297-8281-550

DMS-100 Family

Remote Switching Center

Remote Switching Center-SONET Model B Maintenance Manual

XPM11 and up   Standard   10.05   November 2000

NORTEL NETWORKS™

DMS-100 Family

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Publication number: 297-8281-550
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Contents

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:

- *1-Meg Modem Service Network Implementation Guide*, 297-8063-200
- *Bellcore Technical Reference, ISDN D-Channel Exchange Access Signaling and Switching Requirements (Layer 2)*
- *North American DMS-100 Log Report Reference Manual*
- *Operational Measurements Reference Manual*
- *Product Documentation Directory, 297-8991-001*
- *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 Nortel Networks documents include attention boxes and danger, warning, and caution messages.

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

Examples of the precautionary messages follow.

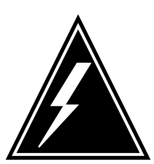
ATTENTION - Information needed to perform a task

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

DANGER - Possibility of personal injury

> **DANGER**
> **Risk of electrocution**
> Do not open the front panel of the inverter unless fuses F1, F2, and F3 have been removed. The inverter contains high-voltage lines. Until the fuses are removed, the high-voltage lines are active, and you risk being electrocuted.

WARNING - Possibility of equipment damage



> **WARNING**
> **Damage to the backplane connector pins**
> Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.

CAUTION - Possibility of service interruption or degradation

CAUTION
Possible loss of service
Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

```
>BSY
```

Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

```
>BSY CTRL
```

Variables

Variables are shown in lowercase letters:

```
>BSY  CTRL  ctrl_no
```

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.

Responses

Responses correspond to the MAP display and are shown in a different type:

```
FP 3 Busy CTRL 0: Command request has been submitted.

FP 3 Busy CTRL 0: Command passed.
```

1 Maintenance overview

This chapter contains the following sections:

- functional description

  The functional description provides a summary of the components that comprise the Remote Switching Center-SONET (RSC-S) configurations. This section provides a summary of the components of the modular supervisory panel (MSP) and remote cluster controller 2 (RCC2). This section also explains how software processes affect RCC2 components, and highlights voice and message flows.

- fault conditions

  Fault conditions are problems that can occur in the following:

  — components, like a card or power supply

  — links that connect the components

  — software that controls the voice and message flow

- automatic maintenance

  The following components are designed with system actions that locate and correct faults when fault conditions occur:

  — the RSC-S

  — the Remote Switching Center (RSC)

  — the Digital Multiplex System (DMS)

  — the Data Packet Network (DPN)

  If the faults that these components correct do not require manual intervention, the appropriate trouble indicators are explained.

- escalation to manual maintenance

  With the RSC-S, automatic maintenance includes the output of the appropriate trouble indicators. Refer to the Automatic maintenance section for this information.

Functional description

This section describes components of the RSC-S, MSP, RCC2 along with feature descriptions.

Remote Switching Center-SONET

The RSC-S uses common peripheral module (CPM) architecture rather than XMS-based peripheral module (XPM) architecture. When the RSC-s uses a CPM instead of an XPM, the system implements the following differences:

- 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
- improvement of the matrix
- creation of the pulse code modulation (PCM) card to concentrate all signaling functions in one card
- how digital signal 1 (DS-1) signaling bits (A, B, C, D) are hendled
- addition of downloadable firmware to the Unified Processor (UP) (NTMX77), Cellular Access Processor (CAP) card (NTAX74) and PCM Signaling Processor (NTMX73) cards. The NTMX77 has two FLASH EEPROMs, or banks, that are two 256-kbyte programmable chips. These chips provide the ability to load the firmware independent of the RAM load on an RCC2 or manually busied (ManB) RCC2 unit. To load the firmware, type

  >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

Parameter	Value	Definition
UNIT	n/a	Peripheral module unit
PM	n/a	Peripheral module
INACTIVE	n/a	State of peripheral module
ACTIVE	n/a	State of peripheral module
unit_no	0 or 1	PM unit number
filename	n/a	Name of firmware file. If the firmware file is not specified, the firmware load found in the appropriate inventory table is used.
UPGRADE	n/a	Upgrades the PM to the new firmware load. UPGRADE is an optional parameter.
ALL	n/a	Permits the use of the LOADFW command on a posted set of PMs. ALL is an optional parameter.
NOWAIT	n/a	Returns the prompt before the command is finished, on-screen status is not visible. NOWAIT is an optional parameter.
Note: In this table N/A is an abbreviation for not applicable.		

Primary components of RCC2

In this architecture, the primary components of the RSC-S that can be assembled are the RCC2 or dual RCC2 (DRCC2). Installation can occur for an RCC2 with or without the integrated services digital network (ISDN) or emergency stand-alone (ESA). The following sections describe these components according to functional areas.

Each functional area provides the following features:

- highlight of the specified the functions
- description of the other RSC-S components

Modular supervisory panel

The following sections describe MSP components.

Talk battery module (NTRX44AA)

The NTRX44AA talk battery module provides filtered power feed of a maximum 20A for cabinets in a central office (CO) environment. This card also provides inrush current protection (soft-start) to protect against power distribution center (PDC) breaker trips. This module is provisioned with the MSP and accepts -48V or -60V battery input.

The NTRX44AA provides the following functions:

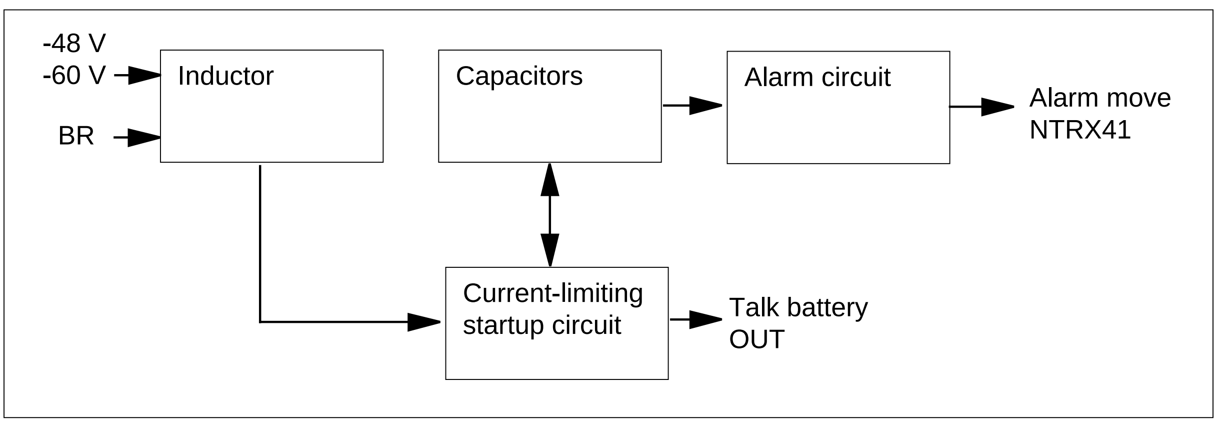
- termination point for PDC feeds
- filtered battery feed through connector interfaces
- soft-start a current-limiting startup circuit provides to protect against PDC breaker trip
- two fail alarms

The NTRX44AA has the following functional blocks:

- inductor
- capacitors
- startup circuit
- alarm circuit

The relationship between the functional blocks appears in the following figure.

Figure 1-1 NTRX44AA functional blocks



The NTRX44AA uses a 20A QHP77C bracket-mounted power inductor and six 80-V capacitors that provide 6800µF of capacitance.

Current-limiting startup circuit This circuit limits the inrush current on startup. This action eliminates the risk of a tripped PDC feed breaker. A thermistor initially charges the capacitors. When the capacitors are charged, a relay is powered on and the contacts connect the capacitors to the output. This soft-start occurs approximately 5 s from the time of application of input power.

Alarm circuit This block reports filter failure in an NTRX44AA to the alarm module (NTRX41AA) through connector P3. The alarm module generates a FRAMEFAIL alarm. this system reports a total power loss to the maintenance trunk monitor (MTM) through connector P4.

Pin-outs Pin-outs for NTRX44AA appear in the following four tables.

Pin-outs for the PCD power input connector P1 appear in the following table.

Table 1-2 PCD power input connector P1

Pin	Signal
A	-48V or -60V
B	-48V or -60V
C	BAT RTN
D	BAT RTN

Pin-outs for the talk battery output connector P2 appear in the following table.

Table 1-3 Talk battery output connector P2

Pin	Signal
A	TALKBAT
B	TALKBAT
C	BAT RTN
D	BAT RTN

Pin-outs for the FAIL alarm connector P3 appear in the following table.

Table 1-4 FAIL alarm connector P3

Pin	Signal
1	TALKALM
2	TALKALM
Note: Only pin 1 must connect to alarm module NTRX41AA.	

Pin-outs for the FAIL alarm connector P4 appear in the following table.

Table 1-5 FAIL alarm connector P4

Pin	Signal
1	LOSS1
2	LOSS2

Power requirements The nominal input voltage is -48V, but a range of -42V to -75V is acceptable. The maximum steady-state input current is 20A. The maximum inrush current is 50A.

Output Output specifications for NTRX44AA appear in the following table.

Table 1-6 NTRX44AA output specifications

Parameter	Value
Voltage	-48V or -60V
High voltage shutdown	-75V
Low voltage shutdown	-42V
Maximum current	20A
Attenuation	40dB @1kHz
Output impedance	50Ω @300 to 3500Hz

Alarm module (NTRX41AA)

The NTRX41AA alarm card provides monitoring and alarm reporting for cabinets in a CO environment. This card requires an input battery voltage of -48V or -60V. This module has the MSP. The NTRX41AA monitors and detects the following types of faults:

- converter faults
- thermal breaker failures
- fan failure on one or two cooling units
- failures in the talk battery modules
- inverter failure in the cabinet

If any of these faults occur, NTRX41AA raises alarms and sends signals to the office alarm unit. The NTRX41AA also provides maintenance facilities in the form of telephone, data, and alarm battery supply (ABS) jacks.

The NTRX41AA has the following functional blocks:

- alarm circuit
- maintenance block

Alarm circuit The alarm circuit consists of transistor logic. The following four alarm inputs activate the transistor logic:

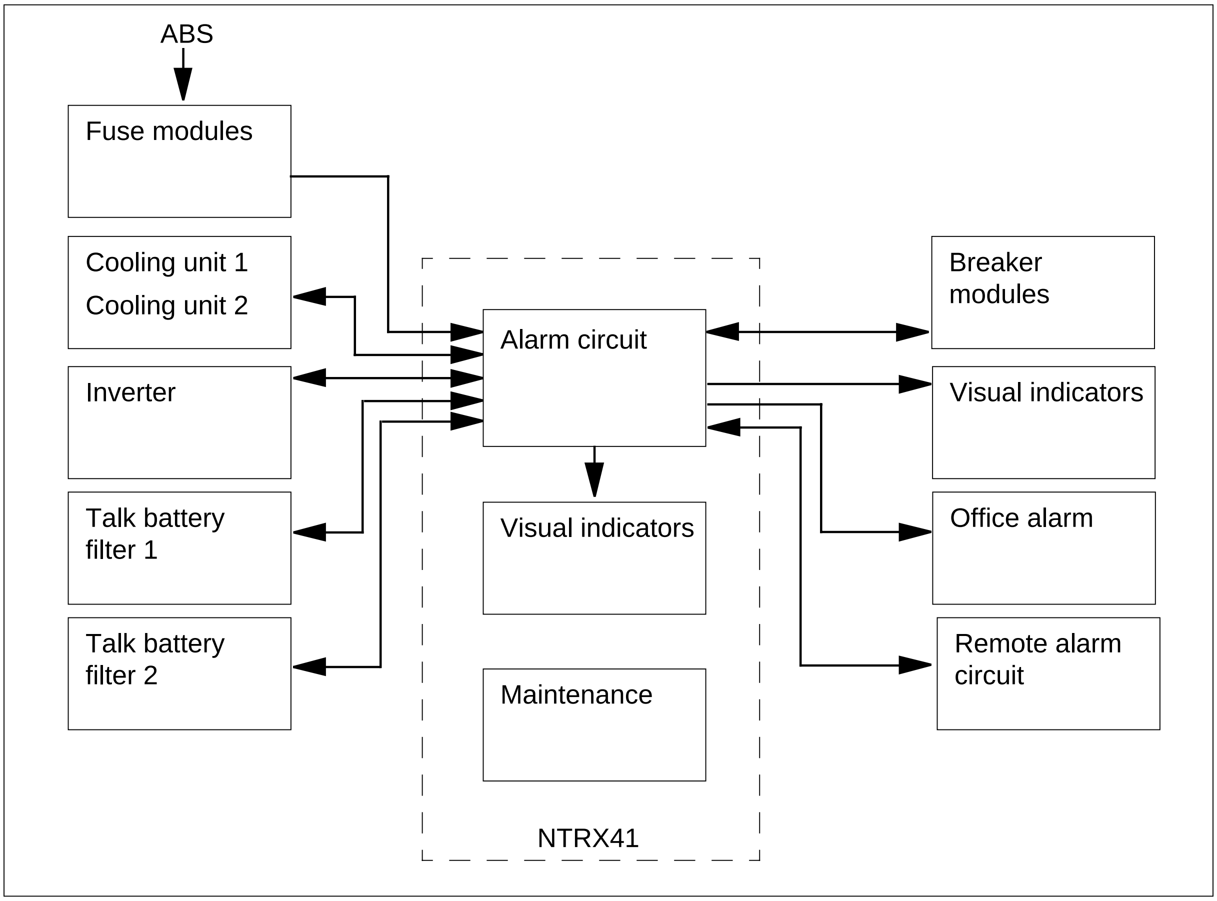
- battery-input voltage, which triggers a FRAMEFAIL signal for an inverter alarm, talk battery module alarm or fuse module alarm
- battery-return voltage, which triggers a FRAMEFAIL signal for a converter fail alarm and line concentrating equipment (LCE) alarm
- 90 Vrms, which triggers a FRAMEFAIL signal for a ringing generator (RG) on an LCE cabinet
- battery-input voltage, which generates a FANFAIL signal and triggers an alarm for the cooling units

The alarm circuit provides two light-emitting diodes (LED) as visual indicators of the FRAMEFAIL and FANFAIL signals. In addition to these LEDs, the alarm circuit can use a connector interface to drive two additional external LEDs.

Maintenance block The NTRX41AA provides several maintenance features. Examples of these features are jacks for telephone, data, and ABS. These features provide for interoffice communication and data transmission.

The relationship between the functional blocks appears in the following figure.

Figure 1-2 NTRX41AA functional blocks



Pin-outs Pin-outs for the NTRX41AA appear in the following table.

Table 1-7 Connector J1 NTRX41AA (Sheet 1 of 2)

Pin	D	C	B	A
1	RINGALM2	———	———	RINGALM1
2	———	———	———	———
3	———	———	———	———
4	BAT2	K2	BAT1	K1
5	BAT4	K4	BAT3	K3
6	BAT6	K6	BAT5	K5

Table 1-7 Connector J1 NTRX41AA (Sheet 2 of 2)

Pin	D	C	B	A
7	BAT8	K8	BAT7	K7
8	BAT10	K10	BAT9	K9
9	BAT12	K12	BAT11	K11
10	BAT14	K14	BAT13	K13
11	BAT16	K16	BAT15	K15
12	BAT18	K18	BAT17	K17
13	BAT20	K20	BAT19	K19
14	———	FRAMEFAIL	———	FRMFLTST
15	INVALM	FUSEALM	FAN48	FAN48
16	D1B	D1A	TTB	TTA
17	-48V2	-48V2	-48V1	-48V1
18	-48V4	-48V4	-48V3	-48V3
19	FAIL4	FAIL3	FAIL2	FAIL1
20	FAIL8	FAIL7	FAIL6	FAIL5
21	FAIL12	FAIL11	FAIL10	FAIL9
22	FAIL16	FAIL15	FAIL14	FAIL13
23	FAIL20	FAIL19	FAIL18	FAIL17
24	———	FANALM2	———	FANALM1
25	———	———	———	———
26	FANLMPTST	ACO	AISALM2	AISALM1
27	D2B	D2A	TRB	TRA
28	BR	BR	BR	BR
29	———	TEMPSW2	———	TEMPSW1
30	+15FG	+15FG	+5FG	+5FG

Power requirements The nominal input voltage is -48V or -60V. A range from -42V to -75V is acceptable. The maximum input current is 0.75A.

Fuse module (NTRX43AA)

The NTRX43AA fuse module provides a maximum of eight current-limited feed outputs and one alarm output for cabinets in a CO. This card is provisioned with the MSP and requires an input battery voltage of -48V or -60V.

> ***Note:*** The QFF fuses do not have this module, but are provisioned at the cabinet level.

The NTRX43AA provides the following functions:

- acts as termination point for PDC feeds
- supplies eight current-limited outputs for miscellaneous circuits
- reports fuse and breaker failures to the NTRX41AA alarm module

Connector P1 provides the power feed for fuses F01 to F04. Connector P2 provides the power feed for fuses F05 to F08. These fuses are on the faceplate of the NTRX43AA.

Connector J1 provides the fused outputs with currents that range from 0.18A to 5.0A.

Connector P3 provides alarm outputs that report fuse failures to the NTRX41AA alarm module.

Pin-outs

The following section describes pin-outs for the NTRX43AA.

Pin-outs for power input connectors P1 and P2 appear in the following table.

Table 1-8 Power input connectors P1 and P2

Connector/pin	Signal
P1 1—9	-48V or -60V
P1 10—18	BAT RTN
P2 1—9	-48V or -60V
P2 10—18	BAT RTN

Pin-outs for output connector J1 appear in the following table.

Table 1-9 NTRX43AA output connector J1

Pin	Signal	Pin	Signal
1	-48VOUT 1	10	-48VOUT 5
2	-48VOUT 2	11	BAT RTN5
3	-48VOUT 4	12	BAT RTN6
4	-48VOUT 6	13	BAT RTN3
5	-48VOUT 7	14	BAT RTN4
6	-48VOUT 8	15	NC
7	BAT RTN1	16	NC
8	BAT RTN2	17	BAT RTN7
9	-48VOUT 3	18	BAT RTN8

Pin-outs for the FAIL alarm connector P3 appear in the following table.

Table 1-10 Fail alarm connector P3

Pin	Signal
1	FUSEALM
2	FUSEALM

Power requirements The nominal input voltage is -48V or -60V. A range from -42V to -75V is acceptable. The maximum input current is 30A.

Output Output specifications for the NTRX43AA appear in the following table.

Table 1-11 Output specifications NTRX43AA (Sheet 1 of 2)

Parameter	Value
Maximum voltage	-72V
Maximum current	5.0 A

Table 1-11 Output specifications NTRX43AA (Sheet 2 of 2)

Parameter	Value
Minimum voltage	-42V
Minimum current	0.18 A

Breaker module (NTRX42AA)

The NTRX42AA is a breaker module provisioned with the MSP. This module contains two circuit breakers of -48V or -60V that provide two 10-A power feeds.

The NTRX42AA receives two input feeds from the PDC and allows the two front-mounted breakers to limit the input current. The breakers are also equipped with automatic recovery from low battery and the standard DMS switch converter interface. These features allow the breakers to monitor converters.

The primary functions of NTRX42AA are as follows:

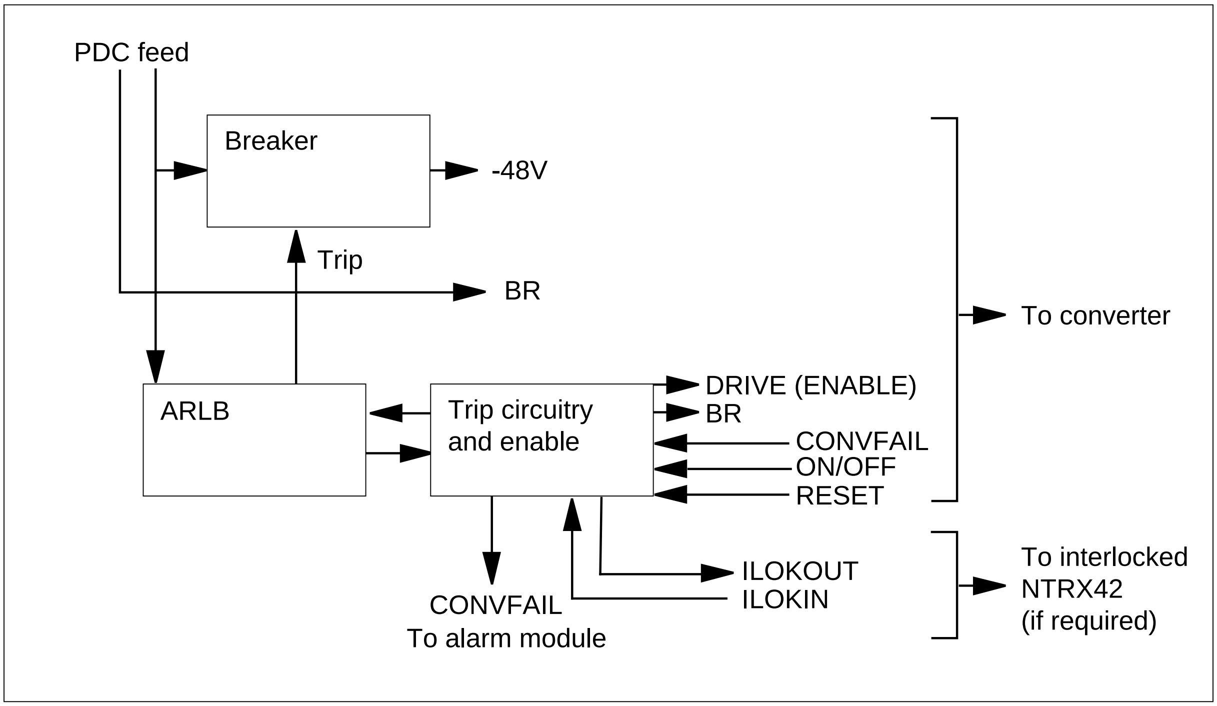
- monitor and detect converter failures
- trip breakers when overcurrent conditions occur
- trip breakers on converter failure
- provide termination points for PDC feeds
- provide battery feed samples for the alarm module
- respond to automatic recovery from low battery (ARLB) conditions

The NTRX42AA has the following functional blocks:

- ARLB
- trip circuitry and enable
- breakers

The relationship between the functional blocks appear in the following figure.

Figure 1-3 NTRX42AA functional blocks



Automatic recovery from low battery The breaker module sends the NT6L62AA ARLB hybrid a sample of each of the two input battery feeds. The ARLB provides two outputs to NTRX42AA. One output controls the two relays on each breaker module. When the tested voltage falls below -41.5V ± 0.5V, the relays depower to prevent breaker trip. The relays also remove the DRIVE or ENABLE signal that causes the converters to shut down. The battery voltage must rise above -44.5V ± 0.5V before the restart of the RESET relay.

Trip and enable circuitry A transistor circuit trips the associated circuit breaker in response to alarm relay release in the associated power converter or RG. This circuitry also provides the DRIVE or ENABLE signal for converters that require the signal.

Breakers Two 10-A magnetic breakers are stacked one on top of the other in this breaker module. The breakers operate over the complete -48V to -60V range.

Pin-outs Pin-outs for the NTRX42AA appear in the following table.

Table 1-12 Connector J1 NTRX42AA

Pin	Signal	Pin	Signal
1	-48VSW1	13	CONVFAIL2
2	not used	14	ILOKIN
3	ON/OFF1	15	DRIVE2
4	OEM-ALM1	16	not used
5	OEM-ALM2	17	BAT RTN1
6	ON/OFF2	18	BR1
7	not used	19	RESET1
8	-48VSW2	20	CONVFAIL1
9	not used	21	CONVFAIL2
10	DRIVE1	22	RESET2
11	ILOKOUT	23	BR2
12	CONVFAIL1	24	BAT RTN2

Power requirements The nominal input voltage is -48V or -60V. A range from -42V to -72V is acceptable. The maximum input current is 20A.

Output Output specifications for the NTRX42AA appear in the following table.

Table 1-13 Output specifications NTRX42AA

Parameter	Value
Voltage	-48V or -60V
High voltage shutdown	-72V
Low voltage shutdown	-42V
Maximum current	2 x 10A
Minimum current	0A

Breaker module (NTRX42CA)

The NTRX42CA is a breaker module provisioned with an MSP. The NTRX42CA contains two circuit breakers of -48V or -60V that provide two 20A power feeds.

The NTRX42CA receives two input feeds from the PDC and allows the two front-mounted breakers to limit input current. The breakers are also equipped with automatic recovery from low battery and standard DMS switch converter interface. These features allow the breakers to monitor converters.

The primary functions of the NTRX42CA are as follows:

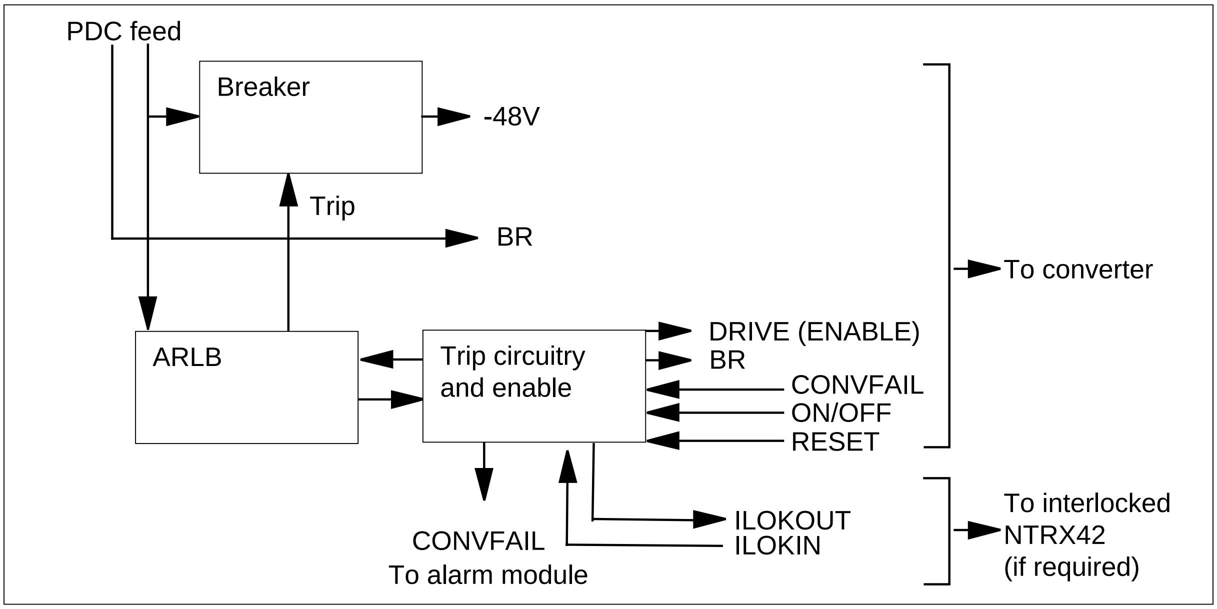
- monitor and detect converter failures
- trip breakers when overcurrent conditions occur
- trip breakers when the converter fails
- provide termination points for PDC feeds
- provide battery feed samples for the alarm module
- respond to ARLB conditions

The NTRX42CA has the following functional blocks:

- ARLB
- trip circuitry and enable
- breakers

The relationship between the functional blocks appears in the following figure.

Figure 1-4 NTRX42CA functional blocks



Automatic recovery from low battery The breaker module sends the T6L62AA ARLB hybrid a sample of each of the two input battery feeds. The ARLB provides two outputs to NTRX42CA. One output controls the two relays on each breaker module. When the tested voltage falls below -41.5V ± 0.5V, the relays depower to prevent breaker trip. The relays also remove the DRIVE or ENABLE signal and cause the converters to shut down. The battery voltage must rise above -44.5V ± 0.5V before the restart of the RESET relay occurs.

Trip and enable circuits A transistor circuit trips the associated circuit breaker when an alarm relay release in the associated power converter or RG occurs. These circuits also provide the DRIVE or ENABLE signal for the converters that require the signal.

Breakers Two 20A magnetic breakers are stacked one on top of the other in this breaker module. The breakers operate over the complete -48V to -60V range.

Pin-outs Pin-outs for NTRX42CA appear in the following table.

Table 1-14 Connector J1 NTRX42CA

Pin	Signal	Pin	Signal
1	-48VSW1	13	CONVFAIL2
2	Not used	14	ILOKIN
3	ON/OFF1	15	DRIVE2
4	OEM-ALM1	16	Not used
5	OEM-ALM2	17	BAT RTN1
6	ON/OFF2	18	BR1
7	Not used	19	RESET1
8	-48VSW2	20	CONVFAIL1
9	Not used	21	CONVFAIL2
10	DRIVE1	22	RESET2
11	ILOKOUT	23	BR2
12	CONVFAIL1	24	BAT RTN2

Power requirements The nominal input voltage is -48V or -60V. A range from -42V to -72V is acceptable. The maximum input current is 40A.

Output Output specifications for the NTRX42CA appear in the following table.

Table 1-15 Output specifications NTRX42CA

Parameter	Value
Voltage	-48V or -60V
High voltage shutdown	-72V
Low voltage shutdown	-42V
Maximum current	2 x 20A
Minimum current	0A

Fan power control module (NTRX54BA)

The fan power control receives A-feed and B-feed inputs from the cabinetized power distribution center (CPDC). The fan control provides a combined C-feed for the 48 Vdc fans and an alarm output. The card can operate at -48 Vdc and -60 Vdc input in a CO environment.

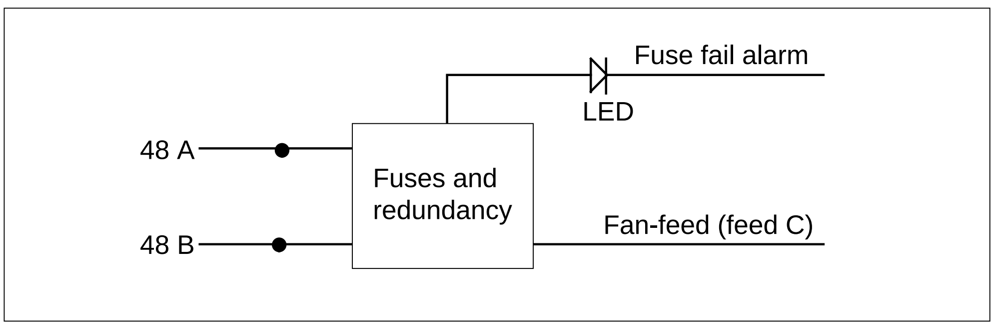
The card includes two faceplate-mounted fuse holders that have 5-A fuses and an LED. A captive screw, attached to the faceplate, provides positive retention and conductive coupling to the shelf.

Location The fan power control circuit card occupies the last two card positions in an MSP. The fan power control circuit card is fully connectorized. The card uses two 6.35 mm (0.25 in) quick-connect plugs (A0381899) to provide A- and B-feed input. The card also uses an 18-pin Positronics power-lok connector (A0380977) to provide power/alarm output.

The fan power control circuit card provides a nominal regulated 48V for fan operation. Features include a fuse failure alarm and a redundant feed.

The functionality of the fan power control circuit card appears in the following figure.

Figure 1-5 NTRX54BA functional blocks



Feed combining To provide redundancy, combine feeds A and B. If one of the feeds is not present, the other feed supplies power.

Fuse fail alarm The system generates an alarm indication for a possible fuse failure.

Signaling Three connectors are on the rear of the NTRX54BA. These connectors are the P1 input, P2 input, and the J1 output.

The following table describes pin-outs of the P1 input (battery A) connector.

Table 1-16 Power input (P1) connector

Connector number	Signal	Function	Description
P1 / A, B	L - (A)	Input	-48 Vdc
P1 / C, D	L + (A)	Input	BAT RTN

The following table describes pin-outs of the P2 input (battery B) connector.

Table 1-17 Power input (P2) connector

Connector number	Signal	Function	Description
P2 / A, B	L - (B)	Input	-48 Vdc
P2 / C, D	L + (B)	Input	BAT RTN

The following table describes pin-outs of the J1 output (18-pin) connector.

Table 1-18 18 pin output (J1) connector

Pin number	Signal	Function	Description
1—9	L - (FAN1)	Output	-48 Vdc
18	FAIL	Output	O/C -> BR through 3.0k and LED on output failure causes Frame Fail to alarm module
10—17	L + (FAN)	Output	BAT RTN from fans

Power requirements The following table lists input power requirements for the fan power control circuit card.

Table 1-19 Power input requirement limits (A and B)

	Limits		
Signal	**Norm**	**Alarm minimum**	**Alarm maximum**
Voltage	-48 Vdc	-39 Vdc	-56 Vdc
Current	1.5 A	— — —	2.5 A

The following table lists output power requirements for the fan power control circuit card.

Table 1-20 Power output requirement limits (A and B)

	Limits		
Signal	**Norm**	**Alarm minimum**	**Alarm maximum**
Voltage	-48 Vdc	— — —	-56 Vdc
Current	1.5 A	0.0 A	3.0 A

Environmental conditions The fan power control circuit card performs under the limited environmental limits described in the following table.

Table 1-21 Ambient conditions

Condition	Operating range	Short-term range
Temperature	0°C to 50°C	N/A
	(32°F to 122°F)	N/A
Humidity	5.0% to 95.0%	N/A

Equipment dimensions The fan power control circuit card dimensions are 101.6 mm (4 in.) in height, 60.9 mm (2.4 in.) in width, and 254 mm (10 in.) in depth. The approximate weight is 0.68 kg (1.5 lb).

Remote cluster controller 2

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 of static data (non-ESA)
- return to service of the RCC2 to service

> ***Note:*** Figure Functional block diagram of RCC2 associates with 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 layouts.

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

The RCC2 can be provisioned with one of the following cards:

- The Unified Processor (UP) card (NTMX77 with 68020 CPU).
- The optional Cellular Access Processor card (NTAX74 with 16 Mb memory).

NTMX77 Unified Processor The UP card, with 68020 central processing unit (CPU), controls the RCC2 activities. Memory associated with the UP is consolidated on the card and provides 8 Mb of memory with a possible expansion to 16 Mb. The UP provides electrically erasable programmable read-only memory (EEPROM), and has two FLASH EEPROMs. Both of the FLASH EEPROMs are 256 Kbyte programmable chips.

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

> ***Note:*** The NTMX77 must support NT7X05 functionality.

NTAX74 Cellular Access Processor (CAP) The optional CAP card is in slots 3 and 25 of the RCC2 shelf. The CAP consists of the NTAX74 motherboard and an NTNX4814 microcontroller subsystem (MCS) daughterboard. The MCS daughterboard has a 68040 processor and 16 Mbytes of memory to support downloadable firmware capability. The CAP has direct read/write access to the matrix card, SIGP, EISP, CMR, UTR, and MSG and CSM card. The NTAX74 provides the following call processing functions:

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

Real-time call processing functions are as follows:

- send and receive messages
- control the enhanced time switch
- supervise channels
- switch activity and reset control

Speech bus cards

The speech bus consists of two speech buses, send and receive. Speech bus cards include NTMX76 or NT6X69, NT6X92, NTMX75, NTMX73, NT6X78, and NT7X05. A description of these cards follows.

NTMX76 or NT6X69 The NTMX76 messaging is optional. If the speech bus card uses NTMX76 messaging , the NTMX76 circuit card replaces the NT6X69 messaging card. The NTMX76 card is the interface between the UP and and a maximum of 32 data links.

The new 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 the data channels.

The NTMX76AB version of the message and CSM card contains upgraded firmware. This frirmware is required to support Analog Display Services Interface (ADSI) and deluxe spontaneous call waiting identification (DSCWID). A description of ADSI and DSCWID appears below.

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

- 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 can perform the following operations:

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

NT6X92

> **ATTENTION**
> To maintain peak performance, do not install the UTR and GTR on the same RCC2. At this time, you cannot determine which receiver interprets tone samples. Some call processing tones can be degraded if 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 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 on the parallel speech bus.

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

NTMX75 The formatter circuit card (NT6X41/NT6X72) and the time switch (NT6X44) from the RCC are combined in one card on the RCC2. The enhanced matrix NTMX75 is the RCC2.

NTMX73 The NTMX73 supports all low-level signaling tasks and provides the system clock. This card replaces XPM circuit cards NT6X86, NT6X80, and NT6X28. Software for maintaining synchronization with the network also resides on this 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 for compliance with ADSI protocol. The ADSI protocol supports CLASS features that provide display-based information to subscribers with ADSI-compatible customer premises equipment (CPE). An example of a CLASS feature is DSCWID.

DSCWID The revised proprietary DSCWID feature complies to Bellcore TR-416 standards. Bellcore TR-416 describes the requirements for DSCWID and specifies how this feature interfaces with the following sets:

- 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). The 2500 set cannot deliver CID data while off-hook.

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

In response to alert tones, the DSCWID CPE generates an acknowledgement (ACK) tone that indicates the DSCWID CPE is ready to receive DSCWID data. The ACK tone is collected on the GTR card in the RCC2. If the CPE is ADSI compatible, a DTMF A ACK signal is sent 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 this alert sends tones, the subscriber can control the condition of the incoming call. The subscriber can use the CPE softkeys to respond if the CPE is ADSI. The subscriber can use hard-coded keys to respond if the CPE is a SCWID or a 2500 set to respond. If the CPE does not send an acknowledgment tone, the CPE is treated as a 2500 set. The following figures provide examples of responses from the three set types.

Figure 1-6 Example of a DSCWID call on an ADSI set

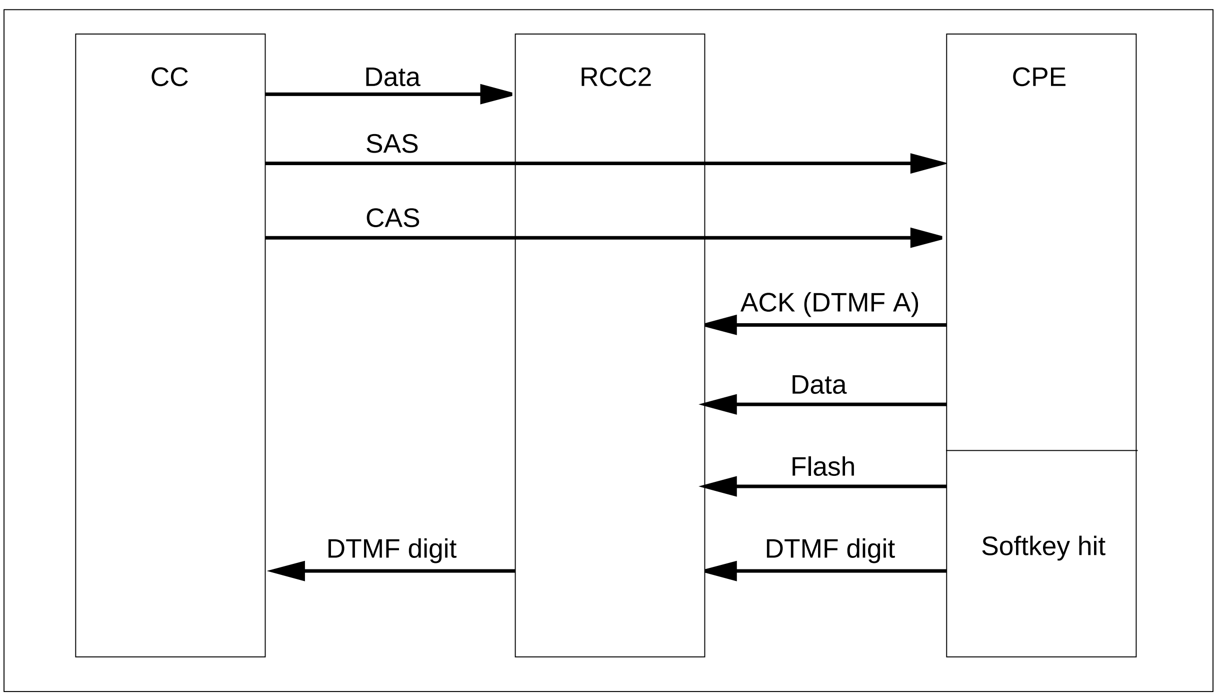


Figure 1-7 Example of a DSCWID call on a SCWID set

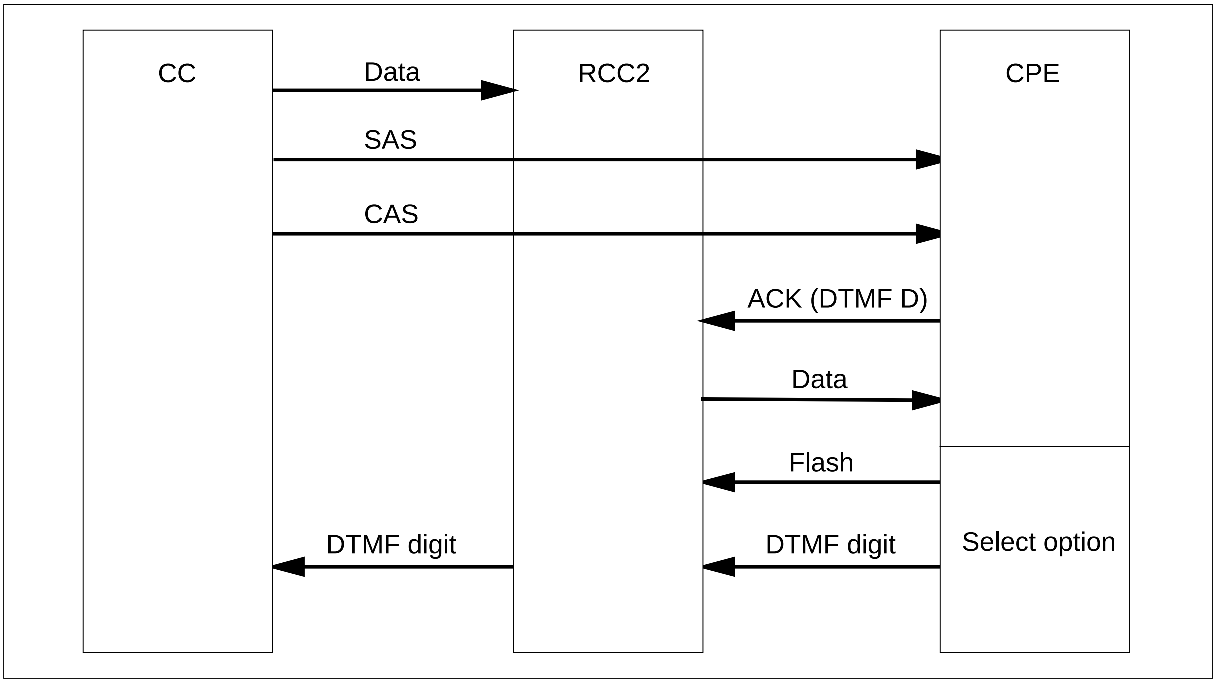
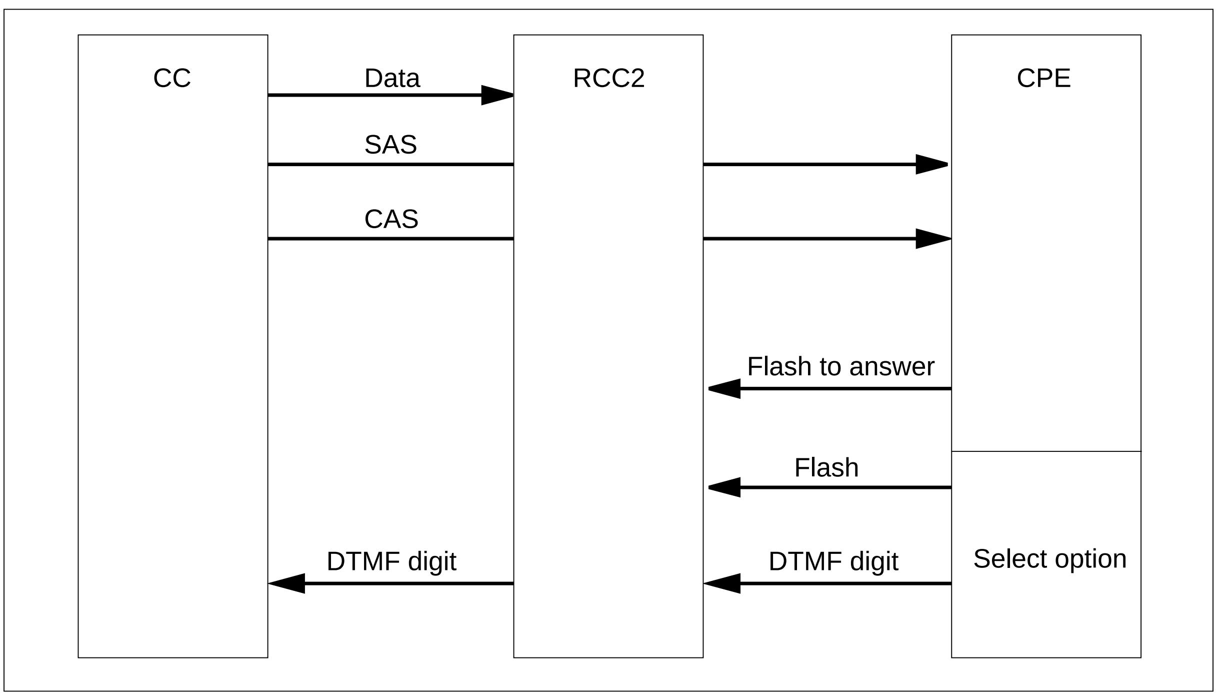


Figure 1-8 Example of a DSCWID call on a 2500 set



Alerting signals are sent to the CPE when a GTR channel is not available. If GTR channels are not available, data is not sent to the CPE. In the proprietary

DSCWID, when the RCC2 cannot attach a GTR, a flash was ignored. For Bellcore compliance, the switch must provide options if the switch detects a flash and cannot attach a GTR. To comply with this requirement, the RCC2 sends a flash to the CC if the RCC2 cannot attach a GTR in 400 ms. If the first notification of a pending call is not acknowledged in 10 s, the RCC2 sends a second alert signal. If display data was not sent to the CPE, not enough GTR channels are available. When this condition occurs, the data is held and sent again if re-alerting occurs.

