**297-8261-550**

DMS-100 Family

# Remote Switching Center

Remote Switching Center-SONET Model A

Maintenance Manual

XPM11 and up    Standard    10.05    November 2000

DMS-100 Family

# Remote Switching Center

## Remote Switching Center-SONET Model A Maintenance Manual

Publication number: 297-8261-550
Product release: XPM11 and up
Document release: Standard 10.05
Date: November 2000

# Contents

## Remote Switching Center-SONET Model A Maintenance Manual

# About this document

## How to check the version and issue of this document

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

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

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

To determine which version of this document applies to the software in your office and how documentation for your product is organized, check the release information in *Product Documentation Directory,* 297-8991-001.

## References in this document

The following documents are referred to in this document:

- *Bellcore Technical Reference, ISDN D-Channel Exchange Access Signaling and Swithching Requirements (Layer 2)*
- *1-Meg Modem Service Network Implementation Guide,* 297-8063-200
- *North American DMS-100 Log Report Reference Manual*
- *PMDEBUG User Guide,* TAM-1001-004
- *Translations Guide*
- *XPM Log Report Reference Manual*
- *XPM Translations Reference Manual*

## What precautionary messages mean

The types of precautionary messages used in NT 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.

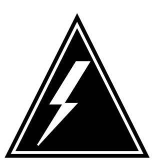
DANGER - Possibility of personal injury

**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.
```

# 1 Maintenance overview

This chapter contains the following sections:

- functional description

  The functional description chapter summarizes the components of the Remote Switching Center-SONET (RSC-S) configurations with the voice and message flows highlighted. The functional description includes explanations of how software processes affect these components.

- fault conditions

  Fault conditions are problems that can occur in the following components:

  — a card or power supply

  — the links that connect these components

  — the software that controls the voice and message flow

- automatic maintenance

  The following use system actions that pinpoint fault conditions:

  — RSC-S

  — Remote Switching Center (RSC)

  — Digital Multiplex System (DMS)

  — Data Packet Network (DPN)

  An example of a system action is an audit. The system actions correct the fault, and do not require user action. When user action is necessary, the correct trouble indicators are explained.

- escalation to manual maintenance

  For the RSC-S, automatic maintenance includes the output of the correct trouble indicators. The *Automatic Maintenance* section includes this information.

## Functional description

The RSC-S uses common peripheral module (CPM) design, and does not use XMS-based peripheral module (XPM) design. When RSC-S uses a CPM, the following differences are implemented:

- change in channel supervision message (CSM) connections in the CPM
- direct channel connection to the D-channel handler (DCH) (NTBX02), DS30A interface (NTMX74), and dual DS-1 interface (NTMX81) cards
- enhancement of the matrix
- creation of the pulse code modulation (PCM) card to concentrate all signaling functions in one card
- handling of digital signal 1 (DS-1) signaling bits (A, B, C, D) modified

- addition of firmware that can be downloaded to the following:
  - — unified processor (UP) (NTMX77)
  - — Cellular Access Processor (CAP) card (NTAX74)
  - — PCM signaling processor (NTMX73) cards
- The NTMX77 has two FLASH EEPROMs, or banks, which are two 256-kbyte programmable chips. These chips load the firmware separate of the RAM load on a manually-busied (ManB) RCC2 or RCC2 unit. To perform this action, enter the following commands:

  **>LOADFW PM**

  or

  **>LOADFW UNIT unit_no**

  or

  **>LOADFW INACTIVE**

## 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.

**Table 1-1 LOADFW parameters (Sheet 1 of 2)**

| 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. |
| ***Note:*** In this table N/A is an abbreviation for not applicable. | | |

**Table 1-1 LOADFW parameters (Sheet 2 of 2)**

| Parameter | Value | Definition |
|---|---|---|
| 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 cluster controller 2

In this design, the primary components are the RCC2 or the dual RCC2 (DRCC2). The user can install the RCC2 with or without the services of the integrated services digital network (ISDN) or emergency stand-alone (ESA). The following sections describe the components according to functional areas. Each functional area highlights the functions of specified cards and the presents other RSC-S components.

The RCC2 is the primary operations device for the RSC-S. Functional areas of the RCC2 include the following:

- cards
- speech and message paths in the RCC2
- routine exercise (REX) test
- switch of activity (SWACT)
- update static data (non-ESA)
- return the RCC2 to service

> ***Note:*** Figure Functional block diagram of RCC2 relates to the functional description of the RCC2 that follows.

### Cards

The RCC2 uses the following cards:

- host communication
- processor
- speech bus
- peripheral communication

Refer to *RSC-S hardware* in this document for a description of RCC2 circuit card design.

### Host communication cards

Host communication cards translate up to 20 C-side DS-1 ports to the parallel speech bus.

In NA010 or lower, up to 16 C-side ports are available. This configuration requires the following hardware:

- NTMX87AA/AB Quad Frame Carrier card in slots 9 and 19
- NTMX81AA Dual DS-1 Packlets (1-4 packlets for each Quad Frame Carrier) *or*
- NTMX83AA Filler Packlet (0-3)
- NTMX75AA Enhanced Matrix card

> ***Note:*** NA011 and higher supports these packs when an office needs only up to 16 C-side DS-1 links.

In NA011 or higher, up to 20 C-side DS-1 ports are available. This configuration requires the following hardware:

- NTMX87BA Penta DS-1 Packlet Carrier cards in slots 9 and 19
- NTMX81BA Compact Dual DS-1 Packlets (1-5 packlets for each Penta DS-1 Packlet Carrier) *or*
- NTMX83BA Compact Filler Packlet (0-4 for each Quad Frame Carrier)
- NTMX75DA Enhanced Matrix card

> ***Note:*** This hardware is backward compatible from NA008 to NA010 for use in the 16 C-side DS-1 link configuration.

A Penta DS-1 Packlet Carrier holds a maximum of five packlets. These packlets can be Compact Dual DS-1 packlets (NTMX81BA) or filler plate packlets (NTMX83BA). Compact Dual DS-1 packlets support all the features and maintenance functions the NTX6X50AB provides. The compact dual DS-1 packlets provide and support all performance counters that the NTX6X50AB supports.

The Quad Frame Carrier holds up to four packlets. These packlets are either Dual DS-1 packlets (NTMX81AA) or filler packlets (NTMX83AA). The Dual DS-1 packlets provide all the features and performance counters of the NT6X50AB.

The enhanced matrix NTMX75 card combines the functions of the formatter card (NT6X41/NT6X72) and the time switch (NT6X44) used on the remote cluster controller (RCC). The RCC uses the formatter card and time switch for RSC applications. This card is nonblocking and performs all switching functions that the RCC2 shelf and the extension shelf require. The card is a single stage time switch with 2528 channels (input and output). Any channel can be switched to any free channel. Input and output are divided into two groups: central side (C-side), which has 640 channels, of which 128 channels are for service cards, and peripheral side (P-side), which has 1888 channels.

> **WARNING**
> **Possible link failure**
> An NTMX87BA with 1-5 NTMX81BA cards in slots 9 or 19 of the RCC2 requires the NTMX75DA. You cannot mix NTMX75AAs with NTMX87BAs or NTMX75DAs with NTMX87AA/ABs except during the upgrade to 20 C-side DS-1 links.

### Processor cards

Supply the RCC2 with the Unified Processor (UP) card (NTMX77 with 68020 CPU) or the optional Cellular Access Processor card, (NTAX74 with 16 Mb memory).

**NTMX77 Unified Processor** The UP card has 68020 central processing unit (CPU). The UP card controls the RCC2 activities. Memory with the UP is placed in the card and provides 8Mb of memory with the potential for expansion to 16Mb. The UP provides electrically erasable programmable read-only memory (EEPROM). The UP has two FLASH EEPROMs. Each FLASH EEPROM is a 256Kbyte programmable chip.

The NTMX77 UP increases real time and replaces several cards in each unit of the RCC2. This action results in reduction of power use.

**NTAX74 Cellular Access Processor (CAP)** Slots 3 and 25 of the RCC2 shelf contain the optional CAP. 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 ability. The CAP has direct read/write access to the matrix card, SIGP, EISP, CMR, UTR, and MSG and CSM card. NTAX74 provides the following call processing functions:

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

Real-time call processing functions include:

- send and receive messages
- control the enhanced time switch

- supervising channels
- switching activity and reset control

### Speech bus cards

The speech bus is two speech busses (send speech bus and receive speech bus). Speech bus cards include NTMX76 or NT6X69, NT6X92, NTMX75, NTMX73, NT6X78, and NT7X05. A description of these speech bus cards follows:

**NTMX76 or NT6X69** The NTMX76 messaging is optional. When in use, the NTMX76 circuit card replaces the NT6X69 messaging card. The NTMX76 card is the interface between the UP and up to 32 data links.

The NTMX76 circuit card provides an interface and processes signaling and control messages between the RCC2 and the central control (CC). The NTMX76 uses the Consultative Committee for International Telegraphy and Telephony (CCITT) level 2 Signaling System No 7 (Q.703) over data channels.

The Q.703 protocol allows for enhanced distance capacity (EDC) between the RSC-S and the host. EDC is a maximum 804.5 km (500 mi). The CLASS feature Deluxe Call Waiting with Disposition (DSCWID) and EDC are fully compatible and supported. The Q.703 protocol also provides for:

- full duplexing
- windowing
- equal treatment and equal performance in both messaging directions

The message and CSM card processes signaling and control messages between the RCC2 and the CM. The NTMX76AB card performs:

- channel supervision messaging (CSM) for call processing and diagnostics. The CSM messages are conveyed between two peripherals together with the pulse code modulation (PCM). The CSM messages also setup, maintain, and terminate calls and check the parity and PCM path accuracy.
- ROM and RAM tones generation
- receive and send DS30 control messages to the CM

The NTMX76AB version of the message and CSM card contains upgraded firmware. The system requires this firmware to support Analog Display Services Interface (ADSI) and deluxe spontaneous call waiting identification (DSCWID).

### NT6X92

> **ATTENTION**
> For peak performance, do not install the UTR and GTR on the same RCC2. The receiver that interprets tone samples is not known and cannot be determined. Some call processing tones can be degraded when designed for use with a GTR.

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

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

The GTR is LSSGR (LATA switching systems general requirements) and meets the standards of CCITT (International telegraph and telephone consultative committee). The GTR is available as a replacement for all national and international versions of the UTR.

**NTMX75** The formatter (NT6X41/NT6X72) and time switch (NT6X44) functions are in the enhanced matrix NTMX75 card.

**NTMX73** The NTMX73 supports all low-level signaling tasks and provides the system clock. NTMX73 card replaces XPM circuit cards NT6X86, NT6X80, and NT6X28. Software to maintain adjustment with the network resides on the NTMX73 card.

**NT6X78** The NT6X78 custom local area signaling service (CLASS) modem resource (CMR) card supports Calling Number Delivery (CND) and other CLASS services. The CMR card provides the Analog Display Services Interface (ADSI) protocol to transmit CLASS data between the CC and ADSI-compliant customer premises equipment (CPE).

The NT6X78AB, NTMX76AB, and NT6X92BB cards are required to meet the standards of ADSI protocol. The ADSI protocol supports CLASS features that provide display-based information, like DSCWID, to subscribers with ADSI-compatible customer premises equipment (CPE).

**DSCWID** The revised proprietary DSCWID feature meets the standards of Bellcore TR-416. Bellcore TR416 describes the requirements for DSCWID and specifies how this feature interfaces with the following:

- ADSI set

  A screen-based ADSI CPE that can display options.

- SCWID set

  A non-ADSI CPE that can deliver caller identification (CID) data.

- 2500 set

  A non-ADSI CPE that can signal dual tone multifrequency (DTMF) but cannot off-hook deliver CID data.

Tones sent by the CC alert the DSCWID subscriber of a pending call, and the CPE of pending caller data. A line with DSCWID option can have a call established and a second call that attempts to terminate to that line. When this condition occurs, the CC provides one of two types of alerting signals. A subscriber alerting signal (SAS) or an SAS followed by a CPE alerting signal (CAS). The SAS is the tone that the subscriber recognizes as the call waiting tone (CWT). The CAS alerts the CPE of pending data when the subscriber line also has the Caller Identification (CID) feature.

The DSCWID CPE generates an acknowledgement (ACK) tone. The ACK tone indicates the CPE is able to receive DSCWID data. The GTR card in the RCC2 collects the ACK tone. When the CPE with ADSI is in use, the system sends a DTMF A ACK signal in response to the CAS. When the CPE is a SCWID CPE, the CPE sends a DTMF D ACK signal in response to the CAS. When alerting tones are sent, the subscriber can control distribution of the incoming call. The subscriber responds by use of the CPE softkeys when the CPE is ADSI or hard-coded keys when the CPE is a SCWID or a 2500 set. When the CPE does not respond with an acknowledgment tone, the CPE is a 2500 set. The following figures show examples of responses from the three set types.

**Figure 1-1 Example of a DSCWID call on an ADSI set**

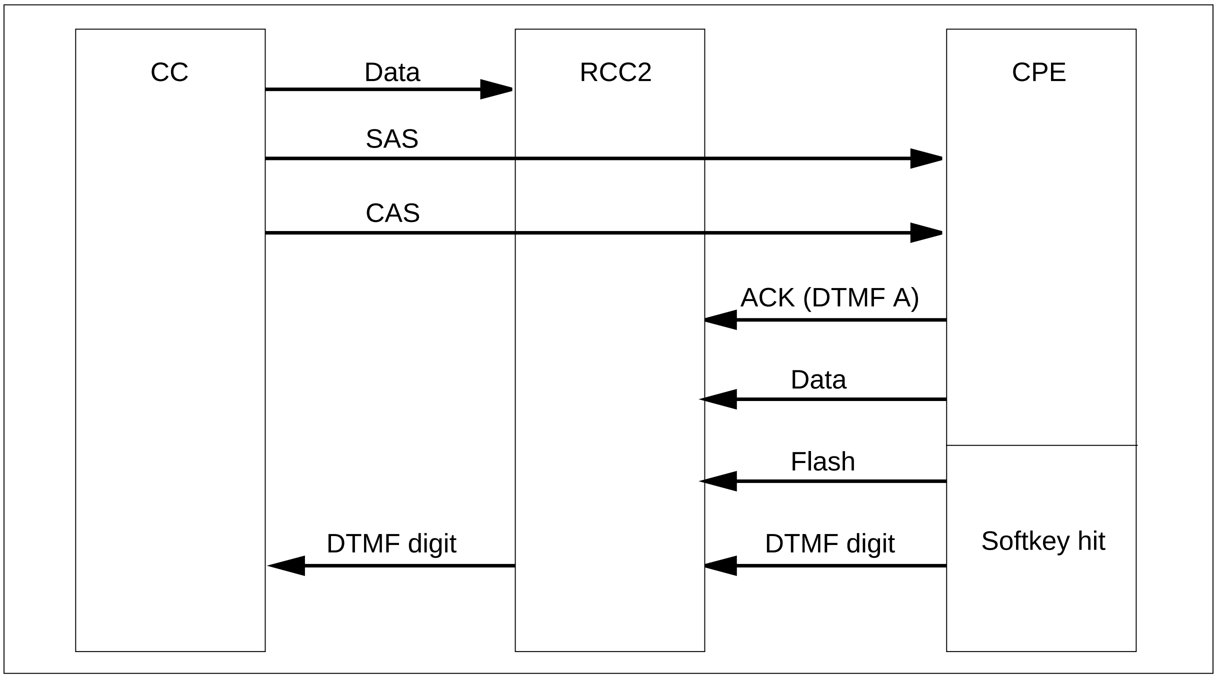



**Figure 1-2 Example of a DSCWID call on a SCWID set**

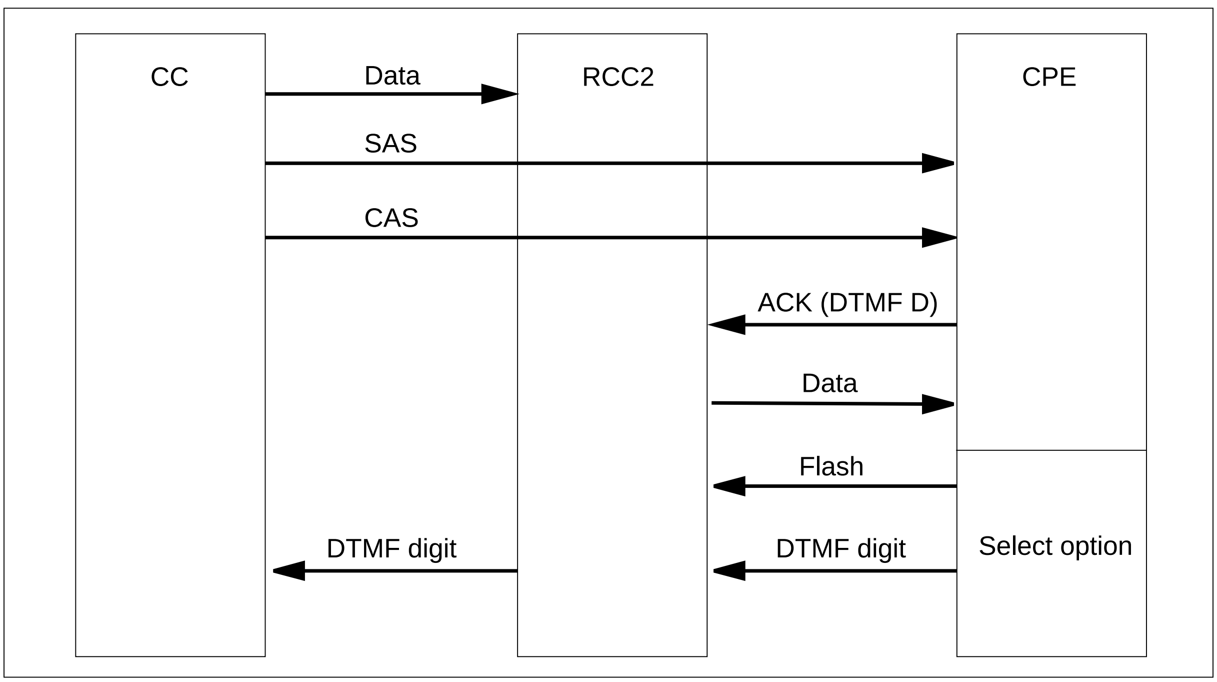
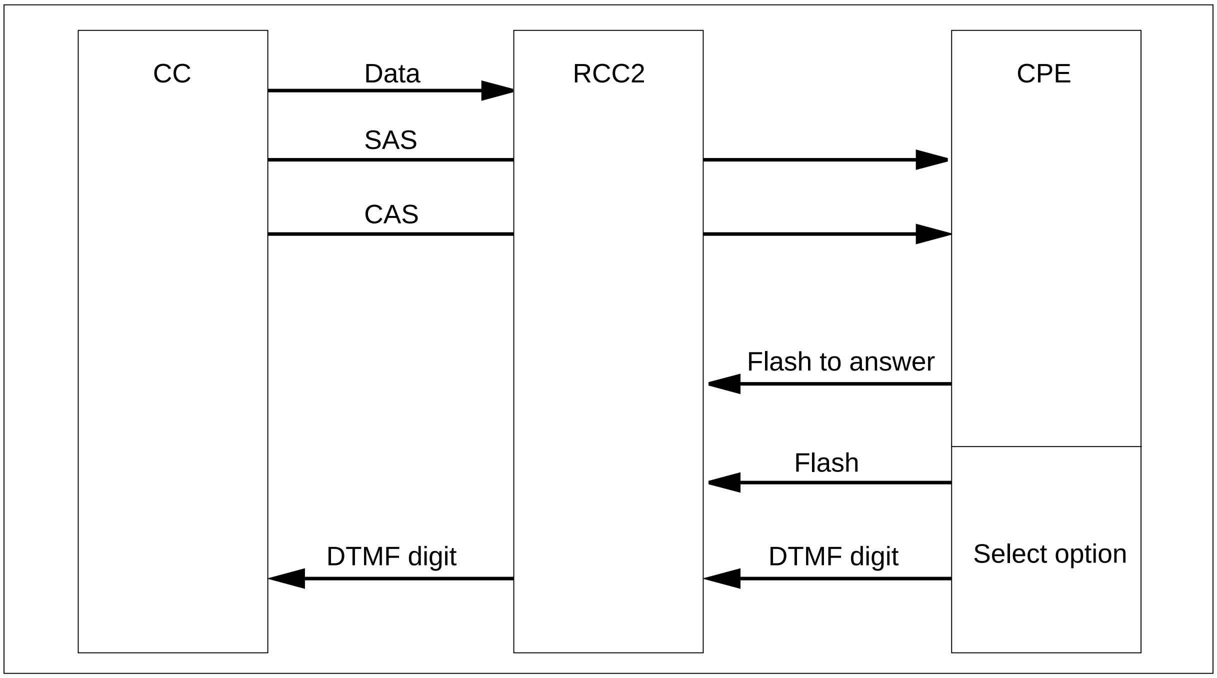


**Figure 1-3 Example of a DSCWID call on a 2500 set**




Alerting signals are sent to the CPE even when a GTR channel is not available. When GTR channels are not available, data is not sent to the CPE. In the controlled DSCWID, when the RCC2 is not able to attach a GTR, the system ignores a flash. To meet Bellcore standards, the switch must provide options when the system detects a flash and the switch cannot attach a GTR. The RCC2 complies with this requirement. The RCC2 sends a flash to the CC when it is not able to attach a GTR in 400 ms. When the first notification of a pending call is not acknowledged in 10 s, the system sends a second alerting signal. When display data is not sent to the CPE because of GTR channels not available, the system holds the data. The system sends the data again when alerting occurs again.

After the RCC2 receives a flash signal from the ADSI compatible CPE of the customer, the RCC2 starts a T-tone timer. The T-tone timer times for the maximum time between a flash and the DTMF digit on an ADSI set. The timeout is 600ms. The speech path is muted. The T-tone timer starts for the initial option selection during a DSCWID call. Additional ADSI DSCWID option selections also start the T-tone timer.

Additional DSCWID option selections on a SCWID or 2500 set uses a new timer (T-flash). The system uses the T-flash timer after a call is answered with SCWID and 2500 sets. This timer provides the customer with enough time to select an option after a flash. The new timer allows a subscriber time to flash and then dial a DTMF digit in 600 ms.

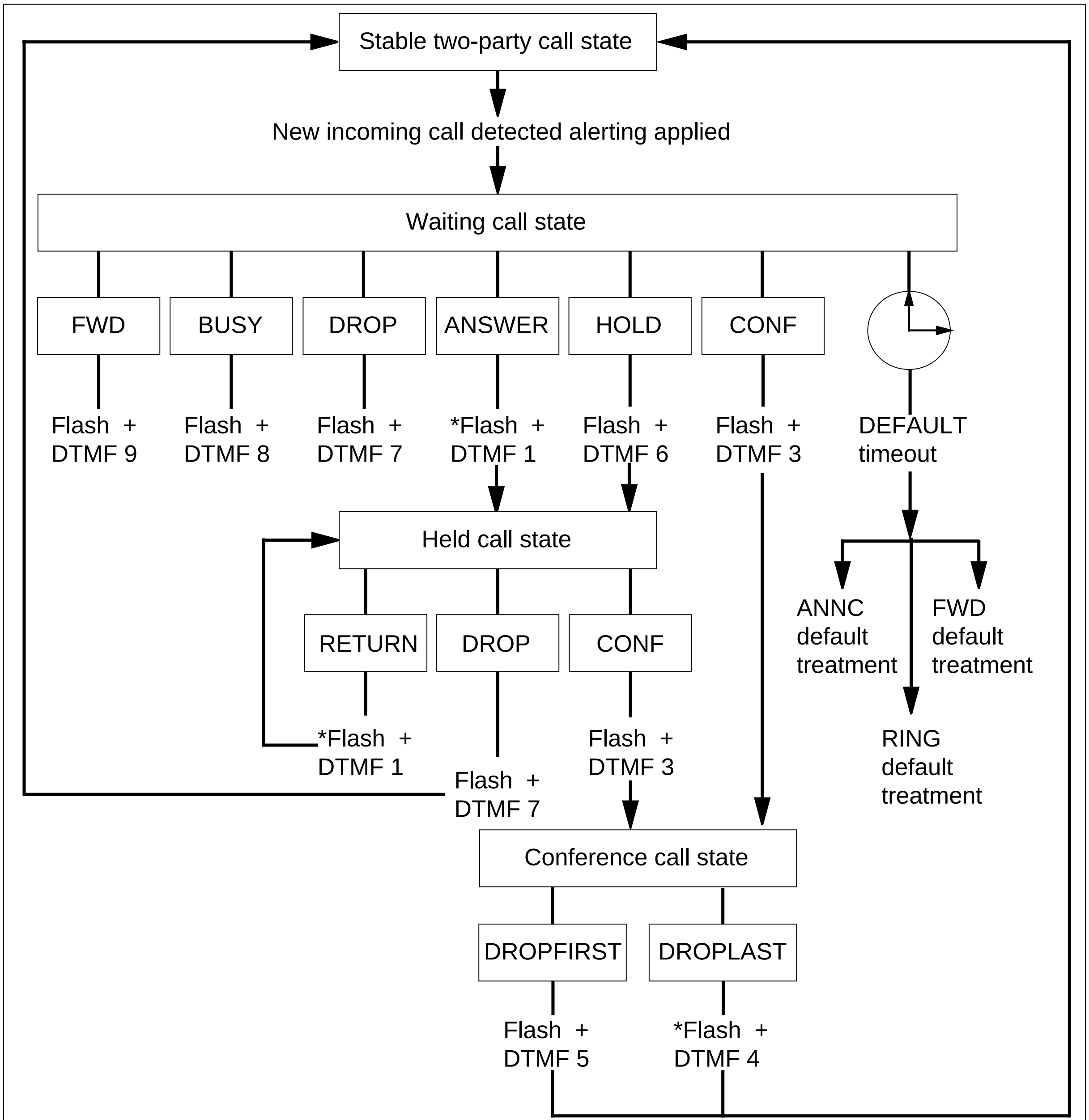
The operating company can set the T-flash timer from 1 to 8 s (default = seconds). The RCC2 starts the T-flash timer when the NONADSI field in table DSCWDTYP is set to Y and the RCC2 receives a flash signal from a customers SCWID or 2500 set during the held or conference call state. The RCC2 must keep track of the DSCWID call state and the type of CPE. The timer used depends on this requirement. When the RCC2 cannot attach a GTR before 400 ms, the RETURN option is applied.

The CC attempts to remain synchronized with the CPE at all times. This close control prevents conditions where the switch does not process the option based on the call state. The DSCWID call waiting disposition options are:

- answer the new call and put the current call on hold
- disconnect the present call and answer the new call
- forward the new call
- connect the new call to a busy announcement
- put the new call on hold after the connection to a hold announcement
- conference the new call with the current call

The figure on the following page shows DSCWID with ADSI set dispositions.

**Figure 1-4 DSCWID with ADSI set dispositions**




***Note 1:*** An asterisk (*) indicates that a flash can be performed to accomplish the same function as sending the DTMF code for that digit.

***Note 2:*** When a non-ADSI set is configured for hard-coded keys to perform DSCWID dispositions, or the subscriber is able to provide a DTMF-digit within 600 ms, dispositions can be available when NONADSI = Y in table DSCWDTYP for the given DSCWID type.

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

The peripheral/remote loader-16 (PRL) reduces XPM simplex time. The PRL allows XPM software loads to transfer to the XPM and store locally in an in-service XPM unit. This action replaces a current load file with a newer load file. During load file replacement, the last image is available for recovery actions. The local storage mechanism is the NT7X05 card. The software transfers to the XPM when the software instructs a manually busy (ManB) XPM unit to load from the NT7X05. This transfer occurs with the use of the improved LOADPM command. Use the following parameters to perform this action:

**DANGER**
**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.

>**LOADPM [PM] LOCAL LOADFILE**

**[ACTIVE]**

**[UNIT]**

**[INACTIVE]**

The PRL accomplishes peripheral loading improvements with the use of imaging technology. The computing module (CM) provides imaging control at a high level. The CM monitors changes to restart survivable objects in the XPM. Restart survivable objects are static data and code, in the form of patches. The PRL makes a copy of the RAM of the MX7 in an in-service, active or inactive XPM unit. The PRL copies the RAM to the NT7X05. When the XPM must be loaded again, the system restores the image from the NT7X05 to the UP RAM.

> ***Note:*** You cannot dump an image of an embedded processor. Use LOADPM command with a source of CC and a parameter of CMR to load the CMR processor from the CM.

You can dump an image of the Unified Processor RAM to the NT7X05 card when the XPM is InSv. Use the IMAGE command with the following parameters:

**`IMAGE`**

```
[<DEVICE {PM,
                    ACTIVE,
                    INACTIVE}]
[<ALL>{ALL}]
```

When you install the NT7X05 card, the load file is not valid and must be loaded with parameter XPMSTOR. To view the state of NT7X05 files, enter the following command:

**>QUERYPM FILES**

*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
```

***Note:*** The example MAP response reflects RSC-S with ISDN. The NT7X05 image file name appears for non-ISDN configurations only.

When the system requires loading, the CM verifies the NT7X05 is entered. When NT7X05 is present, the system transfers the following:

- the the recovery software loader (RSL)
- the name of the desired load file
- an indication of if the image or load file must be loaded are transferred from the CM to the UP

The RSL checks the NT7X05 load file name. When the load name test passes, the RSL restores the image or load to the UP. The restore/loading process verifies the image/load file integrity. This action avoids forcing delays in loading when the file being restored is good. To view the status of the NT7X05 files, enter the following command again:

**>QUERYPM FILES**

*Example of a MAP response:*

```
Unit 0:
   NT7X05 load File: CRI07AW
   NT7X05 Image File:
   CMR Load:  CMR03A
Unit 1:
   NT7X05 load File: CRI07AW
   NT7X05 Image File:
   CMR Load:  CMR03A
```

***Note:*** The example MAP response reflects RSC-S with ISDN. The NT7X05 image file name appears for non-ISDN configurations only.

### Peripheral communication cards

The following cards translate between the 54 P-side ports and the parallel speech bus:

**NTMX75** The NTMX75 card, which the host communication section describes, applies here.

**NTMX87AA/AB** The Quad Frame Carrier (NTMX87) card provides an interface between RSC-S peripherals and collocated transmission equipment like channel banks. The NTMX87BA version of the card contains five dual DS-1 packlets. Earlier versions of the card contain four dual DS-1 packlets. The dual DS-1 packlets provide and support all features, maintenance functions, and performance counters that the NT6X50AB provides.

**NTMX87BA** The Penta DS-1 Packlet Carrier does not support P-side links.

**NTMX74** The DS30A (NTMX74) card provides 32 DS30A links for the following:

- terminating line concentrating modules (LCM)
- remote maintenance modules (RMM)
- Subscriber Carrier Module-100S Remotes (SMS-R) at the RSC-S

Each interface (I/F) chip on the NTMX74 serves 4 DS30A links. Message (MS) links must be separated by a minimum of 4 when the user enters table

LCMINV. This action prevents a single chip failure that causes a T1 outage. Link-to-chip relationships appears in the following table.

**Table 1-2 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 remote cluster controller 2

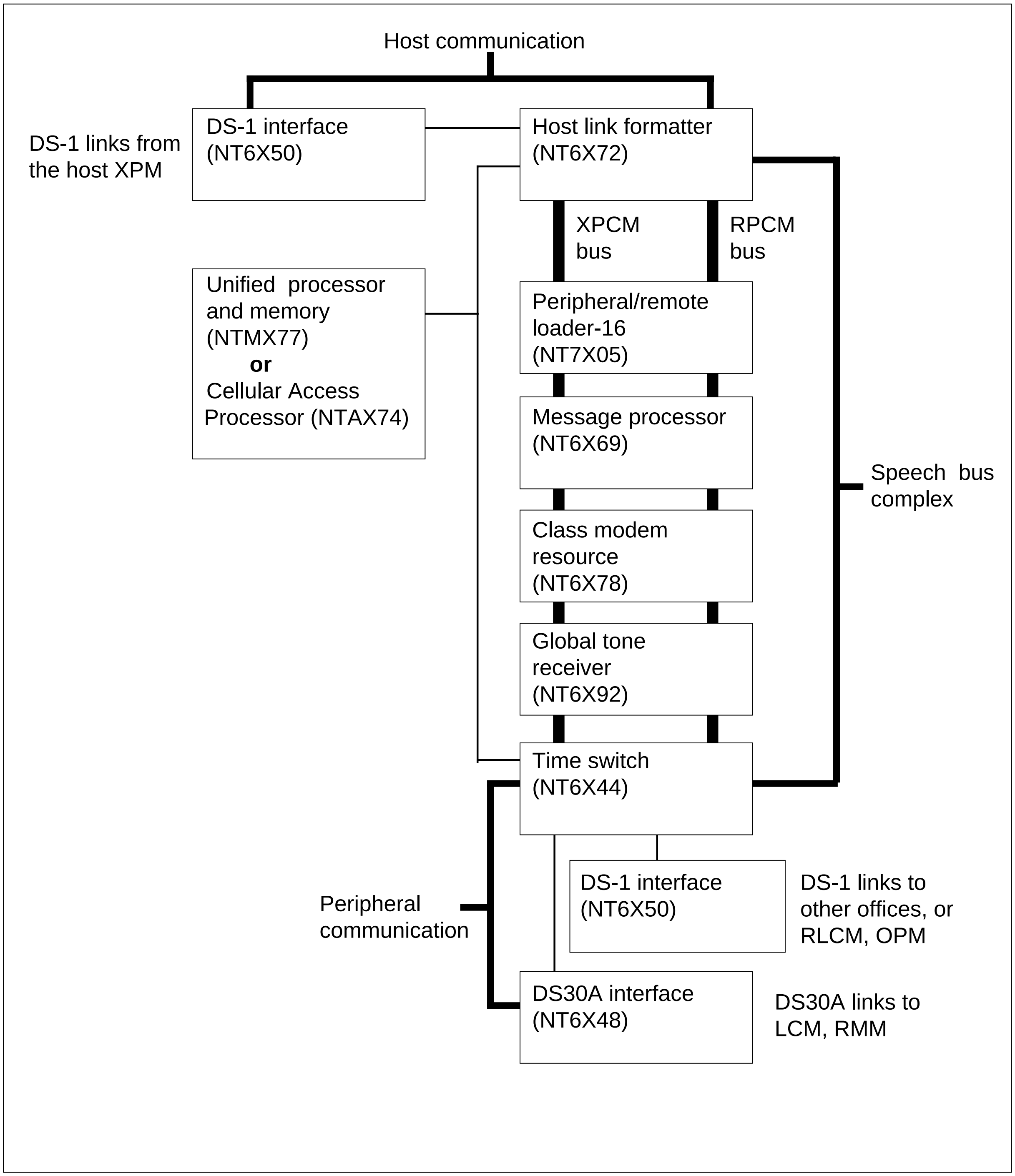
The parallel speech bus consists of a transmit bus and a receive bus. Voice and message paths go between the two RCC2 units in a DRCC2 from the RCC2 to the host.

For an RCC2 to work, there must be enough communication between the RCC2 units. For example, the inactive unit can take over call processing when necessary RCC2 units communicate over the intermodule communication (IMC) links.

An RCC2 communicates with the host over links 0 and 2. When these message links fail, the RCC2 cannot communicate with the host. The ESA is enabled.

The next figure shows a functional block diagram of the RCC2.

**Figure 1-5 Functional block diagram of the RCC2**




## Routine exercise test

The REX test tests the RCC2. The REX test helps make sure that each unit can take over call processing when the other unit fails. Table OFCVAR, parameter NODEREXCONTROL controls the REX test schedules. When you enter data in the table, the REX test schedule is controlled for a peripheral module (PM). To control the REX test schedule for a PM, post the PM from the PM level of the MAP display. The following are examples:

```
>TST REX ON
XPM n is included in the REX test
schedule
>TST REX OFF
XPM n is removed from the REX test
schedule
>TST REX NOW
REX test in progress
(REX test messages)
```

The REX test for the RCC2 combines diagnostic and functional routines available with the RCC to improve fault coverage and reliability. The system generates logs during the test. Operational measurement (OM) increases and alarms that the system normally generate are suppressed when activated because of the REX test.

### Switch of activity

A SWACT process allows the two units of an RCC2 to switch activity. The active unit becomes the inactive unit. The inactive unit becomes the active unit and takes over call processing.

A peripheral that supports a subscriber line with an active DSCWID session can undergo a Warm SWACT. When this event occurs, the system drops all parties to the call. This event occurs between the alert tones plus the timer default seconds after re-alert and before the incoming call is acknowledged.

For an RCC2 with DS-1 links that operate in HDLC mode, the unit attempts a SWACT. This action occurs when all HDLC links lose synchronization to the active unit. When the SWACT fails, the RCC2 enters ESA. When synchronization fails in the inactive unit, the unit works in the DMS-X mode.

### Computing module datasync

The XPMs must adhere to several requirements to maintain system sanity. The node and port tables in both units must remain synchronized. The same internal indexes must reference common tuples to both units. Common tuples to both units must contain the same data. Identical indexes maintained in both units allow processes to communicate between units. Active processes continue to function after a Warm SWACT. When the system designed XPMs, maintenance of this synchronization was not difficult. When the system introduced subsequent functionalities, preservation of the synchronization of the mate unit node and port tables became difficult.

Data is set in the active unit of an XPM. This event occurs through the node and link RTS and state changes that are triggered from the outside. Data propagates to the inactive XPM unit through the group and separate messages of the current XPM datasync mechanism.

For the successful initialization of the RCC2 data, include the following:

- link states data
- P-side node and port states data for basic loads

The XPM coordinates the management of node table synchronization. The XPM forces the inactive unit to order the XPM node table the same as the active unit. The active unit sends a map of the XPM node table to the inactive unit. This event occurs during a group download of configuration data. When the inactive unit receives data from the CM, the inactive unit uses the map to enter data. The inactive unit enters data in the node table.

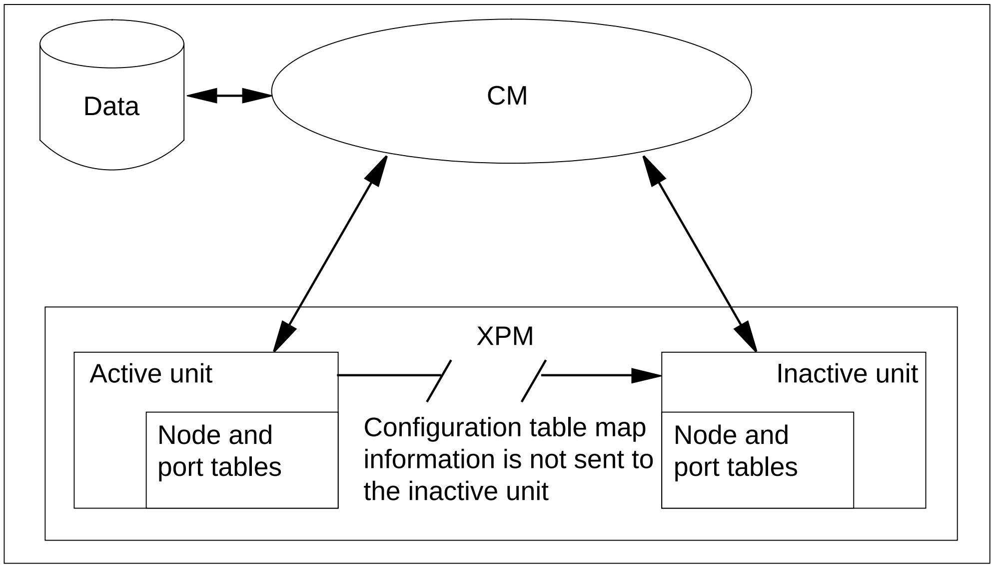
The inactive unit does not use the node map to write dynamic updates. The inactive unit expects to receive the data in exactly the same order as the active unit. When the inactive unit is operational, the node and port tables of the inactive unit remain in synchronization. The node and port tables remain in synchronization with the active unit. Units can lose synchronization when one unit loses a previous dynamic update. The active unit can contain a temporary interprocessor message link (IPML) in the node table when a dynamic update occurs. The IPML allows broadcast loading. The temporary IPML causes the node and port tables to be out of synchronization. Temporary IPMLs are added only in the node table of the active unit.

### Node table synchronization improvements

Table PMNODES, created by feature AF5678, XPM Node Table Sync Redesign, contains a list of all nodes in each XPM. Table PMNODES transfers XPM node information to the new CM load during a software upgrade. This transfer makes sure that the new CM software contains the correct node order for each XPM that becomes active. The CM controls the sequence and entry of node and port tables in both XPM units. The CM and the tables in both active and inactive XPM units maintain synchronization. The XPMs converted to this table management system do not synchronize with the use of mapping information. The active unit sends this information to the inactive unit.

Table PMNODES is a read-only table. The system adds and deletes tuples as the system enters data in inventory tables, like tables RCCINV and LCMINV. The system rejects attempts from a user to update this table directly. A check of the XPM resources occurs with the addition or change of a tuple for a subtending node. This change occurs in an inventory table. The system displays warnings when an XPM does not have enough table space, port, or terminal resources. The XPM requires these resources to support the new requirements. For a complete description of the entries for table PMNODES, refer to the *XPM Translations Reference Manual*.

**Figure 1-6 Enhanced XPM node table synchronization**




Feature AF5678 adds a new software component. The new software component is configuration data table (CDT) management. The CDT bind interface allows XPM applications to bind a feature. The XPM applications bind the feature with a set of procedures to a CDT during initial program load (IPL). An XPM with a software load notifies the CM during an XPM node data audit. The system binds the XPM with the new CDT management system. The CM starts a CDT audit every 5 min which initiates the XPM node data audit in the XPMs.

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

The CM controls both units of an XPM node under the following conditions:

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

> ***Note:*** An office receives an initial software load with the new node table management system. The CM gains control of compatible XPM node and terminal tables during the next scheduled CDT / XPM node data audits. When an XPM is taken out of service (OOS), the CM does not take control until the CDT/XPM audits convert an XPM to the CDT management system and aligns the CM tables with the node tables.

The CM initiates the audit request to an XPM with a VERTUPLE message. The message has a parameter. The parameter identifies if the XPM must respond with a message with accurate tuples of data or a checksum of the table. The tuples data must supply the CM with the required information to convert an XPM to CDT management control. When differences occur between the active and inactive unit tables, the CM aligns to the table of the active unit. The CM sets the XPM ISTb. After an XPM converts to CDT, a checksum of the table is requested when the CDT audit runs.

Checksums of the node and port table data verify synchronization of XPM nodes under the CDT management system. The regeneration of each tuple in the XPM table calculates the checksums. After a tuple is formatted, the checksum is calculated for that tuple. The checksum is added to the table checksum for that XPM. The XPM checksums are verified against corresponding checksums generated in the CM. Mate unit synchronization or CM control can confirm XPM synchronization. For both methods of confirming XPM synchronization, an out-of-synchronization condition causes that unit to be set ISTb. During the next audit cycle, when the unit checksum coincides with the CM checksum, the ISTb condition clears.

The CM takes a more active role to maintain the accuracy of the node tables in XPMs. The XPMs become less active. The XPM must accept the CM data because the system sends the data without corrections or adjustments.

The following functions are created or changed to implement the improved synchronization ability that feature AF5678 provides.

- The XPM does not derive node table data from a subset of data sent from the CM. The CM specifies all the data that the node and port tables contain. The XPM stores the received data.
- The CM notifies operating company personnel when resources are not available on an XPM when inventory tables change. The CM notifies operating company personnel even if the XPM is ManB or OOS at the time the inventory tables change.
- The XPM does not compare node tables between units. The CM makes sure the node tables in each unit match because the CM controls the content of each table. The RTS of an inactive unit with the NODATSYNC option does not cause a configuration download from the CM.

Configuration download occurs when both units are taken out-of-service and RTSed at the same time.

- Node and port table aspect and access routines allow applications to access the data. These routines provide Read-only access to applications. The CM updates tuples in the XPM tables when the XPM is INSV.
- The creation of a new external node number to internal node number look-up table occurs in the XPM. The look-up table provides fast conversion from external to internal node numbers. This table eliminates collisions.
- An improved messaging interface includes state information between the CM and XPM. The new interface contains:
  - — the ability to detect lost messages by the addition of a sequence number from 1 to 255 in the header
  - — a byte of data transfer state information that informs the XPM when more messages follow
  - — a count of tuples that the message affects
  - — table format identification to identify the version of XPM table software. Leave the current node table management software in the XPM until XPM06 to maintain backward compatibility.

### Enhanced Dynamic Data Sync (EDDS)

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

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

The inactive unit can be out of service (OOS), manually busy (ManB), system busy (SysB), or C-side busy (CBsy). If the inactive unit was in one of these states, the following occurs during a return to service (RTS).

- the system initializes the inactive unit
- the OOS tests run on the inactive unit
- if the inactive unit static data checksum is not correct, the CM sends new static data. The CM marks the inactive unit in-service trouble (ISTb)

- the active unit sends dynamic data to the inactive unit (bulk synchronization)
- the CM marks the inactive unit INSV

Feature AF6436 provides EDDS and warm SWACT abilities for ISDN basic rate interface (BRI) calls on the RCC2.

### Reset non-remote carriers and trunk call cleanup

In addition to the CM dynamic data, the system cycles all non-remote carriers if present. Cycling performs a busy and return-to-service sequence on a terminal. Cycling makes sure that all trunk data initializes in the RCC2. This activity releases all trunk calls and attempts to RTS any system busy trunk carriers.

### Line call cleanup

On line concentrating XPMs, the system idles all calls on all subtending P-side nodes. This idling takes into account intra- and interswitched calls on subtending RCC2s. The cleanup has a rippling impact. The system idles calls in local P-side nodes. The system then idles calls in subtending RCC2s. During the line call cleanup, messaging overload can occur in the RCC2. To prevent this occurrence, the system inhibits call terminations and starts.

### Special cases

An LTC can have subtending RCC2s. The subtending RCC2s can have subtending SMSRs. In this occurrence, not all of the RCC2s can have loads compatible with this feature.

When an error occurs during the SWACT, the location of the error on the RCC2 that undergoes the SWACT determines the action. For failures that occur:

- before the actual activity switch, the SWACT aborts and the node is in the ISTb state. The inactive unit becomes SysB. Maintenance personnel can recover the unit. The system recovers the SysB unit if maintenance personnel do not work on the unit.
- after the actual activity switch, but before the full post-SWACT cleanup completes, the node becomes SysB. Maintenance personnel determine the cause of the failure and bring the node back in service. The system recovers the SysB unit if maintenance personnel do not work on the unit.
- after the actual activity switch and after the full post-SWACT cleanup, the newly inactive unit remains out of service. Maintenance personnel work on the inactive unit. The system recovers the SysB unit if maintenance personnel do not work on the unit.

A datasync failure for any of the P-side nodes causes the P-side node to become busy and RTS. A P-side node datasync failure of a single P-side node does not affect the node that undergoes the SWACT. This action does not affect any other P-side nodes. When a P-side node has a problem with the CM dynamic data synchronization, the problem affects that P-side node. The problem does not affect the host XPM or other P-side nodes.

**Controlled and uncontrolled switch of activity** The types of SWACT are controlled SWACT and uncontrolled SWACT. The system implements controlled SWACTs because of the following:

- manual action like the entry of the SWACT command
- planned system requests like REX test schedule
- the active unit becomes busy when the inactive unit is in service (INSV)

Controlled SWACTs can occur only if both units are INSV or if the RCC2 is in the in-service trouble (ISTb) state. The RCC2 is in an ISTb state because of a previous REX test failure.

> ***Note:*** Feature AF2987 makes sure that a system audit does not RTS the unit.

The system implements uncontrolled SWACTs when a hardware fault or a trap is present in the active unit. Failures that initiate uncontrolled SWACTs follow:

- power
- clock
- extension shelf
- power converter

### Updating static data (non-emergency stand alone)

To execute call processing and maintenance on the RCC2 and the subtending nodes of the RCC2, the RCC2 must have information. The RCC2 must know the cards, ports, execs and terminals that are present. This information is static data and is in tables. The RCC2 does not change static data autonomously. The RCC2 changes static data autonomously for dynamic data like call-processing connections. The system establishes call-processing connections when a call is set up.

Data entered through the different inventory tables in the CM determines the node data that resides in the RCC2 and subtending XPMs. Tables LTCINV, LCMINV, and IPMLINV are examples of inventory tables in the CM. These tables identify which nodes must communicate with each other. A node, like a line concentrating module (LCM), is entered on an RCC2. You must make an entry for the LCM in the RCC2 node table. This action makes sure that the RCC2 routes messages to and from the LCM.

The inventory tables receive the data. The CM verifies that the head or messaging XPM has the resources for the new node like an LCM. An example of the head or messaging XPM is RCC2. If the XPM does not have the necessary resources, the system rejects the data modification order (DMO). At any other time, the CM writes the data in the CM copy of the XPM node table. The CM determines the internal index for the new node.

When the data transfers to the XPM, the CM reads the data from the XPM node table. The data that transfers includes the internal index for each tuple to write in the XPM node table. The XPM uses the index the CM sends to determine the location of the tuples. The tuples are in the node table of the XPM.

The CM transfers the index to both units. This action makes sure that the XPM receives the same tuple indexes for both units. This transfer maintains the synchronization in the node table the XPM requires to support Warm SWACTs and inter-unit messaging.

Before, the CM transferred the port table information for a node in the same message as the node data. This event occurs even though the node and port tables are separate tables in the XPM. The CM now transfers the node and port data in separate messages to effectively manage these tables. The CM uses different configuration table identifiers for each table.

The state of the peripheral modules determines when and how the system performs the static data update :

- if the host XPM is ManB, the system loads the static data during RTS
- if the host XPM is INSV, the static data dynamically updates
- if the RCC2 is ManB, the system loads the static data during RTS
- if the RCC2 is INSV, the static data dynamically updates

The system also downloads static data if the inactive unit is busied and RTSd.

### RSC_XPMESAEXIT parameter

This parameter (Remote Cluster Controller Xms-based Peripheral Module Emergency Stand Alone Exit) is required and appears only in a switching unit with the remote cluster controller (RCC) and the emergency stand alone (ESA) feature.

The RSC_XPMESAEXIT parameter determines if the system initiates ESA exit or if manual intervention is required to exit ESA. It also determines how long the system waits to initiate the ESA exit.

### Provisioning rules

Set the value of this parameter to the desired delay between links being restored (or communication with C-side peripheral recovered) and the remote service center coming out of ESA mode.

The time is defined in 10-s intervals (for example, a value of 2 indicates a delay of 20 s). The default setting of 6 (see “Range information") indicates that after a 60-s delay, the system will initiate an ESA exit. A value of N indicates that a manual RETURN TO SERVICE (RTS) is required to exit ESA.

The range of values type is RSC_ESA_EXIT_TYPE with the following multiple values:

**Table 1-3**

| | |
|---|---|
| SYSTEM_ESA_EXIT | {N, Y} |
| EXIT_DELAY | {0 to 100} |

The SYSTEM_ESA_EXIT field is a boolean that determines if the system initiates an ESA exit (Y) or if a manual ESA exit is required (N). The EXIT_DELAY field determines how long the system waits to initiate the ESA exit. The value is non-zero if the system initiates the ESA exit. The delay increases in multiples of 10-s increments. The range has a minimum of 0, a maximum of 100, and a default of 6. The activation is immediate.

### Verification

Verification of the SYSTEM_ESA_EXIT field is “Y"; verification of the XPM_EXIT_DELAY field is “6".

To verify:

1. Set the parameter to its default value in table OFCENG as follows:

**Table 1-4**

| | | |
|---|---|---|
| RSC_XPMESAEXIT | Y | 6 |

2. From the MAP (Maintenance Administration Position) display, post an InSv RCC.
3. Break RCC C-side msg links at DSX.
4. From the MAP display, observe RCC go from InSv to CBsy, then to SysB.
5. From the MAP display, observe the ESA countdown start at 60.
6. From the MAP display, observe the system warm exit RCC.

### Memory requirements

This parameter value requires 1 word of memory.

### Dump and restore rules

Copy the existing value of this parameter when doing a dump and restore.

If the current software release has the parameter RSC_XMPESAEXIT delay set to “0", then the new parameter will be set as follows:

**Table 1-5**

| | | |
|---|---|---|
| RSC_XPMESAEXIT | N | 0 |

If the previous software release had the parameter RSC_XMPESAEXIT delay set to a non-zero setting, then the new parameter will be set as follows:

**Table 1-6**

| | | |
|---|---|---|
| RSC_XPMESAEXIT | Y | <dt> |

where <dt> is the ESA exit delay time of the previous software release.

### Testing the RCC

Operating company personnel usually test the RCC by issuing the TST command. The type of test used depends on two factors, the state of the RCC and the parameters included in the TST command.

*User input:* To busy the inactive unit of the RCC, enter:

**> TST UNIT 0**

and press the Enter key

*where*

**0 =**
the inactive unit

*System response:* The following message sequence appears:

```
ROM/RAM query
/Reset
/Status
Non Destr ROMtst
/Run
Initializing
Testing TESTALL
ABDIAG
UTRDIAG
PSLOOP
MSGDIAG
SPCHDIAG
TS DIAG
TONESDG
CMRDIAG
Initializing
Tst Passed
```

Following is the message sequence for command testing the inactive unit. This is a subset of the TST command that performs full diagnostics.

*User input:* To test the inactive unit, enter:

**> TST UNIT 0 ROM**

*System response:*

```
/Status
ROM/RAM query
Non Destr ROMtst
Tst Passed
```

### Testing other cards

Following are cards with special test sequences:

- *NT6X69*

  *Messaging* When the TST command is given and the RCC is both busy and inactive, the following tests are run:

  — *destructive* replaces the contents of RAM by resetting the card, checking the message buffer, testing the interface to the speech bus, and testing ROM

  — *nondestructive* runs when the destructive test cannot run. It tests the P-side by running a looparound test on a dedicated channel of the time switch card, checking the interface to the speech bus, and testing its ROM.

- *NT6X50AA and NT6X50AB*

  *DS-1 interface* When the TST command is given for an out-of-service (OOS) unit, loopback tests are performed through the DS-1 card.

### Returning the remote cluster controller 2 to service

An RCC2 RTS after performance of manual maintenance or if a system audit detects a defective component.

If performance of manual maintenance occurs and a defect causes the RCC2 unit or PM going system busy (SysB), the unit is normally busied and tested. When the defective component is found and repaired or replaced, an RTS occurs on the unit or PM.

If a system audit detects a defective component, an audit attempts to RTS the component.

**Performing a return to service without running diagnostics** If you use the FORCE parameter with the RTS command, the system does not perform read-only memory (ROM) diagnostics.

> **CAUTION**
> **Use the FORCE parameter only when directed to.**
> Operating company personnel must not use the FORCE parameter unless directed to. Diagnostics that are normally part of the RTS command can find an additional fault.

The system displays the following message sequence when you use the RTS command with the FORCE parameter.

```
>TST UNIT 0 FORCE
ROM/RAM query
/Clear data
Initializing
/Static Data
Loading:Execs
Initializing
ESA Data Load
```

After the message sequence, there is a dynamic data synchronization. When the dynamic data synchronization is complete, the unit RTS.

## Dual remote cluster controller 2

An RCC2 that is part of a dual configuration is functionally the same as a single RCC2. The main difference between a dual RCC2 and a single RCC2 is that P-side DS-1 links connect the two peripherals.

The following sections explain DRCC2 functional areas:

- speech and message paths
- ESA and dual ESA (DESA)
- maintenance messaging

### Speech and message paths

The DRCC2 can allow calls that originate on one RCC2 and terminate on the interconnected RCC2 to route directly over interlinks. This event occurs after the set up of the call. The minimum configuration for a DRCC2 requires these four messaging links.

For this type of call to occur, the two peripherals must communicate with the host. Each peripheral must also communicate with the other peripheral.

**C-side connections to the host** The NTMX81 and NTMX75 cards are the host communication cards. In the DRCC2, these cards handle communication between the two peripherals. The C-side ports 0 and 2 handle the messaging links to the network.

**Sending messages between remote cluster controller 2s** When the system receives a message over a messaging link, the system routes the message to the NTMX76 of the active unit. The system receives this message from the interconnected RCC2. The message card examines the message and determines if the message is for the active or inactive unit. The P-side ports 0 and 8 handle the messaging links between the two peripherals.

**Inter-RCC2 link dynamic static data update** Feature AF6046 performs the dynamic download of static data (SD) for table IRLNKINV. Feature AF6046 interlinks information in table IRLNKINV was not dynamically downloaded to both RCC2s of a DRCC2. To download interlinks information, the system requires a manual busy and return-to-service of the two RCC2s. This requirement causes an E1 outage. Table IRLNKINV information downloaded to the master RCC2 and the spouse RCC2 as part of the SD bulk download.

Feature AF6046 provides a process to dynamically reconfigure interlinks between two in-service (INSV) RCC2 nodes in a dual configuration. The system preserves stable interswitched calls. Feature AF6046 performs the following:

- adds the command INTERSW to the IRLINK MAP level to enable and disable interswitched calls for the posted RCC2
- improves the BSY interlink MAP command to display the number of interswitched calls that revert to the network using available C-side channels
- improves the QUERYIR interlink MAP command. The MAP command now displays the state of IRLINKS and the state of interswitching, ability of the posted RCC2 of a DRCC2. The state of interswitching is enabled or disabled.
- allows dynamic downloading of IRLINKS static data to both RCC2s connected in a dual configuration
- provides dynamic downloading of ForceESA SD

The reconfiguration of interlinks of a posted RCC2 of a DRCC2 can result in the addition, removal or movement of interlinks. Before this action occurs, enter the following command from the IRLINK MAP level to disable interswitching ability:>**INTERSW DISABLE**

To confirm that interswitching disabled, enter the QUERYIR command. The QUERYIR command displays the status of interswitching ability for the posted RCC2:>**QUERYIR**

*Example of a MAP display*

```
Interswitching is DISABLED
IR   FROM         TO              C  ALRM SLIP FRME BER STATE
 0   RCC2  0, 0   RCC2  1, 0      .        0    0         OK
 1   RCC2  0, 8   RCC2  1, 8      .        0    0         OK
 2   RCC2  0, 4   RCC2  1, 7      .        0    0         OK
 3   RCC2  0, 9   RCC2  1, 12     .        0    0         OK
```

When the interswitching ability disables, enter the BSY command with the IRLINK number. The IRLINK number is the IRLINK you want to configure. This action starts the reconfiguration of the IRLINKS. The BSY command improves to display the number of interswitched calls. The interswitched calls revert to the network with available C-side channels. This action appears in the following example:>**BSY 3**

*Example of a MAP response*

```
67 interswitched calls will be reverted to the network.
Potential loss of calls on the interlink if there are no
available C-side channels.
```

The C-side channels of the RCC2 is a limited resource. Reconfigure the IRLINKS during low traffic. The system can lose some interswitched calls if not enough available C-side channels are present.

Enter the INTERSW command before you attempt to manually busy (BSY) a specified IRLINK. If you do not perform this action, the MAP terminal displays the following response:>**BSY 3**

*Example of a MAP response*

```
interswitched calls should be disabled before an
interlink is busied.
```

With the IRLINKS manually-busied (ManB), enter table IRLNKINV and make link changes for the desired IRLINK configuration. The system downloads static data to both units of both RCC2s of the DRCC2. The RCC2s must be INSV.

After reconfiguration of DRCC2 IRLINKS, enter the improved RTS command to RTS the IRLINKS. The MAP terminal displays the following response to indicate interswitching is disabled.>**RTS 3**

*Example of a MAP response*

```
Be aware that Interswitching is Disabled.
```

To enable interswitching, enter the following command from the IRLINK MAP level:>**INTERSW ENABLE**

To confirm interswitching is enabled for the posted RCC2, enter the QUERYIR command from the IRLINK MAP level:>**QUERYIR**

*Example of a MAP display*

```
Interswitching is ENABLED
IR   FROM         TO              C  ALRM SLIP FRME BER STATE
 0   RCC2  0, 0   RCC2  1, 0      .        0    0         OK
 1   RCC2  0, 8   RCC2  1, 8      .        0    0         OK
 2   RCC2  0, 4   RCC2  1, 7      .        0    0         OK
 3   RCC2  0, 6   RCC2  1, 6      .        0    0         OK
```

The system dynamically downloads IRLINKS and ForceESA static data to both RCC2s of the DRCC2. The system also downloads ESA lines, components of the ESA static data for both RCC2s, trunks and ESA table control data. The units of both RCC2s are set to in-service trouble (ISTb) with the reason `ESA STATIC DATA MISMATCH`.

Manually download ESA static data at the PM MAP with the RCC2s posted. To perform this action, enter the LOADPM command with the source of `CC.` and file of `ESADATA`. You can also update ESA static data at the automatic nightly static data updates. Table OFCENG tuples RSC_XPMESASDUPD_BOOL and RSC_XPMESASDUPD_HOUR define these static data updates.

### Emergency stand-alone and dual emergency stand-alone

The following sections describe the design of the system. The design helps make sure the RCC2 can communicate with the host. The following sections describe exit from or entry to the ESA and DESA.

**Synchronization in dual emergency stand-alone mode** When the DRCC2 enters DESA, the NTMX81, NTMX75 and NTMX76 cards perform functions. The functions allow both peripherals to synchronize and send messages to each other.

For calls to be interswitched, both peripherals must be in synchronization with the same source. In normal operation, each RCC2 in the DRCC2 follows the timing of the host line group controller (LGC) or line trunk controller (LTC). The system sends the timing element out to all nodes in the network. This action causes both peripherals to synchronize to the same source.

The RCC2 uses the NTMX75 card to generate a frame pulse. An internal XPM clock controls this frame pulse. The clock for the active unit dynamically adjusts to the network clock pulse. The RCC2 is in synchronization with the host.

When the system loses communication to the host, the internal XPM clock for the active unit does not have a frame pulse to follow. The internal clock enters free-run mode. With the NTX380AA package, the RCC2 can synchronize to the interconnected RCC2. The DRCC2 software determines which RCC2 is the source of the frame pulse. This RCC2 sends frame pulses over links 0 and 8 to the other RCC2.

**Forced emergency stand-alone** When RCC2 A and RCC2 B are in ESA, the system implements DESA and allows interswitched calls.

> ***Note:*** The RCC2 B is not truly in ESA. The RCC2 B can exit ESA under certain conditions. For example, if the RCC2s cannot exchange messages over the interlinks, the RCC2 B starts a timer. This timer is the same timer

as the timer in parameter RSC_ESAENTRY_BADLINK in table OFCENG. Use this timer to prevent links that bounce.

When this timer begins, the following conditions can occur:

- if the interlinks cannot resume messaging before the timer expires, RCC2 B stops the simulation of defects and exits ESA
- if the interlinks resume messaging before the timer expires, the system cancels the timer and establishes DESA again
- The timer can expire and RCC2 B can exits ESA. If these events occur and the interlinks resume messaging, the system forces the RCC2 B back into ESA

### Maintenance messaging

For the messaging channels, RCC2 software performs the following tasks:

- sends and receives messages across the interlinks with DMS-X protocol
- handles intermessaging link faults the messaging system detects
- provides support when maintenance occurs on the messaging links

When an RCC2 sends a message to the other RCC2, messaging software sends the message to transmit to the firmware of the NTMX76 card. If the system cannot send the message, the message returns to the messaging software. For example, the link can be closed or a timeout is present in the DMS-X protocol. These messages have rebounded.

When a message rebounds, the message link closes and software attempts to send the message over the other messaging link. The system informs the XPM maintenance in the RCC2 of this situation. This software attempts to RTS the defective link, and the system generates a PM181 log.

### Emergency stand-alone warm exit

The RCC2 warm exit is based on the RCC warm exit. The RCC warm exit software makes any necessary adjustments to operate warm exit for the RCC2.

The system developed warm exit for the RCC2 to address two deficiencies when an RCC2 exits ESA. One deficiency is a service outage of a maximum of 20 min. A second deficiency is that the system drops all stable calls. Messaging between the RCC2 and the CC informs the CC of current active calls.

The system supports ESA warm exit for the DRCC2. The system does not support ESA warm exit for ISDN.

## 1-Meg Modem Service

The RSC-S supports the 1-Meg Modem Service from frame-based LCMs and RLCMs that connect to RSC-Ss. The 1-Meg Modem Service provides high-speed, data-over-voice communications over standard telephone lines to the home or small-office subscriber. The service provides the following functionality:

- high bandwidth with line transport rates up to 1280 kilobits per second (kbit/s) downstream and 320 kbit/s upstream
- simultaneous data and voice connection
- continuous data connection
- data traffic routed to data networks, which reduces congestion on the voice switch

The 1-Meg Modem Service uses a digital subscriber line (DSL) technology to provide the increased bandwidth with current office equipment and the subscriber loop. In this document, the term xDSL refers to all the different DSL technologies.

### Components

The 1-Meg Modem Service includes the following components:

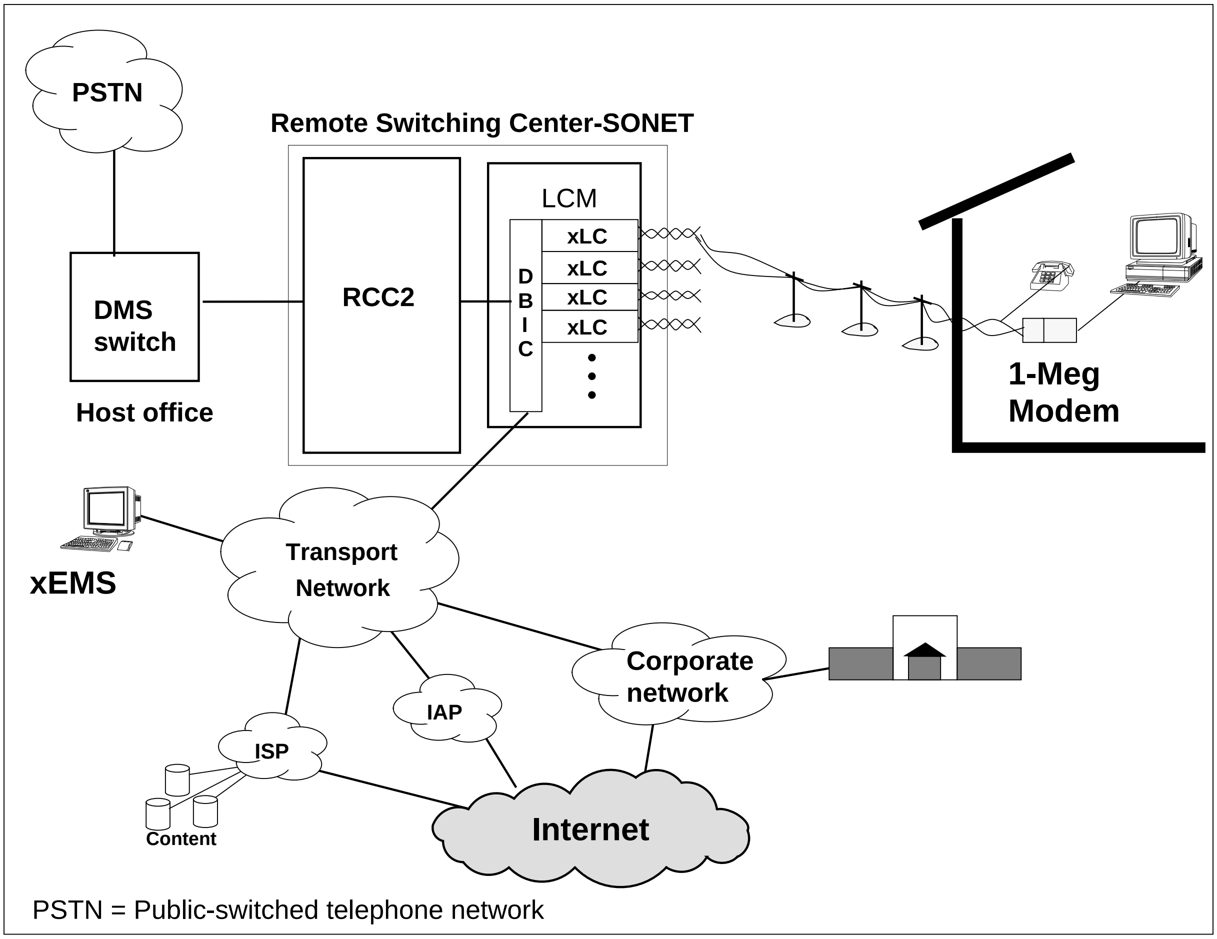
- The 1-Meg Modem is customer premises equipment (CPE) that connects the telephone line, extension telephone, and computer. To the subscriber, the modem installs like a regular voice band modem, except the modem uses a 10BaseT Ethernet connection to the computer. Voice and data circuits are kept separate on the loop. This separation allows simultaneous voice and data traffic with no impact to other telephony features.
- The xDSL line card (xLC) replaces the subscriber's line card in an existing line concentrating module (LCM) drawer. The card provides full voice service in parallel with high speed data communication with the 1-Meg Modem.
- The data-enhanced bus interface card (DBIC) replaces the existing bus interface card (BIC) in the existing LCM drawer. The card is a concentrator for the voice and data connections within a single LCM drawer. The card also separates the voice and data traffic for routing to the correct networks.
- The xDSL Element Management System (xEMS) provides operations, administration, maintenance, and provisioning (OAM&P) functions from a Hewlett-Packard (HP) or Sun workstation. Based on HP OpenView, the xEMS is a graphical user interface (GUI) that uses icons and pull-down

menus. Refer to *1-Meg Modem Service Network Implementation Guide*, 297-8063-200, for more information on xEMS.

- The transport network provides the connection to the service providers. Refer to *1-Meg Modem Service Implementation Guide*, 297-8063-200, for more information on transport networks.

The following figure illustrates a network with the 1-Meg Modem Service.

**Figure 1-7 Telephone network with 1-Meg Modem Service**




The LCM line drawer contains the DBIC and xLCs. One LCM can hold up to 10 line drawers. In a frame-based LCM, the line cards in each drawer can be a mix of xLCs and plain old telephone service (POTS) line cards. In a frame-based RLCM, the line cards in each drawer can be either xLCs or POTS line cards. Each 1-Meg Modem Service subscriber has an xLC. Each line drawer with xLCs must have a DBIC to provide data service. Each DBIC provides an Ethernet connection to the transport network for all subscribers in the LCM line drawer.

An LCM can have a maximum of ten Ethernet connections for all its 1-Meg Modem Service subscribers. The configuration of the transport network can require these Ethernet interfaces to connect to a mix of network components. The flexibility of the 1-Meg Modem Service allows you to change the interface to public and private wide area networks (WAN) to meet your requirements. Examples of WANs are Internet access providers (IAP), Internet service providers (ISP), and corporate networks.

### Potential applications

Potential applications of the 1-Meg Modem Service include the following:

- work-at-home

  The subscriber uses the 1-Meg Modem Service, including the transport network, to connect to their corporate network.

- Internet access

  The subscriber uses the 1-Meg Modem Service, including the transport network, to connect to their ISP.

- small office communications

  The subscriber uses the 1-Meg Modem Service, including the transport network, to connect to their corporate network. Two small offices can communicate through the 1-Meg Modem Service and depend on on the transport network for interconnection.

### Compatibility

This section describes compatibility between the 1-Meg Modem Service and other services.

Voice services The 1-Meg Modem Service shares many components with the existing voice service. Some of these components are the following:

- LCE hardware, including power supplies and distribution
- the subscriber's copper loop

Other data services The 1-Meg Modem Service can function with the following data services in the same binder group:

- integrated services digital network (ISDN) basic rate interface (BRI)
- asymmetric digital subscriber line (ADSL)
- high bit rate digital subscriber line (HDSL) services

The 1-Meg Modem Service can function with T1 services in adjacent binder groups.

*Ethernet* The Ethernet interfaces at the 1-Meg Modem and the DBIC meet standard *ANSI/IEEE Standard 802.3* with one exception. The 1-Meg Modem does not support the truncated binary exponential backoff algorithm described in section 4.2.3.2.5 of the IEEE802.3 specification. This exception allows the best use of the bandwidth on the link. This exception also confirms a standard allocation between multiple users.

### 1-Meg Modem Service components

The following section describes some of the components in the 1-Meg Modem Service.

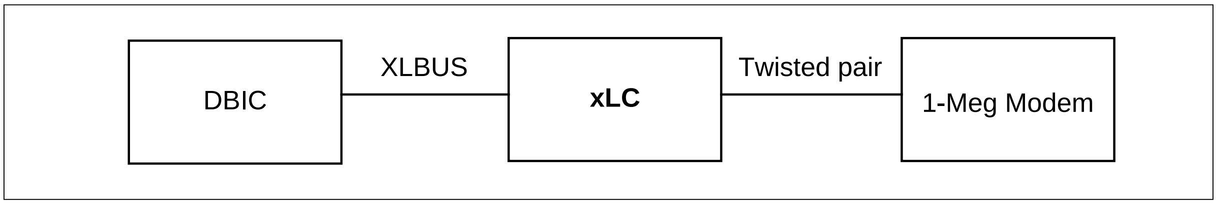
*xDSL line card* The xDSL line card (xLC) provides full voice service and high speed data communication with a subscriber's 1-Meg Modem.

The xLC has the following features:

- located in a standard LCM line drawer with 1-Meg Modem Service capability
- provides standard voice service using the world line card (WLC)
- provides xDSL modem function over loops up to 18,000 feet on 26 American wire gauge (AWG) and 24,000 feet on 24 AWG
- rate-adaptable in both downstream (DS) and upstream (US) directions
- QAM modulation in both DS and US directions
- supports both narrowband and wideband DS spectra low and high transmission levels
- raw transport downstream data rates of 1280 kbit/s to 80 kbit/s
- raw transport upstream transport data rates of 320 kbit/s to 40 kbit/s
- provides an XLBUS interface to backplane
- -48 V power to data part of card
- self-identifying to DBIC on installation
- out-of-service data loopback capability for OAM
- low power design
- occupies a two-slot form factor

The xLC terminates the subscriber's line and transmits the call to the DBIC for multiplexing. The following figure illustrates the xLC in the 1-Meg Modem Service.

**Figure 1-8 xLC in 1-Meg Modem Service**




The 1-Meg Modem Service supports three types of xLCs. Each xLC supports different transmission rates and LCM drawer fill requirements. The following table lists the xLCs supported by the 1-Meg Modem Service.

**Table 1-7 Types of xLCs in 1-Meg Modem Service**

| PEC | Maximum US/DS rates (kbit/s) | Maximum LCM drawer fill | PMs |
|---|---|---|---|
| NTEX17AA | 960/120 | 16 | All |
| NTEX17BA | 1280/320 | 16 | All |
| NTEX17CA | 1280/320 | 31 | All |
| NTEX17DA | 12809/320 | 31 | • RLCM<br>• Star Remote Hub |

An LCM line drawer can contain a mix of POTS line cards and different types of xLCs. An RLCM line drawer can contain either xLCs or POTS line cards. However, thermal constraints and power distribution determine the location and maximum number of each type of card. Refer to *1-Meg Modem Service Network Implementation Guide*, 297-8063-200, for more information.

*Data-enhanced bus interface card* The DBIC replaces the existing BIC in each LCM drawer with an xLC. The DBIC separates the voice and data traffic. The card multiplexes the voice traffic to standard DS-30A interfaces to the existing circuit switched voice network. The card multiplexes the data traffic to one Ethernet connection to the transport network.

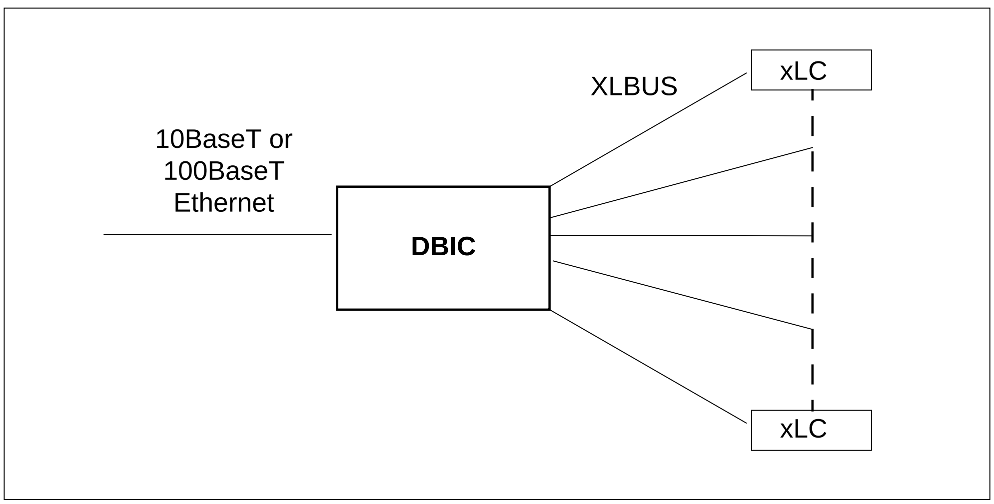
The DBIC has the following features:

- half duplex, standard compliant Ethernet interface
- auto-sensing feature allows DBIC to connect at 10BaseT or 100BaseT
- maximum of 31 xLCs in a drawer
- connected to all line card slots through XLBUS

- backwards compatible with all POTS line cards compatible with the NT6X54AA
- different media access control (MAC) addresses for each xLC and DBIC
- demultiplex 64 voice channels from receive data (RD) links to XLBUS links
- multiplex 64 voice channels from XLBUS links to transmit data (TD) links
- +12.7v CODEC reference to all 64 line positions
- controls ring bus and automatic number ID (ANI)/COIN voltages using relays

Any LCM line drawer that contains xLCs must have a DBIC. The following figure illustrates the DBIC in the 1-Meg Modem Service.

**Figure 1-9 DBIC in 1-Meg Modem Service**




The 1-Meg Modem Service supports three types of DBICs. Each DBIC supports different transmission rates and Ethernet interfaces. The following table lists the DBICs supported by the 1-Meg Modem Service.

**Table 1-8 Types of DBICs in 1-Meg Modem Service (Sheet 1 of 2)**

| PEC | Maximum US/DS rates (kbit/s) | Ethernet interface | PMs |
|---|---|---|---|
| NTEX54AA | 960/120 | 10BaseT | All |
| NTEX54AB | 1280/320 | 10BaseT | All |

**Table 1-8 Types of DBICs in 1-Meg Modem Service (Sheet 2 of 2)**

| PEC | Maximum US/DS rates (kbit/s) | Ethernet interface | PMs |
|---|---|---|---|
| NTEX54BA | 1280/320 | 10Base T or 100BaseT | All |
| NTEX54CA | 1280/320 | 10BaseT or 100BaseT | • RLCM<br>• Star Remote |

## RSC ESA firewall

An RCC enters ESA when communication to the C-side node is lost. When this happens, the RCC 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 RCC from any detrimental system actions. When communication with the C-side node is restored, the RCC 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 RCC 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 RCC 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 RCC. 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 RCC node or unit.

Feature AF6142 enhances ESA service by the following actions:

- enhancements to the commands at the RCC level of the MAP display to prevent detrimental human machine interface (HMI) request to an RCC in ESA
- The ESA condition is displayed at the MAP terminal when an RCC 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 RCC 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 RCC ESA status, thus improving RCC maintenance and preventing accidential outages through unnecessary maintenance actions.

### BSY command

An RCC 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 RCC is in ESA.
A manual ESA exit is required if the RCC 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 RCC 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
RCC 0 Unit 1    Request Invalid
                RCC is in ESA
RCC 0 Unit 1    Request Invalid
                RCC is in ESA
```

**or**

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

**or**

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

The CM rejects the test request because this HMI command is detrimental to the service of the RCC 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 RCC that is known to be in ESA. It also prevents ESA static data from being loaded into an RCC 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
RCC 0 Unit 1    Request Invalid
                RCC is in ESA
RCC 0 Unit 0    Request Invalid
                RCC 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
RCC 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 RCC is in ESA. This prevents the reset sent down to query the counters if the RCC 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
RCC 0 Unit 1    Request Invalid
                RCC is in ESA
RCC 0 Unit 0    Request Invalid
                RCC is in ESA
```

**or**

```
>QUERYPM ESA
RCC ESA Subsystem Status

ESA static data is valid
Expected ESA exit is Warm
Dual ESA entry force down is Enabled
RCC 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 RCC that is known to be in ESA. Resetting an RCC in ESA drops all stable calls for the ESA exit procedure.

*Example of a MAP response:*

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

Use EXITBYPASS option to force reset PM in ESA.
```

**or**

```
>PMRESET PM EXITBYPASS
WARNING
EXITBYPASS allows the RCC in ESA to be reset.
The PMRESET will drop the RCC 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 RCC that is known to be in ESA. Resetting an RCC 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
RCC 0 Unit 1    Request Invalid
                RCC is in ESA
RCC 0 Unit 0    Request Invalid
                RCC is in ESA

Use EXITBYPASS option to force reset PM in ESA.
```

**or**

```
>XPMRESET PM EXITBYPASS
WARNING
EXITBYPASS allows the RCC in ESA to be reset.
The XPMRESET will drop the RCC 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 RCC that is known to be in ESA. Recovering an RCC in ESA drops all stable calls and discards all ESA OM data for the recover procedure. If the RCC has NT6X45BA hardware or later this command can determine if the RCC has been loaded since power up. If the RCC has not been loaded since power up, it will be loaded and returned to service. If the RCC 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
RCC 0 Unit 1    Request Invalid
                RCC is in ESA
RCC 0 Unit 0    Request Invalid
                RCC is in ESA

Use EXITBYPASS option to force reset PM in ESA.
```

**or**

```
>RECOVER PM EXITBYPASS
WARNING
EXITBYPASS allows the RCC in ESA to be reset.
The RECOVER will drop the RCC 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 RCCs 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 RCC 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 RCC 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 RCC when, the only unit of the RCC that the CM can communicate with, is at ROM level. After being RTSed, the ESA state of the RCC should be determinate. If the RCC is found in ESA it performs a warm exit from ESA and return the RCC to service without an outage. Previously the RCC would remain in ESA until manual actions recovered the RCC.

When the single or dual RCC 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 RCC is then turned over to Base XPM Maintenance to be RTSed.

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

### Emergency stand-alone impacts

Emergency Stand-Alone Impacts (XPM) is a feature that improves the NI-2 compliancy of ESA call processing on the RCC2. It allows several NI-2 XPM09 activities to function properly or without detrimental results.

The following list presents the specific NA009 ISDN enhancements.

- support for more than two B-channel logical terminals on a BRI loop (any combination of initializing and noninitializing NI-2 logical terminals up to a maximum of eight)
- parameter download (PD) trigger following ESA EXIT
- associated groups on a terminal service profile (TSP) basis
- BRI on a residential line

### Support for more than two B-channel logical terminals on a BRI loop

This feature is supported in ESA mode by increasing the capacity to hold up to 14,436 directory numbers (DN). Dual configuration is also supported.

### Parameter download notification

During ESA, a fully initializing terminal (FIT) can reinitialize layer 2, then reinitialize layer 3 with a different service profile identifier (SPID), associating itself with a different LTID. The LTID is datafilled and attached to the loop. The newly initialized LTID can both originate and terminate calls within ESA. Because the RCC2 cannot communicate with the CM, service profile management (SPM) similar to PM is blocked. A failed PD request leaves the ISDN set with the same values it had prior to the request. USER must manually program into the set any new data associated with the new LTID. Sets that initialized layer 3 with a new SPID during ESA associate themselves with a different LTID. Following ESA EXIT, these sets are left with old data that may not be relevant to the new LTID.

PD notification is invoked from the ESA EXIT code to notify only those logical terminals (LT) that need a PD. This happens in WARM ESA EXIT, when communication is restored to the CM and call takeback has finished.

If ESA ENTRY reoccurs before this activity completes, the PD notification process aborts. This is because there is no communication with the CM. The check for ESA ENTRY is part of the Emergency Stand-Alone Impacts (XPM) feature.

### Associated groups (AG) on a TSP basis

AGs on a TSP basis provide the user with the ability to restrict B-channel usage. The user can have a particular interface for a specific application. This limits the call types employed on the B channels or restricts B-channel access for particular directory number/call type (DN/CT) combinations.

### BRI on a residential line

BRI on a residential line allows the operating company to provide ISDN lines to residential and small business customers without elaborate circumvention of centralized private branch exchange (CENTREX). By eliminating the need for separate customer groups for single line ISDN sets, the operating company reduces its cost of ownership.

## Remote cluster controller 2 with integrated services digital network

The RCC2 can be configured with ISDN services for RSC-S. The functional areas of the RCC2 with ISDN include:

- cards
- speech and message paths

- host ISDN peripherals
- enhanced LCM (LCME)
- operation, administration and maintenance (OAM) processor

> ***Note:*** Figure Functional block diagram of the RCC2 with ISDN relates to the following functional description of the RCC2 with ISDN.

### Cards

The RCC2 with ISDN is based on RCC2 with the addition of two new cards. The cards are the enhanced ISDN signaling preprocessor (EISP) and the DCH. When the system requires clear DS-1 channels, use the NTMX81 card.

The DCH card is an ISDN line group controller (LGCI) or ISDN line trunk controller (LTCI). The DCH card provides the primary interface to all D-channels. The DCH card performs Q.921 link access procedure on D-channel (LAPD) layer 2 processing. The DCH permanently connects to an ISDN loop. The DCH receives or sends messages on the signaling and packet data channel.

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

The DS-1 cards, like NTMX81, provide the 64-kb/s clear channels necessary to process D-channels.

### Speech and message paths

Speech and message paths of the RCC2 with ISDN are like the RCC2 without ISDN. The addition of the DCH, EISP and DS-1 (NTMX81) cards allows the RCC2 to process calls from ISDN terminals.

The DCH cards provide the Q.921 function. The DCH cards provide the processing for the D-channels from the ISDN loops that terminate on ISDN line cards. The DCH interprets the service access point identifier (SAPI). Data with SAPI 16 (packet data) are sent over Bd links to the PH. The system routes the SAPI 0 (call control messages) data to the EISP for further processing. The SAPI 17 messages return back on the same loop.

A DCH resides in a P-side port and terminates a single port. The single port consists of 32 64-kb/s time slots. Reserve time slot 0 for messaging to the EISP. The slots that remain support basic rate interface (BRI) D-channels to ISDN terminals or Bd channels to the PH.

### Host integrated services digital network peripherals

The RCC2 can connect to an LGCI or an LTCI.

The host XPM terminates the DS-1 links from the RCC2. The host XPM passes the circuit-switched traffic on to the network. The circuit-switched traffic is nailed-up through the RCC2. The circuit-switched traffic does not concentrate. The configuration of the RSC-S with ISDN determines the other abilities of the circuit-switched traffic.

This condition is true in terms of how to handle data-switched traffic. This condition appears in the following list of host XPM abilities:

- provides P-side DS-1 links to the PH if the PH is at the host
- terminates LCMs directly

  ***Note:*** The host XPM does not always have to directly support an ISDN line concentrating module (LCME). In this condition, the Lost XPM can be an LGC or LTC.

- terminates LCMEs directly if the host XPM is an LGCI or LTCI
- allows the RCC2 to support trunks if the host XPM is an LTC or LTCI

### Improved line concentrating module

The LCME provides the subscriber with BRI, using the two binary one quaternary (2B1Q) U-loop interface. Northern Telecom (Nortel) uses 2B + D channels and six maintenance channels throughout the 2B1Q superframe. This action allows Nortel to provide North American Standard 2B1Q U-loop interface.

### Line concentrating module

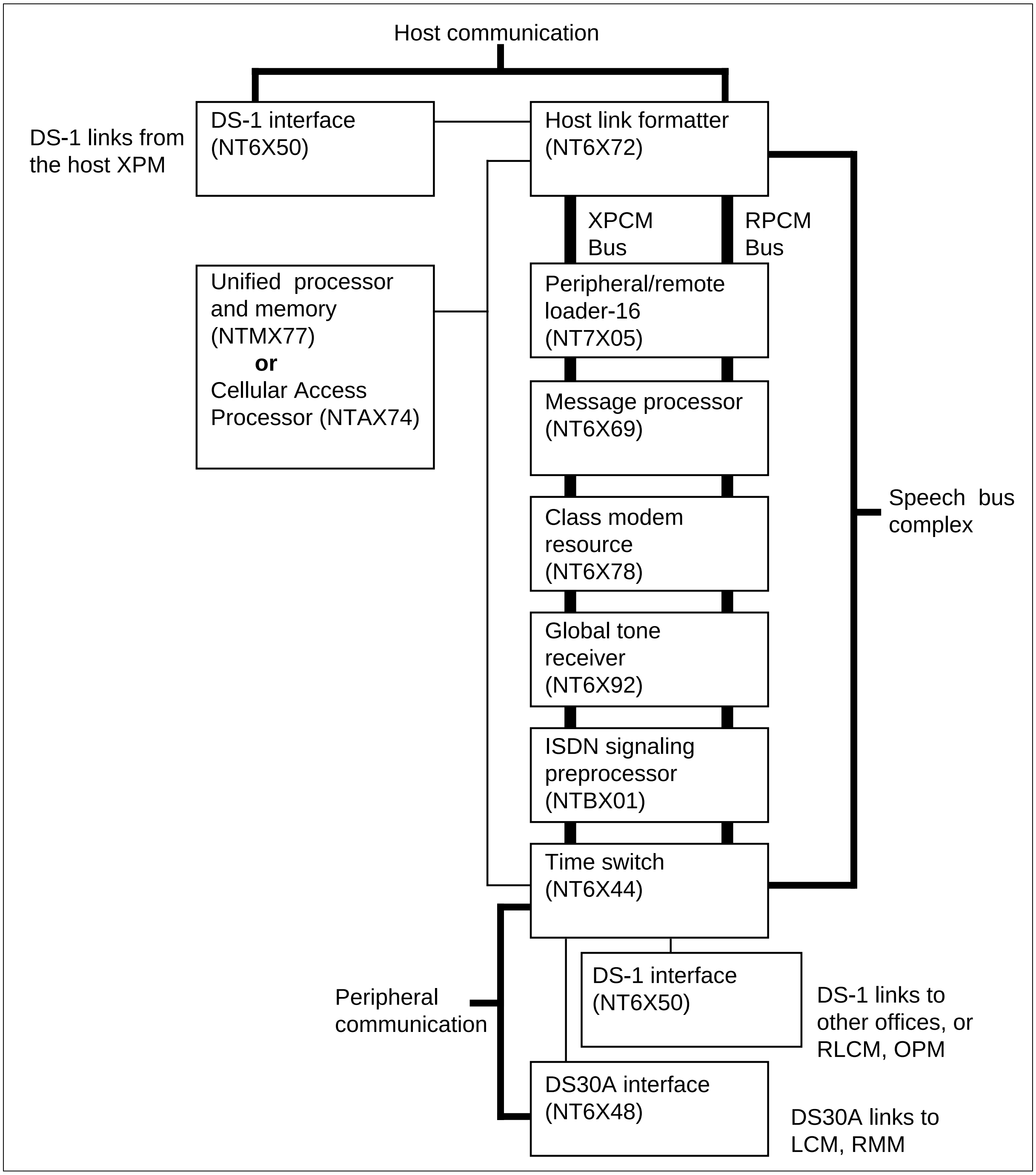
The RSC-S can have an LCM. The RSC-S supplied with an LCM does not support ISDN. The RSC-S with LCM offers the following features:

- coin and automatic number identification (ANI) support
- increased line density (640 versus 480)

The LCM has six internal DS30A ports that consist of two message ports and four speech links. Thirty external ports are available for connection to LCMs or LCMEs.

The following figure is a functional block diagram of the RCC2 with ISDN.

**Figure 1-10 RCC2 with ISDN**




## Operation, administration and maintenance processor

The ISDN OAM processor provides centralized OAM. The ISDN OAM processor allows information to transfer to and from the PH, from the MAP display at the exchange termination.

## Fault conditions

The RSC-S contains monitoring systems that detect and indicate fault conditions. The following section describes fault conditions that automatic maintenance monitors. The next main section describes automatic maintenance features. The section describes fault conditions for the RSC-S according to the configurations.

### Remote cluster controller 2

The RCC2 fault conditions include errors common to processor cards and errors that are not common to processor cards.

### Errors specific to processor cards

The following errors can occur in RCC2 processor cards:

- traps

  Traps are interrupts that hardware or software generate. Traps occur when the CC receives a gain message that is not requested from the currently active unit.

- software errors (SWERR)

  A SWERR is an error attributed to software.

- parity faults (intermittent, soft, and hard)

  - intermittent

    Intermittent parity faults occur when the RCC2 detects a fault, but does not find an error. The RCC2 does not find an error during the reread of the location.

  - soft

    Soft parity faults occur when the RCC2 detects a parity error. The RCC2 finds an error when the RCC2 attempts to reread the location. The RCC2 does not find an error when the RCC2 attempts to write to the location. The error can occur in the program store (PS) or memory store.

  - hard

    Hard parity faults occur when the RCC2 detects a fault and cannot reread or write to the memory location. When this event occurs, the hardware is defective. Replace the associated memory card to correct the fault.

- exception faults

  An exception is a special condition at the ROM or task level that preempts normal processing. Exception handling includes exception detection, data capture and recovery. Exception services include exception administration, reporting and data access and display.

Internal and external conditions can cause exceptions. Internal conditions include:

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

External conditions include:

- interrupts from external devices
- bus errors
- errors that the coprocessor detects
- resets

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

**Table 1-9 XPM error type and description (Sheet 1 of 2)**

| Type | Fatal | Description |
|---|---|---|
| 1 | No | Value range error |
| 2 | No | Segment not present |
| 3 | No | Exit from 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 |

**Table 1-9 XPM error type and description (Sheet 2 of 2)**

| Type | Fatal | Description |
|---|---|---|
| 14 | No | Bad CSP (standard procedure not implemented) |
| 15 | Yes | Bad P-code instruction |
| 16 | No | Task error |
| 17 | Yes | Request for reset—Trap 7 |
| 18 | No | (Not used) |
| 19 | Yes | Parity error |
| 20 | No | Addressing error |
| 21 | No | instruction that is not permitted |
| 22 | Yes | Spurious interrupt |
| 23 | No | Bus error |
| 24 | No | MMU error |
| 25 | No | (Not used) |
| 26 | No | Privilege problem |
| 27 | Yes | Sanity timeout |

## Errors not related to processor cards

The following are errors that are not related to RCC2 processor cards:

- static data mismatch faults

  Static data defines the RSC-S configuration. Static data does not change as calls connect and disconnect. When static data in the host and the RCC2 do not match, data corruption can occur. As a result of the mismatch, the following event can occur: The host assumes that a line is present. The RCC2 assumes that a line is not present. This condition results in a loss of calls.

- unit node table mismatch faults

Each XPM unit has tables that contain information about nodes that the unit connects to, and terminals that the unit uses. The following two systems determine unit table mismatches:

- Mate unit matching compares the inactive unit tables with the active unit. Mate unit matching sets the XPM ISTb when a mismatch occurs. The active unit sends table mapping information to the inactive unit during updates.

- Node table audits determine when this information corresponds to data in the computing module (CM) table PMNODES. To prevent differences in entries for the XPM units, the CM maintains all node information. For a complete description of the entries for table PMNODES, refer to the *XPM Translations Reference Manual*. Feature AF5678 introduces entries for table PMNODES.

Feature AF5678, Node Table Sync Redesign, introduces the following error handling changes:

- Table Control applications, which change the inventory tables, reject tuples. These applications change tuples when a peripheral does not have the necessary resources available to support these tuples.
- The node table audit raises an ISTb condition on an XPM that has a node table mismatch with the CM. The user must BSY and RTS the complete XPM to clear the ISTb condition manually.
- A negative acknowledgment from the XPM causes the system to abort the loading or RTS process. This negative acknowledgment occurs when the system downloads the configuration data table (CDT) node or port information during a bulk download.
- A negative acknowledgment from the XPM raises an ISTb condition on the XPM. This negative acknowledgment occurs while the system downloads the node CDT or port CDT data during a configuration update.

Other faults that are not related to processor cards include:

- intermodule communication faults

  Intermodule communication faults occur when an RCC2 unit cannot communicate with another RCC2 unit. When this event occurs, a warm SWACT cannot occur. A Warm SWACT cannot occur because one unit does not know the information that the other unit processes.

- messaging overload on speech bus cards

  Messaging overload conditions can prevent the transmission of data from the CMR and UTR cards. For example, the system forwards messages sent to the RCC2 to the CMR card. The system forwards these messages to support ADSI protocol for features that rely on display. The CMR card forwards the data to the CPE. When the CMR receives the request to transmit data, modem resources are not always available. When the modem resources are not available, the CMR card does not send display data to the CPE. An overload in the CMR can cause the card to hold display data.

The CPM must receive an acknowledgment (ACK) tone from the UTR card to transmit data. Channels on the UTR card are not always available to transmit the ACK tone. When these channels are not available, the CPM does not send the display data to the CPE.

### Dual remote cluster controller 2

The main fault that can occur with the DRCC2 is defective interlinks. When this fault occurs over the messaging interlinks (0 and 8), the peripherals cannot communicate. Interswitched calls cannot occur.

### Remote cluster controller 2 with integrated services digital network

An RCC2 with ISDN can have the same faults as an RCC2 without ISDN. The RCC2 with ISDN can have sending and receiving problems with data packets and call control messages. Most of these problems involve the DCH card.

## Automatic maintenance

This section provides information on how audits and system actions identify the fault conditions. The system can adjust the fault. The system can produce a log that identifies the problem.

### Exception processing system

Feature AF5680, Exception Processing System Enhancements, provides improvements in exception handling and exception services. These improvements increase the strength of the RCC2. The exception processing system improvements support the following functions:

- removal of trap data loss when multiple traps occur in a 10-second period
- accurate capture of trap-specific data
- guaranteed survival of trap data over restarts and reloads
- capture of supervisor and user stacks at exception time
- circular buffer management at exception time
- enhanced trap administration
- expanded trap-specific error information to accommodate parity fault requirements. The exception processing system reports parity faults to the parity audit instead of the CC
- saves the trap system version for each trap
- traceback support on patched procedures

**ROM-level exception processing** The firmware maps all vectors to local exception handlers when the firmware initializes. The ROM-level exception processing performs the following:

- minimizes error recording and reporting
- establishes a bootstrap environment
- provides debug utilities
- allows for abstraction of memory management hardware

**Task-level exception processing** Task-level exception processing reports critical information on hardware and software states when a hardware or software fault is present. These faults prevent normal operation of the CPM unit. When possible, the process restores the task to a recognized point of execution. The process allows the task to perform recovery actions. When the process does not recover the task, the task-level exception processing initiates local maintenance. Local maintenance restarts or resets the CPM unit.

**Exception processing system trap recovery** The exception processing system interacts with the CC, PMDEBUG and local maintenance in the CPM. The system interacts to recover from error exceptions. The system interacts to report and display information about error exceptions.

Exception recovery consists of three different operations:

- determine severity of the trap. The severity of the trap is fatal or able to recover.
- process fatal trap
- recover task (trap that is not fatal)

When the exception processing system detects a fatal error, the system initiates local maintenance action to drop activity. Local maintenance drops activity from the active unit only. Local maintenance resets or restarts the CPM unit. When the CPM is InSv, the CPM reports exception errors to the CC. The exception errors are messages that are not requested. The CPM generates a report for each exception in the trap buffer that is not reported. The CC receives the report and acknowledges the message. The CC logs into PMDEBUG to extract the exception information. The CC generates a PM185 log report for each trap.

The PMDEBUG provides the ability to view and delete exception data from the trap buffer at the task level. The display routines change to reflect data capture differences for required improvements accurately. An example of the PMDEBUG debug, trapinfo level display appears in the following figure. At the ROM level, exception data appears as a hex dump.

**Figure 1-11 Example exception display with improvements**

```
Run Load name = NLT02WY
MP ron 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 DOZERRODI 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
DO =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
```

When the recovery process is complete, the exception reporting system receives a notification. The system receives notification that new trap data is available and exception handling is complete.

At this stage, one of the following events occurs:

- the recovery process sets up the trapped task for recovery. The recovery process allows the task to continue
- the recovery process initiates a maintenance action to restart or reset the unit

When the trap is not fatal, the system restores the selected task to a point of execution. This point allows the task to restore to a recognized state. The process of recovery does not start the task again. The process forces the task to perform a multi-level exit back to the task mainline.

A task must provide a mainline in the task recovery model. A mainline is a continuous loop that repeats calls to the main body of the steady state code. An optional call to a recovery procedure follows. After a trap occurs that the process can recover, the task is resumed. When this event occurs, the process forces the task to return to the next instruction. This event follows the call to the main body of code. The next instruction must be a call to a recovery procedure or a branch back to the start of the loop.

**Memory management unit error recovery** The enhanced exception processing system feature improves exception recovery. Exception recovery deals with the direct memory access memory management unit (DMA MMU). Before this feature, when a DMA MMU error occurred, the exception processing system selected the task that was interrupted. The software on the NTMX77 did not cause the error. The selected task determines when the error is fatal, because an MMU error is not fatal. The processor that caused the fault did not know that a problem occurred.

The external processor can receive invalid data with the enhanced feature. The external processor receives invalid data when the access is for a read from NTMX77 memory. When the access is to write to NTMX77 memory, data is not written. The processor determines that the trap is fatal and the processor initiates maintenance action to restart or reset the unit.

### EDC protection for babbling links

Feature AF4915, EDC Protection for Babbling Links, provides software support of outgoing message channels on the NTMX76AA circuit card. Outgoing message channel management reduces the number of lost messages.

The NTMX76AA circuit card uses CCITT level 2 signaling (Q.703) over the data channels. The NTMX76AA circuit card provides message interface to the UP. The NTMX76AA circuit card provides a maximum of 32 high-level data link control (HDLC) message channels for interface to the UP. To allow HDLC messaging, the host and remote offices must have the NTMX76AA circuit card.

The system sends HDLC messages through message buffers allocated in the common RAM. The NTMX76AA circuit card checks to make sure that the messages are valid. The NTMX76AA circuit card copies the valid message to the R8071 Rockwell memory buffer. The NTMX76AA circuit card receives a message in the R8071 data link. To receive this message, the NTMX76AA circuit card copies the message from the R8071 memory to the message buffer. The system can place the outgoing buffer in a queue in the R8071 transmit queue. The outgoing buffer queues when the number of buffers already in a queue is less than the maximum number allowed. When the queue is full, the message is rebounded.

The following section describes two messaging concerns: channel management and overload.

**Channel management** The RCC2 or LGC plus can send a message on one of the HDLC links. To perform this task, the system copies the message to a buffer in the NTMX76AA circuit card. The NTMX76AA circuit card sends the message on the appropriate destination link that the message determines. The NTMX76AA circuit card has a limited number of buffers for messaging. The R8071 has a limited number of transmit queues for a specified link. A buffer for message transmission is not always available. This feature controls the rate at which outgoing messages are sent. This feature makes sure that buffers remain available.

**Overload** An overload condition occurs when a messaging link receives too many messages in a specified time. An overload condition can occur when the link increases the output to a destination. When a link is overloaded, the channel management system does not permit a transfer of messages to the NTMX76AA circuit card. The channel management system stores the messages in a holding queue until the link is clear.

The following section describes the SWACT process and the routine exercise (REx) test. The section describes the audits and system actions that identify fault conditions for the RSC-S components.

### Loop recognition for HDLC links

Feature AN1523, Loop Recognition for HDLC (EDC) links, supports loop recognition in the HDLC protocol on the NTMX76AA. This feature detects loop conditions that are not wanted on the messaging channels in the LTC+ and the RCC2. When this feature detects an necessary loop, relevant protocol operational measurements (POM) increase. The EDC shelves alert the CC of protocol problems, like negative acknowledgements (NACKS). The EDC shelves use the operational fault (OPF) system to alert the CC of problems. After the CC receives the alert, the CC begins maintenance. The CC can set the RCC2 SysB, cause a SWACT or cause the RCC2 to enter ESA to solve the alert.

> ***Note:*** For Feature AN1523, the term loop refers to recovering the current transmitted data on the receiving side of the same link. The term loop does not refer to the connection of the P-side output of a link to the input of another P-side link.

### Switch of activity

A SWACT is the process in which the two units of an XPM exchange activity status. The unit that is active and handles call processing becomes the inactive unit. The inactive unit becomes the active unit at the same time, and takes over call processing. The system maintains all processing of active POTS or ISDN BRI calls during a warm SWACT.

A SWACT can be controlled or uncontrolled. The following cause a controlled SWACT to occur:

- manual action, like use of the SWACT command
- planned system requests, like the REx test schedule
- when the active unit is busied, while the inactive unit is InSv

When both units are InSv, a controlled SWACT can occur. A controlled SWACT can occur when a previous REx test failure causes the RCC2 to become ISTb.

The system implements uncontrolled SWACTs when a hardware fault or trap is present in the active unit. The PM181 log messages tell the 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 RCC2 to start an audit of the inactive unit.
- The active unit messages the inactive unit to start a pre-SWACT audit.
- The inactive unit messages back to the active unit the pre-SWACT audit results. Audit results can cause the system to start a warm SWACT based on the audit results.
- The original active unit stays InSv. The original active unit clears data that does not have stability.
- The new active unit sends five gain messages to the CC.
- The CC sends five gain-acknowledge messages to the RCC2.
- The RCC2 sends three gain-acknowledge received messages to the CC.
- The CC tells the original active unit to drop activity.
- The original active unit sends the CC a drop message. 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 RCC2 to start an audit of the inactive unit.
- The system starts a pre-SWACT audit.
- Audit results can cause the system to start a warm SWACT.
- The original active unit stays InSv. The original active unit clears data that does not have stability.
- The new active unit does not send messages to the CC.

- The wait time of the original active ends. A SWACT-back occurs.
- The original active unit sends a SWACT-failed message to the CC.
- The CC SysB and RTS the inactive RCC2 unit.
- When the CC does not receive messages, the CC forces a SWACT, SysB and RTS of both units of the RCC2.

In an uncontrolled SWACT, the RCC2 starts the pre-SWACT audit. The following sequence of messages occurs:

- The active RCC2 unit messages the inactive RCC2 unit to start a pre-SWACT audit.
- The system starts pre-SWACT audit.
- Audit results can cause the system to start a warm SWACT.
- The new active unit messages the CC that a gain occurs. The system does not expect this gain.
- The original active unit stays InSv. The original active unit clears data that does not have stability.
- The new active unit sends five gain messages to the CC.
- The CC sends five gain-acknowledged messages to the RCC2.
- The RCC2 sends three acknowledge-received messages to the CC.
- The CC tells the original active unit to drop activity.
- When the CC does not receive messages, the CC forces a SWACT, SysB and RTS of the two RCC2s.

For controlled and uncontrolled SWACTs, SWACT is complete when the CC receives a gain message from the new active unit. The CC acknowledges the gain to the original active unit. When a SWACT occurs, the CC and the RCC2 exchange a series of drop and gain messages. The drop and gain messages explain activity. Common phrases that appear in these messages appear in the following table.

**Table 1-10 Message phrases that describe CC to RCC2 SWACT communication (Sheet 1 of 2)**

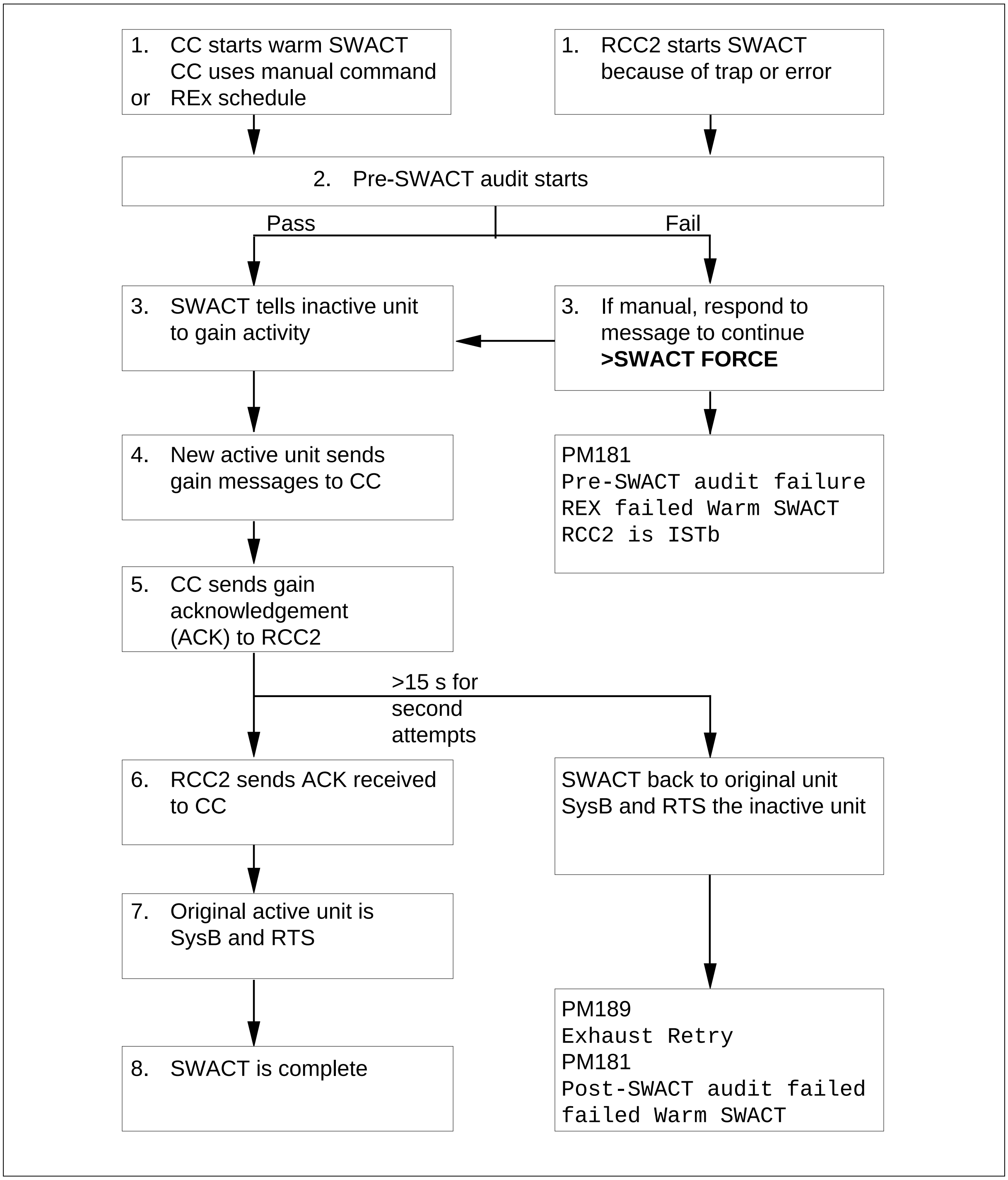
| Message phrase | Explanation |
|---|---|
| Original active unit | Active unit before the SWACT (unit 0) |
| Original inactive unit | Inactive unit before the SWACT (unit 1) |
| New active unit | Active unit after the SWACT (unit 1) |
| New inactive unit | Inactive unit after the SWACT (unit 0) |

**Table 1-10 Message phrases that describe CC to RCC2 SWACT communication (Sheet 2 of 2)**

| Message phrase | Explanation |
|---|---|
| Gain message | The message the new active unit (unit 1) sends to inform the CC that the unit gained activity |
| Gain acknowledge message | The message the CC sends to original active unit to confirm that the new active unit sends messages |
| Gain acknowledge received | Message that the original active unit sends to CC to confirm that the new active unit passes the post-SWACT audit |
| Drop message | Message the original active unit (unit 0) sends to inform the CC that the unit dropped activity |

The sequence for a controlled and uncontrolled SWACT appears in the following figure. The SWACT-back operation of feature AN0538 appears in the following figure. The following sections describe this feature.

**Figure 1-12 SWACT sequence**




**Pre- and post-SWACT audits** Feature AN0538, RCC2 Pre-SWACT/Post-SWACT Audit, improves the warm SWACT operation. This feature denies the SWACT when the inactive unit cannot maintain activity or communication with the CC. Under these conditions, feature AN0538 allows a SWACT-back to the original active unit. The SWACT controller in the CC and an autonomous capability added to the RCC2 software drive this feature.

**SWACT controller** The system routes all manual requests and selected system requests for SWACTs to the SWACT controller in the CC. The SWACT controller polls PM diagnostic history data in the CC and RCC2 status data. Make sure you do not confuse status data with static data. The data polled determines when the SWACT controller denies or allows the request for a warm SWACT. During the SWACT, the new inactive unit stays in service. The new inactive unit starts a process to clean up data structures left in states that do not have stability.

**Pre-SWACT audit** The active RCC2 unit queries the mate RCC2 unit over the intermodule communication (IMC) links. The active RCC2 unit messages the SWACT controller in the CC. The RCC2 starts a SWACT. Feature AN0538 improves the pre-SWACT audit of the inactive unit, to include the state of the unit during diagnostics. Feature AN0538 assigns a weighted value to the results of the diagnostics. The result of the pre-SWACT audit query is a boolean pass or fail.

The SWACT controller can deny a manual request for a SWACT. When this event occurs, a message on the MAP terminal informs you that the system denies the request. The system provides a detailed reason for the denial. The system informs you that you can enter the SWACT FORCE command to override the SWACT controller. When you override the SWACT controller, the system attempts a warm SWACT. The system does not consult diagnostic history or status.

**Post-SWACT audit** The system busies the inactive unit and return the unit to service. This event occurs when two-way communication is available with the CC and the new active unit can maintain activity. This event occurs after a SWACT. The original active unit remains in service until the new active unit can verify two-way communication with the CC. The new active unit must verify the ability to maintain activity. When communication fails or the new active unit cannot maintain activity, RCC2 starts SWACT-back to the original active unit.

**SWACT-back** When an RCC2 does not receive a gain-acknowledged message from the CC, the original active RCC2 unit starts a SWACT-back. During a SWACT-back, the original active RCC2 unit attempts to gain activity again. When the original active RCC2 unit gains activity, the inactive unit is set SysB and returned to service. The active unit remains in service. The system preserves calls that have stability from the original active unit over the SWACT-back. The system drops all new calls made after the SWACT and before the SWACT-back. When a SWACT-back is not successful, both RCC2 units are set SysB and RTS.

> ***Note 1:*** The system does not initialize operational measurements (OM) and peg counts after a SWACT-back.
>
> ***Note 2:*** The system does not support this feature during RCC2 or CC overload.

The system provides SWACT-back for the following manual SWACT commands:

- 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 system provides SWACT-back for a REx test that the REx scheduler initiates. For more information on how this feature interacts with REx testing, refer to Routine exercise test.

**Manual switch of activity** To perform manual SWACT, enter the SWACT command at the MAP terminal. The following message appears at the MAP display.

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

The default does not proceed, because the new inactive unit can take over call processing again.

**Uncontrolled switch of activity** An uncontrolled SWACT can occur when the following events occurs:

- 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 causes a different SWACT sequence. The state of the units and the reason for the activity drop determine the order of events during an uncontrolled SWACT.

When a hardware fault occurs, the system generates a PM181 log. The log can contain messages that indicate the following conditions:

- activity timeout
- the CC links are not present

  Message links to the CC or host XPM are broken. Messaging cannot occur.
- duplicate fault

  A critical hardware fault occurs.
- jammed

  The unit jammed, which means that the unit cannot change status (active/inactive).
- DRCC2 sync

  The original active unit of a DRCC2 cannot continue to process calls. The original active unit must SWACT to allow the RCC2 to synchronize with the mate RCC2.
- ready for ESA

  This message deals with the RCC2. In this example, the system loses all CC messaging. When the original inactive unit does not send a drop message in a given time period, the RCC2 enters ESA.
- static data corruption
- The original active unit sends a drop message to the CC.
- The new active unit must send a gain message.

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

An uncontrolled SWACT can occur when the original active unit is InSv and the original inactive unit is ISTb. In this event, the reason the inactive unit is ISTb is the important factor. When the reason is data synchronization, the sequence is the same as when the active and inactive units are InSv. When data synchronization causes the ISTb, the original active unit drops synchronization. The XPM initializes again.

When the original active unit is InSv for a maximum of three minutes, the unit returns to service without OOS diagnostics. A previous SWACT causes this event. When the previous SWACT occurs in less than three minutes, the active unit must have OOS diagnostics run. When the original unit is active for more than three minutes, the active unit returns to service with OOS diagnostics.

The active unit attempts to restore normal activity. The type of RTS does not affect this activity. When the active unit cannot become active, both units are set SysB. The XPM is set SysB.

### Routine exercise (REx) test

A routine exercise (REx) test includes a series of tests performed on an XPM unit. The system scheduler can initiate these tests or operating company personnel can initiate these tests. The recommended schedule for the REx tests is one time each day. The REx test combines the diagnostic and functional routines available on XPMs. The following four classes of REx test results occur:

- not performed
- passed
- failed
- manual action aborts the test
  - maintenance action with the FORCE parameter can abort the XPM
  - maintenance action with the ABTK command from another MAP terminal with the XPM posted can abort the XPM

Each class generates a log or displays a message at the MAP terminal. The maintenance record stores passed and failed REx tests. Failure reasons are available for failed REx tests.

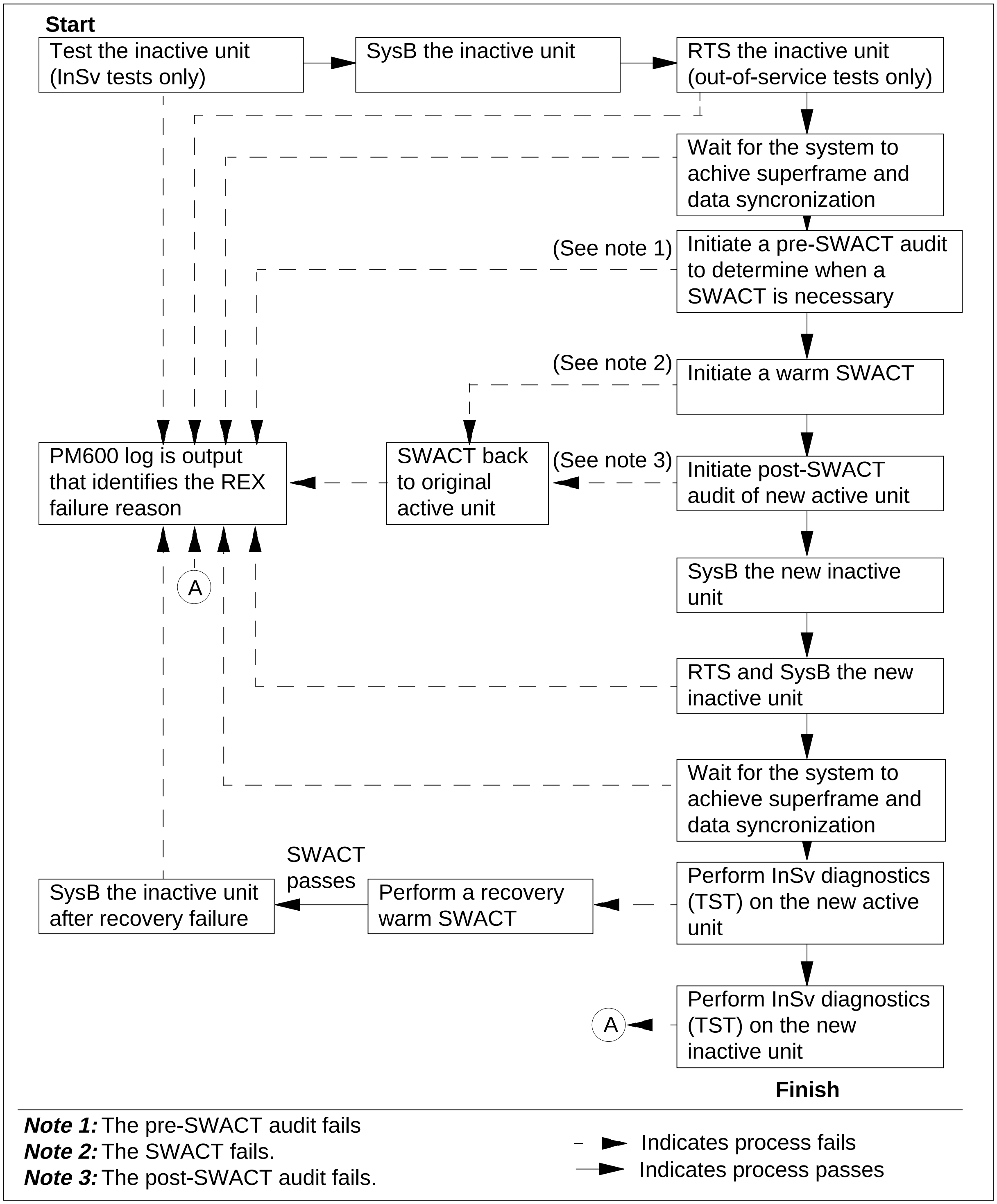
The REx test state machine, or controller, performs a sequence of events. This sequence of events follows:

1. Test the inactive unit (includes InSv tests only).
2. SysB the inactive unit.
3. RTS the inactive unit. This action 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 original active unit if necessary.
10. SysB the new 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 new active unit.
14. Run InSv diagnostics (TST) on the inactive unit.

REx test state machine (controller) actions appear in the following figure.

**Figure 1-13 REx test state machine actions**




When a REx test fails, the system generates a PM600 log. The PM600 log starts a major alarm for the XPM that fails the REx test. The major alarm appears at the MAP terminal under the PM banner at the top of the display. The system generates a PM181 log after a successful REx test.

An InSv or OOS diagnostic test can fail. When this event occurs, the REx test failure reason includes a mnemonic. This mnemonic is for the diagnostic that fails and the unit that fails (0 or 1). The mnemonic is an abbreviation that is easy to remember.

The PM600 log details the following:

- the start time of each step that the REx test executes
- the unit that the REx test step affects
- the failure reason

The log includes the REx test steps that occur after the failed step. These steps are recovery actions the REx test initiates because of the failure. The log includes the unit number when the REx test action specifies a unit, and the action does not affect the node. Examples of specified unit actions are BSY unit, RTS unit, TST unit and synchronization. Actions that affect the node include SWACT and BSY both units. The log supplemental data is a card list and a mnemonic of the failed diagnostic.

The QUERYPM, QUERYPM FLT, TST REX QUERY and TST REXCOV QUERY commands contain information about the last REx test. Manually and system-initiated REx tests store and display a new date, time and status in the REx test maintenance record. The status is passed or failed. The status *Passed* means the REx test completed without errors. The status *Failed* means the REx test did not complete because of an error. This information is available with the QUERY PM and TST REX QUERY commands. When the REx test fails, you can perform the following to return the XPM to service from ISTb:

- a manual RTS
- a manual REx test
- an automated REx test

The system stores REx test maintenance record for each XPM that contains the following information:

- REx test scheduler, when the XPM is in the system
- date, time and result (pass or fail) of the last REx test
- failure reason, diagnostics failures and a list of defective cards, when the last REx test fails
- date and time of earlier REx test failure
- date and time of first passed REx test after earlier failure

The following limits apply to REx tests:

- The system REx test controller runs a REx test on one XPM at a time when the office uses the NT-40 processor. The SuperNode supports REx tests for a maximum of ten XPMs at same time. These XPMs must have the same REx test class.
- The system can run a maximum of four LCM_REX_TESTs at the same time. The system must not REx test the HOST XPM to which the XPMs currently are associated with.
- The SREX scheduler schedules the LCM_REXCOV tests separately for converter and ringing voltages in LCM.
- For a REx test to run, the following events must occur:
  - the node is InSv
  - the node is ISTb because of a REX test failure
  - the node is ISTb because P-side DS-1 links are OOS
- When a warm SWACT is not possible, a REx test terminates.
- After successful completion of a REx test, the XPM has a new active unit. This condition occurs because of the SWACT.
- When a restart occurs while a REx test is in progress, the system does not generate a PM600 log. The system does not generate a log because the restart de-allocates the temporary data store that builds the PM600 log.
- A SWACT controller override is not provided for a manual REx test.

**REx test state machine interface to the pre-SWACT and post-SWACT audits** The REx test state machine (or controller):

- calls the pre-SWACT audit, and messages the other unit. The system performs a warm SWACT when the audit passes.
- accounts for SWACT denial and failure reasons
- terminates a REx test when the system denies a SWACT
- terminates a REx test when a SWACT back occurs, but the active unit of the XPM is the same as the time the REx test began. The REx test performs recovery. Recovery is a busy (BSY) and an RTS of the inactive unit.
- displays the failure reason for a SWACT denial. The REx test state machine displays the failure performed during a manual REx test at the MAP terminal as REx failed. Use the TST REX QUERY or TST REXCOV QUERY command for the posted XPM to obtain the reason for the failure. The system generates a PM600 log report that details the REx test failure reason.

## System REx controller: XPM maintenance

Feature AF3771, System REx Controller: XPM Maintenance, provides the SuperNode switch with an S/DMS system REx test (SREX) controller. This SREX coordinates all system REx tests under a common REx test scheduler. This feature allows the SREX to schedule LCM REX tests while other REX tests are in progress. The SREX test controller eases the performance of a REx test on the whole switch that includes all peripherals. The RSC-S is an example of a peripheral. The system performs REx tests to provide indication of faults that can impact service. The REx tests allow operating company personnel to take corrective measures. The NT40 systems continue to use IOREXP for LGC node types.

Feature AF3771 allows the system to find and correct REx test failures in a minimum amount of time. This action reduces outages in the field. The SREX test controller allows operating company personnel to perform the following actions:

- change the order in which the system tests peripherals
- coordinate manually-initiated and system-initiated REx tests
- receive alarms for the RSC-S not REx tested in a time limit set with table REXSCHED

The SREX test scheduler allows you to enter the CI level REXTEST command and the following parameters:

- the SUSPEND command suspends REx testing for one maintenance window. A maintenance window is the time period between the REXSTART and REXSTOP time. The REXSTART and REXSTOP times are datafilled in table OFCVAR under the NODEREXCONTROL parameter.
- the RESUME command resumes REx tests after the interruption of REx tests.
- the QUERY command returns the status of the REx test (active or suspended).
- the HELP command returns a short description of the REx test.

The REx test has the following order for feature AF3771:

- critical nodes, for example,
  - communications module (CM)
  - message switch (MS)
- the number of days from the last system or manual REx test
- the order of internal PM (RSC-S) number

You must datafill table REXSCHED to establish the REx test schedule for the RSC-S. This table contains the information that the REx test coordinator requires to schedule the tests according to operating company specifications. Datafill in table REXSCHED can also disable the test. For more information about table REXSCHED, refer to the data design section of the *Translations Guide*.

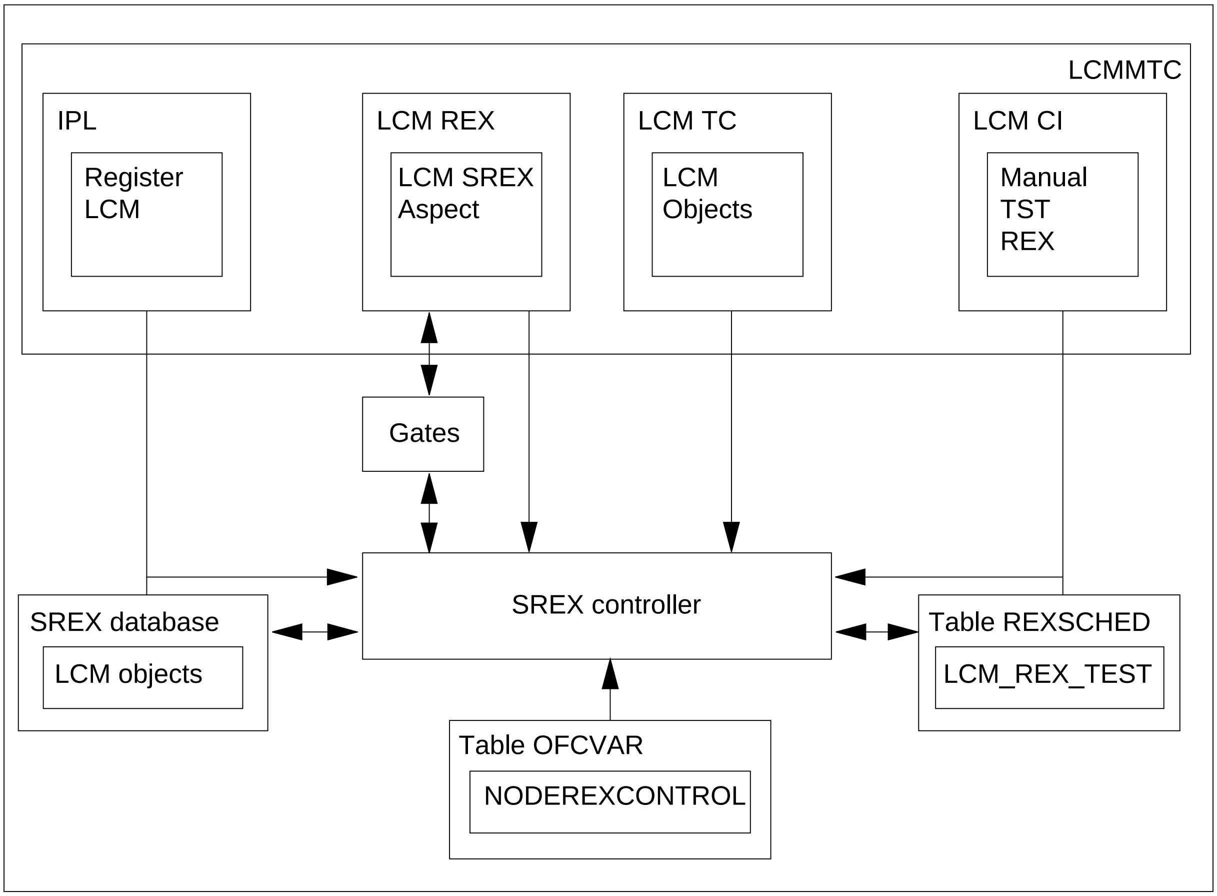
The system generates the IOAU112 log report for LCMs when the following events occur:

- the LCM is not REx tested in the previous seven days
- REx test takes longer than specified
- REx test does not start after a set number of attempts

**Extended line concentrating module 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. The task SREX can occur at the same time as REx tests of XPMs. The LGC, LTC and the RCC XPMs can host LCMs. Problems occur when an XPM scheduled for REx testing is the host of an LCM scheduled for REx testing.

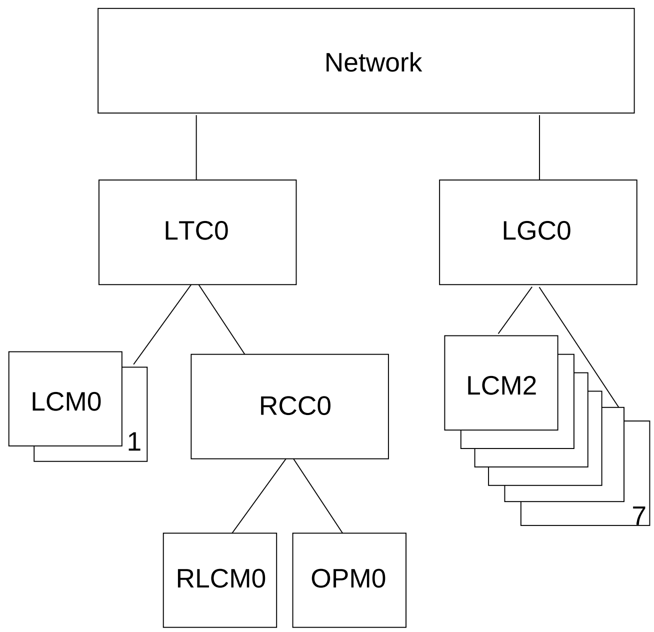
To avoid problems, the SREX controller schedules all REx tests of XPMs and LCMs at the same time. The LCM SREX subsystem registers the LCM_REX_TEST class. The LCM SREX subsystem identifies dependencies with other REX_TEST types during initial program load (IPL). As you add LCM nodes to the SREX database, the controller adds entries with defaults in table REXSCHED.

**Figure 1-14 SREX system dependencies**




The converter voltage and ring test sections of LCM_REX_TEST require wait states and unique test resources. These requirements cause delays in SREX main task execution that are not acceptable. The LCMCOV_REX_TEST, that runs at a lower priority, starts 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 access the single LTU when the other unit is out of service. This resource limit does not allow LCMCOV_REX_TEST execution at the same time. The entry of the PARALLEL execution field for LCMCOV_REX_TEST, in table REXSCHED, allows a maximum of one execution.

**Figure 1-15 SREX scheduling**




***Note:*** The REx tests can run on LCM 0 and LCM1 at the same time with REx tests that run on RCC0 and LGC0.
***Note:*** The REx tests cannot run on LCM2 through LCM7 when a REx test runs on LGC0.

The separation of the LCM_REX_TEST and the LCMCOV_REX_TEST allows faster completion of site REX_TEST cover. The LCM_REX_TESTs can run without the limits of the converter voltage and ring tests. The LCM_REX_TESTS can run at the same time and scheduled separately for the best execution periods.

> ***Note:*** The system can perform the LCMCOV_REX_TEST on LCMs, XLCMs, OPMs and RLCMs.

Feature AF3234 provides the following REx test improvements for LCM peripherals and the variants, like LCME:

- the emergency stand-alone (ESA) REx test
- the LCM and ESA-independent REx test
- the MAP command for manual REx test
- the fault indicators

- the REx test maintenance record
- the MAP commands to access REx test failures

**Emergency stand-alone REx test** The emergency stand-alone REx test (ESA REX) tests the ability of RLCM units to enter and exit ESA. The ESA REX tests the ability of the LCM units to message the ESA processor while in ESA. When the LCM REX test is complete the ESA REX test begins.

**MAP commands for manual REx tests** The XLCM diagnostics provide the capability to implement a manual LCM REX test. To perform a manual REX test, add a REX or REXCOV parameter. Add the REX or REXCOV parameter to the TST command at the PM level of the MAP display. Examples of this command follow:**>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 the LCM REX tests for immediate execution, type**>TST REX NOW**

and press the Enter key

> ***Note:*** Performs LCM_REX_TEST on the posted LCM.

*or*>**TST COVREX NOW**

and press the Enter key

> ***Note:*** Performs LCMCOV_REX_TEST on the posted LCM.

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

```
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 ESA REX test starts. A manually implemented LCM REX test does not implement an ESA REX test. A REx test that is not complete causes the LCM to be set ISTb when InSv diagnostics fail or SysB when OOS diagnostics fail.

