of the RCO2. This protects the equipment against damage caused by static electricity.

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.

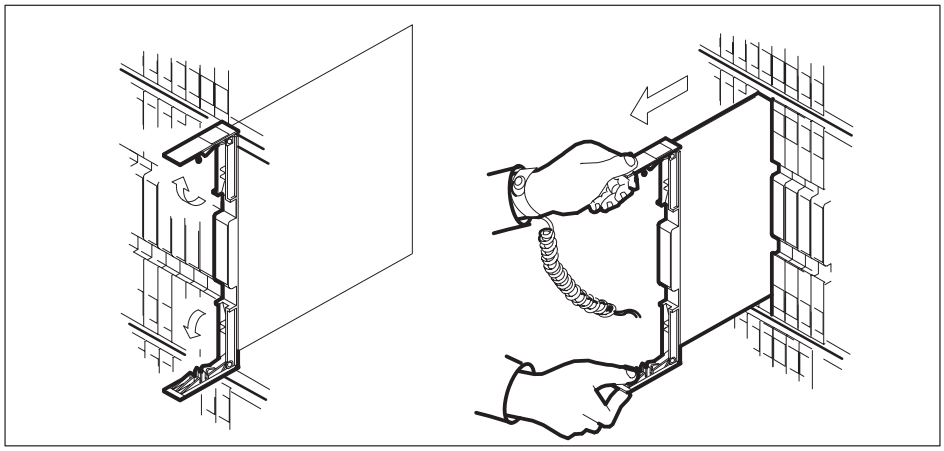
Put on a wrist strap.

11 Remove the NT7X05 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



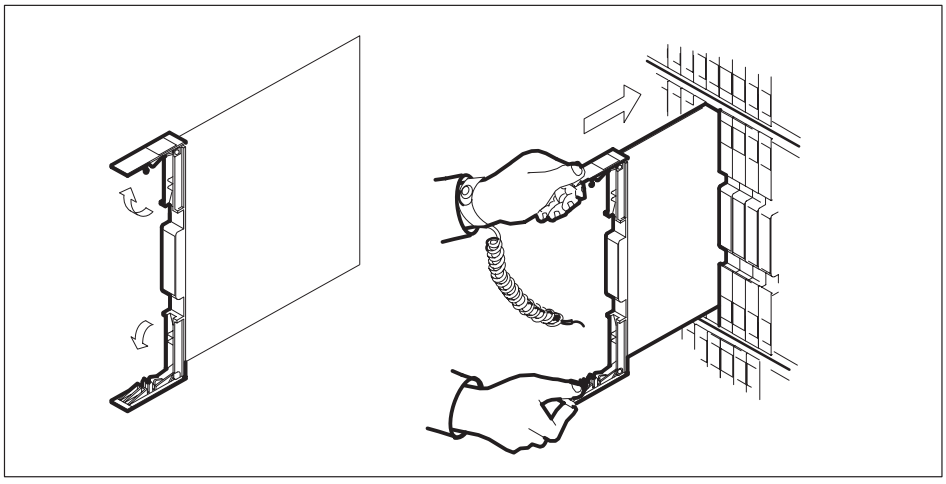
b. Open the locking levers on the card to be replaced and gently pull the card towards you until it clears the shelf.



c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

12 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf and gently slide the card into the shelf.

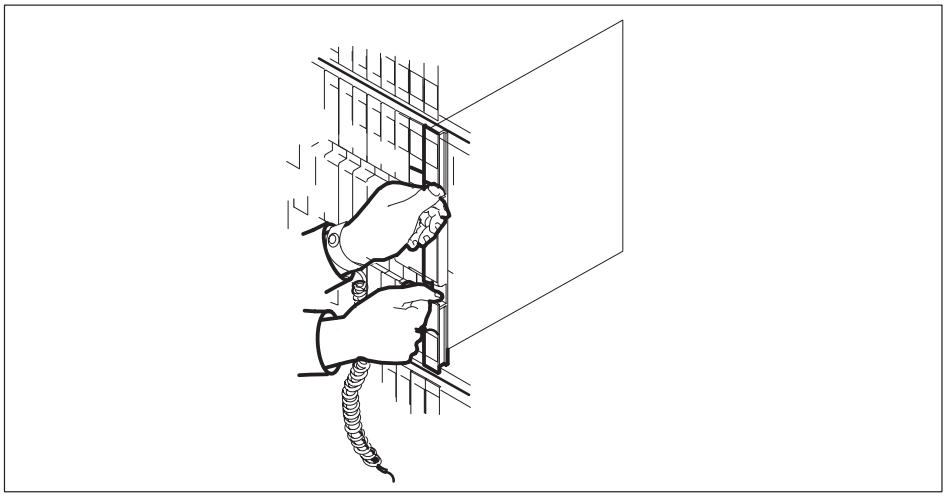


13 Seat and lock the card.

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.

NT7X05 in RSC-S RCO2 (continued)

b. Close the locking levers.



At the MAP display

14 Test the inactive RCO2 unit by typing

>TST UNIT RCO2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

Example of a MAP response:

```
Test Passed
```
or
```
Test Failed
```

If TST	Do
passed	step 15
failed	step 19

15 Return the inactive RCO2 unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the RCO2 unit (0 or 1) tested in step 14

If TST	Do
passed	step 16
failed	step 19

16 Load the inactive RCO2 unit by typing

>XPMSTOR INACTIVE CC [load_file_name]
and pressing the Enter key.

where

load_file_name is the name of the file datafilled in field, LOAD, of the inventory table.

If load	Do
passed	step 17
failed	step 19

17 Send any faulty cards for repair according to local procedure.

18 Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 20.

19 Obtain further assistance in replacing this card by contacting personnel responsible for higher level of support.

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTAX74 in RSC-S RCO2

Application

Use this procedure to replace an NTAX74 card in an RCO2.

PEC	Suffixes	Name
NTAX74	AA	Cellular Access Processor with 16Mb Memory

Common procedures

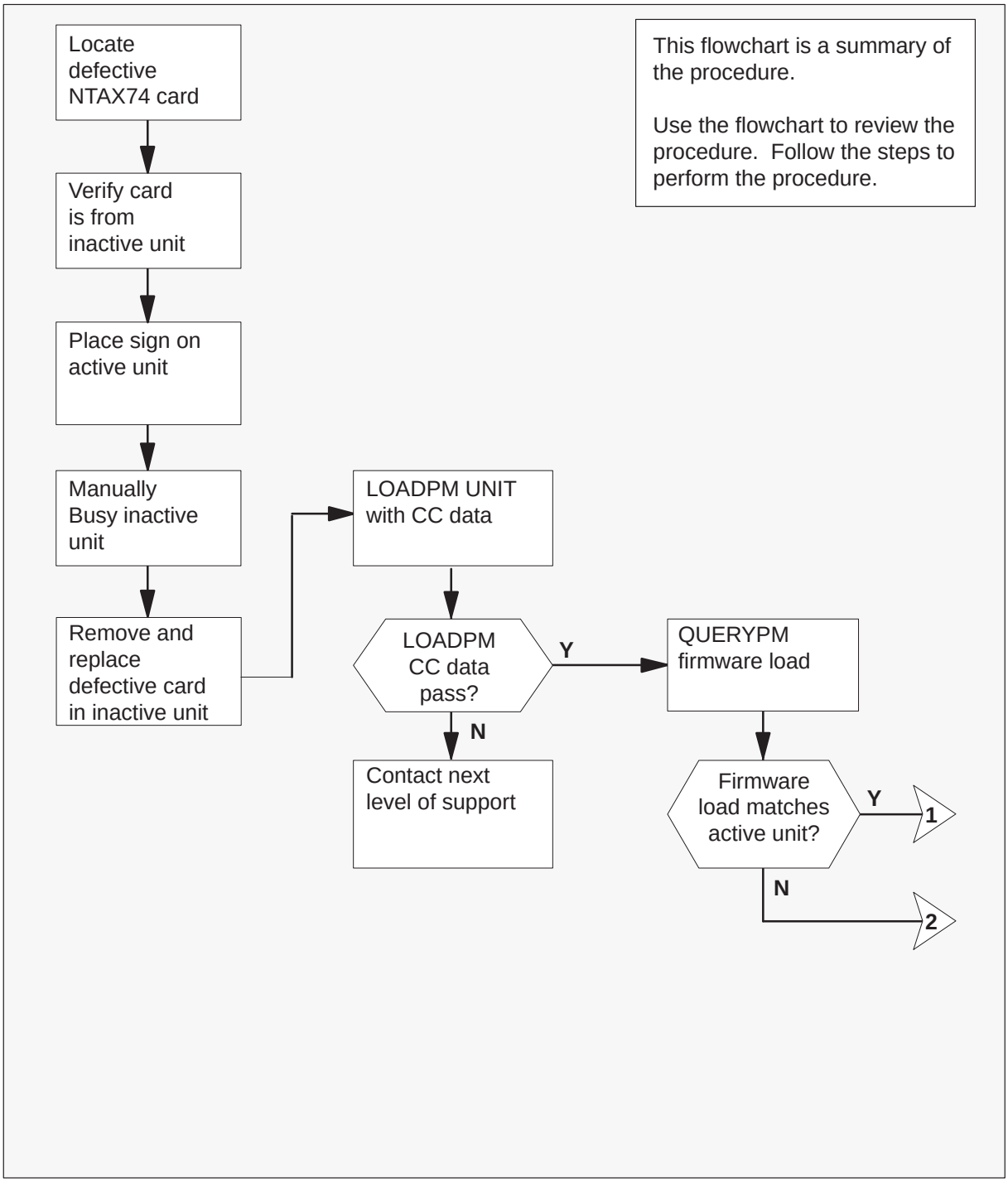
Does not apply

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

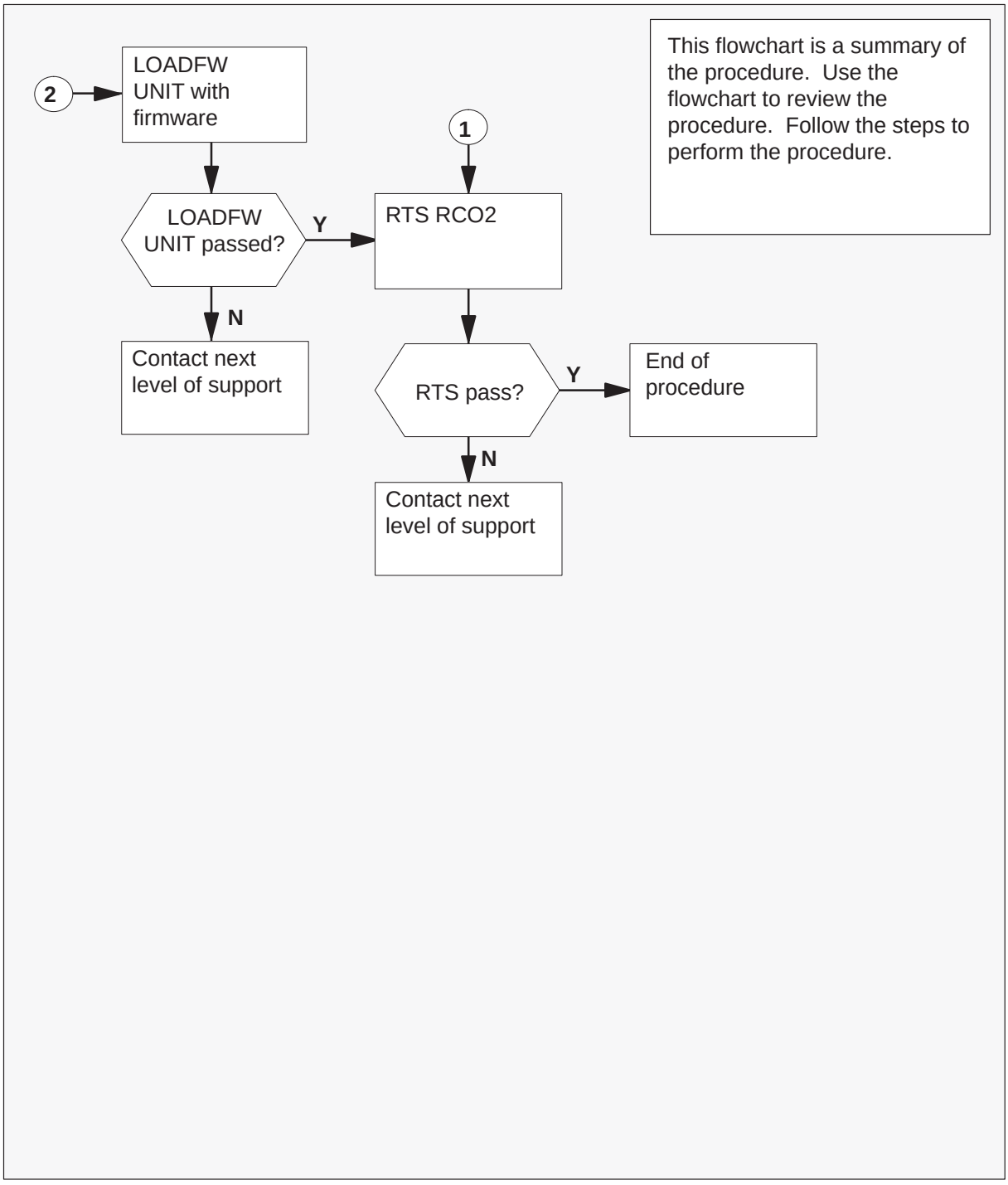
NTAX74
in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTAX74 card in RSC-S RCO2



NTAX74
in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTAX74 card in RSC-S RCO2 (continued)



NTAX74 in RSC-S RCO2 (continued)

To replace a/an NTAX74 in RSC-S RCO2

At your current location

1 Proceed if one of the following conditions apply:

- a step in a maintenance procedure directed you to this card replacement procedure
- you use this procedure to verify or accept cards
- the maintenance support group directed you to this procedure.

2

CAUTION
Loss of service
When you replace a card in an RCO2, make sure the unit in which you replace the card is *inactive* and the mate unit is *active*.

Obtain an NTAX74 replacement card. Make sure the replacement card has the same product engineering code (PEC) and (PEC) suffix, as the card to be removed.

At the MAP terminal

3 To make sure the current MAP display is at the peripheral module (PM) level and to post the RCO2, type:

>MAPCI;MTC;PM;POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 to be busied

NTAX74 in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS    LNS    Trks    Ext    APPL
 .      .      .      .    1RCO2   .      .       .      .      .

 RCO2             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        2        0        2        25
 2 Post_   RCO2      0        0        0        0        1         1
 3 ListSet
 4         RCO2   0 ISTb  Links_OOS:  CSide  0, PSide   0
 5 TRNSL_  Unit0:   Inact SysB
 6 TST_    Unit1:     Act InSv
 7 BSY_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13 SwAct
14 QueryPM
15
16 IRLINK
17 Perform
18
```

4 To verify the defective NTAX74 card is in the inactive unit, make sure the light-emitting diode (LED) labled ACTIVE is OFF or check the MAP display.

If the defective card	Do
is in the active unit	step 5
is in the inactive unit	step 9

5 To switch the processing activity (SWACT) to the inactive unit, type:

>SWACT
and press the Enter key.

A confirmation prompt for the SWACT command appears at the MAP terminal.

If SWACT	Do
cannot continue at this time	step 6
can continue at this time	step 7

6 To reject the prompt to SWACT the units, type:

>NO
and press the Enter key.

The system stops the SWACT.

Return to step 5 during periods of low traffic.

7 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 accurately.

Note: A maintenance flag 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 9
is `SWACT failed` `Reason:  XPM SWACTback`	step 8
is `SWACT refused by SWACT Controller`	step 8

8 To clear the alarm condition on the inactive unit return to the *Clearing an Alarm Procedures*. When you clear the alarm, return to step 1 of this procedure.

At the RCE frame

9 Place a sign with the words **Active unit–Do not touch** on the active unit. Do not attach this sign with magnets or tape.

At the MAP terminal

10 Check the MAP display and determine the state of the inactive unit.

If state	Do
is `SysB, CBsy, ISTb, or InSv`	step 11
is `ManB`	step 13

NTAX74
in RSC-S RCO2 (continued)

11 To busy the inactive PM unit, type:

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive RCO2 unit zero or one

12 To prevent the PM from trapping, type:

>PMRESET UNIT rco2_unit_no NORUN
and press the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit zero or one

At the RCE frame

13

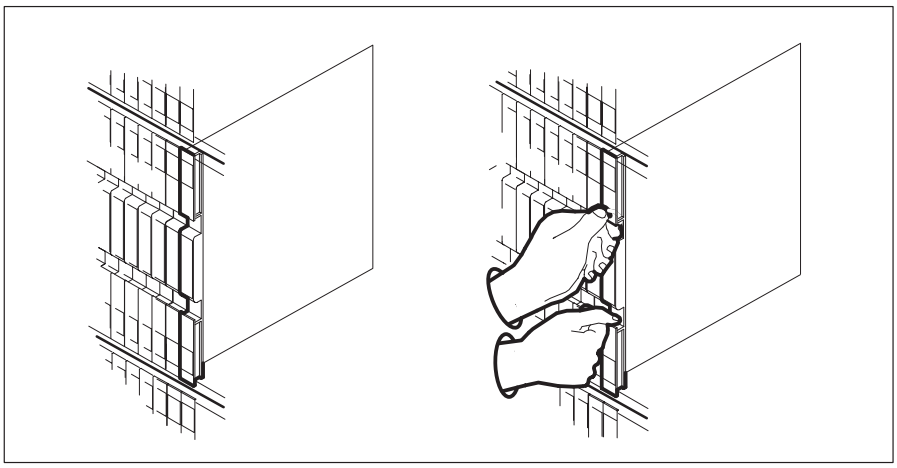
WARNING
Static electricity damage
Before you remove cards, wear a wrist strap that connects to the wrist-strap grounding point on the left side of the frame supervisory panel (FSP) of the RCO2. This protects the equipment against static electricity damage.

WARNING
Equipment damage
Take the following precautions when you remove or insert a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards in the slots.

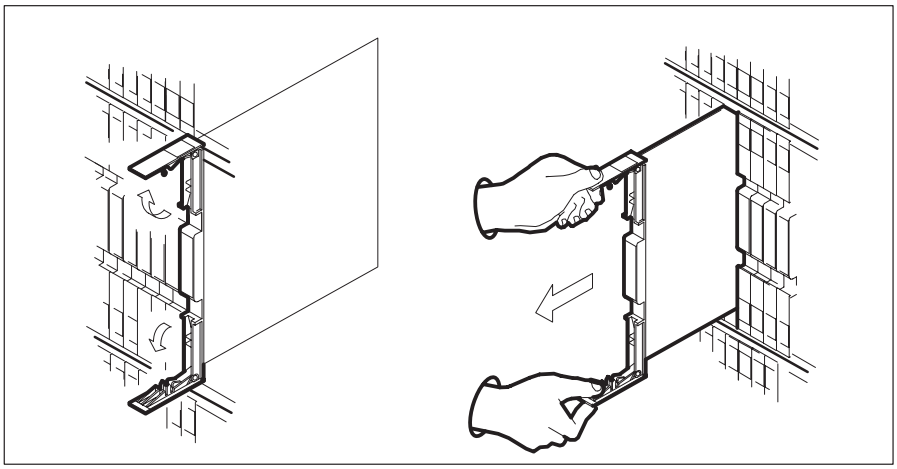
Wear a wrist strap.

14 The following figures show how to remove the NTAX74 card:

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced. Carefully pull the card toward you until the card clears the shelf.



c. Make sure the replacement card has the same PEC and PEC suffix, as the card you removed. Make sure all replacement card DIP switch settings match settings of the card you removed.

Note: If the NTAX74 circuit card has a DIP switch, set the DIP switch S1 to the common peripheral module (CPM).

NTAX74
in RSC-S RCO2 (continued)

15

WARNING

Possible loss of P-side nodes

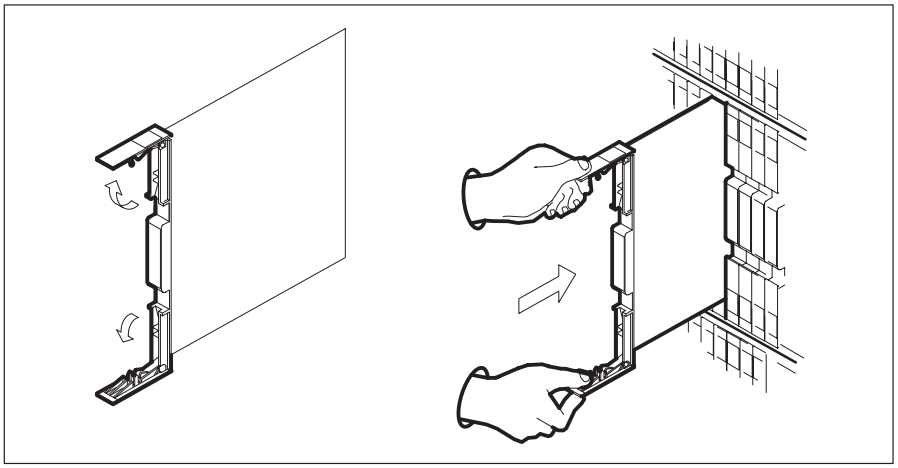
When you install the replacement NTAX74, monitor the LEDs on the faceplate of the NTAX74 for the following indicators:

1. The INSV and ESA LEDs come ON and remain ON until loading starts.
2. The ACT LED can come ON and light for less than 1 s. If the ACT LED remains ON for more than 1 s, remove the NTAX74 circuit card and return to this step. If the NTAX74 circuit card remains with both units that have an active processor, a condition of dual activity occurs. This condition causes the loss of P-side nodes.

Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

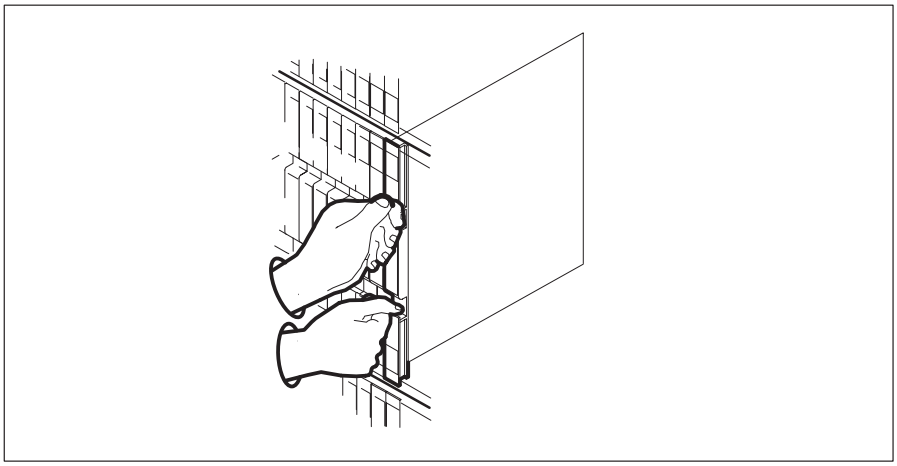
b. Carefully slide the card in the shelf.



16 Seat and lock the card.

a. Use your fingers or thumbs to push on the upper and lower edges of the faceplate. Make sure the card sits completely in the shelf.

b. Close the locking levers.



17 Use the following information to determine the next step:

If you were directed here from	Do
alarm clearing procedures	step 26
other	step 18

At the MAP terminal

18 To load the inactive RCO2 unit, type:

>LOADPM UNIT rco2_unit_no
and press the Enter key.

where

rco2_unit_no is the number of the busied RCO2 unit

If load	Do
passed	step 19
failed	step 27

NTAX74 in RSC-S RCO2 (continued)

19 To query the XMS-based peripheral module (XPM) counters for the firmware load on the NTAX74, type:

>QUERYPM CNTRS
and press the Enter key.

Example of a MAP response

```
Unsolicitited MSG limit = 250, Unit 0 = 0, Unit 1 = 0
Unit 0:
Ram Load: WRI07BE
EPRom Version: AB02
EEPRom Load: Loadable: AX74XE01, Executable: AX74XE01
CMR Load: CMR03A
CAP:AX74AA
Unit 1:
Ram Load: WRI07BE
EPRom Version: AB02
EEPRom Load: Loadable: AX74XE01 , Executable: AX74XE01
CMR Load: CMR03A
CAP:AX74AA
```

NTAX74 firmware load name

If firmware	Do
is valid	step 22
is invalid	step 20

20 To load the firmware on the inactive unit type:

>LOADFW INACTIVE
and press the Enter key.

If the LOADFW	Do
passes	step 21
fails	step 27

21 To upgrade the firmware on the inactive unit type:

>LOADFW INACTIVE UPGRADE
and press the Enter key.

If the LOADFW UPGRADE	Do
passes	step 22
fails	step 27

22 To return the inactive RCO2 unit to service, type:

>RTS UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive RCO2 unit

If RTS	Do
passes	step 23
fails	step 27

At the RCE frame

23 Remove the sign from the active RCO2 unit.

24 Send the defective cards for repair according to local procedure.

25 Note the following in the office records:

- date the card is replaced
- serial number of the card
- problems that prompted replacement of the card.

Go to step 28.

26 Return to the *Clearing an Alarm Procedure* or other procedure that directed you to this procedure. If necessary, go to the point where the system produced the defective card list. Identify the next defective card on the list, and go to the appropriate procedure for that card in this manual.

27 For additional help, contact the next level of support.

NTAX74
in RSC-S RCO2 (end)

28 This procedure is complete. Return to the maintenance procedure that directed you to this card replacement procedure. Continue as directed.

NTBX01 in RSC-S RCO2

Application

Use this procedure to replace an NTBX01 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTBX01	AB, AC, BA	ISDN Signaling Preprocessor
Note: NTBX01AC or NTBX01BA is required when the RC02 is configured with the optional processor NTAX74AA instead of the NTMX77AA.		

Common procedures

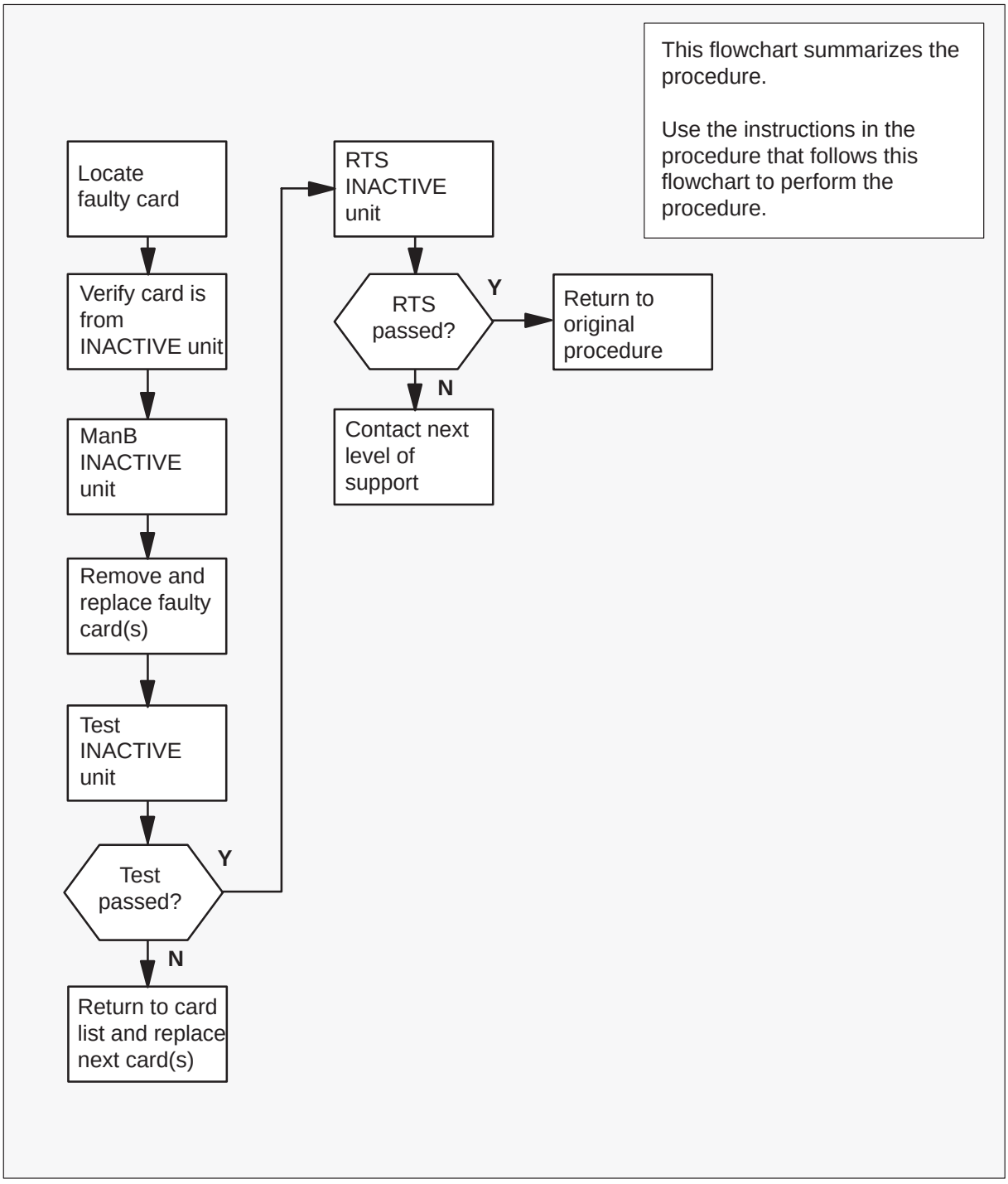
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX01 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTBX01 card in RSC-S RCO2



NTBX01 in RSC-S RCO2 (continued)

Replacing an NTBX01 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTBX01 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Ensure the PM level of the MAP display is currently displayed and the RCO2 is posted by typing

>MAPCI;MTC;PM;POST RCO2 rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 with the faulty card

NTBX01 in RSC-S RCO2 (continued)

Example of a MAP display:

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .       .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCO2      0        0        0        0        0         0
 3 ListSet
 4         RCO2    0 ISTb  Links_OOS:  CSide  0, PSide   0
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 By observing the MAP display, be sure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 7

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in service, proceed to the next step.

NTBX01
in RSC-S RCO2 (continued)

At the RCE frame

7 Put 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

8 Busy the inactive PM unit by typing

>BSY UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

At the RCE frame

9

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 modular supervisory panel of the RCO2. This protects the equipment against damage caused by static electricity.

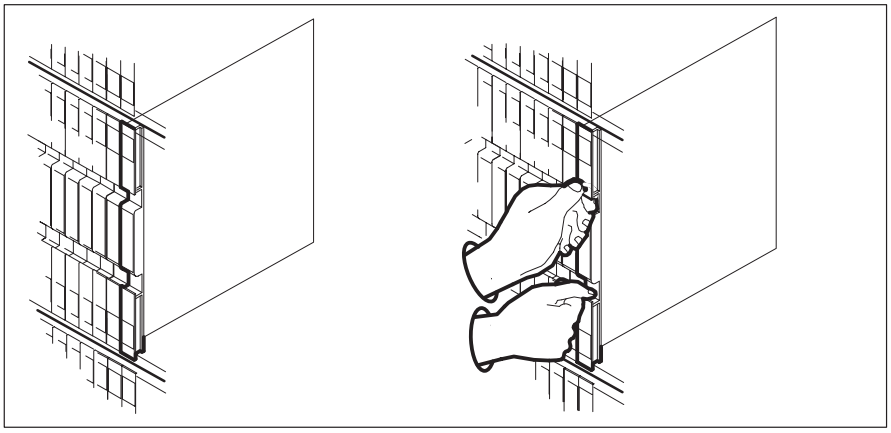
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Put on a wrist strap.

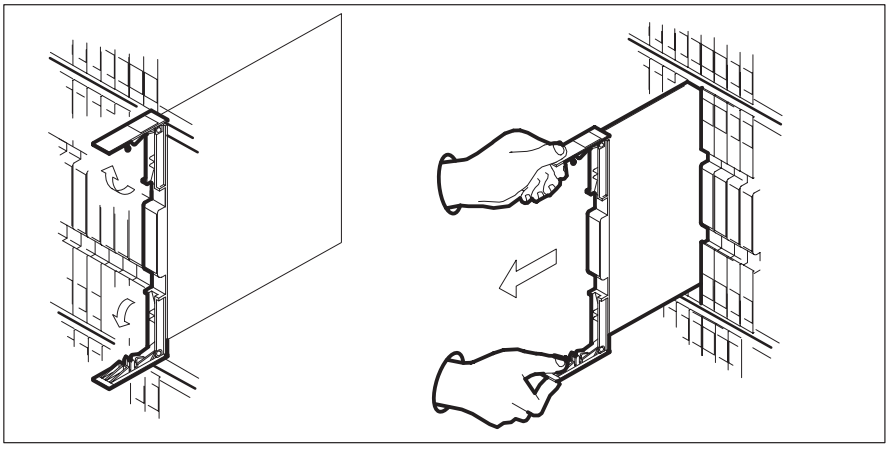
NTBX01
in RSC-S RCO2 (continued)

10 Remove the NTBX01 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

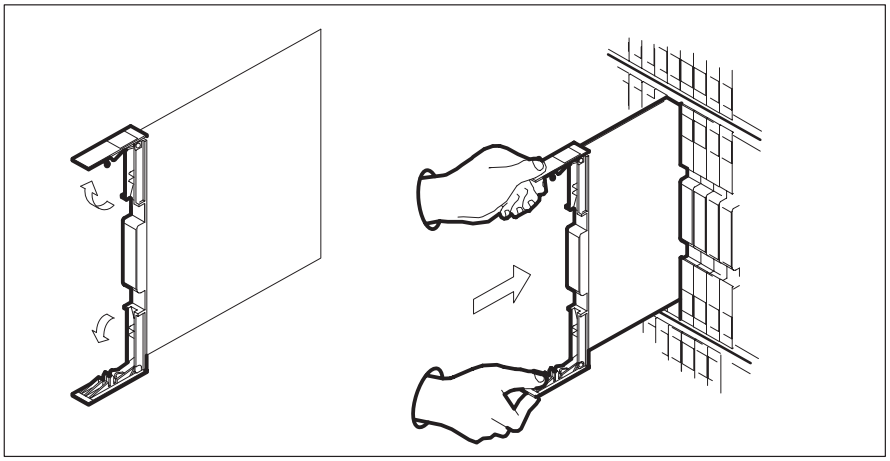


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

11 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

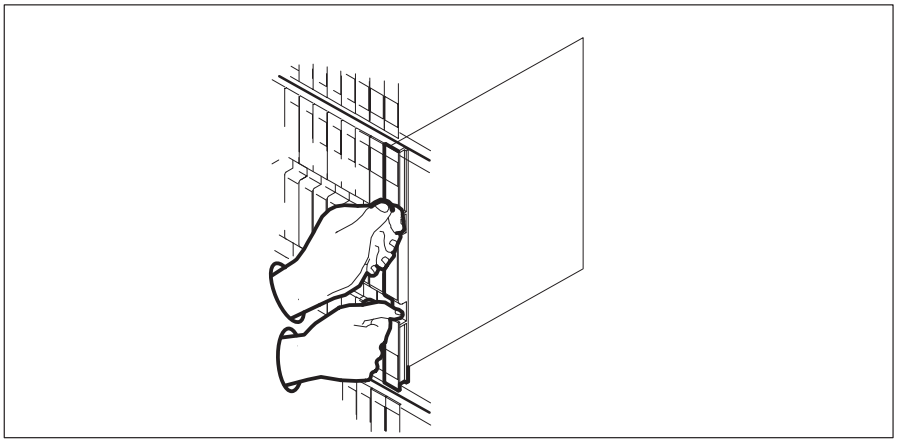
b. Gently slide the card into the shelf.



12 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.



NTBX01 in RSC-S RCO2 (continued)

At the MAP terminal

13 After replacing the faulty card, load the inactive RCO2 unit by typing

>LOADPM UNIT rco2_unit_no CC
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 unit busied in step 8

14 Use the following information to determine where to proceed.

If LOADPM	Do
passed	step 15
failed	step 23

15 Test the inactive unit by typing

>TST UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 unit loaded in step 13

16 Use the following information to determine where to proceed.

If TST	Do
passed	step 17
failed	step 22

17 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 22
other	step 18

NTBX01 in RSC-S RCO2 (end)

18 Return the inactive RCO2 unit to service by typing

>RTS UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 unit tested in step 15

19 Use the following information to determine where to proceed.

If RTS	Do
passed	step 20
failed	step 24

20 Send any faulty cards for repair according to local procedure.

21 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 24.

22 Return to the 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.

23 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

24 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.

NTBX02 in RSC-S RCO2

Application

Use this procedure to replace an NTBX02 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTBX02	AA	D-Channel Handler
NTBX02	BA	Enhanced D-Channel Handler

Note: NTBX02BA is required when the RC02 is configured with the optional processor NTAX74AA instead of the NTMX77AA.

Common procedures

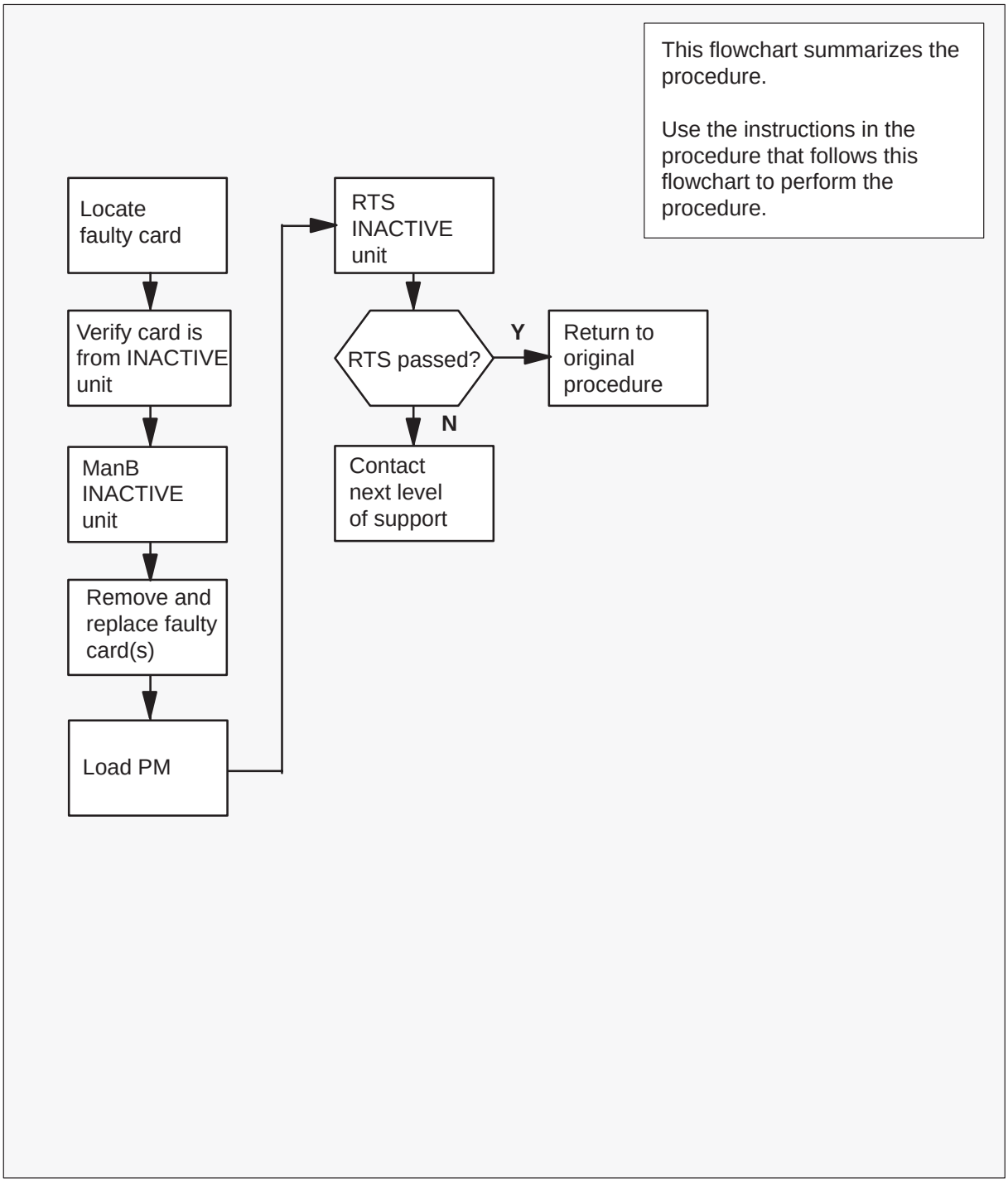
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX02
in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTBX02 card in an RSC-S RCO2



NTBX02 in RSC-S RCO2 (continued)

Replacing an NTBX02 card in an RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

If the faulty card is	Do
in an extension (EXT) shelf	step 3
not in an EXT shelf	step 4

NTBX02 in RSC-S RCO2 (continued)

At the MAP terminal

3 For an extension shelf, refer to the slot positions in the following table to determine which unit contains the faulty NTBX02 card, and proceed to step 4 .

EXT shelf slot number	CPM unit number
3 / 24	0
4 / 23	0
5 / 22	0
6 / 21	0
7 / 20	0
8 / 19	1
9 / 18	1
10 / 17	1
11 / 16	1
12 / 15	1

4 Ensure the PM level of the MAP display is currently displayed and the RCO2 with the faulty DCH card is posted by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no

and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card

NTBX02 in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .      .     .      .      .       .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCO2      0        0        0        0        0         0
 3 ListSet
 4         RCO2   0     Links_OOS:  CSide  0, PSide   0
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15 DCH
16
17
18
```

5 Refer to the MAP display posted in step 4 to see if the faulty NTBX02 card is in the active or inactive unit.

If faulty card is in	Do
active unit	step 6
inactive unit	step 10

6 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT

and pressing the Enter key.

If SWACT	Do
cannot continue at this time	step 7
can continue at this time	step 8

7 Do not switch activity of the units. Reject the SWACT by typing

>NO
and pressing the Enter key.

The system discontinues the SWACT.

Return to step 6 during a period of low traffic.

8 Confirm the system prompt by typing

>YES
and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

Note: A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding to the next maintenance action.

If the message is	Do
SWACT passed	step 10
SWACT failed	step 9
SWACT refused by SWACT controller	step 9

9 Return to the *Alarm Clearing Procedures* to clear the alarm condition on the inactive unit. When the alarm is cleared, return to step 1 of this procedure.

At the RCE frame

10 Put a sign on the *active* unit bearing the words **Active unit—Do not touch**. This sign should not be attached by magnets or tape.

At the MAP terminal

11 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 RCO2 unit (0 or 1) containing the faulty BX02 card

NTBX02 in RSC-S RCO2 (continued)

12 Access the DCH level of the MAP display by typing

>DCH
and pressing the Enter key.

Example of a MAP display:

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
.     .      .      .      .     .      .      .       .      .

DCH              SysB     ManB     OffL     CBsy     ISTb      InSv
0 Quit    PM       0        0        0        0        0        25
2 Post_   RCO2     0        0        0        0        0         0
3
4         RCO2  0     Links_OOS:  CSide  0, PSide   0
5 TRNSL   Unit0:   InSv
6 TST     Unit1:   InSv
7 BSY
8 RTS       DCH    0        0        0        1        0         0
9 OffL
10 LoadPM_
11 Disp_
12 Next_
13 SwAct
14 QueryPM
15 DCH
16
17 Perform
18
```

13 Using the information in the MAP display in step 12, identify and post the faulty DCH card state by typing

>POST dch_card_state
and pressing the Enter key.

where

dch_card_state — is either CBsy, SysB or ISTb. The example in step 12 shows the DCH card as being CBsy.

Example of a MAP display

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
.     .      .      .     .      .      .      .       .      .

DCH              SysB     ManB     OffL     CBsy     ISTb      InSv
0 Quit    PM        0        0        0        0        0        25
2 Post_   RCO2      0        0        0        0        0         0
3
4         RCO2  0    Links_OOS:  CSide  0, PSide   0
5 TRNSL   Unit0:   InSv
6 TST     Unit1:   InSv
7 BSY
8 RTS        DCH    0        0        0        1        0         0
9 OffL
10 LoadPM_    DCH   0  ISG   1   CBSY   RCO2     2  PORT  15
11 Disp_
12 Next_
13 SwAct
14 QueryPM
15 DCH
16
17 Perform
18
```

14 Identify the DCH load file name by typing

>QUERYPM
and pressing the Enter key.

Example of a MAP response

```
Site  Flr  RPos  Bay_id   Shf  Description    Slot  EqPEC
HOST  01    R09 LTEI 00   32   PLGC : 002      02    BX02

Loadnames : DCHINV – DCH32BT  : INTL INDEX : 8
```

The DCH load file name in the example is *DCH32BT*.

15 Use the following information to determine the next step in this procedure.

If system load module is	Do
version 1	step 16
version 2	step 17

NTBX02 in RSC-S RCO2 (continued)

16 List the loadfile in the directory by typing

>DSKUT;LISTVOL D000_dch_load_file_name ALL
and pressing the Enter key.

or

>DSKUT;LISTVOL D010_dch_load_file_name ALL
and pressing the Enter key.

Local operating company policy determines which disk, D000 or D010, the loadfile will be on.

Example of a MAP response:

```
TAPE$DIR
DCH32BT
```

Proceed to step 18.

17 List the loadfile in the directory by typing

>DISKUT;LV S00D
and pressing the Enter key.

>LF S00D file_name
and pressing the Enter key.

or

>DISKUT;LV S01D
and pressing the Enter key.

>LF S01D file_name
and pressing the Enter key.

18 Leave the disk utility by typing

>QUIT
and pressing the Enter key.

19 Compare the information in the example in step 14 with the information in the example in step 16 or 17 to verify the DCH file name exists. For instance, the file name in step 16 is *DCH32BT*, which corresponds with the file name in step 14.

20 Busy the faulty card by typing

>BSY
and pressing the Enter key.