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 the maximum time allowed between a sent flash and the DTMF digit on an ADSI set. The timeout is 600 ms, during which the speech path is muted. The T-tone timer starts for the initial option selection during a DSCWID call. The type of the CPE does not affect the start of the T-tone timer. Any ADSI DSCWID option selections that follow also start the T-tone timer.

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

The operating company can set the T-flash timer from 1 to 8 s. The default time is 1.5 s. The RCC2 starts the T-flash timer when the following condition occurs:

- the NONADSI field in table DSCWDTYP is set to Y
- the RCC2 receives a flash signal from a SCWID or 2500 set of a customer 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 on this information. If the RCC2 cannot attach a GTR before 400 ms, application of the RETURN option occurs.

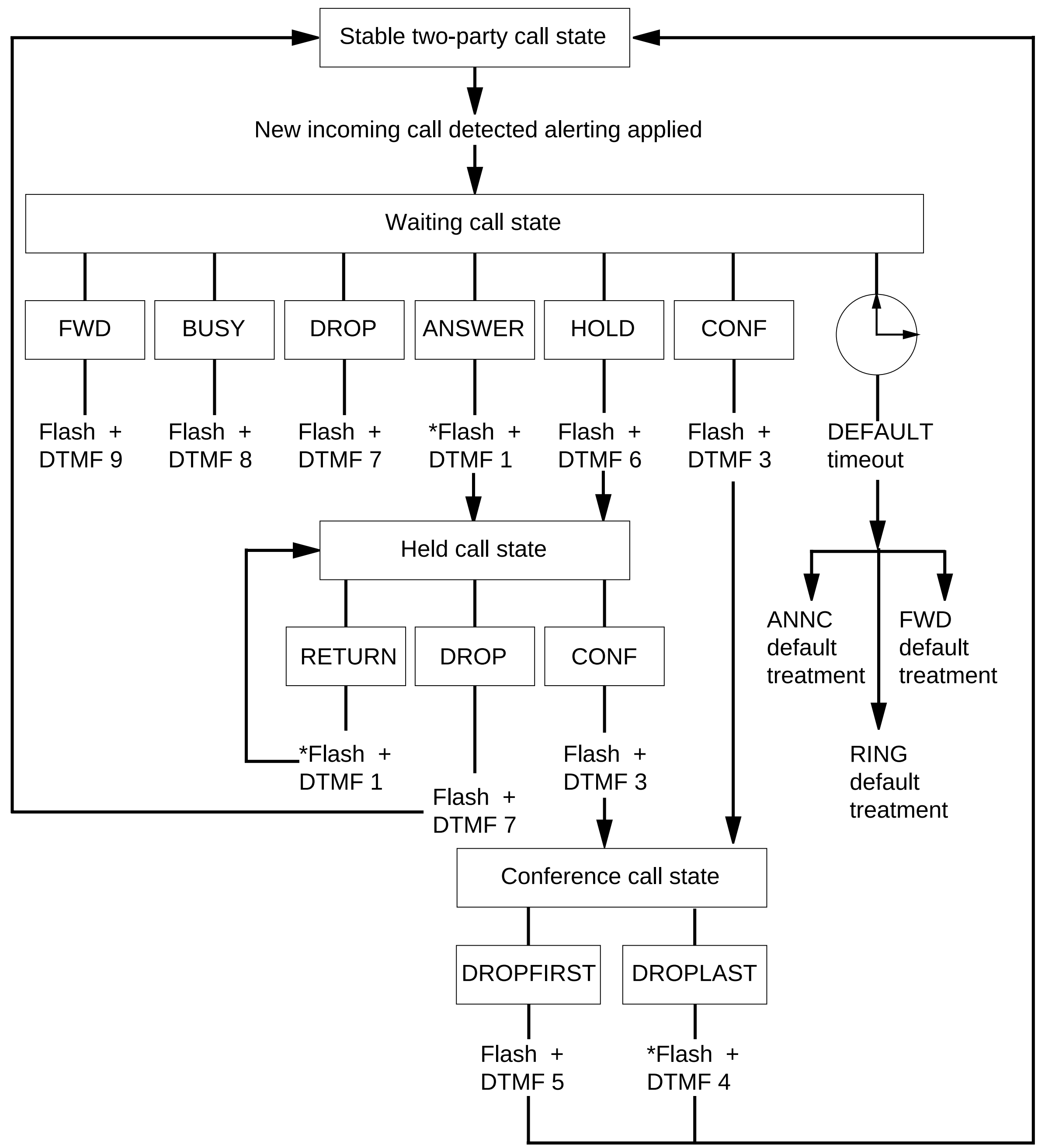
The CC attempts to stay synchronized with the CPE at all times. This supervision prevents some conditions where the CPE thinks the CPE performed a function, but the switch does not process the call. The DSCWID call waiting disposition options are:

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

- put the new call on hold after you connect to a hold announcement
- conference the new call with the current call.

DSCWID with ADSI set options appear in the figure on the following page.

Figure 1-9 DSCWID with ADSI set dispositions



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

Note 2: A non-ADSI set can be configured for hard-coded keys to perform DSCWID dispositions or the subscriber can provide a DTMF-digit in less than 600 ms. When this condition occurs, dispositions can be available if 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) allows XPM software loads to be transferred to the XPM and stored locally in an in-service XPM unit. This action reduces XPM simplex time and allows the replacement of the 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. To transfer the software, the enhanced LOADPM command instructs a manually busy (ManB) XPM unit to load from the NT7X05 card with the enhanced LOADPM command. The enhanced LOADPM command uses the following parameters:

DANGER
Potential service interruption
The LOCAL LOADFILE option of the LOADPM command has a parameter of [<file> string}]. When you use this parameter, the system does not patch the loadfile named in the parameter. Do not use this parameter unless the NOPATCH option of the loadfile is required.

>LOADPM [PM] LOCAL LOADFILE

[ACTIVE]

[INACTIVE]

[UNIT]

The PRL uses imaging technology to accomplish peripheral loading improvements. The monitoring of changes that ocur to restart survivable objects in the XPM provides control at a high level in the computing module (CM). Restart survivable objects are static data and code in the form of patches. The PRL dumps an image of the RAM of the MX77 in an in-service, active or inactive, XPM unit. The PRL copies the RAM to the NT7X05. To dump an image the PRL makes a copy. If the XPM must be reloaded, the image is restored from the NT7X05 to the UP RAM.

Note: You cannot dump an image of an embedded processor. The LOADPM command with a source of CC and a parameter of CMR must 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 the installation of the NT7X05 card occurs, the load file is invalid. The card must be loaded with parameter XPMSTOR. To view the status of NT7X05 files, type

>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 loading is a requirement, the CM verifies the NT7X05 datafill is present. If NT7X05 is present the following are transferred from the CM to the UP:

- the recovery software loader (RSL) software load
- the name of the desired load file
- an indication if the image or load file must is a requirement

The RSL checks the NT7X05 load file name. If the load name test passes, the RSL restores the image or load to the UP. To avoid delays in loading, part of the restore/loading process verifies the image/load file integrity. 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 Application of the NTMX75 circuit card occurs as described in the host communication section.

NTMX87AA/AB The Quad Frame Carrier (NTMX87) provides an interface between RSC-S peripherals and collocated transmission equipment like channel banks. The octal DS-1 circuit card contains up to four NTMX81AA dual DS-1 packlets. The dual DS-1 packlets provide and support all features and maintenance functions that the NT6X50AB provides. The dual DS-1 packlets also provide and support all performance counters the NT6X50AB supports.

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

NTMX74 The DS30A (NTMX74) circuit card provides 32 DS30A links for the following components located at the RCS-S:

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

Each interface (I/F) chip on the NTMX74 card serves 4 DS30A links. The following chart provides the link-to-chip relationship. A minimum of 4 must separate message (MS) links table LCMINV. This condition prevents a single chip failure that causes a T1 outage.

Table 1-22 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

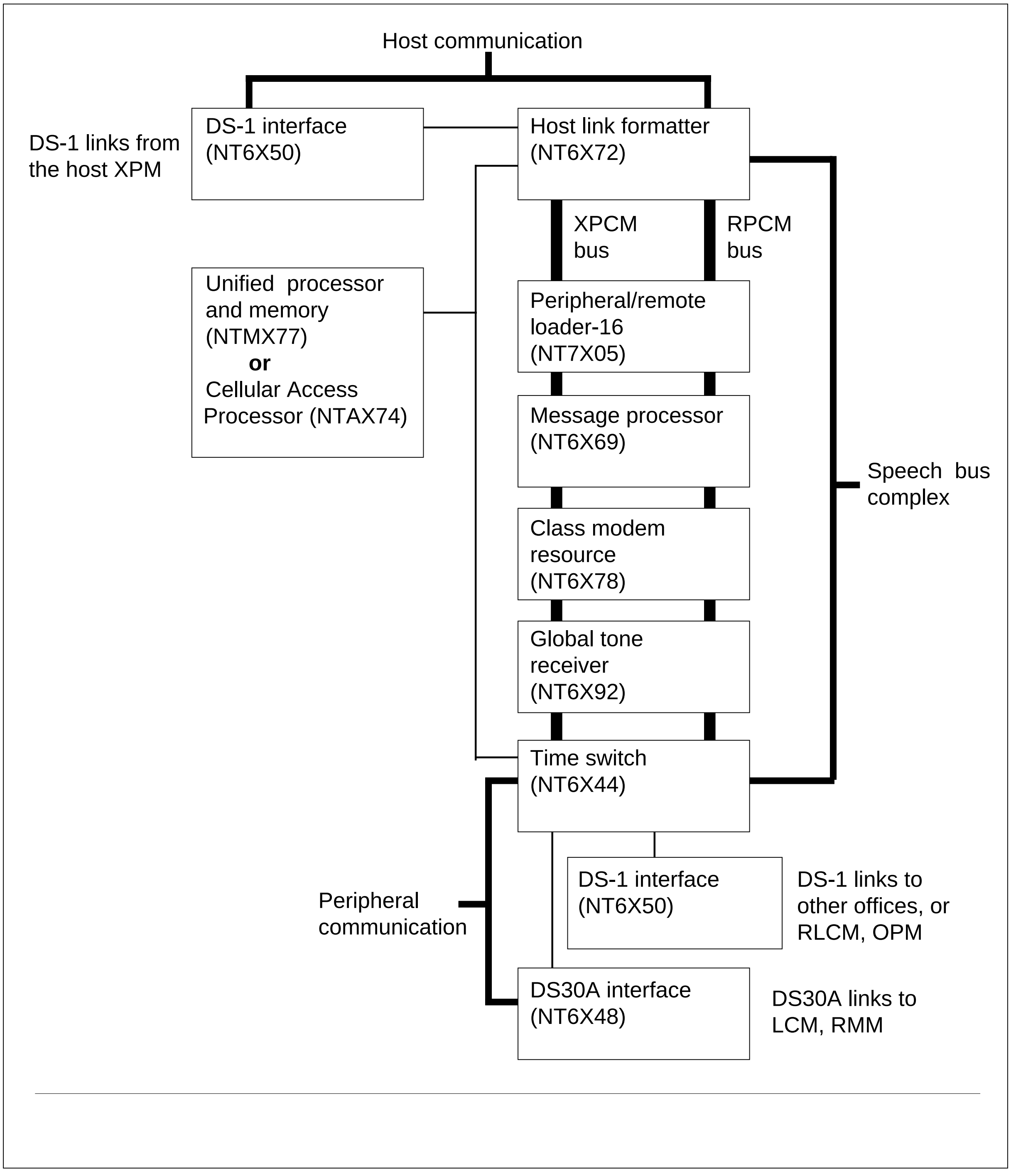
The parallel speech bus consists of a transmit bus and a receive bus. Voice and message paths link the two RCC2 units in a DRCC2 from the RCC2 to the host.

For an RCC2 to function correctly, adequate communication between the RCC2 units must occur. For example, the inactive unit can take over call processing. The RCC2 units communicate over the intermodule communication (IMC) links.

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

A functional block diagram of the RCC2 appears in the following figure.

Figure 1-10 Functional block diagram of the RCC2



Routine exercise test

The REX tests the RCC2 on a routine basis. The REX test makes sure that both units can perform call processing if one unit fails.

Parameter NODEREXCONTROL in table OFCVAR controls the REX schedule. When the table has datafill, operating company personnel can change access the PM level of the MAP display and post the associated PM This action activates the REX test schedule for a peripheral module (PM). The following are examples of this action:

```
>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 many of the diagnostic and functional routines available with the RCC. These routines improve fault coverage and reliability. The system generates logs for the duration of the test. The system suppresses operational measurement (OM) pegs and alarms if the pegs and alarms are active because of the REX test.

Switch of activity

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

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

For an RCC2 with DS-1 links that operates in HDLC mode, all HDLC links can lose synchronization to the active unit. When this condition occurs, the unit attempts a SWACT. If the SWACT fails, the RCC2 enters ESA. If synchronization fails in the inactive unit, the unit operates in the DMS-X mode.

Computing module datasync

The XPMs must follow several requirements to maintain system sanity. One requirement is that node and port tables in both units must remain synchronized. the same internal indexes must reference common tuples to both units and the tuples must contain the same data. Identical indexes in both units allow processes to communicate between units. Active processes continue to function after a warm SWACT. The addition of new XPM functionalities caused the preservation of synchronization of the mate unit node and port tables to be more difficult.

Data is set in the active unit of an XPM through the node and link RTS and external triggers cause the state changes. Data transfer to the inactive XPM unit can occur through the bulk and individual messages of the current XPM datasync mechanism. Data transfer occurs through the use of the following equipment:

- an IMC filter that blocks all individual XPM datasync messages
- an RTS NODATASYNC that blocks all bulk XPM datasync messages and compresses the node table in the XPM
- the CM supplied static and dynamic data for the RCC2 and subtending P-side nodes in the RCC2 that undergo the SWACT

For basic loads, the link states data and P-side node and port states data must be included to make sure that the correct initialization occurs for RCC2 data.

The inactive unit is forced to order the node table the same as the active unit. This action coordinates management of node table synchronization in the XPM. To perform this action, the active unit must send a map of the node table during a bulk download of configuration data. The inactive unit uses the map to enter data in the node table as data is received from the CM.

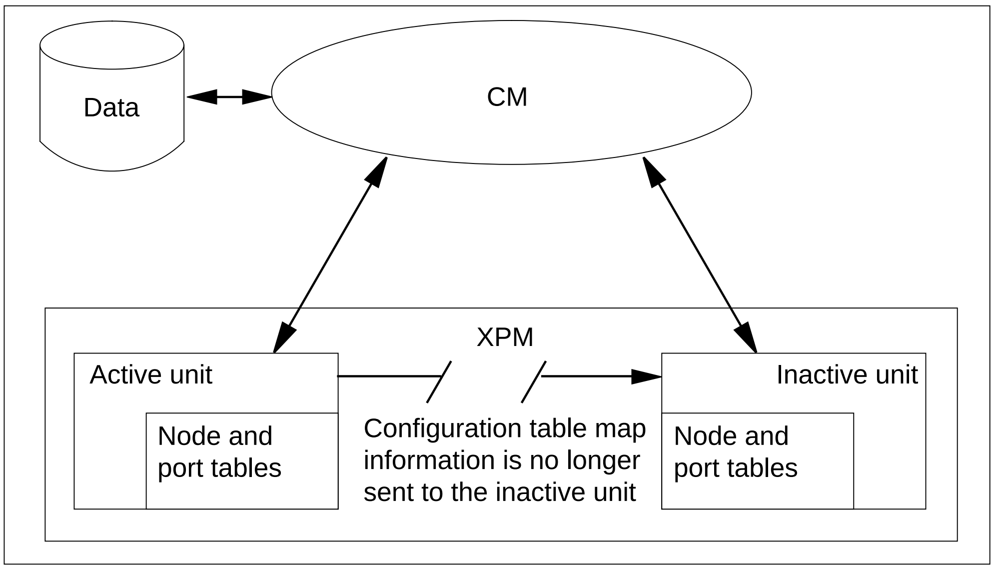
The inactive unit does not use the node map to write dynamic updates. The inactive unit expets to receive the data in the same order as the active unit. When the inactive unit runs, the node and port tables must remain in synchronization with the active unit. Units can lose synchronization if one unit lost an earlier dynamic update. The active unit can contain a temporary interprocessor message link (IPML) in the node table when a dynamic update occurred. The IPML is used for broadcasting. This condition causes the tables to be out of synchronization because addition of temporary IPMLs occurs only in the node table of the active unit.

Node table synchronization enhancements

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

Table PMNODES is a read-only table. The system adds and deletes tuples as related inventory tables, like RCCINV and LCMINV, are entered. The system rejects attempts to directly update this table. The system checks XPM resources when addition of a tuple for a subtending node occurs or changes occur in an inventory table. Warnings appear when an XPM does not have the table space, port, or terminal resources to support the new requirements. For a complete description of the datafill for table PMNODES, refer to the *XPM Translations Reference Manual*.

Figure 1-11 Enhanced XPM node table synchronization



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

The CDT / XPM node audits convert XPMs that have compatible software loads to the new node table management control. The CDT/XPM node audits also verify the sanity of XPMs for which the conversion occurs. To maintain backward compatibility, XPMs with software loads without CDT management capability continue to maintain mate unit synchronization.

The CM has control of both units of an XPM node when the following events.

- The CDT / XPM node data audits successfully updated the tuple(s) of that node in table PMNODES. When this update occurs, these tuples match the data and indices 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 when a one night process (ONP) conversion does not occur. Nodes added during ONP are not new and are now in service.

Note: An office can receive an initial software load with the new node table management system. When this condition occurs the CM gains control of compatible XPM node and terminal tables during the next scheduled CDT / XPM node data audits. An XPM can be taken out of service (OOS). When this condition occurs, the CDT / XPM audit must successfully convert an XPM to the CDT management system and align the CM tables with the node tables. When this condition occurs, the CM assumes control.

The CM initiates the audit request to an XPM with a VERTUPLE message. The message has a parameter that identifies if the XPM responds with a message with actual tuples of data or a checksum of the table. The CM requests the tuples data to supply the CM with the required information to convert an XPM to CDT management control. differences between the active and inactive unit tables can be present. If this condition occurs, the CM aligns to the table of the active unit and sets the XPM ISTb. After an XPM converts to CDT, a checksum of the table is always requested when the CDT audit runs.

Checksums of the node and port table data verify the synchronization of XPM nodes in the CDT management system. Regenerate each tuple in the XPM table. Calculate the checksums. After a tuple is formatted, the calculation for that tuple occurs and is added to the table checksum for that XPM. The XPM checksums are verified against corresponding checksums that the system generates in the CM. An out-of-synchronization condition causes the unit to be set ISTb. The method that confirms XPM synchronization, mate unit synchronization or CM control, does not affect the state change of the unit. During the next audit cycle, if the unit checksum coincides with the CM checksum the ISTb condition is cleared.

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

The XPM node table and the port table are only compressed when:

- both units of an XPM are taken out-of-service
- new configuration data is downloaded

This condition allows the CM to manage the node and port tables more effectively.

As the CM takes a more active role in the maintenance of the node tables in XPMs, the XPMs become less active. The XPM must accept the CM data as the data is sent without corrections or adjustments.

To implement the enhanced synchronization capability that feature AF5678 provides, the following functions are created or changed.

- The XPM does not derive node table data from a subset of data sent from the CM any longer. The CM specifies all data the node and port tables contain and the XPM stores the XPM data receives.
- The CM notifies operating company personnel if resources are not available on an XPM when inventory tables are changed. The state of the XPM (ManB or OOS) at the time the inventory tables are changed does not affect notification.
- The XPM does not compare node tables between units any longer. The CM makes sure that the node tables in each unit match because the CM controls the content of each table. An RTS that occurs on 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.
- Creation of node and port table aspect and access routines allows applications to access the data. Read-only access is provided to applications. Tuples in XPM tables continue to be dynamically updated from the CM when the XPM is InSv.
- Creation of new external node number to internal node number look-up table occurs in the XPM to provide fast conversion from external to internal node numbers. This action eliminates the possibility of collisions.
- An enhanced messaging interface includes status information between the CM and XPM. The new interface contains:
  - — the ability to add a sequence number from 1 to 255 in the header to detect lost messages.
  - — a byte of data transfer status information that informs the XPM if more messages follow.
  - — a count of tuples the message affected.
  - — 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 necessary to support call processing. These states are normally set in the active unit of an XPM through:

- the node and link RTS
- state changes that have external causes

These states transfer to the inactive XPM unit through the bulk and individual messages of the XPM data synchronization mechanism.

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

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

- The initialization of the inactive unit.
- The OOS tests run on the inactive unit.
- the CM sends new static data and marks the inactive unit in-service trouble (ISTb) if the inactive unit static data is not correct.
- The active unit sends dynamic data to the inactive unit (bulk sync).
- The CM marks the inactive unit InSv.

Reset non-remote carriers and trunk call cleanup

In addition to the CM dynamic data, all non-remote carriers that are present are cycled. Cycling is a busy and return-to-service sequence on a terminal. This activity makes sure all trunk data are initialized 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 calls on all subtending P-side. This action takes into account intraswitched and interswitched calls on subtending RCC2s. The cleanup causes the calls in local P-side nodes to be first idled, and the calls in subtending RCC2s are idled. During the line call cleanup, the RCC2 is subject to messaging overload. When messaging overload occurs, the system inhibits call terminations and originations.

Special cases

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

If an error occurs during the SWACT, errors on the RCC2 that undergo the SWACT are handled differently based on when the error occurred. The failure can occur:

- before the activity switch. When this condition occurs, the SWACT aborts and the node is in the ISTb state. The inactive unit is made SysB, and maintenance personnel can recover the unit. If the unit is left untended, the system recovers the SysB unit.

- after the activity switch and before the full post-SWACT cleanup completes. When this condition occurs, the complete node is made SysB. Maintenance personnel must determine the cause of the failure and bring the node in service. If the unit is left untended, the system recovers the SysB unit.
- after the activity switch and after the full post-SWACT cleanup. When this condition occurs, the newly inactive unit remains out of service for maintenance personnel to handle. If the unit is left untended, the system recovers the SysB unit.

A datasync failure can occur for any of the P-side nodes. When this condition occurs, the system in returns to service. A P-side node datasync failure of a single P-side node does not impact:

- the node that undergoes the SWACT
- any other P-side nodes

When a P-side node encounters a problem with the CM dynamic data synchronization, the problem is limited to that P-side node. The problem does not affect the host XPM or other P-side nodes.

Controlled and uncontrolled switch of activity The two types of SWACTs are controlled and uncontrolled. The following actions result in controlled SWACTS:

- manual action when you use the SWACT command)
- planned system requests from the REX test schedule
- when the active unit is busied while the inactive unit is in service (InSv)

Controlled SWACTs can occur when both units are InSv. Controlled SWACTs can also occur when the RCC2 is in the in-service trouble (ISTb) state because of a previous REX test failure.

> ***Note:*** Feature AF2987 makes sure a system audit does not return the unit to service.

The system implements uncontrolled SWACTs when a hardware fault or a trap in the active unit occurs. Examples of failures that initiate uncontrolled SWACTs follows:

- 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, the RCC2 must know which of the following are present:

- cards
- ports
- execs
- terminals

This information is in tables and is called static data. The RCC2 does change dynamic data that is established when set up occurs.

The node data that resides in the RCC2 and subtending XPMs determine data entered through the inventory tables in the CM. These inventory tables include LTCINV, LCMINV, IPMLINV. These tables identify which nodes must communicate with other nodes. When a node, like a line concentrating module (LCM), is entered on an RCC2 , an entry for the LCM must be placed in the RCC2 Node table. This action allows the RCC2 to route messages to and from the LCM.

As the data entry occurs through the inventory tables, the CM verifies that the head or messaging XPM has the resources available for the new node. If the XPM does not have the required resource, the data modification order (DMO) is rejected. If the DMO is not rejected, the CM writes the data in the copy of the XPM node table and determines the internal index for the new node.

When the data transfers to the XPM, the CM reads the data from the version of the XPM node table. The data transfer includes the internal index for each tuple to use in the XPM node table. The XPM uses the index the CM sends to determine the location of the tuple in the node table.

The transfer of the index to both units from the CM makes sure the XPM receives the same tuple indexes for both units. This transfer maintains the synchronization in the node table required for the XPM to support warm SWACTs and inter-unit messaging.

Previously, the CM transferred the port table information for a node in the same message as the node data. The node and port tables are separate tables in the XPM and do not affect this action. To manage these tables, the CM now transfers the node and port data in separate messages. The CM uses unique configuration table identifiers for each table to perform this transfer.

The status of the peripheral modules determines when and how the static data update occurs:

- If the host XPM is ManB, the static data load occurs during RTS.
- If the host XPM is InSv, the static data is dynamically updated.
- If the RCC2 is ManB, the static data load occurs during RTS.
- If the RCC2 is InSv, the static data is dynamically updated.

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 1-23

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 1-24

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 1-25

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 1-26

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
/RunInitializing
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 returns to service if manual maintenance occurred or if a system audit detects a defective component.

When manual maintenance occurs, a fault can occur in the RCC2 unit or PM becoming system busy (SysB). When this condition occurs, the unit is normally busied and tested. When the defective component is found and repaired or replaced, performance of an RTS occurs on the unit or PM.

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

Performing a return to service without running diagnostics Use of FORCE parameter with the RTS command causes the read-only memory (ROM) diagnostics to not perform.

CAUTION
Use the FORCE parameter only when directed.
Do not use the FORCE parameter unless directed, because diagnostics that are normally part of the RTS command can encounter additional faults.

The following message sequence appears 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 a dynamic data synchronization with a fault flag raised occurs. This action occurs because warm SWACT is disabled. When synchronization completes, the system returns the unit to service.

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 is that P-side DS-1 links connect the two peripherals. The following sections explain DRCC2 in terms of the functional areas in the following sections:

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

Speech and message paths

The DRCC2 allows calls that originate on one RCC2 and terminate on the interconnected RCC2 to route directly over interlinks during call setup. The minimum DRCC2 configuration requires four messaging links. For this type of call to occur, the two peripherals must be able to communicate with the host and with each peripheral.

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

Sending messages between the remote cluster controller 2s

When a message is received over a messaging link from the interconnected RCC2, the system routes the message to the NTMX76 of the active unit. 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 Before feature AF6046 (Dynamic Download Of Static Data (SD) for Table IRLNKINV), interlinks information in table IRLNKINV was not dynamically downloaded to both

RCC2s of a DRCC2. A download of interlinks information required a manual busy and return-to-service of the two RCC2s. This download caused an E1 outage. Table IRLNKINV information was downloaded to both the master RCC2 and the spouse RCC2 as part of the SD bulk download.

Feature AF6046 provides a process which dynamically reconfigures interlinks between two in-service (InSv) RCC2 nodes in a dual configuration. This feature provides this process and preserves stable interswitched calls. This feature provides the following improvements:

- adds command INTERSW to the IRLINK MAP level. This command activates and disables interswitched calls for the posted RCC2.
- improves the BSY interlink MAP command. The improved command displays the number of interswitched calls that use available C-side channels to revert to the network.
- improves the QUERYIR interlink MAP command. The improved command displays the state of IRLINKS and the state of interswitching capability of the posted RCC2 of a DRCC2.
- allows the dynamic download of IRLINKS static data to both RCC2s that interconnect in a dual configuration.
- provides the dynamic download of ForceESA SD.

Enter the following command from the IRLINK MAP level to disable interswitching capability. Enter this command before you reconfigure (adding, removing, or moving) interlinks of a posted RCC2 of a DRCC2.>**INTERSW DISABLE**

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

Example of a MAP response

```
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 is disabled, enter the BSY command with the IRLINK number(s) you want reconfigured. This action begins modification of the IRLINKS. The improved BSY command displays the number of interswitched calls that use C-side channels to revert to the network. The following is an example of this command:>**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 are a limited resource. Reconfigure IRLINKS during periods of low traffic. Loss of interswitched calls can occur if not enough C-side channels are available.

Enter the INTERSW command before an attempt occurs to BSY a specified IRLINK. If you do not enter this command before the BSY attempt, the MAP terminal displays the following response:>**BSY 3**

Example of a MAP response

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

When the IRLINKS are ManB, enter table IRLNKINV and make link changes for the desired IRLINK configuration. Static data immediately downloads to both units of both RCC2s of the DRCC2, if the units are InSv.

After DRCC2 IRLINKS are reconfigured, enter the improved RTS command to return the IRLINKS to service 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 activate interswitching, enter the following command from the IRLINK MAP level:>**INTERSW ENABLE**

To confirm interswitching is activated for the posted RCC2, enter the QUERYIR command from the IRLINK MAP level. The MAP displays for the RCC2 appear in the following examples:>**QUERYIR**