**Fault indicators** A REx test that is not complete sets the LCM unit to ISTb or SysB with a reason of REX failed. The system performs audits on LCMs every 10 min and audits run InSv tests. The ISTb flag remains with a REX failed reason. When the audit is not successful and the system detects additional failure conditions, the audit contributes to the ISTb list. When the LCM is SysB and a successful system RTS is performed, the unit returns to ISTb with the REX failed reason. To remove the ISTb, the LCM must complete a successful manual RTS, or a successful manual or scheduled REx test.

The system generates the node assessment graph log (NAG) 400 each hour. The system generates this log in response to the NAG command. This log lists all nodes not in service (InSv). The results of the most recent REx test appear in field REX_INFO in log NAG400. For LCMs, the LCM_REX_TEST result appear first. A colon separates the LCM_REX_TEST from the LCMCOV_REX_TEST result. For more information about NAG400 logs, refer to the *RSC-S Related Logs.* section of this document.

**NAG command** The CI level NAG command displays out-of-service nodes. The MAP response to the NAG command is like the response in the NAG400 log report. The command and log report are part of the NAG feature. The NAG feature provides a list of nodes in the system that are out-of-service or have a REx issue. Enter the command NAG ALL to include offline nodes in the output. The log report runs each hour. Enter the command string NAG ON or NAG OFF to turn the log report on or off.

The output or log report can include a node. The node must be in one of the following states:

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

The report can also include a node when the node fails, aborts or does not complete the last REx test. When a node does not have REx problem, the string ATP appears in the REx column to indicate all tests pass.

An abbreviated report in response to the NAG command appears in the following example log

```
NAG400 JUN20  11:09:08 5800 INFO Node Assessment Graph
Front End Load: FSL37AO
Level     Node      Status        REX INFO    COUNT    UNIT 0    UNIT 1
    CPU        1      ACT
CM                  NORMAL
MS                  NORMAL
MS                  NORMAL
IOD                 NORMAL
NET                 NORMAL
PM  LTC        3     ISTB          FAILED        1      ISTB       ISTB
    DTC        0     ISTB       NO_REX_RUN       4      ISTB       ISTB
    SMS        0     ISTB       NO_REX_RUN       4       .          .
    TMS        1     ISTB          FAILED        1      ISTB       ISTB
    LTC        0     ISTB           OFF          9       .          .
    LTC        2     ISTB           ATP          1       .          .
    TMS        0     ISTB       NO_REX_RUN       4      ISTB       ISTB
    SMA        0     ISTB       NO_REX_RUN       4      ISTB       MANB
    SMA        1     ISTB           ATP          2      ISTB       ISTB
    TMS        2     ISTB       NO_REX_RUN       4      ISTB       ISTB
    MSB7       0     ISTB           ATP          1      ISTB       ISTB
    LCM HOST   00 0  ISTB         FAIL:PASS      2      ISTB       ISTB
    LCM HOST   00 1  ISTB         FAIL:PASS      2      ISTB       ISTB
    LCME HOST  01 0  ISTB         Pass:N/A       4      ISTB       ISTB
    IDT        0     MANB          ----          2       --         --
    LIM        0      .         NO_REX_RUN       2       .          .
    LIM        1      .         NO_REX_RUN       2       .          .
Offline Node count: 1
```

**REX maintenance records** The system generates a maintenance record from a REX test to indicate results of recent REx tests for each LCM entered. This information is available at the PM level of the MAP display for a posted LCM.

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

## Diagnostics

The following section identifies fault conditions in the RCC2, the RCC2 with ISDN and the DRCC2. The section includes new diagnostics and REx test results for the extended line concentrating module (XLCM).

**Extended line concentrating module diagnostics** The XLCM diagnostics implement the CC and the XLCM software. The system requires this software to test the tip/ring reversal relay on each LCM bus interface card (BIC), NT6X54. You can perform the test on separate logical-drawers from the MAP display level. The system can perform the test on separate logical-drawers. The XLCM diagnostics apply to the LCM. The XLCM diagnostics do not operate on the LCME.

The XLCM diagnostics implement the following:

- BIC test schedules
- test activation and deactivation
  - BICRELAY command
- test operation
  - system test, run according to a schedule that the user defines
  - 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 is 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 identical halves form a drawer pair. Each drawer of the pair can be considered 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 AIN and coin voltages. The ringing voltage is ac ringing voltages to a phone. The ANI and coin voltages are dc voltages to perform functions that a coin activates. The second relay is the tip and ring reversal relay. This relay switches ringing voltages from tip to ring and ring to tip. The system uses this relay for multiparty ringing.

This feature tests the reversal relay only. The XLCM diagnostics allow you to schedule the system BIC relay test (BRT). The BRT tests a set of LCMs and associated drawers (scheduled BRT). You can run a manual BRT on separate logical drawers.

Use information from table OFCVAR office parameters BICRELAY_XLCM_TEST_SCHEDULE and

BICRELAY_MUM_SIMUL_TESTS to schedule the BRT. The parameters perform the following functions:

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

The XLCM diagnostics implement tests at the office, LCM and drawer levels. The office-level test loops over each LCM in the schedule. The system runs a single BRT on each drawer of the LCM. The test results 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 does not have any drawers tested during the BRT window. Office parameters define the BRT window. The test runs a BRT on each drawer in the LCM. This test is a single LCM drawer test. This test runs from the LCM-level test or runs manually from the LCM MAP display level.

The office-level test loops over the LCMs in an office. The office level test performs the LCM-level test. The LCM-level test loops over each drawer of a specified LCM. The LCM-level test performs the drawer-level test that constitutes a BRT.

The system provides a new command interpreter to enable, disable, reset or query the BRT for the complete 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 current scheduled drawer-level tests. This command prevents the start of the office-level test.
- RESET

  allows you to start office-level tests again when the system does not test LCMs
- QUERY

displays the following information:

- the current on or off status of the 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 uses a new log report, PM132, to display results of each LCM-level test. This report displays a combined report of each drawer-level test in a specified LCM. The following limits apply to this procedure:

- The system test sets the logical drawer ManB before the relay test. When lines are in a call-processing busy state, the system skips the drawer for the test cycle.
- Operating company personnel must set the drawer to ManB before the system runs the manual BRT on a single drawer.
- A minimum of one NT6X17 line card in each logical drawer does not contain data. When this event occurs, the system does not test the drawer.
- This test does not run on an LCM with automatic line tests (ALT) or REx tests.
- The user cannot enter the BRTST_START_TIME and BRTST_STOP_TIME fields of the BICRELAY_XLCM_TEST_SCHEDULE office parameter with the same value. A 10 min minimum time span must be present between these fields.

The XLCM diagnostics use the test access bus, metallic test equipment and one NT6X17 card in each drawer to complete tests. When the ALT and the BRT run at the same time, a delay of the two tests can occur. When REx test already runs on an LCM , the system does not run BRT on that LCM. The LCM remains in the current state. The system generates a PM181 log that indicates the BRT does not run. The BRT does not run because of a REx test in progress.

**Extended line concentrating module REx test results** The system performs REx tests to provide an early indication of defects that can impact service. The REx tests allow operating company personnel to take corrective measures. An office parameter controls REx tests for LCMs that the system initiates. The office parameter determines the time interval to perform REx test on the LCM. The system REx tests the LCMs one at a time. The tests run in the order in which you enter data in the LCMs. A REx test involves OOS and InSv tests run on both LCM units.

> ***Note:*** Before this feature, only the system scheduler initiated REx tests on an LCM. Manual REx test was not available.

This feature generates changes to the system REx test. These changes do not change the functionality of the current diagnostic subtests.

Feature AF3234 provides the following REx test improvements for LCM peripherals and variants, like LCME:

- ESA REx test
- LCM and REx test independent of ESA
- MAP command for manual REx test
- defect indicators
- REx test maintenance record
- MAP commands to access REx test failures

**Emergency stand-alone REx test** The system performs ESA REX test on ESAs that are associated with RLCMs. The ESA REX tests the ability of RLCM units to enter and exit ESA. The ESA REX tests the ability of RLCM units to message to the ESA processor while in ESA. A system or manual request started the ESA REX test before this feature became available. This functionality does not change. The XLCM diagnostics changes the order of the system REx test. The system LCM REX test is complete after the ESA REX test runs. The ESA REX test is not a subtest of the LCM REX test.

**Line concentrating module and ESA-independent REx test**
Before this feature, the system scheduler initiates an ESA REX test as part of the LCM REX subtests. This feature allows the scheduler to initiate REx tests on an LCM. On completion, the system initiates the ESA REX test. A manual LCM REx test does not use the ESA REX test.

When the REx test fails, the system places the LCM in one of the following states:

- in an ISTb state when InSv diagnostics fail
- in a SysB state when OOS diagnostics fail.

**MAP command for manual REx test** The XLCM diagnostics allow you to use a manual LCM REX test. To perform a manual REx test, add parameter REx test to the TST command at the PM level of the MAP display. The following is an example of this command.>**TST REX QUERY**

> ***Note:*** All subcommands are performed on a posted LCM.

**Fault indicators** An REx test that does not complete sets the LCM unit to an ISTb or to a SysB state. The LCM unit is set to the state with a reason of REx failed. Audits on LCMs are performed every 10 min. Audits run InSv tests. A successful audit cleared the ISTb flag before this feature became available. This feature affects a successful audit. The ISTb flag remains with a REX failed reason. When the audit is not successful, and the detection of additional failure conditions occurs, the audit contributes to the ISTb list. The

LCM is in a SysB state and a successful system RTS occurs. When this event occurs the unit is returned to an ISTb state. The unit is not returned to an InSv state with the REX failed reason. Because of these actions, operating company personnel see a failed REx test. To remove the ISTb state, the LCM must complete a successful manual RTS or a successful manual or scheduled REx test.

**REx test maintenance record** The system generates a maintenance record from a REx test. An internal database stores the maintenance record. The maintenance record indicates the results of REx tests for each LCM that contains entries. The system updates the maintenance record each time REx test activity occurs. For a posted LCM, this information is available at the PM level of the MAP display.

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

**MAP commands to access REx test failures** The QUERYPM FLT command indicates that an LCM unit is ISTb or SysB. The state changes when a REx test failure has the reason REX failed. Use the TST REX QUERY command for each unit. This command provides the test ID of the subtest, and the card list that shows the cause of the REx test failure.

**Remote cluster controller 2** To test the RCC2, use the TST command. The type of test depends on the state of the RCC2 and the TST command parameters. The following events determine fault conditions for the RCC2:

- overload indicators (PM128, QUERYPM)
- REX tests
- audits of the intermodule communication links
- RCC2 parity errors

### Overload resources

The LCM processor cards can handle a limited amount of call processing on an LCM. When the amount of call processing is more than the LCM can handle, the RLCM accepts calls at a reduced rate. The RLCM operates at a reduced rate until the overload clears. Normally, the LCM queues call requests. The LCM assigns call priorities in the data store. As the data store reaches the data store limit, the RLCM overload controls can slow the rate of load acceptance. The RLCM can halt the call process until data store is available. The LCM overload control applies to the following:

- C-side communication

  In slow or stopped C-side communication, the LCM processor cards decrease the scan rate for messages on the C-side. A slow intake of work decreases the need for data store. The MAP display queries of LCM status and C-side responses to LCM-supported terminals are reduced.

- line scanning

  During overload, LCM processor cards do not scan the BIC until data store is available. The work from the P-side is queued in the BIC output buffers and prevents the intake of work. When buffers are full, the system does not accept more work. As a result, business sets have partial dials or ignored keys.

**Display of overload state** When the LCM has an overload, the LCM status display changes to in-service trouble (ISTb) while both units appear as InSv. From the LCM level, the QUERYPM FLT command produces the MAP response: `LCM Overloaded`.

**Overload indicators (PM128, QUERYPM)** When the RCC2 enters overload, or RCC2 is ISTb, the system generates a PM128 log with the message : `PM Overloaded`. You can post the RCC2 at the PM level of the MAP display and enter the QUERYPM FLT command. This action generates the same message.

When the RCC2 enters overload, collect all of the related OMs. These OMs track the type and the amount of traffic. The reason for an RCC2 overload can relate to a maintenance area, such as a network fault. The reason can also relate to an engineering problem in the RCC2 configuration. Forward the OM reports to both maintenance and engineering personnel for analysis.

Log reports PM128 and PM181 indicate an LCM overload condition. When call processing resumes, the system generates log PM128 with this message: `LCM out of Overload`.

**Overload control** Overload control maintains system sanity and component sanity during overload conditions. Flow control provides the overload control. Flow control provides a use trigger to regulate the basic flow task to the CPU. Flow control regulation starts when the CP level tasks use a certain percentage threshold of the real time available to the CP level. When CP level tasks use a reduced percentage of real time available to the CP level, flow tasks send another message. The message indicates that the overload condition is clear.

**Extended line concentrating module overload control** The XLCM has a specified number of small, medium, and large memory blocks. The memory blocks do not change size. Local LCMs and XLCMs use small and large memory blocks to send and receive messages. Small memory blocks (SMB) are also for utility purposes use. An example of a utility purpose is a timer control block. Medium memory blocks (MMB) are normally for call data blocks (CDB) use. The CDBs hold data associated with active lines.

The system reports an overload when the XLCM cannot receive an external message. The type of message includes DMS-X or inter-unit communication (IUC). An overload can occur when there are not enough small or large memory blocks. Service degradation can occur before the system reaches an overload.

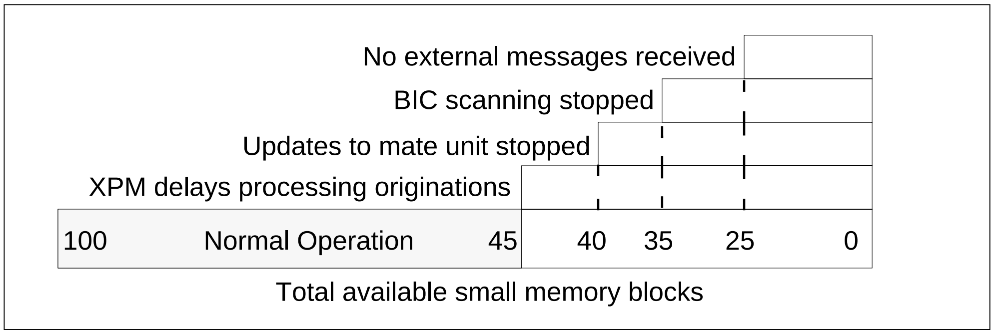
An XLCM has four levels of throttling to prevent overload. Three of the levels are based on the number of available SMBs. These levels conserve SMBs. The system weights each level to allow terminating calls to have priority over originating calls. The four throttling levels appear in the following list:

1. An XPM throttles messages to an XLCM to a maximum of two each 50 ms. Use this process to control small peaks of very heavy traffic. Sustained messaging at this rate can drive the XLCM into overload.
2. An XLCM adds the number of available SMBs for external messages to each POTS origination message and all messages that originate from P-phones. (This number = total available SMBs - the number of SMB reserve). When this number is less than 20, the XPM delays processing the origination until this number returns to a minimum of 20.
3. The total number of SMBs available for external messages can be less than 15. When this event occurs, an XLCM stops sending call processing updates to the mate XLCM. To find the total number of SMBs available, perform the following calculation. (Total available SMBs - number of the SMB reserve <15).
4. If the total number of SMBs available for external messages is less than 10 an XLCM stops scanning the bus interface cards (BIC). An XLCM scans BICs for line scan changes. To find the total number of SMBs, perform the following calculation. (Total number of SMBs - number of SMB reserve < 10).

An XLCM holds a reserve of small memory blocks that are not for external message reception use. This reserve protects the XLCM during heavy overload. The reserve makes sure that internal processes in the XLCM have enough small memory blocks to finish tasks. The total number of SMBs available can be less than or equal to the size of the SMB reserve. When this condition occurs, external messages that require SMBs are rejected, except for maintenance or monitor messages. The XLCM sends an overload report to the computing module (CM).

The overload protection system is static because throttle levels are constant and nonreactive. The overload protection system is distributed, because a single place does not monitor overload that initiate and control protective measures. The XLCM overload protection system appears in the following figure.

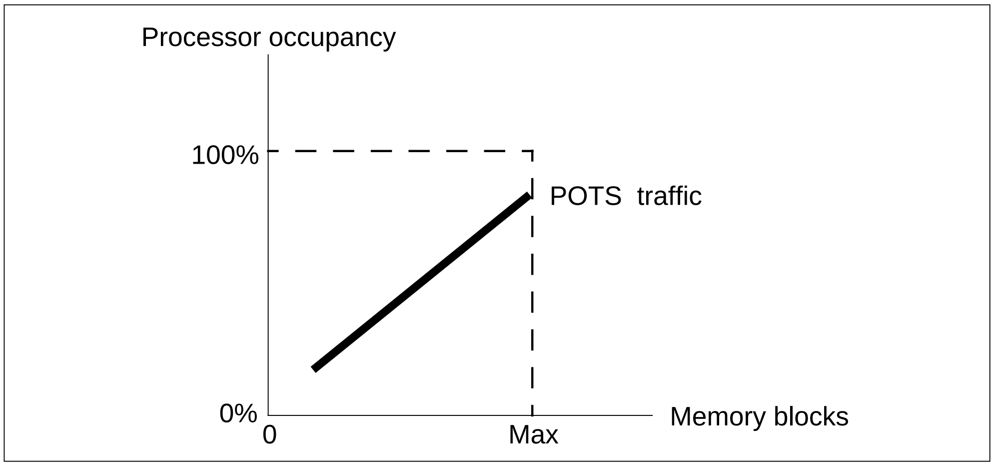
**Figure 1-16 XLCM overload protection system**




Early models of plain ordinary telephone service (POTS), of the small memory LCM (64 kbyte), show the capacity is memory block limited. In this model, the LCM runs out of small memory blocks before the LCM runs out of real-time use. The design of the LCM depends on this memory block limited capacity. Memory block limited is an LCM characteristic carried over to XLCMs.

The XLCM overload system works with POTS traffic. The present selection for the number of SMBs (100), and the size of the SMB reserve (25) affect the processor. In this event, the processor remains memory block limited. The processor runs out of SMBs before the processor runs out of real-time use. Processor occupancy or real-time use compared to memory block use appears in the following graph.

**Figure 1-17 Processor occupancy (real-time use) compared to memory blocks**




The XLCMs have more memory blocks than small-memory LCMs. The XLCMs must accommodate additional messaging requirements. An example of additional requirements are P-phones provisioned with features like displays and MADN. The result is that the XLCM can run out of real time before the XLCM runs out of memory blocks. Real-time overload appears in the following graphs.

**Figure 1-18 Processor occupancy—real-time overload**

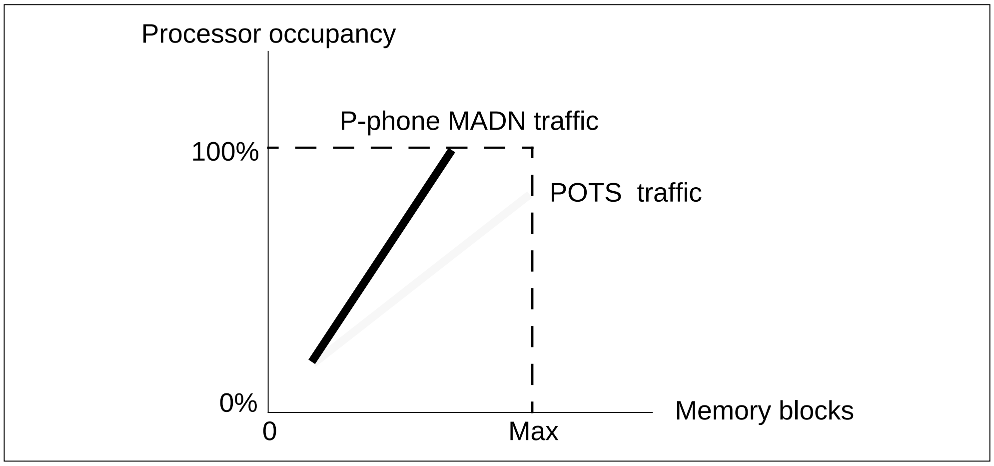
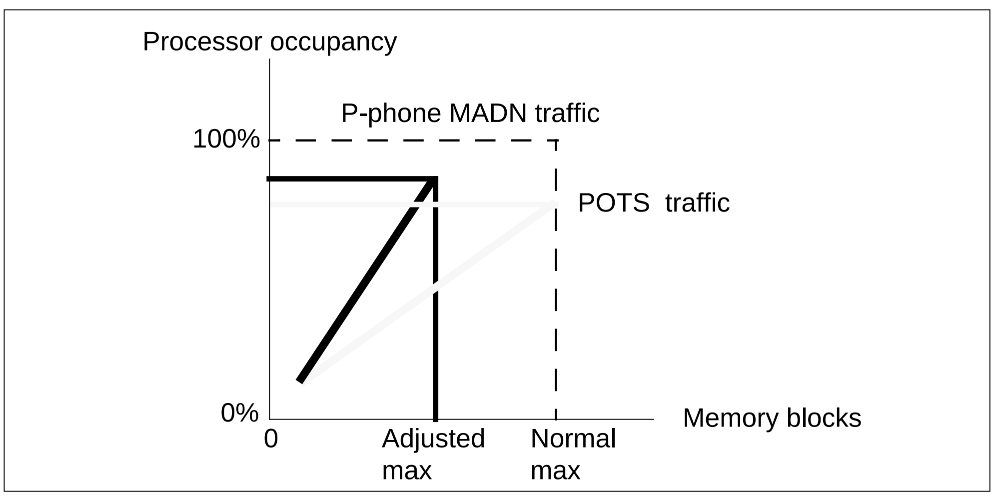



**Figure 1-19 Processor occupancy—memory block reduction after real-time overload detection**




The XLCM is not equipped to handle real-time overload because the XLCM is memory block limited. This problem can allow the following conditions to cause outages:

1. An overload report is not sent because XLCMs do not detect real-time overload. The CM does not suspend functions that require a response

from the XLCM. When the XLCM does not respond in time, the CM sets the XLCM SysB.

2. The XLCM cannot handle lack of memory when tasks with a lower priority do not run. Lack of memory can lead to traps or important software errors that cause the CM to set the XLCM SysB.

**Enhancements to the overload protection system** In addition to current functions of the XLCM, the enhanced XLCM overload protection system performs the following tasks:

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

These protective measures are active for as short a time as possible, to make sure the XLCM retains call processing capacity.

This enhancement adds three new components to the current overload protection system. The overload protection system is modified to accommodate the following three new components:

1. processor occupancy data collection

   The processor occupancy data collection component is distributed over key areas of XLCM code. The data collection collects raw data to detect real-time overload. The data collection leaves the raw data in a depository for the data analysis component. The data analysis component matches the priority of the segment of the system in which the component resides.

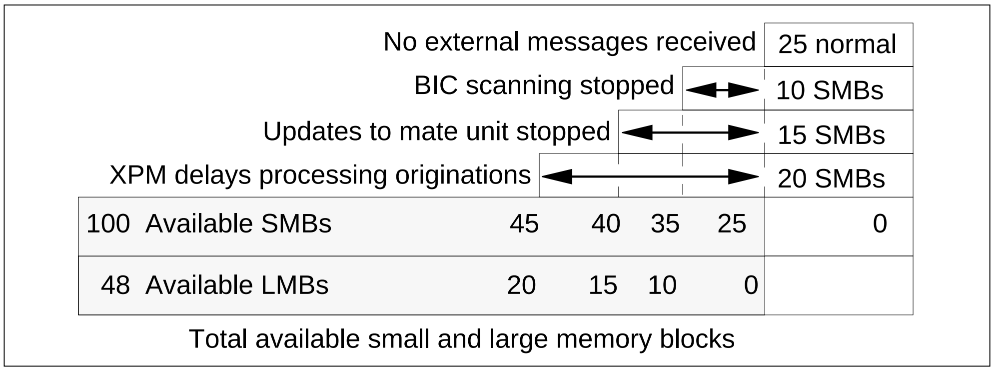
2. real-time data analysis

   The real-time data analysis component analyzes data in the depository. The data analysis indicates processor occupancy status. The status is not a percentage. The status is a distress rating. This component does not use percentages because percentages are difficult and take too much time to work with. Percentages do not supply all of the information that the control component requires. The control component uses the distress rating. The control component reports the distress rating to the CM when an XLCM reports overload. The data analysis component provides indication of the activity of the distress rating. The data analysis component indicates when the distress rating runs normally. This component runs at a high priority.

3. real-time overload control

   The real-time overload control scans the distress rating that the data analysis component generates. The rating can indicate real-time overload. When this event occurs, the control component adjusts parameters in the overload protection system to recover some real time. This adjustment keeps memory block limits ahead of the real-time limits of the XLCM. The limits appear in the following chart. When the data does not indicate trouble, the control component restores the overload protection system parameters. This restoration allows maximum call processing. This component runs at a very high priority.

**Figure 1-20 Overload protection system variable thresholds**




**Changes to the real-time subsystem** The real-time subsystem changes memory block system parameters to keep memory block limits ahead of real-time limits.

The improvements to the real-time subsystem follow:

1. To preserve real-time, work shedding reduces the number of memory blocks available for external messages and associated throttles. Reduction of memory blocks occurs in increments. Reduction of memory blocks continues until the XLCM recovers some real-time use.
2. Real-time overload is defined as a processor occupancy rate of a minimum of 75% for a minimum amount of time. The calculation of percentages is real-time intensive. This method is not a flexible method of calculation. This method can result in premature reaction when the XLCM is not in severe real-time trouble.
3. The amount of time required to process specified key maintenance requests at high levels of occupancy is monitored. The high levels must not be 100%. This monitor makes sure the XLCM responds to these requests before the CM times out or enters overload. The average time to process these key requests is benchmarked. When processing time takes longer than the benchmarked average, assume real-time overload.
4. When an idle task does not run for a specified period of time, the following events occur:
   a. idle task activity is monitored
   b. the XLCM enters real-time overload

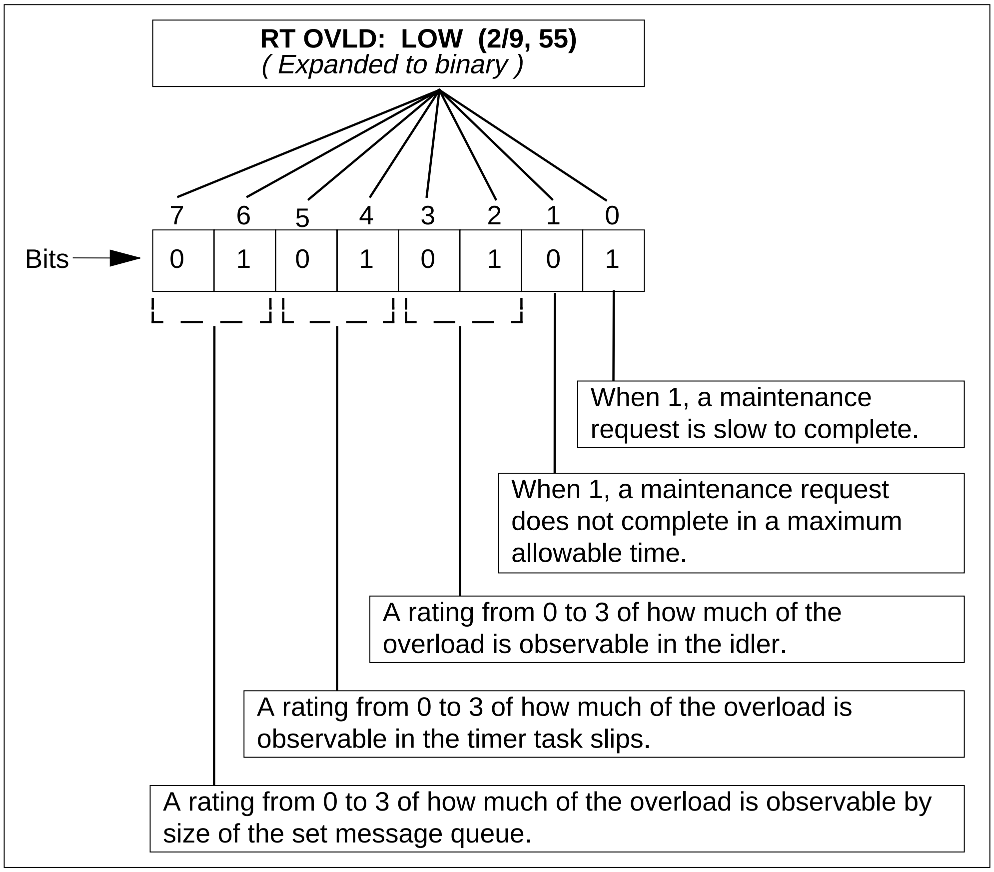
5. The timer task slip counter normally operates at a high occupancy. This level of high occupancy is not at 100%. When the timer task slips at more than the normal high occupancy rate, the XLCM enters real-time overload.
6. The size of the set message queue is monitored. When the queue gets too high (a minimum of 40), the XLCM is very near real-time overload.
7. Large memory blocks (LMB) are included in the reduction of memory blocks component to be completely effective to recover real time.

**Extended line concentrating module log report appendages** An XLCM adds a new field to current overload messages sent to the CM to indicate the level of real-time overload. When the CM is at CCM04 or later, this new information appears in two logs. These logs are the modified PM180 LCM Enters Overload log and modified PM180 LCM Overloaded log. The current field contains a ratio that compares two points of real-time distress:

- the maximum level of real-time distress reached before the system generates the overload report (values 0-9)
- the maximum level of real-time distress in total (values 5-9)

The overload report provides a real-time overload indication summary byte in hexadecimal format. The overload indication summary appears in the following chart.

**Figure 1-21 Summary of real-time overload indications**




The XLCM maintains overload data that allows the XLCM to provide a summary of the overload period. The XLCM adds this summary to the current overload exit message to the CM. When the CM is at CCM04 or later, this information appears in a modified PM180 LCM Out Of Overload log.

This feature is active in XLCMs and international XLCMs with extended memory and XPM04 loads. The system applies the new logs when CCM04 is installed in the CM.

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

The current memory block overload system has the real-time overload detection and protection subsystem. When in real-time trouble, the system sheds work. The system changes memory block overload system parameters to reduce the amount of memory blocks available for new work. This feature makes the new overload system dynamic. The system adjusts to allow high processor occupancy in any traffic configuration.

### Line concentrating module talk battery audit

In previous models, loss of talk battery to an LCM shelf was not reported unless the talk battery fuse had blown. The system did not report loss of talk battery to maintenance personnel. Maintenance personnel were not alerted that LCM subscriber lines did not have dial tone.

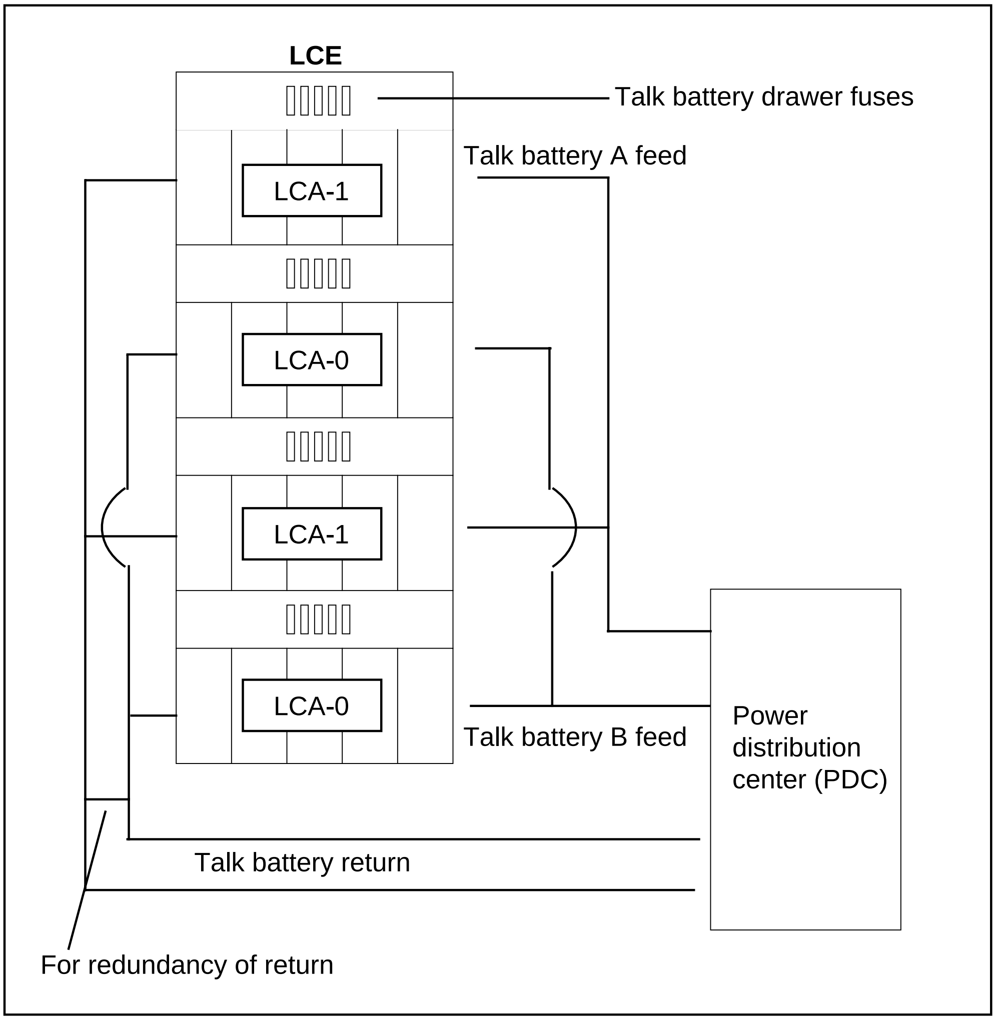
The Talk Battery Alarm feature adds new CM and LCM maintenance software. This software audits each LCM shelf for talk battery ability. When the audit does not detect talk battery, the system generates critical alarm log report PM179.

To support this feature, each LCM shelf must be provisioned with at least one world line card (WLC). A subscriber can use the WLC for talk battery audit use for call processing. The system generates minor alarm log report PM179 when WLCs are not available to perform the audit.

> ***Note:*** This feature supports all WLC types. There are no limits as to the WLC position in the LCM shelf.

**Loss of talk battery** The following figure shows how talk battery distribution occurs in a line concentrating equipment (LCE) frame with four shelves.

**Figure 1-22 Talk battery distribution on LCE frame**




The A feed provides talk battery for the second and fourth shelves of the LCE frame. The B feed provides talk battery for the first and third shelves. The feeds are not redundant. A single fault that loses a feed can affect two shelves. The two shelves can hold a maximum of 640 subscriber lines.

> ***Note:*** Talk battery returns are provided with some redundancy. A single fault does not always cause an outage.

In previous models, the system did not indicate a problem unless the talk battery fuse had blown. When the talk battery fuse blows, the LCM indicates `InSv` (in service) on the MAP display. The LCM performs a line card audit. This audit cannot check for loss of talk battery. Loss of talk battery affects one or two LCM shelves. The location of the fault determines the number of shelves.

Without talk battery, LCM line cards cannot signal an off-hook condition. The LCM detects an off-hook line as on-hook. The system forces LCM calls to the on-hook state when talk battery feed loss occurs. The LCM lines cannot originate and terminate calls while talk battery is not available.

**Feature activation** To control the activation of the Talk Battery Alarm feature, change the value of office parameter TALK_BATTERY_ALARM in table OFCENG. This change of value disables the Talk Battery Alarm feature by default. A WLC must be provisioned in each LCM shelf in the office before this feature is enabled. When a WLC is not provisioned, a minor alarm occurs for each LCM shelf that does not contain a WLC.

While the Talk Battery Alarm feature is enabled, diagnostics and background audits perform talk battery testing.

A disabled Talk Battery Alarm feature automatically clears the following conditions:

- talk battery alarms
- in-service trouble (ISTb) reasons that this feature introduced

**Background audit** Each LCM can audit the shelves for loss of talk battery. When the Talk Battery Alarm feature is disabled, audits do not run. When this feature is disabled, checks for the loss of talk battery on the LCMs in the office do not occur.

An enabled Talk Battery Alarm feature performs a search for an available WLC on each LCM shelf. An available WLC must be in one of the following states:

- hardware assigned, software unassigned (HASU)
- InSv and assigned to a subscriber

When this feature cannot find an available WLC, the system generates minor alarm log report PM179. This log indicates that that system cannot test talk battery. The LCM becomes ISTb. When this feature finds an available WLC, a special audit checks for loss of talk battery feed one time each minute. This feature tests all LCM shelves at the same time. The audit checks each LCM shelf one time each minute. Audits do not run talk battery tests on an Out Of Service (OOS) LCM.

When the available WLC for audit testing use is not available, the audit searches for another available WLC. For example, when the available WLS goes OOS, the WLC is not available. When the audit finds another available WLC, audit testing continues with the new WLC. When the audit cannot find an available WLC, the system generates minor alarm log report PM179. This log report indicates the system cannot test talk battery, and the LCM shelf is set ISTb.

To test for loss of talk battery feed, the system instructs the WLC to verify talk battery feed to the WLC. The test passes when talk battery feed is present. The test fails when talk battery feed is not present.

When off-hook or call processing busy (CPB) occupies an InSv WLC, the system does not perform the talk battery test. The system assumes the talk battery test is a pass. Examples of occupied states include talking, ringing, and maintenance lockout. For ringing, the WLC is on-hook and in a CPB state.

When the audit finds a failure of the talk battery test, the system generates critical alarm log report PM179. The system places the LCM shelf in an ISTb state. The audit does not report the failure again until diagnostics clear the alarm and ISTb state.

**Diagnostics** The INSV and OOS diagnostics for an LCM unit have the talk battery test. The diagnostics affected include the following commands:

- TST UNIT UNIT_NO
- TST PM
- TST REX NOW
- RTS UNIT UNIT_NO
- RTS PM

Diagnostics report all talk battery failures, even when the system tests the same LCM repeatedly. When the talk battery test passes, diagnostics clear the alarm and ISTb reason. The talk battery test affects both manual and automatic versions of these commands. Diagnostics run talk battery tests when the talk battery alarm feature is enabled.

To support the Talk Battery Alarm feature, each LCM shelf must be provisioned with a WLC. Special provisioning rules are not present as to the location of the WLC in the shelf. The maintenance line card in LSG 0 Card 0 for the LCM shelf can be assigned as a WLC. When this condition is present, the feature can or cannot use this card because this line card tests the ringing generators.

This condition causes the MAP commands that busy the last available WLC on an LCM shelf to issue a warning message. These commands follow:

- BSY

  Enter the BSY command at the LTP MAP level when a WLC is posted.
- DIAG

Enter the DIAG command at the LTP MAP level when a WLC is posted (Diag temporarily manually busies [ManB] the WLC.)

- BSY DRWR

  Enter the BSY DRWR command at the PM MAP level when an LCM is posted.

When one of these commands causes the last available WLC on the LCM shelf to be busied, a warning message appears. The following message is an example of the warning message:

*Example of a MAP response:*

```
Busying the last available WLC on LCM shelf.  This prevents
testing for talk battery failure on the LCM shelf.  Minor alarm
will be raised within one minute unless WLC becomes available.
```

The QUERYPM FLT command is modified to display new ISTb reasons by shelf and line equipment number (LEN) for both alarm conditions. An example appears in the following MAP response:

*Example of a MAP response:*

```
Node inservice trouble exist:One or both units Inservice
Trouble:LCM UNIT 0 Inservice Trouble Exist:Talk Battery failure
detected on shelf <shelf #> by <LEN>LCM UNIT 1 No Faults Exist

              orNode inservice trouble exist:One or both units
Inservice Trouble:LCM UNIT 0 Inservice Trouble Exist:Cannot
test Talk Battery on shelf <shelf #> by <LEN>LCM UNIT 1 No Faults
Exist
```

The MAP commands that RTS the first available WLC on an LCM shelf are modified to issue the following notification messages. These notification messages indicate the minor alarm and ISTb reason for the LCM shelf are cleared. The minor alarm and ISTb reason cleared because a WLC becomes available to test for talk battery failures. Commands that can cause this condition are as follows:

- RTS

  You can enter the RTS command at the LTP MAP level. When a WLC is posted and returned-to-service, this command generates the following MAP response:

  *Example of a MAP response:*

  ```
  RTSing the first available WLC on the LCM shelf.  Loss of
  talk battery can now be detected on LCM shelf.  The minor
  alarm and ISTb reason will be cleared for the LCM shelf
  within ten minutes (unless the last WLC becomes unavailable
  again).
  ```

- RTS DRWR

  You can enter the RTS DRWR command at the PM level. When an LCM is posted, this command generates the following MAP response:

  *Example of a MAP response:*

  ```
  RTSing DRWR of the first available WLC on the LCM shelf.  Loss
  of talk battery can now be detected on LCM shelf.  The minor
  alarm and ISTb reason will be cleared for the LCM shelf
  within ten minutes (unless the last WLC becomes unavailable
  again).
  ```

Emergency stand alone (ESA) is not affected for RCC2. Talk battery alarm conditions are ignored. During the ESA exit procedure, the CM diagnoses the LCM to determine when talk battery failures are present.

**Limits and controls** The following limits apply to the Talk Battery Alarm feature:

- Only the following LCM types support the Talk Battery Alarm feature:
  - extended LCM (XLCM) (256-Kbyte capacity)
  - enhanced LCM with ISDN (LCME)
  - cabinetized XLCM (ELCM) (also referred to as Meridian cabinetized LCM)
  - remote line concentrating module (RLCM)
  - outside plant module (OPM) (cabinetized RLCM with 256-Kbyte capacity)
- A subscriber line can use the same WLC for talk battery test use. A talk battery test on a WLC can cause a delay in dial tone when the following events occur:
  - the WLC goes on-hook to request call origination
  - the subscriber goes off-hook

The delay can be a maximum of 90 ms before the subscriber receives dial tone. The WLC can receive a call termination request while the talk battery test runs on the WLC. When this condition occurs, an additional delay of a maximum of 90 ms can occur before the line rings. For both originations and terminations, there is no impact on call processing other than this short delay.

- The Talk Battery Alarm feature detects the loss of talk battery *feed* to an LCM shelf. The system cannot detect the loss of talk battery *return* because of WLC limits. Talk battery returns are duplicated. Return failures do not occur often. Refer to the previous figure, “Talk battery distribution on LCE frame", for more information on the duplication of talk battery returns.
- The CM does not perform talk battery tests during LCM or LCM C-side node overload condition.
- The Talk Battery Alarm feature isolates shelf-level failures of talk battery feed. The system guarantees to report talk battery feed failures that affect talk battery for all lines on the LCM shelf. System detection of drawer-level failures depends on the drawer that contains the WLC. The detection depends on the drawer in which the failure occurs.
- Defects in the WLC or the WLC drawer can prevent correct detection of talk battery failures by the WLC. These defects can cause the WLC to fail line card diagnostics. When this event occurs, the WLC can report talk battery failure and cause a critical alarm. The WLC can report the failure even when talk battery is present for other lines on the shelf. These reports are wrong and do not occur often. The critical alarm log report PM179 gives the location of the WLC to help troubleshoot these instances.

- The Talk Battery Alarm feature does not affect ESA operation on RCCs, RLCMs, or OPMs. Talk battery alarm conditions or reports are ignored during ESA. Talk battery failures are not reported while an LCM is in ESA mode. During the ESA exit procedure, the CM diagnoses the LCM to determine when talk battery failures are present.
- While the Talk Battery Alarm feature activates in an office, the office LCMs can take time to begin the audit. A maximum of 10 min can pass before all the LCMs check for talk battery failures. This delay time depends on how long the LCM audit takes to cycle through all LCMs in the office. The audit can take longer than 10 min to start in a office with heavy traffic or many LCMs.
- If you use the SERVORD OUT commands, a minor `Cannot test Talk Battery` alarm can appear. The SERVORD OUT command deletes the directory number (DN) assigned to the last WLC on an LCM shelf. The alarm message indicates the WLC for which the command deletes the last assigned DN. When this event occurs, the WLC is HASU. The WLC is in a maintenance state that is not normal. This state does not allow the LCM to use the WLC to detect talk battery failures. Use one of the following solutions to resolve this condition:
  - You can BSY and RTS the LCM. Nortel does not recomend this method. This method can cause service outage. After the action, the WLC is in the proper HASU maintenance state. The LCM can use the WLC for talk battery testing.
  - You can Assign a second WLC on the same LCM shelf. This WLC can remain as HASU without a DN assigned. This option requires an additional WLC. This action provides redundancy for the Talk Battery Alarm feature.
  - You can assign a DN to the WLC so that the LCM can use the WLC for talk battery testing. This option provides the easiest answer.

**Routine exercise test** For the REx test sequence to occur, both units must be InSv. The REx test does not run when the following conditions are present:

- a REx test runs on a HOST XPM where this node subtends
- Warm SWACT is not turned on for the PM
- one unit is SysB (the PM is ISTb), or the two units are SysB. The PM is SysB.
- the PM is in overload or is ISTb.

> ***Note:*** When the PM is ISTb because of a previous REx test, the REx test runs again.

When a TST REX NOW command aborts the REs test, the terminal displays a message. The message indicates the reason you used the TST REX NOW command to abort the REx test. When you abort the REx test without this command, the system generates a PM181 log with the same message.

**Audits of the intermodule communication links** An audit runs sanity tests on intermodule communication links to make sure links do not have data loss or data corruption. The audit runs on the inactive and active units. When the audit detects a fault, only the active InSv unit reports the fault to CC. When the audit detects a fault on the intermodule communication link or links, the following events occur:

- The system closes the link.
- The RCC2 status changes to ISTb.
- The RCC2 units do not communicate over the links. A warm SWACT cannot occur.
- The system generates a PM128 log.
- At the RCC2 level, the QUERYPM FLT command contains the message `NON-CRITICAL HARDWARE FAULT`.

**Parity errors in the remote cluster controller 2** On the RCC2, a parity system checks the main memory systems for accuracy. The parity system adds 1 bit of data to each byte stored. This addition allows the hardware that maintains this additional bit to detect any single-bit memory fault. A parity fault indicates a memory accuracy fault. The parity hardware is on the NTMX77 processor that has the memory.

Feature AN0741, Parity Improvements, improves the ability of the CPM to collect and report additional information on parity faults. This feature performs the following tasks:

- unifies the parity audit and parity trap handlers
- improves the data that the handler captures and saves to
  - use the information stored in the card status register
  - localize the parity fault to a specified byte address
  - perform hard/soft/intermittent fault categorization
  - query to determine when the fault is in code
- updates interfaces to log reports PM189 and PM185 to include the new information

Before feature AN0741, when the CPM execution code encountered a fault, the CPM dropped activity and went OOS. The parity audit initiates an interrupt instead of a bus error. The current parity audit can identify memory faults before code execution hits them. This identification prevents a potential loss of service.

**Task-level parity handler** A level 6 interrupt to the CPU reports parity faults to the local CPU. The level 6 interrupt autovector in a CPM binds to an assembly interrupt handler. The assembly interrupt handler has one handler entry point for each interrupt level. This handler receives interrupts during standard code execution, or by parity audits detection. The handler decides which handler functions to perform.

The parity interrupt handler determines when the parity audit causes the interrupt. The parity handler takes a snapshot of the state of the processor that executes when the interrupt occurred. The parity handler saves the following data:

- processor register set
- interrupt return address and CPU status register
- memory card status registers

The parity handler categorizes the parity faults (hard, soft, or intermittent). The parity handler saves the fault word address. The parity handler returns control to the parity audit. After the parity handler completes the tasks, the handler passes any standard trap information to the generic trap handler. Standard trap information includes registers or task. The generic trap handler reinitializes or resets the unit.

**Parity error log reports** A PM181 log indicates the type of parity fault that occurred. Other logs, like PM128 and PM106, indicate the action that the CC performs. These logs indicate when the CC clears the fault. You can use the QUERYPM FLT command to determine the type of parity fault that occurs.

The system generates PM185 log reports to indicate a parity trap. The system or supervisor stack and the user stack now appear in this log report. These stacks show the exact location of the trap. Log PM189 reports when the parity error is in or out of code.

A PM185 log report with all available data appears in the following example.

**Figure 1-23 Example of a PM185 log report**

```
PM185 FEB16 12:41:58 8900 TBL  PM TRAP
LTC 9 Unit 0 : Inact
Trap Sequence #: 1 Current  load
# Reloads since trap: 0     # Restarts since trap: 0
Trap in UP : Division by 0
Trap was Recoverable
Load name = ECL03AN
Executable EEPROM version: XPMRMA25
Loadable   EEPROM version: XPMRMA25
RTSS Version = AI15    Trap Version = 01    Trap flags: 2080
Unit was Inactive/Ready    Mate was Active/Running
Kstats: 3F00    Load Status: A1A1A1A1
Task: BASEMON    000B 000B
CC Time : 16:12:34:34.00    PP Time : 00:02:32:59.79
Occurred at: 008D4881   TRAPMSG   44   DOZERODI  54   Offset: #2B
Called from: 3E0023A4   BASEMON   19   TDRIVBOD  30   Offset: #22C
             3E0024B3   BASEMON   19   TERMDRIV  11   Offset: #19
PC:00001350  SR=2004      US=000A69AE  SS=002B0FF6  TCB=00024D9A
D0 =0000010C D1 =00000059 D2 =00020000 D3 =00000003
D4 =000A5DA6 D5 =FFFF0040 D6 =0000FFF4 D7 =00000000
A0 =00001A96 A1 =008E9BCE A2 =00025C5E A3 =008D4881
A4 =02000000 A5 =00025C6C A6 =00009724
Supervisor Stack:
  002B0FF6    FAB9 FFFB FAB9 FFFB 2367 0000 0001 0000
  002B1006    FB20 0000 0001 0102 0001 0000 0000 0000
  002B1016    0000 6B09 0000 0000 000C 0000 0000 0000
User Stack:
  00025C5E    0000 0000 0000 008D 488E 0218 0000 0002
  00025C6E    5E40 002C 0036 0000 25E4 015A 5000 0000
Possible Locals:
  00025C44    3E00 0001 008E 9BCE 0218 0000 0002 5C6C
  00025C54    0006 008F CD5C 000F 000F 0000 0000 0000
Stack Frame:
  00025C64    008D 488E 0218 0000 0002 5E40 002C 0036
  00025C74    0000 25E4
Possible Parameters:
  00025C78    015A 5000 0000 002E 0000 24C8 008F 5368
  00025C88    0002 5CAA 0218 0000 002E 9E46 0002 5CAC
END OF TRAP
```

## Too many levels of nesting!! Not a good idea.Feature dependencies

The Parity Improvements feature depends on features AF5680, XPM Exception Processing System Enhancements, and AF5682, XPM Code Protection. The parity audit examines protected areas of memory and areas that are not protected. Feature AF5682 allows the parity audit to write to a write-protected memory area. The audit performs this action for pattern testing a parity fault location byte. This feature allows the parity audit to query when a given physical address is in loaded code. To initiate the best recovery process, the parity interrupt handler determines when the parity fault occurred in execution space.

Feature AF5391 allows the allocation of protected memory for protectable patches when memory is available. When the allocation fails, the system stores the patch in memory that is not protected. The system must store local patches in non-direct memory access (DMA) memory, when possible.

> ***Note:*** In the enhanced processor (UP) and unified processor (UP), the allocation of more non-DMA occurs. In the facilities processor (FP), only released code space operates for non-DMA.

**Handling a parity error fault** In most events, when the system detects a parity fault, the fault can be corrected without loss of service. This section provides information on the types of parity faults. This section provides a review of the actions the CM takes to deal with parity faults. This section includes the actions for operating company personnel to take.

As discussed in “Errors specific to processor cards", three types of parity faults are:

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

When a parity fault occurs, the CM determines the action to perform on the RCC2 unit. This action depends on the state of the unit that reports the fault. The state is active or inactive. The CM handles the three types of faults with the same method.

When the CM detects a parity fault in the active unit of the RCC2, the CM sets the unit ISTb. The CM gives the reason for the ISTb as `parity`. The CM recovers the unit during a maintenance window. The maintenance window for recovery of a parity fault on the active unit is the XPM REx test window. When the XPM REx test window time is the same as the switch time, an audit checks the active XPM unit. The audit looks for an ISTb of `parity`. When an ISTb is present, the CM SWACTs and reloads the RCC2 when conditions are not present. This action clears the ISTb parity fault and the short-term failure (STF) parity fault peg. This action resolves the parity fault in the RCC2.

When the active unit reports a parity fault, the system generates a PM181 log. The CM SWACTs the XPM as a recovery action. The CM loads the new inactive unit with the XPM software load. The corresponding inventory table defines the XPM software load. The CM considers this load an autoload. A manual, 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 the following:

- a P-side or C-side node of the XPM that is in the recovery process from a parity fault
- the XPM when a P-side or C-side node in the recovery process from a parity fault

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

The PM181 logs report parity faults. Operating company personnel can check for associated logs, like PM128, to understand the actions the CM takes. This section provides examples of the messages associated with the PM181 and PM128 logs.

The RCC2 unit can be set ISTb with multiple reasons at the same time. When you perform a QUERYPM FLT at the MAP level, ISTb reasons appear. These ISTb reasons occur on the unit and are not cleared.

## Too many levels of nesting!! Not a good idea.Hard parity fault

When the active unit of the RCC2 reports a hard parity fault to the CM, the system generates a PM181 log. This log notifies operating company personnel of the following conditions:

- a parity fault occurred on the active unit. The system set the unit ISTb.
- the CM reloads the unit during the next XPM REX test window

You can perform a manual SWACT and reload to clear the ISTb and the parity fault.

An example of a PM181 log report follows:

```
PM181 JUL23 23:29:16 7700 INFO RCC2 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   CMVI 00  18  RCC2 : 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.

An example of a PM128 log follows:

```
*PM128 MAY09 09:49:56 9000 TBL ISTB RCC2 1
 Node: ISTb (Unit ISTb)
 Unit0 Inact: InSv
 Unit1   Act: ISTb (UP RAM Parity)
```

Use the command string QUERYPM FLT to display the faults on a posted RCC2. The following example MAP response shows a hard parity fault is present in unit 1 of the posted RCC2:

```
>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 RCC2 during the next XPM REX test window. After the reload, the ISTb fault clears.

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

**Dual remote cluster controller 2** The maintenance functions provided for the DS-1 interlinks are the same as those provided for the DS-1 links that connect to the host PM. These functions perform the following tasks:

- detect the presence of the card
- monitor the DS-1 circuits. Conditions reported include:
  - slips
  - frame loss
  - bipolar violation (BpV)
  - remote carrier group alarms (RCGA)
  - local carrier group alarms (LCG)
- report the state of the link

**Remote cluster controller 2 with ISDN** The RCC2 can be configured with a spare DCH. When a DCH card goes OOS, the spare DCH gains control of the correct D-channel processing. The D-channel service does not have temporary loss. Enter the SWITCH command to implement this function manually.

## Escalation to manual maintenance

The RSC-S, automatic maintenance includes the output of the appropriate problem indicators. Refer to the section “Automatic maintenance", for more information.

# 2 RSC-S hardware

## Hardware components

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

**Table 2-1 Hardware component deliverables (Sheet 1 of 2)**

| Hardware | PEC |
|---|---|
| Cellular Access Processor with 16Mb Memory | NTAX74AA |
| FSP for CRSC and CEXT | NTMX26BA |
| Power converter | NTMX72AA |
| PCM signaling | NTMX73AA |
| 32-port DS30A | NTMX74AA |
| Enhanced matrix | NTMX75AA<br>NTMX75DA |
| Processor with 8-MB Dynamic Random Access Memory | NTMX77AA |
| DS60 extender and power supply | NTMX79AA |
| Dual DS-1 packlet | NTMX81AA |
| Compact Dual DS-1 packlet | NTMX81BA |
| Filler packlet | NTMX83AA |
| Compact Filler packlet | NTMX83BA |
| CPM shelf | NTZZ12XA |
| EXT shelf | NTMX8601 |
| ***Note:*** The NT7X05 Peripheral/Remote Loader-16 requires the NTMX77AA to operate. | |

**Table 2-1 Hardware component deliverables (Sheet 2 of 2)**

| Hardware | PEC |
|---|---|
| Quad Frame Carrier | NTMX87AA/AB |
| Penta DS-1 Packlet Carrier | NTMX87BA |
| CEXT cabinet | NTMX88AA |
| CRSC cabinet equipped with LCME | NTMX89AA |
| CRSC cabinet equipped with LCM | NTMX89CA |
| HDLC/DMSX messaging interface card | NTMX76AA |
| Peripheral/remote loader-16 | NT7X05AA |
| ***Note:*** The NT7X05 Peripheral/Remote Loader-16 requires the NTMX77AA to operate. | |

Hardware developed during the first phase includes nine circuit cards and the main shelf. The nine circuit cards and the main shelf are housed in:

- the cabinetized Remote Switching Center (CRSC)
- the cabinetized extension module (CEXT)
- the frame supervisory panel (FSP) for the CRSC and the CEXT

## RSC-S packaging

The RSC-S hardware component packaging differs from standard Remote Switching Center (RSC) packaging. The RSC-S is provided in cabinets, not in equipment frames. These cabinets contain many hardware units. The configuration of 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 single-cabinet and multicabinet configurations.

## Single-cabinet RSC-S configuration

**WARNING**
**RCC2 supports a maximum of ten P-side peripherals**
The total amount of peripheral nodes and remote modules configured on an RCC2 cannot exceed ten. Peripheral nodes include LCM(E)s, RLCMs, SMSRs and RMMs. The system does not allow you to datfill more than ten P-side nodes in inventory tables.

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

- a master controller (the RCC2) that controls associated line concentrating modules (LCM), RMMs, remotes, and digital trunks as the host directs
- 480 lines for one enhanced line concentrating module (LCME) that can support different services:

  The LCMEs can support services like integrated services digital network (ISDN). The LCMEs can also support two binary, one quarternary (2B1Q), plain ordinary telephone service (POTS), and Meridian Digital Centrex (MDC). LCMs can support services like POTS and MDC.
- maintenance and service circuits the RMM provides
- 640 lines for one LCM
- FSP
- ringing generators (RG)

***Note:*** The single-cabinet configuration requires an external power source.

Provisioning options for a single-cabinet configuration include peripheral-side (P-side) digital signal 1 (DS-1) trunk links and central-side (C-side) links for communication with the host. An additional provisioning option is introduced during the phase 1 enhancements phase. This option is the Subscriber Carrier Module-100S Remote (SMS-R) for digital integrating digital loop carriers compatible with the TR-008.

### Cabinetized remote switching center

The CRSC is a single-cabinet RSC-S that supports service and maintenance circuits and DS-1 links to the host. A single-configuration RSC-S can have one CRSC cabinet with the following components:

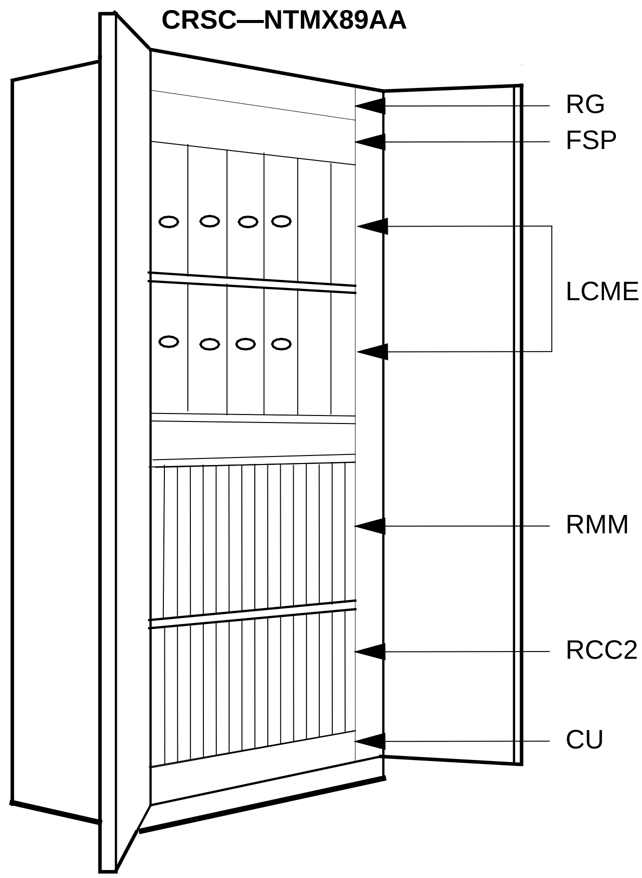
- one RCC2 shelf (always provisioned)
- one RMM that dedicated DS30A links serve

- one LCME or LCM
- one FSP
- two RGs

The single CRSC C-side interfaces are DS-1 links to a line trunk controller (LTC) or line group controller (LGC) host peripheral.

The CRSC components appear in the following figure. A description of each CRSC component follows the figures. A CRSC cabinet with an LCME appears in the first figure.

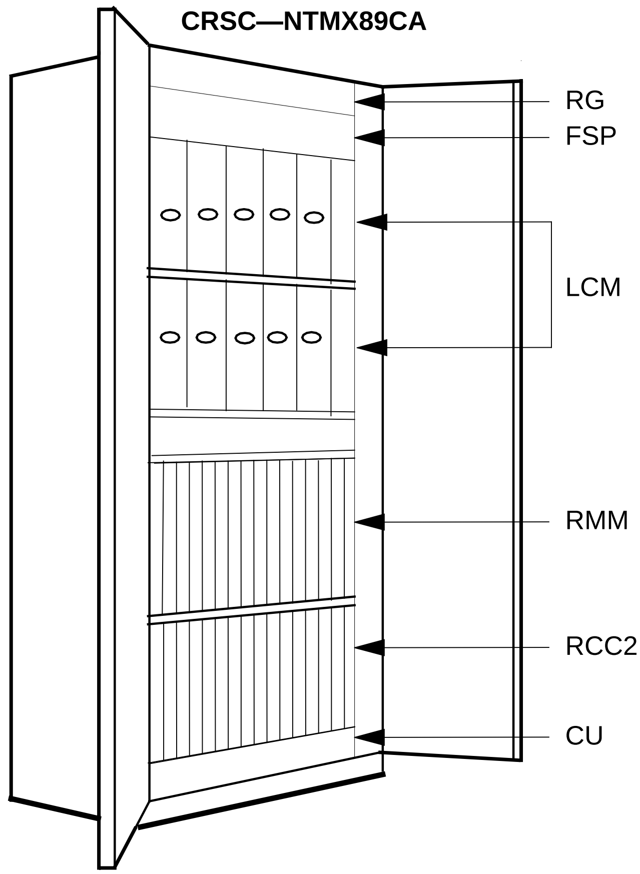
**Figure 2-1 CRSC cabinet with LCME**




CU — NTNX27CA
FSP — NTMX26BA
LCME — NTBX32AA
RCC2 — NTZZ12XA
RG — NT6X30
RMM — NT6X13

A CRSC cabinet with an LCM appears in the following figure.

**Figure 2-2 CRSC cabinet with LCM**




CU — NTNX27CA
FSP — NTMX26BA
LCM — NT6X04
RCC2 — NTZZ12XA
RG — NT6X30
RMM — NT6X13

**Enhanced remote cluster controller 2** The RSC-S is based on the RCC2. The RCC2 is the master controller for RSC-S peripherals. The RCC2 controls associated LCMs, RMMs, remotes, and digital trunks as the host directs.

During normal operations (without SONET interfaces), the host LGC or LTC controls the RCC2. The RCC2 P-side ports can be configured to support lines and trunks, Outside Plant Modules (OPM), Remote Line Concentrating Modules (RLCM), and SMS-Rs off the RSC-S.

The RCC2 is the remote office unit of the common peripheral module (CPM). The RCC2 is a single-shelf, 68020-based module. The RCC2 contains units 0 and 1. For reliability, RCC2 units 0 and 1 run in an active and standby mode of operation.

The RCC2 shelf contains the following components:

- duplicated RCC2 processor cards that contain a 68020-based (NTMX77) or 68040-based (NTAX74) processor. The 68040-based NTAX74 CAP is an optional upgrade replacement for the 68020-based NTMX77 UP. The CAP increases XPM capacity, real-time availability, and memory. A RCC2 with the CAP requires the following components to support NTAX74 functionality:
  - — NTBX01BA or NTBX01AC ISDN Signaling Preprocessor
  - — NTBX02BA Enhanced D-Channel Handler

  ***Note 1:*** The NT7X05 Peripheral/Remote Loader-16 requires the NTMX77 to operate.

  ***Note 2:*** An RCC2 with NTAX74 requires the NTBX01BA or NTBX01AC ISDN Signaling Preprocessor and the NTBX02BA 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 circuit cards
- a pulse code modulation (PCM) signaling card that supports all low-level PCM signaling tasks
- DS-1 interface cards (ten DS-1 links for each card) for host-directed DS-1 links for P-side link requirements
- a DS30A interface card, that provides 32 DS30A links to interface to LCMs, RMMs, and SMS-Rs at the RSC-S
- a selection of global tone receiver (GTR) or universal tone receiver (UTR), custom local area signaling service (CLASS) class modem resource (CMR), D-channel handler (DCH), or enhanced-ISDN signaling preprocessor (EISP) service circuit cards

The RCC2 contains RSC-S processor and memory cards for normal and emergency stand-alone (ESA) modes. The RCC2 also contains time switches, tone generators, and power converters. The RCC2 also supports GTR/UTR for lines and trunks in normal and ESA modes, and provides local switching for the following:

- host-directed calls (connects LCM, DS-1 trunking, RLCM, OPM, and data line card [DLC] channels to host-directed DS-1 channels)
- line and trunk calls internal to the RSC-S and associated remotes of the RSC-S (supported under the intraswitching feature)
- intraswitched calls during ESA (supported if the ESA feature is active)

The RCC2 provides local switching through a total of 20 C-side ports and 54 P-side ports. These ports support all the features of the current RSC and RSC with ISDN with increased capacity. The RCC2 peripheral allows for C-side-to-P-side, P-side-to-C-side, P-side-to-P-side, and C-side-to-C-side connections. C-side ports support host-to-remote capabilities.

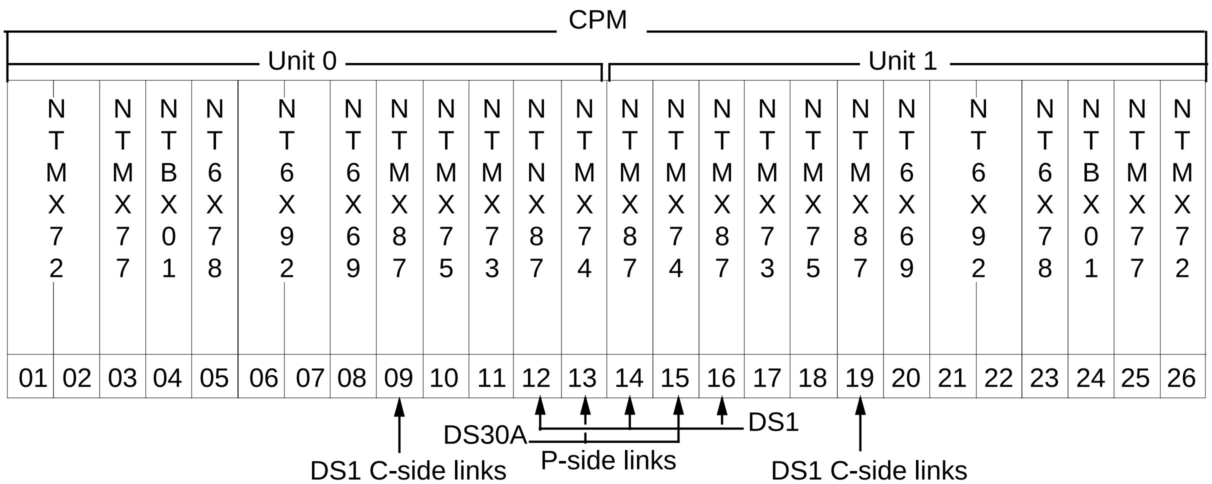
The RCC2 performs the following termination functions:

- C-side links from the host LGC or LTC (for DS-1 electrical links), with a maximum of 20 DS-1 links, provide a maximum of 480 channels
- DS-1 links from the mate RCC2 in a dual configuration
- P-side DS-30A links from LCMs, RMMs, and SMS-Rs
- P-side DS-1 links used for digital connectivity to RLCMs and OPMs in the remote-off-remote configuration
- P-side DS-1 links for digital trunking to community dial offices (CDO) and private branch exchanges (PBX)

The circuit card design for an RCC2 shelf appears in the following figure.

> ***Note:*** The following figure does not show slot 27, that also contains an NTMX72 power converter.

**Figure 2-3 RCC2 circuit card design**




In NA010 and lower, up to 16 C-side ports are available. This configuration requires the NTMX87AA/AB in slots 9 and 19. NA011 and higher supports these packs when an office needs only up to 16 C-side links.

In NA011 and higher, up to 20 C-side ports are available. This configuration requires the NTMX87BA in slots 9 and 19. This hardware is backward compatible from NA008 to NA010 for use in the 16 C-side link configuration.

Descriptions for circuit cards for RCC2 unit 0 (slots 01through 13) appear in the following table.

**Table 2-2 RCC2 unit 0 circuit cards (Sheet 1 of 2)**

| Slot | Description | PEC |
|---|---|---|
| 01-02 | Power Converter | NTMX72 |
| 03 | Unified Processor *or*Cellular Access Processor | NTMX77 *or* NTAX74 |
| 04 | ISDN Signaling Preprocessor | NTBX01 |

***Note 1:*** Refer to “Maintenance overview" in this document for detailed descriptions of circuit cards for an RCC2 shelf.

***Note 2:*** The functionality of the NT7X05 Peripheral/Remote Loader-16 requires the NTMX77AA for support .

***Note 3:*** For NA011, a 20 C-side link configuration is available. This configuration requires the Penta DS-1 Packlet Carrier. For a 16 C-side link configuration, the Quad Frame Carrier is acceptable. The Penta DS-1 Packlet Carrier is hardware backward compatible to NA008, but only in a 16 C-side link configuration.

**Table 2-2 RCC2 unit 0 circuit cards (Sheet 2 of 2)**

| Slot | Description | PEC |
|---|---|---|
| 05 | CLASS Modem Resource *or* Peripheral Recovery Loader-16 | NT6X78 *or* NT7X05 |
| 06 | Global/Universal Tone Receiver | NT6X92 |
| 07 | Global/Universal Tone Receiver *or* Peripheral Recovery Loader-16 | NT6X92 *or* NT7X05 |
| 08 | Enhanced Message and Tone Card *or* HDLC Message and Tone Card (for EDC) | NT6X69 *or* NTMX76 |
| 09 | The following configurations are possible: (see notes below) | |
| | Penta DS-1 Packlet Carrier *with* Compact Dual DS-1 Packlet (1-5) *or* Filler Face Plate (0-4) | NTMX87BA *with* NTMX81BA *or* NTMX83BA |
| | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 10 | Enhanced Matrix NTMX75AA *with* NTMX87AA/AB in slots 9 and 19 *or* Enhanced Matrix NTMX75DA *with* NTMX87BA in slots 9 and 19. | NTMX75AA *or* NTMX75DA |
| 11 | Pulse Code Modulation Signaling Processor | NTMX73 |
| 12 | (Enhanced) D-Channel Handler *or* Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTBX02 *or* NTMX87AA/AB *with* NTMX81 AA *or* NTMX83AA |
| 13 | DS-30A Interface Card | NTMX74 |

***Note 1:*** Refer to “Maintenance overview" in this document for detailed descriptions of circuit cards for an RCC2 shelf.

***Note 2:*** The functionality of the NT7X05 Peripheral/Remote Loader-16 requires the NTMX77AA for support .

***Note 3:*** For NA011, a 20 C-side link configuration is available. This configuration requires the Penta DS-1 Packlet Carrier. For a 16 C-side link configuration, the Quad Frame Carrier is acceptable. The Penta DS-1 Packlet Carrier is hardware backward compatible to NA008, but only in a 16 C-side link configuration.

The following table describes circuit cards for RCC2 unit 1 (slots 14 through 27).

**Table 2-3 RCC2 unit 1 circuit cards (Sheet 1 of 2)**

| Slot | Description | PEC |
|---|---|---|
| 14 | (Enhanced) D-Channel Handler *or* Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTBX02 *or* NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 15 | DS-30A Interface | NTMX74 |
| 16 | (Enhanced) D-Channel Handler *or* Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTBX02 *or* NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 17 | Pulse Code Modulation Signaling Processor | NTMX73 |
| 18 | Enhanced Matrix NTMX75AA *with* NTMX87AA/AB in slots 9 and 19 *or* Enhanced Matrix NTMX75DA *with* NTMX87BA in slots 9 and 19. | NTMX75AA *or* NTMX75DA |
| 19 | The following configurations are possible: (see notes below) | |
| | Penta DS-1 Packlet Carrier *with* Compact Dual DS-1 Packlet (1-5) *or* Filler Face Plate (0-4) | NTMX87BA *with* NTMX81BA *or* NTMX83BA |
| | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 20 | Enhanced Message and Tone Card *or* HDLC Message and Tone Card (for EDC) | NT6X69 *or* NTMX76 |
| 21 | Global/Universal Tone Receiver *or* Peripheral Recovery Loader-16 | NT6X92 *or* NT7X05 |
| 22 | Global/Universal Tone Receiver | NT6X92 |

***Note 1:*** Refer to “Maintenance overview" in this document for detailed descriptions of circuit cards for an RCC2 shelf.

***Note 2:*** The functionality for the NT7X05 Peripheral/Remote Loader-16 requires the NTMX77AA for support.

***Note 3:*** For NA011, a 20 C-side link configuration is available. This configuration requires the Penta DS-1 Packlet Carrier. For a 16 C-side link configuration, the Quad Frame Carrier is acceptable. The Penta DS-1 Packlet Carrier is hardware backward compatible to NA008, but only in a 16 C-side link configuration.

**Table 2-3 RCC2 unit 1 circuit cards (Sheet 2 of 2)**

| Slot | Description | PEC |
|---|---|---|
| 23 | CLASS Modem Resource *or* Peripheral Recovery Loader-16 | NT6X78 *or* NT7X05 |
| 24 | ISDN Signaling Preprocessor | NTBX01 |
| 25 | Unified Processor | NTMX77 |
| 26-27 | Power Converter | NTMX72 |

***Note 1:*** Refer to “Maintenance overview" in this document for detailed descriptions of circuit cards for an RCC2 shelf.

***Note 2:*** The functionality for the NT7X05 Peripheral/Remote Loader-16 requires the NTMX77AA for support.

***Note 3:*** For NA011, a 20 C-side link configuration is available. This configuration requires the Penta DS-1 Packlet Carrier. For a 16 C-side link configuration, the Quad Frame Carrier is acceptable. The Penta DS-1 Packlet Carrier is hardware backward compatible to NA008, but only in a 16 C-side link configuration.

**Remote maintenance module** The RMM is based on the DMS-100 switch maintenance trunk module (MTM). At least one RMM must be present at each RSC-S site to perform diagnostic and line tests, and to monitor alarm conditions. A maximum of two RMMs can be provided for each RCC2. Each RMM has one DS30A P-side port. An RMM can contain the following components:

- one RMM control card
- one group coder-decoder (CODEC) card
- two power converters
- 14 service circuit cards, that include 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, but an additional LCME can connect to the RSC-S. An LCME shelf increases the capabilities of the CRSC. An LCME shelf serves as the subscriber interface of the RSC-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:

- four line drawers that contain line cards
- one power converter
- two di-group control cards
- one processor card

Additional LCMEs connect to the P-side of the RCC2 through 2 to 18 DS30A links. The number of DS30A links for each LCME depends on operating company traffic requirements. A maximum of two LCMEs can be on the P-side links of the RCC2.

**Line concentrating module** The LCM can be part of the CRSC. The LCM is the subscriber line interface of the RSC-S for a maximum of 640 lines. The LCM connects to the P-side of the RCC2 through two to sixDS30A 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** The FSP is for power, control, and alarm circuits.

**Ringing generators** Each ringing generator (RG) in the FSP consists of two generators: a frequency generator and an ANI/coin generator. The RG supplies the necessary voltage for the following:

- ringing subscriber lines (frequency generation)
- tests for 2-and 4-party automatic number identification (ANI) and coin presence
- supply of ANI and coin control voltages (ANI/generation)

## Multicabinet RSC-S configuration

The multicabinet configuration requires a cabinetized power distribution center (CPDC) in addition to the CRSC. A CEXT cabinet can be provided.

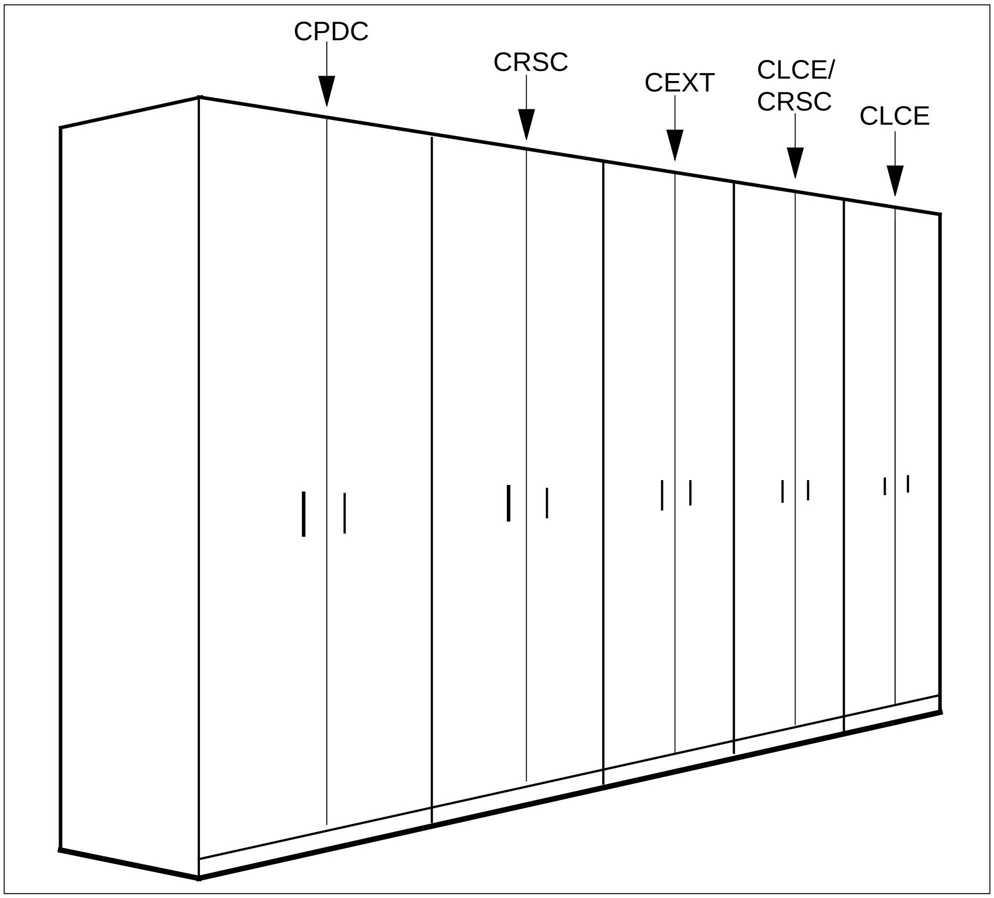
Up to five cabinetized line concentrating equipment (CLCE) cabinets and an LCME can be provisioned on the CEXT. (This increases the maximum for line size.) An NTMX8601 extension shelf (EXT) provides additional RCC2 capacity on the CEXT.

Multicabinet RSC-S configuration can include a cabinetized miscellaneous equipment cabinet (CMIS) to store customer-specified equipment. A cabinetized miscellaneous spares storage (CMSS) cabinet can be included for spare card storage.

> ***Note:*** The ISDN lines cannot be provisioned in the five line cabinets until phase 2/3.

A multicabinet configuration appears in the following figure.

**Figure 2-4 Multicabinet RSC-S configuration**




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

- P-side DS-1 links that trunk
- C-side links for communication with the host

An additional provisioning option is introduced in the phase 1- enhancements phase. This option is the SMS-R for digital integrating digital loop carriers compatible with the TR-008.

The following sections describe the cabinets and the components of the cabinets.

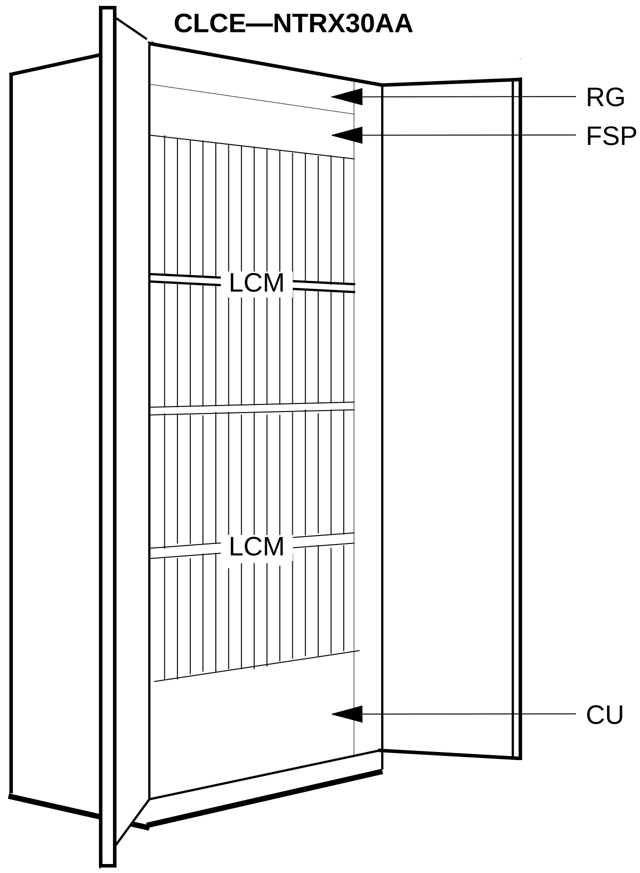
## Cabinetized line concentrating equipment

A single configuration RSC-S can have up to five CLCE cabinets. Each cabinet supports up to two completely duplicated LCMs. Each cabinet provides 640 line card capacity. Each CLCE cabinet contains a maximum of two completely duplicated LCMs to terminate subscriber lines. Each cabinet also contains one FSP for power, control, two RGs and alarm circuits. The CLCE is for POTS applications and connects to the RCC2 with two to six DS30A links. A maximum of ten LCMs can connect to the RCC2 in a single RCC2 configuration.

> ***Note:*** Phase 1 limits ISDN lines to the CRSC and CEXT cabinets only. The ISDN lines cannot be provisioned in the five additional line cabinets until a later release.

A CLCE cabinet appears in the following figure.

**Figure 2-5 CLCE cabinet**



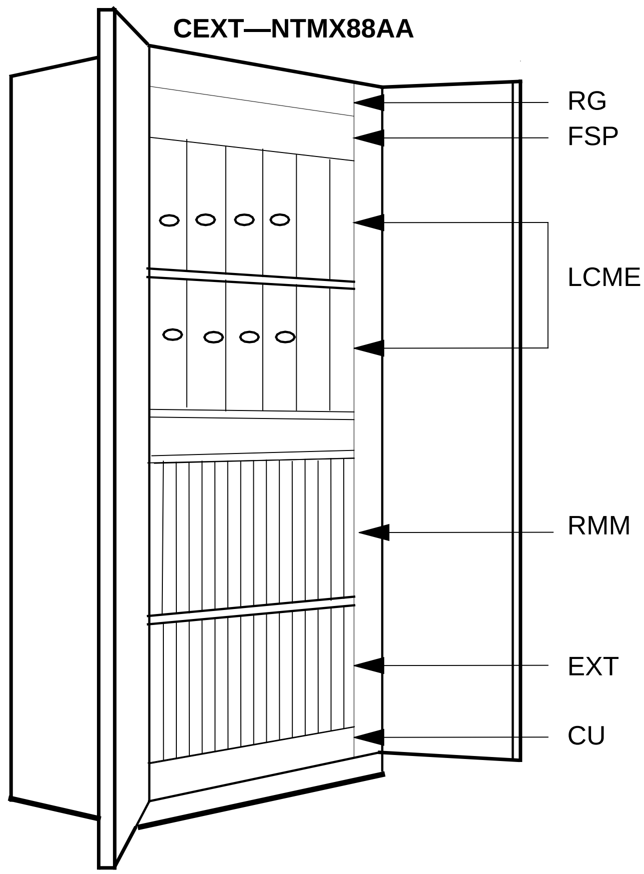

CU — NTNX27CA
FSP — NTMX26BA
LCM — NT6X040AB
RG — NT6X30

## CRSC extension cabinet

The hardware requirement to support 54 ports is greater than the physical capacity of the RCC. The EXT shelf extends the capacity of the RCC. The CEXT contains an EXT, an FSP, an RMM shelf, and an LCME. The CEXT provides power, service, maintenance circuits, and an additional 480 lines. This cabinet houses additional ISDN DCHs or DS-1 interfaces. The EXT shelf also contains one ISDN LCM.

The CEXT components appear in the following figure. A description of each CEXT component follows the figure.

**Figure 2-6 CEXT cabinet**




CU — NTNX27CA
EXT — NTMX8601
FSP — NTMX26BA
LCME — NTBX32AA
RG — NT6X30
RMM — NT6X13

The CEXT provides room for additional DS-1 interfaces and DCH cards. The CEXT units 1 and 2 require the DS60 card that provides DS60 links to the CRSC. The extension card contains 12 DS60 links that connect the card to the RCC2 shelf. The EXT shelf uses two-extension cards.

**Extension shelf** The EXT shelf contains two extension half shelves. Each half of the EXT shelf supports one RCC2 shelf. One CEXT supports two CRSC cabinets.

The EXT shelf provides additional DS-1 links or supports additional DCHs to accommodate ISDN line requirements. This shelf works with the RCC2 shelf. The EXT shelf connects to the RCC2 shelf with a DS60 plus power card.

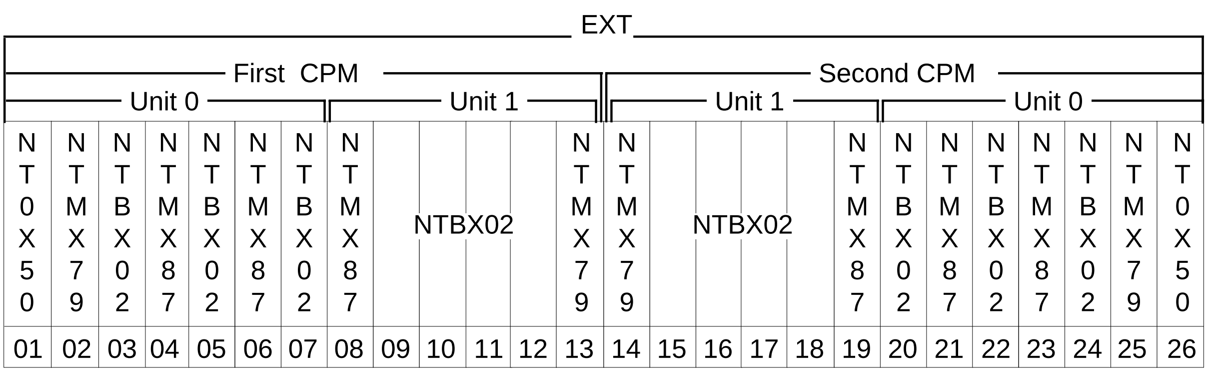
Mounted on the CEXT, the EXT shelf contains the following components:

- 0 to 3 octal DS-1 interface cards (up to 24 DS-1 links) in an NTMX87 Quad Frame Carrier
- 0 to 10 DCH cards
- DS60 extension cards

The following figure shows the circuit card design for an RCC2 EXT shelf.

> ***Note:*** The following figure does not show slot 27. Slot 27 also can contain an NT0X50 filler face plate.

**Figure 2-7 RCC2 EXT shelf circuit card layout**




The following table describes the circuit cards for an RCC2 EXT shelf.

**Table 2-4 RCC2 EXT shelf circuit cards (Sheet 1 of 2)**

| Slot | Description | PEC |
|---|---|---|
| 01 | Filler Face Plate | NT0X50 |
| 02 | DS60 Extender | NTMX79 |
| 03 | (Enhanced) D-Channel Handler | NTBX02 |
| 04 | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |

***Note 1:*** Refer to “Maintenance overview" in this document for detailed descriptions of circuit cards for an RCC2 EXT shelf.

***Note 2:*** Do not use the NTMX87BA Penta DS-1 Packlet Carrier in the RCC2 extension shelf.

**Table 2-4 RCC2 EXT shelf circuit cards (Sheet 2 of 2)**

| Slot | Description | PEC |
|---|---|---|
| 05 | (Enhanced) D-Channel Handler | NTBX02 |
| 06 | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 07 | (Enhanced) D-Channel Handler | NTBX02 |
| 08 | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 09-12 | (Enhanced) D-Channel Handler | NTBX02 |
| 13-14 | DS60 Extender | NTMX79 |
| 15-18 | (Enhanced) D-Channel Handler | NTBX02 |
| 19 | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 20 | (Enhanced) D-Channel Handler | NTBX02 |
| 21 | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 22 | (Enhanced) D-Channel Handler | NTBX02 |
| 23 | Quad Frame Carrier *with* Dual DS-1 Packlet (1-4) *or* Filler Face Plate (0-3) | NTMX87AA/AB *with* NTMX81AA *or* NTMX83AA |
| 24 | (Enhanced) D-Channel Handler | NTBX02 |
| 25 | DS60 Extender | NTMX79 |
| 26-27 | Filler Face Plate | NT0X50 |

***Note 1:*** Refer to “Maintenance overview" in this document for detailed descriptions of circuit cards for an RCC2 EXT shelf.

***Note 2:*** Do not use the NTMX87BA Penta DS-1 Packlet Carrier in the RCC2 extension shelf.

**Other CEXT components** The FSP, RMM, and LCM for the CEXT perform the same functions as the CRSC. Unit redundancy of the CEXT increases RSC-S capabilities.

#### Cabinetized miscellaneous equipment cabinet

A single-configuration RSC-S can have one CMIS cabinet to contain 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 configuration is like the RSC-S without ISDN configuration. The ISDN basic rate interface (BRI) services need additional components:

- RCC2 or DRCC2 with ISDN
  - — DCH card
  - — EISP card
- LCME
  - — host
  - — operation, administration, and maintenance (OAM) processor
- customer premises equipment (CPE)

### RCC2 with ISDN

To allow the RSC-S configuration to support ISDN services, the following actions are required:

- Use P-side DS-1 slots so DCH circuit cards can be provisioned.
- Change the FSP to support DCH cards.
- Add appropriate software loads.

#### DCH card

The DCH card functions like the DCH for a host ISDN office, as follows:

- provides service access point identifier (SAPI) discrimination function at layer 2 (Q.921 link access procedure on the D-channel [LAPD])
- terminates SAPI (signaling) frames and routes SAPI (signaling) frames to the ISDN signaling preprocessor (ISP) card

- statistically multiplexes SAPI 16 (packet) frames and sends SAPI 16 (packet) frames to the packet handler (PH) (with a statistical multiplex ratio of up to 64:1)
- reflects SAPI 17 (user-to-user looparound) frames back toward the user

### EISP card

The EISP card provides ISDN layer 3, Q.931 processing. This card is in slot 4 in unit 0 and slot 24 in unit 1. Each RCC2 contains one ISP card. Activity of the EISP card connects to and is part of the RCC2 unit activity. Only the active ISP communicates with the DCHs.

The EISP card functions like the ISP for a host ISDN office, as follows:

- provides a communication channel between the signaling processor (SP), master processor (MP), and DCH cards
- processes SAPI 0 call control messages that the DCH card sends

An RCC2 with ISDN differs from an RCC2 without ISDN. An RCC2 with ISDN contains ISP card ISP16. This card is datafilled in translations.

## LCME

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

### Packet handler

Based on the DPN-100 Family of packet switches, the packet handler (PH) contains the following components:

- digital interworking unit (DIU)

  The DIU takes B- and D-channel packets in DS-1 format that the DMS-100 controller peripheral sends. This controller peripheral can be the RCC2, LTCI, or other ISDN-compatible peripheral. The DIU converts B- and D-channel packets to V.35 format for the AM. When data routes in the opposite direction, the DIU changes data in V.35 format to DS-1 format.
- access module (AM)

The AM provides access to the resource modules (RM) of the DPN from local subscriber packet lines and from the DIU.

- resource module (RM). The RM performs the following functions:
  - packet-switching operations on data packets that the AM, or digital trunks in the packet-switched network sends
  - switched packets returned to the AM for format conversion and distribution to the appropriate destination, or to terminals in the packet-switched network through a digital trunk

#### OAM processor

The system achieves central OAM with the ISDN OAM processor. 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

  is the part of the ISDN BRI interface that connects to ISDN terminals.
- ISDN terminals

  include the T2317, M5209T/TD, and M5317T/TD telephone sets that provide voice and data features.
- ISDN Universal Terminal Adapter (UTA)

  connects the S/T-bus to a personal computer.
- network termination 1 (NT1)

  converts proprietary loop protocol on the network side to the CCITT standardized protocols on the user side. When an ISDN U-line card terminates a line, the NT1 requires equipment for BRI . The system uses network termination 2 (NT2) when an S/T-line card terminates ISDN lines. The ISDN switch acts as an NT2.
- U-loop

  is the part of the BRI interface that converts the NT1 to an ISDN U-line card in the ET ISDN switch.

## Planned deliverables

Future development of the RSC-S adds STS-1 capability for the RSC-S to provide an interface to a SONET multiplexer. A paddleboard that contains a junction circuit card will connect the two STS-1 interface cards to a single STS-1 transmission link interface. The paddleboard has two functions: in the transmit path, the paddleboard selects the transmission STS-1 interface card. The STS-interface card generates the data stream according to the fiber activity signal. In the receive path, the paddleboard splits the input data stream to both STS-1 interface cards.

# 3 RSC-S signaling

## Signaling for RSC-S

This section describes the signal design and protocols of Remote Switching Center SONET (RSC-S) and the features RSC-S support.

## Signaling and communications protocols

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

- DMS-X

  The use of a full duplex message channel implements DMS-X. The DMS-X is a half-duplex, byte-oriented protocol. The DS-1 or DS-30A links are full duplex message channels. The RSC-S processor handles the DMS-X message protocol on the message channels of the DMS-X to the host, remote or collocated equipment.

- HDLC

  The HDLC is a full duplex message protocol based on the CCITT level 2 Signaling System 7 (Q.703). The LTC+ and RCC2 peripherals support this protocol.

- Q.921 CCITT link access procedure on the D-channel (LAPD)

  Use Q.921 LAPD protocol to establish data link communications between a service access point identifier (SAPI) and a terminal end point identifier (TEI). This action transmits information from a higher layer protocol or receives information for delivery to a higher layer protocol. The Q.921 protocol transmits common signal channel (CSC) messages and embedded operations channel (EOC) messages.

- Q.931 CCITT digital network access

  Use Q.931 protocol to communicate call setup, call monitoring and call tear-down information between the RSC-S and the host. The RSC-S must translate Q.931 generic-based signaling messages into a DMS-X message format the host can understand. Use Q.931 protocol for common signal channel messages.

- X.200

The X.200 protocol is the Open Systems Interconnect (OSI) defined 7-layer stack communications protocol.

- Bellcore compliant ADSI tones and Compatible Voiceband Data

  Bellcore Customer Premises Equipment Compatibility for Voiceband data transmission, CLASS features and ADSI tones.

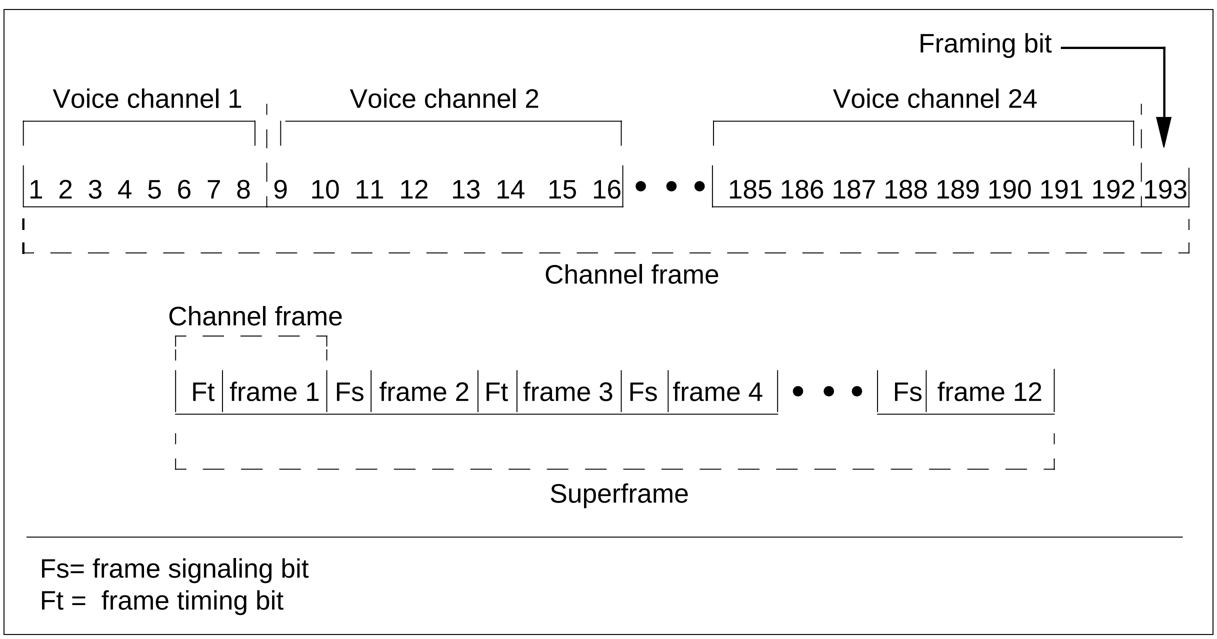
## C-side links

The RSC-S and the host central controller (CC) use an extended super frame format. The RSC-S and the host CC use this format to exchange information over 2 to 20 DS-1 control side (C-side) links. The DS-1 links operate at a rate of 1.544 Mb/s, with a sampling frequency of 8000 frames each second.

The DS-1 link has 24 information channels. Each channel contains eight bits of pulse code modulation (PCM) data. A framing bit is present at the end of the sequence. The framing bit makes sure the RSC-S and the host recognize the start of each 24-channel sequence. Framing bits are also called stuffing or S-bits. The sequence can send 192 bits of information and a framing bit during each 24-channel sequence.

The DS-1 channel frames carry speech, signaling or operations information. The following figure is the format of a DS-1 frame and a super frame that has 12 DS-1 frames.

**Figure 3-1 DS-1 frame format**



## Extended frame format

The DS-1 extended super frame format (ESF) has 24 frames. The 24 sync-bits are used as follows:

- six bits for framing pattern sequence (FPS)

  Every fourth framing bit carries a FPS bit. When the FPS works with the cyclic redundancy check (CRC), the FPS defines an in-frame condition.

- 12 bits for facility data link (FDL)

  The 4-kb/s facility data link (FDL) bit begins with the first framing bit. An FDL-messaged bit carries over every other frame.

- six bits for cyclic redundancy check (CRC)

  The cyclic redundancy check (CRC) bit begins with the second bit and carries over every fourth bit. In an extended super frame, the system checks a block check field six times. The CRC-6 check detects bits that emulate an FSP bit and determines if an out-of-frame condition is present.

The superframe alignment pattern appears in the following table.

**Table 3-1 Superframe alignment pattern (Sheet 1 of 2)**

| Frame number | Framing bit type | Framing bit value |
|---|---|---|
| 1 | FDL | m |
| 2 | CRC | CB1 |
| 3 | FDL | m |
| 4 | FPS | 0 |
| 5 | FDL | m |
| 6 | CRC | CB2 |
| 7 | FDL | m |
| 8 | FPS | 0 |
| 9 | FDL | m |
| 10 | CRC | CB3 |
| 11 | FDL | m |
| 12 | FPS | 1 |
| 13 | FDL | m |
| 14 | CRC | CB4 |

**Table 3-1 Superframe alignment pattern (Sheet 2 of 2)**

| Frame number | Framing bit type | Framing bit value |
|---|---|---|
| 15 | FDL | m |
| 16 | FPS | 0 |
| 17 | FDL | m |
| 18 | CRC | CB5 |
| 19 | FDL | m |
| 20 | FPS | 1 |
| 21 | FDL | m |
| 22 | CRC | CB6 |
| 23 | FDL | m |
| 24 | FPS | 1 |
| CB = check bitsm = message byte | | |

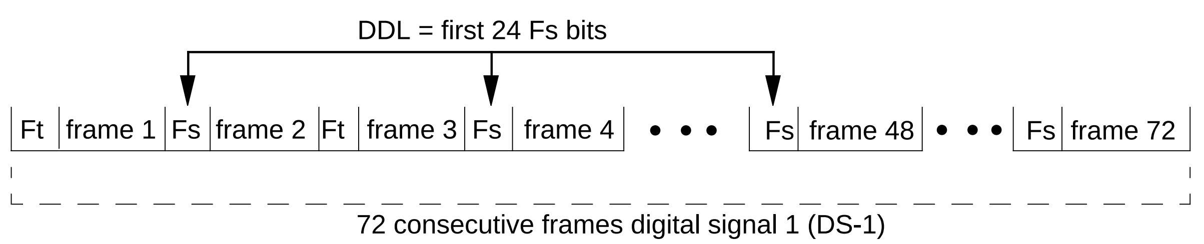
## Signaling additions

Use of the Bellcore TR-303 protocol adds an information facility data link as a part of the North America signaling.

## DDL signaling to SLC-96

A derived data link (DDL) frame has 6 super frames or 72 channel frames. Use the derived data link (DDL) to virtually connect the CC to the SLC-96. The DDL message uses the first 24 of 36 frame-signaling (Fs) bits of 72 frames. The format of the synchronization bits of 72 consecutive frames appears in the following figure.

**Figure 3-2 DDL signaling format**




Fs = frame signaling bit
Ft = frame timing bit

The 24-bit pattern conveys three types of information:

- frame pattern sequence
- facility data link performance
- cyclic redundancy check

### Incoming DDL

The DS-1 interface (IF) card places a string of six consecutive DDL bits from the DS-1s on the DS30 lines. The DS30 signaling protocol is like DS30A protocol.

### Outgoing DDL

In transmission, the CPM places a 6-bit byte in every 12th frame that comes out of the matrix card. This action occurs four times in 72 frames for a total of 24 DDL bits.

### DDL processing

The matrix card switches all frame output into one DS60 digroup connected to the SIGP card. The DS60 digroup is 2 DS-30s. The signaling processor (SP) takes control from this point.

**Table 3-2 DDL message bits and field names (Sheet 1 of 2)**

| DDL bits | Field name | Explanation |
|---|---|---|
| 1 —11 | Concentrator field (C-field) | Shelf groups AB and CD only use the C-field when the groups operate in Mode II. This field carries information for shelves A, B, C and D. This field also carries information for control of subscriber assignment and de-assignment to DS-1 channels. The field also carries information for hook changes and activation of the PCM looping test.<br><br>***Note:*** When C-field is not available to send on the DDL link, the microprocessor sends an idle pattern on the link. The RSC-S sends an idle pattern when a new C-field is not present. |
| 12—14 | Spoiler bits (fixed pattern of 010) | The system inserts spoiler bits at specified positions in the DDL. This action makes sure the DDL does not duplicate the signaling pattern. |
| 15—17 | Maintenance field (M-field) | The M-field on the A-link carries information for all shelves and controls card and customer loop testing. Refer to note. |
| ***Note:*** If fields M, A or S do not change between messages, the microprocessor sends previous field patterns. The microprocessor sends information to the SP only when a DDL field changes. The system does not transmit idle patterns. | | |

**Table 3-2 DDL message bits and field names (Sheet 2 of 2)**

| DDL bits | Field name | Explanation |
|---|---|---|
| 18—19 | Alarm data link field (A-field) | The A-field on the A-link carries alarm and system control information for all shelves (refer to note). |
| 20—23 | Protection line switch field (S-field) | The S-field on the A-link controls the switching of the DS-1 protection link (refer to note). |
| 24 | Spoiler bit field (fixed pattern of 1) | The system inserts spoiler bit at the specified position in the DD. This action makes sure the DDL does not duplicate the signaling pattern. |
| ***Note:*** If fields M, A or S do not change between messages, the microprocessor sends previous field patterns. The microprocessor sends information to the SP only when a DDL field changes. The system does not transmit idle patterns. | | |

### Planned products

Future development of the RSC-S adds synchronous transport signal level 1 (STS-1) capability for the RSC-S. This development provides an interface to a SONET multiplexer.

### SONET format

The SONET uses the basic building block of STS-1 with a bit rate of 51.84 Mb/s. Higher level signals are integer multiples of the base rate.

A quantity of 8-bit bytes organized into a frame 125 µs in length make a synchronous signal. In the frame, framing or marker bytes identify each byte.

In an STS-1 frame, the synchronous payload has two areas. The areas are path overhead and payload area. The payload area contains customer data. The path overhead contains alarm and performance monitoring information. Transport support and maintenance of the synchronous payload envelop between end locations requires this information.

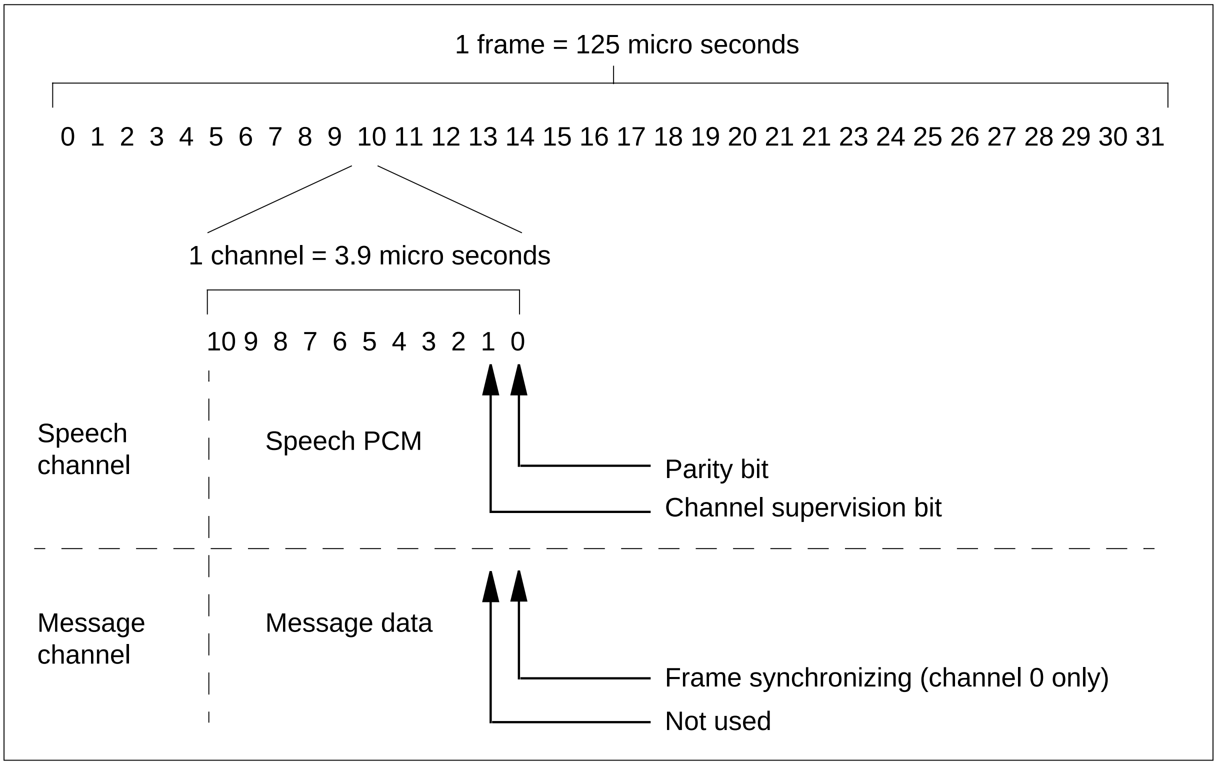
> ***Note:*** One STS-1 level signal can transport 28 DS-1 links.

## P-side links

The RSC-S supports a maximum of 54 P-side links that can configure to various combinations of DS-1 links and DS-30A links. The P-side DS-1 links can attach to remote line concentrating modules (RLCM), outside plant modules (OPM) and PBX or CDO trunking. The P-side DS-1 links have the same format as C-side DS-1 links. The P-side DS-30A links can connect to collocated equipment like improved line concentrating modules (LCME) or remote maintenance modules (RMM). Both DS-1 links and DS30A links use the DMS-X protocol.

The DS30A channel frames carry speech or message information. The format of a DS30A frame appears in the following figure. The DS30A links operate at a rate of 2.56 Mb/s with a sampling frequency of 8000 frames every second. The DS30A link frame contains 32 channels. Each channel contains 10 bits of pulse code modulation (PCM) data.

**Figure 3-3 DS-30A frame format**




A frame synchronization bit is at channel 0 bit 0. This bit makes sure the RCC2 and the LCME or RMM recognize the start of each frame sequence.

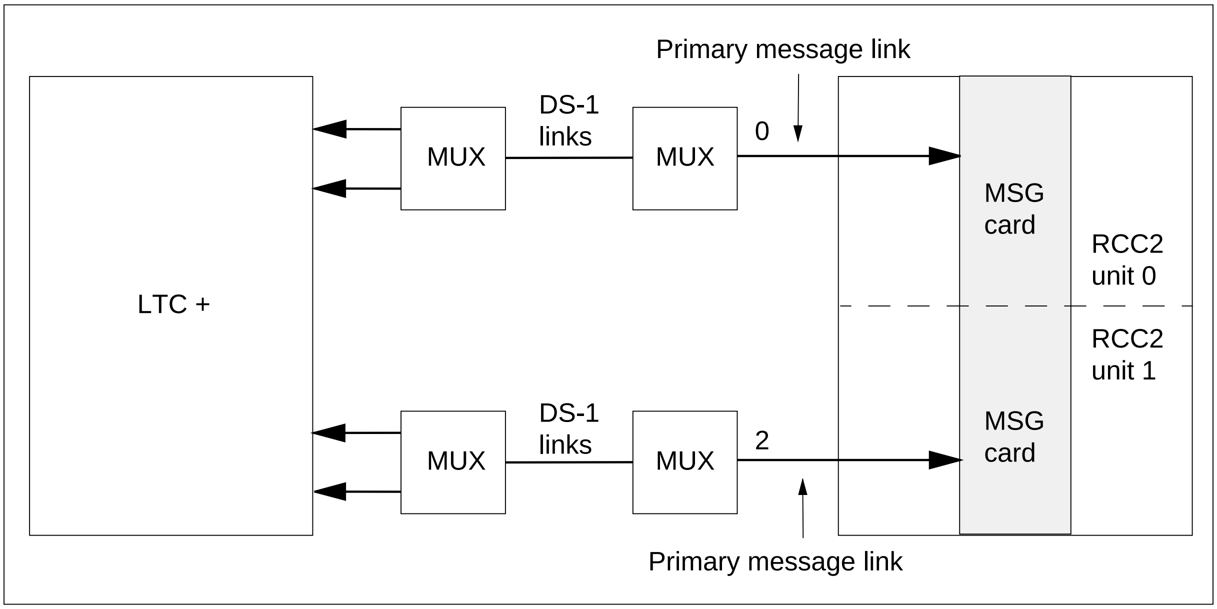
## Message links

The RSC-S and host exchange system control information with dedicated message links. 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 inform the host of the activities of the RSC-S. System control messages contain information like time slot assignments to off-hook subscriber lines, test requests and alarm statuses.

One message channel time slot is the primary message link. The other message channel is the secondary message link. The primary message link is active and the secondary message link is not active.

The host monitors both links for messages and only responds to messages on the primary link. When DS-1 links 0 and 2 are installed, the selected primary message channel is the first DS-1 link 0.

**Figure 3-4 RCC2 message links**




## Message channels

Communication links between the RCC2 and the host peripherals on the C-side use the DMS-X protocol. Communication links between the RCC2 and peripherals on the P-side also use the DMS-X protocol.

Messages from the CC to the RCC2 are first sent to the host XPM, like a line trunk controller (LTC+). The host LTC recognizes the message for the P-side node and sends the message with the XPM messaging software system. The message uses a message channel. The message channel sends the message between the two nodes to the destination.

The XPM messaging software system contains the following operating layers:

- The link layer (level 1) provides the mechanism required to transfer the data bits from one node to another node. In this condition, the required mechanism is the DS-1 link. This link connects between the host XPM P-side interface card and the RCC2 C-side interface card.
- The data link layer (level 2) provides the mechanism required to transfer messages from one node to another node. The second node is directly connected to the node. The data link layer uses the route the network layer selects. This layer performs error detection and notification and maintains

sequential order of messages. This layer allows the activation and deactivation of message support links.

- The network layer (level 3) provides the application software with the mechanism required to send a message in the network. Messages go from one node to another node. The network layer selects a route to send the message toward the desired destination node. The layer starts the required service from the message link layer.

### Data link layer

The RCC2 converts two standard DS-1 frames into one internal DS60 frame. Timeslot 1 of links 0 and 2 is extracted from the DS-1 interface. Timeslot 1 is wired directly to the first network message interface (NMIF) channel. The timeslot is wired in the correct RCC2 message card. The speech bus interface (SBIF) directs messages along the speech bus until the messages reach the messaging card. Each timeslot on the speech bus also functions as a messaging channel, toward the C-side or P-side of the shelf. The DMS-X protocol uses channel 1 on each link .

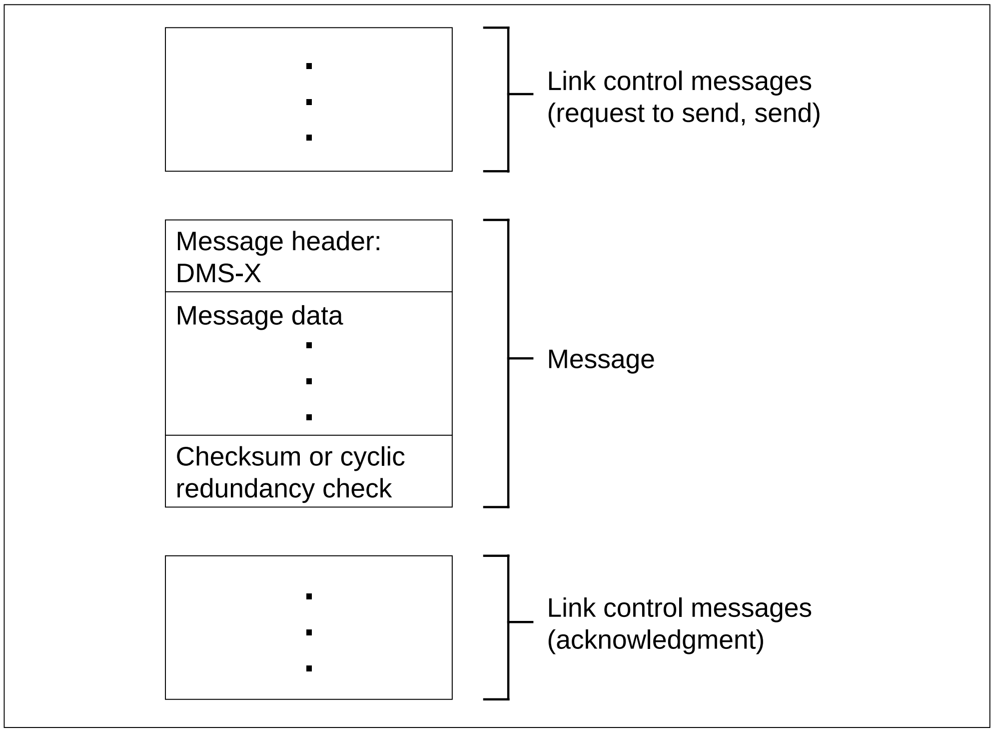
## DMS-X and HDLC protocol applications

Two data link protocols are used between LTC (DMS-X) or an LTC+ (DMS-X and HDLC) and an RCC2. The data link protocols are DMS-X and high data link control (HDLC). To apply a data link protocol on a specified timeslot, the specified channel is declared a data link. Data link protocols apply to the C-side of an RCC2 or P-side of an LTC or an LTC+. The system assigns this data link to a specified node entity. Additional data links occur in the LTC+ and RCC2.

### DMS-X protocol

The DMS-X is a half-duplex, byte-oriented protocol implemented with a full duplex message channel, like the DS-1 links. The DMS-X is a state-driven code. The DMS-X requires handshake messaging between the RSC-S and host at each stage of data transfer. This requirement allows communicating terminals to delay the message transfer if one of the terminals is not ready. The DMS-X handshaking protocol appears in the following figure.

**Figure 3-5 DMS-X handshaking protocol**




Message time-out and message checksum or CRC calculation perform message error detection. Protocol, checksum or CRC failure can occur on an outgoing message. When this event occurs, the node that attempted the send sequence attempts the send sequence again. On an incoming message failure, the node that sends routes the message again over an alternate (C-side) link. Hardware redundancies provide a minimum of one alternative path to and from a node.

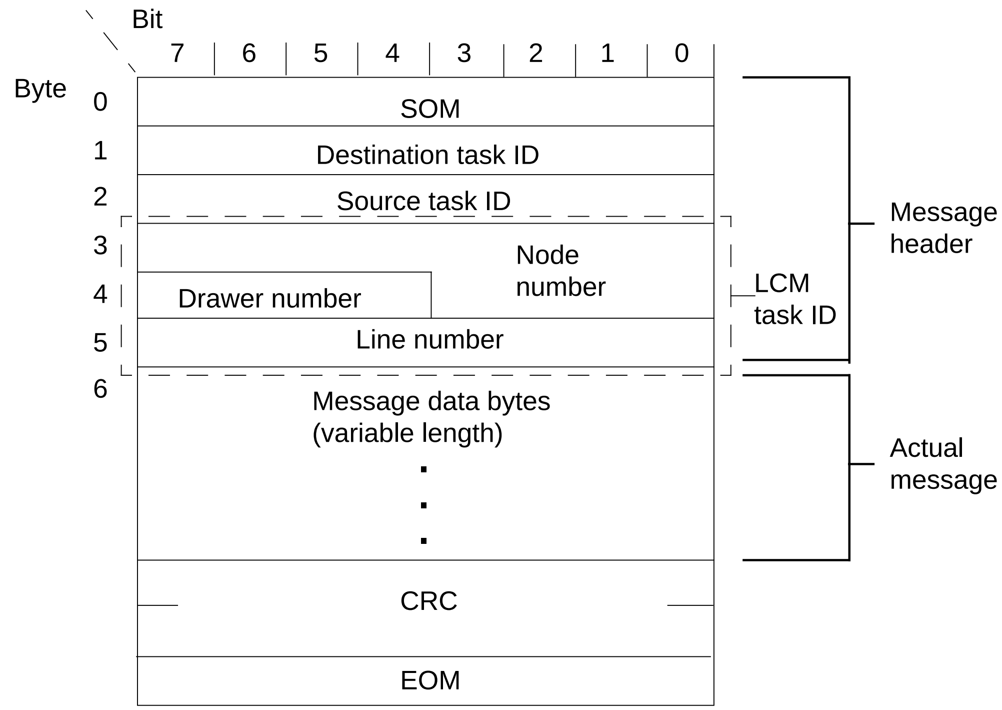
## DMS-X message format

The DMS-X message applies to both DS-1 and DS30A. The DMS-X message header in the first six bytes is as follows:

- The first byte is the start of message.
- The second byte is the destination task identification (ID) of the message. An outgoing message uses this ID to identify the process to receive the message.
- The third byte is the source task ID. An incoming message uses this ID to identify the process that sent the message.
- The last three bytes are the task ID numbers.

The number of bytes in the message or data can change. The CRC, that occupies two bytes, detects transmission errors. The end of message occupies one byte. The DS-1 message format appears in the following figure.

**Figure 3-6 DMS-X message format**




EOM = end of message
ID = identification
LCM = line concentrating module
SOM = start of message

## HDLC protocol

High data link controller (HDLC) protocol is a new LTC+ to RCC2 message protocol for the extended distance capability (EDC) application. The NTMX76AA messaging card implements this protocol. The NTMX76AA messaging card is in the host and the remote peripherals. The NTMX76AA card replaces the NT6X69 card. The LTC+ and the RCC2 use the same links as message links. The LTC+ and the RCC2 use timeslot 6 through the speech bus interface (SBIF).

You cannot apply HDLC protocol with the NMIF. The system requires two additional timeslots on the speech bus. The system cannot use the timeslots for speech.

## Protocol change from DMS-X to HDLC

Feature AN1548, with feature AN0979, In-service Upgrade DMS-X to HDLC, supports the upgrade of DS-1 links between the LTC+ and the RCC2. When the messaging protocol changes, the remote can be in service. Static data downloaded from the CC is updated dynamically in both the host and the remote peripherals.

When HDLC protocol is applied dynamically, the system scans for current calls on channels for HDLC messaging. When established calls are present on these channels, the system displays a warning that the system can drop active calls. The system prompts the user to reject or confirm dropping these calls. Free channels are channels calls do not occupy. These channels are reserved for HDLC. The system reserves these channels until the protocol changes or the user refuses the change in protocol.