NTBX02
in RSC-S RCO2 (continued)

At the RCE frame

21

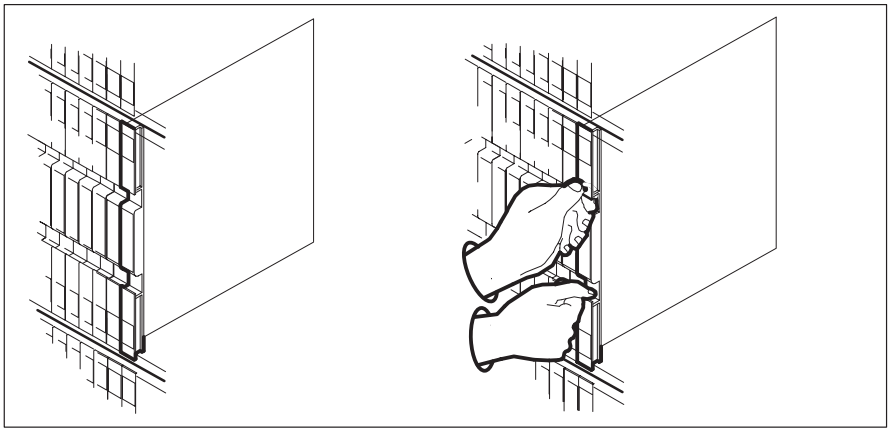
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

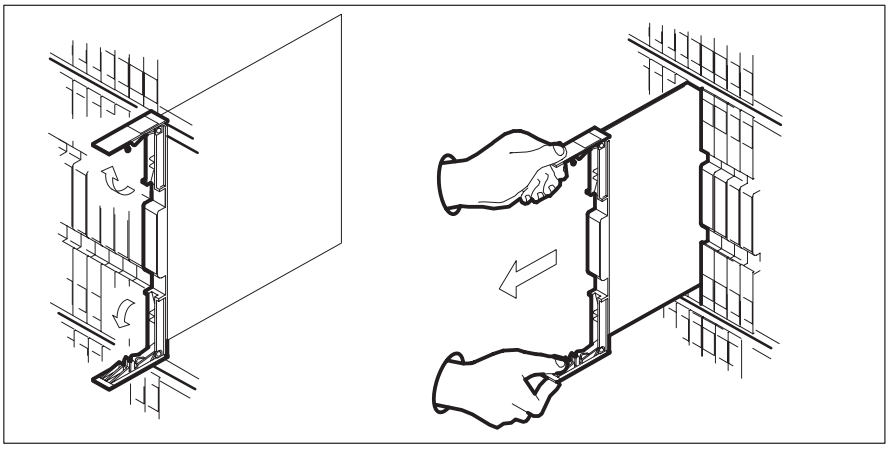
22 Remove the NTBX02 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



NTBX02 in RSC-S RCO2 (continued)

b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

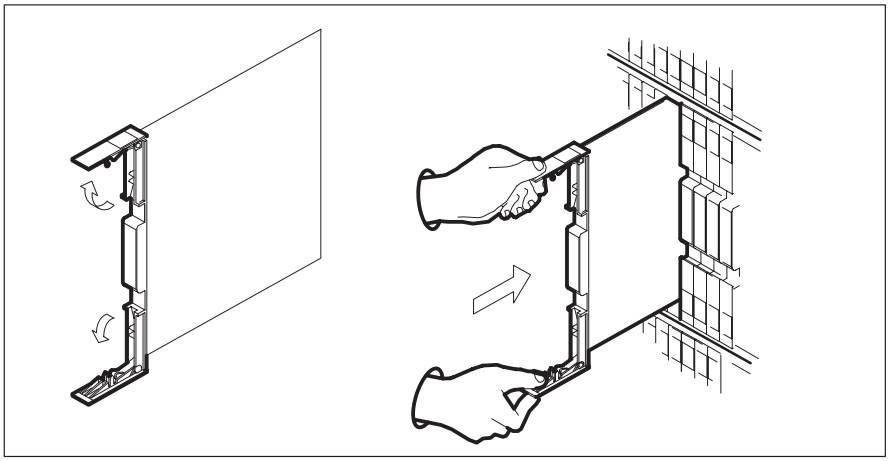


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

23 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



24

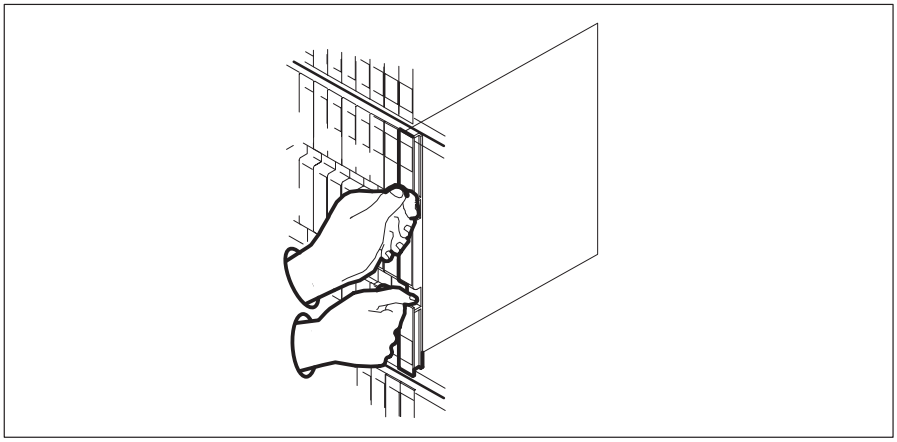
CAUTION
Loss of subscriber service
Subscriber service may be lost in the active unit when reseating the NTBX02 card.

It is recommended that this procedure be performed during low traffic periods.

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.



At the MAP terminal

25 Load the DCH card by typing

>LOADPM
and pressing the Enter key.

26 Use the following information to determine the next step in this procedure.

If LOADPM	Do
passed	step 27
failed	step 34

NTBX02 in RSC-S RCO2 (continued)

27 Return the DCH card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 28
failed	step 34

28 Leave the DCH level of the MAP display and return to the RCO2 level by typing

>QUIT
and pressing the Enter key.

29 Return to service the PM unit busied in step 11 by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit (0 or 1) containing the new BX02 card

30 Ensure that the RCO2 unit is in service by typing

>QUERYPM FLT
and pressing the Enter key.

NTBX02
in RSC-S RCO2 (continued)

Example of a MAP display:

```
CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit    PM        0        0        0        0        0       25
 2 Post_   RCO2      0        0        0        0        0        1
 3 ListSet
 4         RCO2  0  InSv  Links_OOS:  CSide  0, PSide   0
 5 TRNSL_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact InSv
 7 Bsy_    QUERYPM FLT
 8 RTS_         Unit0  No troubles exist
 9 OffL         Unit1  No troubles exist
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15 DCH
16
17
18
```

Use the following information to determine the next step in this procedure.

If faults are	Do
not indicated	step 31
indicated	step 34

31 Send any faulty cards for repair according to local procedure.

32 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card.

If you entered this procedure from	Do
alarm clearing procedures	step 33
other	step 35

NTBX02 in RSC-S RCO2 (end)

33 Return to *Alarm Clearing Procedures* 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.

34 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

35 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.

NTBX26 in RSC-S LCME

Application

Use this procedure to replace an NTBX26 card in an RSC-S LCME.

PEC	Suffixes	Name
NTBX26	AA	ISDN S/T Interface Line card

Common procedures

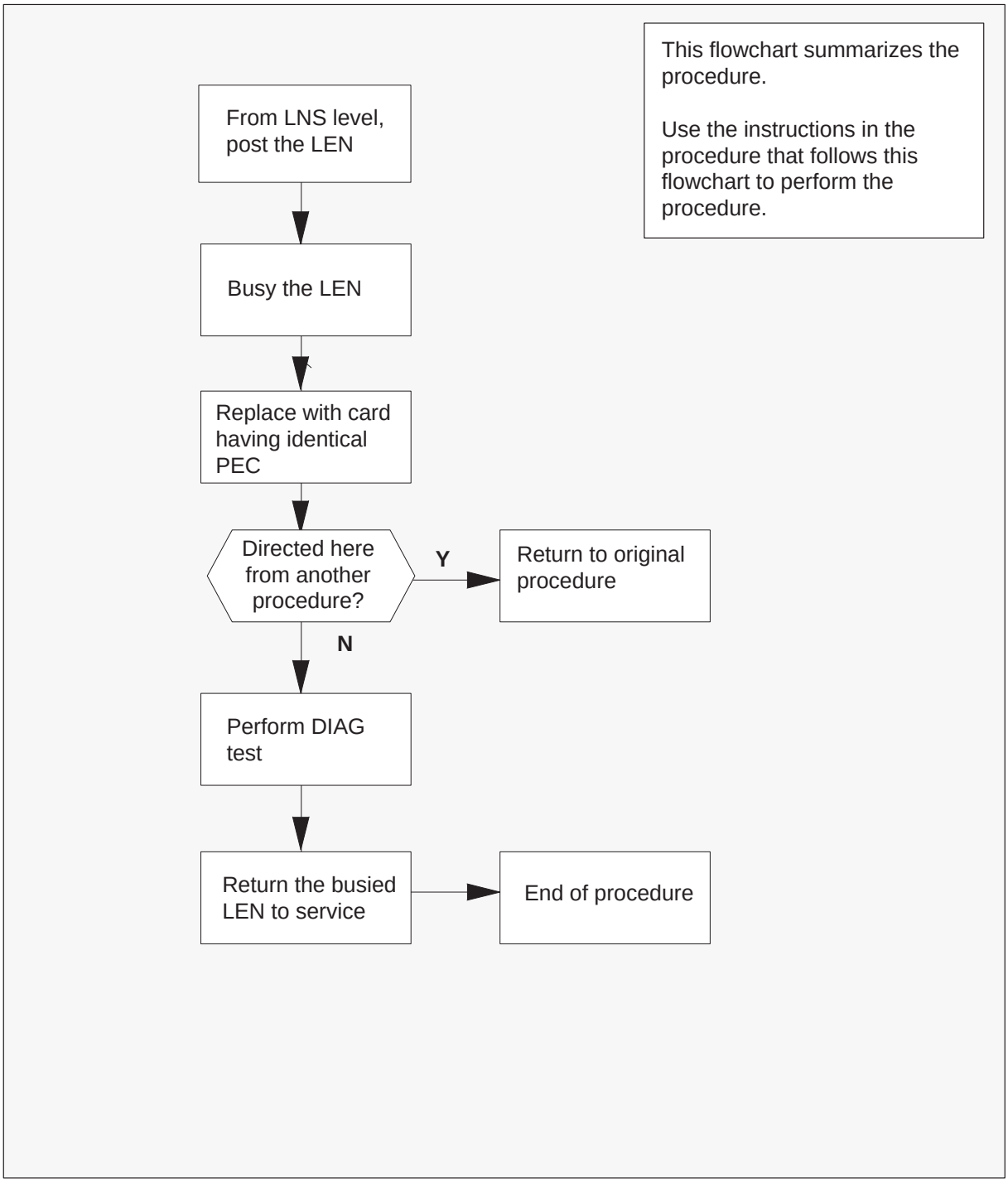
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX26 in RSC-S LCME (continued)

Summary of card replacement procedure for an NTBX26 card in an RSC-S LCME



NTBX26 in RSC-S LCME (continued)

Replacing an NTBX26 card in an RSC-S LCME

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 Obtain an NTBX26 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the line equipment number (LEN) of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site is the location name of the LCME with the faulty card
lcme_no is the number of the LCME with the faulty card
unit_no is the number of the LCME unit with the faulty card
lsg_no is the number of the LSG with the faulty card
ckt_no is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .      .     .      .      .       .       .

LTP
 0 Quit      Post     DELQ      BUSYQ      PREFIX
 2 Post_
 3           LCC PTY RNG....LEN......DN      STA F S LTA TE RESULT
 4           ISDN Loop HOST 00 0 03 03  4931082  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

NTBX26 in RSC-S LCME (continued)

4 Busy the NTBX26 line card by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .      .     .      .      .       .       .

LTP
 0 Quit     Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3          LCC PTY RNG....LEN......DN       STA F S LTA TE RESULT
 4          ISDN Loop  HOST 00 0 03 03 4931082  MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

At the LCE frame

5

NTBX26
in RSC-S LCME (continued)

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers.

Put on a wrist strap.

NTBX26 in RSC-S LCME (continued)

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

6 To prepare to remove the faulty card, open the line drawer and do the following substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 15
other	step 10

At the MAP terminal

10 Test the NTBX26 line card by typing

>DIAG
and pressing the Enter key.

NTBX26 in RSC-S LCME (end)

11 Use the following information to determine where to proceed.

If DIAG	Do
passed	step 12
failed	step 15

12 Return the NTBX26 card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 13
failed	step 16

13 Send any faulty cards for repair according to local procedure.

14 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 17.

15 Return to the 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.

16 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

17 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTBX27 in RSC-S LCME

Application

Use this procedure to replace an NTBX27 card in an RSC-S LCME.

PEC	Suffixes	Name
NTBX27	AA	SDN 2B1Q U Interface Line card

Common procedures

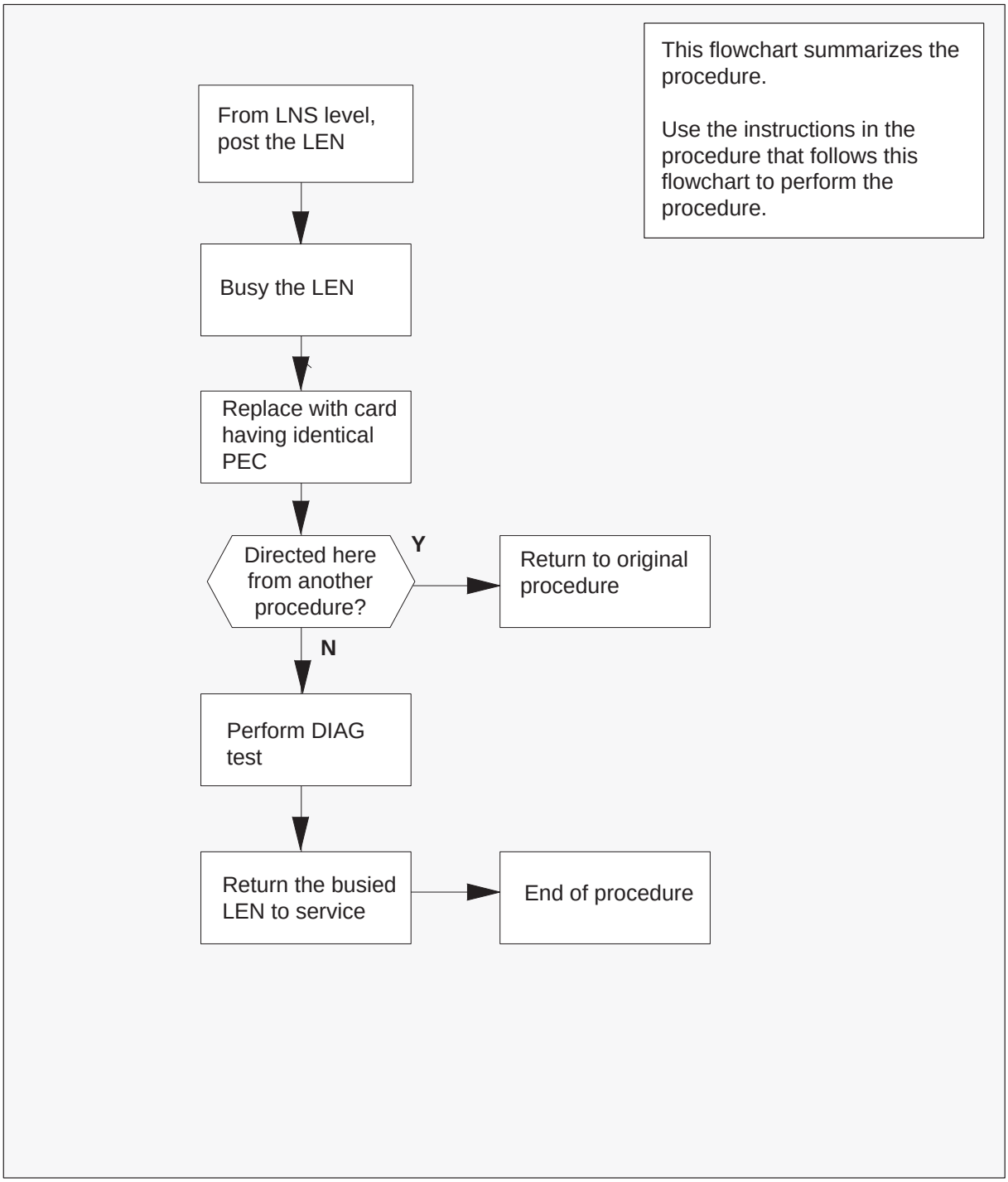
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX27 in RSC-S LCME (continued)

Summary of card replacement procedure for an NTBX27 card in an RSC-S LCME



NTBX27
in RSC-S LCME (continued)

Replacing an NTBX27 card in an RSC-S LCME

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 Obtain an NTBX27 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site lcme_no unit_no lsg_no ckt_no
and pressing the Enter key.

where

site	is the location name of the LCME with the faulty card
lcme_no	is the number of the LCME with the faulty card
unit_no	is the number of the LCME unit with the faulty card
lsg_no	is the number of the LSG with the faulty card
ckt_no	is the number of the circuit associated with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .      .     .      .      .       .       .

LTP
 0 Quit     Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3          LCC PTY RNG....LEN......DN       STA F S LTA TE RESULT
 4          ISDN Loop    HOST 00 0 03 03  4931082  IDL
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

NTBX27 in RSC-S LCME (continued)

4 Busy the NTBX27 line card by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .      .     .      .      .       .       .

LTP
 0 Quit     Post       DELQ       BUSYQ        PREFIX
 2 Post_
 3          LCC PTY RNG....LEN......DN       STA F S LTA TE RESULT
 4          ISDN Loop  HOST 00 0 03 03 4931082  MB
 5 BSY
 6 RTS
 7 DIAG
 8
 9 AIMStat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix
17 LCO
18 Level
```

NTBX27
in RSC-S LCME (continued)

At the LCE frame

5

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers.

NTBX27
in RSC-S LCME (continued)

Put on a wrist strap.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

6 To prepare to remove the faulty card, open the line drawer and follow these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 15
other	step 10

At the MAP terminal

10 Test the NTBX27 line card by typing

>DIAG
and pressing the Enter key.

NTBX27 in RSC-S LCME (end)

11 Use the following information to determine where to proceed.

If DIAG	Do
passed	step 12
failed	step 16

12 Return the NTBX27 card to service by typing

>RTS
and pressing the Enter key.

If RTS	Do
passed	step 13
failed	step 16

13 Send any faulty cards for repair according to local procedure.

14 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 17.

15 Return to the 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.

16 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

17 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTBX34 in RSC-S LCME

Application

Use this procedure to replace an NTBX34 card in an RSC-S LCME.

PEC	Suffixes	Name
NTBX34	BA	ISDN Enhanced LCM Processor

Common procedures

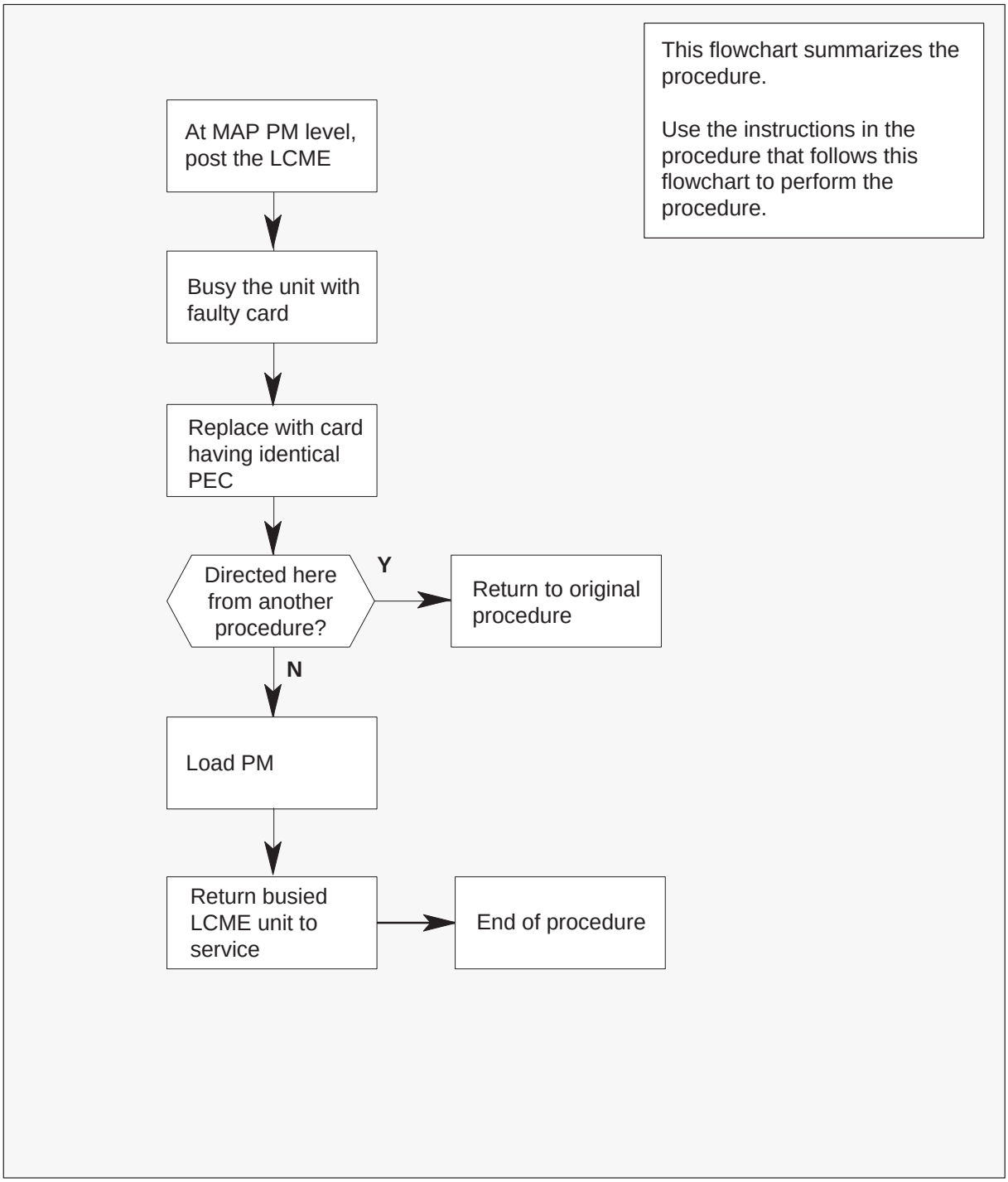
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX34 in RSC-S LCME (continued)

Summary of card replacement procedure for an NTBX34 card in an RSC-S LCME



Replacing an NTBX34 card in an RSC-S LCME

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 Obtain an NTBX34 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME site frame_no lcme_no
and pressing the Enter key.

where

site is the name of the site at which the LCME is located
frame_no is the number of the frame at which the LCME is located
lcme_no is the number of the LCME with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .      .

LCME              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0       130
 2 Post_   LCME      0        0        0        0        0         0
 3
 4 Swrg_      LCME  RemL  00 0   Links_OOS:  CSide 0
 5 Trnsl_     Unit-0:   InSv              /RG:  0
 6 Tst_       Unit-1:   InSv              /RG:  0
 7 Bsy_      RG: Preferred 0:  InSv  Standby1:  InSv
 8 RTS_
 9 OffL_
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

NTBX34 in RSC-S LCME (continued)

4 Busy the LCME unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the LCME unit with the faulty card

Example of a MAP display:

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .      .

LCME              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0       130
 2 Post_   LCME      0        1        0        0        0         0
 3
 4 Swrg_      LCME  RemL  00 0   Links_OOS:  CSide 0
 5 Trnsl_     Unit-0:   InSv Mtce Takeover /RG:  0
 6 Tst_       Unit-1:   ManB Mtce          /RG:  0
 7 Bsy_      RG: Preferred 0:  InSv  Standby1:  InSv
 8 RTS_
 9 OffL_
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

At the LCE frame

5

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

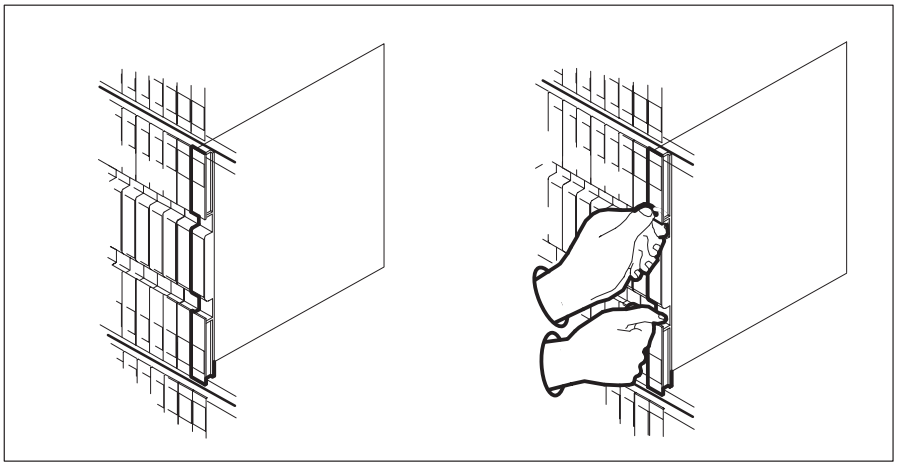
When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

Put on a wrist strap.

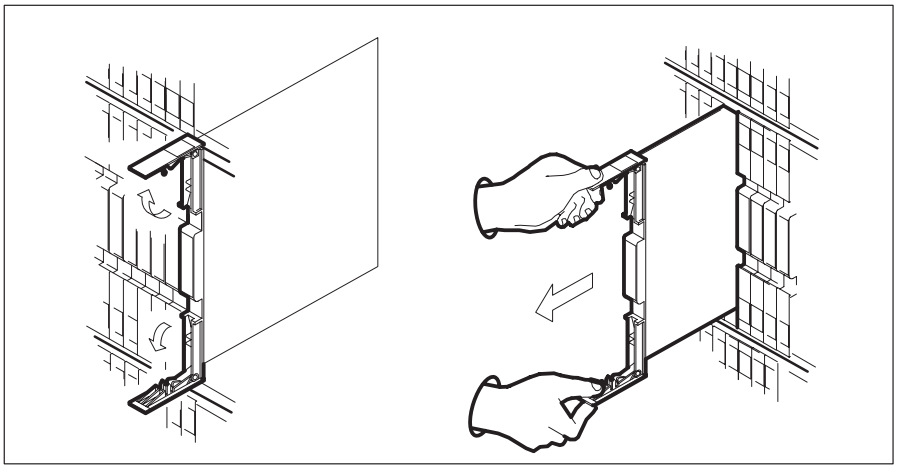
6 Remove the NTBX34 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



NTBX34 in RSC-S LCME (continued)

b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

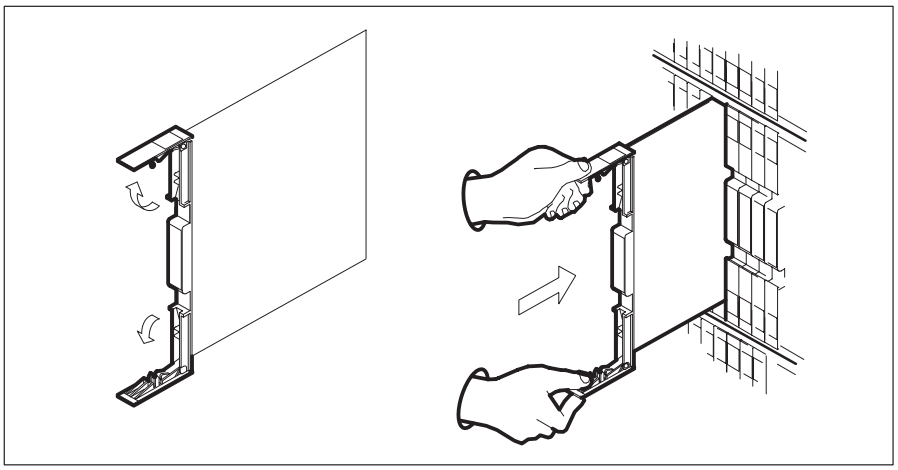


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

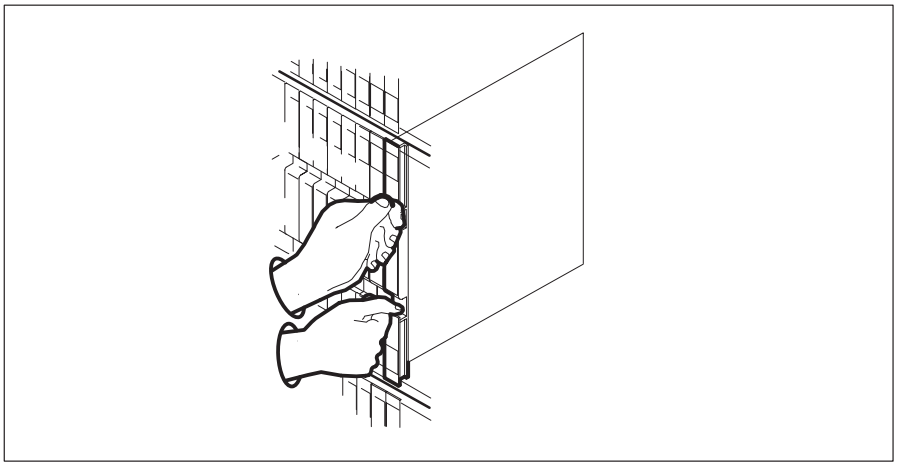
b. Gently slide the card into the shelf.



8 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.



At the MAP terminal

9 Load the LCME unit by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the LCME unit busied in step 4

10 Use the following information to determine where to proceed.

If load	Do
passed	step 11
failed	step 19

11 Test the LCME unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the LCME unit loaded in step 9

NTBX34 in RSC-S LCME (continued)

12 Use the following information to determine where to proceed.

If TST	Do
passed	step 13
failed	step 18

13 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 18
other	step 14

14 Return the LCME unit to service by typing

>RTS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit tested in step 12

15 Use the following information to determine where to proceed.

If RTS	Do
passed	step 16
failed	step 19

16 Send any faulty cards for repair according to local procedure.

17 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 20.

18 Return to the 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 operating company maintenance personnel.

NTBX34
in RSC-S LCME (end)

20 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTBX35 in RSC-S LCME

Application

Use this procedure to replace an NTBX35 card in an RSC-S LCME.

PEC	Suffixes	Name
NTBX35	AA	ISDN LCM Digroup Controller

Common procedures

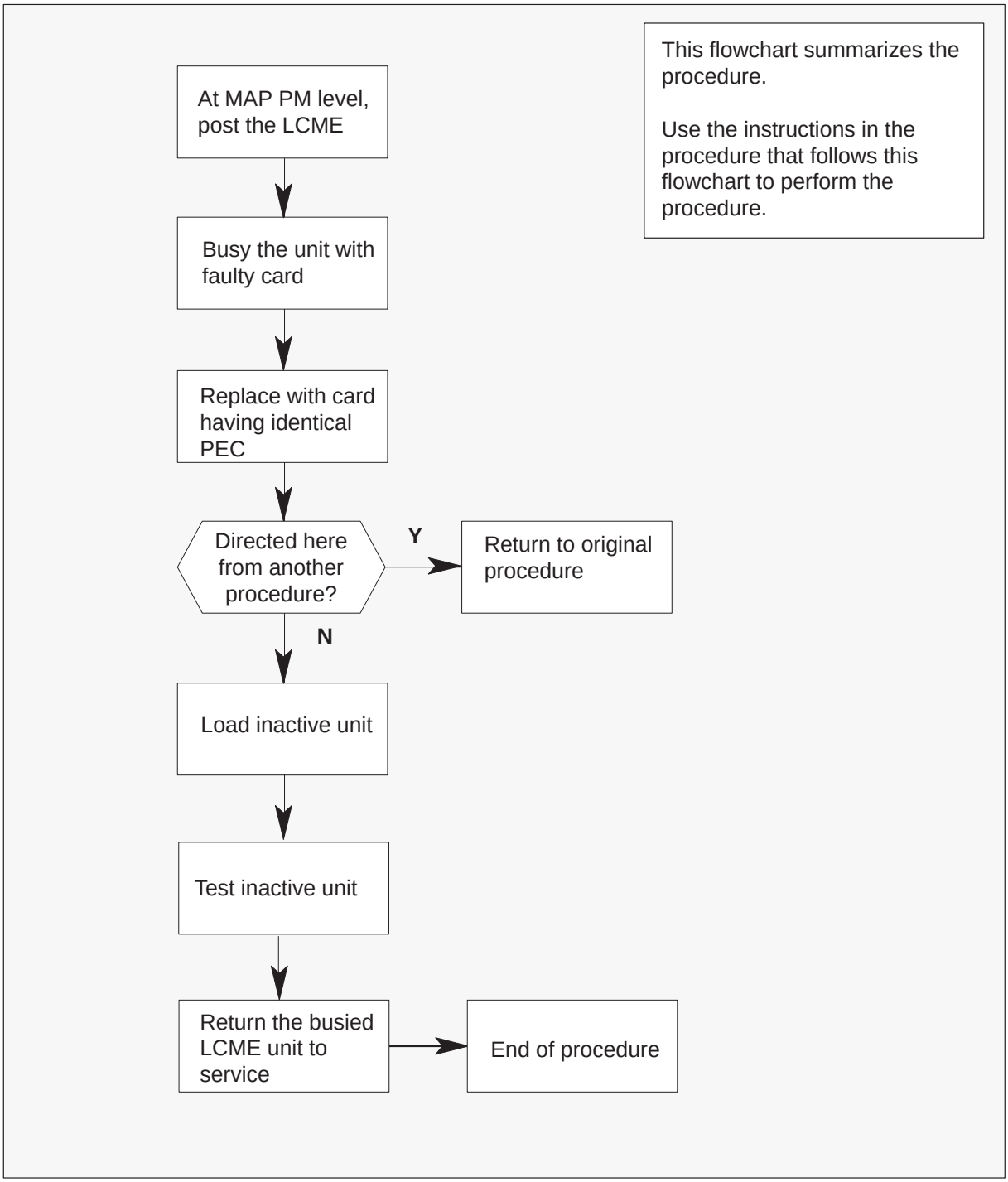
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX35 in RSC-S LCME (continued)

Summary of card replacement procedure for an NTBX35 card in an RSC-S LCME



NTBX35 in RSC-S LCME (continued)

Replacing an NTBX35 card in an RSC-S LCME

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 Obtain an NTBX35 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP to the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME site frame_no unit_no
and pressing the Enter key.

where

site is the name of the site at which the LCME is located
frame_no is the number of the frame in which the LCME is located
unit_no is the number of the LCME with the faulty card

Example of a MAP display:

```
 CM     MS     IOD    Net    PM    CCS    LNS    Trks     Ext      Appl
 .      .       .      .     .      .      .       .       .         .
LCME             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       o        0        0        0        0       130
 2 Post_   LCME     0        0        0        0        0         0
 3
 4 Swrg_
 5 Trnsl_                    LCME   RemL  OO O   Links_OOS:  CSide 0
 6 Tst_                      Unit-0:  InSv                /RG:  0
 7 Bsy_                      Unit-1:  InSv                /RG:  0
 8 RTS_                     RG: Preferred 0:  InSv   Standby1: InSv
 9 OffL_
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Busy the LCME unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the LCME unit with the faulty card

Example of a MAP display:

```
 CM     MS     IOD   Net    PM    CCS    LNS    Trks     Ext      Appl
 .      .       .     .      .     .      .       .       .        .
LCME             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        0        0        0       130
 2 Post_   LCME     0        1        0        0        0         0
 3
 4 SwRg              LCME   RemL  OO O   Links_OOS:  CSide 0
 5 Trnsl             Unit-0:  InSv  Mtce TakeOver /RG:  0
 6 Tst               Unit-1:  ManB Mtce           /RG:  0
 7 Bsy              RG: Preferred 0:  InSv   Standby1: InSv
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NTBX35 in RSC-S LCME (continued)

At the LCE frame

5

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

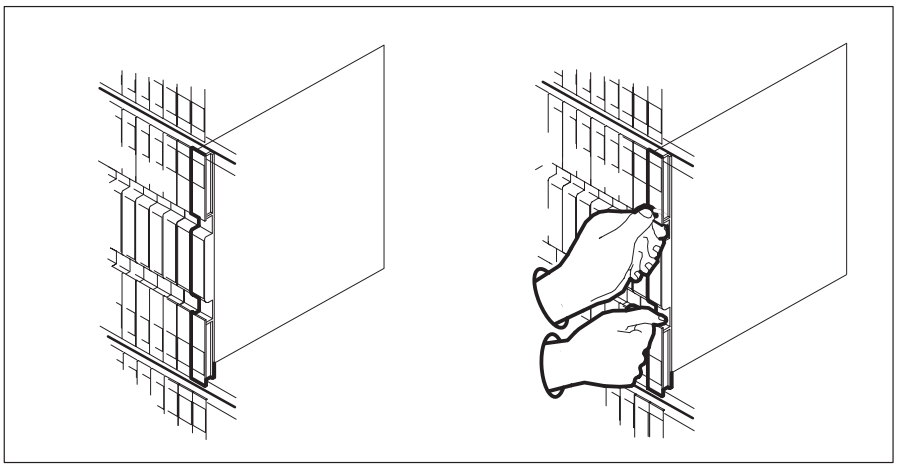
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

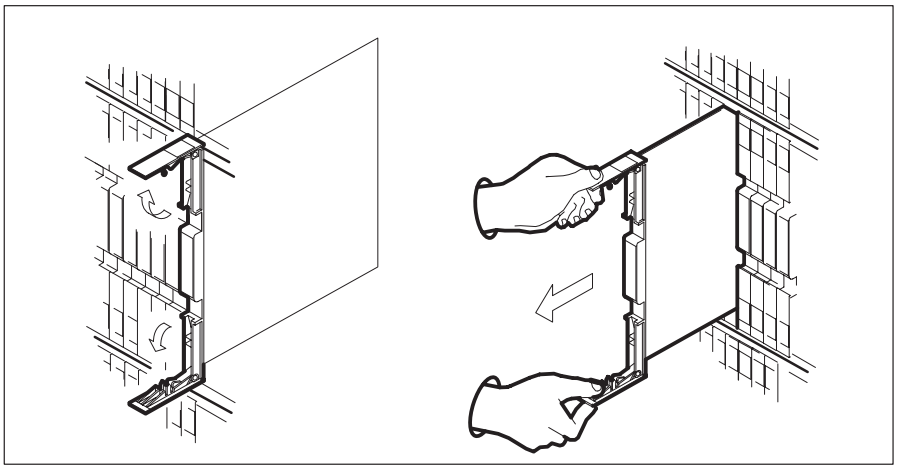
NTBX35 in RSC-S LCME (continued)

6 Remove the NTBX35 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



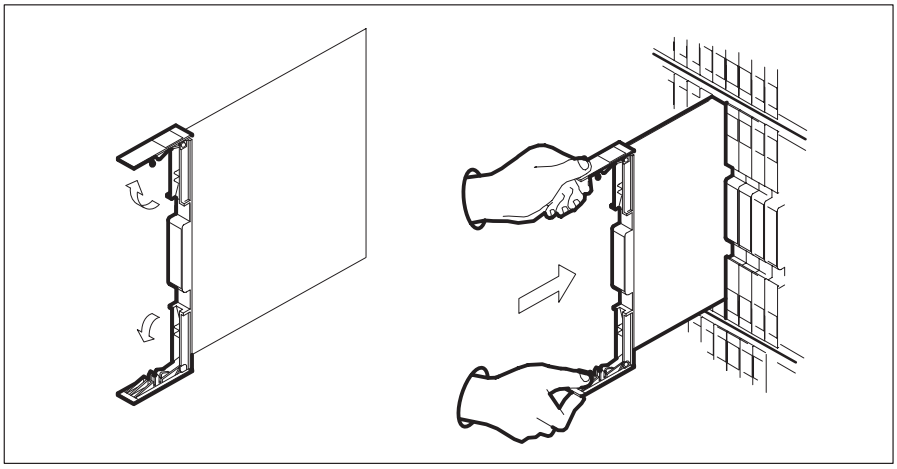
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

NTBX35 in RSC-S LCME (continued)

7 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

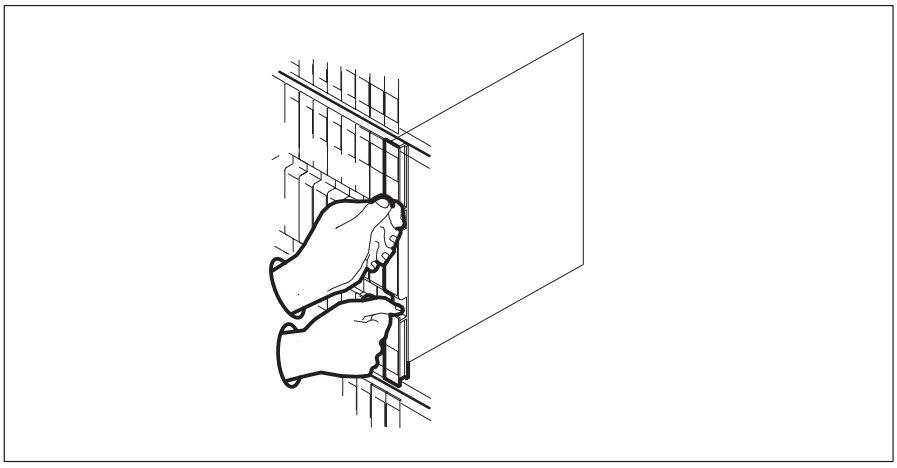
b. Gently slide the card into the shelf.



8 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.



At the MAP terminal

9 Load the LCME unit by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the LCME unit busied in step 4

If load	Do
passed	step 10
failed	step 16

10 Test the LCME unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the LCME unit loaded in step 9

If TST	Do
passed	step 11
failed	step 15

11 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 15
other	step 12

NTBX35 in RSC-S LCME (end)

12 Return the LCME unit to service by typing

>RTS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit tested in step 10

If RTS	Do
passed	step 13
failed	step 16

13 Send any faulty cards for repair according to local procedure.

14 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 17.

15 Return to the 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.

16 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

17 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTBX36 in RSC-S LCME

Application

Use this procedure to replace an NTBX36 card in an RSC-S LCME.

PEC	Suffixes	Name
NTBX36	BA	Bus Interface Card (BIC)

Common procedures

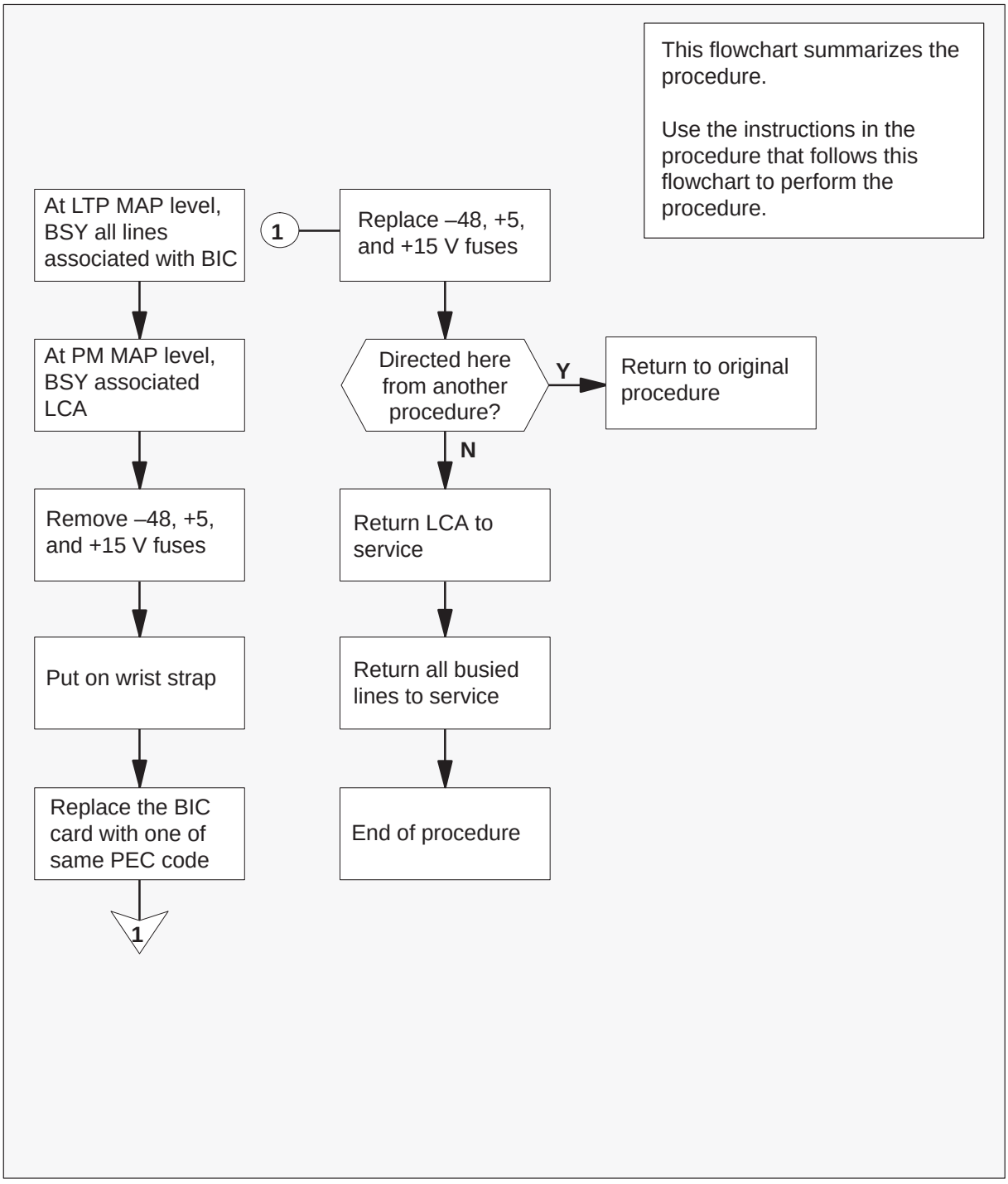
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX36 in RSC-S LCME (continued)

Summary of card replacement procedure for an NTBX36 card in RSC-S LCME



NTBX36 in RSC-S LCME (continued)

Replacing an NTBX36 card in RSC-S LCME

At your Current Location

1 Proceed only if you were either directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or were directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC) including suffix, as the card that is to be removed.

At the MAP terminal

3 Access the LTP level and post the first line subgroup (LSG) of the line drawer that contains the bus interface card (BIC) to be replaced by typing

>MAPCI;MTC;LNS;LTP;POST L site frame_no unit_no lcm_dr LSG
and pressing the Enter key.

where

site_ is the name of the site at which the LCME is located
frame_no is the number of the frame in which the LCME is located
unit_no is the number of the LCME unit with the faulty card
lcm_dr is the number of the drawer with the faulty card

4 Busy all lines in the first LSG by typing

>BSY ALL
and pressing the Enter key.

5 Post the next LSG of the same line drawer by typing

>NEXT D
and pressing the Enter key.

6 Repeat step 4 and step 5 until all LSGs of the same line drawer are busied.

NTBX36 in RSC-S LCME (continued)

7 Post the LCME with the LCA shelf containing the card to be replaced by typing

>PM;POST LCME site frame_no unit_no
and pressing the Enter key.

where

site is the name of the site at which the LCME is located
frame_no is the number of the frame in which the LCME is located
unit_no is the number of the LCME unit with the faulty card

Example of a MAP display:

```
 CM     MS     IOD    Net     PM    CCS     LNS    Trks    Ext   Appl
 .      .       .      .     1LCME    .      .       .       .     .
LCME             SysB    ManB    OffL    CBsy    ISTb     InSv
 0 Quit    PM        0       0       0       0       0      130
 2 Post_   LCME      0       0       0       0       0        0
 3
 4 SwRg       LCME    Reml   00  0  ISTb   Links_OOS:  CSide 1
 5 Trnsl      Unit0:   InSV                  /RG:  0
 6 Tst        Unit1:   InSv                  /RG:  0
 7 Bsy                                 11 11 11      RG:Pref 0 InSv
 8 RTS        Drwr: 01 23 45 67 89 01 23 45         Stby:1 InSv
 9 OffL             .. .. .. .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

8 Busy all LSGs associated with the LCME drawer in which the card is being replaced by typing

>BSY DRWR x
and pressing the Enter key.

>BSY DRWR y
and pressing the Enter key.

>BSY DRWR z
and pressing the Enter key.

where

x is the first line subgroup
y is the next line subgroup
z is the next line subgroup (if an LCMI)

Example of a MAP response:

```
Please confirm ("YES" or "NO")
```

9 Confirm the busied LSGs by typing

>YES
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS    IOD     Net    PM     CCS    LNS    Trks    Ext   Appl
 .      .       .       .     1LCME   .      .       .      .     .
LCME              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        1        0        0        0       130
 2 Post_   LCME     0        1        0        0        0         0
 3
 4 SwRg       LCME      RemL   00  0  ISTb   Links_OOS:   CSide 1
 5 Trnsl      Unit 0:    InSv                  /RG:  0
 6 Tst        Unit 1:    InSv                  /RG:  0
 7 Bsy                                  11 11 11      RG:Pref 0 InSv
 8 RTS        Drwr: 01 23 45 46 67 89 01 23 45         Stby:1 InSv
 9 OffL             .. .. MM .. .. .. .. .. .. ..
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NTBX36 in RSC-S LCME (continued)

At the LCE frame

10

WARNING
Card damage—transport
Take these precautions to protect the circuit cards from electrical and mechanical damage while transporting cards.

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wrist strap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom Corporate Standard 5028).

Store and transport circuit cards in an ESD protective container.

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

WARNING
Hot materials
Exercise care when handling the line card. The line feed resistor may be very hot.

CAUTION
Special tools required
Card shrouds and removal tools are required for removing cards from the line drawers.

Remove the –48V fuse for the line drawer containing the BIC to be replaced.

Remove the +5V fuse for the line drawer containing the BIC to be replaced.

Remove the +15V fuse for the line drawer containing the BIC to be replaced.

Put on a wrist strap.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note 1: Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards. Descriptions of these shrouds follow.

Note 2: Card removal tools are required for removing cards from line drawers. Two sizes are available. Descriptions of these tools follow.