Example of a MAP response

```
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 IRLINKS and ForceESA static data are dynamically downloaded to both RCC2s of the DRCC2. The following components must also download:

- ESA lines
- trunks and ESA table control data
- components of the ESA static data for both RCC2s

For this reason, the units of both RCC2s are set to in-service trouble (ISTb) with the message `ESA STATIC DATA MISMATCH`.

You can download the ESA static data manually at the PM MAP with the RCC2s posted. To download the ESA static data, enter the LOADPM command with the source `CC` and file `ESADATA`. You can update ESA static data at the automatic nightly static data updates as defined in table OFCENG tuples RSC_XPMESASDUPD_BOOL and RSC_XPMESASDUPD_HOUR.

Emergency stand-alone and dual emergency stand-alone

The following sections describe how the system makes sure that the RCC2 can communicate with the host. The sections also describe how to enter and exit ESA and DESA are entered and exited.

Synchronization in dual emergency stand-alone mode When the DRCC2 enters DESA the following cards perform functions that allow both peripherals to synchronize and send messages to each other:

- NTMX81
- NTMX75
- NTMX76

For calls to be interswitched, both peripherals must be synchronized to 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). Both peripherals synchronize to the same source because the timing element is sent out to all nodes in the network.

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

When loss of communication to the host occurs, the internal XPM clock for the active unit does not have a frame pulse to follow. The XPM clock goes into 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, DESA is implemented and interswitched calls are allowed.

> ***Note:*** Because RCC2 B is not truly in ESA, it can exit ESA under certain conditions. For example, if the RCC2s can no longer exchange messages over the interlinks, the RCC2 B starts a timer. This timer is used to prevent bouncing links.

When this timer begins, the following conditions are possible:

- If the interlinks cannot resume messaging before the timer expires, RCC2 B stops the simulating faults and exits ESA.
- If the interlinks resume messaging before the timer expires, the timer is canceled and DESA is reestablished.
- If the timer expires and RCC2 B exits ESA and the interlinks resume messaging, the system forces RCC2 B into ESA.

Maintenance messaging

For the messaging channels, RCC2 software can perform the following tasks:

- send and receive messages across the interlinks with DMS-X protocol
- handle intermessaging link faults the messaging system detects
- provide support when maintenance is performed on the messaging links

One RCC2 can send a message to the other RCC2. When this condition occurs, messaging software sends the message to the firmware of the NTMX76 card to be transmitted. If the software cannot send, the message to the messaging software. For example, the link can be closed, or a timeout exists in the DMS-X protocol. These messages rebounded.

When a message rebounds, the message link is closed and software tries to send the message over the other messaging link. The XPM maintenance in the RCC2 is informed of the rebound. This software tries to RTS the defective link. A PM181 log informs operating company personnel of these procedures.

Emergency stand-alone warm exit

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

Warm exit for the RCC2 addresses the following deficiencies when an RCC2 exits ESA:

- service outage of a maximum of 20 min
- drop of all stable calls
- messaging between the RCC2 and the CC that informs the CC of any active calls

The system supports the ESA warm exit for the DRCC2. The system does not support the 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-S. 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:

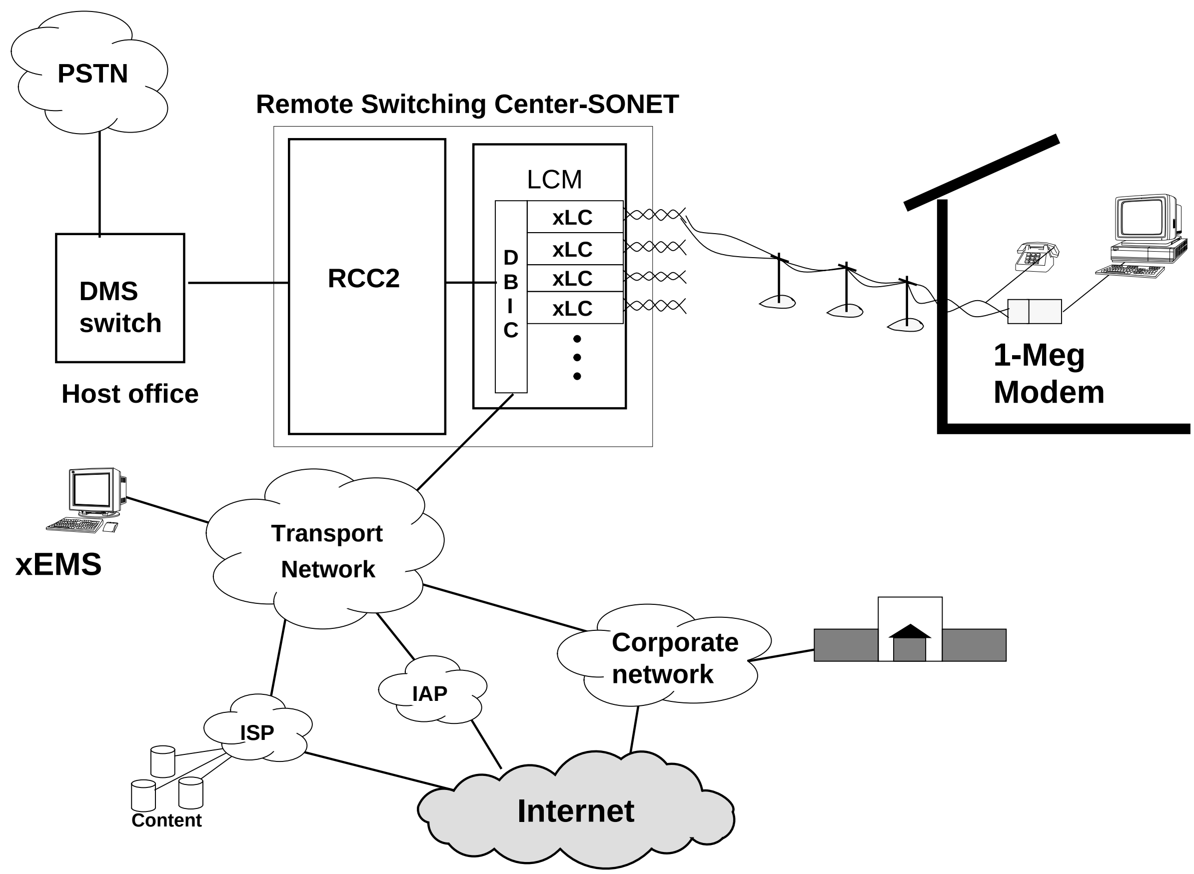
- The 1-Meg Modem is customer premises equipment (CPE) that connects the telephone line, extension telephone, and computer. To the subscriber, the modem installs like a regular voice band modem, except the modem uses a 10BaseT Ethernet connection to the computer. Voice and data circuits are kept separate 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 Manual*, 297-8063-200, for more information on xEMS.

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

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

Figure 1-12 Telephone network with 1-Meg Modem Service



PSTN = Public-switched telephone network

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.

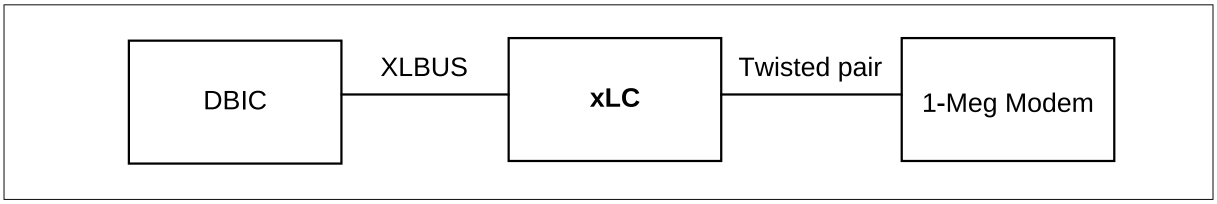
xDSL line card The xDSL line card (xLC) provides full voice service and high speed data communication with a subscriber's 1-Meg Modem.

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 1-13 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 1-27 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 • 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 10BaseT Ethernet connection to the transport network.

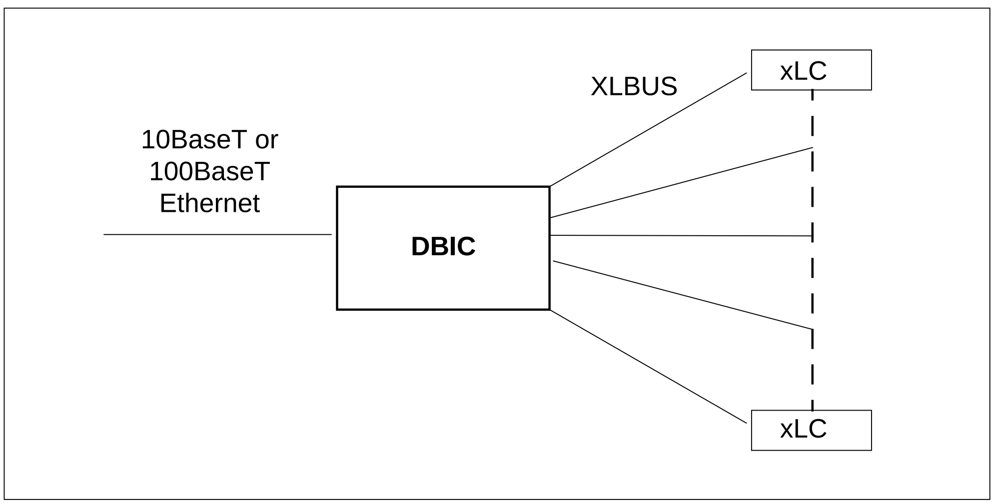
The DBIC has the following features:

- half duplex, standard compliant 10BaseT 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 1-14 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 1-28 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 1-28 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 • 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 the following:

- cards
- speech and message paths

- host ISDN peripherals
- enhanced LCM (LCME)

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

Cards

The RCC2 with ISDN is based on RCC2 with the addition of the enhanced ISDN signaling preprocessor (EISP) card and the DCH card. Use of the NTMX81 card occurs when clear DS-1 channels are needed.

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 and performs Q.921 link access procedure on D-channel (LAPD) layer 2 processing. The DCH is permanently connected to an ISDN loop and 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 (specifically NTMX81) provide the 64-kb/s clear channels necessary to process D-channels.

Speech and message paths

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

The DCH cards provide the Q.921 function and 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) is sent over Bd links to the PH. The system routes the SAPI 0 (call control messages) data to the EISP for further processing. SAPI 17 messages are returned back on the same loop.

A DCH resides in a P-side port and terminates a single port, which consists of 32 64-kb/s time slots. Time slot 0 is reserved for messaging to the EISP. The other slots 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.

One of the main functions of the host XPM is to terminate the DS-1 links from the RCC2 and pass the circuit-switched traffic to the network. As with the RCC2 without ISDN, this traffic is nailed-up through the RCC2 and is nonconcentrating. The other capabilities of the host XPM depend on how the RSC-S with ISDN is configured.

How data-switched traffic is to be handled also affects the other capabilities of the host XPM. The following is a list of host XPM capabilities:

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

  Note: If the host XPM does not have to support an ISDN line concentrating module (LCME) directly. An LGC or LTC can support an ISDN LCME.

- 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

Enhanced line concentrating module

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

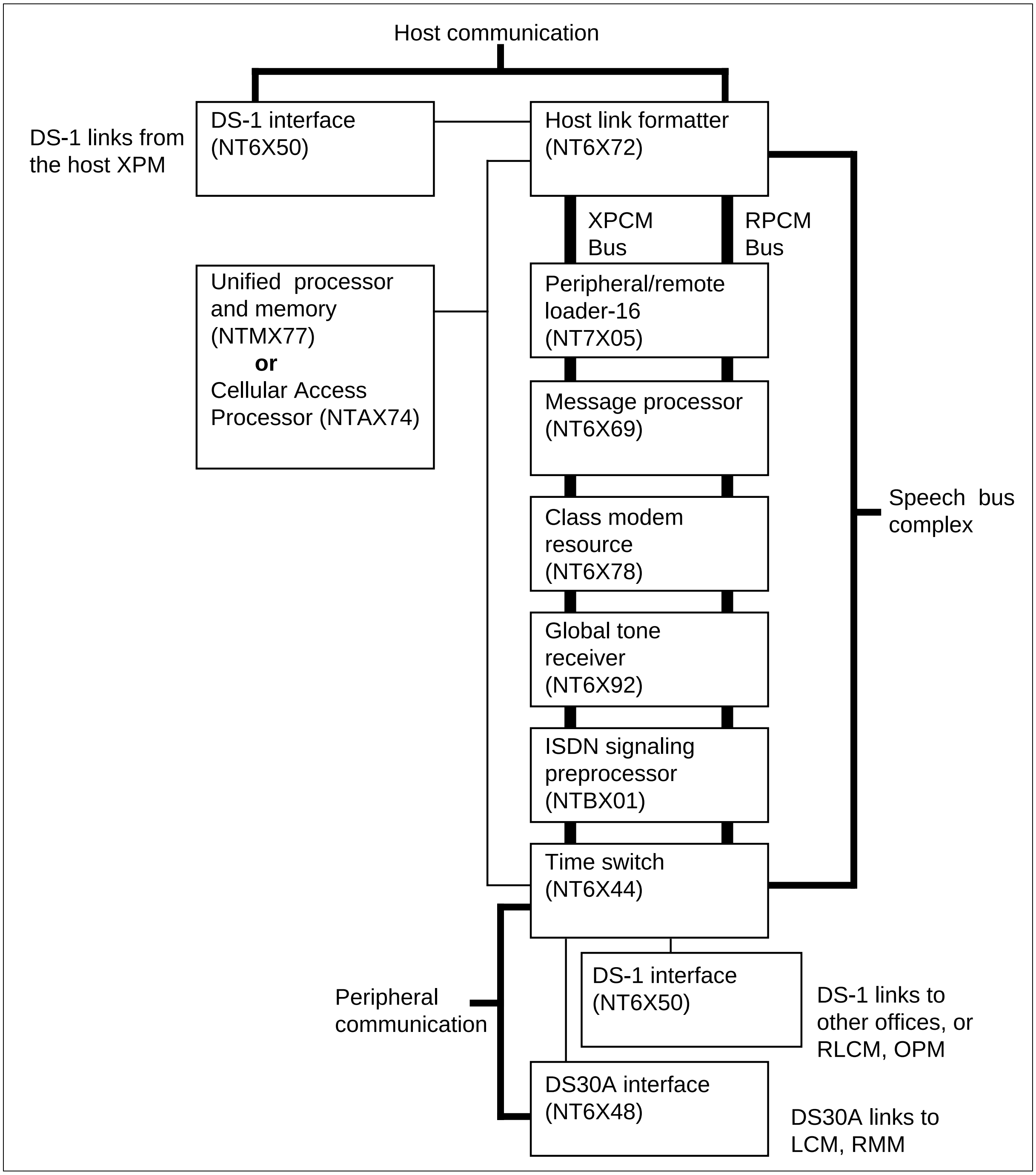
Line concentrating module

The RSC-S can be provisioned with an LCM. The RSC-S provisioned with an LCM does not support ISDN. The RSC-S with LCM offers coin and automatic number identification (ANI) support and 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 an RCC2 with ISDN.

Figure 1-15 RCC2 with ISDN



Fault conditions

The RSC-S includes internal monitoring systems that detect fault conditions. The following section describes fault conditions that automatic maintenance monitors, and automatic maintenance features. The configurations describe the RSC-S fault conditions.

Remote cluster controller 2

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

Errors specific to processor cards

The following errors can occur in RCC2 processor cards:

- traps

  errors that hardware or software causes. Traps occur when the CC receives a gain message that the new active unit does not request.

- software errors (SWERR)

  errors caused by software.

- intermittent, soft parity, or hard parity, and exception faults
  - — intermittent

    The system detects a fault but does not detect an error during the reread of the location.

  - — soft

    The system detects a parity error and detects an error when the RCC2 attempts to read the location again. The system does not detect an error when the RCC2 attempts to write to the location. The error can occur in the program store (PS) or memory store.

  - — hard

    The RCC2 detects a fault and cannot reread or write to the memory location. The hardware is defective. You must replace the associated memory card to correct the fault.

  - — exception

    A special condition at the ROM or task level interrupts 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.

The following *Internal* conditions can cause an exception:

- illegal instructions
- address errors
- tracing

- breakpoints
- coprocessor protocol violations

The following *External* conditions can cause an exception:

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

Exceptions that are fault conditions appear in the following table. These fault conditions require maintenance.

Table 1-29 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
14	No	Bad CSP, system does not implement standard procedure
15	Yes	Bad P-code instruction
16	No	Task error
17	Yes	Request for reset—Trap 7

Table 1-29 XPM error type and description (Sheet 2 of 2)

Type	Fatal	Description
18	No	Not used
19	Yes	Parity error
20	No	Addressing error
21	No	Illegal instruction
22	Yes	Spurious interrupt
23	No	Bus error
24	No	MMU error
25	No	Not used
26	No	Privilege violation
27	Yes	Sanity timeout

Errors not limited to processor cards

The following list contains errors that are not limited to RCC2 processor cards:

- static data mismatch faults

  Static data defines the RSC-S configuration and does not change when the system connects and disconnects calls. When static data in the host and the RCC2 do not match, data corruption can occur. The host can recognize a line when the RCC2 does not recognize the line. A loss of calls can occur.

- unit node table mismatch faults

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

- Mate unit matching compares the inactive unit tables with the active unit and sets the XPM ISTb if mismatch occurs. The active unit sends table mapping information to the inactive unit during updates.
- Node table audits determine if the information relates to data in the computing module (CM) table PMNODES. To prevent differences in datafill for the XPM units, the CM maintains all node information. For a complete description of the datafill for table PMNODES, refer to the *XPM Translations Reference Manual*. Feature AF5678 introduced table NODES.

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

- Table Control applications that change inventory tables reject tuples that a peripheral cannot support. The system cannot support tuples when a peripheral does not provide the required resources.
- The node table audit raises an ISTb condition on an XPM that has a node table mismatch with the CM. You must BSY and RTS the whole XPM to clear the ISTb condition.
- A negative acknowledgment from the XPM can occur when the configuration data table (CDT) node or port information downloads during a bulk download. The system can abort the loading or RTS process.
- A negative acknowledgment from the XPM can occur when the node CDT or port CDT data downloads during a dynamic configuration update. The system raises an ISTb condition on the XPM.
- Feature AF5678 creates two new PMDEBUG commands. Operating company personnel determine which tables are bound to the CDT data distribution. These commands allow operating company personnel to

display tuples in the tables. The syntax of the commands appears in the following list.

- To display a minimum of one tuple in a table bound to CDT management when in the CHNL:PROT level of PMDEBUG, enter
  - — To obtain a list of the XPM data tables bound to CDT management, when in the CHNL:Prot level of PMDEBUG, type

    >SHOWTBLS

    without parameters
  - — To display a minimum of one tuple in a table bound to CDT management when in the CHNL:PROT level of PMDEBUG, type

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

    where

    table_id
    is the name of the table that appears

    tuple_no
    is the number of a specified tuple that appears

    R
    is a range of tuples that appear

    begtuple
    is the beginning tuple of the range

    endtuple
    is the end tuple of the range

    all
    is display all tuples in the table

    If the table identification appears, all tuples appear in a list. Press the RETURN key to abort the list.

Note: Feature AF5678 XPM Node Table Sync Redesign changes the start of the command RTS with the NODATASYNC option. Refer to the *Trouble isolation and correction procedures* in this document.

Additional specified faults not related to cards:

- intermodule communication faults

  When two RCC2 units cannot communicate with each other, a warm SWACT cannot occur. Intermodule communication faults cause this condition. A warm SWACT cannot occur because one unit does not know the type of information 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. The RCC2 can receive messages that support ADSI protocol for display-based features. The RCC2 forwards these messages to the CMR card. The CMR card forwards the data to the CPE. The CMR can receive the request to transmit data. If modem resources are not available, the CPE does not receive display data. An overload in the CMR causes this condition.

  The CPM must receive an acknowledgment (ACK) tone from the UTR card to transmit data. The CMP transmits display data to the CPE. If the UTR card does not contain available channels to transmit the ACK tone, the CPM does not send the display data.

Dual remote cluster controller 2

Interlink corruption can occur in a DRCC2. When interlink corruption occurs over 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 that does not have ISDN. Problems can occur when the RCC2 with ISDN attempts to send and receive data packets and call control messages. These problems normally involve the DCH card.

Automatic maintenance

This section describes how audits and system actions identify fault conditions. The system can adjust the fault or 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 period of 10 s
- accurate capture of trap-specified data
- guaranteed survival of trap data over restarts and reloads
- capture of both supervisor and user stacks at exception time
- circular buffer management at exception time
- enhanced trap administration

- expanded trap-specified error information to accommodate parity fault requirements. The exception processing system reports parity faults to the parity audit. This system does not report the CC.
- storage of the trap system version for each trap
- traceback support on patched procedures

ROM-level exception processing On initialization, the firmware maps all vectors to local exception handlers. The ROM-level exception processing performs the following functions:

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

Task-level exception processing Task-level exception processing reports important information on hardware and software states. Task level exception processing reports this information when a hardware or software fault prevents normal operation of the CPM unit. The process attempts to restore the task to a known start point and allows the task to perform recovery actions. If the task cannot recover, the task-level exception processing initiates local maintenance to restart or reset the CPM unit.

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

Exception recovery consists of three different operations:

- determine how important a trap is. The trap can be fatal or recoverable.
- process fatal trap
- recover task, not-fatal trap

When the exception processing system detects a fatal error, the system initiates local maintenance action to drop activity in the active unit. The system initiates local maintenance action to reset or restart the CPM unit. When the CPM is INSV, the CPM sends exception errors to CC in the form of messages that are not requested. The CPM generates a report for each exception not reported in the trap buffer. The CC receives the report, acknowledges the message, and logs in PMDEBUG to access the exception information. The CC generates a PM185 log report for each trap.

The PMDEBUG can view and delete exception data from the trap buffer at the task level. Changes occur in the display routines that correctly reflect data capture differences for required improvements. 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 1-16 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 recovery is complete, the exception reporting system learns that trap data is available and exception handling is complete. The recovery process:

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

If the trap is not fatal, the system restores the selected task to a start point that allows the task to return to a known state. For recovery to occur, the task must exit many levels to return to the task mainline.

The task recovery model specifies that a task must provide a mainline. A mainline is a continuous loop that repeats calls to the main body of the steady state code. A call to a recovery procedure can follow. When the task follows a recoverable trap again, the task must return to the instruction that follows the call to the main body of code. This instruction is a call to a recovery procedure or a branch back to the loop start.

Memory management unit error recovery The enhanced exception processing system feature provides an improvement to exception recovery.

This improvement works with the direct memory access memory management unit (DMA MMU). When a DMA MMU error occurred before the improvement, the exception processing system convicted the interrupted task. The system convicted the task even though the software on the NTMX77 did not cause the error. The convicted task determined if the error was fatal. An MMU error is not fatal. The processor that caused the fault did not recognize the problem.

With the improved feature, the external processor receives invalid data if the access is for a read from NTMX77 memory. If the access is to write to NTMX77 memory, data is not written. The processor identifies a fatal trap and 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 data channels. The NTMX76AA circuit card provides message interface to the UP. A maximum of 32 high-level data link control (HDLC) message channels are available for interface to the UP. To allow HDLC messaging, the host and remote offices must have the NTMX76AA circuit card.

The HDLC messages transfer through message buffers allocated in the common RAM. The NTMX76AA circuit card performs checks to verify the HDLC messages. This card copies the message to the R8071 Rockwell memory buffer. To receive a message in the R8071 data link, the NTMX76AA circuit card copies the message from the R8071 memory to the message buffer. The system queues the outgoing buffer in the R8071 transmit queue if the number of queued buffers is less than the maximum allowed. If the queue is full, the message returns.

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

Channel management When the RCC2 or LGC plus is ready to send a message on an HDLC link, the message is copied to a buffer. The message is copied to a buffer in the NTMX76AA circuit card. The NTMX76AA circuit card sends the message on the correct destination link. The message to send determines the correct link. The NTMX76AA circuit card contains a limited number of buffers used for messaging and R8071 transmit queues for a specified link. This feature controls the rate of outgoing messages. This action allows buffers for message transmission to remain available.

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

A description of the REx test and SWACT process, and the audits and system actions appear in the following section. The audits and system actions identify fault conditions related to 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 required on the messaging channels in the LTC+ and the RCC2. When Feature AN1523 detects a loop that is not required, related protocol operational measurements (POM) increase. The EDC shelves alert the CC of protocol problems, like negative acknowledgements (NACKS), through the operational fault (OPF) system. The CC receives the alert and starts correct maintenance. The CC sets the RCC2 SysB, starts a SWACT, or causes the RCC2 to enter ESA.

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

Switch of activity

A SWACT occurs when two units of an XPM exchange activity state. The active unit that handles call processing becomes the inactive unit and the inactive unit becomes the active unit. The inactive unit controls call processing.

The SWACTs can be controlled or uncontrolled. The following events cause controlled SWACTs to occur:

- manual action, link the entry of a SWACT command
- planned system requests, like the REx test schedule
- system action to busy the active unit when the inactive unit is INSV.

If both units are INSV, a controlled SWACT can occur. If the RCC2 is ISTb because a previous REx test failed, a controlled SWACT can occur.

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

In a controlled SWACT, the following message exchange 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. The audit results determine if the system can start a warm SWACT.
- The original active unit remains INSV and clears data that is not stable.
- 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 signals the original active unit to drop activity.
- The original active unit sends the CC a drop message, and the CC expects to receive this message.

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

- The CC messages the active unit of the RCC2 to start an audit of the inactive unit.
- The user implements the pre-SWACT audit.
- The audit results determine if the system initiates a warm SWACT.
- The original active unit stays INSV and clears data that is not stable.
- The new active unit does not send messages to the CC.
- The wait time of the original active unit expires and 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.
- If the CC does not receive any messages, the CC sets both units of the RCC2 to SysB. The CC returns to service both units of the RCC2.

In an uncontrolled SWACT, the RCC2 initiates the pre-SWACT audit. The sequence of messages is as follows:

- The active RCC2 unit messages the inactive unit to start a pre-SWACT audit.
- The user implements the pre-SWACT audit.
- The system initiates a warm SWACT based on the audit results.
- The new active unit messages the CC that a gain that is not solicited occurred.

- The original active unit stays INSV and clears data that is not stable.
- 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.
- If the CC does not receive any messages, the CC sets both units of the RCC2 to SysB. The CC returns both RCC2 units to service.

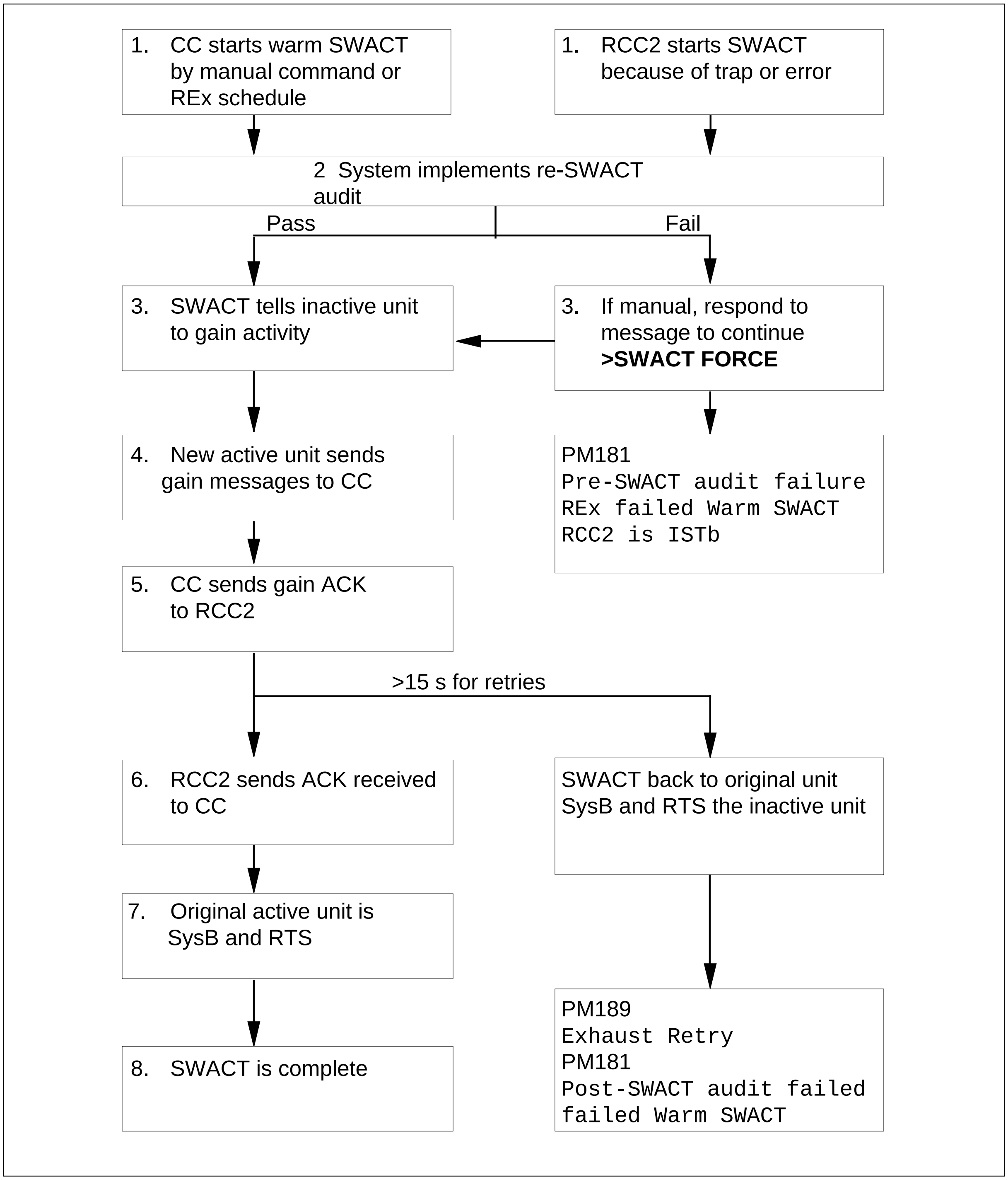
Controlled and uncontrolled SWACTs consider the SWACT complete when the CC receives the gain message from the new active unit. Controlled and uncontrolled SWACTs consider the SWACT complete when the CC acknowledges the gain to the original active unit. When a SWACT occurs, the CC and the RCC2 exchange a series of drop and gain messages to clarify the condition. Common phrases that occur in these messages appear in the following table.

Table 1-30 Message phrases that describe CC to RCC2 SWACT communication

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

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

Figure 1-17 SWACT sequence



Pre- and post-SWACT audits To improve the warm SWACT operation, feature AN0538, RCC2 Pre-SWACT/Post-SWACT Audit denies the SWACT if the inactive unit cannot maintain activity or communication with the CC.

Feature AN0538 can SWACT-back to the original active unit. The software that drives this feature is the SWACT controller and an autonomous capability added to the RCC2 software. The SWACT controller is in the CC.

SWACT controller The system routes manual requests and selected system requests for warm SWACTs to the SWACT controller in the CC. The SWACT controller polls PM diagnostic history data located in the CC and RCC2 state data. The controller does not poll static data. Polled data determines if the SWACT controller denies the request for a warm SWACT or allows a warm SWACT to proceed. During the SWACT, the new inactive unit remains in service. The new inactive unit cleans data structures left in states that do not have stability.

Pre-SWACT audit Before a SWACT occurs, 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. 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.

If the SWACT controller denies a manual request for a warm SWACT, the MAP terminal alerts you of this information. The MAP terminal provides you with a detailed reason for the denial. You can enter the SWACT FORCE command to supersede the SWACT controller. If you override the SWACT controller, the system does not consult diagnostic history or state data to attempt a warm SWACT.

Post-SWACT audit The system busies and returns to service the inactive unit after a SWACT if:

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

The previously active unit remains in service until the new active unit can verify two-way communication with the CC. The new active unit must also verify the capability to maintain activity. If communication fails, or if the new active unit cannot maintain activity, the RCC2 performs a SWACT-back. The SWACT-back is to the originally active unit.

SWACT-back If an RCC2 does not receive a gain-acknowledged message from the CC, the originally active RCC2 unit initiates a SWACT-back. During a SWACT-back, the originally active RCC2 unit attempts to regain activity. If successful, the inactive unit is set SysB and returned to service, and the active unit remains in service. The system preserves calls with stability from the original active unit over the SWACT-back. The system drops calls made after the SWACT and before the SWACT-back. If a SWACT-back is not successful, a cold SWACT occurs. The system sets both RCC2 units to SysB and returns the units to service.

> ***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 SWACT-back functions for the following manual SWACT commands are:

- 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 a SWACT-back for a REX test initiated that the REX scheduler initiated. For additional information how this feature interacts with REX tests, 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.

Example of a MAP response:

```
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 must not proceed. The newly inactive unit can control call processing again.

Uncontrolled switch of activity An uncontrolled SWACT can occur when both units are INSV, the active unit is INSV, and the inactive unit is ISTb.

An uncontrolled SWACT can occur when the active unit is INSV and the inactive unit is SysB. Each of these states results in a different SWACT condition. The state of the units and the reason for the activity drop determine the sequence of events during an uncontrolled SWACT.

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

- activity timeout
- no CC links

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

  A critical hardware fault occurred.
- jammed

  the unit cannot change the active or inactive state because the unit is jammed.
- DRCC2 sync

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

  This message deals with the RCC2. In this condition, the loss of all CC messaging can occur. If the original inactive unit does not send a drop message in a specified time period, the RCC2 enters ESA.
- static data corruption
- originally active unit sends a drop message to the CC.
- new active unit must send a gain message.

The XPM continues to send the gain message at a maximum of 15 s.

An uncontrolled SWACT can occur if the originally active unit is INSV and the original inactive unit is ISTb. This condition depends on the reason the inactive unit is ISTb. The inactive unit can be ISTB because of data synchronization. The condition is the same as when the active and inactive units are INSV. If the inactive unit is ISTb because of data synchronization, the originally active unit drops synchronization. The XPM starts again.

If the originally active unit is INSV for less than 3 min, the unit returns to service without the OOS diagnostic. The unit returns to service without the OOS diagnostic because a previous SWACT occurred. If the SWACT occurred in less than 3 min previous to the current attempt, the active unit had OOS diagnostics run at that time. If the original unit is active more than 3 min, the active unit returns to service with OOS diagnostics.

Regardless of the type of RTS, the active unit attempts return to service. If the active unit cannot return to service, the system sets both units in the XPM to SysB.

Routine exercise test

A REx test includes a series of tests performed on an XPM unit. The system scheduler or manual action by operating company personnel starts the REx tests each day. The REx test combines the diagnostic and functional routines available on XPMs. The REx test results can be grouped in four classes:

- not performed
- passed
- failed
- aborted by manual action. Maintenance action with FORCE parameter or with ABTK command from another MAP terminal with XPM posted causes the test to abort.

All four classes generate a log or display a message at the MAP terminal. The maintenance record contains only passed and failed REx. The user can access failure reasons only for failed REx tests.

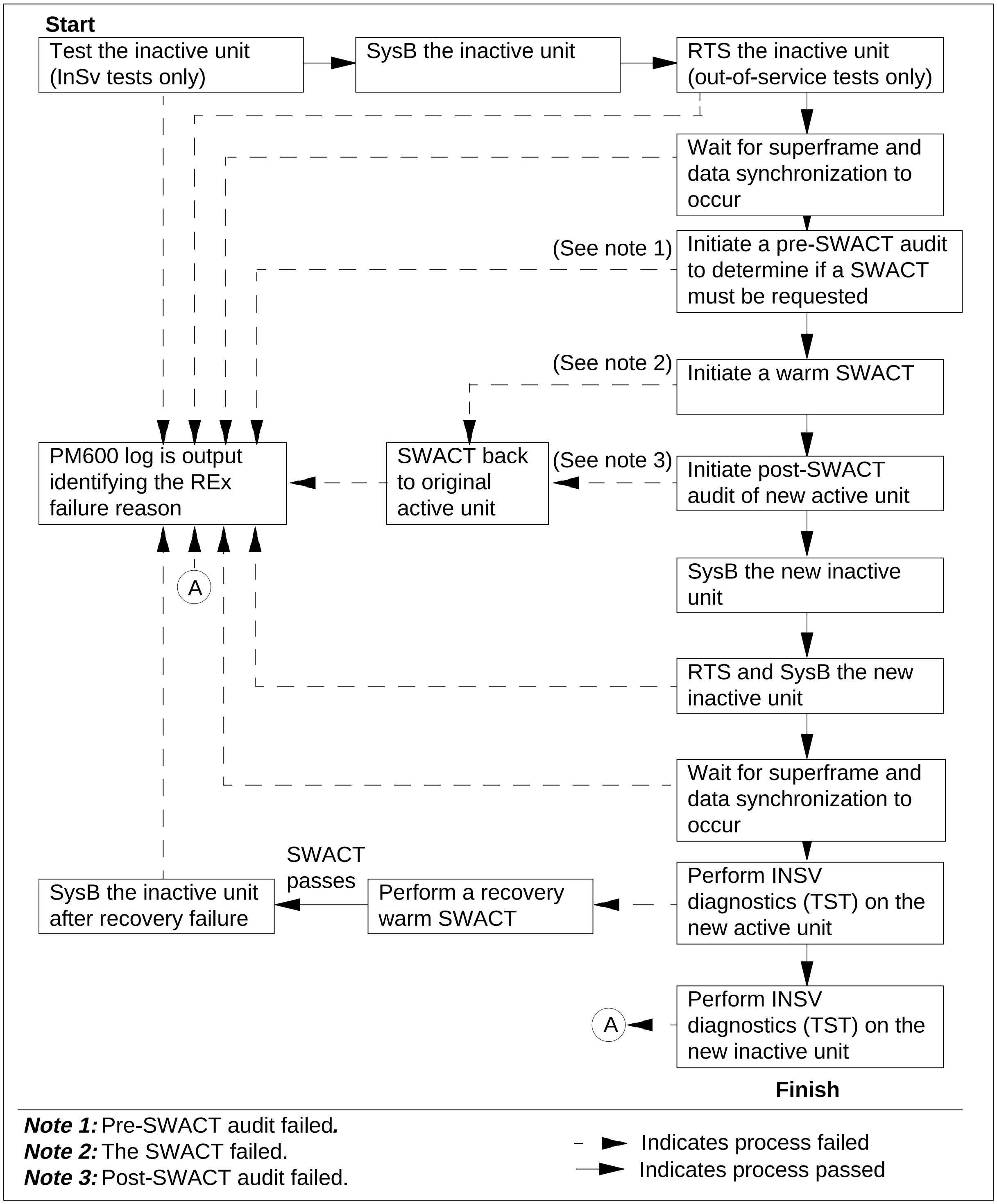
The sequence of events the REx test state machine or controller performs, appear in the following numbered list:

1. Test the inactive unit. Test 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 superframe and data synchronization to occur.
5. Perform a pre-SWACT audit.
6. Perform a warm SWACT.
7. Maintain call processing capability on previous active unit.
8. Perform a post-SWACT audit.
9. SWACT back to previously active unit, if necessary.
10. SysB the newly inactive unit.
11. RTS the inactive unit.
12. Wait for superframe and data synchronization to occur.

13. Run INSV diagnostics (TST) on the newly active unit.
14. Run INSV diagnostics (TST) on the inactive unit.

The REX test state machine controller actions appear in the following figure diagram.

Figure 1-18 REx test state machine actions



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

If an INSV or OOS diagnostic test fails, the REx test failure reason includes the following:

- the mnemonic, an easy-to-remember abbreviation, of the diagnostic that failed
- the unit that failed (0 or 1)

The PM600 log details the start time of each step the REx test initiated, the unit the REx test step affects, and the failure reason. The REx test steps included in the log after the failed step are recovery actions. The REx test initiates these recovery actions because of the REx test failure. The unit number appears in this log only if the REx test action is unit-specified, like BSY unit, RTS unit, TST unit, or synchronization. The unit number does not appear if the REx test action does not affect the node, like SWACT, BSY both units. Additional data of the log consists of a card list and a mnemonic of the failed diagnostic.

The following commands contain information about the last REX test:

- QUERYPM
- QUERYPM FLT
- TST REx QUERY
- TST REXCOV QUERY

Manually and system-initiated REX tests store and display a new date, time, and state. The state can be passed or failed. The REX test maintenance record contains this information. *Passed* means that the REX test completed with no errors. *Failed* means that the REX test did not complete because an error was present. The user enters the QUERY PM and TST REx QUERY commands to access this information. If the REX test fails, operating company personnel perform a manual RTS, a manual REx test, or an automated REx test. Operating company personnel initiate one of these tests to return the XPM to service from ISTb.

A REX test maintenance record stored for each XPM contains the

- REX test scheduler, if the XPM is in the system
- date, time, and result of the last REx test. The result is passed or failed.
- failure reason, diagnostics failures, and a list of defective cards, if the last REX test failed
- date and time of previous REX test that failed
- date and time of first passed REX test that follows the previous failure

Limits that apply to REX tests appear in the following list:

- The system REX test controller runs a REx test on one XPM at a time if the office uses the NT-40 processor. SuperNode supports REx tests that run at the same time. These REx tests run for a maximum of ten XPMs with the same REx test class.
- A maximum of four LCM_REx_TESTs can run at the same time if a REx test for the HOST XPM of these limits is not currently in progress.
- The SREx scheduler schedules LCM_RExCOV tests for converter and ringing voltages in LCM separately.
- For a REx test to run, the node must be one of the following states:
  — INSV, ISTb because of a REx test failure
  — ISTb because P-side DS-1 links are OOS.
- If a warm SWACT does not occur, a REx test terminates.
- After a REx test completes, the XPM has a newly active unit because of the SWACT.
- If a restart occurs when a REx test is in progress, the system does not generate the PM600 log. The system does not generate the PM600 log because the restart deallocates the temporary DS that generates the PM600 log.
- A manual REx test cannot access a SWACT controller override.

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, messages the other unit, and the warm SWACT occurs if the audit passes
- accounts for SWACT denial and failure reasons
- terminates a REx test if the controller denies SWACT
- terminates a REx test if a SWACT back occurs. This action occurs when the active unit of the XPM does not change from the time the REx test started. A REx test performs the recovery. The recovery consists of a busy (BSY) and an RTS of the inactive unit.
- displays the failure reason for a SWACT denial or failure performed during a manual REx test at the MAP terminal. The controller displays REx failed as the result. The user can enter the TST REx QUERY command string for the posted XPM to access 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. The

SREx coordinates all system REx tests under a common REx test scheduler. The REx test scheduler can schedule LCM REx tests when other REx tests are in progress. The SREx test controller performs a REx test on the whole switch in less time. The test runs on all peripherals, like the RSC-S, in less time. The REx tests indicate faults that can affect service. The tests allow operating company personnel to take corrective measures. The NT 40 systems use IORExP for LGC node types.

Feature AF3771 allows the controller to locate and resolve REx test failures sooner. This feature helps reduce outages in the field. The SREx test controller allows operating company personnel to

- change the order in which the system tests peripherals
- coordinate between manual- and system-initiated REx tests
- receive alarms for the RSC-S that are not REx tested in a time limit set. The time limit appears in table RExSCHED

The SREx test scheduler allows the user to enter the CI level RExTEST command and the following parameters:

- The SUSPEND suspends REx tests for one maintenance window. A maintenance window is the time between the REx START and STOP time entered in table OFCVAR under the NODERExCONTROL parameter.
- The RESUME resumes REx tests after the system suspends REx tests.
- The QUERY returns the state of the REx test. The state can be active or suspended.
- The HELP returns a short description of the REx test.

The REx test order for feature AF3771 is as follows:

- critical nodes, like communications module [CM] and MS
- the number of days since the last system or manual REx test second
- the order of internal PM (RSC-S) number last

Table RExSCHED must be entered to establish the REX test schedule for the RSC-S. This table contains the information that the REx test coordinator requires. The coordinator must schedule tests according to operating company specifications. Datafill in table RExSCHED can disable this test. For additional information on table RExSCHED, refer to the data design section of the *Translations Guide*.

The system generates IOAU112 log report for LCMs if:

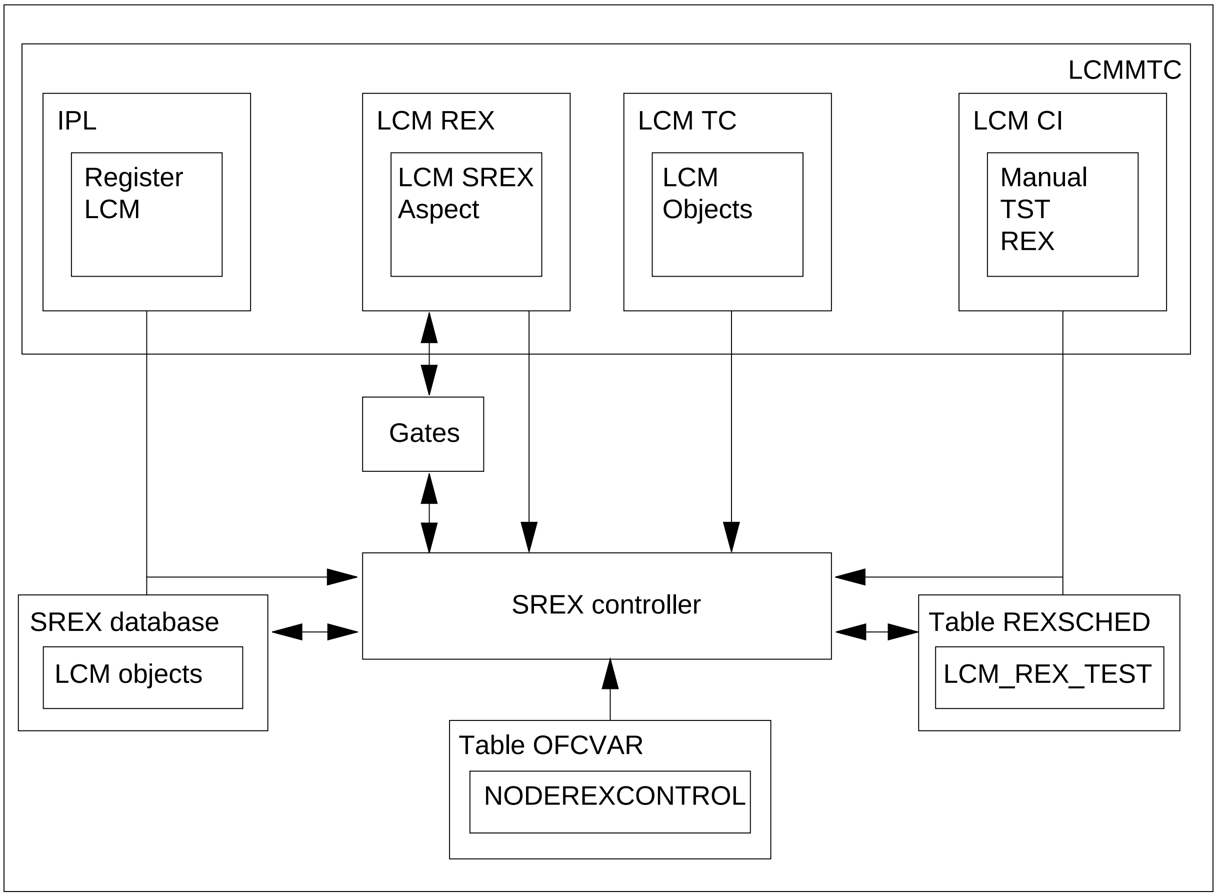
- the LCM is not REx tested for a minimum of seven days
- The REx test takes longer than specified
- The REx test does not start after a defined number of attempts

Extended line concentrating module REx test results Table REx SCHED controls scheduling of SREx for LCMs. The LCM_REx_TEST task SREx runs at the same time in groups of four and with REx tests of XPMs. The LGC, LTC, and the RCC XPMs can act as hosts to LCMs. Problems occur when an XPM scheduled for REx tests hosts an LCM scheduled for REx tests.

To avoid problems, the SREx controller schedules REx tests of XPMs and LCMs that occur at the same time. The LCM SREx subsystem registers the LCM_REx_TEST class and identifies conditions with other REx_TEST types during initial program load (IPL). When LCM nodes join the SREx database, the controller automatically enters entries with defaults in table RExSCHED.

A functional diagram of SREx system requirements appears in the following figure.

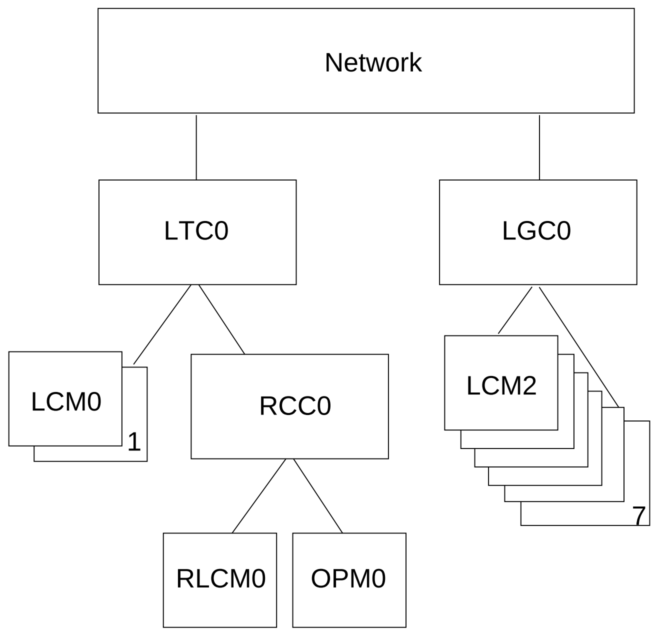
Figure 1-19 SREX system conditions



The converter voltage and ring test sections of LCM_REx_TEST require wait states and different test resources. Wait states and different test resources cause delays in SREx main task initiation. The LCMCOV_REx_TEST runs at a lower priority and implements these tests separately from the LCM_REx_TEST. The LCMCOV_REx_TEST requires logical test unit (LTU) connections in the maintenance line card. An LCM unit can only access one LTU when the other unit is out of service. This resource limit makes sure LCMCOV_REx_TEST initiation does not occur at the same time. The entry of the PARALLEL execution field for LCMCOV_REx_TEST, in table RExSCHED, allows a maximum of one entry.

A functional diagram of SREx scheduling appears in the following figure.

Figure 1-20 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 if a REx test runs on LGC0.

When the LCM_REx_TEST and the LCMCOV_REx_TEST are separate, faster completion of site REx_TEST coverage occurs. The LCM_REx_TESTs that do not have limits of the converter voltage and ring tests run at the same time. The coordinator schedules these tests separately for maximum start periods.

> ***Note:*** The LCMCOV_REx_TEST runs only on LCMs, XLCMs, OPMs, and RLCMs.

The following REx test improvements for LCM peripherals and variants, like LCME, appear in feature AF3234:

- ESA REx test
- LCM and ESA-independent REx test
- MAP command for manual REx test
- fault indicators

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

Emergency stand-alone REx test The ESA REx tests the ability of RLCM units to enter and exit ESA and to message the ESA processor in ESA. The ESA REx test starts after the LCM REx test completes.

MAP commands for manual REx tests The addition of a REx or RExCOV parameter to the TST command at the PM level of the MAP display can start a manual LCM REx test. Examples of this command appear as follows:

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

> ***Note:*** Posts 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 appears, type

>TST REx [ON] [OFF]

> ***Note:*** You can enable or disable the REx test of the posted LCM.

or

>TST COVREx [ON] [OFF]

> ***Note:*** You can enable or disable the COVREx test of the posted LCM.

To start LCM REx tests immediately, type

>TST REX NOW

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

or

>TST COVREx NOW

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

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

Example of a MAP response:

```
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. The scheduler initiates the ESA REx test when the ESA REx test completes. A manually implemented LCM REx test does not start an ESA REx test. The LCM sets ISTb if INSV diagnostics fail or SysB if OOS diagnostics fail if a REx test is not complete. After a REx test fails, the system sets the LCM to ISTb if INSV diagnostics fail. The system set the LCM to SysB if OOS diagnostics fail.

Fault indicators A REx test that is not complete sets the LCM unit to ISTb or SysB. The REx test audit provides a REx failed reason. Audits on LCMs occur at intervals of 10 min and run INSV tests. The ISTb flag remains with a REx failed reason. If the audit fails and detects additional failure conditions, the audit contributes to the ISTb list. If the LCM is SysB and a successful system RTS occurs, the unit returns to ISTb with the REx failed reason. The unit does not return to INSV. To remove the ISTb, the LCM must complete a manual RTS or a manual or scheduled REx test.

The system generates the node evaluation graph log (NAG400) each hour. The system generates the NAG400 in response to the NAG command, to list all nodes not in service (INSV). The results of the current REx test appear in field REx_INFO in log NAG400. For LCMs, the LCM_REx_TEST result appears first. A colon separates this result from the LCMCOV_REx_TEST result. For additional information about NAG400 logs, refer to the *RSC-S Related Logs section of this document.*

NAG command The CI level NAG command displays all out-of-service nodes. The MAP response to the NAG command and the response in the NAG400 log report are the same. The command and log report are part of the node evaluation graph (NAG) feature. The NAG feature provides an image of nodes in the system that are out-of-service or have a REx issue. To include offline nodes in the output, enter the command NAG ALL. The log report runs each hour. The user can enter the command string NAG ON or NAG OFF to turn the log report on and off.

The output or log report includes nodes in the following states.

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

- manual busy (ManB)
- failed
- aborted
- does not complete the last REx test

If a node does not have REx problems, the string ATP appears in the REx column. The string indicates all tests passed.

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

```
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. This test indicates the results of current REx tests for each LCM entered. You can access this information at the PM level of the MAP display for a posted LCM.

> ***Note:*** The system erases the maintenance record for each LCM after a reload restart occurs.

Diagnostics

The following section describes fault conditions for the RCC2, the RCC2 with ISDN, and the DRCC2. The current diagnostics and REx test results for the extended line concentrating module (XLCM) appear in the following example.

Extended line concentrating module diagnostics The XLCM diagnostics implements the CC and the XLCM software. This software is necessary to test the tip/ring reversal relay on each LCM bus interface card (BIC), NT6X54. The system or operating company personnel runs this test on separate logical drawers from the MAP display level. The XLCM diagnostics apply to the LCM. The XLCM diagnostic does not run 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 user-defined schedule
  - manual test, initiated from the LCM MAP display level over a single drawer of an LCM
- test results
  - new LCM node ISTb reason
  - PM132 log report
  - PM181 log report

The BIC acts as an interface between the 64 line cards in a drawer and the digroup control card (DCC), NT6X52, in the LCM. Each BIC consists of two identical parts that connect to a maximum of 32 line cards, 0-31. The identical parts form a drawer pair. Each drawer of the pair can be a logical drawer or digroups 0 or 1. Each LCM has ten BICs in ten physical drawers. Each LCM contains 20 logical drawers.

Two relays perform ring distribution on each half of the BIC. The first relay selects between ringing voltages and the ANI and coin voltages. Ringing voltages consist of ac ringing voltages to a telephone. The ANI and coin voltages consist of dc voltages that perform coin-activated functions. The second relay is the tip and ring reversal relay. This relay switches ringing voltages from tip to ring and ring to tip for multiparty ringing.