The following is an example MAP display of this process:

```
Enter Y to confirm, N to reject or E to edit
```

>**Y**

```
3 existing calls will be dropped

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

>**Y**

In the example, the user establishes three calls. The user allows the three calls to drop and continues the DMS-X to HDLC protocol change. Static data goes from the CC to the LTC+ and the RCC2. This action establishes RCC2 nailed-up connections for HDLC message channels. Data and network links are created and bound into the messaging system. The PM is set ISTb until all HDLC links synchronize.

The NTMX76 firmware (layer) handles HDLC synchronizations. The link synchronizes when the host link and remote sides communicate. The NTMX76 audit process verifies if the new HDLC links synchronize.

When a minimum of one HDLC link (for each unit) synchronizes, the audit activates the HDLC link for messaging. An unsolicited message goes to CC. The system generates a PM181 log for each synchronized HDLC link. The ISTb state the synchronization problem causes clears when all HDLC message links of an RCC2 unit synchronize again.

When a link fails to synchronize or loses synchronization, an unsolicited message from each remote unit goes to the CC. The message goes out after the version registry check to prevent problems in one-night-process (ONP). The system generates a PM181 log to indicate the exact link is not in synchronization.

When all HDLC links lose synchronization to the active RCC2 unit, the RCC2 attempts to SWACT. When the SWACT fails, the RCC2 enters ESA. When all HDLC message links of a RCC2 unit are not in synchronization, the RCC2 unit works in the DMS-X mode. The message links must be in synchronization after the dynamic upgrade.

### Limits

The following limits apply for the in-service upgrade from DMS-X to HDLC protocol.

- When the HDLC protocol is declared on a new defined remote peripheral, DS-1 carriers must use the B8ZC attribute. The DS-1 carriers must also use this attribute during the upgrade from DMS-X to HDLC. Some DS-1 carriers are dedicated to messaging between the host and remote, as table LTCPSINV defines. These DS-1 carriers cannot use the ZCS attribute as defined in the corresponding tuple in table CARRMTC.
- During dynamic upgrade, the system can drop a maximum of six current calls.
- Do not perform a dynamic upgrade during heavy call traffic.

## ISDN basic rate interface signaling

The ISDN basic rate interface (BRI) has two 64-kbit B-channels for voice and data and a 16-kbit D-channel for signaling and packet data. The ISDN basic rate interface is referred to as 2B+D. The two types of ISDN BRI signaling are functional and stimulus.

Software assembled into the physical set of the functional BRI terminal supports functional BRI signaling. The Q.931 protocol and the signaling control protocol (SCP) sends call control messages. The protocol sends control messages between the functional BRI terminal and the network.

The system does not support stimulus BRI signaling for the RSC-S configuration.

### Q.931 digital network access protocol

Call control uses Q.931 signaling protocol. The following determines the protocol procedure:

- setup and takedown of calls and features between the network and terminals
- address displays and progress indicators at the terminal and the network
- B-channel control from the network

The Q.931 protocol supports basic error-handling procedures and re-initialization after the errors occur. The system can recover from these errors. The Q.931 protocol also determines the signaling methods used in host-switched calls.

## Meridian business set signaling

Meridian Business Set (MBS) signaling allows call processing software to communicate directly with the MBS terminal. An above-voice frequency, low-speed data channel transports the MBS messaging over the loop. This data channel sends signaling information over a separate D-channel between the RSC-S DCH card and the host.

Data channels communicate data by the presence or absence of an 8-kHzsignal. The system supports the following MBS features for the RSC-S:

- Automatic Answer Back
- Automatic Dial
- Automatic Line
- Executive Busy Override
- Call Back Queueing
- 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 per DN

## Global and Universal tone receiver (GTR/UTR) features

**ATTENTION**
For peak performance, do not install the UTR and GTR on the same RCC2. You cannot identify the receiver that interprets tone samples. Some call processing tones can degrade if designed for use with a GTR.

Subscriber lines associated with an RSC-S can use the optional global and universal tone receiver (GTR/UTR) feature. The GTR/UTR feature allows the part of the processing load to be removed from the host computing module (CM) to be implemented in the PM.

If the GTR/UTR feature is on the RSC-S, the RSC-S performs all digit collection functions at the subscriber terminal. These functions can be to perform the following:

- allocate a free receiver
- establish a path to the receiver
- collect and process digits
- de-allocate the receiver

The RSC-S goes through the following steps if the GTR/UTR is on:

1. Request a GTR/UTR channel.
2. Instruct the GTR/UTR to monitor tones.
3. When monitoring starts, the system informs the RSC-S of collected digits and normally performs some translation functions on the digits.
4. When the system does not require the receiver, the RSC-S frees the allocated GTR/UTR channel.

***Note:*** To start the sequence requires a receiver request.

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 attempt to terminate to that line. In this occurrence, the RSC-S provides one of two types of alerting signals. The two types of signal are a subscriber alerting signal (SAS) and an 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 recognizes 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. When alerting tones are sent, the subscriber can use the CPE softkeys to control disposition to the incoming call. 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 sending a 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 affect 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 enough time to select an option after a flash. The T-flash was introduced because subscribers did not have enough time to flash and dial a DTMF digit in 600 ms. The T-flash is an operating company controlled timer that the operating company can set 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 400 ms.

> ***Note:*** The RSC-S must provide options for Bellcore TR-416 compliance. The RSC-S must provide options if the RSC-S detects a flash and cannot attach a GTR/UTR. The RSC-S sends a flash to the CC if the RSC-S cannot attach a GTR/UTR in 400 ms. The RSC-S sends a flash to comply with the Bellcore requirement.

## A- and B-bit signaling

The RSC-S basic call processing supports software for basic call processing, CLASS services, ISDN and ESA. The RSC-S and host must exchange system control messages over the DS-1 message channel to support these activities. Each channel signaling message uses A- and B-bits from selected speech channels. The A-bits transport on bit 8 of the 6th frame of every 12 frame sequence. The B-bits transport on bit 8 of the 12th frame in the sequence.

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

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

A- and B-bits have a value of 0 or 1 and are used together for signaling. The type of line card that receives or sends the bits determines how the bits are interpreted. For dial pulses, a series of makes and breaks are sent on the subscriber loop. The value A=1 represents a make and A=0 represents a break.

Coin lines use A- and B-bits in selected speech channels for each channel signaling. These lines use 8-bit patterns in correct speech channels for supervision. The coin lines use A- and B-bits and 8-bit coin signaling patterns together to perform supervision. The coin line card handles ground start or loop start supervisory signaling.

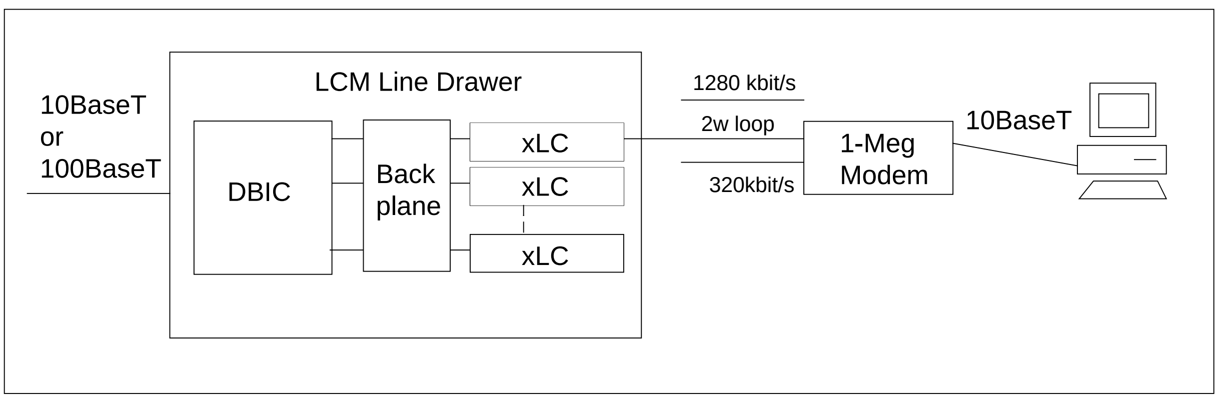
The following eight areas are essential to call processing:

- 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

## 1-Meg Modem Service supported protocols

The 1-Meg Modem Service uses several protocols to carry data from the subscriber to the service provider. The following figure illustrates the 1-Meg Modem Service architecture.

**Figure 3-7 1-Meg Modem Service architecture**




### DBIC

The following section describes the protocols used by the DBIC, xLC, subscriber loop, and 1-Meg Modem.

#### Ethernet

The DBIC has a half-duplex Ethernet interface on the network side. The DBIC stores downstream frames and transmits the frames to the user. The DBIC only sends frames with MAC addresses that match the MAC addresses of the active users. Similarly, the DBIC stores frames from the user side. The DBIC sends these frames to the network when it receives the whole frame.

The DBIC sends all user traffic out at the Ethernet port. The DBIC does not route traffic between users. This method has the following advantages.

- makes sure that all traffic goes to the correct service provider
- reduces the bandwidth overhead for broadcasts
- improves network security

The 1-Meg Modem Service does not process data above Layer 2. The 1-Meg Modem Service remains at the MAC layer and only uses the Ethernet address. Since the DBIC does not look at the payload carried in the Ethernet frames, except for ARP and BOOTP messages, the DBIC can carry Layer 3 data, such as internet protocol (IP), Internet Packet Exchange (IPX), and Appletalk. However, 1-Meg Modem Service only supports TCP/IP. The 1-Meg Modem Service can support other protocols, such as IPX, if MAC translation is turned off. When you turn MAC translation off, you reduce security and increase the configuration work for the transport network. However, this setup can be acceptable in a campus environment. The maximum transfer unit (MTU) size for the 1-Meg Modem Service is 1500 bytes, the same size that is defined in the ANSI 802.3 standard.

### XLBUS

The DBIC uses a point-to-point connection to each line card to exchange voice and data with the xLCs. The extended LBUS (XLBUS) is bidirectional with a total capacity of approximately 1.5 Mbit/s for data traffic. Upstream data, downstream data, and control data share this capacity. The XLBUS carries user data, synchronization and xLC control and status information. The control data carried over the XLBUS allows the DBIC processor to access registers in the xLC. User frames passed by the XLBUS have special Start Of Frame (SOF) and End Of Frame (EOF) control bytes.

## xLC and loop

The xLC and subscriber loop use the following protocols.

### XDLC

The user data in the xLC is encapsulated into the XDLC protocol, which is based on HDLC.

### XLINK

The XLINK frame has a fixed length for robust framing.

### XLOOP

The XLOOP includes the details that relate to the modulation used to carry data over the copper loop. In the downstream direction, 256/64/16/4-QAM can be used over narrowband or wideband spectrums providing 1280, 960, 640, 320, 240, 160 or 80 kbit/s of raw data throughput. In the upstream direction, 256/64/16/4-QAM are also used providing 320, 240, 160, 120, 80 or 40 kbit/s of raw data throughput.

### 1-Meg Modem

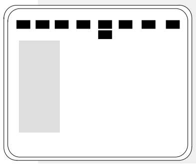
The Ethernet interface at the 1-Meg Modem provides a half-duplex 10BaseT or 100BaseT connection. The interface does not filter local traffic and passes all traffic upstream. Only one Ethernet device can connect to the 1-Meg Modem.

# 4 RSC-S recovery procedures

This chapter describes the recovery procedure for the DMS-100 Remote Switching Center-SONET (RSC-S). You can use this procedure to return an RSC-S to service. An example of an out-of-service condition is an emergency stand-alone (ESA) condition. Maintenance personnel use this procedure.

# PM RCC2 critical

## Alarm display



| CM | MS | IOD | Net | **PM** | CCS | Lns | Trks | Ext | Appl |
|---|---|---|---|---|---|---|---|---|---|
| . | . | . | . | **nRCC2** | . | . | . | . | . |
| | | | | ***C*** | | | | | |

## Application

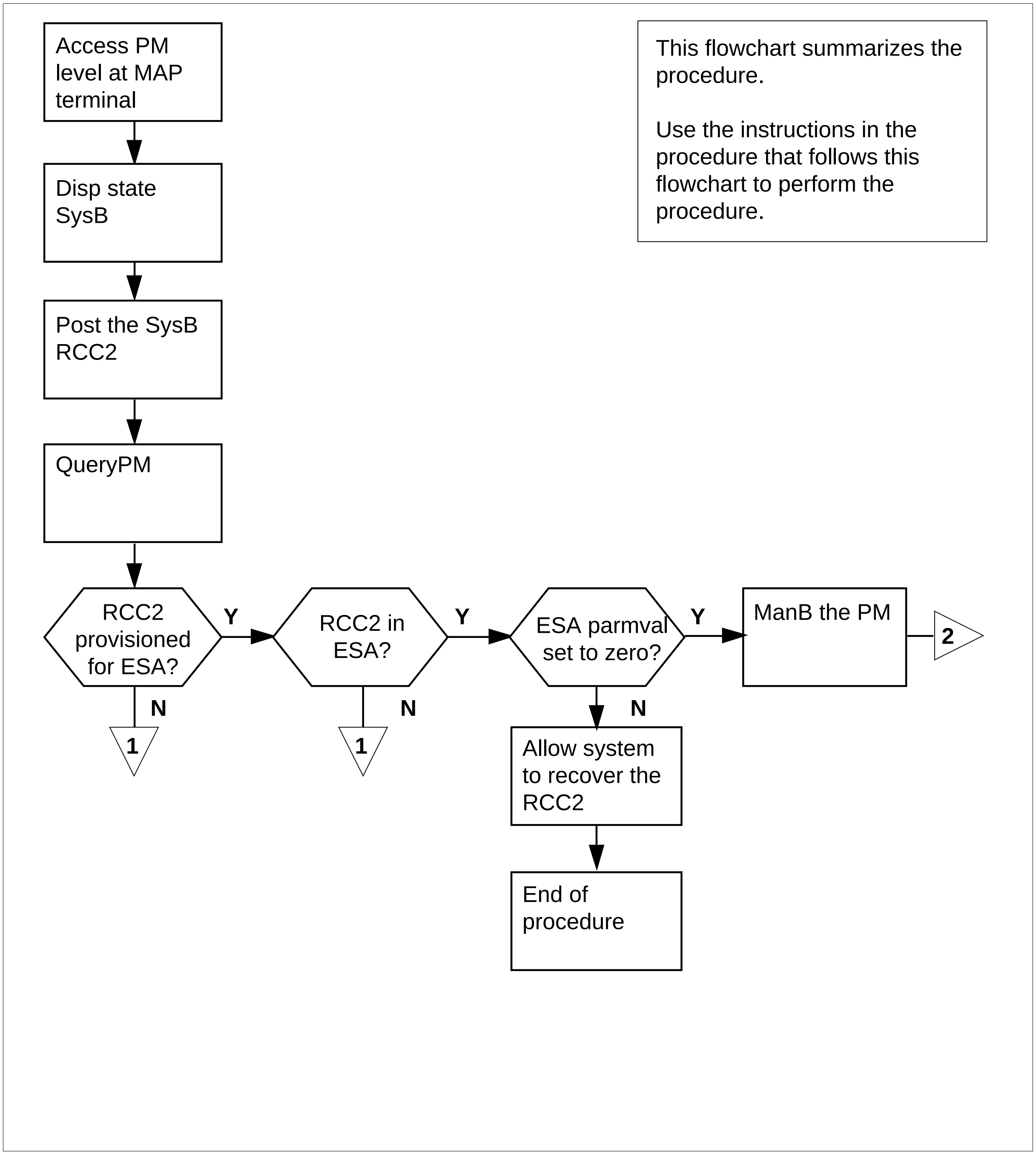
Use this procedure to restore call processing under central control (CC) on an remote cluster controller 2 (RCC2).

## Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Use the instructions in the procedure that follows the flowchart to perform the recovery task.

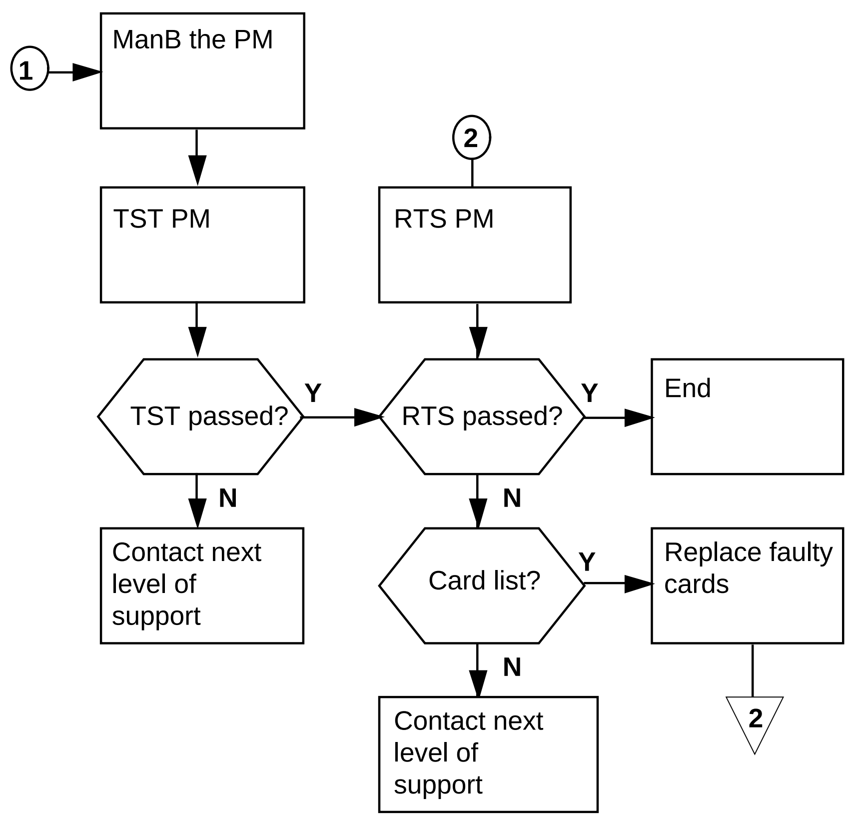
## PM RCC2
## **critical** (continued)

### Summary of recovering an RCC2



# PM RCC2
## critical (continued)

**Summary of recovering an RCC2 (continued)**



## PM RCC2
**critical** (continued)

### Recovering a PM RCC2

***At the host office***

**1** Proceed only if your maintenance support group or an *Alarm Clearing Procedure* procedure directed you to this procedure.

***At the MAP terminal***

**2** To silence an alarm that is still audible, type

**>MAPCI;MTC;SIL**

and press the Enter key.

**3** To access the peripheral module (PM) level of the MAP display and identify the defective RCC2, type

**>PM;DISP STATE SYSB RCC2**

and press the Enter key.

**4** To post the RCC2 with the alarm condition, type

***>POST RCC2 SYSB***

and press the Enter key.

**5** 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

**6** To determine if the RCC2 is equipped with emergency stand-alone (ESA), type

***>QUERYPM***

and press the Enter key.

*Example of a MAP response:*
PM Type: RCC2 PM No.: 0 PM Int. No.: 1 Node_No.: 203
PMs Equipped: 309 Loadname: CRI007AZ EEPRom Load: MX77NH08
ESA equipped: YES IntraSwitching is ON
WARM SWACT is supported and available.
RCC2 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}

## PM RCC2
**critical** (continued)

```
Site Flr RPos  Bay_id   Shf  Description    Slot    EqPEC
RSC0  01  A00  RCE 00   18   RCC2 : 000             6X12AA
```

> ***Note:*** For RCC2s with the optional NTAX74AA Cellular Access Processor (CAP) instead of the NTMX77AA Unified Processor (UP), the EEPROM load name reflects NTAX74AA instead of NTMX77AA. For instance, in the example, the EEPROM load name is `MX77NH08`. If the RCC2 has the NTAX74AA, the EEPROM load name is `AX74XE01`.

| If the RCC2 | Do |
|---|---|
| is equipped with ESA | step 7 |
| is not equipped with ESA | step 16 |

**7** 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.

**8** To check ESA exit time for the remote switching center-synchronous optical network (SONET) (RSC-S), type

***>POS RSC_XPMESAEXIT***

and press the Enter key.

*Example of a MAP response:*

```
PARMNAME                     PARMVAL
------------------------------------------------
RSC_XPMESAEXIT                 0
```

| If PARMVAL | Do |
|---|---|
| is equal to zero | step 9 |
| is greater than zero | step 37. Allow the system to recover the RCC2. |

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

**>QUIT**

and press the Enter key.

**10** To examine PM181 log reports that this RCC2 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  RSC0  RCC2  0  UNIT 0
 Node:SysB, Unit 0 Act:SysB, Unit 1 Inact:SysB
 PM in ESA, Communication restored, ready to be RTSed
```

## PM RCC2
**critical** (continued)

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

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

**>QUIT**

and press the Enter key.

**12** Before you manually restore the RCC2 from ESA, check to see if the links to the RCC2 are stable. To find the link numbers for this RCC2, type

***>trnsl c***

and press the Enter key.

*Example of a MAP response:*

*(Host XPM P-side link number)*

```
Link  0: LTC 1     0;Cap MS;Status:OK   P;MsgCond:CLS, Restrict
Link  1: LTC 1     2;Cap MS;Status:OK   P;MsgCond:CLS, Unrestricted
Link  2: LTC 1     4;Cap  S;Status:OK
Link  3: LTC 1     5;Cap  S;Status:OK
```

**13** To access the CARRIER level of the MAP, type

***>trks;carrier***

and press the Enter key.

**14** To post the peripheral-side (P-side) links for the host XMS-based PM (XPM) that interface with the RCC2 in ESA and 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 associated with the host XPM identified in

step 12

***Note:*** Repeat the POST command for each link that interfaces with the RCC2 in ESA.

*Example of a MAP response:*

# PM RCC2
## critical (continued)

*(Host XPM P-side link number)*

```
N  CLASS  SITE LTC CK D ALRM SLIP FRME  BER     ES  SES  STATE
0  REMOTE HOST   1  0 C        0    0     1       0   0   INSV
```

| If link conditions | Do |
|---|---|
| indicate a high number of SLIP and FRME errors | step 36. Leave the RCC2 in ESA. |
| indicate a low number of SLIP and FRME errors | step 15 |

**15** To access the PM level of the MAP terminal and post the RCC2, type

**>PM;POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 identified in step 4

**16** To manually busy (ManB) the PM, type

**>BSY PM**

and press the Enter key.

**17** To test the RCC2, type

**>TST PM**

and press the Enter key.

| If system response | Do |
|---|---|
| is TEST PASSED | step 18 |
| is TEST FAILED with reason C-side links not available | step 24 |
| is TEST FAILED with a card list | step 34 |

**18** To return to service (RTS) the PM, type

**>RTS PM**

*MAP response example of an RCC2:*

and press the Enter key.

```
RCC2 rcc2_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 system response | Do |
|---|---|
| is `RTS PASSED` | step 37 |
| is `RTS FAILED` and the RCC2 is configured with an NTMX77AA processor | step 19 |
| is `RTS FAILED` and the RCC2 is configured with an NTAX74AA processor | step 21 |

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

**19** The peripheral/remote loader-16 card (NT7X05) allows a local load of RCC2 data, which reduces recovery time. To check to see that the NT7X05 card is present, type:

**>QUERYPM FILES**

and press the Enter key.

*Example of a MAP display:*

```
  CM   MS   IOD   Net    PM    CCS    LNS    Trks    Ext    APPL
   .    .     .    .    1RCC2   .      .       .      .      .
                         *C*
RCC2           SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM     2        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 SysB
 6 TST_     Unit 1:  Inact SysB
 7 BSY_
 8 RTS_     QUERYPM files
 9 OffL     Unit 0:
10 LoadPM_     NT7X05 load File: CRI07AZ
11 Disp_       NT7X05 Image File:
12 Next_       CMR Load:  CMR03A
13 SwAct    Unit 1:
14 QueryPM     NT7X05 load File: CRI07AZ
15             NT7X05 Image File:
16 IRLINK      CMR Load:  CMR03A
17 Perform
18
```

## PM RCC2
## critical (continued)

***Note:*** If the NT7X05 card is not present, the MAP response is:
NT7X05 not datafilled, QueryPm files invalid

| If the NT7X05 card | Do |
|---|---|
| is provided | step 20 |
| is not provided | step 21 |

**20**

**DANGER**
**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.

To load the RCC2 from the local loadfile, type

**>LOADPM PM LOCAL LOADFILE**

and press the Enter key.

| If the load | Do |
|---|---|
| passes | step 22 |
| fails | step 36 |

**21** To load the RCC2 from the CC, type

**>LOADPM PM**

and press the Enter key.

| If the load | Do |
|---|---|
| passes | step 22 |
| fails | step 36 |

**22** To return the PM to service, type

**>RTS PM**

and press the Enter key.

| If system response | Do |
|---|---|
| is RTS PASSED | step 23 |

## PM RCC2
## critical (continued)

| If system response | Do |
|---|---|
| is `RTS FAILED` | step 36 |

**23** Check for dial tone according to local operating company procedures.

| If dial tone | Do |
|---|---|
| is not restored | step 36 |
| is restored | step 37 |

**24** To identify central-side (C-side) links to the host PM, which is a line group controller (LGC) or a line trunk controller (LTC), that are system busy (SysB), type

**>TRNSL C**

and press the Enter key.

*Example of a MAP response:*

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

**25** To post the host PM identified in step 24, 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:*

# PM RCC2
## critical (continued)

```
   CM   MS   IOD   Net    PM    CCS    LNS    Trks    Ext    APPL
   .    .     .     .    1RCC2   .      .       .       .      .
                          *C*
LTC                SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        3        0        1        0        4        12
 2 Post_   LTC       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
```

**26** To identify the defective P-side links, type

**>TRNSL P**

and press the Enter key.

*Example of a MAP response:*

```
LINK 0:   RCC2 1    0;CAP MS;STATUS;    SysB;MSGCOND:CLS,Restricted
LINK 1:   RCC2 1    1;CAP  S;STATUS:    OK
LINK 2:   RCC2 1    2;CAP MS;STATUS     SysB;MSGCOND:CLS,Unrestricted
LINK 4:   RCC2 1    3;CAP  S;STATUS:    OK
LINK 5:   RCC2 1    4;CAP  S;STATUS:    OK
LINK 6:   RCC2 1    5;CAP  S;STATUS:    OK
LINK 7:   RCC2 1    6;CAP  S;STATUS:    OK
```

**27** 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 26

**28** To test the defective link, type

**>TST LINK link_no**

and press the Enter key.

*where*

## PM RCC2
**critical** (continued)

**link_no**
is the number of the link manually busied in step 27

***Note:*** You must perform this step for each ManB link.

| If system response | Do |
|---|---|
| is `TEST PASSED` | step 29 |
| is `TEST FAILED` | step 36 |

**29** 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 28

***Note:*** You must perform this step for each ManB link.

| If system response | Do |
|---|---|
| is `RTS FAILED` | step 36 |
| is `RTS PASSED` | step 30 |

**30** To post the RCC2, type

**`>POST RCC2 rcc2_no`**

and press the Enter key.

*where*

**rcc2_no**
is the number of the ManB RCC2

**31** To return the RCC2 to service, type

**`>RTS PM`**

and press the Enter key.

| If system response | Do |
|---|---|
| is `RTS PASSED` on both units | step 37 |
| is `RTS FAILED` on both units | step 36 |
| is `RTS FAILED` on one unit | step 32 |

**32** To test the ManB RCC2 unit, type

**`>TST UNIT unit_no`**

and press the Enter key.

## PM RCC2
## critical (continued)

*where*

**unit_no**
is the number of the ManB RCC2 unit (0 or 1) that failed to RTS

| If system response | Do |
|---|---|
| is `TST PASSED` | step 33 |
| is `TST FAILED` | step 36 |

**33** To return the tested RCC2 unit to service, type

**>RTS UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit tested in step 32

| If system response | Do |
|---|---|
| is `RTS PASSED` | step 37 |
| is `RTS FAILED` | step 36 |

**34** Observe the card list that appears in the MAP display. The card list results from step 17.

For RCC2s with the NTMX77AA UP, the card list shows MX77 in slot 03, as shown in the following examples. The RCC2s with the optional NTAX74AA CAP have AX74 in slot 03.

*NTMX77*

*Example of a MAP response for an RCC2 configured with the NTMX77 Unified Processor:*

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :03    MX77
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :08    6X69
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :11    MX73
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :13    MX74
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :05    6X78
```

*NTAX74*

*Example of a MAP response for RCC2s configured with the optional NTAX74AA Cellular Access Processor:*

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :03    AX74
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :08    6X69
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :11    MX73
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :15    MX74
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :05    6X78
```

| If all cards on the list | Do |
|---|---|
| are replaced | step 36 |
| are not replaced | step 37 |

**35** If the list indicates other defective cards, go to the card replacement procedure for the next card on the card list. The card replacement procedure is in *Card Replacement Procedures*. When you finish the card replacement procedures, go to step 17 of this procedure.

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

**37** This procedure is complete. If other alarms appear, refer to the alarm clearing procedures for the alarms.

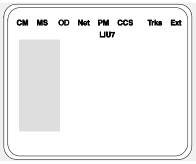
# 5 RSC-S alarm clearing procedures

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

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

# 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

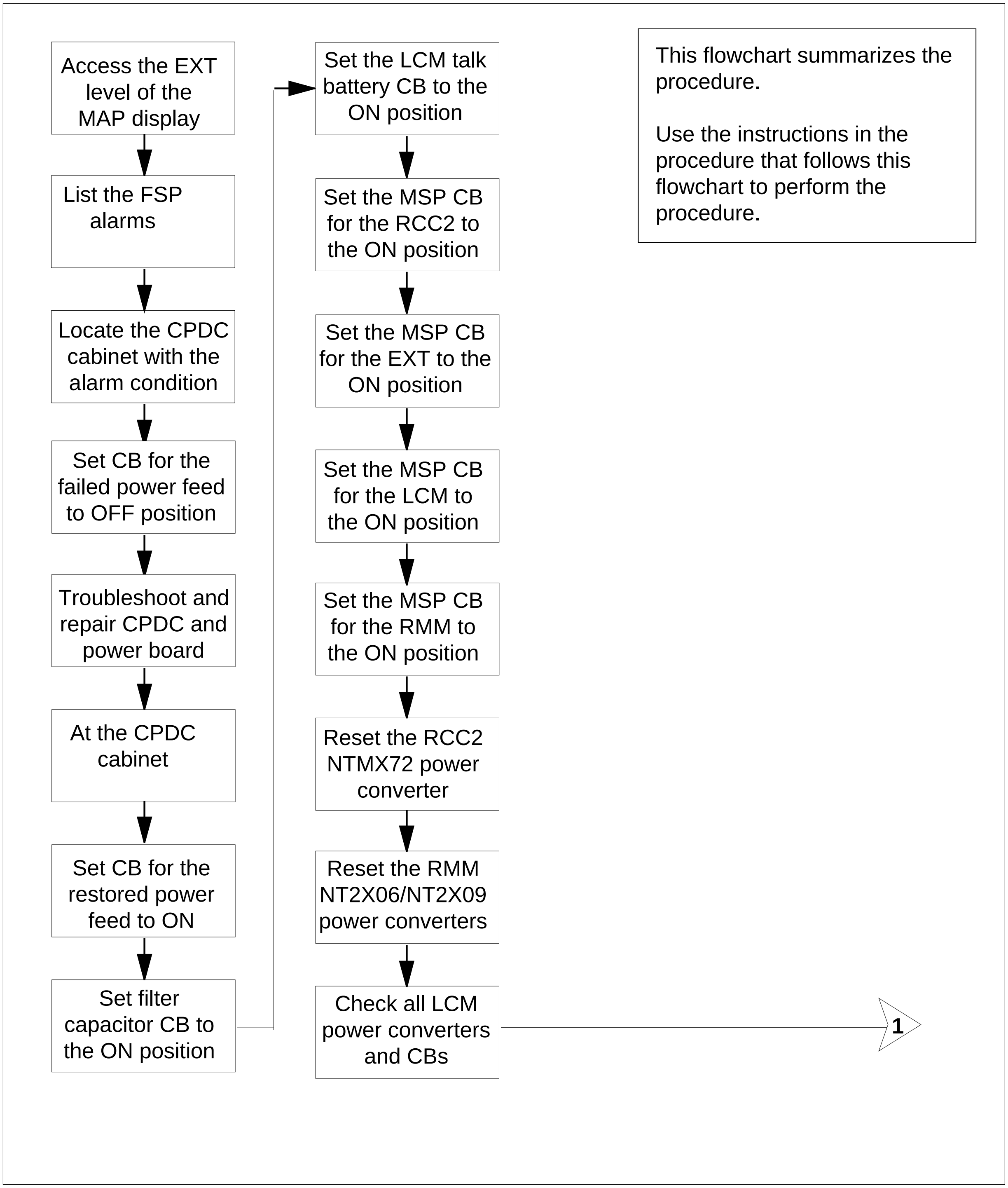
Not applicable

## 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.

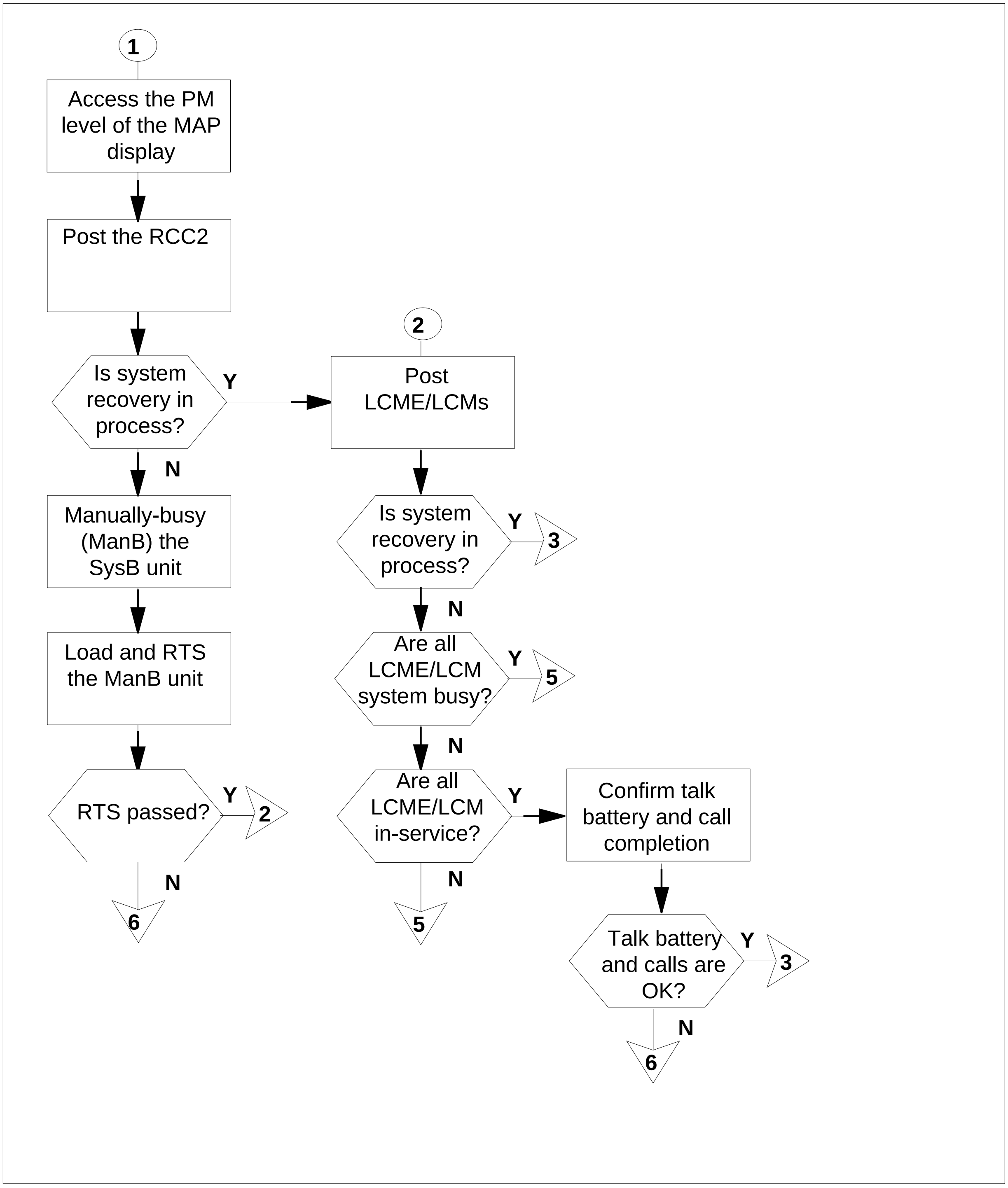
# CPDC single power feed failure
# CPDC frame Major (continued)

**Summary of clearing a CPDC single power feed failure alarm**



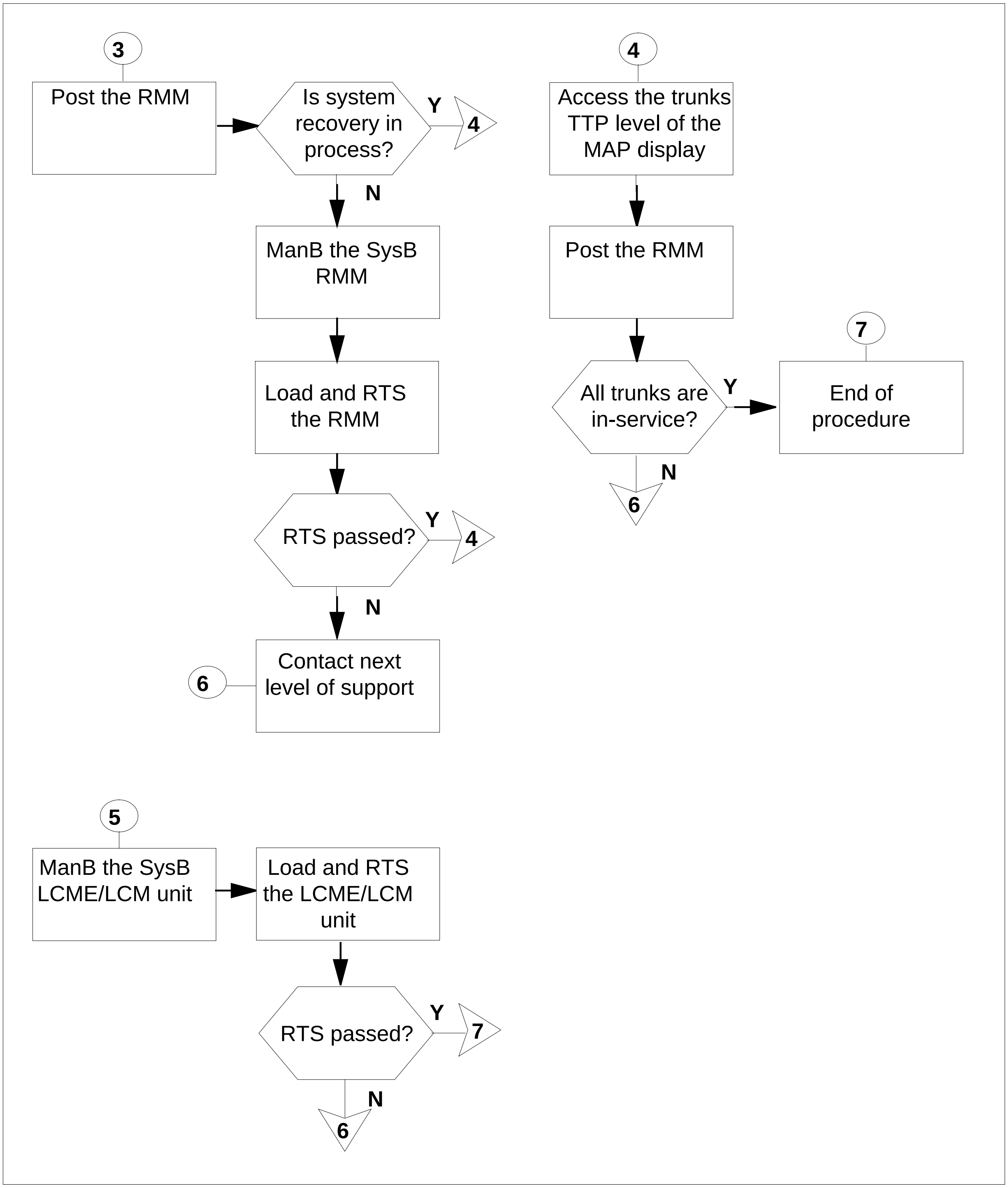
# CPDC single power feed failure
# CPDC frame Major (continued)

**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.

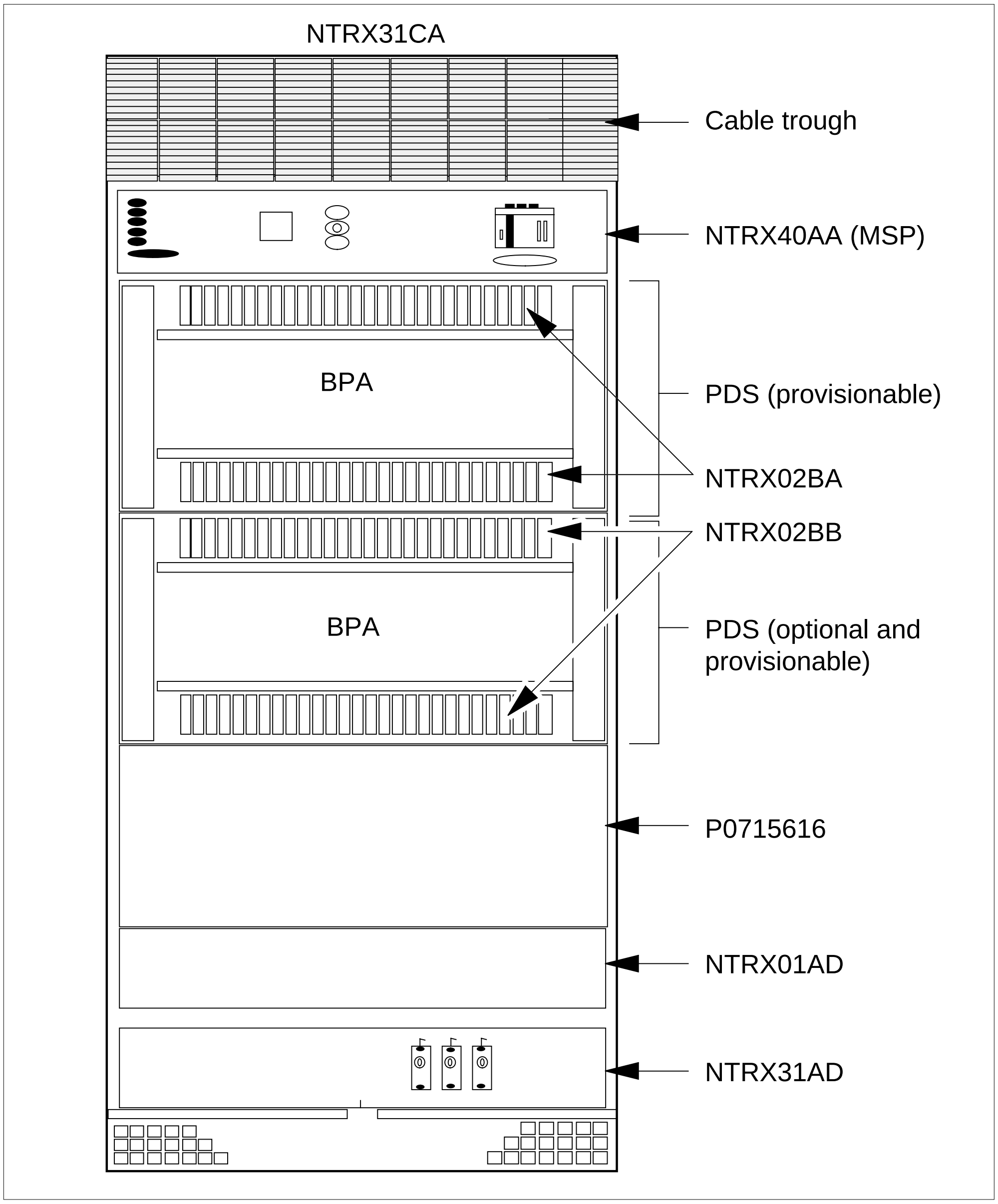
**4** Record the aisles generating an FSP alarm identified in step 3.

***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

## CPDC single power feed failure
## CPDC frame Major (continued)

**8** Set the following CBs associated with the restored power feed to the ON position in the order specified below:

| If | Do |
|---|---|
| 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.

# CPDC single power feed failure
# CPDC frame Major (continued)

***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.

***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
```

# CPDC single power feed failure
# CPDC frame Major (continued)

**21** Examine the screen display, if the DMS system is recovering the RCC2 Inactive unit:

| If 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
```

## CPDC single power feed failure
## CPDC frame Major (continued)

***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 |

**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**

**DANGER**
**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 |

## CPDC single power feed failure
## CPDC frame Major (continued)

**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.

**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)

# CPDC single power feed failure
# CPDC frame Major (continued)

*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.

## CPDC single power feed failure
## CPDC frame Major (continued)

*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.

**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)

## CPDC single power feed failure
## CPDC frame Major (continued)

*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.

## CPDC single power feed failure
## CPDC frame Major (continued)

*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.

**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

## CPDC single power feed failure
## CPDC frame Major (continued)

*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 |

**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 |

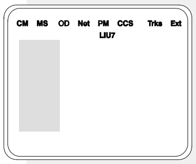
**43** Go to the appropriate procedure in the *Alarm Clearing Procedure* to clear an RMM minor alarm. When you have completed that procedure, return to step 45.

**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*.

# PM LCME critical

## Alarm display



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

## Indication

An 1LCME *C* under the PM subsystem header at the MTC level of the MAP terminal indicates a critical condition in the LCME.

## Meaning

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

## Impact

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

## Common procedures

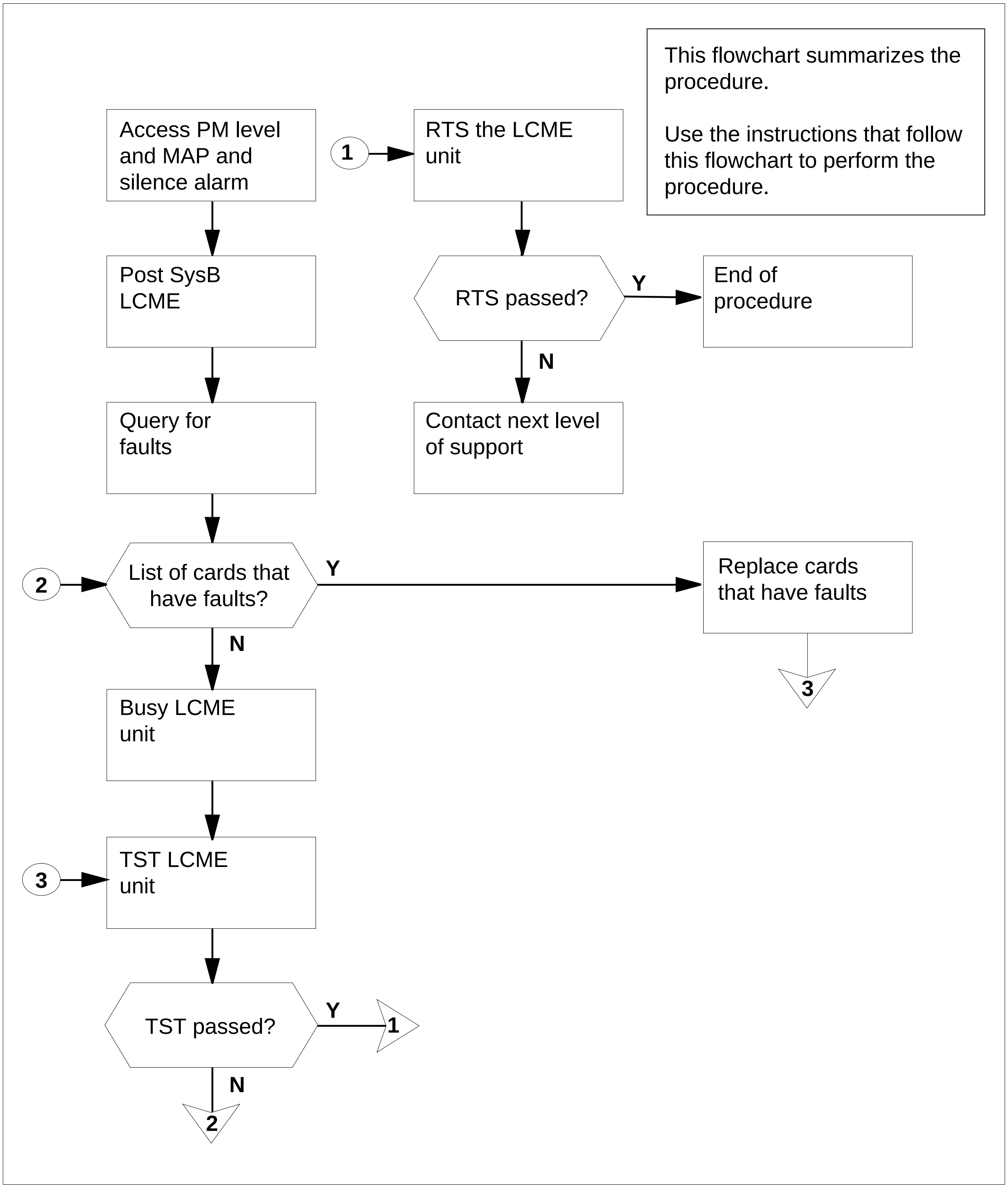
There are no common procedures.

## 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.

*Normal 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

# PM LCME
## critical (continued)

*Normal response on the MAP display*:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
 .      .      .        .     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
```

**4** To check for fault indicators, type

**>QUERYPM FLT**

and press the Enter key.

# PM LCME
## critical (continued)

*Normal response on the MAP display*:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
 .      .      .       .     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 the system | Do |
|---|---|
| indicates a card that has faults | step 15 |
| 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.

# PM LCME
## critical (continued)

*Normal response on the MAP display*:

```
Test Passed
    or
Test Failed
```

| If TST | Do |
|---|---|
| passed | step 14 |
| failed and the system produced a card list | step 15 |
| failed and the system did not produce a card list | step 16 |
| cannot test cental-side busy (CBsy) | step 7 |

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

**>TRNSL C**

and press the Enter key.

*Normal response on the MAP display*:

```
LINK 0    RCC2 2 ;CAP MS;STATUS:   SYSB,;MSGCOND:CLS
LINK 10   RCC2 2  CAP MS;STATUS:   SYSB,;MSGCOND:CLS
LINK 1    RCC2 2  CAP S; STATUS:   OK
LINK 11   RCC2 2  CAP S; STATUS:   OK
LINK 2    RCC2 2 ;CAP S; STATUS:   OK
```

| If links | Do |
|---|---|
| are SysB | step 8 |
| are open | step 25 |

**8** To post the RCC2 unit associated with the LCME, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the RCC2 unit identified in step 7

*Normal response on the MAP display*:

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

RCC2             SysB     ManB     OffL     CBsy     ISTb      InSv
0 Quit    PM        3        0        1        0        4        12
2 Post_   RCC2      0        0        2        0        2         9
3 ListSet
4         RCC2   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 P-side links that have faults, and choose a link that has faults, type

**>TRNSL P**

and press the Enter key.

*Normal response on the MAP display*:

```
LINK 24:LCME   1    0;CAP MS;STATUS:    SYSB;MSGCOND:CLS
LINK 25:LCME   1    1;CAP  S;STATUS:    OK
LINK 26:LCME   1    2;CAP  S;STATUS:    OK
LINK 27:LCME   1    3;CAP  S;STATUS:    OK
LINK 28:LCME   2    0;CAP  MS;STATUS:   SysB;MSGCOND:CLS
LINK 29:LCME   2    1;CAP  S;STATUS:    OK
LINK 30: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 chosen in step 9

**11** To test the ManB link, type

**>TST LINK link_no**

and press the Enter key.

# PM LCME
## critical (continued)

*where*

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

| If the system | Do |
|---|---|
| indicates a card that has faults | step 15 |
| 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 25 |

***Note:*** If the system identifies other lines that have faults, execute the procedures in steps 10 through 12 for each link. Follow the procedures until the system busies, tests, and returns all links to service.

**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 26 |

| If TST | Do |
|---|---|
| failed | step 18 |

**15** If the system produced a card list with one or more cards with possible faults, replace the cards. Begin with the first card in the list. A MAP example follows.

*Normal response on the MAP display for an LCM in an LCE cabinet*:

```
SITE      FLR   RPOS  BAY_ID         SHF  DESCRIPTION     SLOT    EQPEC
REM1       01   A00   LCE    00       21  LCM   :00 0     : 04     6X51
REM1       01   A00   LCE    00       21  LCM   :00 0     : 05     6X52
REM1       01   A00   LCE    00       21  LCM   :00 0     : 01     6X53
REM1       01   A00   LCE    00       21  LCM   :00 0     :        6X54
REM1       01   A00   LCE    00       32  RCC   :00 0     : 07     6X48
```

*Normal response on the MAP display for an LCME in a CLCE cabinet*:

```
SITE      FLR   RPOS  BAY_ID         SHF  DESCRIPTION     SLOT    EQPEC
REM1       01   A00   CLCE    00      04  LCME   :01 0    : 21     BX34
REM1       01   A00   CLCE    00      04  LCME   :01 0    : 20     BX35
REM1       01   A00   CLCE    00      04  LCME   :01 0    : 25     BX72
REM1       01   A00   CLCE    00      04  LCME   :01 0    : 22     6X53
REM1       01   A00   CLCE    00      05  RCC2   :01 0    : 13     MX74
```

| If you | Do |
|---|---|
| replaced all the cards on the list | step 16 |
| did not replace all the cards on the list | step 23 |

**16** The trouble can be the DS30A interface (I/F) card connected to the links that have faults, identified in step 9. The DS30A I/F is located:

- on the NTMX74 card in the RCC2 or
- on two NT6X48 cards in the RCC

| If you | Do |
|---|---|
| replaced the NTMX74 or 6X48 cards | step 18 |
| did not replace the NTMX74 or 6X48 cards | step 17 |

***Note:*** If the system indicates the NTMX74 card, check to see if one link or several links have faults. Repeat procedure to clear as necessary.

**17** Determine the location of the card with link(s) that have faults. Each interface (I/F) chip on the NTMX74 card serves four DS30A links. The following chart illustrates the link-to-chip relationship.

# PM LCME
## critical (continued)

To make sure that message (MS) links are redundant, separate links by a minimum of four on an RCC2 when you enter table LCMINV.

**Chip-to-link relationship table for an RCC2**

| NTMX74 I/F 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 |

Each I/F chip on the 6X48 cards serves two DS30A links. The following chart illustrates the card and chip-to-link relationship.

To make sure that message (MS) links are redundant, separate links by a minimum of two on an RSC when you datafill table LCMINV.

**Card and chip-to-link relationship table for an RSC**

| Chip number | Card Slots | DS30A links |
|---|---|---|
| 1 | 7 | 0 |
| 1 | 7 | 1 |
| 1 | 6 | 2 |
| 1 | 6 | 3 |
| 2 | 7 | 4 |
| 2 | 7 | 5 |
| 2 | 6 | 6 |
| 2 | 6 | 7 |
| 3 | 7 | 8 |
| 3 | 7 | 9 |
| 3 | 6 | 10 |
| 3 | 6 | 11 |
| 4 | 7 | 12 |
| 4 | 7 | 13 |
| 4 | 6 | 14 |
| 4 | 6 | 15 |
| 5 | 7 | 16 |
| 5 | 7 | 17 |
| 5 | 6 | 18 |
| 5 | 6 | 19 |

## PM LCME
**critical** (continued)

**18** A line drawer that has faults can cause the trouble. Remove the fuses from each line drawer that services the posted LCME module in the following order. This process isolates the trouble to one line drawer.

**a** -48V fuse(s)

**b** +15V fuse

**c** +5V fuse

**19** After you remove the fuses from all line drawers connected to the LCME that has faults, try to return the LCME to service. Type

**>RTS PM**

and press the Enter key.

| If RTS | Do |
|---|---|
| passed | step 20 |
| failed | step 25 |

**20** oInsert the drawer fuses, one drawer pair at a time, in the following order and apply power. This process isolates the failing line drawer pair.

**a** +5V fuse

**b** +15V fuse

**c** -48V fuse(s)

**21** After you insert fuses in a drawer pair and apply power, attempt to restore the drawer to service. Type

**>BSY DRWR drwr_no**

*where*

**drwr_no**
is either drawer number of a pair

and press the Enter key.

# PM LCME
## critical (continued)

*Normal response on the MAP display:*

```
 CM     MS     IOD   Net     PM     CCS    Lns   Trks    Ext   Appl
CM Flt  .       .     .     4 RCS   5 RSC    .   17 CC   1Crit   .
  M                          *C*     *C*          *C*     *C*

LCME               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        6        2        1        0       23        39
 2 Post_   LCME      0        0        0        0        1         0
 3 ListSet
 4 SwRg    LCME RSCS 00 0 ISTb  Links_OOS:  CSide  0
 5 Trnsl_  Unit0:   IStb              /RG:  0
 6 Tst_    Unit1:   IStb              /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_ bsy drwr 13
11 Disp_   Warning ... this action will affect both drwrs 12 and 13
12 Next    LCNE RSCS 00 0 Drwr 13 will be taken out of service
13         Please confirm (”YES, ”Y”, ”NO”, or ”N”):
14 QueryPM
15
16
17
18
```

***Note:*** In a MAP display, drawer numbers over 9 read vertically, from top to bottom.

**22** To return the line drawer to service, type

**>RTS DRWR drwr_no**

and press the Enter key.

*where*

**drwr_no**
is the number of the drawer busied in step 21

Repeat steps 20, 21 and 22 until you have inserted fuses again in all drawers and restored service to all drawers.

# PM LCME
## critical (end)

*Normal response on the MAP display:*

```
 CM     MS    IOD    Net     PM     CCS    Lns   Trks    Ext   Appl
CM Flt  .      .      .     4 RCS   5 RSC   .    17 CC   1Crit   .
  M                          *C*     *C*          *C*     *C*

LCME                 SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM          6        2        1        0       23        39
 2 Post_   LCME        0        0        0        0        1         0
 3 ListSet
 4 SwRg    LCME RSCS 00 0 ISTb  Links_OOS:  CSide  0
 5 Trnsl_  Unit0:   IStb              /RG:  0
 6 Tst_    Unit1:   IStb              /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_ rts drwr 13
11 Disp_   Warning ... this action will affect both drwrs 12 and 13
12 Next    OSvce Tests Initiated
13         LCME RSCS 00 0 Drwr 13 Tst Passed
14 QueryPM LCME RSCS 00 0 Drwr 13 Rts Passed
15
16
17
18
```

| If RTS | Do |
|---|---|
| passed | step 26 |
| failed | step 24 |

**23** 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 6 of this procedure.

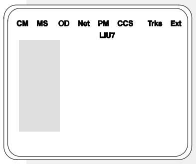
**24** You have isolated the trouble to a line drawer pair. Diagnose the trouble to a card, shelf, frame, or cable. Make the necessary replacement. After you correct the trouble, return to step 20 of this procedure. Insert all fuses again and busy and return to service all drawers.

**25** For additional help, contact the next level of support.

**26** This procedure is complete. If the system displays other alarms, reference the correct alarm clearing procedures for the indicated alarms.

# PM LCME major

## Alarm display



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

## Indication

The 1LCME (enhanced line concentrating module) alarm code appears under the peripheral module (PM) subsystem header at the maintenance (MTC) level of the MAP display. This code indicates an alarm involving an LCME. The letter M under the alarm code indicates that 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 condition affects subscriber service. Local LCME backup is not available if the other LCME units fail.

## Common procedures

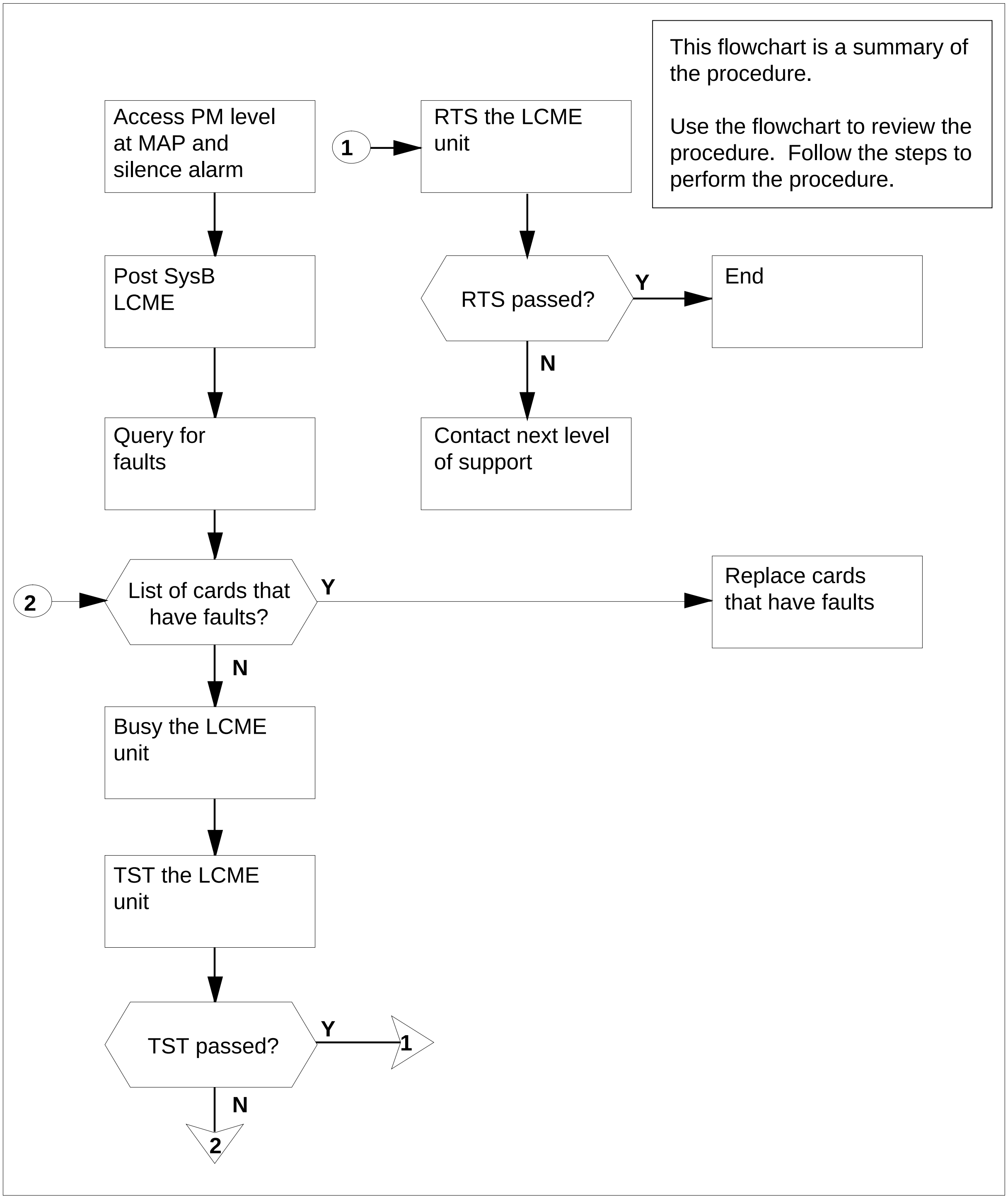
There are no common procedures.

## Action

This procedure contains a summary 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 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 SysB LCME, type

**>DISP STATE ISTB LCME**

and press the Enter key.

*Sample 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

**lcme_frame_no**
is the number of the associated LCME equipment frame

**lcme_no**
is the number of the LCME that has faults

# PM LCME
## major (continued)

*Sample response on the MAP display:*

```
 CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
  .     .     .      .    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.

# PM LCME
## major (continued)

*Sample response on the MAP display:*

```
 CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext   APPL
  .     .     .      .    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 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 UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the SysB LCME

**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 ManB in step 5

*Sample response on the MAP display:*

```
Test Passed
    or
Test Failed
```

| If TST | Do |
|---|---|
| passes | step 15 |
| fails | step 16 |
| can not test central-side busy (CBsy) links | step 7 |

**7** To identify central-side (C-side) links in a SysB condition, type

**>TRNSL C**

and press the Enter key.

*Sample response on the MAP display:*

```
LINK 0    RCC2 2 ;CAP MS;STATUS:   SYSB,;MSGCOND:CLS
LINK 1    RCC2 2  CAP S; STATUS:   OK
LINK 2    RCC2 2  CAP S; STATUS:   OK
LINK 3    RCC2 2  CAP S; STATUS:   OK
LINK 4    RCC2 2 ;CAP MS;STATUS:   OK,;MSCOND:OPN,
```

| If links are | Do |
|---|---|
| SysB | step 8 |
| open | step 20 |

**8** To post the RCC2 unit associated with the LCME, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the RCC2 unit identified in step 7

# PM LCME
## major (continued)

*Sample response on the MAP display:*

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

RCC2             SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit    PM       3        0        1        0        4       12
 2 Post_   RCC2     0        0        2        0        2        9
 3 ListSet
 4         RCC2   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 peripheral-side (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:    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
```

**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 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 ManB in step 10

| If the 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

***Note:*** If the system identifies other links that have faults, perform the procedures in steps 10 through 12. Execute procedures for each link until all links are busy, tested, and returned to service.

| If RTS | Do |
|---|---|
| passes | step 13 |
| 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.

## PM LCME
## major (continued)

*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 |

**16** Check the card listing that appears in the following 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
```

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

| If all cards on the list have | Do |
|---|---|
| been replaced | step 17 |
| not replaced | step 19 |

**17** The trouble can be the NTMX74 DS30A interface card in the RCC2. This interface card connects to the links that have faults shown in step 9.

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

## PM LCME
## major (end)

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

**18** Each interface (I/F) chip on the NTMX74 card serves 4 DS30A links. The following chart illustrates the link to chip relationship. Message (MS) links can be separated by a minimum of 4 when entered 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*. Perform the procedures. When you complete the card replacement procedures, go to step 11 of this procedure.

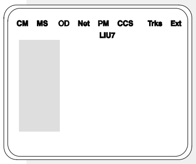
**19** Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Perform the procedures. When you complete the card replacement procedures, go to step 14 of this procedure.

**20** Obtain additional help in clearing this alarm by contacting the personnel responsible for higher level support.

**21** This procedure is complete. If other alarms appear, refer to 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 indicates an LCME minor alarm. This header appears at the MTC level of the MAP display.

## Meaning

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

## Result

This condition does not affect subscriber service. Local backup is not available if the other LCME units fail.

## Common procedures

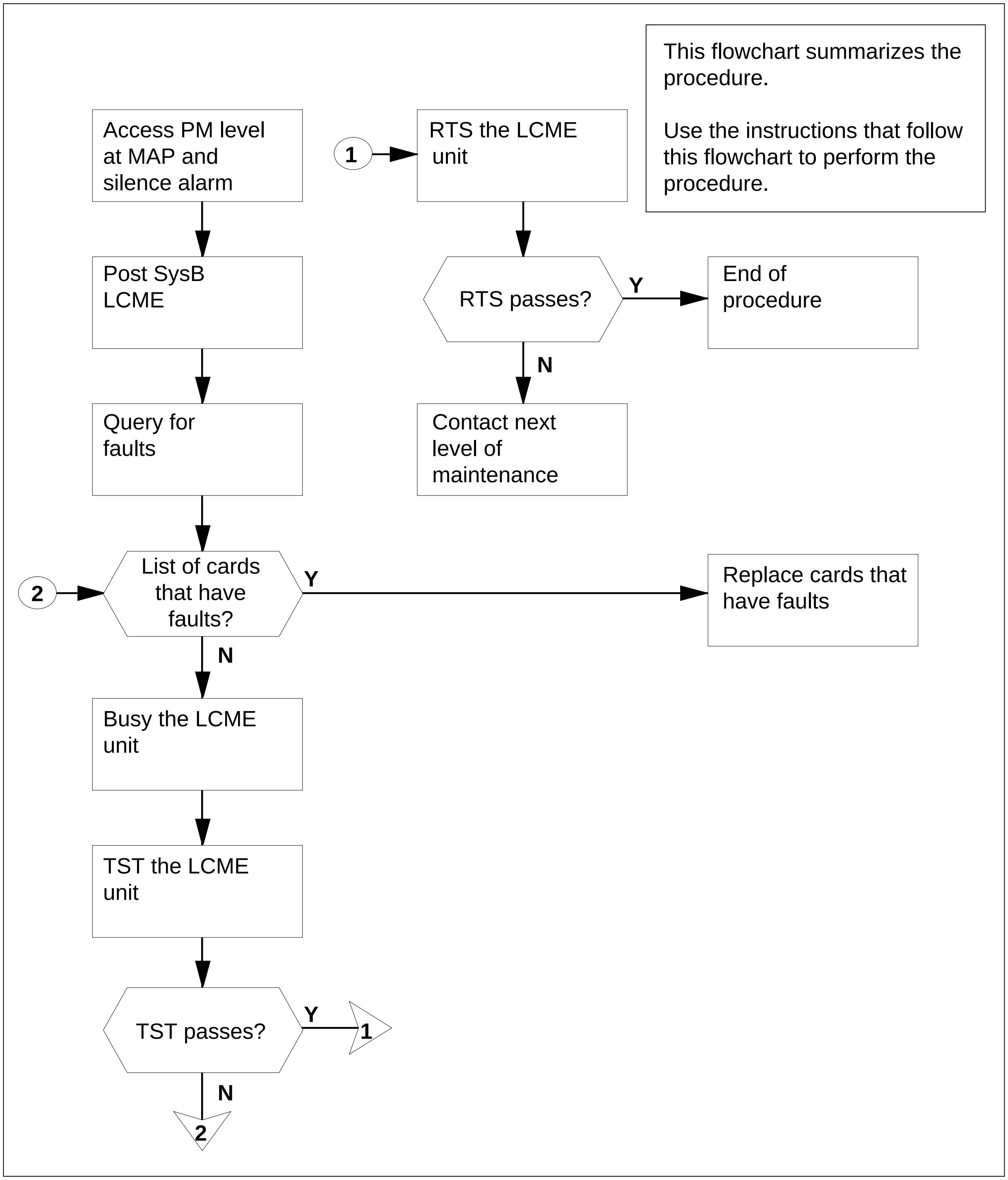
There are no common procedures.

## 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 from 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

# PM LCME
## minor (continued)

*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
```

**4** To check for fault indicators, type

**>QUERYPM FLT**

and press the Enter key.

# PM LCME
## minor (continued)

*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 that appears 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

## PM LCME
**minor** (continued)

*Sample response on the MAP display:*

```
Test Passed
    or
Test Failed
```

| If TST | Do |
|---|---|
| passes | step 16 |
| fails | step 17 |
| cannot 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    RCC2 2 ;CAP MS;STATUS:   OK,;MSGCOND:OPN
LINK 1    RCC2 2  CAP S; STATUS:   SysB
LINK 2    RCC2 2  CAP S; STATUS:   OK
LINK 3    RCC2 2  CAP S; STATUS:   OK
LINK 4    RCC2 2 ;CAP MS;STATUS:   OK,;MSCOND:OPN,
```

| If links | Do |
|---|---|
| are SysB | step 8 |
| are open | step 21 |

**8** To post the RCC2 unit associated with the LCME, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the RCC2 unit from step 7

# PM LCME
## minor (continued)

*Sample response on the MAP display:*

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


RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        4        12
 2 Post_   RCC2      0        0        0        0        2         9
 3 ListSet
 4         RCC2   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 |
|---|---|
| passes | step 16 |
| fails | step 12 |

**12** Read the following table to determine your next action.

| If the system | Do |
|---|---|
| indicates a card that has faults | step 17 |
| does not indicate a card that has faults | step 13 |

**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 |
|---|---|
| passes | step 22 |
| fails | step 21 |

***Note:*** If the system identifies other links that have faults, execute steps 10 through 13. Execute these steps for each link until the links are busied, tested, and returned to service.

**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

# PM LCME
## minor (continued)

**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 that appears in step 14

| If TST | Do |
|---|---|
| passes | step 16 |
| fails | 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 |
|---|---|
| passes | step 22 |
| fails | step 21 |

**17** Check the card listing that appears 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 the cards on the list | step 18 |
| did not replace the cards on the list | step 20 |

**18** The trouble can be the NTMX74 DS30A interface card in the RCC2 that connects to the links with faults listed in step 9.

| If you | Do |
|---|---|
| replaced the NTMX74 card | step 21 |

## PM LCME
## minor (end)

| If you | Do |
|---|---|
| did not replace the NTMX74 card | step 19 |

***Note:*** If the NTMX74 card is indicated, check if one link or several links have faults. Repeat the alarm clearing procedure.

**19** Each interface (I/F) chip on the NTMX74 card serves 4 DS30A links. The following chart illustrates the Link to chip relationship. A minimum of 4 must separate message (MS) 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*. Complete the card replacement procedures. Go to step 11.

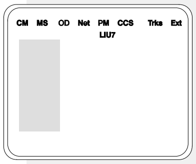
**20** Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 15.

**21** For additional help, contact the next level of support.

**22** The procedure is complete. If other alarms appear at the MAP display, refer to the appropriate alarm clearing procedures.

# PM LCME(RG) major

## Alarm display



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

## Indication

The alarm code 1LCME M indicates a major alarm involving an LCME ringing generator. The 1LCME M 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 condition interrupts service to the subscriber.

## Common procedures

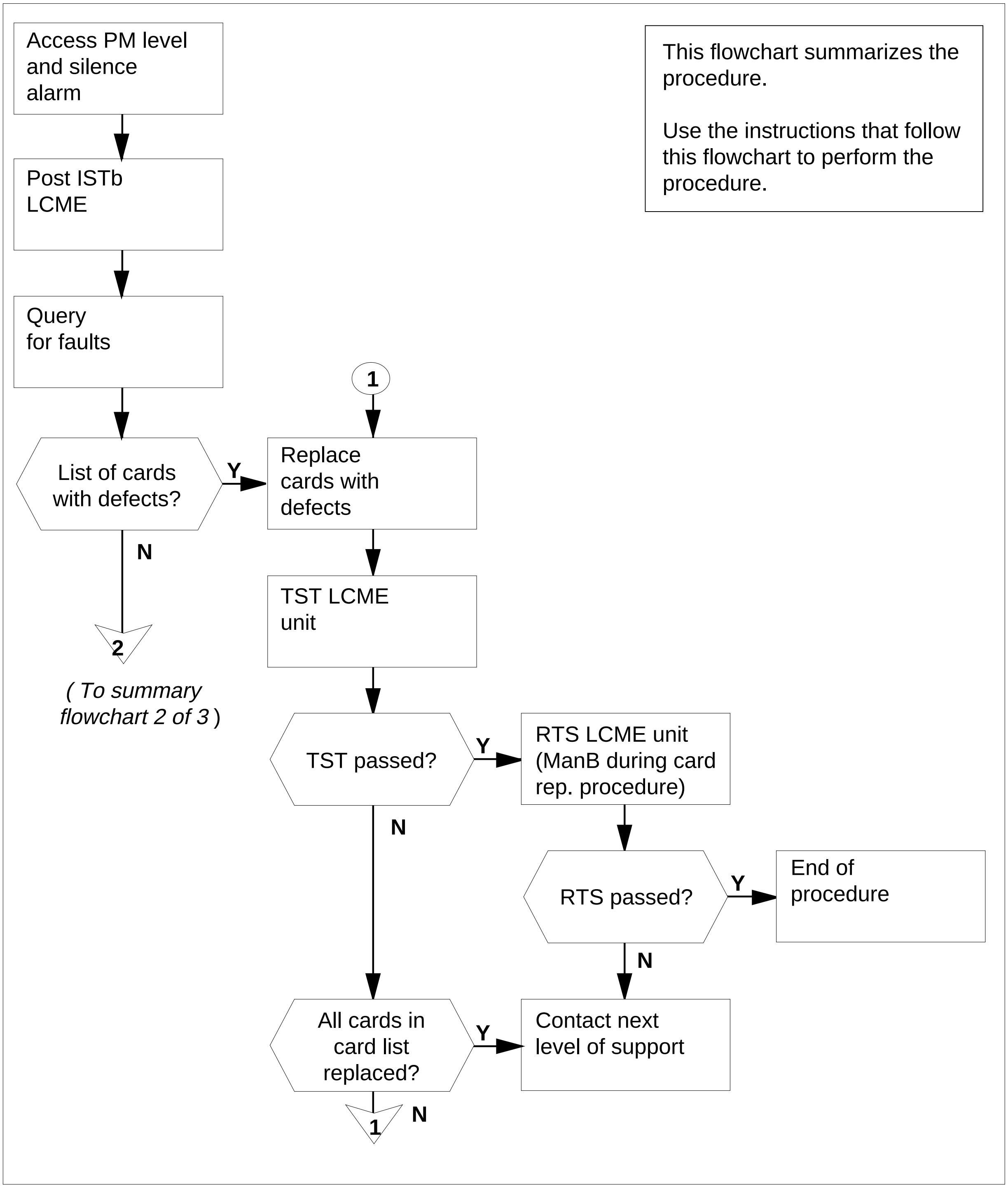
There are no common procedures.

## 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.

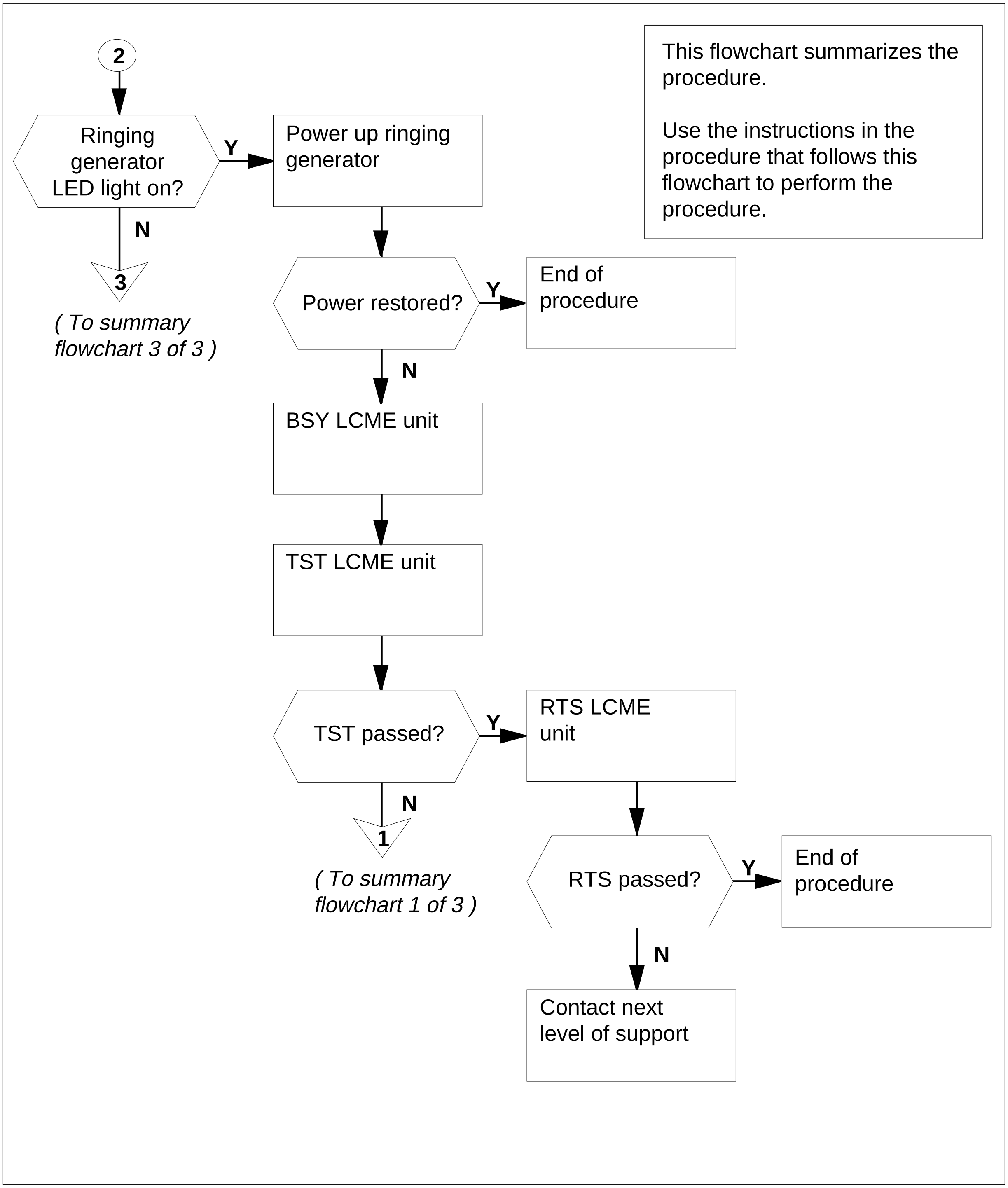
# PM LCME(RG) major (continued)

**Summary of clearing a PM LCME (RG) major alarm (flowchart 1 of 3)**



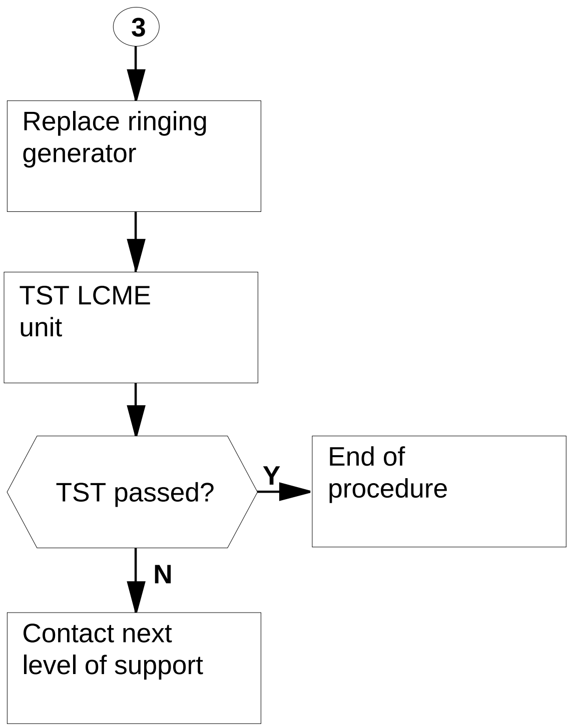
# PM LCME(RG)
**major** (continued)

**Summary of clearing a PM LCME (RG) major alarm (flowchart 2 of 3)**



# PM LCME(RG) major (continued)

**Summary of clearing a PM LCME (RG) major alarm (flowchart 3 of 3)**




This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

# PM LCME(RG)
**major** (continued)

### Clearing a PM LCME(RG) major alarm

***At the MAP terminal***

**1**

> **ATTENTION**
> You must enter this procedure from a PM system-level alarm clearing procedure step that identified a fault associated with the LCME.

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.

*Example response on the MAP display:*
SysB 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

## PM LCME(RG)
**major** (continued)

*Example response on the MAP display:*

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

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
```

**4** To check for problem indicators, type

**>QUERYPM FLT**

and press the Enter key.

## PM LCME(RG) major (continued)

*Example response on the MAP display:*

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

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 to see if the LED is on.

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

**6** To power up the ringing generator (RG), move the power switch to the ON position. (The LED goes out.) These switches are identified as follows: 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

*Example 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 |

**9** To return the ManB LCME to service, type

**>RTS UNIT unit_no**

and press the Enter key.

# PM LCME(RG) major (end)

*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 listing that appears. The card listing is the result of step 8.

*Example 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** Refer 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.

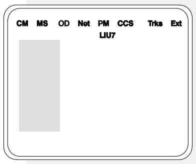
**13** Refer to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 8 of this procedure.

**14** Obtain 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 LCME(RG) minor

## Alarm display



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

## Indication

The alarm code 1LCME under the PM subsystem header indicates a minor alarm that involves an LCME ringing generator. This 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 switches automatically to a backup ringing generator (SwRG). If the backup ringing generator fails, the system does not produce ringing.

## Common procedures

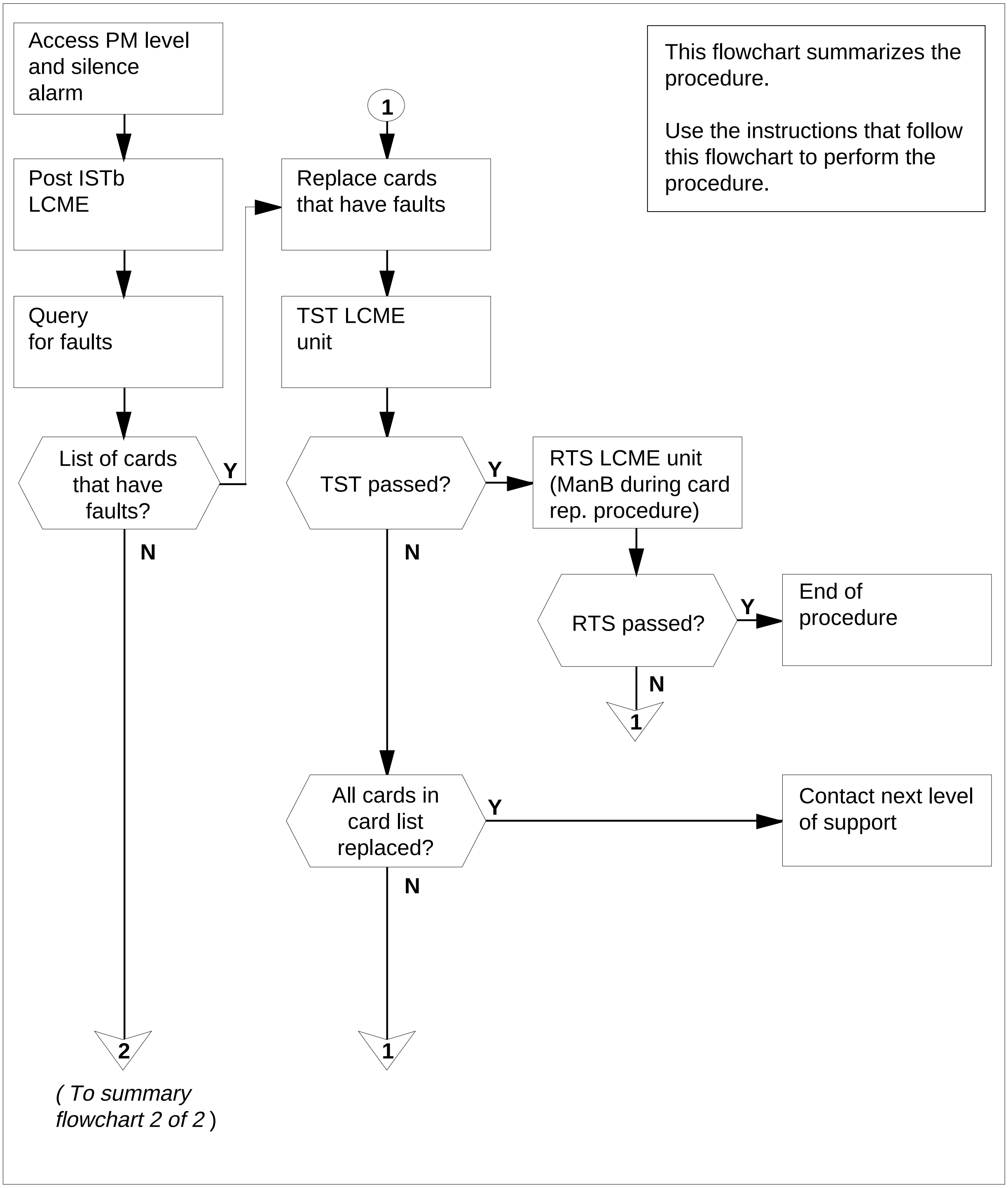
There are no common procedures.

## Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to reveiw the procedure. Follow the steps to perform the procedure.

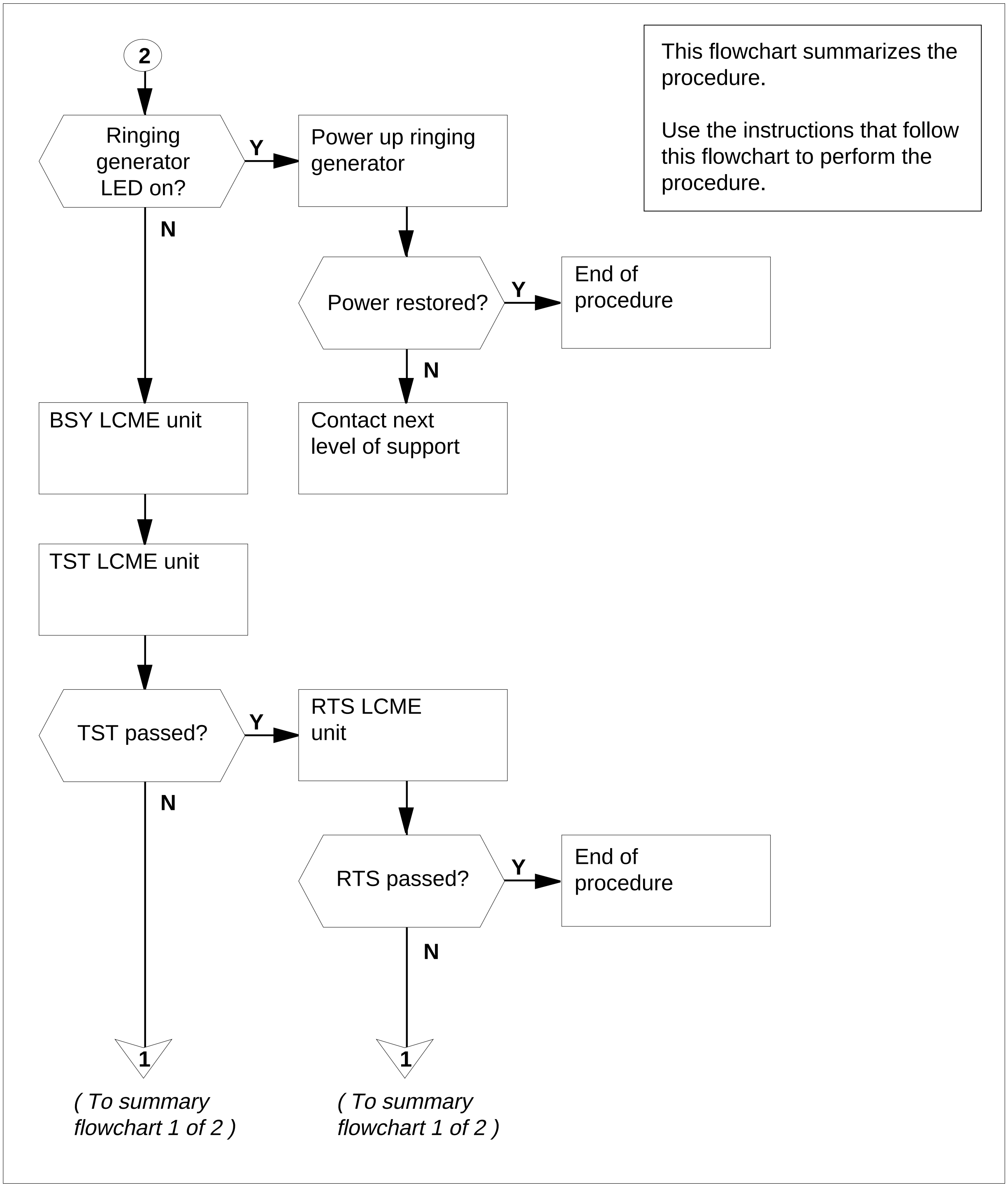
# PM LCME(RG)
## minor (continued)

**Summary of clearing a PM LCME (RG) minor alarm (flowchart 1 of 2)**



# PM LCME(RG) minor (continued)

**Summary of clearing a PM LCME (RG) minor alarm (flowchart 2 of 2)**



# 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, 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

# PM LCME(RG) minor (continued)

*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  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.

# PM LCME(RG)
## minor (continued)

*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        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 |

**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 |

| If | Do |
|---|---|
| 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 10 |

# PM LCME(RG) minor (end)

**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 the cards on the list | step 11 |
| did not replace all the cards on the list | step 13 |

**11** Determine if you replaced the NT6X30 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.

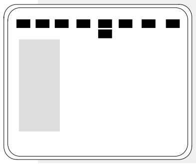
**13** Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 8 of this procedure.

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

**15** This procedure is complete. If the system displays other alarms, reference the correct alarm clearing procedures for the indicated alarms.

# PM RCC2 critical

## Alarm display



| CM | MS | IOD | Net | **PM** | Lns | Trks | Ext | APPL |
|---|---|---|---|---|---|---|---|---|
| . | . | . | . | **nRCC2** | . | . | . | . |
| | | | | ***C*** | | | | |

## Indication

An nRCC2 *C* under the PM subsystem header at the MTC level of the MAP display indicates an RCC2 critical alarm.

## Meaning

Both RCC2 units are in the system-busy (SysB) or in the C-side busy (CBsy) state.

## Result

Call processing ceases. The RCC2 can be in emergency stand-alone (ESA).

## Common procedures

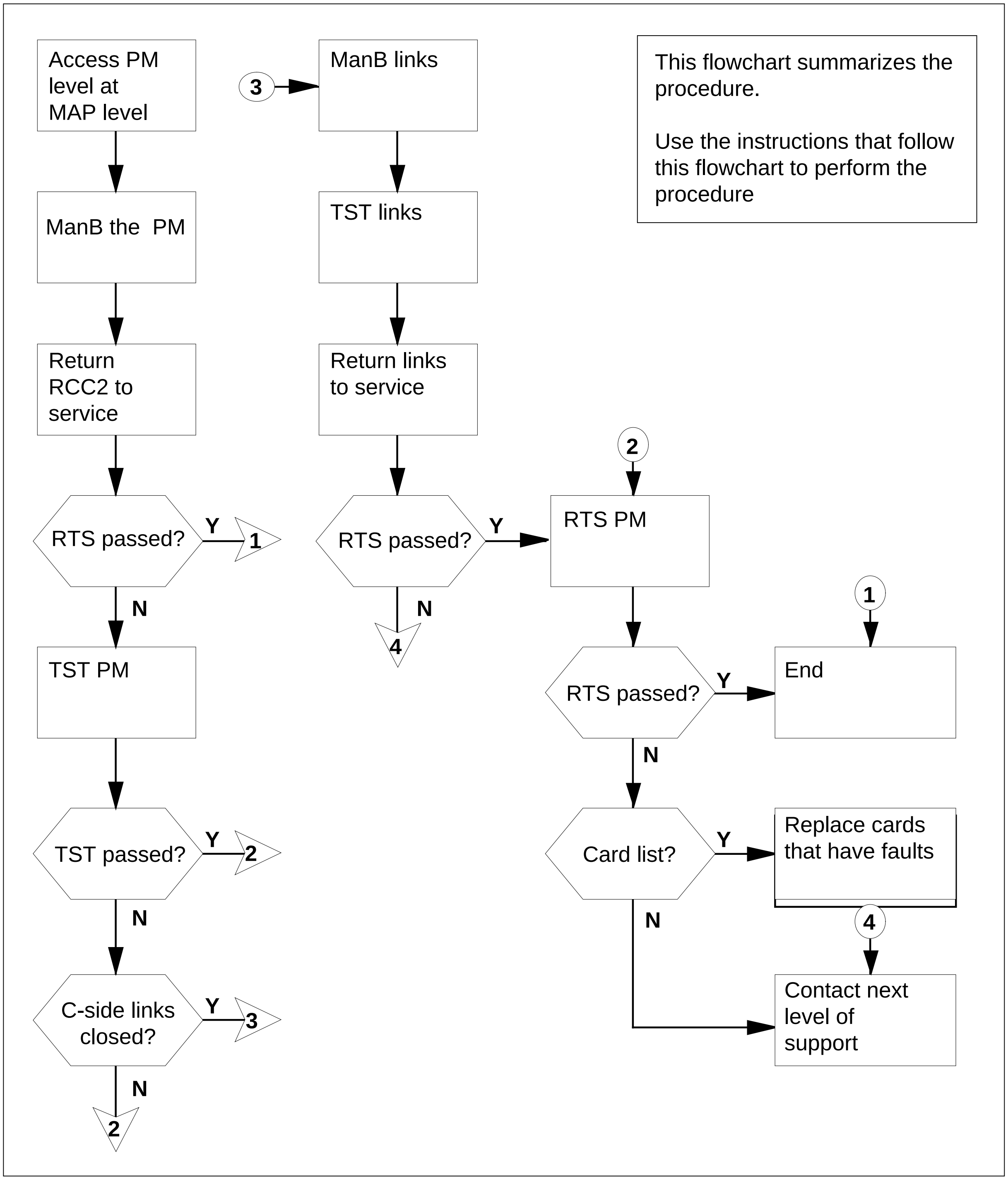
There are no common procedures.

## 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 RCC2
## critical (continued)

### Summary of a PM RCC2 critical alarm



### Clearing a PM RCC2 critical alarm

***At the MAP display***

**1**

> **ATTENTION**
> Enter this procedure from the PM system-level alarm clearing procedure step that identifies an RCC2-associated fault.

To silence the alarm, type

***>MAPCI;MTC;SIL***

and press the Enter key.

**2** To identify the RCC2 that has faults, type

***>Pm;disp STATE cbsy RCC2***

and press the Enter key.

*Example of a MAP response:*

```
CBsy  RCC2: 2
```
*or*
```
None
```

If *None* appears on the MAP screen, display the SysB RCC2. To display the SysB RCC2, type

***>disp STATE SYSB RCC2***

and press the Enter key.

*Example of a MAP response:*

```
SysB  RCC2: 2
```

**3** To post the CBsy or SysB RCC2, type

***>POST RCC2*** **rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 displayed by step 2

# PM RCC2
## critical (continued)

*Example of a MAP response:*

```
RCC2          SysB    ManB    Offl    CBsy    ISTb    InSv
     PM          3       0       1       1       4      12
    RCC2         0       0       2       1       2       9
```

**4** To check for defect 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         3        0        1        1        4        12
 2 Post_   RCC        0        0        2        1        2         9
 3 ListSet
 4         RCC    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**

**DANGER**
**The RCC2 can be in ESA**
A CBsy indicator can change to a SysB indicator. This change means that the RCC2 is in emergency stand-alone (ESA) mode. During ESA, the system generates PM180 and PM181 logs. This action indicates ESA. The system supports only local calls.

Use the following information to determine the next step.

| If the RCC2 | Do |
|---|---|
| is SysB | step 6 |
| is CBsy | step 15 |

**6** Check for PM180 and PM181 logs. These logs indicate that the RCC2 is in emergency stand-alone (ESA). You must 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 to determine reasons for the critical alarm in the RCC2. When the MAP display finishes 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 RCC2 again, type

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 displayed in step 2

| If the PM logs | Do |
|---|---|
| indicate ESA | step 35 |
| do not indicate ESA | step 11 |

## PM RCC2
## critical (continued)

**11** To manually busy the RCC2, type

***>bsy pm***

and press the Enter key.

**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 RCC2 identified in step 2

**n**
is the number of calls in progress

**13** To confirm the command in step 12, type

***>yes***

and press the Enter key.

| If RTS PM FORCE | Do |
|---|---|
| passed for both units | step 37 |
| failed for both units | step 14 |
| failed for one unit | Refer to the alarm clearing procedures for an RCC2 ISTb major alarm. |

**14** To perform an in-service test on the ManB RCC2, type

***>tst pm***

and press the Enter key.

*Example of a MAP response:*

```
Test Passed
```

*or*

```
Test Failed
```

| If TST | Do |
|---|---|
| passed | step 12 |

## PM RCC2
**critical** (continued)

| If TST | Do |
|---|---|
| failed because C-side links are closed | step 15 |
| failed and a card list appears | step 31 |

**15** To identify C-side links to the host PM that are CBsy, type

***>trnsl c***

and press the Enter key.

A host PM is a line group controller (LGC) or a line trunk controller (LTC). In the following example, the host PM is an LTC.

*Example of a MAP response:*

```
LINK 0: LTC    1 0;CAP MS;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 1: LTC    1 1;CAP  S;STATUS:  OK
LINK 2: LTC    1 2;CAP MS;STATUS:  OK,;MSGCOND:OPN,Unrestricted
LINK 4: LTC    1 4;CAP  S;STATUS:  CBsy
LINK 5: LTC    1 4;CAP  S;STATUS:  OK
LINK 6: LTC    1 4;CAP  S;STATUS:  OK
LINK 7 :LTC    1 4;CAP  S;STATUS:  OK
```

**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 an LGC(I) or an LTC(I)

**host_pm_no**
is the number of the LGC(I) or LTC(I)

# PM RCC2
## critical (continued)

*Example of a MAP display:*

```
  CM    MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
  .      .      .       .    1RCC2     .       .       .        .       .
                               *C*

LTC                 SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM         3         0         1         1         4          12
 2 Post_   LTC        0         0         2         1         2           9
 3 ListSet
 4         LTC    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: RCC2    1 0;CAP MS;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 1: RCC2    1 1;CAP  S;STATUS:  OK
LINK 2: RCC2    1 2;CAP MS;STATUS:  OK,;MSGCOND:OPN,Unrestricted
LINK 4: RCC2    1 4;CAP  S;STATUS:  ISTb
LINK 5: RCC2    1 4;CAP  S;STATUS:  OK
LINK 6: RCC2    1 4;CAP  S;STATUS:  OK
LINK 7 :RCC2    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

***Note:*** Repeat steps 18 and 19 for each link identified by step 17

| If TST on all links | Do |
|---|---|
| passed and the alarm clears | step 25 |
| failed | 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 RCC2 CKT D ALARM SLIP FRAME  BER  SES STATE
0  TRUNKS BRSC 0    2  C        0    0   1995262 0  INSV
1  REMOTE BRSC 0   12  C        0    0   1995262 0  INSV
2  REMOTE BRSC 0   13  C        0    0   1995262 0  MANB

                                            MORE . . .
```

***Note:*** The `MORE . . .` at the bottom of the display indicates you can observe more links. To observe these links, type

**>NEXT**

and press the Enter key.

**21** Carry out the repair or corrective procedures indicated in the MAP display in step 20.

***Note:*** If the MAP display indicates message links with faults, the links must be ManB before the links can be RTS.

**22** To test the ManB link, type

***>tst* link_no**

and press the Enter key.

# PM RCC2
## critical (continued)

*where*

**link_no**
is the number of the ManB link. This link number appears under the NO column as appears in the MAP display in step 20. The number for the ManB link in the example is 2.

| If TST | Do |
|---|---|
| passed and the alarm clears | step 23 |
| failed | step 36 |
| failed and the system generated 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 LGCI or LTCI posted in step 16

**host_pm_no**
is the number of the host PM

**24** To verify the status of the P-side links, type

***>TRNSL P***

and press the Enter key.

*Example of a MAP response:*

```
LINK 0: RCC2    1 0;CAP MS;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 1: RCC2    1 1;CAP  S;STATUS:  OK
LINK 2: RCC2    1 2;CAP MS;STATUS:  OK,;MSGCOND:OPN,Unrestricted
LINK 4: RCC2    1 4;CAP  S;STATUS:  OK
LINK 5: RCC2    1 4;CAP  S;STATUS:  OK
LINK 6: RCC2    1 4;CAP  S;STATUS:  OK
LINK 7 :RCC2    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:*** You must perform this step for each link that was made busy.

**26** To post the *inactive* RCC2, type

***>post* RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 identified in step 2

***Note:*** This RCC2 must be SysB.

**27** To return the *inactive* PM unit to service, type

***>RTS PM***

and press the Enter key.

| If RTS for both RCC2 units | Do |
|---|---|
| passed | step 37 |
| failed | step 28 |

**28** To manually busy the *inactive* RCC2 unit, type

***>bsy INACTIVE***

and press the Enter key.

**29** To perform an out-of-service (OOS) test on the *inactive* RCC2 unit, type

***>tst unit* unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit manually made busy in step 28

| If TST | Do |
|---|---|
| passed | step 30 |
| failed | step 31 |

**30** To return the *inactive* RCC2 unit to service, type

***>rts unit* unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 tested in step 29

| If RTS | Do |
|---|---|
| passes | step 37 |
| fails | step 36 |

## PM RCC2
### critical (continued)

**31** Check the card listing that appear on the MAP display.

The RCC2s can have the optional NTAX74AA Cellular Access Processor (CAP). For RCC2s with NTAX74AA CAP, the card list that appears in the MAP response reflects AX74 in slot 03.

For RCC2s that have the NTMX77AA Unified Processor (UP), the list reflects MX77. Both lists appear in the following examples.

*NTMX77*

*Example of a MAP response for an RCC2 configured with the NTMX77 Unified Processor:*

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :03    MX77
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :08    6X69
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :11    MX73
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :13    MX74
RSC0  01        A00 CRSC    00      05       RCC2 :  000   :05    6X78
```

*NTAX74*

*Example of a MAP response for RCC2s configured with the optional NTAX74AA Cellular Access Processor:*

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :03    AX74
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :08    6X69
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :11    MX73
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :15    MX74
RSC0  01        A00 CRSC   00  05       RCC2 :  000   :05    6X78
```

| If you | Do |
|---|---|
| replaced all cards on the list | step 32 |
| did not replace all cards on the list | step 34 |

**32** Determine if the NTMX81 circuit card has been 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.

## PM RCC2
## critical (end)

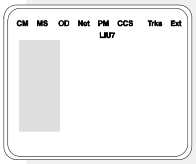
**35** *Go to Recovery Procedures for instructions on recovering the RCC2.* When you complete the recovery procedure, return to step 4. Complete the alarm clearing procedure.

**36** Contact the next level of support for additional help to clear this alarm.

**37** The procedure is complete. When other alarms appear, refer to the correct alarm clearing procedures for the indicated alarms.

# PM RCC2 major

## Alarm display



| CM | MS | IOD | Net | **PM** | CCS | Lns | Trks | Ext | APPL |
|---|---|---|---|---|---|---|---|---|---|
| . | . | . | . | **1RCC2** | . | . | . | . | . |
| | | | | **M** | | | | | |

## Indication

At the MTC level of the MAP display, the alarm code 1RCC2 appears under the PM subsystem header. The alarm code indicates an RCC2 alarm. The letter M under the alarm code indicates that the alarm class is major.

## Meaning

The indicated number of RCC2 units are in the system-busy (SysB) state.

## Result

This alarm does not affect subscriber service. If both RCC2 units fail, subscriber service ends.

## Common procedures

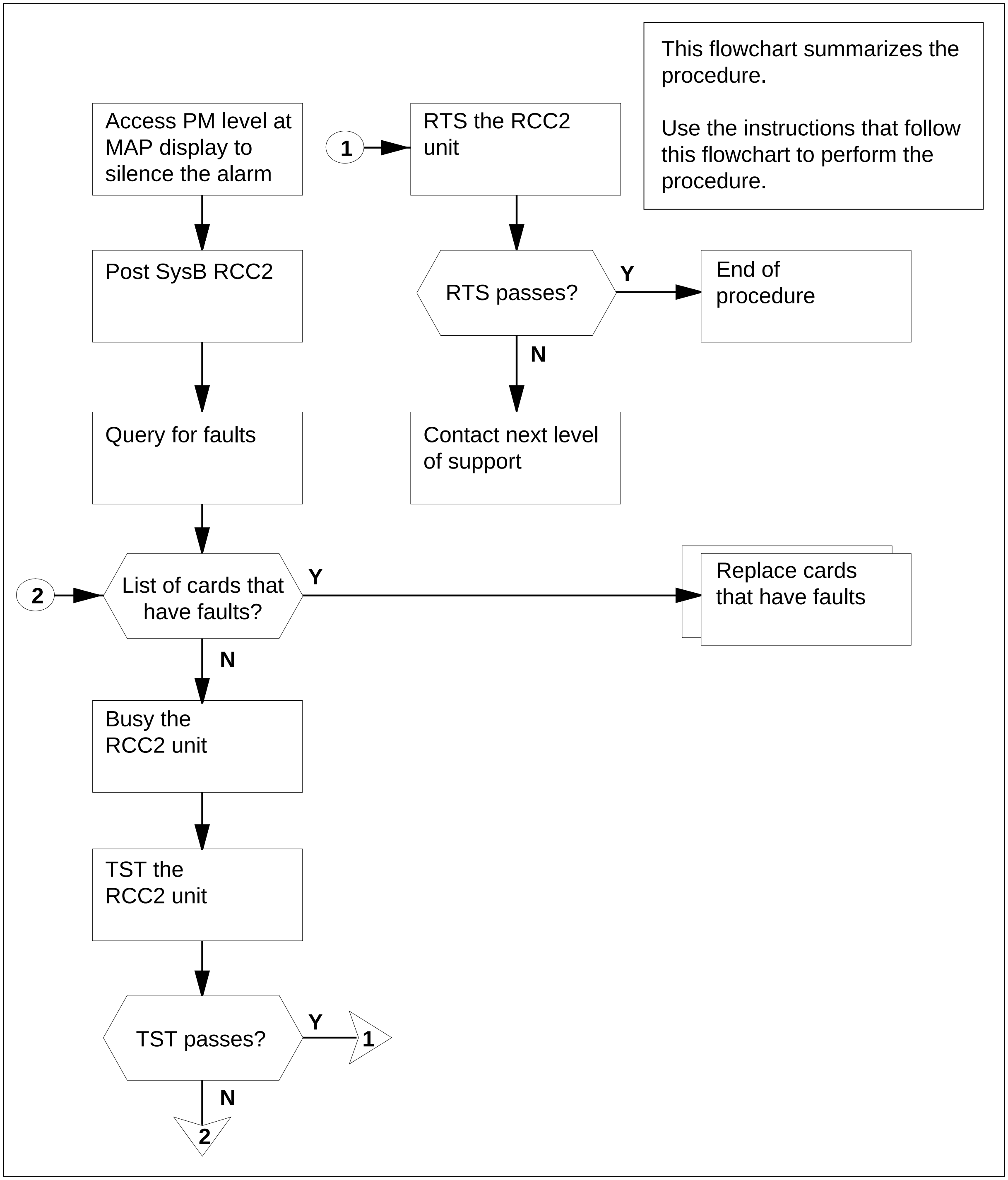
There are no common procedures.

## 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 recovery task.

## PM RCC2
## major (continued)

**Summary of clearing a PM RCC2 major alarm**



# PM RCC2
## major (continued)

### Clearing a PM RCC2 major alarm

***At the MAP display***

**1**

> **ATTENTION**
> Enter this procedure from a PM system-level alarm clearing procedure step that identified an RCC2-associated fault.

To silence the alarm, if required, type

**>MAPCI;MTC;PM;SIL**

and press the Enter key.

**2** To identify the RCC2 that has faults, type

**>DISP STATE SYSB RCC2**

and press the Enter key.

*Sample response on the MAP display:*
SysB RCC2 : 2

**3** To post the SysB RCC2, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 displayed in step 2

*Sample response on the MAP display:*

```
RCC2  2      SysB    ManB    Offl    CBsy    ISTb    InSv
          PM      3       0       1       0       4      12
          RCC2    1       0       2       0       2       9
```

**4** To check for fault indicators, type

**>QUERYPM FLT**

and press the Enter key.

## PM RCC2
**major** (continued)

*Sample response on the 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
 7 Bsy_    QUERYPM FLT
 8 RTS_         Unit0  No fault exists
 9 OffL         Unit1  Reset
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

| If the system | Do |
|---|---|
| indicates a card that has faults | step 24 |
| does not indicate a card that has faults | step 5 |

**5** To manually busy the SysB RCC2 unit, type

**>BSY INACTIVE**

and press the Enter key.

**6** To test the ManB RCC2, type

**>TST UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit manually busied in step 5

# PM RCC2
## major (continued)

*Sample response on the MAP display:*

```
Test Passed
```
*or*
```
Test Failed
```

| If TST | Do |
|---|---|
| passes | step 23 |
| fails and the system generates a card list | step 24 |
| fails and the system generates a card list | step 7 |

**7** To identify C-side links to the host PM that is in a SysB condition, type

**>TRNSL C**

and press the Enter key.

A host PM can be any of the following:

- a line group controller (LGC)
- a line group controller with ISDN (LGCI)
- a line trunk controller (LTC)
- a line trunk controller with ISDN (LTCI)

In the following example, the host PM is an LTCI.

*Sample response on the MAP display:*

```
LINK 0:   LTC(I)    1 0;CAP MS;STATUS:  OK,;MSGCOND:OPN,Restricted
LINK 1:   LTC(I)    1 1;CAP  S;STATUS:  OK
LINK 2:   LTC(I)    1 2;CAP MS;STATUS:  SysB,;MSGCOND:CLS,Unrestricted
LINK 4:   LTC(I)    1 4;CAP  S;STATUS:  ISTb
LINK 5:   LTC(I)    1 4;CAP  S;STATUS:  OK
LINK 6:   LTC(I)    1 4;CAP  S;STATUS:  OK
LINK 7:   LTC(I)    1 4;CAP  S;STATUS:  OK
```

| If link | Do |
|---|---|
| is not busy | step 28 |
| is a message link or a speech link | step 8 |

**8** To post the host PM, type

**>POST host_pm  host_pm_no**

and press the Enter key.

*where*

**host_pm**
is either an LGCI or an LTCI

**host_pm_no**
is the number of the LGCI or LTCI

*Sample response on the MAP display:*

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext    APPL
 .      .      .       .     1RCC2    .       .       .        .      .
                                M

LTC(I)            SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM        1         0         1         0         1         12
 2 Post_   LTC(I)    0         0         2         0         1          9
 3 ListSet
 4         LTC(I) 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:   RCC2  1   0;CAP MS;STATUS:OK,;MSGCOND:OPN,Restricted
LINK 1:   RCC2  1   1;CAP  S;STATUS:OK
LINK 2:   RCC2  1   2;CAP MS;STATUS:SysB,;MSGCOND:CLS,Unrestricted
LINK 4:   RCC2  1   4;CAP  S;STATUS:ISTb
LINK 5:   RCC2  1   4;CAP  S;STATUS:OK
LINK 6:   RCC2  1   4;CAP  S;STATUS:OK
LINK 7:   RCC2  1   4;CAP  S;STATUS:OK
```

**10** To busy the link that has faults, type

**>BSY LINK  link_no**

and press the Enter key.

# PM RCC2
## major (continued)

*where*

**link_no**
is the number of the P-side link selected 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 28 |
| passes and alarm clears | step 16 |
| fails | step 12 |

**12** To display links that can 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  1995262  0  INSV
1   REMOTE  BRSCS    0    1   C             0       0  1995262  0  INSV
2   REMOTE  BRSCS    0    2   C             0       0  1995262  0  MANB

                                                       MORE ....
```

***Note:*** The MORE at the bottom of the display indicates that the user can observe more links. To observe these links, type

**>NEXT**

and press the Enter key.

**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 shown in the MAP display in step 12. The number for the ManB link in the example is 2.

| If TST | Do |
|---|---|
| passes and alarms clear | step 15 |
| fails | step 28 |

**14** Perform the repair or corrective procedure on the link that the MAP display indicates in step 12.

***Note:*** The system can indicate message links that have faults. These links must be in the ManB state before you can return the links to service.

**15** 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 (LGCI or LTCI) posted in step 8

**host_pm_no**
is the number of the host PM (LGCI or LTCI)

**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 28 |

**17** To post the RCC2, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 identified in step 2

***Note:*** This RCC2 must be SysB.

## PM RCC2
## major (continued)

**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 RCC2 posted in step 17

| If RTS | Do |
|---|---|
| passes | step 19 |
| fails | step 28 |

**19** To perform a switch of activity (SwAct) of the RCC2 units to make sure the unit to test is *inactive*, type

**>SWACT**

and press the Enter key.

*Sample response on the MAP display:*

```
RCC2   1    A Warm SwAct will be performed
Please confirm (“YES” “Y” or “NO” “N”)
```

**20** 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 proceed.

| If SWACT | Do |
|---|---|
| passes | step 21 |
| fails | step 28 |

**21** To busy the *inactive* RCC2 unit, type

**>BSY INACTIVE**

and press the Enter key.

**22** To perform an out-of-service (OOS) test on the *inactive* RCC2 unit, type

**>TST UNIT unit_no**

and press the Enter key.

# PM RCC2
## major (continued)

*where*

**unit_no**
is the number of the RCC2 unit busied in step 21

| If TST | Do |
|---|---|
| passes | step 23 |
| fails | step 24 |

**23** To return the *inactive* RCC2 unit to service, type

**>RTS UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit tested in step 22

| If RTS | Do |
|---|---|
| passes | step 29 |
| fails | step 28 |

**24** Check the card list shown in the following MAP display.

The following MAP display has two examples of provisioning. The first card list displays RCC2s provisioned with the NTMX77AA unified processor (UP), with MX77 in slot 03. The second card list displays RCC2s provisioned with the optional NTAX74AA cellular access processor (CAP), with AX74 in slot 03.

*NTMX77*

*Example of a MAP response for an RCC2 configured with the NTMX77 Unified Processor:*

```
SITE      FLR  RPOS BAY_ID         SHF        DESCRIPTION  SLOT   EQPEC
RSC0      01   A00  CRSC  00       05         RCC2 :  000   :03    MX77
RSC0      01   A00  CRSC  00       05         RCC2 :  000   :08    6X69
RSC0      01   A00  CRSC  00       05         RCC2 :  000   :11    MX73
RSC0      01   A00  CRSC  00       05         RCC2 :  000   :13    MX74
RSC0      01   A00  CRSC  00       05         RCC2 :  000   :05    6X78
```

*NTAX74*

# PM RCC2
# major (end)

*Example of a MAP response for RCC2s configured with the optional NTAX74AA Cellular Access Processor:*

```
SITE      FLR       RPOS BAY_ID    SHF       DESCRIPTION  SLOT   EQPEC
RSC0      01         A00 CRSC   00  05       RCC2 :  000   :03    AX74
RSC0      01         A00 CRSC   00  05       RCC2 :  000   :08    6X69
RSC0      01         A00 CRSC   00  05       RCC2 :  000   :11    MX73
RSC0      01         A00 CRSC   00  05       RCC2 :  000   :15    MX74
RSC0      01         A00 CRSC   00  05       RCC2 :  000   :05    6X78
```

| If you | Do |
|---|---|
| replaced all cards on the list | step 25 |
| did not replace all cards on the list | step 27 |

**25** Determine if you replaced the NTMX81 circuit card.

| If you | Do |
|---|---|
| replaced the NTMX81 card | step 28 |
| did not replace the NTMX81 card | step 26 |

**26** Go to the card replacement procedure for the NTMX81 circuit card in *Card Replacement Procedures*. Complete the card replacement procedures. Go to step 13 of this procedure.

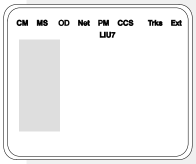
**27** Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 22 of this procedure.

**28** For additional help, contact the next level of support.

**29** The procedure is complete. If other alarms occur, refer to the appropriate alarm clearing procedures for the indicated alarms.

# PM RCC2
# minor

## Alarm display



| CM | MS | IOD | Net | **PM** | CCS | Lns | Trks | Ext | APPL |
|---|---|---|---|---|---|---|---|---|---|
| . | . | . | . | **1RCC2** | . | . | . | . | . |

## Indication

A 1RCC2 under the PM subsystem header at the MTC level of the MAP display indicates an RCC2 minor alarm.

## Meaning

The indicated number of RCC2 units are in the in-service trouble (ISTb) state.

## Impact

This condition does not affect subscriber service.

## Common procedures

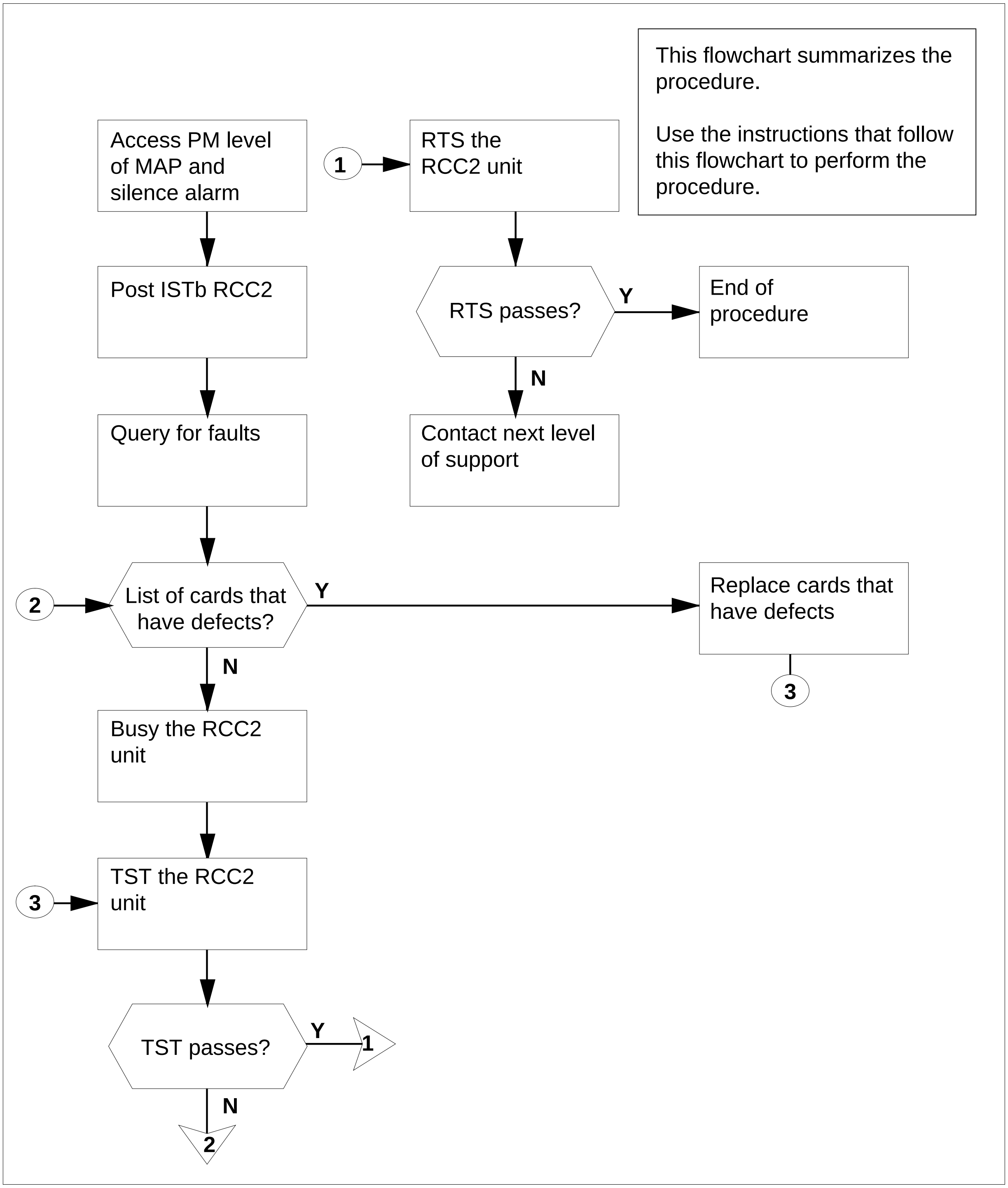
There are no common procedures.

## 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 RCC2
## minor (continued)

**Summary of clearing a PM RCC2 minor alarm**



# PM RCC2
## minor (continued)

### Clearing a PM RCC2 minor alarm

***At the MAP display***

**1**

> **ATTENTION**
> You must enter this procedure from a peripheral module (PM) system-level alarm clearing procedure step that identified an RCC2-associated fault.

To silence the alarm, type

**>MAPCI;MTC;PM;SIL**

and press the Enter key.

**2** To identify the defective RCC2, type

**>DISP STATE ISTB RCC2**

and press the Enter key.

*Normal response on the MAP display:*
ISTb RCC2 : 2

**3** To post the ISTb RCC2, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 displayed in step 2

*Normal response on the MAP display:*

```
RCC2            SysB      ManB      Offl      CBsy      ISTb      InSv
        PM         0         0         1         0         4        12
        RCC2       0         0         2         0         2         9
```

**4** To check for fault indicators, type

**>QUERYPM  FLT**

and press the Enter key.

## PM RCC2
## minor (continued)

*Normal response on the MAP display:*

```
 CM     MS    IOD    Net    PM    CCS    Lns    Trks    Ext   APPL
 .      .      .      .    1RCC2   .      .       .      .      .


RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        1        0        1         12
 2 Post_   RCC2     0        0        2        0        1          9
 3 ListSet
 4         RCC2   0 ISTb  Links_OOS:  CSide  1, PSide   0
 5 TRNSL_  Unit0:   Act InSv
 6 Tst_    Unit1:   Inact ISTb
 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 | 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 RCC2 unit, type

**>BSY UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the ISTb RCC2 indicated in step 4

**6** To test the ManB RCC2, type

**>TST UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit manually busied in step 5

*Normal response on the MAP display:*

```
Test Passed
    or
Test Failed
```

| If TST | Do |
|---|---|
| passes | step 25 |
| fails, and the system generates a card list | step 26 |
| fails, and the system does not generate 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.

A host PM can be:

- a line group controller (LGC)
- a line group controller with ISDN (LGCI)
- a line trunk controller (LTC)
- a line trunk controller with ISDN (LTCI)

In the following example, the host PM is an LTCI.

*Normal response on the MAP display:*

```
LINK 0:   LTC(I)    1    0;CAP MS;STATUS:    OK,;MSGCOND: OPN,Restricted
LINK 1:   LTC(I)    1    1;CAP  S;STATUS:    OK
LINK 2:   LTC(I)    1    2;CAP MS;STATUS:    OK,;MSGCOND:OPN,Unrestricted
LINK 4:   LTC(I)    1    4;CAP  S;STATUS:    SysB
LINK 5:   LTC(I)    1    4;CAP  S;STATUS:    OK
LINK 6:   LTC(I)    1    4;CAP  S;STATUS:    OK
LINK 7:   LTC(I)    1    4;CAP  S;STATUS:    OK
```

**8** To post the host PM, type

**>POST host_pm host_pm_no**

and press the Enter key.

*where*

**host_pm**
is an LGCI or an LTCI

**host_pm_no**
is the number of the LGCI or LTCI

# PM RCC2
## minor (continued)

*Normal response on the MAP display:*

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks      Ext    APPL
 .      .      .       .     1RCC2    .       .        .        .       .


LTC(I)           SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM       0         0         1         0         4         12
 2 Post_   LTC(I)   0         0         2         0         2          9
 3 ListSet
 4         LTC(I) 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 peripheral-side (P-side) links that have defects, type

**>TRNSL P**

and press the Enter key.