Card removal tool for	Apparatus code	Common product code
3–4 inch cards	QTH57A	A0298292
Note: For 4-inch or larger cards, use the large grip tool ITA9953.		

11 To prepare to remove the faulty card, open the line drawer and follow these substeps:

a. Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.

b. Push up on the drawer latch with the thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c. Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d. While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.

e. Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f. Ensure a card shroud and line card extractor are available.

NTBX36 in RSC-S LCME (continued)

12 Remove the line card to be replaced by following these substeps:

a. Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b. Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c. Squeeze the handles of the extractor together to grasp the card tightly.

d. Hold the front cover of the line drawer to steady it using your left hand.

e. Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

f. Continue pulling the card with the extractor until the card is clear of the shroud.

g. Insert the card removed into the ESD container and store using local procedures.

13 Replace the faulty card by following these substeps:

a. Remove the replacement card from the ESD container.

b. Slide the card in the shroud guide slots toward the drawer backplane.

c. Hold the front cover of the line drawer with your left hand to steady it.

d. Grasp the top and bottom edges of the card with the fingers of your right hand.

e. Push the card toward the backplane until it plugs fully into the backplane socket.

f. Close the line drawer.

14 Replace the –48V fuse for the line drawer containing the BIC that was replaced.

Replace the +5V fuse for the line drawer containing the BIC that was replaced.

Replace the +15V fuse for the line drawer containing the BIC that was replaced.

15 Use the following information to determine the next step in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 26
other	step 16

At the MAP terminal

16 Return the LSGs to service by typing

>RTS DRWR x
and pressing the Enter key.

>RTS DRWR y
and pressing the Enter key.

where

x is the first line subgroup busied in step 8
y is the next line subgroup busied in step 8

17 Access the PM level of the MAP display and post the first LSG of the line drawer that contains the BIC to be replaced by typing

>MAPCI;MTC;PM;LNS;LTP;POST L site frame_no unit_no lcm_dr
and pressing the Enter key.

where

site is the name of the site at which the LCME is located
frame_no is the number of the frame in which the LCME is located
unit_no is the number of the LCME unit with the faulty card
lcm_dr is the number of the drawer with the faulty card

18 Return the busied lines in the first LSG to service by typing

>RTS ALL
and pressing the Enter key.

19 Post the next LSG of the same line drawer by typing

>NEXT D
and pressing the Enter key.

NTBX36 in RSC-S LCME (continued)

20 Repeat step 18 and step 19 until all busied lines in the drawer are returned to service.

21 Post the LCME with the LCA shelf containing the replaced card by typing

>PM;POST LCME site frame_no unit_no
and pressing the Enter key.

where

site is the name of the site at which the LCME is located
frame_no is the number of the frame in which the LCME is located
unit_no is the number of the LCME unit with the faulty card

22 Test the LCME unit by typing

>TST UNIT lcm_unit_no
and pressing the Enter key.

where

lcm_unit_no is the number of the LCME unit posted in step 21

If TST	Do
passed	step 23
failed	step 26

23 Return the LCME unit to service by typing

>RTS lcm_unit_no
and pressing the Enter key.

where

lcm_unit_no is the number of the LCME unit tested in step 22

If RTS	Do
passed	step 24
failed	step 27

24 Send any faulty cards for repair according to local procedure.

25 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 28.

NTBX36
in RSC-S LCME (end)

26 Return to the *Alarm Clearing Procedures.* 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 card replacement procedure for that card in this manual.

27 Obtain further assistance in replacing this card by contacting personnel responsible for a higher level of support.

28 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this procedure and continue as directed.

NTBX72 in RSC-S LCME

Application

Use this procedure to replace an NTBX72 card in an RSC-S LCME.

PEC	Suffixes	Name
NTBX72	AA	ISDN LCME Battery and Ring Router

Common procedures

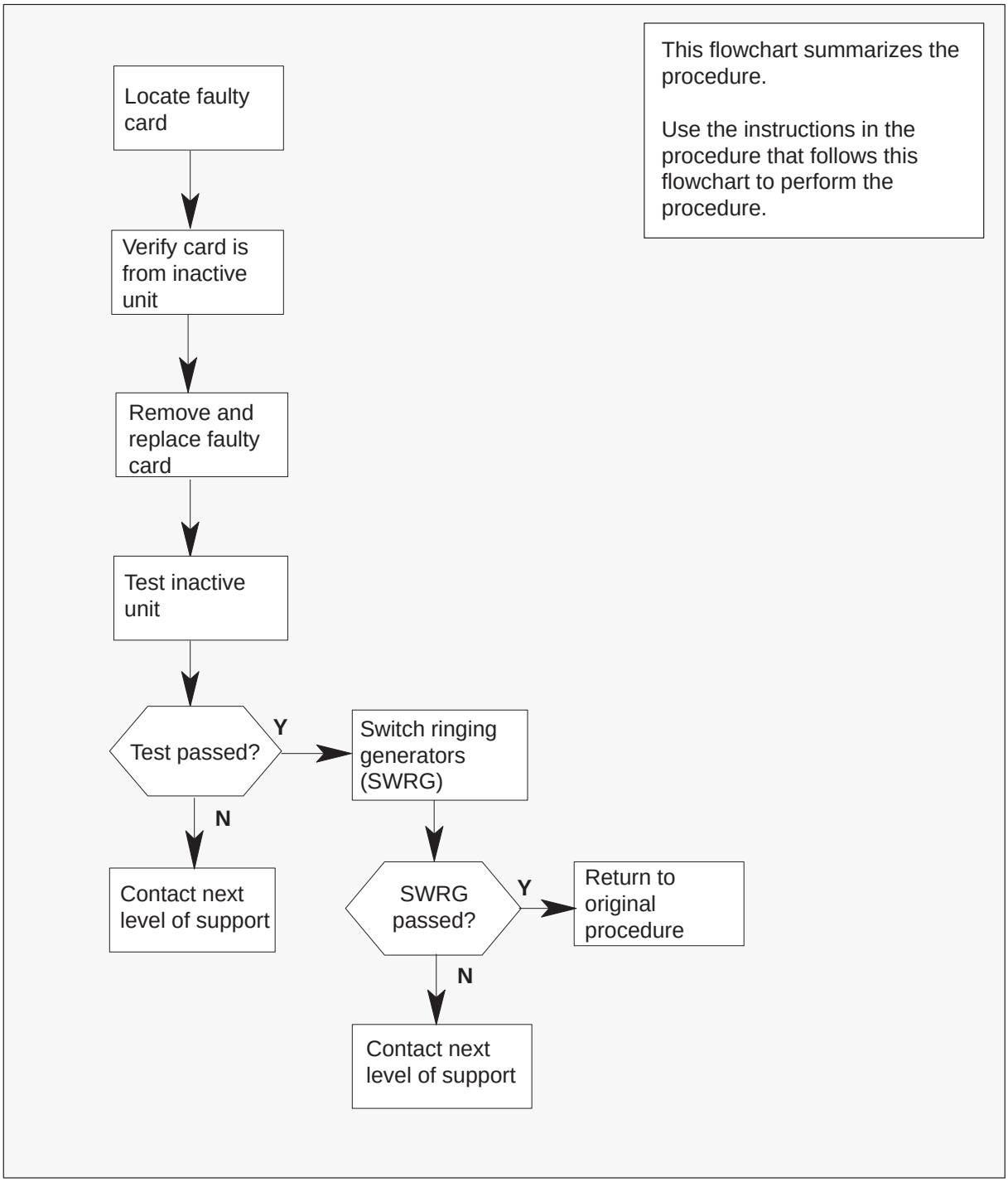
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTBX72 in RSC-S LCME (continued)

Summary of card replacement procedure for an NTBX72 card in an RSC-S LCME



NTBX72 in RSC-S LCME (continued)

Replacing an NTBX72 card in an RSC-S LCME

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 Obtain an NTBX72 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME site frame_no unit_no
and pressing the Enter key.

where

site is the name of the site at which the LCME is located
frame_no is the number of the frame in which the LCME is located
unit_no is the number of the LCME with the faulty card

Example of a MAP display:

```
 CM     MS     IOD    Net     PM    CCS    Lns    Trks    Ext     Appl
 .      .       .       .    1LCME     .       .       .       .       .

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

4 Check for fault indicators by typing

>QUERYPM FLT
and pressing the Enter key.

Example of a MAP display:

```
 CM     MS     IOD    Net    PM    CC     Lns    Trks    Ext    Appl
 .      .       .       .    1LCME     .       .

LCME               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit     PM        1        0        2        0        2        12
 2 Post_    LCME      0        0        2        0        2         9
 3 ListSet
 4 SwRG     LCME   RSC-S 14 1 ISTb  Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   InSv  Takeover       /RG: 1
 6 Tst_     Unit1:   ISTb                 /RG: 1
 7 Bsy_                                 11  11  11   RG:Pref 1 ISTb
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45      Stby 0 InSv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_  QUERYPM FLT
11 Disp_    Node inservice troubles exist:
12 Next         One or both Units inservice trouble
13          LCME   UNIT 0  Inservice
14 QueryPM  LCME   UNIT 1  Inservice
15          Ringing Generator 1 failure
16
17
18
```

5 Switch ringing generator activity from the unit with the faulty NTBX72 card by typing

>SWRG PM
and pressing the Enter key.

If SWRG	Do
passed	step 6
failed	step 20

NTBX72 in RSC-S LCME (continued)

6 Busy the LCME unit by typing

>BSY UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit with the faulty card

At the RCE

7

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) of the LCME. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

8

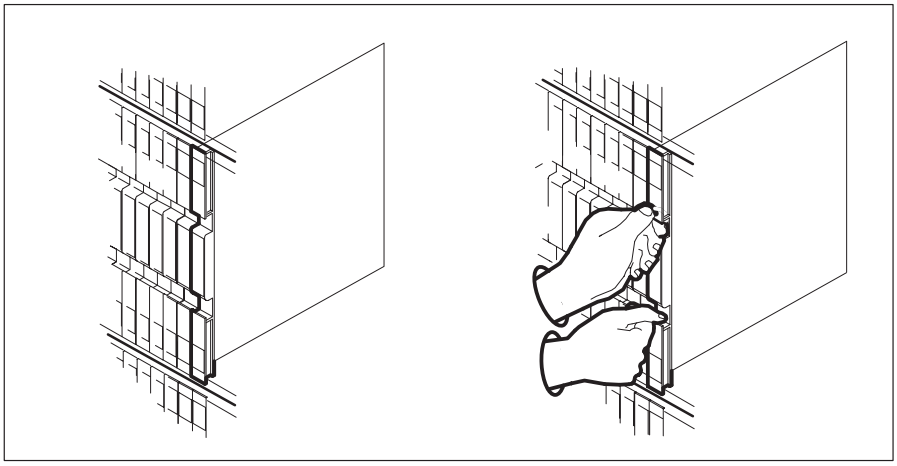
WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Power down the NT6X53 power converter by setting the POWER switch to the OFF position.

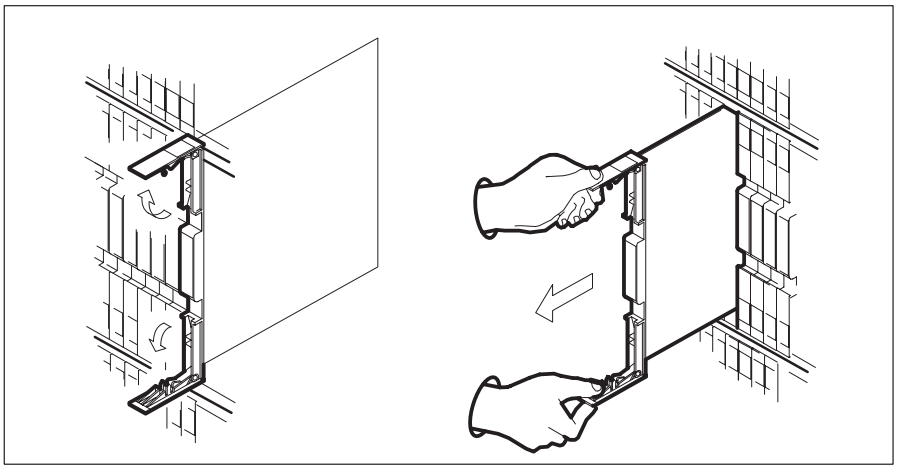
NTBX72
in RSC-S LCME (continued)

9 Remove the NTBX72 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



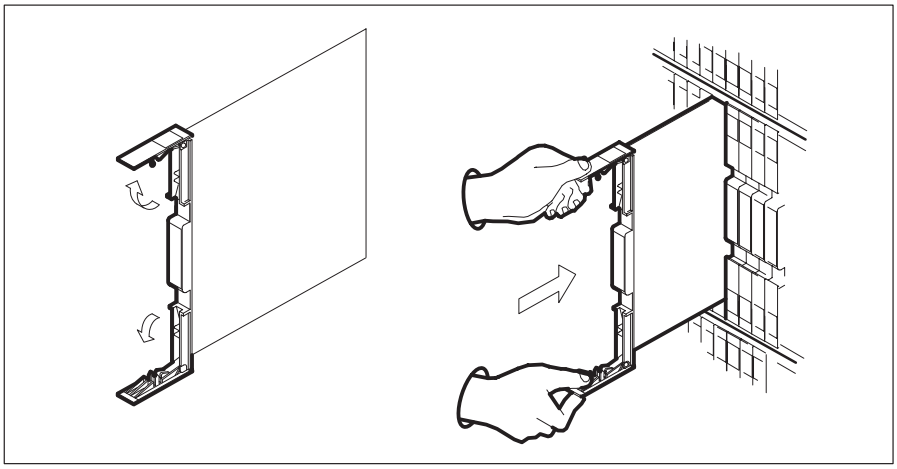
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

10 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

NTBX72
in RSC-S LCME (continued)

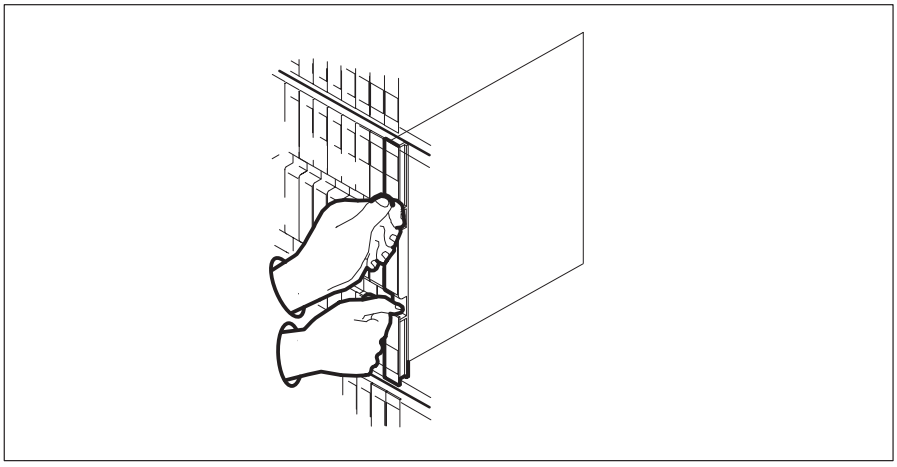
b. Gently slide the card into the shelf.



11 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.



12 Power up the LCME unit as follows:

a. Ensure the power converter (NT6X53) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the circuit breaker switch to the ON position.

13 Use the following information to determine the next step in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 19
other	step 14

At the MAP terminal

14 Test the unit by typing

>TST UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit posted in step 3

If TST	Do
passed	step 15
failed	step 19

15 Return the LCME unit to service by typing

>RTS UNIT lcme_unit_no
and pressing the Enter key.

where

lcme_unit_no is the number of the LCME unit tested in step 14

If RTS	Do
passed	step 16
failed	step 20

NTBX72 in RSC-S LCME (end)

16 Switch ringing generator activity to the new NTBX72 card by typing

>SWRG PM

and pressing the Enter key.

If SWRG	Do
passed	step 17
failed	step 20

17 Send any faulty cards for repair according to local procedure.

18 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 21.

19 Return to the 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.

20 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTMX72 in RSC-S RCO2

Application

Use this procedure to replace an NTMX72 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX72	AA, AB	Power Converter

Common procedures

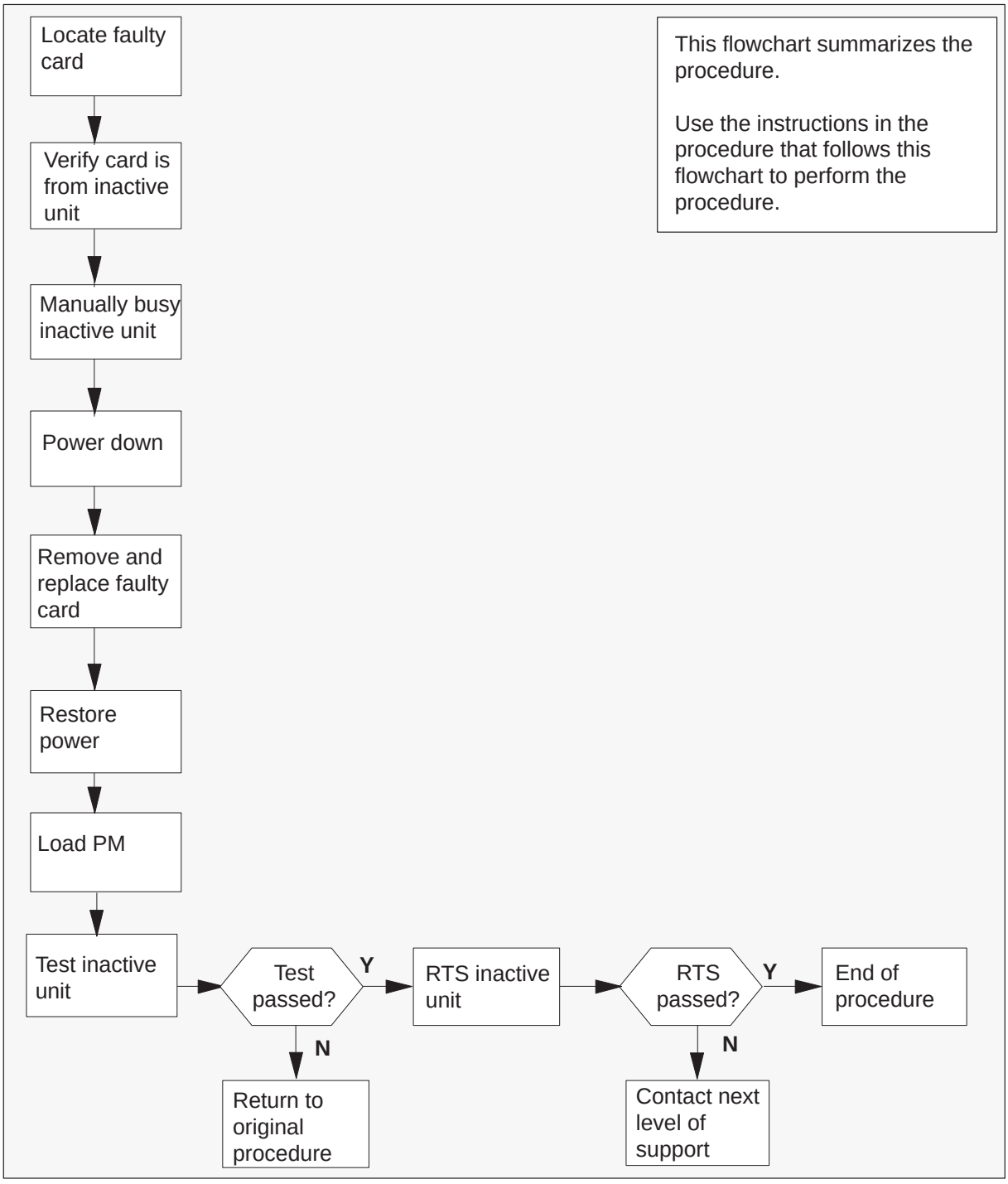
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX72 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX72 card in an RSC-S RCO2



NTMX72 in RSC-S RCO2 (continued)

Replacing an NTMX72 card in an RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX72 replacement card. Ensure the replacement card has the same product engineering code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card

NTMX72 in RSC-S RCO2 (continued)

Example of a MAP display:

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .       .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCO2      0        0        0        0        0         0
 3 ListSet
 4         RCO2    0 ISTb  Links_OOS:  CSide  0, PSide   0
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 By observing the MAP display, be sure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 7

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Answer the prompt by typing

>YES
and pressing the Enter key.

7 Place a sign on the active unit bearing the words **Active Unit–Do Not Touch**. This sign should not be attached by magnets or tape.

8 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 RCO2 unit

9 Use the following information to determine where to proceed:

If the card you are replacing has a suffix of	Do
AA	step 10
AB	step 11

10

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) of the RCO2. This protects the equipment against damage caused by static electricity.

Power down the NTMX72 power converter by setting the POWER switch on the face plate to the OFF position.

Go to step 12.

11

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.

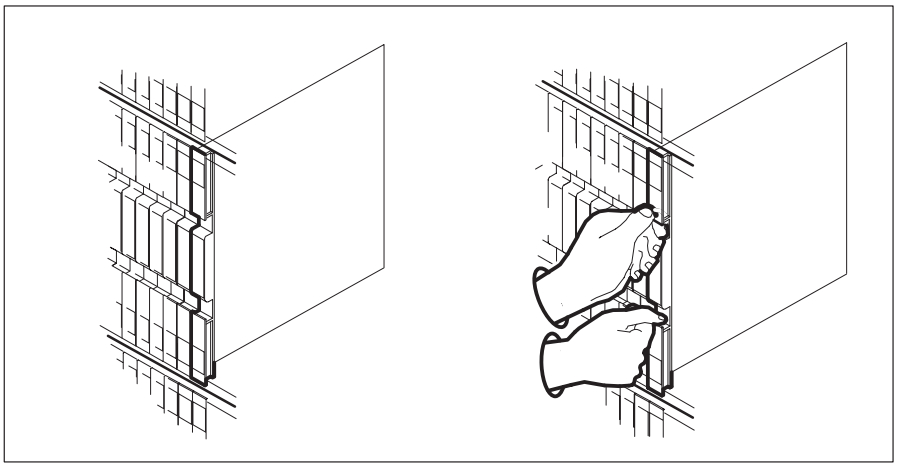
Power down the NTMX72AB power converter by setting the circuit breaker on the FSP for the inactive unit to the OFF position.

NTMX72
in RSC-S RCO2 (continued)

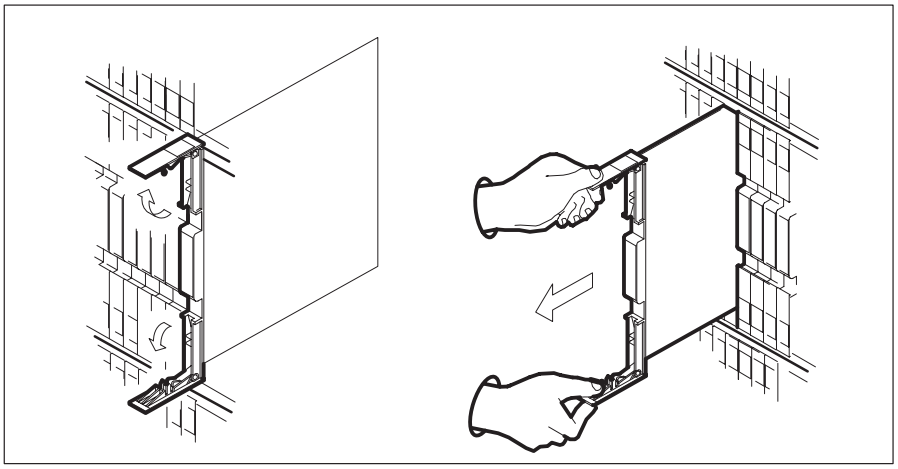
Go to step 12.

12 Remove the NTMX72 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

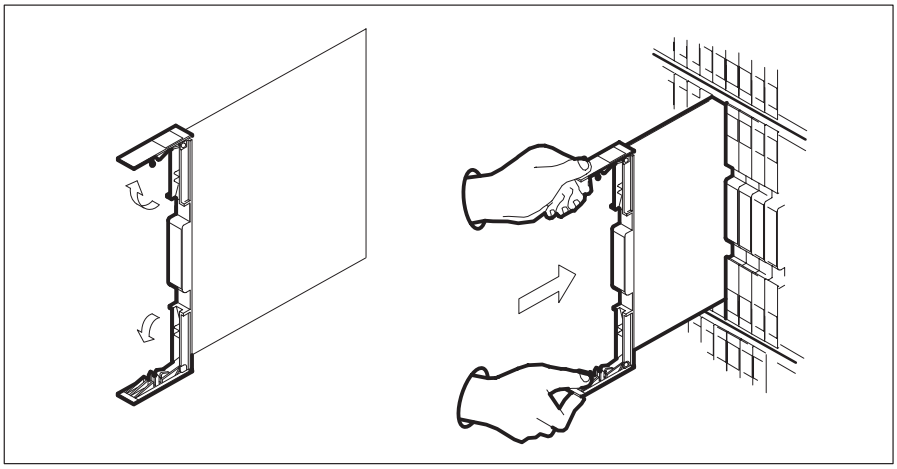


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

13 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

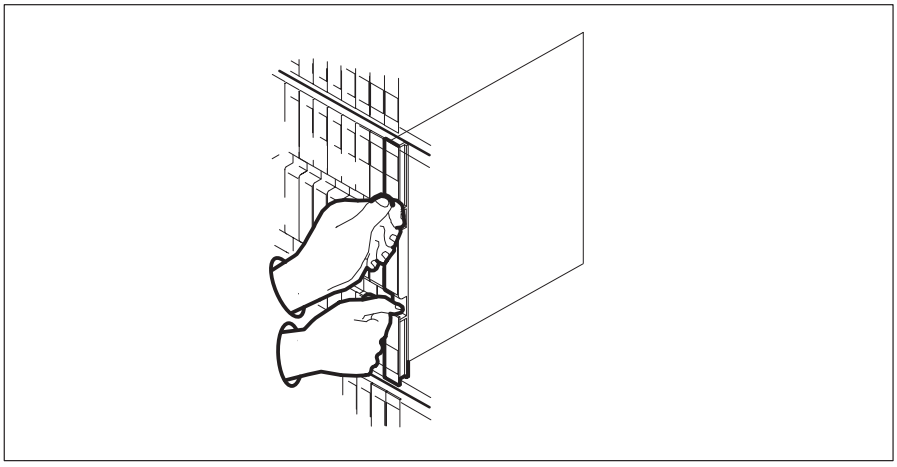
b. Gently slide the card into the shelf.



14 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.



15 Power up the inactive RCO2 unit as follows:

a. Ensure the power converter (NTMX72) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

NTMX72 in RSC-S RCO2 (continued)

b. If the power converter you replaced is an NTMX72AA, set the POWER switch to the ON position. Set the POWER switch to RESET when setting the circuit breaker on the FSP to the ON position.

c. If the power converter you replaced is an NTMX72AB, set the circuit breaker on the FSP to the ON position for the NTMX72AB that was powered down in step 11.

16 After replacing the faulty card, load the inactive RCO2 unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit

If LOADPM	Do
passed	step 17
failed	step 24

17 Test the inactive unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit

If TST	Do
passed	step 18
failed	step 23

18 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 23
other	step 19

19 Return the inactive RCO2 unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit

If RTS	Do
passed	step 20
failed	step 24

20 Remove the sign from the active RCO2 unit.

21 Send any faulty cards for repair according to local procedure.

22 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 25.

23 Return to the 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.

24 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

25 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTMX73 in RSC-S RCO2

Application

Use this procedure to replace an NTMX73 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX73	AA	PCM Signaling Processor

Common procedures

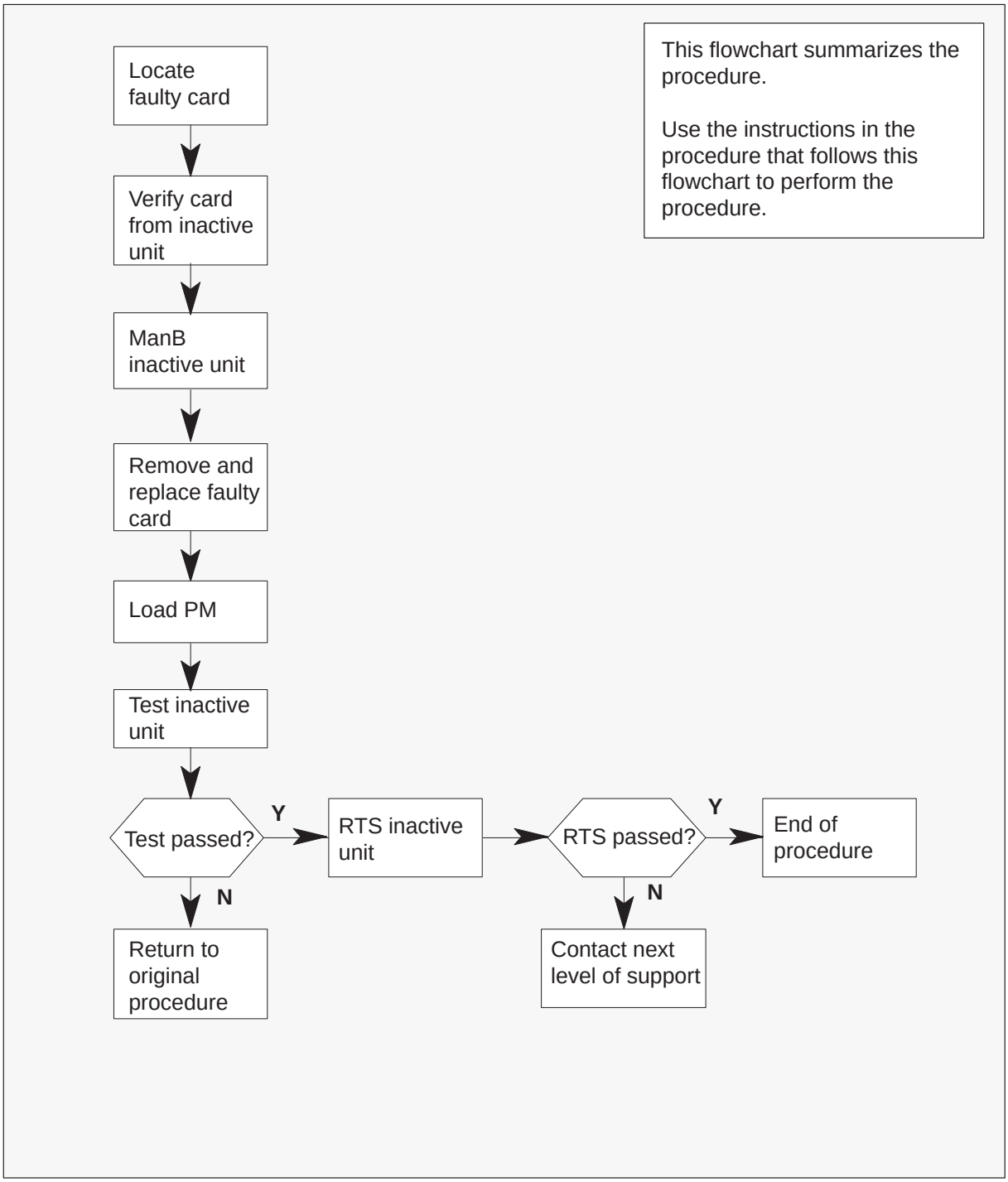
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX73 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX73 card in RSC-S RCO2



NTMX73 in RSC-S RCO2 (continued)

Replacing an NTMX73 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX73 replacement card. Verify that the replacement card has the same product engineering code (PEC), including suffix, as the card that is to be removed.

At the MAP display

3 Set the MAP display to the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 to be posted (0 or 1)

4 By observing the MAP display, be sure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 7

Example of a MAP display:

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .       .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCO2      0        0        0        0        0         0
 3 ListSet
 4         RCO2    0 ISTb  Links_OOS:  CSide  0, PSide   0
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in-service, proceed to the next step.

7 Place 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 display

8 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the unit to be busied (0 or 1)

NTMX73 in RSC-S RCO2 (continued)

When both units are in-service, proceed to the next step.

At the frame

9

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 modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

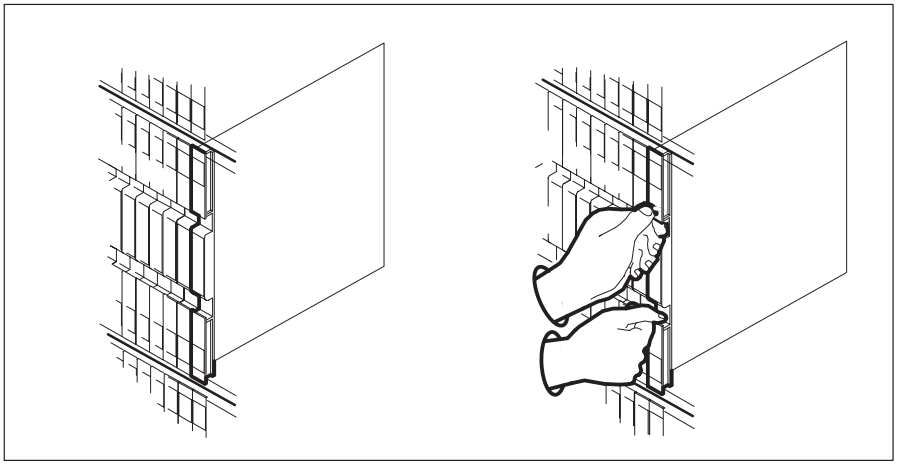
Put on a wrist strap.

10

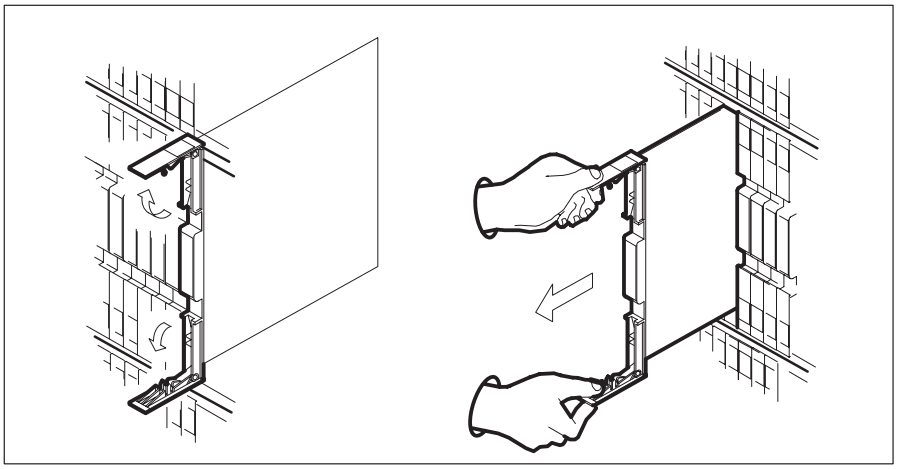
WARNING
Equipment damage
Take the following precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Remove the NTMX73 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



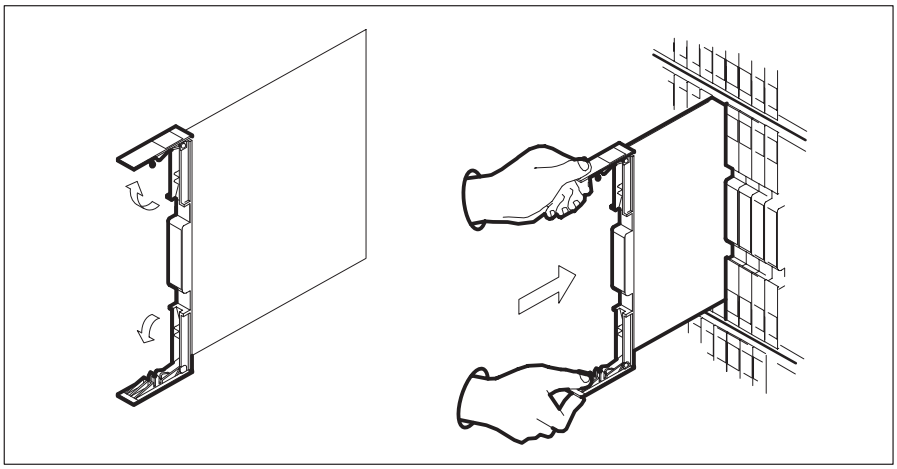
c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

Note: Set dip switch S1 toward IC U1.

11 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.

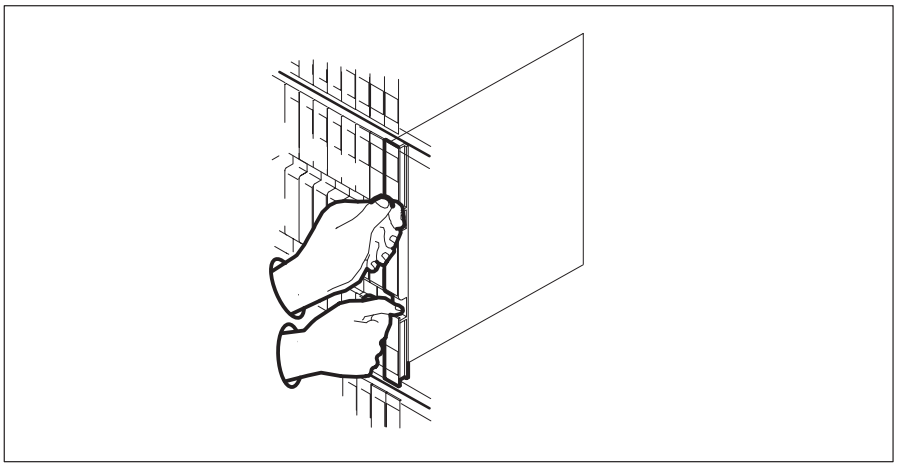


12 Seat and lock the card.

NTMX73 in RSC-S RCO2 (continued)

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

b. Close the locking levers.



At the MAP display

13 Load the inactive RCO2 unit by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the faulty RCO2 unit

If LOADPM	Do
passed	step 14
failed	step 18

14 Test the inactive unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the faulty RCO2 unit

If TST	Do
passed	step 15
failed	step 17

15 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 17
other	step 16

16 Return the inactive RCO2 unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the faulty RCO2 unit

If RTS	Do
passed	step 19
failed	step 18

17 Return to the 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.

18 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

19 Remove the sign from the active RCO2 unit.

20 Send any faulty cards for repair according to local procedure.

21 Note in office records the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card.

NTMX73 in RSC-S RCO2 (end)

22 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTMX74 in RSC-S RCO2

Application

Use this procedure to replace an NTMX74 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX74	AA	DS30A Interface card

Common procedures

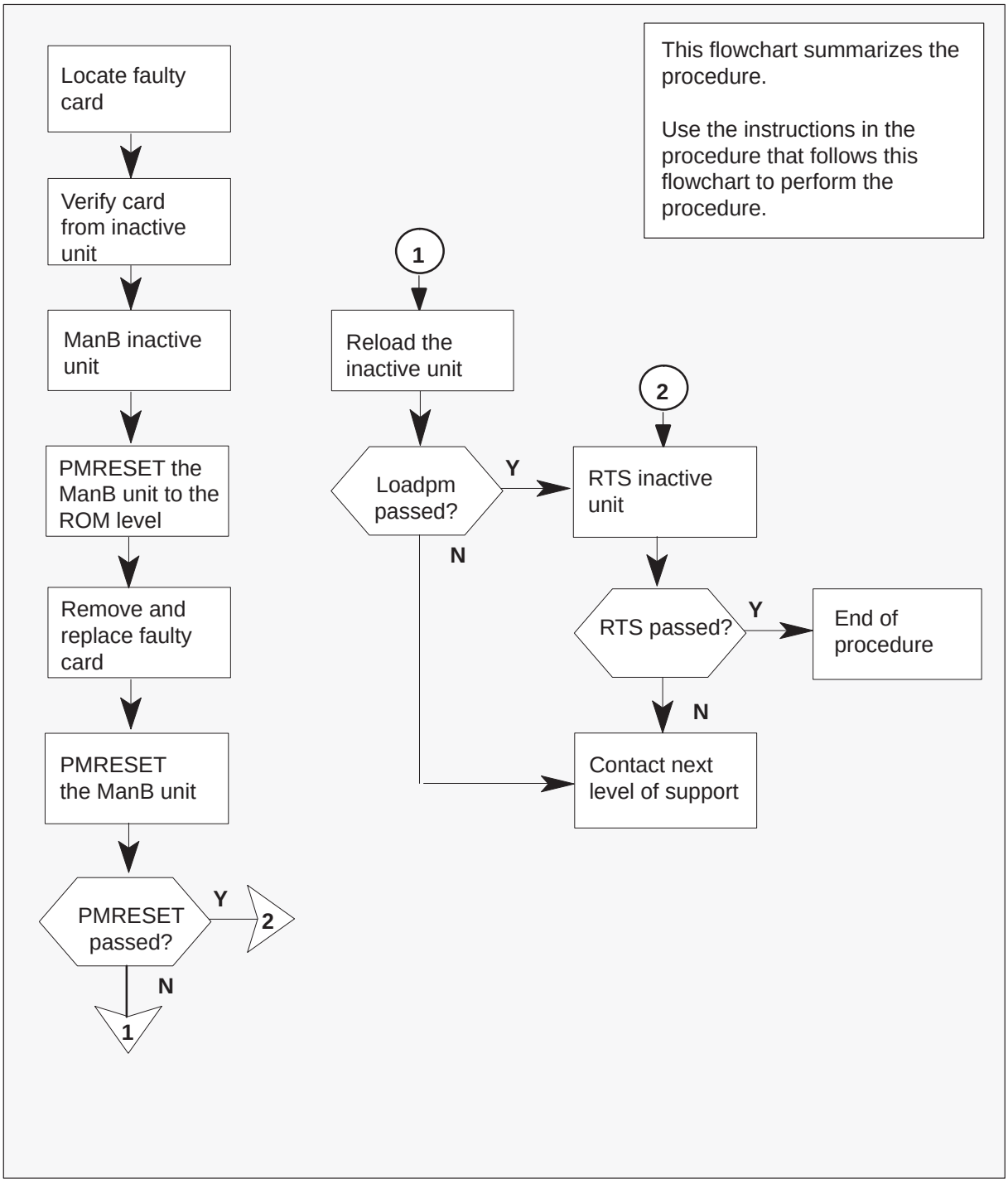
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX74 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX74 card in RSC-S RCO2



NTMX74
in RSC-S RCO2 (continued)

Replacing an NTMX74 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX74 replacement card. Verify the replacement card has the same product engineering code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card

NTMX74
in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM     MS    IOD     Net     PM    CCS    LNS    Trks   Ext    Appl
 .      .       .       .     1RCO2   .      .      .      .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0        2        0        2         25
 2 Post_   RCO2    0        0        0        0        1          1
 3 ListSet
 4         RCO2   0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 By observing the MAP display, be sure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 6

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in-service, proceed to the next step.

NTMX74
in RSC-S RCO2 (continued)

At the RCE frame

6 Place 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

7 Busy the inactive PM unit by typing

>BSY INACTIVE
and pressing the Enter key.

8 Set the ManB RCO2 unit to the ROM level to prevent trapping by typing

>PMRESET UNIT unit_no NORUN
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit busied in step 7

At the RCE frame

9

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 modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

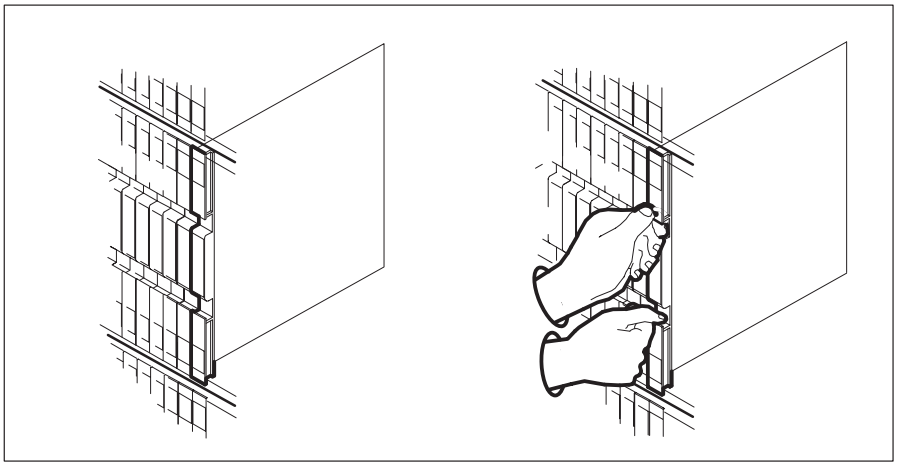
10

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.

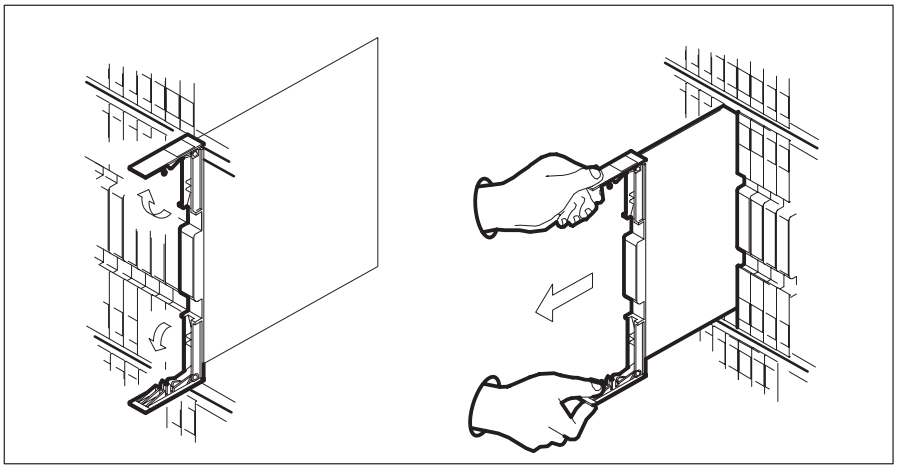
Remove the NTMX74 card as shown in the following figures.

NTMX74
in RSC-S RCO2 (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

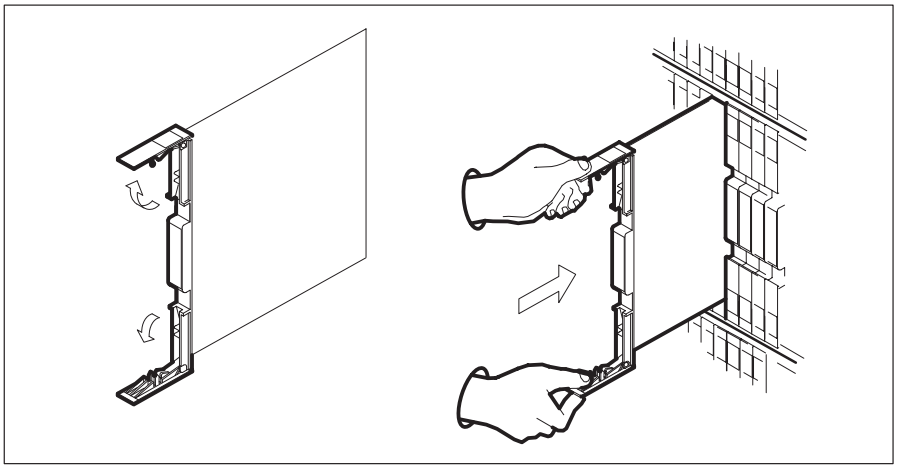


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

11 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

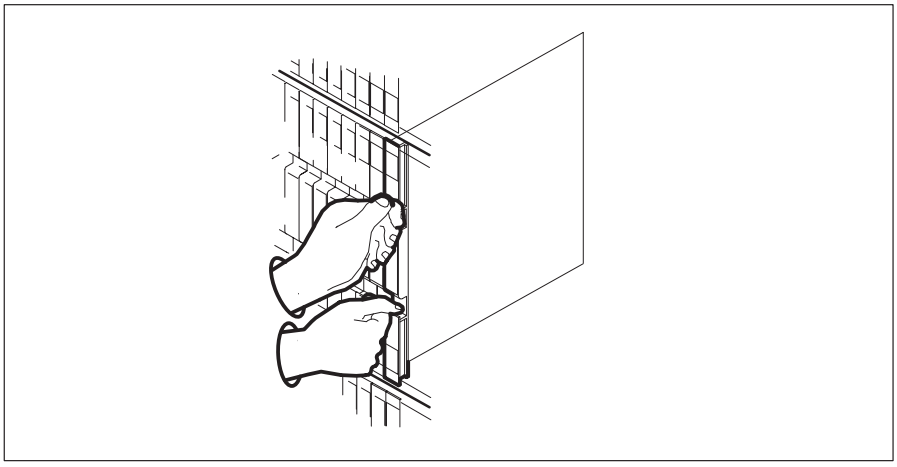
b. Gently slide the card into the shelf.



12 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.



NTMX74 in RSC-S RCO2 (continued)

13 Refer to the following table to determine the next step

If you entered this procedure from	Do
alarm clearing procedure	step 19
other	step 14

At the MAP terminal

14 Reset the inactive RCO2 unit by typing

>PMRESET UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit (0 or 1)

If the PMRESET command	Do
passed	step 16
failed	step 15

15 Reload the inactive RCO2 unit by typing

>LOADPM UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit (0 or 1)

If the LOADPM command	Do
passed	step 16
failed	step 20

NTMX74 in RSC-S RCO2 (end)

16 Return the inactive RCO2 unit to service by typing

>RTS UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 unit (0 or 1)

If RTS	Do
passed	step 17
failed	step 20

17 Send any faulty cards for repair according to local procedure.

18 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 21.

19 Return to the 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.

20 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTMX75 in RSC-S RCO2

Application

Use this procedure to replace an NTMX75 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX75	AA	Enhanced Matrix

Common procedures

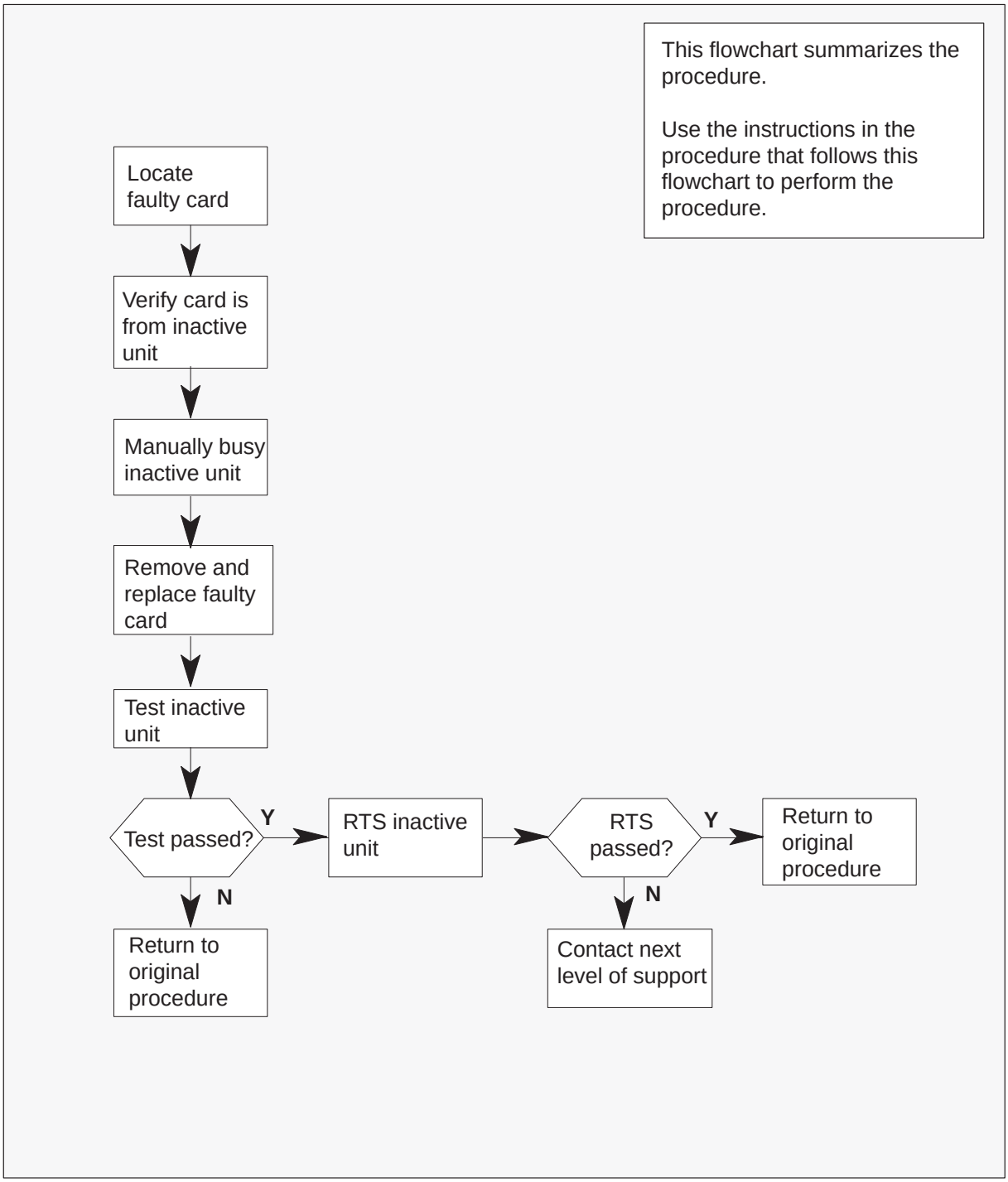
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX75 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX75 card in RSC-S RCO2



NTMX75 in RSC-S RCO2 (continued)

Replacing an NTMX75 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX75 replacement card. Verify the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 to be busied

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS    LNS    Trks    Ext    Appl
 .      .       .       .     1RCO2    .      .       .      .       .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0         2        0        2         25
 2 Post_   RCO2    0        0         0        0        1          1
 3 ListSet
 4         RCO2   0 InSv  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Determine from the MAP display if the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 5
inactive unit	step 7

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in-service, proceed to the next step.

NTMX75 in RSC-S RCO2 (continued)

At the RCE frame

7 Place 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

8 Busy the inactive PM unit by typing

>BSY unit_no
and pressing the Enter key.

where

unit_no is the number of the unit to be busied (0 or 1)

When both units are in-service, proceed to the next step.

At the RCE frame

9

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 modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

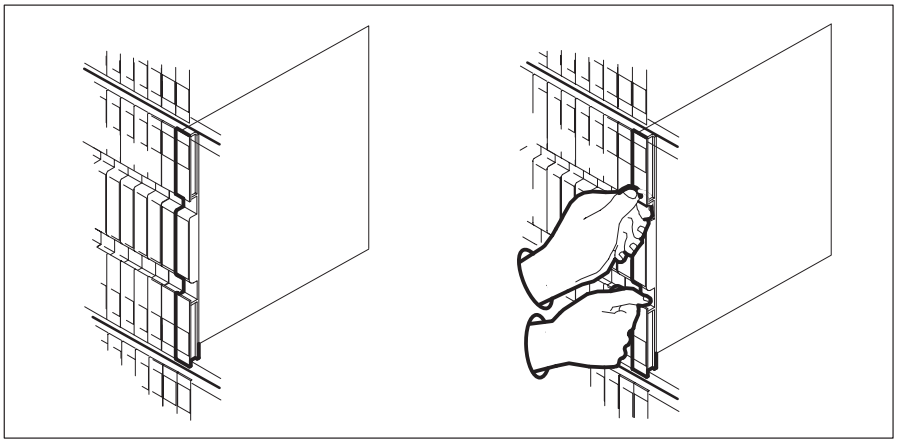
WARNING
Equipment damage
Take the following precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

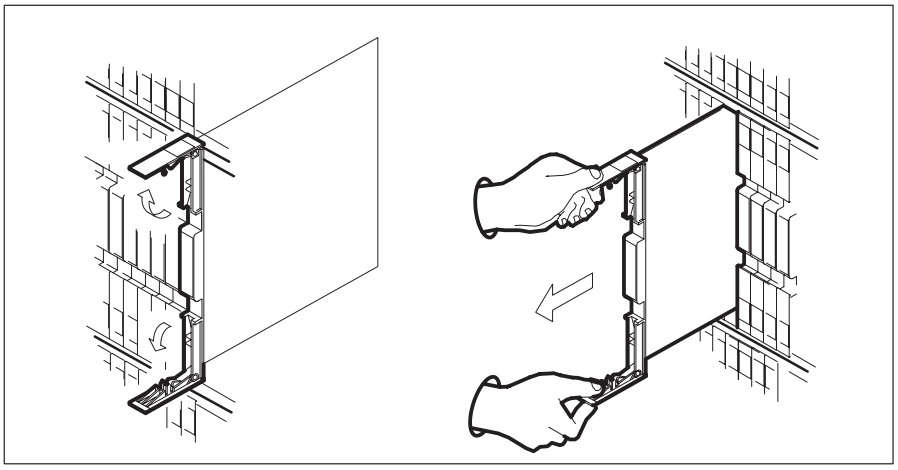
10 Unseat the NTMX73 card.

11 Remove the NTMX75 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



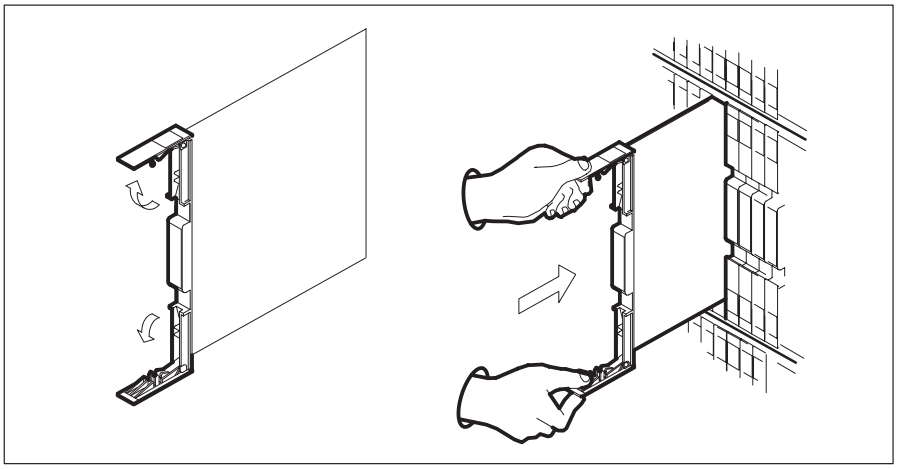
c. Ensure that the replacement card has the same PEC, including suffix, as the card you just removed.

12 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

NTMX75
in RSC-S RCO2 (continued)

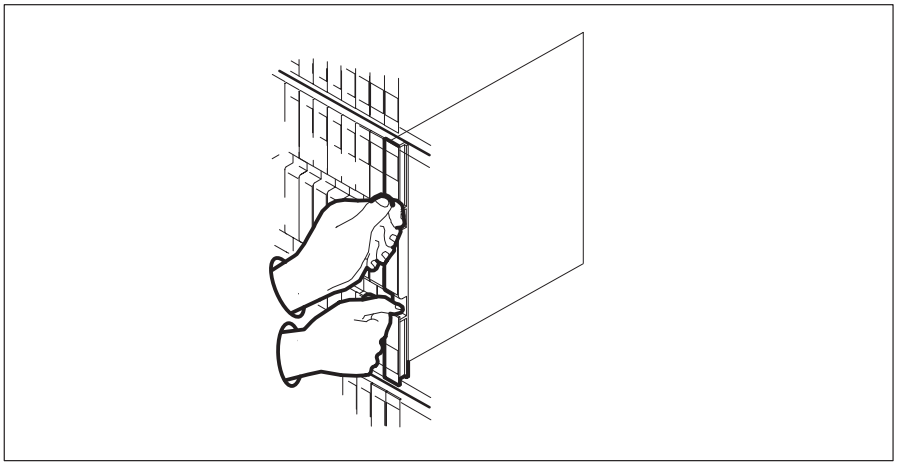
b. Gently slide the card into the shelf.



13 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.



14 Reseat the NTMX73 card.

At the MAP terminal

15 Load the inactive RCO2 by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the RCO2 busied in step 8

If LOADPM	Do
passed	step 16
failed	step 22

16 Test the inactive RCO2 unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the RCO2 unit loaded in step 15

If TST	Do
passed	step 17
failed	step 21

17 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 21
other	step 18

18 Return the inactive RCO2 unit to service by typing

>RTS UNIT rco2_unit_no
and pressing the Enter key.

where

rco2_unit_no is the number of the RCO2 unit being returned to service

NTMX75 in RSC-S RCO2 (end)

If RTS	Do
passed	step 19
failed	step 21

19 Send any faulty cards for repair according to local procedure.

20 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 23.

21 Return to the 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.

22 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

23 You have successfully completed this procedure. 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.

NTMX76 in RSC-S RCO2

Application

Use this procedure to replace an NTMX76 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX76	AA, AB	Message and Tone card

Common procedures

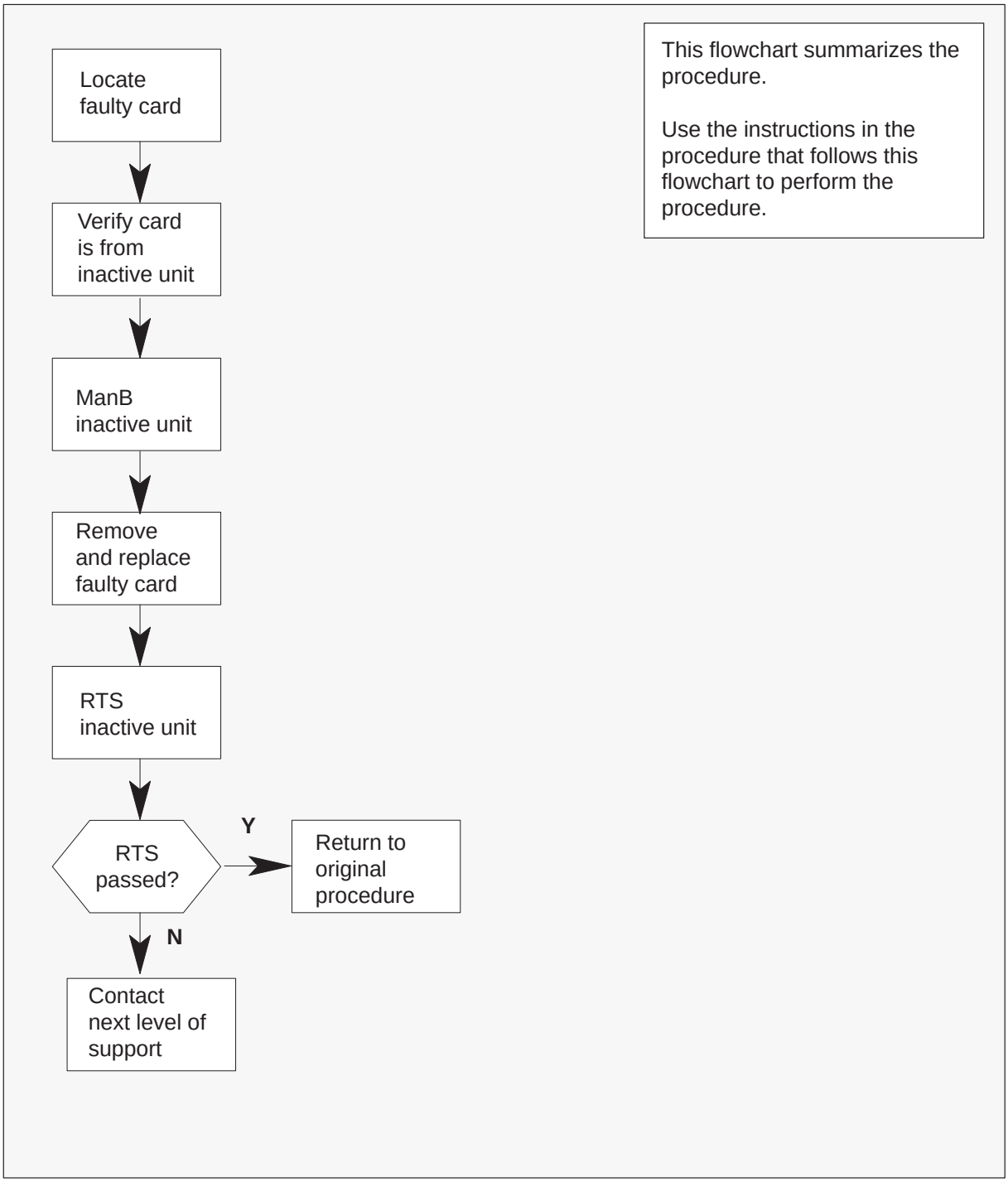
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX76 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX76 card in RSC-S RCO2



NTMX76 in RSC-S RCO2 (continued)

Replacing an NTMX76 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX76 replacement card. Verify the replacement card has the same product engineering code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card(s)

NTMX76
in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM     MS    IOD     Net    PM     CCS     LNS     Trks    Ext    Appl
 .      .      .       .    1RCO2    .       .       .       .       .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0         2        0        2         25
 2 Post_   RCO2    0        0         0        0        1          1
 3 ListSet
 4         RCO2   0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Determine the location of the RCO2 containing the circuit card you are replacing by typing

>QUERYPM

and pressing the Enter key.

Example of a MAP response:

```
PM Type: RCO2 PM No.: 0 PM Int. No.: 9 Node_No: 24
PMs Equipped: 53 Loadname: UK00ADU6 EEPRom Load:
BNK0N205
WARM SWACT is supported and available
RCO2 0 is included in the REX schedule.
REX on RCO2 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
RSC-M 00  C02  RSC-M 00  05  RCO2:  000     MX85AA
RSC-M 00  C02  RSC-M 00  47  EXT:LEFT  01:13 MX86AA
```

5 By observing the MAP display, be sure that the card to be removed is on the inactive unit.

If faulty card is on	Do
active unit	step 6
inactive unit	step 9

6 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Example of a MAP response:

```
RCO2 0     A Warm SwAct will be performed after
          data sync of active terminals.
Please confirm (”YES”, ”Y”, ”NO”, or ”N”):
```

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

7 Confirm the system prompt by typing

>YES
and pressing the Enter key.

and pressing the Enter key.

Example of a MAP response:

```
Unit0:   Inact SysB  Mtce
Unit1:   Act   ISTb

RCO2 0     SwAct Passed
```

If the MAP response is	Do
`SWACT passed`	step 8
anything else	step 24

8 A maintenance flag (Mtce) may appear, indicating system-initiated maintenance tasks are in progress. Wait until the flag disappears from the status lines for both RCO2 units before proceeding to the next step.

NTMX76 in RSC-S RCO2 (continued)

At the RCE frame

9 Put 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

10 Busy the inactive PM unit by typing

>BSY INACTIVE
and pressing the Enter key.

Example of a MAP response:

```
RCO2     0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Inact ManB
Unit1:   Act   ISTb
Bsy INACTIVE
RCO2 0 Unit 0    Bsy Passed
```

If the BSY command	Do
passed	step 11
failed	step 24

11 Reset the inactive RCO2 unit by typing

>PMRESET UNIT unit_no NORUN
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit (0 or 1)

At the RCE 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 left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

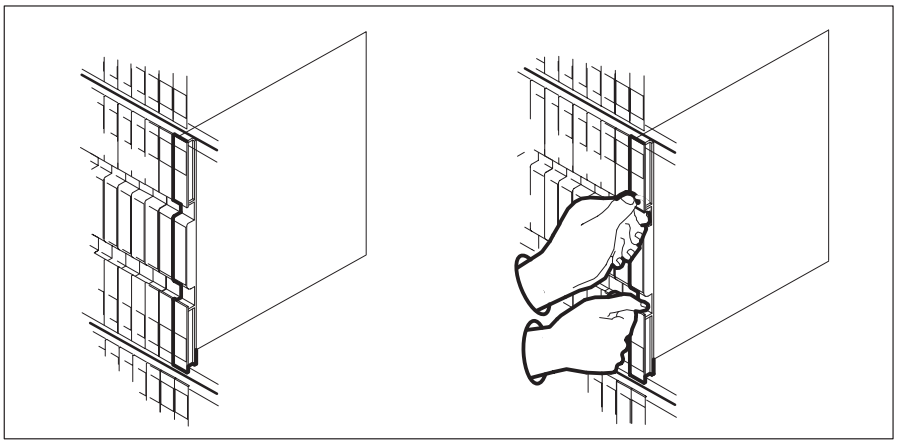
NTMX76
in RSC-S RCO2 (continued)

13

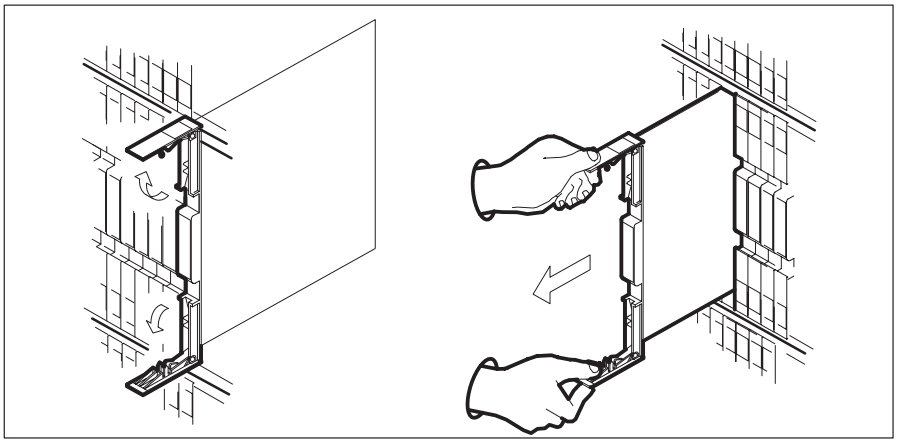
WARNING
Equipment damage
Take the following precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Remove the NTMX76 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced and gently pull the card towards you until it clears the shelf.



NTMX76 in RSC-S RCO2 (continued)

c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

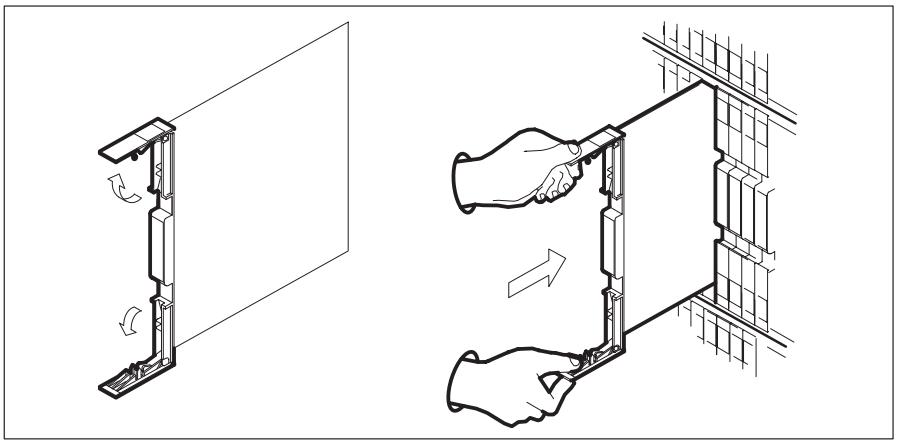
14

WARNING
Equipment damage
Take these precautions when removing or inserting a card:
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

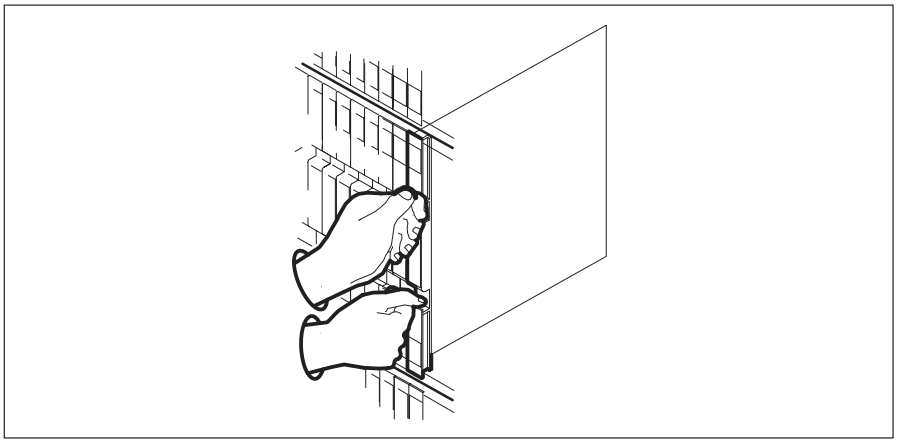
b. Gently slide the card into the shelf.



15 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.



16 Reseat the MX76 card.

At the MAP terminal

17 Reset the inactive unit by typing

>PMRESET UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the RCO2 unit busied in step 10

If PMRESET	Do
passed	step 18
failed	step 24

18 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 23
other	step 19

NTMX76 in RSC-S RCO2 (end)

19 Return the inactive RCO2 unit to service by typing

>RTS INACTIVE

and pressing the Enter key.

If RTS	Do
passed	step 20
failed	step 24

20 Remove the sign from the active unit.

21 Send any faulty cards for repair according to local procedure.

22 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 25.

23 Return to *Alarm Clearing Procedures* 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.

24 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

25 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.

NTMX77 in RSC-S RCO2

Application

Use this procedure to replace an NTMX77 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX77	AA	Unified Processor

Common procedures

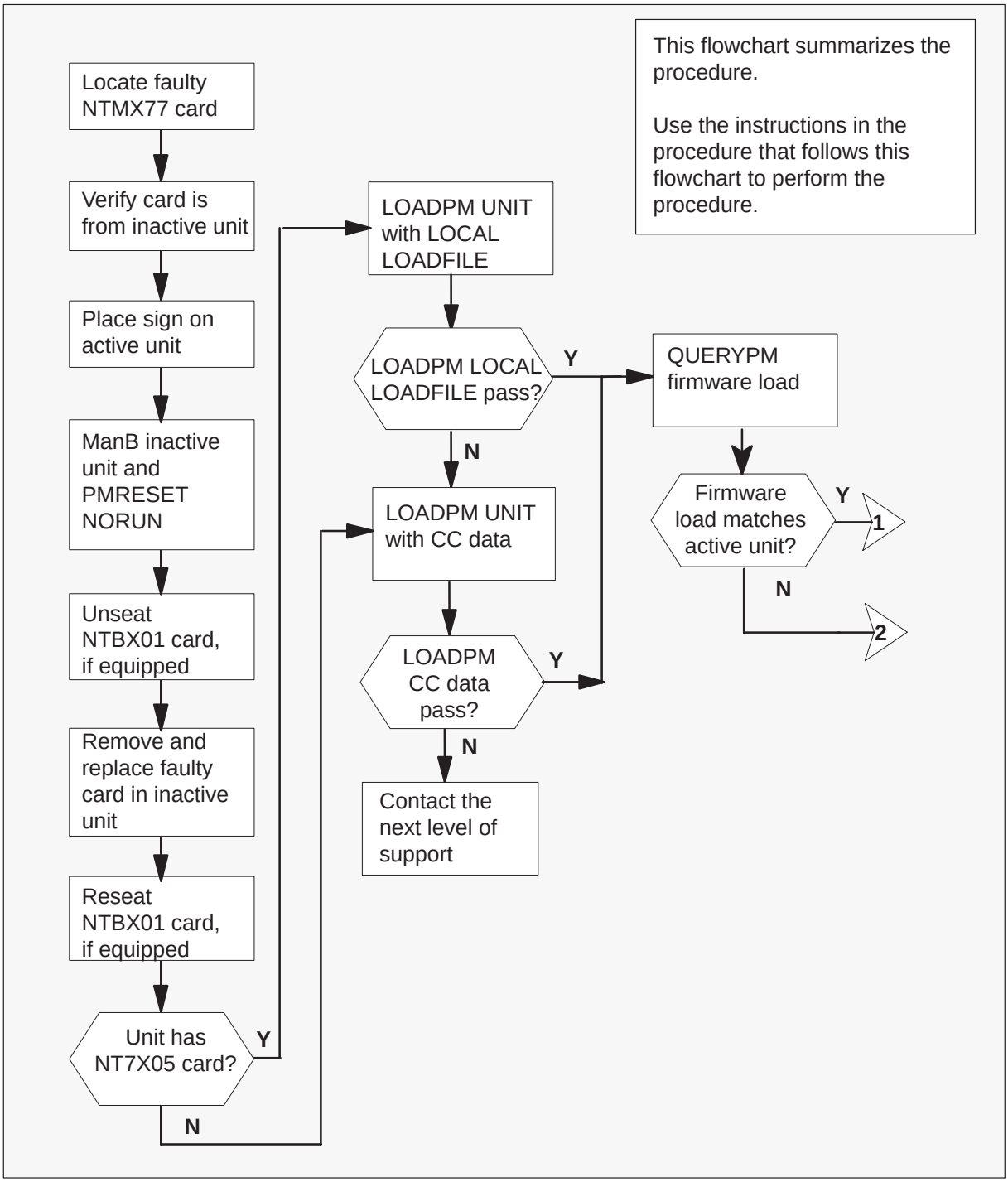
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

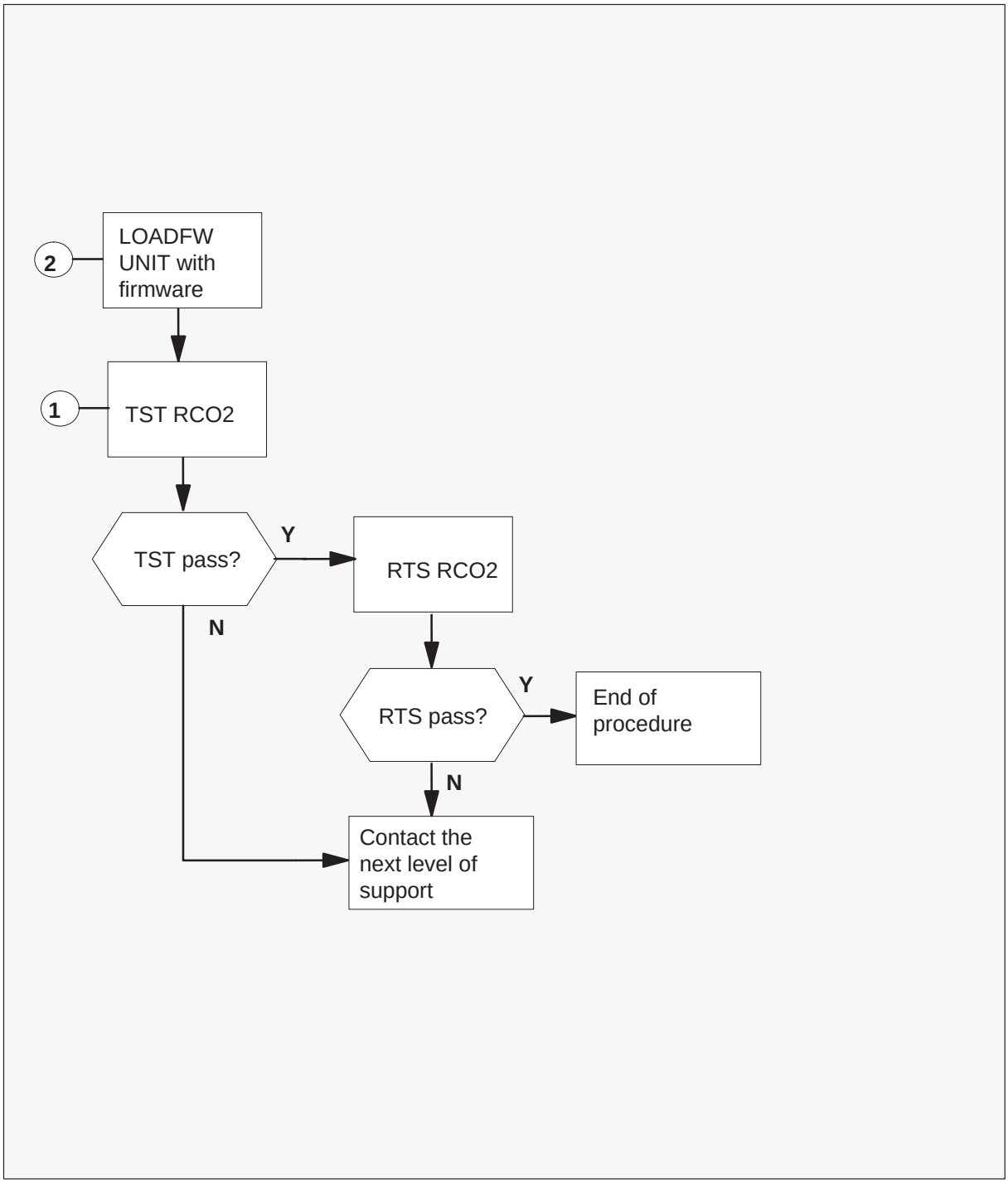
NTMX77 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX77 card in RSC-S RCO2 (1 of 2)



NTMX77 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX77 card in RSC-S RCO2 (2 of 2)



NTMX77 in RSC-S RCO2 (continued)

Replacing an NTMX77 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, make sure the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Get a replacement card. Make sure the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Access the PM level of the MAP terminal and post the RCO2. To post the RCO2, type

>MAPCI;MTC;PM;POST RCO2 rco2_no
and press the Enter key.

where

rco2_no is the number of the RCO2 to be busied (0 or 1)

NTMX77
in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM     MS    IOD    Net    PM    CCS     LNS     Trks    Ext     Appl
 .      .       .     .     1RCO2   .       .       .       .       .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0         2        0        2         25
 2 Post_   RCO2    0        0         0        0        1          1
 3 ListSet
 4         RCO2   0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Check that the NTMX77AA card with faults is in the inactive unit. Make sure the LED labeled ACTIVE is OFF or observe the MAP display.

If the NTMX77AA card with faults is in	Do
active unit	step 5
inactive unit	step 9

5 Switch the processing activity (SWACT) to the inactive unit. To SWACT the unit, type

>SWACT

and press the Enter key.

If SWACT	Do
cannot continue now	step 6
can continue now	step 7

NTMX77 in RSC-S RCO2 (continued)

6 Do not switch activity of the units. To reject the SWACT, type

>NO
and press the Enter key.

The system discontinues the SWACT.

Return to step 5 during a period of low traffic.

7 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 reliably.

> ***Note:*** A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before continuing to the next maintenance action.

If the message is	Do
SWACT passed	step 9
SWACT failed	step 8
SWACT not accepted by SWACT controller	step 8

8 Return to the Alarm Clearing Procedures in this manual to clear the alarm condition on the inactive unit. When the alarm clears, return to step 1 of this procedure.

At the RCE frame

9 Place a sign on the active unit with the words **Active unit—Do not touch**. This sign must not be attached by magnets or tape.

At the MAP terminal

10 Busy the inactive PM unit. To busy the unit, type

>BSY UNIT unit_no
and press the Enter key.

where

unit_no is the number of the inactive RCO2 unit (0 or 1)

11 Set the inactive unit to the ROM level. To set the unit to the ROM level, type

>PMRESET UNIT rco2_unit_no NORUN
and press the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit (0 or 1)

At the RCE 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 left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment 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.

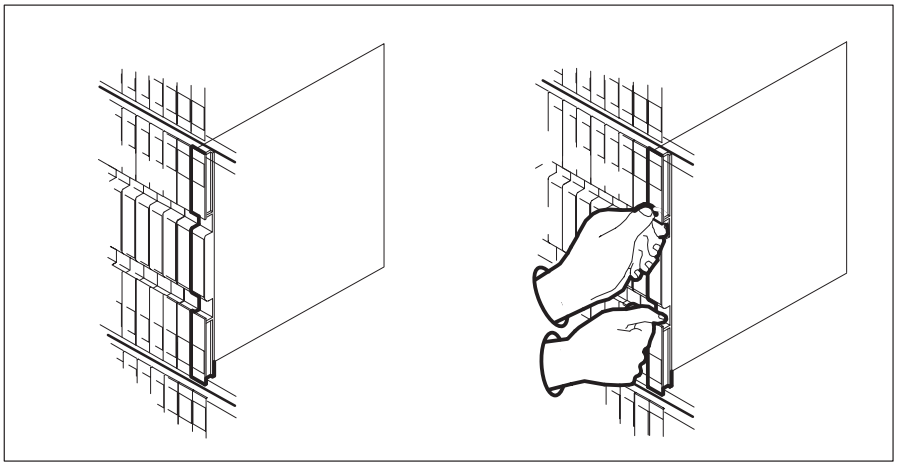
Put on a wrist strap.

13 Unseat the NTBX01 card, if equipped.

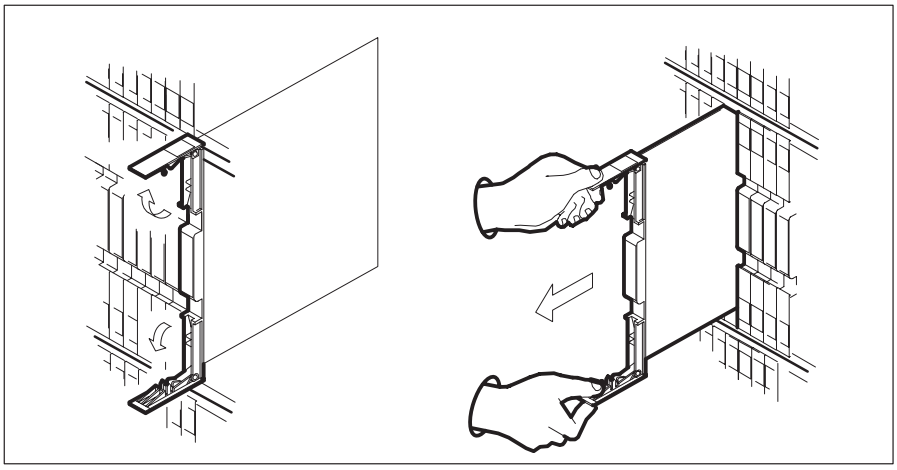
14 Remove the NTMX77 card as shown in the following figures.

NTMX77
in RSC-S RCO2 (continued)

a. Locate the card to be removed on the appropriate shelf.



b. Open the locking levers on the card to be replaced. Carefully pull the card toward you until it clears the shelf.



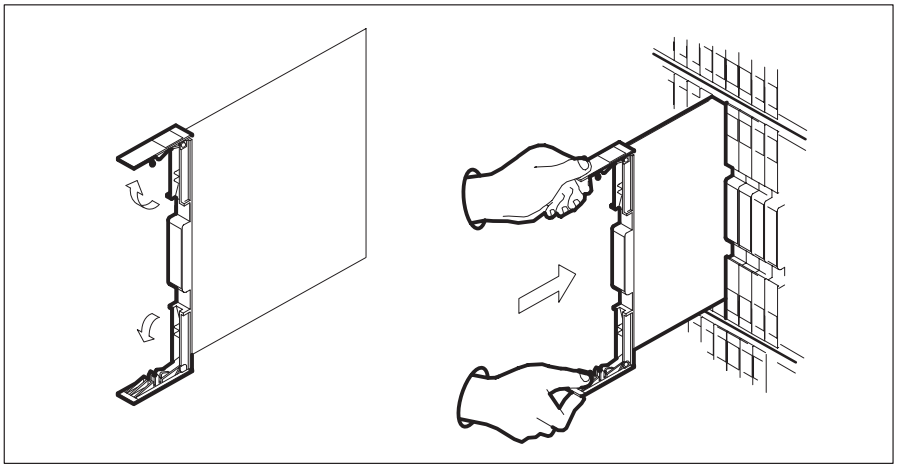
c. Make sure the replacement card has the same PEC, including suffix, as the card you just removed. Also make sure the DIP switch settings on the replacement card match the settings of the card just removed.

Note: If the NTMX77 circuit card has a DIP switch, set DIP switch S1 to CPM.

15 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Carefully slide the card into the shelf.



16

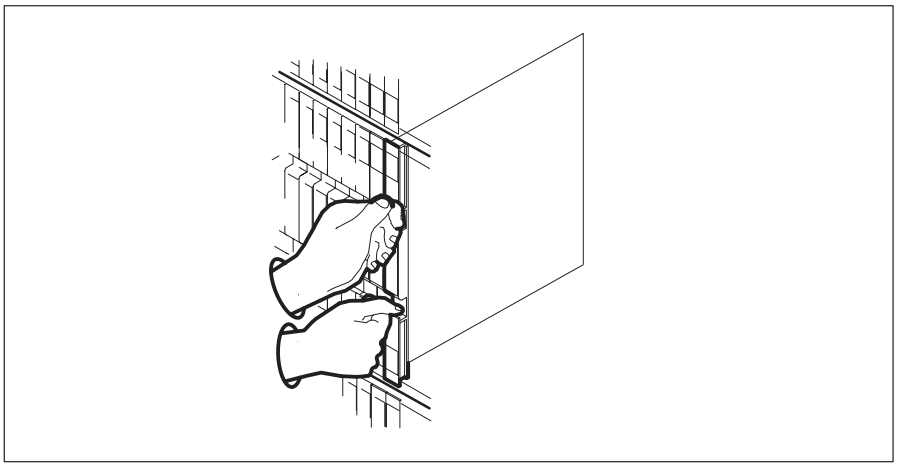
WARNING
Possible loss of P-side nodes
Monitor the LEDs on the faceplate of the replacement NTMX77 when installing.
1. The INSV and ESA LEDs may come ON and must go OFF in less than 4 seconds.
2. The ACT LCD may come ON and light for less than 1 second. If the ACT LED remains ON for more than 1 second, immediately remove the NTMX77 card and return to step 14 c. with a new NTMX77 card. If the NTMX77 card is allowed to remain with both units having an active processor, this is a condition of dual activity, which results in the loss of P-side nodes.

Seat and lock the card.

NTMX77
in RSC-S RCO2 (continued)

a. Use your fingers or thumbs to push on the upper and lower edges of the faceplate to make sure the card is fully seated in the shelf.

b. Close the locking levers.



17 Reseat the NTBX01 card, if equipped.

18 Use the following information to determine the next step in this procedure.

If you entered this procedure from	Do
an alarm clearing procedure	step 28
other	step 19

NTMX77
in RSC-S RCO2 (continued)

At the MAP terminal

19 The peripheral/remote loader 16 card (NT7X05) allows local loading of RCO2 data, which reduces recovery time. To check if the NT7X05 card is provisioned, type

>QUERYPM FILES

and press the Enter key.

Example of a MAP display:

```
   CM   MS   IOD   Net    PM    CCS    LNS    Trks    Ext    APPL
    .    .     .    .    1RCO2    .      .       .      .      .
                          *C*
 RCO2            SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM     2        0        2        0        2       25
 2 Post     RCO2    1       0        0        0        1        1
 3 ListSet
 4          RCO2      0 ISTb  Links_OOS:  CSide  0,  PSide   0
 5 TRNSL_   Unit 0:  Inact ManB
 6 TST_     Unit 1:  Inact InSv
 7 BSY_
 8 RTS_     QUERYPM files
 9 OffL       Unit 0:
10 LoadPM_       NT7X05 load File: KRI05AU
11 Disp_         NT7X05 Image File:
12 Next_     Unit 1:
13 SwAct         NT7X05 load File: KRI05AU
14 QueryPM       NT7X05 Image File:
15
16 IRLINK                                  (NT7X05 load file name)
17 Perform
18
```

Note: If the NT7X05 card is not provisioned, the MAP response is:
`Nt7X05 not datafilled, QueryPm files invalid`

If the NT7X05 card is	Do
provisioned	step 20
not provisioned	step 21

NTMX77
in RSC-S RCO2 (continued)

20

WARNING
Possible service interruption
The LOCAL LOADFILE option of the LOADPM command has a parameter of [<file> string}]. When this parameter is used, the loadfile named in the parameter is not patched. Do not use this parameter unless the NOPATCH option of the loadfile is desired.

Load the inactive RCO2 unit from the local loadfile. To load the inactive RCO2 unit from the local loadfile, type

>LOADPM UNIT rco2_unit_no LOCAL LOADFILE
and press the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

If the load	Do
passed	step 22
failed	step 21

21 To load the inactive RCO2 unit, type

>LOADPM UNIT rco2_unit_no
and press the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

If LOADPM	Do
passed	step 22
failed	step 29

NTMX77
in RSC-S RCO2 (continued)

22 Query the XPM counters for the firmware load on the NTMX77. To query XPM counters, type

>QUERYPM CNTRS
and press the Enter key.

Example of a MAP display:

```
Unsolicitited MSG limit = 250, Unit 0 = 0, Unit 1 = 0
Unit 0:
Ram Load: KRI05AU
EPRom Version: AB02
EEPRom Load: Loadable: MX77NG03, Executable: MX77NG03
CMR LOAD: CMR33A15
UP:MX77AA
IP:BX01
Unit 1:
Ram Load: KRI05AU
EPRom Version: AB02
EEPRom Load: Loadable: MX77NG03, Executable: MX77NG03
CMR LOAD: CMR33A15
UP:MX77AA
IP:BX01
```

(NTMX77 firmware load name)

If firmware is	Do
valid	step 25
invalid	step 23

23 To load the firmware on the inactive unit, type

>LOADFW INACTIVE
and press the Enter key.

If the LOADFW	Do
passes	step 24
fails	step 29

NTMX77 in RSC-S RCO2 (end)

24 To upgrade the firmware on the inactive unit, type

>LOADFW INACTIVE UPGRADE
and press the Enter key.

If the LOADFW UPGRADE	Do
passes	step 25
fails	step 29

25 Return the inactive RCO2 unit to service. To RTS the unit, type

>RTS UNIT rco2_unit_no
and press the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

If RTS	Do
passed	step 26
failed	step 29

26 Send any faulty cards for repair according to local procedure.

27 Record the following information in office records:

- date the card was replaced
- serial number of the card
- indications that prompted replacement of the card

Go to step 30.

28 Return to the alarm clearing procedure that directed you to this procedure. At the point where a card list was produced, identify the next card on the list and go to the appropriate card replacement procedure for that card in this manual.

29 Get additional help in replacing this card by contacting operating company maintenance personnel.

30 You have correctly 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.

NTMX79 in RSC-S EXT

Application

Use this procedure to replace an NTMX79 card in an RSC-S EXT.

PEC	Suffixes	Name
NTMX79	AA	DS60 Extender

Common procedures

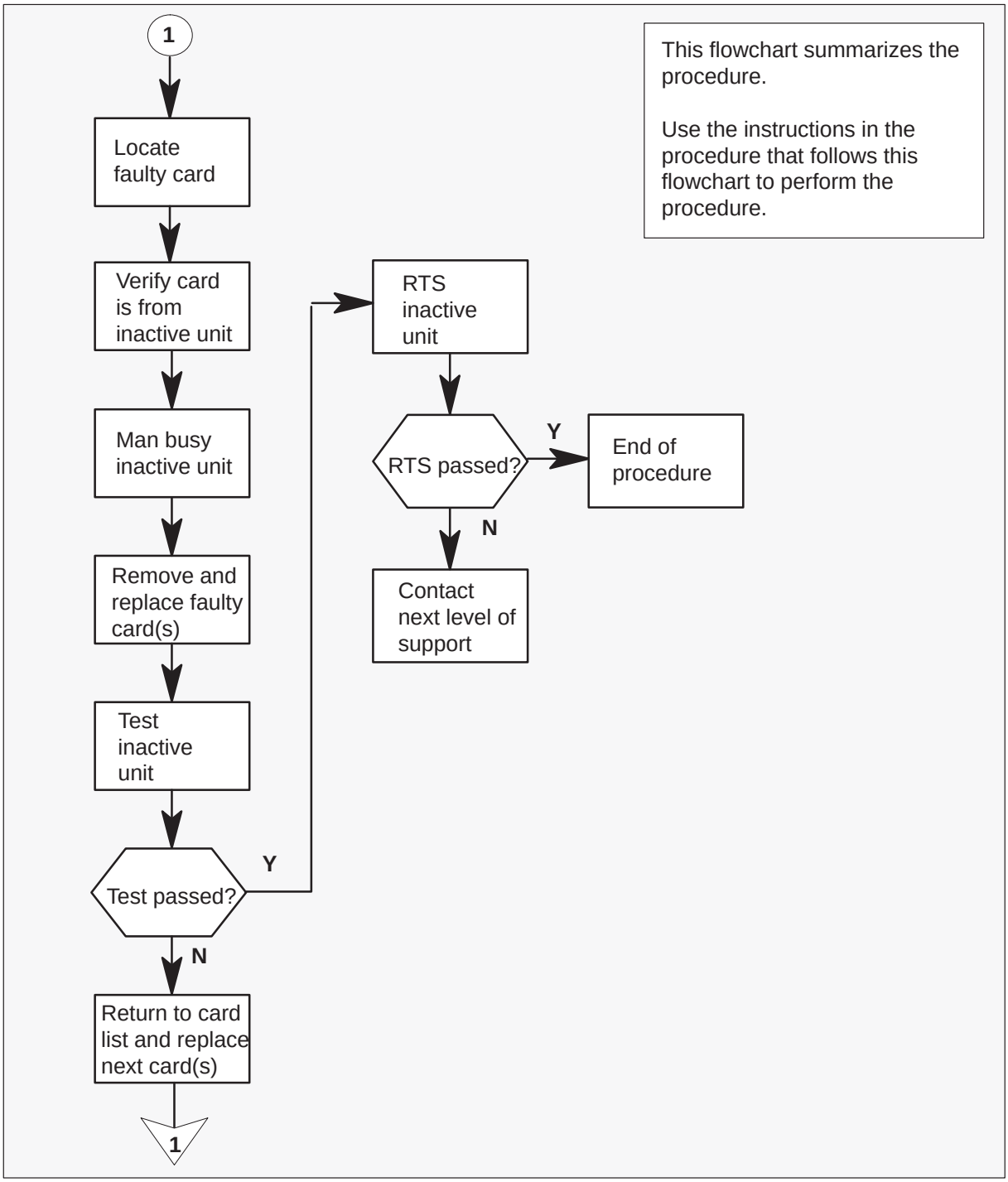
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX79 in RSC-S EXT (continued)

Summary of card replacement procedure for an NTMX79 card in RSC-S EXT



NTMX79
in RSC-S EXT (continued)

Replacing an NTMX79 card in an RSC-S EXT

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX79 replacement card. Verify the replacement card has the same product engineering code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the RCO2 by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card

4 Determine on which side of the extension shelf (right or left side) the faulty card is located by typing

QUERYPM
and pressing the Enter key.

Example of a MAP response:

```
PM Type: RCO2 PM Nol.: 0 PM Int. No.: 2 Node_No.: 126
PMs Equipped: 61  Loadname: KRI05AU
ESA equipped: YES IntraSwitching is ON
WARM SWACT is supported and available.
REX on RCO2 0 is included in the REX schedule.
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
 R113   01  AA00  CRSC 00   05  RCO2 : 000         MX85AA
 R113   01  AA01  CEXT 00   05  EXT : LEFT         MX86AA
```

(Extension shelf location of faulty card)

NTMX79 in RSC-S EXT (continued)

5 By observing the LED on the extension shelf, be sure that the card to be removed is on the inactive unit. The LED is lit (ON) on the active unit, and not lit (OFF) on the inactive unit.

If faulty card is on	Do
active unit	step 6
inactive unit	step 8

6 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

7 Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in-service, proceed to the next step.

At the RCE frame

8 Place 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

9 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the unit to be busied (0 or 1)

At the RCE frame

10

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 modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

11

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.

Power down the NTMX72 card in the inactive RCO2.

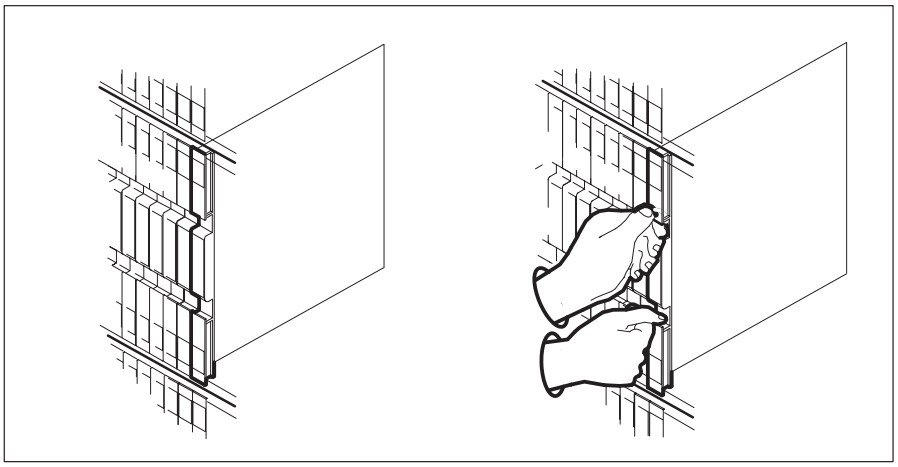
12

CAUTION
Loss of subscriber service
To prevent the D-channel handler (DCH) card from being set system busy (SysB), which causes a loss of subscriber service, make sure the toggle switch on the MX79 card is set to the ON position before removing the NTMX79 card.

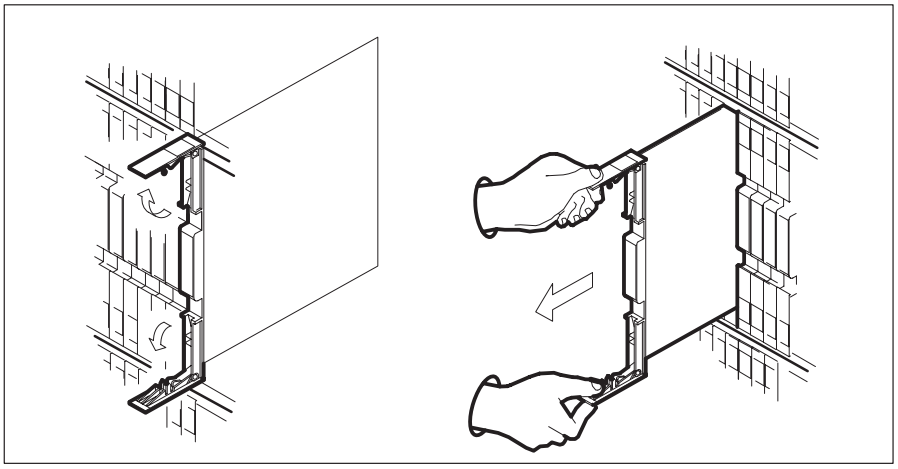
Remove the NTMX79 card as shown in the following figures.

a. Locate the card to be removed on the appropriate shelf.

NTMX79
in RSC-S EXT (continued)



b. Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

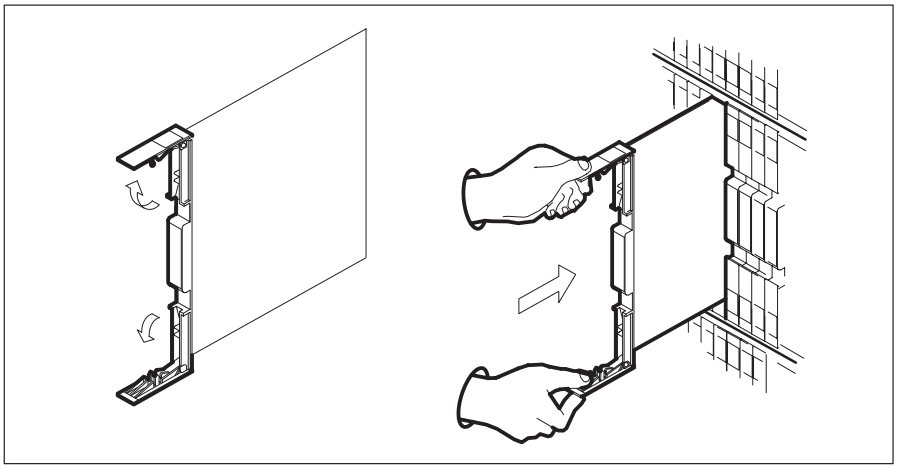


c. Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

13 Open the locking levers on the replacement card.

a. Align the card with the slots in the shelf.

b. Gently slide the card into the shelf.



14

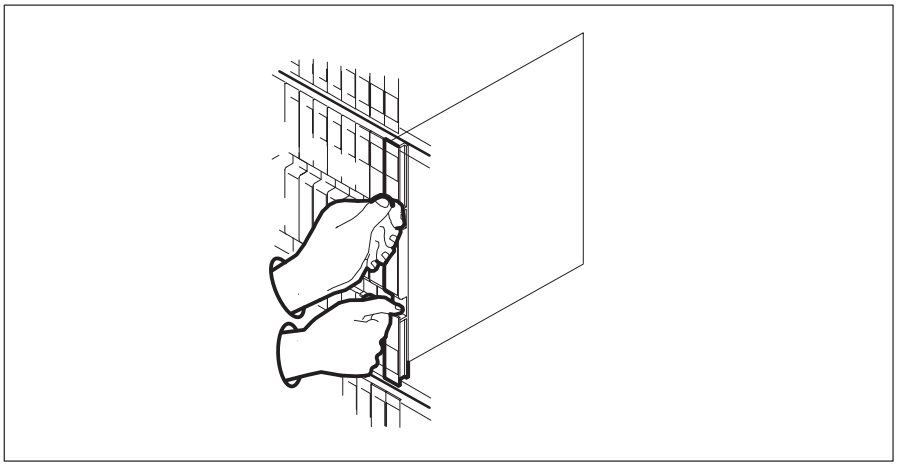
CAUTION
Loss of subscriber service
To prevent the D-channel handler (DCH) card from being set system busy (SysB), which causes a loss of subscriber service, make sure the toggle switch on the MX79 card is set to the OFF position before seating the NTMX79 card.

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.

NTMX79
in RSC-S EXT (continued)

b. Close the locking levers.



15 Power up the inactive RCO2 unit as follows:

a. Ensure that the power converter (NTMX72) is inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

b. Set the POWER switch of the inactive unit to the ON position.

16 Press the RESET button while setting the circuit breaker to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the MSP will be ON.

NTMX79
in RSC-S EXT (continued)

17 The peripheral loader card (NT7X05) allows local loading of the RCO2 data. Local data loading reduces recovery time. Determine if an NT7X05 is located in slot 12. Check if the NT7X05 card is provisioned by typing

>QUERYPM FILES
and pressing the Enter key.

Example of a MAP display:

```
   CM   MS   IOD   Net    PM    CCS    LNS    Trks    Ext    APPL
    .    .     .    .    1RCO2   .      .       .      .      .
                           *C*
 RCO2           SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM     2        0        2        0        2       25
 2 Post     RCO2   1        0        0        0        1        1
 3 ListSet
 4          RCO2     0 ISTb  Links_OOS:  CSide  0,  PSide   0
 5 TRNSL_   Unit 0:  Inact ManB
 6 TST_     Unit 1:  Inact InSv
 7 BSY_
 8 RTS_     QUERYPM files
 9 OffL     Unit 0:
10 LoadPM_      NT7X05 load File: KRI05AU
11 Disp_        NT7X05 Image File:KRI05AU
12 Next_
13 SwAct   Unit 1:
14 QueryPM      NT7X05 load File: KRI05AU
15              NT7X05 Image File:KRI05AU
16 IRLINK
17 Perform
18
```

Note: If the NT7X05 card is not provisioned the MAP response is:
`NT7X05 not datafilled, QueryPm files invalid`

If the NT7X05 card is	Do
provisioned	step 18
not provisioned	step 20

NTMX79 in RSC-S EXT (continued)

18 Load the inactive RCO2 unit from the local image by typing

>LOADPM UNIT rco2_unit_no LOCAL IMAGE
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

If the load	Do
passed	step 21
failed	step 19

19 Load the inactive RCO2 unit from the local loadfile by typing

>LOADPM UNIT unit_no LOCAL LOADFILE
and pressing the Enter key.

where

rco2_unit_no is the number of the inactive RCO2 unit

If the load	Do
passed	step 21
failed	step 20

20 After replacing the faulty card, load the inactive unit by typing

>LOADPM UNIT unit_no CC
and pressing the Enter key.

where

unit_no is the number of the inactive unit

If LOAD	Do
passed	step 21
failed	step 29

21 Test the inactive unit by typing

>TST UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit

If TST	Do
passed	step 22
failed	step 28

22 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 28
other	step 23

23 Return the inactive RCO2 unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit

24 Use the following information to determine where to proceed.

If RTS	Do
passed	step 25
failed	step 29

25 Remove the sign from the active RCO2 unit.

26 Send any faulty cards for repair according to local procedure.

NTMX79 in RSC-S EXT (end)

27 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 30.

28 Return to the 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.

29 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

30 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTMX82 in RSC-S RCO2

Application

Use this procedure to replace an NTMX82 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX82	AA	Dual PCM-30 Interface

Common procedures

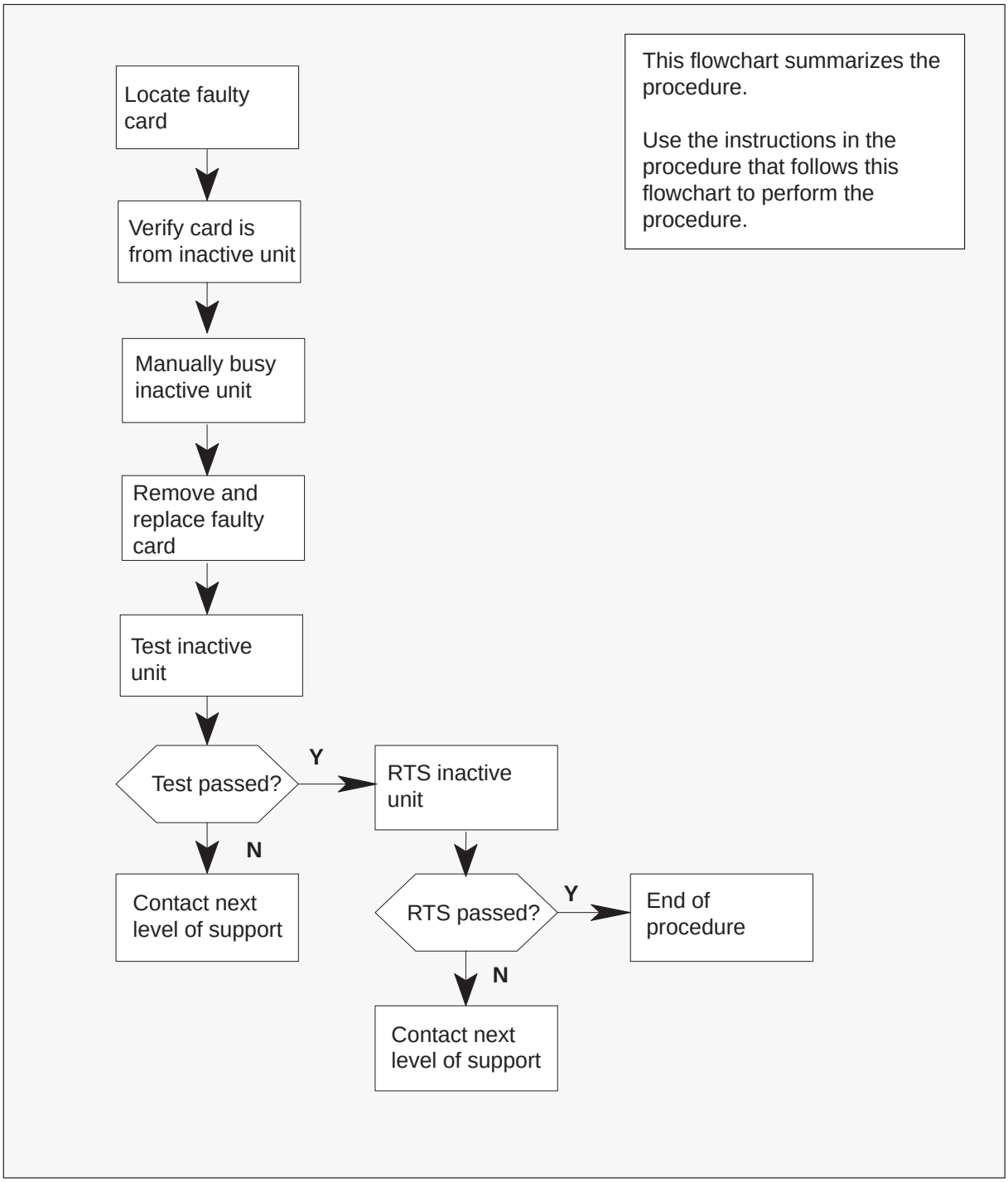
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX82 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX82 card in RSC-S RCO2



NTMX82 in RSC-S RCO2 (continued)

Replacing an NTMX82 card in RSC-S RCO2

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

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX82 replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Ensure the PM level of the MAP display is currently displayed by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card

NTMX82 in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     LNS    Trks    Ext    Appl
  .      .       .      .    1RCO2    .       .       .       .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0        2        0        2         25
 2 Post_   RCO2    0        0        0        0        1          1
 3 ListSet
 4         RCO2   0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 By observing the MAP display, be sure that the card to be removed is in the inactive unit.

If faulty card is in the	Do
active unit	step 5
inactive unit	step 7

5 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT
and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

6 Confirm the system prompt by typing

>YES
and pressing the Enter key.

After both units are in-service, proceed to the next step.

At the RCE frame

7 Place 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

8 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 RCO2 unit (unit 0 or 1)

When both units are in-service, proceed to the next step.

9 Display the C-side links associated with the DS-1 card by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response:

```
LINK  0   PLGC 0         0;CAP     MS:STATUS OK        MSGCOND   OPN
LINK  1   PLGC 0         1;CAP      S:STATUS SBsy
LINK  2   PLGC 0         2;CAP     MS:STATUS OK        MSGCOND   OPN
LINK  3   PLGC 0         3;CAP      S:STATUS OK
LINK  4   PLGC 0         4;CAP      S:STATUS OK
LINK  5   PLGC 0         5;CAP      S:STATUS SBsy
```

If C-side links are	Do
faulty	step 11
not faulty	step 10

10 Display the P-side links associated with the DS-1 card by typing

>TRNSL P
and pressing the Enter key.

NTMX82 in RSC-S RCO2 (continued)

Example of a MAP response

```
LINK 0    RCO2 0 5  27;CAP    MS:STATUS OK   MSGCOND OPN
LINK 1    RCO2 1 5  27;CAP    MS:STATUS SBsy MSGCOND CLS
LINK 2    RCO2 0 7  47;CAP    MS:STATUS OK
LINK 3    RCO2 1 7  47;CAP    MS:STATUS OK
LINK 4    RCO2 0 5  50;CAP    MS:STATUS OK   MSGCOND OPN
LINK 5    RCO2 1 5  50;CAP    MS:STATUS SBsy MSGCOND CLS
```

If P-side links are	Do
faulty	step 12
not faulty	step 26

11 Post the host PM by typing

>POST host_pm host_pm_no
and pressing the Enter key.

where

host_pm is a PCM-30 line group controller (PLGC)
host_pm_no is the number of the PLGC with the faulty card
Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext  Appl
  .      .      .       .    1RCO2     .       .       .        .    .

PLGC               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        1        0        4        12
 2 Post_   PLGC      0        0        2        0        2         9
 3 ListSet
 4         PLGC   1 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17 Perform
18
```

12 Manually busy the links connected to the faulty card by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no is the number of the link associated with the faulty MX82 card

Note 1: Each NTMX82 card has two links associated with it. Therefore, each link must be manually busied. Possible link number pairs are as follows: 0,1; 2,3; 4,5; or 6,7.

Note 2: To busy the other links associated with the RCO2, execute this step for each link until all links are busied.

At the RCE frame

13

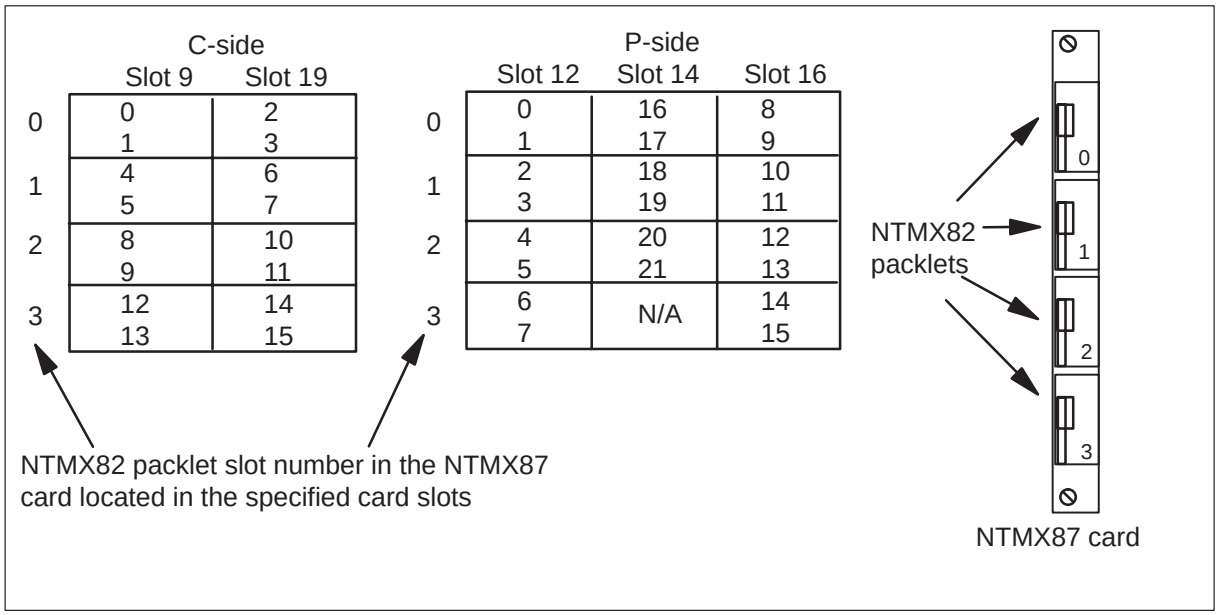
WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

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.

Put on a wrist strap.

NTMX82 in RSC-S RCO2 (continued)

14 After identifying the faulty link, use the following charts to determine which NTMX82 is to be removed by first identifying whether the link is a C-side or P-side link, then by matching the link number with the slot number and the packlet number to the left of each respective table.



Remove the NTMX82 card as described in the following steps:

a. Locate the packlet to be removed on the appropriate NTMX87 card slot.

b. Open the locking lever on the packlet to be replaced and gently pull the card toward you until it clears the shelf.

c. Ensure that the replacement card has the same PEC, including suffix, as the card you just removed.

15 Before inserting the replacement card ensure the switch settings are the same as on the card that was removed. The following table describes the PCM-30 DIP switch settings on the NTMX82. Set switch S2 positions 1 & 2 on to enable messaging.

Port	Impedance	Input	Output
Even port	75 OHM	Switch S3 pos 1,2, & 3 ON	Switch S3 pos 4 ON Switch S3 pos 5 OFF
Even port	120 OHM	Switch S3 pos 1 ON pos 2 & 3 OFF	Switch S3 pos 4 OFF Switch S3 pos 5 ON
Odd port	75 OHM	Switch S1 pos 1,2, & 3 ON	Switch S1 pos 4 ON Switch S1 pos 5 OFF
Odd port	120 OHM	Switch S1 pos 1 ON pos 2 & 3 OFF	Switch S1 pos 4 OFF Switch S1 pos 5 ON

Note: Switch position 6 of both switches is not used and should be set to OFF.

16 Open the locking lever on the replacement packlet.

a. Align the packlet with the slots in the shelf.

b. Gently slide the packlet into the card slot in the NTMX87 card.

17 Seat and lock the packlet.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate of the packlet to ensure that the packlet is fully seated in the slot.

b. Close the locking lever.

NTMX82 in RSC-S RCO2 (continued)

18 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 25
other	step 19

At the MAP terminal

19 Test the busied network links from step 12 by typing

>TST LINK link_no
and pressing the Enter key.
where

link_no is the number of the link that was manually busied in step 12

Note 1: This step must be performed for each link that is manually busied.

Note 2: To test the other links associated with the RCO2, execute the procedures in this step for each link until all links are tested.

If the test of the link(s)	Do
passed	step 20
failed	step 26

20 Return to service the P-side links by typing

>RTS Link 0
and pressing the Enter key.

Note: To RTS the other links associated with the RCO2, execute the procedures in this step for each link until all links are returned to service.

If RTS	Do
passed	step 21
failed	step 26

NTMX82 in RSC-S RCO2 (end)

21 Post the inactive RCO2 in which the NTMX82 card is located by typing

>POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 associated with the faulty card

22 Return the inactive RCO2 unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key**.**

where

unit_no is the number of the RCO2 unit posted in step 21

If RTS	Do
passed	step 23
failed	step 26

23 Send any faulty cards for repair according to local procedure.

24 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 27.

25 Return to the *Alarm Clearing Procedures* 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.

26 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level support.

27 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.

NTMX87 in RSC-S RCO2

Application

Use this procedure to replace an NTMX87 card in an RSC-S RCO2.

PEC	Suffixes	Name
NTMX87	AA	Quad Frame Carrier

Common procedures

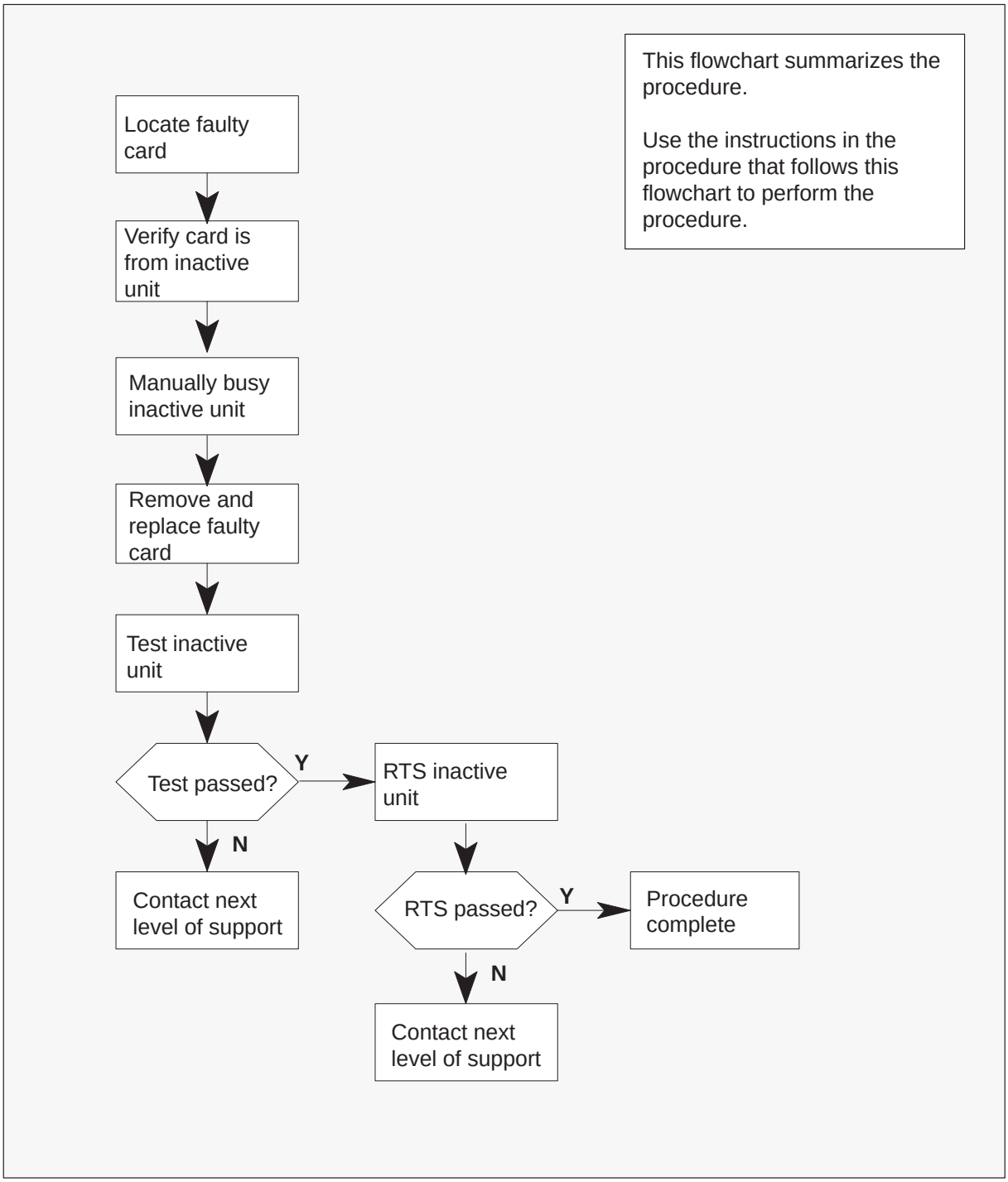
None

Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

NTMX87 in RSC-S RCO2 (continued)

Summary of card replacement procedure for an NTMX87 card in RSC-S RCO2



NTMX87 in RSC-S RCO2 (continued)

Replacing an NTMX87 card in RSC-S RCO2

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

CAUTION
Several configurations of the NTMX87 quad frame carrier card are detailed in this procedure.
Be sure you are using the steps for the configuration of your RCO2, such as a single or dual RCO2 (DRCO2), main or extension shelf, or links versus carrier trunks.

CAUTION
Loss of service
When replacing a card in the RCO2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX87 replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

Note: The dual RCO2 configuration for the international RSC-S will be available in a future release.

At the MAP terminal

3 Ensure the PM level of the MAP display is currently displayed by typing

>MAPCI;MTC;PM;POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 with the faulty card

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     LNS    Trks    Ext    Appl
  .      .       .      .    1RCO2    .       .       .       .      .

RCO2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0        2        0        2         25
 2 Post_   RCO2    0        0        0        0        1          1
 3 ListSet
 4         RCO2   0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST     Unit1:   Act InSv
 7 BSY
 8 RTS
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Display and record the C-side link status of the posted RCO2 associated with the faulty NTMX87 quad carrier card by typing

>TRNSL C
and pressing the Enter key.

Example of a MAP response

```
LINK 0  PLGC 0 0;CAP MS: STATUS SysB MSGCOND CLS RESTRICT
LINK 1  PLGC 0 1;CAP  S: STATUS SysB
LINK 2  PLGC 0 2;CAP MS: STATUS OK MSGCOND OPN UNRESTRICT
LINK 3  PLGC 0 3;CAP  S: STATUS OK
LINK 4  PLGC 0 4;CAP  S: STATUS SysB
LINK 5  PLGC 0 5;CAP  S: STATUS SysB
```

NTMX87 in RSC-S RCO2 (continued)

5 Display and record the P-side link status of the posted RCO2 associated with the faulty NTMX87 quad carrier card by typing

>TRNSL P

and pressing the Enter key.

Example of a MAP response

```
LINK 1    Carrier of Class – Trunk      ;Status;OK
LINK 2    Carrier of Class – Trunk      ;Status;OK
LINK 3    Carrier of Class – Trunk      ;Status;OK
LINK 10   DCH 6; Status :OK
LINK 13   DCH 7; Status :OK
LINK 17   DCH 4; Status :OK
LINK 22   RMM 6           0;CAP MS;Status  OK MSGCOND OPN
LINK 24   LCME RSCS 00 0  0;CAP MS;Status OK MSGCOND OPN
LINK 25   LCME RSCS 00 0  1;CAP MS;Status OK MSGCOND OPN
LINK 26   LCME RSCS 00 0  2;CAP  S;Status OK
```

6 By observing the MAP display, be sure the card that is to be removed is in the inactive unit.

If faulty card is in the	Do
active unit	step 7
inactive unit	step 9

7 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT

and pressing the Enter key.

Note: If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

8 Confirm the system prompt by typing

>YES

and pressing the Enter key.

After both units are in-service, proceed to the next step.

At the RCE frame

9 Place a sign on the active unit bearing the words **Active unit—Do not touch**. This sign should not be attached by magnets or tape.

If faulty card is	Do
C-side of RCO2	step 10
P-side faulty	step 16

At the MAP terminal

10 Busy the inactive PM unit by typing

>BSY UNIT unit_no
and pressing the Enter key.

where

unit_no is the number of the inactive RCO2 unit (unit 0 or 1)

11 Post the host PM by typing

>POST host_pm host_pm_no
and pressing the Enter key.

where

host_pm is a PCM-30 line group controller (PLGC)
host_pm_no is the number of a PLGC

NTMX87 in RSC-S RCO2 (continued)

Example of a MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext  Appl
  .      .      .       .    1RCO2     .       .       .        .    .

PLGC               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        1        0        4        12
 2 Post_   PLGC      0        0        2        0        2         9
 3 ListSet
 4         PLGC   1 ISTb  Links_OOS:  CSide  0, PSide   1
 5 Trnsl_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact InSv
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next
13 SwAct
14 QueryPM
15
16
17 Perform
18
```

12 Display the host peripherals P-side links associated with the RCO2 by typing

>TRNSL P
and pressing the Enter key.

Example of a MAP response

```
LINK 0 RCO2 0  0;CAP MS:STATUS SysB MSGCOND CLS RESTRICT
LINK 1 RCO2 0  1;CAP      S:STATUS SBsy
LINK 2 RCO2 0  2;CAP MS:STATUS OK MSGCOND OPN UNRESTRICT
LINK 3 RCO2 0  3;CAP      S:STATUS OK
LINK 4 RCO2 0  4;CAP      S:STATUS SysB
LINK 5 RCO2 0  5;CAP      S:STATUS Sysb
```

13 Manually busy the links connected to the faulty NTMX87 card by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no is the number of the link associated with the faulty NTMX87 card

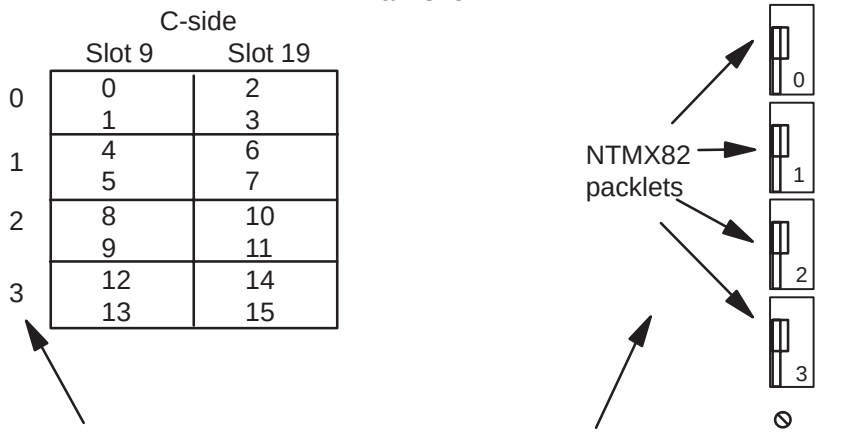
Note 1: All provisioned links in the slot must be busied.

Note 2: Reference the chart in step 14 for the RCO2 C-side link-to-slot assignments.

NTMX87
in RSC-S RCO2 (continued)

At the RCE frame

14 Use the following charts to determine which NTMX87 card is to be removed by matching the provisioned link number with the slot number and the packlet number to the left of each respective table.



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 left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

Remove the NTMX82 packlet as described in the following steps:

a. Locate the NTMX82 packlet to be removed on the appropriate NTMX87 quad carrier card slot.

b. Open the locking lever on the NTMX82 packlet and gently pull the packlet toward you until it clears the shelf.

c. Ensure the NTMX82 packlets are stored in an electrostatic discharge (ESD) container for protection of the circuit card until it is reinstalled in the NTMX87 quad carrier card.

Go to step 32.

NTMX87 in RSC-S RCO2 (continued)

At the MAP terminal

16 Determine if the RCO2 is in a single or dual configuration by typing

>POST RCO2 rco2_no ;IRLINK
and pressing the Enter key.

where

rco2_no is the number of the RCO2 associated with the faulty NTMX87 card

Note: If the posted RCO2 is in a single RCO2 configuration, the system will respnd with the following message:

```
NO IRLINKS DATAFILLED, IRLINK LEVEL CANNOT BE ENTERED.
```

If the RCO2 is in a	Do
single configuration	step 17
dual configuration	step 30

17 Determine if P-side ports are links or carrier trunks by observing the information obtained in step 5.

If P-side port is	Do
links	step 18
trunks	step 20

18 Manually busy all provisioned links connected to the faulty NTMX87 circuit card by typing

>BSY LINK link_no
and pressing the Enter key.

where

link_no is the number of the link associated with the faulty NTMX87 circuit card

Note 1: Each NTMX82 card has two links, and each link must be manually busied. Possible link pairs are 0 and 1, 2 and 3, 4 and 5, 6 and 7. This pair relationship continues throughout all 54 P-side links.

Note 2: Reference the charts in steps 26 and 28 for P-side link-to-slot assignments. All provisioned links in the slot must be busied.

NTMX87
in RSC-S RCO2 (continued)

19 Determine if the faulty NTMX87 circuit card is on the main or extension shelf. P-side ports 0 to 23, and 48 to 54 are on the main shelf. Ports 24 to 47 are on the extension shelf.

If the faulty NTMX87 is on the	Do
main shelf	step 26
extension shelf	step 28

20 Access the TRKS;TTP MAP display level, and busy the trunks assigned to the P-side carriers associated with the faulty NTMX87 by typing

>TRKS;TTP;POST D RCO2 rco2_no carrier_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 associated with the faulty NTMX87
carrier_no is the number of the P-side carrier assigned

Example of a MAP response

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  1125
OK, CLLI POSTED

POST  18   DELQ       BUSY Q          DIG
TTP 6-006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG    RCO2   0 1      WADEOUT796 11    LO
```

21 Busy the trunks associated with the faulty NTMX87 circuit card by typing

>BSY ALL
and pressing the Enter key.

Note 1: Wait for the busy queue to clear.

Note 2: To busy other carriers associated with the faulty NTMX87 circuit card, reference the link-to-slot assignment charts in steps 26 and 28.

NTMX87 in RSC-S RCO2 (continued)

22 Installation busy all the trunks to prevent carrier alarms by typing

>BSY INB ALL
and pressing the Enter key.

23 Access the CARRIER level and post the P-side carriers associated with the faulty NTMX87 circuit card by typing

>CARRIER;POST RCO2 rco2_no carrier_no
and pressing the Enter key.

where

rco2_no	is the number of the RCO2 associated with the faulty NTMX87
carrier_no	is the number of the P-side carrier assigned

Note: Perform this step for each carrier span in the faulty NTMX87 circuit card.

24 Busy and offline the P-side carriers associated with the faulty NTMX87 circuit card by typing

>BSY carrier_no ;OFFL carrier_no
and pressing the Enter key.

where

carrier_no	is the number of the P-side carrier assigned

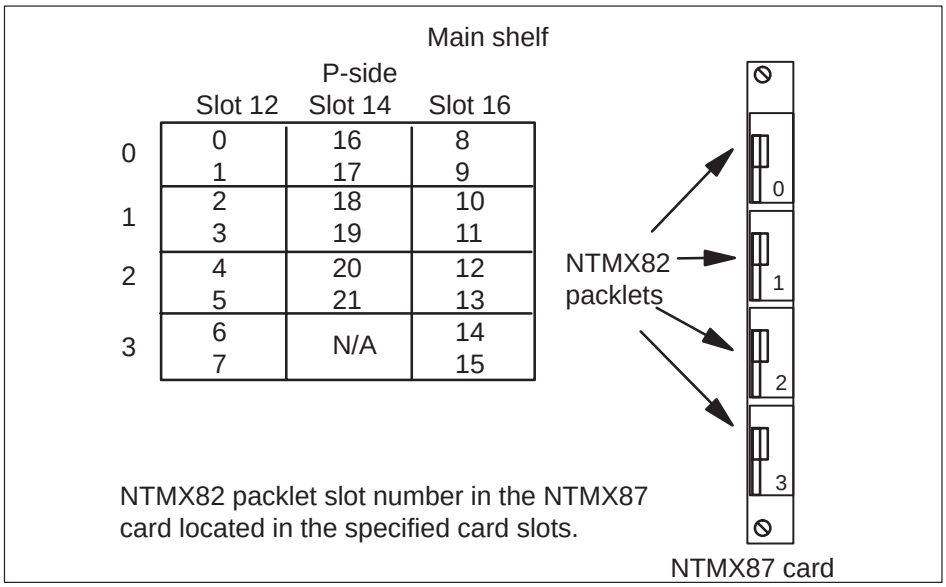
Note: Perform this step for each carrier span in the faulty NTMX87 circuit card.

25 Determine if the faulty NTMX87 circuit card is on the main or extension shelf. P-side ports 0 to 23, and 48 to 54 are on the main shelf. Ports 24 to 47 are on the extension shelf.

If the faulty NTMX87 is on the	Do
main shelf	step 26
extension shelf	step 28

At the RCE frame

26 Use the following figure to determine slot assignments on the P-side of the main shelf.



27

WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

Remove the NTMX82 packlet as described in the following steps:

a. Locate the NTMX82 packlet to be removed on the appropriate NTMX87 quad carrier card slot.

b. Open the locking lever on the NTMX82 packlet and gently pull the packlet toward you until it clears the shelf.

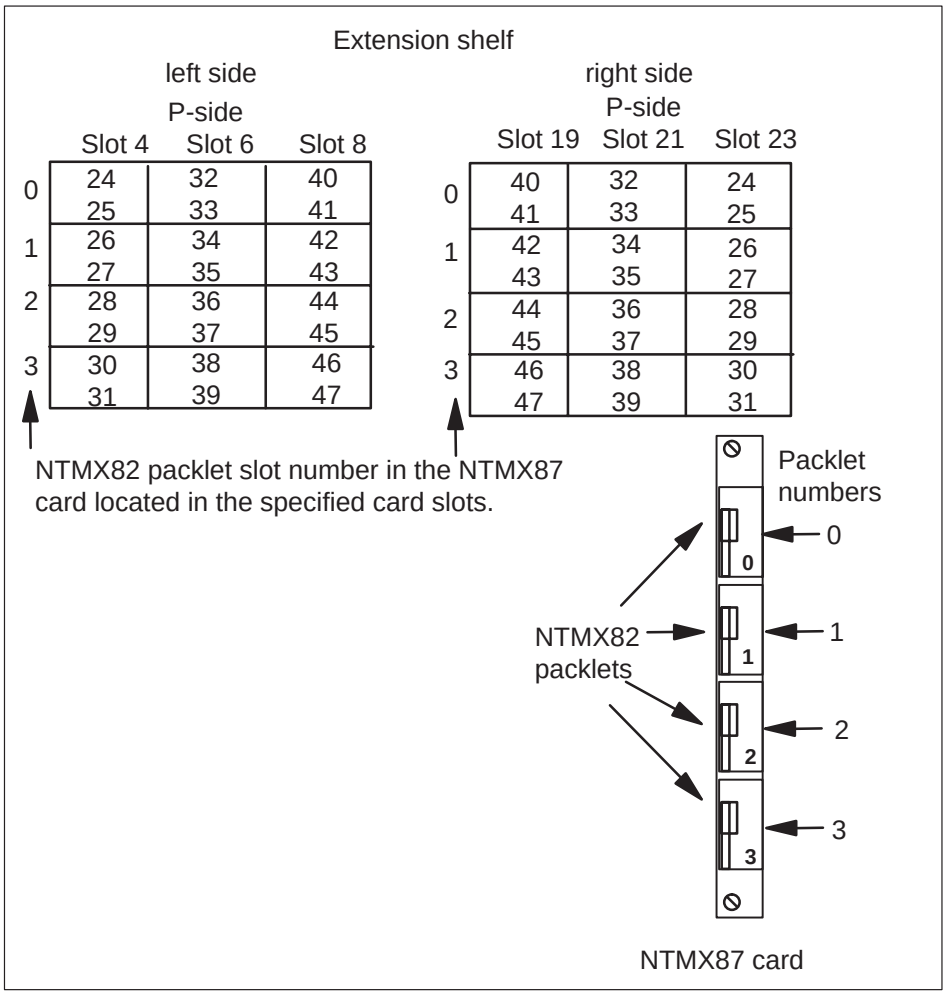
c. Ensure the NTMX82 packlets are stored in an electrostatic discharge (ESD) container for protection of the circuit card until it is reinstalled in the NTMX87 quad carrier card.

Go to step 32.

NTMX87 in RSC-S RCO2 (continued)

At the RCE frame

28 Determine which side of the extension shelf the faulty NTMX87 circuit card is located by referencing field SIDE of table RCCINV.



29

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 modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

Remove the NTMX82 packlet as described in the following steps:

a. Locate the NTMX82 packlet to be removed on the appropriate NTMX87 quad carrier card slot.

b. Open the locking lever on the NTMX82 packlet and gently pull the packlet toward you until it clears the shelf.

c. Ensure the NTMX82 packlets are stored in an electrostatic discharge (ESD) container for protection of the circuit card until it is reinstalled in the NTMX87 quad carrier card.

Go to step 32.

30 Translate the dual RCO2s IRLINKS by typing

>TRNSL
and pressing the Enter key.

Example of a MAP response

```
 CM     MS     IOD     Net     PM    CCS     LNS    Trks     Ext   Appl
 .      .       .       .     1RCO2   .       .       .        .     .

IRLINK            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0         2       0        2         25
 2         RCO2    0        0         0       0        1          1
 3
 4         RCO2   0 ISTb  Links_OOS:  CSide  1, PSide   1
 5 TRNSL   Unit0:   Inact InSv
 6 TST_    Unit1:   Act InSv
 7 BSY_
 8 RTS_
 9
10            IR    From       To            CAP    STATE    MSGCOND
11             0   RCO2 0, 0  RCO2 1, 0      MS       OK       OPN
12             1   RCO2 0, 8  Rcc2 1, 8      MS       OK       OPN
13             2   RCO2 0, 12 RCO2 1, 12      S       OK
14 QueryIR     3   RCO2 0, 13 RCO2 1, 13      S       OK
15
16
17
18
```

NTMX87 in RSC-S RCO2 (continued)

31 Busy IRLINKS in the faulty NTMX87 circuit card by typing

>BSY irlink_no
and pressing the Enter key.

where

irlink_no is the number of the irlink that must be busied

Note 1: This step must be performed for each provisioned link in the slot position.

Note 2: For link-to-slot assignments, reference step 26 for the main shelf, and step 28 for the extension shelf.

At the RCE frame

32

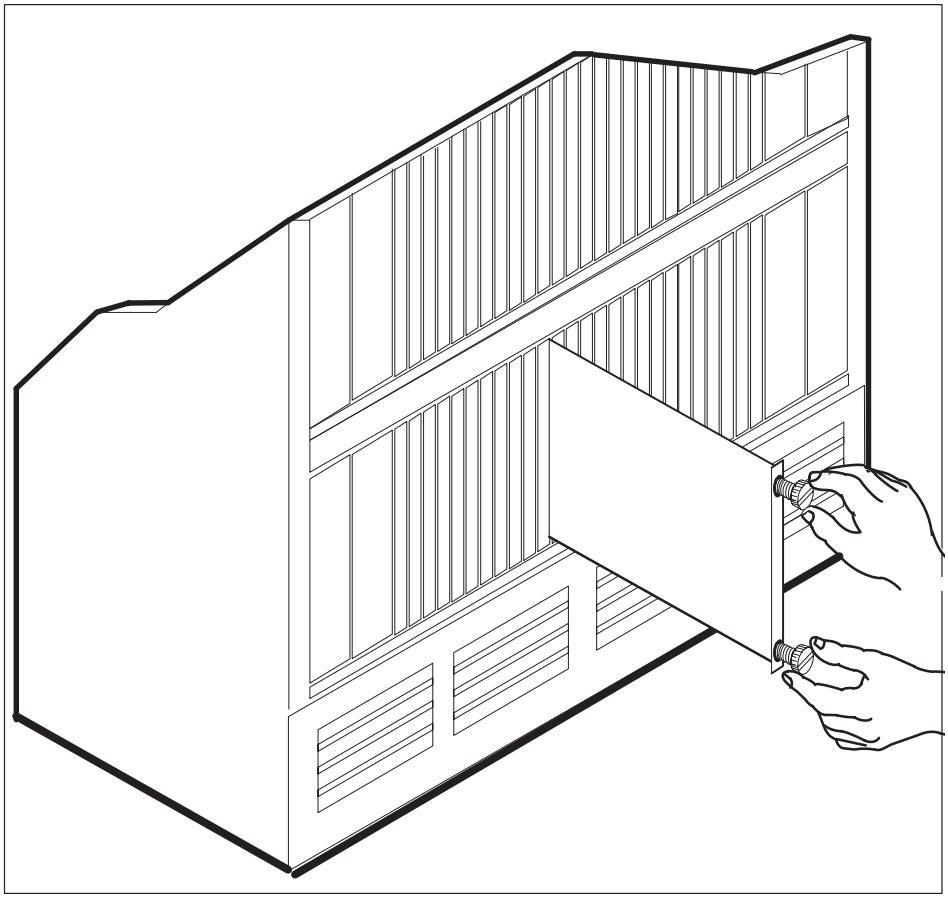
WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP) of the RCO2. This protects the equipment against damage caused by static electricity.