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

To schedule the BRT, use information from table OFCVAR office parameters BICRELAY_XLCM_TEST_SCHEDULE and BICRELAY_MUM_SIMUL_TESTS. The parameters allow flexibility to schedule the BRT from one to seven days a week. You can define the window size, and define how many tests (LCM-level) can run at the same time.

The XLCM diagnostics implement tests at the office level, LCM, and drawer levels. The office-level test loops over each LCM in the schedule. A single BRT runs on each drawer of the LCM. 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 with drawers not tested during the BRT window that office parameters define. The test runs a BRT on each drawer of this LCM. This test is a single LCM drawer test. The system runs this test from the LCM-level test. Operating company personnel run this test from the LCM MAP display level.

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

A new command interpreter can enable, disable, reset, or query the BRT for the whole office. The BICRELAY command has one parameter that can be ON, OFF, RESET or QUERY:

- ON

  allows the test to start at the scheduled window
- OFF

  disables current scheduled drawer-level tests. This setting does not allow the office-level test to start again
- RESET

  allows you to restart office-level tests if the test did not run on LCMs
- QUERY

  displays the current on or off state of the office-level test, the number of LCM-level tests in progress, and the next LCM tested in the scheduled BRT.

An example of the BICRELAY command follows:

```
>BICRELAY ON
```

The system BRT displays the results of each LCM-level test in the form of a new log report, PM132. This report displays a combined report of each drawer-level test in a specified LCM.

The following limits apply:

- The system test sets the logical drawer to ManB before the system runs the relay test. For this test cycle, the drawer skips over lines in a call-processing busy state.
- Before maintenance personnel run the manual BRT on a single drawer, maintenance personnel must set the drawer to ManB.
- If a minimum of one NT6X17 line card is not entered in each logical drawer, the system does not test the drawer.
- This test does not run on an LCM at the same time with the following:
  - automatic line test (ALT)
  - REX test
- The BRTST_START_TIME and BRTST_STOP_TIME fields of the BICRELAY_XLCM_TEST_SCHEDULE office parameter cannot have the same value. A time span of 10 min between these fields must occur.

The XLCM diagnostics use the test access bus, the metal test equipment, and a single NT6X17 card in each drawer. The XLCM diagnostics use these features to complete tests. When the ALT and the BRT run at the same time, a delay of both tests can occur. If a REx test starts on an LCM, the BRT does not run on that LCM. The LCM remains in the current state. The system generates a PM181 log. This log indicates the BRT does not run because a REx test is in progress.

Line card diagnostics for NT6X18AA and NT6X18AB A description of line card types A and B appear as follows:

- standard line card type A (NT6X17AA, AB, AC, AD) or plain old telephone service (POTS) card
- line card type B (NT6X18AA, AB, BA) or COIN card

  Provides all features of type A and multiparty lines. This card supports the following features:
- coded ringing
- private branch exchange (PBX)
- ground start
- hotel/motel
- analog pay telephone sets that require coin control

For NT6X18AA and NT6X18AB, use the service order (SERVORD) option negate partial ground start diagnostics (NPGD). The SERVORD option NPGD allows the system to test a line against a smaller subset of ground start diagnostics. When table LENLINES contains option NPGD, the table omits loop detector, reversal relay, and ground start relay tests. If the system identifies the NT6X18AA or NT6X18AB card as ground start (GND=Y) in table LNINV, run diagnostics again. Run diagnostics again if initial diagnostics fail.

> ***Note:*** For additional information about SERVORD, refer to the *XPM Translation Guide*.

Extended line concentrating module REX test results The REx tests indicate faults that can affect service. The REx tests allow operating company personnel to take corrective measures. The system initiates REx tests for LCMs that an office parameter controls. This office parameter determines the time interval to perform a REx test on the LCM. The system tests the LCMs one LCM at a time in the order in which you datafill the LCMs. A REx test involves OOS and INSV tests run on both LCM units.

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

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

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

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

Too many levels of nesting!! Not a good idea.Emergency stand-alone REX test

The ESA REx test occurs on ESAs subtended for RLCMs. The ESA REx test tests the ability of RLCM units to enter and exit ESA and to message to the ESA processor when in ESA. Before the addition of this feature, a system or manual request did not initiate the ESA REx test. This functionality stays the same. The XLCM diagnostics changed the sequence order of the system REX test. Operating company personnel run the ESA REx test after the system LCM REx test completes. Operating company personnel do not run this test as a subtest.

Too many levels of nesting!! Not a good idea.Line concentrating module and ESA-independent REX test

Before the addition of this feature, the system scheduler initiated an ESA REx test as part of the LCM REx subtests. The scheduler now initiates REx tests on an LCM. The scheduler initiates the ESA REx test when the REx test completes. An LCM REx test that operating company personnel run does not implement an ESA REx test. If a REx test does not complete, the LCM is put in an ISTb state if INSV diagnostics fail. The system places the LCM in a SysB state if OOS diagnostics fail.

Too many levels of nesting!! Not a good idea.MAP command for manual REx test

The XLCM diagnostics can implement a manual LCM REx test. The user must add a parameter named REx test to the TST command at the PM level of the MAP display. The user performs this action to complete a manual REx test. An example of this command follows:

```
>TST REx QUERY
```

Note: All subcommands occur on one posted LCM.

Too many levels of nesting!! Not a good idea.Fault indicators

A REx test that is not complete sets the LCM unit ISTb or SysB with the reason `REX failed`. The LCM audits occur at intervals of 10 min and run INSV tests. Before the addition of this feature, a successful audit cleared the ISTb flag. This feature affects only a successful audit. The ISTb flag remains with the reason `REX failed`. If the audit does not complete and the audit detects additional failure conditions, the audit contributes to the ISTb list. If the LCM is SysB and a successful system RTS occurs, the system resets the unit to ISTb with the reason `REX failed`. The system does not reset the unit to INSV. You can recognize a failed REx test. To clear the ISTb, the LCM must complete a successful manual RTS or a successful REx test. The REx test can be manual or scheduled.

Too many levels of nesting!! Not a good idea.REx test maintenance record

The system generates a maintenance record from a REx test and stores the record in an internal database. This record indicates the results of current REx tests for each LCM entered. When REx test activity occurs, the system updates the maintenance record. This information is available at the PM level of the MAP display for a posted LCM.

Note: The system deletes the maintenance record for each LCM after a reload restart.

Too many levels of nesting!! Not a good idea.MAP commands to access REx test failures

The QUERYPM FLT command indicates that an LCM unit is ISTb or SysB because a REx test failure has the reason `REX failed`. Use the TST REx

QUERY command to provide the test ID of the subtest and the card list that caused the REx test to fail for each unit.

Remote cluster controller 2 The most common method to test the RCC2 is to enter the TST command. The types of test depends on the RCC2 state and the TST command parameters. The following conditions determine the fault conditions for the RCC2:

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

Overload resources

When call processing on an LCM exceeds the amount that LCM processor cards can handle, the RLCM accepts calls at a slower rate. The RLCM accepts calls at a slower rate until the overload clears. Normally, the LCM queues call requests and assigns the call request priorities in the data store. As the data store fills near capacity, RLCM overload controls slow the rate of load acceptance. The RLCM overload controls can stop the call process until data store becomes available.

The LCM overload control occurs for the following areas of operation:

- C-side communication

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

- line scanning

  During overload, LCM processor cards do not scan the BIC until enough data store becomes available. When the LCM cards do not scan the BIC, the cards prevent incoming work from the P-side. The LCM cards queue incoming work from the P-side in the BIC output buffers. When the buffers are full, the buffers do not accept additional work. Partial dials or ignored keys on business sets can occur.

Display of overload state When the LCM becomes overloaded, the LCM state display changes to in-service trouble (ISTb) when both units show INSV. When the user enters the QUERYPM FLT command at the LCM level, the MAP response includes the message: `LCM Overloaded`.

Too many levels of nesting!! Not a good idea.Overload indicators (PM128, QUERYPM)

The system generates a PM128 log (RCC2 is ISTb) when the RCC2 enters overload. The message `PM Overloaded` displays. If you post the RCC2 at the PM level of the MAP display and enter the QUERYPM FLT command, the MAP also displays `PM Overloaded`.

When this condition occurs, the user must collect all important OMs that track the amount and types of traffic. The reason that the RCC2 entered overload relates to a maintenance area, like network faults. Lack of engineering of the RCC2 configuration can cause the RCC2 to enter overload. Maintenance and engineering personnel must receive the OM reports for analysis.

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

Too many levels of nesting!! Not a good idea.Overload control

Overload control maintains system sanity and component sanity during overload conditions. Flow control provides overload control. Flow control provides a use trigger that regulates the basic flow task to the CPU. Flow control regulation starts when the CP level tasks use a specified percentage threshold of the real time available to the CP level. When CP level tasks use less real time, flow tasks send another message that indicates the overload condition passed.

Too many levels of nesting!! Not a good idea.Extended line card module overload controls

The XLCM has a defined number of small, medium, and large memory blocks of a specified size. Domestic LCMs and XLCMs use only small and large memory blocks to receive and send external messages. Small memory blocks (SMB) are used for utility purposes, like timer control blocks. Call data blocks, which hold data associated with active lines, use medium blocks (MMB).

The system reports overload when the XLCM cannot receive an external message, (DMS-X or inter-unit communication [IUC]). The XLCM cannot receive an external message because not enough small or large memory blocks are available. Service degradation can occur before the XLCM enters overload.

An XLCM has four levels of throttling to prevent overload. Three of these levels depend on the number of available SMBs. These levels can conserve

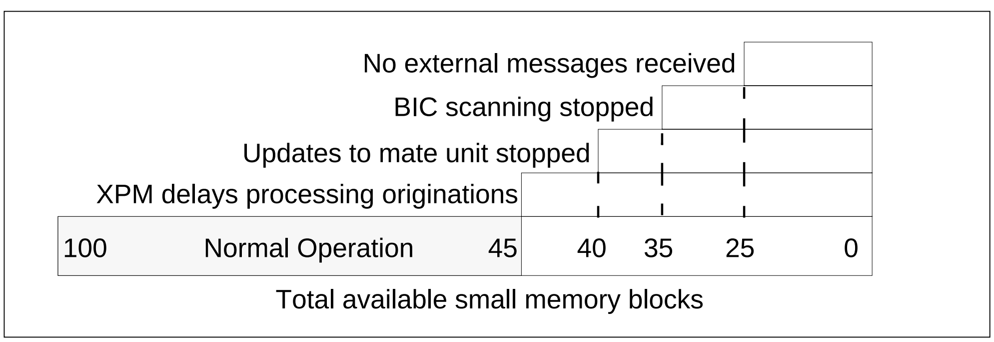
SMBs. The four levels are weighted. Terminating calls have priority over originating calls. The four throttling levels appear as follows:

1. An XPM throttles messages to a minimum of two XLCMs at intervals of 50 ms to control small peaks of very heavy traffic. At this rate, sustained messaging can drive the XLCM to overload.
2. An XLCM appends the number of SMBs available for external messages to each POTS origination message. An XLCM appends the number of SMBs available to 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 of the origination until this number equals or exceeds 20.
3. The total number of SMBs available for external messages is less than 15. (The total available SMBs - the number of SMB reserve < 15.) An XLCM does not send call processing updates to the mate.
4. The total number of SMBs available for external messages is less than 10. The total available SMBs - the number of SMB reserve < 10. An XLCM does not scan the bus interface cards (BIC) for line scan changes.

An XLCM holds a reserve of small memory blocks. The blocks do not receive external messages. Even if the XLCM enters extremely heavy overload, internal processes have enough small memory blocks to complete the tasks. When the total number of SMBs available is less or equal to the size of the SMB reserve, the following occurs. The system rejects external messages that require SMBs, except for maintenance or monitor messages. At this point, the XLCM sends an overload report to the computing module (CM).

The overload protection system is static because throttle levels remain constant and not reactive. The overload protection system is distributed because a specified area is not present where the system monitors overload. No specified area is present where the system initiates and controls protective measures. The XLCM overload protection system appears in the following figure.

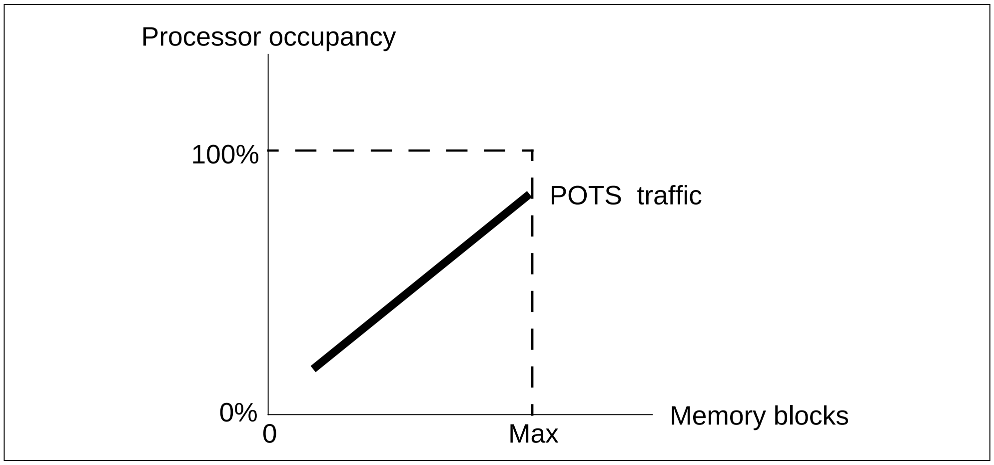
Figure 1-21 The XLCM overload protection system



Previous POTS models of the small memory LCM (64k) can be memory block limited. The LCM uses the small memory blocks before the LCM runs out of real-time use. The design of the LCM depends on this loss of memory blocks before a loss of real-time use. Memory block limited is an LCM functionality that also applies to XLCMs.

The XLCM overload system functions with POTS traffic. The current selection for the number of SMBs, (100) and the size of the SMB reserve (25), allow the processor to be memory block limited. The processor will sustain a loss of SMBs before a loss of real-time use. Processor occupancy or real-time use compared to memory block use appears in the following figure.

Figure 1-22 Processor occupancy or real-time use compared to memory blocks



The XLCMs contain more memory blocks than small-memory LCMs. The XLCMs must contain messaging requirements, like P-phones. The P-phones have features like displays and MADN. The XLCM can sustain a loss of real-time before a loss of memory blocks. The following figures show real-time overload.

Figure 1-23 Processor occupancy—real-time overload

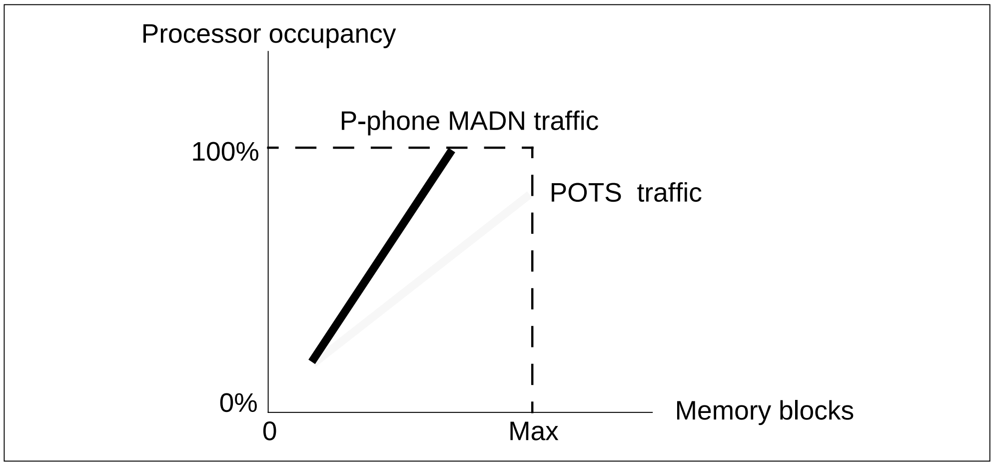
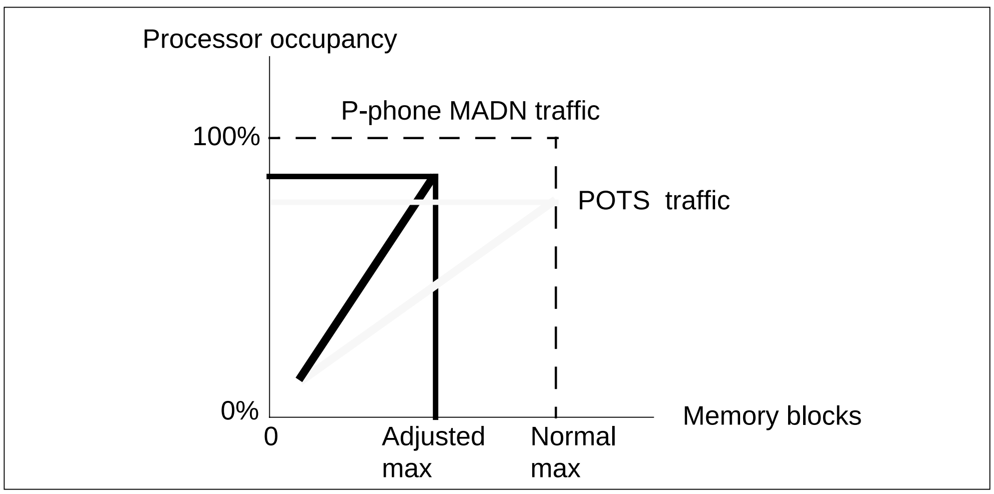


Figure 1-24 Processor occupancy—memory block reduced after real-time overload detection



The XLCM is memory block limited. The XLCM cannot handle real-time overload. Outages can occur because of the following conditions:

1. The XLCMs do not send an overload report because XLCMs do not currently detect real-time overload. The CM does not suspend functions that require a response from the XLCM. If the XLCM does not respond in time, the CM sets the XLCM to SysB.
2. The XLCM cannot handle starvation. This condition occurs when low priority tasks do not run. This condition can cause traps or important software errors. These errors cause the CM to set the XLCM to SysB.

Too many levels of nesting!! Not a good idea.Enhancements to the overload protection system

In addition to the current functions, the improved XLCM overload protection system performs the following functions:

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

The protective measures are active for a short time to retain the XLCM call processing capabilty.

This improvement adds the following components to the current overload protection system. The system changes to accommodate the components.

1. Processor occupancy data collection component

   Distributes over key areas of XLCM code to collect raw data used to detect real-time overload. A depository contains the raw data for the data analysis component. The data analysis component matches the priority of the segment of the system in which this data resides.

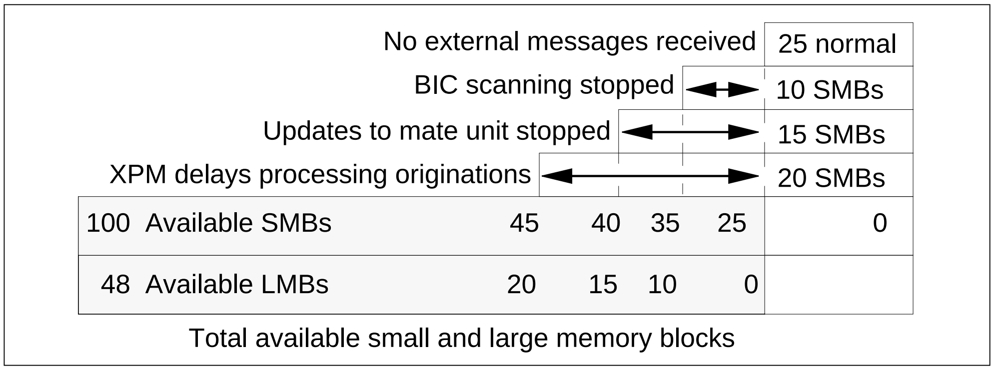
2. Real-time data analysis component

   Analyzes data in the depository. This component indicates the processor occupancy state. This state consists of a distress rating, not a percentage. The control component does not use percentages because percentages are difficult and do not supply all the information required. The control component uses and reports the distress rating to the CM when an XLCM reports overload. The data analysis component indicates activity, and if the control component functions normally. This component runs at a high priority.

3. Real-time overload control component

   Scans the distress rating that the data analysis component generates. If the rating indicates real-time overload, the control component adjusts parameters in the overload protection system. The adjusted parameters recover real-time and keep memory block limits ahead of the real-time limits of the XLCM. This process appears in the following chart. If the data does not indicate trouble, the control component restores the overload protection system parameters to allow maximum call processing. This component runs at a very high priority.

Figure 1-25 Overload protection system variable thresholds



Too many levels of nesting!! Not a good idea.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.

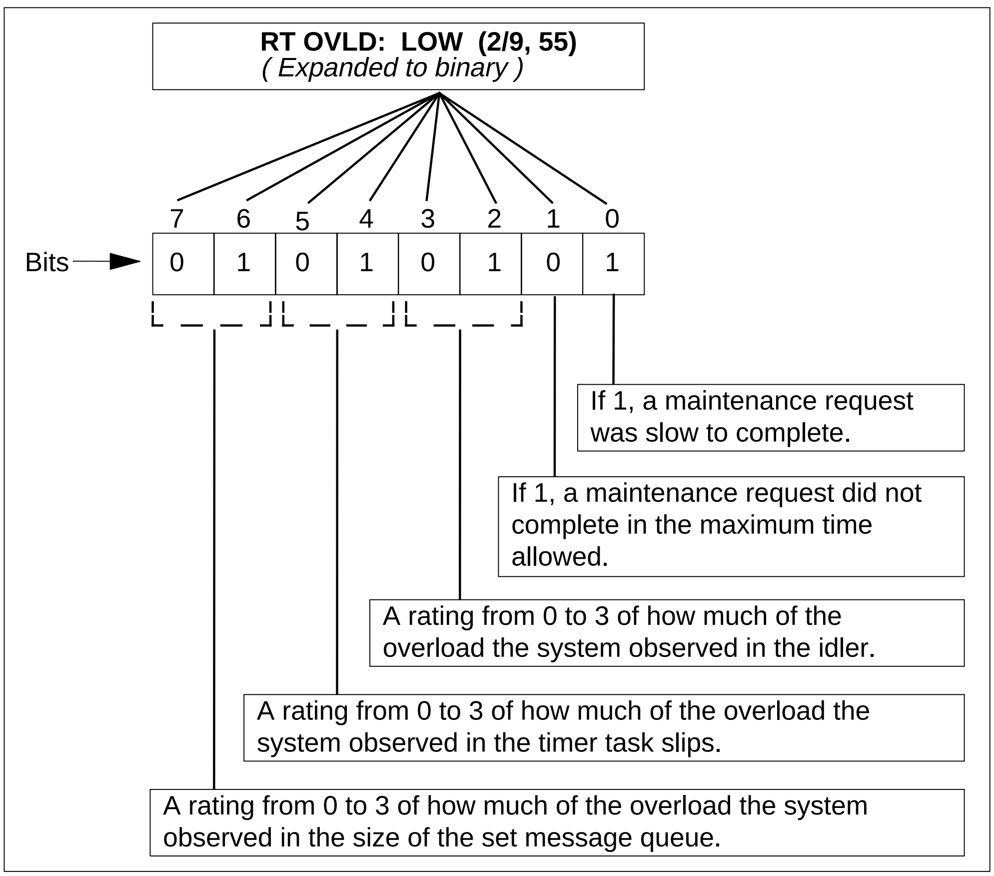
Improvements to the real-time subsystem appears in the following list:

1. Reduction of memory blocks. Preserves real-time and reduces the number of memory blocks available for external messages and all associated throttles. This process continues until reduction of memory blocks recovers some real-time use.
2. Real-time overload. A processor occupancy rate of a minimum of 75% for a minimum amount of time is real-time overload. The calculation of percentages is real-time intensive. This improvement is not a flexible method of calculation. Premature reaction if the XLCM is not in severe real-time trouble can occur.
3. The system monitors the amount of time required to process specified key maintenance requests at high levels of occupancy under 100%. The system monitors the amount of time to make 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. If processing time exceeds the benchmarked average, assume real-time overload.
4. The user monitors idle task activity. The user enters real-time overload if an idle task does not run for a defined period of time.
5. The timer task slip counter is at a high occupancy of under 100%. If the timer task slips at more than the normal high occupancy rate, real-time overload is entered.
6. The user monitors the size of the set message queue. If the height of the queue exceeds 40 messages, the XLCM almost reaches real-time overload.
7. The reduction of memory blocks component includes large memory blocks (LMB) to recover real-time.

Too many levels of nesting!! Not a good idea.Extended line card module log report appendages

An XLCM adds a new field to current overload messages the CM receives to indicate the extent of real-time overload. If the CM is at CCM04 or later, this new information appears in the modified PM180 LCM Enters Overload log. This information appears in the modified PM180 Overloaded log. The new field contains a ratio of the maximum read-time distress reached before the system generated the overload report. This ratio contains the values 0-9. The new field contains a ratio of the maximum read-time distress to the maximum level of real-time distress. This ratio contains the values 5-9. A real-time overload symptoms summary byte in hexadecimal format appears in the following diagram.

Figure 1-26 Summary of real-time overload symptoms



The XLCM maintains overload data that provides a summary of the overload period. This summary appears with the current overload exit message to the CM. If 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 new logs apply automatically when the user installs CCM04 in the CM.

This feature detects only real-time overload to report overload state to the CM. The XLCM must have enough real-time in order to function according to the operating model, with memory block limited.

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

Line card module talk battery audit

Before the addition of the Talk Battery Alarm feature, the system reported a loss of talk battery to an LCM shelf only if the talk battery fuse blew. When this condition occurred, maintenance personnel did not know that LCM subscriber lines did not have dial tone.

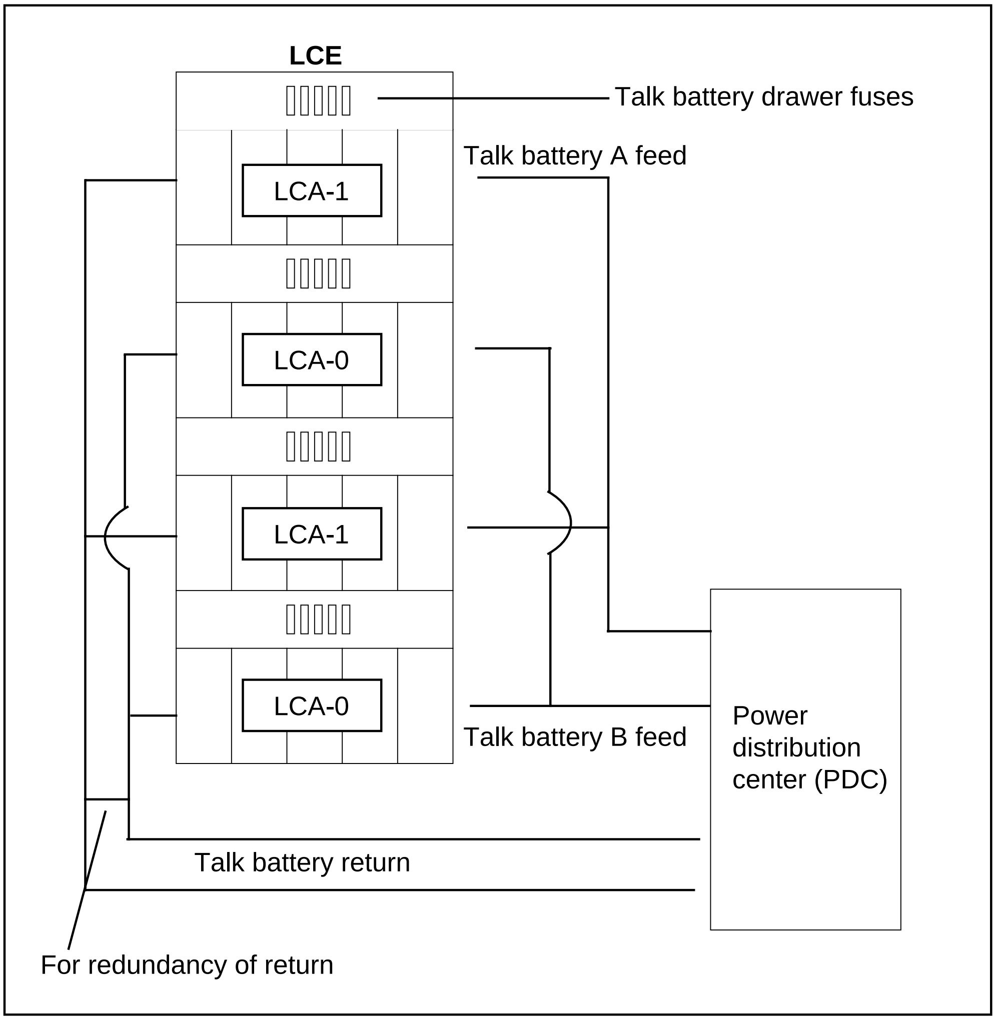
The Talk Battery Alarm feature adds new computing module (CM) and LCM maintenance software. The software audits each LCM shelf to detect talk battery. If the audit fails to detect talk battery, the system generates a critical alarm log report (PM179).

To support this feature, each LCM shelf must be provisioned with a minimum of one world line card (WLC). A subscriber can use the WLC used for the talk battery audit for call processing. The system generates a minor alarm log report (PM179) when WLCs cannot perform the audit when the feature is on.

> ***Note:*** This feature supports all WLC types. The WLC can reside in any position in the LCM shelf.

Loss of talk battery Talk battery distribution in a line concentrating equipment (LCE) frame with four shelves appears in the following diagram.

Figure 1-27 Talk battery distribution on an 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 repeated. A single fault that loses a feed can affect two shelves. Two shelves can hold a maximum of 640 subscriber lines.

> ***Note:*** Talk battery returns have some redundancy. A possibility exists that a single fault does not cause an outage.

Before the addition of this alarm, the system indicated that a loss of talk battery occurred only if the talk battery fuse blew. If the talk battery 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 shelves affected.

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

Feature activation To control activation of the Talk Battery Alarm feature, change the value of office parameter TALK_BATTERY_ALARM in table OFCENG. The default setting disables the Talk Battery Alarm feature. Each LCM shelf in the office must contain a WLC before this feature starts. A minor alarm occurs for each LCM shelf that does not contain a WLC.

When the Talk Battery Alarm feature starts, talk battery tests occur through diagnostics and background audits.

When you disable the Talk Battery Alarm feature, talk battery alarms and in-service trouble (ISTb) reasons that this feature introduces clear up.

Background audit Each LCM can audit the shelves for loss of talk battery. When the Talk Battery Alarm feature is disabled, audits do not perform checks. Audits do not check for loss of talk battery on any of the LCMs in the office.

When the Talk Battery Alarm feature activates, a search occurs for an available WLC on each LCM shelf. To be available, a WLC must be in one of the following states:

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

If the audit does not find an available WLC, the system generates a minor alarm log report (PM179). The PM179 indicates that the audit cannot test talk battery, and the LCM becomes ISTb. If the audit locates an available WLC, a special audit checks for loss of talk battery feed each minute. The audit tests all LCM shelves at intervals of 1 min. Audits do not perform talk battery tests on an out-of-service (OOS) LCM.

If the WLC used for audit tests is not available, the audit searches for another available WLC. This occurs, for example, if the WLC goes OOS. If the audit locates another available WLC, audit testing continues with the new WLC. If the audit does not locate an available WLC, the system generates a minor alarm log report (PM179). The PM179 indicates the audit cannot test the talk battery, and the LCM shelf is set ISTb.

To test for loss of talk battery feed, the WLC must verify the presence of talk battery feed to the WLC. The test passes if talk battery feed is present and fails if talk battery feed is not available.

If an off-hook or call processing busy (CPB), or both, occupy an INSV WLC, the talk battery test does not occur. The system assumes that the talk battery test passed. 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 detects a failure of the talk battery test, the system generates a critical alarm log report (PM179). The system places the LCM shelf in an ISTb state. The audit does not report the failure until diagnostics clears the alarm and ISTb state.

Diagnostics The audit incorporates the talk battery test into INSV and OOS diagnostics for an LCM unit. 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 if the audit tests the same LCM again. If the talk battery test passes, diagnostics clear the alarm and ISTb reason. This process affects both manual and automatic versions of these commands. Diagnostics run talk battery tests only when the talk battery alarm feature is not active.

To support the Talk Battery Alarm feature, each LCM shelf must contain an WLC. The WLC can reside in any position in the shelf. If the maintenance line card in LSG 0 Card 0 for the LCM shelf is assigned as a WLC, the feature can use this card. This line card since this line card tests the ringing generators.

The MAP commands that busy the last available WLC on an LCM shelf issue a warning message if this condition occurs. These commands appear as follows:

- BSY

  Enter the BSY command at the LTP MAP level when the user posts a WLC.

- DIAG

  Enter the DIAG command at the LTP MAP level when the user posts a WLC. DIAG temporarily manually busies [ManB] the WLC.

- BSY DRWR

  Enter the BSY DRWR command at the PM MAP level when the user posts an LCM.

If one of these commands busies the last available WLC on the LCM shelf, a warning message appears. An example follows:

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 displays new ISTb reasons by shelf and line equipment number (LEN) for both alarm conditions. An example of the MAP response follows:

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
```

or

```
Node 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 issue the following notification messages. These notification messages indicate that the minor alarm and ISTb reason for the LCM shelf is cleared. The alarm and reason clear when a WLC becomes available to test for talk battery failures. The following commands cause this condition:

- RTS

  You can enter the RTS command at the LTP MAP level when you post and returns to service a WLC. 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 you post an LCM. 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).
  ```

This audit does not affect emergency stand alone (ESA) for RCC2. The audit ignores talk battery alarm conditions. During the ESA exit procedure, the CM diagnoses the LCM to determine if talk battery failures are present.

Limits 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)
  - — improved LCM with ISDN (LCME)
  - — cabinetized XLCM (ELCM), called the Meridian cabinetized LCM
  - — remote line concentrating module (RLCM)
  - — outside plant module (OPM), cabinetized RLCM with 256-kbyte capacity
- The same WLC used for talk battery tests functions as a subscriber line. If the talk battery test is in progress on a WLC, the WLC goes on-hook to request a call origination. The subscriber goes off-hook. An additional delay of up to 90 ms can occur before the subscriber receives dial tone. The talk battery test can be in progress on a WLC when the WLC receives a call termination request to ring the line. These conditions can cause a

delay of 90 ms before ringing starts. For originations and terminations, only this delay affects call processing.

- The Talk Battery Alarm feature only detect the loss of talk battery *feed* to an LCM shelf. The audit cannot detect the loss of talk battery *return* because of WLC limits. Talk battery returns repeat. Return failures probably do not occur. Refer to figure, “Talk battery distribution on LCE frame".
- The CM does not perform talk battery tests when the LCM or one of the C-side nodes is in the overload condition.
- The Talk Battery Alarm feature only isolates shelf-level failures of talk battery feed. The only reported talk battery feed failures are the failures that affect talk battery for all lines on the LCM shelf. The audit can detect drawer-level failures. The detection of failures depends on the drawer in which the WLC resides and the drawer in which the failure occurs.
- Faults specified to the WLC or the drawer can prevent the correct detection of talk battery failures. These faults include errors that cause the WLC to fail line card diagnostics. If this condition occurs, the WLC can report talk battery failure by mistake. An important alarm can occur, even if talk battery is present for other lines on the shelf. These occurrences probably do not occur. The important alarm log report (PM179) provides the location of the WLC to help troubleshoot occurrences.
- The Talk Battery Alarm feature does not affect the following features:
  - emergency stand-alone (ESA) on remote cluster controllers (RCC)
  - remote line concentrating modules (RLCM)
  - outside plant modules (OPM)

The audit ignores talk battery alarm conditions or reports during ESA. The audit does not report talk battery features when an LCM is in ESA. During ESA exit, the CM diagnoses the LCM to determine if talk battery failures are present.

- If the SERVORD OUT command deletes the directory number (DN) assigned to the last WLC on an LCM shelf, a minor `Cannot test Talk Battery` alarm occurs. The alarm message indicates the WLC for which the SERVORD OUT command deleted the last assigned DN. In this condition, the WLC is HASU. The WLC is in a maintenance state that is not normal. The LCM cannot use the WLC to detect talk battery failures because of this maintenance state that is not normal. Use one of the following procedures to solve this condition:
  - BSY and RTS the LCM. Nortel does not recommend this procedure. The procedure causes service outage. When the WLC is in the correct

HASU maintenance state, the LCM can use the WLC for talk battery tests.

- — Assign a second WLC on the same LCM shelf. This WLC can remain as HASU. The WLC does not require a DN assigned. This option requires additional hardware, like an additional WLC. This option provides redundancy for the Talk Battery Alarm feature.
- — Assign a DN to the WLC. The LCM can use the WLC for talk battery tests. This option provides a simple solution.

Too many levels of nesting!! Not a good idea.Routine exercise test

For the REx test sequence to occur, both units must be INSV. The REx test does not run if the following conditions are present:

- a REx test runs on a HOST XPM where the audit subtends this node
- the system does not activate a warm SWACT for the PM
- one unit is SysB, the PM is ISTb, or both units are SysB, the PM is SysB.
- the PM is in overload or is ISTb

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

When the system aborts the REx test because of a TST REX NOW command, a message appears. The message describes the reason that the REx test terminated. In any other condition, the system generates a PM181 log with the same type of message.

Too many levels of nesting!! Not a good idea.Audits of the intermodule communication links

An audit runs sanity tests on the intermodule communication links to make sure data passed on those links is not lost or corrupted. The audit runs on the inactive and active units. If the audit detects a fault, only the active INSV unit reports the fault to the CC. When the audit detects a fault on the intermodule communication link or links, the following steps occur:

- The system closes the link.
- The RCC2 state changes to ISTb.
- The RCC2 units does 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`.

Too many levels of nesting!! Not a good idea.Parity errors in the remote cluster controller 2

On the RCC2, a parity system checks the integrity of the main memory systems. The parity system adds one bit of data to each byte stored. The hardware that maintains this additional bit can detect any single-bit memory fault. When a parity fault occurs, the fault indicates a memory integrity fault. The system implements the parity hardware on the NTMX77 processor where the memory resides.

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

- unifies the parity audit and parity trap handlers
- improves the data that the current handler captured and saved
  - use the information stored in the card state register
  - localize the parity fault to a specified byte address
  - perform hard/soft/intermittent fault groups
  - query to determine if the fault is in code
- updates interfaces to log reports PM189 and PM185 to include the current information

Before the addition of feature AN0741, the CPM dropped activity and went out-of-service if code execution detected a fault. The parity audit can initiate an interrupt instead of a bus error. This action allows the parity audit to identify memory faults before code initiation hits the memory faults. This process can prevent a potential loss of service.

Too many levels of nesting!! Not a good idea.Task-level parity handler

A level 6 interrupt reports parity faults to the local CPU. The level 6 interrupt autovector in a CPM connects to an assembly interrupt handler. This handler has one handler entry point for each interrupt level. This handler receives interrupts that the standard code execution or parity audit detected. The handle decides which handler functions to perform.

The parity interrupt handler determines if the parity audit caused the interrupt. The parity handler takes a snapshot of the state of the processor when the interrupt occurred. The handler stores the following data:

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

The parity handler categorizes the parity faults as hard, soft, or intermittent. The parity handler saves the fault word address, and returns control to the parity audit. The parity handler completes these tasks and passes standard trap information, like registers or task, to the generic trap handler. The generic trap handler can initialize or set the unit again.

Too many levels of nesting!! Not a good idea.Parity error log reports

. A PM181 log indicates parity fault type. Logs, like PM128 and PM106, indicate any action the CC performs. These logs indicate if the CC cleared the fault. Enter the QUERYPM FLT command to display information about this type of parity fault.

The system generates PM185 log reports. These logs indicate that a parity trap occurred. This log report can display the system or supervisor stack and the user stack. These stacks display the exact location of the trap. Log PM189 indicates if the parity error is in or out of code.

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

Figure 1-28 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 requirements

The Parity Improvement feature depends on features AF5680, XPM Exception Processing System Enhancements, and AF5682, XPM Code Protection. The parity audit audits areas of memory that are protected and not protected. Feature AF5682 allows parity audit to write to a write-protected memory area to pattern test a parity fault location byte. The following allows the audit to write in this memory area to query if a specified address is in loaded code. The parity interrupt handler must determine if the parity fault occurred in execution space to perform the best recovery process.

Feature AF5391 allows the system to allocate protected memory for protected patches if there are no protected patches available. If the allocation fails, the system can use memory that is not protected to store the patch. Local patches must be stored in not direct memory access (DMA) memory, if possible.

> ***Note:*** In the enhanced processor (UP) and unified processor (UP), the system allocates additional non-DMA. In the facilities processor (FP), non-DMA can only use released code space.

Handling a parity error fault If the audit detects a parity fault, the audit can normally correct the fault without loss of service. This section provides information on different parity faults. The section provides an overview of the actions the CM takes to handle parity faults. The actions that operating company personnel must take appear in this section.

Errors specified to processor cards. The three types of parity faults described in Error specified to processor cards are:

- an intermittent fault occurs when the audit detects a fault and does not find an error. The audit does not find an error during the reread of the location.
- a soft fault occurs when the audit detects a parity error. The audit detects error when the XPM reads the location again. The audit does not detect an error when the XPM tries to write to the location. The error can occur in the program store or memory store.
- a hard fault occurs when an XPM detects a fault and cannot reread or write to the memory location

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

When the CM detects a parity fault in the active unit of the RCC2, the CM sets the unit ISTb with a reason of `parity`. The CM recovers the unit during a maintenance window. The XPM REx test window is as maintenance window that can recover a parity fault on the active unit. If the time for the XPM REx test window is the same as the current time of the switch, an audit checks if the active unit of the XPM has an ISTb of `parity`. If an ISTb is present, the CM SWACTs and reloads the RCC2 if no dependencies are present. This action clears the ISTb parity fault and the short term failure (STF) parity fault peg. This action clears the parity fault in the RCC2.

When the active unit reports the parity fault, the system generates a PM181 log. Recovery actions by the CM include a SWACT of the XPM and the loading of the newly inactive unit. The CM loads the unit with the XPM software load defined in the related inventory table. The CM considers loading as 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

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

The CM does not allow a parity reload by two XPMs in the same configuration. A P-side node cannot perform a parity reload at the same time as the C-side node. A C-side parity reload cannot occur at the same time as the P-side node. This limit 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 the PM128, to understand actions the CM takes. Examples of the messages associated with the PM181 and PM128 logs appear in this section.

The RCC2 unit can be set ISTb with many reasons at the same time. All the ISTb reasons perform a QUERYPM FLT at the MAP level. When this process occurs, the ISTb reasons that occurred on the unit that are not cleared appear.

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 information log. This log alerts operating company personnel that

- a parity fault occurred on the active unit, and the unit is set ISTb
- the CM loads the unit again during the XPM REx test window

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

An example of a PM181 log report follows:

Example of a MAP response:

```
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 has changed state.

An example of a PM128 log follows:

Example of a MAP response:

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

The command string QUERYPM FLT displays the faults on a posted RCC2. A hard parity fault is present in unit 1 of the posted RCC2 and appears in the following example MAP response:

Example of a MAP response:

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

Action by the CM:

The CM SWACTs and loads the RCC2 again during the next XPM REx window. After the reload, the system clears the ISTb fault.