*Normal response on the MAP display:*

```
LINK 0:   RCC2      1    0;CAP MS;STATUS:    OK,;MSGCOND: OPN,Restricted
LINK 1:   RCC2      1    1;CAP  S;STATUS:    OK
LINK 2:   RCC2      1    2;CAP MS;STATUS:    OK,;MSGCOND:OPN,Unrestricted
LINK 4:   RCC2      1    4;CAP  S;STATUS:    ISTb
LINK 5:   RCC2      1    4;CAP  S;STATUS:    OK
LINK 6:   RCC2      1    4;CAP  S;STATUS:    OK
LINK 7:   RCC2      1    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 chosen in step 9

**11** 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 10

| If TST | Do |
|---|---|
| passes and alarm persists | 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.

*Normal 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     1995262   0     INSV
1   REMOTE BRSCS     0    1    C         0    0     1995262   0     INSV
2   REMOTE BRSCS     0    2    C         0    0     1995262   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.

**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 listed under the NO column as shown 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 |

## PM RCC2
**minor** (continued)

**14** Carry out the repair/corrective procedure that the MAP display in step 12 indicates.

> ***Note:*** If the system indicates defective message links, these links must be ManB before you return to service (RTS) these links.

**15** 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 (LGCI or LTCI) posted in step 8

**host_pm_no**
is the number of the host PM (LGCI or LTCI)

**16** Use the information displayed in step 7 to determine which RCC2 unit associates with the SysB link. The unit identified must be *inactive* to continue.

| If RCC2 unit | Do |
|---|---|
| is inactive | step 27 |
| is active | step 17 |

**17** 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

**18** To post the RCC2, type

**>POST rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 identified in step 2

> ***Note:*** This RCC2 must be SysB.

**19** To return the *inactive* unit to service, type

**>RTS UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 posted in step 18

## PM RCC2
**minor** (continued)

**20** To post the host PM, type

**>POST host_pm host_pm_no**

and press the Enter key.

*where*

**host_pm**
is an LGCI or an LTCI

**host_pm_no**
is the number of the LGCI or LTCI

**21** To switch activity (SwAct) of the RCC2 units to make sure that the unit to test is *inactive*, type

**>SWACT**

and press the Enter key.

*Normal response on the MAP display:*

```
RCC2   1    A Warm SwAct will be performed
Please confirm (“YES” or “NO”)
```

**22** To confirm the SwAct initiated in step 21, type

**>YES**

and press the Enter key.

After both units are in service, proceed to the next step.

| If SWACT | Do |
|---|---|
| passes | step 23 |
| fails | step 30 |

**23** To busy the *inactive* RCC2 unit, type

**>BSY UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the *inactive* RCC2 unit (from step 19)

**24** To perform an out-of-service (OOS) test on the *inactive* RCC2 unit, type

**>TST UNIT unit_no**

and press the Enter key.

## PM RCC2
## minor (continued)

*where*

**unit_no**
is the number of the RCC2 unit busied in step 23

| If TST | Do |
|---|---|
| passes | step 25 |
| fails | step 26 |

**25** To return the *inactive* RCC2 unit to service, type

**>RTS UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit tested in step 24

| If RTS | Do |
|---|---|
| passes | step 31 |
| fails | step 30 |

**26** Observe the card listing shown in the following MAP display.

*Normal response on the MAP display:*

```
 SITE     FLR       RPOS BAY_ID        SHF  DESCRIPTION    SLOT EQPEC
RSCS0      01        A00 RCE    00      32  RCC2 :  000    : 09  MX81
RSCS0      01        A00 RCE    00      32  RCC2 :  000    : 08  6X69
```

| If all cards on the list | Do |
|---|---|
| are replaced | step 27 |
| are not replaced | step 29 |

**27** Determine if the NTMX81 circuit card is replaced.

| If the NTMX81 card | Do |
|---|---|
| is replaced | step 30 |
| is not replaced | step 28 |

**28** Go to the card replacement procedure for the NTMX81 circuit card in *Card Replacement Procedures*. When the card replacement procedures are complete, go to step 24 of this procedure.

## PM RCC2
## minor (end)

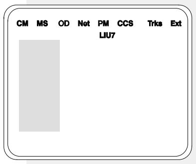
**29** Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. When the card replacement procedures are complete, go to step 24 of this procedure.

**30** For additional help, contact the next level of support.

**31** This procedure is complete. If the system displays other alarms, reference the correct alarm clearing procedures for the indicated alarms.

# PM RMM major

## Alarm display



| CM | MS | IOD | Net | **PM** | Lns | Trks | Ext | APPL |
|---|---|---|---|---|---|---|---|---|
| . | . | . | . | **1SysB** | . | . | . | . |
| | | | | **M** | | | | |

## Indication

At the MTC level of the MAP display, the alarm code 1SysB under the PM subsystem header indicates an alarm involving a remote maintenance module (RMM). The letter *M* under the alarm code indicates the alarm status 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. The condition does not affect subscriber service.

## Common procedures

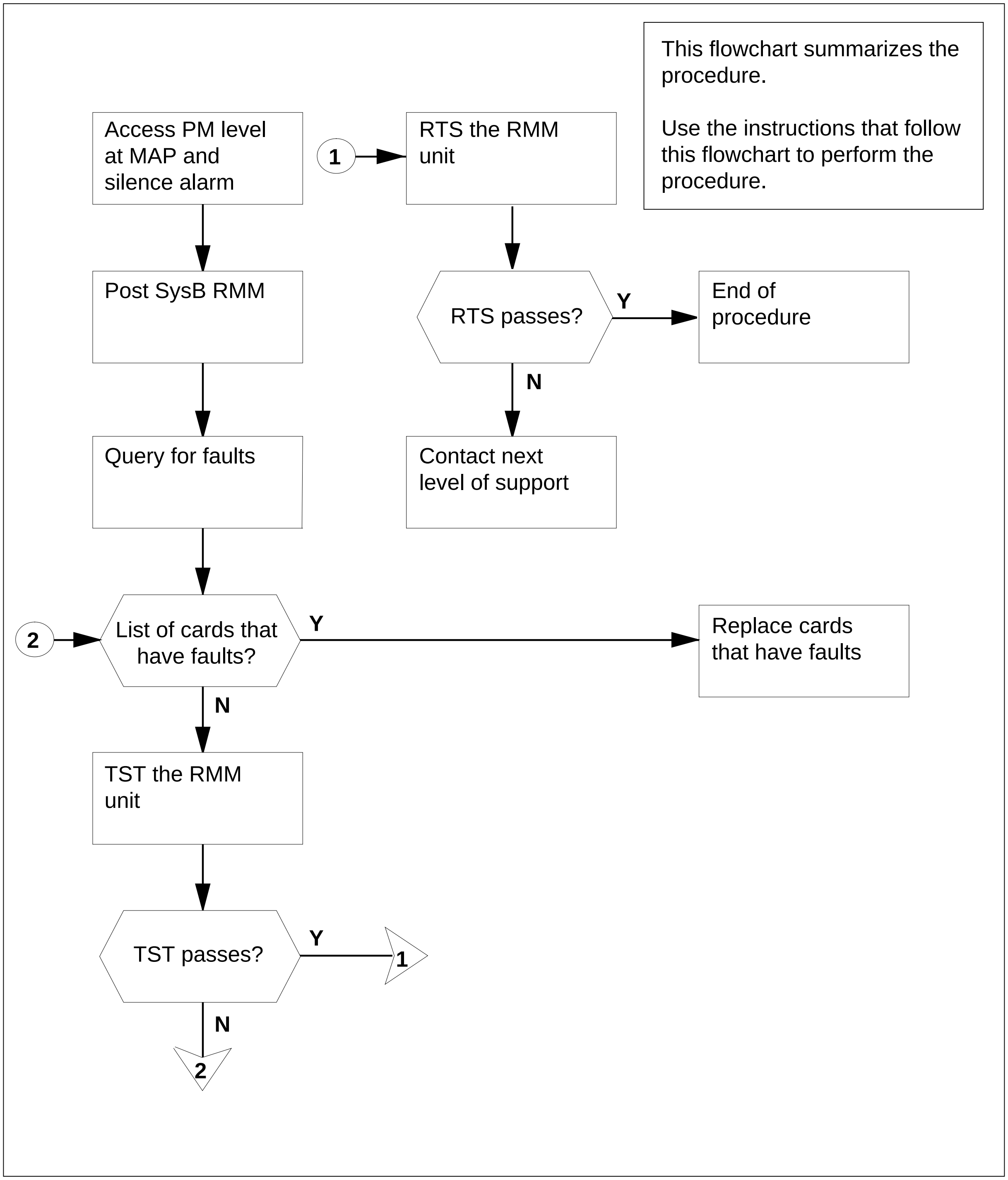
There are no common procedures.

## 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

**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

# PM RMM
## major (continued)

*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.

# PM RMM
## major (continued)

*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.

**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 |

| **If TST** | **Do** |
|---|---|
| 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 RCC2 in a busy condition, type

***>trnsl C***

and press the Enter key.

*Example of a MAP response:*

```
LINK 22:  RCC2 2    0;CAP S;STATUS:     OK,;MSGCOND:   OPN,Restricted
LINK 23:  RCC2 2    1;CAP S;STATUS:     SYSB
```

**8** To post the RCC2 unit associated with the RMM, type

***>post RCc2* rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 unit from step 7

*Example of a MAP display:*

```
  CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
  .      .      .       .     1SysB    .       .        .        .       .


RCC2               SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM       3         0         1         1         4          12
 2 Post_   RCC2     0         0         2         1         2           9
 3 ListSet
 4         RCC2   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
```

# PM RMM
## major (continued)

**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

**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

***Note:*** The system can identify other links that have faults. Perform steps 11 through 13 for each link until the links are made busy, tested, and returned to service.

| If RTS | Do |
|---|---|
| passes | step 13 |
| fails | step 16 |

## PM RMM
## major (continued)

**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
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 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.

> ***Note:*** If the card list indicates the NTMX74 card, check if one link or several links have faults. Repeat the alarm clearing procedure.

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

**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.

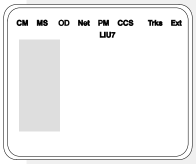
**19** Perform the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Finish with the card replacement procedures. Go to step 14.

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

**21** The procedure is complete. If other alarms appear at the MAP display, perform the appropriate alarm clearing procedure.

# PM RMM minor

## Alarm display



| CM | MS | IOD | Net | **PM** | Lns | Trks | Ext | APPL |
|---|---|---|---|---|---|---|---|---|
| . | . | . | . | **1CBsy** | . | . | . | . |

## Indication

At the MTC level of the MAP display, the 1CBsy under the peripheral module (PM) subsystem header indicates a minor alarm associates with a remote maintenance module (RMM).

## Meaning

The indicated number of units are in the C-side busy (CBsy) state.

## Impact

This CBsy state does not affect subscriber service. Local RMM backup is not available if the unit (or both units if the RCE contains two RMMs) fails.

## Common procedures

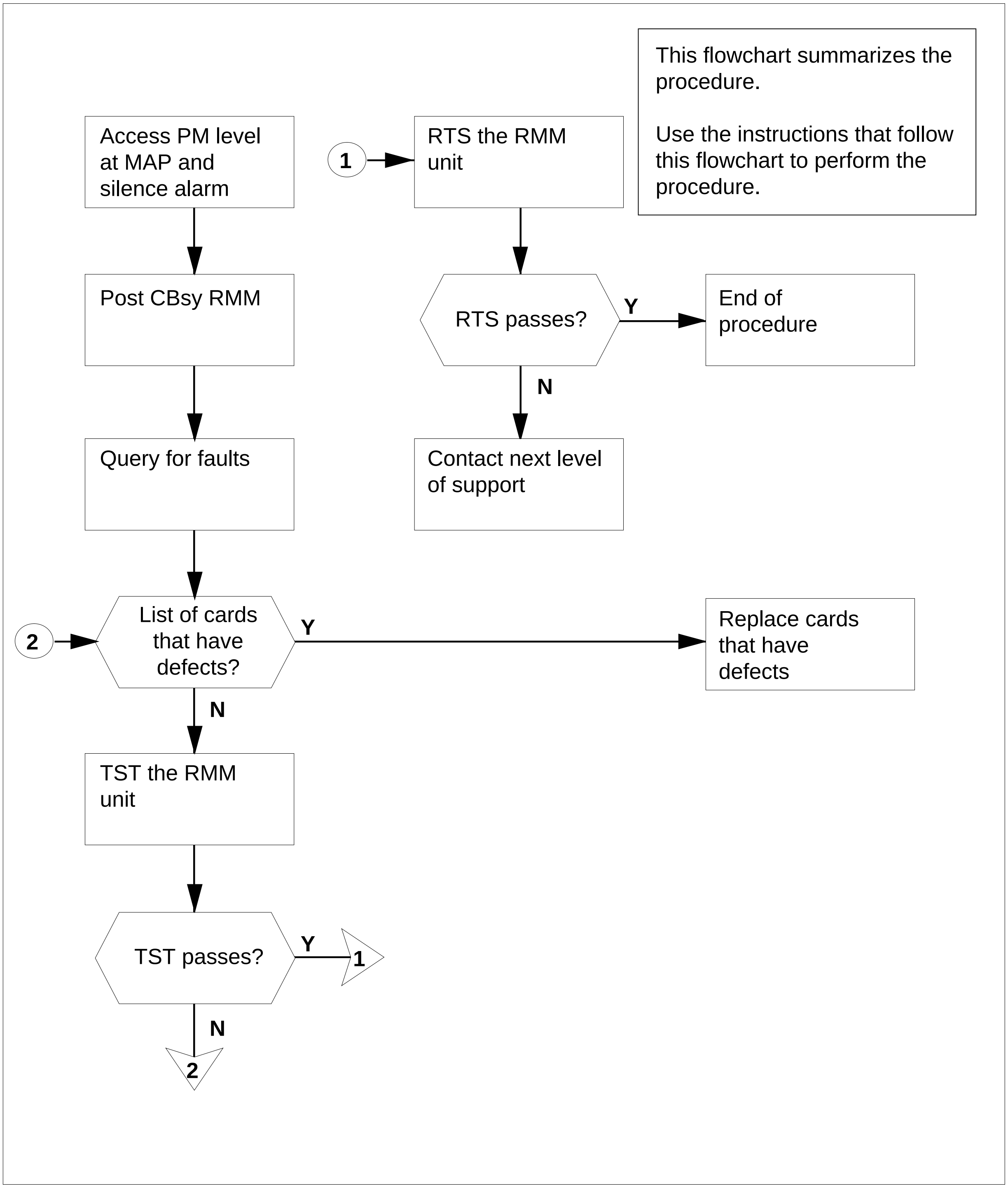
There are no common procedures.

## 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 a PM RMM minor alarm**



### Clearing an PM RMM minor alarm

***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

**3** To post the central-side busy (CBsy) RMM 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

# PM RMM
## minor (continued)

*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.

## PM RMM
**minor** (continued)

*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.

**6** To perform an in-service test on the RMM that has defects, type

**>TST**

and press the Enter key.

# PM RMM
## minor (continued)

*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 RCC2 that are in a busy condition, type

**>TRNSL C**

and press the Enter key.

*Example of a MAP response:*

```
LINK 22:  RCC2 2 0;CAP  S;STATUS:  OK,;MSGCOND: OPN,Restricted
LINK 23:  RCC2 2 1;CAP  S;STATUS:  CBSY
```

**8** To post the RCC2 unit associated with the RMM, type

**>POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the RCC2 unit in step 7

*Example of a MAP display:*

```
 CM    MS     IOD     Net     PM     CCS     LNS     Trks     Ext     APPL
 .     .      .       .     1CBsy    .       .        .        .       .


RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        4        12
 2 Post_   RCC2      0        0        0        0        2         9
 3 ListSet
 4         RCC2   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 a link that has defects and busy the link, type

**>BSY LINK  link_no**

and press the Enter key.

*where*

**link_no**
is the number of the link in step 9 (22 or 23)

**11** To test the manually busied (MANB) link, type

**>TST LINK  link_no**

and press the Enter key.

# PM RMM
## minor (continued)

*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 16 |

**12** To RTS the ManB link, 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 RTSs all links.

**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 RTS the ManB RMM, type

**>RTS**

# PM RMM
## minor (end)

and press the Enter key.

| If RTS | Do |
|---|---|
| passes | step 21 |
| fails | step 20 |

**16** Check the card listing 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 |

**17** Determine if the NTMX74 circuit card was replaced.

> ***Note:*** If the system indicates the NTMX74 card, check if one link or several links have defects. Repeat the alarm clearing procedure as required.

| If the NTMX74 card | Do |
|---|---|
| is replaced | step 20 |
| is not replaced | step 18 |

**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** This procedure is complete. If the system displays other alarms, perform the appropriate alarm clearing procedures.

# 6 RSC-S card replacement procedures

This document contains the card replacement procedures for the DMS-100 Remote Switching Center-SONET (RSC-S). These procedures are used by maintenance personnel to remove and replace circuit packs.

# NT0X10
# in an RSC-S (DS-1) Model A RMM

## Application

Use this procedure to replace an NT0X10 card in an RSC-S RMM.

| PEC | Suffixes | Name |
|---|---|---|
| NT0X10 | AA | Miscellaneous Scan Card (MSC) |

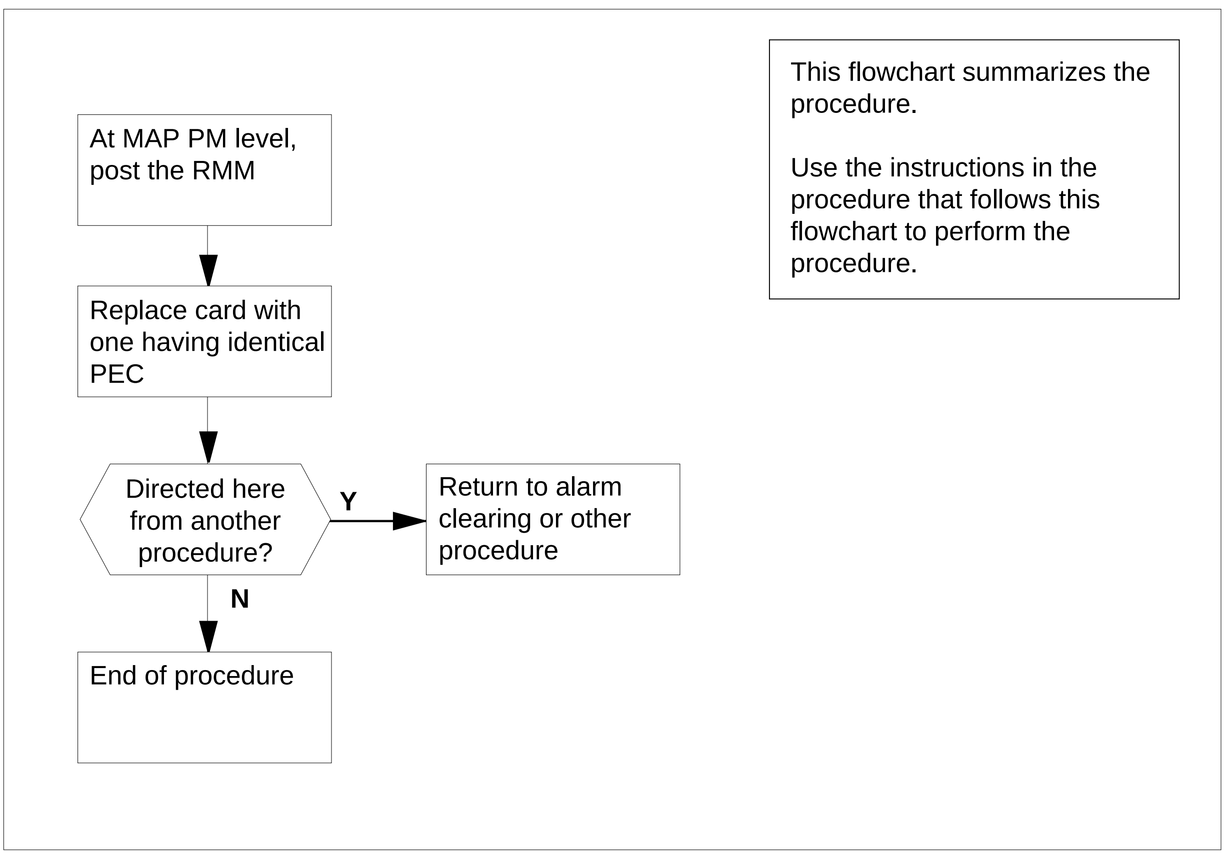
## Common procedures

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 an RSC-S (DS-1) Model A RMM (continued)

### Replacing an NT0X10 card in RSC-S RMM

***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 a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

**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
```

**4** Busy the RMM by typing

**>BSY**

and pressing the Enter key.

## NT0X10
## in an RSC-S (DS-1) Model A 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  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**

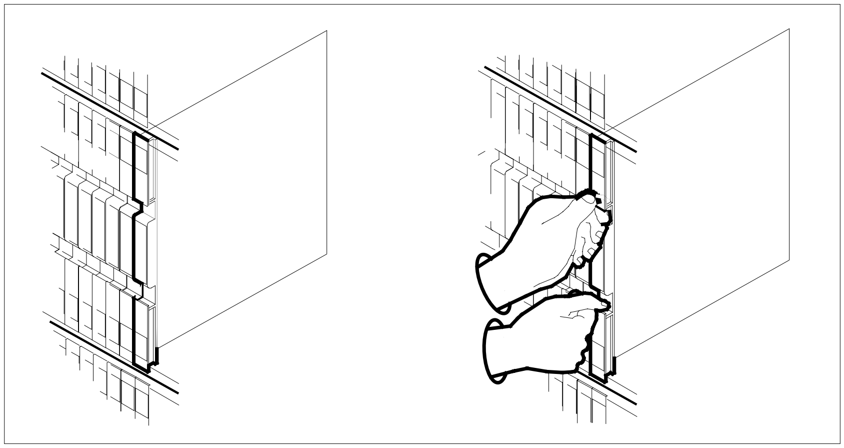
**DANGER**
**Static discharge may cause damage to circuit packs**
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

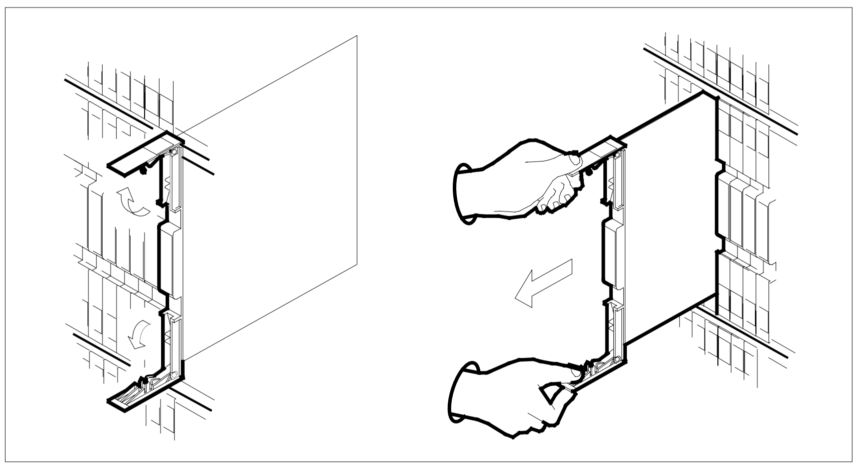
**6** Remove the NT0X10 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT0X10
## in an RSC-S (DS-1) Model A RMM (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.

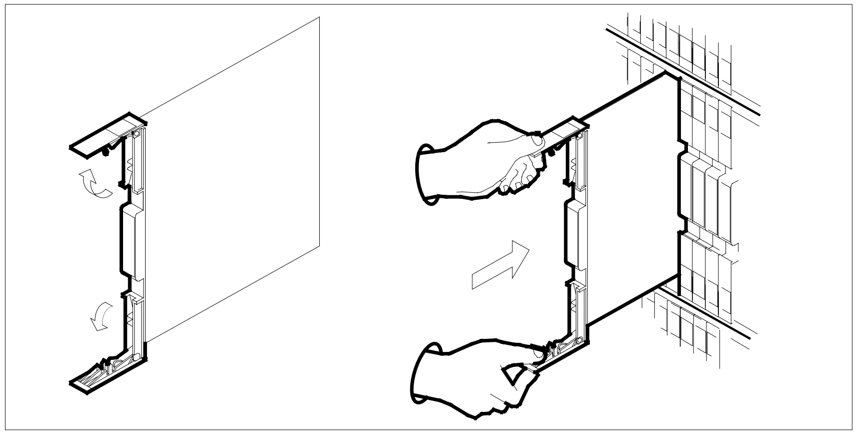
**d** Set the switch settings on the card to match those of the card you are replacing.

**7** Open the locking levers on the replacement card.

**a** Align the card with the slots in the shelf.

**b** Gently slide the card into the shelf.

## NT0X10
## in an RSC-S (DS-1) Model A RMM (continued)



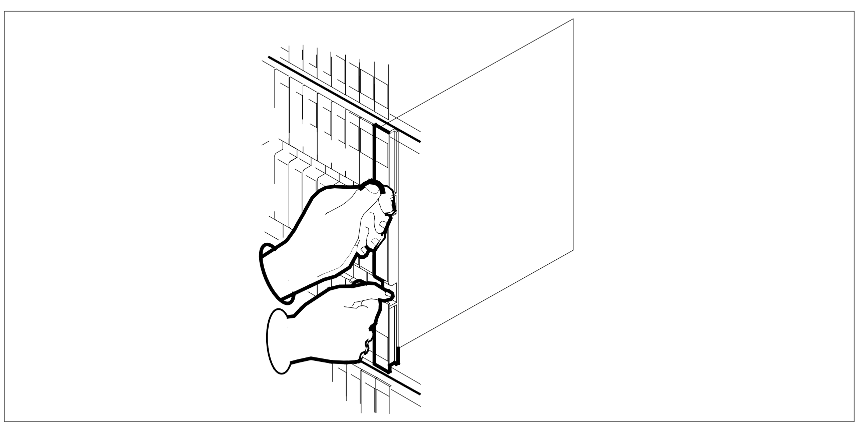
**8**

> **DANGER**
> **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.



## NT0X10
## in an RSC-S (DS-1) Model A RMM (end)

**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 an RSC-S (DS-1) Model A 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

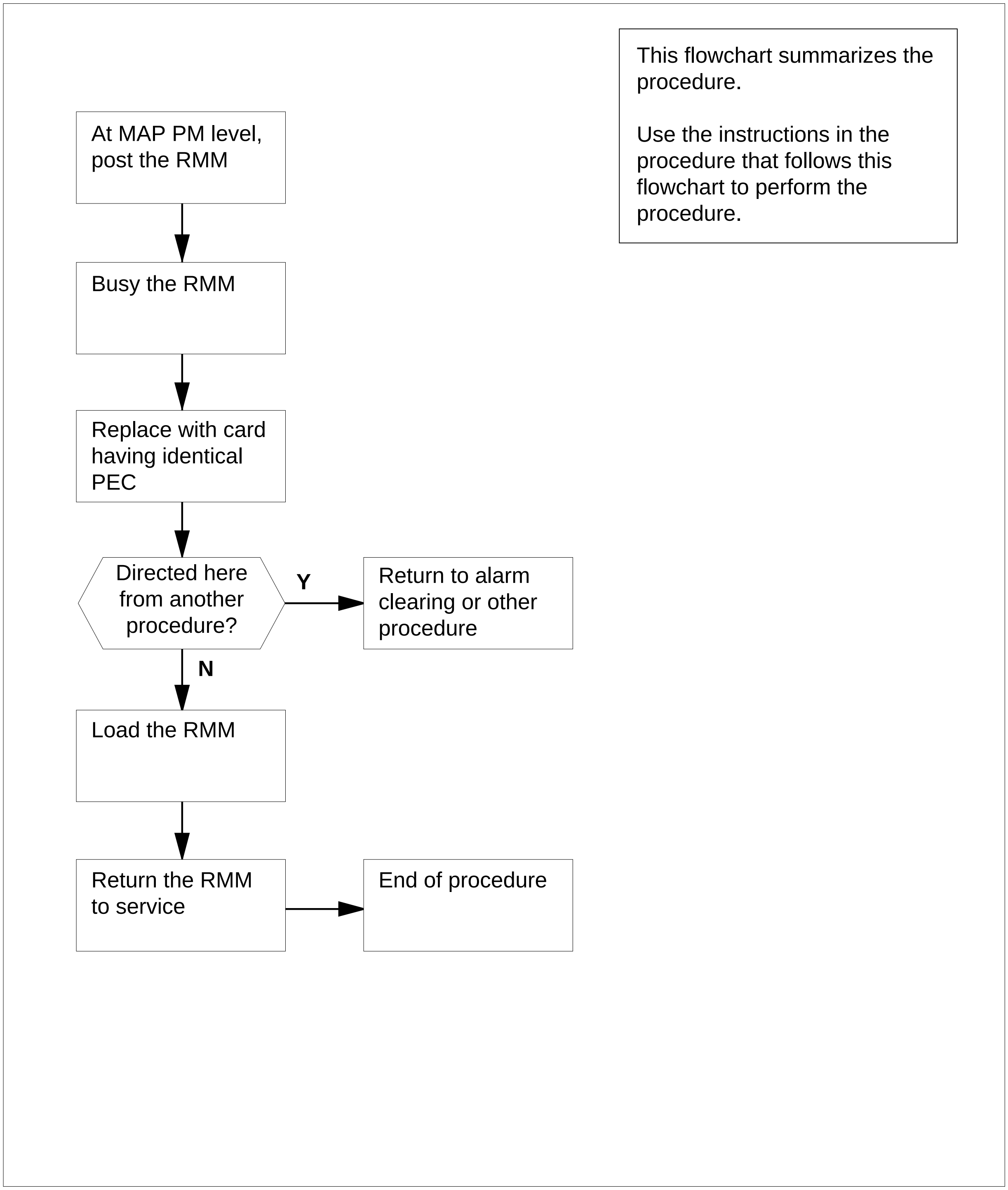
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X06 card in RSC-S RMM**



# NT2X06
# in an RSC-S (DS-1) Model A 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.

## NT2X06
## in an RSC-S (DS-1) Model A 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** 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

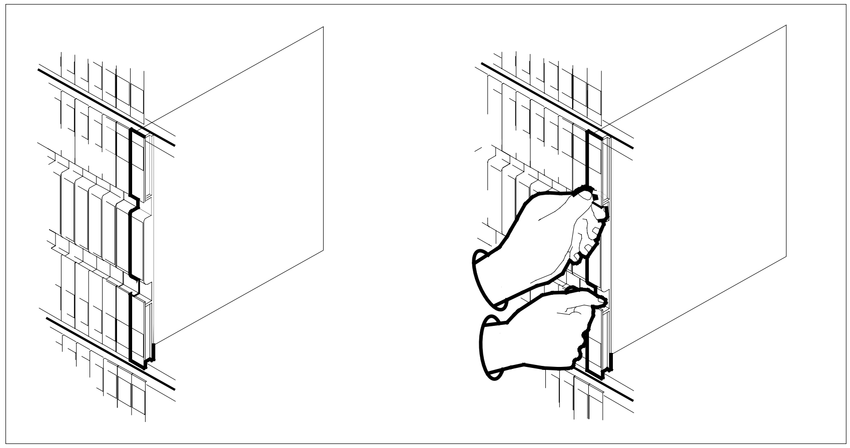
***>sil***

and pressing the Enter key.

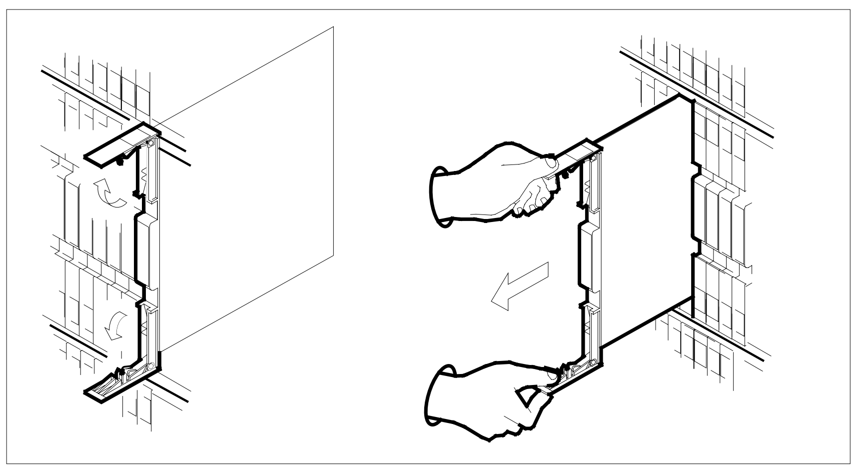
**7** Remove the NT2X06 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT2X06
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



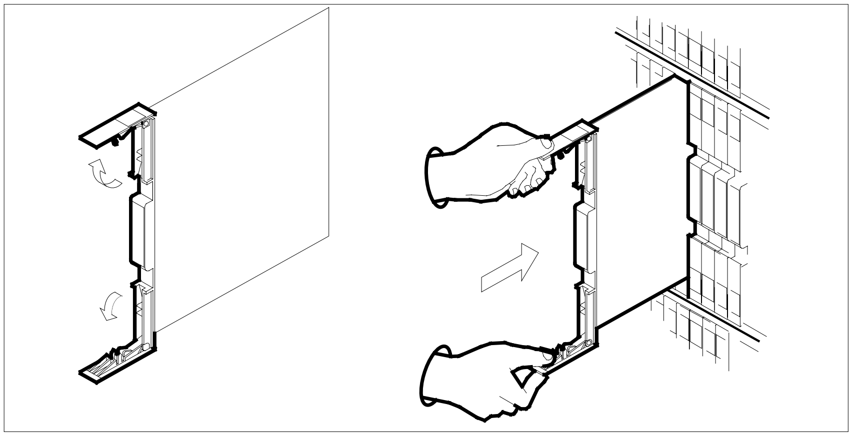
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT2X06
## in an RSC-S (DS-1) Model A RMM (continued)



**9**

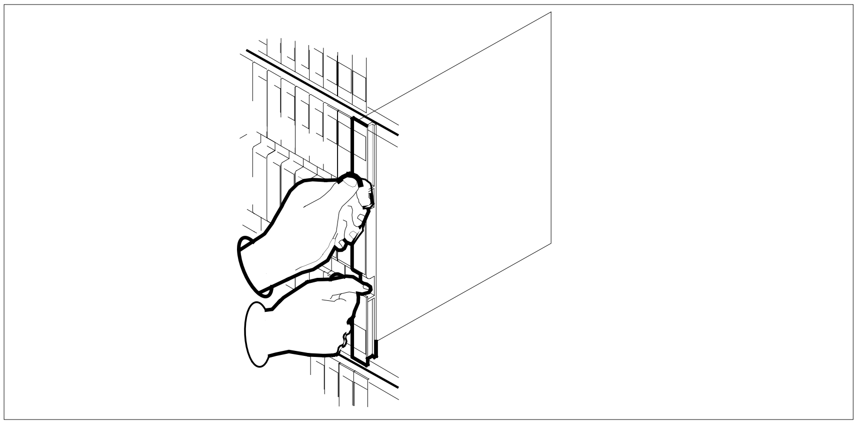
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

**b** Close the locking levers.



## NT2X06
## in an RSC-S (DS-1) Model A RMM (continued)

**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 |

## NT2X06 in an RSC-S (DS-1) Model A RMM (continued)

**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.

**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***

## NT2X06
## in an RSC-S (DS-1) Model A RMM (end)

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 |

**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 an RSC-S (DS-1) Model A RMM

## Application

Use this procedure to replace an NT2X09 card in an RSC-S RMM.

| PEC | Suffixes | Name |
|---|---|---|
| NT2X09 | AA | Power Converter |

## Common procedures

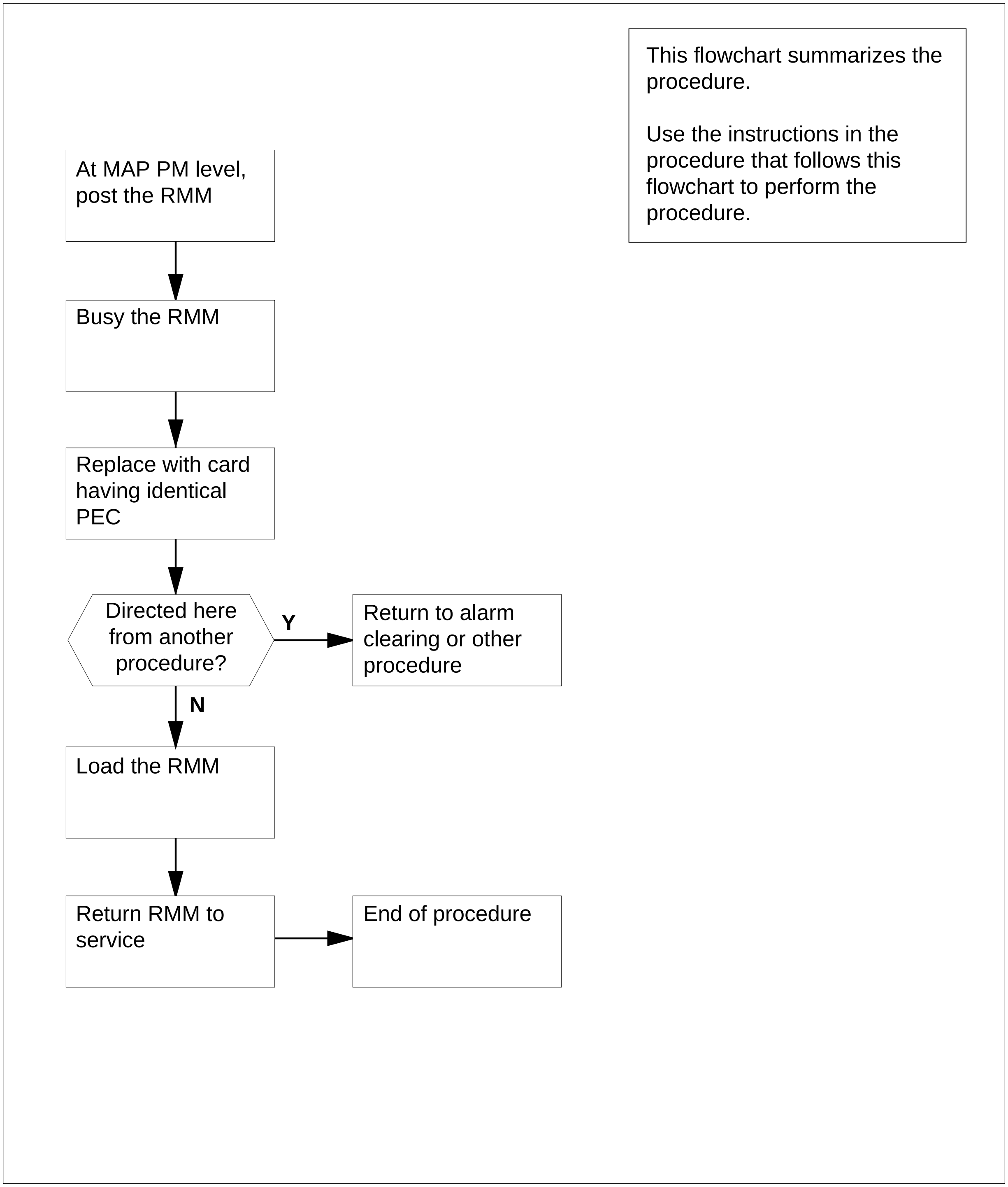
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X09 card in RSC-S RMM**



# NT2X09
# in an RSC-S (DS-1) Model A 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.

## NT2X09 in an RSC-S (DS-1) Model A 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
```

**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

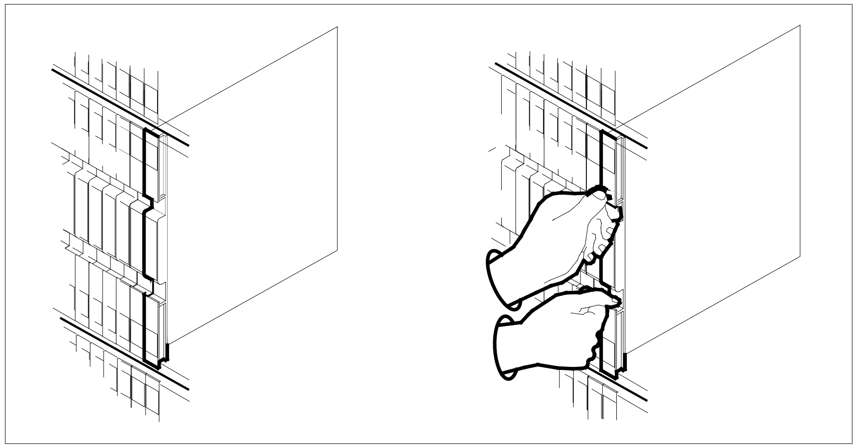
***>sil***

and pressing the Enter key.

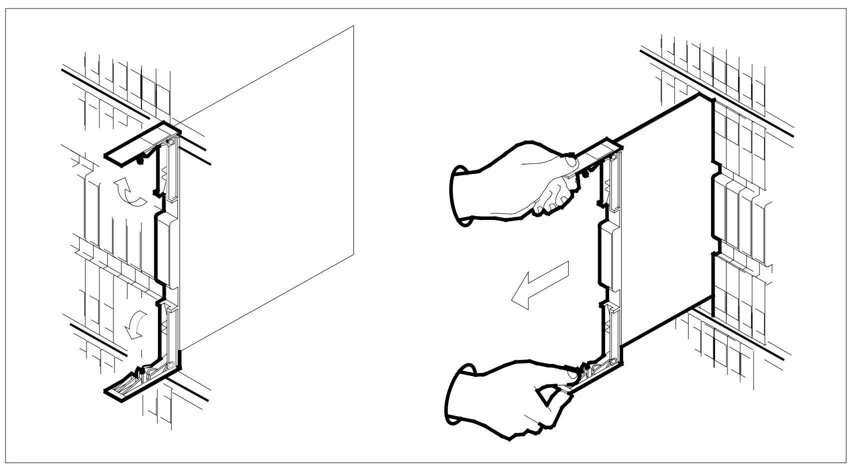
**7** Remove the NT2X09 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT2X09
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



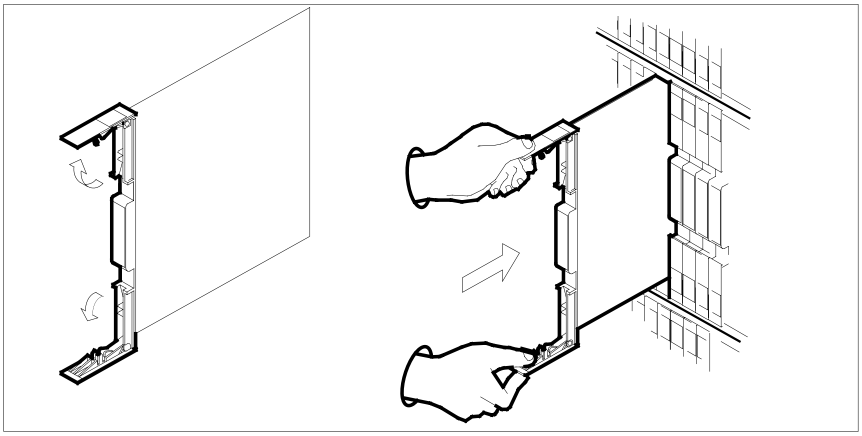
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT2X09
## in an RSC-S (DS-1) Model A RMM (continued)



**9**

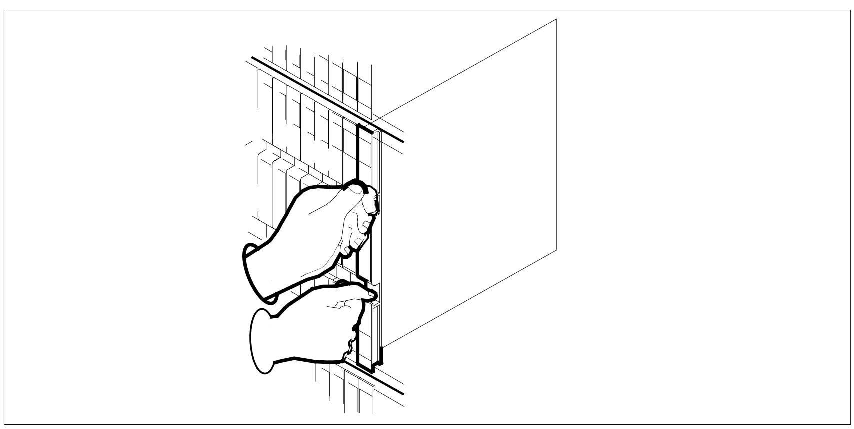
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

**b** Close the locking levers.



## NT2X09
## in an RSC-S (DS-1) Model A RMM (continued)

**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 |

## NT2X09
## in an RSC-S (DS-1) Model A RMM (continued)

**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.

**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 |

## NT2X09
## in an RSC-S (DS-1) Model A RMM (end)

**20** Return the RMM to service by typing

**>RTS**

and pressing the Enter key.

| If RTS | Do |
|---|---|
| passed | step 21 |
| failed | step 24 |

**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 an RSC-S (DS-1) Model A 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

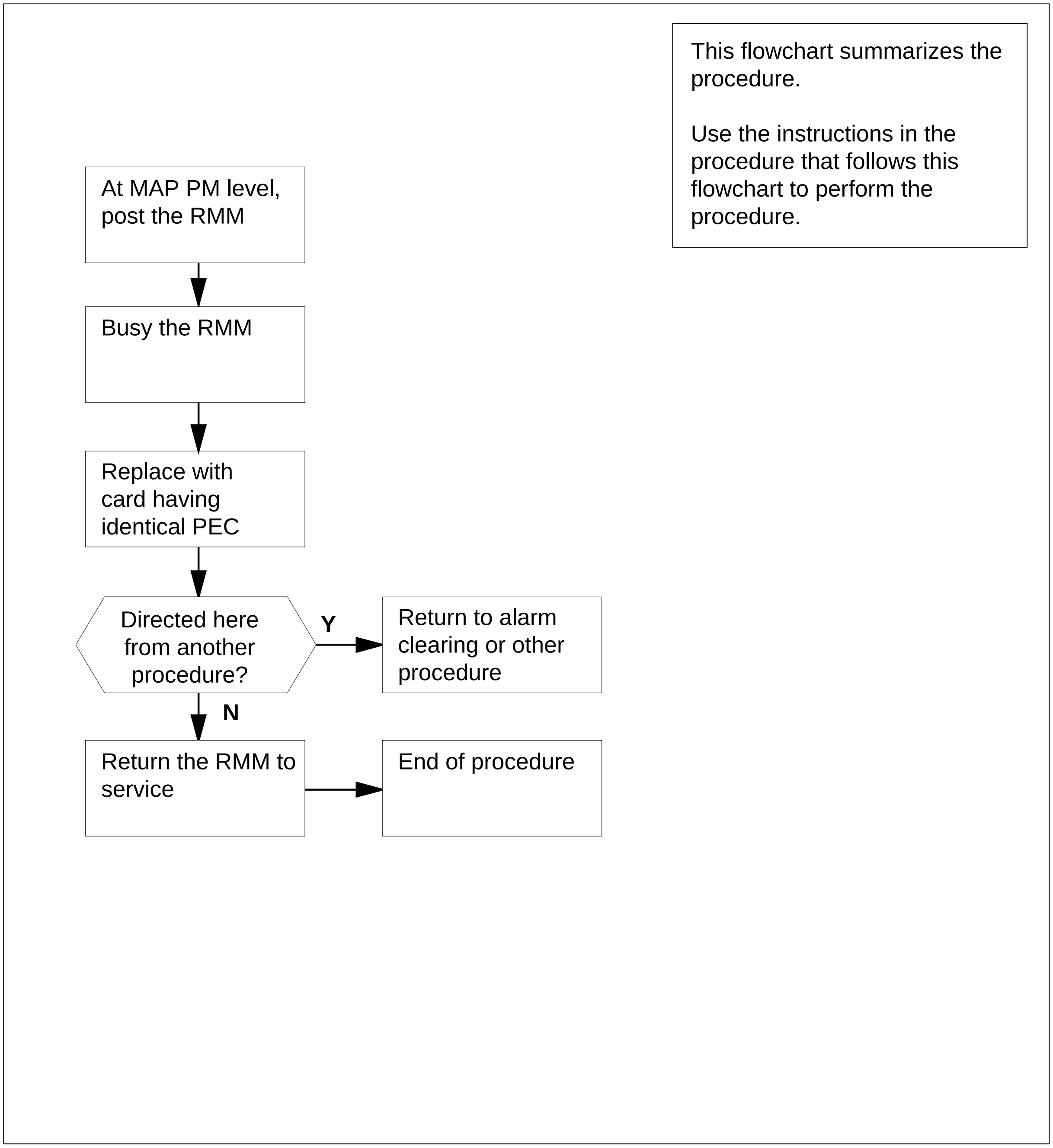
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X10 card in RSC-S RMM**



# NT2X10
# in an RSC-S (DS-1) Model A 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**

## NT2X10
## in an RSC-S (DS-1) Model A RMM (continued)

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**

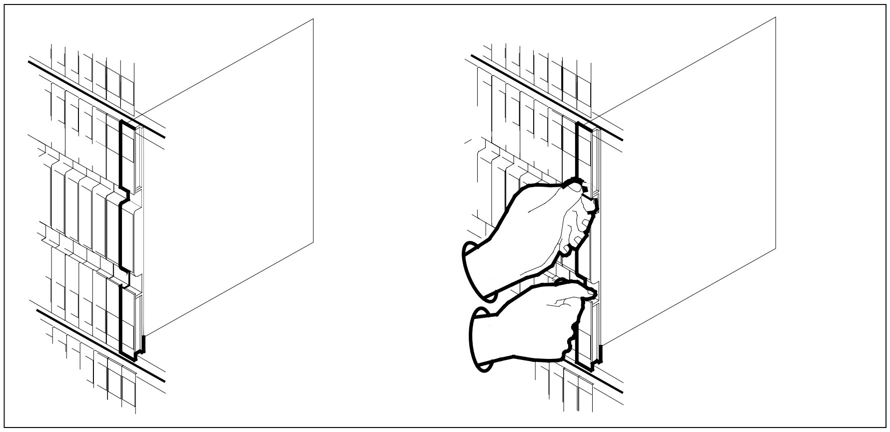
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

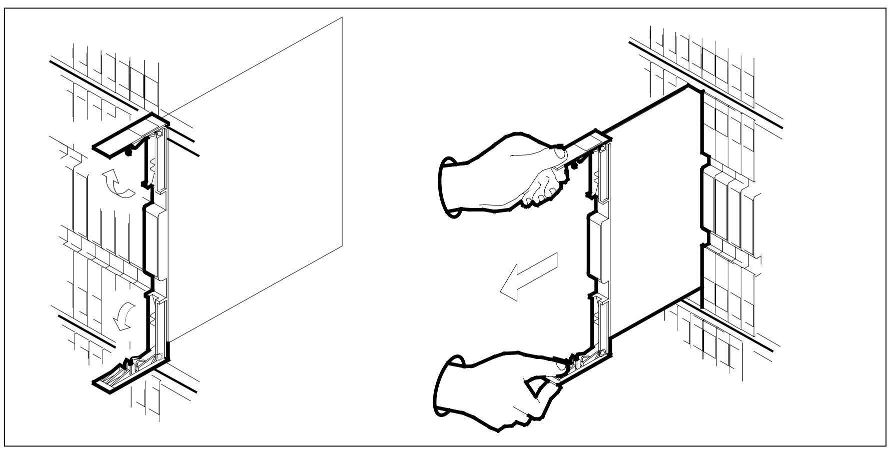
**6** Remove the NT2X10 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT2X10 in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



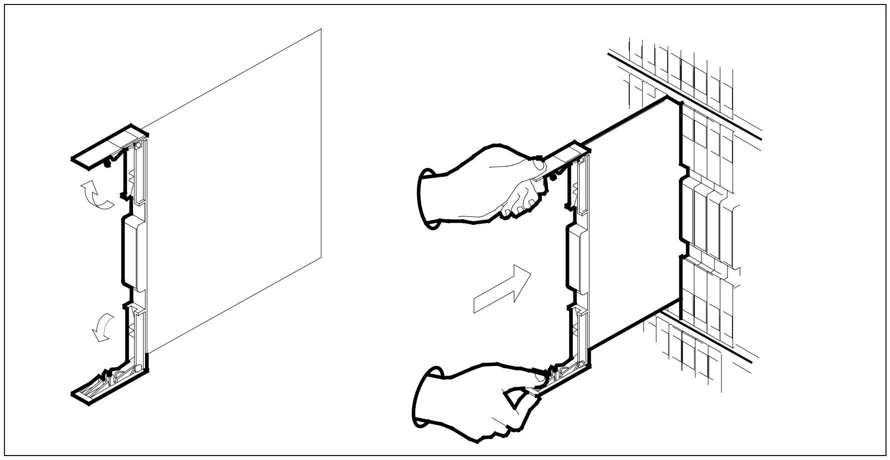
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT2X10
## in an RSC-S (DS-1) Model A RMM (continued)



**8**

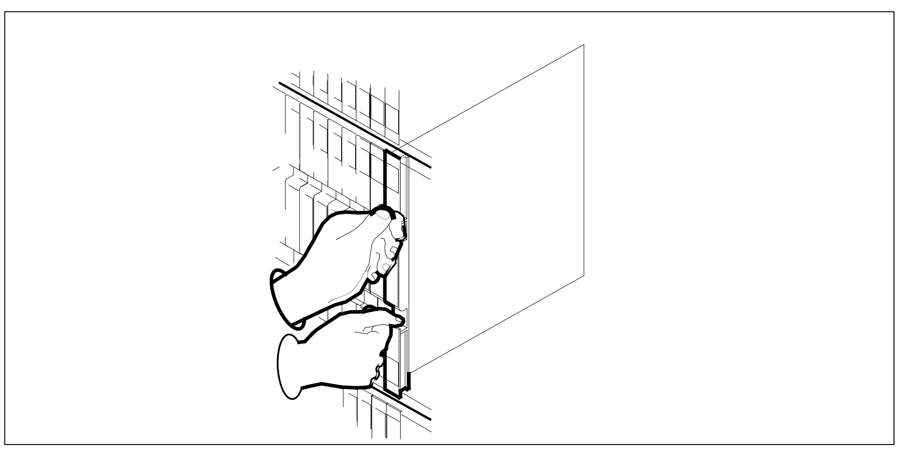
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.



# NT2X10
# in an RSC-S (DS-1) Model A RMM (end)

**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 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 an RSC-S (DS-1) Model A 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

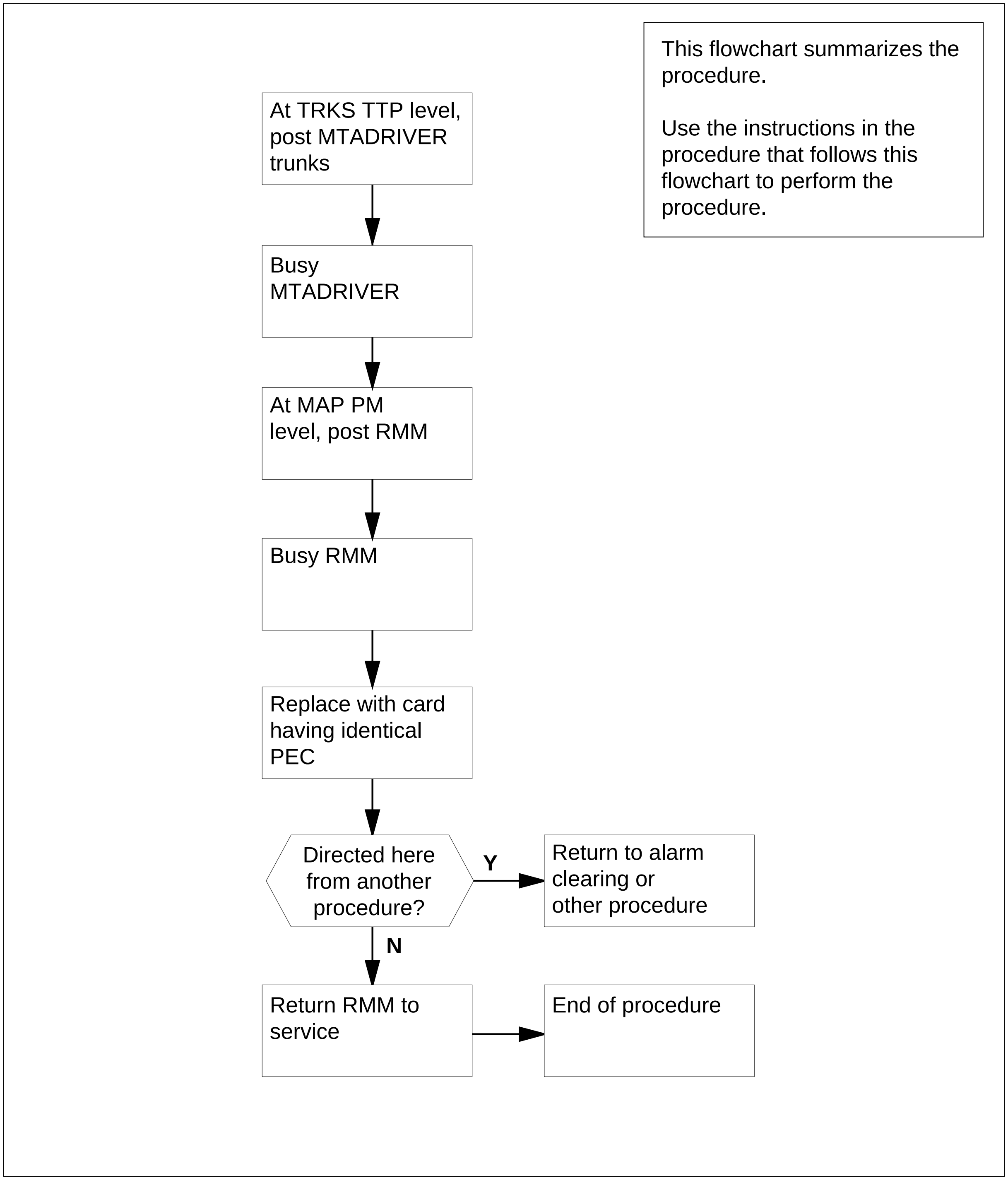
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X11 card in RSC-S RMM**



# NT2X11
# in an RSC-S (DS-1) Model A 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 G MTADRIVER**

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_
```

**4** Busy the MTADRIVER by typing

**>BSY;BSY;INB;ALL**

and pressing the Enter key.

*Example of a MAP display:*

## NT2X11
## in an RSC-S (DS-1) Model A RMM (continued)

```
 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_
```

**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

*Example of a MAP display:*

## NT2X11 in an RSC-S (DS-1) Model A RMM (continued)

```
 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.

*Example of a MAP display:*

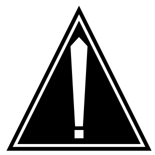
```
 CM     MS     IOD     Net      PM     CCS     LNS     Trks     Ext     Appl
  .      .      .       .     1ManB     .       .       .        .       .

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
```

# NT2X11
# in an RSC-S (DS-1) Model A RMM (continued)

***At the RMM shelf***

**7**

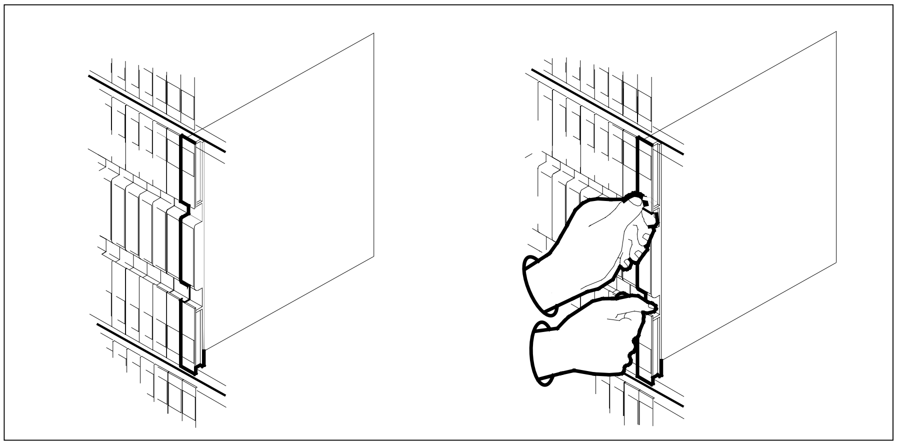


**CAUTION**
**Static discharge may cause damage to circuit packs**
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

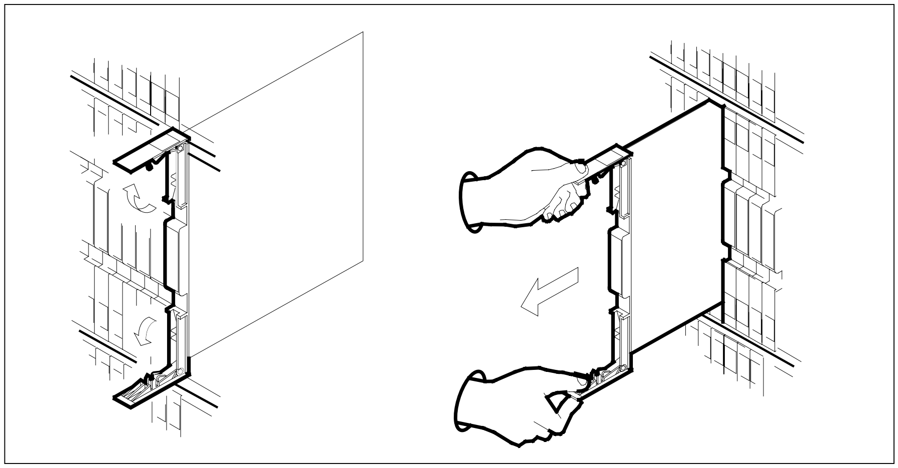
**8** Remove the NT2X11 card as shown in the following figures.

**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.

## NT2X11
## in an RSC-S (DS-1) Model A RMM (continued)

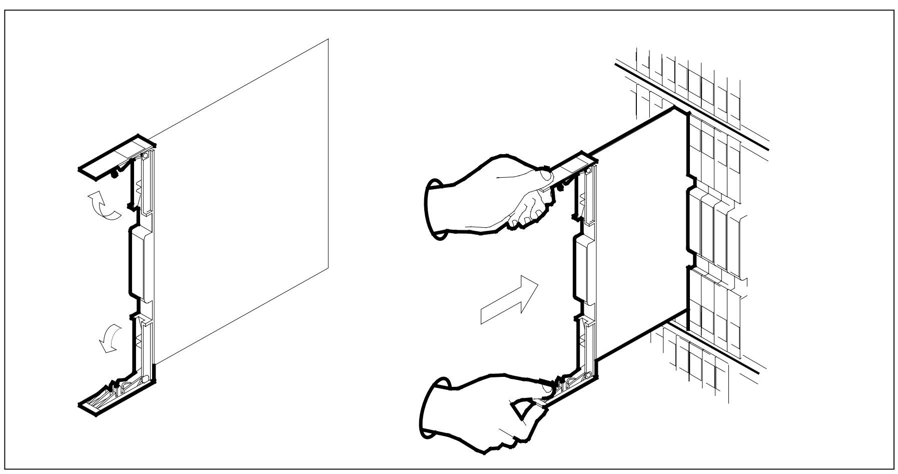


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.



## NT2X11 in an RSC-S (DS-1) Model A RMM (continued)

**10**

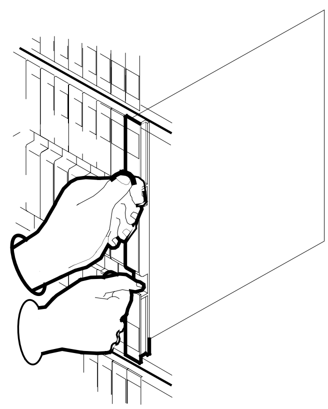
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

**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 |

# NT2X11
# in an RSC-S (DS-1) Model A RMM (end)

***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 G MTADRIVER**

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 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.

# NT2X57
# in an RSC-S (DS-1) Model A RMM

## Application

Use this procedure to replace an NT2X57 card in an RSC-S RMM.

| PEC | Suffixes | Name |
|---|---|---|
| NT2X57 | AA | Signal Distribution |

## Common procedures

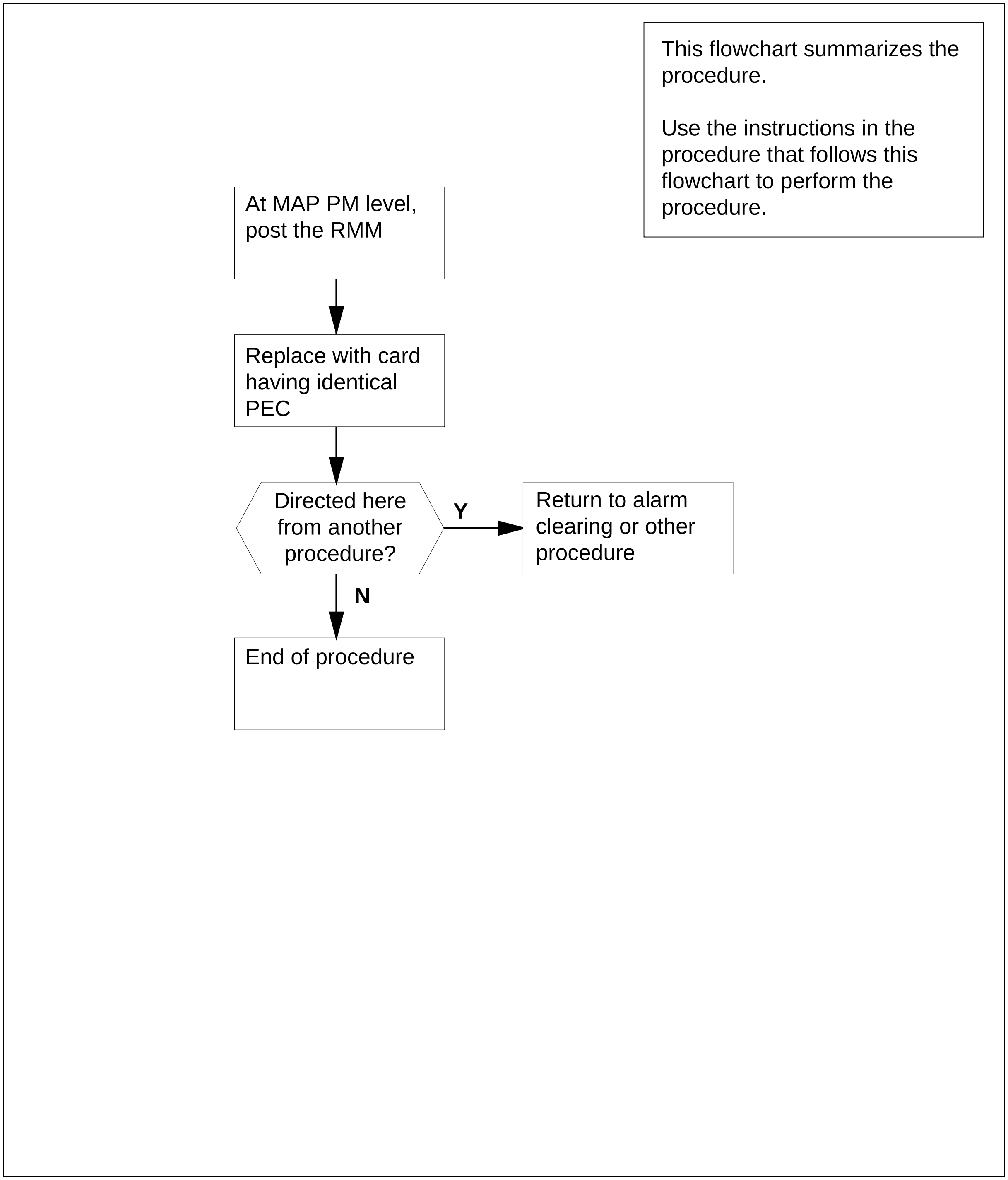
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X57 card in RSC-S RMM**



# NT2X57
# in an RSC-S (DS-1) Model A 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**

## NT2X57
## in an RSC-S (DS-1) Model A RMM (continued)

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**

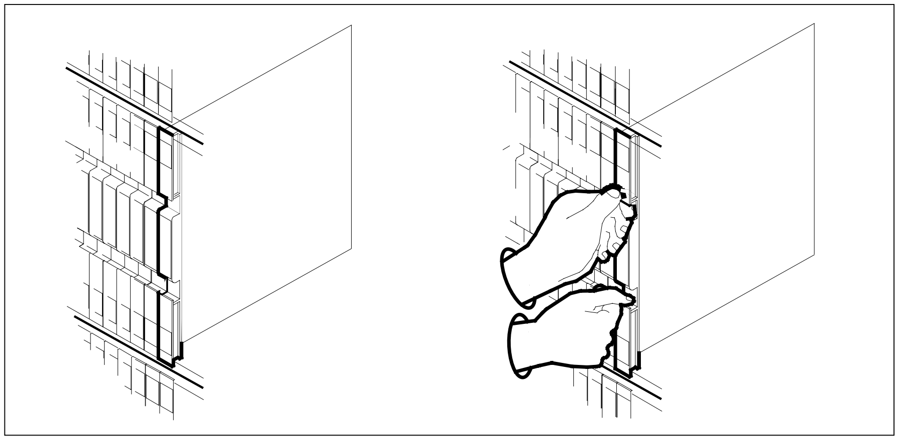
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

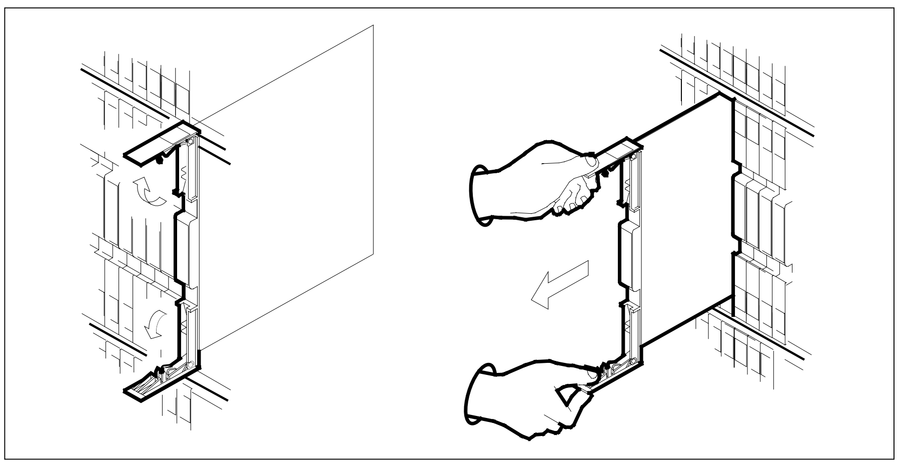
**6** Remove the NT2X57 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT2X57
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

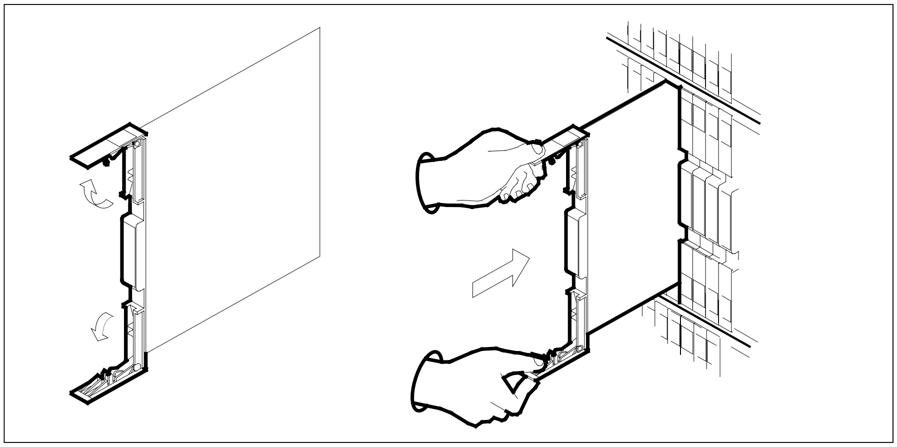


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT2X57 in an RSC-S (DS-1) Model A RMM (continued)



**8**

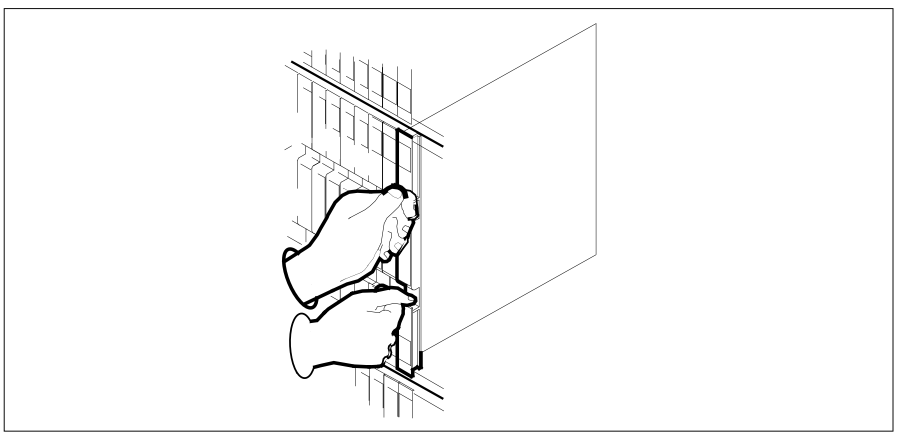
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

**b** Close the locking levers.



## NT2X57
## in an RSC-S (DS-1) Model A RMM (end)

**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 |

**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 an RSC-S (DS-1) Model A RMM

## Application

Use this procedure to replace an NT2X59 card in an RSC-S RMM.

| PEC | Suffixes | Name |
|---|---|---|
| NT2X59 | AA | Group Codec |

## Common procedures

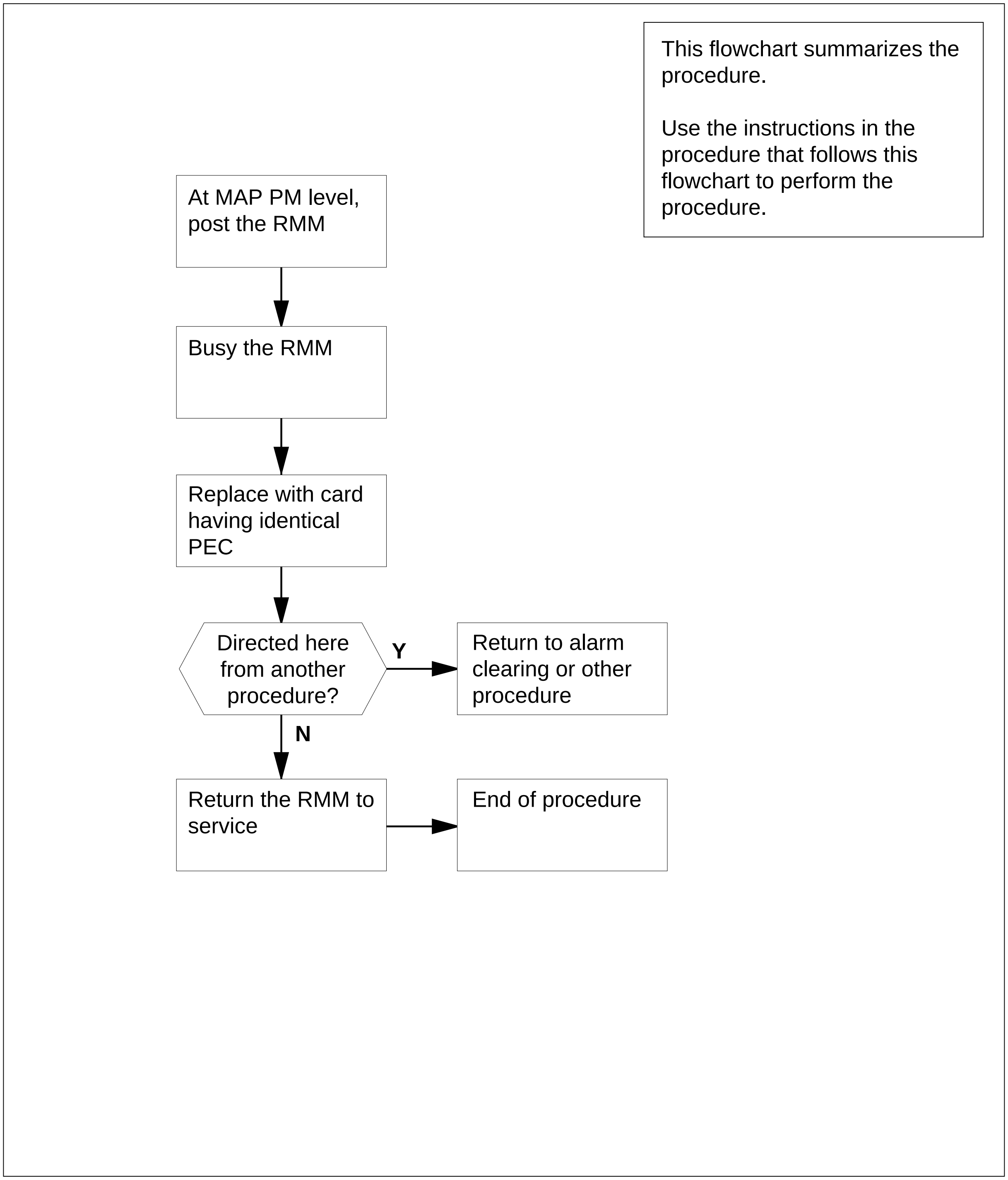
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X59 card in RSC-S RMM**



# NT2X59
# in an RSC-S (DS-1) Model A 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**

## NT2X59
## in an RSC-S (DS-1) Model A RMM (continued)

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**

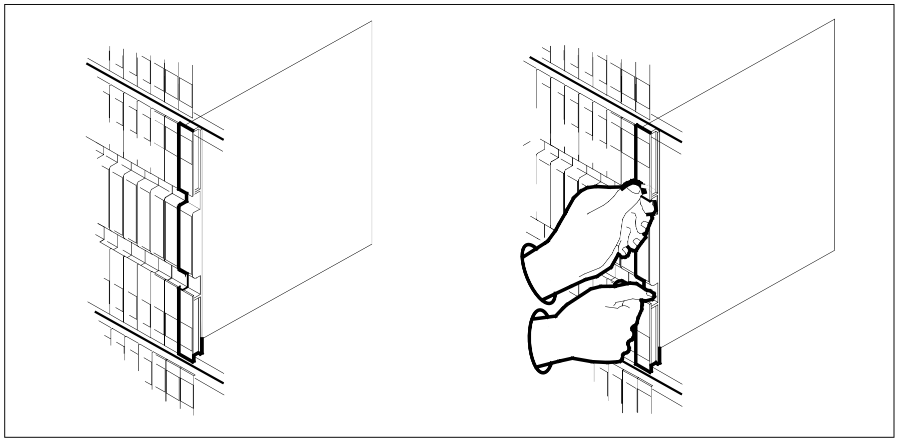
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

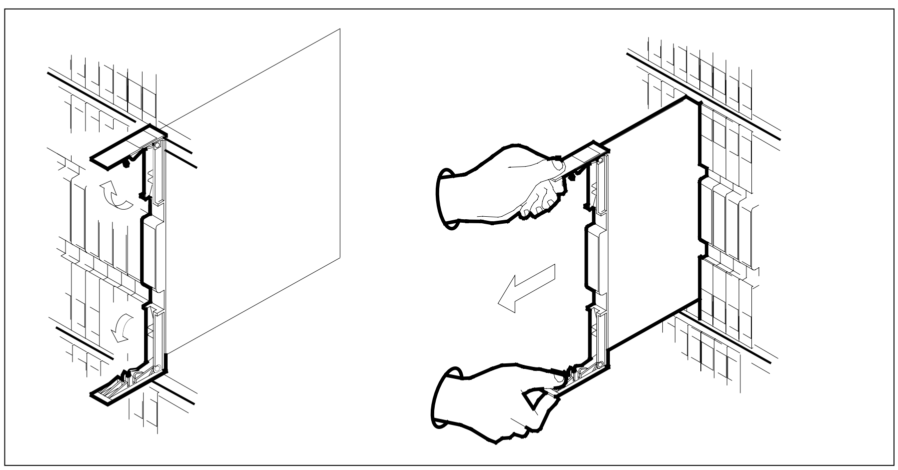
**6** Remove the NT2X59 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT2X59
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



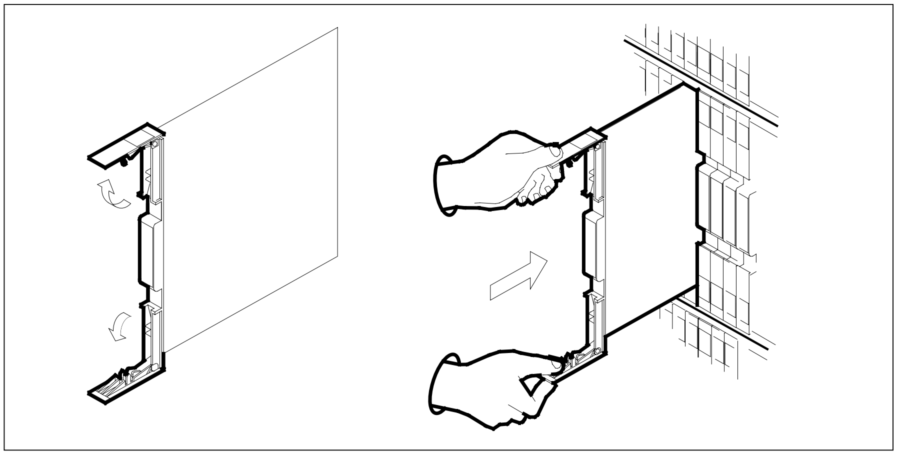
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

# NT2X59
# in an RSC-S (DS-1) Model A RMM (continued)



**8**

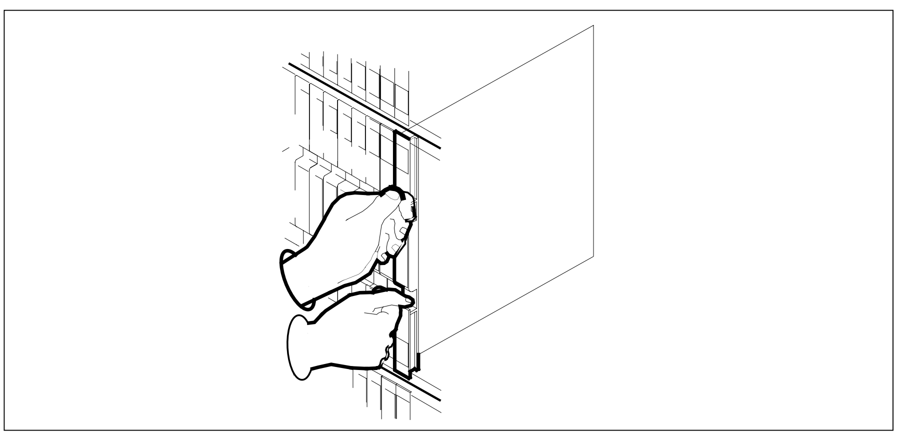
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

**b** Close the locking levers.



## NT2X59
## in an RSC-S (DS-1) Model A RMM (end)

**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 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 an RSC-S (DS-1) Model A 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

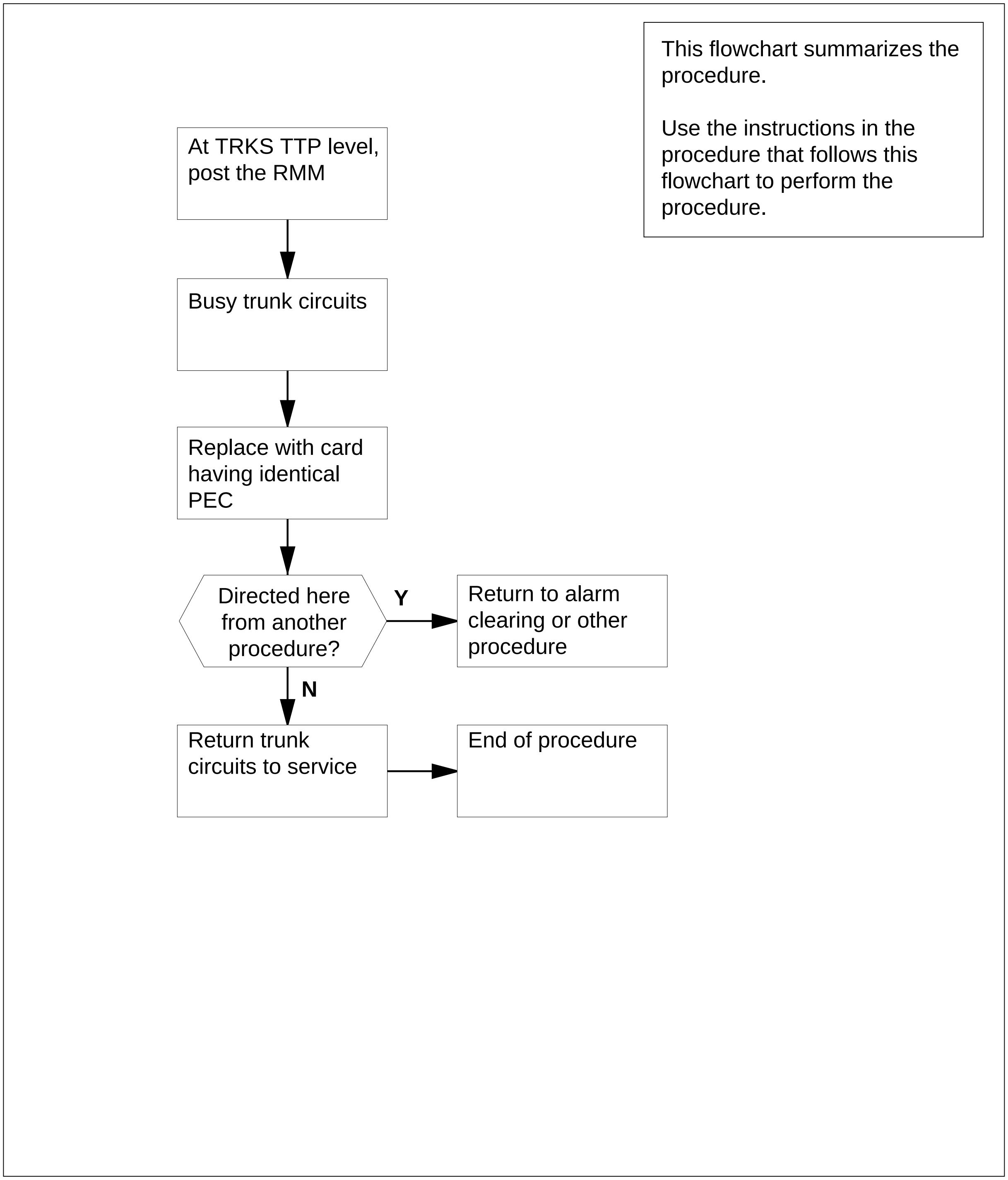
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT2X90 card in RSC-S RMM**



# NT2X90
# in an RSC-S (DS-1) Model A 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 TTP 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 an RSC-S (DS-1) Model A 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**

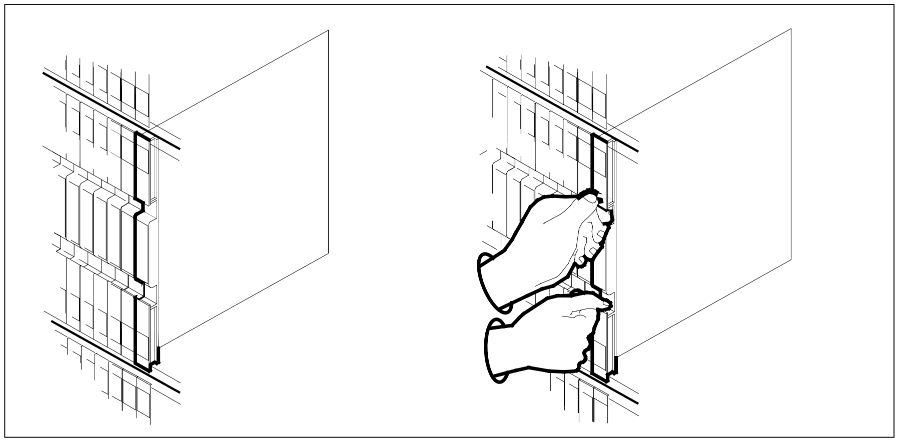
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

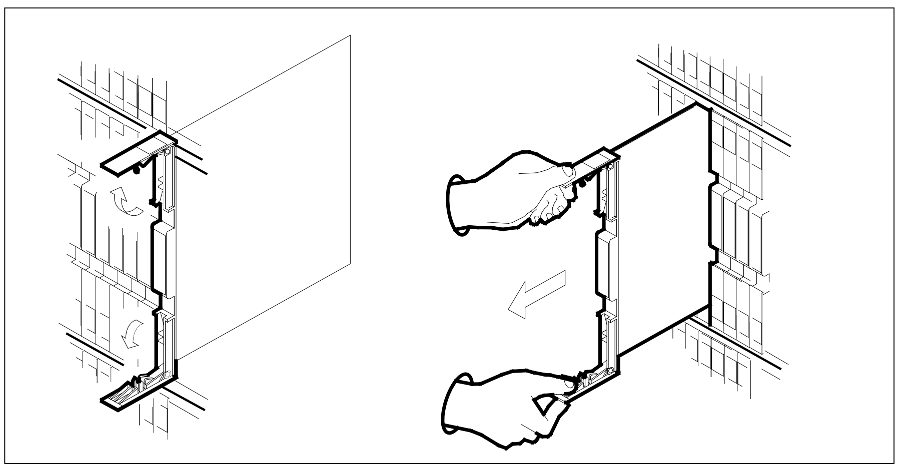
**6** Remove the NT2X90 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT2X90
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

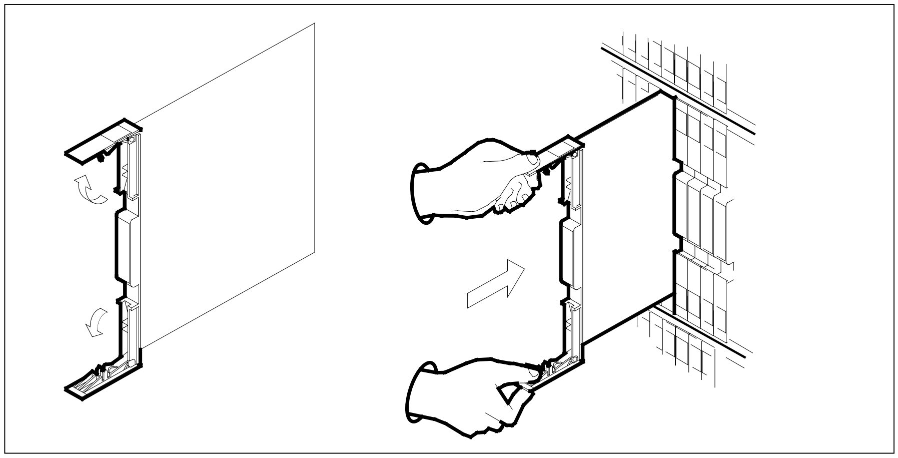


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.



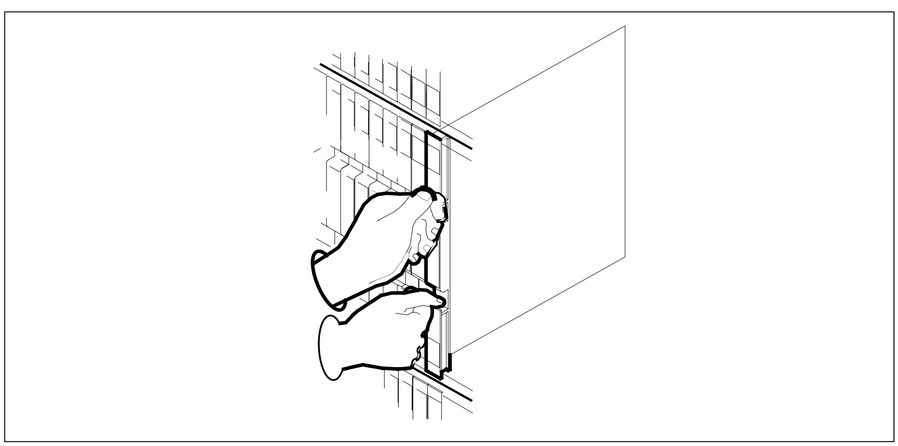
**8**

> **DANGER**
> **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.

**b** Close the locking levers.



## NT2X90
## in an RSC-S (DS-1) Model A RMM (end)

**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 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 an RSC-S (DS-1) Model A 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

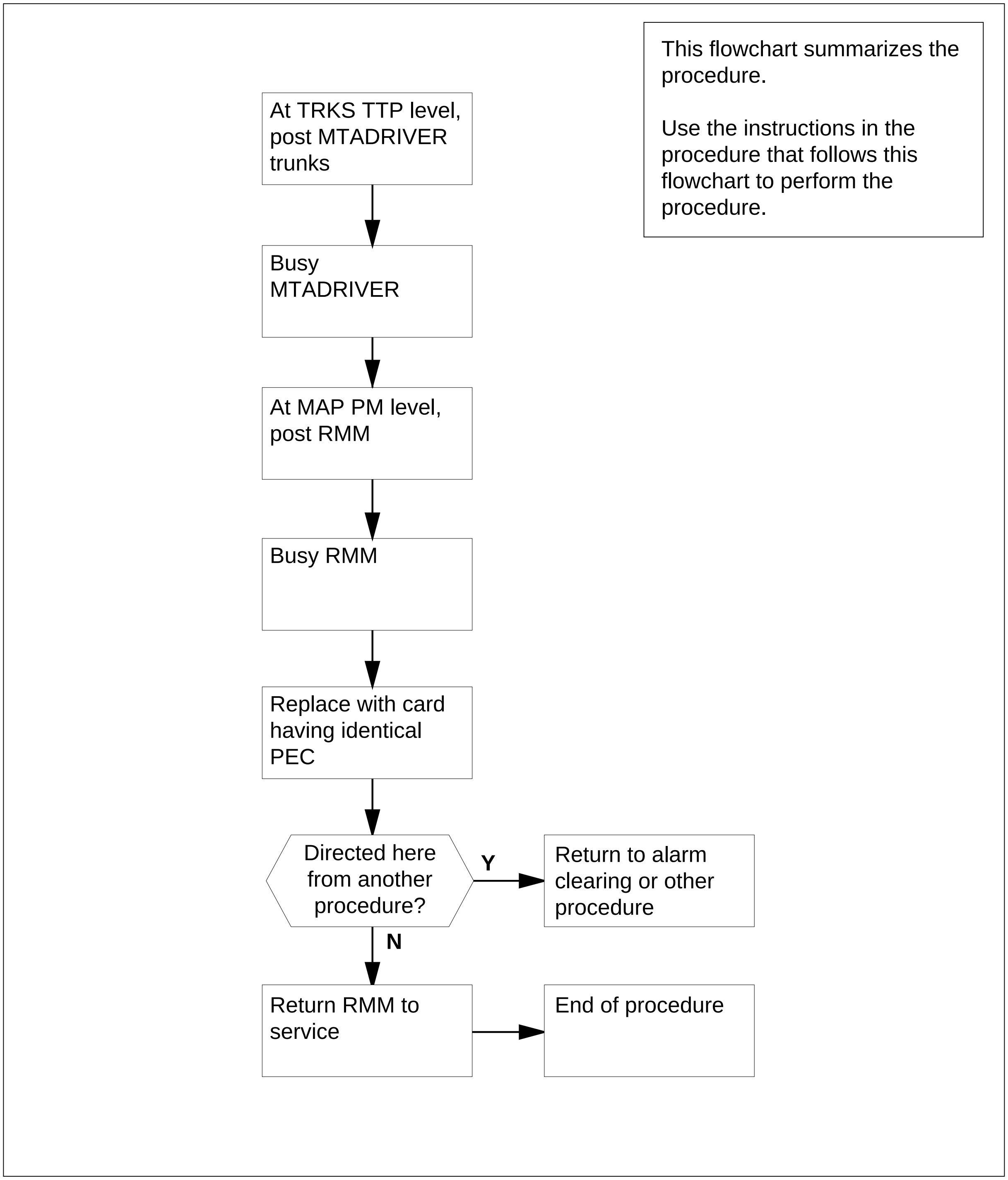
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT3X09 card in RSC-S RMM**



# NT3X09
# in an RSC-S (DS-1) Model A 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 G MTADRIVER**

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_
```

**4** Busy the MTADRIVER by typing

**>BSY;BSY;INB;ALL**

and pressing the Enter key.

# NT3X09
# in an RSC-S (DS-1) Model A RMM (continued)

*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 an RSC-S (DS-1) Model A 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 an RSC-S (DS-1) Model A 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**

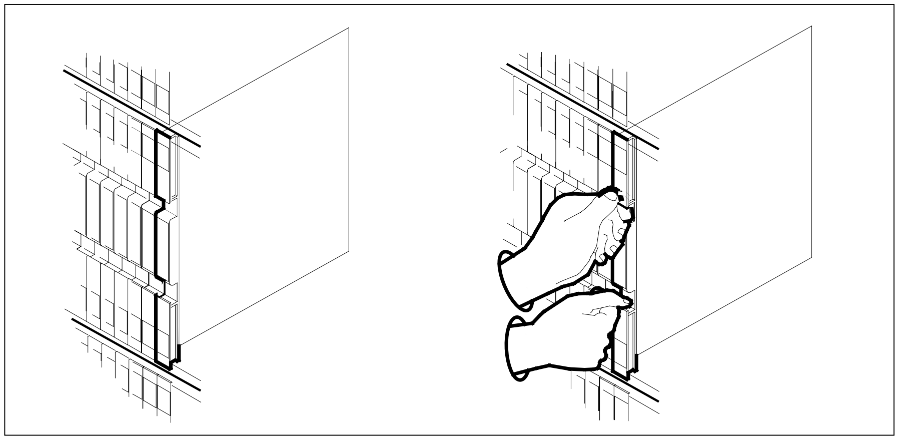
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

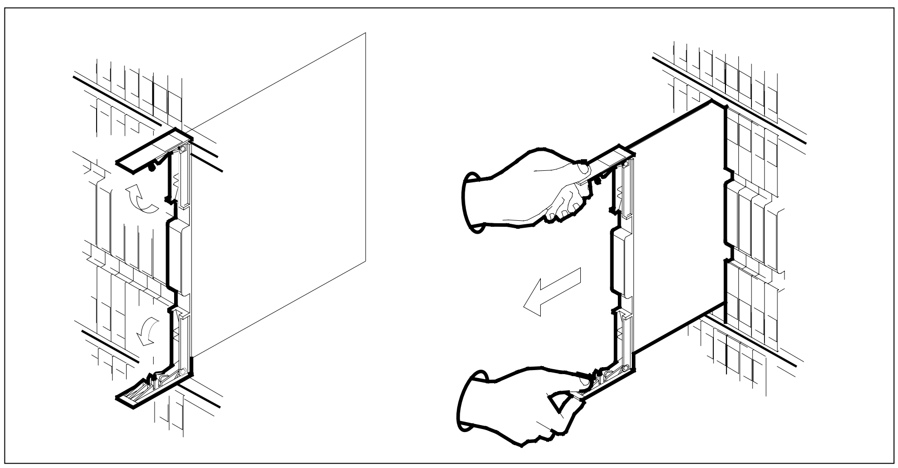
**8** Remove the NT3X09 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT3X09
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



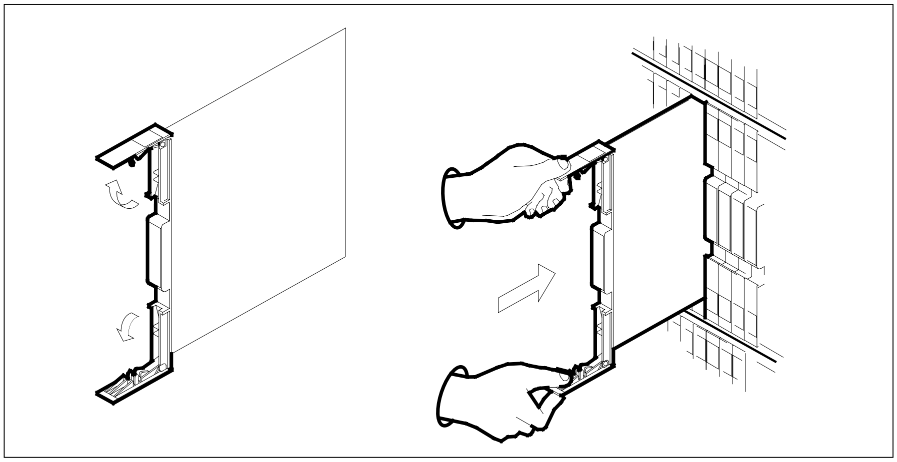
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT3X09
## in an RSC-S (DS-1) Model A RMM (continued)



**10**

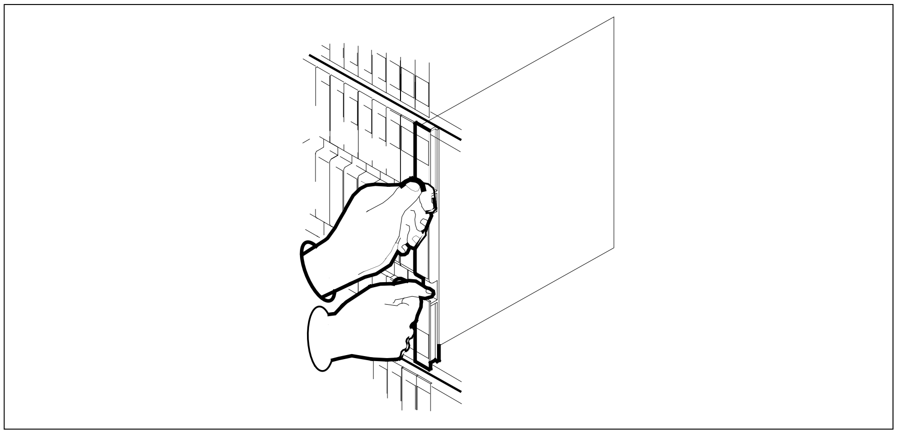
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

**b** Close the locking levers.



## NT3X09
## in an RSC-S (DS-1) Model A RMM (continued)

**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 G MTADRIVER**

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 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.

## NT3X09
## in an RSC-S (DS-1) Model A RMM (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.

# NT6X17
# in an RSC-S (DS-1) Model A 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

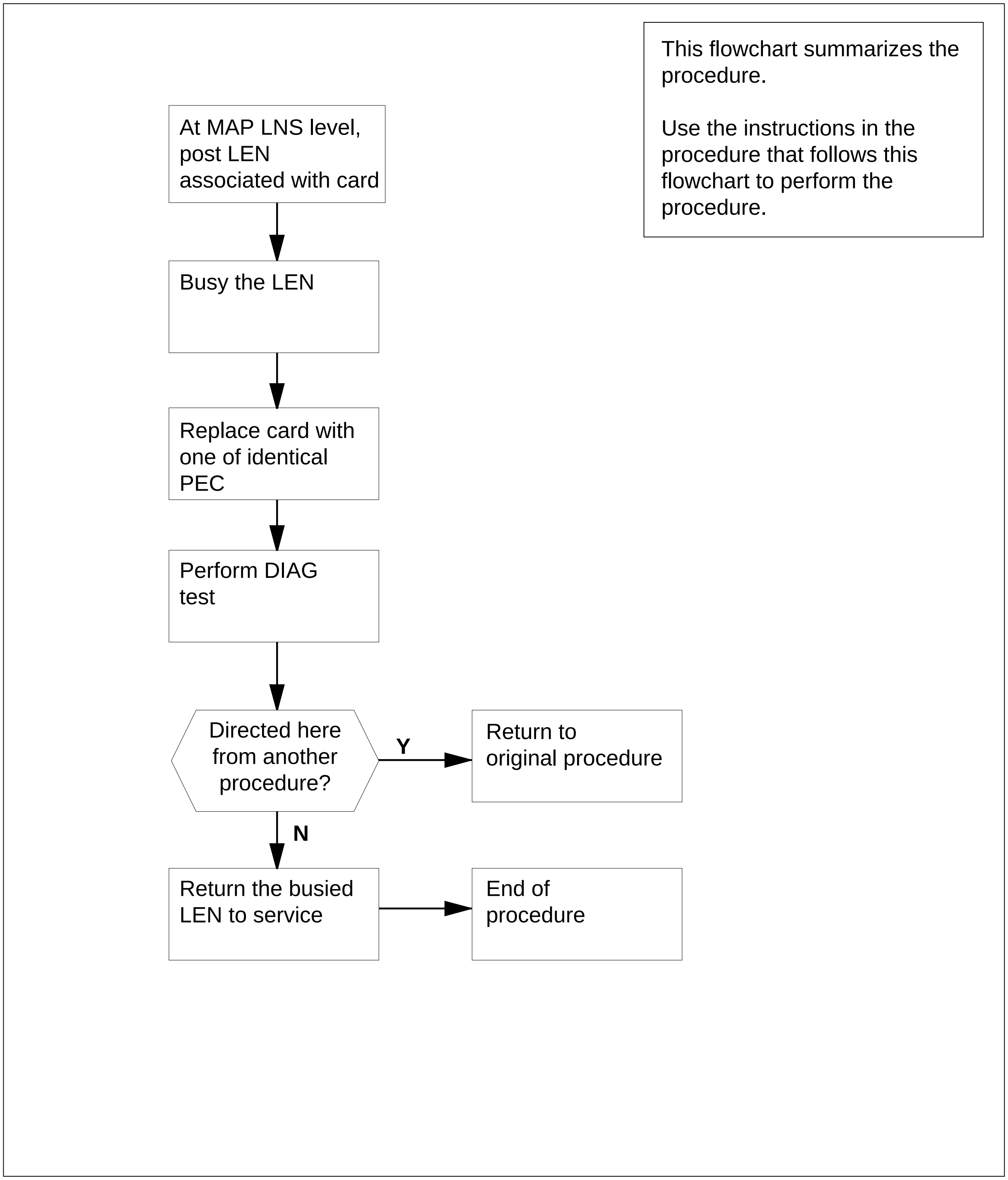
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X17 card in RSC-S LCME**



# NT6X17
# in an RSC-S (DS-1) Model A LCME (continued)

**Replacing an NT6X17 card 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 NT6X17 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

## NT6X17
## in an RSC-S (DS-1) Model A LCME (continued)

*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
```

## NT6X17
## in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap, connected through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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 the slot.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

## NT6X17 in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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 identified in step 1 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 (1.0 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 1.0 cm (0.5 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.

## NT6X17
## in an RSC-S (DS-1) Model A LCME (continued)

- **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.
- **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 |

# NT6X17
# in an RSC-S (DS-1) Model A LCME (end)

**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 an RSC-S (DS-1) Model A 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 (Coin/Ground Start) |
| 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

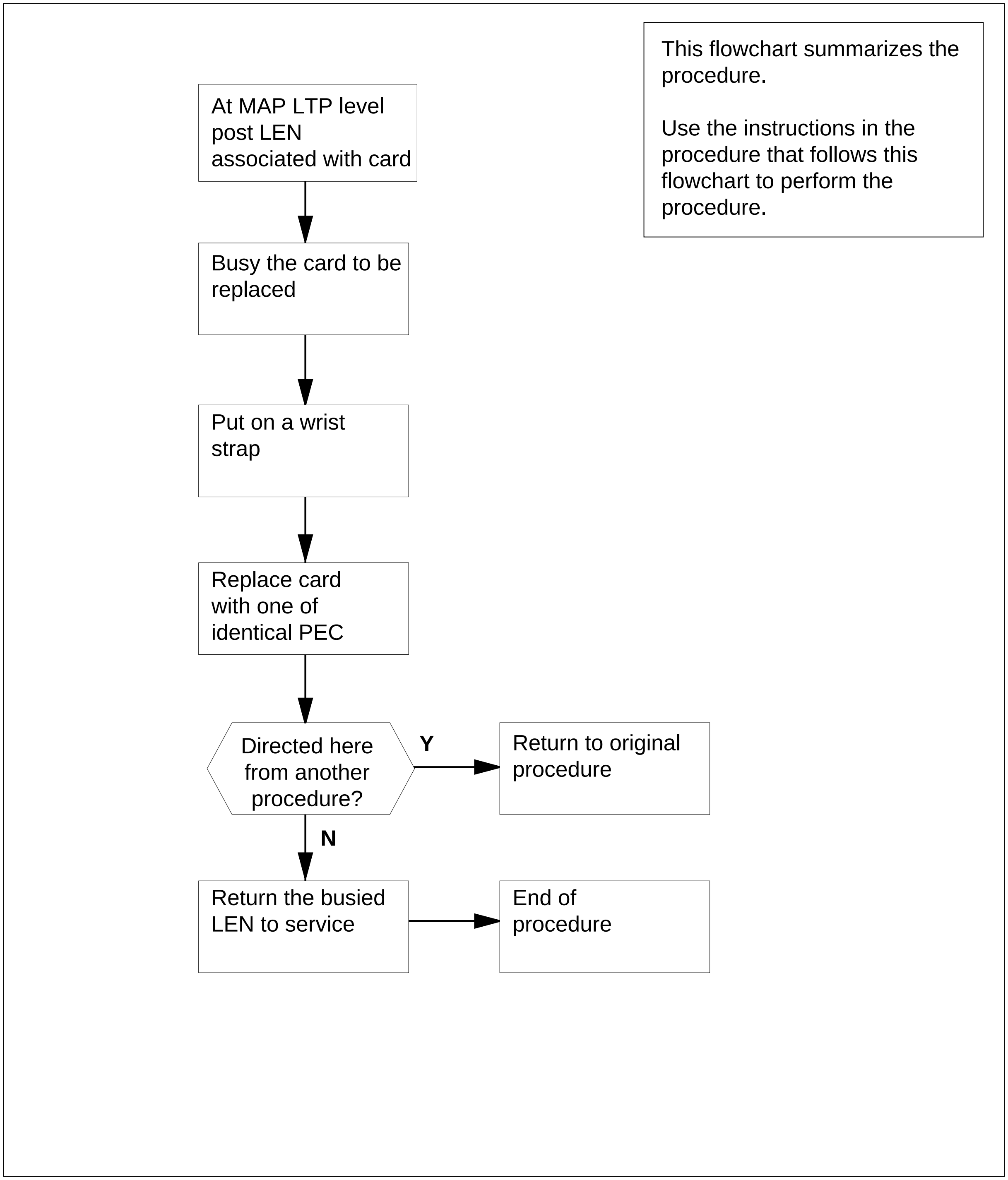
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X18 card in RSC-S LCME**



# NT6X18
# in an RSC-S (DS-1) Model A LCME (continued)

**Replacing an NT6X18 card 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 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:*

## NT6X18
## in an RSC-S (DS-1) Model A LCME (continued)

```
 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
```

## NT6X18 in an RSC-S (DS-1) Model A 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.

Store and transport circuit cards in an ESD protective container.

**DANGER**
**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**

**DANGER**
**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.

## NT6X18
## in an RSC-S (DS-1) Model A LCME (continued)

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. | | |

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.

## NT6X18 in an RSC-S (DS-1) Model A LCME (continued)

**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 NT6X18 line card by typing

**>DIAG**

and pressing the Enter key.

| If DIAG | Do |
|---|---|
| passed | step 11 |
| failed | step 14 |

***Note:*** If the suffix of the NT6X18 card is AA or AB, and the line is identified as ground start (GND=Y in table LNINV), rerun diagnostics if the initial diagnostics fails. This action is possible by adding service order (SERVORD) option NPGD (negate partial ground start diagnostics). This option allows the line to be tested against a smaller subset of ground start diagnostics. Therefore, when option NPGD is set in table LENLINES, loop detector, reversal relay, and ground start relay are omitted. For more information about SERVORD and NPGD, refer to the *XPM Translations Guide*.

# NT6X18
# in an RSC-S (DS-1) Model A LCME (end)

**11**

> **ATTENTION**
> There is a new diagnostics test for NT6X18AA/AB cards. This NT6X18 card may be good. See the notes on line cards in the general maintenance section of this book for information on running an enhanced diagnostics.

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.

**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 an RSC-S (DS-1) Model A 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

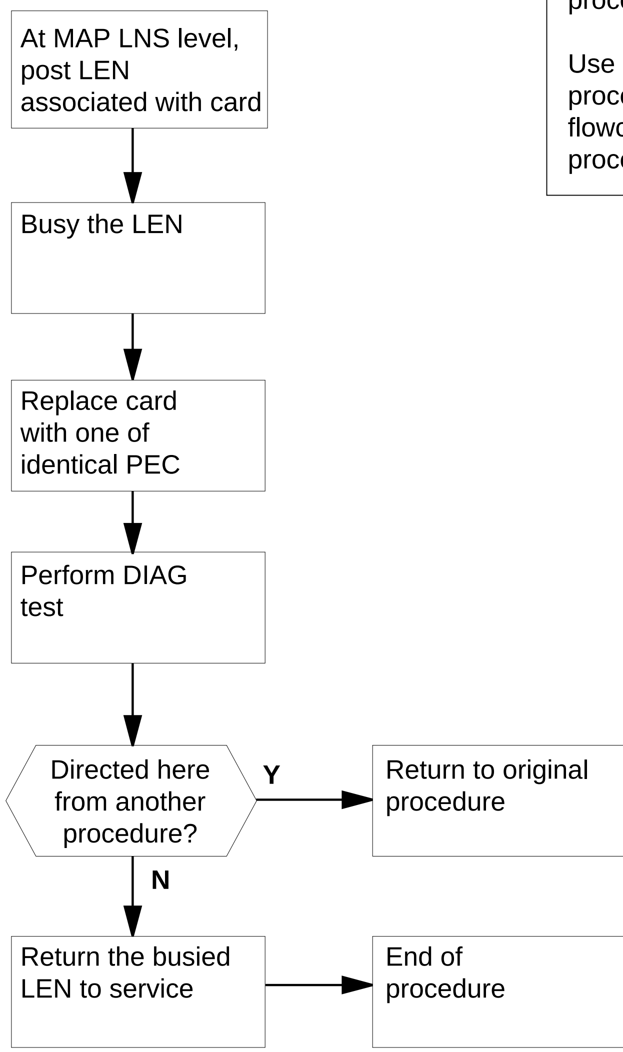
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for NT6X19 card in RSC-S LCME**




This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

# NT6X19
# in an RSC-S (DS-1) Model A LCME (continued)

**Replacing an NT6X19 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 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:*

# NT6X19
# in an RSC-S (DS-1) Model A LCME (continued)

```
 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
```

## NT6X19
## in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

## NT6X19
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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, identified instep 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 (1.0 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 1.0 cm (0.5 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.

## NT6X19
## in an RSC-S (DS-1) Model A LCME (continued)

- **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.
- **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 | step 14 |

## NT6X19 in an RSC-S (DS-1) Model A LCME (end)

**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.

**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 an RSC-S (DS-1) Model A 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

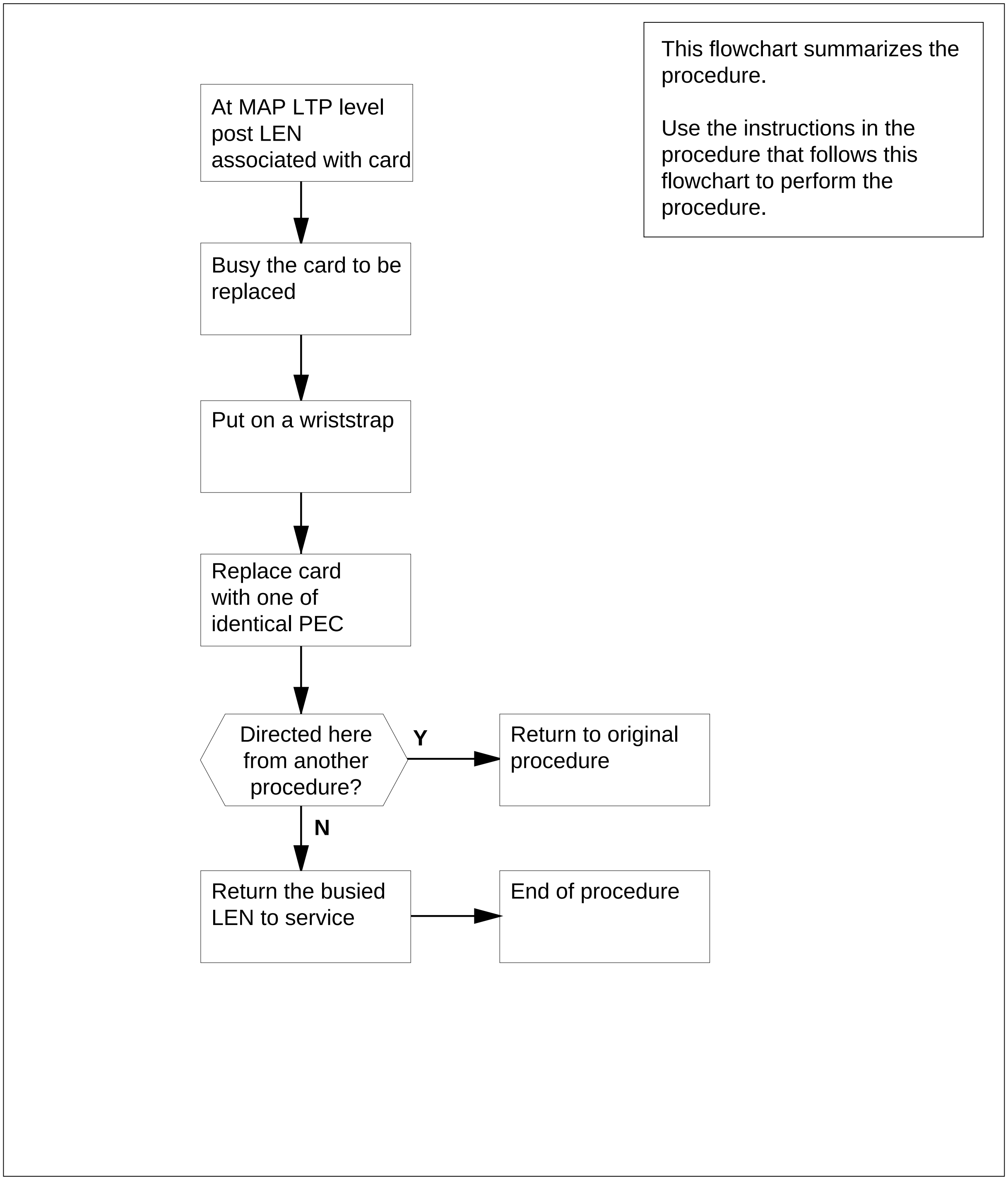
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X20 card in an RSC-S LCME**



# NT6X20
# in an RSC-S (DS-1) Model A 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:*

## NT6X20 in an RSC-S (DS-1) Model A LCME (continued)

```
 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:*

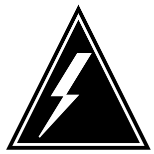
```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .      .     .      .      .     .      .      .       .      .