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.

Put on a wrist strap.

NTMX87
in RSC-S RCO2 (continued)

33 Using the T9908 wrist grounding strap and a T1324 screwdriver, remove the NTMX87 quad frame carrier circuit card. Insert the new quad frame carrier card and secure.



34 Replace the NTMX82 packlets previously removed. Align the packlet with the slots in the shelf and gently slide the packlet into the circuit card slot in the NTMX87 circuit card.

NTMX87 in RSC-S RCO2 (continued)

35 Seat and lock the packlet.

a. Using your fingers or thumbs, push on the upper and lower edges of the faceplate of the packlet to ensure that the packlet is fully seated in the slot.

b. Close the locking lever.

36 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 53
other	step 37

37 Use the following information to determine what step to go to next in this procedure.

If you entered this section of the procedure from	Do
step 15 for a single RCO2 with C-side links affected	step 38
step 27 or 29 for an RCO2 with P-side trunks affected	step 46
step 27 or 29, for a single RCO2 with P-side links affected	step 42
step 31 for a DRCO2 with irlinks affected	step 44

At the MAP terminal

38 Test the busied network links from step 13 by typing

>TST LINK link_no
and pressing the Enter key.
where

link_no is the number of the link associated with the new NTMX87 quad frame carrier card

Note 1: This step must be performed for each manually busied link.

Note 2: To test the other links associated with the RCO2, execute this step for each link until all links are tested.

If TST	Do
passed	step 39
failed	step 53

39 Return to service the P-side links by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of the link manually busied in step 13

Note 1: This step must be performed for each link that is manually busied.

Note 2: To RTS the other links associated with the RCO2, execute the procedures in this step for each link until all links are returned to service.

If RTS	Do
passed	step 40
failed	step 53

NTMX87 in RSC-S RCO2 (continued)

40 Post the inactive RCO2 in which the NTMX87 card is located by typing

>POST RCO2 rco2_no
and pressing the Enter key.

where

rco2_no is the number of the RCO2 associated with the faulty card

41 Return the inactive RCO2 unit to service by typing

>RTS UNIT unit_no
and pressing the Enter key**.**

where

unit_no is the number of the RCO2 unit posted in step 40

If RTS	Do
passes	step 51
fails	step 53

At the MAP terminal

42 Test the busied links from step 18 by typing

>TST LINK link_no
and pressing the Enter key.

where

link_no is the number of the link associated with the new NTMX87 quad frame carrier card

Note 1: This step must be performed for each manually busied link.

Note 2: To test the other links associated with the RCO2, execute this step for each link until all links are tested.

If TST	Do
passed	step 43
failed	step 53

43 Return to service the P-side links by typing

>RTS LINK link_no
and pressing the Enter key.

where

link_no is the number of the link manually busied in step 13

Note 1: This step must be performed for each link that is manually busied.

Note 2: To RTS the other links associated with the RCO2, execute the procedures in this step for each link until all links are returned to service.

If RTS	Do
passed	step 51
failed	step 53

At the MAP terminal

44 Test the IRLINKS by typing

>TST irlink_no
and pressing the Enter key.
where

irlink_no is the number of the link busied in step 31

Note 1: This step must be performed for each manually busied link.

Note 2: To test the other irlinks associated with the RCO2, execute this step for each irlink until all links are tested.

If TST	Do
passed	step 45
failed	step 53

NTMX87 in RSC-S RCO2 (continued)

45 Return to service the IRLINKS by typing

>RTS irlink_no
and pressing the Enter key.

where

irlink_no is the number of the link manually busied in step 31

Note 1: This step must be performed for each irlink that is manually busied.

Note 2: To RTS the other links associated with the RCO2, execute this step for each link until all links are returned to service.

If RTS	Do
passed	step 51
failed	step 53

At the MAP terminal

46 Busy and return to service P-side carriers that were offlined in step 24 by typing

>BSY carrier_no; RTS carrier_no
and pressing the Enter key.

where

carrier_no is the number of the P-side carrier assigned

If carrier RTS	Do
passed	step 47
failed	step 53

47 Access the TTP MAP level to post the P-side links associated with the new NTMX87 circuit card by typing

>TTP;POST D RCO2 rco2_no carrier_no
and pressing the Enter key.

where

rco2_no — is the number of the RCO2 associated with the new NTMX87 circuit card

carrier_no — is the number of the P-side link trunks are assigned

Example of a MAP response

```
LAST CIRCUIT = 27
POST CKT IDLED
SHORT CLLI IS:  1125
OK, CLLI POSTED

POST  18   DELQ       BUSY Q          DIG
TTP 6–006
CKT TYPE   PM NO.     COM LANG        STA S R DOT TE R
OG    RCO2   0 1      WADEOUT796 11    INB
```

48 Busy the trunks associated with the new NTMX87 circuit card by typing

>BSY ALL
and pressing the Enter key.

Note 1: Wait for the busy queue to clear.

Note 2: Busy the other carriers associated with the faulty NTMX87 circuit card. Reference the link-to-slot assignment charts in steps 26 and 28**.**

49 Test the trunks associated with the new NTMX87 circuit card by typing

>TST;NEXT
and pressing the Enter key.

Note: Perform this step for each carrier span associated with the new NTMX87 circuit card.

If trunks TST	Do
passed	step 50
failed	step 53

NTMX87 in RSC-S RCO2 (end)

50 Return-to-service trunks assigned to links on the new NTMX87 circuit card by typing

>RTS ALL

and pressing the Enter key.

If RTS	Do
passed	step 51
failed	step 53

51 Send any faulty cards for repair according to local procedure.

52 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 55.

53 Return to *Alarm Clearing Procedures* or the 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.

54 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level support.

55 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.

Locating and clearing trouble in the RSC-S

The section Locating and clearing trouble in the Remote Switching Center-SONET (RSC-S), is for maintenance engineering and field maintenance personnel use. This section is for personnel with a basic knowledge of the RSC-S for international applications only.

Trouble isolation and correction

The Remote Switching Center-Synchronous Optical Network (SONET), or RSC-S, consists of one of the following:

- Remote Center Offshore #2 (RCO2)
- RCO2 with the following components:
  - integrated services digital network (ISDN)
  - line concentrating devices (LCD)
  - trunks
  - links that connect components

This chapter describes troubleshooting procedures for these components.

Description of troubleshooting procedures

The RCO2 is the primary component that forms the RSC-S configuration. The state of the RCO2 normally determines the state of other RSC-S components.

Locating and clearing faults

This section describes how to locate and clear faults in terms of trouble condition indicators and trouble conditions.

Trouble condition indicators

The following indicate trouble conditions:

- operational measurements (OM)
- log reports
- alarms

Operational measurements

The OMs monitor and count events in the system and are the best means to detect accurate and potential system troubles. Use the OM thresholding feature to monitor and report key RSC-S with ISDN activity. These reports

must be routine (daily or weekly). Reports are the primary method of trouble detection.

Log reports

Use logs as an analysis tool. Logs provide detailed information on call errors, diagnostic results, and system status. Logs also indicate trouble conditions when any of the following conditions occur:

- sudden increase in volume of logs
- message not printed reports
- large number of like logs

Alarms

Audible and visual alarms indicate that something requires correcting action. Routine system maintenance and use of OMs and logs must minimize the occurrence of alarms.

The level of the alarm (minor, major, or critical) indicates alarm severity and the urgency for correcting action. The following table describes alarm conditions.

Alarm description

Alarms	Map display	Description
Minor	(blank)	normally does not affect service
Major	(M)	normally indicates condition that degrades or threatens service
Critical	(*C*)	normally indicates a service outage or potential service outage

Assessing alarms

The MAP terminal subsystems for the RSC-S configuration produces alarms. The following table lists the alarms and the meanings of the alarms. The table also lists the log reports that normally accompany the alarm.

Assessing PM alarms from the MAP display

MTC level	PM level	Possible conditions
PM RCO2	ISTb 1	One (or both) units experience minor problems that do not normally involve the peripheral processor (PP). A static data mismatch between an RCO2 unit and the central control (CC) occurred. A nonmessaging central side (C-side) link is out-of-service (OOS). A peripheral side (P-side) link is OOS.
PM RCO2 M	ISTb 1	One of the units is system busy (SysB), normally because of a PP card failure. If the unit is the active unit, the peripheral module (PM) software performs a switch of activity (SWACT) on the units. Check for PM128 logs.
PM RCO2 *C*	SysB 1	Both units are SysB. If communication with the host causes the units to go SysB, the RCO2 enters emergency stand-alone (ESA). The system generates the following sequence of logs when RCO2 enters ESA: • PM109 – The carrier is busy. • PM128 – The RCO2 is in-service trouble (ISTb). • PM107 – The RCO2 is central side busy (CBsy). • PM107 – The line concentrating modules (LCM) are CBsy. • PM102 – The RCO2 is SysB. • PM181 – The RCO2 is trying to restart the message links. Both PPs can be SysB because both units have faults.

—continued—

Assessing PM alarms from the MAP display (continued)

MTC level	PM level	Possible conditions
PM RCO2	ISTb 1	One (or both) units experience minor problems that normally do not involve the PP. When the RCO2 has ISDN capability, the following problems can have occurred: • The D-channel handler (DCH) card malfunctioned. If a spare DCH is present, the spare DCH is put in service (InSv) or the system loses D-channel capability. The RCO2 is set ISTb in both occurrences. • The ISDN signaling preprocessor (ISP) card malfunction. The RCO2 cannot process ISDN calls and the RCO2 continues to process plain ordinary telephone service (POTS) calls.
PM RCO2 M	ISTb 1	One of the RCO2 units is OOS. The RCO2 can continue to process both voice and data calls.
PM RCO2 *C*	SysB 1	Both RCO2 units are OOS. Both voice and data services are lost. If the RCO2 entered ESA, the ability to process data calls depends on the location of the packet handler (PH).
		—end—

Clearing alarms

Follow these guidelines to respond to alarms:

- More than one alarm of the same severity can appear on the MAP display. When this occurs, clear the alarms on the screen from left to right.
- If an alarm of greater severity occurs when you are fixing another alarm, respond to the new alarm. Do not continue to clear the less severe alarm.

For alarm clearing procedures, refer to *Alarm Clearing Procedures.*

Trouble conditions

The following trouble conditions can occur for the RSC-S:

- data mismatch
- lines
- DS30A
- pulse code modulation 30 (PCM-30) links

- dual remote center offshore #2 (DRCO2) – available at a future batch change supplement (BCS) release
- forced ESA
- RCO2 with ISDN
- ISDN lines

Data mismatch

The RCO2 can have data mismatch troubles like a static data mismatch with the CC. If data mismatch occurs, busy and return to service (RTS) all of the RCO2. Use the NODATASYNC parameter with RTS to minimize the time needed to have the correct data in both RCO2 units.

When you issue the RTS NODATASYNC command for the inactive unit, the following occurs:

- The system blocks node translation table transfer from the active to the inactive unit. The system checks node tables to make sure that the node tables match.
- The system loads static data from the CC to the inactive unit.
- When the system returns the inactive unit to service, the system disables data sync between active and inactive units.

  Note: The NODATASYNC option is valid only for the inactive unit.

When these actions are done, the system sets RCO2 ISTb. If the node table does not match, the system generates another PM128 with the following message:

```
Node table mismatch.
```

To match static data and node tables, perform the following:

1 To busy the inactive unit, type

  >BSY UNIT n

2 To RTS the inactive unit with the NODATASYNC option, type

  >RTS UNIT N NODATASYNC

  Note: The system returns the inactive unit to service. If static data changes during the RTS, the system generates a PM128 log with the following message:

  ```
  Mismatch found in node table between the two units.
  ```

  The QUERYPM FLT command shows a node table mismatch.

3 Perform a SWACT.

The system clears all trouble indicators associated with the data mismatch as the RCO2 returns to service.

Lines

When you isolate a fault to an LCD, maintenance procedures are like host office maintenance procedures. Operating company personnel must make sure that a fault in an LCM is not the result of a different fault.

DS30A

The DS30A links are on the P-side of the RCO2, and on the C-side of the enhanced line concentrating module (LCME), LCM, and remote maintenance module (RMM). Defective DS30A links affect associated components.

PCM-30 links

The system uses PCM-30 links on the C-side and P-side of the RCO2. The system uses links on the C-side of the RCO2 to send both voice and messages to the host. The system can use some of the channels as trunks. Channels 0 and 2 are only for messaging.

The system uses the links on the P-side of the RCO2 to connect remote line concentrating modules (RLCM) or other offices. In this event, the PCM-30 links function as trunks. These trunks can be static or dynamic.

Note: A future BCS release will offer RLCM capability.

DRCO2

The condition of the interlinks is a primary source of trouble for the DRCO2. The condition of the messaging links to the host office can cause the RCO2 to enter dual ESA (DESA). A future BCS release will make available DRCO2 and DESA.

Forced ESA

When a condition forces an RCO2 into ESA, the system sends a PM189 log to the host with a FORCE DOWN message. The system simulates link faults on messaging links 0 and 2. If these links appear at the CARRIER level of the MAP display (POST PLGC 2, for example), the links display the alarm RCGA.

Receive the PM189 log to determine if the RCGA is a real alarm. If links 0 and 2 break while the RCO2 is in forced ESA, the links at the CARRIER level have the LCGA alarm.

Note: Real faults at the RCO2 can be one-way. If the alarm continues to be RCGA, you can have the PM189 log. This is not always correct. Real faults on the messaging links are normally two-way and produce LCGA alarms.

RCO2 with ISDN

The following list contains sets of procedures for troubleshooting the RCO2 with ISDN:

- B-channel packet service, ISDN line to Data Packet Network (DPN)
- provisioned B-channel data service, ISDN line to ISDN line
- D-channel packet service
- B-channel voice service
- B-channel circuit-switched data service

The ISP is the main difference between an RCO2 without ISDN and an RCO2 with ISDN. If the ISP is at fault, the RCO2 with ISDN does not work. Use the QUERY PM FAULT command to check for defective cards before you take other maintenance action.

ISDN lines

The following table lists possible states for the ISDN line card, the equipment most likely OOS, and the suggested maintenance action.

Restoring service to the line

ISLC	OOS equipment	Suggested maintenance action
CUT	Line	Post the ISDN line by the line equipment number (LEN) of the ISDN line. Enter the DIAG command to see if the relay is stuck. If the relay is stuck, replace the line card.
LMB	RCO2, LCME, or message link between RCO2 and LCME	Post the ISDN line by the LEN of the ISDN line. Enter the CKTLOC command to display the status of all associated PMs and links for the line. Access the associated MAP level for the item that does not have the correct status. Use MAP commands to test suspect components.
DMB		Use the CKTLOC command in the LTP level to identify where the fault lies. Take one of the following actions:
	DCH is OOS	Access DCH and ISG levels of the MAP display. Post the appropriate DCH. Use MAP commands to locate defective components.
	Speech link is OOS	Access the PM level of the MAP display. Identify the defective speech link. Test the speech link and return the speech link to service to restore all associated LENs for that speech link.
	ISG channel	Busy and RTS the ISDN services group (ISG) channel at the ISG level of the MAP display.
	Path fault in RCO2	Perform a SWACT to see if the fault continues to be present.
	Path fault in LCME	Busy and return the LCME to service if required.
	I-flag is set	Use MAP commands to test for a defective connection or a babbling terminal.

—continued—

Restoring service to the line (continued)

ISLC	OOS equipment	Suggested maintenance action
LO	Line	Loss of sync between the ISDN line card and the network termination 1 (NT1). This is a system-detected fault. The change out of this state occurs when the system detects a sync condition. Use commands available at the LTP level of the MAP display to locate defective hardware.
INB	Line	Line undergoes office data modifications. An entry is present in table LNINV. If you cannot remove the line from the INB state, use the CKTLOC command. Use this command to verify if one of the following conditions is present: • an associated DCH channel for the ISDN line • an unbroken path between the DCH and the LEN
MB	Line	Enter commands at the LTP level of the MAP display to ready line for routine maintenance. A customer complaint made operating company personnel remove the line from service. Line undergoes fault-finding tests.
CPD	Line	Line now processes a circuit-switched call. The line will be removed from service for possible maintenance activity when the call ends. You can access the line from any MAP display for maintenance activity when the state changes to MB. To cancel maintenance activity, post the deload queue at the LTP level of the MAP display.
NEQ	Line	Use the table editor to enter tables LNINV and DCHINV.
		—end—

Fault isolation tests

This section describes fault isolation tests for the following:

- RCO2
- lines
- RCO2 with ISDN

RCO2

When you troubleshoot the RCO2, you normally access the RCO2 level of the MAP display and enter the QUERYPM FLT command. The following table lists the possible reasons for a SysB RCO2 alarm and the possible conditions. In most conditions, the log report mirrors the QUERYPM FLT response.

Assessing SysB alarms for the RCO2

Message at RCO2 level	Possible conditions
`All C-side Links are Down`	The C-side PM cannot talk with the RCO2.
`Audit Detected Inconsistent PM Activity`	As an example, the CC thinks that unit 0 is active when actually unit 1 is active. This means the CC does not know that a SWACT occurred. The CC busies and returns both units to service. The units come back with the active/inactive unit configuration of the original CC.
`Audit Detected Inconsistent PM State`	The internal state of the active unit is not ready. The state is busy, restart, or syncing. This is normally a software error. The CC busies and returns both the RCO2 and the C-side links to service.
`Autonomous Activity Drop`	A system-generated SWACT occurred, normally because of a trap or facility audit.
`Diagnostics Failed`	Unit failed TST or RTS.
`Inact Unit Lost Data Synch`	Unit-to-unit communication failed. A SWACT cannot be performed.
`PM Audit Detect Fault`	One of the background hardware audits detected a fault.
`PM SWACT`	A SWACT occurred.

—continued—

Assessing SysB alarms for the RCO2 (continued)

Message at RCO2 level	Possible conditions
`Require Data Load`	An error occurred on a PCM-30 link to the unit. The unit awaits the maintenance system to reset the unit.
`Reset WhileIn-Service`	An error occurred on a PCM-30 link to the unit. The unit awaits the maintenance system to reset the unit.
`REx Incomplete` (Terminated)	The routine exercise (REx) test cannot complete the series of tests because of an abnormal condition. At least one unit is ISTb. The inactive unit is BSY.

`REx Failed`
 	
`Achieving superframe data synch`
`Inactive OOS Tests`
`Inactive RTS`
`Warm SWACT`
`Inactive OOS Tests after SWACT`
	A failure occurred during a test. The actions that the system takes to compensate for the failure results in the messages.

`Self Test Failed`	One of the background hardware audits detected a fault.
`Trap Message Received From PM`	Unit sent an `initiation complete` message to the CC following an auto-restart.
`Unsolicited Message Limit Exceeded`	Unit sent more than 100 unsolicited messages to the CC in 1 min.

—end—

The following table lists the possible reasons for an ISTb RCO2 alarm and the possible conditions. In most conditions, the log report mirrors the QUERYPM FLT response.

Assessing ISTb alarms for the RCO2

Message at RCO2 level	Alarm	Possible conditions
`One/Both Unit(s) ISTb`	Minor	One or both units are ISTb.
`PM Overloaded`	Minor	Traffic load exceeds the ability of the PM to process calls.
`CSLinks Out of Service`	Minor	C-side message links failed the periodic InSv C-side links test (one per minute).
`PSLinks Out of Service`	Minor	A P-side link (for example, to the LCME or RMM) is SysB.
`Node Redundancy Lost`	Major	A unit is OOS, so the RCO2 cannot perform a SWACT.
`Major CSLink Failure`	Major	A C-side link failure caused a major alarm.
`Critical CSLink Failure`	Critical	A C-side link failure caused a critical alarm.
`Interlinks out of service`	Minor	One of the DRCO2 interlinks is SysB.
`Bad MX77 IMC link`	Minor	An intermodule communication link is bad.
`Bad 6X69 IMC link`	Minor	An intermodule communication link is bad.
`PM node table mismatch`	Minor	The node table data in the RCO2 and in the CC do not match.
`Dynamic data sync`	Minor	The RCO2 has not achieved dynamic data sync.
`ESADATA`	Minor	The RCO2 does not have an ESA load, or the ESA load is corrupt or does not match the CC.

—continued—

Assessing ISTb alarms for the RCO2 (continued)

Message at RCO2 level	Alarm	Possible conditions
`Static data mismatch with CC`	Minor	The RCO2 static data does not match CC static data.
`Data mismatch with inventory table`	Minor	The load in table RCCINV does not match the load name according to the CC.
—end—		

Lines

When an LCM alarm appears at the MAP display, enter the LCM level and post the LCMs that match that state. Post the LCM according to site to make sure that the LCM with the alarm is part of the RSC-S configuration.

If the LCM is part of the RSC-S configuration, post the C-side RCO2 and enter the QUERYPM FLT command. If any response indicates a problem, perform an InSv test. If the test fails, perform normal RCO2 maintenance. When this maintenance is complete, the LCM maintenance is the same as with the host office.

RCO2 with ISDN

When you troubleshoot the RCO2, you normally access the RCO2 level of the MAP display and enter the QUERYPM FLT command.

Diagnostic tests

The following sections describe RSC-S diagnostics.

P-side PCM-30 diagnostics

Diagnostic tests are provided for PCM-30 packlet NTMX82. These diagnostic tests make sure that the PCM-30 cards located on the P-side of the RCO2 function correctly. The CC, XMS-based peripheral module (XPM) maintenance, or the XPM monitor, implement PCM-30 diagnostic tests.

The following is a list of PCM-30 P-side diagnostics:

- NTMX82 fault detection
- NTMX82 fault isolation

The PCM-30 diagnostics find and report faults to the unified processor (UP) card (NTMX77). The PCM-30 diagnostics logs faults with standard diagnostic format.

The PCM-30 P-side diagnostics use module state and module activity to determine the type of tests to perform. The type of tests that PCM-30 P-side diagnostics perform depends on the following module states or activity:

- InSv or active state
  - command registers check test
  - channel 12 loop-around to channel 16 test
- busy or active state
  - diagroup loop test
  - international signaling test
  - remote frame alignment test
  - remote multiframe alignment test
  - alarm indication signal test
  - alarm indication signal 16 indication test
  - local loss multiframe alignment test
  - command register check test
- busy or inactive state
  - channel 12 loop-around to channel 16 test

Correct operation of the PCM-30 P-side diagnostics requires the following cards:

- NT6X69

  Universal Tone Receiver (UTR) card

- NTMX73

  PCM Signaling card

- NTMX75

  Matrix card

- NTMX82

  Dual PCM-30 Packlet card

Other diagnostic tests for the RCO2 include the following tests:

- universal tone receiver (UTR) test
- extension test
- matrix test (MTX)

- XBERTPSL (OOS carriers only)
- XBERTHLP

The following section describes the signaling diagnostic test.

The CC, XPM diagnostic system, or PMDEBUG implements the signaling diagnostic test. The signaling diagnostic test provides a set of diagnostic routines to detect faults in the signaling components of the RCO2 shelf. These tests verify that the system can transmit and receive signaling bits from or to each PCM-30 link (P- or C-side) of the RCO2.

The signaling diagnostic test performs the following tests:

- 2-ms interrupt test
- ABCD transmit random access memory (RAM) test
- signaling loop test on the signaling circuit card
- signaling loop test on the PCM-30 circuit card

The NTMX73 and NTMX82 cards implement the ABCD bits hardware on the RCO2 shelf. Timeswitch 16 of each PCM-30 link (C-side or P-side of the RCO2) that a nailed-up connection in the NTMX75 card connects to the NTMX73 card. This connection permits the transfer of signaling bits from or to the signaling RAM on the NTMX73 card. This RAM is accessible by the NTMX77 card and the signaling processors.

XPM diagnostic history

Extended Peripheral Modules Diagnostics History, feature number AF5006, provides a resident database to record selected diagnostic results of XPMs. The XPM diagnostic history feature captures diagnostic results that indicate XPM sanity. The data in this database can influence DMS switch maintenance. This database provides you 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). This feature is not an optional feature.

An XPM can execute diagnostics to test the functionality of XPM hardware. Diagnostics can run as a result of CC or XPM requests. Diagnostics that the XPM performs are normally part of XPM audits. Use the diagnostic results that feature AF5006 provides for system analysis.

Operating company personnel analysis

Feature AF5006 provides data on the failure history of diagnostics. This feature indicates the number of failures that occur and which cards are at fault. This feature provides MAP commands to display data for a given

XPM or for all XPMs that this feature supports. Two data counts are available through the use of MAP commands: short-term failure and long-term failure counts.

Short-term failure counts Short-term failure counts accumulate from the last time a unit correctly gained activity. This data can guide maintenance activities and outage analysis. If an outage occurs, include with other pertinent data the XPM Diagnostics History data for that peripheral.

Long-term failure counts Long-term failure counts accumulate from the last time manual action or BCS application reset long-term failure counts. Long-term failure counts are intended to last for the life of the BCS. This data is channeled back to design groups and provides data for additional diagnostic system improvements.

Functionality described in this feature is implemented on SuperNode and BNR Reduced Instruction Set Computing (BRISC) platforms. For the NT-40 platform, the diagnostic results and suspect cards captured is smaller than the SuperNode or BRISC platforms. The NT-40 data store requirements cause this restriction.

Description of diagnostics

Different PMs contain different hardware. The system runs different diagnostics on every type of PM. There are approximately 75 diagnostics for XPMs. The system runs a subset of the 75 diagnostics on any given PM.

This feature captures failures for the following types of diagnostics:

- InSv
- OOS
- single diagnostic
- facility audit
- other audits

Each diagnostic indicates zero or more cards as the XPM determines. In some instances, the CC generates card lists for display at the MAP terminal or in logs. Feature AF5006 includes in a list of card failures any card that an XPM diagnostic or audit indicates and reports to the CC.

> ***Note:*** Feature AF5006 records only those cards that an XPM indicates. This feature does not record cards that the CC generates.

The system can run diagnostics as a single test or group diagnostics together as a set. Defined sets follow:

- InSv tests
- OOS tests
- facility audit tests
- mate diagnostics
- ROM diagnostics

In-service and out-of-service tests

The InSv and OOS tests are solicited tests. These tests run only as a result of CC requests. When the CC requests to test an XPM unit, the XPM runs a set of diagnostics. The CC request use one of the following commands:

- manual TST command
- manual or system RTS command
- manual or system SWACT command
- manual or system BSY command
- manual or system REx command

The diagnostics included in the set vary according to the following:

- the PM type of the XPM
- the state of the XPM unit
- the activity of the XPM unit

If the unit is InSv, the XPM runs a set of InSv diagnostics. If the unit is OOS, the XPM runs a set of OOS diagnostics.

The system returns results of each diagnostic to the CC along with a final result for all of the set. If any cards are defective, the system generates a card list. The system transfers the card list to the CC at the termination of the set of tests.

Facility audit

The facility audit is a set of diagnostics the XPM runs periodically to test the XPM. If the XPM encounters problems, the XPM sends a message to the CC. This message indicates the problem along with a list of defective cards.

Mate diagnostics

If communications are lost with one unit, a mate unit can diagnose that unit and send the results to the CC.

ROM diagnostics

If the XPM is at ROM level, the system can implement a set of ROM diagnostics.

This feature does not capture failures, nor does this feature capture the cards that mate and ROM diagnostics indicate. For each diagnostic, the system generates a card list or log at the MAP terminal. The system does not record a card list or diagnostic failure in the diagnostic history.

The following table lists and describes diagnostics that this feature supports. The diagnostics are classified as solicited, audit, or both.

Diagnostics supported

Diagnostic name	Description	Type (solicited or audit)
AB DIAG	A/B Bits	Solicited
AMUDIAG	NT6X50 External Loop	Solicited
CSD1DG	C-Side DS-1	Solicited
CMRDIAG	CLASS modem resource (CMR) card	Both
CONT DG	Continuity Diag	Solicited
CS SPCH	Network Links	Solicited
DCHIALB	DCH Inactive Loopback	Solicited
DS1DIAG	P-Side DS-1	Solicited
DS30A	NT6X48/NTMX74 Audit	Audit
FAC AUD	Facility Audit	Audit
FORMATR	Local Formatter	Solicited
ISPHDLC	ISP High-level Data Link Control (HDLC) Diag	Solicited
ISPSPHI	ISP Speech Bus Internal	Solicited
ISPSPHF	ISP Speech Bus Full	Solicited
MSGDIAG	NT6X69 Messaging Card	Solicited
MSG IMC	Intermodule Communication (IMC) Link	Both
MX76 MSG	NTMX76 Messaging Card	Solicited

—continued—

Diagnostics supported (continued)

Diagnostic name	Description	Type (solicited or audit)
PADRING	NT6X80 Pad/Ring	Solicited
PARITY	Parity Audit	Audit
PS LOOP	P-Side Loops	Solicited
PS SPCH	P-Side Speech Links	Solicited
RCC FMT	Remote Formatter	Solicited
SCM AB	NT6X81 A/B Bits	Solicited
SCM MSG	SCM A/B DDL Msg	Solicited
SPCH DG	Speech Path	Solicited
STRDIAG	Special Tone Receiver	Solicited
SYNC DG	Sync Diag	Both
TONES DG	Tone Diag	Both
TS DIAG	Time Switch Diag	Solicited
UTRDIAG	UTR Card	Solicited

—end—

The following table lists the cards that this feature supports.

Supported cards

Card name	Description
NT6X40	Net Interface Link
NT6X42	Channel Supervision Message (CSM)
NT6X44	Timeswitch and A/B Bit Logic
NTMX77	Unified Processor and Memory
NT6X48	DS30A Interface
NT6X50	DS-1 Interface
NT6X55	DS-0 Interface
NT6X62	Selective Trunk Reservation (STR) Card

—continued—

Supported cards (continued)

Card name	Description
NT6X69	Messaging Card
NT6X70	Continuity Card
NT6X72	Remote Cluster Controller (RCC) Host Link Formatter
NT6X78	CMR
NT6X79	Tone Generator
NT6X80	SCM Pad/Padring
NT6X81	SCM A/B Bit
NT6X85	SCM DS-1
NT6X86	SCM MSG
NT6X92	UTR
NT8X18	Subscriber Carrier Module-100S Remote (SMSR) C-side DS30A Interface
NTBX01	ISP
NTBX02	DCH
NTMX76	CSM + MSG Card
NTMX77	68020 PROCESSOR (UP)
—end—	

How diagnostics are stored

The ROM diagnostics store counters of diagnostic results. Each unit of each peripheral that this feature supports has a set of counters. This feature keeps counters for diagnostic failures and for defective cards. This feature keeps three types of counters:

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

This feature keeps two subcounters for each of the three counters: short-term and long-term failure counters. The system resets short-term failure counters frequently in the BCS cycle. Long-term failure counters record the diagnostic history of a peripheral or office over an extended period of time. To reset long-term failure counters, use the QUERYPM DIAGHIST RESET command or a BCS application.

A single test failure can report one or more diagnostic failures and zero or more defective cards. A diagnostic that runs in one unit can report cards both in that unit and in a mate unit. Only certain diagnostics report failures on the mate unit. When a diagnostic fails, the separate diagnostic sends the failure information to the history database.

Resets and time stamps

The history database stores five time stamps for each 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

Short-term counters reset (set to zero) internally on a unit basis when a unit gains activity. These counters can reset as a result of an RTS or SWACT command. Long-term counters reset on a node basis when you post an XPM at the MAP terminal. When long-term counters reset, the system generates a log with a summary of the data collected for that node before to the reset.

A BCS application resets all diagnostic history data, including short- and long-term failure counts. In this event, the system does not generate a log with long-term failure counts.

The system performs diagnostic tests for the RSC-S and RSC-S with ISDN on the following components:

- RCO2
- lines
- DRCO2
- RCO2 with ISDN
- ISDN lines

RCO2

Issue the TST command to perform diagnostic tests for the RCO2.

Lines

When you perform a test on a subscriber line, perform the command several times. This action makes sure that PCM-30 links do not affect the results.

DRCO2

Issue the TST command at the IRLINK to perform diagnostic tests for the interlinks of the DRCO2.

RCO2 with ISDN

Issue the TST command to perform diagnostic tests for the RCO2.

ISDN lines

When you perform a test on a subscriber line, perform the command several times. This action makes sure that PCM-30 links do not affect the results.

RSC-S Enhanced Line Testing 1

Feature AF4838 (RSC-S Enhanced Line Testing 1) verifies the functionality provided in phases 1 and 2 of the DMS-100 switch translation language 1 project. This feature verifies that this functionality is provided for ISDN 2B1Q loops subtending LCMEs attached to an ISDN RCO2.

An operating system is the system of an operating company. An operating system supports the operation, administration, and maintenance (OAM) of the following:

- subscriber loops
- trunks
- POTS
- special services
- other services that the DMS-100 switch provides

An operating system uses an X.25 data link to communicate with a DMS-100 switch. The interface between an operating system and DMS-100 switch is the translation language 1, command, and response set.

The ISDN translation language 1 project provides the following capabilities:

- supports X.25 data links between operating systems and the DMS-100 switch
- decodes and encodes translation language 1 commands and responses
- executes maintenance activities that translation language 1 commands specify, and generates responses that contain the results of maintenance activities
- supports test equipment required to execute maintenance activities
- supports commands at the LTPISDN and LTPLTA levels of the MAP display to allow support of ISDN 2B1Q loop and line activities

The TEST command is a menu command available at the LTPISDN MAP level. In order to function, the test command requires a posted ISDN 2B1Q loop. The TEST command consists of many options that are also referred to as unlisted menu commands. Each option or unlisted menu of the TEST command is a test in support of a corresponding translation language 1 command. These tests implement ISDN loop and line maintenance activities.

Implement all tests at the LTPISDN MAP level. Implement the ac resistance test at the LTPLTA MAP level. Use the TEST command with a specified option to implement each test at the LTPISDN MAP. Use the RES command with ac as an option to implement the ac resistance test. In order

to function, the RES menu command requires a posted line in order to function.

The following table describes the applicable commands and options.

MAP commands, options, and activities

Command	Option and activity
CONN-DTAC-ISDN	Indicates the beginning of a test session. You can perform tests and measurements that require digital test access. The system seizes and keeps OOS the tested line during the test session.
CONN-MTAC-ISDN	Indicates the beginning of a test session. You can perform tests and measurements that require metallic test access (MTA). The system seizes and keeps OOS the tested line for the duration of the test session.
DGN-DET-TOTS	Requests a complete set of tests on the ISDN 2B1Q line card, digital subscriber loop, and the 2B1Q NT1. This command determines if a fault is present in any 2B1Q loop component. The system immediately terminates the test when the system encounters a fault.
DISC-TACC	Indicates the end of a test session. The system releases connections that the connect commands set up. The line returns to the previous state.
MEAS IMPNSE	Measures the impulse noise on the loop for a specified time.
MEAS-LOOP-LOSS	Measures the 2B1Q signal level that the NT1 generates to identify the presence of load coils on the loop. Also verifies if the amount of loss is acceptable.
MEAS-NSE	Measures wideband noise interference on the digital subscriber loop.
MEAS-SCUR-DSL	Measures the sealing current that the ISDN 2B1Q line card generates on the digital subscriber loop.
REPT-ALM	The DMS-100 switch generates this command when the system encounters a failure on one or more test sessions.

—continued—

MAP commands, options, and activities (continued)

Command	Option and activity
REPT-INITZN	An autonomous command that the operating system or the DMS-100 switch sent. The operating system uses this command to verify that the DMS-100 switch is online and restart is complete. The DMS-100 switch uses this command to report that the switch completed a restart.
REPT-STAT	Checks the X.25 data link operation. The operating system sends this command to the DMS-100 switch automatically if the system did not send additional messages in the last 60 s.
RES AC	Implements the measurement of two-terminal ac resistance, which calculates three-terminal resistance to identify terminations and high resistance open circuits
RMV-TOTS	Removes services from an ISDN 2B1Q line and places the line in a manual OOS state
RST-TOTS	Restores service to an ISDN 2B1Q line and places the line in an idle InSv state
RTRV-COND-ISDNL2	Instructs the DMS-100 switch to retrieve the current line state and standing condition (alarm or status) associated with one or more lines
RTRV-DNCT	Retrieves the associated equipment for the directory number (DN) and call type of the line
RTVR-PM-TOTS	Retrieves the current set of associated performance monitoring data for an ISDN 2B1Q line. The system retrieves data on block errors, errored seconds, and severely errored seconds in both directions of the transmission path.
RTRV-TRNSL	Retrieves the associated translation information for an ISDN line. You need this information to determine if datafill problems cause the ISDN 2B1Q line to not work.
TEST ALM	Verifies the ability of the DMS-100 switch to detect and report loss of signal without an NT1 dying gasp

—continued—

MAP commands, options, and activities (continued)

Command	Option and activity
TEST COLDST	Implements the cold start test. The cold start test checks the ability of the ISDN 2B1Q line card to train the echo cancellers and equalizers to an NT1. This test checks the ability of the line card to train echo cancellers and equalizers to an NT1 over a maximum length in 15 s.
TEST DCSIG	Implements the NT1 signature test. This command measures the direct current metallic termination characteristic of the NT1.
TEST DET	Implements the performance monitoring test. This command checks the ability of the ISDN 2B1Q line card to detect the following errors for a specified direction of transmission: • bit block errors • errored seconds • severly errored seconds
TEST ILOSS	Implements the measurement of insertion loss test. This command implements the measurement of insertion loss on an ISDN 2B1Q digital subscriber loop.
TEST IMP	Implements the impulse noise measurement test. This command implements the measurement of impulse noise on an ISDN 2B1Q digital subscriber loop.
TEST NSE	Implements the measurement of wideband noise interference test. This command implements the measurement of wideband noise interference on an ISDN 2B1Q digital loop subscriber.
TEST SCUR	Implements the sealing current measurement test on an ISDN 2B1Q line card. During this test, the system applies sealing current continuously while the test equipment verifies that the current is within the acceptable range.

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MAP commands, options, and activities (continued)

Command	Option and activity
TEST THR	Implements the performance monitoring threshold test. This command checks the ability of the ISDN 2B1Q line card to report threshold crossings for the following errors for a specified direction of transmission: • bit block errors • errored seconds • severely errored seconds
TST-LPBK-ISDN	Performs bit error testing on an ISDN line card, and on the digital subscriber loop to the NT1
TST-PM	Checks the ability of the ISDN 2B1Q line card to detect the following errors for a specified direction of transmission: • bit block errors • errored seconds • severely errored seconds
TST-QISDN	Performs loop measurements on the ISDN 2B1Q digital subscriber loop
TST-THRS	Checks the ability of the ISDN 2B1Q line card to report threshold crossings for the following errors for a specified transmission of transmission: • bit block errors • errored seconds • severely errored seconds
—end—	

RSC-S Layer 1 Performance Monitoring

Feature AF4842 (RSC-S Layer 1 Performance Monitoring) provides the following layer 1 performance monitoring capabilities to the RCO2:

- Bd-channel logical loopback
- DCH performance OMs
- layer 1 performance monitoring
- multipoint embedded operations channel (EOC)

Note: Refer to the *Operational Measurements Reference Manual* for information on DCH OMs.

Bd-channel logical loopback

Bd-channel logical loopback provides logical loopback capability between a DCH and the PH in the DPN. The Bd-channel logical loopback allows you to place the P-side link of a logical terminal into a loopback mode. A logical loopback helps to determine if a fault is present inside or outside the DCH.

This loopback is asserted at the DCH end of the connection and not at the PH end of the connection. When you implement the logical loopback for a logical terminal, the DCH loops back the test frame or test packet received from the PH. Use the LTID for that logical terminal to accomplish this loopback. The LTID of a logical terminal identifies that logical terminal.

Use a command at the LTPISDN level of the MAP display to place the P-side of a logical terminal in the logical loopback mode. When you perform this action, the DCH makes sure that the logical terminal cannot use that P-side link to establish new packet-switched virtual calls (SVC). The DPN PH drops any active SVCs on the P-side link before you place the P-side link in the loopback mode. The DPN PH also drops current permanent virtual circuits (PVC) on the P-side link while the P-side link is in the loopback mode.

The logical terminal can send link access procedure on D-channel (LAPD) frames when

- the P-side link of the logical terminal is not in a logical loopback mode
- the DPN PH logically enabled the P-side link

The system brings the P-side link out of the loopback mode when one of the following events occurs:

- the associated loopback timer for the logical timer expires
- you implement the LTLOOPBK command at the LTPISDN level of the MAP display

If the PH sends any LAPD frames on the LTID, the system loops the frames back to the PH.

Note 1: The loopback timer is one of the parameters entered when you place the P-side link of the logical terminal in the logical loopback mode.

Note 2: This feature does not support an attempt to logically loop back the P-side link of a logical terminal. The logical terminal stops on a DMS switch PH.

Emergency stand-alone effects In ESA, SWACT, and restart conditions, the result of loopback maintenance is not known. Remove all Bd-channel loopbacks before or after these maintenance activities.

Layer 1 performance monitoring

Layer 1 performance monitoring provides layer 1 monitoring capabilities for a 2B1Q loop. Layer 1 monitoring monitors performance of the following:

- cyclic redundancy checks (CRC)
- block error events
- loop conditions like synchronization, signal presence, and NT1 power status.

Performance monitoring monitors loop status on a per-loop and per-office basis. Performance monitoring also can set one of 16 performance monitoring threshold sets for a 2B1Q loop. This section describes monitoring capabilities.

Monitoring capabilities

Monitoring capabilities can use logs on a per-loop and per-office basis to enable or disable the reporting of performance monitoring alerts and status alarms.

Loop status monitoring permits loops to report the following abnormal layer 1 conditions:

- loss of synchronization word (LOSW)
- loss of signal with no dying gasp (LOS)
- loss of signal with dying gasp (LOSDG)
- change of NT1 test mode (NTM)
- S/T interface synchronization lost (TSYNC)
- performance monitor reporting (PERF)

The following capabilities handle performance monitoring data:

- The capability to define up to 16 performance monitoring threshold sets. Subscriber loops use these sets to generate alerts. Each set contains up to four thresholds, which are listed below:
  - — errored seconds—hourly (1 through 4095)
  - — errored seconds—daily (1 through 16383)
  - — severely errored seconds—hourly (1 through 4095)
  - — severely errored seconds—daily (1 through 16383)

Note: An errored second is one or more CRC problems in a single direction of transmission during a 1 s interval. A severely errored second is three or more CRC problems in a single direction of transmission during a 1 s interval.

- The capability to set one of 16 known threshold sets to any 2B1Q loop. Performance monitoring thresholding on a per-loop basis is provided for but not limited to prethreshold set values. The system delivers threshold data to line card hardware. The system preserves the threshold information of each loop over a BCS application.

  Note: The system generates a log when the following event occurs. A threshold parameter for far- and near-end block error meets or exceeds the threshold level on an ISDN line card. Near-end refers to the parameters collected for the NT1 to ISDN line card of data transmission on a U-loop. Far-end refers to the parameters collected from the opposite direction of transmission.

- the capability for the time-of-day (TOD) reference clock of each 2B1Q loop to synchronize with the master clock of the DMS-100 switch
- the capability to detect and correct threshold and TOD values on line cards. A periodic per-line audit detects and corrects thresholds.
- the 2B1Q diagnostic functionality, which you implement from the MAP display, verifies threshold levels in the ISDN line card

Tables added or modified for layer 1 performance monitoring

Tables BLMTHRSH and LNTHRSH are added to support 2B1Q lines off an RCO2.

Table BLMTHRSH helps define threshold combinations for 2B1Q loops. Table LNTHRSH preserves threshold and alarm reporting data over a BCS application for 2B1Q and S/T loops. There is an entry for each 2B1Q loop with a nondefault threshold combination or nondefault alarm reporting capability.

Table Office Variable (OFCVAR) controls the default alarm reporting status of datafilled loops. The following OFCVAR parameters support 2B1Q lines off an RCO2:

- ISDN_PERFORMANCE_MON_ALARM controls reports of performance monitoring log LINE131 on an each office basis
- ISDN_LOSS_OF_SYNC_WORD_ALARM controls reports of layer 1 loss of sync
- ISDN_LOSS_OF_SIG_NO_DGASP_ALARM controls reports of 2B1Q loops of layer 1 loss of signal without dying gasp on an each office basis

- ISDN_LOSS_OF_SIG_DGASP_ALARM controls reports of 2B1Q loops of layer 1 loss of signal with dying gasp on an each office basis
- ISDN_NT1_TEST_MODE_ALARM controls reports of 2B1Q loops of NT1 test mode on an each office basis
- ISDN_T_SYNC_LOST_ALARM controls reports of 2B1Q and S/T loops of T-SYNC on an each office basis

Emergency stand-alone effects Any data changes that occur while the RSC-S is in ESA are not guaranteed in the subtending nodes of the remote after a warm ESA exit. Communications are restored with the host office. The state of the RSC-S can only be equivalent to the state that was present before the RSC-S entered ESA.

Table BLMTHRSH contains 16 PM threshold sets. These values do not change often. It is less probable that these values will change while the RSC-S is in ESA. If the data of the LCME is not updated with the changed data, the lines off of the LCME use old threshold values.

Table LNTHRSH contains lines that do not use default values. If you perform any changes on a line while the RSC-S is in ESA, the line continues to use the old value or default value. An audit corrects any mismatches between ISDN line cards and the CC. The LCDI_SYNC_BURST and LCDI_SYNC_DELAY office parameters in table OFCENG determine the frequency of this audit. To disable this audit, set the LCDI_SYNC_BURST office parameter to zero. Do not disable this audit. The system generates a LINE148 log if the audit detects and corrects any mismatches.

The following is the current procedure to restore all the data in the RSC-S and the subtending nodes of the RSC-S. Normally, you must not use this procedure to update LCME data after an ESA warm exit. The use of this procedure depends on the data that changed during ESA. Operating company personnel must determine if the changed data requires an update in the LCME.

Updating the LCME data after ESA warm exit

1 Wait for the inactive unit of the RSC-S to RTS. The active RSC-S unit does not get a copy of the static data of the current CC. The inactive RSC-S unit undergoes a full RTS. The system updates static data.

2 Perform a SWACT on the RSC-S. This SWACT switches activity between the active and inactive units. The previously active unit becomes inactive and undergoes a complete initialization. The system downloads static data.

3 For each LCME attached to the RSC-S, busy and RTS each unit in sequence. These actions allow the other unit to take over call processing during the busy and RTS procedure. This process makes sure that the system downloads all new data to both units of the PM.

4 This procedure is complete.

Multipoint embedded operations channel

Multipoint embedded operations channel (EOC) permits operating company personnel do the following:

- determine the multipoint EOC configuration of a 2B1Q loop
- perform diagnostics on 2B1Q lines equipped with multipoint EOC
- set and release a B1, B2, or 2B+D loopback at any of the multipoint EOC nodes

The EOC was originally proposed for the digital subscriber line to give access to needed operations functionality in the NT1. The following EOC configurations are possible:

- standard EOC
- multipoint EOC

Standard EOC

The standard EOC defines the operations interface that the system uses to send operation messages across the customer to network interface. Standard EOC is point-to-point EOC. Point-to-point EOC occurs when only two end nodes access the EOC. When you use point-to-point capability, the NT1 directly connects to the ISDN line card. The associated channel between the ISDN line card and the NT1 used for OAM purposes is the point-to-point EOC channel. The EOC channel conducts exercises similar to logical loopback on each B-channel or all of the 2B+D loop.

Multipoint EOC

Multipoint EOC occurs when additional nodes are placed on the 2B1Q loop between the ISDN line card and NT1. These additional nodes access the same EOC and allow the transport of basic rate 2B+D information over a T1 span line. Additional nodes pass unaltered EOC signals from a digital subscriber line to a digital carrier facility. These nodes also pass unaltered signals from a digital carrier facility to a digital subscriber line. The additional nodes can monitor information on an ISDN line card and store errors of various types.