User action: There is no action required. The system 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 and the DS-1 links connected to the host PM are the same. These functions must

- detect if the card is present
- monitor the DS-1 circuits

  Conditions reported include slips, frame loss, bipolar violation (BpV), remote carrier group alarms (RCGA), and local carrier group alarms (LCG).
- report the state of the link

Remote cluster controller 2 with ISDN The system can configure the RCC2 with a spare DCH. If a DCH card goes OOS, the spare DCH gains control of the current D-channel processing. A loss of D-channel service does not occur. Enter the SWITCH command to implement this function.

The RCC2 does not affect data communication when the RCC2 performs a warm SWACT. During a cold SWACT, the system interrupts the data connection during the SWACT. The system establishes the data connection again when the SWACT completes.

Escalation to manual maintenance

Automatic maintenance for the RSC-S includes the output of the correct trouble indicators. The information normally in this section is in the Automatic maintenance section.

2 RSC-S hardware

Hardware components

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

Table 2-1 Hardware component products (Sheet 1 of 2)

Hardware	Product engineering code (PEC)
Cellular Access Processor with 16Mb Memory	NTAX74AA
MSP for CRSC and CEXT	NTRX40AA
Power converter	NTMX72AA
PCM signaling	NTMX73AB
32-port DS30A	NTMX74AA
Enhanced matrix	NTMX75AA NTMX75DA
Processor with 8-MB Dynamic Random Access Memory (*see note*)	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
Note: The NTMX77AA supports the functionality of the NT7X05 Peripheral/Remote Loader-16.	

Table 2-1 Hardware component products (Sheet 2 of 2)

Hardware	Product engineering code (PEC)
CPM shelf	NTMX8501
EXT shelf	NTMX8602
Quad Frame Carrier	NTMX87AA/AB
Penta DS-1 Packlet Carrier	NTMX87BA
CEXT cabinet	NTMX89FC
CRSC cabinet equipped with LCME	NTMX89FB
CRSC cabinet equipped with LCM	NTMX89FA
HDLC/DMSX messaging interface card	NTMX76AB
Peripheral/remote loader-16	NT7X05AA
Note: The NTMX77AA supports the functionality of the NT7X05 Peripheral/Remote Loader-16.	

The hardware developed during the first phase includes nine circuit cards. The first phase hardware also includes the main shelf housed in the cabinetized Remote Switching Center (CRSC) and the cabinetized extension module (CEXT) cabinets. The hardware also introduces the modular supervisory panel (MSP) for CRSC and CEXT.

The RSC-S packaging

The RSC-S hardware component packaging differs from normal Remote Switching Center (RSC) packaging. The RSC-S is in cabinets and not equipment frames. These cabinets contain different hardware units. The configuration of these cabinets and cabinet components determines the services the RSC-S can offer. Northern Telecom offers RSC-S in both single-cabinet and multicabinet configurations.

Model B

The Model B RSC project introduces the enhanced cabinet and the MSP to the RSC-S for domestic applications. Improvements in the cooling unit (CU) and system cabling eliminate many assignment limits that remote maintenance module (RMM) shelves required. These limits applied to RSC-S applications. The improvements help integrate remote cabinets with current frame equipment.

Model B addresses cabinet, cooling, MSP, and cabling issues. Circuit card provisioning rules do not change. The equipment of remote cluster controller 2 (RCC2) and extension shelves (EXT) is the same as the original RSC-S. Numbers and types of interfaces supported do not change. The Model B uses vertical power for all applications except the extension of a current Model A alignment. A top-mounted remote power filter unit powers the remote Model B. The extension of a current Model A arrangement uses horizontal (internal) power. A horizontal power kit is available for this application. Cabinet colors are brown and FiberWorld gray.

Single-cabinet configuration

WARNING
RCC2 supports a maximum of ten P-side peripherals
Peripheral nodes include LCM(E)s, RLCMs, SMSRs, RMMs. The number of peripheral nodes and remote modules configured on an RCC2 cannot exceed ten. The system rejects attempts to datafill more than ten P-side nodes in inventory tables.

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

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

The LCMEs can provide services like the following:

- integrated services digital network (ISDN)
- two binary one quarternary (2B1Q)
- plain old telephone service (POTS)
- Meridian Digital Centrex (MDC)

LCMs support services like POTS and MDC.

- maintenance and service circuits that the RMM provides
- 640 lines for one LCM
- MSP
- ringing generators (RG)

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

The provisioning options for a single-cabinet configuration are as follows:

- peripheral-side (P-side) digital signal 1 (DS-1) links for trunking
- central-side (C-side) links for communication with the host

The phase 1 enhancements phase introduces another provisioning option. This option is the Subscriber Carrier Module-100S Remote (SMS-R) for digital integration of digital loop carriers compatible with the TR-008.

Model B does not change P-side and C-side port requirements for the CRSC and CEXT.

Cabinetized remote switching center

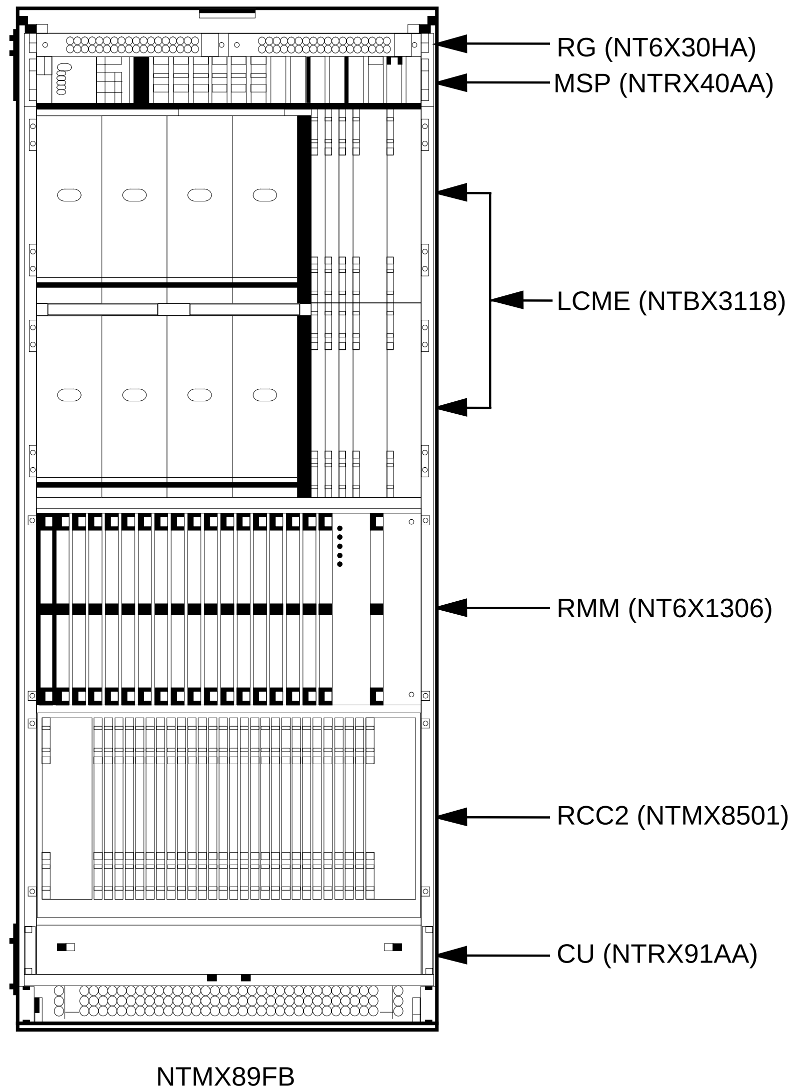
The CRSC is a single-cabinet RSC-S that supports service and maintenance circuits and DS-1 links to the host. A single configuration RSC-S can have one CRSC cabinet with the following:

- one RCC2 shelf (always provisioned)
- one RMM served by dedicated DS30A links
- one LCME or LCM
- one MSP
- 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 diagrams that follow show CRSC components. A description of each CRSC component follows the diagrams. The first diagram shows a CRSC cabinet with an LCME.

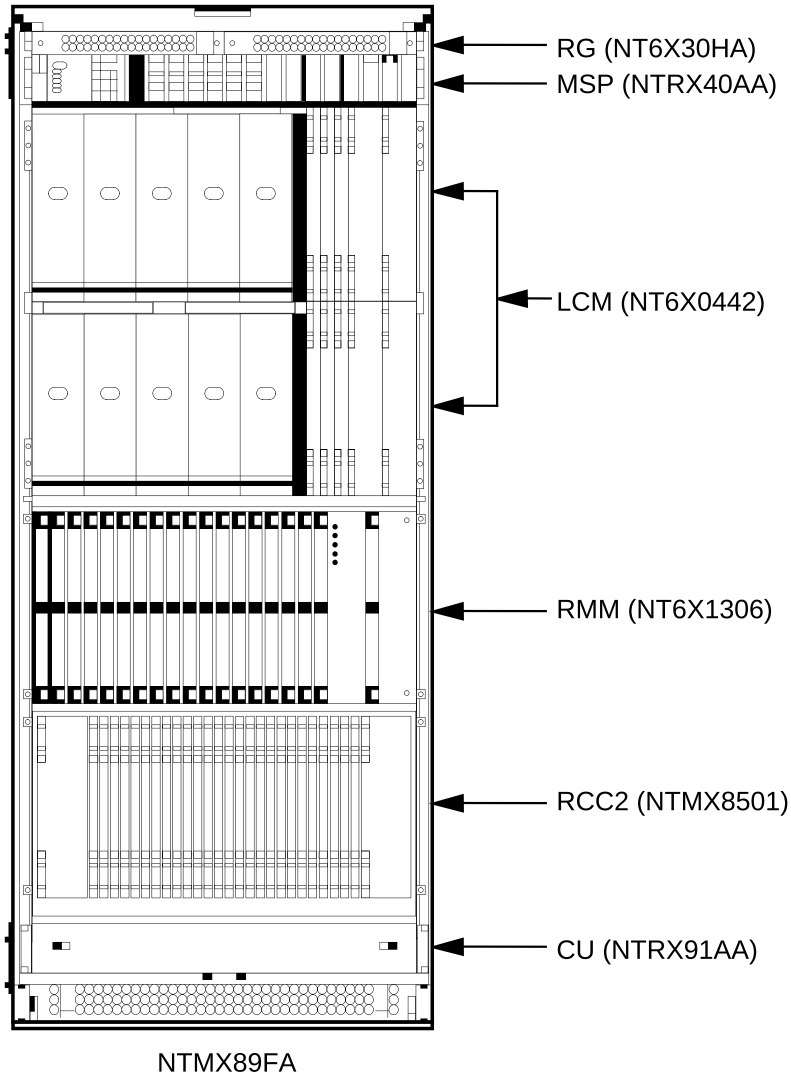
Figure 2-1 CRSC cabinet with LCME



CU — cooling unit
LCME — enhanced line concentrating module
MSP — modular supervisory panel
RCC2 — remote cluster controller
RG — ringing generator
RMM — remote maintenance module

The following figure shows a CRSC cabinet with an LCM.

Figure 2-2 CRSC cabinet with LCM



CU — cooling unit
LCM — line concentrating module
MSP — modular supervisory panel
RCC2 — remote cluster controller
RG — ringing generator
RMM — remote maintenance module

Enhanced remote cluster controller-2 The RSC-S is based on the RCC2, which is the master controller for all RSC-S peripherals.

The RCC2 controls the following as the host directs:

- associated LCMs
- RMMs
- remotes
- digital trunks

During normal operations (without SONET interfaces), the host line group controller (LGC) or LTC controls the RCC2. The RCC2 P-side ports can be configured to support the following:

- lines
- trunks
- Outside Plant Modules (OPM)
- remote line concentrating modules (RLCM)
- the 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, a 68020 module that has units 0 and 1. The RCC2 units 0 and 1 run in an active and standby mode for reliability.

The RCC2 shelf contains the components that follow:

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

  Note: 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 have 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
- the 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 for interfacing to LCMs, RMMs, and SMS-Rs located at the RSC-S
- a selection of the following service circuit cards:
  - — global tone receiver (GTR) or universal tone receiver (UTR)
  - — custom local area signaling service (CLASS)
  - — modem resource (CMR)
  - — D-channel handler (DCH)
  - — enhanced ISDN signaling preprocessor (EISP)

The RCC2 contains RSC-S processor and memory cards for the following:

- normal and emergency stand-alone (ESA) modes
- time switches
- tone generators
- 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 that connect 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 that the intraswitching feature supports
- intraswitched calls during ESA supported when the ESA feature is in use

This process uses up to 20 C-side ports and 54 P-side ports. The ports support all features of the current RSC and RSC with ISDN with increased capacity. The RCC2 peripheral allows the following connections:

- C-side to P-side
- P-side to C-side
- P-side to P-side
- C-side to C-side

The C-side ports support host-to-remote capabilities

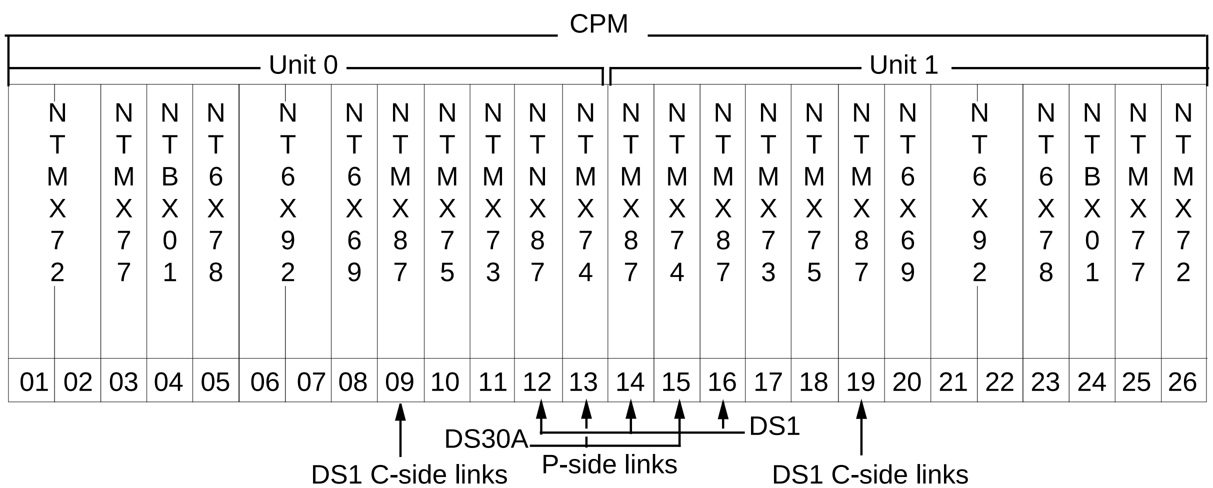
The RCC2 performs the termination functions that follow:

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

The following diagram shows the circuit card layout for an RCC2 shelf.

> ***Note:*** Space limits mean that the following diagram that does not show slot 27. This slot contains an NTMX72 power converter.

Figure 2-3 RCC2 circuit card layout



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.

The following table describes circuit cards for RCC2 unit 0 (slots 01 through 13).

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
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

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
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
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
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
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). Each RSC-S site requires one or more RMM to perform diagnostic and line tests, and monitor alarm conditions. Each RCC2 can have a maximum of two RMMs. Each RMM has one dedicated DS30A P-side port.

An RMM can contain the components that follow:

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

Enhanced line concentrating module The LCME is part of the CRSC and an additional LCME can connect to the RSC-S. The LCME shelf extends the capabilities of the CRSC. The LCME is the subscriber interface of the RSC-S for a maximum of 480 lines. The LCME has 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 digroup control cards
- one processor card

Additional LCMEs connect to the P-side of the RCC2 through 2 to 18 DS30A links. The traffic requirements of the operating company determine the number of DS30A links for each LCME. The P-side links of the RCC2 define a maximum of two LCMEs.

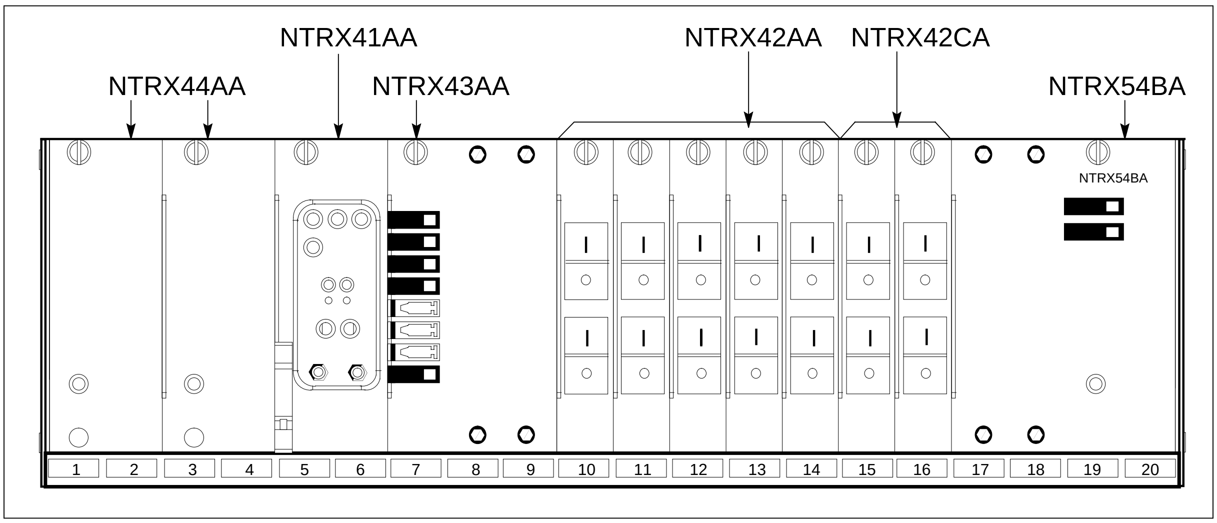
Line concentrating module The LCM can be part of the CRSC. The LCM is the subscriber line interface of the RSC-S for a maximum of 640 lines. The LCM connects to the P-side of the RCC2 through two to six DS30A links. The LCM consists of two line concentrating array (LCA) shelves. Each LCM shelf contains the following equipment:

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

Modular supervisory panel The NTRX40AA MSP provides alarm monitoring and control functions for C28 cabinets. Modules are provisioned with specified functions. A maximum of ten breaker modules, each with two breakers, can provide -48V dc distribution. A maximum of eight fuse modules, each with eight breakers, can protect subcircuits. The MSP can provision a total of 13 fuse and breaker modules.

The following diagram shows an MSP for a CRSC and CEXT.

Figure 2-4 Modular supervisory panel shelf for CRSC and CEXT



Ringing generators The provisionable NT6X30HA RGs module provides analog ringing voltage. The RG unit operates with the NTRX40AA MSP.

Cooling unit The new NTRX91AA CU is a 10-in. deep forced air unit that uses three Rotron type (6-in diameter) tube axial fans. These fans provide 200 cfm at 3 in of back pressure, that evenly spread 1600 watts. The NTRX91AA uses the A0346832 air filter, an 80% dust arrestance synthetic fiber material filter.

Multicabinet configuration

The multicabinet configuration requires one of the following, in addition to the CRSC:

- a cabinetized power distribution center (CPDC)
- cabinetized remote miscellaneous equipment (CRME) cabinet

The configuration can include a CEXT cabinet.

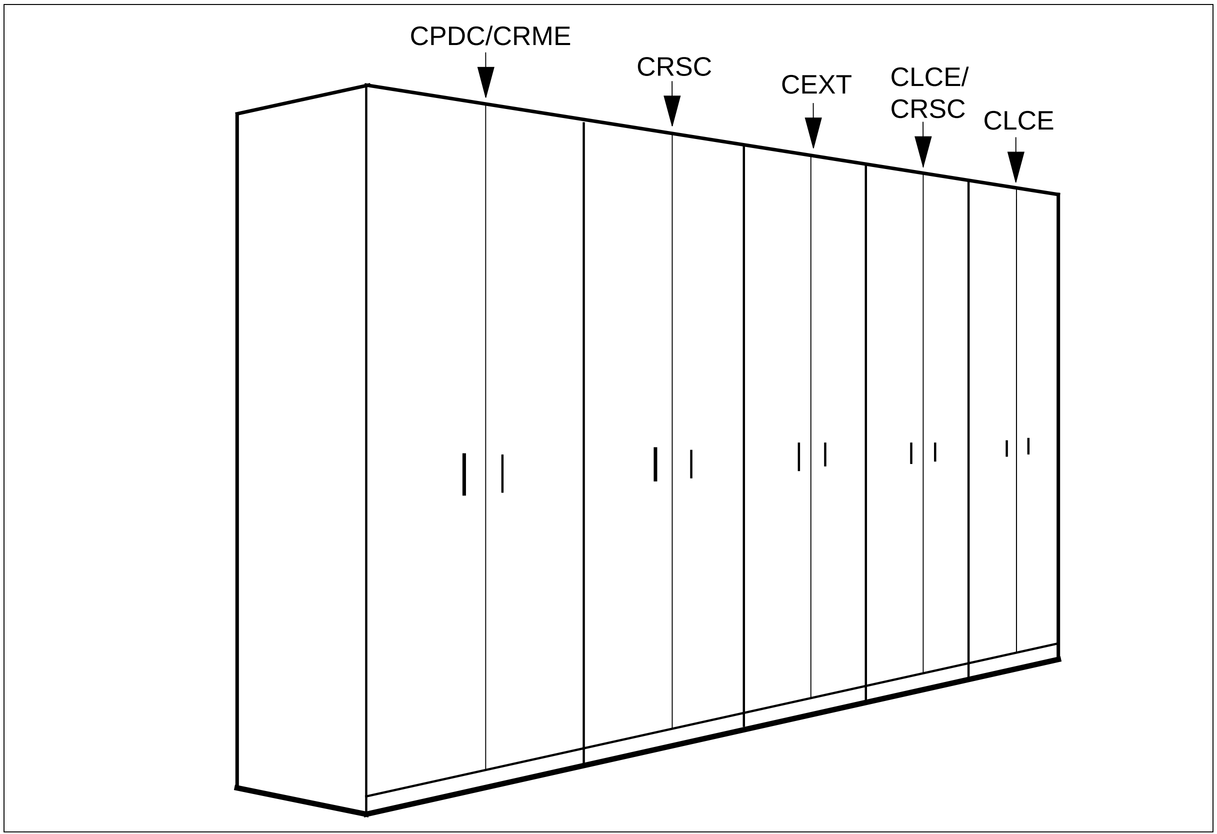
The CEXT can contain a maximum of five cabinetized line concentrating equipment (CLCE) cabinets and an LCME. The number of CLCE cabinets and an LCME increases the maximum size for a line. An NTMX8601 EXT provides additional RCC2 capacity on the CEXT.

This setup can include an NTRX34BA cabinetized miscellaneous equipment cabinet (CMIS) to store equipment that the customer specifies. An NTRX49AA cabinetized miscellaneous spares storage (CMSS) cabinet can provide spare card storage. An NTRX30DA cabinetized line module ISDN (CLMI) allows the system to contain a maximum of two ISDN 2B1Q line modules.

Note: The five line cabinets cannot contain ISDN lines until phase 2/3.

The following diagram shows a multicabinet configuration.

Figure 2-5 Summary of multicabinet RSC-S configuration



The provisioning options that follow are also available for the multicabinet configuration:

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

The phase 1 enhancements phase introduce an additional provisioning option. This option is the SMS-R for digitally integration of digital loop carriers compatible with the TR-008.

The sections that follow describe the cabinets and cabinet components.

Cabinetized line concentrating equipment

A single configuration RSC-S can have a maximum of five CLCE cabinets. Each cabinet supports a maximum of two completely duplicated LCMs. Each LCM provides 640 line card capacity.

The POTS applications use the CLCE. The CLCE connects to the RCC2 through two to six DS30A links. A maximum of ten LCMs can connect to the RCC2 in a single RCC2 configuration.

Each CLCE cabinet contains the following equipment:

- a maximum of two duplicated LCMs to terminate subscriber lines
- one MSP for power, control, two RGs and alarm circuits

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

The CRSC extension cabinet

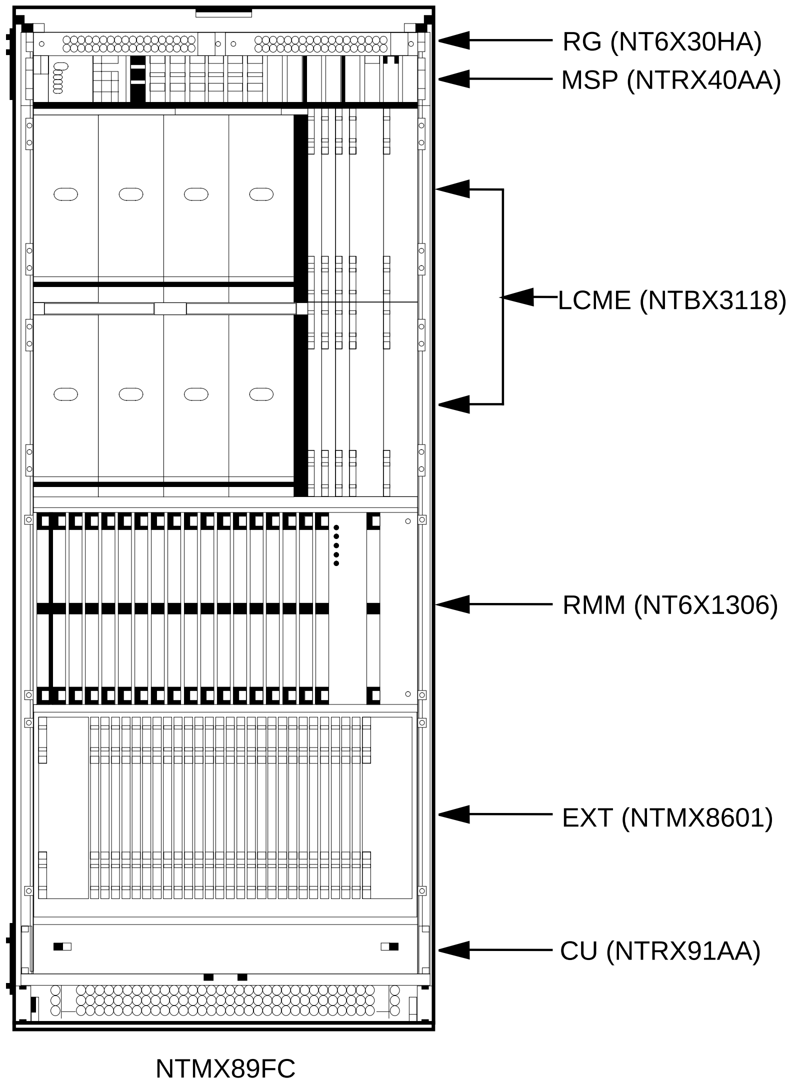
The hardware required to support 54 ports exceeds the physical capacity of the RCC2. The EXT shelf extends the capacity of the hardware. The CEXT contains the following:

- EXT
- MSP
- RMM shelf
- LCME, which provides
  - power
  - service
  - maintenance circuits
  - an additional 480 lines

This cabinet contains more ISDN DCHs or DS-1 interfaces. The EXT shelf has one ISDN LCM also.

The following diagram shows the CEXT components. A description of each CEXT component follows the diagram.

Figure 2-6 CEXT cabinet



CU — cooling unit
EXT — extension shelf
LCME — enhanced line concentrating module
MSP — modular supervisory panel
RG — ringing generator
RMM — remote maintenance module

The CEXT provides room for more DS-1 interfaces and DCH cards. The CEXT units 0 and 1 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 can support 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 and connects to the RCC2 shelf through a DS60 plus power card.

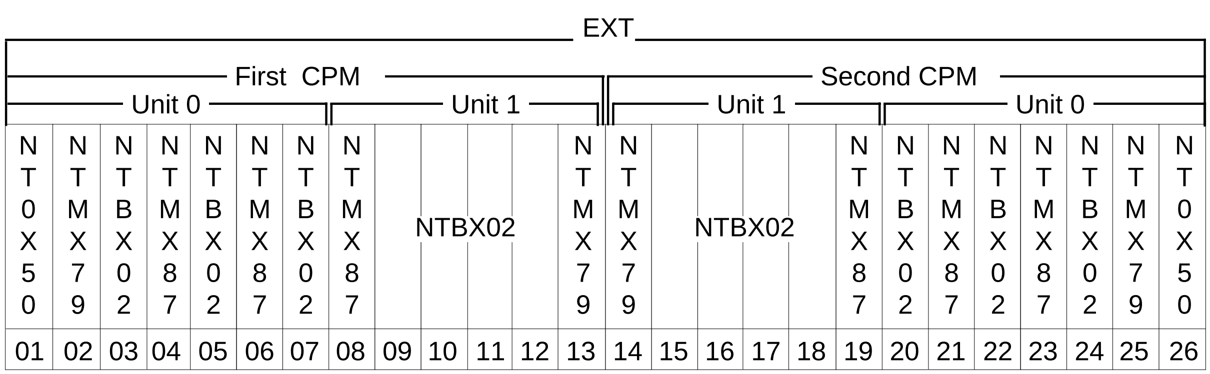
The EXT shelf on the CEXT contains the following cards:

- 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 diagram figure shows the circuit card layout for an RCC2 EXT shelf.

> ***Note:*** The figure that follows cannot show slot 27 as a result of space limits. This slot 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

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
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
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 MSP, RMM, and LCM for the CEXT perform the same functions described for the CRSC. Unit redundancy of the CEXT increases RSC-S abilities.

Cabinetized line module ISDN cabinet

One CLMI cabinet on a single-configuration RSC-S can contain a maximum of two ISDN 2B1Q line modules.

Cabinetized miscellaneous equipment cabinet

One CMIS cabinet on a single-configuration RSC-S can contain equipment that the customer specifies.

Cabinetized miscellaneous spares storage

One CMSS cabinet on a single-configuration RSC-S can provide 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 require additional components as follows:

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

Remote cluster controller-2 with ISDN

Perform the following steps to activate ISDN services on an RSC-S:

- Use P-side DS-1 slots to allow DCH circuit cards.
- Change the MSP to support DCH cards.
- Add the software loads.

The D-channel handler

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

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

- statistical multiplexing of SAPI 16 (packet) frames and transmission of the frames to the packet handler (PH). The DCH card functions with a statistical multiplex ratio of up to 64:1
- reflection of SAPI 17 (user-to-user looparound) frames back toward the user

Enhanced ISDN signaling preprocessor

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

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

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

An RCC2 with ISDN has ISP and ISP16. The ISP card has data entries in translations.

Enhanced line concentrating module

The LCME uses the 2B1Q U-loop interface to provide the subscriber with BRI. Nortel uses the following to provide the North American Standard 2B1Q U-loop interface:

- 2B + D channels
- six maintenance channels (M) located in the 2B1Q superframe

Packet handler

Based on the DPN-100 Family of packet switches, the PH consists of the main components that follow:

- digital interworking unit (DIU)

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

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

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

The OAM processor

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

Customer premises equipment

For BRI, the CPE consists of the components that follow:

- the S/T-bus

  the part of the ISDN BRI interface connected to ISDN terminals

- the ISDN terminals

  include the T2317, M5209T/TD, and M5317T/TD telephone sets that provide voice and data features

- the ISDN Universal Terminal Adapter (UTA)

  connection of the S/T-bus to a personal computer.

- network termination 1 (NT1)

  conversion of the proprietary loop protocol on the network side to the CCITT standardized protocols on the user side. The NT1 is necessary for BRI when an ISDN U-line card terminates a line. An S/T-line card that terminates on ISDN lines requires Network termination 2 (NT2). The ISDN switch acts as an NT2.

- the U-loop

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

Planned products

Future RSC-S development will add STS-1 capability to allow the RSC-S to provide an interface to a SONET multiplexer. A paddleboard that will contain a junction circuit card will connect two STS-1 interface cards. The two cards will connect into one STS-1 transmission link interface. The two functions of the paddleboard are as follows:

- in the transmit path, the paddleboard selects the transmission STS-1 interface card. The 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.

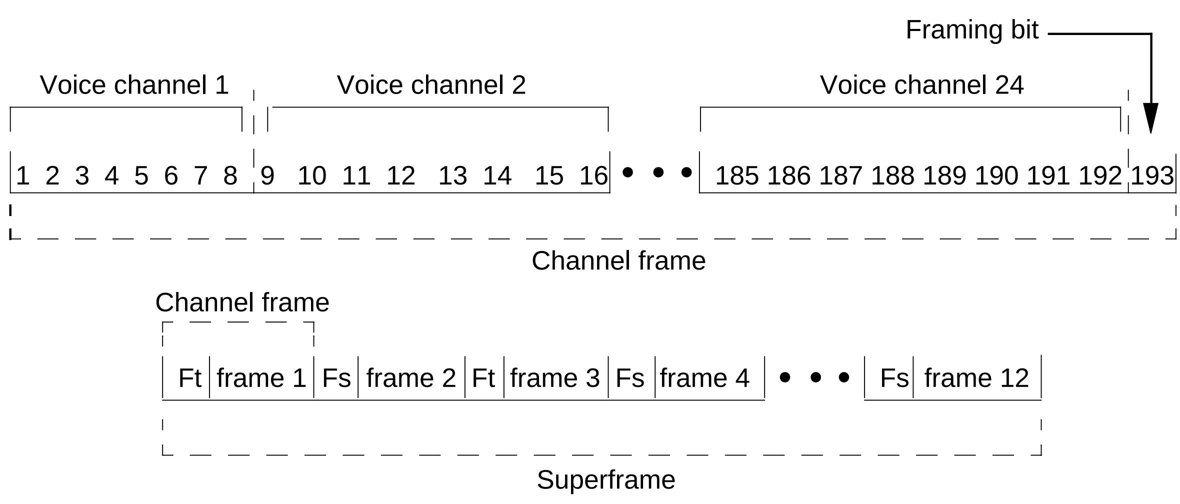
C-side links

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



Fs= frame signaling bit
Ft = frame timing bit

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		

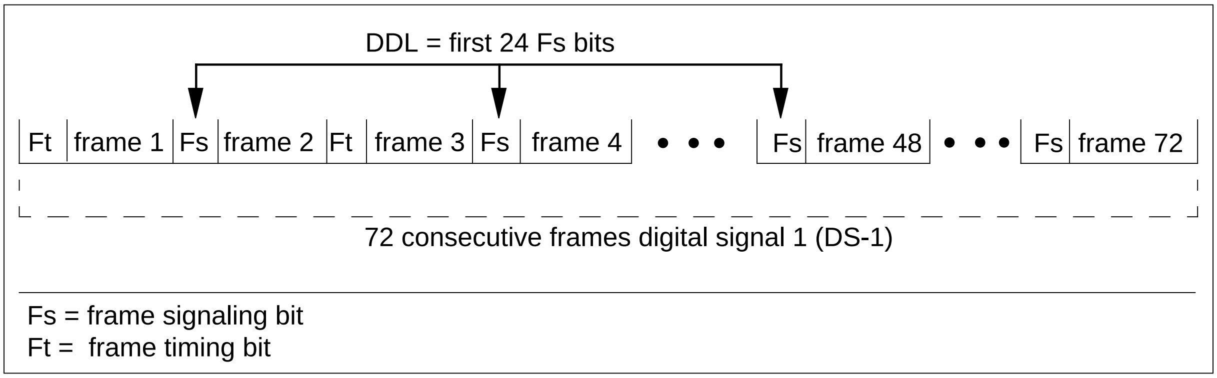
Signaling additions

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



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. ***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.

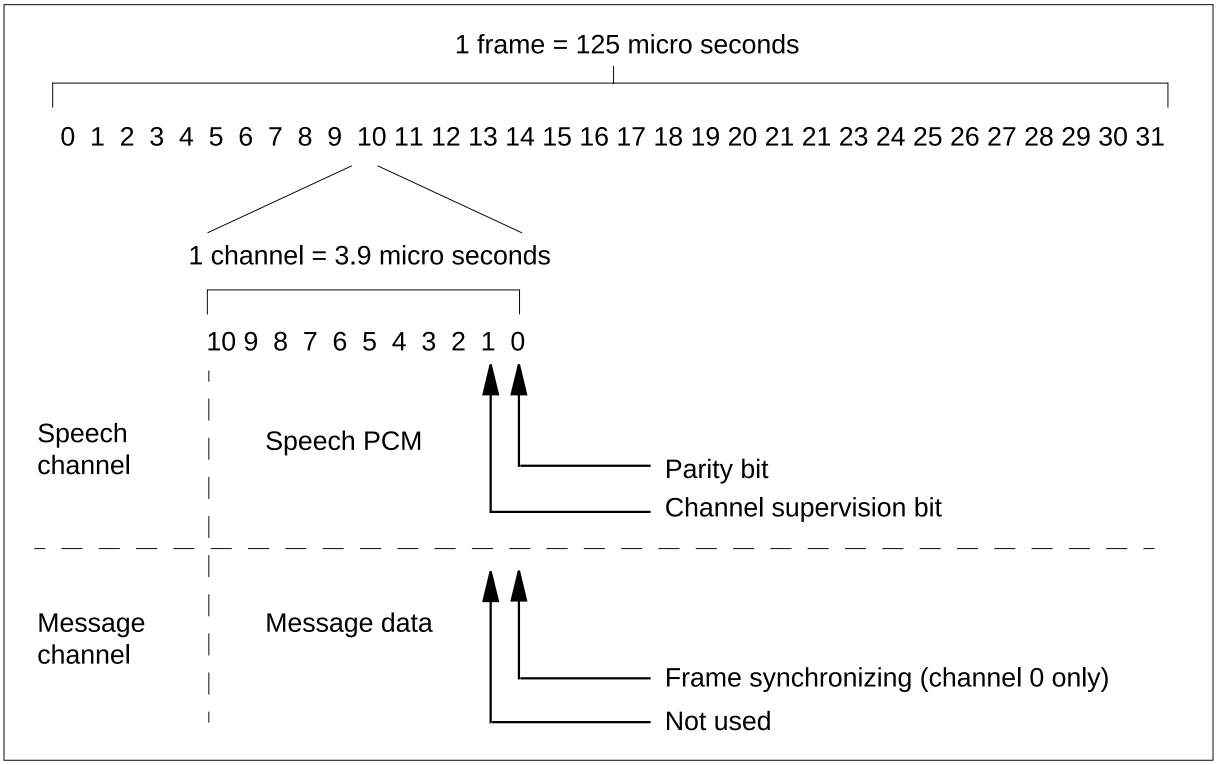
Note: One STS-1 level signal can transport 28 DS-1 links.

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.

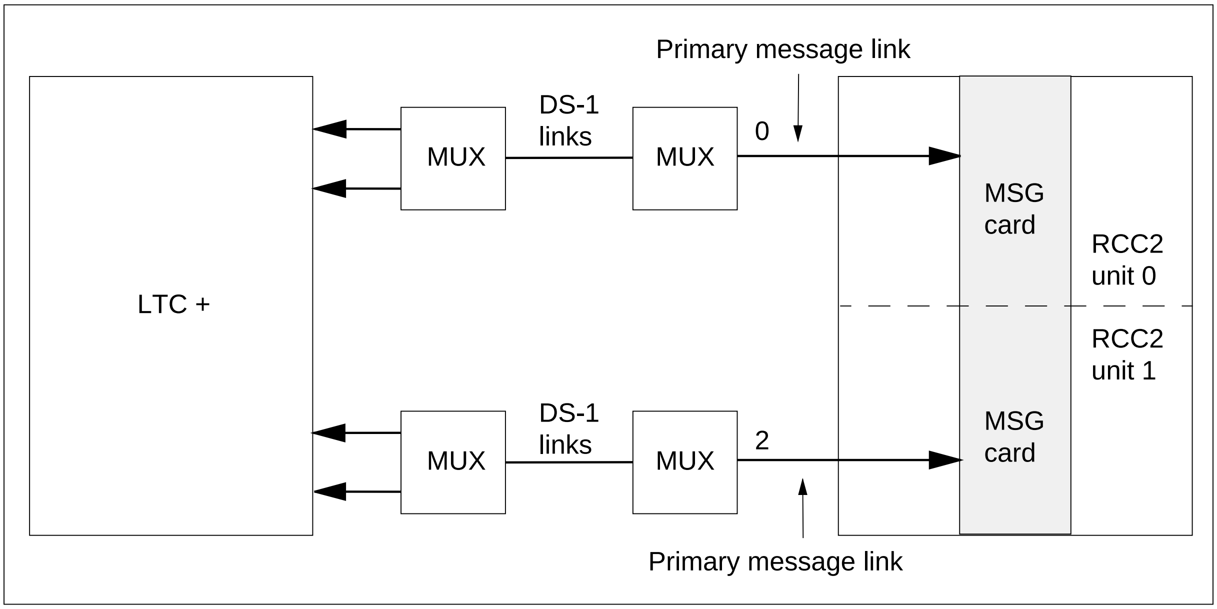
Message links

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 .

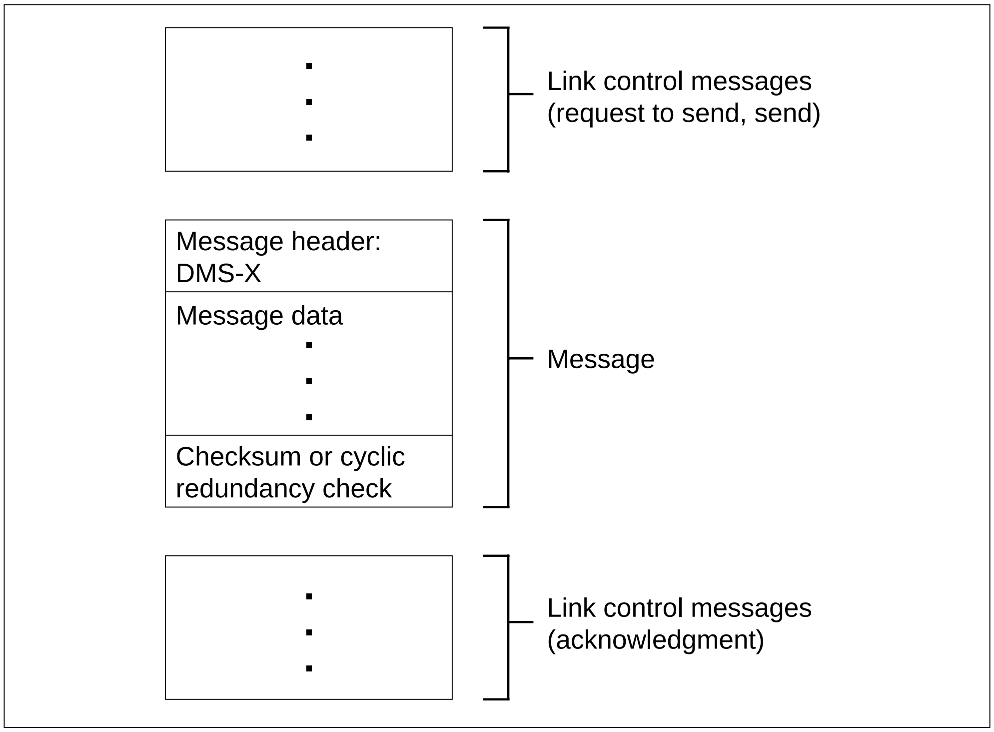
DMS-X and HDLC protocol applications

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.