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
```

# NT6X20
# in an RSC-S (DS-1) Model A LCME (continued)

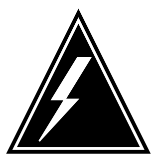
***At the LCE frame***

**5**



**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

## NT6X20
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

> ***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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, identified 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 (1.0 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 1.0 cm (0.5 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.

## NT6X20
## in an RSC-S (DS-1) Model A LCME (continued)

**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:

**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 an RSC-S (DS-1) Model A 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 an RSC-S (DS-1) Model A 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

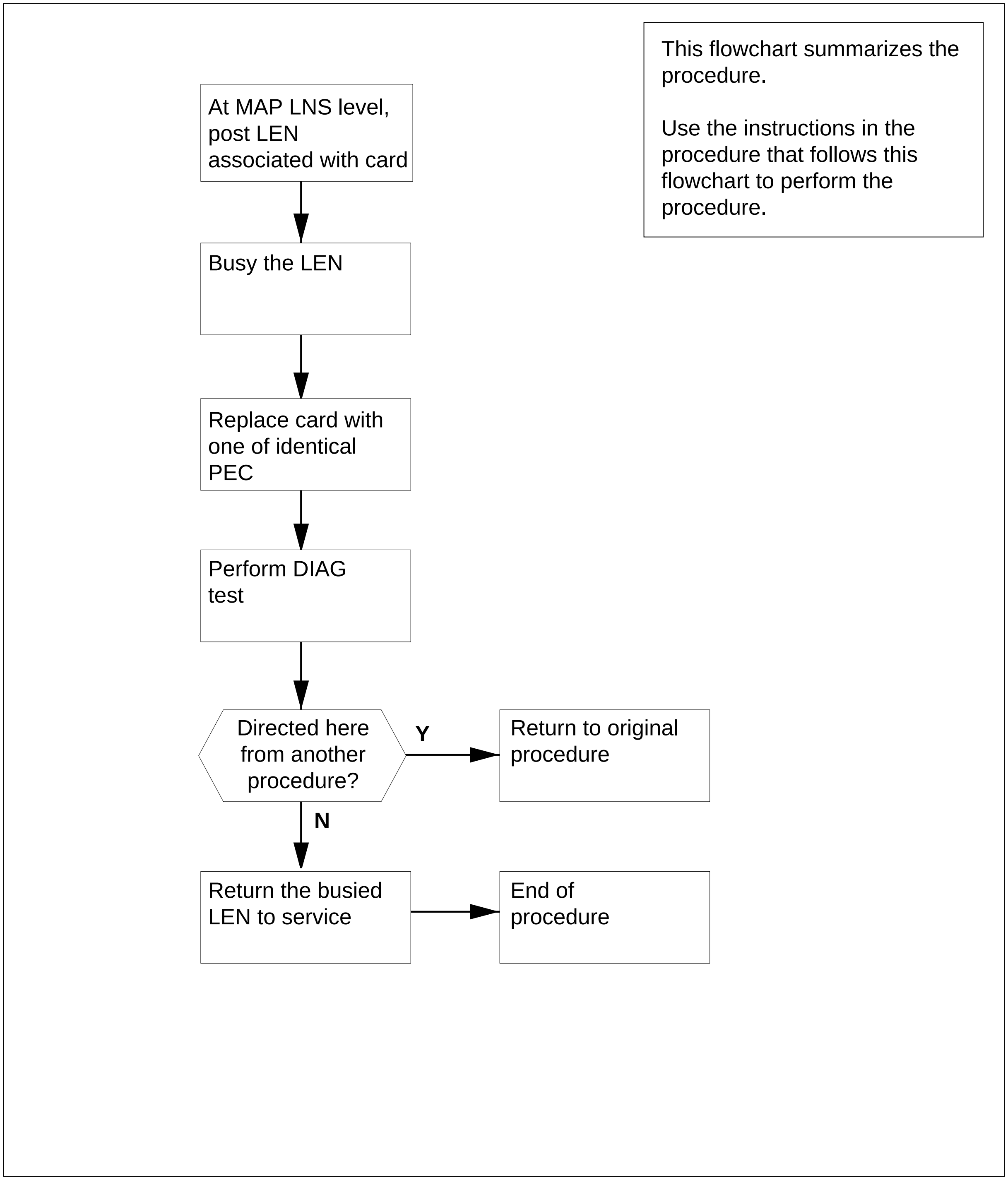
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X21 card in RSC-S LCME**



# NT6X21
## in an RSC-S (DS-1) Model A 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:*

# NT6X21 in an RSC-S (DS-1) Model A LCME (continued)

```
 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
```

## NT6X21
## in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

## NT6X21
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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 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 (1.0 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 1.0 cm (0.5 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.

## NT6X21
## in an RSC-S (DS-1) Model A LCME (continued)

- **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:

- **a** Remove the replacement card from the ESD container.

| If the line card suffix is | Do |
|---|---|
| AA, AB, or AC | step 14 |
| AD | step 10 |

## NT6X21 in an RSC-S (DS-1) Model A LCME (continued)

**b** Make DIP switch changes to the replacement NT6X21AD card to match DIP switch settings of the card being replaced, or as defined in the following table.

**Recommended NT6X21AD S1 DIP switch settings (Sheet 1 of 2)**

| **Recommended application** | **D/A voice S1** | **Balanc<br>e S2** | **Signali<br>ng<br>levels<br>S3 and<br>S4** | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Switch<br>positio<br>nON<br>OFF** | **Switch<br>positio<br>nON<br>OFF** | | | **Both ON** | **S4 ON** | **S3 ON** | **Both OFF** |
| | **0dB** | **-3.5 dB** | **NL** | **9+2** | **1.3 Vpp** | **0.8 Vpp** | **0.6 Vpp** | **0.14 Vpp** |
| 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 |
| Nortel UDLCs | | X | X | | | | | X |
| Other vendors UDLCs | X | | | X | | | X | |

## NT6X21 in an RSC-S (DS-1) Model A LCME (continued)

**Recommended NT6X21AD S1 DIP switch settings (Sheet 2 of 2)**

| Recommended application | D/A voice S1 | Balance S2 | Signaling levels S3 and S4 | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Switch position ON OFF | Switch position ON OFF | | | Both ON | S4 ON | S3 ON | Both OFF |
| | 0dB | -3.5 dB | NL | 9+2 | 1.3 Vpp | 0.8 Vpp | 0.6 Vpp | 0.14 Vpp |
| 6X21AC equivalent mode | | X | X | | X | | | |
| ***Note:*** dB=decibel, NL=nonloaded, 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.

**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 |

# NT6X21
# in an RSC-S (DS-1) Model A LCME (end)

***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.

**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 an RSC-S (DS-1) Model A LCME

## Application

Use this procedure to replace an NT6X30 card in an RSC-S LCME.

| PEC | Suffixes | Name |
|---|---|---|
| NT6X30 | HA | Ringing Generator |

## Common procedures

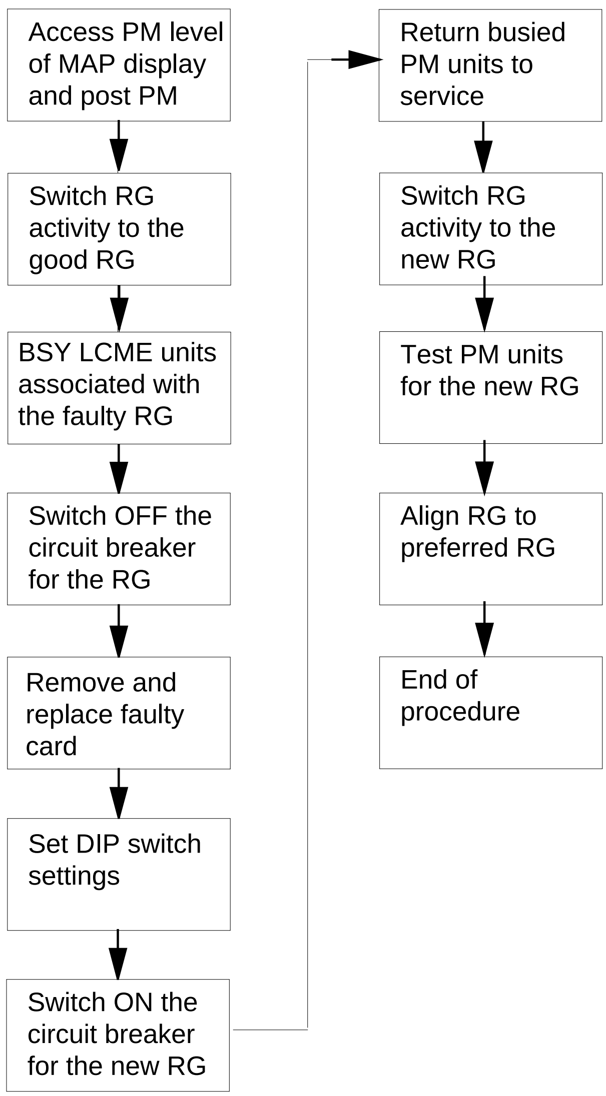
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of replacing an NT6X30 card in RSC-S LCME**




This flowchart summarizes the procedure.

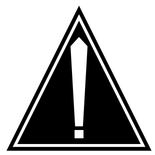
Use the instructions in the procedure that follows this flowchart to perform the procedure.

# NT6X30
## in an RSC-S (DS-1) Model A 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 an approved replacement card.

***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 RSCS 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  0123  45      Stby 1 InSv
       ..  ..  ..  ..  ..  ..  ..  ..
```

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

**4** Check the state of the PM units.

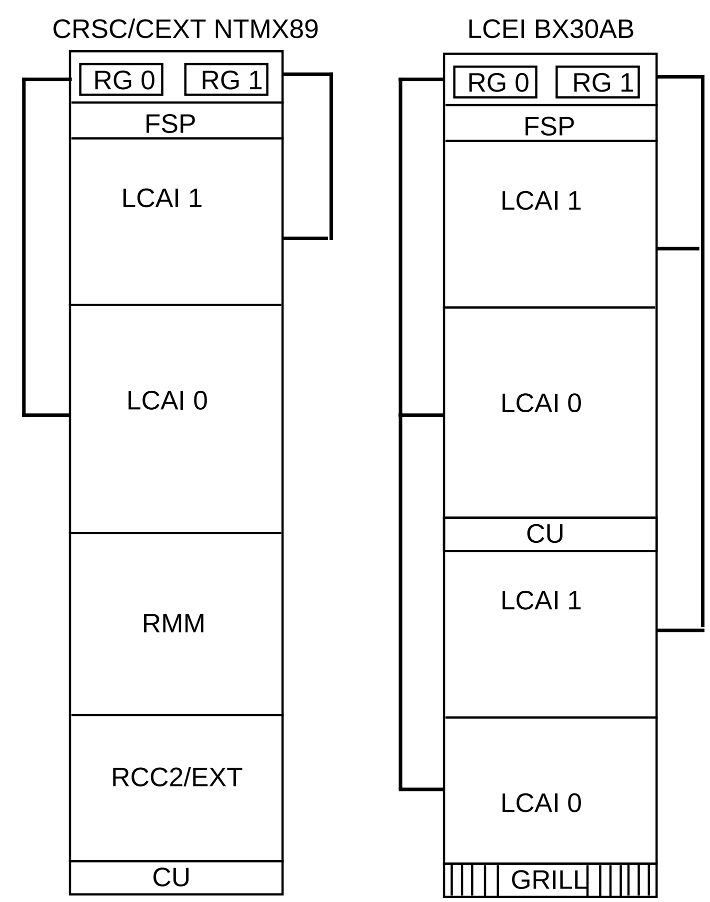
| If the PM or PM units are | Do |
|---|---|
| offl or SysB | step 5 |
| One unit is InSv or ISTb the other unit is ISTb or SysB | step 6 |

**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 |

**6** Record the numbers of the PM units serviced by the faulty RG you are replacing.

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)




***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**

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

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 RSCS 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 |

**11** Repeat step 3 through step10 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

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

**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 RSCS 14 0 RSCS 14 1**

*Example of a MAP display:*

```
LCME RSCS 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  0123  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 RSCS 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  0123  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.

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

***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.

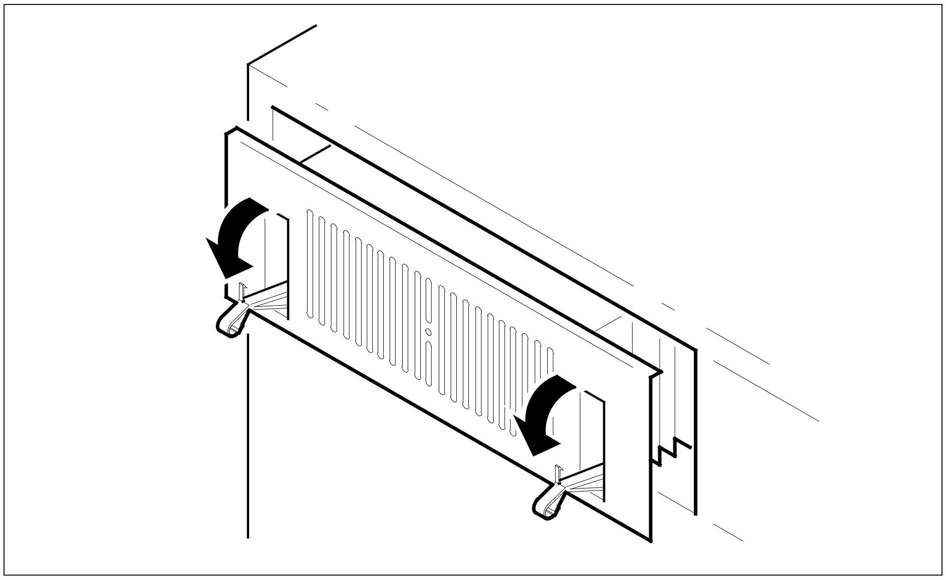
Turn the circuit breaker that powers the faulty ringing generator OFF. Ensure that ringing generator 0 is on circuit breaker 03-65-01. Ensure that ringing generator 1 is on circuit breaker 03-65-02.

**16**

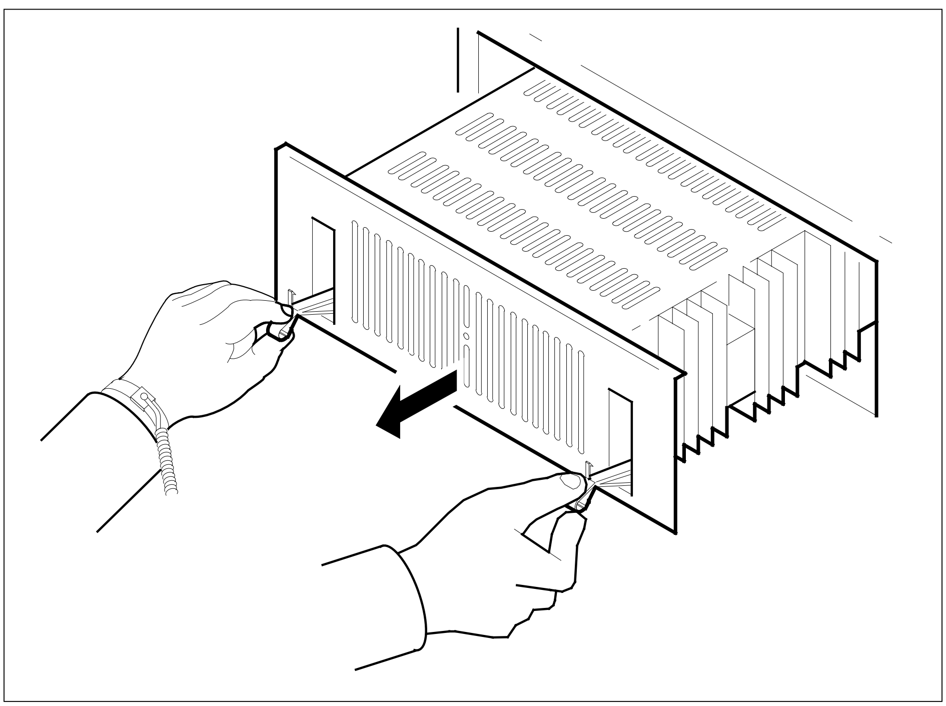
> **WARNING**
> **Do not hold the card by the levers only**
> Holding a card by the locking levers only may break one or both levers. Once the card has been pulled half way out of the shelf, carefully grasp the card underneath for more secure support and continue to remove the card from the shelf. Avoid touching any wires or internal parts on the card.

Open the locking levers on the face of the card.

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)



**17** While grasping the locking levers, gently pull the card towards you until it protrudes approximately halfway out of the shelf.



## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

**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**

> **CAUTION**
> **Loss of service**
> Incorrect DIP switch setting can result in a service outage. Check the DIP switch layout for the switch numbering and for the ON and OFF position.

> **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.

Set the DIP switch settings on the replacement card.

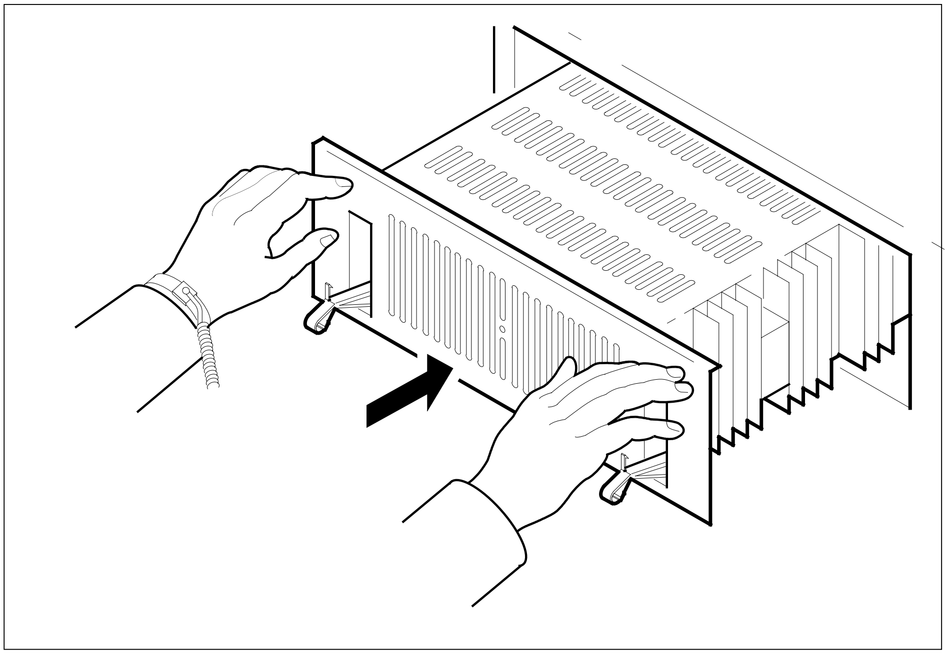
***Note:*** If you are replacing an older version of the NT6X30 with a newer version (newer versions have suffixes BB, CA, DB, HA, or JA), switch 8 must be in the ON position on the replacement card. If in doubt, contact your next level of support.

**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.

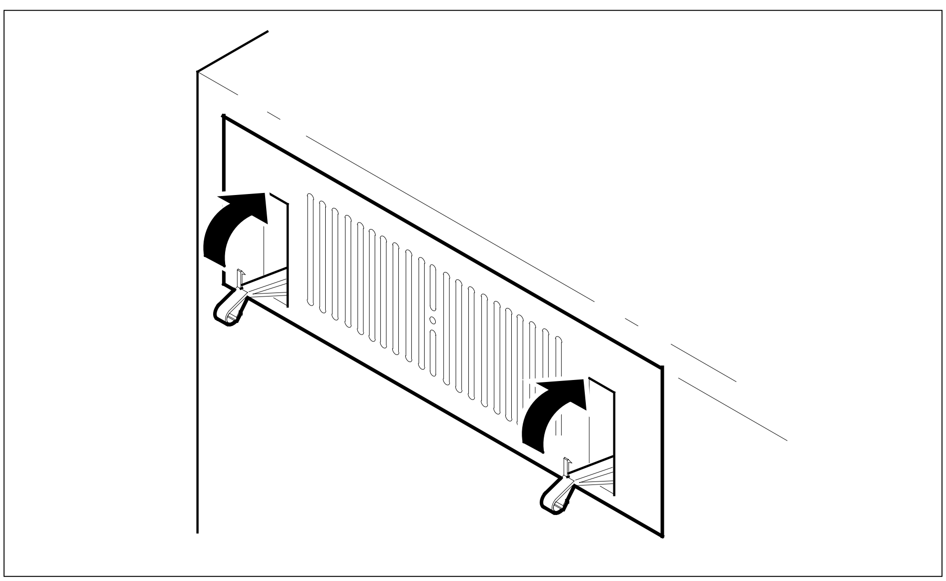
## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)



**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.



## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

**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 |

**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

## NT6X30
## in an RSC-S (DS-1) Model A LCME (continued)

**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 RSCS 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  0123  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 RSCS 14 0 Unit 1  InSvce Tests Initiated
LCME RSCS 14 0 Unit 0  InSvce Tests Initiated
LCME RSCS 14 0 Unit 1  Tst Passed
LCME RSCS 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**

# NT6X30 in an RSC-S (DS-1) Model A LCME (end)

and pressing the Enter key.

*where*

**unit_no**
is the PM unit number (0 or 1)

*Example of a MAP display:*

```
LCME RSCS 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
       ..  ..  ..  ..  ..  ..  ..  ..
```

**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 an RSC-S FSP for CRSC or CEXT

## Application

Use this procedure to replace an NT6X36 card in a cabinetized Remote Switching Center (CRSC) or cabinetized extension shelf (CEXT) cabinet frame supervisory panel (FSP).

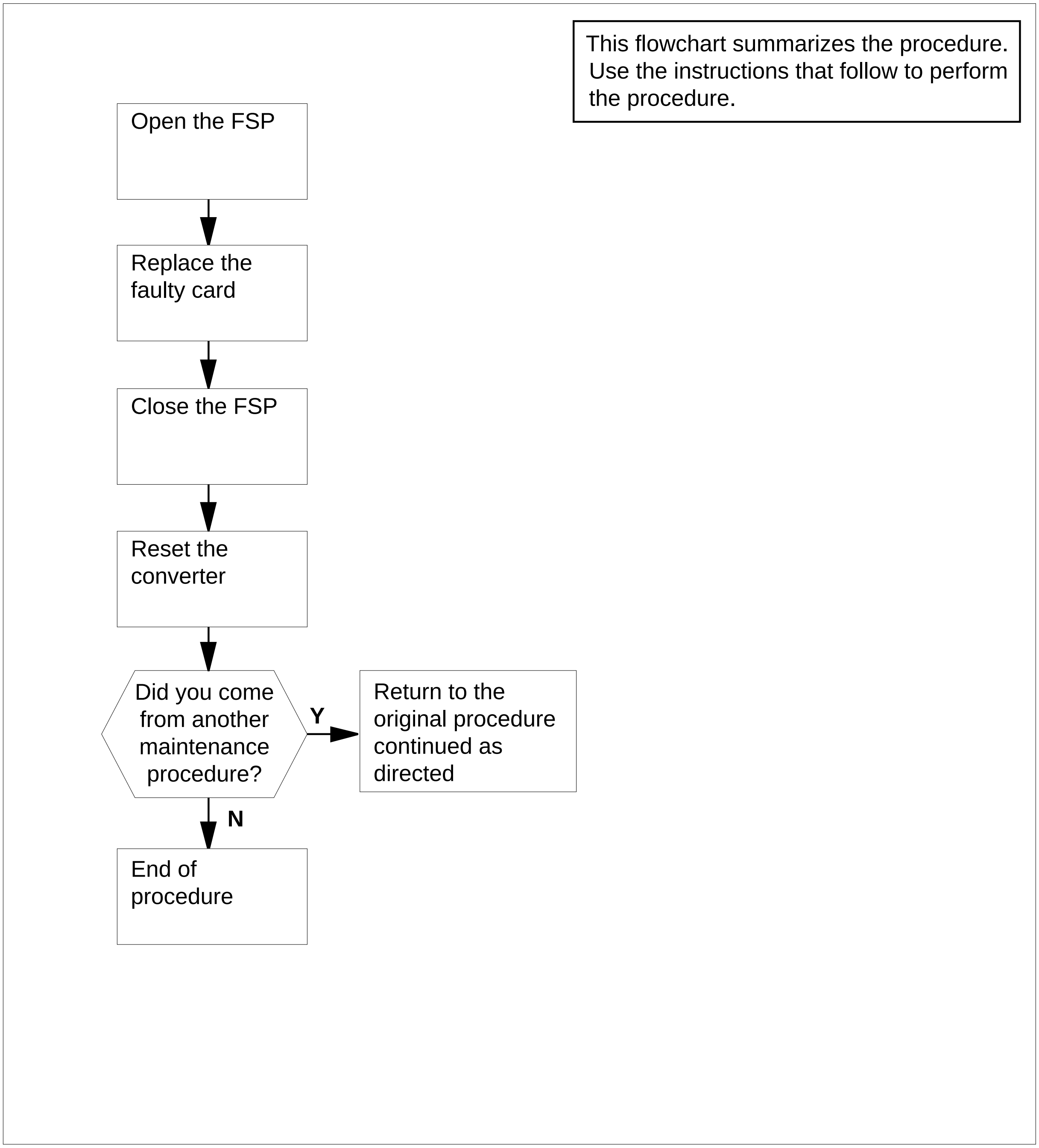
| PEC | Suffixes | Name |
|---|---|---|
| NT6X36 | AA, AB | Frame supervisory panel (FSP) alarm card |

## 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 an 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**

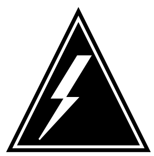


## NT6X36
## in an RSC-S FSP for CRSC or CEXT (continued)

### Replacing an NT6X36 card in an RSC-S FSP for CRSC or CEXT

***At your current location***

**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 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.

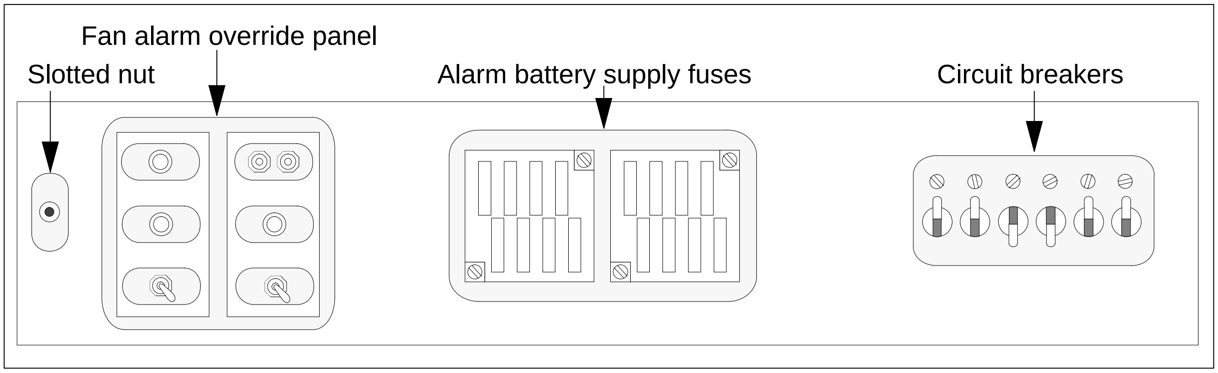
**3**

**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.

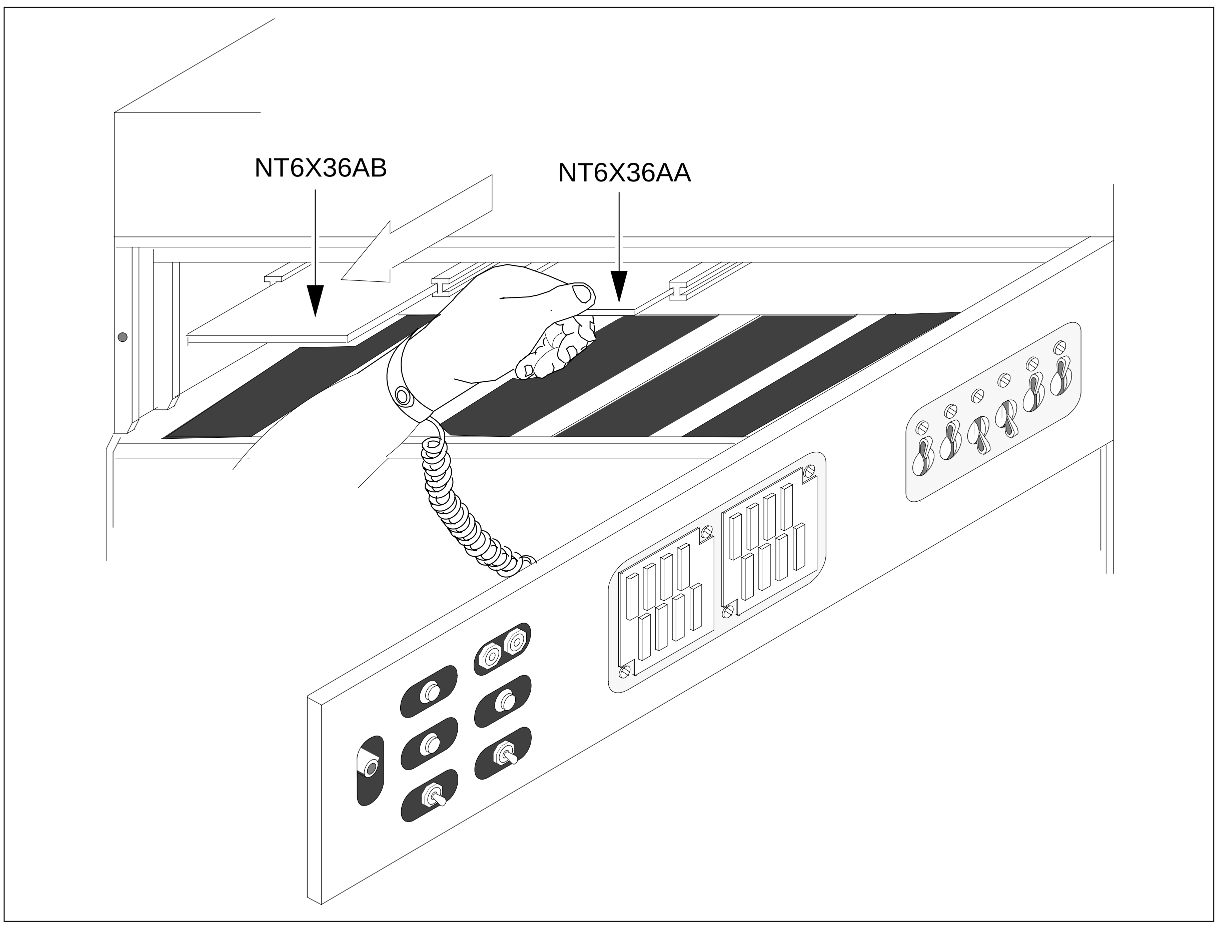
## NT6X36
## in an RSC-S FSP for CRSC or CEXT (continued)

**Frame supervisory panel**




**4** Open the FSP panel and remove the alarm card.

**Frame supervisory panel alarm and control cards**




**5** Insert the replacement alarm card.

## NT6X36
## in an RSC-S FSP for CRSC or CEXT (continued)

**6** Close the FSP panel.

**7** Tighten the slotted nut on the FSP.

Proceed as follows to reset the converter in each shelf 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 ON. 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 |

***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 where the LCME is located

**cabinet_no**
is the number of the cabinet where the LCME is located

**lcme_no**
is the number of the LCME with the faulty card

**10** Monitor the MAP display for system recovery.

# NT6X36
# in an RSC-S FSP for CRSC or CEXT (continued)

*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 the system | Do |
|---|---|
| recovers | step 11 |
| does not recover | step 28 |

***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.

## NT6X36
## in an RSC-S FSP for CRSC or CEXT (continued)

*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

## NT6X36
## in an RSC-S FSP for CRSC or CEXT (continued)

*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
```

**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 |

## NT6X36
## in an RSC-S FSP for CRSC or CEXT (continued)

| If the load | Do |
|---|---|
| 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 where 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
```

# NT6X36
# in an RSC-S FSP for CRSC or CEXT (continued)

**20** Determine the state of the RMM.

| If the state of the RMM is | Do |
|---|---|
| SysB | step 21 |
| InSv | step 28 |

**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**

## NT6X36
## in an RSC-S FSP for CRSC or CEXT (end)

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 successfully completed this procedure.

# NT6X51
# in an RSC-S (DS-1) Model A 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

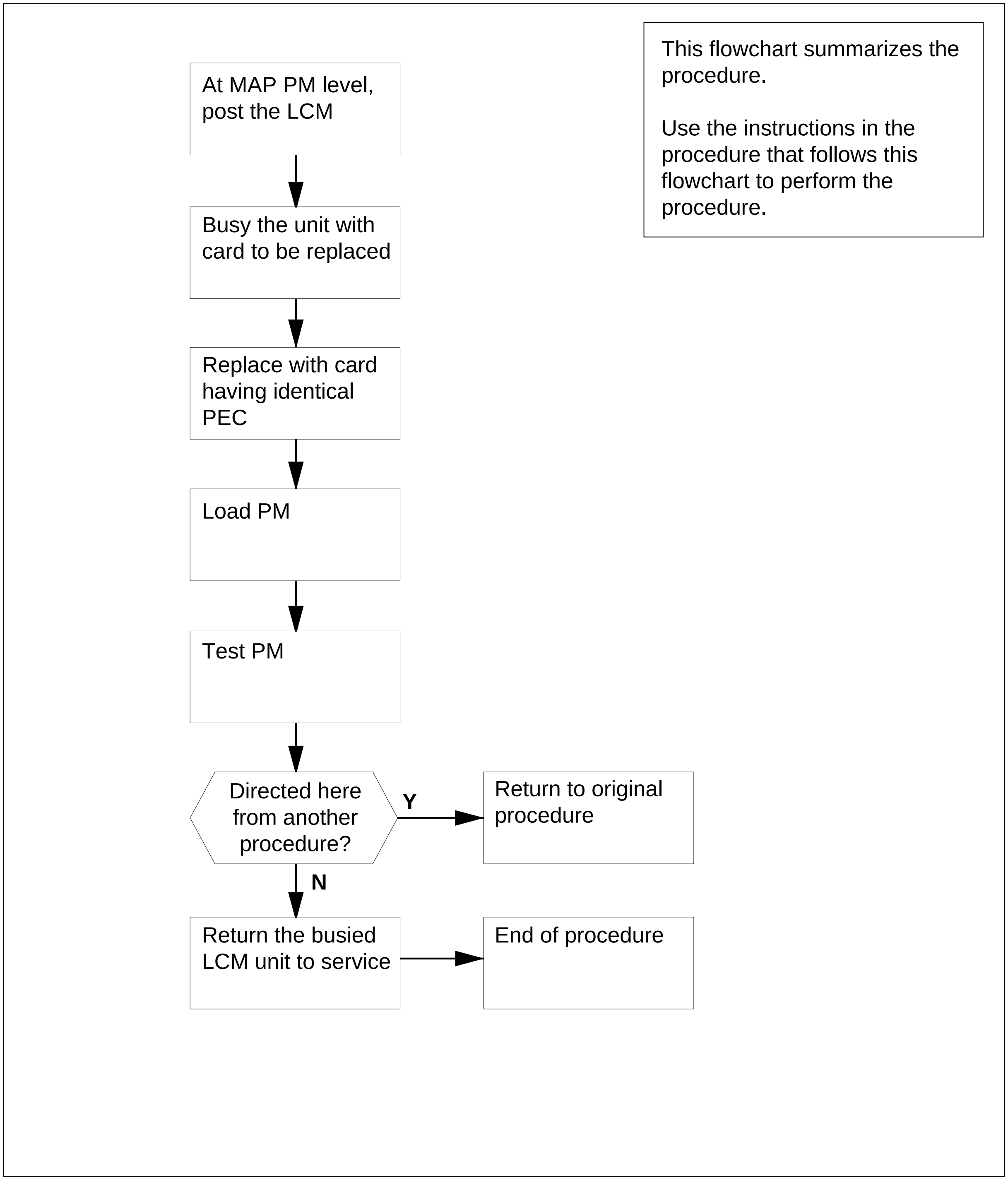
None

## 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 an RSC-S (DS-1) Model A LCM (continued)

**Summary of card replacement procedure for an NT6X51 card in RSC-S LCM**



# NT6X51
# in an RSC-S (DS-1) Model A 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.

# NT6X51
## in an RSC-S (DS-1) Model A LCM (continued)

*where*

**lcm_unit_no**
is the number of the LCM unit

*Example of a MAP response:*

```
LCM    RemL  OO 0 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**

**DANGER**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel} Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

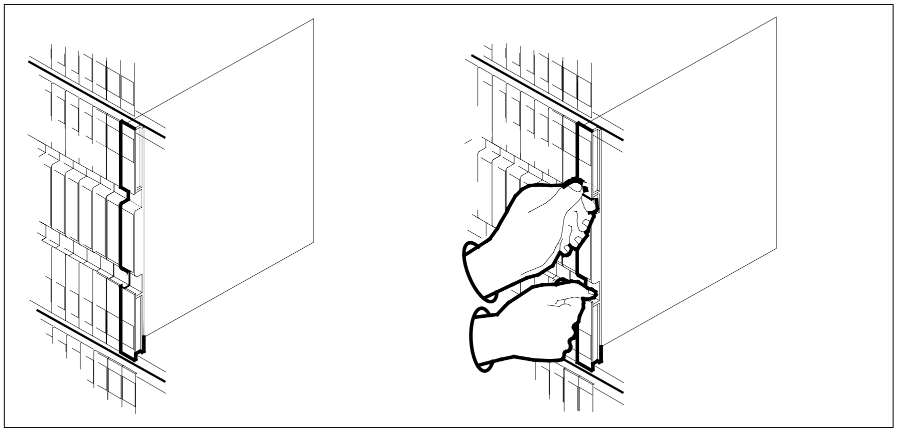
**DANGER**
**Static electricity damage**
Before removing any cards, put on a wriststrap and connect it to the wriststrap grounding point on the left side of the frame supervisory panel (FSP) of the LCM. This protects the equipment against damage caused by static electricity.

Put on a wriststrap.

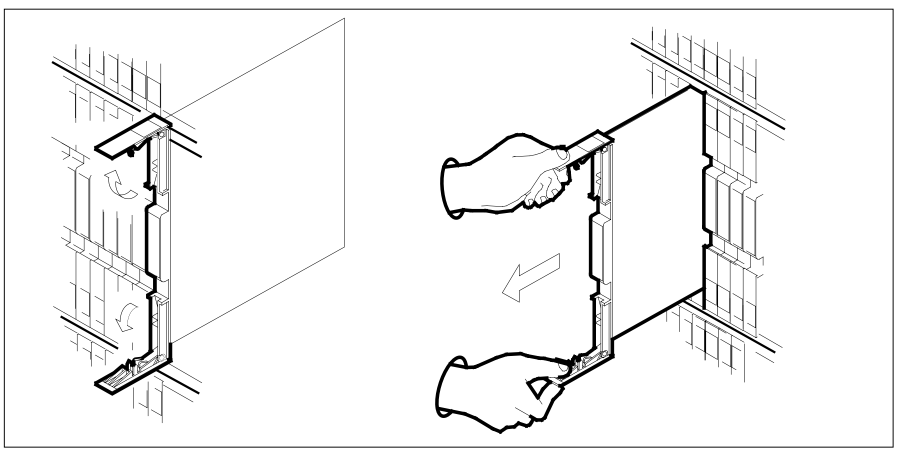
**5** Remove the card to be replaced.

**a** Locate the card to be removed on the appropriate shelf.

## NT6X51
## in an RSC-S (DS-1) Model A LCM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



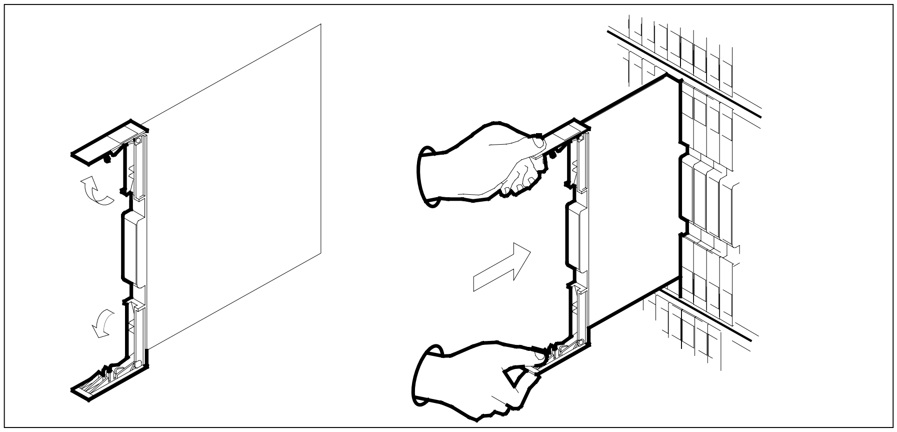
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT6X51
## in an RSC-S (DS-1) Model A LCM (continued)



**7**

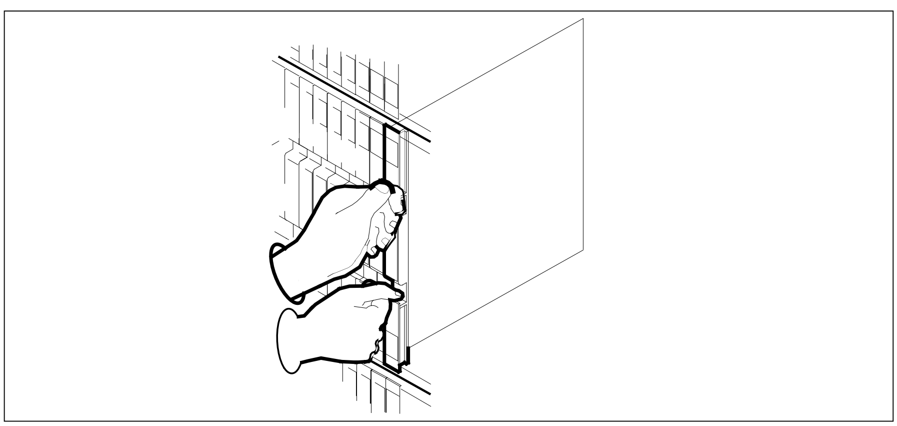
**DANGER**
**Equipment damage**
Take the following precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

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



## NT6X51
## in an RSC-S (DS-1) Model A LCM (continued)

***At the MAP terminal***

**8** 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 9 |
| failed | step 14 |

**9** Use the following information to determine where to proceed.

| If you entered this procedure from | Do |
|---|---|
| alarm clearing procedures | step 13 |
| other | step 10 |

**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.

# NT6X51 in an RSC-S (DS-1) Model A LCM (end)

**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 an RSC-S (DS-1) Model A 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

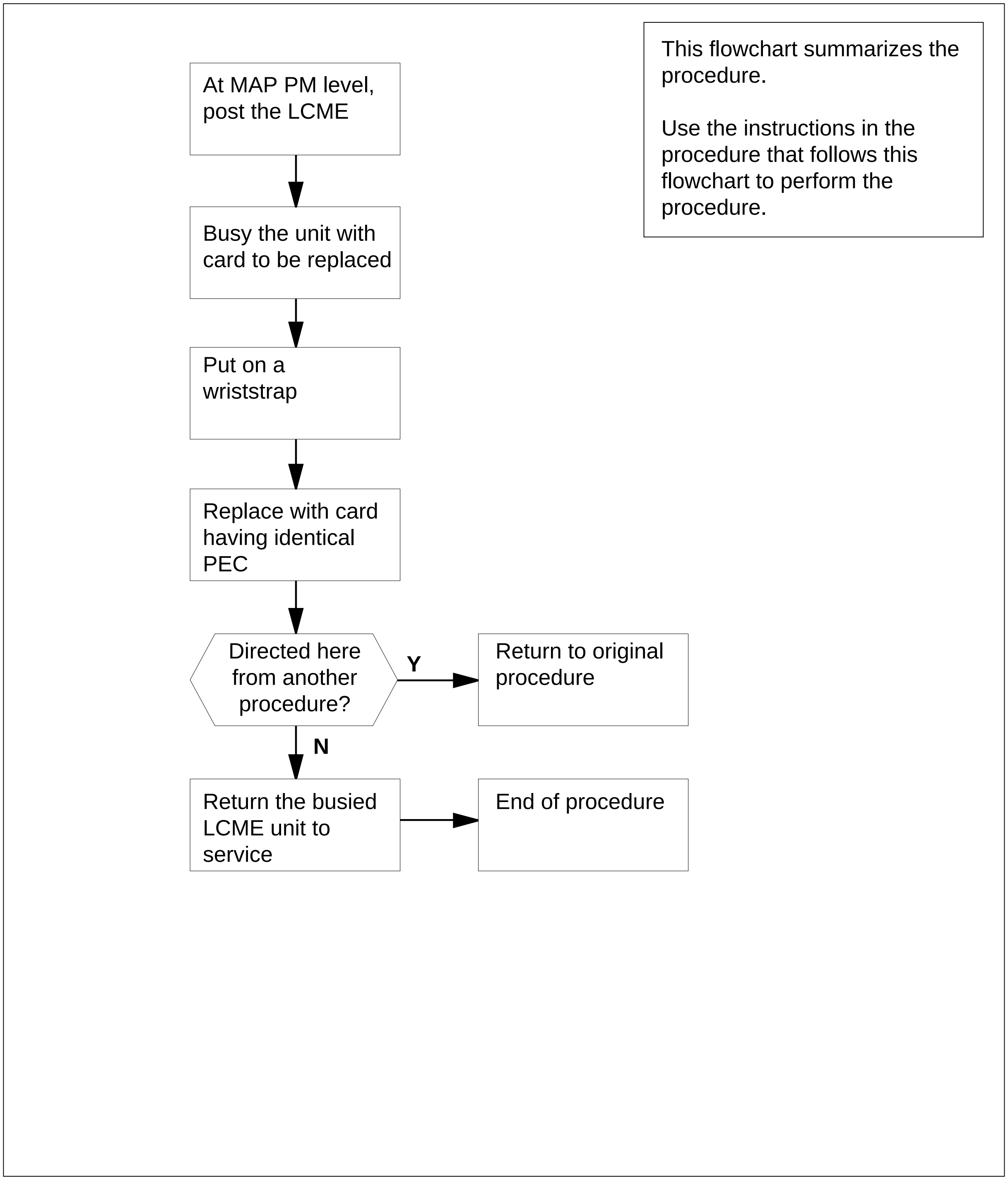
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X52 card in RSC-S LCME**



# NT6X52
# in an RSC-S (DS-1) Model A 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
 .      .       .       .    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_
 5 Trnsl_    LCME   RemL  OO 0 Links_OOS:  CSide 0
 6 Tst_      Unit 0:  InSv               /RG:  0
 7 Bsy_      Unit 1:  InSv               /RG:  1
 8 RTS_                        11 11 11       RG:Pref:0 InSv
 9 OffL_     Drwr: 01 23 45 67 89 01 23 45       Stby:1 InSv
10 LoadPM_   .. .. .. .. .. ..
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

## NT6X52
## in an RSC-S (DS-1) Model A LCME (continued)

**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 an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

> **DANGER**
> **Card damage—transport**
> Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:
>
> When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

> **DANGER**
> **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 LCME. This protects the equipment against damage caused by static electricity.

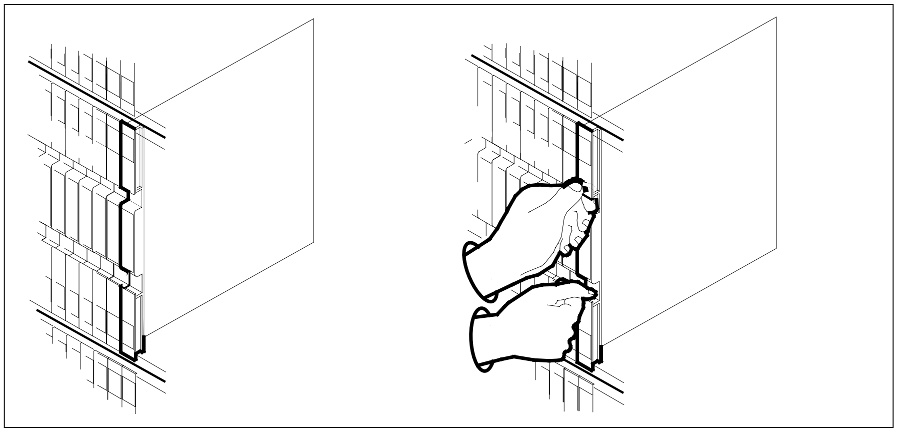
> **DANGER**
> **Equipment damage**
> Take the following precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

Put on a wriststrap.

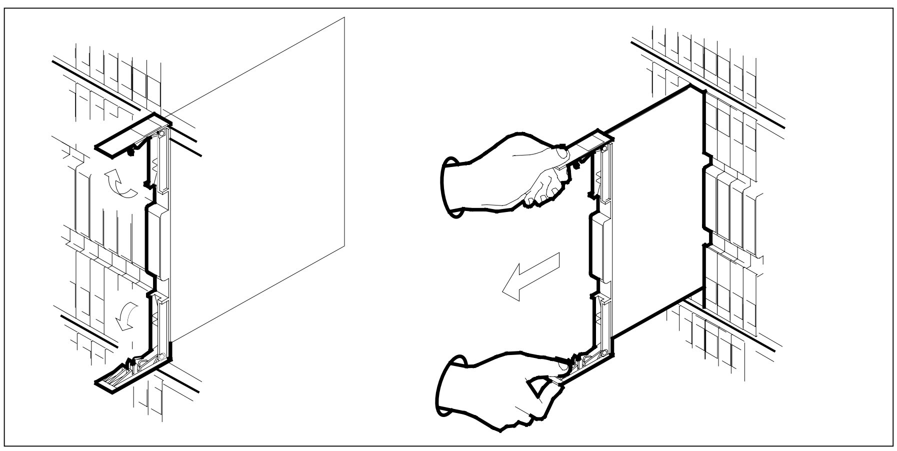
**6** Remove the NT6X52 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT6X52
## in an RSC-S (DS-1) Model A 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.



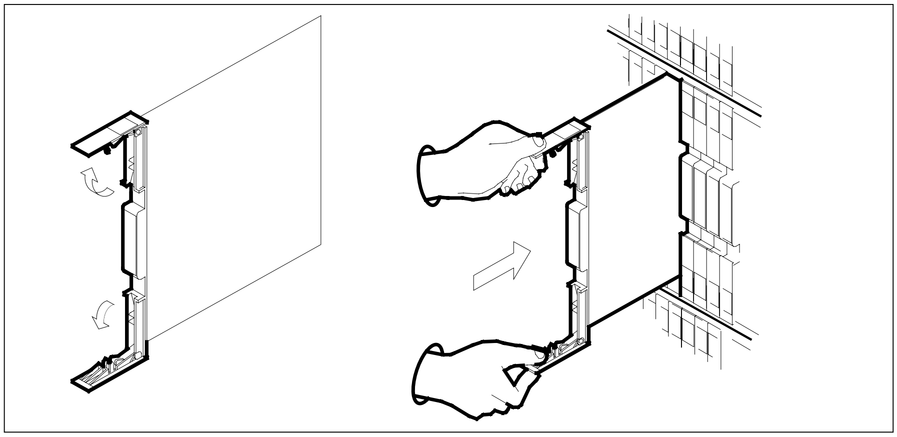
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT6X52
## in an RSC-S (DS-1) Model A LCME (continued)



**8**

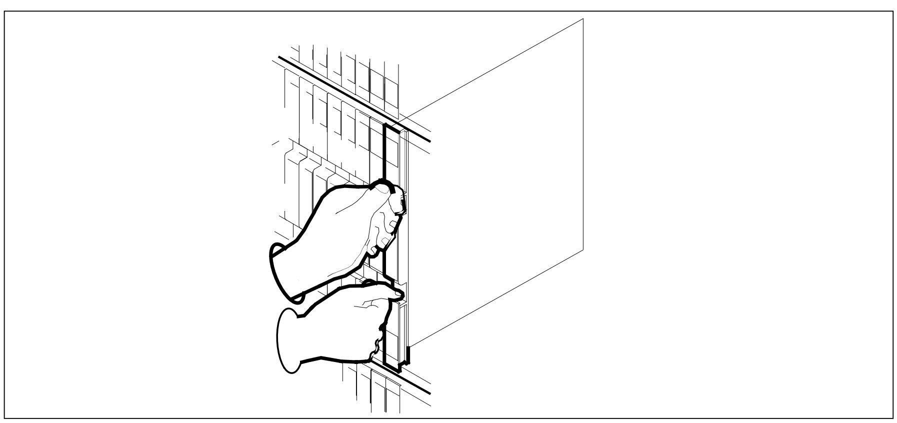
**DANGER**
**Equipment damage**
Take the following precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

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



# NT6X52
## in an RSC-S (DS-1) Model A LCME (continued)

***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 |

**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 |

## NT6X52
## in an RSC-S (DS-1) Model A LCME (end)

| If RTS | Do |
|---|---|
| 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 an RSC-S (DS-1) Model A 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

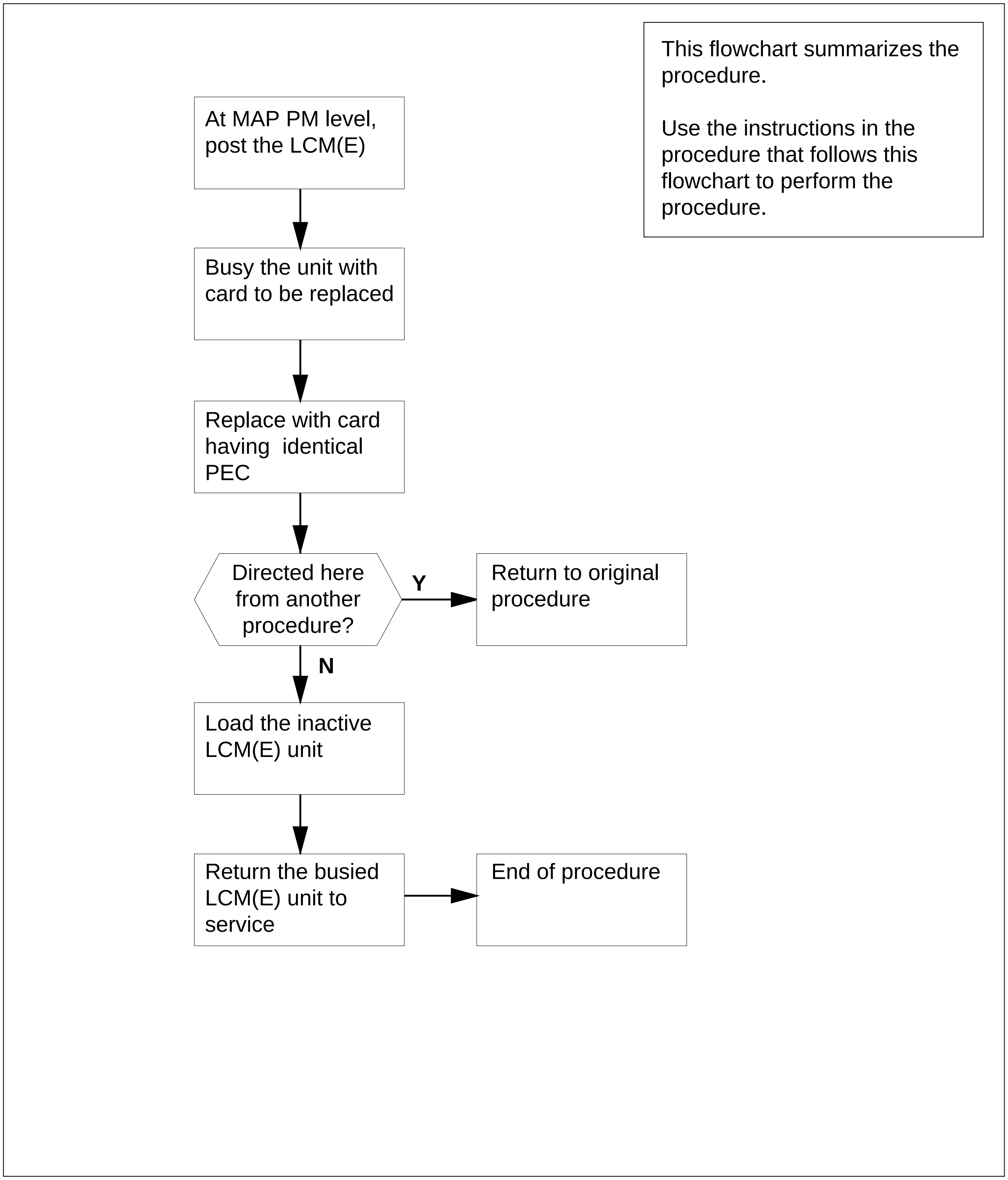
None

## 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 an RSC-S (DS-1) Model A LCM(E) (continued)

**Summary of card replacement procedure for an NT6X53 card in RSC-S LCM(E)**



# NT6X53
# in an RSC-S (DS-1) Model A 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 an RSC-S (DS-1) Model A 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
```

## NT6X53
## in an RSC-S (DS-1) Model A LCM(E) (continued)

***At the LCE frame***

**5**

> **DANGER**
> **Card damage—transport**
> Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:
>
> When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

> **DANGER**
> **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 LCME. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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 wriststrap.

**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

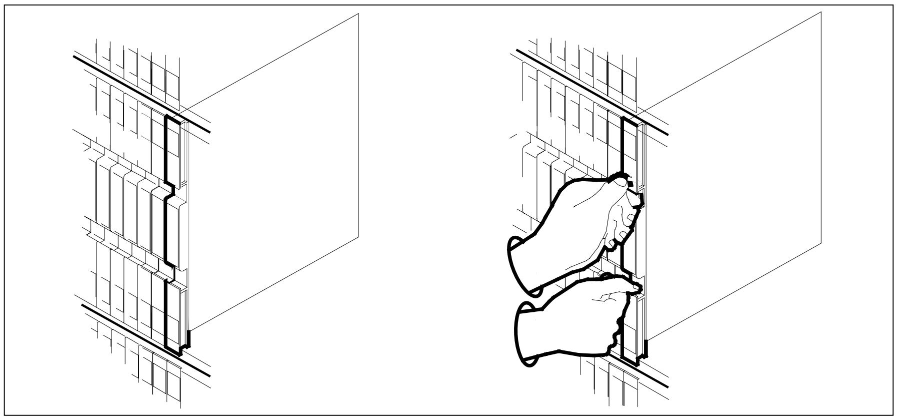
```
>sil
```

and pressing the Enter key.

**7** Remove the NT6X53 card as shown in the following figures.

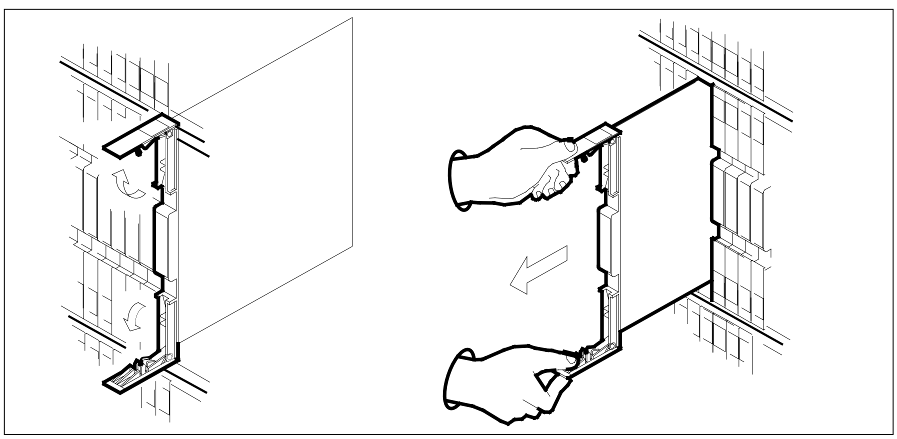
**a** Locate the card to be removed on the appropriate shelf.

## NT6X53
## in an RSC-S (DS-1) Model A LCM(E) (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.

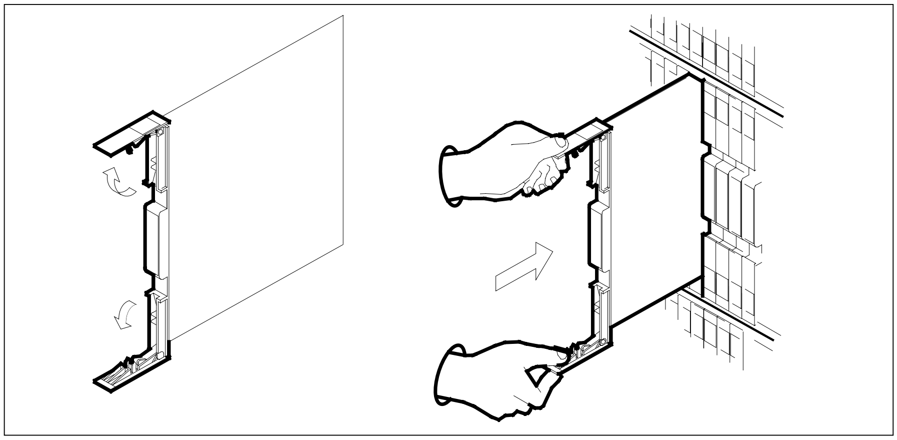


**8** Open the locking levers on the replacement card.

**a** Align the card with the slots in the shelf.

**b** Gently slide the card into the shelf.

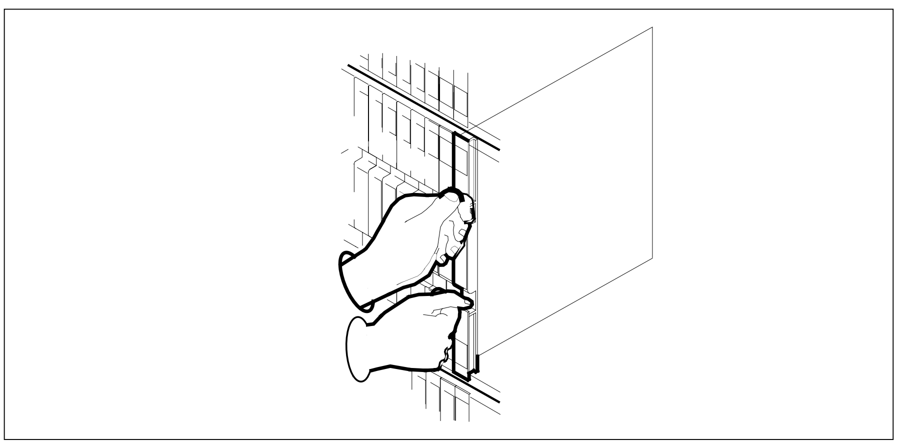
## NT6X53
## in an RSC-S (DS-1) Model A LCM(E) (continued)



**9** Seat and lock the card.

**a** Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure the card is fully seated in the shelf.

**b** Close the locking levers.



**10** 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.

## NT6X53
## in an RSC-S (DS-1) Model A LCM(E) (continued)

***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.

## NT6X53
## in an RSC-S (DS-1) Model A LCM(E) (end)

*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 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.

**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 an RSC-S (DS-1) Model A 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

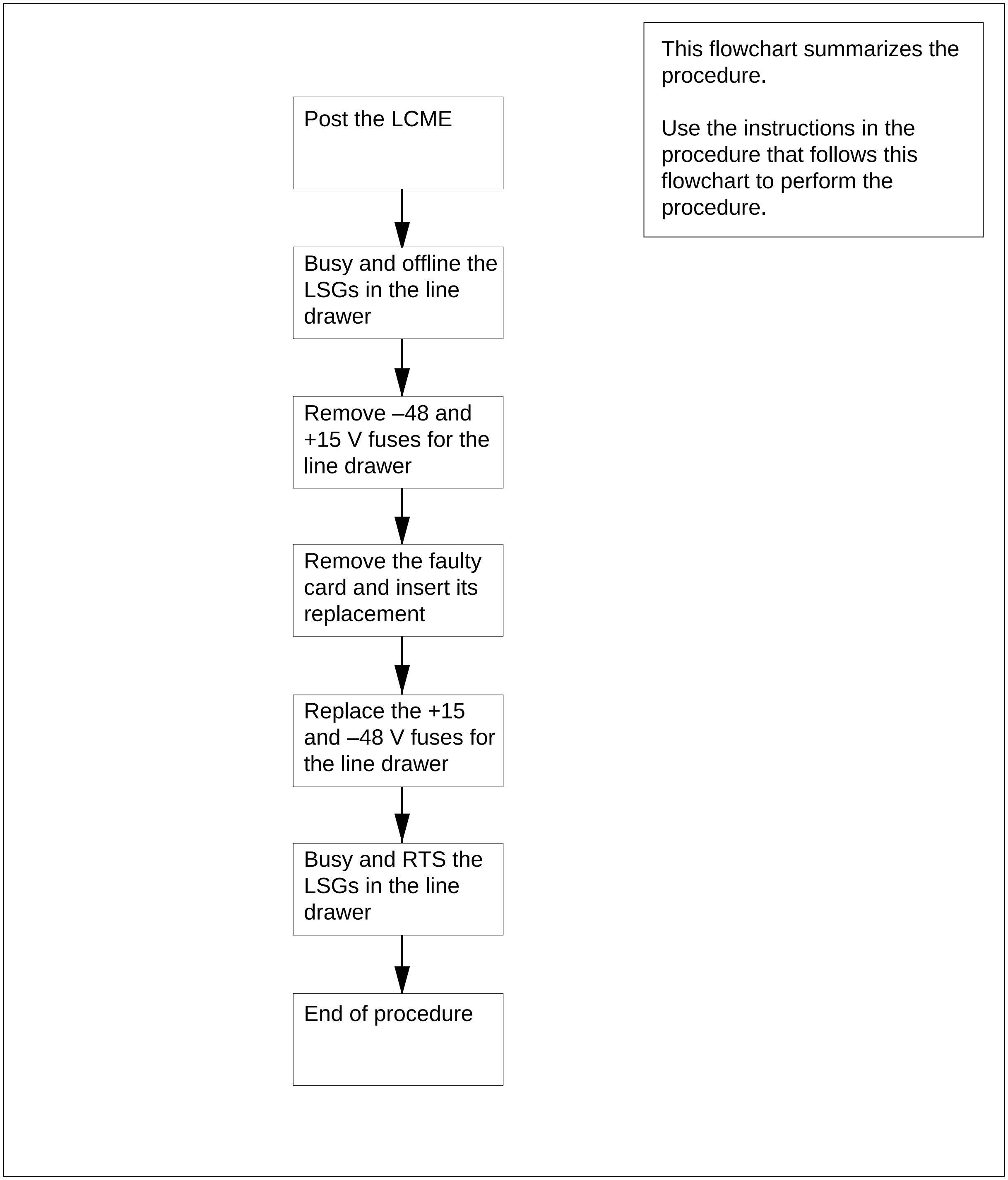
None

## 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 an RSC-S (DS-1) Model A LCM(E) (continued)

**Summary of card replacement procedure for an NT6X54 card in RSC-S LCM(E)**



# NT6X54
# in an RSC-S (DS-1) Model A 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 an RSC-S (DS-1) Model A 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.

**8**

**DANGER**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch cabinet (Northern Telecom [Nortel] Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

## NT6X54
## in an RSC-S (DS-1) Model A LCM(E) (continued)

> **DANGER**
> **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 LCME. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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 wriststrap.

**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 15.0 cm (about 6.0 in).

**10**

> **DANGER**
> **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.

## NT6X54
## in an RSC-S (DS-1) Model A LCM(E) (continued)

**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 |

***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

## NT6X54
## in an RSC-S (DS-1) Model A LCM(E) (end)

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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NT6X69 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NT6X69 | AC, AD, QA | Message and Tone Card |

## Common procedures

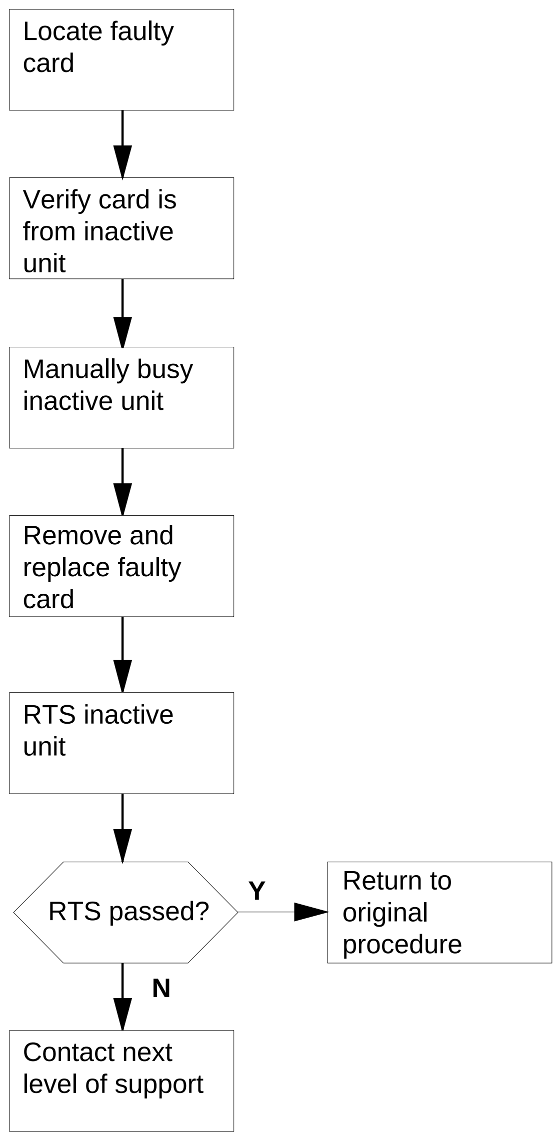
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NT6X69 card in RSC-S RCC2**




This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

# NT6X69
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NT6X69 card in an RSC-S RCC2**

***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 RCC2, 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** Set the MAP display to the PM level and post the RCC2 unit by typing

**`>MAPCI;MTC;PM;POST RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the rcc2 with the faulty card

# NT6X69
# in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
CM     MS     IOD     Net      PM      CCS      LNS      Trks     Ext    Appl
 .      .      .       .        .       .        .         .        .      .

RCC2               SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM       0         0          0        0         0          25
 2 Post_   RCC2     0         0          0        0         0           0
 3 ListSet
 4         RCC2     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.

**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***

**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.

# NT6X69
## in an RSC-S (DS-1) Model A RCC2 (continued)

***At the MAP terminal***

**8** Busy the inactive PM unit by typing

**`>BSY UNIT rcc2_unit_no`**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit (0 or 1)

**9** Set the PM to the read-only memory (ROM) level and inhibit messaging by typing

**`>PMRESET UNIT rcc2_unit_no NORUN`**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit (0 or 1)

***At the RCE***

**10**

> **DANGER**
> **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 RCC2. This protects the equipment against damage caused by static electricity.

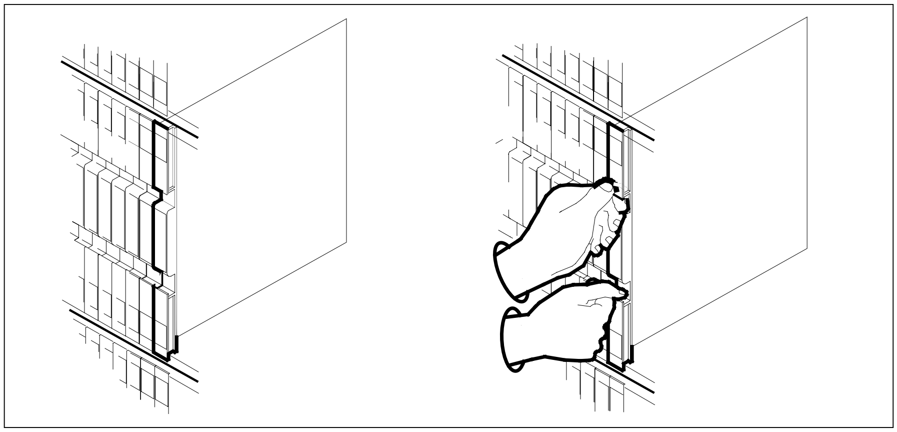
> **DANGER**
> **Equipment damage**
> Take these precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
> 2. Do not force the card into its slot.

Put on a wrist strap.

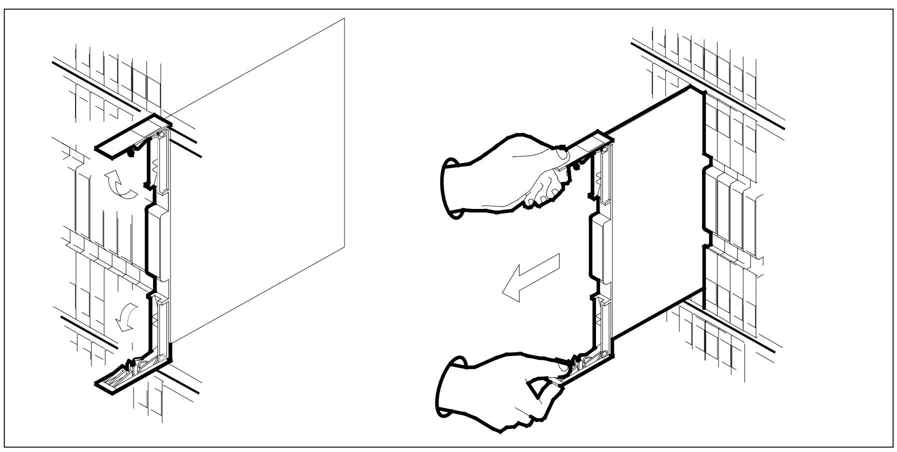
**11** Remove the NT6X69 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT6X69 in an RSC-S (DS-1) Model A RCC2 (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



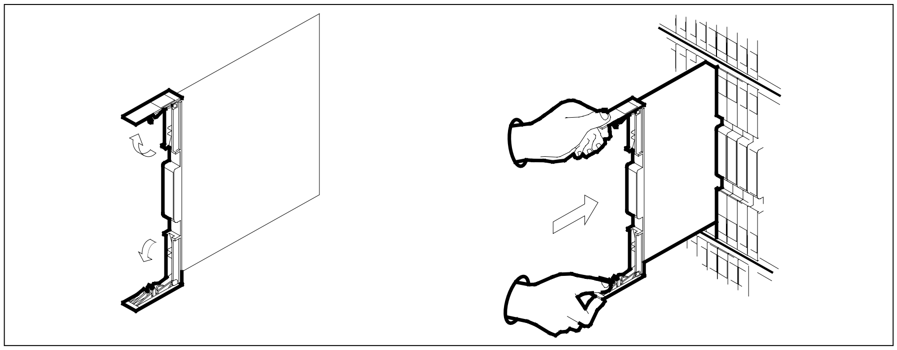
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT6X69
## in an RSC-S (DS-1) Model A RCC2 (continued)



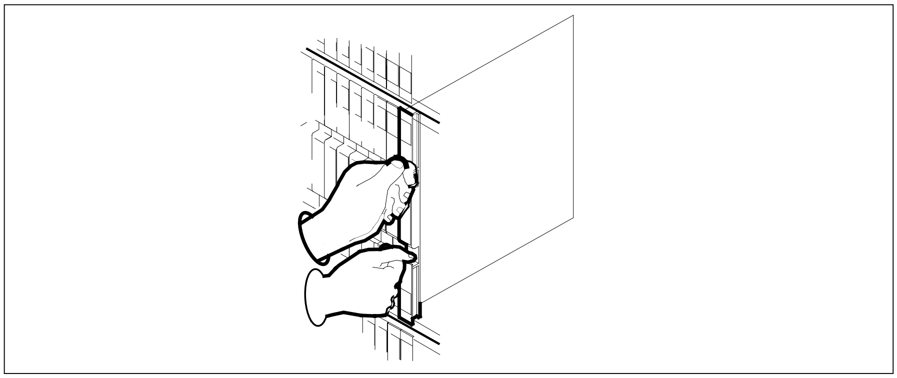
**13**

> **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.

**b** Close the locking levers.



***At the MAP terminal***

**14** Perform a full reset of the inactive unit by typing

**>PMRESET UNIT rcc2_unit_no**

and pressing the Enter key.

## NT6X69
## in an RSC-S (DS-1) Model A RCC2 (continued)

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 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 rcc2_unit_no CC**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 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 RCC2 unit to service by typing

**>RTS UNIT rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit (0 or 1)

| If RTS | Do |
|---|---|
| passed | step 18 |

## NT6X69
## in an RSC-S (DS-1) Model A RCC2 (end)

| If RTS | Do |
|---|---|
| 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 *Card Replacement Procedures*.

**21** Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

**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 an RSC-S (DS-1) Model A 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

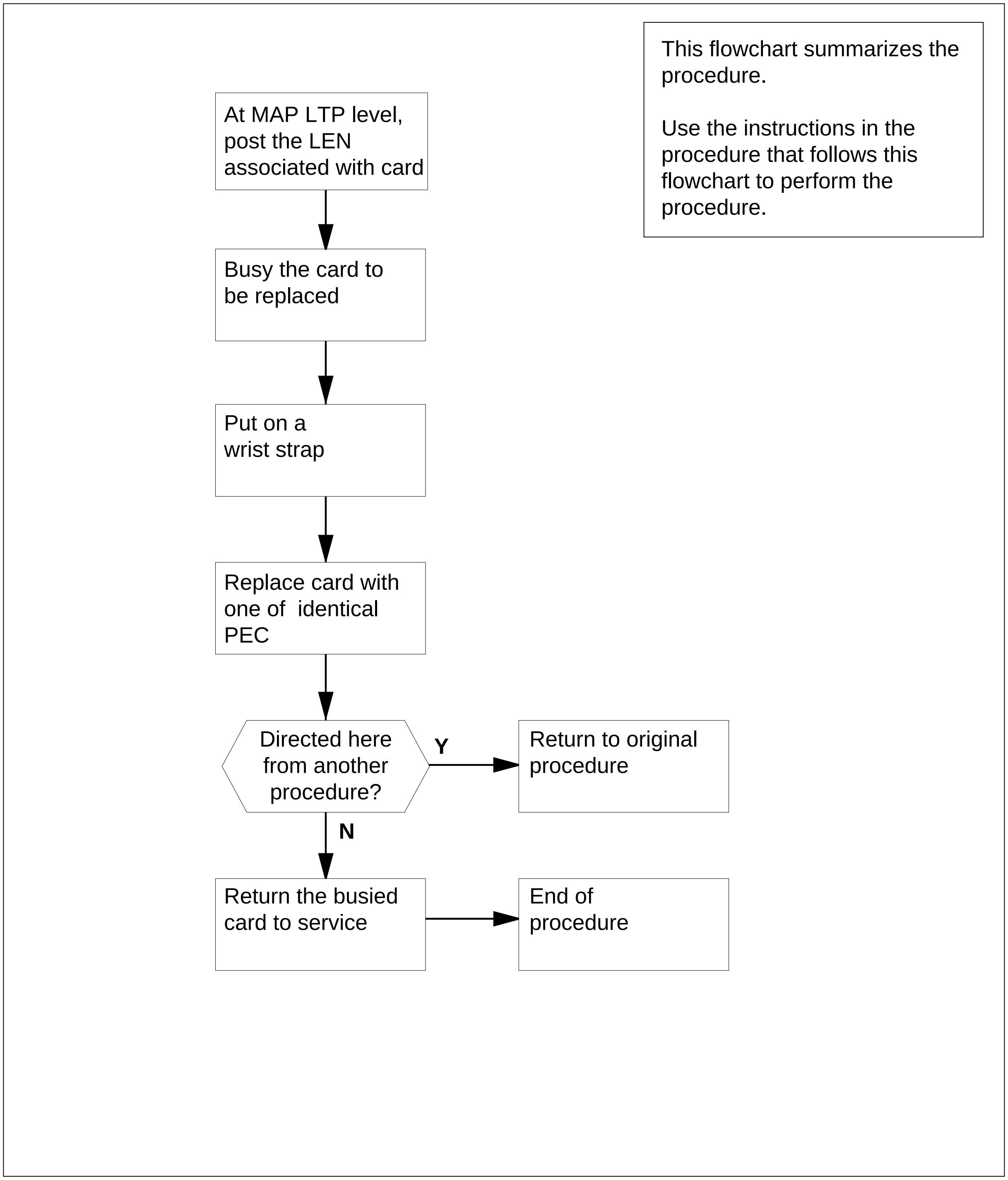
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X71 card in RSC-S LCME**



# NT6X71 in an RSC-S (DS-1) Model A 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:*

## NT6X71 in an RSC-S (DS-1) Model A LCME (continued)

```
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
```

**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
```

# NT6X71
# in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**DANGER**
**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.

**DANGER**
**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.

**DANGER**
**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.

## NT6X71
## in an RSC-S (DS-1) Model A 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** 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.

## NT6X71
## in an RSC-S (DS-1) Model A 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 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 |

## NT6X71
## in an RSC-S (DS-1) Model A LCME (end)

| If RTS | Do |
|---|---|
| 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 *Alarm 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 an RSC-S (DS-1) Model A 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

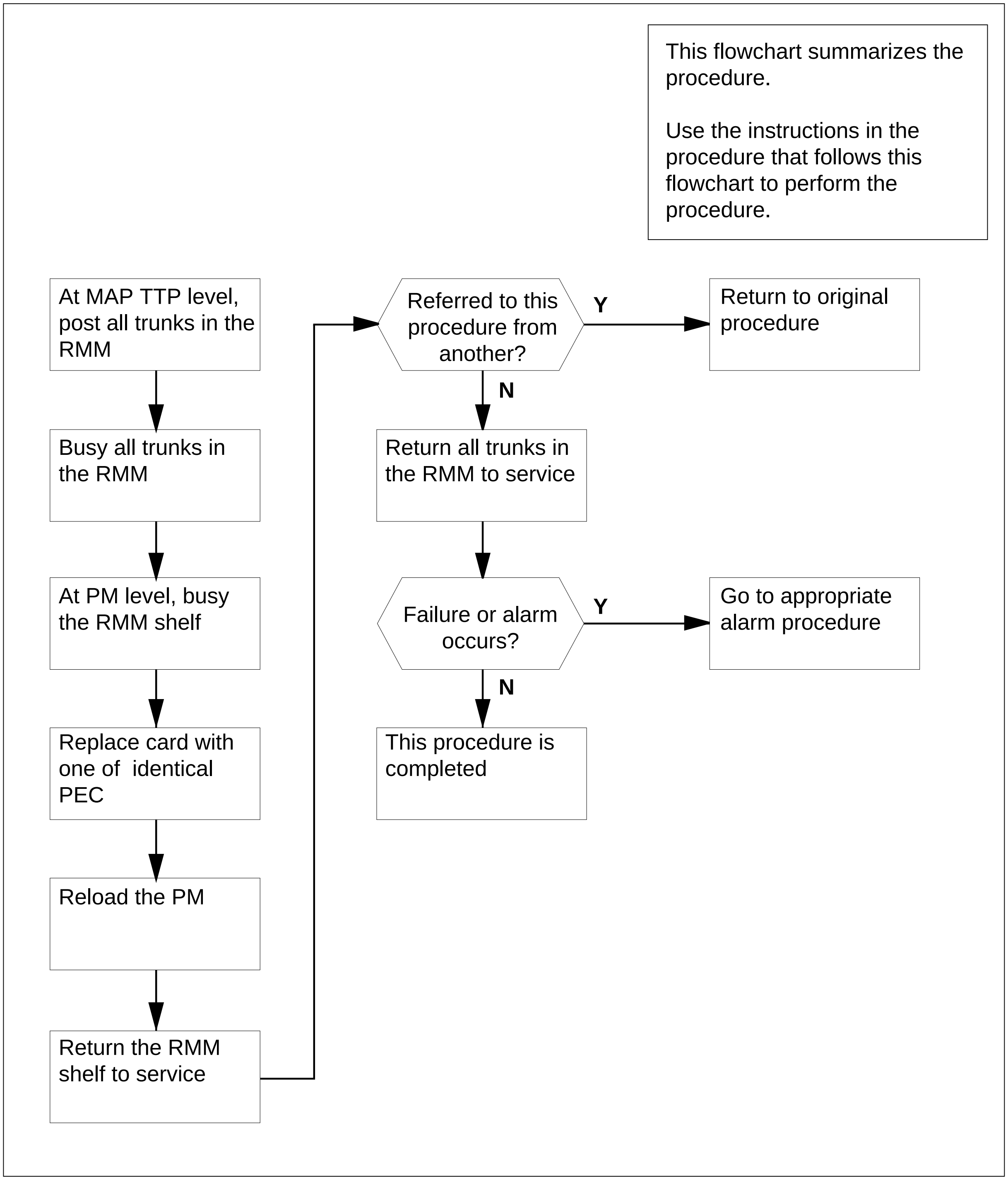
None

## 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 an RSC-S (DS-1) Model A RMM (continued)

**Summary of card replacement procedure for an NT6X74 card in RSC-S RMM**



# NT6X74
# in an RSC-S (DS-1) Model A RMM (continued)

**Replacing an NT6X74 card in an 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.

***At the MAP terminal***

**2** Set the MAP display to the TTP 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 an RSC-S (DS-1) Model A 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**

> **DANGER**
> **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.

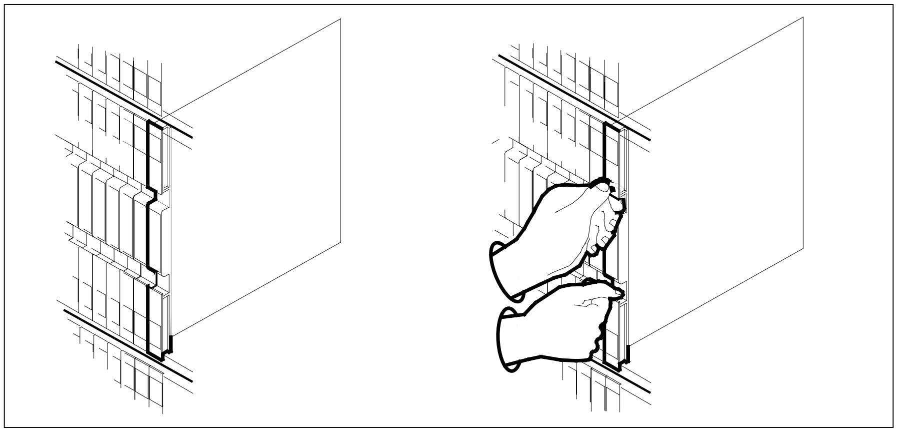
> **DANGER**
> **Improper insertion may cause damage to circuit packs**
> 1. Do not apply direct pressure to the components.
> 2. Do not force the card into its slot.

Put on a wrist strap.

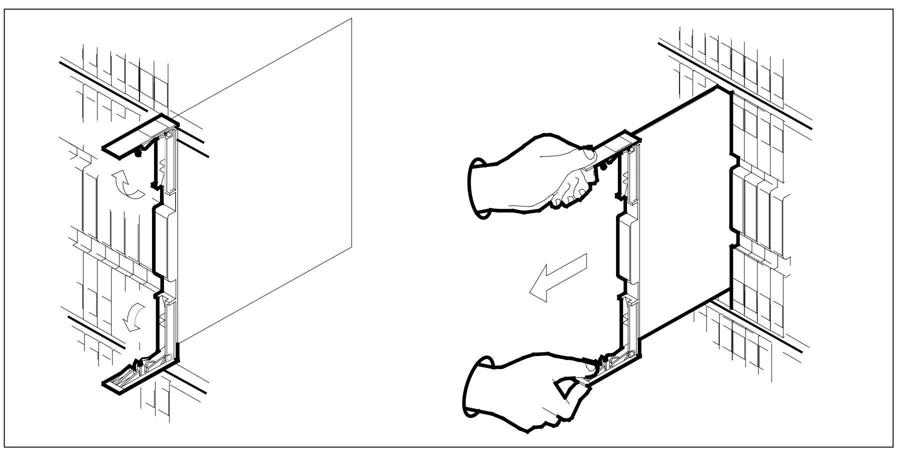
**6** Remove the NT6X74 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT6X74
## in an RSC-S (DS-1) Model A RMM (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



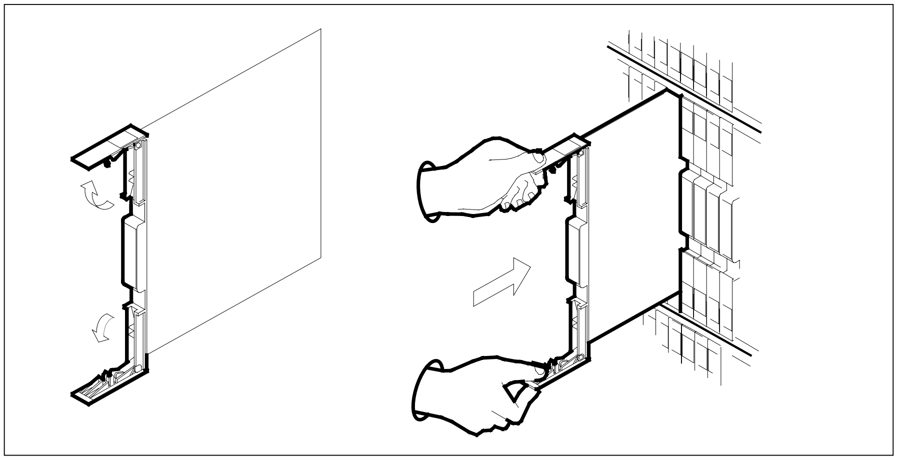
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

## NT6X74
## in an RSC-S (DS-1) Model A RMM (continued)



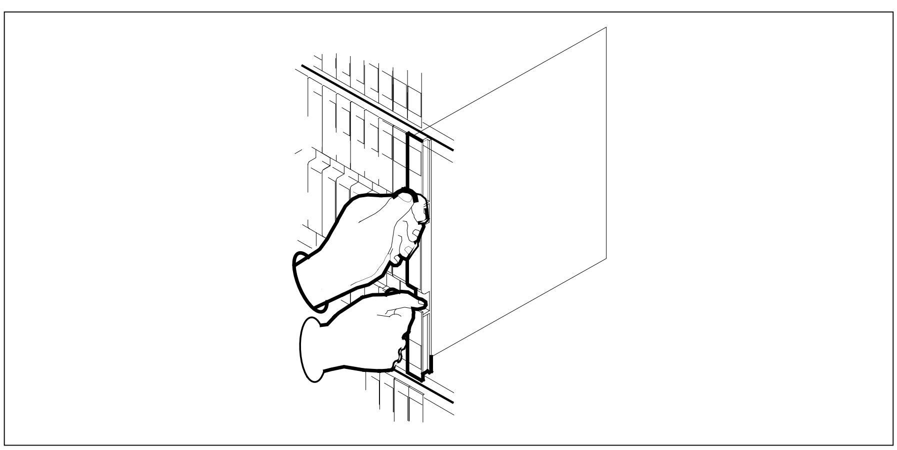
**8**

> **DANGER**
> **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.



## NT6X74
## in an RSC-S (DS-1) Model A RMM (continued)

**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 |

**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.

## NT6X74
## in an RSC-S (DS-1) Model A RMM (continued)

**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.

## NT6X74
## in an RSC-S (DS-1) Model A RMM (end)

**23** You have successfully completed this procedure. Return to the maintenance procedure that directed you to this procedure and continue as directed.

# NT6X76
# in an RSC-S (DS-1) Model A LCME

## Application

Use this procedure to replace the following card in an RSC-S LCME.

| PEC | Suffixes | Name |
|---|---|---|
| NT6X76 | AC | Asynchronous Interface Line card |

## Common procedures

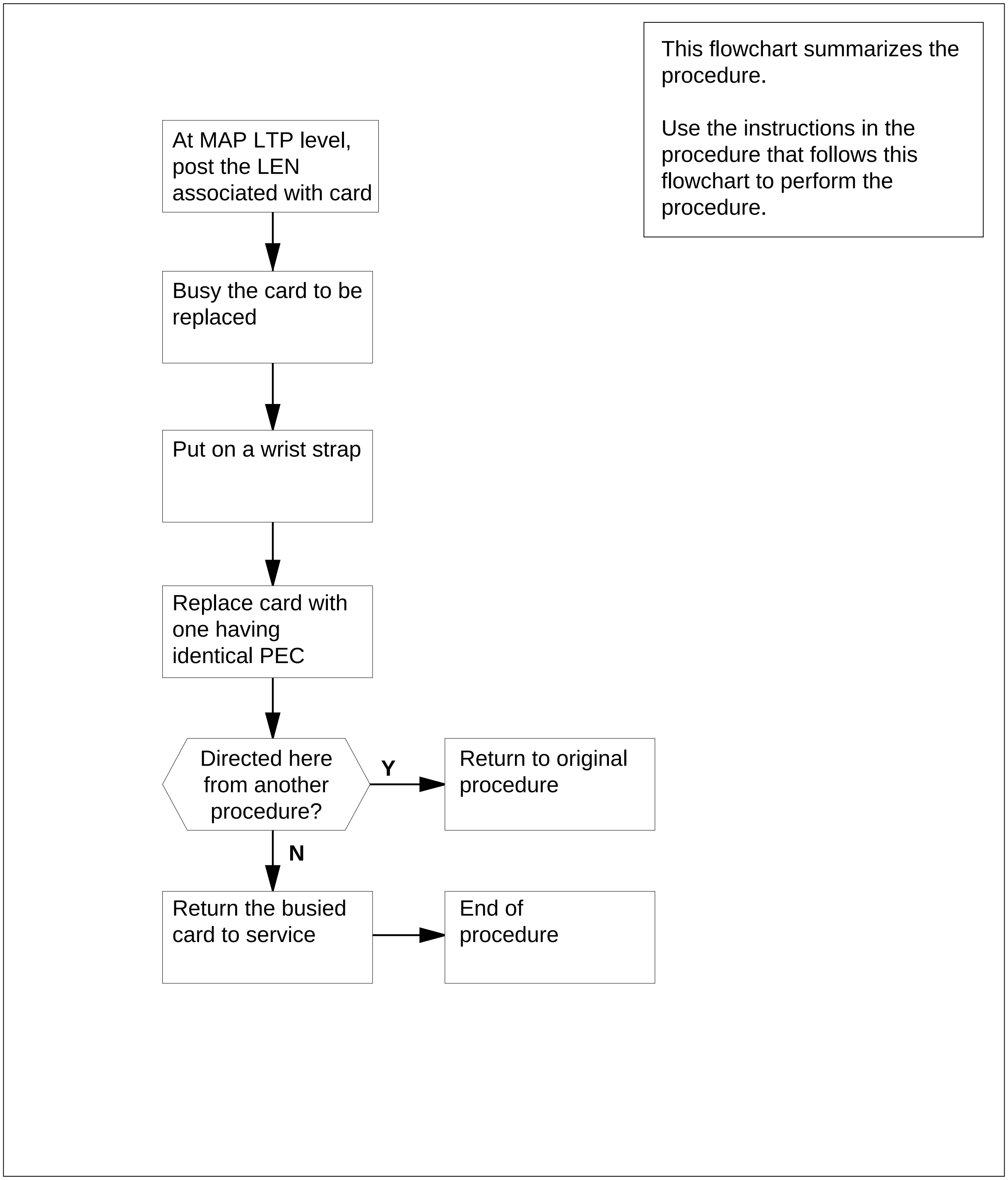
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X76 card in RSC-S LCME**



# NT6X76
# in an RSC-S (DS-1) Model A 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)_nounit_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 display:*

## NT6X76
## in an RSC-S (DS-1) Model A LCME (continued)

```
 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
```

## NT6X76
## in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**DANGER**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

**DANGER**
**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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

# NT6X76
# in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** Card removal tools are required for removing cards from line drawers. Two sizes are available, ash 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 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 (1.0 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 1.0 cm (0.5 in) to the right.

## NT6X76
## in an RSC-S (DS-1) Model A LCME (continued)

- **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 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 |

# NT6X76 in an RSC-S (DS-1) Model A LCME (end)

**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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NT6X78 card in an Remote Switching Center (RSC)-SONET Remote Cluster Controller (RCC) 2.

| PEC | Suffixes | Name |
|---|---|---|
| NT6X78 | AA, AB, BA | CLASS Modem Resource (CMR) |

## Common procedures

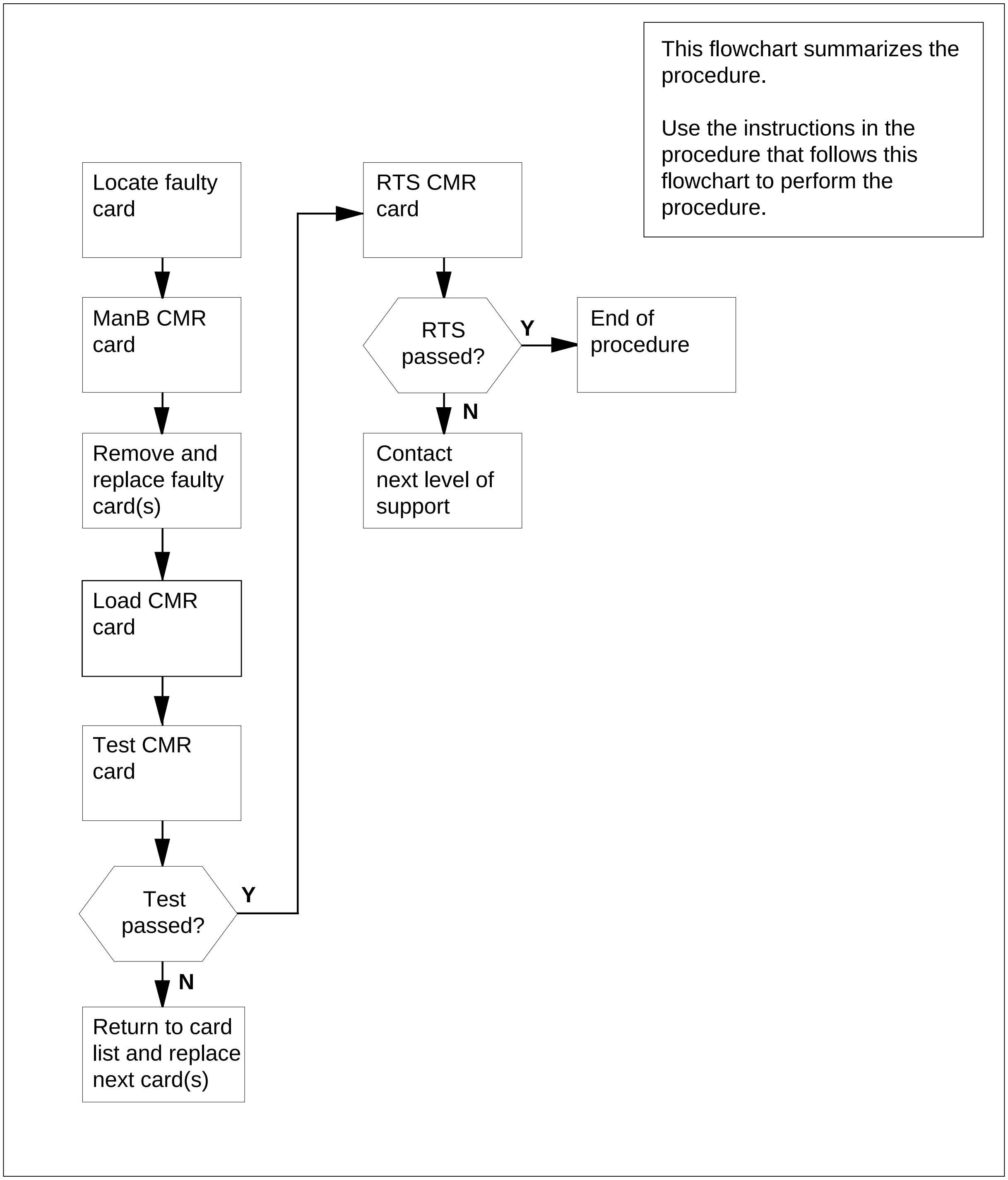
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NT6X78 card in RSC-S RCC2**



# NT6X78
# in an RSC-S (DS-1) Model A RCC2 (continued)

### Replacing an NT6X78 card in an RSC-S RCC2

***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 RCC2, 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 and find out which RCC2 is ISTb by typing

**`>MAPCI;MTC;PM;DISP ISTB RCC2`**

and pressing the Enter key.

**4** Access the ISTb RCC2 by typing

**`>POST RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the ISTB RCC2 identified in step 4.

**5** Busy the CLASS modem resource (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 an RSC-S (DS-1) Model A RCC2 (continued)

***At the RCE***

**6**

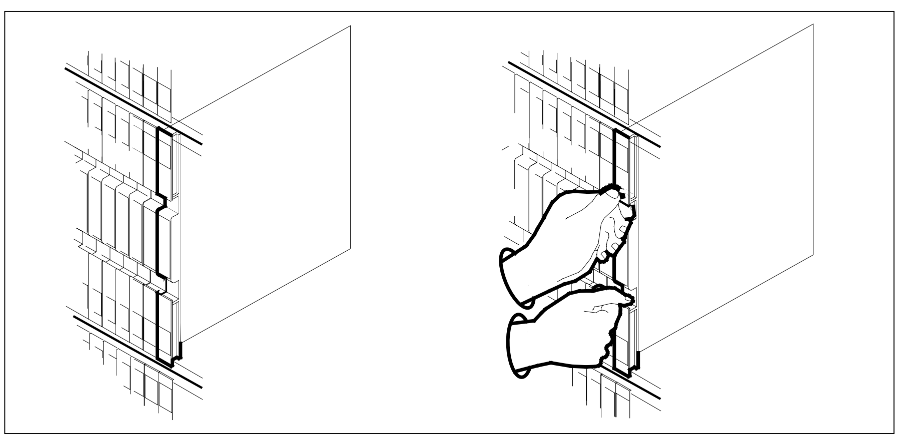
> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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.

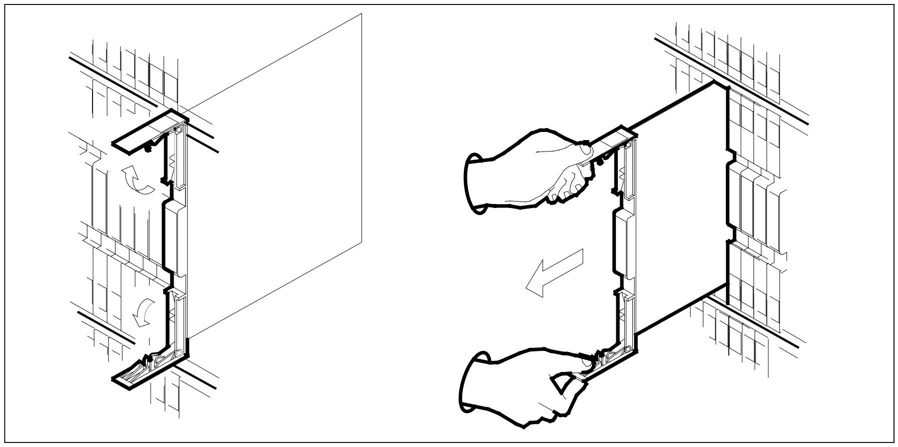
**7** Remove the NT6X78 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

## NT6X78
## in an RSC-S (DS-1) Model A RCC2 (continued)

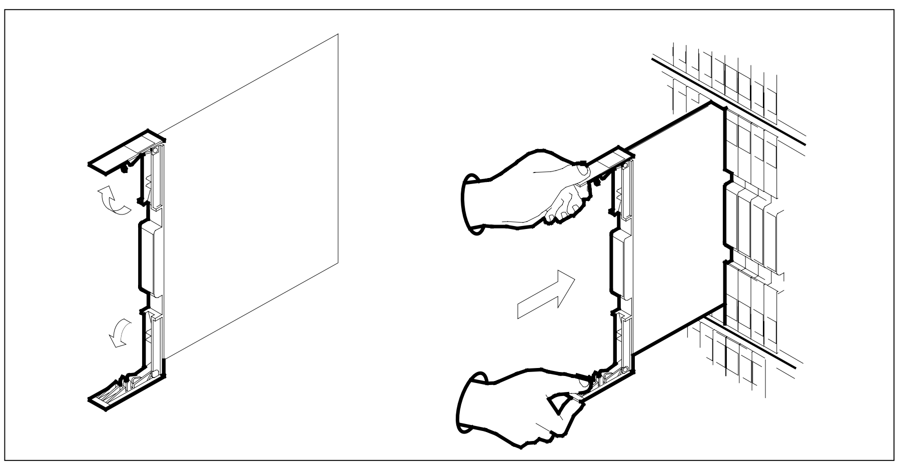


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

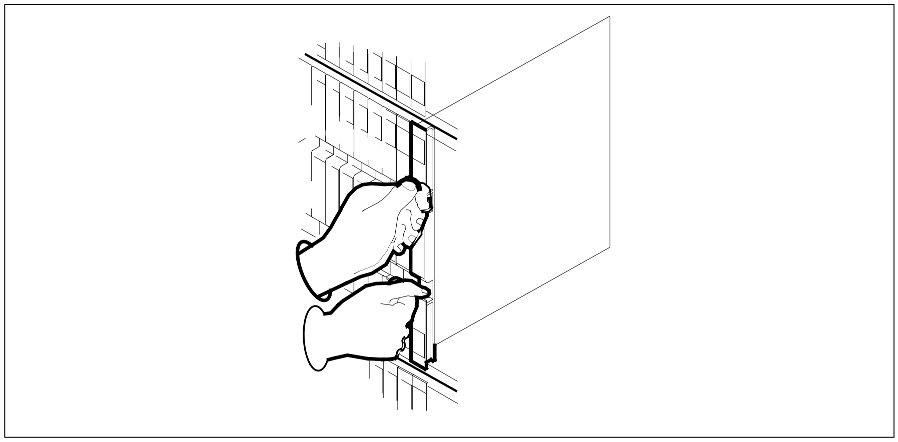


**9** Seat and lock the card.

**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.

## NT6X78
## in an RSC-S (DS-1) Model A RCC2 (continued)



***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 |

**12** Test the CMR card by typing

***>TST UNIT* unit_no CMR**

and pressing the Enter key.

## NT6X78
## in an RSC-S (DS-1) Model A RCC2 (end)

*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 *Card Replacement Procedures*.

**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

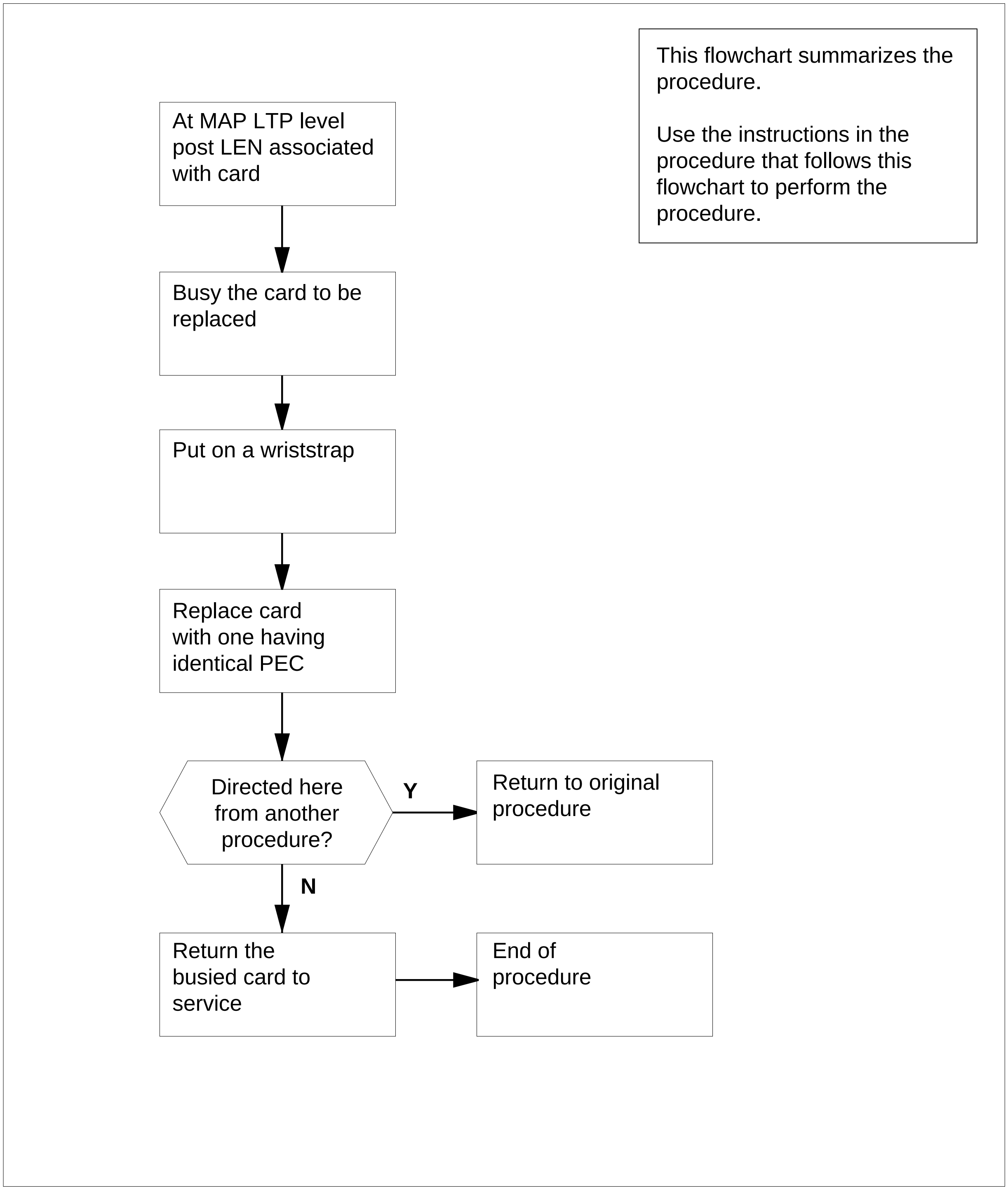
None

## 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 RSC-S LCME**



# NT6X87
# in RSC-S LCME (continued)

### Replacing an NT6X87 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 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:*

## NT6X87
## in RSC-S LCME (continued)

```
 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
```

**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
```

# NT6X87 in RSC-S LCME (continued)

***At the LCE frame***

**5**

**DANGER**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

**DANGER**
**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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

## NT6X87
## in RSC-S LCME (continued)

**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.

Put on a wriststrap.

| 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, as shown in the table above.

***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 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 (1.0 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 1.0 cm (0.5 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.

## NT6X87
## in RSC-S LCME (continued)

**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 14 |
| other | step 10 |

***At the MAP terminal***

**10** Test the NT6X87 line card by typing

**>DIAG**

and pressing the Enter key.

| If DIAG | Do |
|---|---|
| passed | step 11 |
| failed | step 15 |

**11** Return the NT6X87 card to service by typing

**>RTS**

## NT6X87
## in RSC-S LCME (end)

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 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.

# NT6X92
# in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NT6X92 card in an RSC-S RCC2.

**ATTENTION**
To ensure peak performance, do not install the UTR and GTR on the same RSC-S RCC2. Presently, there is no way of knowing which receiver is used to interpret tones. Some call processing tones may be degraded if designed for use with a GTR.

| PEC | Suffixes | Name |
|---|---|---|
| NT6X92 | BB, BC | Universal Tone Receiver (UTR) |
| NT6X92 | EA | Global Tone Receiver (GTR) |

## Common procedures

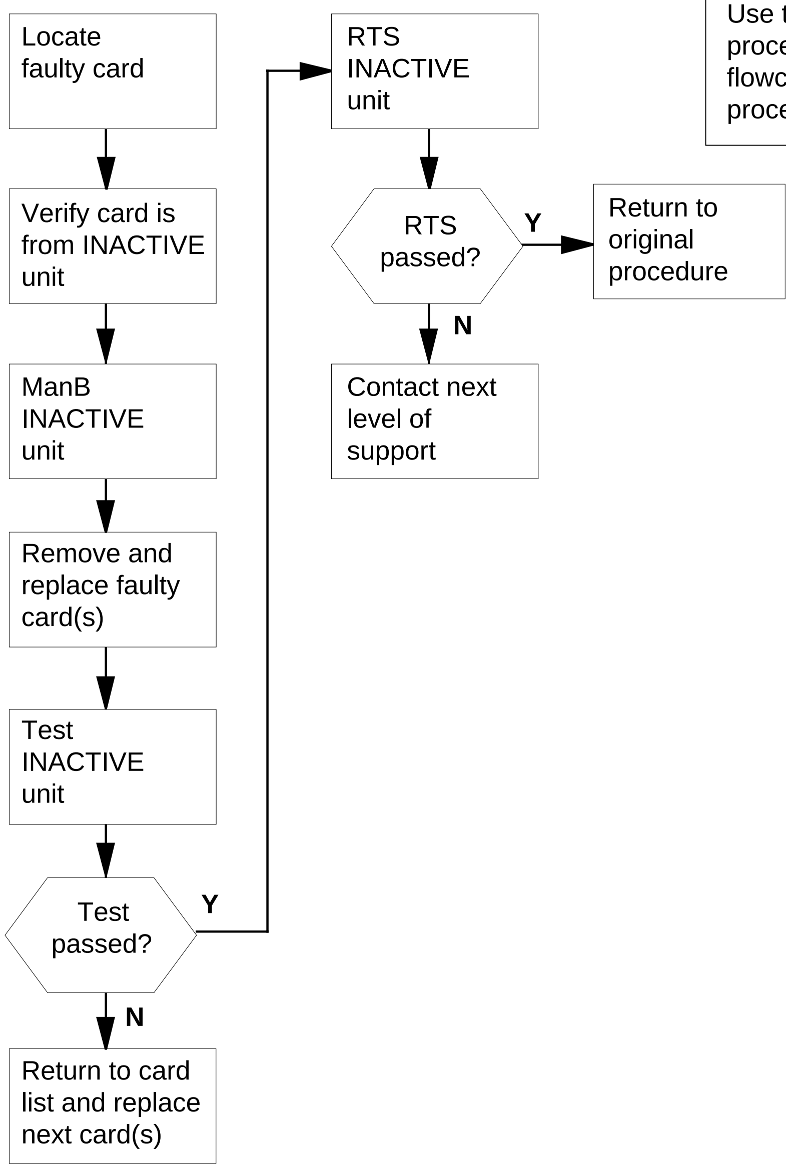
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NT6X92 card in RSC-S RCC2**




This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.

# NT6X92
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NT6X92 card in an RSC-S RCC2**

***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 RCC2, 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.

***At the MAP terminal***

**3** Ensure that the PM level of the MAP display is currently displayed and that the RCC2 is posted by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 with the faulty card

## NT6X92
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
CM    MS    IOD    Net     PM     CCS    LNS    Trks    Ext    Appl
 .     .     .      .    1RCC2    .      .       .       .      .

RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        2        0        2        25
 2 Post_   RCC2      0        0        0        0        1         1
 3 ListSet
 4         RCC2    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, ensure that 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.

**6** Answer the prompt by typing

**>YES**

and pressing the Enter key.

***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.

## NT6X92
## in an RSC-S (DS-1) Model A RCC2 (continued)

***At the MAP terminal***

**8** Busy the inactive PM unit by typing

***>bsy unit*** **rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 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 frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

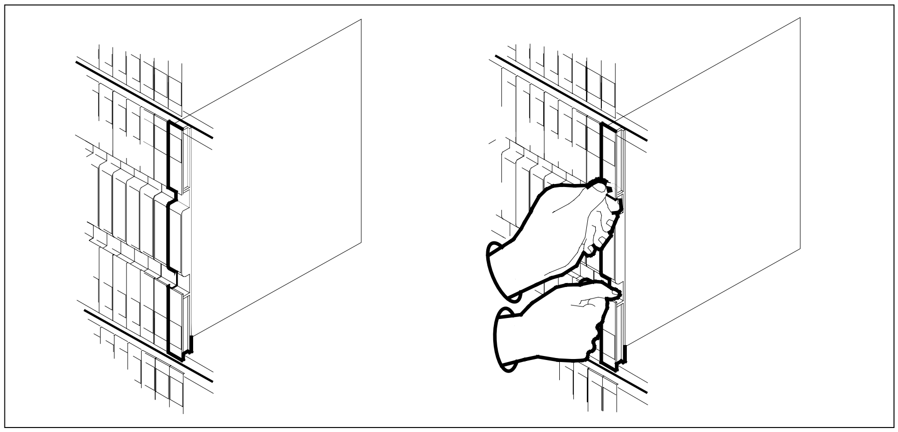
1. Do not apply direct pressure to the components.2. Do not force the card into its slot.

Put on a wrist strap.

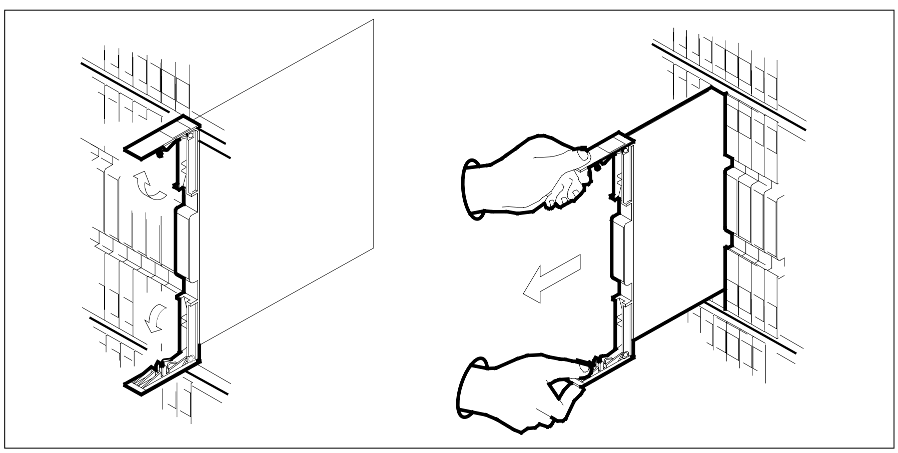
**10** Remove the NT6X92 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NT6X92
## in an RSC-S (DS-1) Model A RCC2 (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



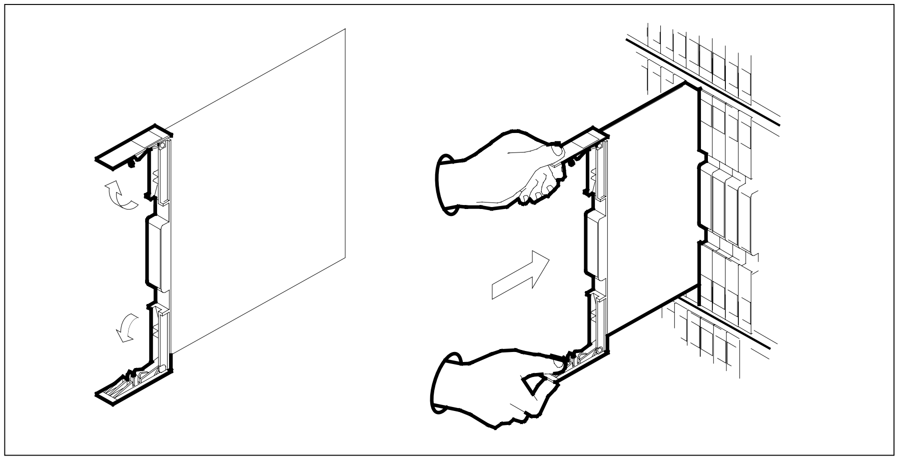
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**11** Open the locking levers on the replacement card.

**a** Align the card with the slots in the shelf.

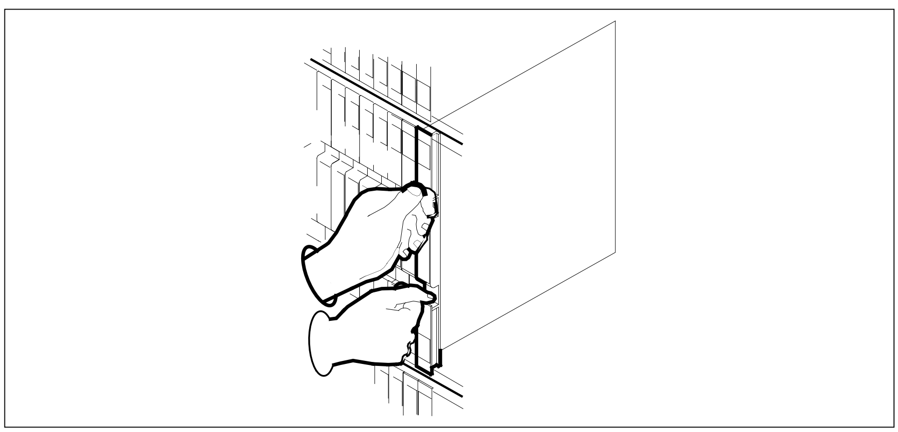
**b** Gently slide the card into the shelf.

## NT6X92
## in an RSC-S (DS-1) Model A RCC2 (continued)



**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.



**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 |

## NT6X92
## in an RSC-S (DS-1) Model A RCC2 (end)

***At the MAP terminal***

**14** Return the inactive RCC2 unit to service by typing

***>RTS UNIT* rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 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 an RSC-S (DS-1) Model A 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

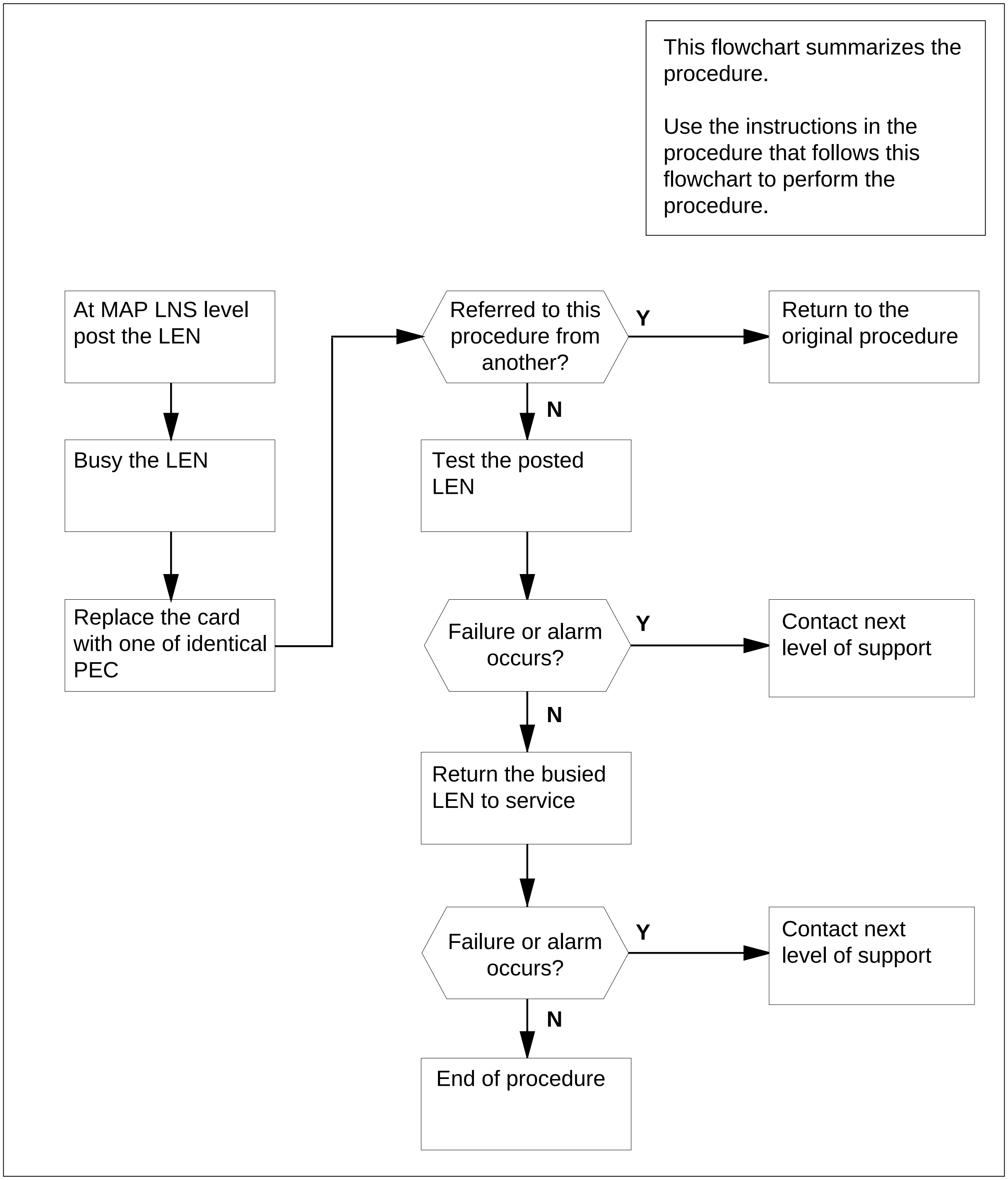
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NT6X99 card in RSC-S LCME**



# NT6X99
# in an RSC-S (DS-1) Model A 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)

*Example of a MAP display:*

## NT6X99
## in an RSC-S (DS-1) Model A LCME (continued)

```
 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 Idl
 6 RTS_
 7 Diag_
 8
 9 Almstat
10 CKTLOC
11 Hold
12 Next_
13
14
15
16 Prefix_
17 LCO_
18 Level_
```

**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_
```

# NT6X99
# in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect the circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Possible injury from hot materials**
Exercise care when handling the line card. The line feed resistor may be hot.

## NT6X99
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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** 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 (1.0 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 1.0 cm (0.5 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.

## NT6X99 in an RSC-S (DS-1) Model A LCME (continued)

- **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**

## NT6X99
## in an RSC-S (DS-1) Model A LCME (end)

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.

**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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace the following cards in an RSC-RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NT7X05 | AA | Peripheral/Remote Loader-16 |

***Note:*** NT7X05 functionality is supported only when the RCC2 is provisioned with the NTMX77 Unified Processor (UP). NT7X05 functionality is *not* supported when the RCC2 is provisioned with the optional NTAX74 Cellular Access Processor (CAP) instead of the NTMX77 UP.

## Common procedures

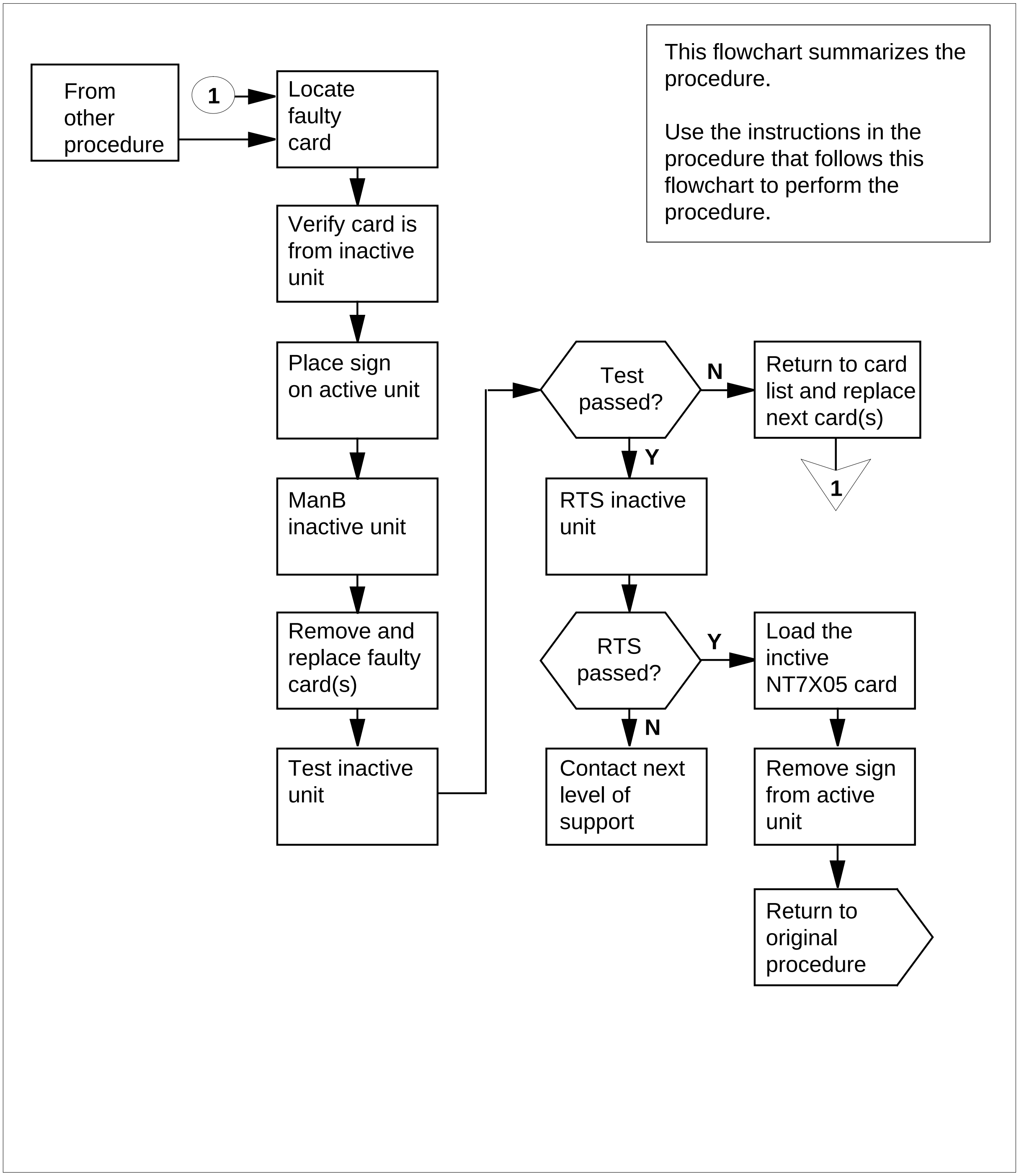
None

## Action

The following flowchart is a summary of the procedure. To replace the card, use the instructions in the procedure that follows the flowchart.

# NT7X05
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NT7X05 card in an RSC-S RCC2**



# NT7X05
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing a/an NT7X05 in RSC-S RCC2**

***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 RCC2 ensure the unit where you are replacing the card is INACTIVE and the mate unit is ACTIVE by observing the INSV and ACTIVE LEDs on each NTMX77 card.

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 RCC2 by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 to be busied

## NT7X05
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
   CM     MS     IOD     Net     PM     CCS     LNS     Trks     Ext     APPL
   .      .       .       .     1RCC2    .       .        .       .       .

RCC2               SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM         0         0         2         0         2         25
 2 Post_   RCC2       0         0         0         0         1          1
 3 ListSet
 4          RCC2     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 9 |

**5** Switch the processing activity to the inactive unit by typing

**>SWACT**

and pressing the Enter key.

| If SWACT | Do |
|---|---|
| cannot continue at this time | step 6 |
| can continue at this time | step 7 |

**6** Do not switch activity of the units. Reject the switch by typing

**>NO**

and pressing the Enter key.

The system discontinues the switch of activity.

Return to step 5 during a period of low traffic.

## NT7X05
## in an RSC-S (DS-1) Model A RCC2 (continued)

**7** Switch the activity of the unit by typing

**>YES**

and pressing the Enter key.

The system runs a pre-SWACT audit to determine the ability of the inactive unit to accept activity reliably.

> ***Note:*** A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before proceeding with the next maintenance action.

| If the message is | Do |
|---|---|
| SwAct passed | step 9 |
| SwAct failed | step 8 |
| SwAct refused by SwAct controller | step 8 |

**8** 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 RCE frame***

**9** Put a sign on the active unit bearing the words *Active unit—Do not touch.*

***At the MAP display***

**10** Busy the inactive RCC2 unit by typing

**>BSY INACTIVE**

and pressing the Enter key.

## NT7X05
## in an RSC-S (DS-1) Model A RCC2 (continued)

***At the RCE frame***

**11**

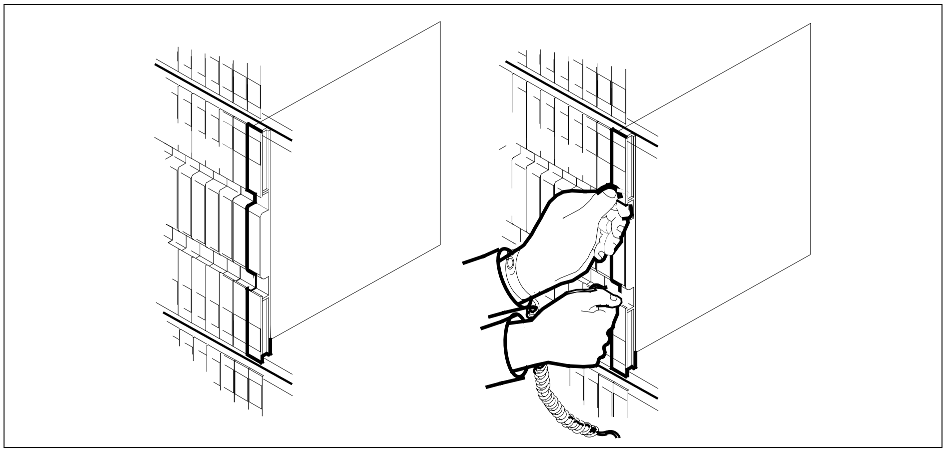
> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel of the RCC2. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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.

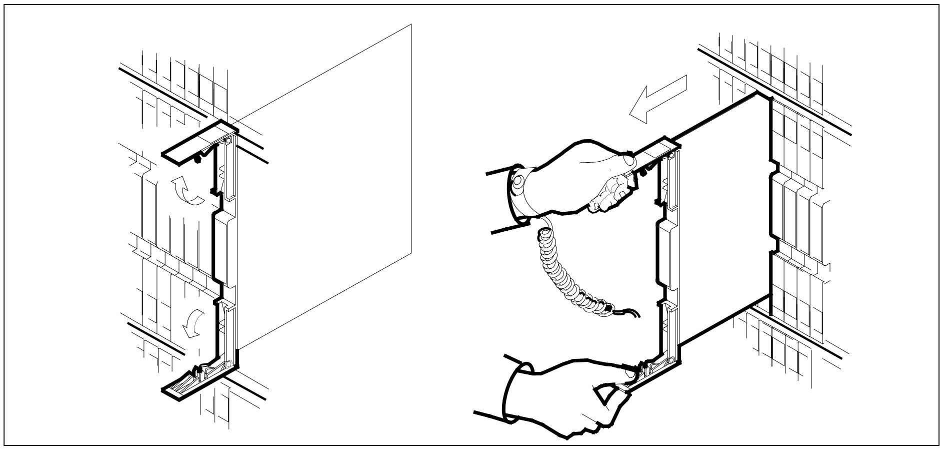
**12** Remove the NT7X05 card as shown in the following figures.

**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.

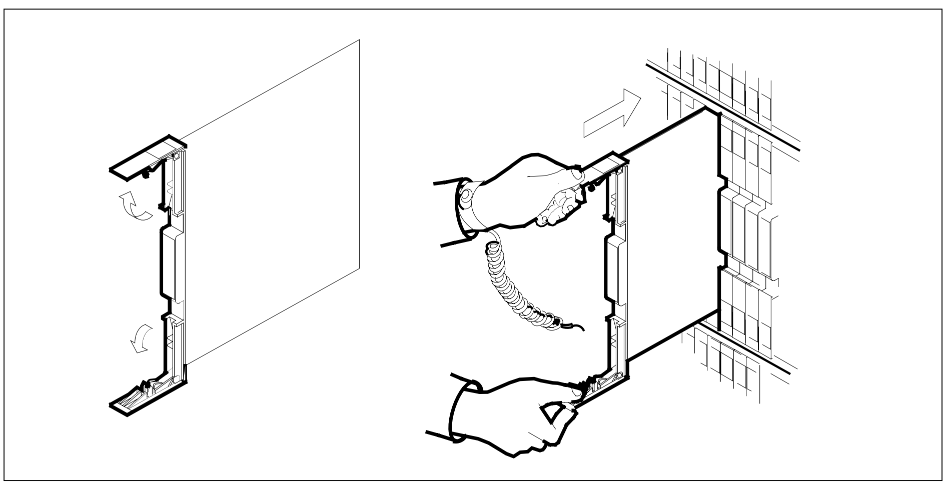
## NT7X05
## in an RSC-S (DS-1) Model A RCC2 (continued)



**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 and gently slide the card into the shelf.

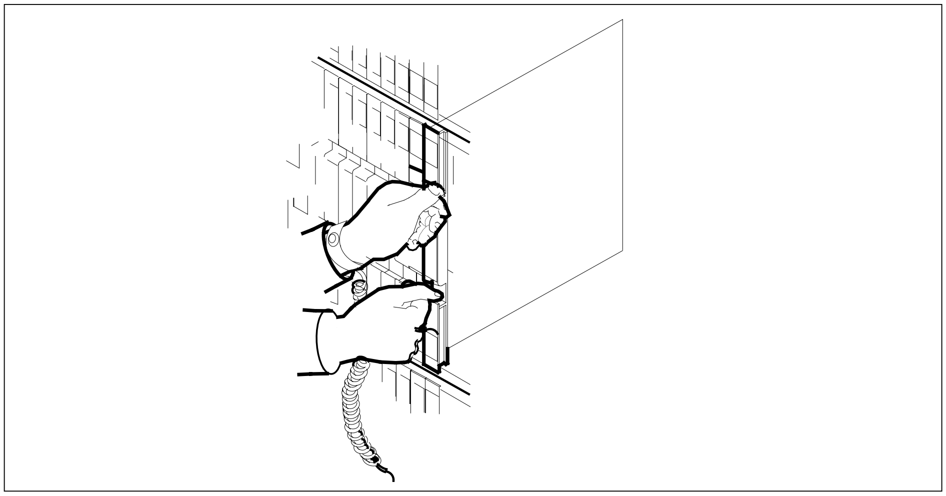


**14** Seat and lock the card.

**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.

## NT7X05
## in an RSC-S (DS-1) Model A RCC2 (continued)



***At the MAP display***

**15** Test the inactive RCC2 unit by typing

**>TST UNIT unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit

*Example of a MAP response:*
Test Passed

or
Test Failed

| If TST | Do |
|---|---|
| passed | step 16 |
| failed | step 20 |

**16** Return the inactive RCC2 unit to service by typing

**>RTS UNIT unit_no**

and pressing the Enter key.

# NT7X05
# in an RSC-S (DS-1) Model A RCC2 (end)

*where*

**unit_no**
is the number of the RCC2 unit (0 or 1) tested in step 15

| If the RTS | Do |
|---|---|
| passed | step 17 |
| failed | step 20 |

**17** Load the inactive NT7X05 card 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. The default load_file_name is the file currently datafilled.