Data transfer takes place between these nodes and the ISDN line card through enhanced EOC messaging. This messaging allows the DMS-100 switch to monitor the performance of an ISDN loop at a specified node. This messaging also allows the DMS-100 switch to instruct a node to set a loopback on a specified channel. The EOC specification for multipoint EOC builds on the point-to-point EOC specification. There can be from one to six multipoint EOCs on a 2B1Q line.

Note: Different from point-to-point EOC, loopback can occur at different points in the loop with multipoint EOC.

The following capabilities are provided with multipoint EOC:

- a table that can list all 2B1Q loops with multipoint EOC nodes

  Note: The name node also refers to line unit.

- determines the multipoint EOC configuration of the loop
- enhances SUSTATE and QLEN commands to display multipoint EOC configurations and status information
- performs diagnostics on 2B1Q lines equipped with multipoint EOC line units
- sets and releases a B1, B2, or 2B+D loopback at any multipoint EOC node

A 2B1Q loop has multipoint capability when the LEN and the number of nodes in the loop are in table LNMPEOC. Table LNMPEOC supports 2B1Q lines off an RCO2. Multipoint EOC messages from the LCME automatically datafill table LNMPEOC. Only the user reads table LNMPEOC. The LENs that support multipoint EOC are in sequential order. All 480 lines on an LCME can support multipoint EOC capability. The system maintains multipoint EOC data in table LNMPEOC over all restarts and BCS applications.

When multipoint hardware is placed on a loop, the LCME detects this change and reports to the computing module (CM). An audit in the LCME

reports this detection of hardware. The audit cycles through all 2B1Q loops on an LCME and checks for multipoint EOC nodes. When the CM receives this message, the system validates the data and adds a tuple to table LNMPEOC. The system generates a LINE149 log that states the loop contains multipoint EOC nodes. When a change to the multipoint EOC configuration of a loop occurs, the LCME informs the CM. The system applies the change in table LNMPEOC. The system generates a LINE149 log. The LCME performs a second audit to make sure that multipoint EOC between the LCME and the CM is accurate.

The time required to poll a multipoint EOC loop depends on the location of the loop within the LCME. With a logical drawer completely equipped with 2B1Q loops, the audit can require up to 8 min. The audit requires up to 8 min to detect a change in the multipoint EOC configuration. Spread the 2B1Q loops evenly across all logical drawers so that any 2B1Q loops can be reported in the same time period.

Note: The system releases multipoint EOC physical loopbacks and returns the loop to the idle state with restarts.

Emergency stand-alone effects

The system maintains any loopback set before to ESA entry on ESA exit. The loop remains manually busy (ManB). If you add or delete multipoint EOC line units from a LEN while the RSC-S is in ESA, you affect the following:

- line diagnostics
- the output that displays from the SUSTATE command

The QLEN command gets information from CC and is not affected.

The following are examples of what appears at the MAP display when different loopbacks are set and released at a multipoint EOC line unit.

The following is an example of the LTPdata MAP display of an ISDN loop. A user set the B1 loopback at multipoint EOC line unit 3 with the following command:

>LOOPBK MPLU 3 B1

Example of LOOPBK MPLU 3 B1 MAP display

```
   CM      MS    IOD     NET      PM     CCS     LNS     Trks     Ext     APPL
    .      .      .       .       .      .       .     10 GC     .       .
                                                          *C*
LTPDATA
 1  Quit_     POST          DELQ              BSYQ    PREFIX
 2  Post_
 3              LCC PTY RNG     .LEN DN       STA     F S LTA  TE   RESULT
 4  Equip_    ISDN    LOOP     HOST 67 0 08 15      7226345   MB     .
 5  Connect_
 6  Sustate
 7  LoopBk_
 8  BERT
 9
10  BPVO_
11  Hold          Bl      Loopback activated at MPLU 3
12  Next_
13
14
15
16
17
18
```

The following is an example of the LTPdata MAP display of an ISDN loop. A user set the B1 loopback at multipoint EOC line unit 3 and issued a loopback query. To query this loopback, the user issued the following command:

>LOOPBK QUERY

Example of LOOPBK QUERY MAP display

```
   CM     MS   IOD    NET     PM    CCS    LNS    Trks    Ext    APPL
    .      .     .      .      .     .      .    10 GC    .       .
                                                   *C*
LTPDATA
 1  Quit_    POST         DELQ             BSYQ   PREFIX
 2  Post_
 3          LCC PTY RNG  .....LEN...... DN   STA    F S LTA TE RESULT
 4  Equip_   ISDN    LOOP     HOST 67 0 08 15     7226345   MB     .
 5  Connect_
 6  Sustate
 7  LoopBk_
 8  BERT
 9
10  BPVO_
11  Hold          Bl   Loopback on HOST 67 0 08 15   722 6345 at MPLU 3
12  Next_
13
14
15
16
17
18
```

The following figure is an example of the LTPdata MAP display of an ISDN loop. A user released a B1 loopback from multipoint EOC line unit 3. To release this loopback, the user issued the following command:

>LOOPBK RLS

Example of LOOPBK RLS MAP display

```
   CM     MS   IOD    NET     PM    CCS    LNS    Trks    Ext    APPL
    .      .     .      .      .     .      .     10 GC    .       .
                                                   *C*
LTPDATA
 1  Quit_    POST         DELQ             BSYQ   PREFIX
 2  Post_
 3          LCC PTY RNG  .....LEN...... DN   STA    F S LTA TE RESULT
 4  Equip_   ISDN    LOOP     HOST 67 0 08 15     7226345   IDL    .
 5  Connect_
 6  Sustate
 7  LoopBk_
 8  BERT
 9
10  BPVO_
11  Hold         Bl   Loopback at MPLU 3 released
12  Next_
13
14
15
16
17
18
```

The following figure is an example of the LTPdata MAP display of an ISDN loop. A user set a 2B+D loopback at multipoint EOC line unit 6. To set this loopback, the user issued the following command:

>LOOPBK MPLU 6 BBD

Example of LOOPBK MPLU 6 BBD MAP display

```
   CM     MS   IOD    NET     PM    CCS    LNS    Trks    Ext    APPL
    .      .     .      .      .     .      .     10 GC    .       .
                                                   *C*
LTPDATA
 1  Quit_    POST          DELQ              BSYQ   PREFIX
 2  Post_
 3          LCC PTY RNG  .....LEN...... DN   STA    F S LTA TE RESULT
 4  Equip_   ISDN    LOOP     HOST 67 0 08 15     7226345   MB     .
 5  Connect_
 6  Sustate
 7  LoopBk_
 8  BERT
 9
10  BPVO_
11  Hold          Bl   Loopback activated at MPLU 6
12  Next_
13
14
15
16
17
18
```

Ring pretrip on LCM lines

A ring pretrip is a premature ring trip. It is a false indication that the ringing phone was answered.

In NA009, the PRETRIP nonmenu command is added to the LCM level. The PRETRIP command provides operating company personnel the

- option to enable or disable pretrip log reports on the posted LCM or all LCMs in the posted set
- option to enable or disable extension of the ring trip filter timing on all 4FR lines on the posted LCM or all LCMs in the posted set
- ability to query the status of the two previous pretrip options

Note: When a new LCM tuple is entered in table LCMINV, the value for LOGS and 4FR are set to DISABLE by default.

In response to the command string HELP PRETRIP, the command syntax is displayed at the MAP terminal as follows.

```
>help pretrip
PRETRIP : AVAILABLE RINGING PRETRIP OPTIONS
    LOGS: Enable/Disable Pretrip LOG Reporting for
          the posted PM or posted set of PMs.
    4FR:  Used to reduce Ring Pretrip occurrences on
          long loop length 4FR lines.  Enabling this
          command results in extension of the Ring
          Trip filter timing for ALL lines serviced
          by the posted PM or posted set of PMs.
 Query:   Displays the status of Pretrip options
Parms: <OPTION>     {LOGS     <ACTION>  {ENABLE   [<OPTION> {ALL}],
                                          DISABLE   [<OPTION> {ALL}]} [<NOWAIT>{NOWAIT}],
                    4FR       <ACTION> {ENABLE    [<OPTION> {ALL}],
                                          DISABLE   [<OPTION> {ALL}]} [<NOWAIT> {NOWAIT}]
                    QUERY}
```

Pretrip log reports

Pretrip log reports are enabled or disabled for a posted LCM or all LCMs in the posted set. If the LCM is in service, the effect is immediate. Otherwise, the LCM is updated during the next RTS. You must enter one of the following actions with the command string PRETRIP LOGS.

- ENABLE – This enables recording of LINE113 log reports for the posted LCM when the system detects a pretrip.
- DISABLE – This prevents any LINE113 log reports from being generated when the system detects a pretrip on a posted LCM.

You can enter the following optional parameters with either of the previous actions.

- ALL – This results in the selected action being applied to all LCMs in the posted set.
- NOWAIT – This option prevents waiting for confirmation that the command has been completed.

For example, to record LINE113 logs for all pretrips detected on all LCMs in the posted set, activate the logs feature by typing

>PRETRIP LOGS ENABLE ALL

and pressing the Enter key.

When a pretrip occurs and the pretrip logs are enabled, a LINE113 log is output. An example of a LINE113 log follows.

```
LINE113  JAN27 09:14:14 6220 TBL
   KRCM 03 0 19 04    DN 6195441578
   TROUBLE CODE = RINGING_FAILED
   RINGING TROUBLE = PRETRIP
   CALLID = 98776
```

When a pretrip occurs on a line that connects to an LCM, a LINE138 log is output. A LINE138 log identifies the call that was routed to a treatment. An example of a LINE138 log follows.

```
LINE138 JAN27 09:14:14 6321 INFO TRMT
   KRCM 03 0 00 08    DN 6195441579
   TREATMENT SET = SYFL   CALLED NO = 5441578
   CALLID= 01D8 0003
```

After two pretrips occur, the line is scheduled for a diagnostic. If the diagnostic fails, a LINE101 log is generated. An example of a LINE101 log follows.

```
LINE101 JAN27 09:16:05 3782 FAIL LN_DIAG
   KRCM 03 0 01 06    DN 6195441586
   DIAGNOSTIC RESULT  Ringing Failed Pre Trip
   ACTION REQUIRED  Chk Ringing
   CARD TYPE  6X17AC
```

Pretrip on 4FR lines

The command string PRETRIP 4FR ENABLE is used to reduce ring pretrip occurrences on long loop length 4FR lines served from the posted LCM or all LCMs in the posted set. The effect of this command is not immediate and will not be realized until the next RTS of the LCM. You must enter one of the following actions with the command string PRETRIP 4FR.

- ENABLE – This extends 4FR line ring filter timing.
- DISABLE – This returns to non-extended 4FR line ring filter timing.

The following optional parameters can be entered with either of the previous actions.

- ALL – This results in the selected action being applied to all LCMs in the posted set.
- NOWAIT – This option prevents waiting for confirmation that a command has been completed.

For example, entend 4FR line ring filter timing for all LCMs in the posted set by typing

>PRETRIP 4FR ENABLE ALL

and pressing the Enter key.

Display status of pretrip options logs and 4FR

Display the status of options LOGS and 4FR by typing

>PRETRIP QUERY

and pressing the Enter key.

An example of a system response to the PRETRIP QUERY command string follows.

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

LCM                SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit        PM    0        0        2        0        2         42
 2 Post_       LCM   0        0        0        0        2          9
 3 ListSet
 4 SwRG     LCM  HOST 00 0  InSv     Links_OOS:  CSide  0   PSide   0
 5 Trnsl_   Unit0:   InSV                /RG: 1
 6 Tst_     Unit1:   InSV                /RG: 1
 7 Bsy_                                  11  11  11  11  11  RG:Pref 1 InSV
 8 RTS_     Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 Insv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_  pretrip query
11 Disp_    LCM HOST 00 0 – PRETRIP LOGS are DISABLED
12 Next                     PRETRIP 4FR is DISABLED
13
14 QueryPM
15
16
17
18
```

Product-specific test tools

The test tools provided for XPMs also apply to the components of the RSC-S.

Real-time Performance Monitoring for NTMX73AA and NTMX76AA

Feature AF4903 (Real-time Performance Monitoring for NTMX73AA and NTMX76AA) supplies real-time performance information about the following:

- the PCM Signaling circuit card (NTMX73AA)

- the Message Processor and Tone Generator circuit card (NTMX76AA)

This information reflects real-time usage in each circuit card.

The performance tool provides information about performance and activity on posted peripherals. The data that this feature supplies appears at the performance level of the MAP display, sublevel PMact. The PMact sublevel provides information that indicates the processor activity within the posted peripheral. The PMACT sublevel divides the real time used into two categories. These categories are call processing occupancy and low priority background. These two categories apply to the UP and EISP.

Information for the NTMX73AA circuit card displays at the PMact sublevel. The information displays as the amount of time (in percent) spent in the interrupt level (call processing occupancy) during the last minute. Information for the NTMX76AA circuit card displays as the amount of time (in percent) used to communicate with the HDLC protocol during the last minute. The real time used for the NTMX73AA and NTMX76AA processors is not classified into categories which is different from information displayed for the UP and EISP. For both circuit cards, the average time provided is for the elapsed time from the start of the recording. If the elapsed time is greater than 15 min, the average time is provided for the last 15 min.

Refer to the following MAP examples.

An example of the command used to monitor the performance in RCO2 unit 1 follows:

>MAPCI;MTC;PM;POST RCO2 1;PERFORM;PMACT;START

The following is an example of the MAP display for the previous command.

Example of an RCO2 MAP display

```
 CM     MS   IOD    NET     PM    CCS    LNS    Trks    Ext    APPL
  .     .     .      .      .      .      .       .      .       .

PMAct                         Sysb  Manb  OffL  Cbsy   ISTb  InSv
 0  Quit    PM                   0     0     0     0      0     5
 2  Strt    RCO2                 0     0     0     0      0     1
 3  Strtlog
 4  Stoplog RCO2    1 InSv Links_OOS: CSide 0 PSide 0
 5  Stop    Unit 0: Act   InSv
 6          Unit 1: Inact InSv
 7          LOAD NAME:
 8          STATUS:          REASON:       LOGS:       TIME:xx:xx:xx
 9                         UP AVG  ISP AVG  SIGP AVG  MX76 AVG
10
11          CALL PROCESSING xxx    xxx  xxx  xxx   xxx xxx  xxx xxx
12          LOW PRIO BGND    xxx xxx  xxx xxx
13                          ORIG    ORIGAVG   TERM  TERMAVG
14                            xxx       xxx   xxx      xxx
15                          AVAIL       INUSE  HIGH
16          PS_CHNL         xxx           xxx   xxx
17          UTR             xxx            xxx   xxx
18
```

An example of the command used to monitor the performance in LTC unit 1 follows:

>MAPCI;MTC;PM;POST LTC 1;PERFORM;PMACT;START

The following is an example of the MAP display for the previous command.

Example of an LTC MAP display

```
 CM     MS   IOD    NET     PM    CCS    LNS    Trks    Ext    APPL
  .     .     .      .      .      .      .       .      .       .

PMAct                         Sysb  Manb  OffL  Cbsy   ISTb  InSv
 0  Quit    PM                   0     0    0     0      0     5
 2  Strt    LTC                  0     0    0     0      0     1
 3  Strtlog
 4  Stoplog  LTC    1 InSv Links_OOS: CSide 0 PSide 0
 5  Stop     Unit 0: Act   InSv
 6           Unit 1: Inact InSv
 7           LOAD NAME:
 8           STATUS:          REASON:        LOGS:       TIME:xx:xx:xx
 9                           UP AVG         ISP AVG    MX76 AVG
10
11           CALL PROCESSING xxx xxx   xxx  xxx   xxx xxx  xxx xxx
12           LOW PRIO BGND   xxx xxx   xxx  xxx
13                          ORIG    ORIGAVG   TERM  TERMAVG
14                            xxx       xxx   xxx      xxx
15                          AVAIL       INUSE  HIGH
16           PS_CHNL          xxx          xxx   xxx
17           UTR              xxx           xxx   xxx
18
```

Troubleshooting chart

This chapter contains tables to help troubleshoot conditions that cause alarms in the Remote Switching Center-SONET (RSC-S). This chapter contains separate tables for each RSC-S component that includes the remote center offshore #2 (RCO2) or RCO2 with integrated services digital network (ISDN). These tables also provide line concentrating modules (LCM) or enhanced line concentrating modules (LCME), and the remote maintenance module (RMM).

The following table lists the possible cause and action to take to clear LCM or LCME alarms.

Clearing a RSC-S alarm for an LCM or an LCME

Alarm condition	Possible cause	Action
Critical	Indicates the number of system busy (SysB) or central–side busy (CBsy), LCM (or LCME) units.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCME critical alarm. 2 Check for any peripheral module (PM), ISDN, or LINE logs that indicate problems in the LCM or LCME. 3 Check any operational measurements (OM) that can indicate problems in the LCM or LCME.

—continued—

Clearing a RSC-S alarm for an LCM or an LCME (continued)

Alarm condition	Possible cause	Action
Critical (contd)	LCM or LCME ringing generators (RG or LCMERG) are in-service trouble (ISTb).	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM/LCME critical alarm. 2 Check for any PM, ISDN, or LINE logs that can indicate problems in the LCM or LCME. 3 Check any OMs that can indicate problems in the LCM or LCME.
Major	Indicates number of ISTb or SysB, LCM (or LCME) units.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures.* Follow the procedure to clear an LCME major alarm. 2 Check for any PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3 Check any OMs that indicate problems in the LCM or LCME.

—continued—

Clearing a RSC-S alarm for an LCM or an LCME (continued)

Alarm condition	Possible cause	Action
Major (contd)	One of the two RGs in an LCM (or LCME) is ISTb.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM/LCME(RG) major alarm. 2 Check for any PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3 Check any OMs that indicate problems in the LCM or LCME.
Minor	Indicates the number of LCMs or LCMEs that are ISTb.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCME minor alarm. 2 Check for any PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3 Check any OMs that indicate problems in the LCM or LCME.
—end—		

The following table lists the possible cause and action to take to clear RCO2 or RCO2 with ISDN alarms.

Clearing a RSC-S alarm for an RCO2 or an RCO2 with ISDN

Alarm condition	Possible cause	Action
Critical	Indicates SysB or CBsy, RCO2 (or RCO2 with ISDN) units. Loss of subscriber service occurs.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCO2 or RCO2 with ISDN critical alarm. 2 Refer to *Recovery Procedures* and follow the procedures to recover an RCO2. 3 Check for any emergency stand-alone (ESA) or PM logs, or both, that indicate problems in the RCO2. Refer to logs ESA101–ESA109, PM181 and PM171. For dual RCO2 (DRCO2), check for any PM logs that associate with dual ESA (DESA). Refer to logs PM221–PM223 and PM189. The DRCO2 configuration becomes available in a future batch change supplement (BCS) release. 4 When ISDN is present, check for any ISDN logs or LINE logs that indicate problems in the RCO2. Refer to logs ISDN100-ISDN109 and LINE131. 5 Check any OMs that indicate problems in the RCO2.

—continued—

Clearing a RSC-S alarm for an RCO2 or an RCO2 with ISDN (continued)

Alarm condition	Possible cause	Action
Critical	The RCO2 is in ESA. Communication to the CC in the host switch is not available.	Proceed as follows: 1 Refer to *Recovery Procedures*. Follow the procedures to recover an RCO2 in ESA. 2 Check for any ESA or PM logs, or both, that indicate problems in the RCO2. Refer to logs ESA101–ESA109, PM181 and PM171. For DRCO2, check for any PM logs that associate with DESA. Refer to logs PM221–PM223 and PM189. The DRCO2 configuration becomes available in a future BCS release. 3 Check any OMs that indicate problems in the RCO2.
Major	Indicates number of CBsy or SysB, RCO2 units. Does not affect subscriber service. Loss of subscriber service occurs when both RCO2s or units fail.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCO2 major alarm. 2 Check for any PM logs that indicate problems in the RCO2. 3 Check any OMs that indicate problems in the RCO2.

—continued—

Clearing a RSC-S alarm for an RCO2 or an RCO2 with ISDN (continued)

Alarm condition	Possible cause	Action
Minor	Alarm indicates number of ISTb RCO2 units. Does not affect subscriber service.	Proceed as follows: 1 Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCO2 minor alarm. 2 Check for any PM181 and PM128 logs that indicate problems in the RCO2. 3 Check any OMs that indicate problems in the RCO2.
—end—		

The following table lists the possible cause and action to take to clear RMM alarms.

Clearing a RSC-S alarm for an RMM

Alarm condition	Possible cause	Action
Major	Indicates number of SysB RMM units.	Refer to the *Alarm Clearing Procedures*. Follow the procedure to clear an RMM major alarm.
Minor	Indicates number of CBsy units.	Refer to the *Alarm Clearing Procedures*. Follow the procedure to clear an RMM minor alarm.

Advanced troubleshooting procedures

Advanced trouble locating procedures

Maintenance personnel can use advanced trouble locating procedures when normal troubleshooting procedures do not clear the problem. You can perform a PMRESET more than one time on the remote center offshore #2 (RCO2). If an error message occurs after each PMRESET attempt, you must use advanced troubleshooting procedures. If this condition occurs, use the advanced troubleshooting tool PMDEBUG.

Refer to the *PMDEBUG User Guide*, TAM-1001-004, for additional information.

Bigfoot utility

The Bigfoot utility stores information on diagnostics that passed and failed. The system implements feature AF5008, XPM REx Control and Trouble Notification Improvements. The Bigfoot utility maintains information on error logs that occurred as a result of diagnostics that failed. This utility improves debugging attempts. The diagnostics code maintains results graphs for each set of diagnostics that runs. The results graph contains data on each diagnostic test in diagnostics runs. The results graph identifies a diagnostic as passed, failed, not run, or test not defined.

Diagnostics results graph output

An example of the diagnostics results graph display output follows:

```
    <001>       CLASS       EVENT   CC TIME OF EVENT
        DIAG GRAPH (#0F)    #00     00:00:06:34:58

Diag_id =did_cmr_diag(#7) – CMR Card Diagnostics.
res_num=FF(P=Pass,F=Fail,N=Not Run|Test Undefined,O=Other)
Diag Results Graph: PFNNNNNNNNNNNNNNNNN
```

Powering up the RSC-S

Use this procedure with the components of the Remote Switching Center-Synchronous Optical Network (SONET), or RSC-S. Use this procedure when you take components of the RSC–S out-of-service and cut power to the components. The following steps are the reverse of a power-down procedure. In this procedure start with the central side (C-side) and work toward the peripheral side (P-side) of the RCO2.

Refer to the following procedure for instructions to power up the RSC-S.

1 To begin the first part of the RSC-S power-up procedure, post the C-side peripheral of the RCO2 to the RCO2. RTS the message links to the RCO2. Normally, you must busy these links when you power the RSC-S down.

2 Set the power switch to ON for one of the RCO2 units.

3 Set the reset button of this RCO2 unit, and at the same time, flip the associated circuit breaker (CB) to the up position. Release the CB. The CB must stay in the up position. If the CB does not stay in the up position, a problem is present in the power circuitry.

4 Repeat step 2 and step 3 for the other RCO2 unit.

5 Post the correct RCO2. The RCO2 must be offline.

6 Busy both units of the RCO2.

7 Load one of the RCO2 units. Make sure that you list the correct device like S01DPMLOADS. Make sure that you use the central control (CC) option. For example:

>LOADPM UNIT n CC

8 Return the unit to service. Do not use parameters. Make sure the RTS sequence includes diagnostics.

9 Return the other unit to service. Do not use parameters. Make sure the RTS sequence includes diagnostics.

10 Perform a switch of activity (SWACT). This action completes the first part of the RSC-S power-up procedure.

11 Begin the second part of the RSC-S power-up procedure. Set the CB on the frame supervisory panel (FSP) of one of the LCME/LCM units to ON. The CB must stay in the up position. If the CB does not stay in the up position, a problem is present in the power circuitry.

12 Repeat step 11 for the other LCME/LCM unit.

13 Post the first LCME/LCM.

14 Load one of the LCME/LCM units. Make sure that you list the correct device like S01DPMLOADS. Make sure that you use the CC option. For example:

>LOADPM UNIT n CC

15 Return the unit to service. Do not use parameters. Make sure the RTS sequence includes diagnostics.

16 Repeat step 14 and step 15 for the other LCME/LCM unit.

17 Repeat steps 11 through 16 until you return all LCME(s)/LCM(s) to service. This action completes the second part of the RSC-S power-up procedure.

18 Begin the third part of the RSC-S power-up procedure. Set the power switch on the NT2X09 power converter of the RMM to ON.

19 Press and hold the reset button of the power converter. At the same time, flip the associated CB to the up position. Release the CB and RESET switch. The CB must stay in the up position. If the CB does not stay in the up position, a problem occurs in the power circuitry.

20 Load the RMM. Make sure that you list the correct device like S01DPMLOADS. For example:

>LOADPM

21 Return the RTS to service. Do not use parameters. Make sure the RTS sequence includes diagnostics.

22 Repeat steps 18 through 21 if the RSC-S uses two RMMs.

23 Post the RCO2 and RTS all P-side PCM-30 links. Normally, the links must be busy when the RSC-S powers down.

24 This procedure is complete.

Powering down the RSC-S

The RSC-S is a separate switching system. Normally, you must not power down the RSC-S. If you power down the RCO2, If you power down the RCO2, loss of communication with other offices occurs. When a power-down procedure is necessary, use the following procedure.

To power down the RSC-S

1 Inform all appropriate personnel that you plan to perform a power-down procedure. Notify personnel at the host office and at offices that connect to the RCO2 over P-side trunks.

2 Busy all P-side peripheral modules (PM) off the RCO2. Include RMMs and line concentrating devices (LCD).

3 Offline all P-side PMs off the RCO2. Modules to offline include RMMs and LCDs.

4 Busy all P-side links off of the RCO2. Links to busy include PCM-30 links to other offices and the packet handler (PH).

5 Power down P-side PMs. Set the switch to the associated power converter units to OFF.

6 Busy the inactive unit of the RCO2.

7 Post the associated PCM-30 line group controller (PLGC). Busy the message link that connects to the busied RCO2 unit.

8 Power down the inactive unit of the RCO2. Set the power converter of the unit to OFF.

9 Busy the active unit of the RCO2. Override any warning.

10 Post the associated PLGC. Busy the message link that connects to the busied RCO2 unit.

11 Power down the formerly active unit of the RCO2. Set the power converter of the unit to OFF.

12 Post and Offl the whole RCO2.

13 This procedure is complete.

RSC-S routine maintenance procedures

This chapter contains the routine maintenance procedures for the Remote Switching Center-synchronous optical network (SONET) (RSC-S) for international applications. These procedures describe preventive maintenance tasks. These procedures are for maintenance engineering and field maintenance personnel. Maintenance engineering and field maintenance personnel perform these maintenance tasks at scheduled intervals.

Checking torque on grounding bolts

Application

Use this procedure to check the correct torque of grounding bolts.

Interval

Perform this procedure every month.

Common procedures

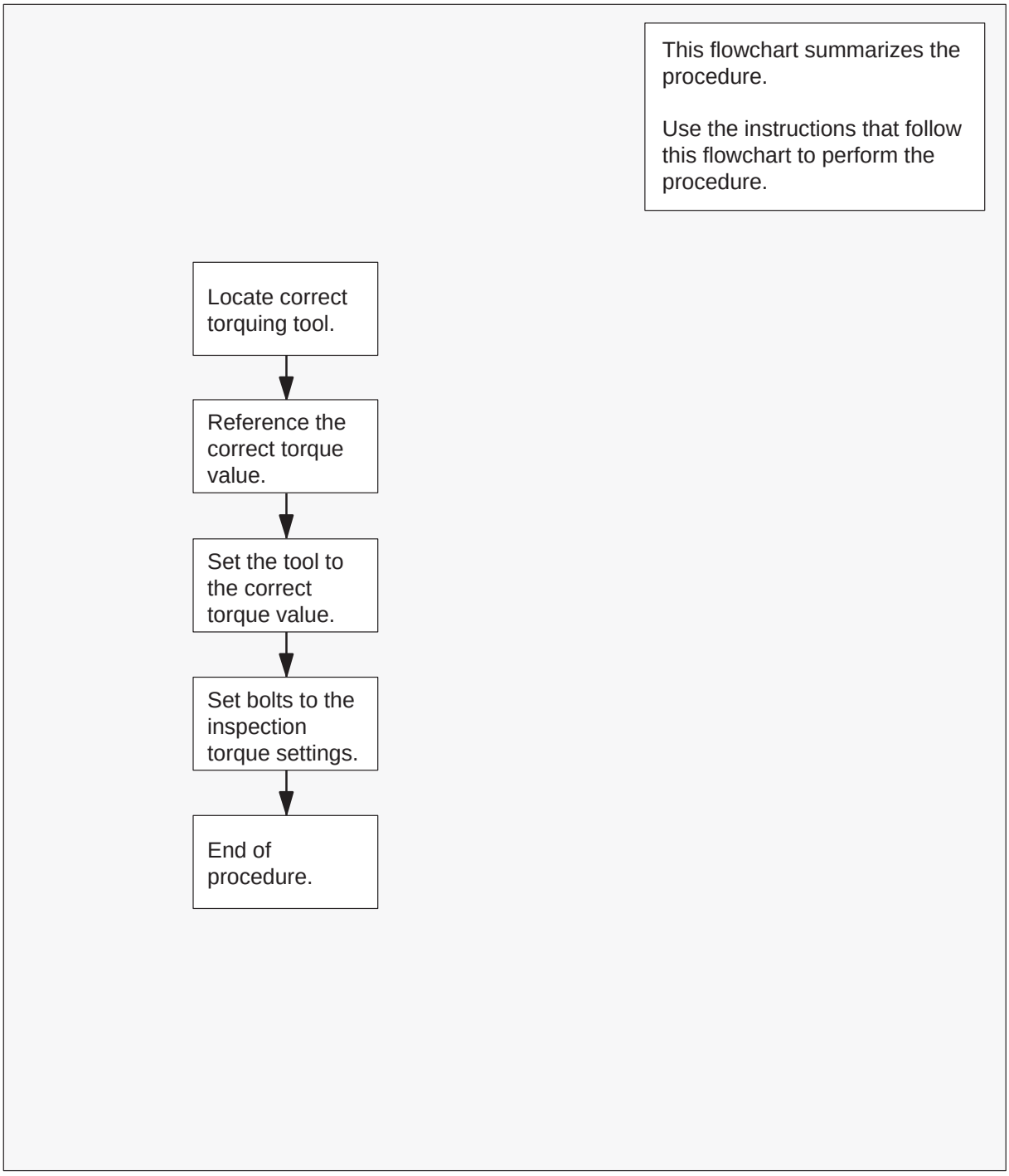
Does not apply

Action

This procedure contains a summary flowchart as an overview of the procedure. Follow the steps to perform this procedure.

Checking torque on grounding bolts
(continued)

Summary of checking torque on grounding bolts



Checking torque on grounding bolts
(end)

Checking torque on grounding bolts

At your Current Location

1 Locate the T9958 click-type preset torque wrench.

2 Align the small fractions on the edge of the handle with the center of the main torque scale.

3 To set the correct inspection torque value, turn clockwise to increase value or turn counter-clockwise to decrease value.

If grounding bolts are type	Do
1/4-20 backplane, –48 V ground first nut	step 4
1/4-20 backplane, –48 V ground second nut	step 5

4 Set inspection torque to 5 ft/lb. Proceed to step 6.

5 Set inspection torque to 25 in/lb.

6 Position the wrench on the grounding bolts and tighten to the specified inspection torque.

7 Return the T9958 torque wrench to the appropriate location.

8 The procedure is complete.

Replacing fan unit assemblies in the FSP

Application

Use this procedure to replace defective fan unit assemblies (NTMX2658) in the following cabinetized frames:

- Cabinetized Remote Switching Center (CRSC), NTMX89AA/BA
- Cabinetized Extension Module (CEXT), NTMX88AA/BA
- Cabinetized Line Concentrating Equipment (CLCE), NTRX30AA
- CLMI, NTRX30BA

Interval

Perform this procedure when a fan unit does not function. An illuminated fan fail indicator on the front of the frame supervisory panel (FSP) indicates a defective fan unit.

Common procedures

There are no common procedures.

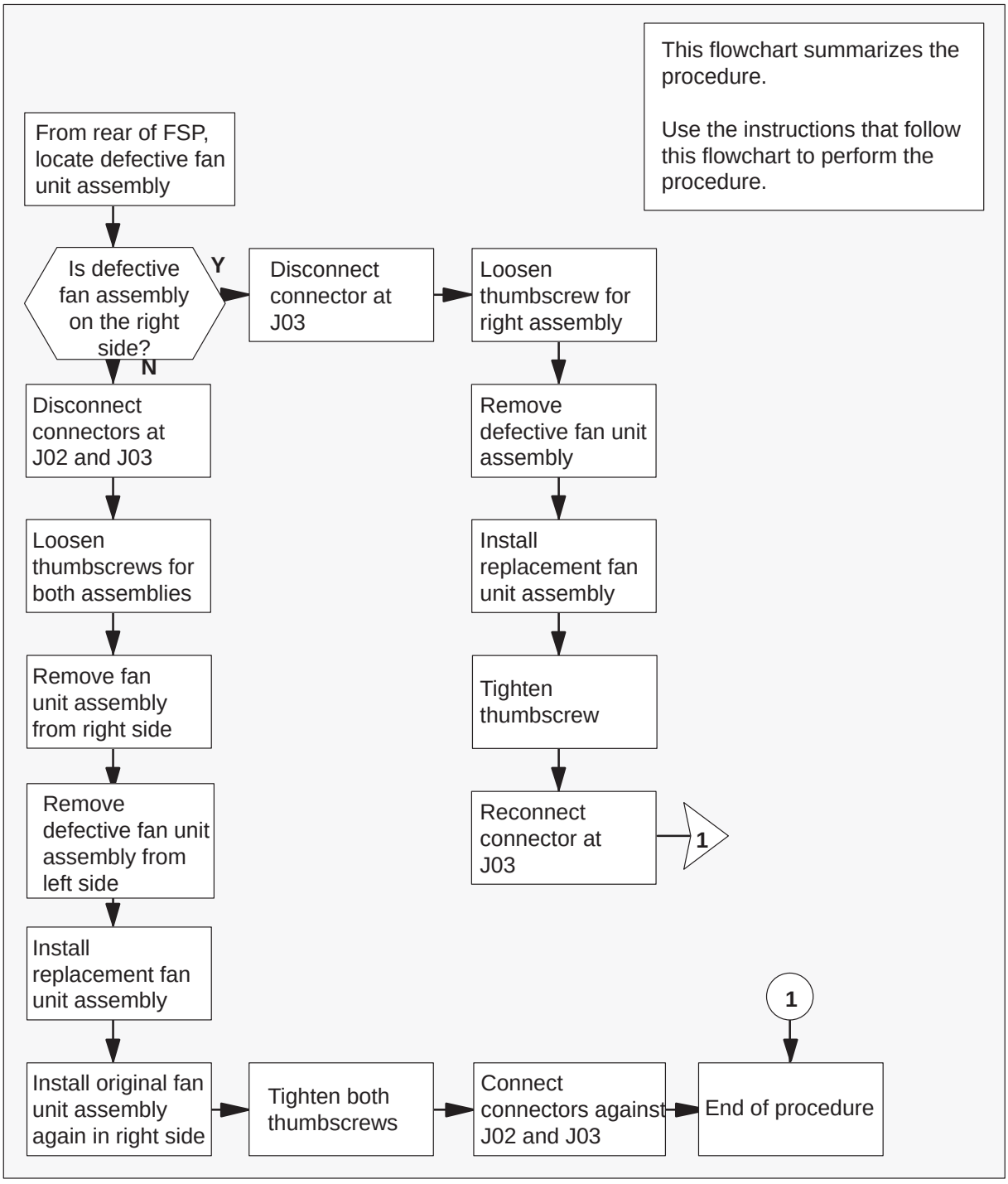
Action

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.

Replacing fan unit assemblies in the FSP

(continued)

Summary of Replacing fan unit assemblies in the FSP



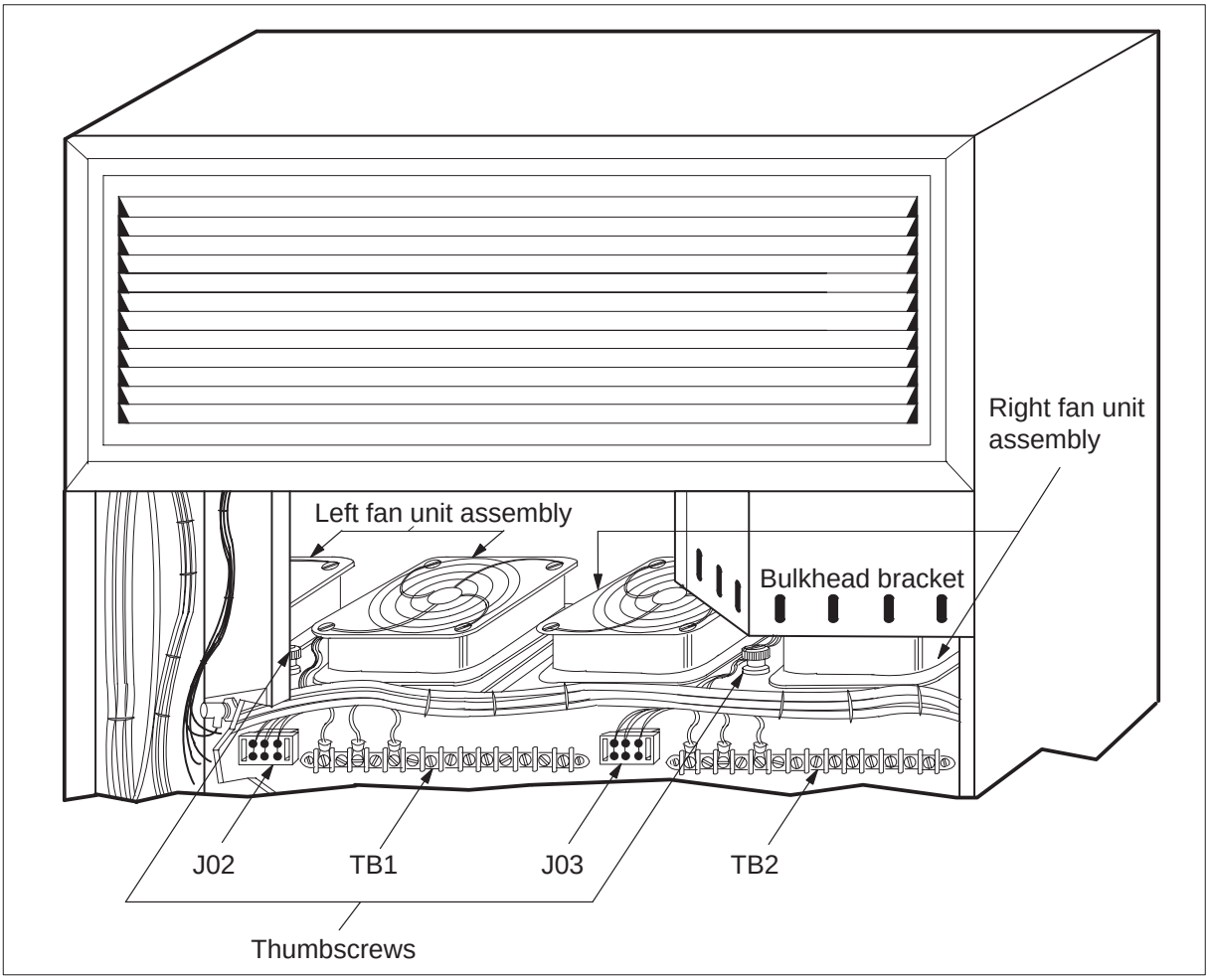
Replacing fan unit assemblies in the FSP
(continued)

Replacing fan unit assemblies in the FSP

At your Current Location

1 The fan fail indicator on the FSP indicates that one or more fan units is defective. To identify the defective fan unit, view the fan units from the rear of the FSP. Refer to the following diagram.

Note: If one fan unit in the fan unit assembly is defective, you must replace the complete fan unit assembly.



Note: The bulkhead bracket is not present on recent cabinets.

Replacing fan unit assemblies in the FSP
(continued)

2 Determine the fan unit assembly that requires replacement.

If the fan unit assembly	Do
on the right side requires replacement	step 3
on the left side requires replacement	step 13

3

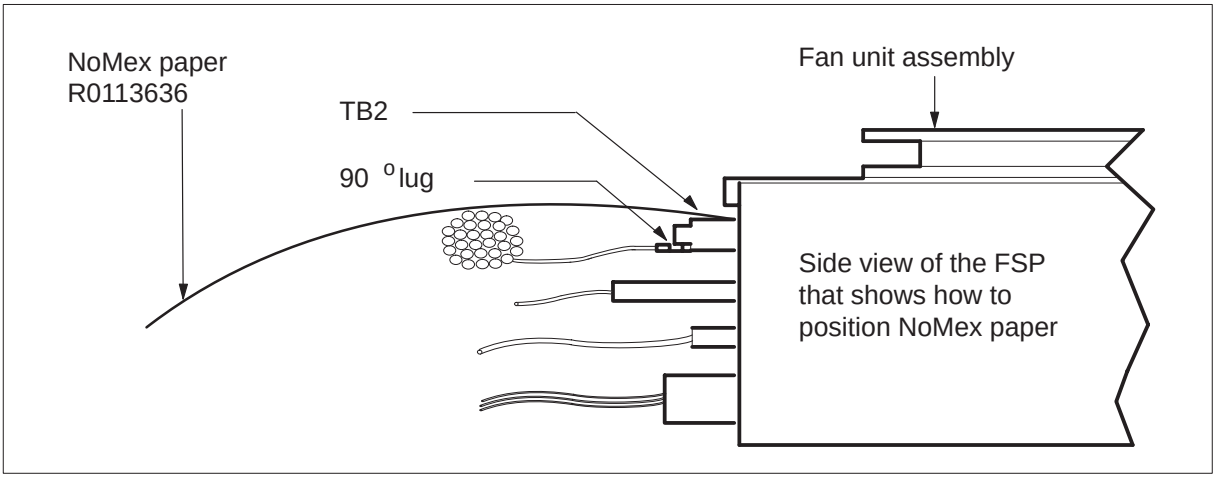
DANGER
High energy hazard
Personal injury can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

WARNING
Overheating, high energy hazard
Service interruption or damage to equipment can occur if the fans are off for more than 30 min. Interruption or damage can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

From the rear of the FSP, carefully unplug the connector from location J03.

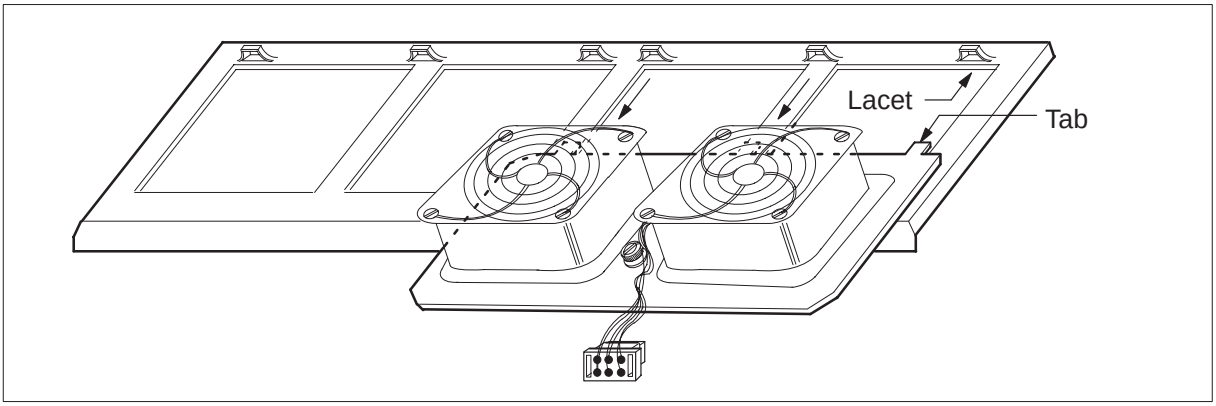
Replacing fan unit assemblies in the FSP
(continued)

4 Place a section of NoMex protective paper, part number R0113636, over the preformed cable and the terminal blocks. Refer to the following diagram. Use electrical tape or wire ties to secure the paper.



5 Loosen the thumbscrew that secures the right fan unit assembly to the base plate.

6 Slide the tabs on the right fan unit assembly (NTMX2658) away from the lacets on the fan base plate assembly. Details of tab and lacet assembly appear in the following diagram.



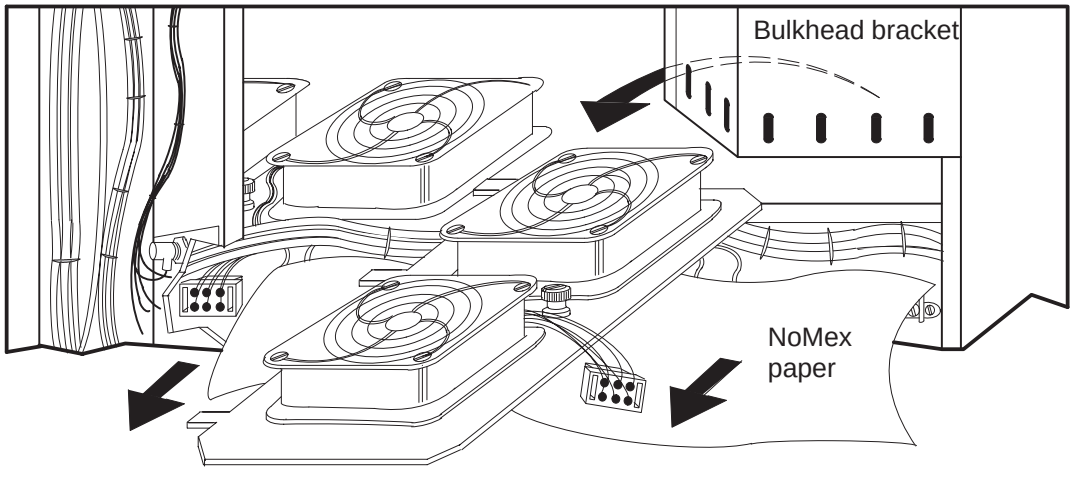
Replacing fan unit assemblies in the FSP
(continued)

7

DANGER
High energy hazard
Personal injury can occur if the fan unit assembly shorts the connections on the terminal blocks. Use terminal block safety covers or NoMex protective paper (part number R0113636) to prevent a short in the connections on the terminal blocks.

WARNING
High energy hazard
Service interruption or damage to equipment can occur if the fan unit assembly shorts the connections on the terminal blocks. Use terminal block safety covers or NoMex protective paper (part number R0113636) to prevent a short in the connections on the terminal blocks.

Carefully remove the fan unit assembly (NTMX2658). Refer to the following diagram.



Note: The bulkhead bracket is not present on recent cabinets.

Replacing fan unit assemblies in the FSP
(continued)

8 Carefully install the replacement fan unit assembly (NTMX2658). Slide the tabs into the lacets on the base plate assembly.

9

DANGER
High energy hazard
Personal injury can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

WARNING
Overheating, high energy hazard
Service interruption or damage to equipment can occur if the fans are off for more than 30 min. Interruption or damage can also result if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

Tighten the thumbscrew to secure the fan unit assembly to the base plate assembly.

10 Carefully connect fan connector again at J03.

11 Remove the NoMex paper.

12 Proceed to step 23.

Replacing fan unit assemblies in the FSP
(continued)

13

DANGER
High energy hazard
Personal injury can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

WARNING
Overheating, high energy hazard
Service interruption or damage to equipment can occur of the fans are off for more than 30 min. Interruption or damage can also result if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

To remove the defective fan unit assembly from the left side, remove the fan unit assembly from the right side. Perform steps 3 through 7 and proceed to step 14.

14 Carefully unplug the fan connector at J02.

15 Loosen the thumbscrew that secures the left fan unit assembly to the base plate.

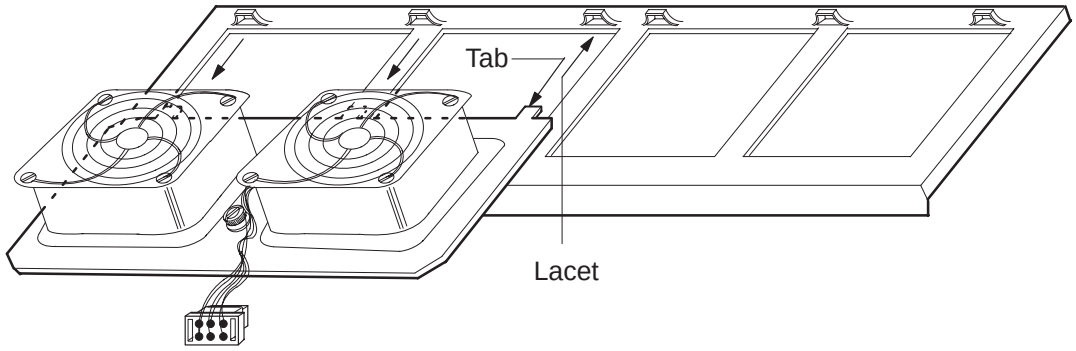
Replacing fan unit assemblies in the FSP
(continued)

16

DANGER
High energy hazard
Personal injury can occur if the fan unit assembly shorts the connections on the terminal blocks. Use terminal block safety covers or NoMex protective paper (part number R0113636) to prevent a short in the connections on the terminal blocks.

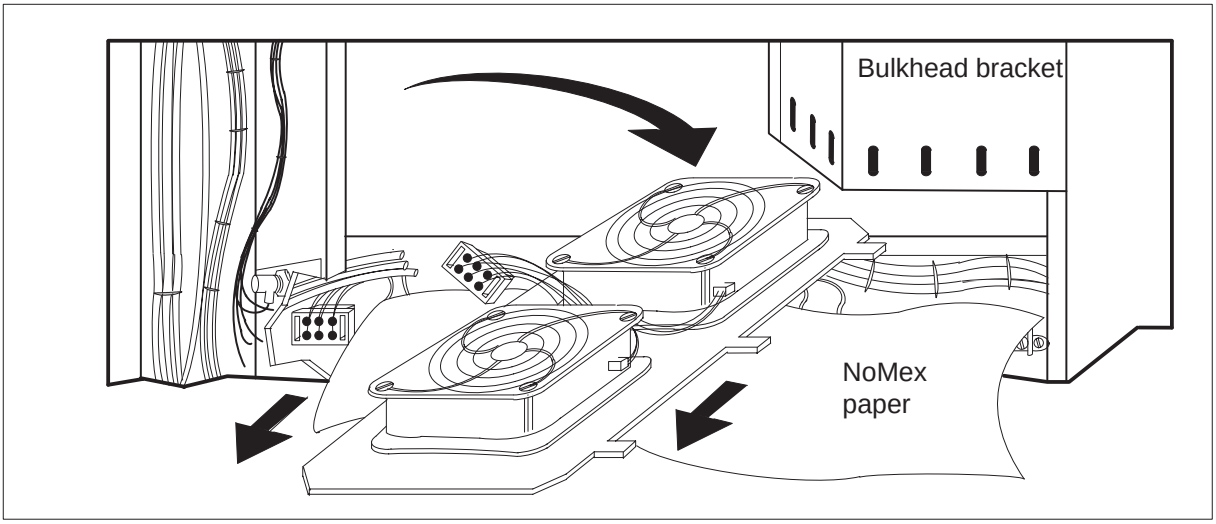
WARNING
High energy hazard
Service interruption or damage to equipment can occur if the fan unit assembly shorts the connections on the terminal blocks. Use terminal block safety covers or NoMex protective paper (part number R0113636) to prevent a short in the connections on the terminal blocks.

Slide the tabs on the left fan unit assembly (NTMX2658) away from the lacets on the fan base plate assembly. Refer to details of tab and lacet assembly in the following diagram.



Replacing fan unit assemblies in the FSP
(continued)

17 Carefully move the defective fan unit assembly (NTMX2658) around the bulkhead. Refer to the following diagram.



Note: The bulkhead bracket is not present on recent cabinets.

18 Carefully install the replacement fan unit assembly (NTMX2658). Slide the tabs into the lacets on the base plate assembly.

19 Carefully install the original fan unit assembly on the right side again. Slide the tabs into the lacets on the base plate assembly.

20 Tighten the thumbscrews to secure the two fan unit assemblies to the base plate assembly.

Replacing fan unit assemblies in the FSP
(end)

21

DANGER
High energy hazard
Personal injury can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

WARNING
Overheating, high energy hazard
Service interruption or damage to equipment can occur if the fans are off for more than 30 min. Interruption or damage can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

Remove the NoMex paper that covers the terminal blocks.

22 Carefully connect the two fan connectors at J02 and J03.

23 The procedure is complete.

Inspecting spare fuse holders

Application

Use this procedure to inspect spare fuse holders. Fill the spare fuse holders again as needed.

Interval

Perform this procedure in one week intervals.

Common procedures

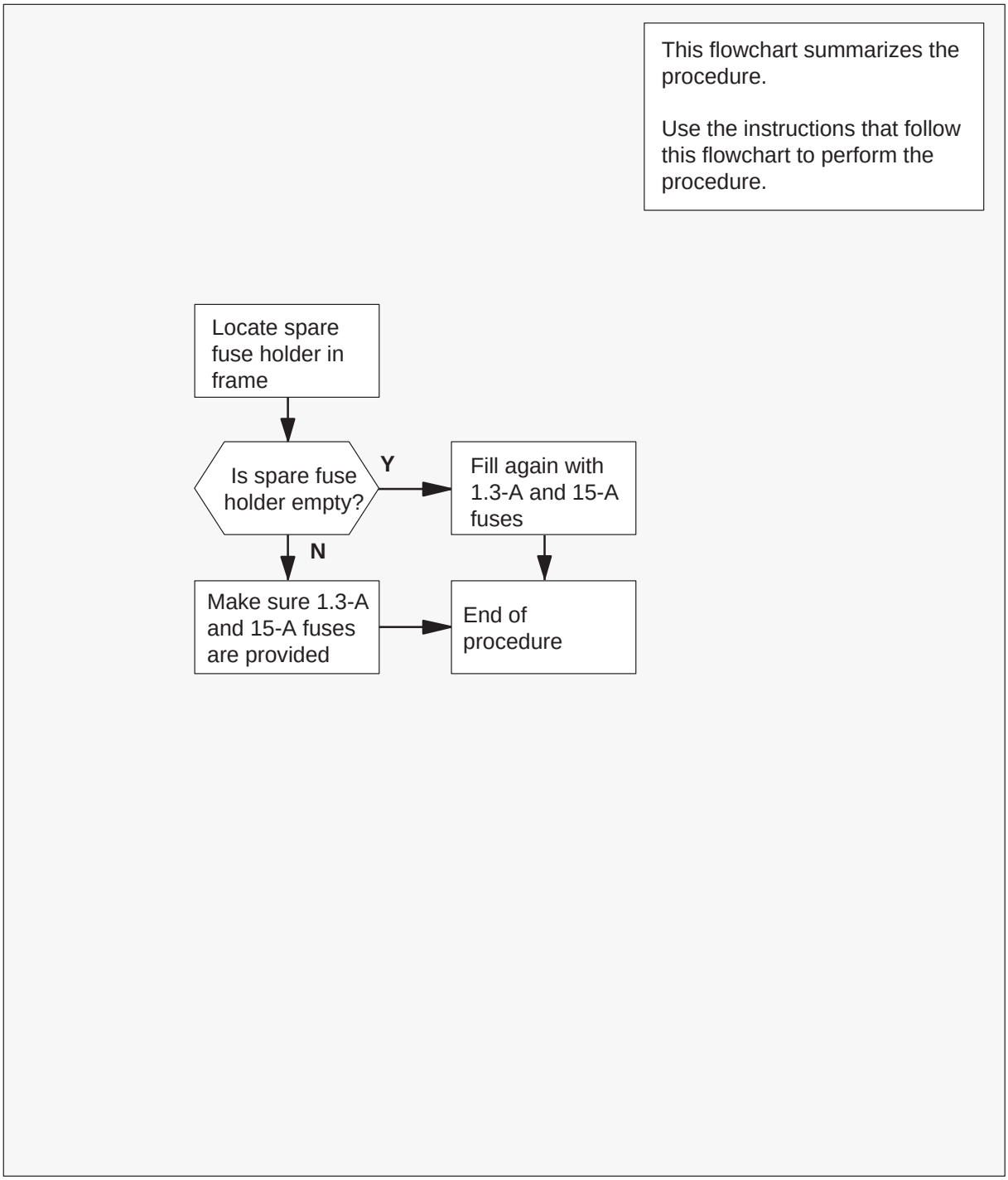
There are no common procedures.

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.

Inspecting spare fuse holders
(continued)

Summary of Inspecting spare fuse holders



Inspecting spare fuse holders
(end)

Inspecting spare fuse holders

At your current location

1 Locate the spare fuse holder in the frame supervisory panel (FSP).

If spare fuse holder	Do
is empty	step 2
is not empty	step 3

2 Fill the spare fuse holder again with the following fuses and circuit breakers:

- 15-A circuit breakers for the –48 V shelf feeds
- 1.3-A fuses for the alarm battery supply (ABS) feeds

Go to step 4.

3 Make sure that enough of the following fuses and circuit breakers are provided:

- 15-A circuit breakers for the –48 V shelf feeds
- 1.3-A fuses for the ABS feeds

4 The procedure is complete.

Inspecting and changing bulbs

Application

Use this procedure to inspect and replace defective fan fail, aisle end, and frame supervisory panel (FSP) bulbs.

Interval

Perform this procedure one time each month.

Common procedures

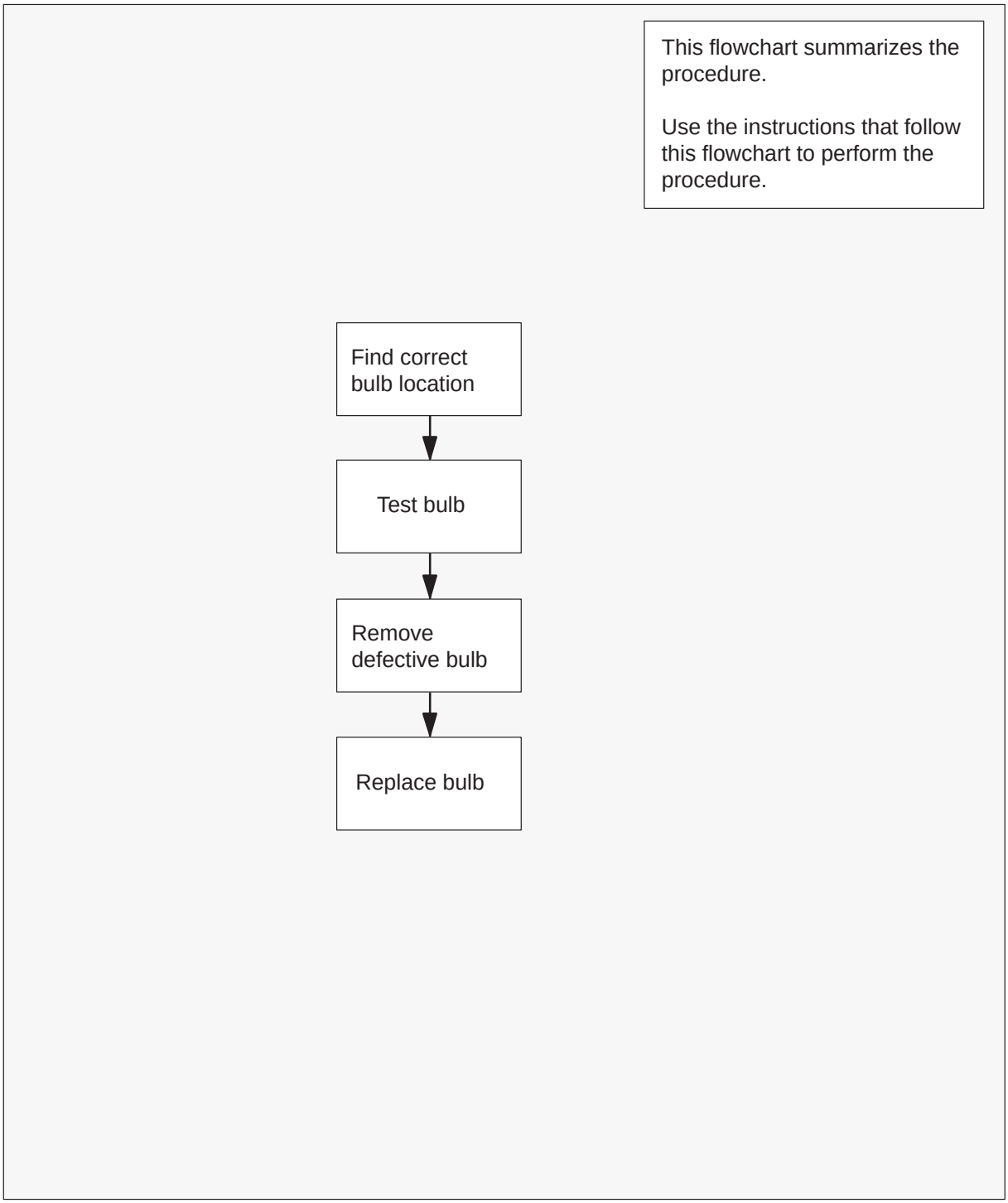
There are no common procedures.

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.

Inspecting and changing bulbs
(continued)

Summary of inspecting and changing bulbs



Inspecting and changing bulbs
(continued)

Inspecting and changing bulbs

At your current location

1 Use the following procedures to inspect the fan fail, aisle end, and FSP panel bulbs.

If bulbs	Do
are fan fail bulbs	step 2
are aisle end bulbs	step 3
are FSP panel bulbs	step 4

2 Flip the ALM override switch, located on the FSP, to ON.

If fan fail bulb	Do
does not light	step 5
lights	step 9

3 Press a fuse on the fuse pad located on the FSP.

If aisle end bulb	Do
does not light	step 5
lights	step 9

4 Press a fuse on the fuse pad located on the FSP.

If FSP panel bulb	Do
does not light	step 6
lights	step 9

5 Remove bulb cover. Grasp the bulb tight with two fingers, squeeze, and pull to remove bulb. Go to step 7.

6 Remove the bulb frame casing. Grasp the aisle end or FSP panel bulb tight with two fingers, squeeze, and pull to remove end or bulb. Go to step 7.

Inspecting and changing bulbs
(end)

7 Replace with new bulb.

8 Attach bulb cover again.

9 This procedure is complete.

Inspecting cooling unit filters

Application

Use this procedure to inspect cooling unit filters in cabinet cooling units.

Interval

Perform this procedure in two week intervals.

Common procedures

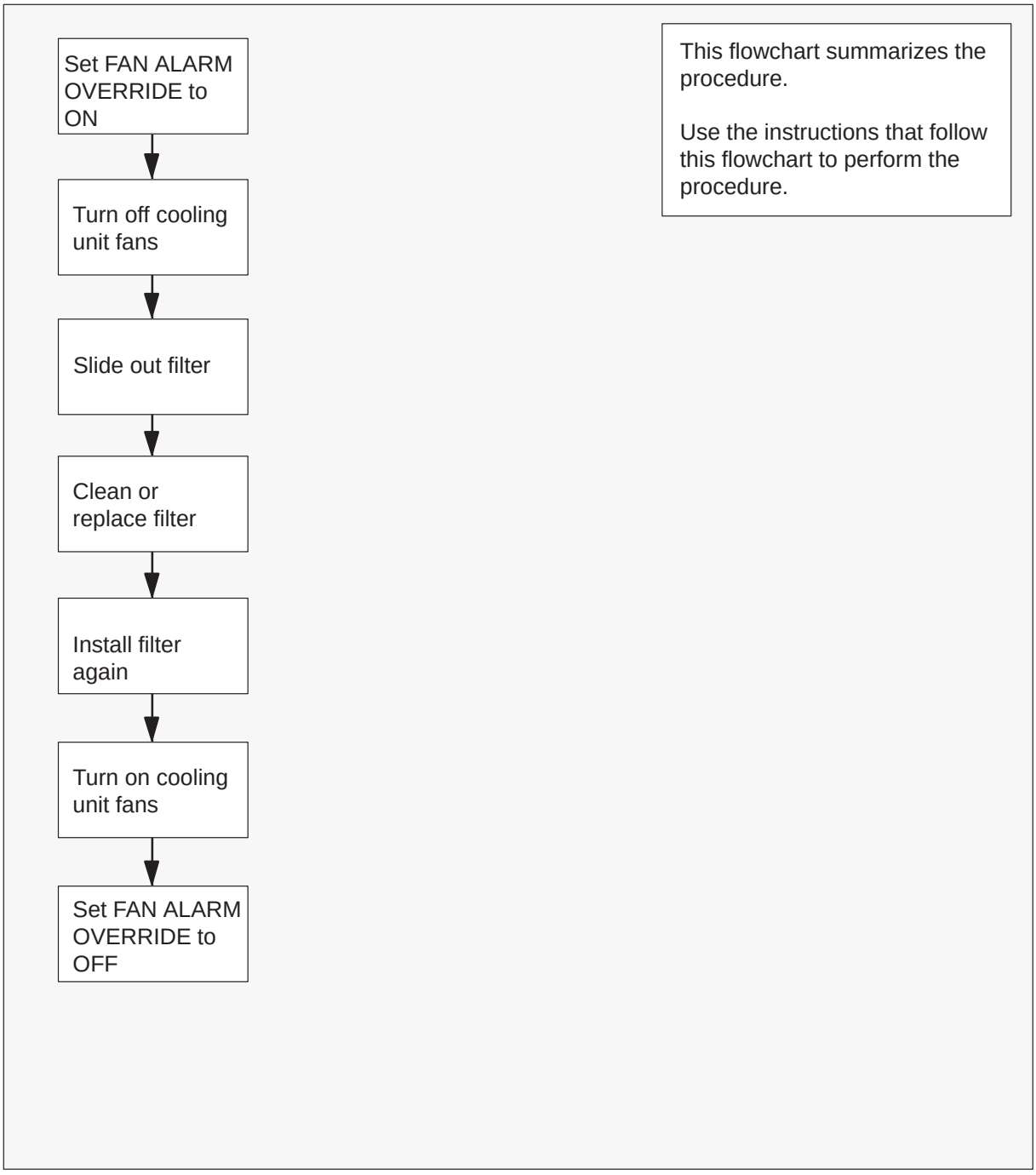
There are no common procedures.

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.

Inspecting cooling unit filters
(continued)

Summary of Inspecting cooling unit filters



Inspecting cooling unit filters
(continued)

Inspecting cooling unit filters

At your Current Location

1

DANGER
Rotation of fan blades
Do not reach in more than 6 in. beyond the upper lip of the air-intake grille. If you reach in more than 6 in., your fingers can touch the rotating blades of the cooling unit fans.

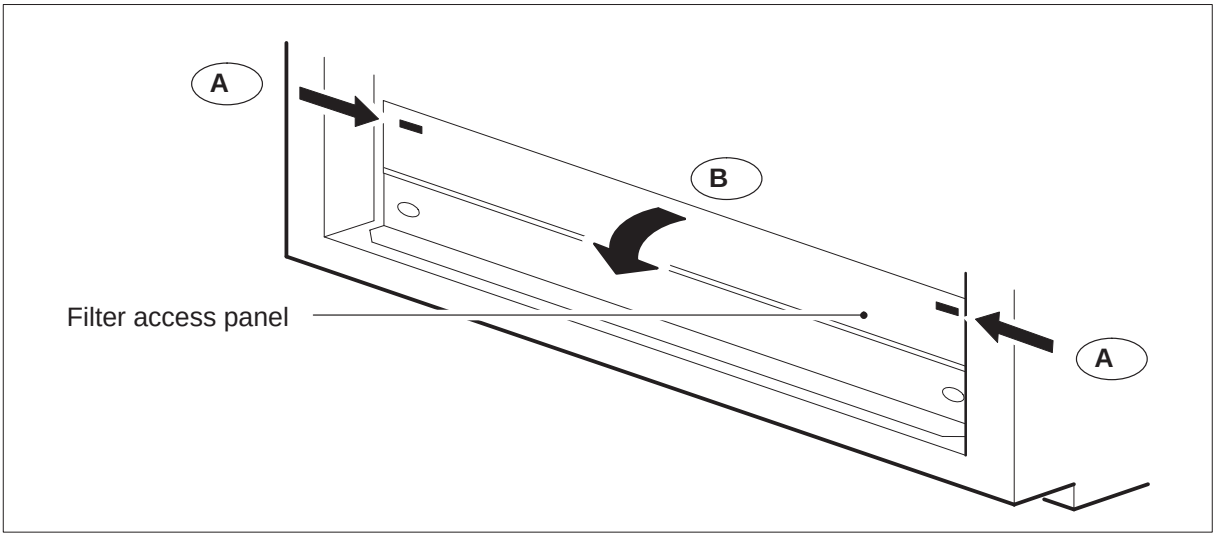
On the frame supervisory panel (FSP), set the FAN ALARM OVERRIDE switch to ON.

2

WARNING
Prevent overheating
Do not leave the cooling unit fans off for more than 30 min.

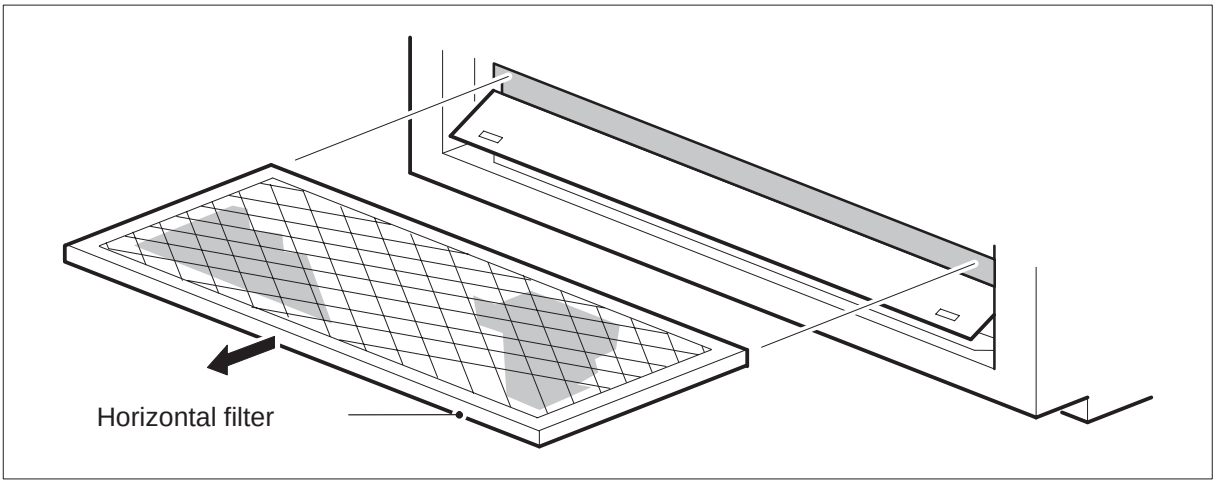
To make sure the cooling unit fans are OFF, remove fuses F03 and F04 on the faceplate of the FSP.

3 To open the filter access panel at the bottom of the cabinet, slide the catches toward each other (A) and swing the panel downward (B).



Inspecting cooling unit filters
(continued)

4 Slide the filter out of the cabinet.



If filter surfaces	Do
appear dirty	step 7
appear clean	step 5

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

6 Install the filter in the cabinet again. Go to step 16.

7 Read the following table to determine where to proceed next.

If filter part number is	Do
A0344437	step 8
P0558302	step 11
P0623539	step 13

Inspecting cooling unit filters
(end)

8 Clean the cooling unit.

9 Slide the replacement filter back into the cabinet.

10 Close the filter access panel. Go to step 16.

11 At an area outside the room that holds the switching system, vacuum the filter.

12 Install the filter in the cabinet. Go to step 16.

13 Wash the filter in soap and water.

14 Rinse the filter. Allow the filter to dry.

15 Install the filter in the cabinet.

16 Replace the fuses removed in step 2.

17 On the front of the FSP, set the FAN ALARM OVERRIDE switch to OFF.

18 The procedure is complete.

Replacing cooling unit filters

Application

Use this procedure to replace cooling unit filters in cabinet cooling units.

Interval

Perform this procedure at intervals of three months.

Common procedures

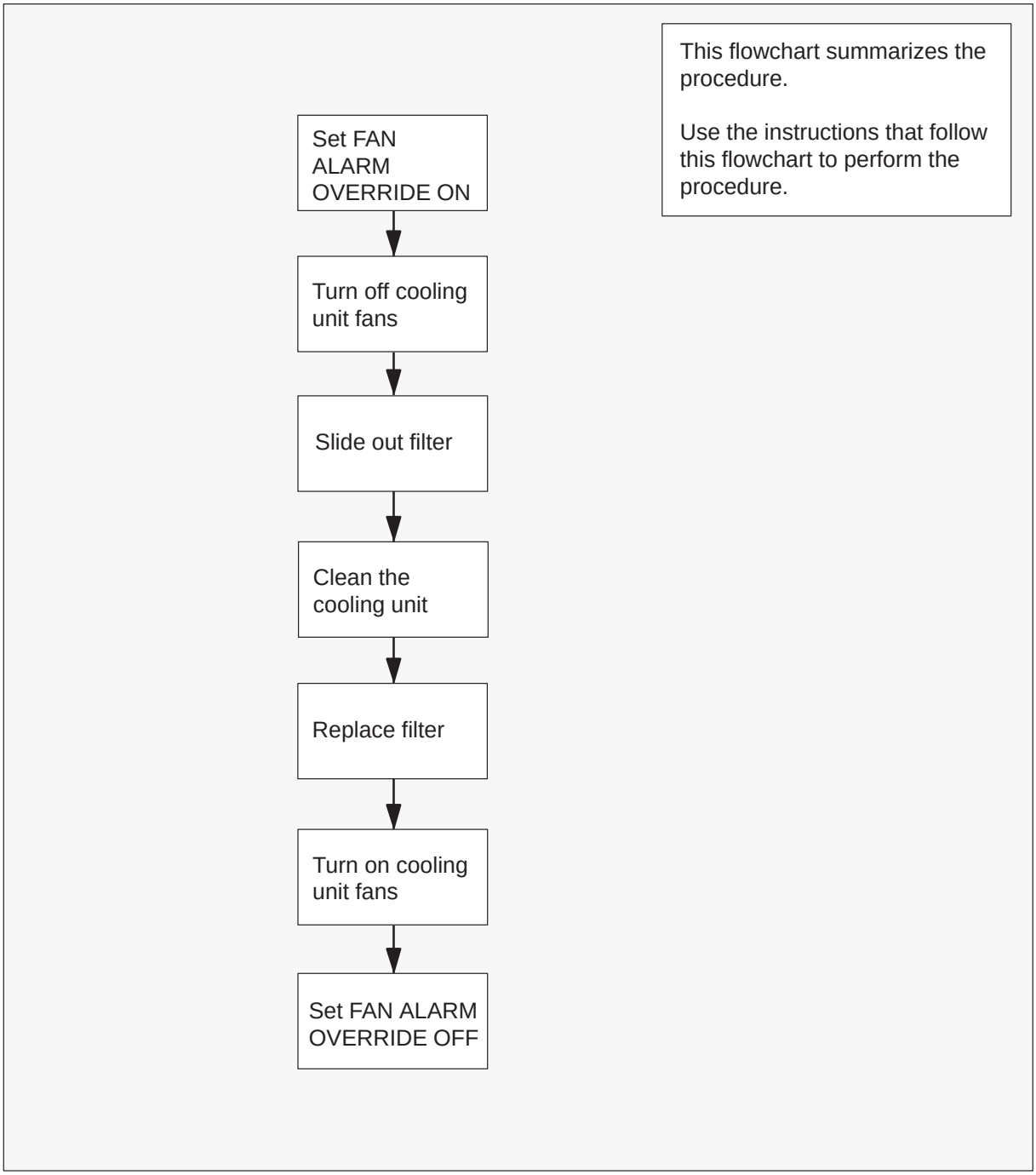
There are no common procedures

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Replacing cooling unit filters
(continued)

Summary of Replacing cooling unit filters



Replacing cooling unit filters
(continued)

Replacing cooling unit filters

At your Current Location

1 On the frame supervisory panel (FSP), set the FAN ALARM OVERRIDE switch to ON.

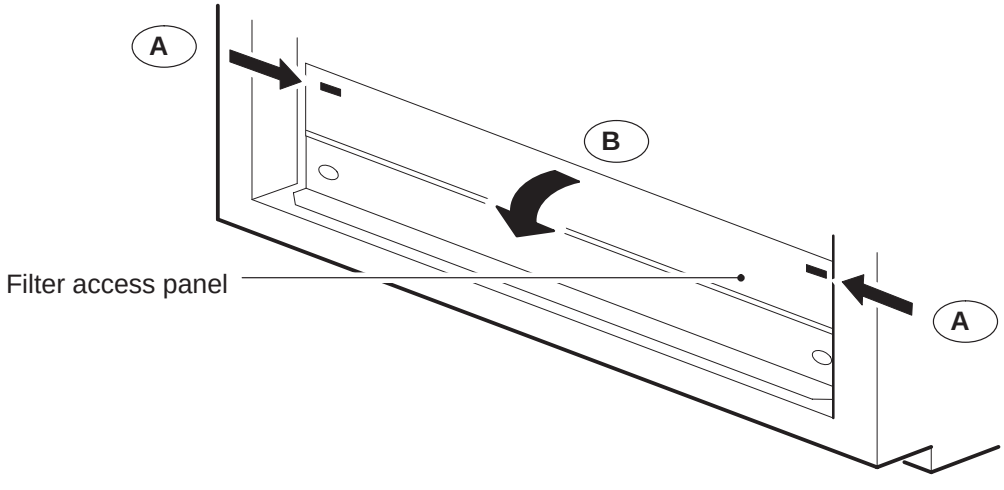
2

DANGER
Rotating fan blades
Do not reach in more than 6 in. beyond the upper lip of the air-intake grill. If you reach beyond 6 in., your fingers can contact the rotating blades of the cooling unit fans.

WARNING
Prevent overheating
Do not leave the cooling unit fans off for more than 30 min.

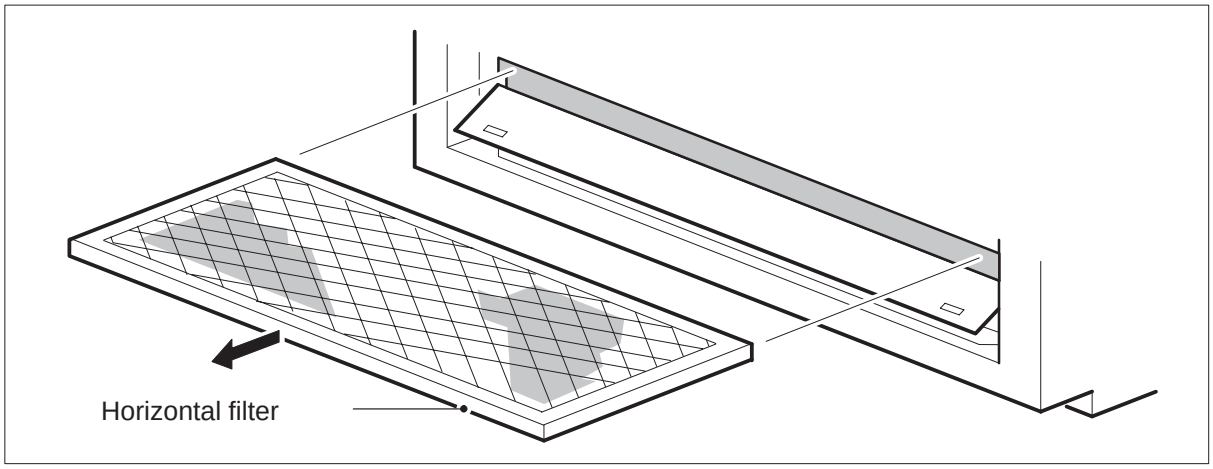
To make sure the cooling unit fans are OFF, remove fuses F03 and F04 on the faceplate of the FSP.

3 Open the filter access panel at the bottom of the cabinet. Slide the catches toward each other (A) and swing the panel downward (B).



Replacing cooling unit filters
(end)

4 Slide the filter out of the cabinet.



5 Clean the cooling unit.

6 Slide the replacement filter back in the cabinet.

7 Close the filter access panel.

8 Replace the fuses removed in step 2.

9 On the front of the FSP, set the FAN ALARM OVERRIDE switch to OFF.

10 The procedure is complete.

Returning a card for repair or replacement

Application

Use this procedure to return a circuit card like a power converter to Northern Telecom for repair or replacement. Your location, Canada or the United States, determines the documents you must complete and the address to return the card to.

Interval

Perform this procedure as required.

Common procedures

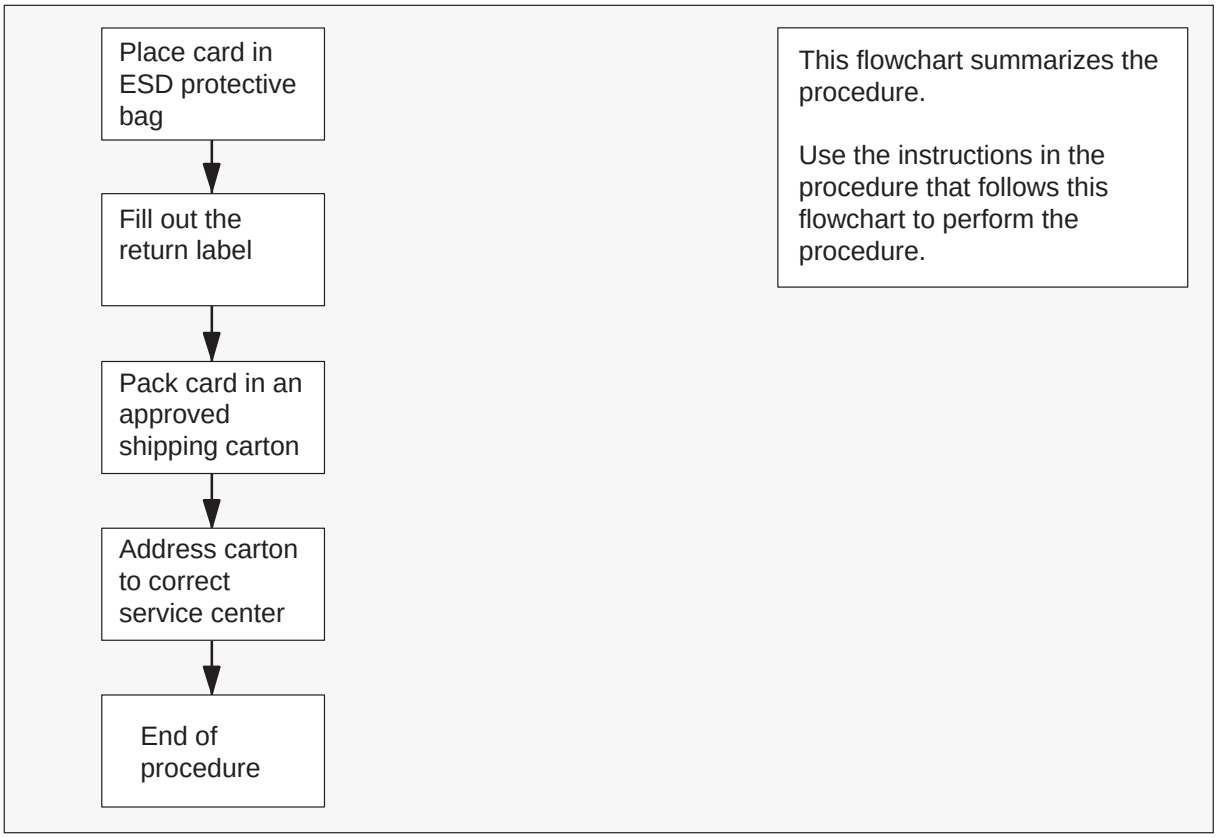
Do not apply

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Returning a card for repair or replacement
(continued)

Summary of returning a card for repair or replacement



Returning a card for repair or replacement

At your Current Location

1 Place the card in an electrostatic-discharge protective bag.

If your location	Do
is in Canada	step 6
is in the United States	step 2

2 Attach a printed label (provided) to each card that you return. If you do not have a printed label, use a blank label. For help, call the Northern Telecom (NT) Service Center at 1-800-347-4850.

3 Pack the card or assembly in an NT card shipping carton and seal.

Returning a card for repair or replacement
(continued)

If an NT shipping carton is not available, use another carton. Make sure that you perform the following actions:

- enclose each card or assembly in packing paper
- surround each card or assembly in bubble pack or foam
- secure each card or assembly in the carton so that the card or assembly cannot shift

4 Send defective cards to the following address:

Northern Telecom Plaza Service Center

4600 Emperor Blvd.

Morrisville, North Carolina 27560

Attention: Repair and return

5 If you use the NT Mail-in Repair Service, address the carton to

Northern Telecom Plaza Service Center

Dept. 6677

4600 Emperor Blvd.

Morrisville, North Carolina 27560

Attention: Mail-in Repair Service

6 Go to step 11.

7 Fill in one return label (form 24-115) for each card or assembly that you return.

Make sure that you include the following information:

- return authorization number from customer service
- the NT product engineering code (PEC)
- serial number
- release number
- batch change supplement (BCS) release software in use at the time of replacement
- peripheral module load name
- description of the failure and action taken to repair
- fault code that describes the fault best (see the bottom of the label)
- name of your company
- office identifier code
- your name
- site name

Returning a card for repair or replacement
(end)

If you require help to fill out the label, call Customer Service Operations at 1-800-668-5511.

8 Attach one copy of the card label to a card latch.

9 Keep the other copies of the label for your records.

10 Pack the card or assembly in an NT shipping carton and seal the card or assembly.

If an NT shipping carton is not available, use another carton. Make sure that you perform the following actions:

- enclose each card or assembly in packing paper
- surround each card or assembly in bubble pack or foam
- secure each card or assembly in the carton so that the card or assembly cannot shift

11 Address the carton to an address as follows:

Bell Canada customers:

Northern Telecom Canada Limited

8200 Dixie Road

Door 1617

Bramalea, Ontario Mississauga, Ontario

L6V 2M6

Other customers:

Northern Telecom Canada Limited

Customer Service Operations

C/O Wesbell Transport

5925 Tomken Road

Unit 13-16

Mississauga, Ontario

L4W L43

12 This procedure is complete.

Testing power converter voltages

Application

Use this procedure to test power converter voltages for all power converters in the remote switching center-SONET (RSC-S) cabinets.

Interval

Perform this procedure in six month intervals.

Common procedures

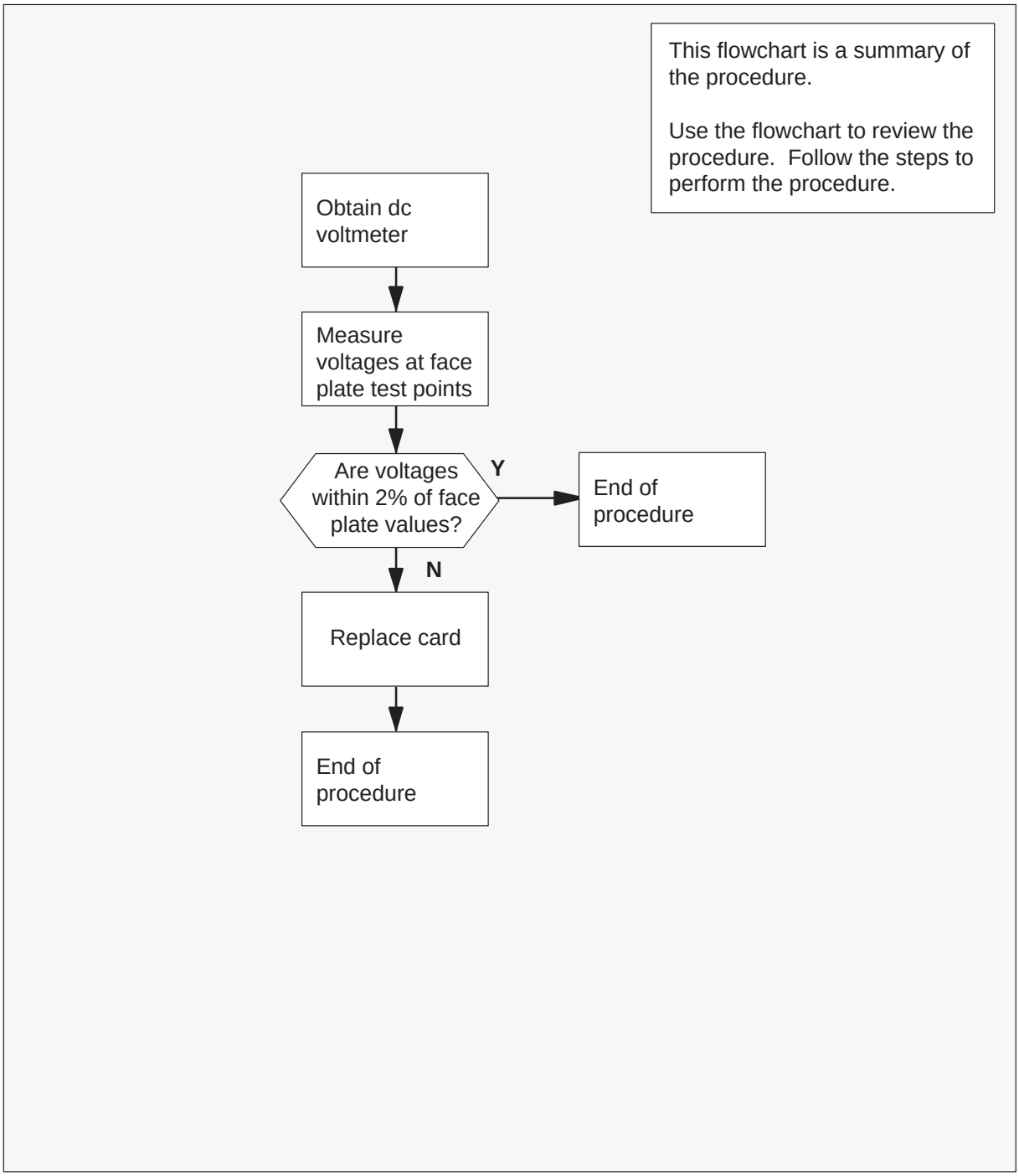
Does not apply

Action

This procedure contains a summary flowchart as an overview of the procedure. Follow the exact steps to perform this procedure.

Testing power converter voltages
(continued)

Summary of Test power converter voltages



Testing power converter voltages
(end)

Testing power converter voltages

At your Current Location

1 Obtain a dc voltmeter.

2 Measure the voltage at the test points on the faceplates of all power converters in the equipment frame.

3 The voltages must be within 2% of the nominal values printed on the faceplate. Compare the voltages measured in step 2 with the following acceptable voltage ranges:

Test point voltage	Acceptable range
+12 V	+11.76 V to + 12.24 V
–12 V	–12.24 V to –11.76 V
+ 5 V	+4.9 V to +5.1 V
– 5 V	–5.1 V to –4.9 V

If test point voltages are	Do
within acceptable range	step 5
not within acceptable range	step 4

4 Replace the NT2X70 power converter as *Card Replacement Procedures* directs. After you return to this procedure, go to step 5.

5 This procedure is complete.

Testing wrist strap grounding cords

Application

Use this procedure to verify that the resistance of wrist strap grounding cords is at the correct level. The level must be low enough to allow static electricity to discharge from the person. The level must be high enough to prevent electrocution if the equipment develops a short-circuit while the person wears the wrist strap.

Interval

Perform this procedure in one month intervals.

Common procedures

There are no common procedures.

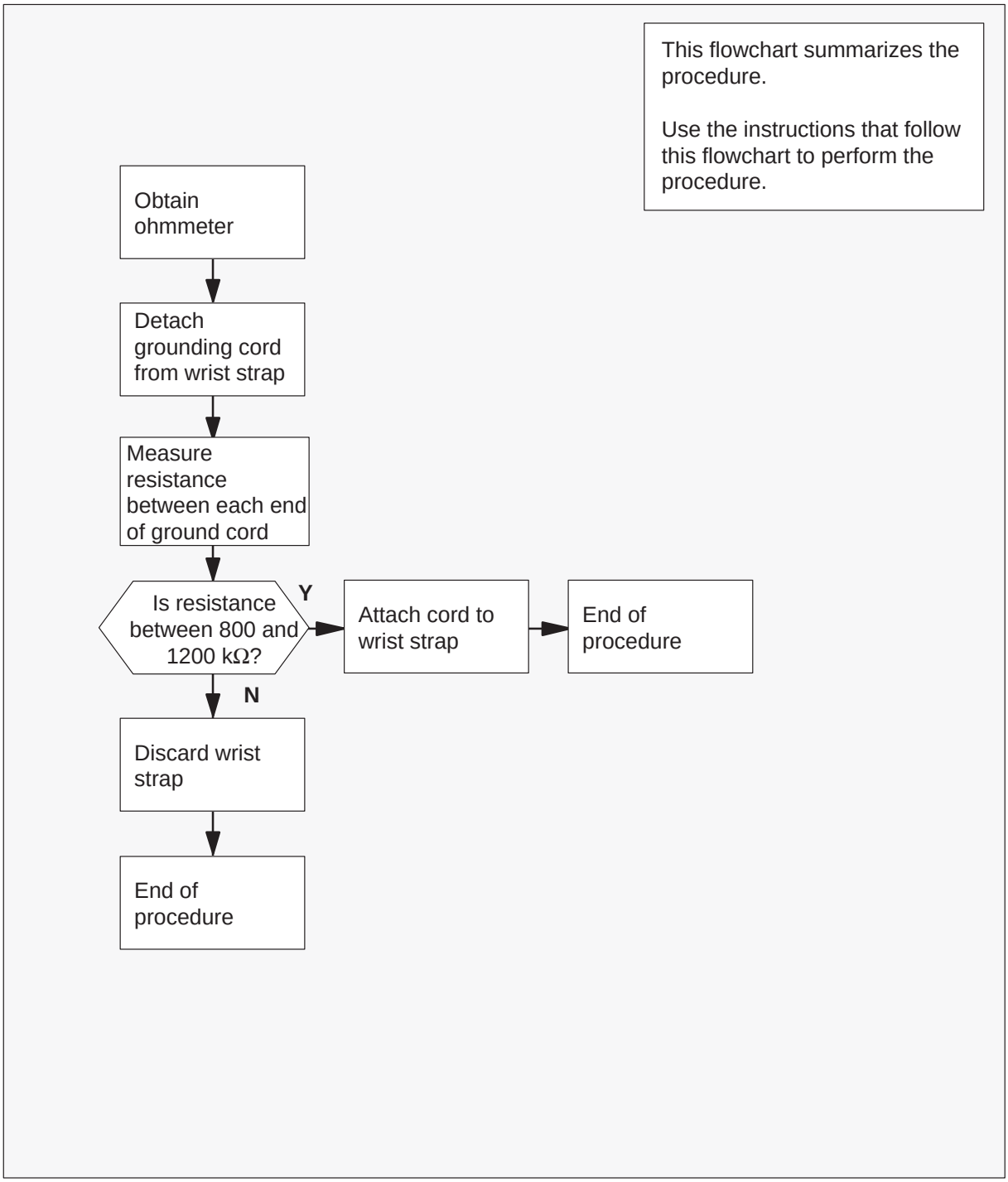
Action

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.

Testing wrist strap grounding cords

(continued)

Summary of Testing wrist strap grounding cords



Testing wrist strap grounding cords
(end)

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 between opposite ends of the grounding cord with the ohmmeter.

If resistance	Do
is between 800 kΩ and 1200 kΩ	step 4
is not between 800 kΩ and 1200 kΩ	step 5

4 You can use the grounding cord and wrist strap assembly. Assemble the wrist strap to the grounding cord.

Go to step 6.

5

DANGER
Risk of electrocution
The grounding cord is safe to use only if the resistance measures higher than 800 kilohms. A lower resistance exposes the wearer to the risk of electrocution if the equipment short-circuits while the person wears the wrist strap.

WARNING
Damage to electronic equipment
A grounding cord that has a resistance higher than 1200 kilohms cannot conduct static charges to ground adequately. A grounding cord will not protect sensitive electronic equipment against build-ups of static charges that can damage.

Discard the entire assembly. *Do not attempt to use it.*

6 The procedure is complete.

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DMS-100 Family
RSC-SONET A
International Maintenance Manual

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