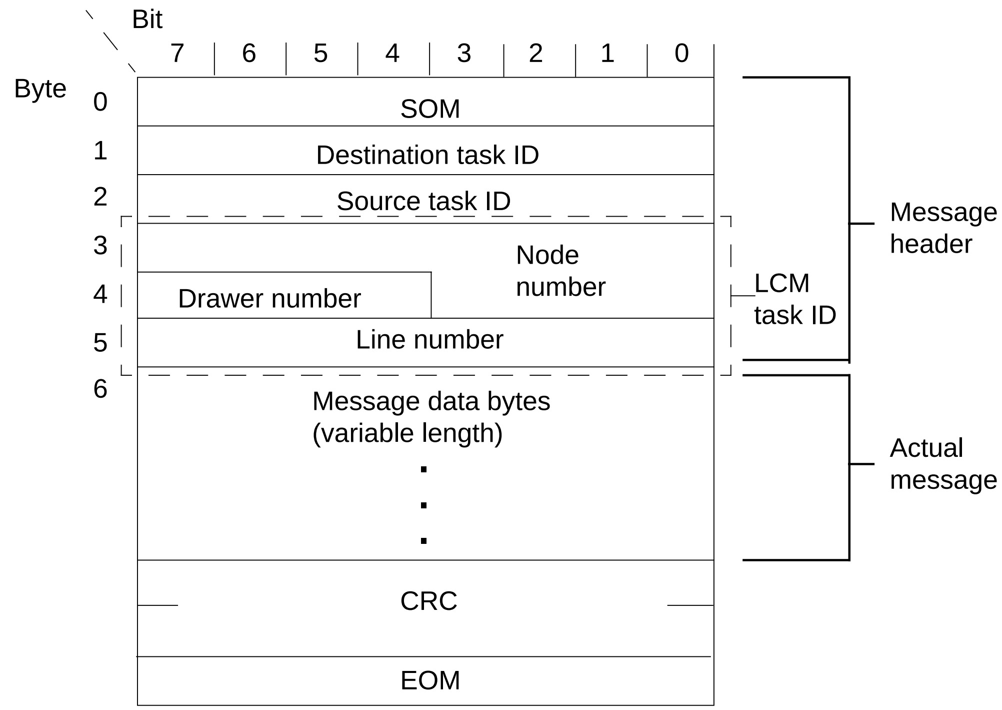
DMS-X message format

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.

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.

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.

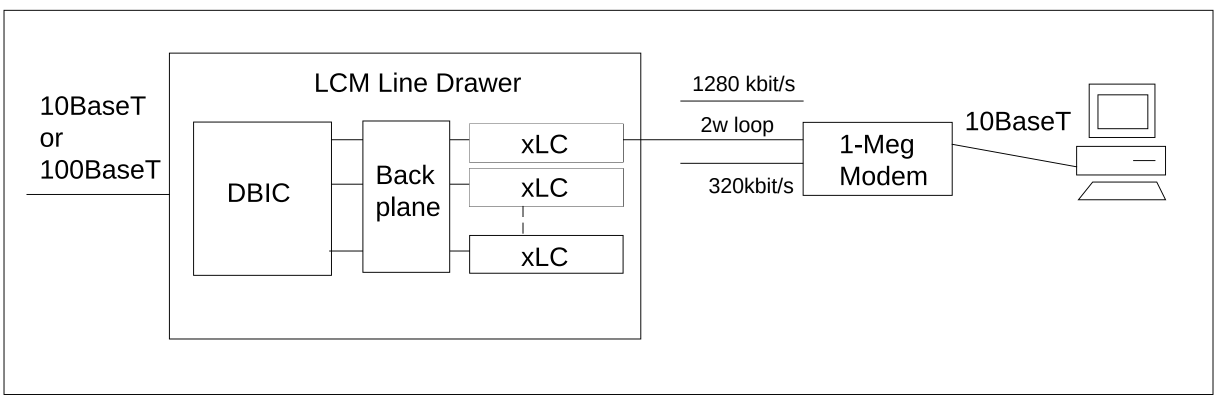
The following eight areas are essential to call processing:

- 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

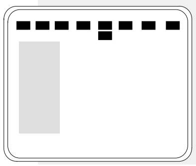
The Ethernet interface at the 1-Meg Modem provides a half-duplex 10BaseT or 100BaseT connection. The interface does not filter local traffic and passes all traffic upstream. Only one Ethernet device can connect to the 1-Meg Modem.

4 RSC-S recovery procedures

This chapter contains the recovery procedure for the DMS-100 Remote Switching Center-SONET (RSC-S). This procedure allows maintenance personnel to return an RSC-S to service from an out-of-service condition. These conditions include an emergency stand-alone (ESA) condition.

PM RCC2 critical

Alarm display



CM	MS	IOD	Net	**PM**	CCS	Lns	Trks	Ext	Appl
.	.	.	.	**nRCC2**	.	.	.	.	.
				C					

Application

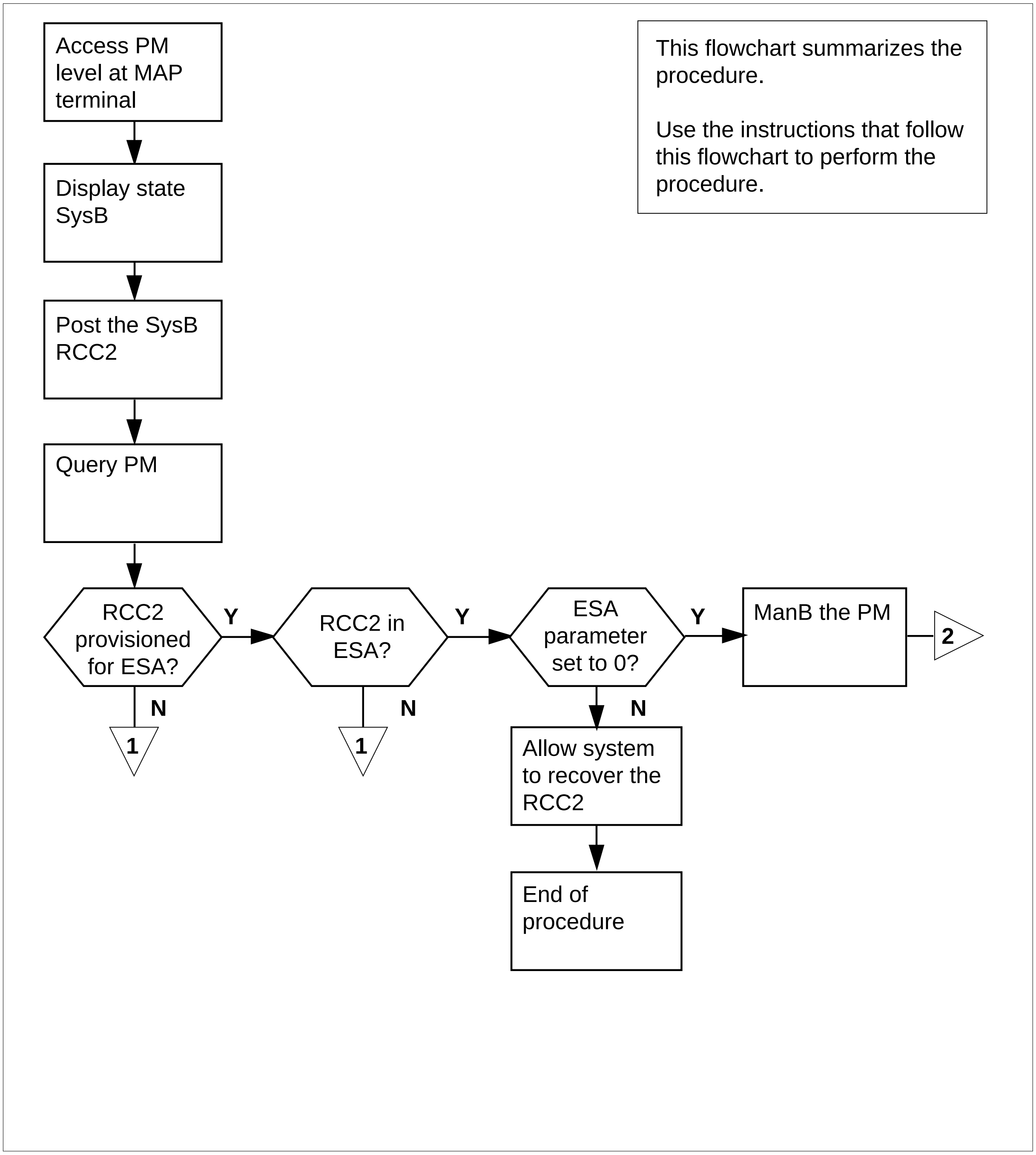
Use this procedure to restore call processing under central control (CC) on an RCC2.

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.

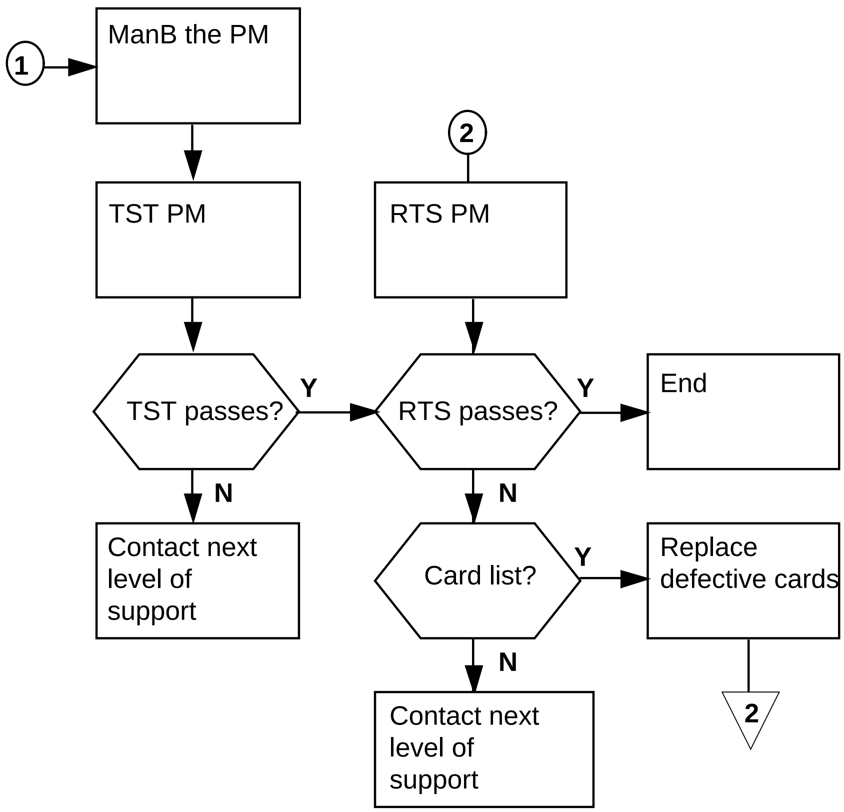
PM RCC2
critical (continued)

Summary of recovering an RCC2



PM RCC2
critical (continued)

Summary of recovering an RCC2 (continued)



Recovering a PM RCC2

At the host office

1 Proceed if:

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

At the MAP terminal

2 To silence an alarm that is 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: CRI07AZ 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}

PM RCC2
critical (continued)

Unit 1 Inact, Status: {SysB, TRUE}
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) ithe EEPROM load name reflects NTAX74AA. For the NTMX77AA Unified Processor (UP) the EEPROM load name reflects NTMX77AA, In the example, the EEPROM load name is `MX77NH08`. If the RCC2 were provisioned with NTAX74AA, an example EEPROM load name would be `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 the remote switching center-synchronous (RSC-S) ESA exit time, type

>POS RSC_XPMESAEXIT

and press the Enter key.

Example of a MAP response:
PARMNAME PARMVAL

RSC_XPMESAEXIT 0

If the PARMVAL	Do
is set to zero	step 9
is more than zero	Allow the system to recover the RCC2. Go to step 37.

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
```

Note: The 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 if 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 display, type

>trks;carrier

and press the Enter key.

14 To post the host XMS-based PM (XPM) peripheral-side (P-side) links that interface the RCC2 in ESA and to check link conditions for slips and framing errors, type

>post **pm_type pm_no link_no**

and press the Enter key.

where

pm_type
is a line group controller (LGC) or line trunk controller (LTC)

pm_no
is the number of the LGC/LTC (0 to 255)

link_no
is the number of the link associated with the host XPM identified in

step 12

Note: Repeat the POST command for each link that interfaces 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 <-7.    0    0 INSV
```

If the link conditions	Do
have a high number of SLIP and FRME errors	Leave the RCC2 in ESA. Go to step 36.
have a low number of SLIP and FRME errors	step 15

15 To access the PM level of the MAP terminal and to 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 the system response	Do
is TEST PASSED	step 18
is TEST FAILED with reason, C-side links not available	step 24
is TEST FAILED and the system generates a card list	step 34

18 To return the PM to service, type

>RTS PM

and press the Enter key.

MAP response example of an RCC2:

```
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 the 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 during ESA EXIT. This action details the call processing operational measurements (OM) during ESA.

19 The peripheral/remote loader-16 card (NT7X05) allows local loading of RCC2 data. This procedure 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         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 provisioned, the MAP response is: NT7X05 not datafilled, QueryPm files invalid

If the NT7X05 card	Do
is provisioned	step 20
is not provisioned	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 of the loadfile.

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 the system response	Do
is RTS PASSED	step 23

PM RCC2
critical (continued)

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

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

If the dial tone	Do
is not restored	step 36
is restored	step 37

24 To identify central-side (C-side) links to the host PM, a line group controller (LGC) or an 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: Perform this step for each ManB link.

If the 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

Note 1: and press the Enter key.

Note 2: *where*

link_no
is the number of the link tested in step 28

Note: Perform this step for each ManB link.

If the 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 the 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 did not RTS

If the 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 the system response	Do
is `RTS PASSED`	step 37
is `RTS FAILED`	step 36

34 Check the card list in the MAP display, that results from step 17.

For RCC2s with the optional NTAX74AA Cellular Access Processor (CAP) the card list in the MAP response reflects AX74 in slot 03. For RCC2s with the NTMX77AA Unified Processor (UP), the card list in the MAP response reflects MX77. This condition appears 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:

PM RCC2
critical (end)

```
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 of the cards on the list	Do
are replaced	step 36
are not replaced	step 37

35 If the system indicates other defective cards, go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedure and go to step 17.

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

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

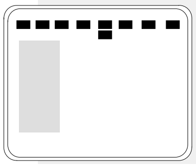
5 RSC-S alarm clearing procedures

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

Procedures in this chapter correspond to 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.

Ext MSP
CLCE cabinet major

Alarm display



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

Indication

An FSP that follows a number under the Ext header of the alarm banner indicates an Ext modular supervisory panel (MSP) alarm. An M under the FSP indicates that the alarm class is major. The alarm display is at the MTC level of the MAP display.

> ***Note:*** Current software does not reflect the change from FSP to MSP in the MAP display.

Meaning

An MSP alarm occurs when one or more cabinets in the office have a power fault or a cooling unit fault. The number before the FSP is the number of cabinets with an MSP alarm. Refer to the previous note.

Result

The effect of this alarm on subscriber service depends on the type of fault. The effect also depends on the type of frame the fault is in.

Common procedures

This procedure refers to the common procedure “Replacing the cooling unit". Refer to this common procedure in the routine maintenance section of this manual.

Action

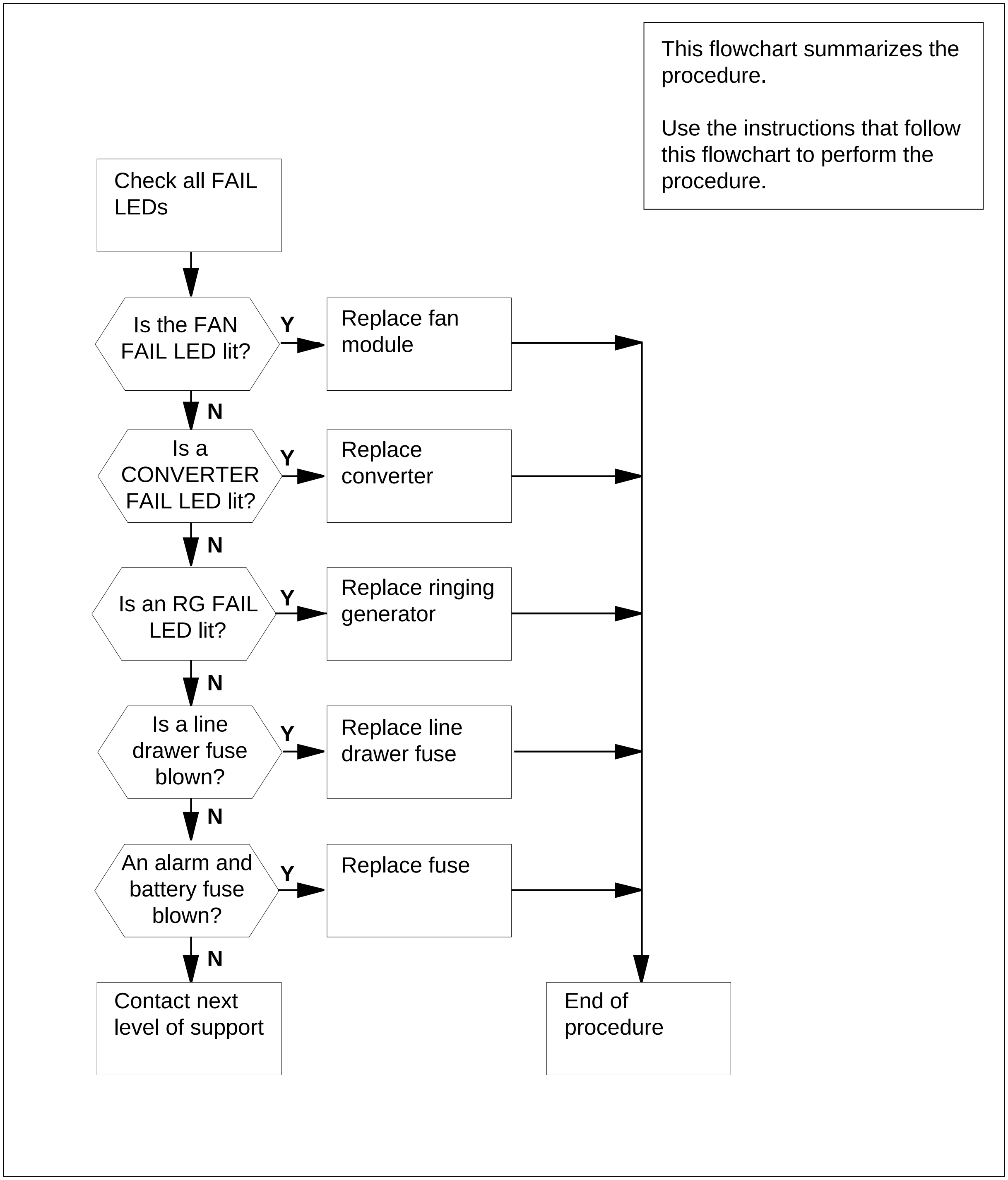
This procedure applies to the following cabinets:

- Cabinetized Remote Switching Center with Line Concentrating Module (CRSC with LCM), NTMX89FA
- Cabinetized Line Concentrating Equipment (CLCE), NTRX30CA

The following flowchart is only a summary of the procedure to clear an alarm. A detailed step-action procedure follows the flowchart.

Ext MSP
CLCE cabinet major (continued)

Summary of clearing an Ext MSP CLCE cabinet major alarm



Ext MSP
CLCE cabinet major (continued)

Clearing an Ext MSP CLCE cabinet major alarm

At the CLCE cabinet

1

> **ATTENTION**
> Illustrations of the CLCE cabinet, LCME fuse panel, and MSP are located at the end of this procedure.

Check the FAN FAIL LEDs.

If	Do
any FAN FAIL LEDs are lit	step 90
no FAN FAIL LEDs are lit	step 2

2 Check the CONVERTER FAIL LED on each converter in the cabinet.

If	Do
any CONVERTER FAIL LEDs are lit	step 51
no CONVERTER FAIL LEDs are lit	step 3

3 Check the RG FAIL LED on both RGs, which are at the top of the cabinet. The FAIL LED is behind the front panel of the RG.

If	Do
one RG has a lit FAIL LED	step 40
none of the RGs have a lit FAIL LED	step 4

4 Check the line drawer fuses located on the fuse panel to the left or right of each line concentrating array (LCA) (0 and 1) of the LCM.

If	Do
there is a blown fuse (protruding)	step 9

Ext MSP
CLCE cabinet major (continued)

If	Do
there are no blown fuses	step 5

5 Check the alarm battery supply (ABS) fuses F01, F02, F03, F04, and F08 located on the MSP.

If	Do
there is a blown fuse (protruding)	step 6
there are no blown fuses	step 87

6 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

7 Remove the blown fuse.

8

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse only with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 87
does not blow	step 83

9 Determine which fuse is blown.

Note: Fuses 01 to 05 each supply +5 V, fuses 06 to 10 each supply +15 V, and fuses 11 to 15 each supply -48 V.

If the blown fuse	Do
is 01 to 05	step 14
is 06 to 15	step 10
is RA or RB	step 14

Ext MSP
CLCE cabinet major (continued)

10 Use the following table to determine which +15V fuse (06 through 10) is associated with which -48V fuse (11 through 15).

If-48V fuse number	Do+15V fuse number
11	06
12	07
13	08
14	09
15	10

11 Remove the blown fuse and the associated fuse. For example, if the blown fuse is 06, remove fuse 06 and 11.

12 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

13 Insert the -48V fuse, then the +15V fuse.

If the fuse	Do
blows (protrudes) again	step 17
does not blow	step 83

14 Obtain a replacement fuse with the same voltage as the blown fuse.

15 Remove the blown fuse.

16

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse only with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 19
does not blow	step 83

17 Remove the blown fuse and the associated fuse. For example, if the blown fuse is 06, remove fuse 06 and 11.

Ext MSP
CLCE cabinet major (continued)

18 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

19 Use the following table to identify the drawer associated with the blown fuse. The drawers are located in the shelf below the fuse panel. The RA and RB fuses supply ringing voltage to all five drawers in the shelf.

Fuse number	shelves 5 and 33	shelves 19 and 47
	drawer number	**drawer number**
01, 06, 11	0 (leftmost)	5 (leftmost)
02, 07, 12	1	6
03, 08, 13	2	7
04, 09, 14	3	8
05, 10, 15	4	9

20 Pull out the line drawer associated with the blown fuse. Begin with the leftmost drawer for a blown RA or RB fuse.

21

DANGER
Personal injury
Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

CAUTION
Loss of service
Perform this procedure during periods of low traffic.

Unseat all the line cards in the drawer. Do not remove them from the drawer.

If the fuse	Do
is any one of fuses 01 to 05	step 23
is any one of fuses 06 to 15	step 22

Ext MSP
CLCE cabinet major (continued)

If the fuse	Do
is an RA or RB fuse	step 23

22 Insert the -48V fuse, then the +15V fuse.

If the fuse	Do
blows (protrudes) again	step 26
does not blow	step 28

23 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

24 Remove the blown fuse.

25

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse only with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 26
does not blow	step 28

26 Check the drawer for loose or short-circuited wires.

If	Do
there are loose or short-circuited wires	step 89
there are no loose or short-circuited wires, and the fuse is a ringing voltage fuse (RA or RB)	step 27
there are no loose or short-circuited wires, the fuse is a ringing voltage fuse (RA or RB), and you have done all five drawers in the shelf	step 89
there are no loose or short-circuited wires, and the fuse is one of the line drawer fuses (01 to 15)	step 89

Ext MSP
CLCE cabinet major (continued)

27 Reseat all the line cards in the drawer and repeat steps 20 and 21 for the next drawer.

28 Reseat the line cards one at a time, and check the fuse.

If	Do
after you reseat a line card, the fuse blows (protrudes) again	step 29
after you reseat all the line cards, the fuse does not blow	step 85

29

DANGER
Personal injury
Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

Remove the line card from the drawer.

30 Obtain a replacement line card. Make sure that the replacement card has the same PEC, including suffix, as the old card.

31 Insert the replacement line card into the drawer.

If the fuse	Do
is any one of fuses 01 to 05	step 35
is any one of fuses 06 to 15	step 32
is an RA or RB fuse	step 35

32 Obtain a replacement fuse with the same voltage as the blown fuse.

33 Remove the blown fuse and the associated fuse. For example, if the blown fuse is 06, remove fuse 06 and 11.

34 Insert the -48V fuse, then the +15V fuse.

If the fuse	Do
blows (protrudes) again	step 89
does not blow	step 38

35 Obtain a replacement fuse with the same voltage and amperage as the blown fuse.

Ext MSP
CLCE cabinet major (continued)

36 Remove the blown fuse.

37

DANGER
Personal injury
Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse only with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 89
does not blow	step 38

38 Reseat all the other line cards in the drawer.

39 Push the drawer back in and go to step 83.

40 Use the following table to identify the circuit breaker that is associated with the RG with a lit FAIL LED. This circuit breaker is on the MSP.

IfRG number	DoCircuit breaker number
RG0 (leftmost)	CB1
RG 1	CB3

41 Check the associated circuit breaker.

If the circuit breaker	Do
is ON	step 48
is OFF	step 42

Ext MSP
CLCE cabinet major (continued)

42 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the FAIL LED on the RG is lit	step 43
remains ON and the FAIL LED on the RG is not lit	step 83
remains ON and the FAIL LED on the RG is lit	step 48

At the CPDC

43 Locate the fuse that associates with the cabinet and shelf number.

If the fuse	Do
is blown (protrudes)	step 44
is not blown	step 49

44 Remove the fuse holder with the blown fuse.

45

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse only with a fuse of the same type, rating (color code), and manufacturer.

Replace the cartridge fuse inside the fuse holder.

46 Install the fuse holder back on the CPDC.

At the CLCE cabinet

47 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the RG FAIL LED is lit	step 49
remains ON and the RG FAIL LED is not lit	step 83

Ext MSP
CLCE cabinet major (continued)

If the circuit breaker	Do
remains ON and the RG FAIL LED is lit	step 48

48 Set the circuit breaker to OFF.

49 Refer to the correct procedure in *Card Replacement Procedures* to replace the RG. When you complete the procedure, return to this point.

50 Check the FAIL LED on the RG you replace.

If the RG	Do
FAIL LED is lit	step 82
FAIL LED is not lit	step 83

51 Note the number of the shelf that contains the converter with the lit CONVERTER FAIL LED.

52 Use the following table to identify the circuit breaker that is associated with the shelf that contain the lit CONVERTER FAIL LED. This circuit breaker is on the MSP.

If Shelf number	Do use circuit breaker number
65	CB1 (RG-0)
05, 33	CB2 (LCM0/LCA0) (LCM1/LCA0)
65	CB3 (RG-1)
19 , 47	CB4 (LCM0/LCA1) (LCM1/LCA1)
33	CB5 (converter)
05	CB6 (converter)
47	CB7 (converter)
19	CB8 (converter)

53 Check the associated circuit breaker.

If the circuit breaker	Do
is ON	step 62
is OFF	step 54

Ext MSP
CLCE cabinet major (continued)

54 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 55
remains ON and the CONVERTER FAIL LED is lit	step 62
remains ON and the CONVERTER FAIL LED is not lit	step 83

55 Note the numbers of the cabinet and shelf that contain the converter with the lit CONVERTER FAIL LED.

At the CPDC

56 Locate the fuse that powers the shelf in the CLCE cabinet.

If the fuse	Do
is blown (protruding)	step 57
is not blown	step 62

57 Remove the fuse holder with the blown fuse.

58 Replace the cartridge fuse inside the fuse holder.

59

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse only with a fuse of the same type, rating (color code), and manufacturer.

Replace the blown fuse.

60 Install the fuse holder back on the CPDC.

61 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 63
remains ON and the CONVERTER FAIL LED is not lit	step 83
remains ON and the CONVERTER FAIL LED is lit	step 62

Ext MSP
CLCE cabinet major (continued)

62 Set the circuit breaker to OFF.

63 Refer to the correct procedure in *Card Replacement Procedures* to replace the converter. Complete the procedure and return to this point.

64 Check the current replaced converter and the associated circuit breaker.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 66
remains ON and the CONVERTER FAIL LED is not lit	step 83
remains ON and the CONVERTER FAIL LED is lit	step 65

65 Set the circuit breaker to OFF.

66 Remove the NT6X51 and NT6X52 cards from the shelf with the lit CONVERTER FAIL LED.

67 Set the circuit breaker to ON.

If the CONVERTER FAIL LED	Do
is lit	step 80
is not lit	step 68

68 Set the circuit breaker to OFF.

69 Insert the NT6X51 card back into the shelf.

70 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 72
remains ON and the CONVERTER FAIL LED is not lit	step 74
remains ON and the CONVERTER FAIL LED is lit	step 71

71 Set the circuit breaker to OFF.

72 Go to the appropriate procedure in *Card Replacement Procedures* to replace the NT6X51 card. Complete the procedure and return to this point.

73 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 78

Ext MSP
CLCE cabinet major (continued)

If the circuit breaker	Do
remains ON and the CONVERTER FAIL LED is not lit	step 74
remains ON and the CONVERTER FAIL LED is lit	step 77

74 Set the circuit breaker to OFF.

75 Insert the NT6X52 card back into the shelf.

76 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 78
remains ON and the CONVERTER FAIL LED is not lit	step 83
remains ON and the CONVERTER FAIL LED is lit	step 77

77 Set the circuit breaker to OFF.

78 Refer to the procedure in *Card Replacement Procedures* to replace the NT6X52 card. Complete the procedure and return to this point.

79 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 80
remains ON and the CONVERTER FAIL LED is not lit	step 83
remains ON and the CONVERTER FAIL LED is lit	step 82

80 Check the backplane of the shelf for bent or short-circuited pins.

If the pins	Do
are bent or short-circuited	step 89
are not bent or short-circuited	step 81

81 Insert the NT6X51 and the NT6X52 cards into the shelf.

82 Refer to the procedure in *Card Replacement Procedures* to replace the alarm card. Complete the procedure and return to this point.

Ext MSP
CLCE cabinet major (continued)

At the CLCE cabinet

83 Check the frame FAIL lamp on the MSP.

If the frame FAIL lamp	Do
is lit and you did not complete steps 2, 3, 4, and 5 in this procedure	step 84
is lit and you did not complete steps 2, 3, 4, and 5 in this procedure	step 89
is not lit	step 85

84 Refer to the step you have not completed, that is, step 2, 3, 4, or 5 in this procedure.

At the MAP terminal

85 To access the Ext level of the MAP display to determine if an MSP alarm is present, type

>MAPCI;MTC;EXT

and press the Enter key.

If an MSP alarm	Do
is present, and you did not access all the cabinets with an MSP alarm	step 86
is present, and you did not access all the cabinets with an MSP alarm	step 89
is not present	step 91

86 Refer to the table of contents in this document to find the procedure for the type of cabinet with an MSP alarm. Perform that procedure.

At the CLCE cabinet

87

> **DANGER**
> **Risk of injury from high energy levels**
> Some of the terminals inside the MSP have an electrical potential of -48 Vdc. Do not touch any terminals inside the MSP.

Loosen the slotted nut on the left-hand side of the MSP.

Ext MSP
CLCE cabinet major (continued)

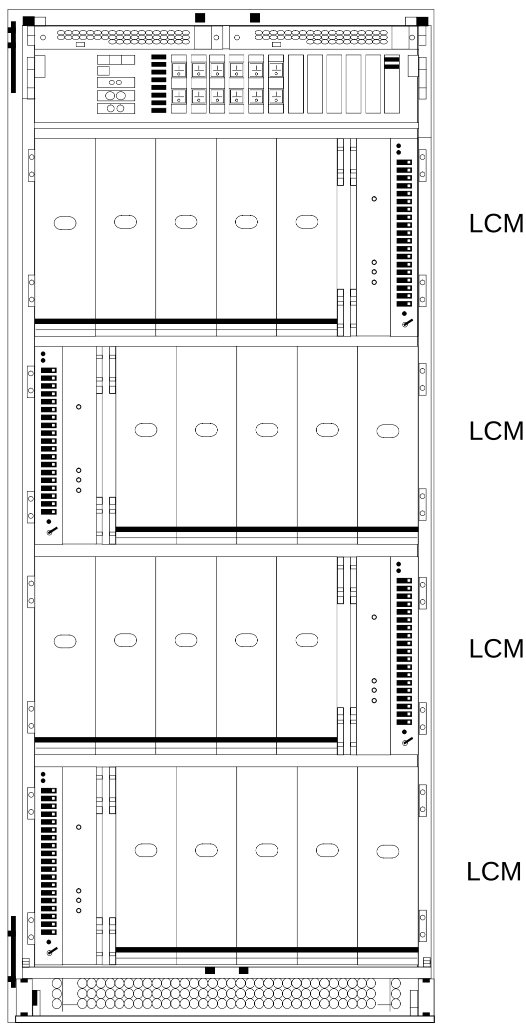
88 Open the MSP panel.

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

90 Refer to the table of contents, routine maintenance section, to find the procedure Replacing the cooling unit. Perform the Replacing the cooling unit procedure. If the MSP alarm presence continues, return to this procedure at step 85.

91 The procedure is complete.

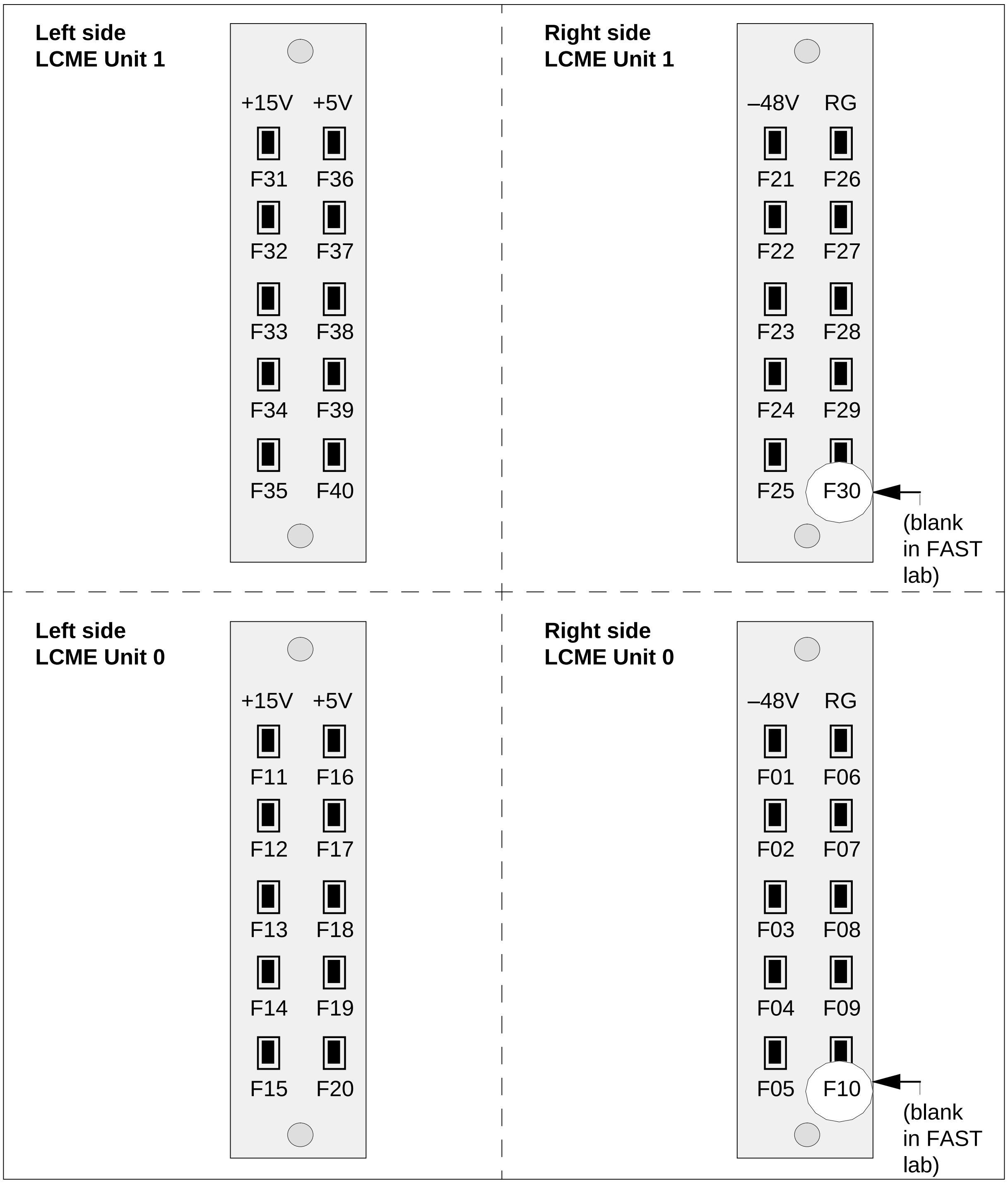
CLCE cabinet



CLCE

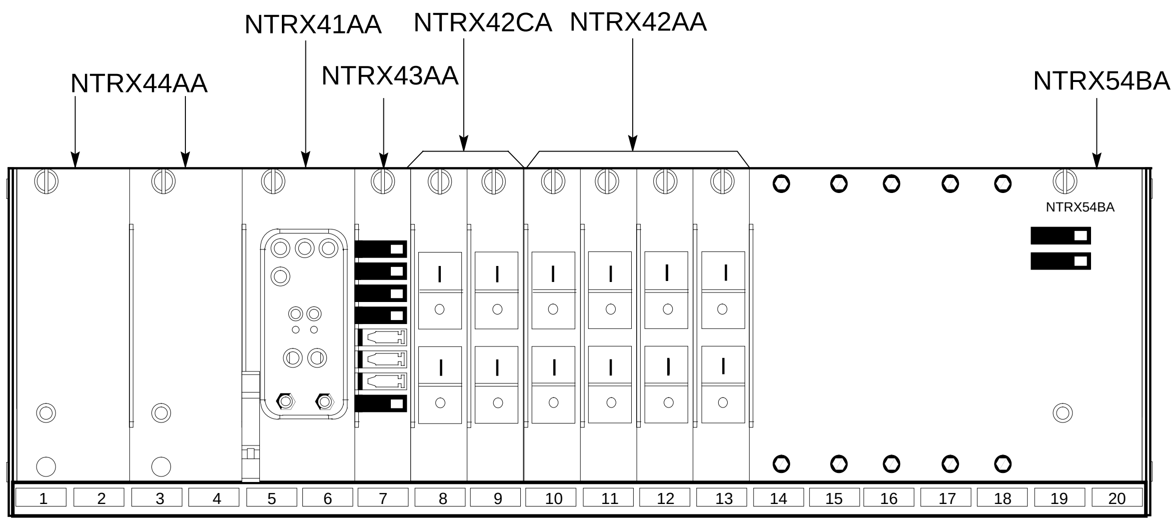
Ext MSP
CLCE cabinet major (continued)

LCME fuse panel



Ext MSP
CLCE cabinet major (end)

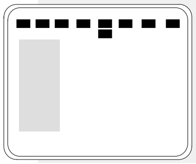
CLCE modular supervisory panel (MSP)



MSP for CLCE

Ext MSP
CLMI cabinet major

Alarm display



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

Indication

An FSP that follows a number under the Ext header of the alarm banner indicates an Ext modular supervisory panel (MSP) alarm. An M under the FSP indicates that the alarm class is major. The alarm display is at the MTC level of the MAP display.

> ***Note:*** Current software does not reflect the change from FSP to MSP in the MAP display.

Meaning

An MSP alarm occurs when one or more cabinets in the office has a power fault or cooling unit fault. The number that precedes FSP is the number of cabinets with an MSP alarm. Refer to the previous note.

Result

The effect on subscriber service depends on the type of fault. The effect on subscriber service also depends on the type of cabinet that contains the fault.

Common procedures

This procedure refers to the common procedure “Replacing the cooling unit". Common procedures are located in the routine maintenance section of this manual.

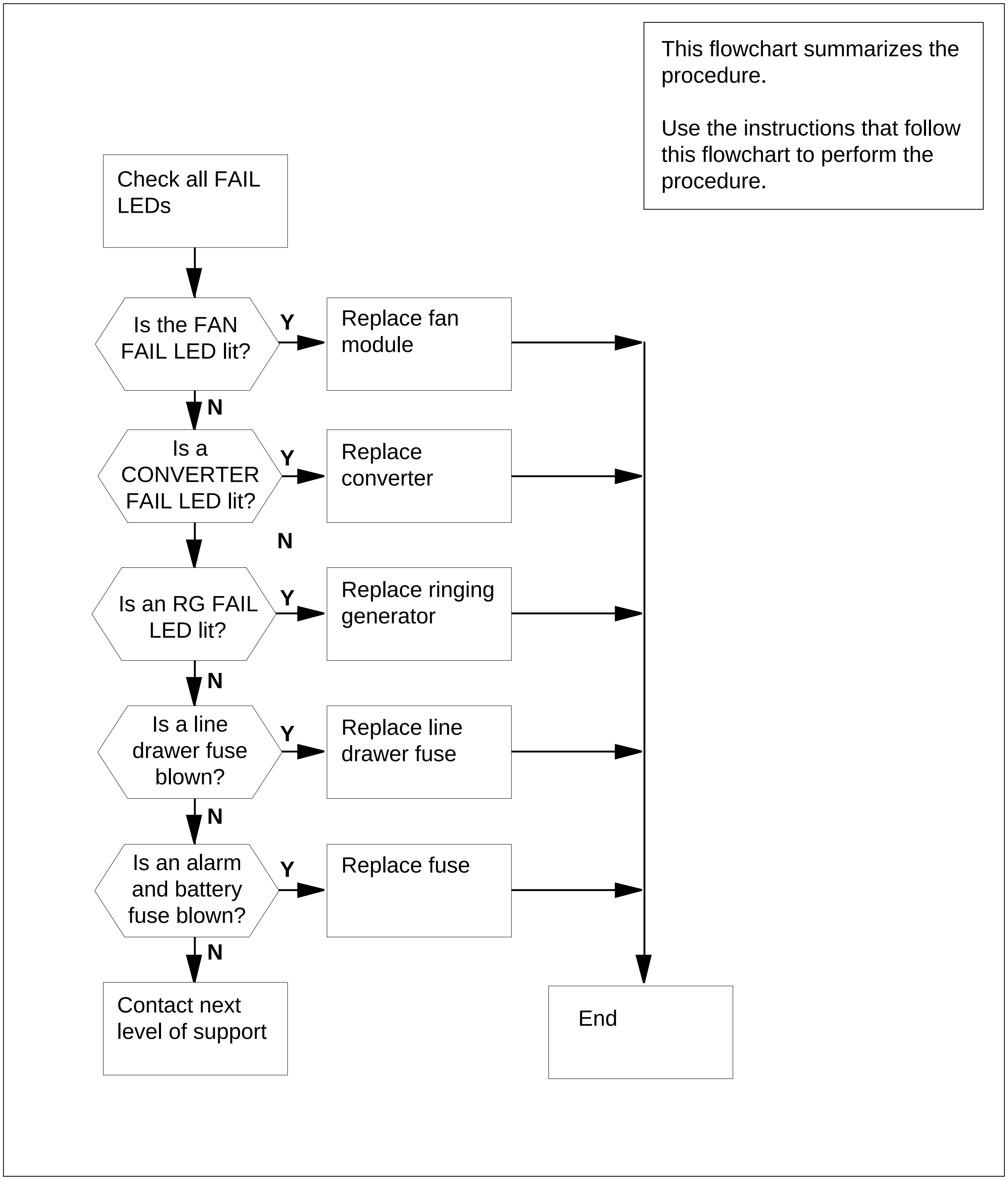
Action

This procedure applies to the Cabinetized Line Module ISDN (CLMI), NTRX30DA.