Obtain further assistance in replacing this card by contacting personnel responsible for higher level of support.

| If load | Do |
|---|---|
| passed | step 18 |
| failed | step 20 |

**18** Send any faulty cards for repair according to local procedure.

**19** Record the following items in office records:

- date the card was replaced
- serial number of the card
- symptoms that prompted replacement of the card

Go to step 21.

**20** Obtain further assistance in replacing this card by contacting 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.

# NTAX74
# in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTAX74 card in an RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTAX74 | AA | Cellular Access Processor with 16Mb Memory |

## Common procedures

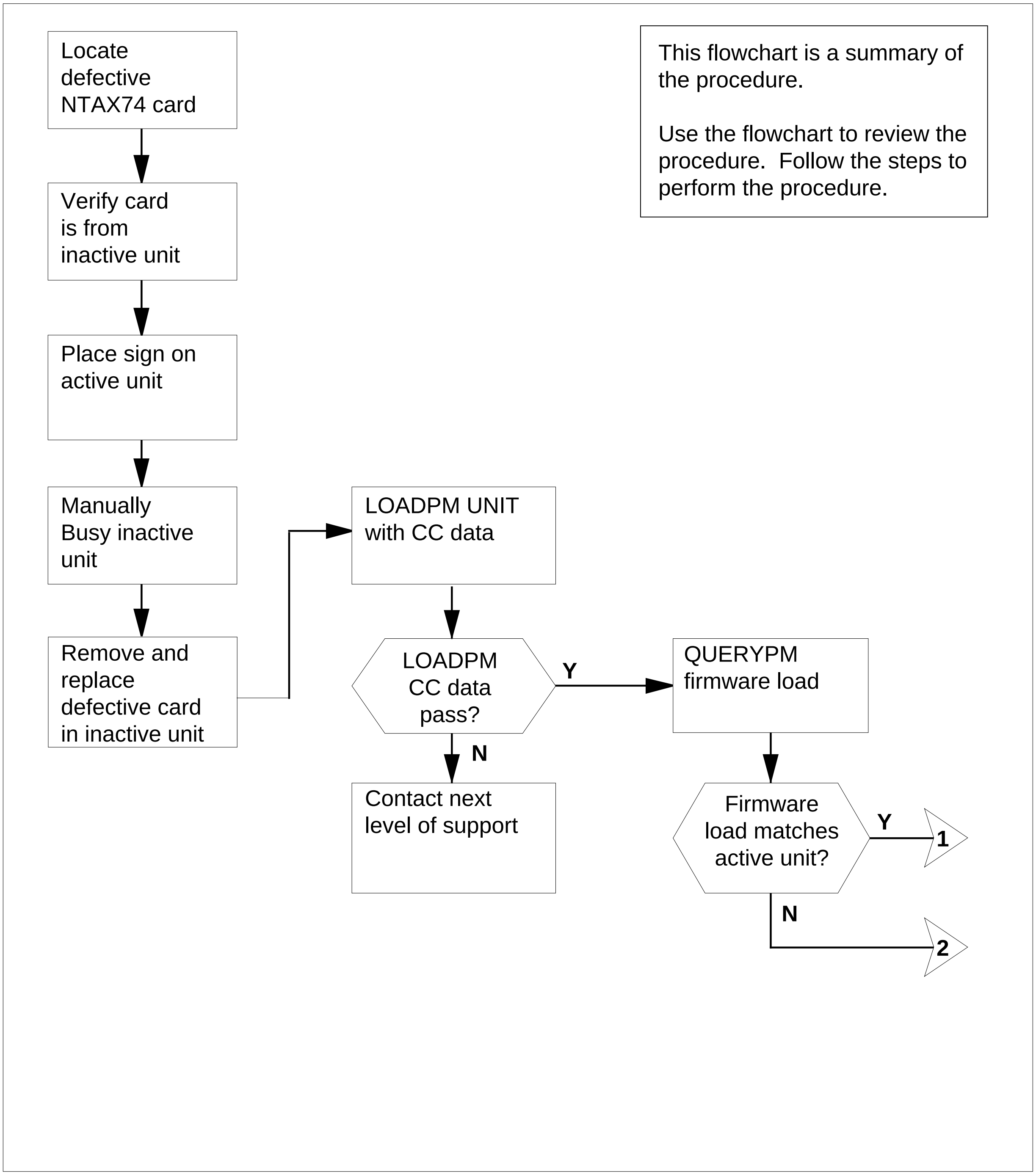
Does not apply

## 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.

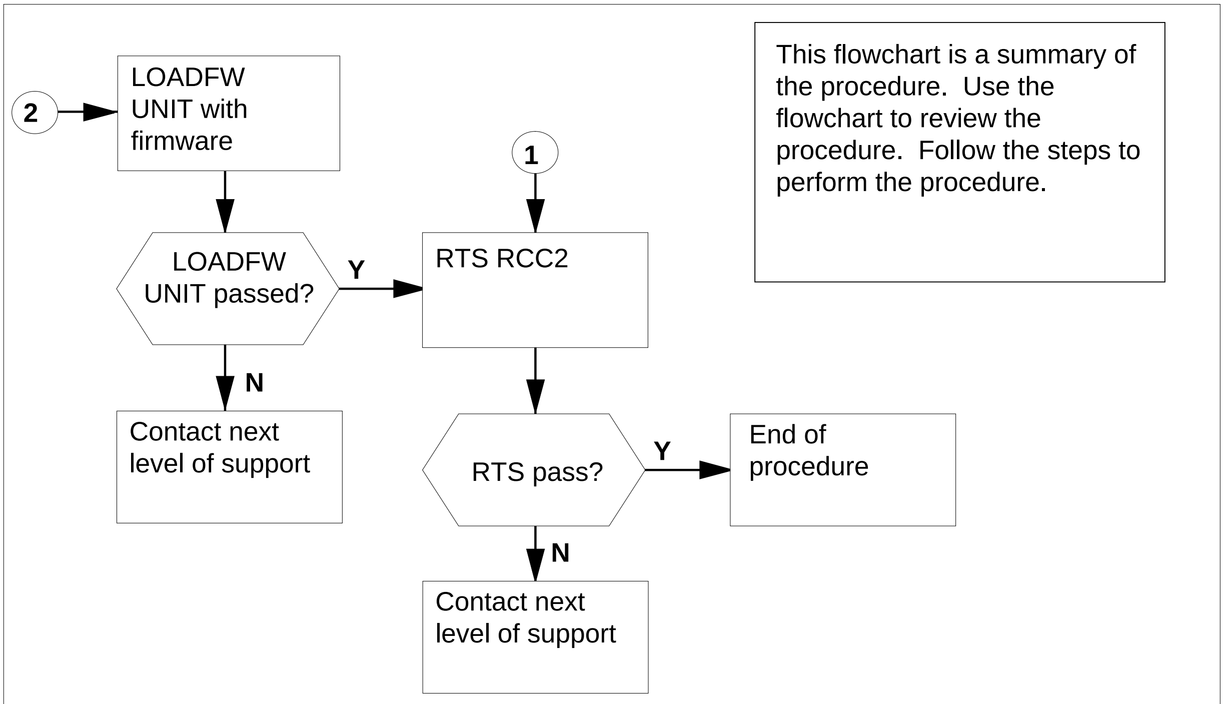
# NTAX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTAX74 card in RSC-S RCC2**



# NTAX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTAX74 card in RSC-S RCC2 (continued)**



# NTAX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

**To replace an NTAX74 in RSC-S RCC2**

***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**

> **WARNING**
> **Loss of service**
> When you replace a card in an RCC2, 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 that the current MAP display is at the PM level and to post the RCC2, type:

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 to be busied

# NTAX74
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
 CM      MS     IOD     Net     PM     CCS     LNS     Trks     Ext     APPL
 .       .       .       .     1RCC2   .       .        .        .        .

 RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        2        0        2         25
 2 Post_   RCC2      0        0        0        0        1          1
 3 ListSet
 4         RCC2   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 cause the processing activity to perform a Switch of 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.

# NTAX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

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 *Alarm Clearing 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 12 |

**11** To busy the inactive peripheral module (PM) unit, type

**>BSY INACTIVE**

and press the Enter key.

**12** To prevent the PM from trapping, type:

**>PMRESET UNIT rcc2_unit_no NORUN**

and press the Enter key.

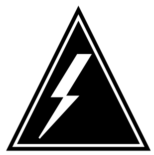
*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit zero or one

## NTAX74
## in an RSC-S (DS-1) Model A RCC2 (continued)

***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 RCC2. This wrist strap protects the equipment against static electricity damage.

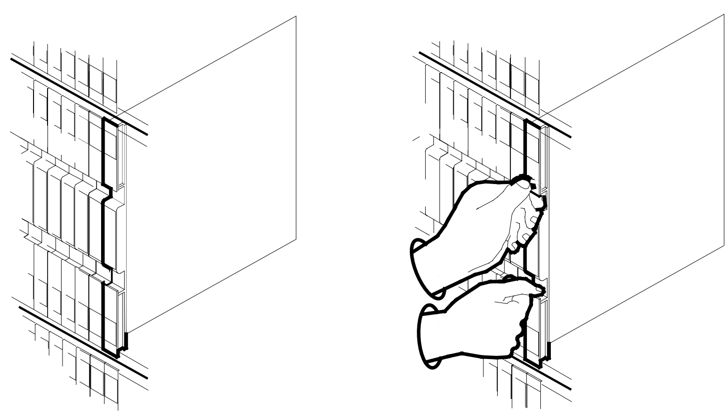
**DANGER**
**Equipment damage**
Take the following precautions when you remove or insert a card:

1. Do not apply direct pressure to the components.
2. Do not force the cards in the slots.

Wear a wrist strap.

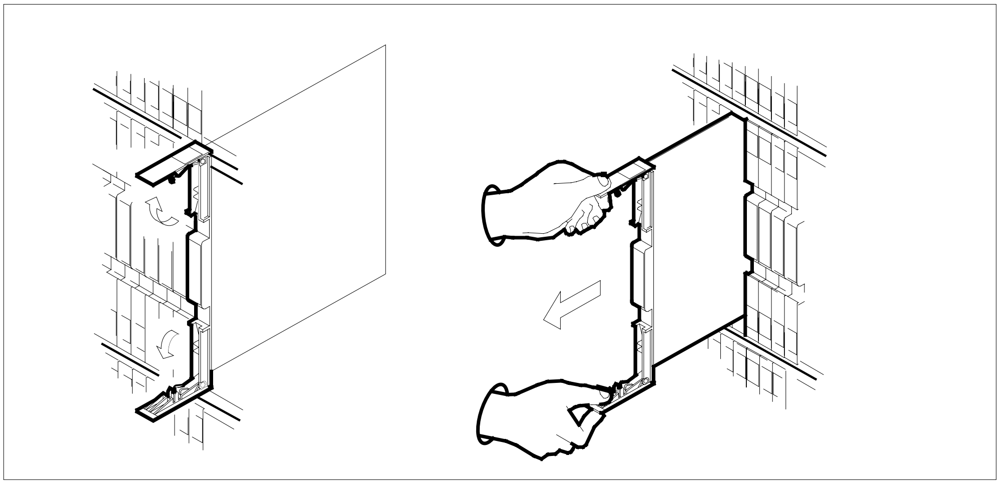
**14** The following figures show removing the NTAX74 card:

**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.

## NTAX74
## in an RSC-S (DS-1) Model A RCC2 (continued)



**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).

**15**

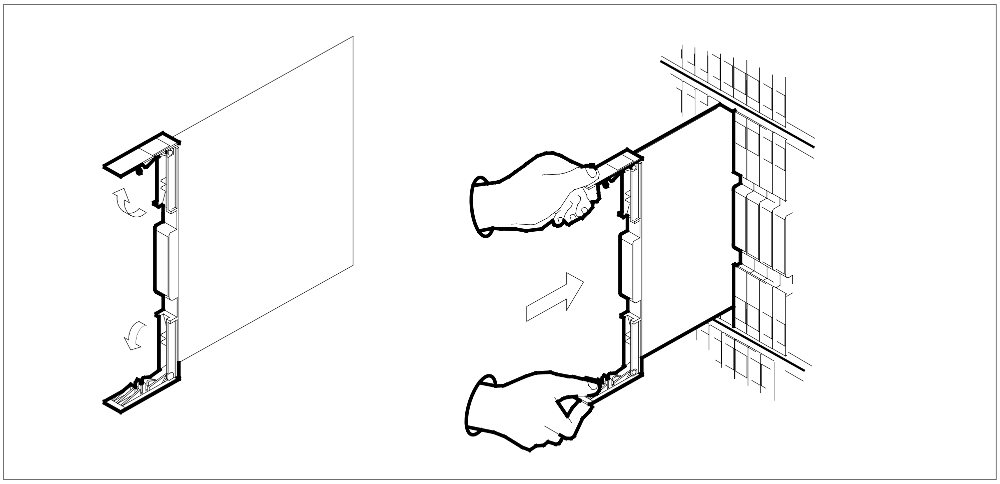
**DANGER**
**Possible loss of P-side nodes**
When you install the replacement NTAX74, monitor the LEDs on the faceplate of the NTAX74 for the following indicators:1. The INSV and ESA LEDs come ON and remain ON until loading starts.2. The ACT LED can come ON and light for less than 1 s. If the ACT LED 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.

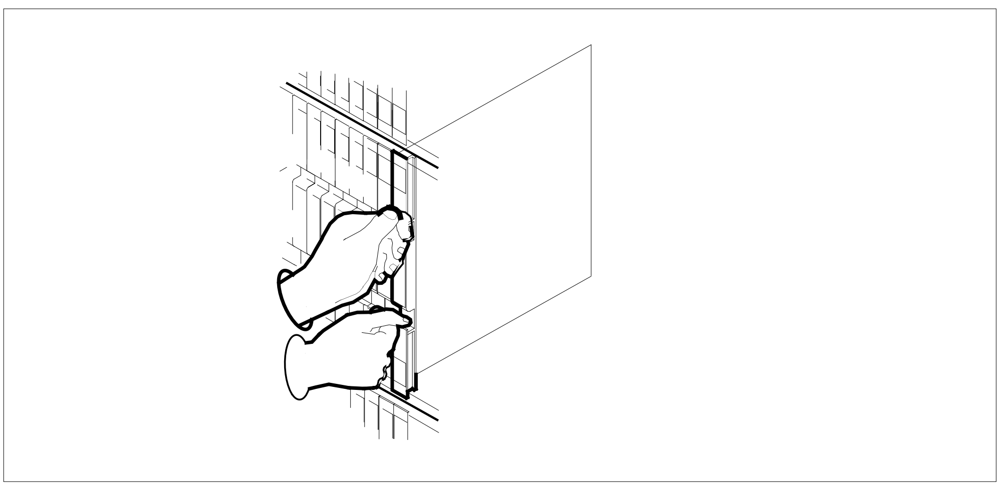
**b** Carefully slide the card in the shelf.

## NTAX74
## in an RSC-S (DS-1) Model A RCC2 (continued)



**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 |

# NTAX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

***At the MAP terminal***

**18** To load the inactive RCC2 unit, type:

**>LOADPM INACTIVE**

and press the Enter key.

| If load | Do |
|---|---|
| passed | step 19 |
| failed | step 27 |

**19** To query the 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 the firmware | Do |
|---|---|
| is valid | step 22 |
| is invalid | step 20 |

**20** To load the inactive unit firmware type:

**>LOADFW INACTIVE**

and press the Enter key.

| If the LOADFW | Do |
|---|---|
| passed | step 21 |
| failed | step 27 |

## NTAX74
## in an RSC-S (DS-1) Model A RCC2 (end)

**21** To upgrade the inactive unit firmware type;

**>LOADFW INACTIVE UPGRADE**

and press the Enter key.

| If the LOADFW UPGRADE | Do |
|---|---|
| passed | step 22 |
| failed | step 27 |

**22** To return the inactive RCC2 unit to service, type:

**>RTS UNIT unit_no**

and press the Enter key.

*where*

**unit_no**
is the number of the inactive RCC2 unit (0 or 1)

| If RTS | Do |
|---|---|
| passes | step 23 |
| fails | step 27 |

***At the RCE frame***

**23** Remove the sign from the active RCC2 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 27.

**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.

**28** This procedure is complete. Return to the maintenance procedure that directed you to this card replacement procedure. Continue as directed.

# NTBX01 in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTBX01 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTBX01 | AB | ISDN Preprocessor |
| ***Note:*** NTBX01AC or NTBX01BA is required when the RCC2 is configured with the optional processor NTAX74AA instead of the NTMX77AA. | | |

## Common procedures

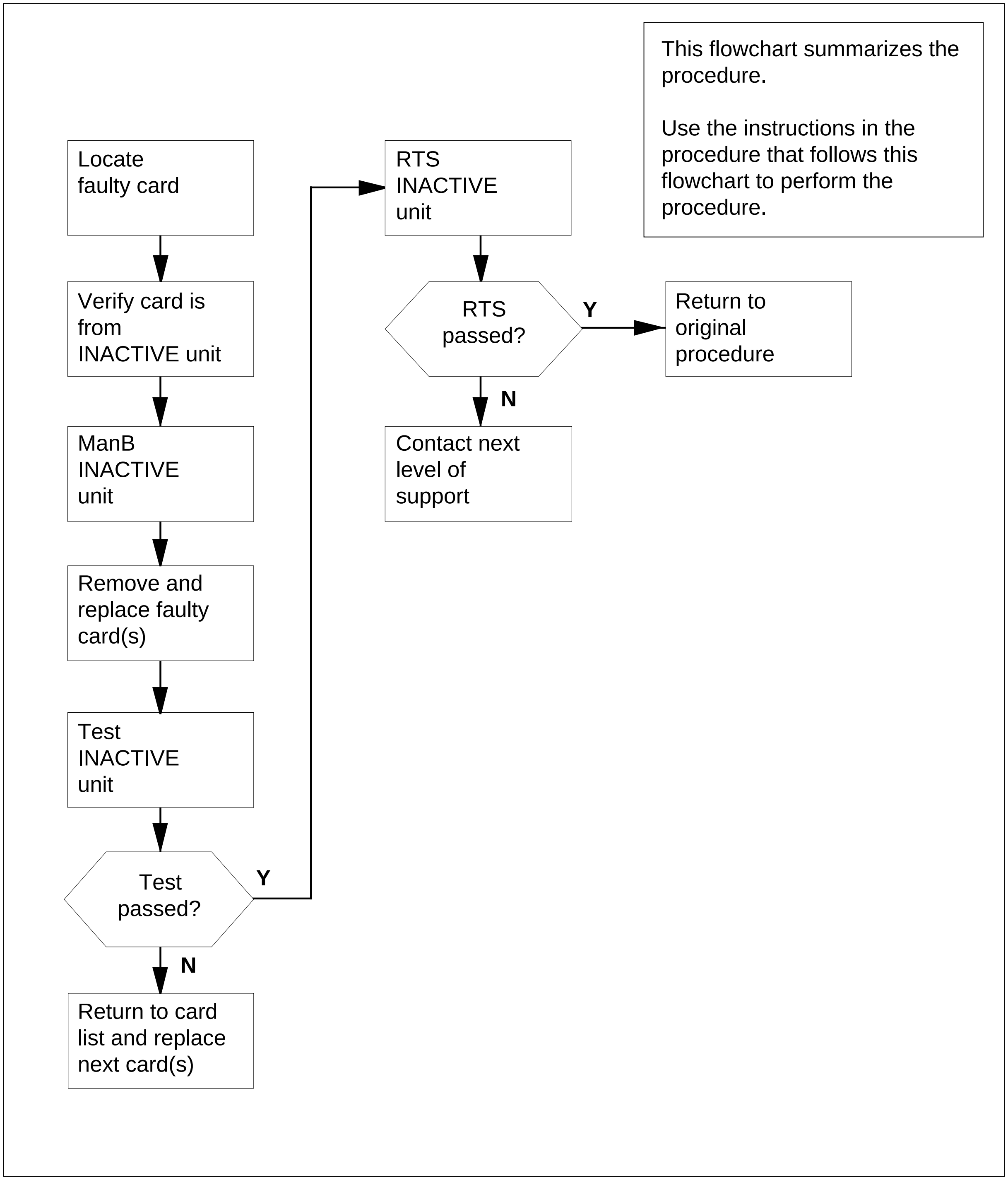
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTBX01 card in RSC-S RCC2**



# NTBX01
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NTBX01 card in RSC-S RCC2**

***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 RCC2, 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 RCC2 is posted by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 with the faulty card

# NTBX01
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .     .      .      .     .      .      .       .      .

RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCC2      0        0        0        0        0         0
 3 ListSet
 4         RCC2    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, ensure that the card to be removed is on the inactive unit.

| If faulty card is on | Do |
|---|---|
| active unit | step 5 |
| inactive unit | step 7 |

**5** Switch the processing activity (SWACT) to the inactive unit by typing

**>SWACT**

and pressing the Enter key.

**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.

## NTBX01
## in an RSC-S (DS-1) Model A RCC2 (continued)

***At the MAP terminal***

**8** Busy the inactive PM unit by typing

***>bsy unit* rcc2_unit_no**

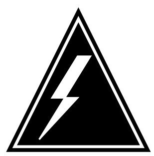
and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 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 frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

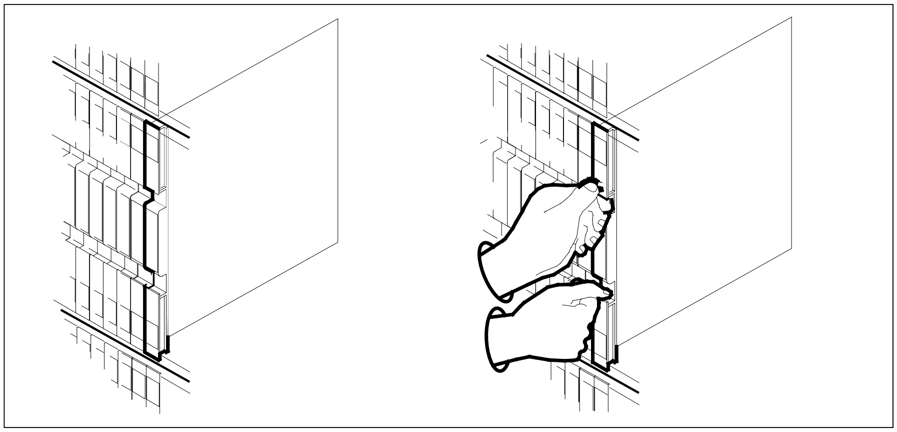
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Put on a wrist strap.

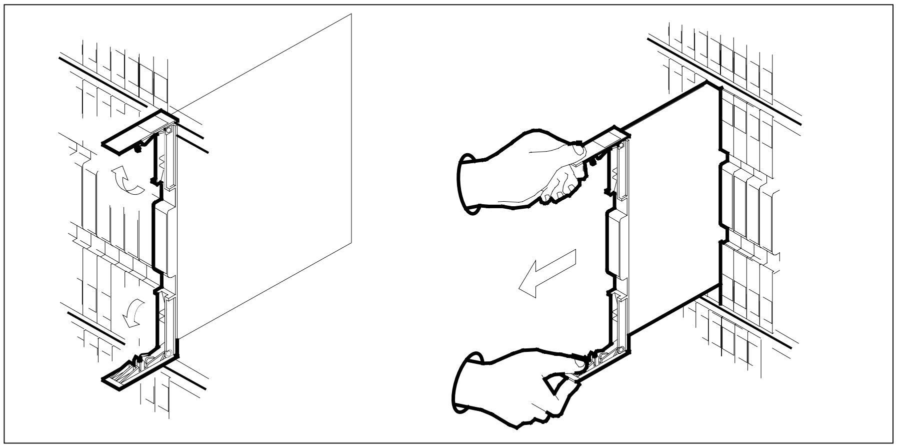
**10** Remove the NTBX01 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NTBX01
## in an RSC-S (DS-1) Model A RCC2 (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



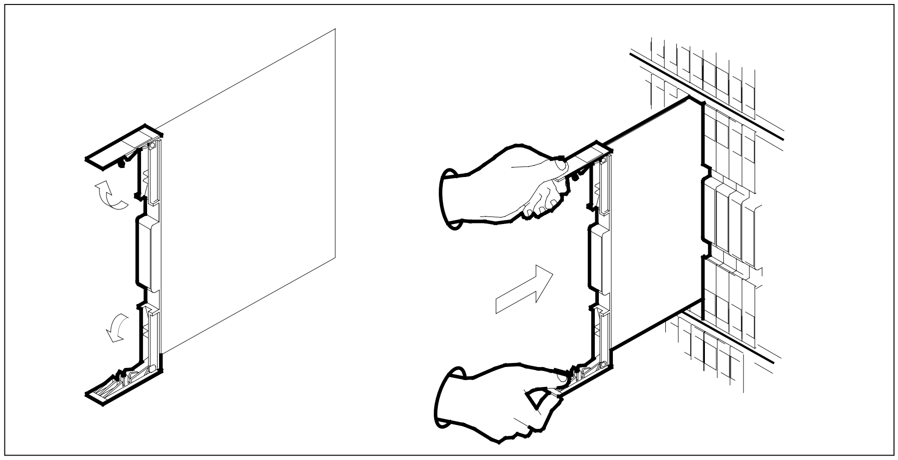
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

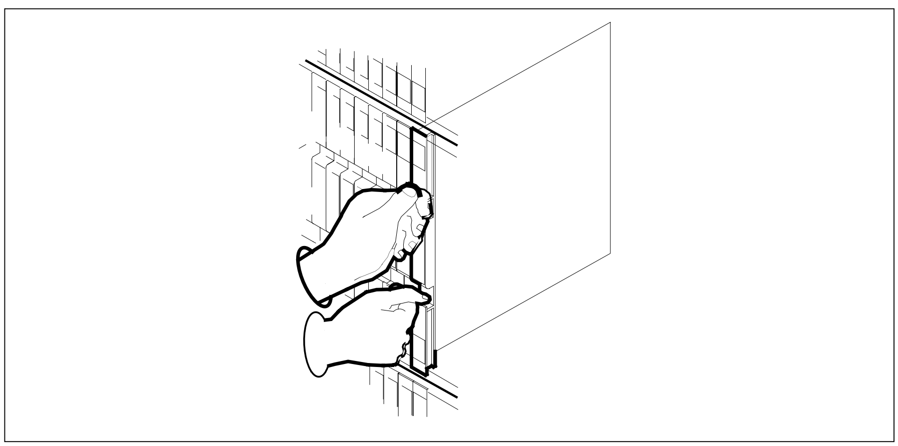
# NTBX01
# in an RSC-S (DS-1) Model A RCC2 (continued)



**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.



***At the MAP terminal***

**13** After replacing the faulty card, load the inactive RCC2 unit by typing

***>LOADPM UNIT* rcc2_unit_no CC**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 unit busied in step 8

## NTBX01
## in an RSC-S (DS-1) Model A RCC2 (continued)

**14** Use the following information to determine where to proceed.

| **If load** | **Do** |
|---|---|
| passed | step 15 |
| failed | step 23 |

**15** Test the inactive unit by typing

***>TST UNIT*** **rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 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 |

**18** Return the inactive RCC2 unit to service by typing

***>RTS UNIT*** **rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 unit tested in step 15

**19** Use the following information to determine where to proceed.

| **If RTS** | **Do** |
|---|---|
| passed | step 20 |
| failed | step 23 |

**20** Send any faulty cards for repair according to local procedure.

## NTBX01
## in an RSC-S (DS-1) Model A RCC2 (end)

**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 *Card Replacement Procedures*.

**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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTBX02 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTBX02 | AA, BA | D-Channel Handler |
| ***Note:*** NTBX02BA is required when the RCC2 is configured with the optional processor NTAX74AA instead of the NTMX77AA. | | |

## Common procedures

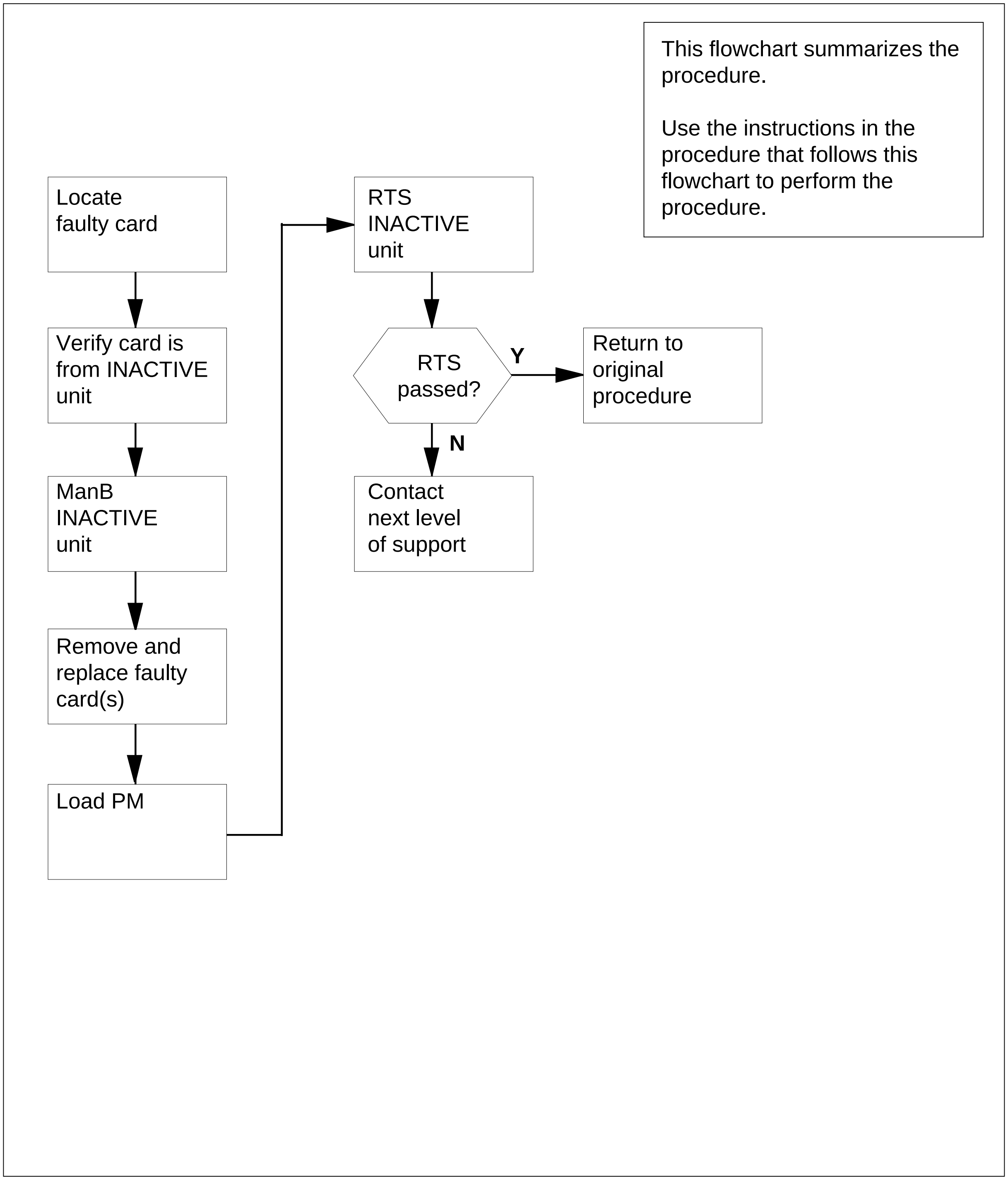
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTBX02 card in an RSC-S RCC2**



## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

### Replacing an NTBX02 card in an RSC-S RCC2

***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 RCC2, 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 |

***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.

| IfEXT shelf slot number | DoCPM unit number |
|---|---|
| 3 / 24 | 0 |
| 4 / 23 | 0 |
| 5 / 22 | 0 |
| 6 / 21 | 0 |
| 7 / 20 | 0 |
| 8 / 19 | 1 |
| 9 / 18 | 1 |

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

| IfEXT shelf slot number | DoCPM unit number |
|---|---|
| 10 / 17 | 1 |
| 11 / 16 | 1 |
| 12 / 15 | 1 |

**4** Ensure the PM level of the MAP display is currently displayed and the RCC2 with the faulty DCH card is posted by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 with the faulty card

*Example of a MAP display:*

```
 CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .      .      .      .     .      .      .       .      .

RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        0        0        0        25
 2 Post_   RCC2     0        0        0        0        0         0
 3 ListSet
 4         RCC2   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 11 |

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

**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** 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***

**11** Busy the inactive PM unit by typing

***>bsy unit* unit_no**

and pressing the Enter key.

# NTBX02
# in an RSC-S (DS-1) Model A RCC2 (continued)

*where*

**unit_no**
is the number of the inactive RCC2 unit (0 or 1) containing the faulty BX02 card

**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_   RCC2      0        0        0        0        0         0
 3
 4         RCC2  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.

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

*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_   RCC2      0        0        0        0        0         0
 3
 4         RCC2  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   RCC2     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   LTC : 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 |

**16** List the loadfile in the directory by typing

**>DSKUT;LISTVOL D000 DCH load_file_name ALL**

and pressing the Enter key.

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

*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 to verify the DCH file name exists. For instance, the file name in step 16 is *DCH32BT*, which corresponds to the file name in step 14.

**20** Busy the faulty card by typing

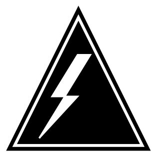
**>BSY**

and pressing the Enter key.

# NTBX02
# in an RSC-S (DS-1) Model A RCC2 (continued)

***At the RCE frame***

**21**



**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.

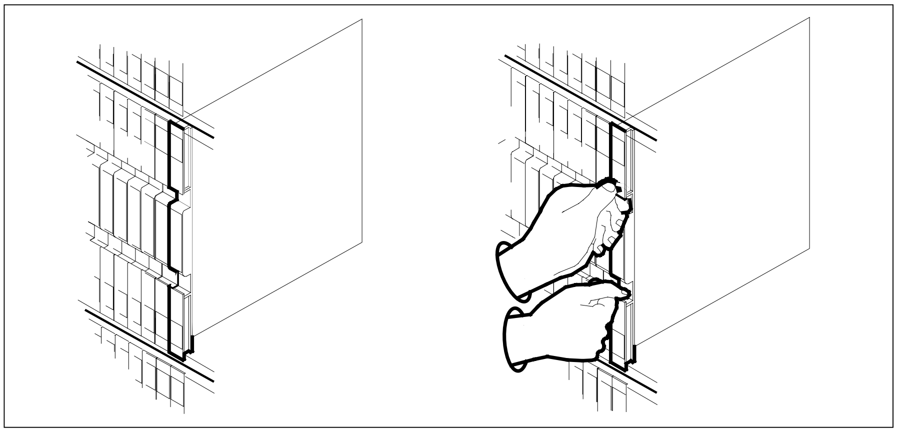
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.2. Do not force the cards into the slots.

Put on a wrist strap.

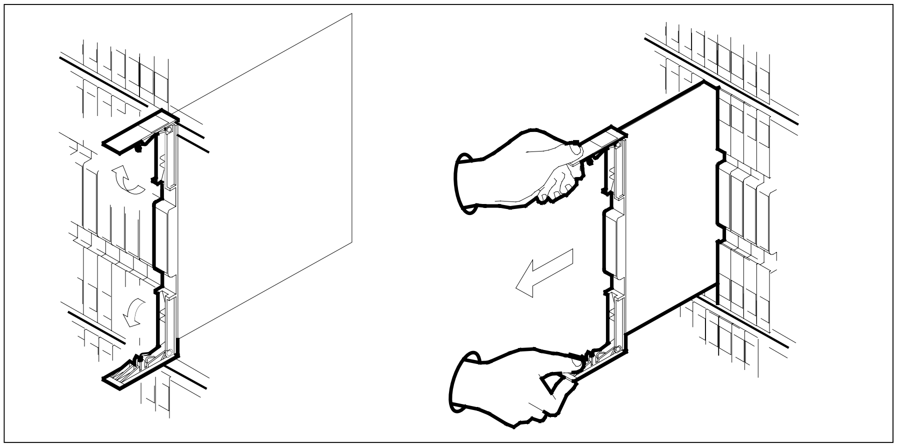
**22** Remove the NTBX02 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

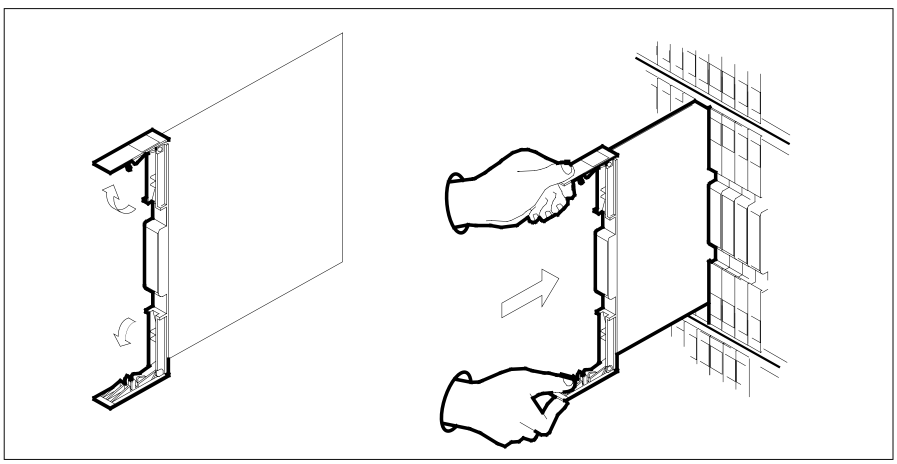


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

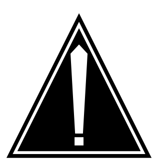
**23** Open the locking levers on the replacement card.

**a** Align the card with the slots in the shelf.

**b** Gently slide the card into the shelf.



**24**



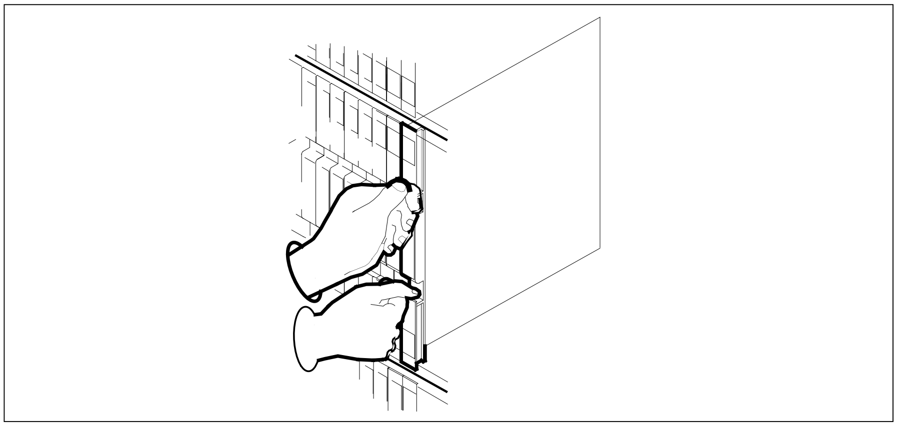
**CAUTION**
**Loss of subscriber service**
Subscriber service may be lost in the active unit when reseating the NTBX02 card. It is recommended that this procedure be performed during low traffic periods.

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (continued)

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 load | Do |
|---|---|
| passed | step 27 |
| failed | step 34 |

**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 RCC2 level by typing

**>QUIT**

and pressing the Enter key.

# NTBX02
# in an RSC-S (DS-1) Model A RCC2 (continued)

**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 RCC2 unit (0 or 1) containing the new BX02 card

**30** Ensure that the RCC2 unit is in service by typing

**>QUERYPM FLT**

and pressing the Enter key.

*Example of a MAP display:*

```
CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    Appl
 .     .      .      .     .      .      .      .       .      .

RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCC2      0        0        0        0        0         1
 3 ListSet
 4         RCC2  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.

## NTBX02
## in an RSC-S (DS-1) Model A RCC2 (end)

**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 |

**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 an RSC-S (DS-1) Model A 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

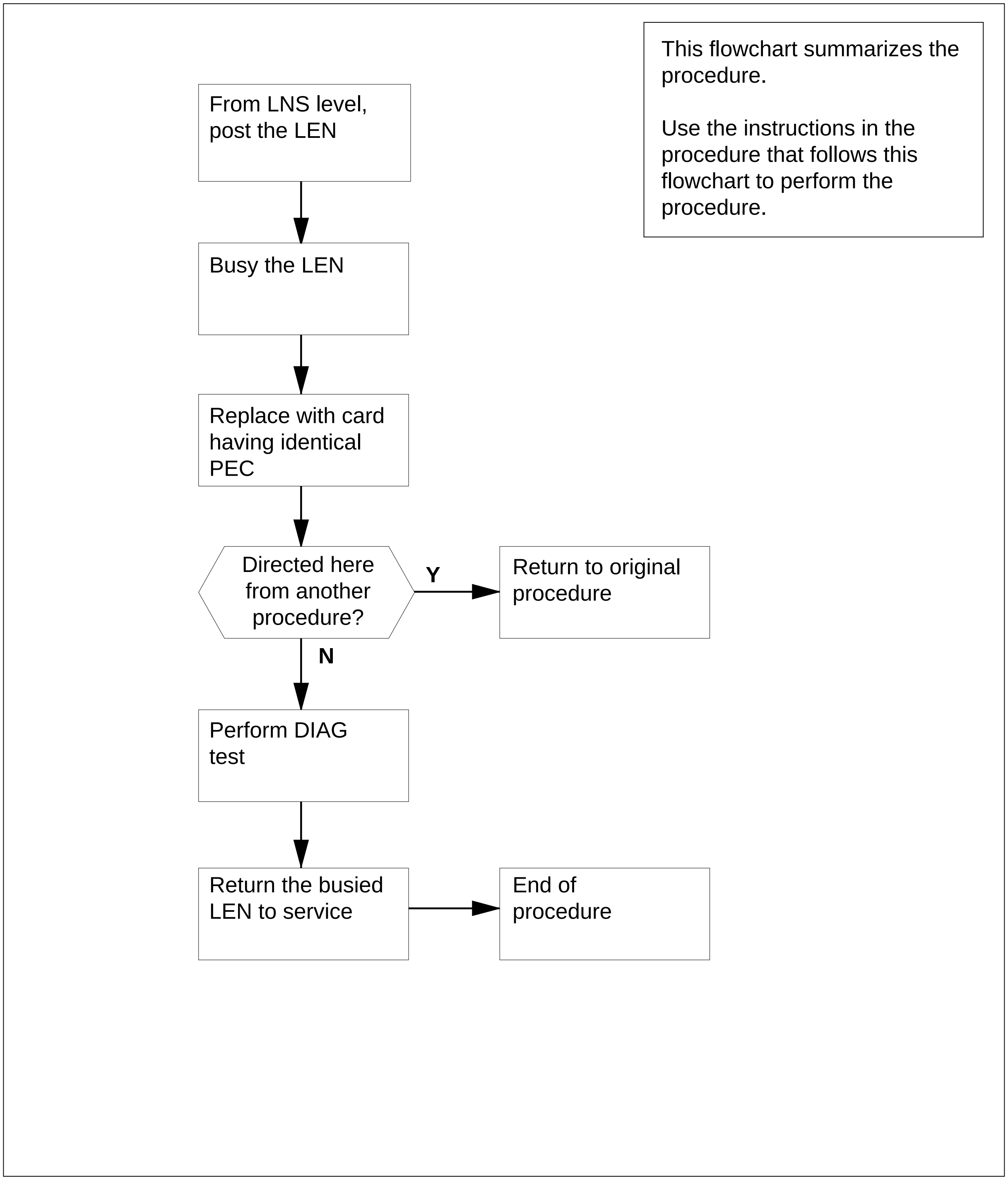
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NTBX26 card in an RSC-S LCME**



# NTBX26
# in an RSC-S (DS-1) Model A 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:*

## NTBX26
## in an RSC-S (DS-1) Model A LCME (continued)

```
 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
```

**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
```

## NTBX26
## in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

# NTBX26
# in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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** 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 (1.0 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 1.0 cm (0.5 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.

## NTBX26
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

**11** Use the following information to determine where to proceed.

| If DIAG | Do |
|---|---|
| passed | step 12 |
| failed | step 15 |

## NTBX26
## in an RSC-S (DS-1) Model A LCME (end)

**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 an RSC-S (DS-1) Model A LCME

## Application

Use this procedure to replace an NTBX27 card in an RSC-S LCME.

| PEC | Suffixes | Name |
|---|---|---|
| NTBX27 | AA | ISDN 2B1Q U Interface Line card |

## Common procedures

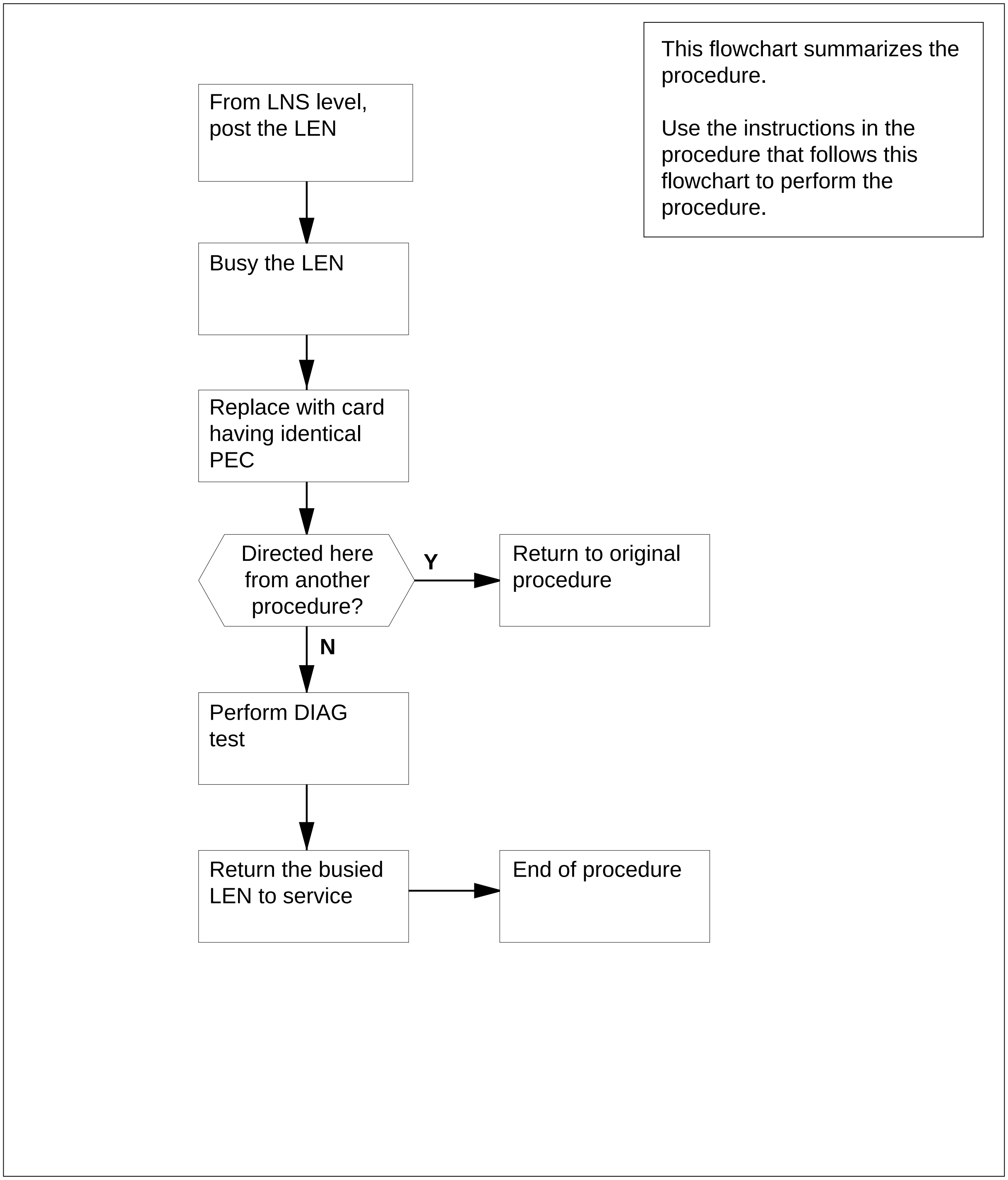
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NTBX27 card in an RSC-S LCME**



# NTBX27 in an RSC-S (DS-1) Model A 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:*

## NTBX27
## in an RSC-S (DS-1) Model A LCME (continued)

```
 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
```

**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 an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

> **WARNING**
> **Card damage—transport**
> Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:
>
> When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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.

> **DANGER**
> **Hot materials**
> Exercise care when handling the line card. The line feed resistor may be very hot.

## NTBX27
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

Put on a wriststrap.

*Note:* Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:* 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** 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 (1.0 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 1.0 cm (0.5 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.

## NTBX27
## in an RSC-S (DS-1) Model A LCME (continued)

- **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.

**11** Use the following information to determine where to proceed.

| If DIAG | Do |
|---|---|
| passed | step 12 |
| failed | step 16 |

# NTBX27
# in an RSC-S (DS-1) Model A LCME (end)

**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 an RSC-S (DS-1) Model A 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

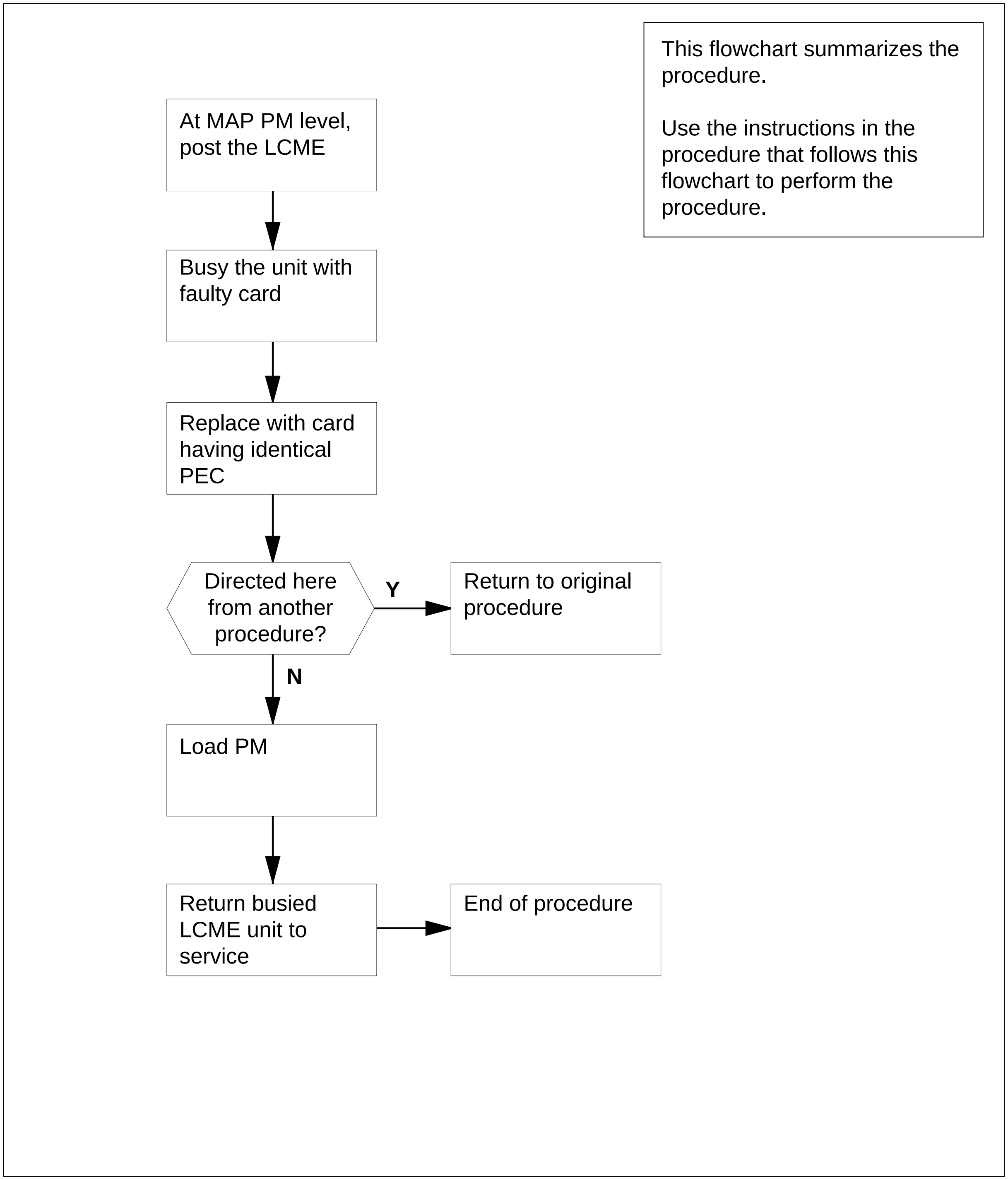
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NTBX34 card in an RSC-S LCME**



# NTBX34
# in an RSC-S (DS-1) Model A LCME (continued)

**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

## NTBX34
## in an RSC-S (DS-1) Model A LCME (continued)

*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
```

**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

## NTBX34
## in an RSC-S (DS-1) Model A LCME (continued)

*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
```

# NTBX34
# in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**Equipment damage**
Take the following precautions when removing or inserting a card:

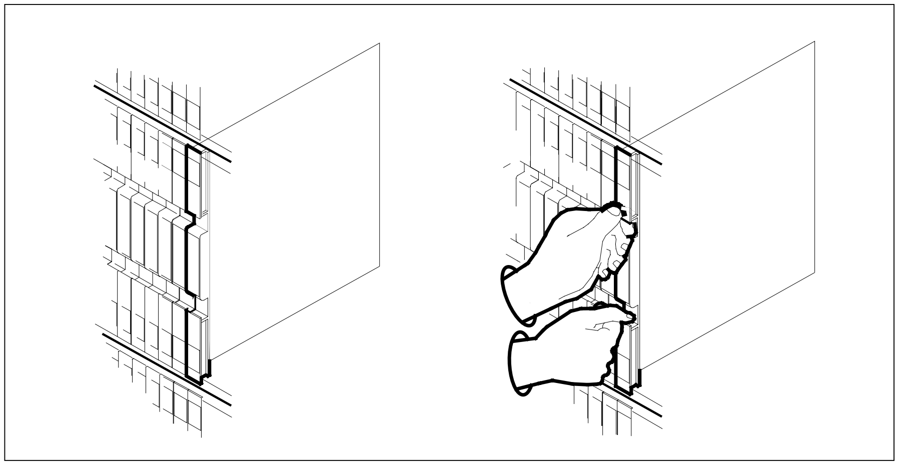
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wriststrap.

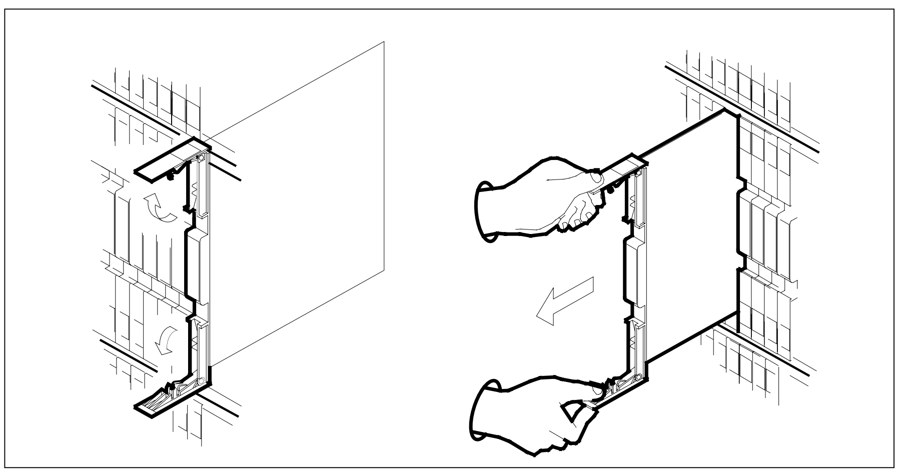
**6** Remove the NTBX34 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NTBX34 in an RSC-S (DS-1) Model A 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.



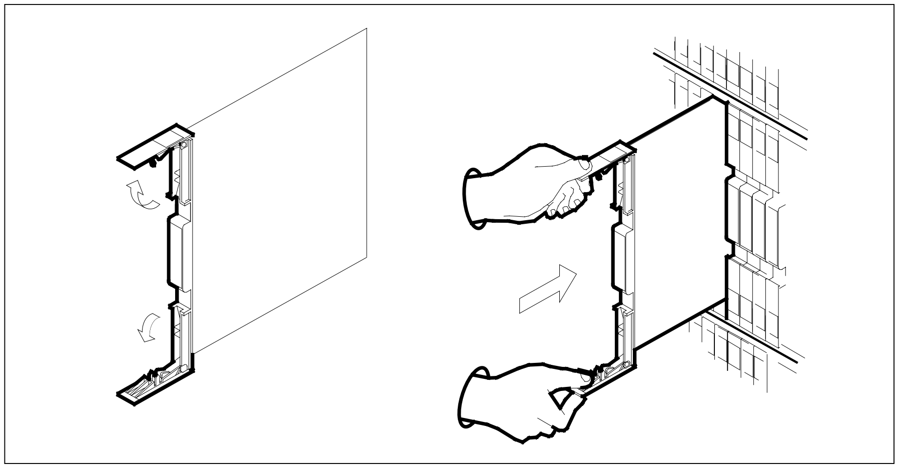
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

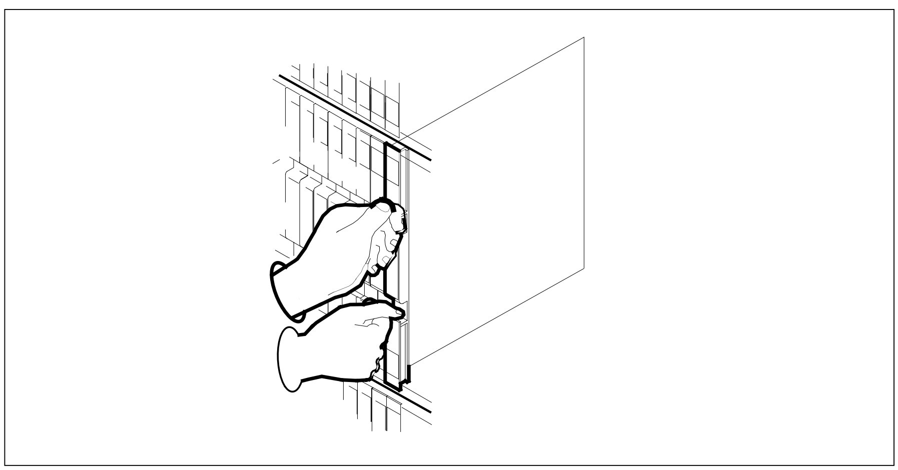
## NTBX34
## in an RSC-S (DS-1) Model A LCME (continued)



**8** Seat and lock the card.

**a** Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure 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

## NTBX34
## in an RSC-S (DS-1) Model A LCME (continued)

**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

**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.

## NTBX34
## in an RSC-S (DS-1) Model A LCME (end)

**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.

# NTBX35
# in an RSC-S (DS-1) Model A 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

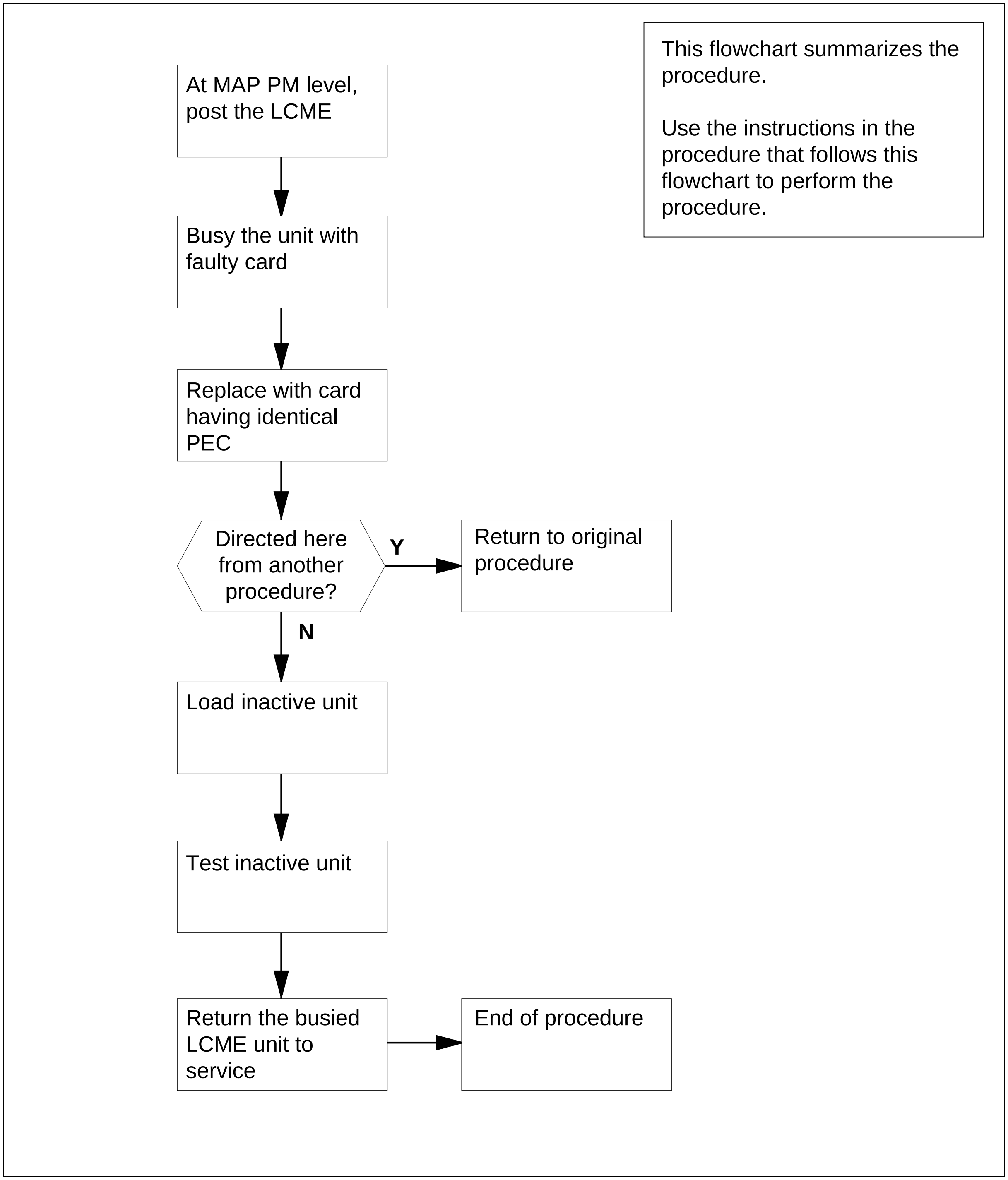
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NTBX35 card in an RSC-S LCME**



# NTBX35
# in an RSC-S (DS-1) Model A 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

## NTBX35
## in an RSC-S (DS-1) Model A LCME (continued)

*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

# NTBX35 in an RSC-S (DS-1) Model A LCME (continued)

*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
 5 Trnsl    LCME   RemL  OO O   Links_OOS:  CSide 0
 6 Tst       Unit-0:  InSv  Mtce TakeOver /RG:  0
 7 Bsy       Unit-1:  ManB Mtce           /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
```

# NTBX35
# in an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**5**

**WARNING**
**Card damage—transport**
Take the following precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] 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 LCME. This protects the equipment against damage caused by static electricity.

**DANGER**
**Equipment damage**
Take the following precautions when removing or inserting a card:

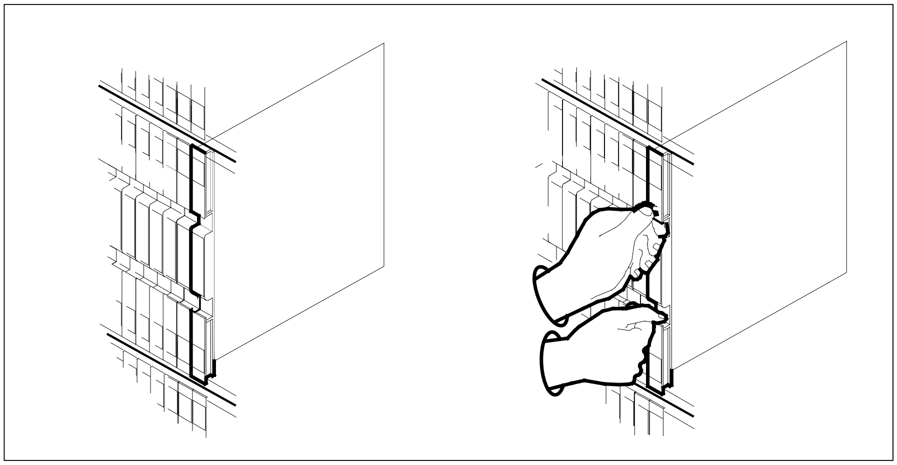
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wriststrap.

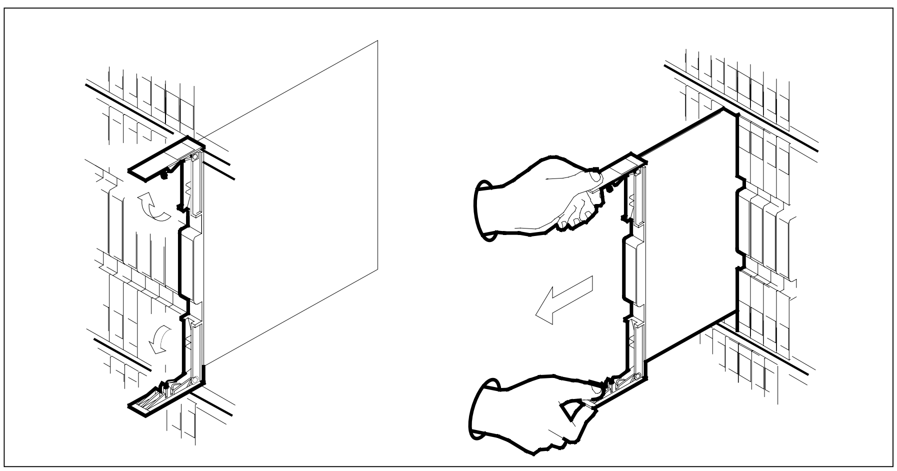
**6** Remove the NTBX35 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NTBX35
## in an RSC-S (DS-1) Model A 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.



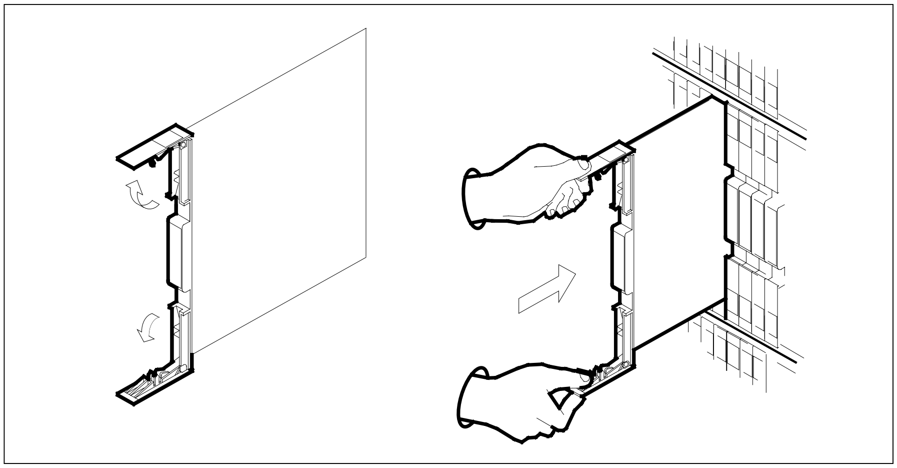
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

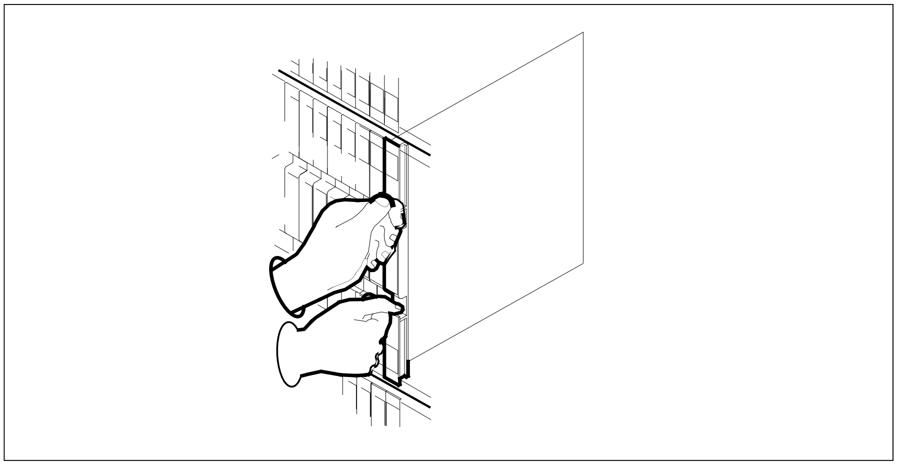
## NTBX35
## in an RSC-S (DS-1) Model A LCME (continued)



**8** Seat and lock the card.

**a** Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure 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.

## NTBX35
## in an RSC-S (DS-1) Model A LCME (continued)

*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 |

**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.

## NTBX35
## in an RSC-S (DS-1) Model A LCME (end)

**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 an RSC-S (DS-1) Model A 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

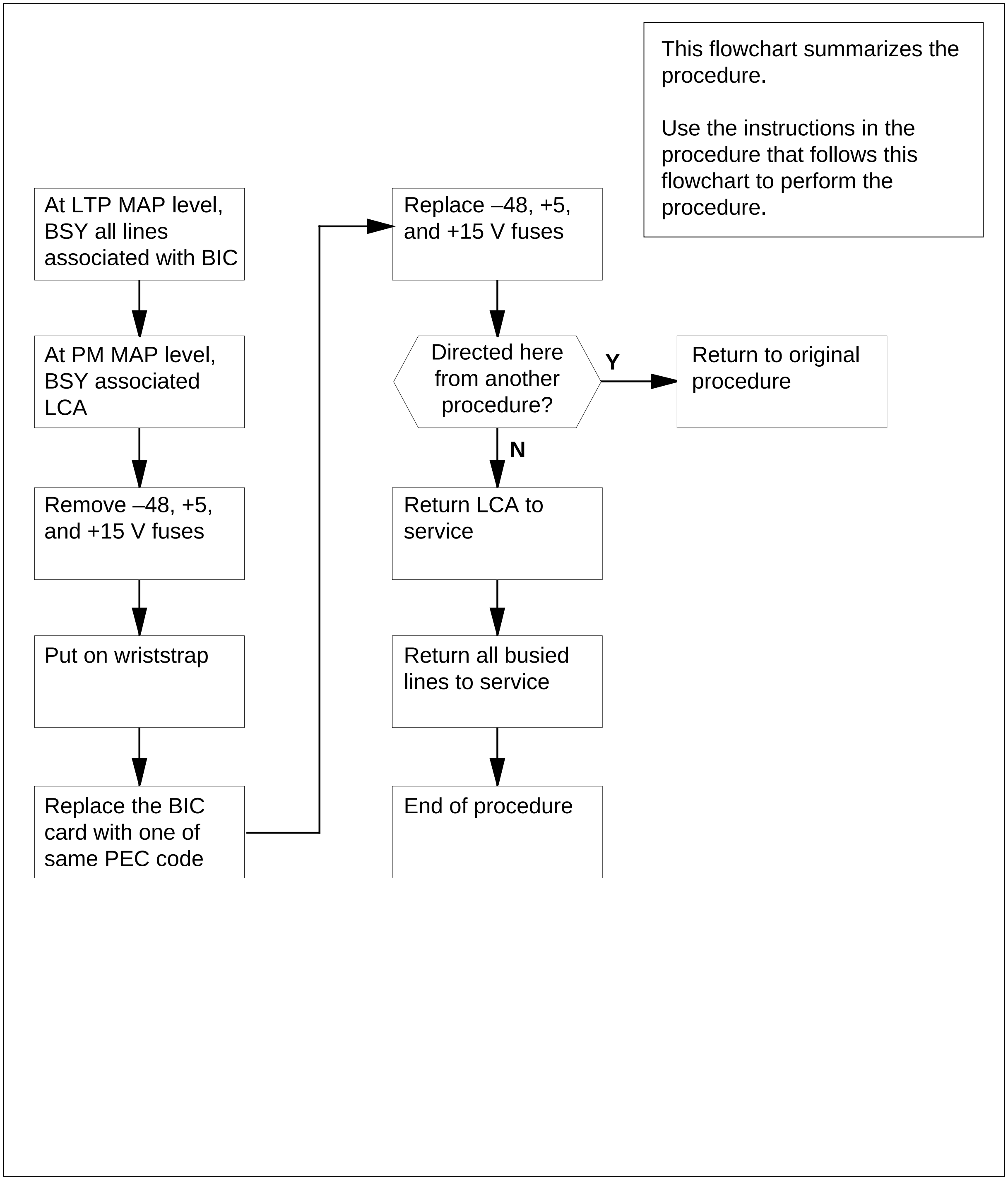
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NTBX36 card in RSC-S LCME**



# NTBX36
# in an RSC-S (DS-1) Model A 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 steps 4 and 5 until all LSGs of the same line drawer are busied.

**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

# NTBX36
## in an RSC-S (DS-1) Model A LCME (continued)

**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")

## NTBX36
## in an RSC-S (DS-1) Model A LCME (continued)

**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 an RSC-S (DS-1) Model A LCME (continued)

***At the LCE frame***

**10**

**WARNING**
**Card damage—transport**
Take the folowing precautions to protect circuit cards from electrical and mechanical damage during transport:

When handling a circuit card not in an electrostatic discharge (ESD) protective container, stand on a conductive floor mat and wear a wriststrap connected, through a 1-megohm resistor, to a suitably grounded object, such as a metal workbench or a DMS switch frame (Northern Telecom [Nortel] Corporate Standard 5028). Store and transport circuit cards in an ESD protective container.

**DANGER**
**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.

**DANGER**
**Hot materials**
Exercise care when handling the line card. The line feed resistor may be very hot.

**CAUTION**
**Special tools required**
Card shrouds and removal tools are required for removing cards from the line drawers. For descriptions of these tools, refer to the following notes.

Remove the -48V, +5V, and +15V fuses (in that order) for the line drawer containing the BIC to be replaced.

Put on a wriststrap.

## NTBX36
## in an RSC-S (DS-1) Model A LCME (continued)

***Note:*** Card shrouds are required for inserting or removing cards in line drawers. Two sizes are available for use with 3-inch and 6-inch cards, 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:*** 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. | | |

**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 (1.0 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 1.0 cm (0.5 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.

**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.

## NTBX36
## in an RSC-S (DS-1) Model A LCME (continued)

- **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, +5V, and +15V fuses (in that order) 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.

## NTBX36
## in an RSC-S (DS-1) Model A LCME (continued)

*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.

**20** Repeat steps 18 and 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 |

## NTBX36
## in an RSC-S (DS-1) Model A LCME (end)

**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.

**26** Return to the Alarm Clearing 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 card replacement procedure and continue as directed.

# NTBX72
# in an RSC-S (DS-1) Model A 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

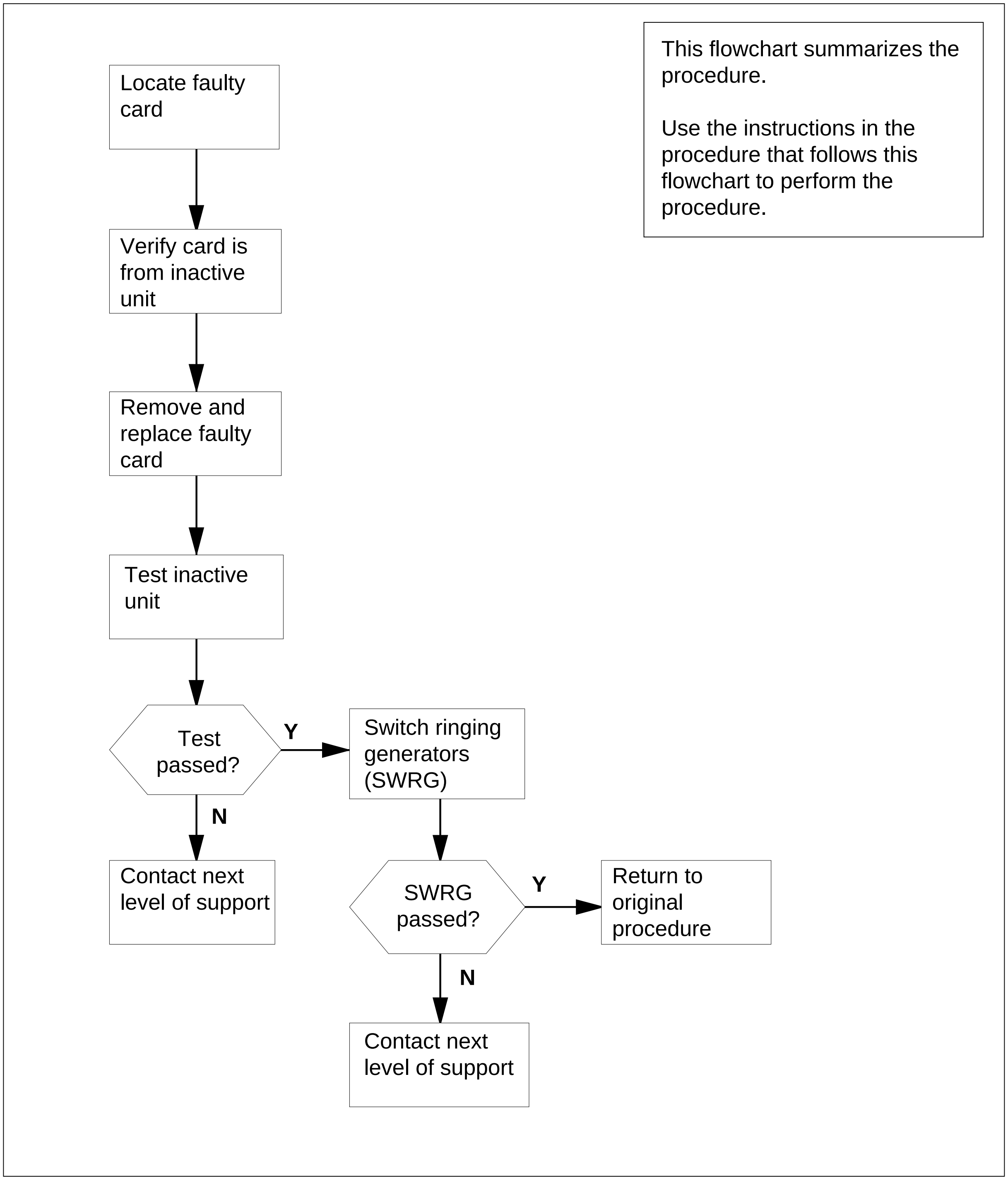
None

## 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 an RSC-S (DS-1) Model A LCME (continued)

**Summary of card replacement procedure for an NTBX72 card in an RSC-S LCME**



# NTBX72
# in an RSC-S (DS-1) Model A 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

## NTBX72
## in an RSC-S (DS-1) Model A LCME (continued)

*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.

# NTBX72
# in an RSC-S (DS-1) Model A LCME (continued)

*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 |

**6** Busy the LCME unit by typing

**>BSY UNIT lcme_unit_no**

and pressing the Enter key.

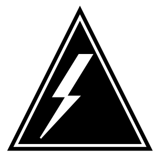
*where*

**lcme_unit_no**
is the number of the LCME unit with the faulty card

# NTBX72
# in an RSC-S (DS-1) Model A LCME (continued)

***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**

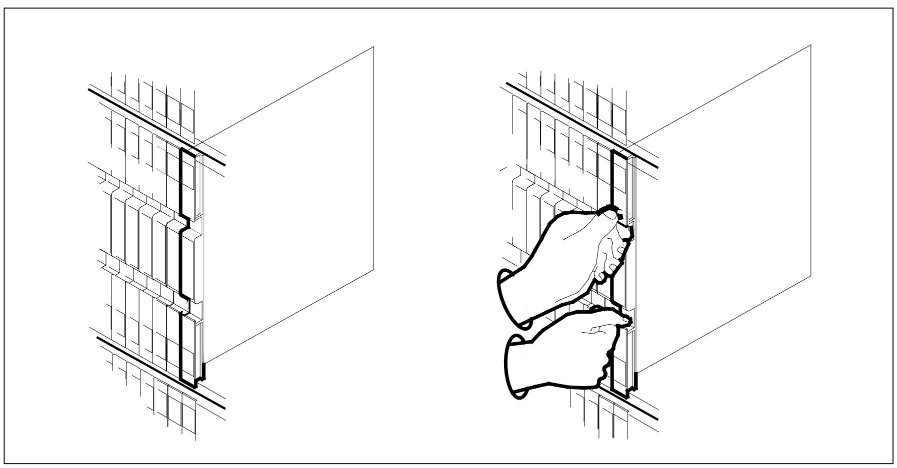
**DANGER**
**Equipment damage**
Take these precautions when removing or inserting a card:

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.

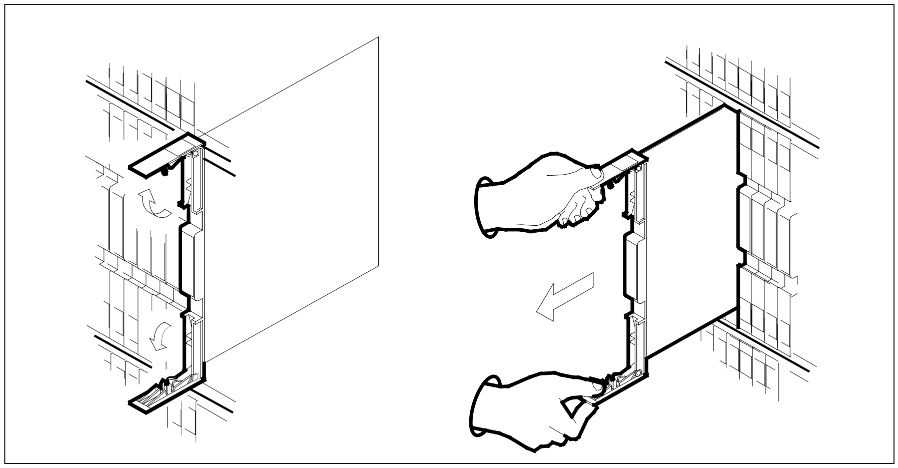
**9** Remove the NTBX72 card as shown in the following figures.

**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.

# NTBX72
# in an RSC-S (DS-1) Model A LCME (continued)

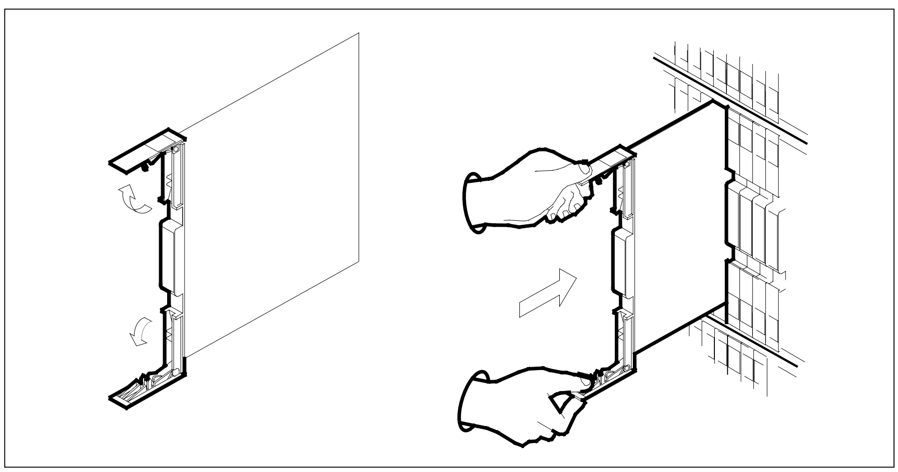


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**10** Open the locking levers on the replacement card.

**a** Align the card with the slots in the shelf.

**b** Gently slide the card into the shelf.

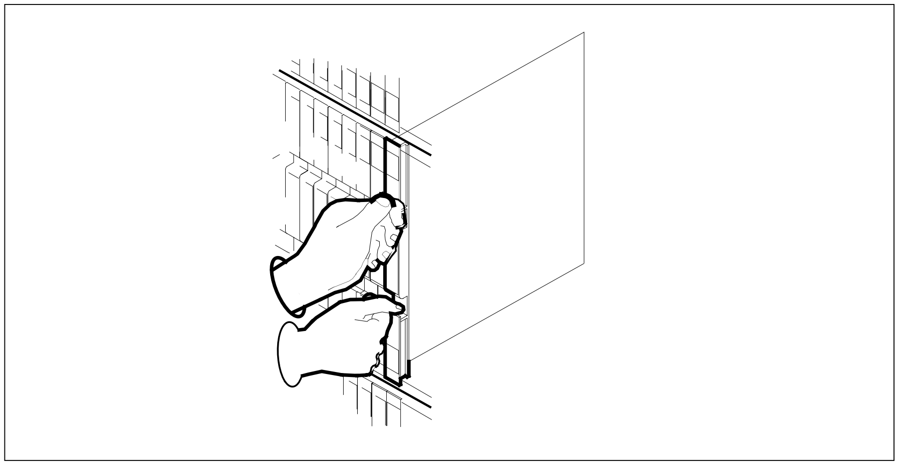


**11** Seat and lock the card.

**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.

## NTBX72
## in an RSC-S (DS-1) Model A LCME (continued)



**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**

# NTBX72
# in an RSC-S (DS-1) Model A LCME (end)

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 |

**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.

# NTEX17 in an RSC-S (DS-1) Model A LCME

## Application

Use this procedure to replace the following card in an RSC LCME line drawer.

| PEC | Suffixes | Name |
|---|---|---|
| NTEX17 | AA | xDSL line card |
| NTEX17 | BA | xDSL line card |
| NTEX17 | CA | xDSL line card |

## Common procedures

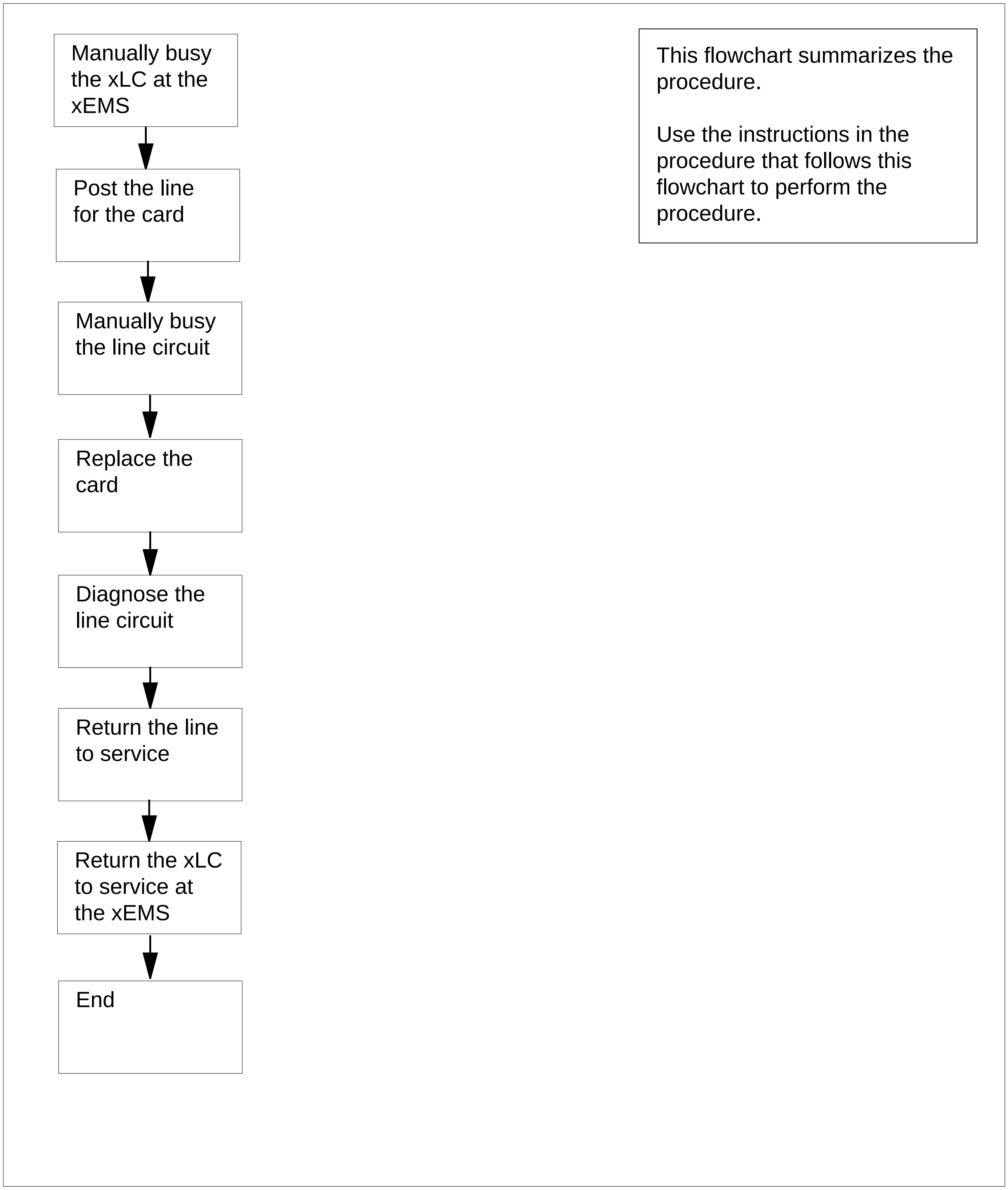
None

## Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

# NTEX17
# in an RSC-S (DS-1) Model A LCME (continued)

### Summary of replacing an NTEX17 in RSC-S LCME



# NTEX17
# in an RSC-S (DS-1) Model A LCME (continued)

### Replacing an NTEX17 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. Make sure that the replacement card and the card that you remove have the same product engineering code (PEC) and PEC suffix.

***At the xEMS workstation***

**3** Go to the submap of the LCM line drawer with the NTEX17 card that you will replace.

**4** Place the cursor on the XLC you want to busy and use the mouse to select

**`Maintenance : XLC -> MB`**

and press the Enter key.

***At the MAP terminal***

**5** To access the LTP level of the MAP display, type

**`>MAPCI;MTC;LNS;LTP`**

and press the Enter key.

*Example of a MAP display:*

```
POST         DELQ             BUSYQ         PREFIX
LCC PTY RNG .....LEN..........      DN     STA F S LTA  TE   RESULT
```

***Note:*** If you worked at the LTP level of the MAP display, a posted line can be present. A posted line does not interfere with this maintenance procedure.

**6** To post the line for the card to be replaced, type

**`>POST L site frame_no unit_no drawer_no slot_no`**

and press the Enter key.

*where*

**site**
is the PM location (alphanumeric)

**frame_no**
is the frame number (0 to 511)

**unit_no**
is the PM unit number (0 or 1)

**drawer_no**
is the line drawer number (0 to 19)

**ckt_no**
is the card slot number (0 to 31)

## NTEX17
## in an RSC-S (DS-1) Model A LCME (continued)

*Example of a MAP display:*

```
LCC PTY RNG .....LEN..........     DN    STA F S LTA  TE   RESULT
1FR         REM1 01 0 01 01     621 1134 IDL
```

**7** Determine the state of the posted line.

| If the state of the line | Do |
|---|---|
| is CPB, CPD | step 8 |
| is CUT, HAZ, IDL, LO, PLO, SB | step 9 |
| is MB | step 10 |
| is NEQ | To determine why the component is offline or not equipped, consult operating company personnel. Continue as directed by operating company personnel. |
| is DEL, DMB, INB, LMB | step 19 |

**8** Wait until the line state changes. Go to step 7.

**9** To manually busy the line circuit, type

**>BSY**

and press the Enter key.

*Example of a MAP display:*

```
LCC PTY RNG .....LEN..........     DN    STA F S LTA  TE   RESULT
1FR         HOST 01 0 01 01     621 1134 MB
```

***Note:*** Observe that the state that appears under the STA header changed to MB.

| If BSY command | Do |
|---|---|
| passed | step 10 |
| failed | step 19 |

***At the MAP terminal***

**10** To display the cabinet location of the faulty line card, type

**>CKTLOC**

and press the Enter key.

## NTEX17
## in an RSC-S (DS-1) Model A LCME (continued)

*Example of a MAP display:*

```
Site Flr RPos  Bay_id   Shf  Description    Slot     EqPEC
REM1  01  B04  LCE  01   04  LCM  01 0      01:00    EX17C

GRD START   2DB LOSS   BAL NETWORK   MAN OVR SET
   NO          NO        NON LOADED        NO
```

***Note:*** In the example MAP display, the line card is an NTEX17CA and the location of the card is

**Site**
in the remote site

**Flr**
on the 1st floor

**RPos**
row B is the location of the line equipment bay 04

**Bay_id**
in line concentrating equipment, bay 01

**Shf**
in shelf 04

**Description**
in hardware device LCM, bay 01

**Slot**
in line drawer 01, slot 00

# NTEX17
# in an RSC-S (DS-1) Model A LCME (continued)

***At the shelf***

**11**

> **DANGER**
> **Static electricity damage**
> Wear a wrist strap that connects to a wrist-strap grounding point to handle circuit cards. The wrist-strap grounding point is on a frame supervisory panel (FSP) or a modular supervisory panel (MSP). The wrist strap protects the cards against static electricity damage.

> **DANGER**
> **Risk of 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.

> **DANGER**
> **Risk of equipment damage**
> Proceed only if a step in a maintenance procedure directs you here. If you perform this procedure without permission, equipment damage can occur.

> **DANGER**
> **Risk of electrocution**
> Proceed only if a step in a maintenance procedure directs you here. If you perform this procedure without permission, personal injury can occur.

Put on a wriststrap.

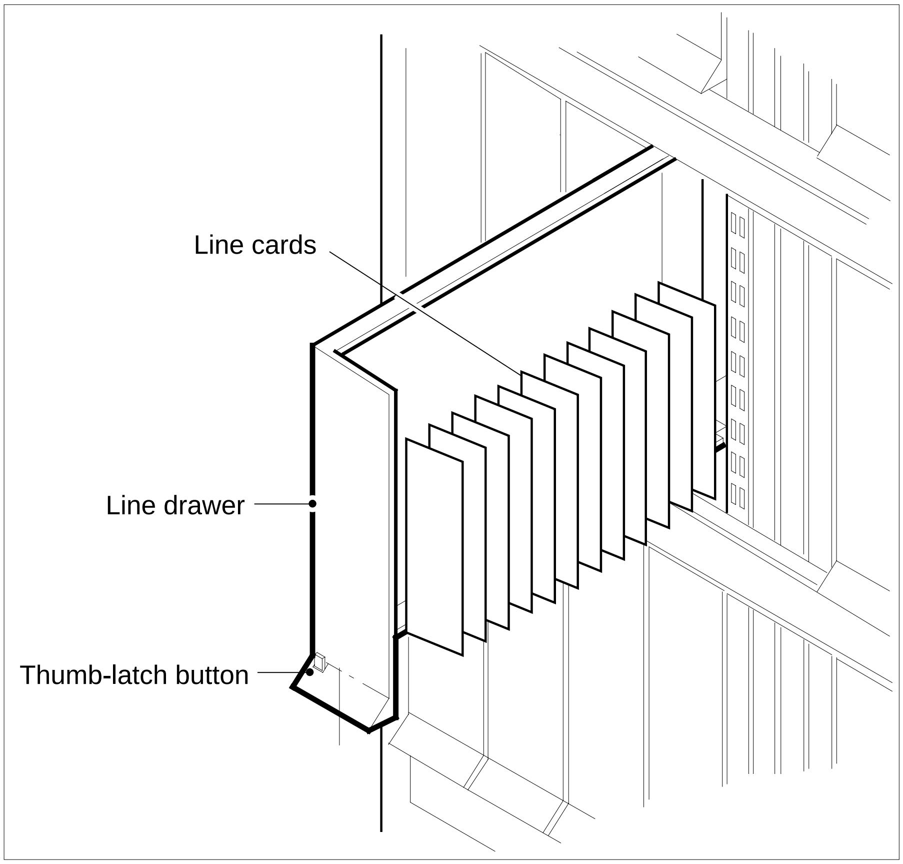
***Note 1:*** A card shroud is required to insert or remove an NTEX17 card in line drawers. This is a 6-inch (152 mm) card, and requires the card shroud with apparatus code QTH58A and common product code A0313317.

***Note 2:*** A card removal tool is required to remove the NTEX17 card from line drawers. The apparatus code for the grip tool is QTH57A, and the common product code is A0298292. You can also use the large grip tool ITA9953.

**12** Use the information you obtained in step 6 to locate the physical location of the line card.

## NTEX17
## in an RSC-S (DS-1) Model A LCME (continued)

**13** Prepare to remove the faulty card identified in step 6 by opening the line drawer and following these substeps.



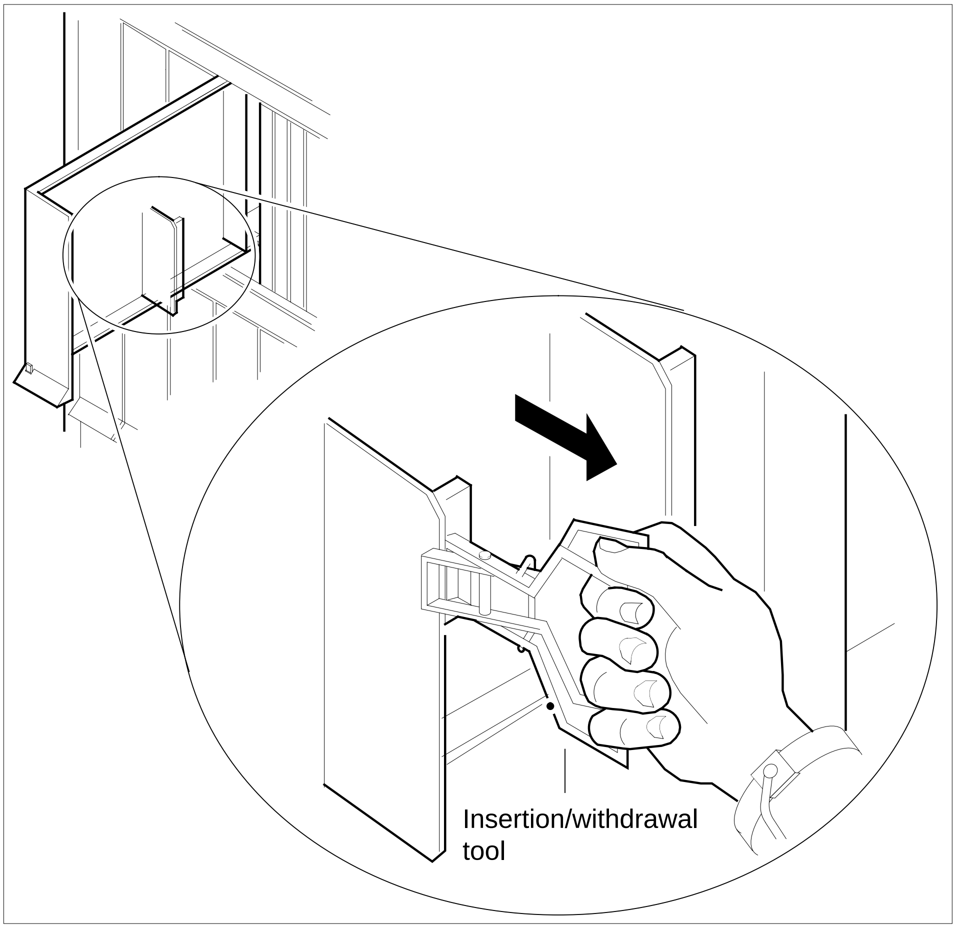

- **a** Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.
- **b** Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.
- **c** Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1.0 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 1.0 cm (0.5 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.

## NTEX17
## in an RSC-S (DS-1) Model A LCME (continued)

**14**

**DANGER**
**Risk of personal injury**
Make sure you handle the line card carefully. The line feed resistor can be very hot. To avoid injury, use the insertion/withdrawal tool to remove the card as shown in the figure that follows.

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.

## NTEX17
## in an RSC-S (DS-1) Model A LCME (continued)

**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.

**15** 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.

**16** Close the line drawer.

***At the MAP terminal***

**17** To perform a diagnostic test on the line, type

**>DIAG**

and press the Enter key.

*Example of a MAP response:*

```
ECOME004AH ***+LINE100 DEC17 10:04:26 0200 PASS LN_DIAG
        LEN HOST 01 0 11 02       NO DIRN
        DIAGNOSTIC RESULT   Card Diagnostic OK
        ACTION REQUIRED  None
        CARD TYPE  EX17BA
```

| If the DIAG command | Do |
|---|---|
| passed | step 18 |
| failed | step 19 |

**18** To return the line to service, type

**>RTS**

and press the Enter key.

| If RTS command | Do |
|---|---|
| passed | step 20 |
| failed | step 19 |

# NTEX17
# in an RSC-S (DS-1) Model A LCME (end)

**19** Obtain further assistance in replacing this card by contacting personnel responsible for a higher level of support.

***At the xEMS workstation***

**20** Go to the submap of the LCM line drawer with the NTEX17 card that you replaced

**21** Place the cursor on the the XLC card you want to return the card to service and use the mouse to select

**`Maintenance : XLC -> IDL`**

and press the Enter key.

**22** The procedure is complete.

# NTEX54
# in an RSC-S (DS-1) Model A LCME

## Application

Use this procedure to replace the following cards in an RSC-S LCME line drawer.

| PEC | Suffixes | Name |
|---|---|---|
| NTEX54 | AA | Data enhanced bus interface card (DBIC) |
| NTEX54 | AB | Data enhanced bus interface card (DBIC) |
| NTEX54 | BA | Data enhanced bus interface card (DBIC) |

## Common procedures

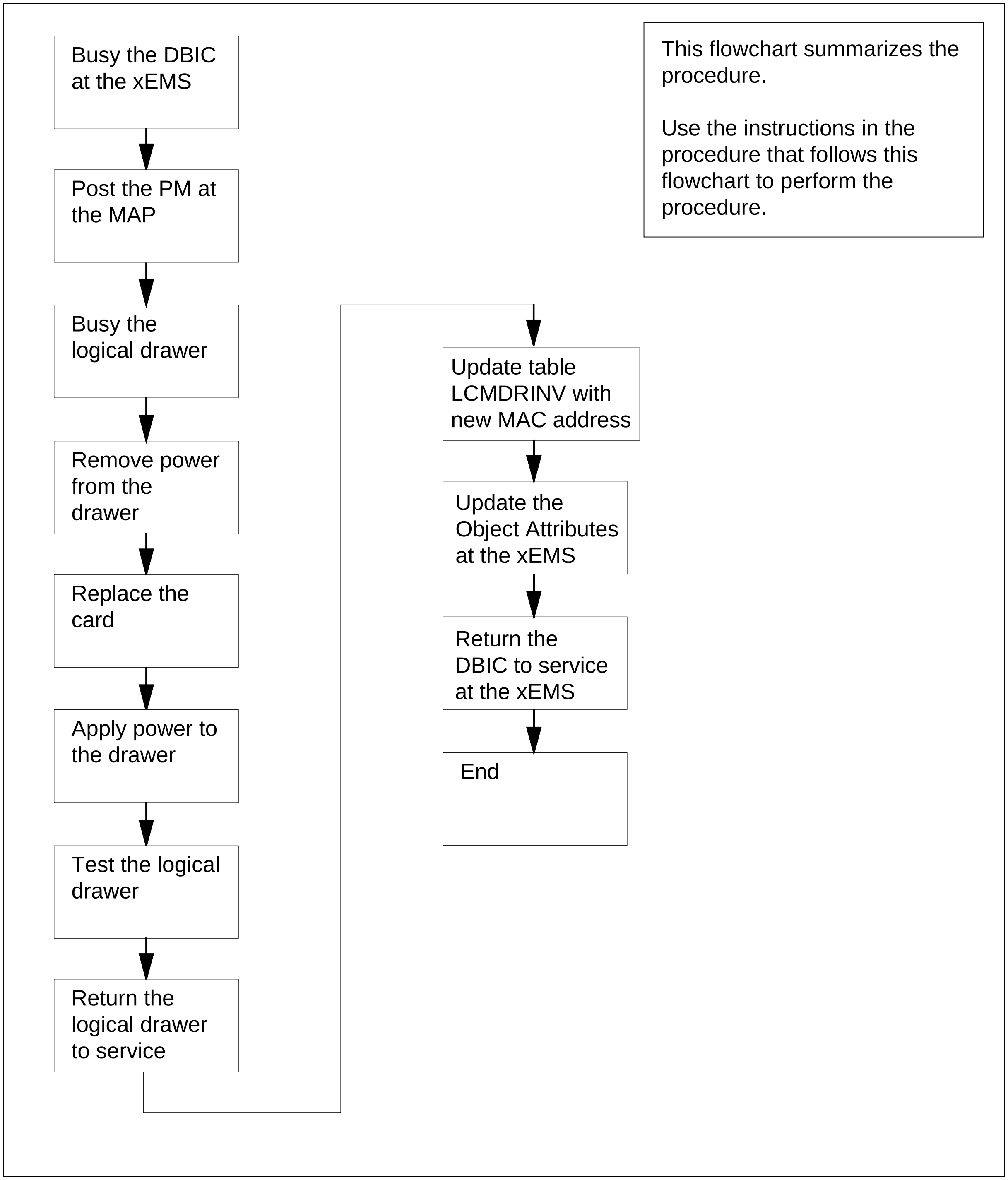
None

## Action

The following flowchart is only a summary of the procedure. To replace the card, use the instructions in the step-action procedure that follows the flowchart.

# NTEX54
# in an RSC-S (DS-1) Model A LCME (continued)

**Summary of replacing an NTEX54 in RSC-S LCME**



### Replacing an NTEX54 in RSC-S LCME

***At your current location***

**1**

> **CAUTION**
> **Loss of service**
> This procedure directs you to manually busy a line drawer. Removal of a line drawer from service can cause the system to drop calls in progress. Perform this procedure only if you need to restore out-of-service components. Unless it is urgent, perform this procedure during periods of low traffic.

Obtain a replacement card. Make sure that the replacement card and the card that you remove have the same product engineering code (PEC) and PEC suffix.

**2**

> **CAUTION**
> **Transport network must know new MAC address**
> Work with the network administrator during this procedure. The transport network must know the MAC adress of the new DBIC before the DBIC can support 1MMS.

Write down the 12-digit number stamped on the new NTEX54 card. This number is the media access control (MAC) address. You will use the MAC address later in this procedure.

***At the xEMS workstation***

**3** Go to the submap of the LCM line drawer with the NTEX54 card that you will replace.

**4** Place the cursor on the DBIC you want to busy and use the mouse to select

**`Maintenance -> DBIC -> ManB`**

from the pop-up menu.

# NTEX54 in an RSC-S (DS-1) Model A LCME (continued)

***At the MAP terminal***

**5** To access the peripheral module (PM) level of the MAP (maintenance and administration position) display and post the LCM, type

**>MAPCI;MTC;PM;POST LCM site frame_no lcm_no**

and press the Enter key.

*where*

**site**
is the PM location (alphanumeric)

**frame_no**
is the equipment frame number (00 to 511)

**lcm_no**
is the number of the LCM (0 or 1)

*Example of a MAP display:*

```
LCM  REM1 01 1   ISTb   Links OOS: Cside  0 Pside  0
Unit0: ISTb                    /RG: 0
Unit1: ISTb  Mtce           /RG: 1  Ring gen Test
                             11   11   11  11  11  RG: Pref 1 InSv
Drwr:  01  23  45  67  89  01  23  45  67  89     Stby              0 InSv
        ..  ..  ..  ..  MM  ..  ..  ..  ..  ..
```

**6** Record the numbers of the logical drawers for the NTEX54.

***Note:*** Logical drawers configure in pairs for the physical drawer. The NTEX54 services the physical drawer. Both logical drawers must be manually busy to perform this card replacement procedure.

**7** Check the state of the affected logical drawers.

| If the state for | Do |
|---|---|
| one or both logical drawers is I, S, or . (dot) | step 8 |
| both logical drawers is M | step 11 |
| one or both logical drawers is 0 or - | Determine why the drawer is offline. If necessary, contact the next level of support. |

**8** To manually busy the logical drawer, type

**>BSY DRWR drwr_no**

and press the Enter key.

*where*

**drwr_no**
is the logical drawer number (0 to 23)

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)

*Example of a MAP response:*

LCM REM1 01 1 Drwr 0 will be taken out of service
Please confirm ("YES", "Y", "NO", or "N"):

**9** To confirm the command, type

**>YES**

and press the Enter key.

*Example of a MAP response:*

LCM REM1 01 1 Drwr 0 Bsy Passed

| If | Do |
|---|---|
| you must busy the other logical drawer of the pair | step 10 |
| both logical drawers are now M | step 11 |

**10** Busy the other logical drawer of the pair.

**>BSY DRWR drwr_no**

and press the Enter key.

*where*

**drwr_no**
is the logical drawer number (0 to 23)

*Example of a MAP response:*

LCM REM1 01 1 Drwr 0 Bsy Passed

# NTEX54
# in an RSC-S (DS-1) Model A LCME (continued)

***At the shelf***

**11**

> **WARNING**
> **Static electricity damage**
> Wear a wrist strap that connects to the wrist-strap grounding point to handle circuit cards. The wrist-strap grounding point is on a frame supervisory panel (FSP) or a modular supervisory panel (MSP). The wrist strap protects the cards against static electricity damage.

> **DANGER**
> **Potential equipment damage**
> Note the fuses that you remove from the fuse panel. If you do not insert fuses in the correct location on the fuse panel, equipment damage occurs.

> **DANGER**
> **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.

Remove fuses for the line drawer containing the faulty DBIC. Perform the following steps. Refer to the figure that follows to identify the correct fuses.

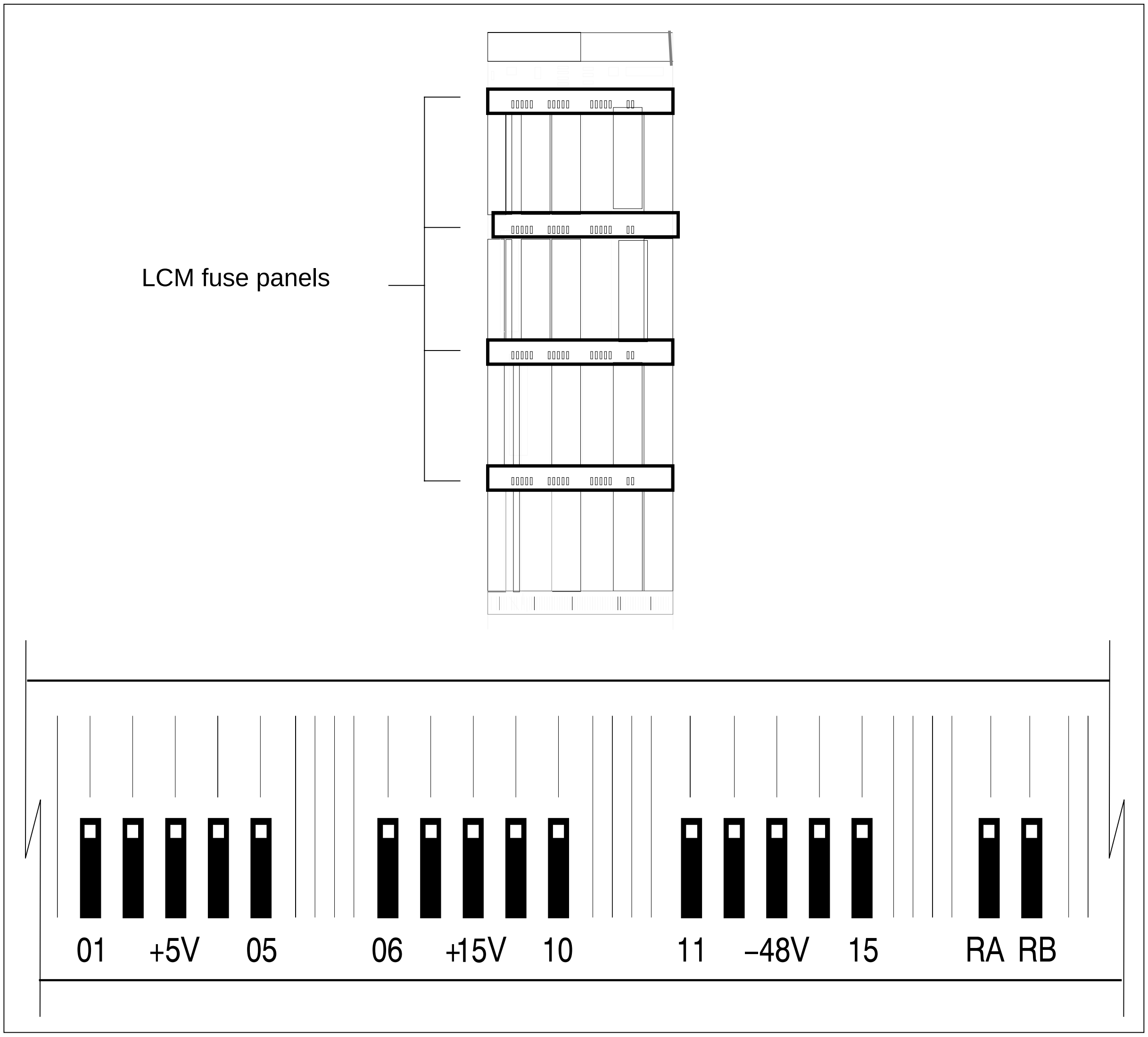
***Note:*** Fuse markings do not always identify voltage. Make sure that you note the fuses and the location of the fuses in the fuse panel.

**a** Remove the -48V fuse for the line drawer that contains the faulty DBIC.

**b** Remove the +15V fuse for the line drawer that contains the faulty DBIC.

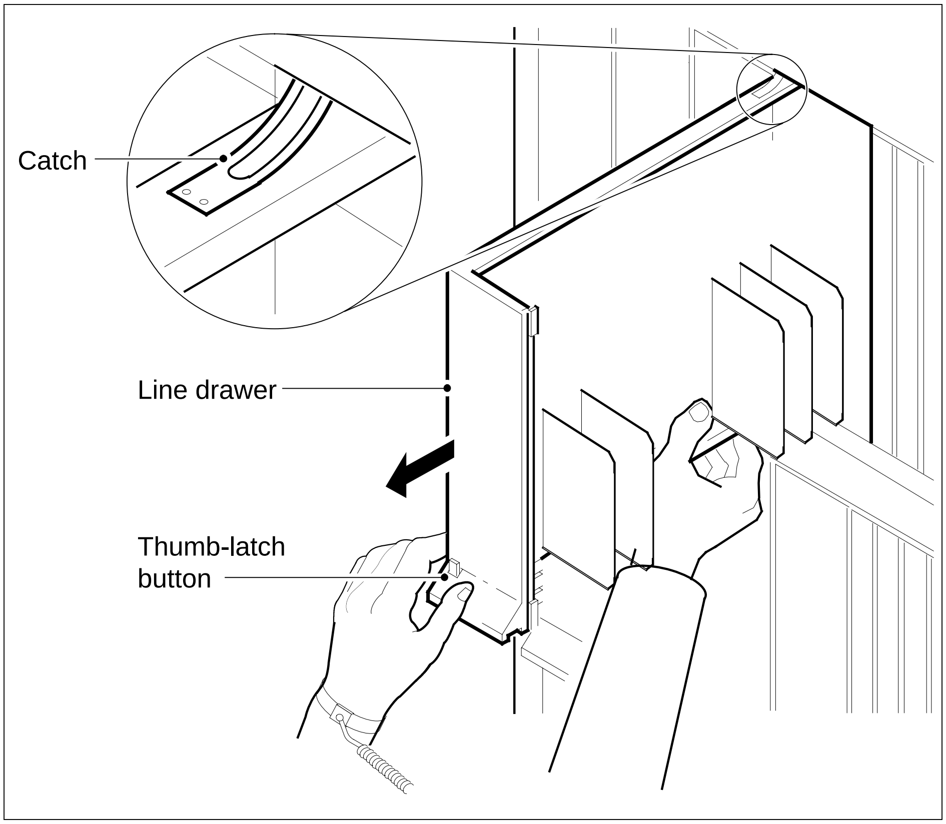
**c** Remove the +5V fuse for the line drawer that contains the faulty DBIC.

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)



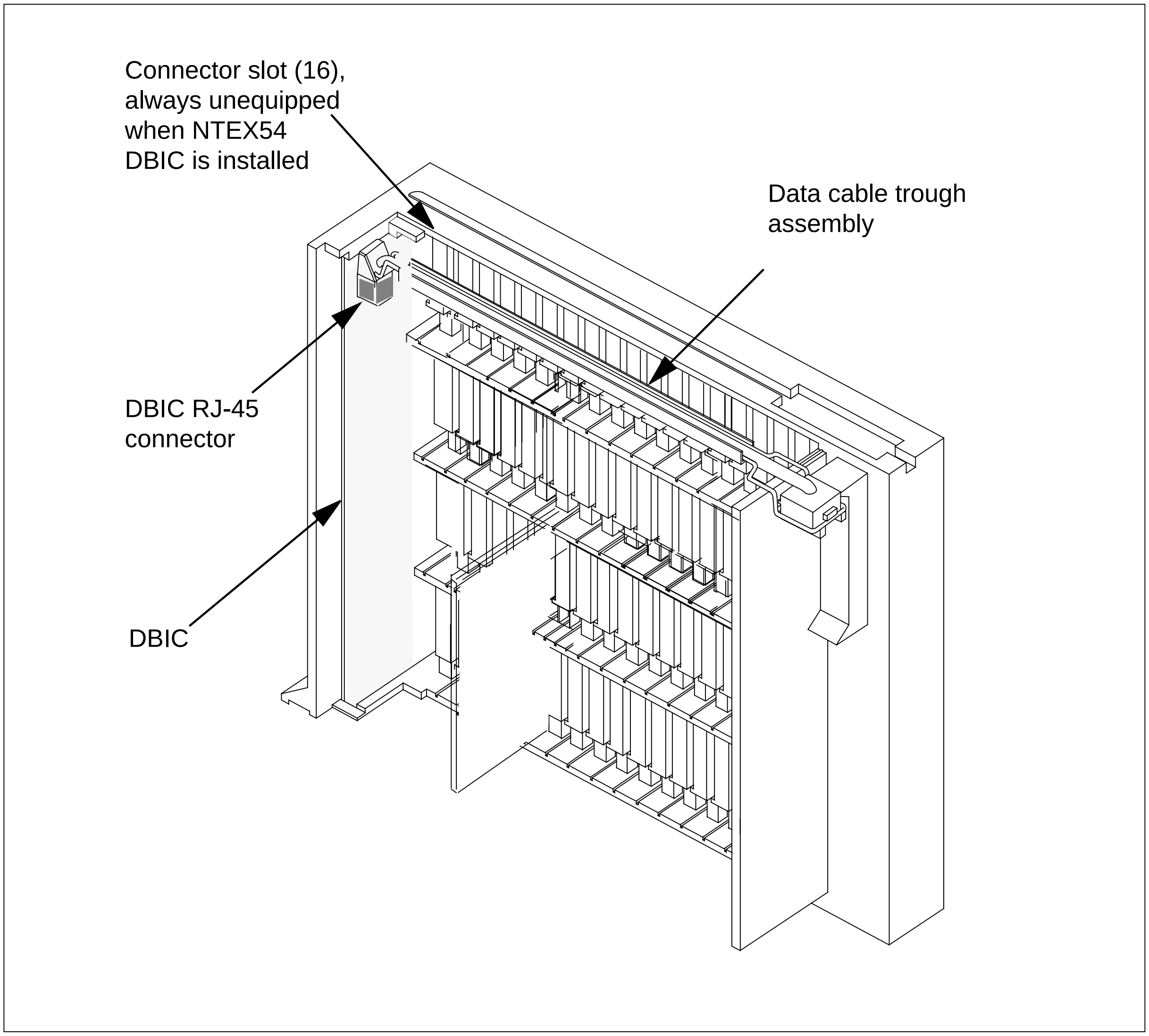

**12** Identify the drawer. Press the small thumb-latch button on the lower left edge of the drawer. Pull the drawer out. To secure the drawer in a steady horizontal position, tip the drawer until the catch rests on the line drawer track.

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)




**13** Disconnect the data cable from the RJ-45 connector on the card. The RJ-45 connector is located at slot position 16 of the odd LSG (connector slot). Refer to the following figure.

# NTEX54
# in an RSC-S (DS-1) Model A LCME (continued)

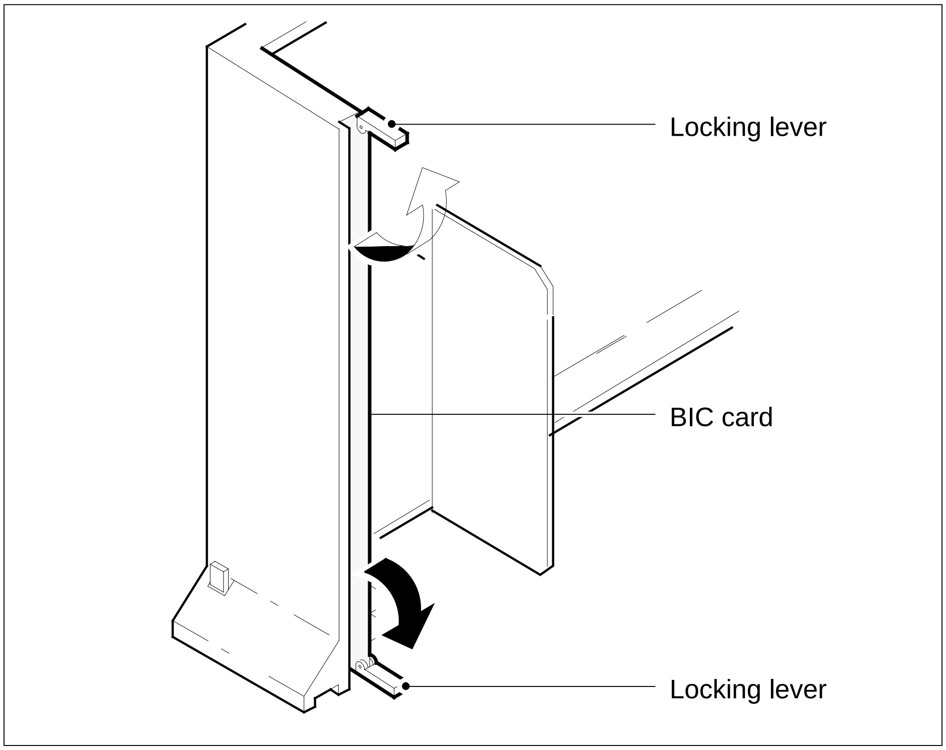



**14**

**DANGER**
**Do not hold the card by the levers only**
If you hold a card by the locking levers only, the levers can break. Pull the card half way out of the slot. Carefully grasp the card from below for more support. Continue to remove the card from the drawer. Make sure that you do not touch any wires or internal parts on the card.

# NTEX54
# in an RSC-S (DS-1) Model A LCME (continued)

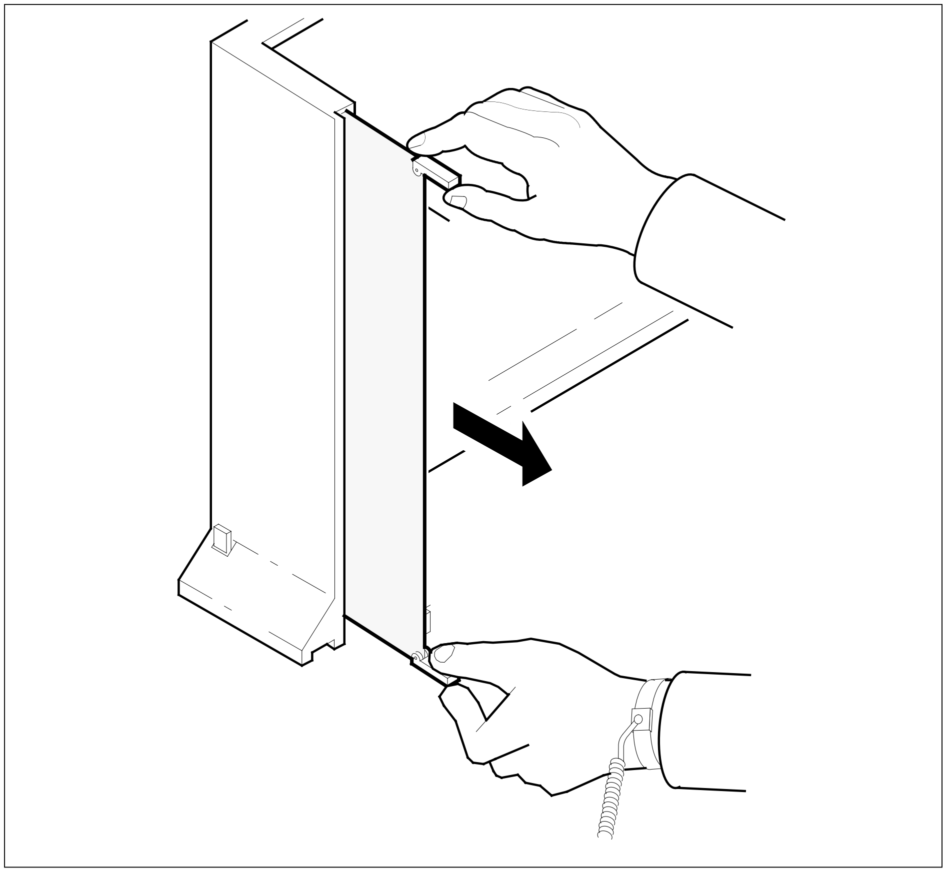
Open the locking levers on the face of the card.




**15** Grasp the locking levers. Carefully pull the card toward you until the card clears the drawer.

***Note:*** Do not use a rocking motion to remove the card.

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)



**16** Place the card that you removed in an electrostatic discharge (ESD) protective container.

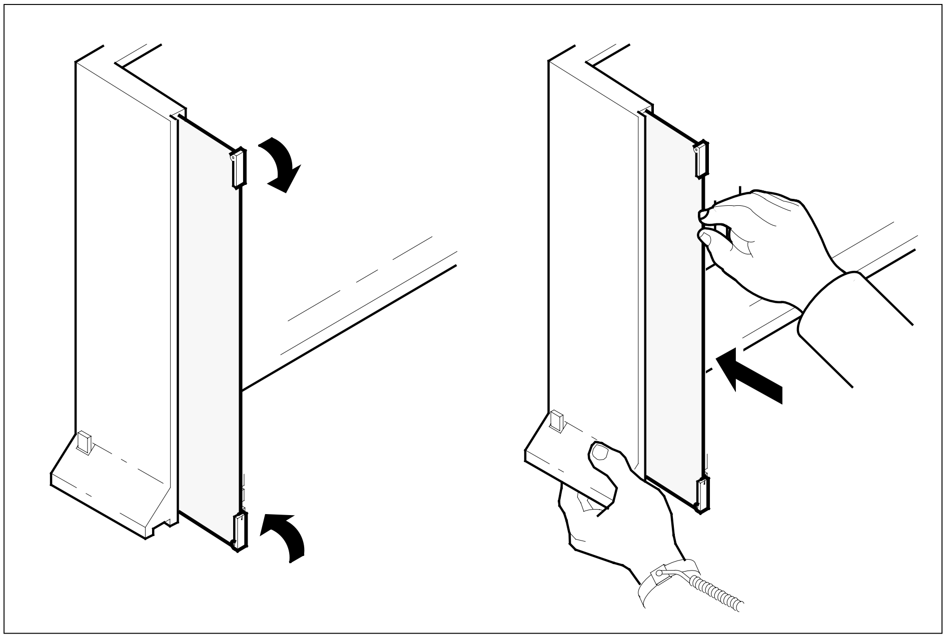
**17** Make sure that the replacement card and the card that you remove have the same PEC and PEC suffix.

**18** Close the locking levers on the replacement card. Align the card with the pin slots in the drawer. Carefully slide the card into the drawer.

**19** Support the drawer with your left hand. Use your right hand to push on the upper and lower edges of the card. Make sure that the card sits completely in the drawer.

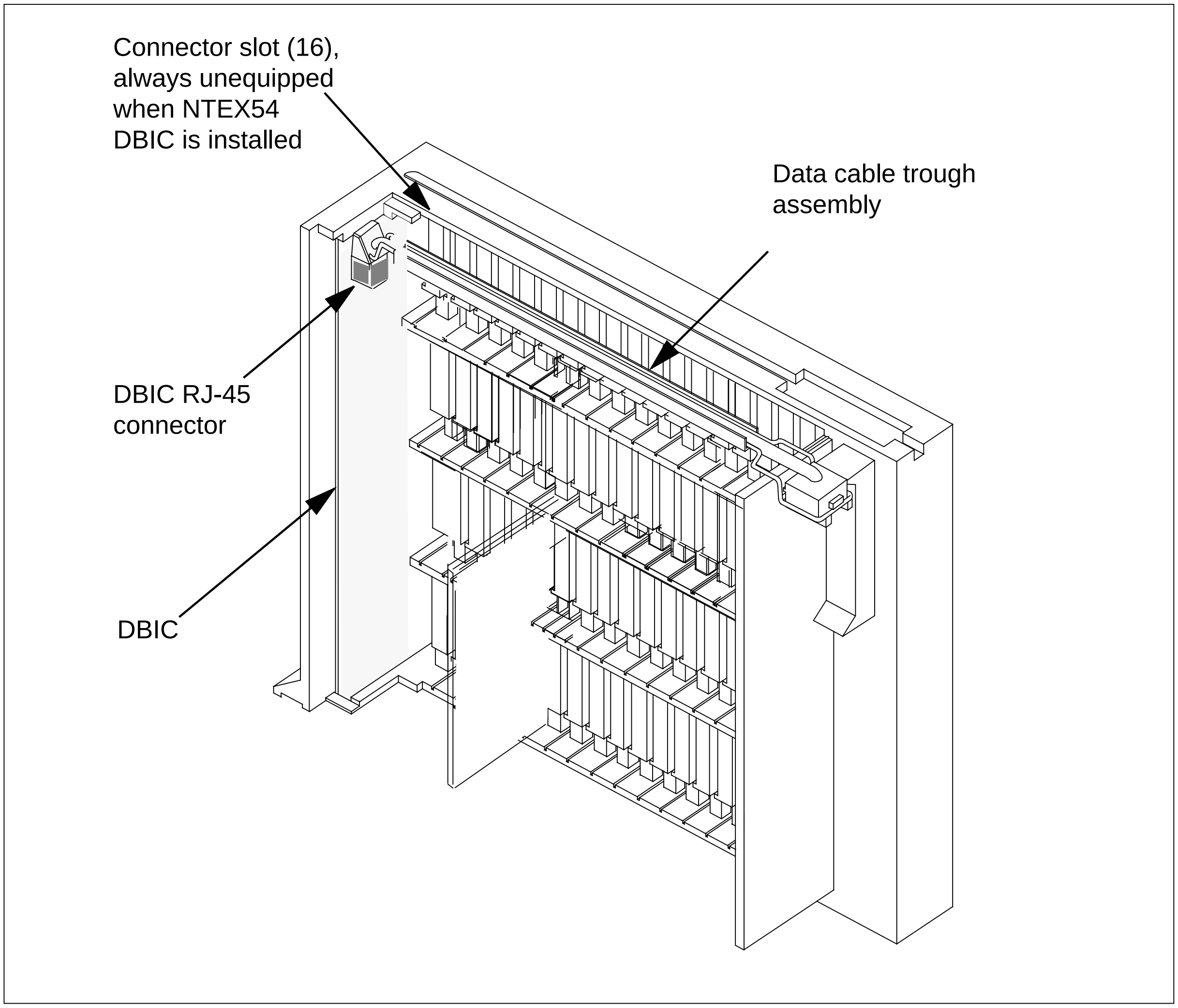
***Note:*** Do not use a rocking motion to insert the card.

# NTEX54
# in an RSC-S (DS-1) Model A LCME (continued)



**20** Connect the data cable to the RJ-45 connector that you disconnected in step 13. Refer to the following figure.

## NTEX54 in an RSC-S (DS-1) Model A LCME (continued)



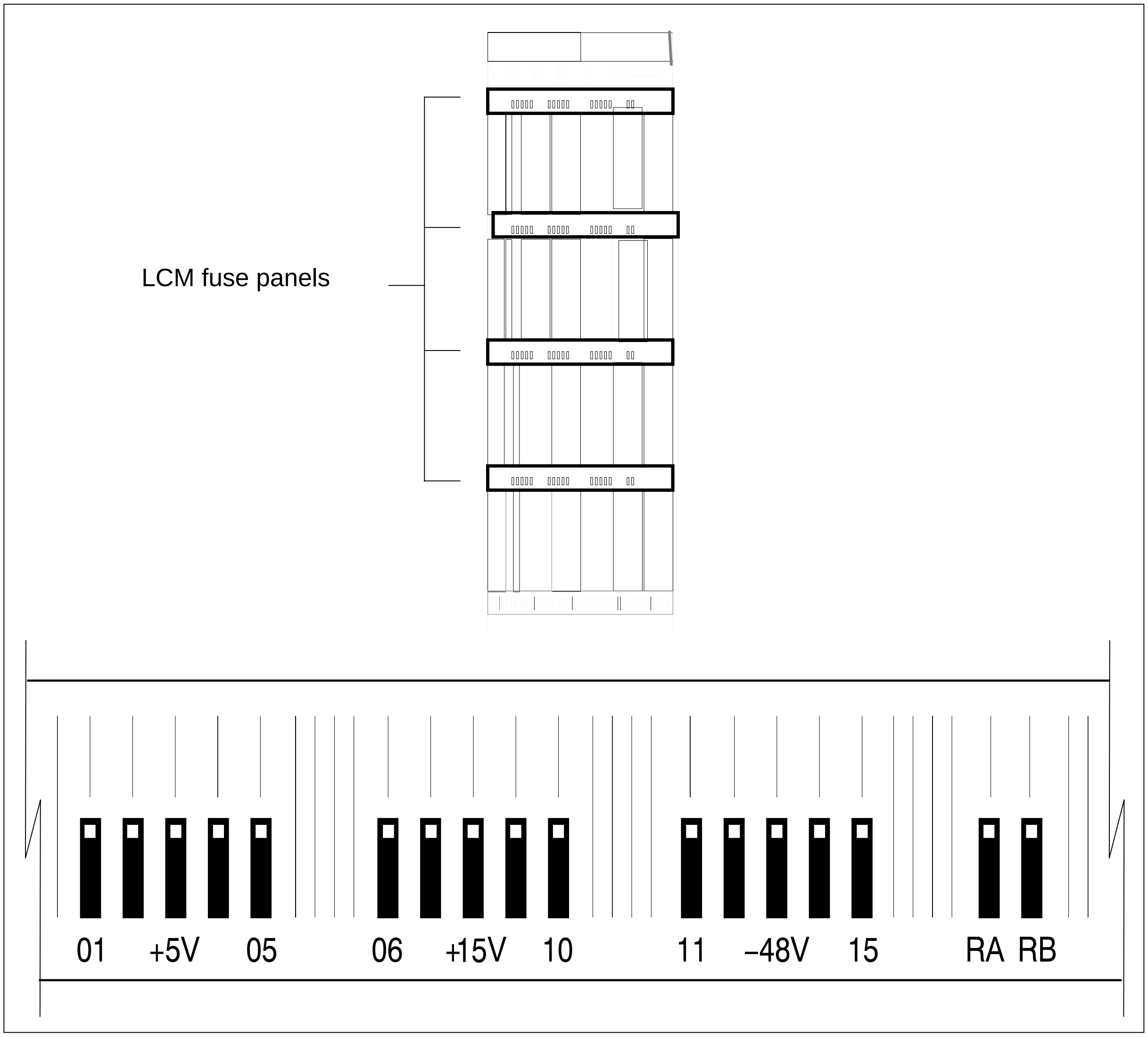

**21** Close the line drawer.

**22**

**DANGER**
**Potential equipment damage**
Make sure you insert the fuses in the correct location on the fuse panel to prevent equipment damage.

Insert the fuses that you removed in step 11. Refer to the following figure.

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)




***Note:*** Fuses are coded for position. The colored square on the face of the fuse identifies the top edge.

**a** Insert the +5V fuse.

**b** Insert the +15V fuse.

**c** Insert the -48V fuse.

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)

***At the MAP terminal***

**23** A maintenance flag (Mtce) can appear. This flag indicates that system-initiated maintenance tasks are in progress. To stop the system-initiated maintenance tasks, type

**>ABTK**

and press the Enter key.

**24** To return the logical drawer to service, type

**>RTS DRWR drwr_no**

and press the Enter key.

*where*

**drwr_no**
is the logical drawer number (0 to 19)

*Example of a MAP response:*

OSvce Tests Initiated
LCM REM1 00 0 Drwe 0 Tst Passed
LCM REM1 00 0 Drwr 0 Rts Passed

| If the RTS command | Do |
|---|---|
| passed, and you must return the other logical drawer to service | step 25 |
| passed, and the other logical drawer is in service | step 26 |
| failed | step 39 |

**25** Repeat step 24 for the other logical drawer in the pair.

**26** Update table LCMDRINV.

***Note:*** Make sure you have the new MAC address from the replacement card as recorded in step 2.

**a** To open table LCMDRINV, type

**>TABLE LCMDRINV**

and press the Enter key.

**b** To position on the tuple for the LCM, type

**>POS site_name frame_no lcm_no**

and press the Enter key.

*where*

**site_name**
is the name of the site

## NTEX54
## in an RSC-S (DS-1) Model A LCME (continued)

**frame_no**
is the number of the frame

**lcm_no**
is the number of the LCM

**c** To begin changing the tuple, type

**>CHA**

and press the Enter key.

**d** To continue processing, type

**>Y**

and press the Enter key.

**e** Press the Enter key to scroll through the fields until you access the field with the MAC address.

**f** Enter the new MAC address. Type

**>drwr_id card_pec drwr_pec mac_address ip_address**

and press the Enter key.

*where*

**drwr_id**
is the physical number of the drawer

**card_pec**
is NTEX54AA, NTEX54AB, or NTEX54BA

**drwr_pec**
is the PEC of the drawer

**mac_address**
is the MAC address of the new NTEX54

**ip_address**
is the IP address of the new NTEX54

**g** Press the Enter key to scroll through remaining fields.

**h** Confirm the change. Type

**>Y**

and press the Enter key.

**i** Exit the table. Type

**>QUIT**

and press the Enter key.

## NTEX54
## in an RSC-S (DS-1) Model A LCME (end)

***At the xEMS workstation***

**27**

> **CAUTION**
> **Transport network must know new MAC address**
> Before you return the DBIC to service, you must provide the MAC address for the DBIC to the transport network. Contact the network administrator for assistance.

Go to the submap of the LCM line drawer with the new NTEX54 card.

**28** Select the card by placing the cursor on the DBIC.

**29** From the pop-up menu select Describe/Modify Object. The Object Description dialog box appears.

**30** From the Object Description dialog box, select HSTP Application from the fields under Object Attributes.

**31** Select View/Modify Object Attributes.

**32** Enter the new MAC address in the %LAC MAC Address field, for example, 0060381120a1.

**33** Click the Verify button to verify the information.

**34** Click the OK button to close the Attributes dialog box.

**35** Click OK to close the Object Description dialog box.

**36** Place the cursor on the DBIC you want to return to service and use the mouse to select

**`Maintenance -> DBIC -> Rts`**

from the pop-up menu.

**37** Send any faulty cards for repair according to local procedure.

**38** 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 40.

**39** Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

**40** You have successfully completed this card replacement procedure.

# NTMX72 in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX72 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX72 | AA, AB | Power Converter |

## Common procedures

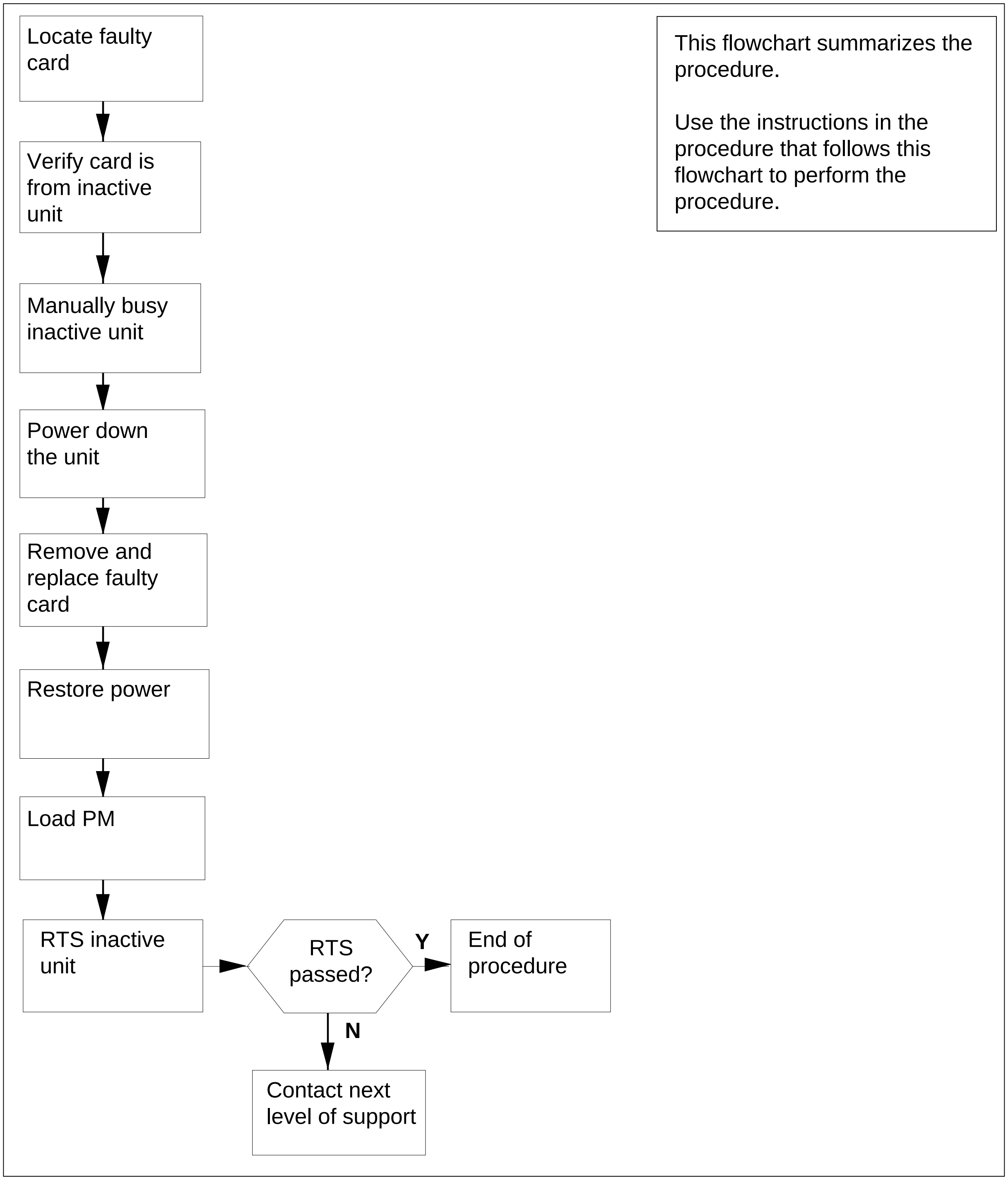
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX72 card in an RSC-S RCC2**



# NTMX72
# in an RSC-S (DS-1) Model A RCC2 (continued)

### Replacing an NTMX72 card in an RSC-S RCC2

***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 RCC2, 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 RCC2 by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 with the faulty card

# NTMX72
# in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
 .     .     .      .      .     .      .      .       .      .

RCC2               SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        0        0        0        25
 2 Post_   RCC2      0        0        0        0        0         0
 3 ListSet
 4         RCC2    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 that is 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.

**6** Answer the prompt by typing

**>YES**

and pressing the Enter key.

**7** Busy the inactive PM unit by typing

***>bsy*** **INACTIVE**

and pressing the Enter key.

## NTMX72
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP response:*

```
RCC2     0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Inact ManB
Unit1:   Act   ISTb
bsy unit 0
RCC2 0 Unit 0    Bsy Passed
```

| If the BSY command | Do |
|---|---|
| passed | step 8 |
| failed | step 24 |

**8** Reset the inactive RCC2 unit by typing

**>PMRESET UNIT unit_no NORUN**

and pressing the Enter key.

*where*

**unit_no**
is the RCC2 unit number (0 or 1)

*Example of a MAP response:*

```
RCC2 0 Unit 0    PMReset Passed
```

***At the RCC2 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.

**10** Use the following information to determine where to proceed:

| If the card you are replacing has a suffix of | Do |
|---|---|
| AA | step 11 |
| AB | step 12 |

**11** Power down the NTMX72AA power converter by setting the POWER switch on the NTMX72 card to the OFF position.

Go to step 13.

**12** Power down the NTMX72AB power converter by setting the circuit breaker on the frame supervisory panel (FSP) for the inactive unit to the OFF position.

## NTMX72
## in an RSC-S (DS-1) Model A RCC2 (continued)

**13**

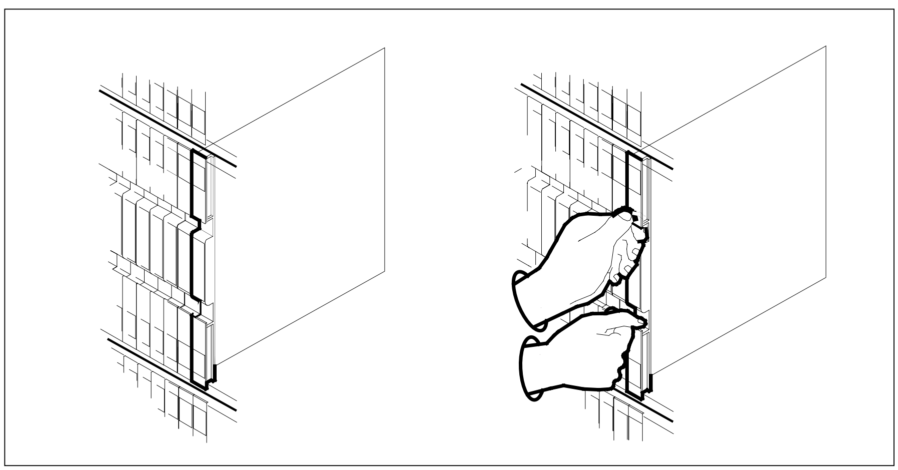
**WARNING**
**Static electricity damage**
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the FSP. This protects the equipment against damage caused by static electricity.

**DANGER**
**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.

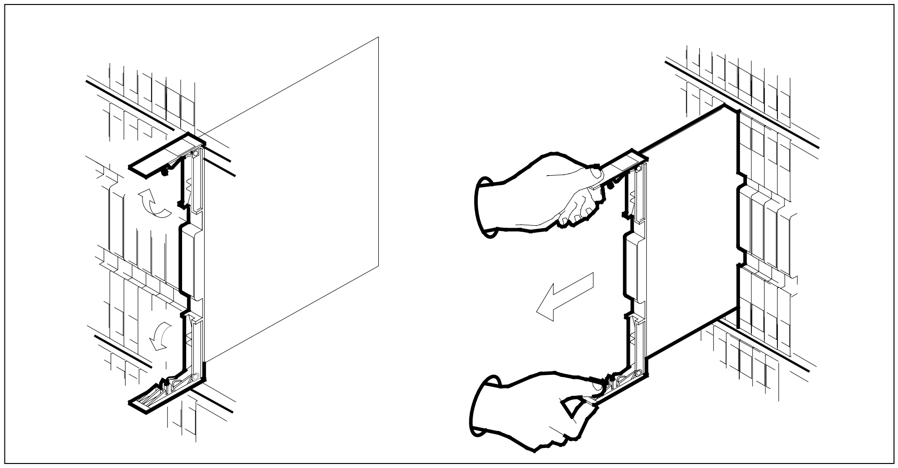
Remove the NTMX72 card as shown in the following figures.

**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.

## NTMX72
## in an RSC-S (DS-1) Model A RCC2 (continued)

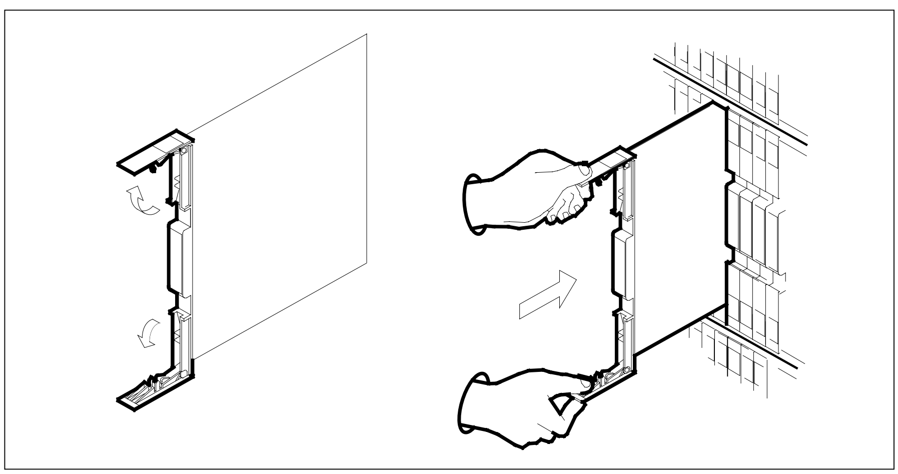


**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**14** 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.

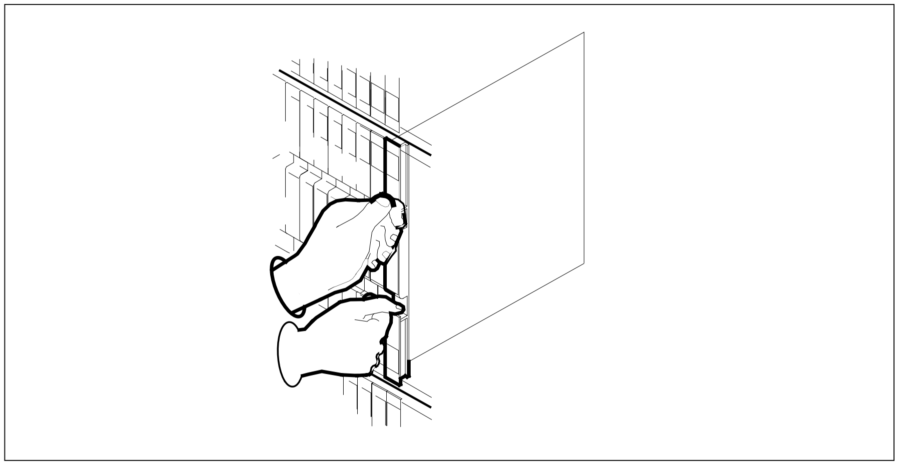


**15** Seat and lock the card.

**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.

## NTMX72
## in an RSC-S (DS-1) Model A RCC2 (continued)



**16** Power up the inactive RCC2 unit as follows:

**a** Ensure that the power converter (NTMX72) is fully inserted. A major audible alarm may sound. This alarm is silenced when power to the NTMX72 circuit card is restored.

***Note:***

**b** If the power converter is an NTMX72AA, set the switch on the power converter to the Reset position. Set the associated circuit breaker on the FSP to the ON position.

If both the converter FAIL LED and FRAME FAIL lamp on the FSP go OFF, go to step 17.

If both the converter FAIL LED and FRAME FAIL lamp on the FSP do not go OFF, hold the switch on the NTMX72AA converter in the Reset position and simultaneously set the associated circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF. Go to step 17.

**c** If the power converter replaced is an NTMX72AB set the associated circuit breaker on the FSP to the ON position for the NTMX72AB that was powered down in step 12. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF. Go to step 17.

**17** After replacing the faulty card, load the inactive RCC2 unit by typing

***>LOADPM UNIT*** **unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the inactive RCC2 unit

| If load | Do |
|---|---|
| passed | step 18 |

## NTMX72
## in an RSC-S (DS-1) Model A RCC2 (end)

| **If load** | **Do** |
|---|---|
| failed | step 24 |

**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 RCC2 unit to service by typing

***>RTS UNIT*** **unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the inactive RCC2 unit

| **If RTS** | **Do** |
|---|---|
| passed | step 20 |
| failed | step 24 |

**20** Remove the sign from the active RCC2 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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX73 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX73 | AA, AB | PCM Signaling Processor |

## Common procedures

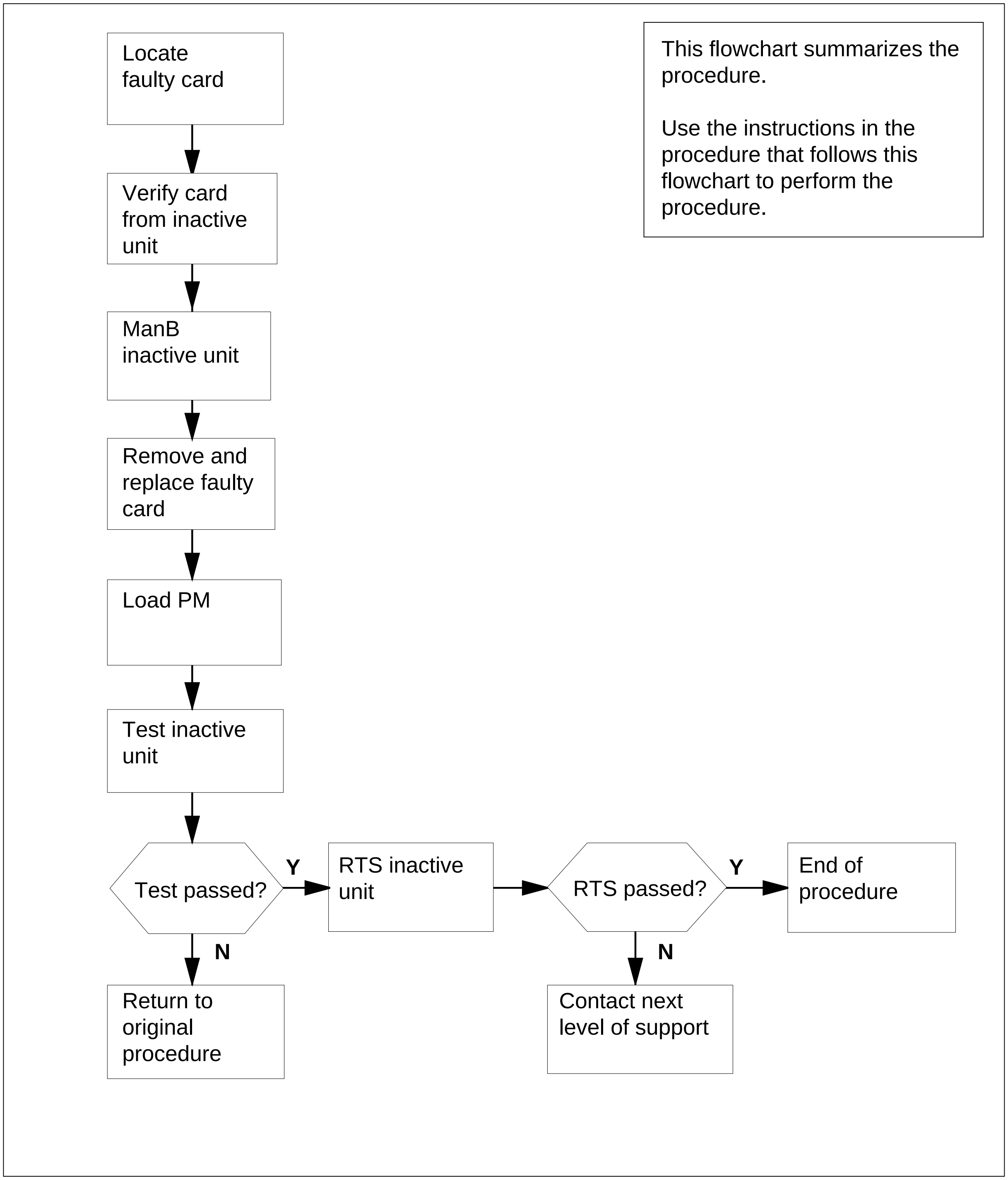
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX73 card in RSC-S RCC2**



## NTMX73
## in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NTMX73 card in RSC-S RCC2**

***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 RCC2, 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 RCC2 by typing

**`>MAPCI;MTC;PM;POST RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 with the faulty card

*Example of a MAP display:*

## NTMX73
## in an RSC-S (DS-1) Model A RCC2 (continued)

```
 CM    MS     IOD     Net     PM     CCS     LNS     Trks     Ext     Appl
  .     .      .       .      .       .       .       .        .       .

RCC2              SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM        0         0         0         0         0         25
 2 Post_   RCC2      0         0         0         0         0          0
 3 ListSet
 4         RCC2    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 the card that is to be removed is on the inactive unit.

*Example of a MAP display:*

# NTMX73
## in an RSC-S (DS-1) Model A RCC2 (continued)

```
 CM     MS     IOD     Net     PM     CCS     LNS     Trks     Ext     Appl
  .      .      .       .       .      .       .       .        .       .

RCC2               SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM        0         0         0         0         0         25
 2 Post_   RCC2      0         0         0         0         0          0
 3 ListSet
 4         RCC2    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
```

| If the faulty card is on 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.

**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*

# NTMX73
# in an RSC-S (DS-1) Model A RCC2 (continued)

**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 frame***

**9**

> **DANGER**
> **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 RCC2. This protects the equipment against damage caused by static electricity.

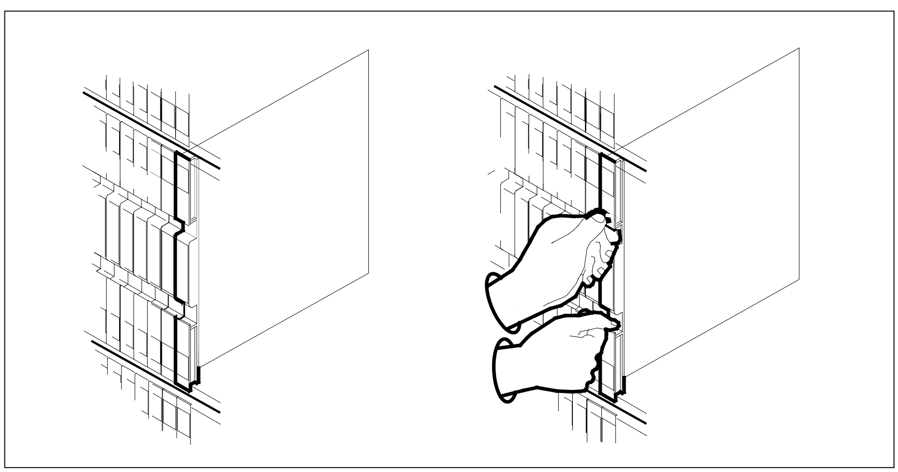
Put on a wrist strap.

**10**

> **DANGER**
> **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.

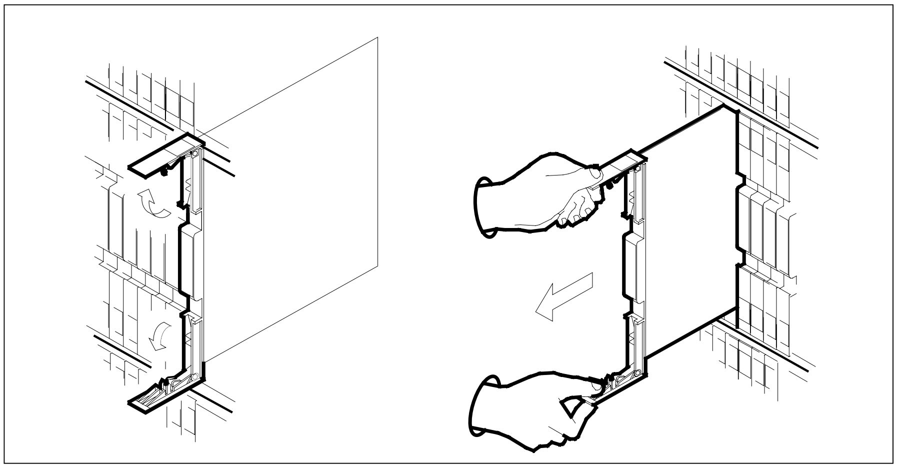
Remove the NTMX73 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.



## NTMX73
## in an RSC-S (DS-1) Model A RCC2 (continued)

**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



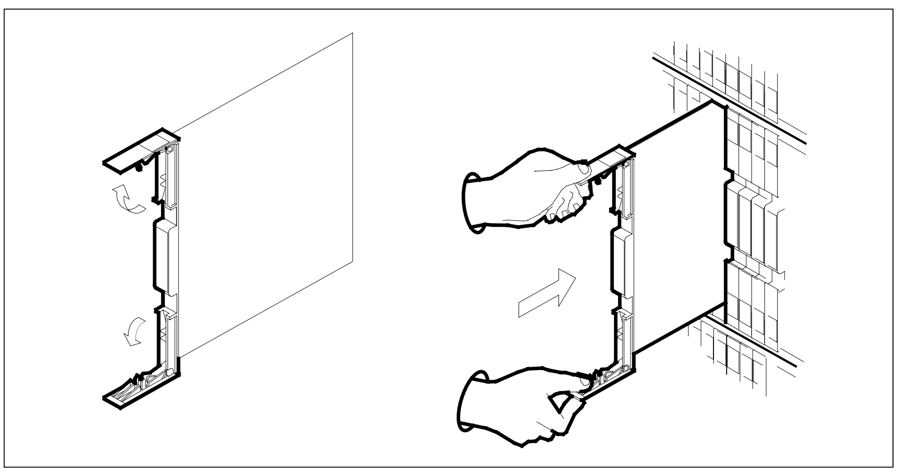
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

***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.

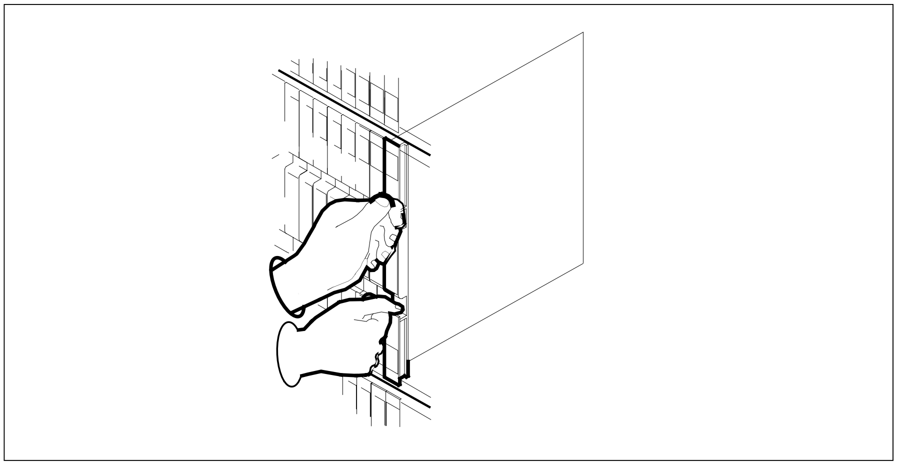


**12** Seat and lock the card.

**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.

## NTMX73
## in an RSC-S (DS-1) Model A RCC2 (continued)



***At the MAP display***

**13** Load the inactive RCC2 unit by typing

***>loadpm unit* unit_no CC**

and pressing the Enter key.

*where*

**unit_no**
is the number of the faulty RCC2 unit

| If load | 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 RCC2 unit

| If TST | Do |
|---|---|
| passed | step 15 |
| failed | step 17 |

## NTMX73
## in an RSC-S (DS-1) Model A RCC2 (end)

**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 RCC2 unit to service by typing

**>RTS UNIT unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the faulty RCC2 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 RCC2 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.

**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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX74 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX74 | AA | DS30A Interface card |

## Common procedures

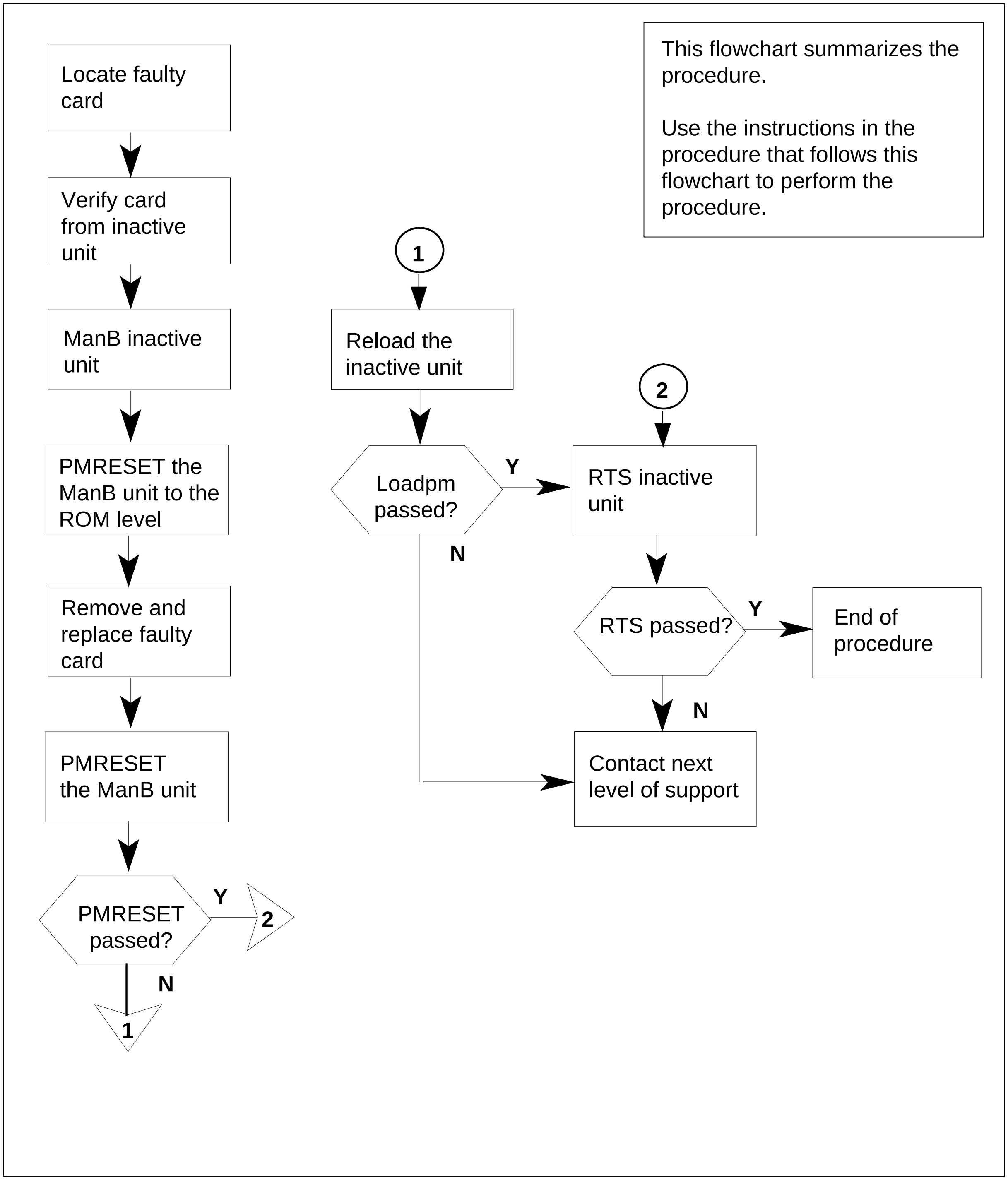
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX74 card in RSC-S RCC2**



# NTMX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NTMX74 card in RSC-S RCC2**

***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 RCC2, 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 RCC2 by typing

**`>MAPCI;MTC;PM;POST RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 with the faulty card

# NTMX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
 CM     MS    IOD     Net     PM    CCS    LNS    Trks    Ext    Appl
 .      .      .       .    1RCC2   .      .      .       .      .

RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0         2       0        2         25
 2 Post_   RCC2    0        0         0       0        1          1
 3 ListSet
 4         RCC2   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, ensure that the card to be removed is on the inactive unit.

| If faulty card is on | Do |
|---|---|
| active unit | step 5 |
| inactive unit | step 7 |

**5** Switch the processing activity (SWACT) to the inactive unit by typing

**>SWACT**

and pressing the Enter key.

**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.

# NTMX74
# in an RSC-S (DS-1) Model A RCC2 (continued)

***At the MAP terminal***

**8** Busy the inactive PM unit by typing

***>bsy INACTIVE***

and pressing the Enter key.

**9** Set the ManB RCC2 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 RCC2 unit busied in step 8

***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 frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

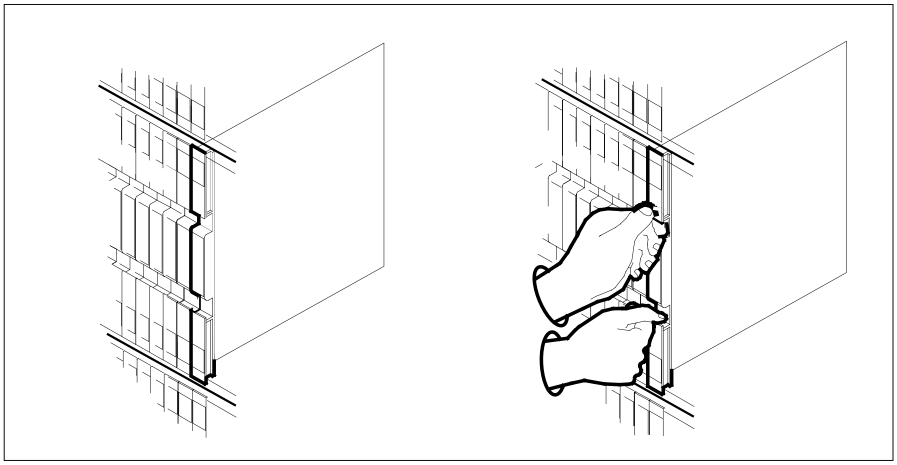
**11**

> **DANGER**
> **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.

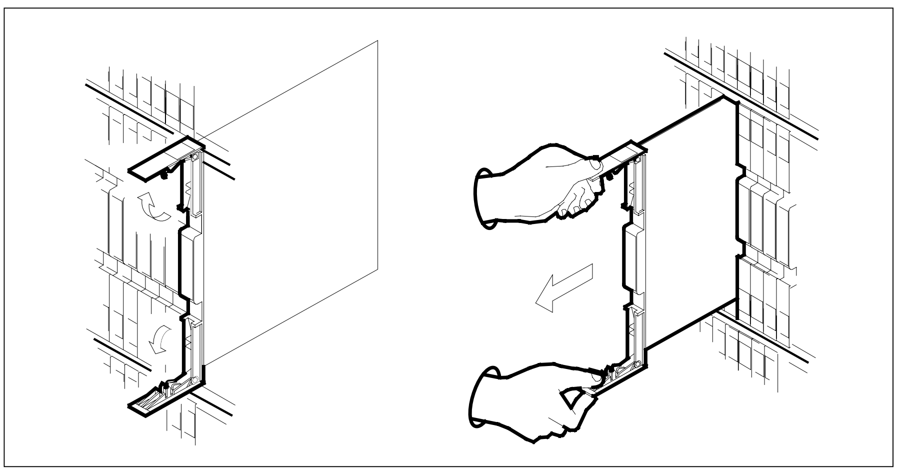
Remove the NTMX74 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NTMX74
## in an RSC-S (DS-1) Model A RCC2 (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



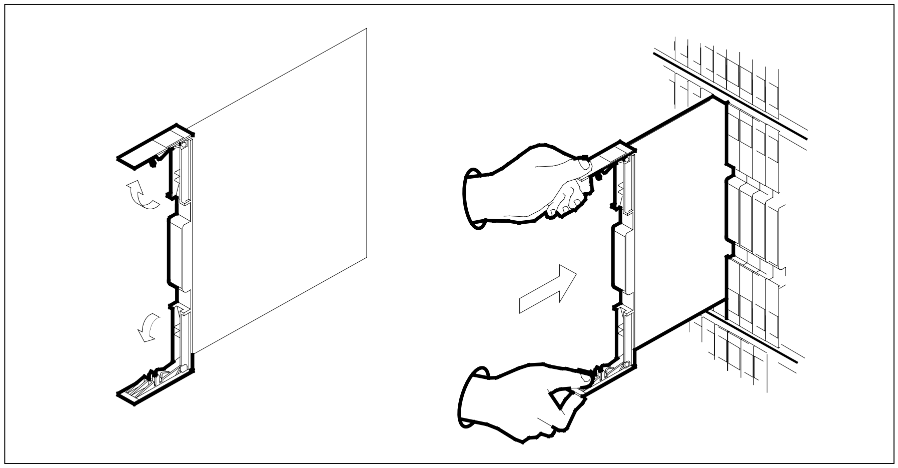
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

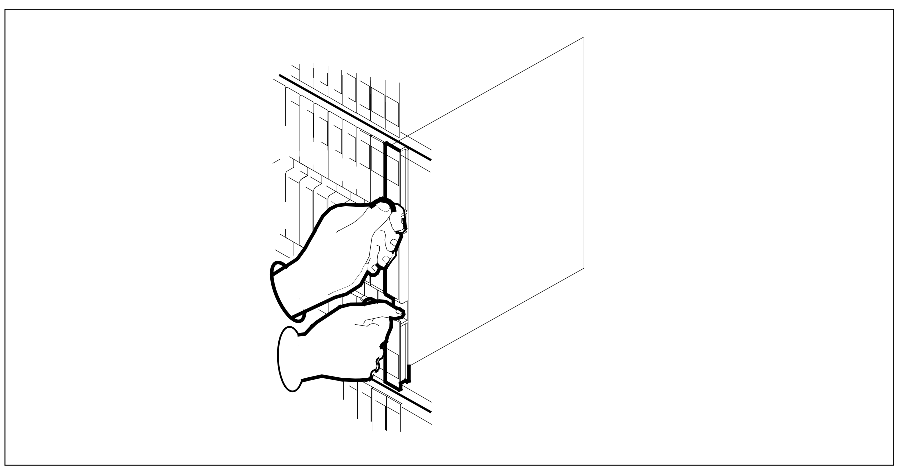
## NTMX74
## in an RSC-S (DS-1) Model A RCC2 (continued)



**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** Refer to the following table to determine the next step

| If you entered this procedure from | Do |
|---|---|
| alarm clearing procedure | step 20 |
| other | step 15 |

**15** Reset the inactive RCC2 unit by typing

**>PMRESET UNIT unit_no**

## NTMX74
## in an RSC-S (DS-1) Model A RCC2 (continued)

and pressing the Enter key.

*where*

**unit_no**
is the number of the inactive RCC2 unit (0 or 1)

| If the PMRESET command | Do |
|---|---|
| passed | step 17 |
| failed | step 16 |

**16** Reload the inactive RCC2 unit by typing

**`>LOADPM UNIT unit_no`**

and pressing the Enter key.

*where*

**unit_no**
is the number of the inactive RCC2 unit (0 or 1)

| If the LOADPM command | Do |
|---|---|
| passed | step 17 |
| failed | step 21 |

**17** Return the inactive RCC2 unit to service by typing

**`>RTS UNIT rcc2_unit_no`**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit (0 or 1)

| If the RTS command | 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 operating company maintenance personnel.

## NTMX74
## in an RSC-S (DS-1) Model A RCC2 (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.

# NTMX75 in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX75 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX75 | AA, DA | Enhanced Matrix |

## Common procedures

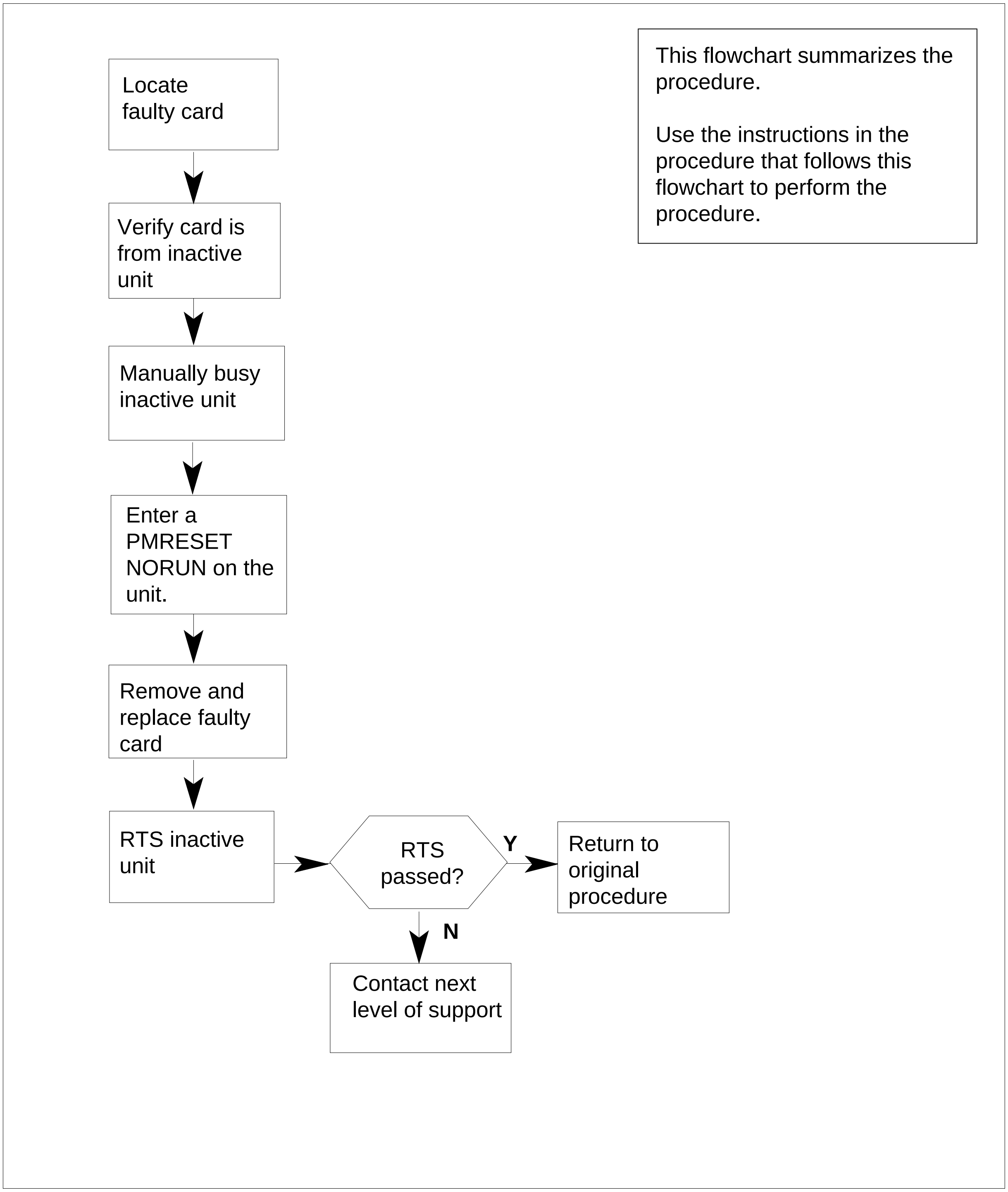
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for NTMX75 card in RSC-S RCC2**



## NTMX75
## in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NTMX75 card in RSC-S RCC2**

***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 RCC2, 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 RCC2 by typing

**`>MAPCI;MTC;PM;POST RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 to be busied

*Example of a MAP display:*

# NTMX75
# in an RSC-S (DS-1) Model A RCC2 (continued)

```
 CM     MS    IOD    Net     PM     CCS    LNS    Trks    Ext    Appl
 .      .      .      .     1RCC2    .      .      .       .      .

RCC2             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        2        0        2        25
 2 Post_   RCC2     0        0        0        0        1         1
 3 ListSet
 4         RCC2   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 that is 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.

**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.* Place this sign in an electostatic discharge (ESD) bag. Do not attach the sign with magnets or tape.

# NTMX75
## in an RSC-S (DS-1) Model A RCC2 (continued)

***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.

**9** Reset the inactive unit by typing

**>PMRESET unit_no NORUN**

and pressing the Enter key.

*where*

**unit_no**
is the number of the unit to be reset (0 or 1)

***At the RCE frame***

**10**

**DANGER**
**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 RCC2. This protects the equipment against damage caused by static electricity.

**DANGER**
**Equipment damage**
Take the following precautions when removing or inserting a card:

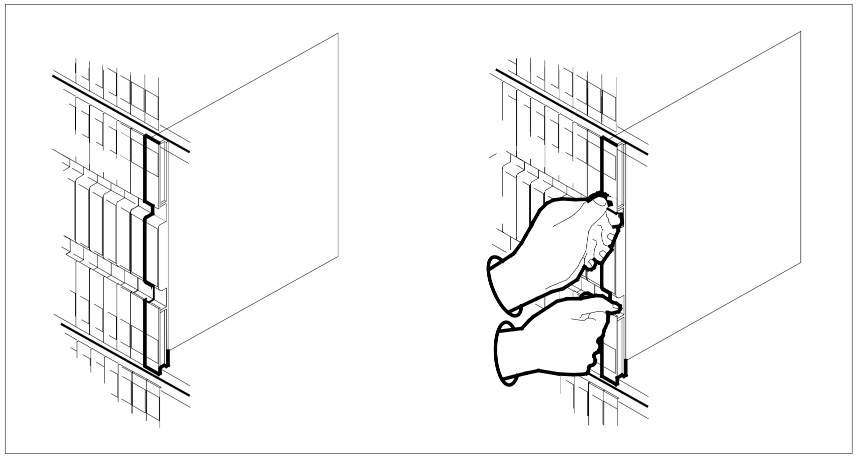
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

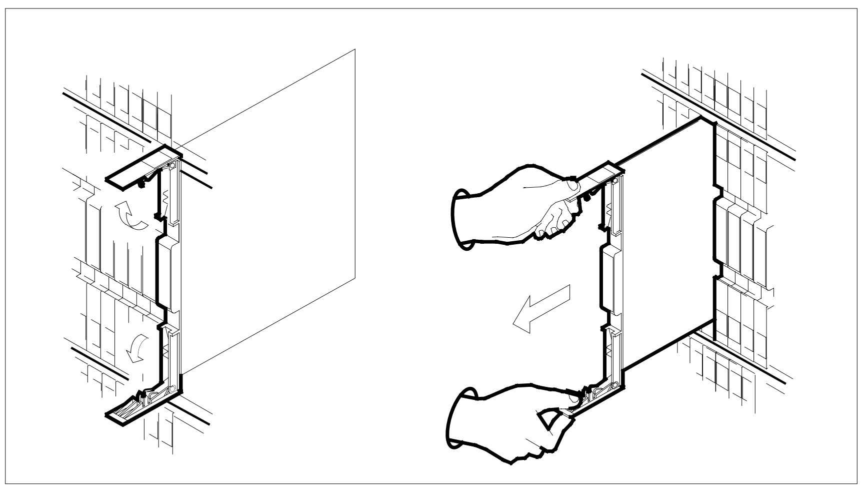
**11** Remove the NTMX75 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.

## NTMX75
## in an RSC-S (DS-1) Model A RCC2 (continued)



**b** Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



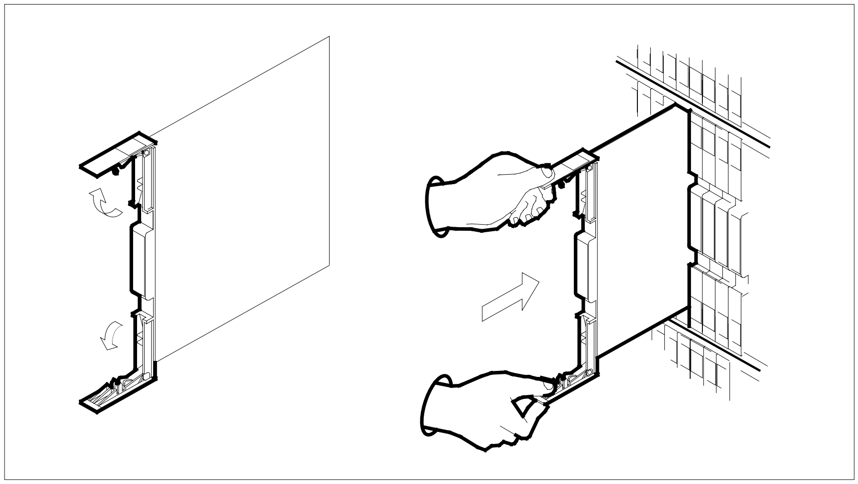
**c** Ensure that the replacement card has the same PEC, including suffix, as the card you just removed.

**12** Open the locking levers on the replacement card.

**a** Align the card with the slots in the shelf.

**b** Gently slide the card into the shelf.

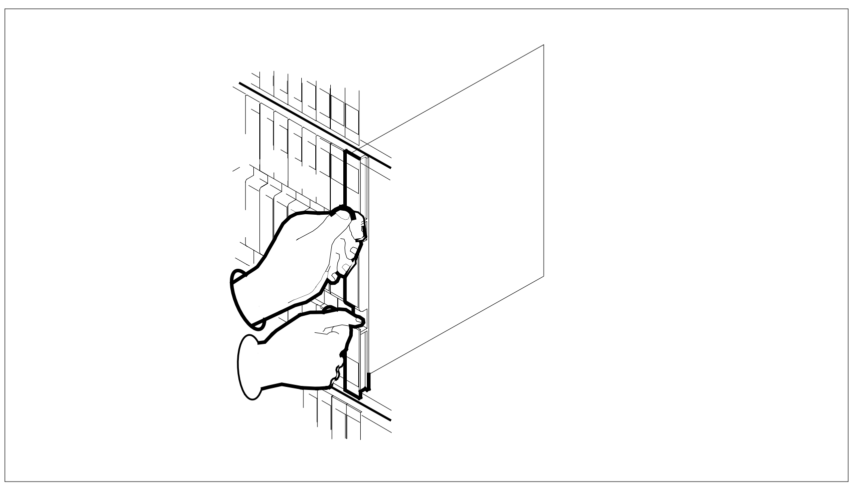
## NTMX75
## in an RSC-S (DS-1) Model A RCC2 (continued)



**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.



***At the MAP terminal***

**14** Reset the inactive unit by typing

**>PMRESET unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the unit to be reset (0 or 1)

## NTMX75
## in an RSC-S (DS-1) Model A RCC2 (end)

**15** 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 19 |
| other | step 16 |

**16** Return the inactive RCC2 unit to service by typing

**`>RTS UNIT rcc2_unit_no`**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 unit being returned to service

| If RTS | Do |
|---|---|
| passed | step 17 |
| failed | step 19 |

**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 the personnel responsible for higher level of support.

**21** 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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace the following card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX76 | AA | Message and Tone card |

If you cannot identify the PEC, suffix, and shelf or frame for the card you want to replace, refer to the Index for a list of cards, shelves, and frames documented in this card replacement NTP.

## Common procedures

Two common procedures are referenced in this section:

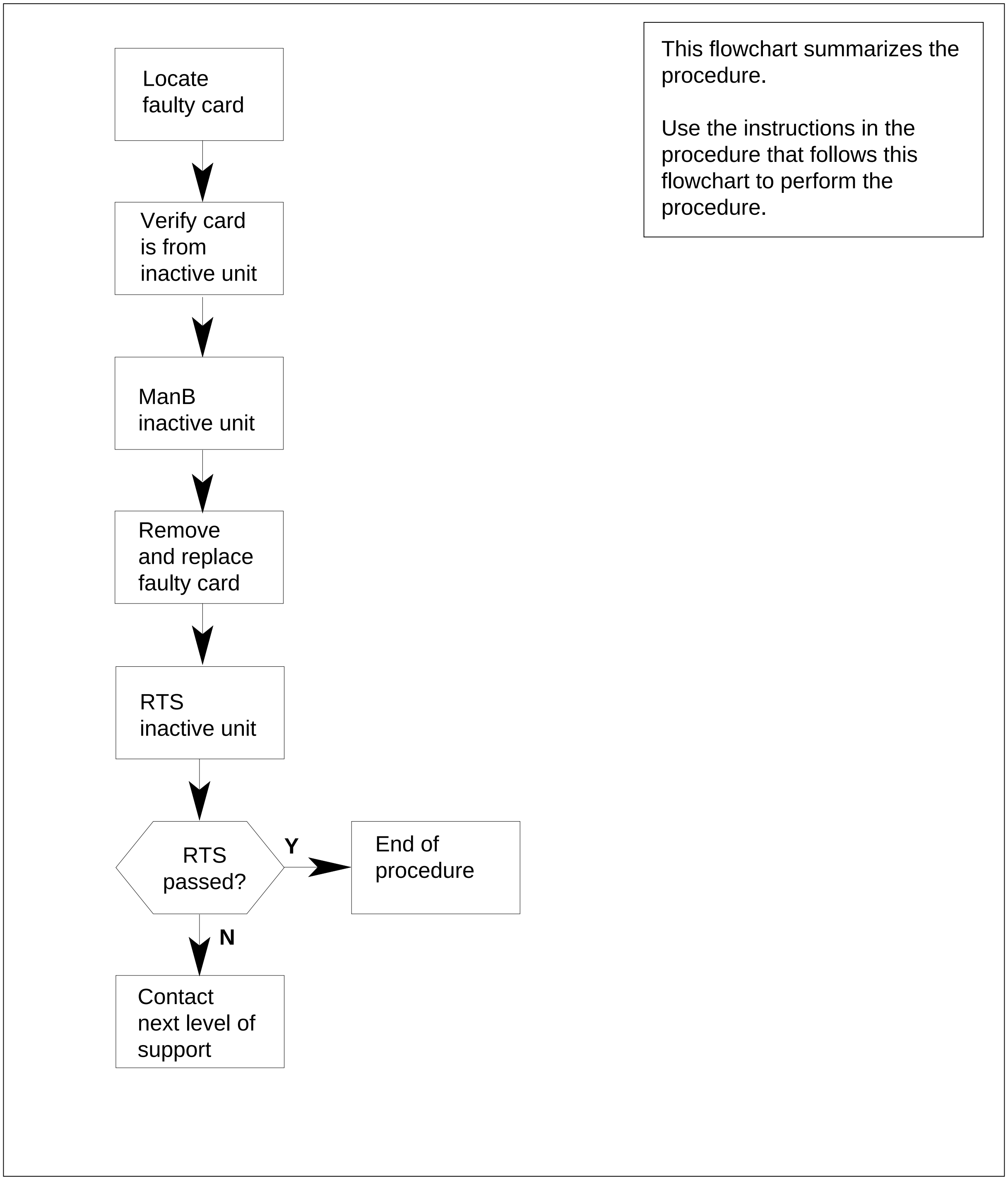
- replacing a card
- returning a card

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX76 card in RSC-S RCC2**



## NTMX76
## in an RSC-S (DS-1) Model A RCC2 (continued)

### Replacing an NTMX76 card in RSC-S RCC2

***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 RCC2, 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 RCC2 by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 to be busied (0 or 1)

*Example of a MAP response:*

```
RCC2   0 ISTb  Links_OOS:  CSide  1, PSide
Unit0:   Inact      ISTb
Unit1:   Act        InSv
```

**4** Determine the location of the RCC2 containing the faulty NTMX76 card by typing

**>QUERYPM**

and pressing the Enter key.

*Example of a MAP response:*

# NTMX76
# in an RSC-S (DS-1) Model A RCC2 (continued)

```
PM Type: RCC2 PM No.: 0 PM Int. No.: 9 Node_No: 24
PMs Equipped: 53 Loadname: CRI07BRI1 EEPRom Load:
MX77NB03
WARM SWACT is supported and available
RCC2 0 is included in the REX schedule.
REX on RCC2 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
RSC0  00 C02  RSC  00 05   RCC2: 000          MX85AA
RSC0  00 C02  RSC  00 47   EXT:LEFT    01:13  MX86AA
```

**5** Determine the state of the RCC2 unit associated with the faulty NTMX76 card..

| If the RCC2 unit is | Do |
|---|---|
| active | step 6 |
| inactive | step 8 |

**6** Switch the processing activity (SWACT) to the inactive unit by typing

**>SWACT**

and pressing the Enter key.

and pressing the Enter key.

*Example of a MAP response:*

```
RCC2 0     A Warm SwAct will be performed after
          data sync of active terminals.
Please confirm (”YES”, ”Y”, ”NO”, or ”N”):
```

| If | Do |
|---|---|
| you are prompted to confirm a warm SWACT | step 7 |
| the system rejects the SWACT | step 20 |

**7** Confirm the system prompt by typing

**>YES**

and pressing the Enter key.

*Example of a MAP response:*

## NTMX76
## in an RSC-S (DS-1) Model A RCC2 (continued)

```
Unit0:   Inact SysB  Mtce
Unit1:   Act   ISTb

RCC2 0     SwAct Passed
```

| If the MAP response is | Do |
|---|---|
| `SWACT passed` | step 8 |
| anything else | step 19 |

***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 INACTIVE***

and pressing the Enter key.

**10** Reset the inactive RCC2 unit to the ROM level by typing

**>PMRESET UNIT rcc2_unit_no NORUN**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit (0 or 1)

***At the RCE frame***

**11**

**WARNING**
**Static electricity damage**
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Locate the circuit card to be replaced.

**12** Replace the card using the common replacing a card procedure in this document. When you have completed the procedure, return to this point.

***Note:*** If the circuit card you are replacing has switches, ensure the switches on the replacement circuit card have the same settings as the card replaced.

## NTMX76
## in an RSC-S (DS-1) Model A RCC2 (end)

***At the MAP terminal***

**13** Reset the inactive RCC2 unit by typing

**>PMRESET UNIT unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the RCC2 busied in step 9

| If PMRESET | Do |
|---|---|
| passed | step 14 |
| failed | step 19 |

**14** 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 18 |
| other | step 15 |

**15** Return the inactive RCC2 unit to service by typing

**>RTS INACTIVE**

and pressing the Enter key.

| If RTS | Do |
|---|---|
| passed | step 16 |
| failed | step 19 |

**16** Remove the sign from the active unit.

**17** Go to the common returning a card procedure in this document.

Go to step 21.

**18** Return to *Alarm Clearing Procedures* or other procedure that directed you to this procedure and continue as directed.

**19** Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

**20** For further assistance with switch of activity, contact the personnel responsible for the next level of support.

**21** You have successfully completed this procedure.

# NTMX77 in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX77 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX77 | AA | Unified Processor |

## Common procedures

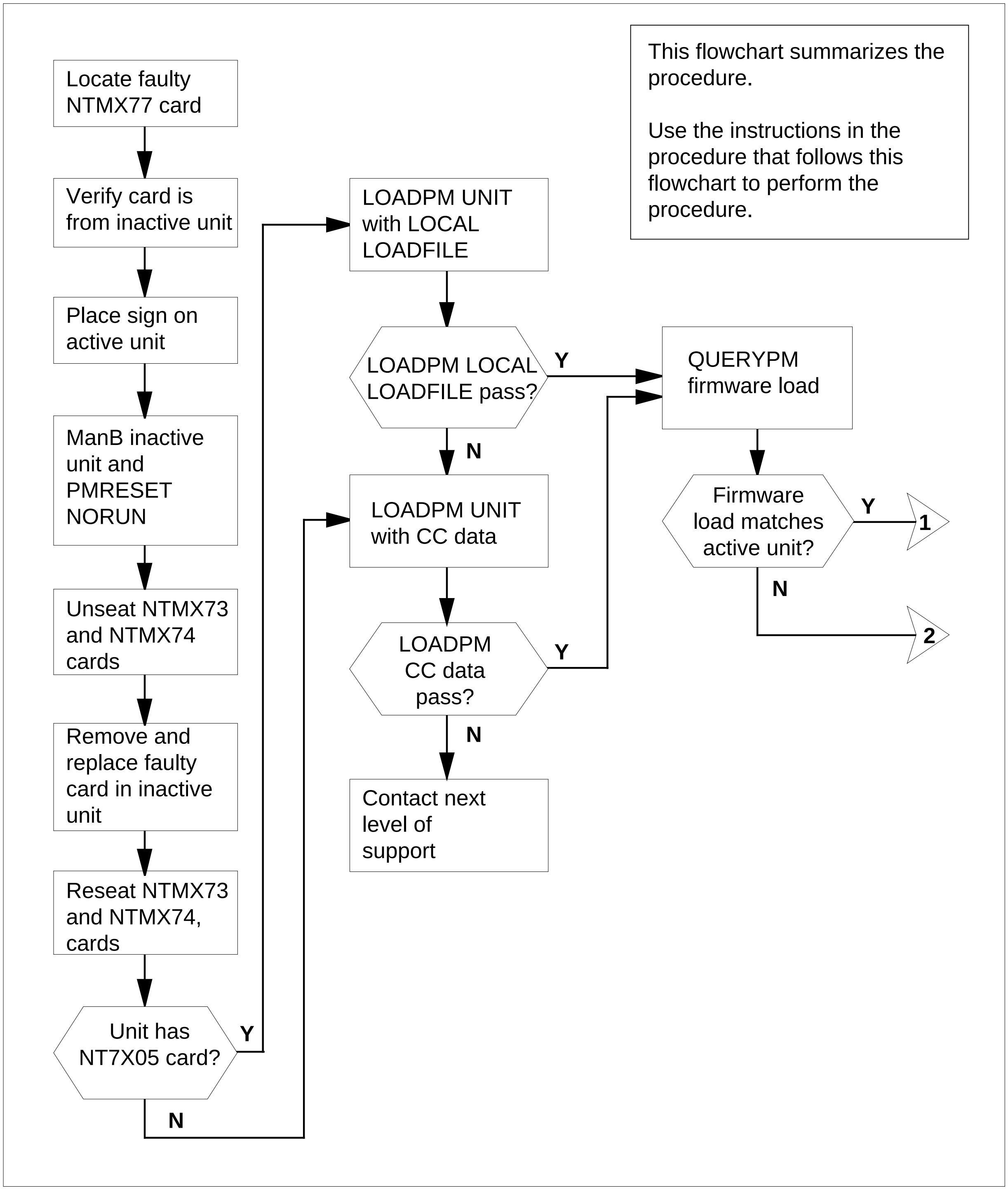
None

## 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.

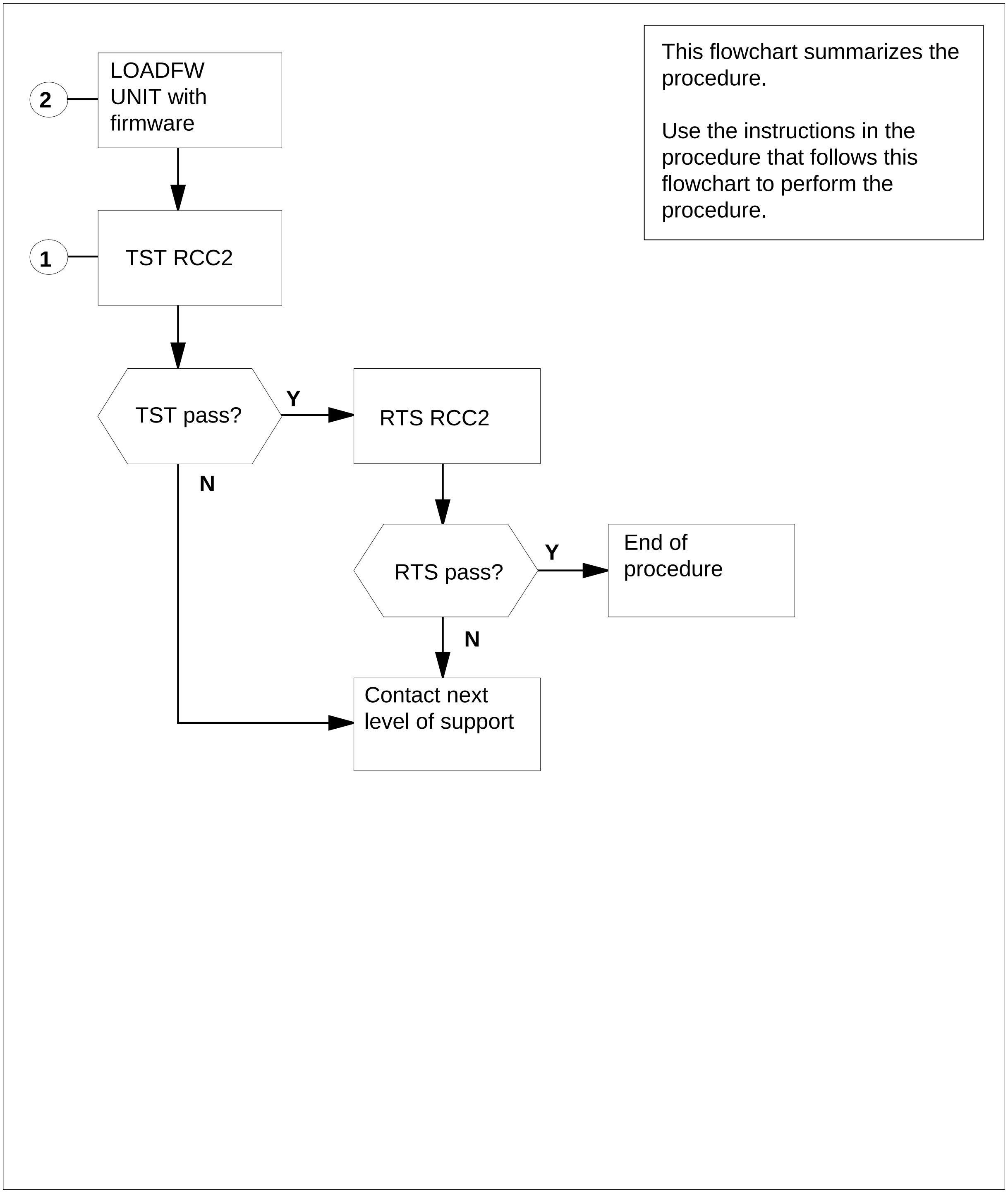
# NTMX77
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX77 card in RSC-S RCO2 (1 of 2)**



## NTMX77 in an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX77 card in RSC-S RCO2 (2 of 2)**



# NTMX77
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NTMX77 card in RSC-S RCC2**

***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 RCC2, make sure the unit in which the card is being replaced is *inactive* and 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 RCC2. To post the RCC2, type

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and press the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 to be busied (0 or 1)

## NTMX77
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
 CM     MS     IOD     Net     PM     CCS     LNS     Trks     Ext     APPL
 .      .      .       .     1RCC2   .       .        .        .       .

 RCC2             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        2        0        2        25
 2 Post_   RCC2      0        0        0        0        1         1
 3 ListSet
 4         RCC2   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** 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 |

**6** Do not switch activity of the units. To reject the SWACT, type

**>NO**

and press the Enter key.

The system discontinues the SWACT.

# NTMX77
# in an RSC-S (DS-1) Model A RCC2 (continued)

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 INACTIVE**

and press the Enter key.

**11** Set the inactive unit to the ROM level. To set the unit to the ROM level, type

**>PMRESET UNIT rcc2_unit_no NORUN**

and press the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit (0 or 1)

# NTMX77
# in an RSC-S (DS-1) Model A RCC2 (continued)

***At the RCE frame***

**12**

**DANGER**
**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 RCC2. This protects the equipment against damage caused by static electricity.

**DANGER**
**Equipment damage**
Take the following precautions when removing or inserting a card:

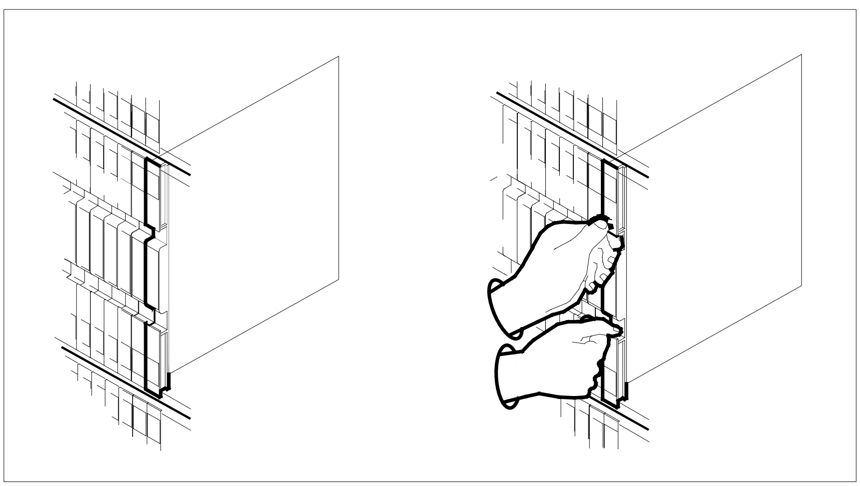
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

**13** Unseat the NTMX73 and NTMX74 circuit cards.

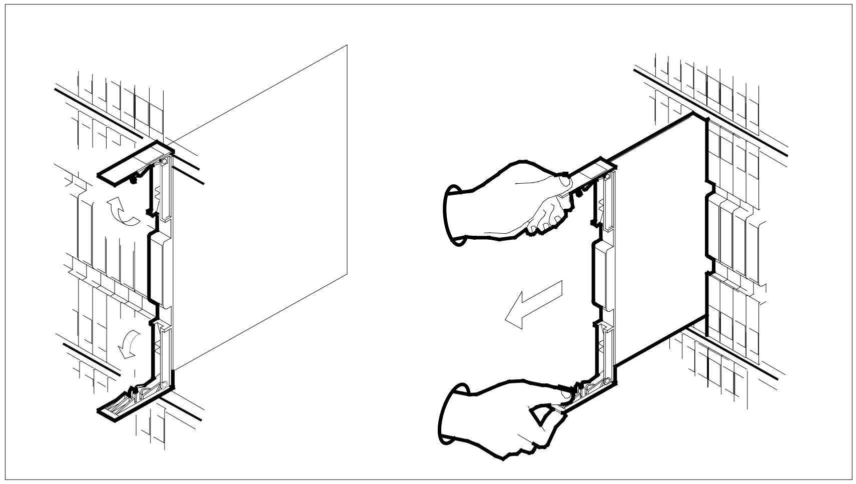
**14** Remove the NTMX77 card as shown in the following figures.

**a** Locate the card to be removed on the appropriate shelf.



**b** Open the locking levers on the card to be replaced. Carefully pull the card toward you until it clears the shelf.

## NTMX77
## in an RSC-S (DS-1) Model A RCC2 (continued)



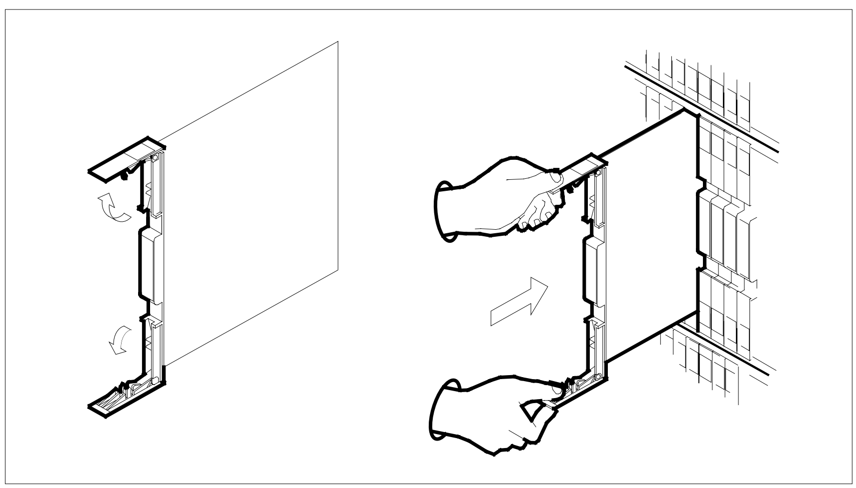
**c** Make sure the replacement card has the same PEC, including suffix, as the card you just removed. Also make sure the DIP switch settings on the replacement card match the settings of the card just removed.

***Note:*** If the NTMX77 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.



## NTMX77
## in an RSC-S (DS-1) Model A RCC2 (continued)

**16**

**DANGER**
**Possible loss of P-side nodes**
Monitor LEDs on the faceplate of the replacement NTMX77 when installing.

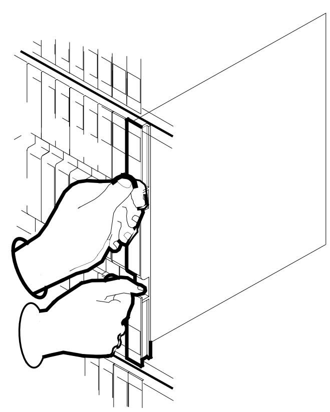
1. INSV and ESA LEDs may come ON and must go OFF in less than 4 seconds.

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 14c. 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.

**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 NTMX73 and NTMX74 circuit cards..

**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 |

# NTMX77
# in an RSC-S (DS-1) Model A RCC2 (continued)

| If you entered this procedure from | Do |
|---|---|
| other | step 19 |

***At the MAP terminal***

**19** The peripheral/remote loader-16 card (NT7X05) allows local loading of RCC2 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
   .    .     .     .   1RCC2   .      .       .      .      .
                         *C*

RCC2           SysB     ManB     OffL     CBsy     ISTb     InSv
 0 Quit     PM     2        0        2        0        2       25
 2 Post     RCC2   1        0        0        0        1        1
 3 ListSet
 4          RCC2     0 ISTb  Links_OOS:  CSide  0,  PSide   0
 5 TRNSL_   Unit 0:  Inact ManB
 6 TST_     Unit 1:    Act InSv
 7 BSY_
 8 RTS_     QUERYPM files
 9 OffL     Unit 0:
10 LoadPM_     NT7X05 load File: CRI05AW
11 Disp_       NT7X05 Image File:
12 Next_       CMR Load:  CMR03A
13 SwAct    Unit 1:
14 QueryPM     NT7X05 load File: CRI05AW
15             NT7X05 Image File:
16 IRLINK      CMR Load:  CMR03A
17 Perform
18
```

*(NT7X05 load file name)*

***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 an RSC-S (DS-1) Model A RCC2 (continued)

**20**

> **DANGER**
> **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 RCC2 unit from the local loadfile. To load the inactive RCC2 unit from the local loadfile, type

**>LOADPM UNIT rcc2_unit_no LOCAL LOADFILE**

and press the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit

| If the load | Do |
|---|---|
| passed | step 22 |
| failed | step 21 |

**21** To load the inactive RCC2 unit, type

**>LOADPM INACTIVE**

and press the Enter key.

| If load | Do |
|---|---|
| passed | step 22 |
| failed | step 29 |

**22** Query the XPM counters for the firmware load on the NTMX77. To query XPM counters, type

**>QUERYPM CNTRS**

and press the Enter key.

## NTMX77
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
Unsolicitited MSG limit = 250, Unit 0 = 0, Unit 1 = 0
Unit 0:
Ram Load: CRI05AW
EPRom Version: AB02
EEPRom Load: Loadable: MX77NG03, Executable: MX77NG03
CMR Load: CMR03A
UP:MX77AA
Unit 1:
Ram Load: CRI05AW
EPRom Version: AB02
EEPRom Load: Loadable: MX77NG03 , Executable: MX77NG03
CMR Load: CMR03A
UP:MX77AA
```

*(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 LOADFW | Do |
|---|---|
| passed | step 24 |
| failed | step 29 |

**24** To upgrade the firmware on the inactive unit, type

**>LOADFW INACTIVE UPGRADE**

and press the Enter key.

| If LOADFW UPGRADE | Do |
|---|---|
| passed | step 25 |
| failed | step 29 |

**25** Return the inactive RCC2 unit to service. To RTS the RCC2 unit, type

**>RTS INACTIVE**

## NTMX77
## in an RSC-S (DS-1) Model A RCC2 (end)

and press the Enter key.

| If RTS | Do |
|---|---|
| passed | step 26 |
| failed | step 29 |

**26** Send any cards with faults 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. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

# NTMX79
# in an RSC-S (DS-1) Model A EXT

## Application

Use this procedure to replace an NTMX79 card in an RSC-S EXT.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX79 | AA | DS60 Extender |

## Common procedures

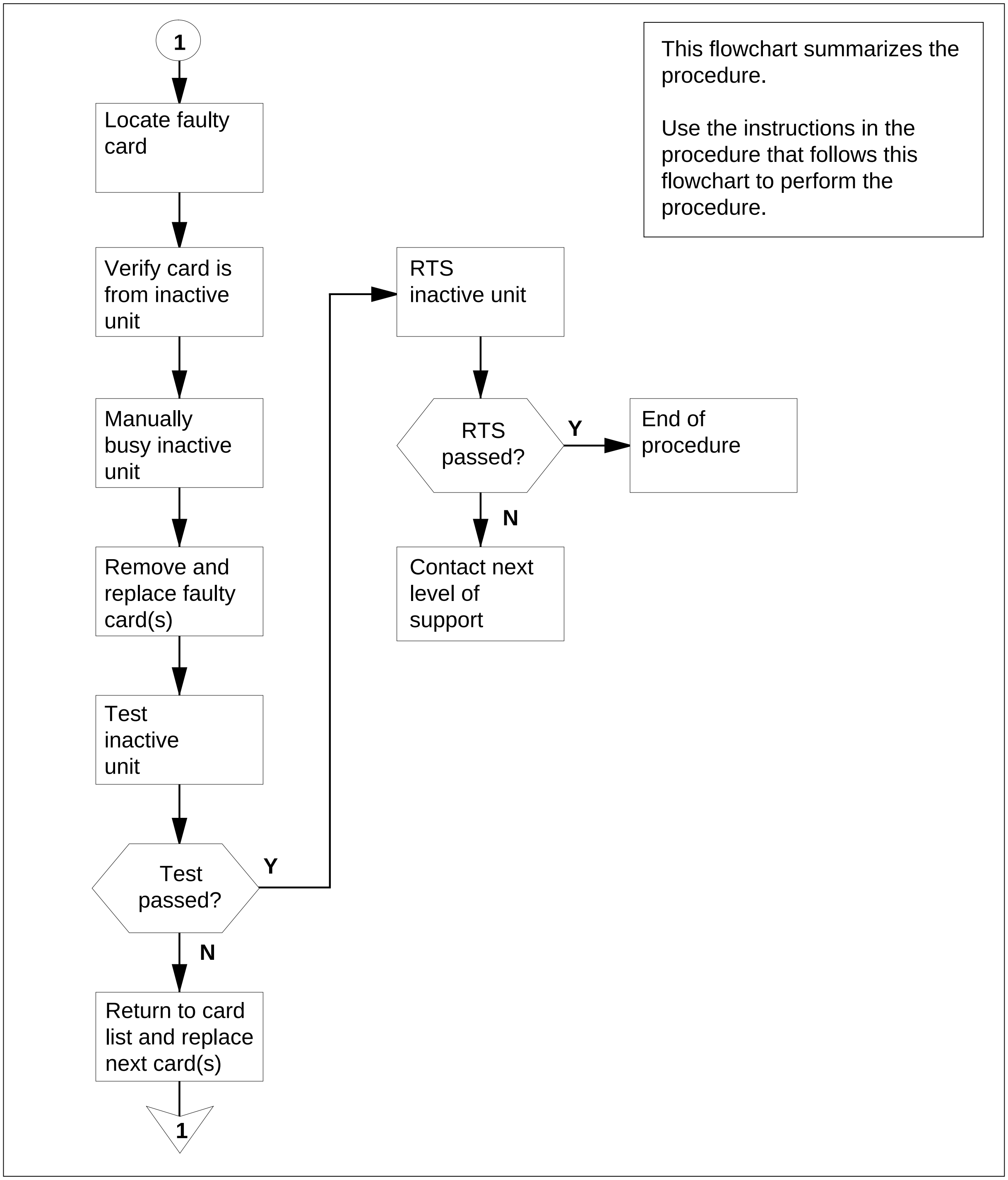
None

## 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 an RSC-S (DS-1) Model A EXT (continued)

**Summary of card replacement procedure for an NTMX79 card in RSC-S EXT**



# NTMX79
# in an RSC-S (DS-1) Model A 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 RCC2, ensure the unit in which the card is being replaced is *inactive* and 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 RCC2 by typing

**`>MAPCI;MTC;PM;POST RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 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.

## NTMX79
## in an RSC-S (DS-1) Model A EXT (continued)

*Example of a MAP response:*

```
PM Type: RCC2 PM Nol.: 0 PM Int. No.: 2 Node_No.: 126
PMs Equipped: 61  Loadname: CRI06AY
ESA equipped: YES IntraSwitching is ON
WARM SWACT is supported and available.
REX on RCC2 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  RCC2 : 000         MX85AA
 R113   01  AA01  CEXT 00   05  EXT : LEFT         MX86AA
```

*(Extension shelf location of faulty card)*

***At the RCE frame***

**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 |

***At the MAP display***

**6** Switch the processing activity (SWACT) to the inactive RCC2 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 RCC2 unit bearing the words *Active unit—Do not touch.* This sign should not be attached by magnets or tape.

## NTMX79
## in an RSC-S (DS-1) Model A EXT (continued)

***At the MAP terminal***

**9** Busy the inactive RCC2 unit by typing

***>bsy unit*** **rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the RCC2 unit with the faulty card (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 frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

**11**

**DANGER**
**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 on the inactive RCC2 unit.

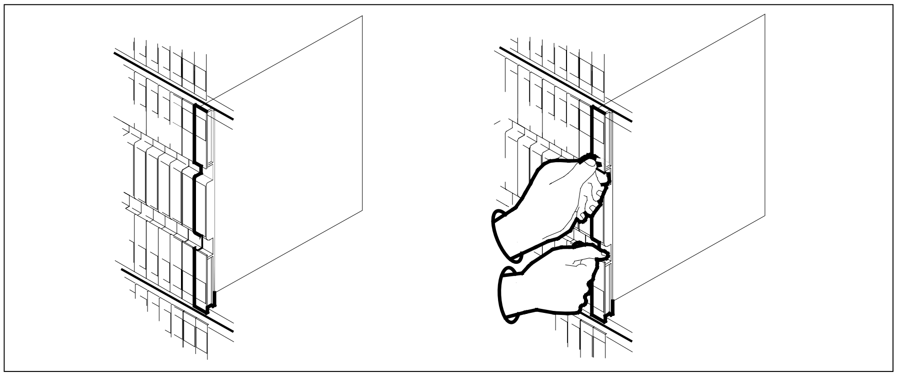
**12**

**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 NTMX79 card is set to the ON position before removing the NTMX79 card.

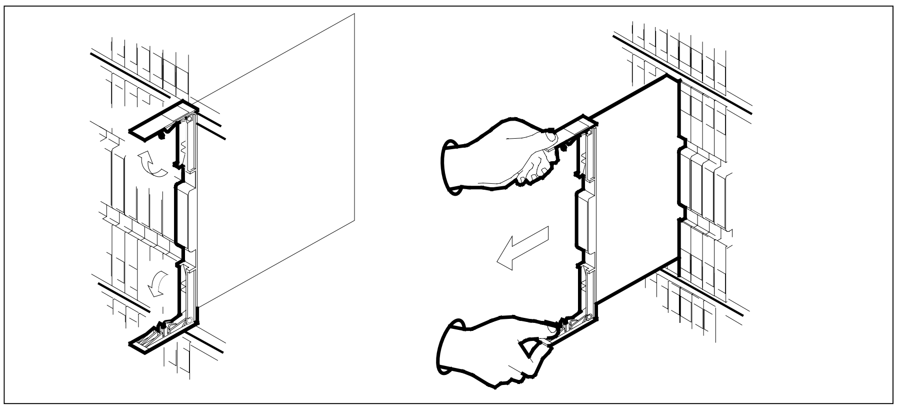
Remove the NTMX79 card as shown in the following figures.

## NTMX79
## in an RSC-S (DS-1) Model A EXT (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.



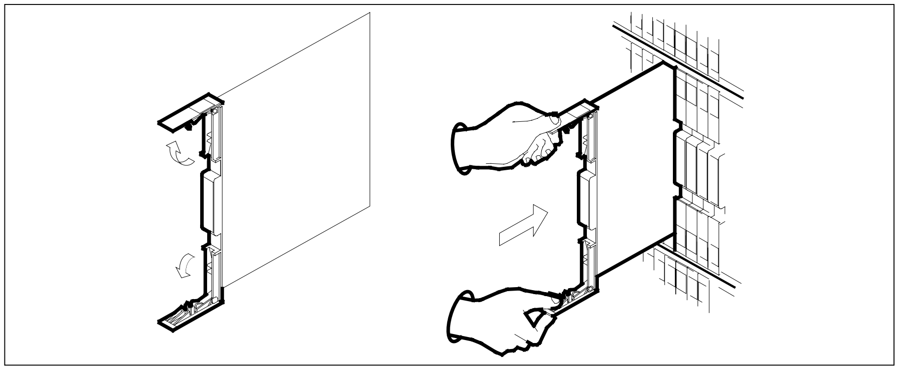
**c** Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

**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.

# NTMX79
# in an RSC-S (DS-1) Model A EXT (continued)



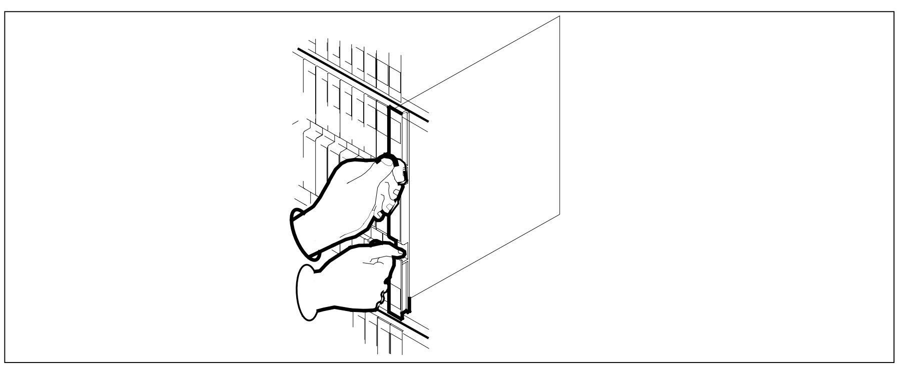
**14**

> **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 NTMX79 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.

**b** Close the locking levers.



**15** Power up the inactive RCC2 unit as follows:

**a** Ensure that the power converter (NTMX72) is fully inserted. A major audible alarm may sound. This alarm is silenced when power is restored to the converter.

***Note:***

# NTMX79
## in an RSC-S (DS-1) Model A EXT (continued)

**b** If the power converter is an NTMX72AA, set the switch on the power converter to the Reset position. Set the associated circuit breaker on the FSP to the ON position.

If both the converter FAIL LED and FRAME FAIL lamp on the FSP go OFF, go to step 16.

If both the converter FAIL LED and FRAME FAIL lamp on the FSP do not go OFF, hold the switch on the NTMX72AA converter in the Reset position and simultaneously set the associated circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF. Go to step 16.

**c** If the power converter is an NTMX72AB set the associated circuit breaker on the FSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the FSP will go OFF. Go to step 16.

**16** The peripheral/remote loader-16 card (NT7X05) allows local loading of RCC2 data,which reduces recovery time. Check to see 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
    .    .     .     .   1RCC2   .      .       .      .      .
                          *C*
 RCC2          SysB     ManB     OffL     CBsy     ISTb     InSv
  0 Quit    PM     2        0        2        0        2       25
  2 Post    RCC2   1        0        0        0        1        1
  3 ListSet
  4         RCC2     0 ISTb  Links_OOS:  CSide  0,  PSide   0
  5 TRNSL_  Unit 0:  Inact ManB
  6 TST_    Unit 1:    Act InSv
  7 BSY_
  8 RTS_    QUERYPM files
  9 OffL    Unit 0:
 10 LoadPM_    NT7X05 load File: CRI05AW
 11 Disp_      NT7X05 Image File:
 12 Next_      CMR Load:  CMR03A
 13 SwAct   Unit 1:
 14 QueryPM    NT7X05 load File: CRI05AW
 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 17 |

## NTMX79
## in an RSC-S (DS-1) Model A EXT (continued)

| If the NT7X05 card is | Do |
|---|---|
| not provisioned | step 18 |

**17**

> **DANGER**
> **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 RCC2 unit from the local loadfile by typing

**>LOADPM UNIT rcc2_unit_no LOCAL LOADFILE**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit

| If the load | Do |
|---|---|
| passed | step 19 |
| failed | step 18 |

**18** Load the inactive RCC2 unit (from the CM) by typing

**>LOADPM UNIT rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit

| If load | Do |
|---|---|
| passed | step 19 |
| failed | step 27 |

**19** Test the inactive RCC2 unit by typing

***>TST UNIT* rcc2_unit_no**

and pressing the Enter key.

## NTMX79
## in an RSC-S (DS-1) Model A EXT (end)

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit

| If TST | Do |
|---|---|
| passed | step 20 |
| failed | step 26 |

**20** 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 26 |
| other | step 21 |

**21** Return the inactive RCC2 unit to service by typing

**>RTS UNIT rcc2_unit_no**

and pressing the Enter key.

*where*

**rcc2_unit_no**
is the number of the inactive RCC2 unit

**22** Use the following information to determine where to proceed.

| If RTS | Do |
|---|---|
| passed | step 23 |
| failed | step 27 |

**23** Remove the sign from the active RCC2 unit.

**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.

**26** 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.

**27** Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

**28** You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

# NTMX81
# in an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX81 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX81 | AA, BA | Dual DS-1 Interface |

## Common procedures

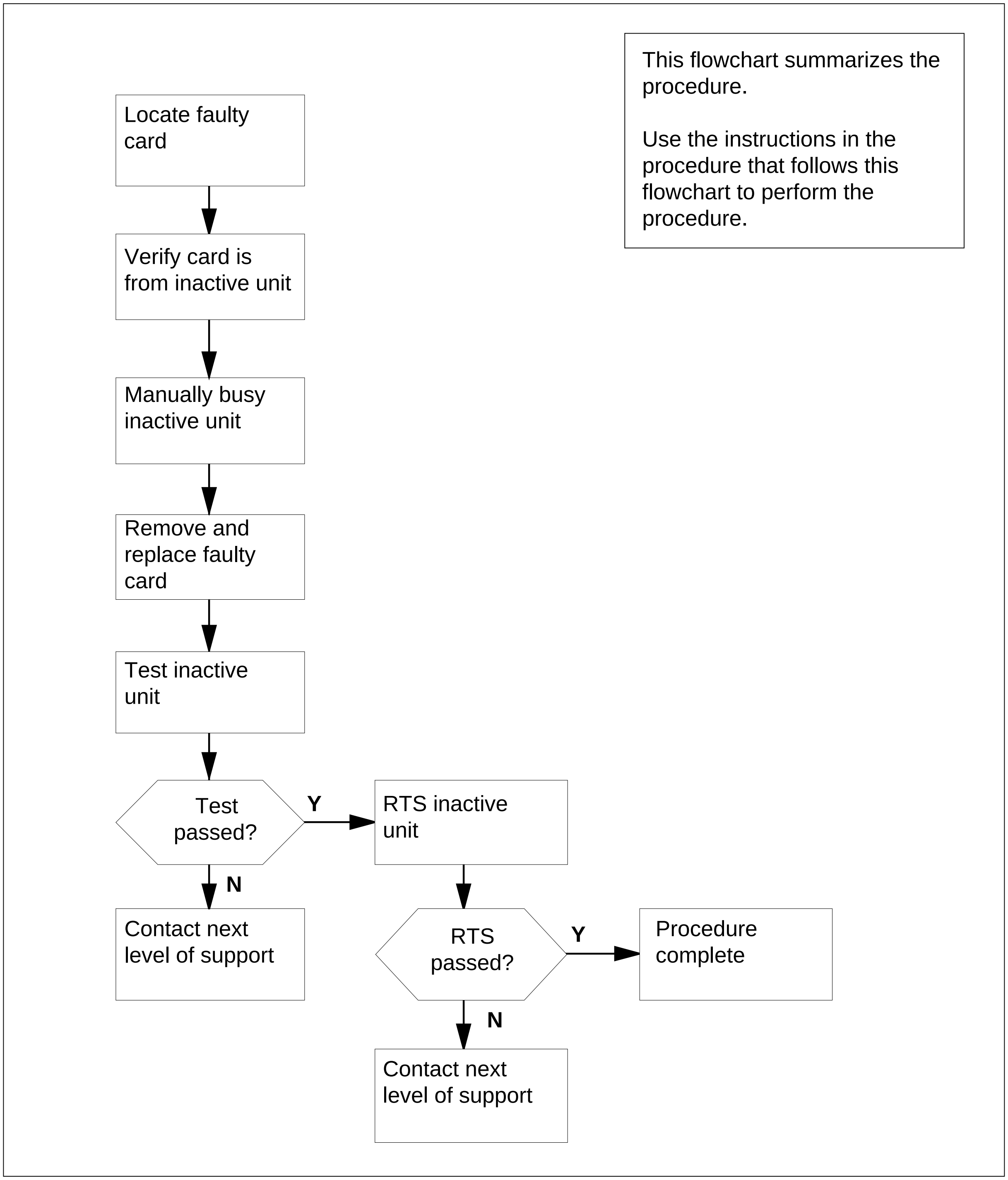
None

## 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.

## NTMX81
## in an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX81 card in RSC-S RCC2**



# NTMX81
# in an RSC-S (DS-1) Model A RCC2 (continued)

### Replacing an NTMX81 card in RSC-S RCC2

***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 RCC2, ensure that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX81 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 RCC2 rcc2_no`**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 with the faulty card

# NTMX81
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
 CM    MS    IOD    Net     PM     CCS     LNS    Trks    Ext    Appl
  .     .     .      .    1RCC2     .       .       .      .      .

RCC2              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM        0        0        2        0        2        25
 2 Post_   RCC2      0        0        0        0        1         1
 3 ListSet
 4         RCC2   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 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.

**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.

| If faulty card is | Do |
|---|---|
| C-side of RCC2 | step 11 |

# NTMX81
# in an RSC-S (DS-1) Model A RCC2 (continued)

| If faulty card is | Do |
|---|---|
| P-side faulty | step 8 |

***At the MAP terminal***

**8** Determine if the RCC2 is in a single or dual configuration by typing

**>POST RCC2 rcc2_no ;IRLINK**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 associated with the faulty NTMX87 card

***Note:*** If the posted RCC2 is in a single RCC2 configuration, the system will respond with the following message:

NO IRLINKS DATAFILLED, IRLINK LEVEL CANNOT BE ENTERED.

| If the RCC2 is in a | Do |
|---|---|
| single configuration | step 11 |
| dual configuration | step 9 |

**9** Translate the dual RCC2s IRLINKS by typing

**>TRNSL**

and pressing the Enter key.

# NTMX81
# in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP response*

```
  CM     MS     IOD     Net      PM     CCS      LNS     Trks     Ext     Appl
  .      .       .       .      1RCC2    .        .       .        .       .

IRLINK            SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM      0         0          2         0         2          25
 2          RCC2    0         0          0         0         1           1
 3
 4          RCC2   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   RCC2 0, 0  RCC2 1, 0      MS        OK        OPN
12              1   RCC2 0, 8  Rcc2 1, 8      MS        OK        OPN
13              2   RCC2 0, 12 RCC2 1, 12      S        OK
14 QueryIR      3   RCC2 0, 13 RCC2 1, 13      S        OK
15
16
17
18
```

**10** 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 18 for the main shelf.

**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 RCC2 unit (unit 0 or 1)

**12** Display the C-side links associated with the DS-1 card by typing

**>TRNSL C**

and pressing the Enter key.

## NTMX81 in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP response*

```
LINK  0   LTC  0        0;CAP    MS:STATUS OK       MSGCOND   OPN
LINK  1   LTC  0        1;CAP     S:STATUS SBsy
LINK  2   LTC  0        2;CAP    MS:STATUS OK       MSGCOND   OPN
LINK  3   LTC  0        3;CAP     S:STATUS OK
LINK  4   LTC  0        4;CAP     S:STATUS OK
LINK  5   LTC  0        5;CAP     S:STATUS SBsy
```

| If C-side links are | Do |
|---|---|
| faulty | step 14 |
| not faulty | step 11 |

**13** Display the P-side links associated with the DS-1 card by typing

**>TRNSL P**

and pressing the Enter key.

*Example of a MAP response*

```
LINK 0    RCC2 0 5  27;CAP    MS:STATUS OK   MSGCOND OPN
LINK 1    RCC2 1 5  27;CAP    MS:STATUS SBsy MSGCOND CLS
LINK 2    RCC2 0 7  47;CAP    MS:STATUS OK
LINK 3    RCC2 1 7  47;CAP    MS:STATUS OK
LINK 4    RCC2 0 5  50;CAP    MS:STATUS OK   MSGCOND OPN
LINK 5    RCC2 1 5  50;CAP    MS:STATUS SBsy MSGCOND CLS
```

| If P-side links are | Do |
|---|---|
| faulty | step 14 |
| not faulty | step 28 |

**14** Busy the links associated with the RCC2 by typing

**>BSY LINK 0**

and pressing the Enter key.

*Example of a MAP response:*

Please confirm (“Yes" or “No")

Confirm by typing

**>YES**

and pressing the Enter key.

*Example of a MAP response:*

LTC 0 LINK 0 Bsy Passed

# NTMX81
# in an RSC-S (DS-1) Model A RCC2 (continued)

***Note:*** To busy the other links associated with the RCC2, execute the procedures in this step for each link until all links are busied.

**15** Post the host PM by typing

**>POST host_pm host_pm_no**

and pressing the Enter key.

*where*

**host_pm**
is either a line group controller (LGC), a line group controller with ISDN (LGCI), a line trunk controller (LTC), or a line trunk controller with ISDN (LTCI)

**host_pm_no**
is the number of either an LGC, LGCI, LTC, or LTCI

*Example of a MAP display:*

```
  CM    MS    IOD     Net    PM     CCS    Lns    Trks    Ext  Appl
   .     .     .       .    1RCC2    .      .      .       .    .

LTC              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       0        0        1        0        4        12
 2 Post_   LTC      0        0        2        0        2         9
 3 ListSet
 4         LTC   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
```

**16** 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 MX81 card, from step 11

***Note:*** Each NTMX81 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.

# NTMX81
# in an RSC-S (DS-1) Model A RCC2 (continued)

***At the RCE frame***

**17**

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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.

**18** After identifying the faulty link, use the following charts to determine which NTMX81 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.

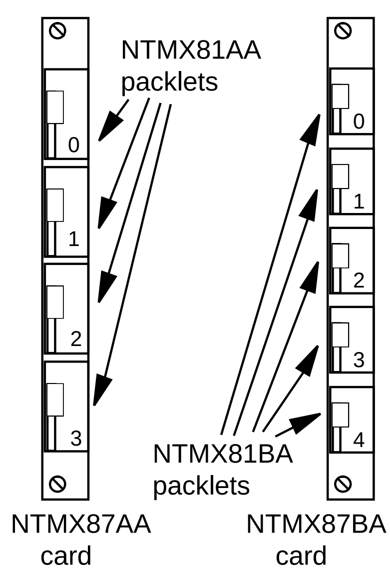
C-side

| | Slot 9 | Slot 19 |
|---|---|---|
| 0 | 0<br>1 | 2<br>3 |
| 1 | 4<br>5 | 6<br>7 |
| 2 | 8<br>9 | 10<br>11 |
| 3 | 12<br>13 | 14<br>15 |
| 4 | 16<br>17 | 18<br>19 |

P-side

| | Slot 12 | Slot 14 | Slot 16 |
|---|---|---|---|
| 0 | 0<br>1 | 16<br>17 | 8<br>9 |
| 1 | 2<br>3 | 18<br>19 | 10<br>11 |
| 2 | 4<br>5 | 20<br>21 | 12<br>13 |
| 3 | 6<br>7 | N/A | 14<br>15 |

NTMX81 packlet slot number in the NTMX87 card located in the specified card slots.



## NTMX81
## in an RSC-S (DS-1) Model A RCC2 (continued)

Remove the NTMX81 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.

**19** Before inserting the replacement card, set the DS-1 switch settings according to the following table.

| **Distance to cross connect** | | **Dip switch settings** | | |
|---|---|---|---|---|
| **Feet** | **Meters** | **S3/6** | **S2/5** | **S1/4** |
| 0-133 | 0-41 | On | Off | Off |
| 133-266 | 41-81 | Off | On | On |
| 266-399 | 81-122 | Off | On | Off |
| 399-533 | 122-163 | Off | Off | On |
| 533-655 | 163-200 | Off | Off | Off |

***Note:*** S indicates switch number(s). On S1 dip switch (6 position): S1-S3 belong to even port, and S4-S6 belong to odd port.

**20** 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.

**21** 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.

**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 29 |
| other | step 23 |

# NTMX81
# in an RSC-S (DS-1) Model A RCC2 (continued)

***At the MAP terminal***

**23** 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 14. This step must be performed for each link that is manually busied.

***Note:*** To test the other links associated with the RCC2, execute this step for each link until all links are tested.

| If TST | Do |
|---|---|
| passed | step 24 |
| failed | step 30 |

**24** 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 RCC2, execute this step for each link until all links are returned to service.

| If RTS | Do |
|---|---|
| passed | step 25 |
| failed | step 30 |

**25** Post the inactive RCC2 unit in which the NTMX81 card is located by typing

**>POST RCC2 UNIT unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the RCC2 unit associated with the faulty card

**26** Return the inactive RCC2 unit to service by typing

***>RTS UNIT*** **unit_no**

and pressing the Enter key.

## NTMX81
## in an RSC-S (DS-1) Model A RCC2 (end)

*where*

**unit_no**
is the number of the RCC2 unit posted in step 25

| If RTS | Do |
|---|---|
| passes | step 27 |
| fails | step 30 |

**27** Send any faulty cards for repair according to local procedure.

**28** 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 29.

**29** 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.

**30** Obtain further assistance in replacing this card by contacting the personnel responsible for higher level support.

**31** 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 an RSC-S (DS-1) Model A RCC2

## Application

Use this procedure to replace an NTMX87 card in an RSC-S RCC2.

| PEC | Suffixes | Name |
|---|---|---|
| NTMX87 | AA, AB | Quad Frame Carrier |
| | BA | Penta DS-1 Packlet Carrier |

## Common procedures

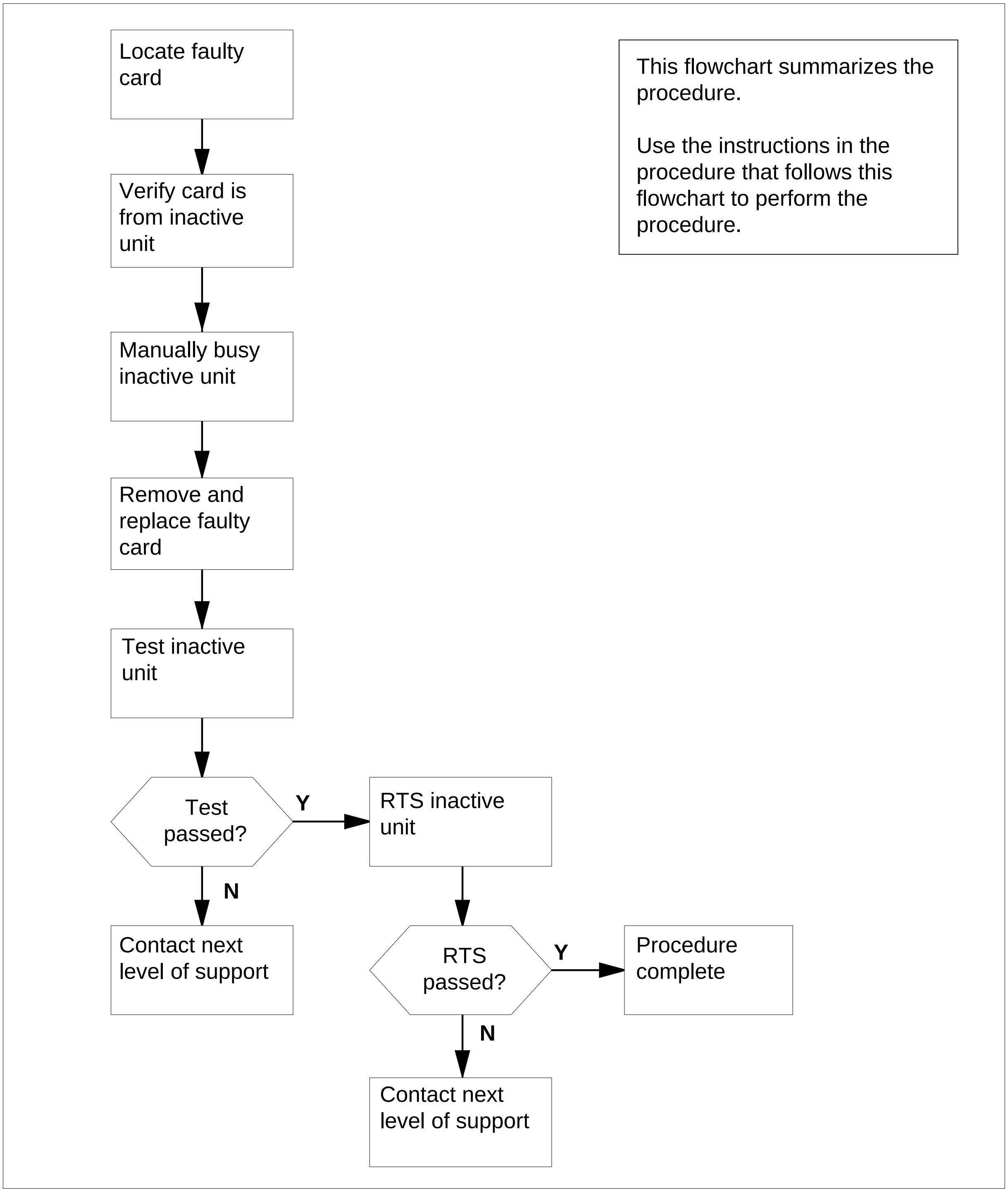
None

## 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 an RSC-S (DS-1) Model A RCC2 (continued)

**Summary of card replacement procedure for an NTMX87 card in RSC RCC2**



# NTMX87
# in an RSC-S (DS-1) Model A RCC2 (continued)

**Replacing an NTMX87 card in RSC-S RCC2**

***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 RCC2, such as a single or dual RCC2 (DRCC2), main or extension shelf, or links versus carrier trunks.

> **CAUTION**
> **Loss of service**
> When replacing a card in the RCC2, 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.

***At the MAP terminal***

**3** Ensure the PM level of the MAP display is currently displayed by typing

**>MAPCI;MTC;PM;POST RCC2 rcc2_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 with the faulty card

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

*Example of a MAP display:*

```
  CM     MS     IOD      Net      PM       CCS      LNS      Trks     Ext      Appl
   .      .      .        .      1RCC2      .        .        .        .        .

RCC2               SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit     PM       0         0         2         0         2          25
 2 Post_    RCC2     0         0         0         0         1           1
 3 ListSet
 4          RCC2   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 RCC2 associated with the faulty NTMX87 carrier card by typing

**>TRNSL C**

and pressing the Enter key.

*Example of a MAP response*

```
LINK 0  LTC 0 0;CAP MS: STATUS SysB MSGCOND CLS RESTRICT
LINK 1  LTC 0 1;CAP  S: STATUS SysB
LINK 2  LTC 0 2;CAP MS: STATUS OK MSGCOND OPN UNRESTRICT
LINK 3  LTC 0 3;CAP  S: STATUS OK
LINK 4  LTC 0 4;CAP  S: STATUS SysB
LINK 5  LTC 0 5;CAP  S: STATUS SysB
```

**5** Display and record the P-side link status of the posted RCC2 associated with the faulty NTMX87 carrier card by typing

**>TRNSL P**

and pressing the Enter key.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

*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.

**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 RCC2 | 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 RCC2 unit (unit 0 or 1)

# NTMX87
# in an RSC-S (DS-1) Model A RCC2 (continued)

**11** Post the host PM by typing

**>POST host_pm host_pm_no**

and pressing the Enter key.

*where*

**host_pm**
is either a line group controller (LGC), a line group controller with ISDN (LGCI), a line trunk controller (LTC), or a line trunk controller with ISDN (LTCI)

**host_pm_no**
is the number of either an LGC, LGCI, LTC, or LTCI

*Example of a MAP display:*

```
 CM     MS     IOD     Net      PM      CCS     Lns     Trks     Ext    Appl
  .      .      .       .     1RCC2      .       .        .       .      .

LTC                  SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM         0         0         1         0         4         12
 2 Post_   LTC        0         0         2         0         2          9
 3 ListSet
 4         LTC   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 RCC2 by typing

**>TRNSL P**

and pressing the Enter key.

*Example of a MAP response*

```
LINK 0 RCC2 0  0;CAP MS:STATUS SysB MSGCOND CLS RESTRICT
LINK 1 RCC2 0  1;CAP      S:STATUS SBsy
LINK 2 RCC2 0  2;CAP MS:STATUS OK MSGCOND OPN UNRESTRICT
LINK 3 RCC2 0  3;CAP      S:STATUS OK
LINK 4 RCC2 0  4;CAP      S:STATUS SysB
LINK 5 RCC2 0  5;CAP      S:STATUS Sysb
```

**13** Manually busy the links connected to the faulty NTMX87 card by typing

**>BSY LINK link_no**

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

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 RCC2 C-side link-to-slot assignments.

***At the RCE frame***

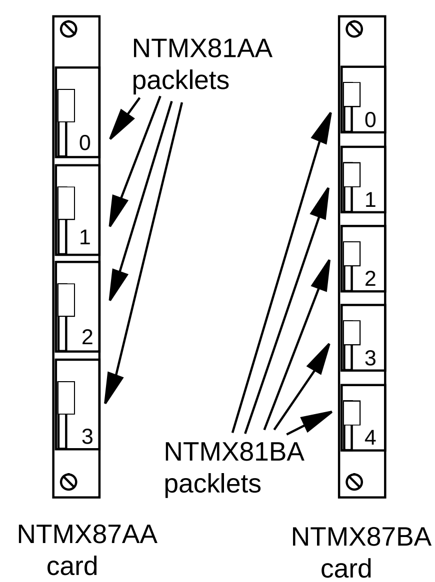
**14** Use the following charts to determine which NTMX87 card is to be removed by matching the provisioned link number with the slot number and the packlet number to the left of each respective table.

Main shelf

C-side

| | Slot 9 | Slot 19 |
|---|---|---|
| 0 | 0<br>1 | 2<br>3 |
| 1 | 4<br>5 | 6<br>7 |
| 2 | 8<br>9 | 10<br>11 |
| 3 | 12<br>13 | 14<br>15 |
| 4 | 16<br>17 | 18<br>19 |

NTMX81 packlet slot number in the NTMX87 card located in the specified card slots.




**15**

> **DANGER**
> **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 (FSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Remove the NTMX81 packlet as described in the following steps:

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

**a** Locate the NTMX81 packlet to be removed on the appropriate NTMX87 carrier card slot.

**b** Open the locking lever on the NTMX81 packlet and gently pull the packlet toward you until it clears the shelf.

**c** Ensure the NTMX81 packlets are stored in an electrostatic discharge (ESD) container for protection of the circuit card until it is reinstalled in the NTMX87 carrier card.

**d** Go to step 32.

***At the MAP terminal***

**16** Determine if the RCC2 is in a single or dual configuration by typing

**>POST RCC2 rcc2_no ;IRLINK**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 associated with the faulty NTMX87 card

***Note:*** If the posted RCC2 is in a single RCC2 configuration, the system will respnd with the following message:
NO IRLINKS DATAFILLED, IRLINK LEVEL CANNOT BE ENTERED.

| If the RCC2 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 NTMX81 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.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

***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.

**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 RCC2 rcc2_no carrier_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 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    RCC2   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.

**22** Installation busy all the trunks to prevent carrier alarms by typing

**>BSY INB ALL**

and pressing the Enter key.

# NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

**23** Access the CARRIER level and post the P-side carriers associated with the faulty NTMX87 circuit card by typing

**>CARRIER;POST RCC2 rcc2_no carrier_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 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 |

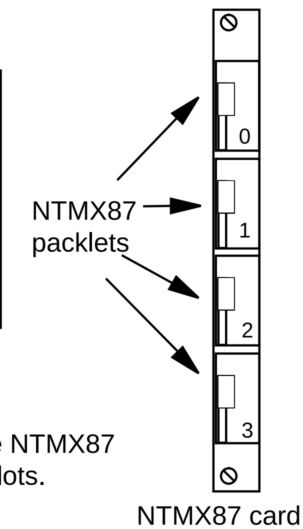
***At the RCE frame***

**26** Use the following figure to determine slot assignments on the P-side of the main shelf.

# NTMX87
# in an RSC-S (DS-1) Model A RCC2 (continued)

Main shelf

| | Slot 12 | P-side Slot 14 | Slot 16 |
|---|---|---|---|
| 0 | 0<br>1 | 16<br>17 | 8<br>9 |
| 1 | 2<br>3 | 18<br>19 | 10<br>11 |
| 2 | 4<br>5 | 20<br>21 | 12<br>13 |
| 3 | 6<br>7 | N/A | 14<br>15 |




NTMX87 packlet slot number in the NTMX87 card located in the specified card slots.

**27**

**DANGER**
**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 RCC2. This protects the equipment against damage caused by static electricity.

Remove the NTMX81 packlet as described in the following steps:

**a** Locate the NTMX81 packlet to be removed on the appropriate NTMX87 carrier card slot.

**b** Open the locking lever on the NTMX81 packlet and gently pull the packlet toward you until it clears the shelf.

**c** Ensure the NTMX81 packlets are stored in an electrostatic discharge (ESD) container for protection of the circuit card until it is reinstalled in the NTMX87 carrier card.

**d** Go to step 32.

***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.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

Extension shelf

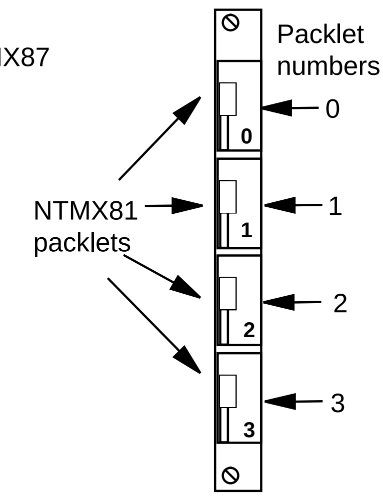
Left side — P-side

| | Slot 4 | Slot 6 | Slot 8 |
|---|---|---|---|
| 0 | 24<br>25 | 32<br>33 | 40<br>41 |
| 1 | 26<br>27 | 34<br>35 | 42<br>43 |
| 2 | 28<br>29 | 36<br>37 | 44<br>45 |
| 3 | 30<br>31 | 38<br>39 | 46<br>47 |

Right side — P-side

| | Slot 19 | Slot 21 | Slot 23 |
|---|---|---|---|
| 0 | 40<br>41 | 32<br>33 | 24<br>25 |
| 1 | 42<br>43 | 34<br>35 | 26<br>27 |
| 2 | 44<br>45 | 36<br>37 | 28<br>29 |
| 3 | 46<br>47 | 38<br>39 | 30<br>31 |

NTMX81 packlet slot number in the NTMX87 card located in the specified card slots.




NTMX87 card

**29**

> **DANGER**
> **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 RCC2. This protects the equipment against damage caused by static electricity.

Remove the NTMX81 packlet as described in the following steps:

**a** Locate the NTMX81 packlet to be removed on the appropriate NTMX87 carrier card slot.

# NTMX87 in an RSC-S (DS-1) Model A RCC2 (continued)

**b** Open the locking lever on the NTMX81 packlet and gently pull the packlet toward you until it clears the shelf.

**c** Ensure the NTMX81 packlets are stored in an electrostatic discharge (ESD) container for protection of the circuit card until it is reinstalled in the NTMX87 carrier card.

**d** Go to step 32.

**30** Translate the dual RCC2s IRLINKS by typing

**>TRNSL**

and pressing the Enter key.

*Example of a MAP response*

```
 CM     MS     IOD     Net      PM     CCS      LNS     Trks     Ext     Appl
 .      .      .       .      1RCC2    .        .       .        .       .

IRLINK            SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      0        0         2       0        2          25
 2         RCC2    0        0         0       0        1           1
 3
 4         RCC2   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   RCC2 0, 0  RCC2 1, 0      MS        OK        OPN
12              1   RCC2 0, 8  Rcc2 1, 8      MS        OK        OPN
13              2   RCC2 0, 12 RCC2 1, 12      S        OK
14 QueryIR      3   RCC2 0, 13 RCC2 1, 13      S        OK
15
16
17
18
```

**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.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

***At the RCE frame***

**32**

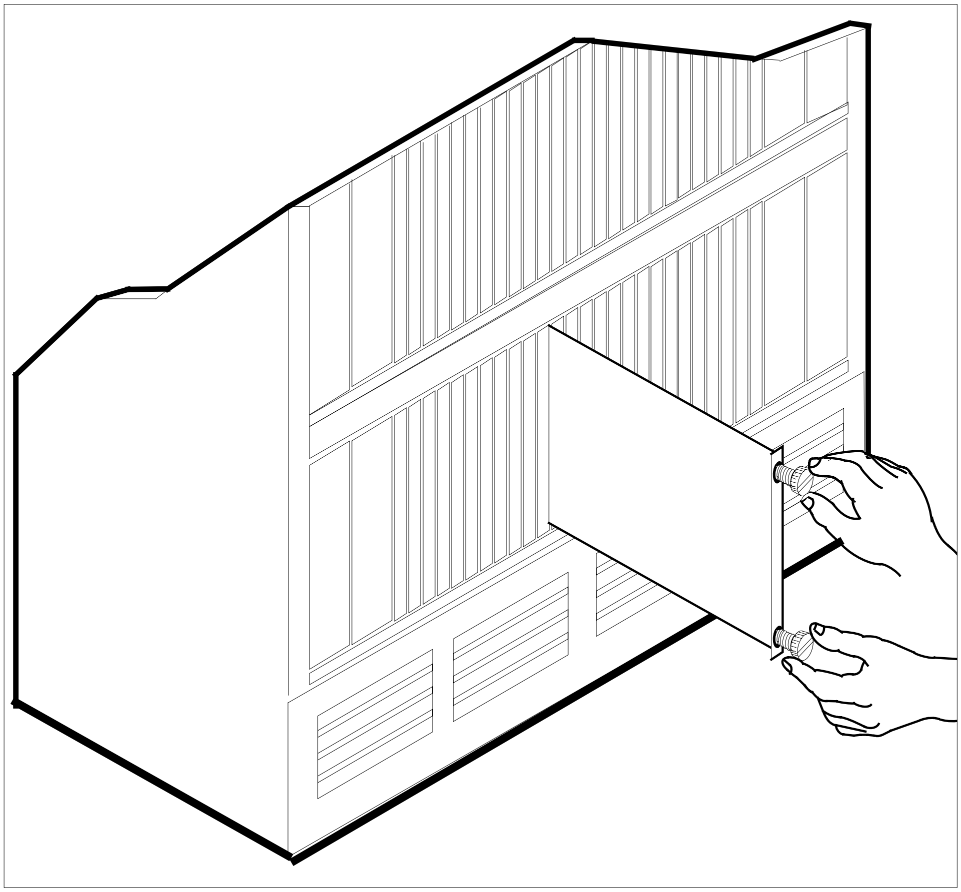
> **DANGER**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP) of the RCC2. This protects the equipment against damage caused by static electricity.

> **DANGER**
> **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.