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Ext MSP
CLMI cabinet major (continued)

Summary of clearing an Ext MSP CLMI cabinet major alarm



Ext MSP
CLMI cabinet major (continued)

Clearing an Ext MSP CLMI cabinet major alarm

At the CLMI cabinets

1

> **ATTENTION**
> Illustrations of the CLCE cabinet, LCME fuse panel, and MSP appear at the end of this procedure.

Check the FAN FAIL LEDs.

If	Do
any FAN FAIL LEDs are lit	step 63
FAN FAIL LEDs are not lit	step 2

2 Check the CONVERTER FAIL LED on each converter in the cabinet.

If	Do
any CONVERTER FAIL LEDs are lit	step 43
CONVERTER FAIL LEDs are not lit	step 3

3 Check the RG FAIL LED on both RGs. The RGs are at the top of the cabinet. The FAIL LED is behind the front panel of the RG.

If	Do
an RG's FAIL LED is lit	step 30
the RGs' FAIL LEDs are not lit	step 4

4 Check the line drawer fuses (F01 to F17). The fuses are on shelves 33 and 47, slot number 18.

If	Do
a fuse is blown (protruding)	step 9
there are no blown fuses	step 5

Ext MSP
CLMI cabinet major (continued)

5 Check the ABS fuses 01 to 04 located on the MSP.

If	Do
a fuse is blown (protruding)	step 6
there are no blown fuses	step 62

6 Obtain a replacement fuse with the same voltage and amperage ratings as the blown fuse.

7 Remove the blown fuse.

8

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If	Do
the fuse blows (protrudes) again	step 10
the fuse does not blow	step 58

9 Identify the blown fuse.

10 Obtain a replacement fuse with the same voltage as the blown fuse.

11 Remove the blown fuse.

12

> **DANGER**
> **Risk of fire**
> For protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code), and manufacturer.

Insert the replacement fuse.

If	Do
the fuse blows (protrudes) again	step 13

Ext MSP
CLMI cabinet major (continued)

If	Do
the fuse does not blow	step 58

13 Use the following information to identify the drawer associated with the blown fuse. The drawers are located next to the fuse panel.

Fuse location

Fuse number	Drawer number
F1 -48 battery return	0 or 4
F2 -48 battery return	1 or 5
F3 -48 battery return	2 or 6
F4 -48 battery return	3 or 7
F5 -48V	0 or 4
F6 -48V	1 or 5
F7 -48V	2 or 6
F8 -48V	3 or 7
F9 +15V	0 or 4
F10 + 15V	1 or 5
F11 + 15V	2 or 6
F12 + 15V	3 or 7
F13 -48V	0 or 4
F14 -48V	1 or 5
F15 -48V	2 or 6
F16 -48V	3 or 7
F17 RG	0 -7

14 Pull out the identified line drawer. When working on a blown RG fuse, begin with the drawer on the far left.

Ext MSP
CLMI cabinet major (continued)

15

> **DANGER**
> **Personal injury**
> Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

> **CAUTION**
> **Loss of service**
> Carry out this procedure during periods of low traffic.

Unseat all the line cards in the drawer. Do not remove the line cards from the drawer.

16 Obtain a replacement fuse with the same voltage and amperage ratings as the blown fuse.

17 Remove the blown fuse.

18

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If	Do
the fuse blows (protrudes) again	step 19
the fuse does not blow	step 21

19 Check the drawer for loose or short-circuited wires.

If	Do
loose or short-circuited wires are present	step 62

Ext MSP
CLMI cabinet major (continued)

If	Do
loose or short-circuited wires are not present, and the fuse you are working with is a ringing voltage fuse	step 20
loose or short-circuited wires are not present, the fuse you are working with is a ringing voltage fuse, and you have done all four line drawers in the shelf	step 62
loose or short-circuited wires are not present, and the fuse you are working with is one of the line drawer fuses (1-17)	step 62

20 Reseat all the line cards in the drawer and repeat steps 15 and 16 for the next drawer.

21 Reseat the line cards one at a time and check the fuse after you reseat each line card.

If	Do
after you reseat a line card, the fuse blows (protrudes) again	step 22
after you reseat all line cards, the fuse does not blow	step 29

22

DANGER
Personal injury
Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

Remove the line card from the drawer.

23 Obtain a replacement line card. Make sure the replacement card has the same PEC, including the suffix, as the removed card.

24 Insert the replacement line card into the drawer.

25 Obtain a replacement fuse with the same voltage and amperage ratings as the blown fuse.

26 Remove the blown fuse.

Ext MSP
CLMI cabinet major (continued)

27

> **DANGER**
> **Personal injury**
> Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If	Do
the fuse blows (protrudes) again	step 62
the fuse does not blow	step 28

28 Reseat all line cards in the drawer.

29 Push the drawer back in and proceed to step 59.

30 Use the following table to identify the circuit breaker associated with the RG that displays a lit FAIL LED. The circuit breaker is located on the MSP.

IfRG number	DoCircuit breaker number
RG0	13
RG1	15

31 Check the associated circuit breaker.

If the circuit breaker	Do
is ON	step 39
is OFF	step 32

Ext MSP
CLMI cabinet major (continued)

32 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF (the FAIL LED on the RG is lit)	step 33
remains ON and the FAIL LED on the RG is not lit	step 58
remains ON and the FAIL LED on the RG is lit	step 39

At the CPDC cabinet

33 Locate the fuse associated with the cabinet and shelf number.

If	Do
the fuse is blown (protruding)	step 34
the fuse is not blown	step 40

34 Remove the fuse holder with the blown fuse.

35 Replace the cartridge fuse inside the fuse holder.

36

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Replace the blown fuse.

37 Install the fuse holder back on to the cabinetized power distribution center (CPDC).

At the CRSC or CEXT cabinet

38 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF (the RG FAIL LED is lit)	step 40
remains ON and the RG FAIL LED is not lit	step 58
remains ON and the RG FAIL LED is lit	step39

39 Set the circuit breaker to OFF.

Ext MSP
CLMI cabinet major (continued)

40 Go to *Card Replacement Procedures* to replace the RG. After you replace the RG, return to this step.

41 Check the FAIL LED on the RG just replaced.

If the FAIL LED on the RG	Do
is lit	step 43
is not lit	step 58

42 Go to *Alarm Clearing Procedures* to clear the RG alarm. After clearing the RG alarm, return to this step.

43 Note the number of the shelf that contains the converter with the lit CONVERTER FAIL LED.

44 Use the following information to identify which circuit breakers associated with the shelf that you noted in step 43. The circuit breakers are located on the MSP.

If Shelf number is	Do use circuit breaker number
05	6, 10
19	8, 12
33	5, 9
47	7, 11

45 Check the associated circuit breaker.

If the circuit breaker	Do
is ON	step 54
is OFF	step 46

46 Set the circuit breaker just identified to ON.

If the circuit breaker	Do
goes OFF and the CONVERTER FAIL LED is lit	step 47
remains ON and the CONVERTER FAIL LED is lit	step 54
remains ON and the CONVERTER FAIL LED is not lit	step 58

47 Note the numbers of the cabinet and shelf that contain the converter with the lit CONVERTER FAIL LED.

Ext MSP
CLMI cabinet major (continued)

At the CDPC

48 Locate the fuse that powers the shelf noted in step 47 in the CLMI cabinet.

If the fuse	Do
is blown (protruding)	step 49
is not blown	step 54

49 Remove the fuse holder with the blown fuse.

50 Replace the cartridge fuse inside the fuse holder.

51

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Replace the blown fuse.

52 Install the fuse holder back on to the CPDC cabinet.

At the CRSC or CEXT cabinet

53 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF (the CONVERTER FAIL LED is not lit)	step 55
remains ON and the CONVERTER FAIL LED is not lit	step 58
remains ON and the CONVERTER FAIL LED is lit	step 54

54 Set the circuit breaker to OFF.

55 Go to *Card Replacement Procedures* to replace the converter. After replacing the converter, return to this step.

56 Check the replaced converter and the associated circuit breaker.

If the circuit breaker	Do
goes OFF (the CONVERTER FAIL LED is lit)	step 62
remains ON and the CONVERTER FAIL LED is not lit	step 58

Ext MSP
CLMI cabinet major (continued)

If the circuit breaker	Do
remains ON and the CONVERTER FAIL LED is lit	step 57

57 Set the circuit breaker to OFF.

At the CLCE cabinet

58 Check the frame FAIL lamp on the MSP.

If the frame FAIL lamp	Do
is lit and you have not completed steps 2, 3, 4 and 5 in this procedure	step 59
is lit and you have completed steps 2, 3, 4 and 5 in this procedure	step 62
not lit	step 60

59 Go to the step you have not completed (step 2, 3, 4, or 5) in this procedure.

At the MAP terminal

60 Access the Ext level of the MAP display. To determine if MSP alarms are present, type

>MAPCI;MTC;EXT

and press the Enter key.

If an MSP alarm	Do
is present and you have not accessed all the cabinets with an MSP alarm	step 61
is present and you accessed all the cabinets with an MSP alarm	step 62
is not present	step 64

61 Go to the table of contents in this document to find the procedure for cabinets with MSP alarms. Perform that procedure.

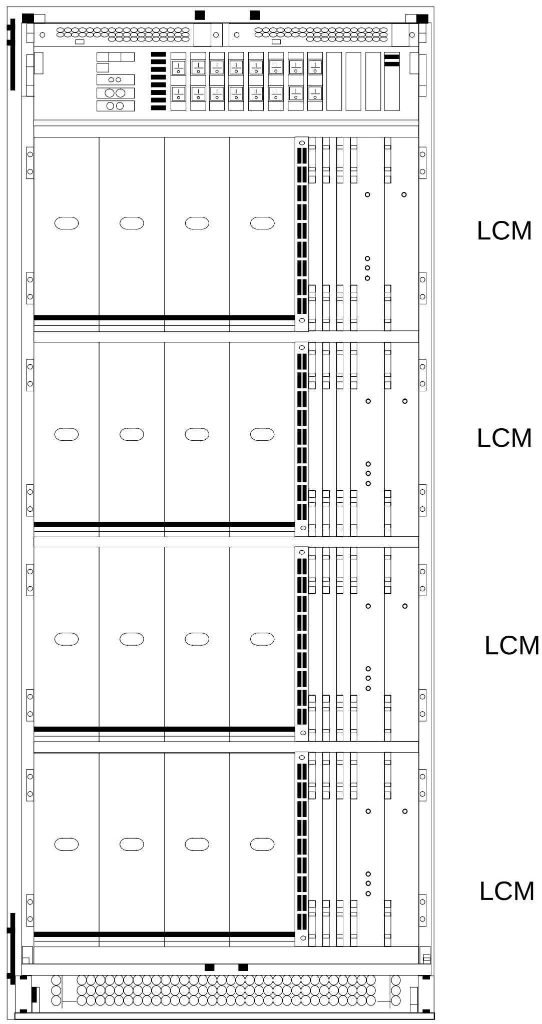
62 For additional help, contact the personnel responsible for the next higher level of support.

63 Go to the table of contents, in the routine maintenance section, to find the procedure “Replacing the cooling unit". Perform that procedure. If the MSP alarm is still present, return to this procedure at step 60.

64 The procedure is complete.

Ext MSP
CLMI cabinet major (continued)

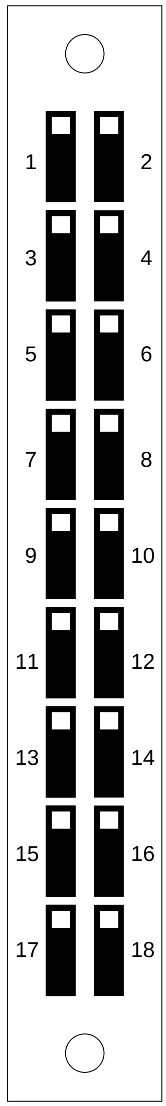
CLMI cabinet



Cabinetized Line Module ISDN (CLMI)

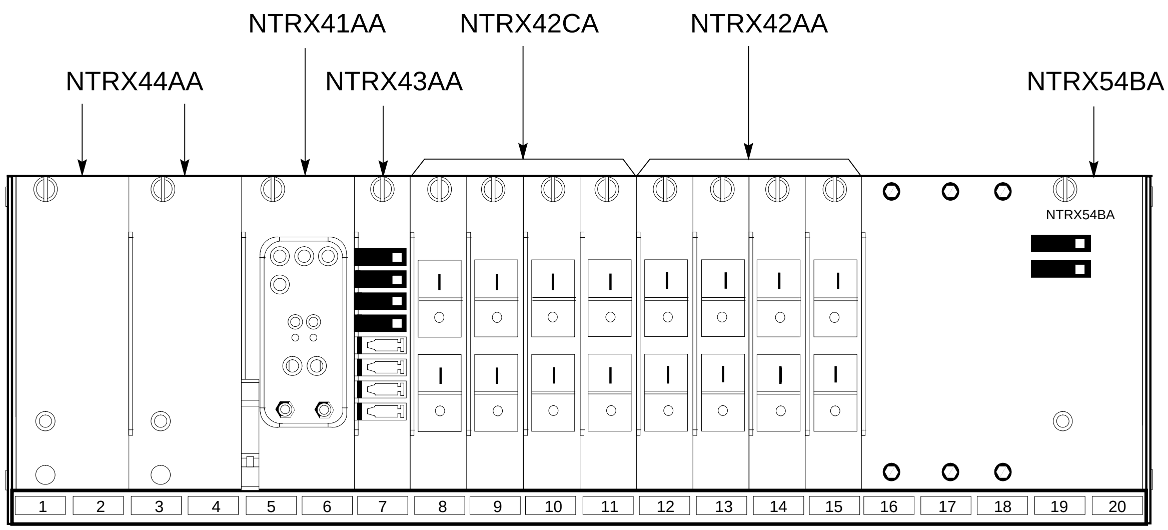
Ext MSP
CLMI cabinet major (continued)

LCME fuse panel



Ext MSP
CLMI cabinet major (end)

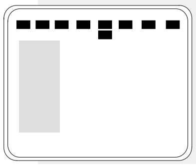
MSP for CLMI cabinet



MSP for Cabinetized Line Module ISDN (CLMI)

Ext MSP
CPDC cabinet major

Alarm display



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

Indication

An FSP that follows a number under the Ext header of the alarm banner indicates an Ext modular supervisory panel (MSP) alarm. An M under the FSP indicates that the alarm class is major. The alarm display is at the MTC level of the MAP display.

> ***Note:*** Current software does not reflect the change from FSP to MSP in the MAP display.

Meaning

An MSP alarm occurs when one or more cabinets in the office has a power or a cooling unit fault. The number that precedes FSP is the number of cabinets with an MSP alarm. Refer to the previous note.

Result

The type of fault and the type of cabinet that contains the fault determines the effect on subscriber service.

Common procedures

This procedure refers to the common procedure “Replacing the cooling unit". Common procedures are located in the routine maintenance section of this manual.

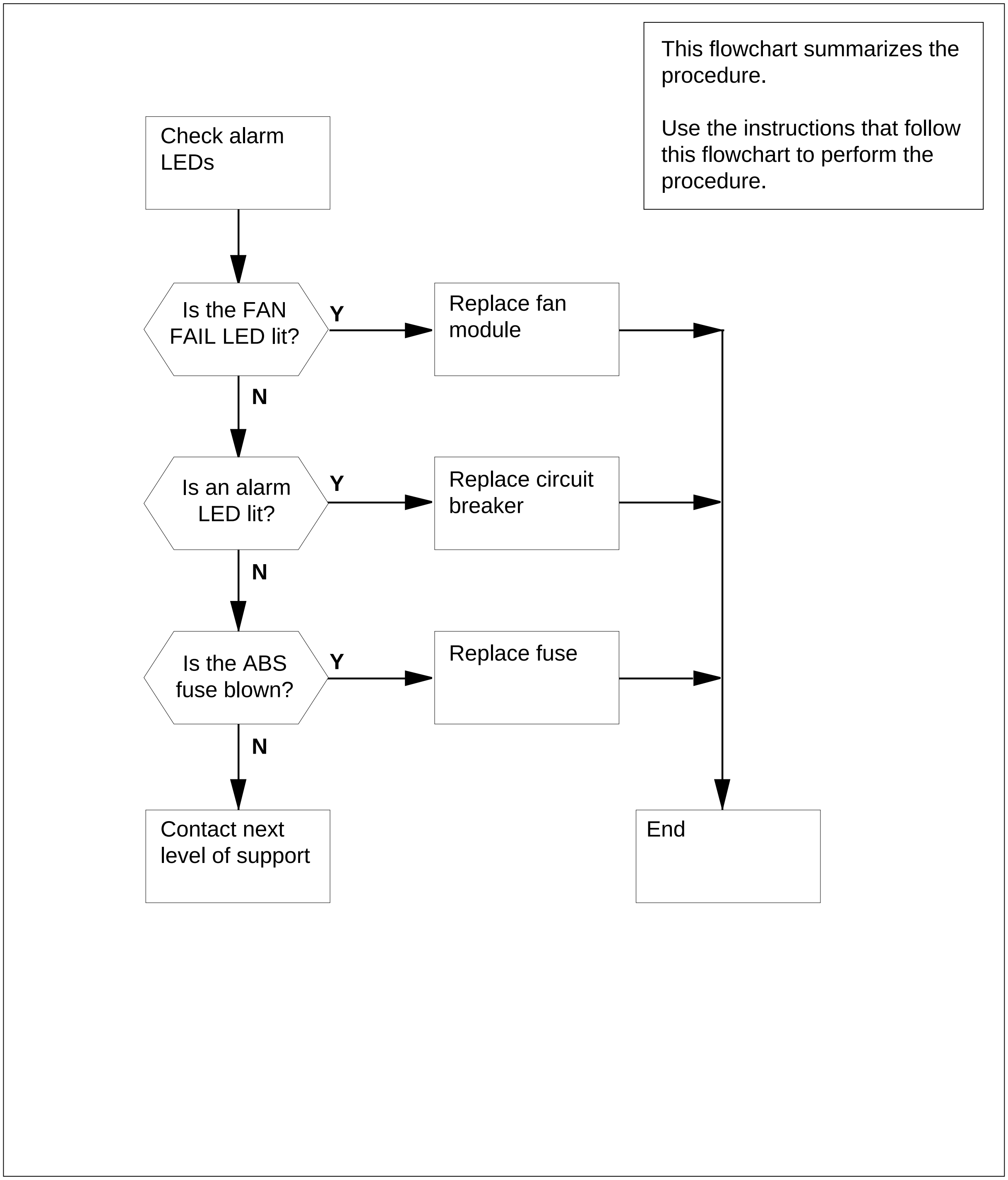
Action

This procedure applies to the Cabinetized Power Distribution Center (CPDC), NTRX31AA.

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Ext MSP
CPDC cabinet major (continued)

Summary of clearing an Ext MSP CPDC cabinet major alarm



Ext MSP
CPDC cabinet major (continued)

Clearing an Ext MSP CPDC cabinet major alarm

At the CPDC

1 Check the FAN FAIL LEDs.

If	Do
any FAN FAIL LEDs are lit	step 45
FAN FAIL LEDs are not lit	step 2

2 Check the alarm LED, which is on the right side of the breaker panel.

If	Do
any alarm LEDs are lit	step 3
alarm LEDs are not lit	step 4

3 Check the circuit breakers on the breaker panel that has the lit alarm LED.

If	Do
any circuit breaker is in center-trip position	step 5
all circuit breakers are ON	step 4

4 Check the ABS fuse on the MSP.

If	Do
the ABS fuse is blown (protruding)	step 22
the ABS fuse is not blown	step 44

5 Check the label under the circuit breaker in the center-trip position.

If the circuit breaker	Do
supplies the talk battery to a line concentrating equipment (LCE) cabinet	step 7
does not supply the talk battery to an LCE cabinet	step 6

Ext MSP
CPDC cabinet major (continued)

If the circuit breaker	Do
supplies power to a filter capacitor on the CPDC breaker panel	step 25

6 Set the circuit breaker to ON, and go to step 21.

7 Record the numbers of the CLCE cabinet and shelf that associates with the circuit breaker.

At the CLCE cabinet

8 Remove the ten talk battery fuses, five for each shelf. The fuses are located above the shelves.

> ***Note:*** Talk battery A powers the first and third shelves from the bottom of the LCE. Talk battery B powers the second and fourth shelves from the bottom of the LCE.

9 Obtain a capacitor-forming tool.

> ***Note:*** A capacitor-forming tool consists of a 100 W 120 V light bulb inserted into a socket with pigtail leads. The pigtail leads must have spring-type alligator clips on each end.

At the CPDC

10

DANGER
Risk of injury from high energy levels
The fuse holder contacts on the filter panel faceplate have high voltages. Do not touch the probes of the capacitor-forming tool to the faceplate of the filter panel. Do not let the probes of the capacitor-forming tool touch each other.

Connect the leads of the capacitor-forming tool across the circuit breaker to charge the capacitors.

If, after a few seconds pass, the bulb	Do
is lit	step 11
is not lit	step 17

At the CLCE cabinet

11 On the positive terminal of the capacitor, label the leads as (+), indicating positive, and the negative terminal as (-), indicating negative.

12 Disconnect the leads from the short-circuited capacitor.

Ext MSP
CPDC cabinet major (continued)

13 Remove the capacitor.

14 Install a replacement capacitor.

15 Connect the positive lead to the capacitor's positive terminal.

16 Connect the negative lead to the capacitor's negative terminal. Return to step 10 to recharge the capacitors.

At the back of the CPDC

17 Remove the capacitor-forming tool.

At the front of the CPDC

18 Set the circuit breaker to ON.

At the CLCE cabinet

19 Insert the ten talk battery fuses that you removed in step 8. Insert the fuses one at a time, and pause between fuses.

20 Press the indicator on one of the talk battery fuses you replace to determine if the talk battery works.

If	Do
the FRAME FAIL LED is lit	step 40
the FRAME FAIL LED is not lit	step 21

At the CPDC

21 Check the circuit breaker.

If the circuit breaker	Do
is OFF	step 44
is ON	step 40

22 Obtain a replacement fuse that has the same voltage and amperage as the blown ABS fuse.

23 Remove the blown ABS fuse.

24

DANGER
Risk of fire
For protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code), and manufacturer.

Ext MSP
CPDC cabinet major (continued)

Insert the replacement ABS fuse.

If the fuse	Do
blows (protrudes) again	step 43
does not blow again	step 40

25 Make sure that the circuit breaker for the capacitor is OFF.

If voltage	Do
is within 3V of -48V rail	step 38
is greater than 3V from -48V rail	step 26

At the back of the CPDC

26 Obtain a capacitor-forming tool and a voltmeter.

> ***Note:*** A capacitor-forming tool consists of a 100 W 120 V light bulb inserted into a socket with pigtail leads. The pigtail leads must have spring-type alligator clips on each end.

27 On the positive terminal of the capacitor, label the leads as (+), positive, and the negative terminal as (-), negative.

28 Connect one lead of the capacitor-forming tool to a ground stud on the battery return ground plate (L+) of the breaker panel.

29 Connect the other lead of the capacitor-forming tool to the bottom post of the circuit breaker that powers the short-circuited capacitor.

30 Use the voltmeter to make sure voltage does not occur across the terminals of the capacitor.

31 Use the voltmeter to make sure voltage does not occur between either terminal of the capacitor and the battery return.

32

DANGER
Risk of injury from high energy levels
The terminals at the back of the CPDC have an electrical potential of -48 Vdc to -60 Vdc. Do not attempt to replace the capacitor when you detect voltage with the voltmeter.

With the capacitor-forming tool in place, disconnect the leads from the short circuited capacitor

33 Remove the capacitor.

34 Install a replacement capacitor.

Ext MSP
CPDC cabinet major (continued)

35 Connect the positive terminal of the capacitor to the positive lead, and the negative terminal of the capacitor to the negative lead.

36 Remove the capacitor-forming tool.

37 Wait approximately 3 to 5 min to allow the capacitor to recharge.

At the front of the CDPC

38 Set the circuit breaker for the capacitor to ON.

39 Check the circuit breaker.

If the circuit breaker	Do
is OFF	step 44
is ON	step 40

40 Check the FRAME FAIL LED on the MSP.

If the FRAME FAIL LED	Do
is lit and you did not complete step 4 in this procedure	step 5
is lit and you completed step 4 in this procedure	step 43
is not lit	step 41

At the MAP terminal

41 To access the Ext level of the MAP display to determine an MSP alarm, type

>MAPCI;MTC;EXT

and press the Enter key.

If an MSP alarm	Do
is present, and you have not accessed all the cabinets with an MSP alarm	step 42
is present, and you have accessed all the cabinets with an MSP alarm	step 44
is not present	step 44

42 Refer to the table of contents in this document to find the procedure for the cabinet with an MSP alarm. Perform that procedure.

Ext MSP
CPDC cabinet major (end)

At the back of the CPDC

43

DANGER
Risk of injury from high energy levels
The terminals at the back of the CPDC have an electrical potential of -48 Vdc to -60 Vdc. Do not touch any terminals inside the MSP.

Note any short-circuits of the ABS wiring inside the MSP. The personnel at the next level of support can request this information.

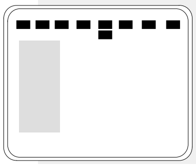
44 For additional help, contact the next level of support.

45 Go to the table of contents, in the routine maintenance section, to find the procedure “Replacing the cooling unit". Perform that procedure. If the MSP alarm is still present, return to this procedure at step 41.

46 The procedure is complete.

Ext MSP
CRME cabinet major

Alarm display



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

Indication

The alarm code FSP, preceded by a number, under the Ext header, indicates an EXT modular supervisory panel (MSP) major alarm. The FSP appears at the MTC level of the MAP display

> ***Note:*** Software is not updated to reflect changes from FSP to MSP in the MAP display.

Meaning

An MSP alarm occurs when one or more cabinets in the office have a power fault or a cooling unit fault. The number that precedes FSP is the number of cabinets with an MSP alarm. Refer to the previous note.

Result

The type of fault and the type of cabinet that contains the fault determines the effect on subscriber service.

Common procedures

This procedure refers to the common procedure “Replacing the cooling unit". Common procedures are located in the routine maintenance section of this manual.

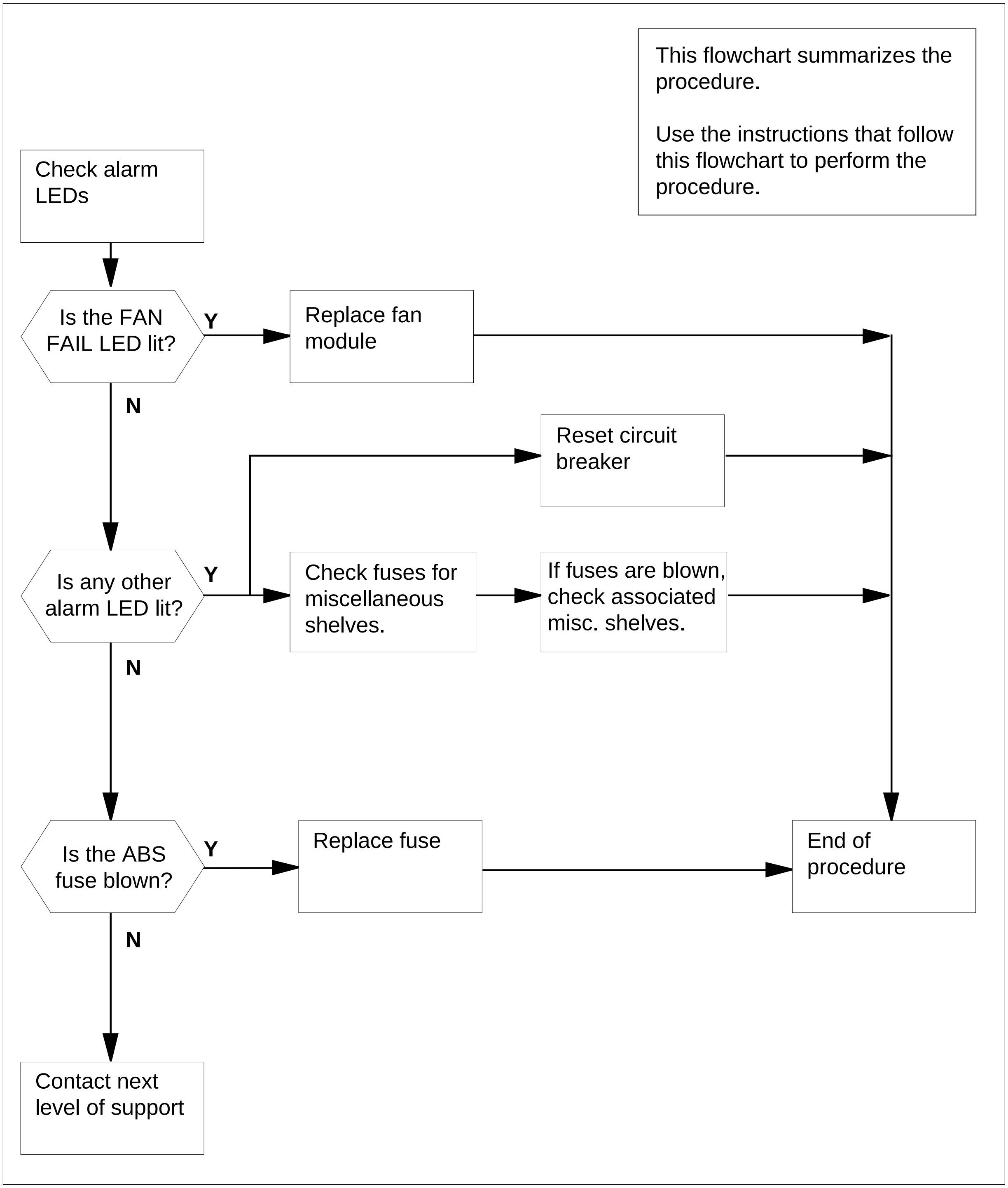
Action

This procedure applies to Cabinetized Remote Miscellaneous Equipment (CRME), NTRX31EA.

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to preform the procedure.

Ext MSP
CRME cabinet major (continued)

Summary of clearing an Ext MSP CRME cabinet major alarm



Ext MSP
CRME cabinet major (continued)

Clearing an Ext MSP CRME cabinet major alarm

At the CRME

1

> **ATTENTION**
> Illustrations of the CRME cabinet and MSP appear at the end of this procedure.

Check the FAN FAIL LEDs.

If	Do
any FAN FAIL LEDs are lit	step 49
FAN FAIL LEDs are not lit	step 2

2 Check the alarm LED on the right side of the breaker panel.

Note 1: The alarm extension panel does not hold shelf alarms and internal fuses.

Note 2: The alarm panel has a redundant power supply.

If	Do
any alarm LEDs are lit	step 3
alarm LEDs are not lit	step 4

3 Check the circuit breakers on the breaker panel that has the lit alarm LED.

If	Do
any circuit breaker is in center-trip position	step 5
all circuit breakers are ON	step 4

Note: eWhen the handle is in the center position, the system is in an overload condition. If the circuit breaker is manually set to the OFF position, alarms do not occur.

4 Check the ABS fuse on the MSP.

If the ABS fuse	Do
is blown (protrudes)	step 26
is not blown	step 48

Ext MSP
CRME cabinet major (continued)

5 Check the label under the circuit breaker in center-trip position.

If the circuit breaker	Do
supplies the talk battery to a line concentrating equipment (LCE) cabinet	step 11
does not supply the talk battery to an LCE cabinet	step 10
supplies power to a filter capacitor on the CRME breaker panel	step 29
supplies power to miscellaneous equipment at bottom of cabinet	step 6

Note: Circuit breakers in the CRME provide alarm contact closure. An alarm occurs if an electrical overload trips a device.

6 Check any fuses that power the miscellaneous shelves for alarm indication. If any fuses are blown (protrude), check the associated miscellaneous shelf.

7 Check the Cook Digital Announcer component for alarm indication. Replace the fuse on the rear of the unit if required.

Note: The Cook Digital Announcer does not have a redundant power supply.

8 Check the DS-6 modem for alarm indication. Replace the internal fuse on the power supply if required.

Note: The DS-6 modem does not have a redundant power supply.

9 Check the LaMarche inverter for alarm indication. Check for a short in power supplied to end aisle ac. Reset the circuit breaker on the front of the unit, if required.

10 Set the circuit breaker to ON, and go to step 25.

11 Record the numbers of the CLCE cabinet and shelf associated with the circuit breaker.

At the CLCE cabinet

12 Remove the ten talk battery fuses, five for each shelf. The ten talk battery fuses are above the shelves.

Note: Talk battery A powers the first and third shelves from the bottom of the LCE. Talk battery B powers the second and fourth shelves.

13 Obtain a capacitor-forming tool.

Note: A capacitor-forming tool consists of a 100 W 120 V light bulb. This light bulb inserted in a socket with pigtail leads The pigtail leads must have spring-type alligator clips on each end.

Ext MSP
CRME cabinet major (continued)

At the CRME

14

> **DANGER**
> **Risk of injury from high energy levels**
> The fuse holder contacts on the filter panel faceplate have high voltages. Do not touch the probes of the capacitor-forming tool to the faceplate of the filter panel. Do not let the probes of the capacitor-forming tool touch each other.

To charge the capacitors connect the leads of the capacitor-forming tool across the circuit breaker

If seconds pass and the bulb	Do
is lit	step 15
is not lit	step 21

At the CLCE cabinet

15 Label the positive terminal of the leads of the capacitor as (+) positive. Label the negative terminal capacitor leads as (-) negative.

16 Disconnect the leads from the short-circuited capacitor.

17 Remove the capacitor.

18 Install a replacement capacitor.

19 Connect the + lead to the positive terminal of the capacitor.

20 Connect the - lead to the negative terminal of the capacitor. To charge the capacitors again return to step 10.

At the back of the CRME

21 Remove the capacitor-forming tool.

At the front of the CRME

22 Set the circuit breaker to ON.

At the CLCE cabinet

23 Insert the ten talk battery fuses that you removed in step 12. Insert the fuses one at a time. Pause between each fuse.

Ext MSP
CRME cabinet major (continued)

24 To determine if the talk battery is present, press the indicator on one of the talk battery fuses you just replaced.

If the frame FAIL LED	Do
is lit	step 44
is not lit	step 25

At the CRME

25 Check the circuit breaker.

If the circuit breaker	Do
is OFF	step 48
is ON	step 44

26 Obtain a replacement fuse with the same voltage and amperage as the blown ABS fuse.

27 Remove the blown ABS fuse.

28

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse with a fuse of the same type. Replace the fuse with a fuse with the same rating (color code), and manufacturer.

Insert the replacement ABS fuse.

If the fuse	Do
blows (protrudes) again	step 47
does not blow again	step 44

29 Make sure the circuit breaker for the capacitor remains OFF. Obtain a voltmeter. Check voltage across capacitor leads.

If voltage	Do
is in 3V of -48V rail	step 42
is more than 3V from -48V rail	step 30

At the back of the CRME

30 Obtain a capacitor-forming tool and a voltmeter.

Note: A capacitor-forming tool consists of a 100 W 120 V light bulb. The light bulb connected to a socket with pigtail leads The pigtail leads must have spring-type alligator clips on each end.

31 Label the positive terminal leads of the capacitor as (+) positive. Label the negative terminal of the capacitor as, (-) negative.

32 Connect one lead of the capacitor-forming tool to a ground stud on the battery return ground plate (L+) of the breaker panel.

33 Connect the other lead of the capacitor-forming tool to the bottom post of the circuit breaker that powers the short-circuited capacitor.

34 Make sure voltage is not present across the terminals of the capacitor with the voltmeter.

35 Make sure voltage is not present between either terminal of the capacitor and the battery return with the voltmeter.

36

DANGER
Risk of injury from high energy levels
The terminals at the rear of the CRME have an electrical potential of -48 Vdc to -60 Vdc. Do not attempt to replace the capacitor when you detect voltage with the voltmeter.

The capacitor-forming tool can remain in place. If this event occurs, disconnect the leads from the short-circuited capacitor.

37 Remove the capacitor.

38 Install a replacement capacitor.

39 Connect the positive lead to the positive terminal of the capacitor. Connect the negative lead to the negative terminal if the capacitor.

40 Remove the capacitor-forming tool.

41 To allow the capacitor to recharge, wait approximately 3 to 5 min.

At the front of the CRME

42 Set the circuit breaker for the capacitor to ON.

43 Check the circuit breaker.

If the circuit breaker is	Do
OFF	step 48
ON	step 44

Ext MSP
CRME cabinet major (continued)

44 Check the frame FAIL LED on the MSP.

If the frame FAIL LED	Do
is lit and you do not complete step 5 in this procedure	step 5
is lit and you complete step 5 in this procedure	step 47
is not lit	step 45

At the MAP terminal

45 To access the Ext level of the MAP display, to determine if an MSP alarm is present, type

>MAPCI;MTC;EXT

and press the Enter key.

If an MSP alarm	Do
is present, and you have not accessed all the cabinets with an MSP alarm	step 46
is present, and you accessed all the cabinets with an MSP alarm	step 48
is not present	step 48

46 To find the procedure for the cabinet with the MSP alarm go to the table of contents in this document. Perform that procedure.

At the back of the CRME

47

DANGER
Risk of injury from high energy levels
The terminals at the rear of the CRME have an electrical potential of -48 Vdc to -60 Vdc. Do not touch any terminals inside the MSP.

Check if the ABS wiring in the MSP is short-circuited. Personnel at the next level of support can request this information.

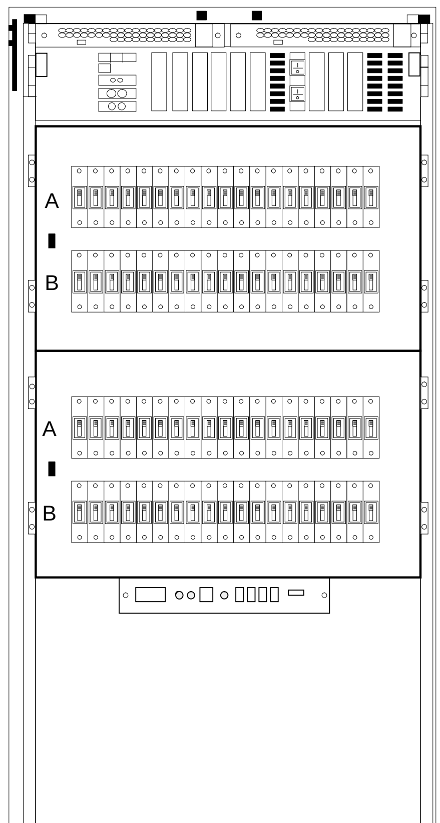
48 For additional help, contact next level of support.

Ext MSP
CRME cabinet major (continued)

49 To find the common procedure “Replacing the cooling unit", go to the table of contents, in the routine maintenance section. Perform that procedure. If the MSP alarm remains present, return to this procedure at step 45.

50 The procedure is complete.

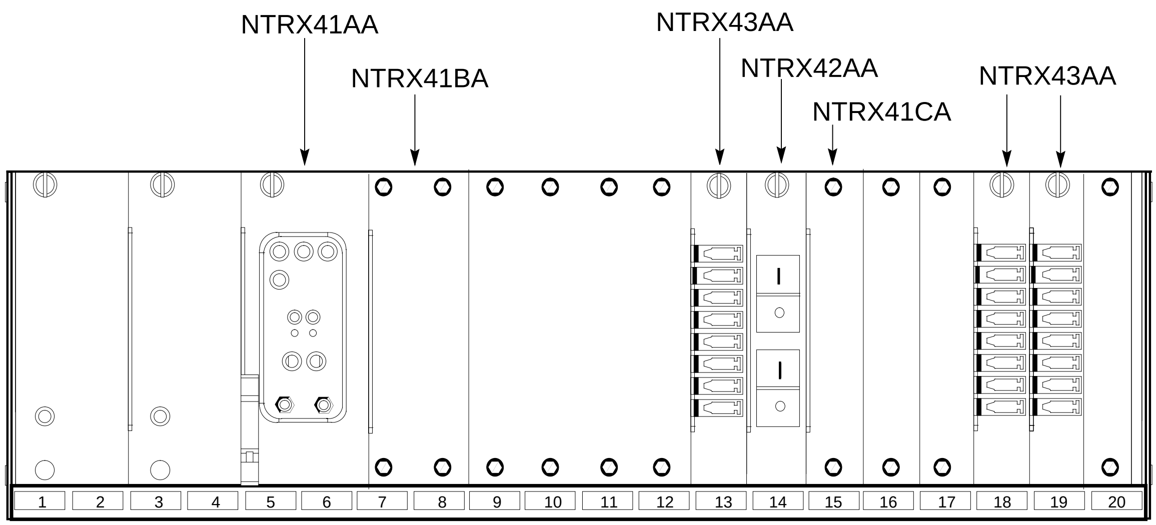
CRME cabinet



CRME

Ext MSP
CRME cabinet major (end)

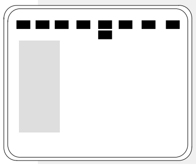
MSP for CRME



MSP for CRME

Ext MSP
CRSC and CEXT cabinets major

Alarm display



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

Indication

An FSP that follows a number under the Ext header of the alarm banner indicates an Ext modular supervisory panel(MSP) major alarm. An M under the FSP indicates that the alarm class is major. The alarm display is at the MTC level of the MAP display.

> ***Note:*** Current software does not reflect the change from FSP to MSP in the MAP display.

Meaning

An MSP alarm occurs when one or more cabinets in the office has a power fault or a cooling unit fault. The number that precedes FSP is the number of cabinets with an MSP alarm. Refer to the previous note.

Result

The type of fault and the type of cabinet that contains the fault determines the effect on subscriber service.

Common procedures

This procedure refers to the common procedure "Replacing the cooling unit". Common procedures are located in the routine maintenance section of this manual.