**33** Using the T9908 wrist grounding strap and a T1324 screwdriver, remove the NTMX87 carrier circuit card. Insert the new carrier card and secure.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)



**34** Replace the NTMX81 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.

**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 |

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

**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 RCC2 with C-side links affected | step 38 |
| step 27 or 29 for an RCC2 with P-side trunks affected | step 46 |
| step 27 or 29, for a single RCC2 with P-side links affected | step 42 |
| step 31 for a DRCC2 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 carrier card

***Note 1:*** This step must be performed for each manually busied link.

***Note 2:*** To test the other links associated with the RCC2, 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.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

***Note 2:*** To RTS the other links associated with the RCC2, 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 |

**40** Post the inactive RCC2 in which the NTMX87 card is located by typing

**>POST RCC2 rcc2_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 associated with the faulty card

**41** Return the inactive RCC2 unit to service by typing

***>RTS UNIT*** **unit_no**

and pressing the Enter key.

*where*

**unit_no**
is the number of the RCC2 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 carrier card

***Note 1:*** This step must be performed for each manually busied link.

***Note 2:*** To test the other links associated with the RCC2, execute this step for each link until all links are tested.

| If TST | Do |
|---|---|
| passed | step 43 |
| failed | step 53 |

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

**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 RCC2, 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 RCC2, execute this step for each irlink until all links are tested.

| If TST | Do |
|---|---|
| passed | step 45 |
| failed | step 53 |

**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.

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (continued)

***Note 2:*** To RTS the other links associated with the RCC2, 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 RCC2 rcc2_no carrier_no**

and pressing the Enter key.

*where*

**rcc2_no**
is the number of the RCC2 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    RCC2   0 1      WADEOUT796 11    INB
```

## NTMX87
## in an RSC-S (DS-1) Model A RCC2 (end)

**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 |

**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.

# 7 Locating and clearing trouble in the RSC-S

The section Locating and clearing trouble in the Remote Switching Center-SONET (RSC-S) trouble is for maintenance engineering and field maintenance personnel use. This section is for personnel that have basic knowledge of the Digital Multiplex System-100 (DMS-100) Family of switches, and the RSC-S only.

# 8 Trouble isolation and correction

The Remote Switching Center-SONET (RSC-S) consists of the remote cluster controller 2 (RCC2) or the RCC2 with the following:

- integrated services digital network (ISDN)
- line concentrating devices (LCD)
- trunks
- links that connect the components

This section describes the problem solving procedure for these components.

## Description of problem solving procedures

The RCC2 is the primary component of the RSC-S configuration. The state of the RCC2 normally determines the state of the 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 indicators that follow indicate that trouble conditions are present:

- operational measurements (OM)
- log reports
- alarms

#### Operational measurements

Operational measurements (OM) monitor and count events in the system. The OMs can detect current and potential system troubles. Use the OM thresholding feature to monitor and report key RSC-S with ISDN activity. The user must submit these reports each day or each week. These reports are the primary method of trouble detection.

## Log reports

Logs are an analysis tool that provide information on call errors, diagnostic results, and system status. Logs can indicate trouble conditions, when any of the following conditions are present:

- sudden increase in volume of logs
- message not printed reports
- large number of the same logs

## Alarms

Audible and visual alarms indicate that the user must correct the problem. Correct performance of routine system maintenance and use of OMs and logs can reduce the occurrence of alarms.

The level of the alarm indicates alarm severity and the need to correct the problem. The levels of alarm are minor, major, or critical. The following table describes the alarm conditions.

**Table 8-1 Alarm description**

| Alarms | MAP display | Description |
|---|---|---|
| Minor | (blank) | Does not affect service |
| Major | (M) | Indicates a condition that can degrade service |
| Critical | (*C*) | Indicates a service outage or potential service outage |

**Assessing alarms** The MAP display subsystems produces alarms for the RSC-S configuration. The following table lists the alarms and the meanings of the alarms. The table also lists log reports that normally accompany the alarm.

**Table 8-2 Assessing PM alarms from the MAP display (Sheet 1 of 2)**

| MTC level | PM level | Possible conditions |
|---|---|---|
| **PM RCC2** | **ISTb 1** | One or both units have minor problems that normally do not involve the peripheral processor (PP).<br>A static data mismatch is present between an RCC2 unit and central control (CC).<br>A non-messaging central-side (C-side) link is out-of-service (OOS).<br>A peripheral-side (P-side) link is OOS. |
| **PM RCC2 M** | **ISTb 1** | One unit is system busy (SysB), normally because of a PP card failure. If the unit is the active unit, peripheral module (PM) software performs a switch of activity (SWACT) on the units. Check for PM128 logs. |
| **PM RCC2 *C*** | **SysB 1** | Both units are SysB. If noncommunication with the host causes the SySb the RCC2 enters emergency stand-alone (ESA). Refer to the following sequence of logs when the RCC2 enters ESA:<br>• PM109 (The carrier is busy.)<br>• PM128 (The RCC2 is in-service trouble [ISTb].)<br>• PM107 (The RCC2 is C-side busy [CBsy].)<br>• PM107 (The line controller modules [LCM] are CBsy.)<br>• PM102 (The RCC2 is SysB.)<br>• PM181 (The RCC2 attempts to start the message links again.)<br>Another possible reason is that both PPs have faults. Both units are SysB. |
| **PM RCC2** | **ISTb 1** | One or both units has minor problems. Normally these problems do not involve the PP. For RCC2 with ISDN, the following problems are possible:<br>• The D-channel handler (DCH) card does not operate. If a spare DCH is present , the DCH goes in-service (InSv). If a spare DCH is not present, the unit loses D-channel capability . In both events, the RCC2 is set ISTb.<br>• The ISDN signaling preprocessor (ISP) card malfunctions. The RCC2 cannot process ISDN calls. The RCC2 continues to process plain old telephone service (POTS) calls. |

**Table 8-2 Assessing PM alarms from the MAP display (Sheet 2 of 2)**

| MTC level | PM level | Possible conditions |
|---|---|---|
| **PM RCC2 M** | **ISTb 1** | One RCC2 unit is OOS. The RCC2 can continue to process voice and data calls. |
| **PM RCC2 *C*** | **SysB 1** | Both RCC2 units are OOS. Loss of voice and data services occurs. If the RCC2 enters ESA, the ability to process data calls depends on the location of the packet handler (PH). |

### Clearing alarms

Use the following guidelines to respond to alarms:

- The MAP display can display more than one alarm of the same level. When more than one alarm of the same level appears, clear the alarms on the screen from left to right.
- If an alarm of a higher level occurs when you fix an alarm, respond to the new alarm. Do not continue attempts to clear the lower level alarm.

For alarm clearing procedures, refer to Clearing an alarm.

## Trouble conditions

Possible RSC-S trouble conditions follow:

- data mismatch
- lines
- DS30A
- digital signal 1 (DS-1) links
- dual remote cluster controller 2 (DRCC2)
- forced ESA
- RCC2 with ISDN
- ISDN lines

### Lines

When you isolate a fault to an LCD, maintenance procedures are like procedures at the host office. Make sure a fault at a different location does not cause the fault in an LCM.

### DS30A

The DS30A links are on the following:

- the P-side of the RCC2
- the C-side of the enhanced line concentrating module (LCME)

- the LCM, and
- the remote maintenance module (RMM)

When these links are defective, the defective links also affect the associated components.

### DS-1 links

The C-side and P-side of the RCC2 use DS-1 links. Links on the C-side of the RCC2 send voice and messages to the host. Some channels can function as trunks. The only use for two of the channels, links 0 and 2, is messaging.

Links on the P-side of the RCC2 connect remote line concentrating modules (RLCM) or other offices. When the lines connect other offices, the links function as trunks. These trunks can be static or dynamic.

### Dual remote cluster controller 2

The primary sources of trouble for the DRCC2 are as follows:

- the condition of the interlinks
- the condition of the messaging links to the host office causes the RCC2 to enter dual ESA (DESA)

The following table summarizes trouble indicators for faults that can occur on the interlinks. This table also summarizes trouble indicators that appear after the user corrects the problem.

**Table 8-3 Indicators for interlink maintenance (Sheet 1 of 3)**

| Trouble indicator | Meaning | Indicators when cleared |
|---|---|---|
| PM110—MTCE LIMIT SET<br>>QUERYIR shows ML under the BER heading. | Bipolar violation (BpV) at the maintenance limit (ML)<br>BpV at the ML indicates defects in the DS-1 link. This is normally set in table CARRMTC. | PM110—*Carrier BPV Limit Cleared*<br>>QUERYIR indicate the ML alarm is gone. |
| PM110—MTCE LIMIT SET<br>PM222—Interlink is system busy.<br>PM128—RCC2 goes ISTb. The system drops calls on that link.<br>>QUERYIR shows OS under the BER heading and the state as SysB. | BpV at the OOS limit<br>BpV at the OOS limit are set in table CARRMTC. | PM110—*Carrier BPV Limit Cleared*<br>PM106—RCC2 returns to service from ISTb.<br>PM223—Interlink returns to service.<br>>QUERYIR indicates the ML alarm is gone, and the link is OK. |

**Table 8-3 Indicators for interlink maintenance (Sheet 2 of 3)**

| Trouble indicator | Meaning | Indicators when cleared |
|---|---|---|
| PM109—Carrier Local Alarm Set<br>PM222—Interlink is system busy.<br>PM128—RCC2 goes ISTb. The system drops calls on that link.<br>>QUERYIR shows LCGA under the ALRM heading and the state as SysB.<br>For the interconnected RCC2, >QUERYIR indicates RCGA under ALRM. | Local alarm is set | PM106—RCC2 returns to service from ISTb.<br>PM223—Interlink returns to service.<br>>QUERYIR indicates the ML alarm is gone. The link is OK. |
| PM109—Carrier Card Removed<br>PM128—RCC2 goes ISTb.<br>PM222—Interlink is system busied. The system drops calls on that link.<br>>QUERYIR shows (-) under the C heading and the state as SysB.<br>For the interconnected RCC2, >QUERYIR shows LCGA under ALRM. | DS-1 card is missing | PM106—RCC2 returns to service from ISTb.<br>PM223—Interlink returns to service.<br>>QUERYIR shows the ML alarm is gone. The link is OK. |
| PM110—Carrier Slip Maintenance Limit Set<br>>QUERYIR shows ML under the slip heading.<br>For the interconnected RCC2, >QUERYIR shows RCGA under ALRM. | Slips at the ML | >QUERYIR shows the ML alarm is gone. |

**Table 8-3 Indicators for interlink maintenance (Sheet 3 of 3)**

| Trouble indicator | Meaning | Indicators when cleared |
|---|---|---|
| PM110—Carrier OSS Limit Set<br><br>>QUERYIR shows OS under the SLIP heading.<br><br>For the interconnected RCC2, >QUERYIR shows RCGA under ALRM. | Slips at the OOS limit | >QUERYIR shows the OS alarm is gone. |
| PM110—Carrier LOF Maintenance Limit Set<br><br>>QUERYIR indicates ML under the FRME heading.<br><br>For the interconnected RCC2, >QUERYIR indicates RCGA under ALRM. | Frame loss at the ML | >QUERYIR indicates the ML alarm is gone. |
| PM110—Carrier LOF Maintenance Limit Set<br><br>>QUERYIR indicates OS under the FRME heading.<br><br>For the interconnected RCC2, >QUERYIR indicates RCGA under ALRM. | Frame loss at the OOS limit | >QUERYIR indicates the OS alarm is gone. |

## Forced emergency stand-alone

When an RCC2 is in forced ESA, the system sends a PM189 log to the host. The log contains a FORCE DOWN message. The log simulates link faults on messaging link 0 and 2. If these links are at the CARRIER level of the MAP display, the alarm remote carrier group alarm (RCGA) appears. An example of a link at the CARRIER level of the MAP display is POST LTC 2.

Reception of the PM189 log indicates if the RCGA is a real alarm. If links 0 and 2 break while the RCC2 is in forced ESA, the links at the CARRIER level have an alarm. The links have a local carrier group alarm (LCGA) alarm.

> ***Note:*** Real faults at the RCC2 can be one-way. One-way alarms are RCGA and operating company personnel only receive the PM189 log. Operating company personnel can become confused because operating company personnel receive only the PM189 log. In most conditions, real faults on the messaging links are normally two-way and produce LCGA alarms.

## Remote cluster controller 2 with ISDN

The following list indicates procedures to troubleshoot the RSC-S 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

> ***Note:*** The difference between an RCC2 without ISDN and an RCC2 with ISDN is the enhanced ISDN signaling preprocessor (EISP). If the EISP has fault, the RCC2 with ISDN does not work. Enter the QUERY PM FAULT command to check for defective cards before you start other maintenance action.

## Integrated services digital network lines

The following table lists:

- the possible states for the ISDN line card
- the possible OOS
- the maintenance action

**Table 8-4 Restoring service to the line (Sheet 1 of 2)**

| ISLC | Equipment OOS | Maintenance action |
|---|---|---|
| CUT | Line | Post the ISDN line. Use the line equipment number (LEN). Enter the DIAG command to determine if the relay does not move. If the relay does not move, replace the line card. |
| LMB | RCC2, LCME, or message link between RCC2 and LCME | Post the ISDN line by the LEN. Enter the CKTLOC command to display the state of all PMs and links for the line.<br>Access the MAP level with the item that does not have the correct state. Use MAP commands to test components. |
| DMB | | Use the CKTLOC command in the line test position (LTP) level to identify the location of the fault. Perform one of the following actions: |
| | DCH OOS | Access DCH and ISDN service group (ISG) levels of the MAP display. Post the appropriate DCH. Use MAP commands to locate defective components. |
| DMB (continued) | Speech link OOS | Access the PM level of the MAP display. Identify the defective speech link. Test the speech link. To restore all LENs with that speech link, return the speech link to service. |

**Table 8-4 Restoring service to the line (Sheet 2 of 2)**

| ISLC | Equipment OOS | Maintenance action |
|---|---|---|
| | ISG channel | Busy and RTS the ISG channel at the ISG level of the MAP display. |
| | Path fault in RCC2 | Perform a SWACT verify if the fault is present. |
| | Path fault in LCME | Busy and RTS the LCME. |
| | I-flag is set | Use MAP commands to test for a defective connection or a babbling terminal. |
| LO | Line | Loss of synchronization between the ISDN line card and the network termination 1 (NT1). This fault is a system-detected fault. The change out of this state occurs only when the system detects a synchronized condition. Use commands available at the LTP level of the MAP display to locate defective hardware. |
| INB | Line | Office data changes occur on the line. Table LNINV contains an entry. If you cannot take the line out of the installation busy state, use the CKTLOC command to verify if<br>• a DCH channel is for the ISDN line<br>• the path between the DCH and the LEN is not broken |
| MB | Line | Line is ready for routine maintenance. Routine maintenance can occur when the user inputs of commands at the LTP level of the MAP display. This display can indicate the removal of the line from service for maintenance as a result of a customer complaint. |
| MB | Line | Fault-finding tests occur on the line |
| CPD | Line | Line processes a circuit-switched call. The system removes this line from service for possible maintenance activity when the call stops. You can access the line from any MAP display for maintenance, when the state changes to manual busy.<br>Post the deload queue at the LTP level of the MAP display to cancel maintenance. |
| NEQ | Line | Use the table editor (TE) to enter data in tables LNINV and DCHINV. |

## Posting ISDN lines with the POST DK command

The activation of the following POST command parameters can occur only when the customer has the SOC NI000050 2B-FIT/NIT feature:

```
POST DK dn_number [<key#>| `all']
```

The POST DK command displays a DN appearance on the specified key on an ISDN terminal. The DN appearance appears in the following figure. If the DN appearance is active the following appears:

- the key number of the DN appearance
- the bearer capability of the call
- the far-end information

**Figure 8-1 LTP MAP level display with a posted ISDN line with key number and bearer capability displayed**

```
  CM     MS     IOD     Net     PM     CCS     Lns      Trks     Ext    Appl
   .      .      .       .    4 SysB    .       .        .        .      .
                                 M
LTP
0  Quit      POST  95    DELQ             BUSYQ            PREFIX
2  Post_
3            LCC PTY RNG ....LEN....       DN    STA F S LTA TE Result
4            ISDN LOOP   HOST 02 1 08 02 6215986 CPB      613 6215982
5  Bsy                                     33  SP
6  RTS
7  Diag
8                                               Bearer capability
9  AlmStat
10 CktLoc                                     Key number
11 Hold
12 Next
13
14
15
16 Prefix
17 LCO_
18 Level_
   userid
TIME  hh : mm>
```

After you post the ISDN line with the POST DK command, the line following the control position displays the following:

- the key number
- the bearer capability

In the previous example, the CPE has DN 621-5986 assigned to key 33. The CPE has a speech call active. The possible bearer capabilities appear in the following table:

**Table 8-5 Bearer capability display codes**

| Bearer capability | Display |
|---|---|
| Speech | SP |
| 3.1 kHz audio | 3AU |
| Circuit mode data, rate adapted to 56 kHz | 56C |
| Circuit mode data 64 kHz | 64C |
| Packet data | PMD |

The system checks the DN state one time each second and updates the display.

## Responses to LTP level commands

The following table lists responses to commands the user enters at the LTP level.

**Table 8-6 Responses to LTP level command (Sheet 1 of 2)**

| **POST** | | |
|---|---|---|
| *Response* | *What the response means* | *What to do* |
| `Option NI000050 is not enabled` | The user attempts to use the POST DK command but does not activate software optionality control (SOC) option NI000050. | Use a different POST command to post the DN. |
| `The DN is not an ISDN DN Posted circuits unchanged` | The user issues the POST DK command on a line that is not an ISDN line. This command is only valid for ISDN lines. | Enter the command on an ISDN line again, or use a different POST command. |
| The system reponds by displaying `NO EQUIPMENT` in the LEN field and `NEQ` in the STAtus field. | The posted DN is assigned to an LTID that is not mapped to a LEN in table LTMAP. | Before you post the DN, use the SLT ATT command to map the LTID to a LEN. |

**Table 8-6 Responses to LTP level command (Sheet 2 of 2)**

| **POST** | | |
|---|---|---|
| `Incorrect DN Appearance.` | The specified DN does not appear on the specified Key. | Enter the POST DK command again with the correct key, or use the ALL option to list all keys for the DN. |
| `ACO/AFC DN:The key number shown can differ than the current key in use` | When you post a DN Appearance that has AFC or ACO provisioned, the DN Appearance is a member of a group of Appearances. This group is the group of Appearances for the DN. The key numbers for these DNs are not always the same as the keys on the ISDN set. This condition is when the Q.931 is used. The Q.931 message protocol first refers to the DN without any reference to the key number. The user or the ISDN set determine which key to use for a call. The CM or XPM does not receive this information. | Information only. |

## Fault isolation tests

This section describes fault isolation tests for the following components:

- RCC2
- lines
- RCC2 with ISDN

### Remote cluster controller 2

When you troubleshoot an RCC2, access the RCC2 MAP level and enter the QUERYPM FLT command. The following table lists possible reasons for a

SysB RCC2 alarm and the possible conditions. The log report normally mirrors the response to the QUERYPM FLT command.

**Table 8-7 Assessing SysB alarms for the RCC2 (Sheet 1 of 2)**

| Message at RCC2 level | Possible descriptions |
|---|---|
| `All C-side Links are Down` | The C-side PM cannot talk with the RCC2. |
| `Audit Detected Inconsistent PM Activity` | As an example, CC detects that unit 0 is active, but unit 1 is active. This message indicates CC does not detect that a SWACT occurs. The CC busies and returns both units to service. The units come back with the original active and inactive unit configuration that CC had. |
| `Audit Detected Inconsistent PM State` | The internal state of the active unit is not ready. The state is busy, restart, or synchronizing. This message is normally a software error. CC busies and returns both the RCC2 and the C-side links to service. |
| `Autonomous Activity Drop` | The system generates a SWACT. A trap or facility audit normally causes the SWACT to occur. |
| `Diagnostics Failed` | Unit fails test or RTS. |
| `Inact Unit Lost Data Synch` | Unit-to-unit communication fails. A SWACT cannot occur. |
| `PM Audit Detect Fault` | One of the background hardware audits detected a fault. |
| `PM SWACT` | A SWACT occurs. |
| `Require Data Load` | An error occurs on a DS-1 link to the unit. The unit waits for a reset that the maintenance system performs. |
| `Reset While InSv` | An error occurs on a DS-1 link to the unit. The unit waits for a reset that the maintenance system performs. |
| `REx Incomplete`<br>(Terminated) | The routine exercise (REx) test cannot complete the series of tests because of a condition that is not normal.<br>At least one unit is ISTb.<br>Inactive unit is BSY. |
| `REx Failed` | A failure occurs while a test runs. The messages are a result of what the system does to compensate for the failure. Superframe and data synchronization occur. Inactive OOS Tests. Inactive RTS. Inactive OOS Tests after SWACT. |
| `Self Test Failed` | A background hardware audits detects a fault. |

**Table 8-7 Assessing SysB alarms for the RCC2 (Sheet 2 of 2)**

| Message at RCC2 level | Possible descriptions |
|---|---|
| Trap Message Received From PM | Unit sends an initiation complete message to CC after an auto-restart. |
| Unsolicited Message Limit Exceeded | Unit sends more than 100 unsolicited messages to the CC in 1 min. |

The following table lists possible reasons for an ISTb RCC2 alarm and possible conditions. The log report normally mirrors the QUERYPM FLT response.

**Table 8-8 Assessing ISTb alarms for the RCC2 (Sheet 1 of 2)**

| Message at RCC2 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 fail the periodic InSv C-side links test, one for each minute. |
| PSLinks Out of Service | minor | A P-side link, like a link to the LCME or RMM, is SysB. |
| Node Redundancy Lost | major | A unit is OOS. The RCC2 cannot perform a SWACT |
| Major CSLink Failure | major | A C-side link failure causes a major alarm. |
| Critical CSLink Failure | critical | A C-side link failure causes a critical alarm. |
| Interlinks out of service | minor | One of the interlinks of the DRCC2 configuration is SysB. |
| Bad MX77 IMC link | minor | An intermodule communication link is defective. |
| Bad 6X69 IMC link | minor | An intermodule communication link is defective. |
| PM node table mismatch | minor | The node table data in the RCC2 and CC do not match. |
| Dynamic data sync | minor | The RCC2 has not achieved dynamic data synchronization. |
| ESADATA | minor | The RCC2 does not have an ESA load, or the current load is defective or does not match the CC. |

**Table 8-8 Assessing ISTb alarms for the RCC2 (Sheet 2 of 2)**

| Message at RCC2 level | Alarm | Possible conditions |
|---|---|---|
| `Static data mismatch with CC` | minor | The RCC2 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 for CC. |

#### Lines

When the MAP screen displays an LCM alarm, enter the LCM MAP level. Post the LCMs that match that state. Post the LCM according to site to verify 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 RCC2 and enter the QUERYPM FLT command. If a problem is present, perform an InSv test. If the test fails, the unit requires normal RCC2 maintenance. When this maintenance is complete, LCM maintenance is the same as for the host office.

### Remote cluster controller 2 with ISDN

To troubleshoot an RCC2, access the RCC2 MAP level and enter the QUERYPM FLT command.

## Diagnostic tests

The following section describes RSC-S diagnostic tests.

### NTMX76 diagnostics

Feature AF4342, NTMX76 Pack Diagnostics, provides message and high-level data link control diagnostics on the Channel Supervisory Messaging (NTMX76AA) memory and hardware.

The user performs tests from the CC or PMDEBUG level. Tests are classified as destructive or not destructive. Perform destructive tests on inactive and manually busied units. Perform the tests according to:

- the message card entered in the inventory table of the RCC2 shelf
- the message card NT6X69AC or NTMX76AA on the RCC2 shelf

The following tests are available:

- message tests—current tests for the NT6X69AC card that you can use for the NTMX76AA card.
  - tone diagnostic
  - message
- high-level data link control tests—new hardware tests for NTMX76AA. These tests find faults in the Q.703 part of NTMX76AA.
  - NTMX76 card occurrence
  - memory
  - receive connection memory
  - data routing
  - high-level data link control messaging system
  - intermodule communication

### Tone diagnostic test

Tone generation, interpretation test, tone checksum follow the current XMS-based peripheral module (XPM) message test design. This test is a destructive test.

### Message tests

Use the same tests for the NTMX76AA circuit card as you use for the NT6X69AC circuit card.

### NTMX76AA card presence test

This test verifies that the NTMX76AA circuit card is in use instead of the NT6X69AC circuit card. This test is not a destructive test.

### Memory test

This test verifies the access and functionality of the receive and transmit data memory and the receive and transmit connection memory. This test is a destructive test.

### Receive connection memory test

This test verifies if data can route from the receive data memory to the correct channel. The system routes data from the receive data memory to the correct channel according to the receive connection memory. This test is a destructive test.

### Data routing test

This test verifies if data can route from the transmit and receive data memories to the correct channels. The test verifies if the data can route according to the receive and transmit connection memories. This test verifies that the transmit and receive data memories receive the data from the correct channels. This test is a destructive test.

### High-level data link control messaging system test

This test verifies the functionality of the high-level data link control messaging system. The test sends a high-level data link control message. The test loops the message back to test the functionality of this system. This test is not a destructive test.

### Intermodule communication test

This test verifies that a bidirectional intermodule communication connection with the mate unit is present. This test uses two channels in each direction. These channels do not have any other purpose. This test is not a destructive test.

## Enhanced line testing 1

Feature AF4838 is RSC-S Enhanced Line Testing 1. This feature verifies the functionality provided in phases 1 and 2 of the DMS-100 switch translation language 1 project. The ISDN 2B1Q loops subtending LCMEs attached to an ISDN RCC2 have this feature.

An operating system supports the operations, administration, and maintenance (OAM) of the operating company. The DMS -100 switch provides operations, administration, and maintenance (OAM) for the following:

- subscriber loops
- trunks
- POTS
- special services, and
- other services

An operating system communicates with a DMS-100 switch with an X.25 data link. 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:

- support of X.25 data links between operating systems and the DMS-100 switch
- decoding and encoding of translation language 1 commands and responses
- perform maintenance that translation language 1 commands specify, and generate of responses that contain the results of maintenance

- support of test equipment required to perform maintenance
- support of 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. The test command requires you to post an ISDN 2B1Q loop in order to function. The TEST command contains options. These options are *unlisted menu* commands. Each option or *unlisted menu* of the TEST command is a test. Each of the tests provide support of a corresponding translation language 1 command. The tests perform ISDN loop and line maintenance activities.

The user performs all tests at the LTPISDN MAP level, except for the ac resistance test. The resistance test occurs at the LTPLTA MAP display level. Use the TEST command with a specified option to perform each test at the LTPISDN MAP display level. Use the RES command with *ac* as an option to perform the ac resistance test. The RES command is a menu command that requires a posted line to function.

The following table provides a description of the commands and activities that apply.

**Table 8-9 MAP commands, options, and activities (Sheet 1 of 4)**

| Command | Option and activity |
|---|---|
| CONN-DTAC-ISDN | Indicates a test session begins. You can perform tests and measurements that require digital test access after this session. The system seizes and keeps the line OOS for the duration of the test session. |
| CONN-MTAC-ISDN | Indicates a test session begins. You can perform tests and measurements that require metallic test access (MTA) after this session. The system seizes and keeps the line OOS 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. This test stops when the test detects a fault. |
| DISC-TACC | Indicates the end of a test session. Connections set up with the connect commands release and the line returns to the previous state of the test session. |
| MEAS IMPNSE | Measures the impulse noise on the loop for a specified time. |

**Table 8-9 MAP commands, options, and activities (Sheet 2 of 4)**

| Command | Option and activity |
|---|---|
| MEAS-LOOP-LOSS | This command measures the 2B1Q signal level that the NT1 generates. The NT1 generates this signal to identify the occurrence of load coils on the loop. The NT1 also generates this signal to verify 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 on the digital subscriber loop generates. |
| REPT-ALM | The DMS-100 switch generates this command when the switch a failure occurs on one or more test sessions. |
| REPT-INITZN | An autonomous command that the operating system or the DMS-100 switch sends. The operating system uses this command to verify the DMS-100 switch is online and reinitialization is complete. The DMS-100 switch uses this command to report that the DMS-100 is started again. |
| REPT-STAT | Checks the X.25 data link operation. The operating system sends this command to the DMS-100 switch. The operating system automatically sends this command if no additional messages are sent in the last 60 s. |
| RES AC | Starts the measurement of two-terminal ac resistance, that 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 state) for one or more lines. |
| RTRV-DNCT | Retrieves the equipment with the directory number (DN) and call type of the line. |
| RTVR-PM-TOTS | Retrieves the current set of performance monitoring data for an ISDN 2B1Q line. The data retrieved are block errors, errored seconds, and severely errored seconds in both directions of the transmission path. |
| RTRV-TRNSL | Retrieves the translation information for an ISDN line. You need this information to determine if an ISDN 2B1Q line does not work because of datafill problems. |

**Table 8-9 MAP commands, options, and activities (Sheet 3 of 4)**

| Command | Option and activity |
|---|---|
| TEST ALM | Verifies if the DMS-100 switch can detect and report loss of signal without an NT1 *Dying Gasp*. |
| TEST COLDST | Implements the cold start test. The cold start test checks the ISDN 2B1Q line card. This test verifies if this line card can train echo cancellers and equalizers to an NT1 over a maximum length in 15 s. |
| TEST DCSIG | Starts the NT1 signature test. This command measures the direct current metal termination characteristic of the NT1. |
| TEST DET | Starts the performance monitoring test. This command checks the ISDN 2B1Q line card. This command checks the ability of the line card to detect the following for a specified direction of transmission:<br>• bit block errors<br>• errored seconds, and<br>• severely 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. This test continues to apply sealing current when the test equipment verifies the current is in the acceptable range. |
| TEST THR | Implements the performance monitoring threshold test. This command checks the ISDN 2B1Q line card. This command checks the ability of the line card to report threshold crossings for the following for a specified direction of transmission:<br>• bit block errors<br>• errored seconds, and<br>• severely errored seconds |
| TST-LPBK-ISDN | Performs bit error tests on an ISDN line card, and the digital subscriber loop to the NT1. |

**Table 8-9 MAP commands, options, and activities (Sheet 4 of 4)**

| Command | Option and activity |
|---|---|
| TST-PM | Checks the ability of the ISDN 2B1Q line card to detect bit block error, errored seconds, and severely errored seconds for a specified direction of transmission. |
| 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 bit block errors, errored seconds, and severely errored seconds for a specified direction of transmission. |

## Digital test access

Feature AF4839, RSC-S Digital Test Access, is a digital monitoring method for ISDN basic rate interface (BRI) loops and Bd connections.

Feature AF4839 provides the following services for the RSC-S product:

- user-assigned terminal endpoint identifier (TEI)
- unsolicited message and link access procedure on the D-channel (LAPD) cleanup
- a digital monitoring method for ISDN BRI and Bd connections

### User-assigned TEI

User-assigned TEI allows customers to specify an ISDN TEI. The range of TEIs is 0 to 63.

### Link access procedure on the D-channel cleanup

The layer 2 state machine software in the DCH, and the EISP changes to comply with specifications. Refer to these specifications in *Bellcore Technical Reference*, ISDN D-Channel Exchange Access Signaling and Switching Requirements (Layer 2).

The LAPD cleanup creates an audit of the important resources that correct messaging in the DCH and EISP.

### Digital test access

Digital test access provides the ability to monitor the following from an ISDN BRI loop:

- circuit-switched B-channels
- packet-switched B-channels
- D-channels
- Bd-channel traffic

An external protocol analyzer performs the monitoring. Access this analyzer through an ISDN line card, or two side by side channels on a digital trunk facility.

The MTA allows test equipment to connect to subscriber lines with a test access bus in the LCM. Test equipment connects to any line card in the drawer instead of a metal path. Test equipment does not connect to a metal path between the subscriber line and the test equipment. The MTA process uses this path. Broadcast the digital data streams to and from subscriber lines to a protocol analyzer to establish digital test access. The LCME for loop monitoring, and the XPM that host the LCME for Bd connections are located where the monitoring occurs. Digital test access does not affect service on the tested loop.

The monitoring of loop channels or Bd connections provide the following two streams of digital data:

- upstream data, the data that flows *toward* the DMS switch and *away* from the subscriber
- downstream data, the data that flows *toward* the subscriber and *away* from the DMS switch

The upstream and downstream data, of the monitored loop or channel are 64-kb/s serial digital data, streams to

- two DS-0 channels of a DS-1 interface, entered with datafill for 64-kb/s transmission or
- the B1 and B2 channels of an ISDN line card

The LCME time switch is the monitoring point for the upstream and downstream data of the loop channels (B or D). The LCME connects to the line card at this monitoring point. The RCC2 time switch is the monitoring point for the upstream data of Bd channels. The time switch connects to the DCH at this monitoring point. The monitoring point of the downstream data of Bd channels is the time switch at the digital trunk that interfaces to the DPN PH.

### Channels available for monitoring

Digital test access monitors the following:

- provisioned B-channels
- TDM D-channels
- circuit switched B-channels
- Bd channels routed to a DS-1 interface connected to a DPN switch

Each loop is allowed one digital test access Bd connection at a time. There can be multiple taps on one Bd connection. These multiple taps allow different loops with the same Bd connection to have digital test access connections at the same time.

When a digital test access monitors a D-channel, the protocol analyzer receives all four TDM channels. The TDM group member number for a specified line is available . Use the CKTLOC command to obtain the numbers from the LTP level of the MAP display. Use the EQUIP DTA QUERQUERYY command at the LTPDATA level of the MAP display to obtain the numbers.

Monitored equipment is only for digital test access use. Monitored equipment connects to the monitored BRI channel or Bd connection. Two commands at the MAP display connect the monitored equipment. A nailed-up connection makes the connection between the monitoring equipment and the monitored channel. The nailed-up connection remains in place until the operating company personnel removes the connection with a MAP command.

The system maintains digital test access connections over CC restarts and XPM SWACTs, if the user initiates the system manually. The system also maintains digital test access connections over CC restarts and XPM SWACTs because of a REX test. Digital test access connections remain in place during DCH takeovers and during LCME takeovers and takebacks.

### Protocol analyzer requirements

The protocol analyzer must interconnect with a DS-1 digital interface or an ISDN S/T loop interface. The protocol analyzer must resolve separate D-channel members from the TDM group.

### Preparation for digital test access monitoring

The user must perform several steps before digital test access monitoring can begin. The user must provision the DMS switch network for data transmission to make sure the system preserves data streams. Failure to provide the DMS switch network results in defective digital data streams to the protocol analyzer.

The following list contains the requirements to prepare for digital test access monitoring:

- provision DS-1 monitoring equipment or provision ISDN line card monitoring equipment
- reserve equipment for use in digital test access monitoring
- establish digital test access connection
- monitor using digital trunk facilities or an ISDN line card

**Provision DS-1 monitoring equipment** If the user uses a DS-1 facility for digital test access monitoring, the user must provision the facility. The user must provide the facility to support 64 kbps clear data transmission.

This requirement has indications in the following areas of the DMS switch:

- hardware that supports the DS-1 interface
- carrier datafill

The RCC2 DS-1 circuit card must be NTMX81AA or NTMX81BA.

**Provision ISDN line card monitoring equipment** An ISDN line card can monitor the digital data obtained from the digital test access on an ISDN line. Table LNINV must contain the line card entered as *hardware assigned software unassigned (HASU)*. When the user enters the line card as HASU, the assignment of DCH resources that are not necessary, is prevented. The user cannot nail-up B-channels of an ISDN line card for provisioned B-channel service. The loop state must be installation busy.

**Reserve equipment for digital test access monitoring** Two channels of a DS-1 digital trunk, or an ISDN line card monitor the upstream and downstream data. This equipment monitors the upstream and downstream data from the monitoring points that result from each digital test access application.

Operating company personnel must use two channels of a digital trunk to remotely monitor the upstream and downstream data. The digital trunk must be entered correctly for RCC2 DS-1 digital test access.

When the user uses a digital trunk for digital test access monitoring, the user cannot nail-up connections. The user cannot nail-up connections to the two DS-0 channels or enter these channels in table TRKMEM. The user cannot perform these procedures until the channels are unequipped for digital test access use. Use the EQUIP DTA RESET command at the LTPDATA level of the MAP display to make channels unequipped.

The EQUIP command at the LTPDATA level of the MAP display equips a line card for digital test access use. A LEN specifies the ISDN line card. The B1 channel receives the upstream data from the monitored line. The B2 channel receives the downstream data from the monitored line.

**Establish digital test access connection** With the monitoring equipment correctly provisioned, operating company personnel from the LTPDATA MAP level can establish and verify the digital test access connections. The CONNECT command makes the connection between the monitoring equipment and the BRI loop or Bd connection to be monitored.

If the monitoring equipment and monitored loop or Bd connection are supported on different peripherals, a network connection occurs. A network connection occurs between the two end-points. A network connection is required if the monitored Bd-channel is nailed-up to a digital trunk supported from a different peripheral. Connections through the network are nailed-up connections. The system retains connections through the network over CC restarts.

### Details of monitoring in the enhanced line concentrating module

The LCME time switch where the line card resides provides upstream and downstream data for loop channels (B or D). At the time switch, a broadcast connection monitors the digital data for the upstream and downstream directions. The time switch allows any current connections to remain the same. For each data stream, connections are made to the RCC2 that hosts the LCME. Connections are made to the monitoring equipment. If the monitoring equipment is in an XPM other than the RCC2, bidirectional network connections occur. The following table summarizes this information.

**Table 8-10 Time switch end-points (B or D channels)**

| Monitored channel | Channel connects to | Upstream monitor point | Downstream monitor point |
|---|---|---|---|
| Circuit switched (B1 or B2) | Any end-point supporting circuit switching | LCME hosting line card | LCME hosting line card |
| Provisioned B-channel, B1, and B2 | Digital trunk or ISDN line card | LCME hosting line card | LCME hosting line card |
| D-channel | ISG or DCH | LCME hosting line card | LCME hosting line card |

### Details of monitoring in XPMs (Bd-channel)

Upstream and downstream data for the monitored Bd-channel come from different points in the DMS switch. The upstream monitor point is in the XPM that supports the LCME that serves the ISDN loop. The downstream monitor points for a Bd-channel are in the XPM that hosts the digital trunk to the PH. At the time switch, the broadcast connection monitors the digital data for the upstream and downstream directions. If the monitoring equipment is on another XPM, bidirectional network connections occur. If the monitoring equipment is not on another XPM, connections remain in the XPM. The following table summarizes end-points for Bd-channels.

**Table 8-11 Time switch end-points for Bd-channels**

| Monitored channel | Channel connects to | Upstream time switch end-point | Downstream time switch end-point |
|---|---|---|---|
| Bd-channel | Digital trunk | XPM hosting loop | XPM hosting digital trunk |

## Verification of digital trunk access connections

When a digital test access connection is established, you can verify the integrity of the digital test access connection. Use the CONNECT command at the LTPDATA MAP level. This command verifies that XPMs that support the monitoring connection receive connection information. This verification replaces the channel supervision message (CSM) that circuit-switched connections use. If the system locates a bad connection, the system updates the state information that appears at the MAP display.

Use the following procedure to use the digital test access feature correctly.

**Procedure 8-1 Steps for use of digital test access**

**1** Identify a loop to monitor

***Note:*** Only ISDN BRI loops are valid.

**2** Identify the monitor equipment.

***Note:*** Monitor equipment can be a digital trunk or an ISDN line card.

**3** Make sure you provision the monitor equipment correctly.

***Note:*** Check carrier or line data fill.

**4** Connect protocol analyzer to the selected access point.

**5** Enter the LTPDATA level of the MAP display.

***Note:*** All digital test access commands are located at this level.

**6** Post the loop to be monitored.

**7** Reserve the monitoring equipment.

***Note:*** Use the EQUP command, note the equip number returned.

**8** Connect the monitoring equipment.

***Note:*** Use the following command syntax of the CONNECT command:

**`>CONNECT equip# chnl`**

**9** Query all digital test access connections. This step is optional.

***Note:*** Command syntax:

**`>EQUIP DTA QUERY ALL`**

**10** Verify connection integrity. This step is optional.

***Note:*** Command syntax:

**11** Release the digital test access connection.

***Note:*** Command syntax:

**>CONNECT equip# RLS**

**12** Release monitoring equipment.

***Note:*** Command syntax:

**>EQUIP DTA RESET equip#**

## Limits and feature interactions

The following is a list of digital test access limits and feature interactions:

- The Bd connections that stop to the DMS PH are not monitored.
- Office parameter MAX_DTA_ON_SWITCH in table OFCENG limits the number of digital test access connections active in the office.
- A maximum of six digital test access connections can be present in an XPM module at the same time.
- The system assigns channels on links between the loop monitoring point and the monitoring equipment. The system makes connections across peripheral and network modules between the assigned channels. These channels are not available for call processing when the digital test access connection is active.
- The user must be careful when the user adds or removes digital test access connections if a unit of the RCC2 is OOS. The system downloads digital test access connections as part of the XPM static data. If the user changes any static data, the change can impact the RCC2 as follows.
  - If the RCC2 is OOS, the system downloads all static data for the RCC2 as part of the RTS sequence. If the system downloads static data, recovery time can increase.
  - If a RCC2 RTS is in progress and static data was downloaded, the change to static data causes a static data mismatch. A static data mismatch occurs between CC and the RCC2. This static data mismatch does not allow the system to download ESA static data to the RCC2.
- Link arrangement of an LCME off of an RCC2 must not occur when digital test access connections are active on LCME lines.
- If the user removes a digital test access connection when an XPM is OOS, RTS time for the XPM can increase. The system downloads digital test access connection information as static data. If the user removes a digital test access connection when the XPM is OOS, static data must download

to the XPM. Static data must download to the XPM when the system returns the XPM to service.

> ***Note:*** The result of adding and removing digital test access connections on host XPMs is identical to the RCC2, except for ESA-related items.

## Layer 1 performance monitoring

Feature AF4842, RSC-S Layer 1 Performance Monitoring, provides the following layer 1 performance monitoring capabilities to the RCC2:

- Bd-channel logical loopback
- DCH performance OM. Refer to *Operational Measurements Reference Manual*
- layer 1 performance monitoring
- multipoint embedded operations channel (EOC)

### Bd-channel logical loopback

The Bd-channel logical loopback provides logical loopback between a DCH and the PH in the DPN. This loopback allows operating company personnel to place a logical terminal P-side link in loopback mode. This loopback

- helps to determine if a fault is present outside the DCH
- helps to determine if a fault is present in the DCH

This loopback is placed at the DCH end of the connection, not at the PH end. When the user implements the logical loopback for a logical terminal, the DCH loops back the test frame or test packet. The DCH loops back the test frame or test packet that the PH sends. Use the logical terminal identifier (LTID) for that logical terminal to loop back the test frame or test packet. The LTID of the logical terminal identifies a logical terminal.

The user can place a logical terminal P-side link in the logical loopback mode with command at the LTPISDN level of the MAP display. When this P-side link is in a logical loopback mode, the DCH makes sure the logical terminal cannot use that P-side link. The DCH makes sure the logical terminal cannot use that P-side link to establish new packet-switched virtual circuits (SVC). The DPN PH drops any active SVCs on the P-side link before the user places the P-side link in the loopback mode. Current permanent virtual circuits (PVC) on the P-side link are dropped when the P-side link is in the loopback mode.

The logical terminal can send LAPD frames when the P-side link is not in a logical loopback mode. The logical terminal sends LAPD frames when the DPN PH logically activates the P-side link. The P-side link leaves the loopback mode when the loopback timer for the logical timer expires. The P-side link also leaves the loopback mode when the user enters the

LTLOOPBK command. The user enters the LTLOOPBK command at the LTPISDN level of the MAP display. If the PH sends any LAPD frames on this LTID, the system loops the frames back to the PH.

> ***Note 1:*** The loopback timer is one parameter entered when the logical terminal P-side link is placed in the logical loopback mode.
>
> ***Note 2:*** This feature does not support attempts to logically loop back a logical terminal P-side link. A P-side link of a logical terminal stops on a DMS PH.

**Emergency stand-alone effects** In ESA, SWACT, and restart conditions, the result of loopback maintenance is not known. The user must remove all Bd-channel loopbacks before after these maintenance activities.

### Layer 1 performance monitoring

Layer 1 performance monitoring provides layer 1 monitoring capabilities for a 2B1Q loop. Layer 1 monitoring includes performance monitoring of cyclic redundancy checks (CRC), block error events, and the monitoring of loop conditions. Different types of loop conditions are synchronization, signal presence, and NT1 power status. Performance monitoring includes loop status monitoring on a per-loop and per-office basis. Performance monitoring includes the ability to set one of 16 performance monitoring threshold sets for a 2B1Q loop. This section describes monitoring capabilities.

**Monitoring capabilities** Monitoring capabilities include the ability to enable or disable reports of performance monitoring alerts and state alarms. The use of logs on a per-loop and per-office basis enables or disables reports of performance monitoring alerts and state alarms.

Loop state monitoring allows loops to report the following not normal 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:

- Define up to 16 performance monitoring threshold sets to generate alerts by subscriber loops. Each set contains a maximum of four thresholds:
  - errored seconds—hourly (1 to 4095)
  - errored seconds—daily (1 to 16383)
  - severely errored seconds—hourly (1 to 4095)
  - severely errored seconds—daily (1 to 16383)

  ***Note:*** An errored second is one or more CRC violations in a single direction of transmission during a 1-s interval. A severely errored second is three or more CRC violations in a single direction of transmission during a 1-s interval.

- Set one of 16 threshold sets defined before to any 2B1Q loop. Set threshold values provide performance monitoring thresholds on a per-loop basis. Performance monitoring thresholds are not limited to these set threshold values. Line card hardware receives threshold data. The system preserves the threshold information of each loop over a batch change supplement (BCS) application.

  ***Note:*** A threshold parameter for far-end block error and near-end block error can meet or exceed a specified threshold level. The threshold parameter can meet or exceed the threshold level on an ISDN line card. When this condition occurs, the system generates a log. *Near end* refers to the parameters collected for 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 time-of-day reference clock of each 2B1Q loop synchronizes with the master clock of the DMS-100 switch
- Detect and correct threshold and time-of-day values on line cards. A periodic per-line audit can detect and correct threshold and time-of-day value on line cards.
- The 2B1Q diagnostic functionality that the user implements 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 support 2B1Q lines off an RCC2.

Table BLMTHRSH helps to define threshold combinations for 2B1Q loops. Table LNTHRSH preserves threshold and alarm reporting data over a BCS application for 2B1Q and S/T loops. An entry for each 2B1Q loop with a no default threshold group or no default alarm reporting capability is present.

Table Office Variable (OFCVAR) controls the default alarm reporting state of entered loops. The following table OFCVAR parameters support 2B1Q lines off an RCC2:

- ISDN_PERFORMANCE_MON_ALARM
  - — controls performance monitoring log LINE131 reporting on a separate office basis
- ISDN_LOSS_OF_SYNC_WORD_ALARM
  - — controls layer 1 loss of synchronized report
- ISDN_LOSS_OF_SIG_NO_DGASP_ALARM
  - — controls layer 1 loss of signal without *dying gasp* by 2B1Q loops on a separate office basis reports
- ISDN_LOSS_OF_SIG_DGASP_ALARM
  - — controls layer 1 loss of signal with *dying gasp* by 2B1Q loops on a separate office basis reports
- ISDN_NT1_TEST_MODE_ALARM
  - — controls NT1 test mode by 2B1Q loops on a separate office basis reports
- ISDN_T_SYNC_LOST_ALARM
  - — controls T-SYNC by 2B1Q and S/T loops on an separate office basis reports

**Emergency stand-alone effects** Data changes that occur when the RSC-S is in ESA are not always present in the subtending nodes of the remote after a warm ESA exit. The system can restore communication with the host office. When this event occurs, the state of the RSC-S is equal to the RSC-S state present before the RSC-S entered ESA.

Table BLMTHRSH contains 16 PM threshold sets. These values normally do not change. These values normally do not change when the RSC-S is in ESA. If the system does not update the LCME data with changed data, the lines on the LCME use old threshold values.

Table LNTHRSH contains lines that do not use default values. If changes occur on a line when the RSC-S is in ESA, the line uses the old value of the line or default value. An audit corrects any mismatches between ISDN line cards and CC. Office parameters LCDI_SYNC_BURST and LCDI_SYNC_DELAY in table OFCENG determine the frequency of this audit. If the user sets office parameter LCDI_SYNC_BURST to zero, the user disables this audit. The user must not disable this audit. The system generates a LINE148 log if the audit detects and corrects any mismatches.

The following steps describe the procedure to restore all data in the RSC-S and the subtending nodes of the RSC-S. The data that changed during ESA, determines if operating company personnel can or cannot use this procedure to update the LCME data after warm exiting ESA. Operating company personnel must determine if the changed data requires an update in the LCME.

Use the following steps to update the LCME data after ESA warm exit:

**Procedure 8-2 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 receive a copy of the static data of the current CC. The inactive RSC-S unit is RTSed. The RTS updates static data.

**2** Perform a SWACT on the RSC-S. This SWACT switches activity between the active and inactive units. The unit that was active before, becomes inactive and is initialized. The system downloads static data.

**3** For each LCME connected to the RSC-S, busy and RTS each unit in order. When you busy and RTS each unit in order, the other unit handles call processing during the busy and RTS procedure. This process makes sure the system downloads new data to both units of the PM.

**4** The procedure is complete.

## Multipoint embedded operations channel

Multipoint EOC allows operating company personnel to determine the multipoint EOC configuration of a 2B1Q loop. Multipoint EOC also permits operating company personnel to perform diagnostics on 2B1Q lines with multipoint EOC. Multipoint EOC also allows operating company personnel to set and release a B1, B2, or 2B+D loopback at any multipoint EOC node.

The EOC is for the digital subscriber line to provide access to necessary operations functionality in the NT1. Two EOC configurations are possible:

- standard EOC
- multipoint EOC

The standard EOC defines the operations interface that 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 the NT1 uses point-to-point capability, the system directly connects the NT1 to the ISDN line card. The associated channel between the ISDN line card and the NT1 uses for OAM purposes, is the point-to-point EOC channel. The EOC channel conducts exercises similar to logical loopback on separate B-channels or the complete 2B+D loop.

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 basic rate 2B+D information to transport over a T1 span line. The EOC signals pass without changes from a digital subscriber line to a digital carrier facility by the additional nodes. Signals pass without changes from a digital carrier facility to a digital subscriber line.

The additional nodes can monitor information on an ISDN line card and store different types of errors. Enhanced EOC messaging allows data transfer to occur between these nodes and the ISDN line card. 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. One to six multipoint EOCs can be present on a 2B1Q line.

> ***Note:*** The point-to-point EOC differs from the multipoint EOC. A multipoint EOC loopback can occur at different points in the loop.

Multipoint EOC provides the following capabilities:

- a table that allows operating company personnel to list all 2B1Q loops with multipoint EOC nodes. The name node also refers to line unit.
- the ability to determine the multipoint EOC configuration of the loop
- enhanced SUSTATE and QLEN commands to display multipoint EOC configurations and state information
- the ability to perform diagnostics on 2B1Q lines with multipoint EOC line units
- the ability to set and release a B1, B2, or 2B+D loopback at any multipoint EOC node

A 2B1Q loop has multipoint capability when table LNMPEOC contains the LEN of the 2B1Q and the number of nodes in the loop. Table LNMPEOC supports 2B1Q lines off an RCC2. Multipoint EOC messages from the LCME automatically enter data in table LNMPEOC. The user only reads table LNMPEOC. The LENs that support multipoint EOC are in 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 on a loop, the LCME detects this change. The LCME reports this change to the computing module. An audit in the LCME reports this detection of hardware. The audit cycles through all 2B1Q loops on an LCME and checks for the occurrence of multipoint EOC nodes. When the computing module receives this message, the system validates the data. Table LNMPEOC receives a tuple. The system generates a LINE149 log that indicates the loop contains multipoint EOC nodes.

When a change to the multipoint EOC configuration of a loop occurs, the LCME informs the computing module. The system applies the change in table LNMPEOC. The system generates log LINE149. The LCME performs a second audit to verify multipoint EOC accuracy between the LCME and the computing module.

The time required to poll a multipoint EOC loop depends on the location of the loop in the LCME. With a logical drawer equipped with 2B1Q loops, the audit can take up to 8 min to detect a change in the multipoint EOC configuration. The user must spread the 2B1Q loops evenly across all logical drawers. This action allows the user to report any 2B1Q loops 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 ESA entry at ESA exit. The loop remains manual busy. The user can add or delete multipoint EOC line units from a LEN when the RSC-S is in ESA. This action affects line diagnostics and the displayed output from the SUSTATE command. The QLEN command receives information from the CC. The QLEN command is not affected.

The system can set and release different loopbacks. The system sets and releases different loopbacks at a multipoint EOC line unit. The following four figures contain examples of the MAP display response to these system actions.

The following figure is an example of the LTPdata MAP display of an ISDN loop. A B1 loopback is set at multipoint EOC line unit 3. The user issues the following command to set the loopback:

**>LOOPBK mplu 3 b1**

**Figure 8-2 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
   MYMAP
 Time 10:25>
```

The following figure is an example of the LTPdata MAP display of an ISDN loop. A B1 loopback is set at multipoint EOC line unit 3. The user issued a loopback query. The user enters the following command to query this loopback:

**>LOOPBK query**

**Figure 8-3 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
   MYMAP
 Time 10:25>
```

The following figure is an example LTPdata MAP display of an ISDN loop. On this ISDN loop, the user releases a B1 loopback. The user releases a B1 loopback from multipoint EOC line unit 3. The user enters the following command to release this loopback:

**>LOOPBK rls**

**Figure 8-4 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
   MYMAP
 Time 10:25>
```

The following figure is an example LTPdata MAP display of an ISDN loop. The user set a 2B+D loopback at multipoint EOC line unit 6. The user enters the following command to set this loopback:

**>LOOPBK mplu 6 bbd**

**Figure 8-5 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        2B+D     Loopback activated at MPLU 6
 12 Next_
 13
 14
 15
 16
 17
 18
   MYMAP
 Time 10:25>
```

## Extended peripheral modules diagnostics history

Feature AF5006, Extended Peripheral Modules Diagnostics History, provides a resident database to record selected diagnostic results of XPMs. This feature captures diagnostic results that indicate the sanity of the XPM. The data in this database can affect DMS switch maintenance. This database provides operating company personnel with MAP command access to data on the accumulated results of diagnostics. Operating company personnel maintain data in the history database over warm, cold, and reload restarts. This feature is not optional. This feature is part of software package New Peripheral Maintenance (NTX270AA).

An XPM can perform diagnostics to test the functionality of the hardware of the XPM. Diagnostics can run as a result of CC or XPM requests. Diagnostics that the XPM performs are normally part of XPM audits. Operating company personnel 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 data includes the number of failures that occur and which cards are defective. The MAP commands display data for a specified XPM or for all XPMs that this feature supports. The two sets of data available through the use of MAP commands are short-term failure counts and long-term failure counts.

**Short-term failure counts** Short-term failure counts accumulate from the last time a unit correctly gains activity. This data can help operating company personnel direct maintenance activities and support organizations for outage analysis. If an outage occurs, you can include the XPM diagnostic history data for that peripheral with other important data.

**Long-term failure counts** Long-term failure counts accumulate from the last time the system resets long-term failure counts. Manual action or BCS application resets long-term failure counts. Long-term failure counts last for the life of the BCS. The system channels this data back to the design groups to provide data for additional diagnostic system improvements.

The functionality described in this feature applies to SuperNode and Bell-Northern Research (BNR) Reduced Instruction Set Computing platforms. For the NT-40 platform, the diagnostic results and suspect cards captured are smaller than the SuperNode or BNR Reduced Instruction Set Computing platforms. The NT-40 data store requirements cause this restriction.

### Description of diagnostics

Different PMs contain different hardware. Different diagnostics run on each type of PM. Approximately 75 diagnostics are available for XPMs. Only a subset of the 75 diagnostics run on any specified PM. This feature captures failures for the following diagnostics:

- InSv
- OOS
- single diagnostic
- facility audit
- other audits

Each diagnostic involves zero or more cards. The XPM determines the number of cards. The CC can generate card lists for display at the MAP terminal or in logs. The list of card failures includes any card involved in an XPM diagnostic or audit and reported to the CC.

> ***Note:*** Feature AF5006 records only those cards indicated by an XPM and not cards that the CC generates.

Diagnostics can run as a group in a set of diagnostics, or run as a single test. Defined sets are

- InSv tests
- OOS tests
- facility audit tests

- mate diagnostics
- read-only memory (ROM) diagnostics

### In-service and out-of-service tests

The InSv and OOS tests are tests that run as a result of CC requests. The XPM runs a set of diagnostics when the CC requests to test an XPM unit. The CC uses the following procedures:

- manual TST command
- manual or systems RTS
- SWACT
- BSY
- REx commands

The diagnostics included in the set depend on the PM type of the XPM and the state of the XPM unit. The diagnostics included in the set also depend on 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 CC receives the results of separate diagnostics and a final result for the complete set of InSv diagnostics. 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 problems occur, the CC receives a message that identifies the problem and with a list of defective cards.

### Mate diagnostics

If one unit loses communications, the mate unit can diagnose the unit. The mate unit sends the results to the CC .

### Read-only memory diagnostics

If the XPM is at ROM level, the user can run a set of read-only memory (ROM) diagnostics.

This feature does not capture failures. This feature does not capture cards that mate and ROM diagnostics use. For each diagnostic, the system generates a card list or log at the MAP terminal. The diagnostic history does not contain a record of a card list or diagnostic failure.

The following table describes diagnostics that this feature supports. The diagnostics are classified as solicited, audit, or both.

**Table 8-12 Diagnostic supported (Sheet 1 of 2)**

| Diagnostic name | Description | Type (solicited, audit, or both) |
|---|---|---|
| AB DIAG | A/B Bits | solicited |
| AMUDIAG | NT6X50 External Loop | solicited |
| CSD1 DG | C-Side DS-1 | solicited |
| CMRDIAG | CLASS modem resource (CMR) card | both |
| CONT DG | Continuity Diag | solicited |
| CSMDIAG | CSM 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 HDLC Diag | solicited |
| ISPSPHI | ISP Speech Bus Internal | solicited |
| ISPSPHF | ISP Speech Bus Full | solicited |
| MSGDIAG | NT6X69 Messaging Card | solicited |
| MSG IMC | IMC Link | both |
| MX76 MSG | NTMX76 Messaging Card | solicited |
| PADRING | NT6X80 Pad and Ring | solicited |
| PARITY | Parity Audit | audit |
| PS LOOP | P-Side Loops | solicited |
| PS SPCH | P-Side Speech Links | solicited |
| RCC FMT | Remote Formatter | solicited |

**Table 8-12 Diagnostic supported (Sheet 2 of 2)**

| Diagnostic name | Description | Type (solicited, audit, or both) |
|---|---|---|
| SCM AB | NT6X81 A/B Bits | solicited |
| SCM MSG | Subscriber carrier module (SCM) A/B DDL Message | 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 |

The following table lists the cards that this feature supports.

**Table 8-13 Supported cards (Sheet 1 of 2)**

| Card name | Description |
|---|---|
| NT6X40 | Net Interface Link |
| NT6X41 | Speech Bus Formatter and Clock |
| NT6X42 | CSM |
| NT6X44 | Time switch and A/B Bit Logic |
| NT6X45 | Master Signaling File Processor |
| NT6X46 | Signaling Processor (SP) Memory |
| NT6X47 | Master Processor (MP) Memory |
| NT6X48 | DS30A Interface |
| NT6X50 | DS-1 Interface |
| NT6X55 | DS-0 Interface |
| NT6X62 | STR Card |
| NT6X69 | Messaging Card |
| NT6X70 | Continuity Card |

**Table 8-13 Supported cards (Sheet 2 of 2)**

| Card name | Description |
|---|---|
| NT6X72 | Remote Cluster Controller (RCC) Host Link Formatter |
| NT6X78 | CMR |
| NT6X79 | Tone Generator |
| NT6X80 | SCM Pad and Padring |
| NT6X81 | SCM A-B Bit |
| NT6X85 | SCM DS-1 |
| NT6X86 | SCM message |
| NT6X92 | UTR |
| NT8X18 | Subscriber Carrier Module-100S Remote (SMS-R) C-Side DS30A Interface |
| NTBX01 | ISP |
| NTBX02 | DCH |
| NTMX76 | CSM and MSG Card |
| NTMX77 | 68020 Processor (Unified Processor [UP]) |

## How diagnostics are stored

This feature stores diagnostic results in the form of counters. Each unit of each peripheral this feature supports has a set of counters. The unit keeps the counters for diagnostic failures and defective cards. Each unit keeps three types of counters:

- diag

  the number of times a diagnostic fails
- card

  the number of times the test reports a card as defective
- diag and card combination

  the number of times a diagnostic and card combination occurs

The system keeps two subcounters for each of the three counters. These subcounters are a short-term failure counter and a long-term failure counter. Short-term failure counters are reset often during the BCS cycle. Long-term failure counters record the diagnostic history of a peripheral or office over a long period of time. The QUERYPM DIAGHIST RESET command or a BCS application resets long-term failure counters.

A test failure can report one or more diagnostic failures and zero or more cards that are defective. A diagnostic that runs in one unit can report cards in that unit and the mate unit of the first unit. Specified diagnostics report failures on the mate unit. When a diagnostic fails, the diagnostic sends the failure information to the history database.

### Resets and time stamps

The history database stores the following 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 are set to zero internally for each unit when the unit correctly gains activity. An RTS or SWACT command can cause this gain of activity. Long-term counters are reset for each node from an XPM posted at the MAP terminal. When long-term counters are reset, the system generates a log with a summary of the data collected for that node before the reset.

A BCS application resets all diagnostic history data. This data includes short- and long-term failure counts. The system does not generate a log with long-term failure counts.

Diagnostic tests for the RSC-S and RSC-S with ISDN occur on the following components:

- RCC2
- lines
- DRCC2
- RCC2 with ISDN
- ISDN lines

## Remote cluster controller 2

Diagnostic tests for the RCC2 occur when the user issues the TST command.

### Lines

When the user performs a test on a subscriber line, the user must enter the command more than one time. The user must enter the command more than one time to make sure DS-1 links do not affect the results.

### Dual remote cluster controller 2

Diagnostic tests for DRCC22 occur when the user issues the TST command at the IRLINK level.

### Remote cluster controller 2 with ISDN

Diagnostic tests for the RCC2 occur when the user issues the TST command.

### ISDN lines

When the user performs a test on a subscriber line, the user must enter the command more than one time. The user must enter the command more than one time to make sure DS-1 links do not affect the results.

## 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

Test tools provided for XPMs apply for RSC-S components.

### Real-time performance monitoring for NTMX73AA and NTMX76AA

Feature AF4903, Real-Time Time Performance Monitoring for NTMX73AA and NTMX76AA, supplies real-time performance information about the Pulse Code Modulation (PCM) Signaling circuit card (NTMX73AA). Feature AF4903 supplies real-time performance information about the optional Message Processor and Tone Generator circuit card (NTMX76AA). This information reflects real-time use in each circuit card.

The performance tool provides operating company personnel with performance and activity information for posted peripherals. The data appears at the performance level of the MAP display, sublevel PMACT. The PMACT sublevel provides information that indicates processor activity in the posted peripheral. The PMACT sublevel divides the real time used into two groups:

call processing occupancy and low priority background. These two groups apply to the UP and EISP.

At the PMACT sublevel, information for the NTMX73AA circuit card appears as the amount of time, in percent. Information for the NTMX73AA circuit card appears as the amount of time spent in the interrupt level, call processing occupancy. Information for the NTMX73AA circuit card appears as the amount of time spent in the interrupt level during the last minute. Information for the NTMX76AA circuit card appears as the amount of time, in percent, used to communicate with the HDLC protocol during the last minute.

Information that appears for the UP and EISP is different than the real time used for the NTMX73AA and NTMX76AA processors. The real time used for the NTMX73AA and NTMX76AA is not classified in groups. For both circuit cards, the average time provided is for the elapsed time from the start of the recording. If the elapsed time exceeds 15 min, the average time provided is for the last 15 min.

An example of the command that monitors the performance in RCC2 unit 1 follows:

**`>MAPCI;MTC;PM;POST RCC2 1;PERFORM;PMACT;START`**

The following figure is an example of the display for the command before.

**Figure 8-6 Example of an RCC2 MAP display**

```
  CM     MS     IOD     NET     PM     CCS     Lns     Trks     Ext     APPL
   .     .       .       .      .       .       .       .        .       .



 PMAct                     Sysb  Manb  Offl  Cbsy  ISTb  INSv
  1 Quit        PM            0     0     0     0     0     5
  2 Strt        RCC2          0     0     0     0     0     1
  3 Strtlog
  4 Stoplog     RCC2   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
 OPERATOR
 Time 09:34
```

An example of the command that monitors performance in line trunk controller (LTC) unit 1 follows:

**>MAPCI;MTC;PM;POST LTC 1;PERFORM;PMACT;START**

The following figure is an example of the display for the previous command.

**Figure 8-7 Example of an LTC MAP display**

```
 CM    MS    IOD    NET    PM    CCS    Lns    Trks    Ext    APPL
  .    .      .      .     .      .      .      .       .      .



PMAct                     Sysb  Manb  Offl  Cbsy  ISTb  INSv
 1 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
OPERATOR
Time 09:34
```

# 9 Troubleshooting chart

This chapter includes tables for troubleshooting conditions that generate alarms in the Remote Switching Center-SONET (RSC-S). This chapter contains separate tables for each RSC-S component. These components include:

- the remote cluster controller 2 (RCC2) or RCC2 with integrated services digital network (ISDN),
- line concentrating modules (LCM) or enhanced line concentrating modules (LCME)
- remote maintenance module (RMM)

The following table describes possible causes and actions to correct and clear LCM or LCME alarms.

**Table 9-1 RSC-S alarm clearing for an LCM or an LCME (Sheet 1 of 2)**

| Alarm condition | Possible cause | Action |
|---|---|---|
| Critical | The indicated number of LCM (or LCME) units is system busy (SysB) or central-side busy (CBsy). | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME critical alarm.<br>2. Check for peripheral module (PM), ISDN, or LINE logs that indicate other problems in the LCM or LCME.<br>3. Check operational measurements (OM) that indicate problems in the LCM or LCME. |

**Table 9-1 RSC-S alarm clearing for an LCM or an LCME (Sheet 2 of 2)**

| Alarm condition | Possible cause | Action |
|---|---|---|
| | Both LCM or LCME ringing generators (RG) are in-service trouble (ISTb). | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME critical alarm.<br>2. Check for PM, ISDN, or LINE logs that indicate other problems in the LCM or LCME.<br>3. Check for OMs that indicate problems in the LCM or LCME. |
| Major | The indicated number of LCM (or LCME) units is ISTb or SysB. | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME major alarm.<br>2. Check for PM, ISDN, or LINE logs that indicate other problems in the LCM or LCME.<br>3. Check for OMs that indicate problems in the LCM or LCME. |
| Major (continued)Mm | One of the two RGs in an LCM (or LCME) is ISTb. | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME RG major alarm.<br>2. Check for PM, ISDN, or LINE logs that indicate other problems in the LCM or LCME.<br>3. Check for OMs that indicate problems in the LCM or LCME. |
| Minor | The indicated number of LCM or LCME units is ISTb. | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME minor alarm.<br>2. Check for PM, ISDN, or LINE logs that indicate other problems in the LCM or LCME.<br>3. Check for OMs that indicate problems in the LCM or LCME. |

The following table describes possible causes and actions to correct and clear RCC2 or RCC2 with ISDN alarms.

**Table 9-2 RSC-S alarm clearing for an RCC2 or an RCC2 with ISDN (Sheet 1 of 2)**

| Alarm condition | Possible cause | Action |
|---|---|---|
| Critical | The RCC2 (or RCC2 with ISDN) units are SysB or CBsy. A loss of subscriber service occurred. | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCC2 or RCC2 with ISDN critical alarm. When necessary, go to step 2.<br>Refer to *Recovery Procedures*. Follow the procedures to recover an RCC2.<br>2. Check for any emergency stand-alone (ESA) and PM logs that indicate other problems in the RCC2. Check logs ESA101-ESA109, PM181, and PM171.<br>3. For dual RCC2 (DRCC2), check for PM logs associated with dual ESA (DESA). Check logs PM221-PM223, and PM189.<br>4. f ISDN is present, check for ISDN logs or LINE logs that indicate other problems in the RCC2. Check logs ISDN100-ISDN109, and LINE131.<br>5. Check for OMs that indicate problems in the RCC2. |
| | The RCC2 is in ESA. There is no communication to the CC in the host switch. | Proceed as follows:<br>1. Refer to *Recovery Procedures*. Follow the procedures to recover an RCC2 in ESA.<br>2. Check for ESA and PM logs that indicate other problems in the RCC2. Check logs ESA101-ESA109, PM181, and PM171.<br>For DRCC2, check for PM logs associated with DESA. Check logs PM221-PM223, and PM189.<br>3. Check for OMs that indicate problems in the RCC2. |

**Table 9-2 RSC-S alarm clearing for an RCC2 or an RCC2 with ISDN (Sheet 2 of 2)**

| Alarm condition | Possible cause | Action |
|---|---|---|
| Major | The indicated number of RCC2 units is CBsy or SysB. Subscriber service is not affected. When both RCC2s or units fail, a loss of subscriber service occurs. | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCC2 major alarm.<br>2. Check for PM logs that indicate other problems in the RCC2.<br>3. Check for OMs that indicate problems in the RCC2. |
| Minor | The indicated number of RCC2 units is ISTb. Subscriber service does not change. | Proceed as follows:<br>1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCC2 minor alarm.<br>2. Check for PM181 and PM128 logs that indicate other problems in the RCC2.<br>3. Check for OMs that indicate problems in the RCC2. |

The following table describes possible causes and actions to correct and clear RMM alarms.

**Table 9-3 RSC-S alarm clearing for an RMM**

| Alarm condition | Possible cause | Action |
|---|---|---|
| Major | The indicated number of RMM units is SysB. | Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RMM major alarm. |
| Minor | The indicated number of RMM units is CBsy. | Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RMM minor alarm. |

# 10 Advanced troubleshooting procedures

This chapter describes advanced troubleshooting procedures for the RSC-S.

## Advanced trouble locating procedures

Maintenance personnel use advanced troubleshooting procedures when normal troubleshooting procedures do not clear a problem. You can perform a PMRESET procedure in a remote cluster controller 2 (RCC2) more than one time. If an error message occurs after each PMRESET attempt, you must use advanced troubleshooting procedures. When 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 pass and fail. Feature AF5008 is the XMS-based Peripheral Module (XPM) Routine Exercise (REX) Control and Trouble Notification Improvements. The Bigfoot utility maintains information on error logs that occurred as a result of diagnostics that failed. This feature improves debugging attempts. The diagnostics code maintains a results graph for each set of diagnostics that runs. The results graph contains data on each diagnostic test in a diagnostics run. 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: PFNNNNNNNNNNNNNNNNNN
```

## Powering up the RSC-S

Use this procedure when you take RSC-S components out-of-service (OOS) cut the power to these 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 RCC2.

Use the following procedure to power up an RSC-S.

**Procedure 10-1 Power-up procedure**

***At the RSC-S***

**1** Begin the RSC-S power-up procedure. Post the C-side peripheral of the RCC2 and RTS the message links to the RCC2. The user must normally busy these links when the user powers down the RSC-S.

**2** Set the power switch to ON for one of the RCC2 units.

**3** Set the reset button of this RCC2 unit, flip the associated circuit breaker up and release the circuit breaker (CB) at the same time. 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 steps 2 and 3 for the other RCC2 unit.

**5** Post the correct RCC2. The RCC2 must be offline (OFFL).

**6** Busy both units of the RCC2.

**7** Load one of the RCC2 units. List the appropriate device like S01DPMLOADS. For example:

```
>LOADPM UNIT unit_no LOCAL IMAGE
```

**8** Return the unit to service. Do not use parameters to perform this action. This step makes sure that the RTS sequence includes diagnostics.

**9** Repeat steps 7and 8 for the other RCC2 unit.

**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 power switch of one of the LCME or LCM units to ON.

**12** Begin the second part of the RSCE power-up procedure. Set the frame supervisory panel (FSP) CB. This CB is part of one of the LCME or LCM units and must be set in the ON position. 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.

**13** Repeat steps 11 and 12 for the other LCME or LCM unit.

**14** Post the first LCME or LCM.

**15** Load one of the LCME or LCM units. Make sure you list the correct device like S01DPMLOADS. For example:

```
>LOADPM UNIT unit_no CC
```

**16** Return the unit to service. Do not use parameters to perform this action. This step makes sure that the RTS sequence includes diagnostics.

**17** Repeat steps 15 and 16 for the other LCME or LCM unit.

**18** Repeat steps 11 through 17 until the system returns all LCME and LCM units to service. This action completes the second part of the RSC-S power-up procedure.

**19** Begin the third part of the RSC-S power-up procedure. Set the power switch of the RMM to ON.

**20** Set the reset button on the NT2X09 power converter of this RMM unit, and flip the CB that connects to the RMM up at the same time. 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.

**21** Load the RMM unit. Make sure you list the correct device like S01DPMLOADS. For example:

**>LOADPM**

**22** RTS the RMM. Do not use parameters. This step makes sure that the RTS sequence includes diagnostics.

**23** Repeat steps 19 through 22 if the RSC-S uses two RMMs.

**24** Post the RCC2 and RTS all P-side DS-1 links. P-side DS-1 links must be busy when the RSC-S powers down.

**25** The procedure is complete.

# Powering down the RSC-S

An RSC-S is a separate switching system. Normally, you must not power the RSC-S down. If you power down the RCC2, loss of communication with other offices occurs. When a power-down procedure is necessary, use the following procedure.

## Power-down procedure

***At 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 RCC2 over P-side trunks.

**2** Busy all P-side peripheral modules (PM) off the RCC2. Modules to busy include RMMs and line concentrating devices (LCD).

**3** Offline all P-side PMs in the RCC2. Modules to offline include RMMs and the LCD.

**4** Busy all P-side links off of the RCC2. Links to busy include DS-1 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 RCC2.

**7** Offline the inactive unit of the RCC2.

**8** Post the associated line trunk controller (LTC), and busy the message link that connects to the busied RCC2 unit.

**9** Power down the inactive unit of the RCC2. Set the power converter of the unit to OFF.

**10** Busy the active unit of the RCC2. Override any warning.

**11** Offline the active unit of the RCC2.

**12** Post the associated LTC. Busy the message link that connects to the busied RCC2 unit.

**13** Power down the previously active unit of the RCC2. Set the power converter of the unit to OFF.

**14** This procedure is complete.

# 11 RSC-S routine maintenance procedures

This chapter contains routine maintenance procedures for the remote switching center-synchronous optical network (SONET) (RSC-S). 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

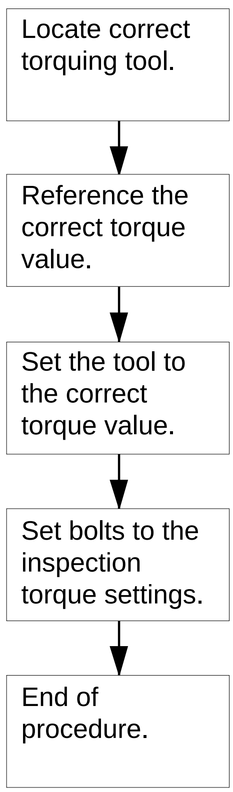
This procedure contains a summary flowchart as an overview of the procedure. Follow the steps to perform this procedure.

## Checking torque on grounding bolts (continued)

**Summary of checking torque on grounding bolts**

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.



# 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 inspection torque specification.

**7** Return the T9958 torque wrench to the appropriate location.

**8** 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

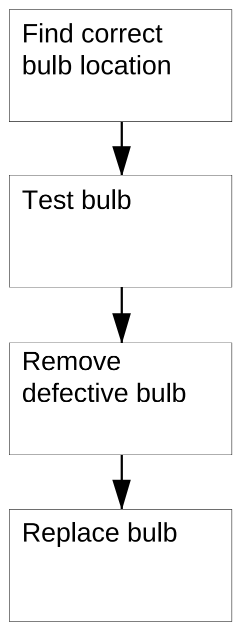
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

# Inspecting and changing bulbs (continued)

### Summary of inspecting and changing bulbs

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.



# Inspecting and changing bulbs (end)

### 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 6 |

**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 bulb. Go to step 7.

**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 every two weeks.

## Common procedures

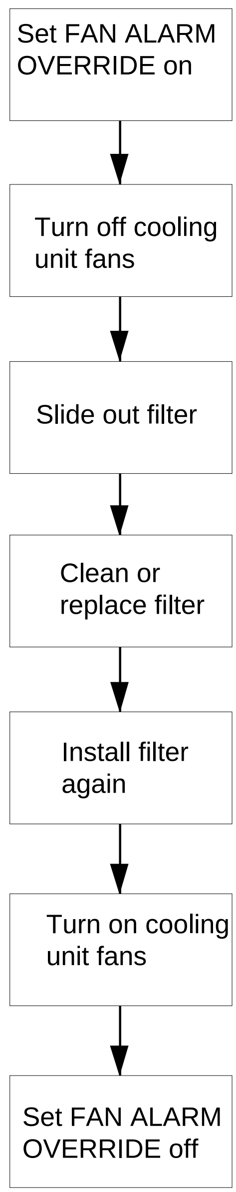
There are no common procedures.

## Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

## Inspecting cooling unit filters (continued)

### Summary of Inspecting cooling unit filters




This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

# **Inspecting cooling unit filters** (continued)

### Inspecting cooling unit filters

***At your Current Location***

**1**

**DANGER**
**Rotating fan blades**
Do not reach more than 6 in. beyond the upper lip of the air-intake grill. You risk injury because your fingers can contact the rotating blades of the cooling unit fans.

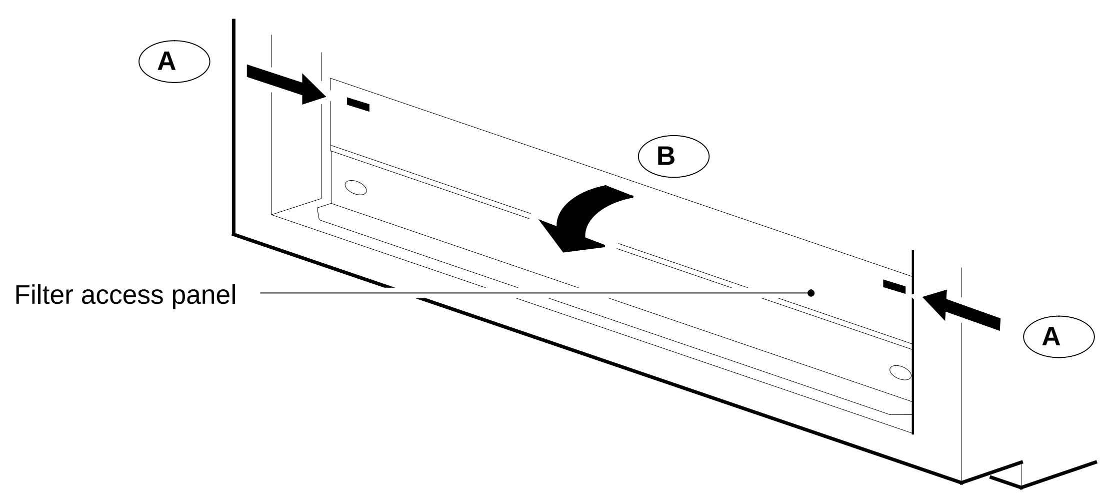
On the frame supervisory panel (FSP), set the FAN ALARM OVERRIDE switch to ON.

**2**

**DANGER**
**Prevent overheating**
Do not leave the cooling unit fans off for longer than 30 min.

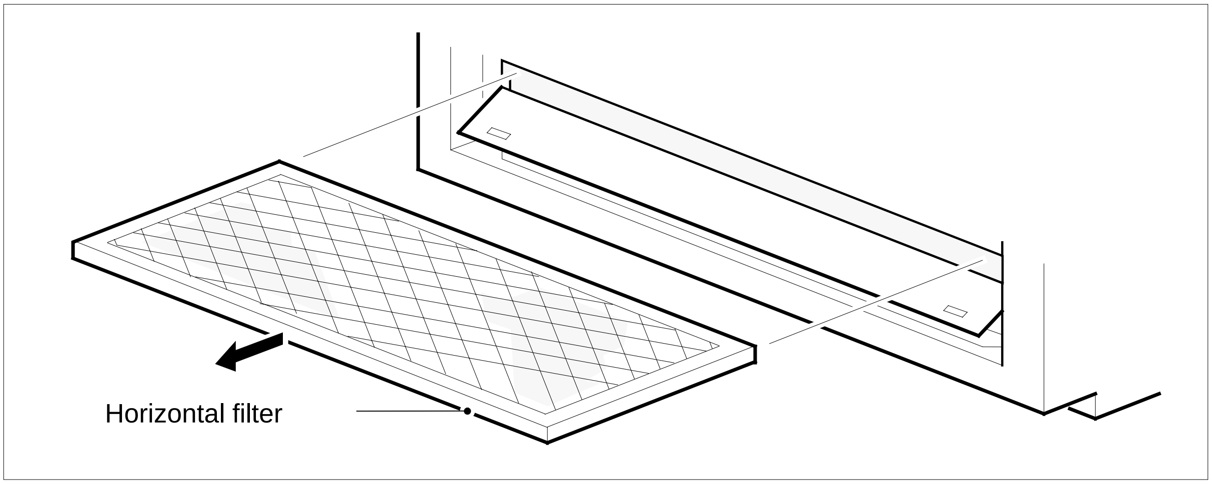
To make sure the cooling unit fans are off, remove fuses F03 and F04 on the faceplate of the FSP

**3** To open the filter access panel, slide the catches toward each other (A) and swinging the panel downward (B). The filter access panel is at the bottom of the cabinet.



## 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** Refer to the following table to determine the next step.

| If filter part number | Do |
|---|---|
| is A0344437 | step 8 |
| is P0558302 | step 11 |
| is P0623539 | step 13 |

**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** Vacuum the filter in an area outside the room that contains the switching system.

**12** Install the filter in the cabinet. Go to step 16.

**13** Wash the filter in soap and water.

## Inspecting cooling unit filters (end)

**14** Before you install the filter again, rinse and dry the filter completely.

**15** Install the filter in the cabinet.

**16** Replace the fuses that you removed in step 2.

**17** On the front of the FSP, set the FAN ALARM OVERRIDE switch to OFF.

**18** The procedure is complete.

# Inspecting spare fuse holders

## Application

Use this procedure to inspect spare fuse holders. Fill the fuse holders again as needed.

## Interval

Perform this procedure in one week intervals.

## Common procedures

There are no common procedures.

## Action

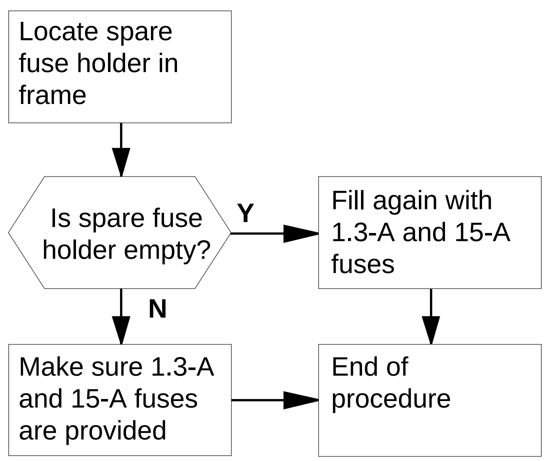
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

# Inspecting spare fuse holders (continued)

### Summary of Inspecting spare fuse holders

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.



## 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 alarm battery supply (ABS) feeds

**4** The procedure is complete.

# Replacing cooling unit filters

## Application

Use this procedure to replace cooling unit filters in the following cabinetized frames:

- NTMX89FA, Cabinetized Remote Switching Center/Line Concentrating Module (CRSC/LCM)
- NTMX89FB, Cabinetized Remote Switching Center/Integrated Services Digital Network (CRSC/ISDN)
- NTMX89FC, Cabinetized Extension Module (CEXT)
- NTRX30CA, Cabinetized Line Concentrating Equipment (CLCE)
- NTRX30DA, Cabinetized Line Module ISDN (CLMI)
- NTRX34BA, Cabinetized Miscellaneous Equipment (CMIS)
- NTRX31AA, Cabinetized Power Distribution Cabinet (CPDC)

## 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

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

Set FAN ALARM OVERRIDE on

↓

Turn off cooling unit fans

↓

Slide out filter

↓

Clean the cooling unit

↓

Replace filter

↓

Turn on cooling unit fans

↓

Set FAN ALARM OVERRIDE off

## Replacing cooling unit filters (continued)

### Replacing cooling unit filters

***At your Current Location***

**1**

> **DANGER**
> **Rotating fan blades**
> Do not reach in more than 6 in. beyond the upper lip of the air-intake grille. If you reach in beyond 6 in., your fingers can contact the rotating blades of the cooling unit fans.

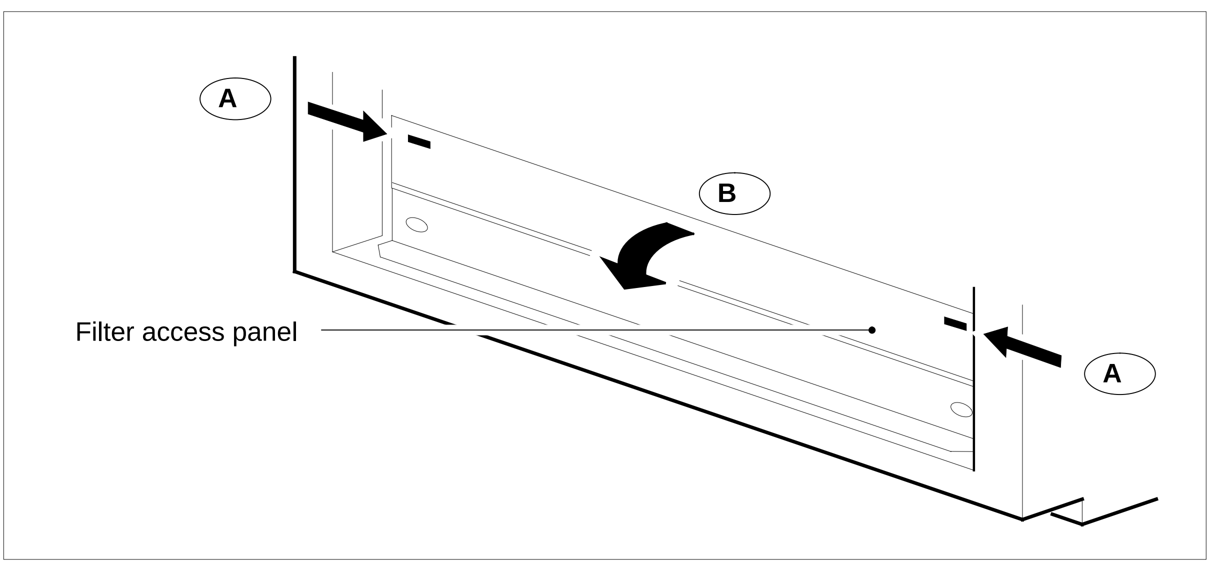
On the frame supervisory panel (FSP), set the FAN ALARM OVERRIDE switch to ON.

**2**

> **DANGER**
> **To prevent overheating**
> Do not leave the cooling unit fans off for more than 30 min.

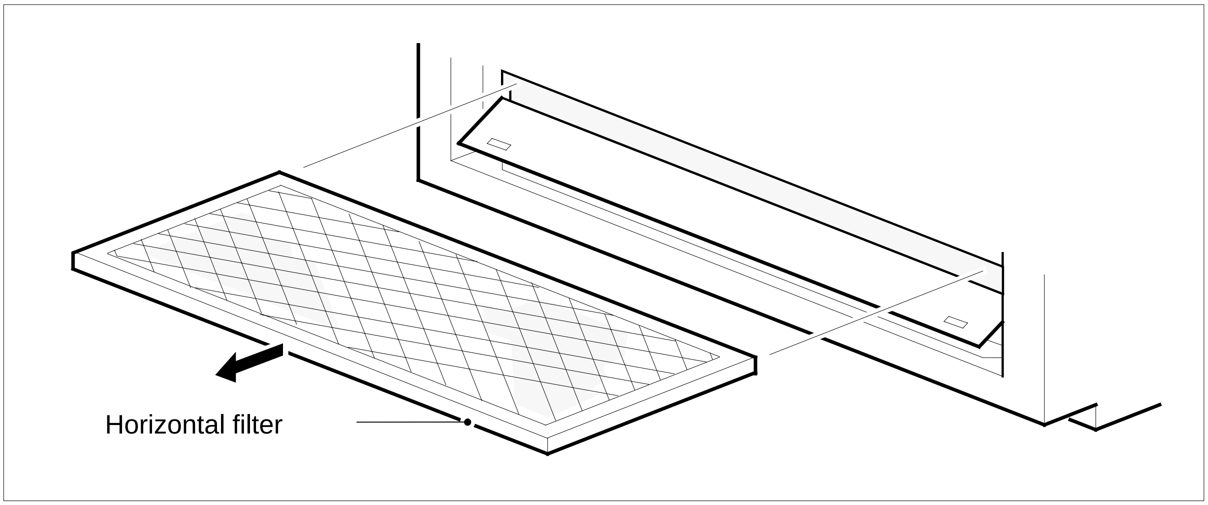
To make sure the cooling unit fans are OFF, remove the fuses F03 and F04 on the faceplate of the FSP.

**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).




**4** Slide the filter out of the cabinet.

## **Replacing cooling unit filters** (end)




**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.

# Replacing fan unit assemblies in the FSP

## Application

Use this procedure to replace defective fan unit assemblies (NTMX2658) in the following cabinetized frames:

- NTMX89AA/BA, Cabinetized Remote Switching Center (CRSC)
- NTMX88AA/BA, Cabinetized Extension Module (CEXT)
- NTRX30AA, Cabinetized Line Concentrating Equipment (CLCE)
- NTRX30BA, Cabinetized Line Module ISDN (CLMI)

## 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

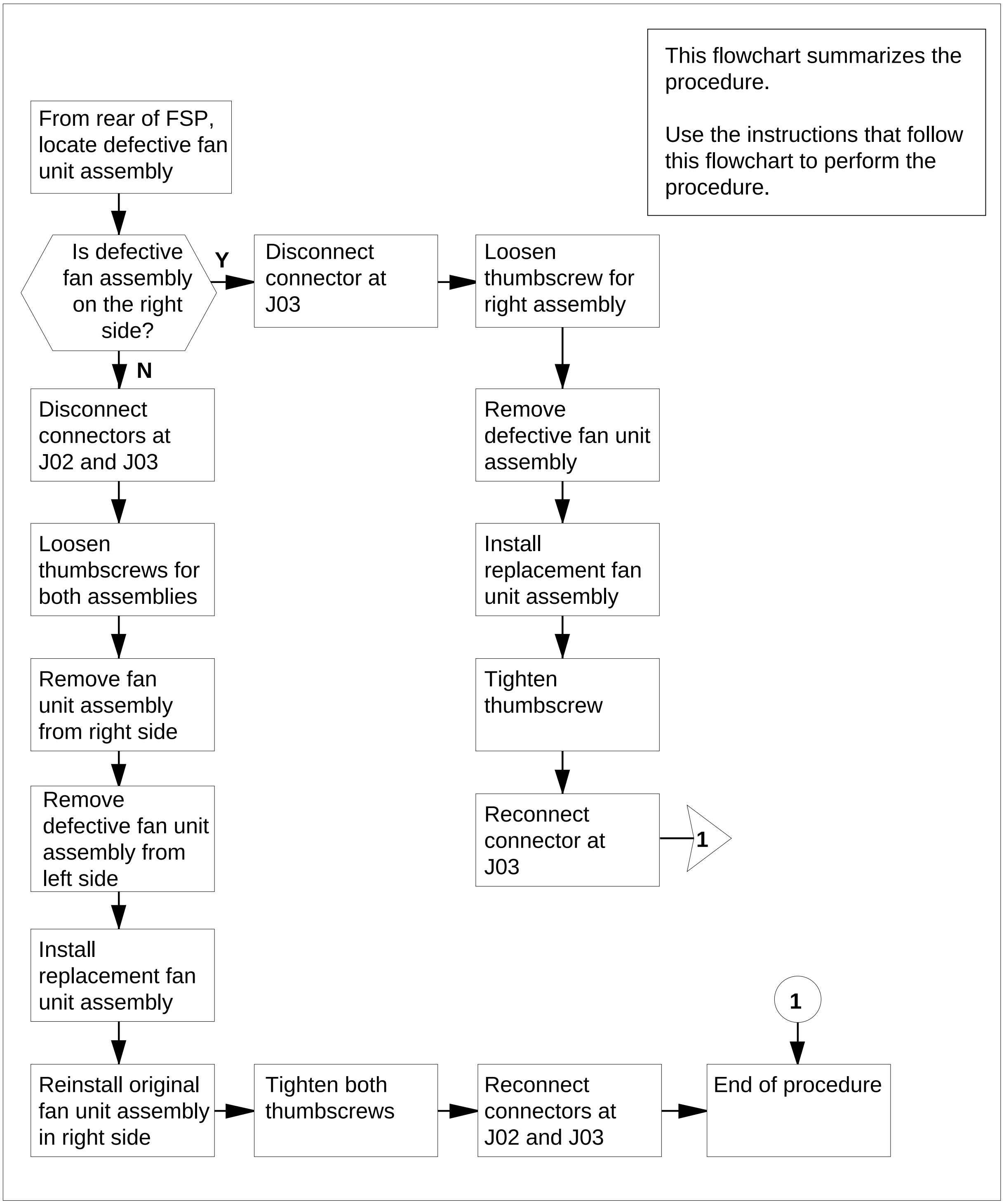
There are no common procedures.

## 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



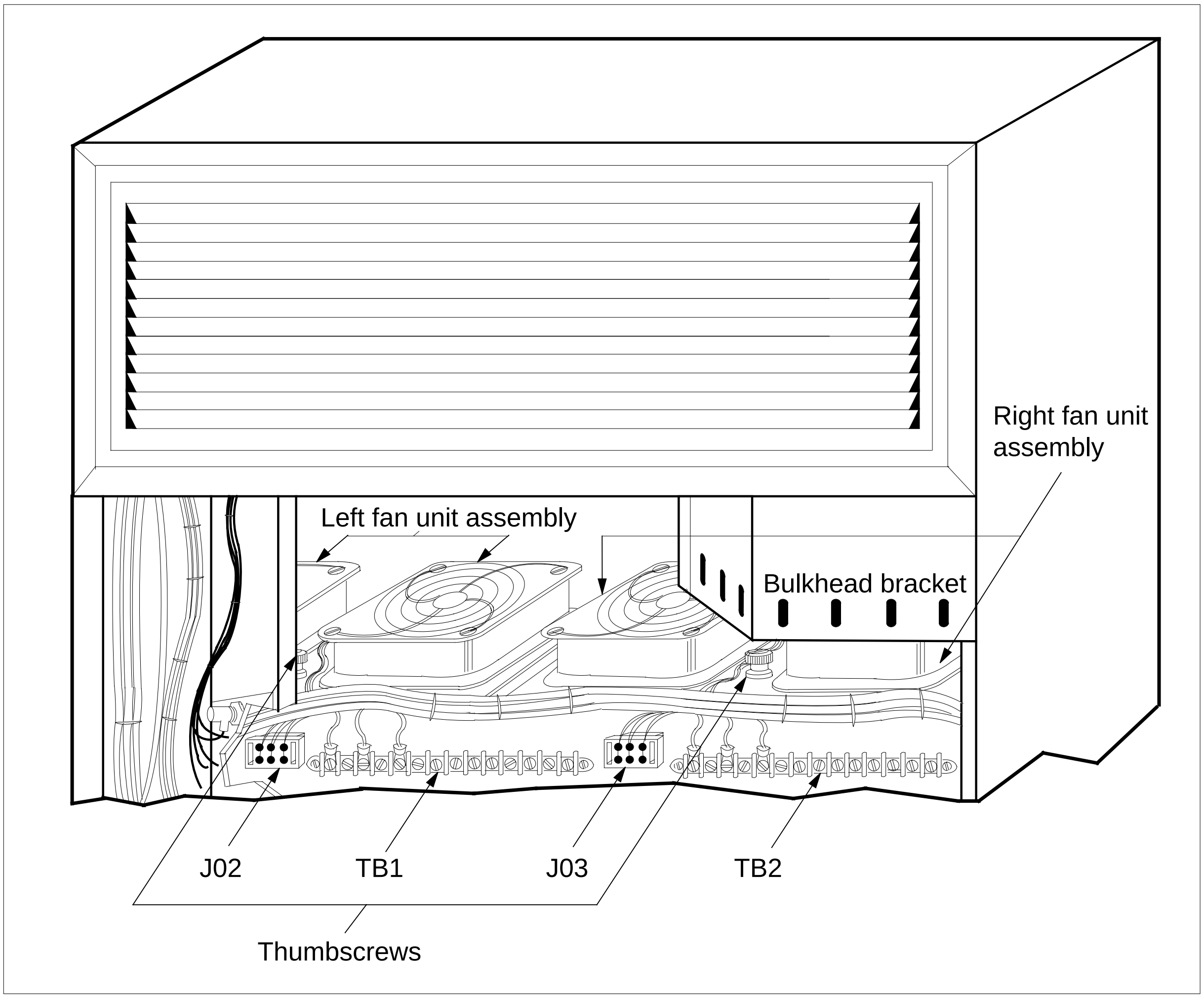
## Replacing fan unit assemblies in the FSP (continued)

**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 only 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.

**2** Determine the fan unit assembly that requires replacement.

| If the fan unit assembly | Do |
|---|---|
| on the right side requires replacement | step 3 |

## Replacing fan unit assemblies in the FSP (continued)

| If the fan unit assembly | Do |
|---|---|
| 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.

**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.

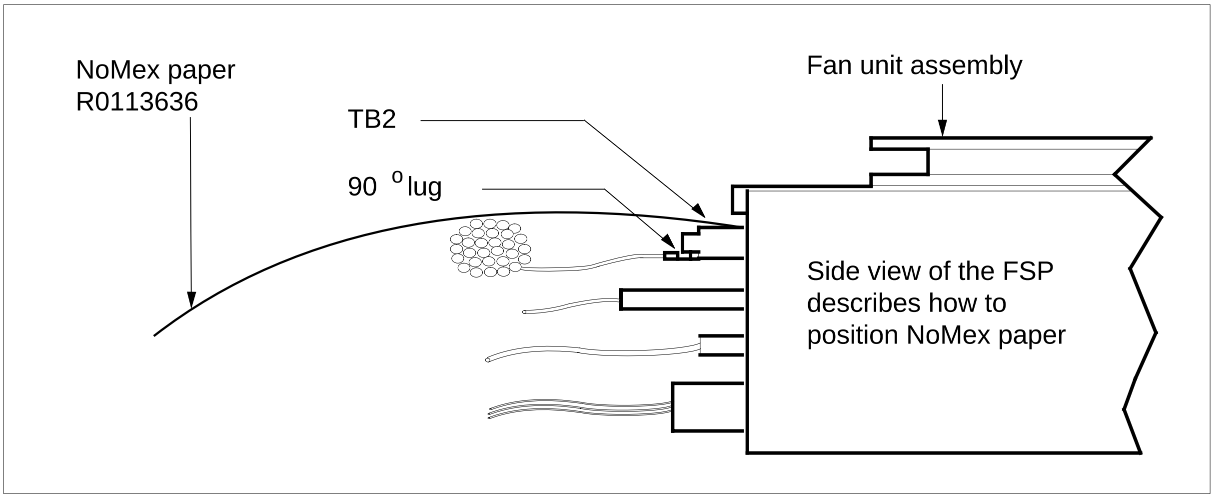
**DANGER**
**Overheating, high energy hazard**
Service interruption or damage to equipment can occur if the fans are off for more than 30 min. Interruption or damage can occur if metallic objects come in contact with connections on the terminal blocks on the rear of the FSP.

**DANGER**
**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.

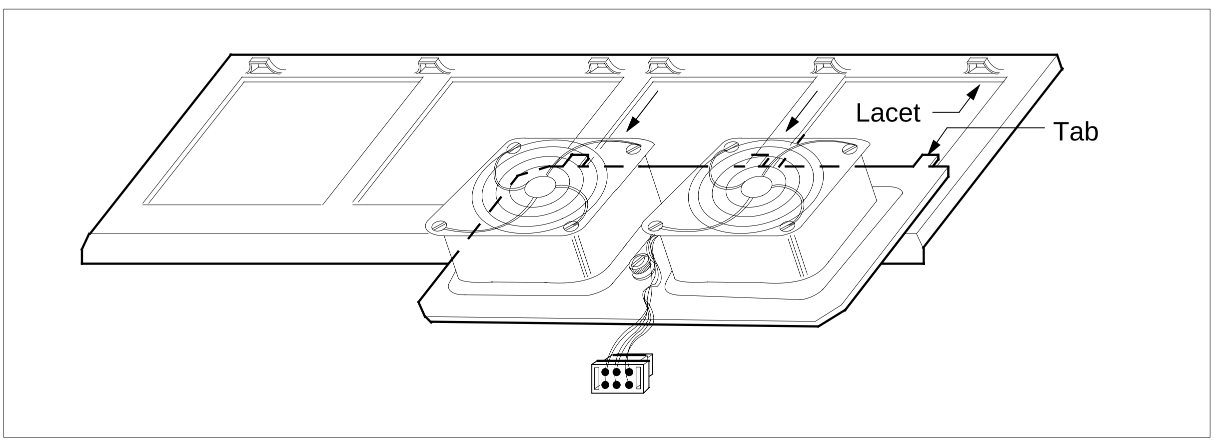
4 Place a section of NoMex protective paper, part number R0113636, over the preformed cable and the terminal blocks. Refer to the following diagram. Use electrical tape or wire ties to secure the paper.

# Replacing fan unit assemblies in the FSP (continued)




**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.




**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.

## Replacing fan unit assemblies in the FSP (continued)

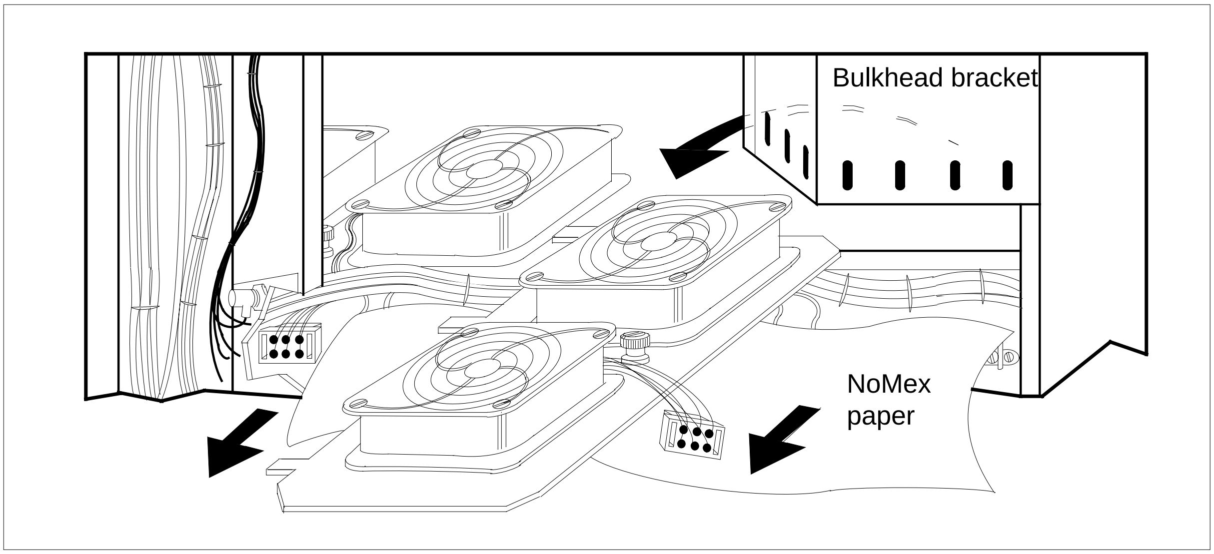
**DANGER**
**High energy hazard**
Personal injury can occur if the fan unit assembly shorts the connections on the terminal blocks. Use terminal block safety covers or NoMex protective paper (part number R0113636) to prevent a short in the connections on the terminal blocks.

**DANGER**
**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.

**DANGER**
**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.

## Replacing fan unit assemblies in the FSP (continued)




***Note:*** The bulkhead bracket is not present on recent cabinets.

**8** To install the replacement fan unit assembly (NTMX2658), slide the tabs in 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.

> **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.

> **DANGER**
> **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.

## **Replacing fan unit assemblies in the FSP** (continued)

**DANGER**
**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.

Tighten the thumbscrew to secure the fan unit assembly to the base plate assembly.

**10** Carefully reconnect fan connector at J03.

**11** Remove the NoMex paper.

**12** Proceed to step 23.

**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.

**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.

**DANGER**
**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.

## Replacing fan unit assemblies in the FSP (continued)

**DANGER**
**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.

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.

**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.

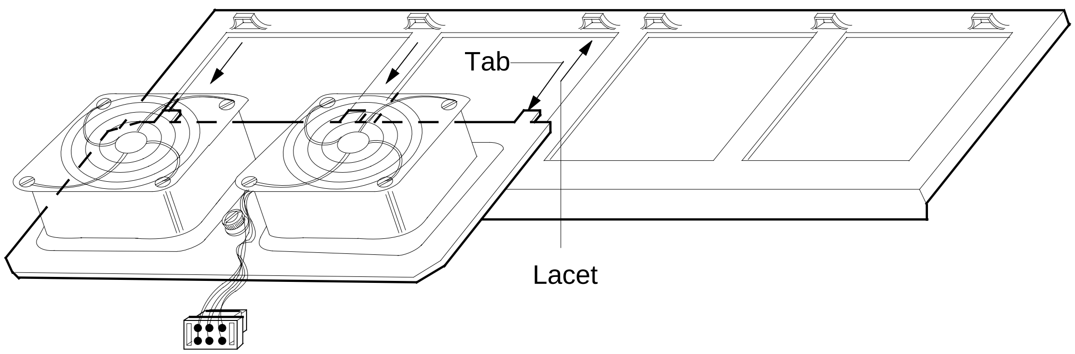
**DANGER**
**High energy hazard**
Personal injury can occur if the fan unit assembly shorts the connections on the terminal blocks. Use terminal block safety covers or NoMex protective paper (part number R0113636) to prevent a short in the connections on the terminal blocks.

**DANGER**
**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.

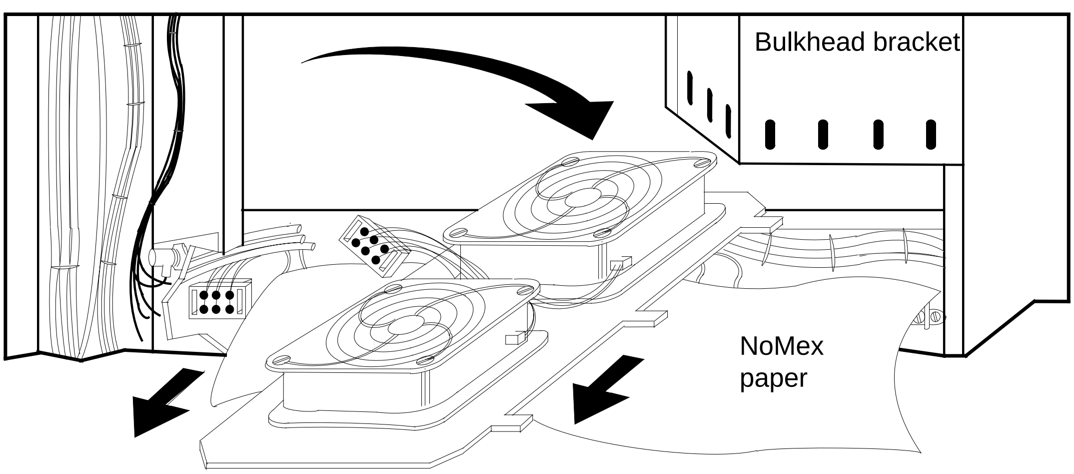
## Replacing fan unit assemblies in the FSP (continued)

**DANGER**
**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. Details of tab and lacet assembly appear in the following diagram.




**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.

## Replacing fan unit assemblies in the FSP (end)

**18** Carefully install the replacement fan unit assembly (NTMX2658). Slide the tabs in the lacets on the base plate assembly.

**19** Carefully install the original fan unit assembly again on the right side. Slide the tabs in the lacets on the base plate assembly.

**20** Tighten the thumbscrews to secure both fan unit assemblies to the base plate assembly.

**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.

**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.

**DANGER**
**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.

**DANGER**
**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 both fan connectors again at J02 and J03.

**23** 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. You location determines to which address you must return the card.

## Interval

Perform this procedure as needed.

## Common procedures

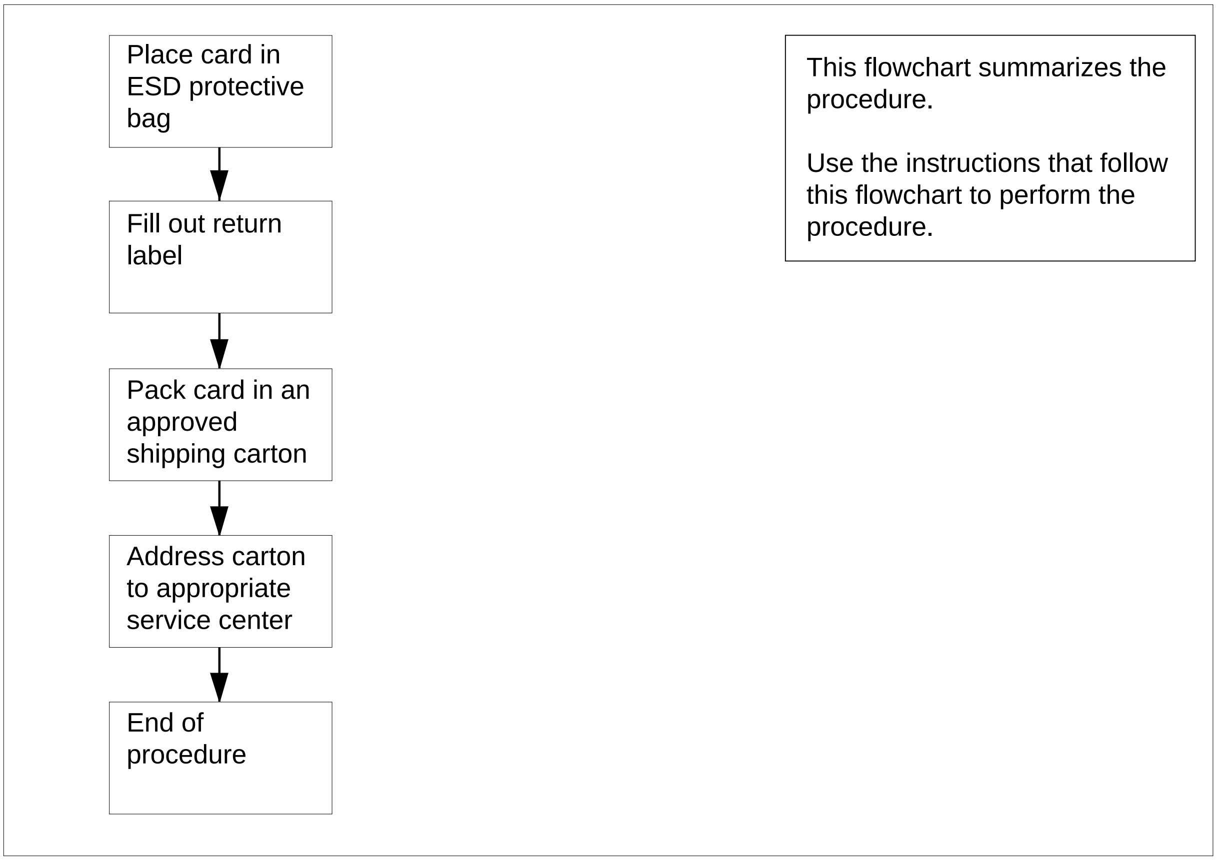
There are no common procedures.

## 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.

# 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 (ESD) protective bag.

| If your location | Do |
|---|---|
| is in Canada | step 6 |
| is in the United States | step 2 |

**2** Fill in the return label for each card you return. If no return labels are available, use any available blank label. For help to fill out the labels, call the Nortel Customer Service Center at 1-800-347-4850.

**3** Pack the card or assembly in a Nortel card shipping carton and seal the carton.

## Returning a card for repair or replacement (continued)

If a Nortel shipping carton is not available, use any available 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 no card or assembly can shift

**4** Address the carton and send the card to Nortel at the following address:

**`Nortel Customer Service Center`**

**`4600 Emperor Blvd.`**

**`Morrisville, North Carolina  27560`**

**5** Go to step 11.

**6** Fill in one return label (form 24-115) for each card or assembly you return.

Make sure you include the following information:

- return authorization number from customer service
- Nortel product engineering code (PEC)
- serial number
- release number
- batch change supplement (BCS) release software used 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

For help to fill out the label, call 905-454-2808. In the event of an emergency, call 905-457-9555.

**7** Attach one copy of the card label to a card latch.

**8** Keep the other copies of the label for your records.

**9** Pack the card or assembly in a Nortel shipping carton and seal the carton.

If a Nortel shipping carton is not available, use any available 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 no card or assembly can shift around

**10** Address the carton and send the carton to Nortel at the following address:

**`Nortel Customer Operations`**

## Returning a card for repair or replacement (end)

**`c/o Wesbell Transport`**

**`1630 Trinity Road`**

**`Unit #3, Door #4`**

**`Mississauga, Ontario`**

**`L5T 1L6`**

**11** This procedure is complete.

# Testing power converter voltages

## Application

Use this procedure to test power converter voltages.

## Interval

Perform this procedure in six month intervals.

## Common procedures

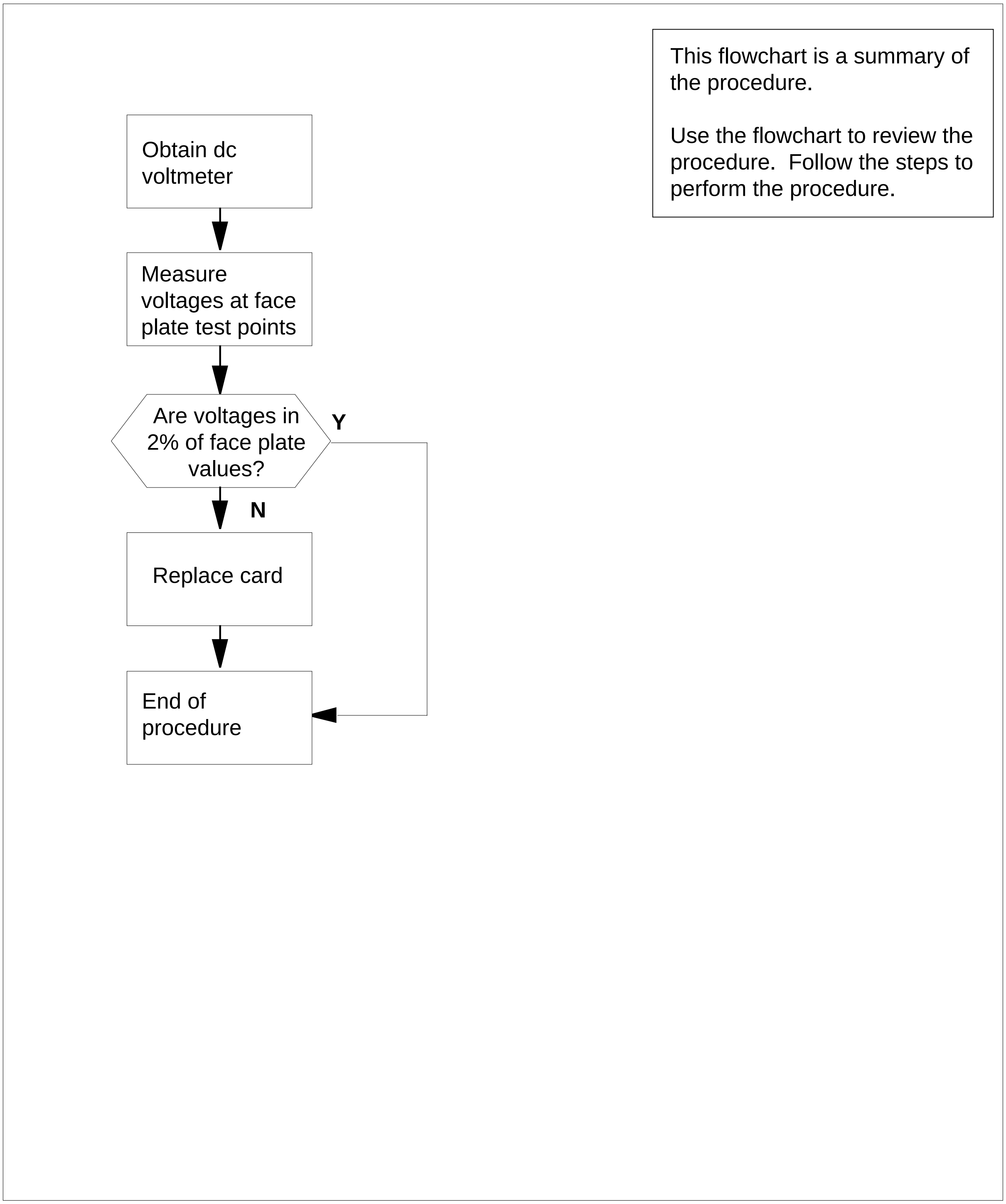
Does not apply

## Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Use the steps to perform the procedure.

# Testing power converter voltages (continued)

### Summary of Testing power converter voltages



## Testing power converter voltages (continued)

**Testing power converter voltages**

***At your Current Location***

**1** Obtain a DC voltmeter.

**2** Determine the version of the NTMX72 converter card.

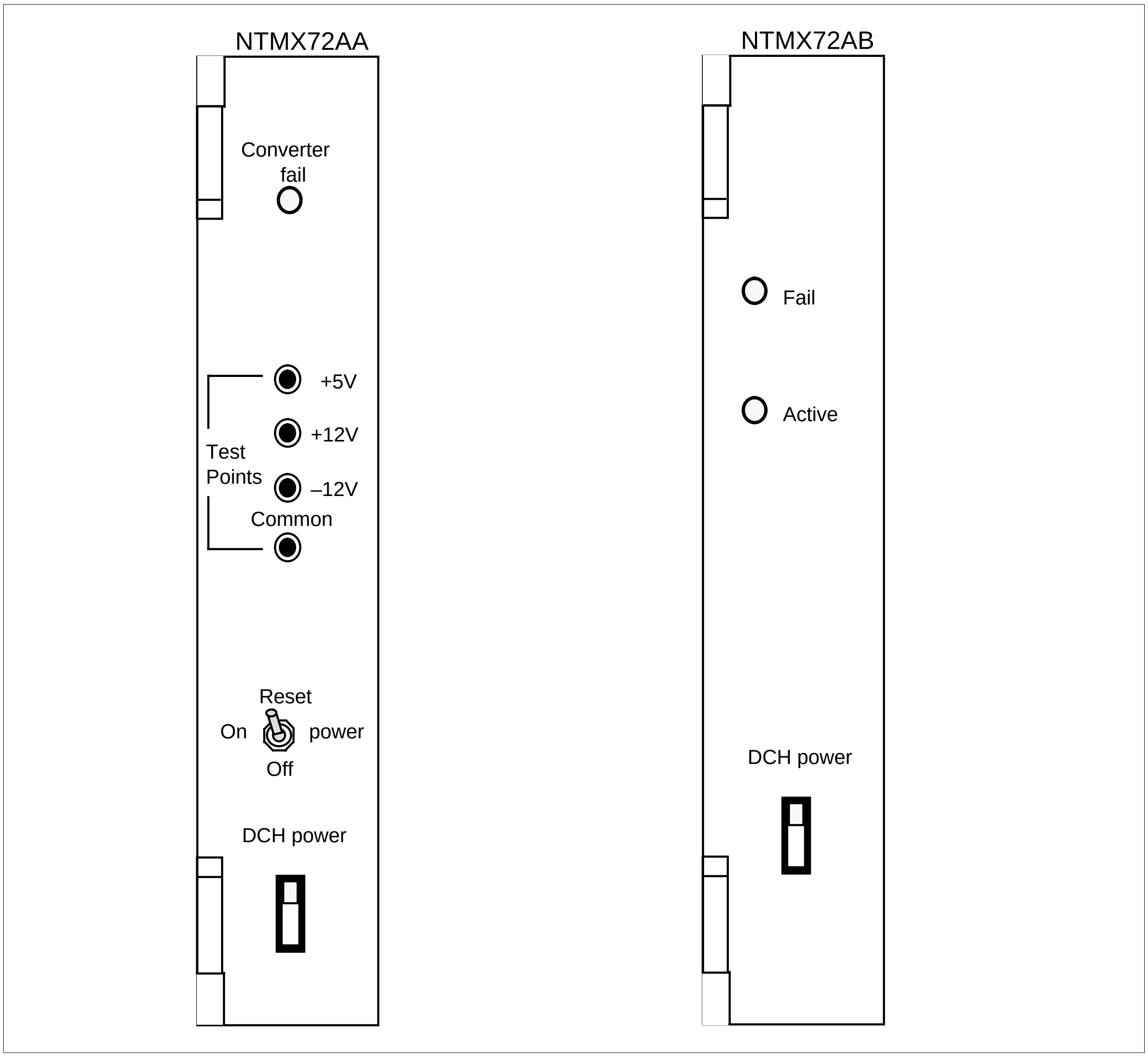
| If the NTMX72 card version | Do |
|---|---|
| is AA | step 4 |
| is AB | step 3 |

**3** The NTMX72AB card does not require tests. Voltage test access points are not available on the face plate of the NTMX72AB power converter card. For additional information about the NTMX72AB card, refer to the power converter paragraph in the cards section of the *Maintenance Overview Chapter.* Go to step 7.

**4** Measure the voltage at the test points on the face plates of all NTMX72AA power converters in the equipment cabinet.

## Testing power converter voltages (continued)

**Circuit cards with status indicators**




**5** The voltages must be within 2% of the nominal values printed on the faceplate. Compare the voltages measured in step 4 with the acceptable voltage ranges given below.

| 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 |

## **Testing power converter voltages** (end)

| If test point voltages are | Do |
|---|---|
| within acceptable range | step 7 |
| not within acceptable range | step 6 |

**6** Replace the power converter as directed in *Card Replacement Procedures*.

**7** You have correctly completed this procedure.

# Testing wrist strap grounding cords

## Application

Use this procedure to verify that the level of resistance of wrist strap grounding cords is correct. The level must be low enough to allow static electricity to discharge from the body of the user. The level must be high enough to prevent electrocution. Electrocution occurs if the equipment develops a short-circuit while the user wears the wrist strap.

## Interval

Perform this procedure in one month intervals.

## Common procedures

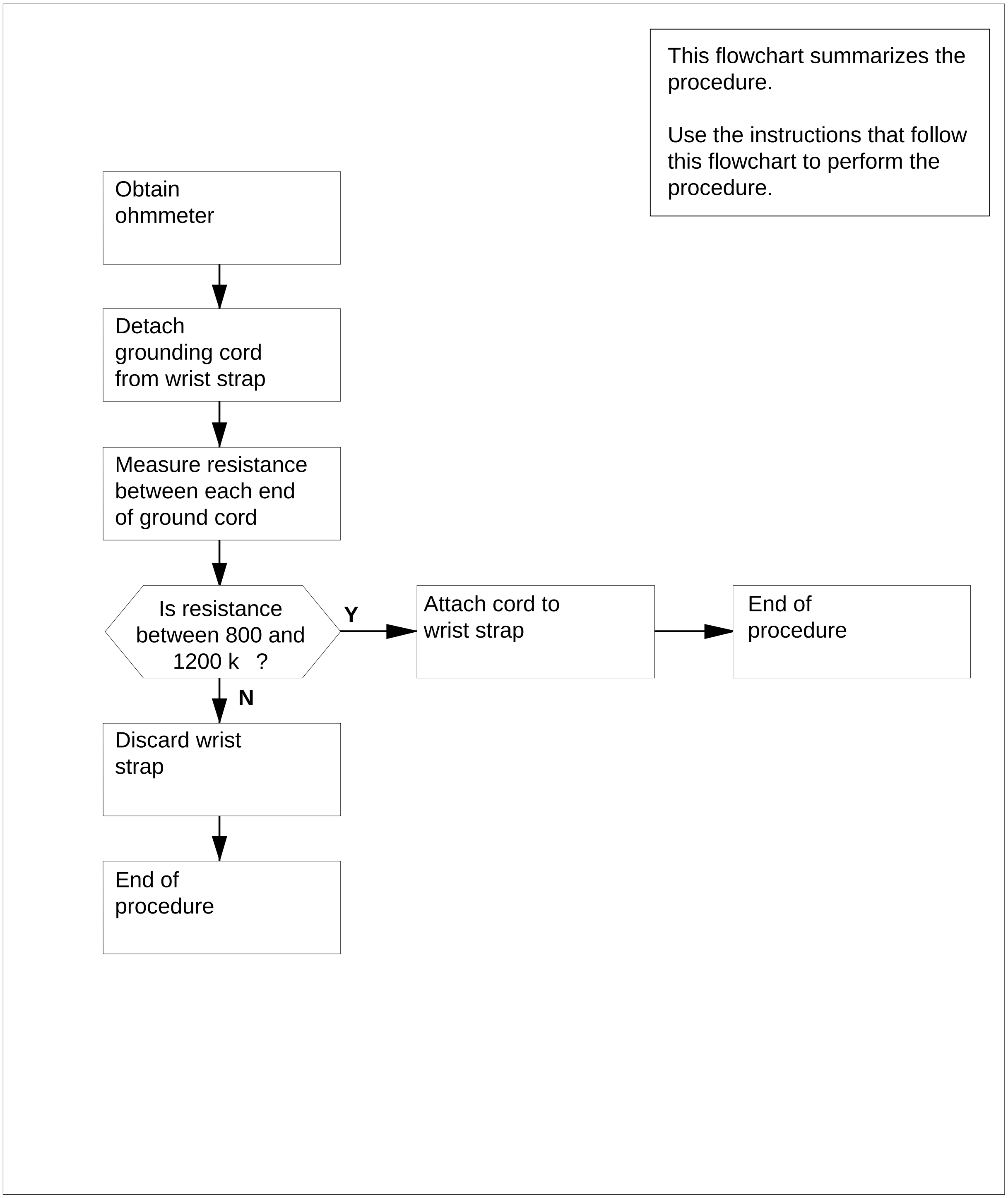
There are no common procedures.

## 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** Take the grounding cord off the wrist strap.

**3** Measure the resistance between opposite ends of the grounding cord with the ohmmeter.

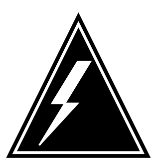
| If resistance | Do |
|---|---|
| is between 800 kΩ and 1200 κΩ | step 4 |
| is not between 800 kΩ and 1200 κΩ | step 5 |

**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 only safe to use if the resistance of the grounding cord measures higher than 800 kΩ. Lower resistance exposes the user to the risk of electrocution. Electrocution can occur if the equipment short-circuits while the user wears the wrist strap.



**WARNING**
**Damage to electronic equipment**
A grounding cord that has a resistance higher than 1200 kΩ cannot conduct enough static charges to ground correctly. The grounding cord will not protect sensitive electronic equipment against build-ups of static charges that can cause damage.

Discard the complete assembly. *Do not attempt to use it.*

**6** The procedure is complete.

# Index

## D

## O



## P



## R

# S



# T



# U



# V



# W



# X

DMS-100 Family

# Remote Switching Center

Remote Switching Center-SONET Model A

Maintenance Manual

Product Documentation-Dept. 3423
Nortel Networks
PO Box 13010
RTP, NC 27709-3010
Telephone: 1-877-662-5669
Electronic mail: cits@nortelnetworks.com



Publication number: 297-8261-550
Product release: XPM11 and up
Document release: Standard 10.05
Date: November 2000
Printed in the United States of America

NORTEL NETWORKS™