Action

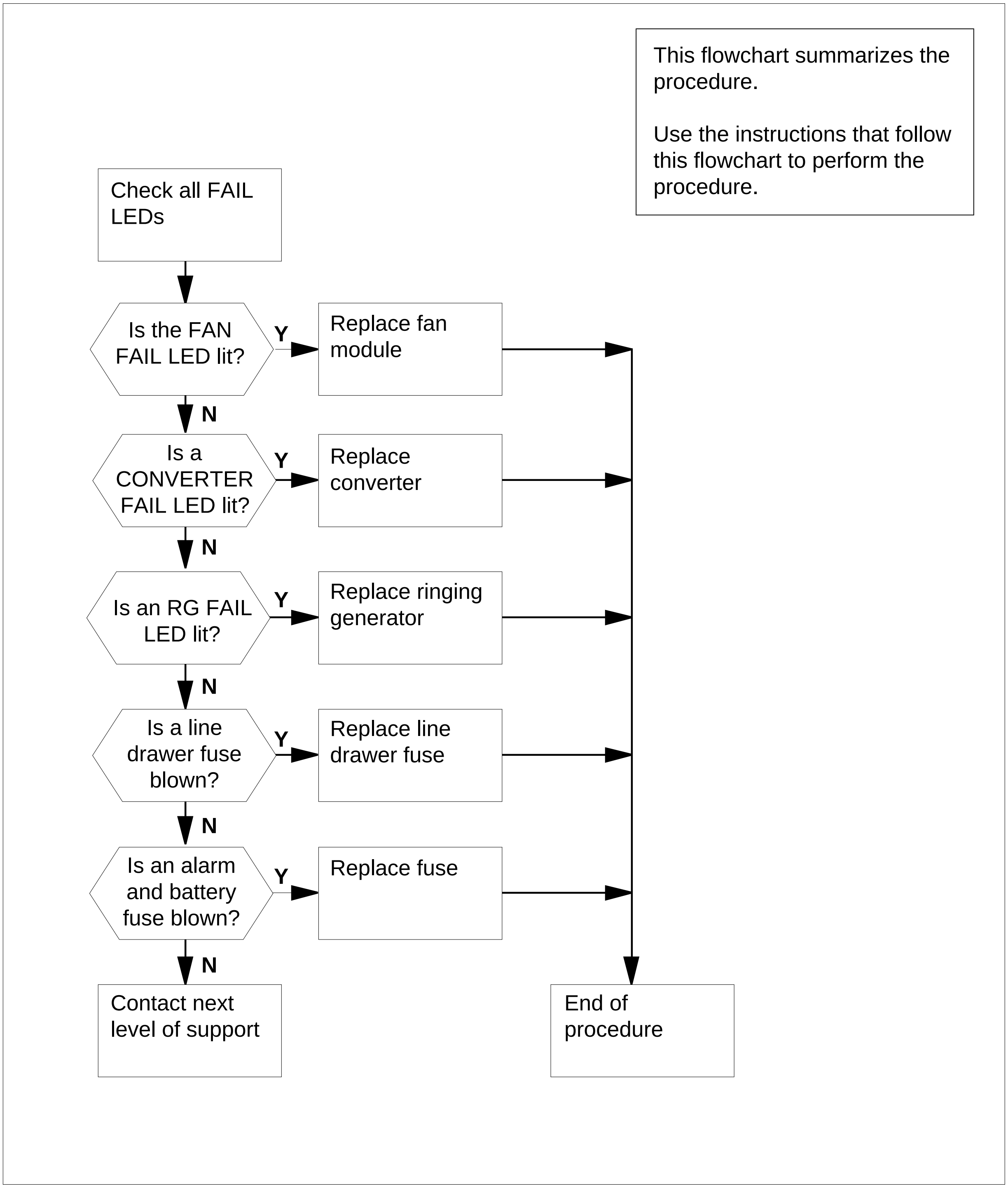
This procedure applies to the following cabinets:

- Cabinetized Remote Switching Center with Integrated Services Digital Network (CRSC with ISDN), NTMX89FB
- Cabinetized Extension cabinet (CEXT), NTMX89FC

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.

Ext MSP
CRSC and CEXT cabinets major (continued)

Summary of clearing a Ext MSP CRSC and CEXT cabinets major alarm



Ext MSP
CRSC and CEXT cabinets major (continued)

Clearing a Ext MSP CRSC and CEXT cabinets major alarm

At the CRSC or CEXT cabinets

1 Check the FAN FAIL LEDs.

Note: Diagrams of the CRSC and CEXT cabinets, LCME fuse panel and MSP appear at the end of this procedure.

If	Do
any FAN FAIL LEDs are lit	step 64
FAN FAIL LEDs are not lit	step 2

2 Check the CONVERTER FAIL LED on each converter in the cabinet.

If	Do
any CONVERTER FAIL LEDs are lit	step 44
CONVERTER FAIL LEDs are not lit	step 3

3 Check the RG FAIL LED on both RGs at the top of the cabinet. The FAIL LED is behind the front panel of the RG.

If	Do
an RG's FAIL LED is lit	step 31
both RGs' FAIL LEDs are not lit	step 4

4 Check the line drawer fuses (F01 to F17). These fuses are on shelves 33 and 47, slot number 18.

If a fuse	Do
is blown (protruding)	step 10
is not blown	step 5

5 Check the ABS fuses 01 to 04 on the MSP.

If	Do
a fuse is blown (protruding)	step 6
there are no blown fuses	step 7

6 Obtain a replacement fuse with the same voltage and amperage ratings as the blown fuse.

Ext MSP
CRSC and CEXT cabinets major (continued)

7 Check the D-channel handler (DCH) power fuses. These fuses are on the power converter circuit card (NTMX72AA) in shelf position 06 in the CRSC cabinet. Check the DCH power fuses on the DS60 extender circuit card (NTMX79AA) in position 06 in the CEXT cabinet.

8 Remove the blown fuse.

9

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 11
does not blow	step 59

10 Determine which fuse is blown.

11 Obtain a replacement fuse with the same voltage as the blown fuse.

12 Remove the blown fuse.

13

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 14
does not blow	step 59

Ext MSP
CRSC and CEXT cabinets major (continued)

14 Use the following information to identify the drawer of the blown fuse. The drawers are beside the fuse panel.

Fuse location

Fuse number	Drawer number
F1 -48 battery return	0 or 4
F2 -48 battery return	1 or 5
F3 -48 battery return	2 or 6
F4 -48 battery return	3 or 7
F5 -48V	0 or 4
F6 -48V	1 or 5
F7 -48V	2 or 6
F8 -48V	3 or 7
F9 + 15V	0 or 4
F10 + 15V	1 or 5
F11 + 15V	2 or 6
F12 + 15V	3 or 7
F13 -48V	0 or 4
F14 -48V	1 or 5
F15 -48V	2 or 6
F16 -48V	3 or 7
F17 RG	0 - 7

15 Pull out the identified line drawer. When working with a blown RG fuse, begin with the the top left drawer.

Ext MSP
CRSC and CEXT cabinets major (continued)

16

> **DANGER**
> **Personal injury**
> Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

> **WARNING**
> **Loss of service**
> Perform this procedure during periods of low traffic.

Unseat all the line cards in the drawer. Do not remove the line cards from the drawer.

17 Obtain a replacement fuse with the same voltage and amperage ratings as the blown fuse.

18 Remove the blown fuse.

19

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 20
does not blow	step 22

20 Check the drawer for loose or short-circuited wires.

If loose or short-circuited wires	Do
are present	step 63

Ext MSP
CRSC and CEXT cabinets major (continued)

If loose or short-circuited wires	Do
are not present, and the fuse you use is a ringing voltage fuse	step 21
are not present, and the fuse you use is a ringing voltage fuse. You have also done all four line drawers in the shelf.	step 63
are not present, and the fuse you use is one of the line drawer fuses (1-17)	step 63

21 Reseat all the line cards in the drawer and repeat steps 15 and 16 for the next drawer.

22 Reseat the line cards one at a time, and check the fuse after you reseat each line card.

If you reseated	Do
a line card and the fuse blows (protrudes) again	step 23
all line cards and the fuse did not blow	step 30

23

> **DANGER**
> **Personal injury**
> Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

Remove the line card from the drawer.

24 Obtain a replacement line card. Make sure the replacement card has the same PEC and PEC suffix, as the card you removed.

25 Insert the replacement line card into the drawer.

26 Obtain a replacement fuse with the same voltage and amperage ratings as the blown fuse.

27 Remove the blown fuse.

Ext MSP
CRSC and CEXT cabinets major (continued)

28

> **DANGER**
> **Personal injury**
> Do not touch the line feed resistors on the line cards. The line feed resistors generate enough heat to burn you.

> **DANGER**
> **Risk of fire**
> For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Insert the replacement fuse.

If the fuse	Do
blows (protrudes) again	step 63
does not blow	step 29

29 Reseat all line cards in the drawer.

30 Push the drawer in and proceed to step 59.

31 Use the following information to identify the circuit breaker associated with the RG that has a lit FAIL LED. The circuit breaker is located on the MSP.

If RG number is	Do Circuit breaker number
RG0	3
RG1	5

32 Check the associated circuit breaker.

If the circuit breaker	Do
is ON	step 40
is OFF	step 33

Ext MSP
CRSC and CEXT cabinets major (continued)

33 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF (the FAIL LED on the RG is lit)	step 34
remains ON and the FAIL LED on the RG is not lit	step 59
remains ON and the FAIL LED on the RG is lit	step 40

At the CPDC cabinet

34 Locate the fuse for the cabinet and shelf number.

If the fuse	Do
is blown (protruding)	step 35
is not blown	step 41

35 Remove the fuse holder with the blown fuse.

36 Replace the cartridge fuse inside the fuse holder.

37

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Replace the blown fuse.

38 Install the fuse holder back on the CPDC.

At the CRSC or CEXT cabinet

39 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF (the RG FAIL LED is lit)	step 41

Ext MSP
CRSC and CEXT cabinets major (continued)

If the circuit breaker	Do
remains ON and the RG FAIL LED is not lit	step 59
remains ON and the RG FAIL LED is lit	step 40

40 Set the circuit breaker to OFF.

41 To replace the RG,go to *Card Replacement Procedures*. After you replace the RG, return to this step.

42 Check the FAIL LED on the RG that you replaced.

If the FAIL LED on the RG	Do
is lit	step 43
is not lit	step 59

43 To clear the RG alarm, go to *Alarm Clearing Procedures*. After you clear the RG alarm, return to this step.

44 Note the number of the shelf that contains the converter with the lit CONVERTER FAIL LED.

45 Identify the circuit breaker associated with the shelf that you noted in step 44. Use the following information to identify this circuit breaker. The circuit breaker is located on the MSP.

If Shelf number is	Do Circuit breaker number
06	7, 8, 9, 10
19	1
33	4, 11
47	6, 13
61	12, 14
65	3, 5

46 Check the associated circuit breaker.

If the circuit breaker	Do
is ON	step 55
is OFF	step 47

Ext MSP
CRSC and CEXT cabinets major (continued)

47 Set the circuit breaker that you identified to ON.

If the circuit breaker	Do
goes OFF (the CONVERTER FAIL LED is lit)	step 48
remains ON and the CONVERTER FAIL LED is lit	step 55
remains ON and the CONVERTER FAIL LED is not lit	step 59

48 Note the numbers of the cabinet and shelf that contain the converter with the lit CONVERTER FAIL LED.

At the CDPC

49 Locate the fuse that powers the shelf that you noted in step 48. The fuse is loctaed in the CRSC or CEXT cabinet.

If the fuse	Do
is blown (protruding)	step 50
is not blown	step 55

50 Remove the fuse holder with the blown fuse.

51 Replace the cartridge fuse inside the fuse holder.

52

DANGER
Risk of fire
For continued protection against risk of fire, replace the fuse with a fuse of the same type, rating (color code) and manufacturer.

Replace the blown fuse.

53 Install the fuse holder back on the CPDC cabinet.

Ext MSP
CRSC and CEXT cabinets major (continued)

At the CRSC or CEXT cabinet

54 Set the circuit breaker to ON.

If the circuit breaker	Do
goes OFF (the CONVERTER FAIL LED is not lit)	step 56
remains ON and the CONVERTER FAIL LED is not lit	step 59
remains ON and the CONVERTER FAIL LED is lit	step 55

55 Set the circuit breaker to OFF.

56 Go to *Card Replacement Procedures* to replace the converter. After replacing the converter, return to this step.

57 Check the replaced converter and the associated circuit breaker.

If the circuit breaker	Do
goes OFF (the CONVERTER FAIL LED is lit)	step 63
remains ON and the CONVERTER FAIL LED is not lit	step 59
remains ON and the CONVERTER FAIL LED is lit	step 58

58 Set the circuit breaker to OFF.

At the CLCE cabinet

59 Check the frame FAIL lamp on the MSP.

If the frame FAIL lamp	Do
is lit and you did not complete steps 2, 3, 4, and 5 in this procedure	step 60
is lit and you completed steps 2, 3, 4, and 5 in this procedure	step 63
is not lit	step 61

60 Go to the step that you did not complete (step 2, 3, 4, or 5) in this procedure.

Ext MSP
CRSC and CEXT cabinets major (continued)

At the MAP terminal

61 To access the Ext level of the MAP display and determine if an MSP alarm is present, type

>MAPCI;MTC;EXT

and press the Enter key.

If an MSP alarm	Do
is present, and you did not access all the cabinets with an MSP alarm	step 62
is present, and you did access all the cabinets with an MSP alarm	step 63
is not present	step 65

62 Check the table of contents of this document. Find the procedure for the type of cabinet that has an AMP alarm. Perform the porcedure.

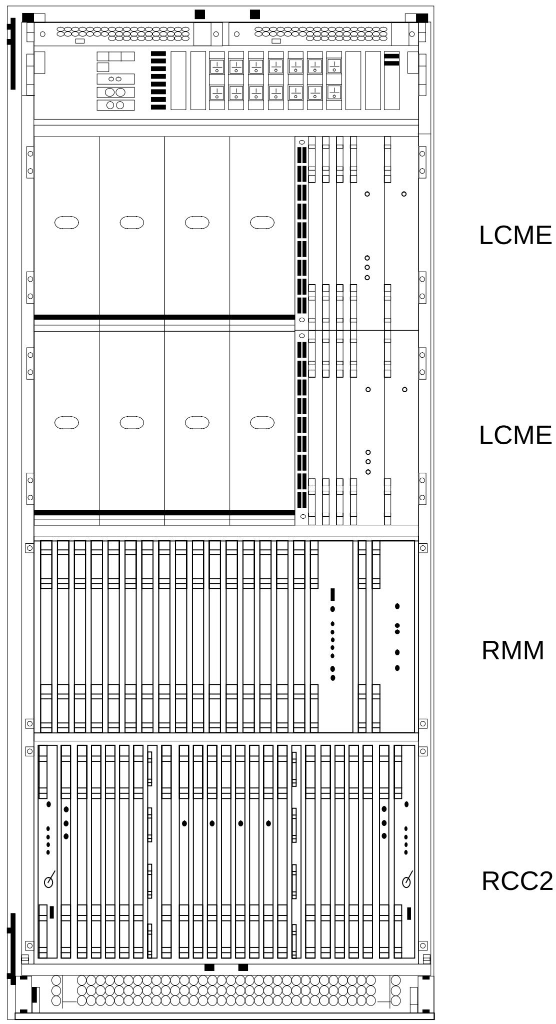
63 For additional help, contact the next level of support.

64 Go to the table of contents in the routine maintenance section. Find the common procedure "Replacing the cooling unit". Perform that procedure. If the MSP alarm is present, return to this procedure at step 60.

65 The procedure is complete.

Ext MSP
CRSC and CEXT cabinets major (continued)

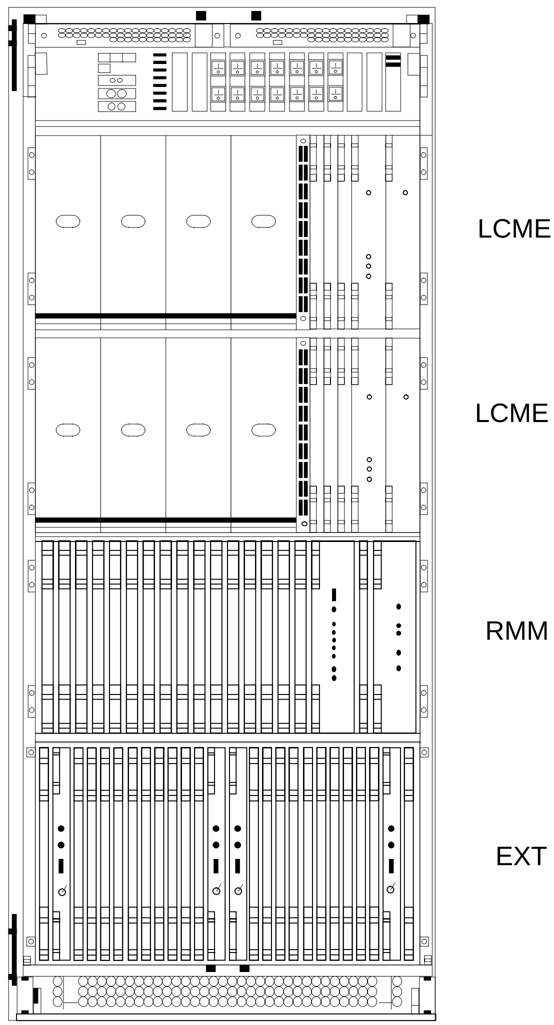
CRSC cabinet



Cabinetized remote switching center (CRSC)

Ext MSP
CRSC and CEXT cabinets major (continued)

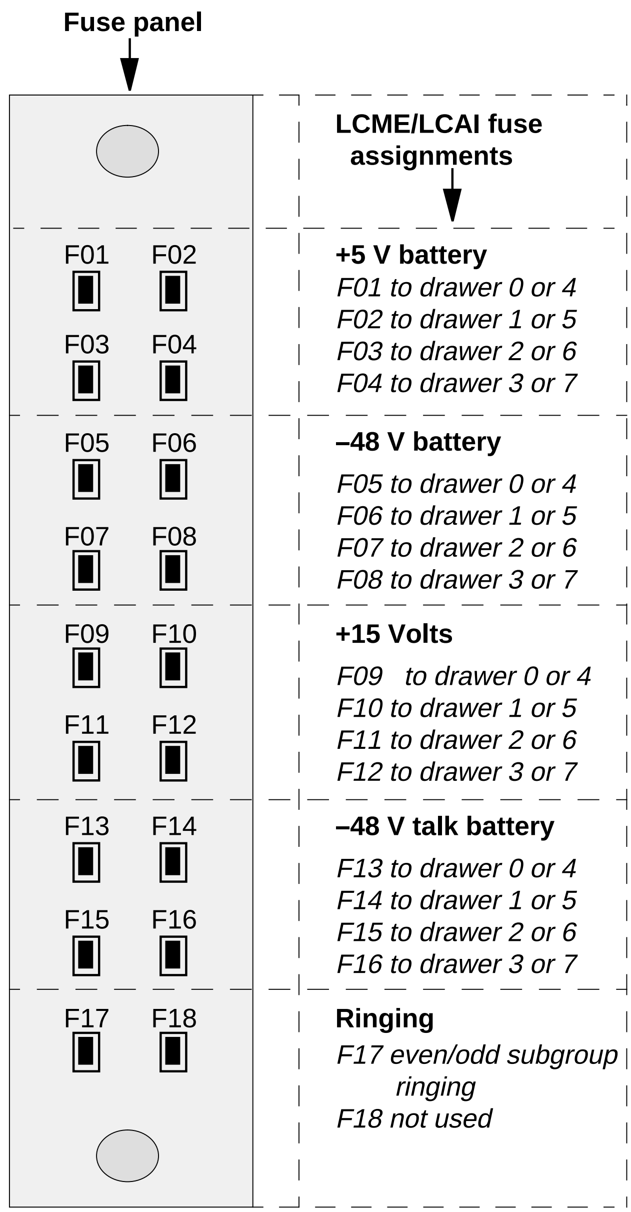
CEXT cabinet



Cabinetized extension module (CEXT)

Ext MSP
CRSC and CEXT cabinets major (continued)

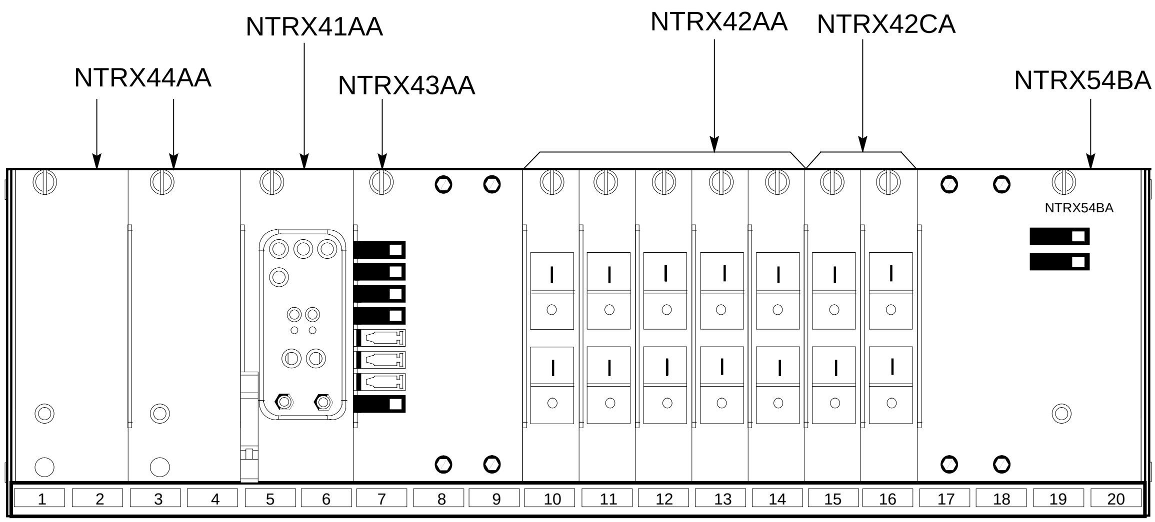
LCME fuse panel



Note: Drawers: 0–3, shelf position 33; 4–7, shelf position 47.

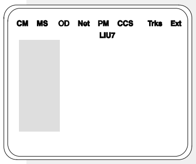
Ext MSP
CRSC and CEXT cabinets major (end)

MSP shelf for CRSC and CEXT cabinets



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.

Result

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

Common procedures

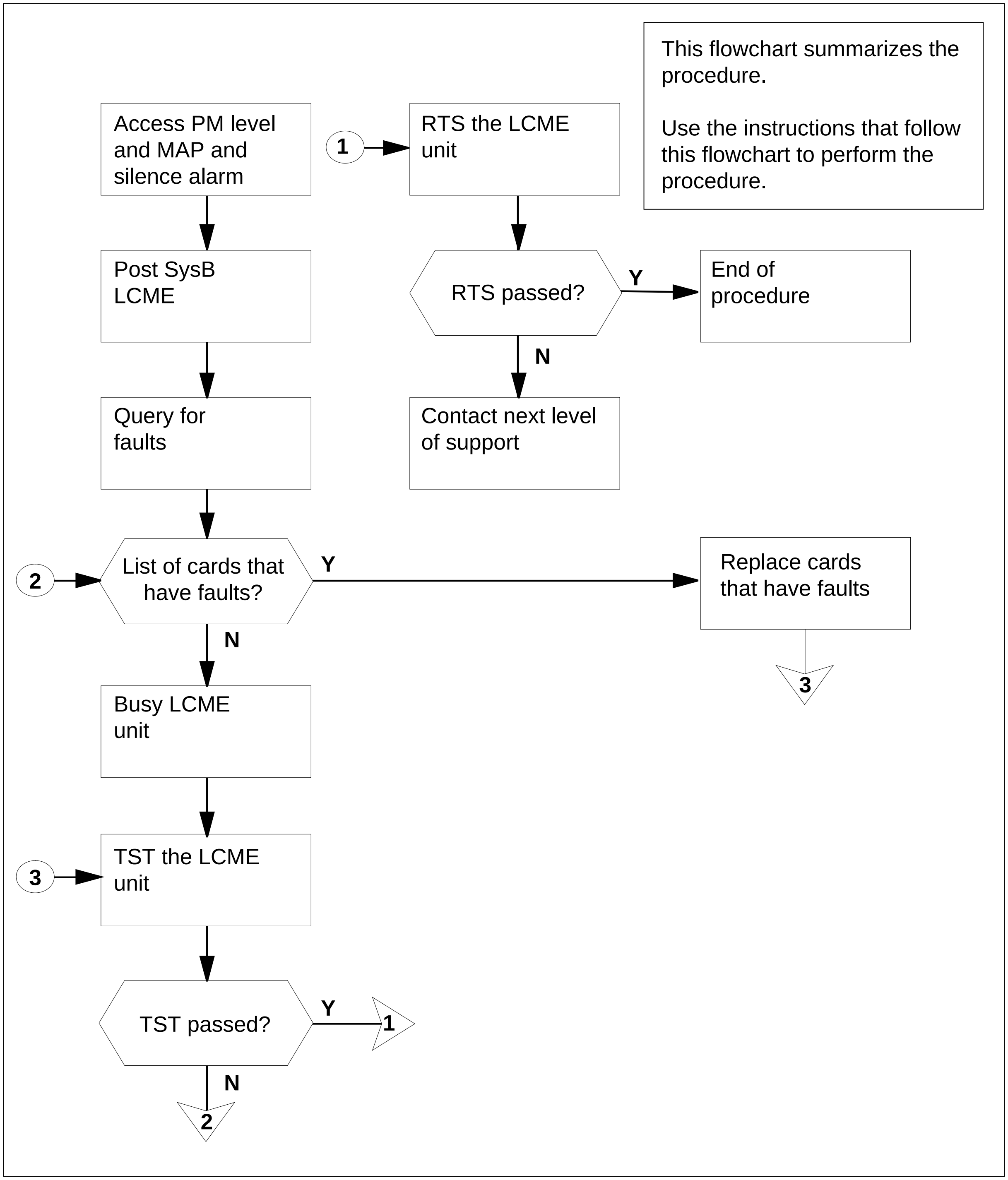
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM LCME
critical (continued)

Summary of clearing a PM LCME critical alarm



PM LCME
critical (continued)

Clearing a PM LCME critical alarm

At the MAP terminal

1

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

To silence the alarm, if required, type

>MAPCI;MTC;PM;SIL

and press the Enter key.

2 To identify the LCME that has faults, type

>DISP STATE SYSB LCME

and press the Enter key.

Typical 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

Normal response on the MAP display:

PM LCME
critical (continued)

```
  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.

Normal response on the MAP display:

PM LCME
critical (continued)

```
 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.

Typical response on the MAP display:

```
Test Passed
    or
Test Failed
```

If TST	Do
passed	step 14

PM LCME
critical (continued)

If TST	Do
failed and the system generated a card list	step 15
failed and the system did not generate a card list	step 16
cannot test central-side busy (CBsy)	step 7

7 To identify C-side links that are SysB, 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:

PM LCME
critical (continued)

```
  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.

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. Perform the procedures until the system busies, tests and returns to service all links.

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

PM LCME
critical (continued)

If TST	Do
failed	step 18

15 If the system produced a list of cards that have possible defects, 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 defects shown in step 9. The DS30A I/F is in one of two locations:

- on the NTMX74 card in the RCC2
- 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 or several links have faults Repeat the 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 the message (MS) links are redundant, separate the links by a minimum of four links on an RCC2 when you datafill 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 the message (MS) links are redundant, separate the links by a minimum of two links 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 could cause the trouble. Remove the fuses from each line drawer that service the posted LCM(E) module in the following order. This action 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 defective LCME, 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 Insert the drawer fuses, one drawer pair at a time, in the following order and apply power. This process isolates the failing line drawer.

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.

Normal response on the MAP display:

PM LCME
critical (continued)

```
 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 above 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 insert fuses again in all drawers and return all drawers to service.

Normal response on the MAP display:

PM LCME
critical (end)

```
 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 with the card replacement procedures, go to step 6 of this procedure.

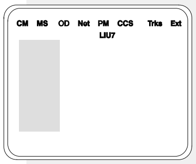
24 You have isolated the trouble to a line drawer pair. Diagnose the trouble to a card, shelf, frame, or cable. Make the necessary replacement. After you correct the trouble, return to step 20 of this procedure. Insert all fuses again, and busy and return to service all drawers.

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

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

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

Common procedures

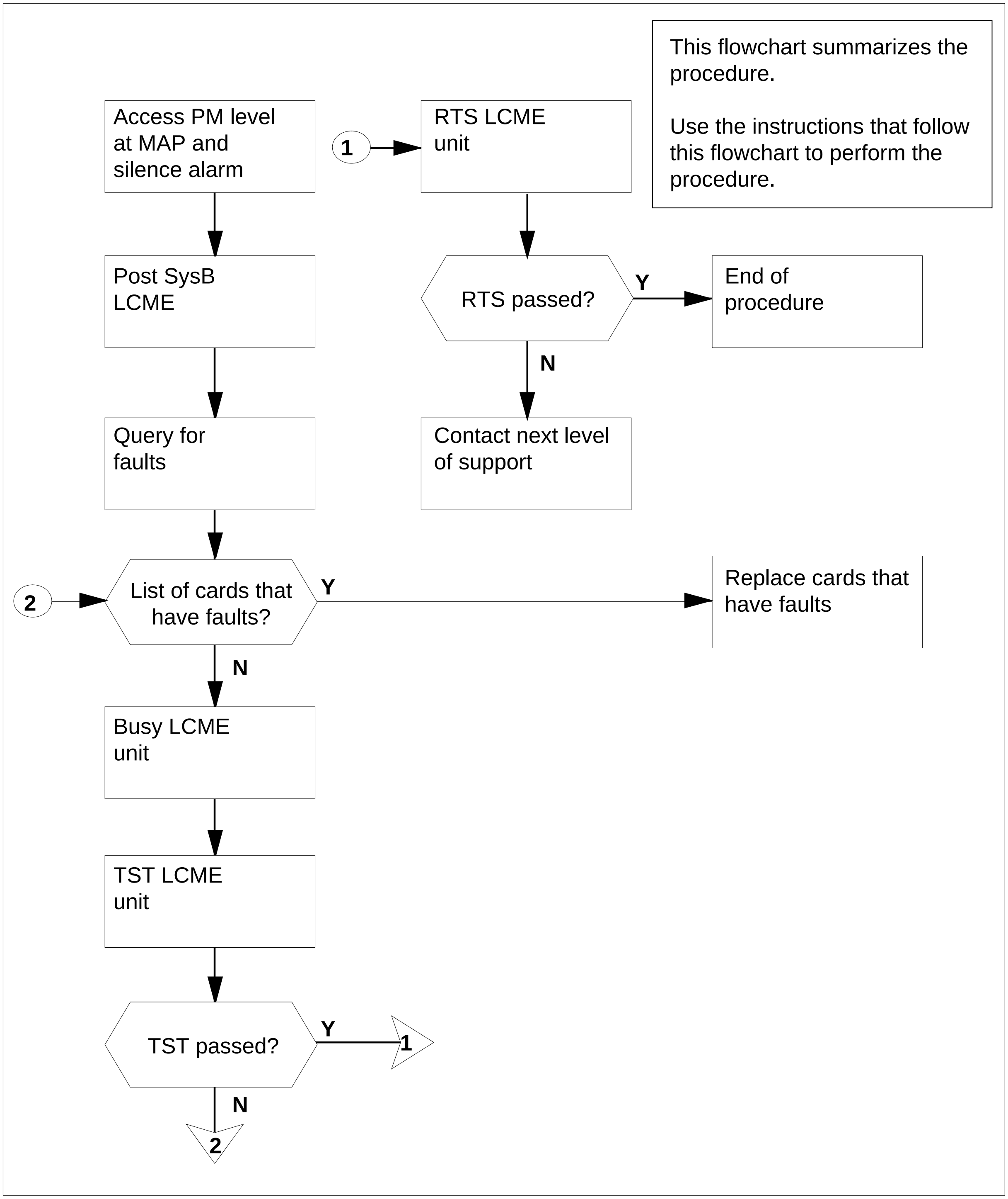
There are no common procedures.

Action

This procedure contains a flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

PM LCME
major (continued)

Summary of clearing a PM LCME major alarm



Clearing a PM LCME major alarm

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

At the MAP terminal

1 To silence the alarm, type

>MAPCI;MTC;PM;SIL

and press the Enter key.

2 To identify the SysB LCME type

>DISP STATE ISTB LCME

and press the Enter key.

Example response on the MAP display:
SysB LCME : 2

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

>POST LCME lcme_site_name lcme_frame_no lcme_no

and press the Enter key.

where

lcme_site_name
is the site name for the LCME that has faults

lcme_frame_no
is the number of the associated LCME equipment frame

lcme_no
is the number of the LCME that has faults

Example response on the MAP display:

PM LCME
major (continued)

```
 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.

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

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

>BSY UNIT unit_no

and press the Enter key.

where

unit_no
is the number of the SysB LCME

6 To test the LCME type

>TST UNIT unit_no

and press the Enter key.

where

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

Example response on the MAP display:

PM LCME
major (continued)

```
Test Passed
    or
Test Failed
```

If TST	Do
passed	step 15
failed	step 16
cannot test CBsy links	step 7

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

>TRNSL C

and press the Enter key.

Typical 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	Do
are SysB	step 8
are 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 that you identified in step 7

Example response on the MAP display:

PM LCME
major (continued)

```
 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 P-side links that have faults, and to choose a link that has faults, type

>TRNSL P

and press the Enter key.

Example response on the MAP display:

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

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
major (continued)

where

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

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

12 To return the ManB link to service by type

>RTS LINK link_no

and press the Enter key.

where

link_no
is the number of the link tested in step 11

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

If RTS	Do
passes	step 13
fails	step 20

13 To post the LCME that you identified in step 2 type

>POST LCME lcme_site_name lcme_frame_no lcme_no

and press the Enter key.

where

lcme_site_name
is the site name for the LCME that has faults

lcme_frame_no
is the number of the associated LCME

lcme_no
is the number of the LCME that has faults

14 To test the LCME unit type

>TST UNIT unit_no

and press the Enter key.

where

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

If TST	Do
passes	step 15
fails	step 16

15 To return the LCME to service, type

>RTS UNIT unit_no

and press the Enter key.

where

unit_no
is the number of the LCME tested in step 14

If RTS	Do
passes	step 21
fails	step 20

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

Example response on the MAP display:

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

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

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

17 The NTMX74 DS30A interface card in the RCC2 can cause the problem. This interface card connects to the links that have faults that appear in step 9.

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

PM LCME
major (end)

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

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

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

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

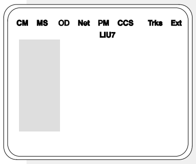
19 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures and go to step 14 of this procedure.

20 For additional help contact the next level of support.

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

PM LCME(RG)
major

Alarm display



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

Indication

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

Meaning

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

Result

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

Common procedures

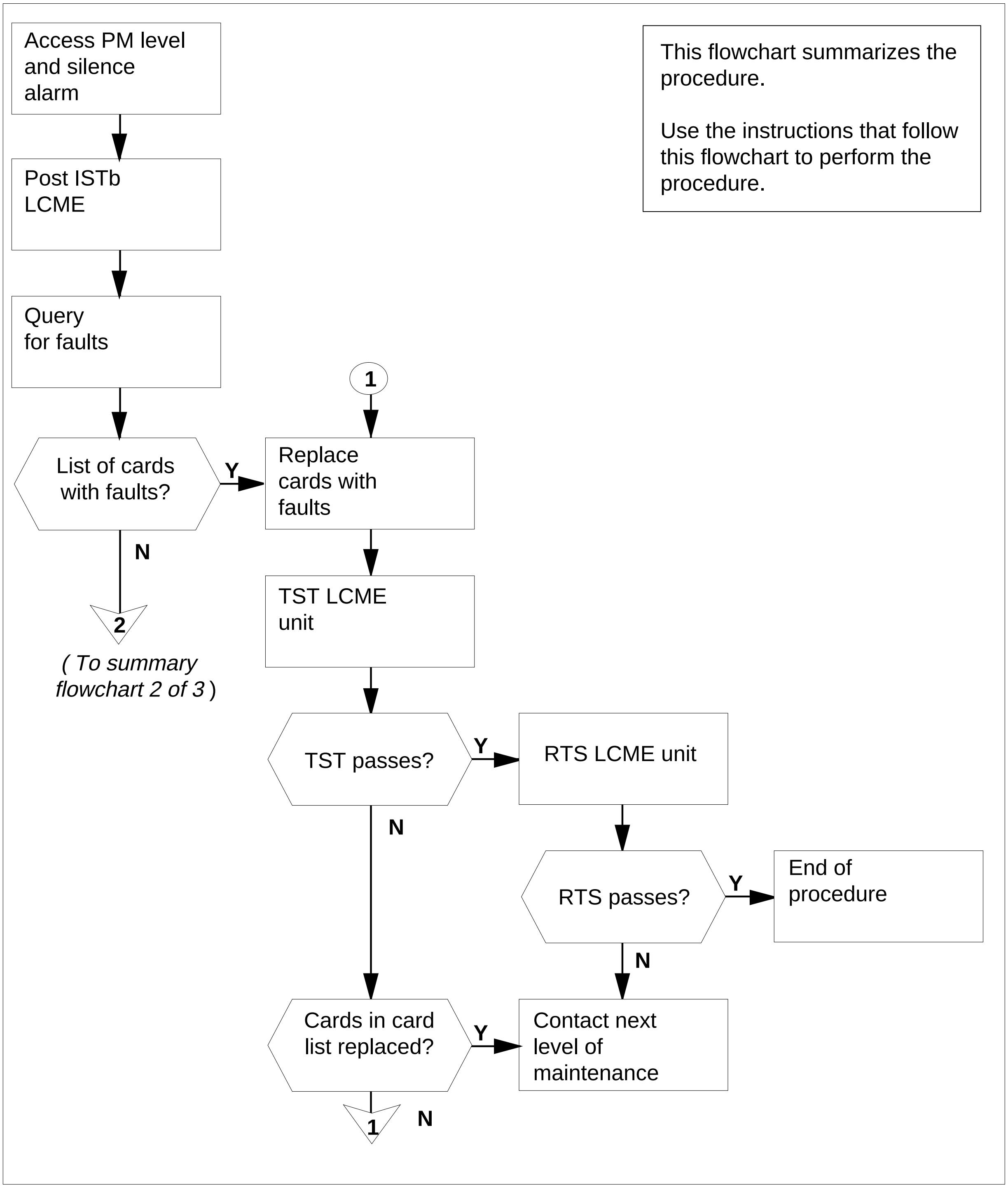
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

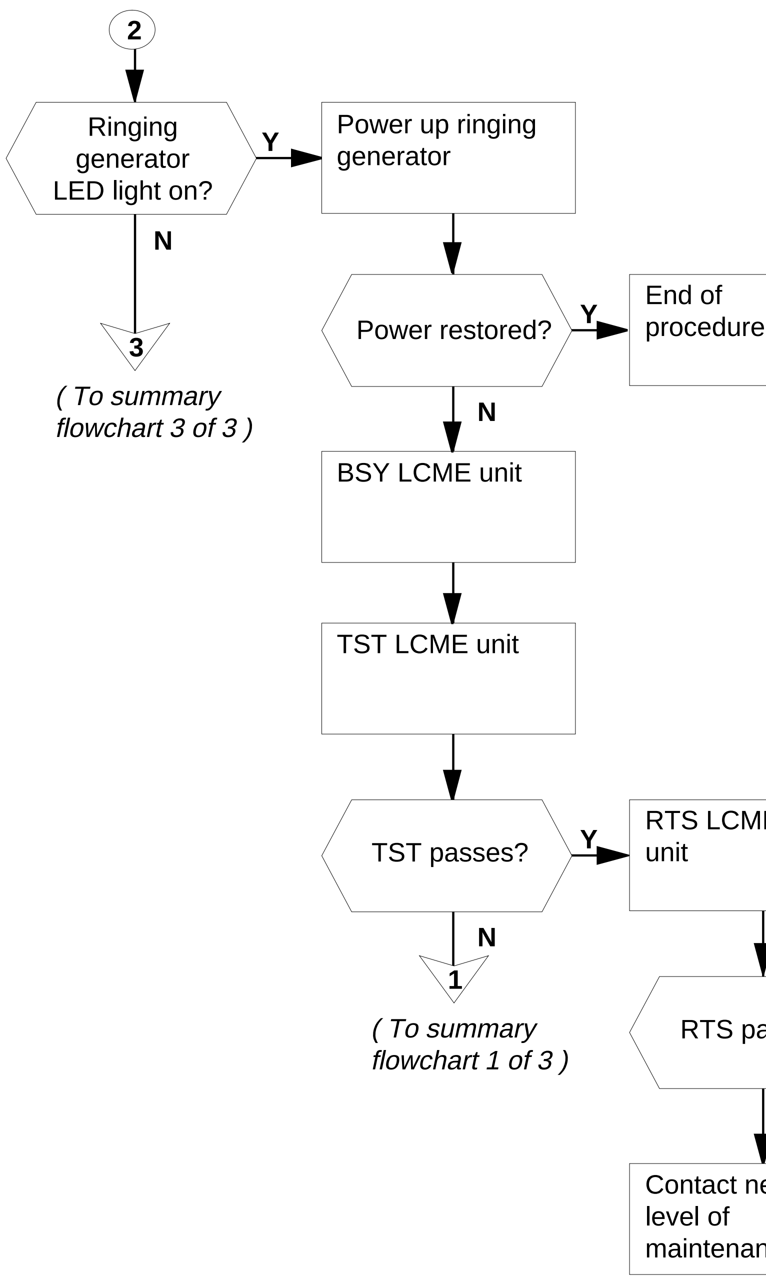
PM LCME(RG)
major (continued)

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)

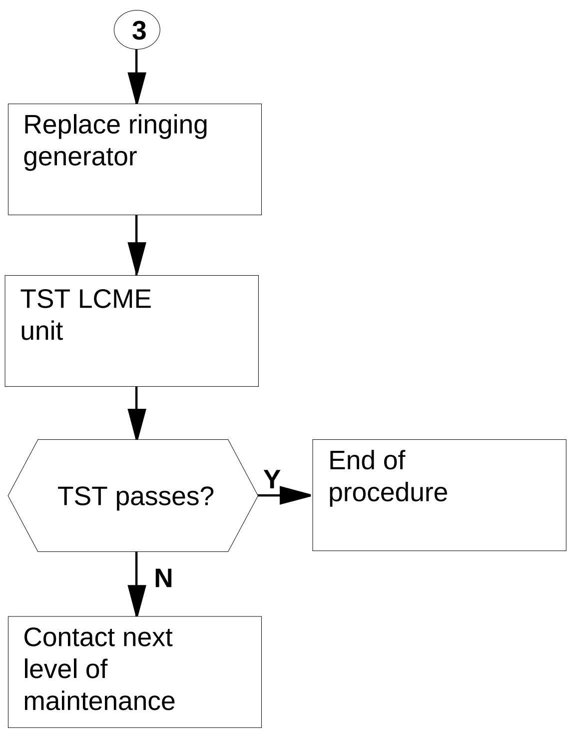


This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.

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.

Clearing a PM LCME(RG) major alarm

At the MAP terminal

1

> **ATTENTION**
> Enter this procedure from a peripheral module (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

Sample response on the MAP display:

PM LCME(RG)
major (continued)

```
  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 fault indicators, type:

>QUERYPM FLT

and press the Enter key.

Sample response on the MAP display:

```
 CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext    APPL
 .      .      .       .      1LCME   .       .        .        .      .
                                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 Perform a visual inspection of the ringing generator. Check if the LED is ON.

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

6 To power up the ringing generator, move the power switch to the ON position. (The LED goes OFF.) The switches are: 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

PM LCME(RG)
major (continued)

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 that appear in step 3

8 To test the ManB LCME, type

>TST UNIT unit_no

and press the Enter key.

where

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

Sample response on the MAP display:

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

If TST	Do
passes	step 9
fails	step 10

9 To return the ManB LCME to service, type:

>RTS UNIT unit_no

and press the Enter key.

where

unit_no
is the number of the LCME tested in step 8

If RTS	Do
passes	step 15
fails	step 14

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

Sample response on the MAP display:

PM LCME(RG) major (end)

```
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*. When you complete the card replacement procedures, go to step 8.

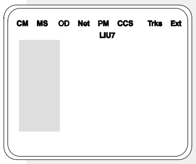
13 Refer to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. When you complete the card replacement procedures, go to step 8.

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

15 The procedure is complete. If other alarms appear at the MAP display, refer to the appropriate alarm clearing procedures.

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 LCME units are 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

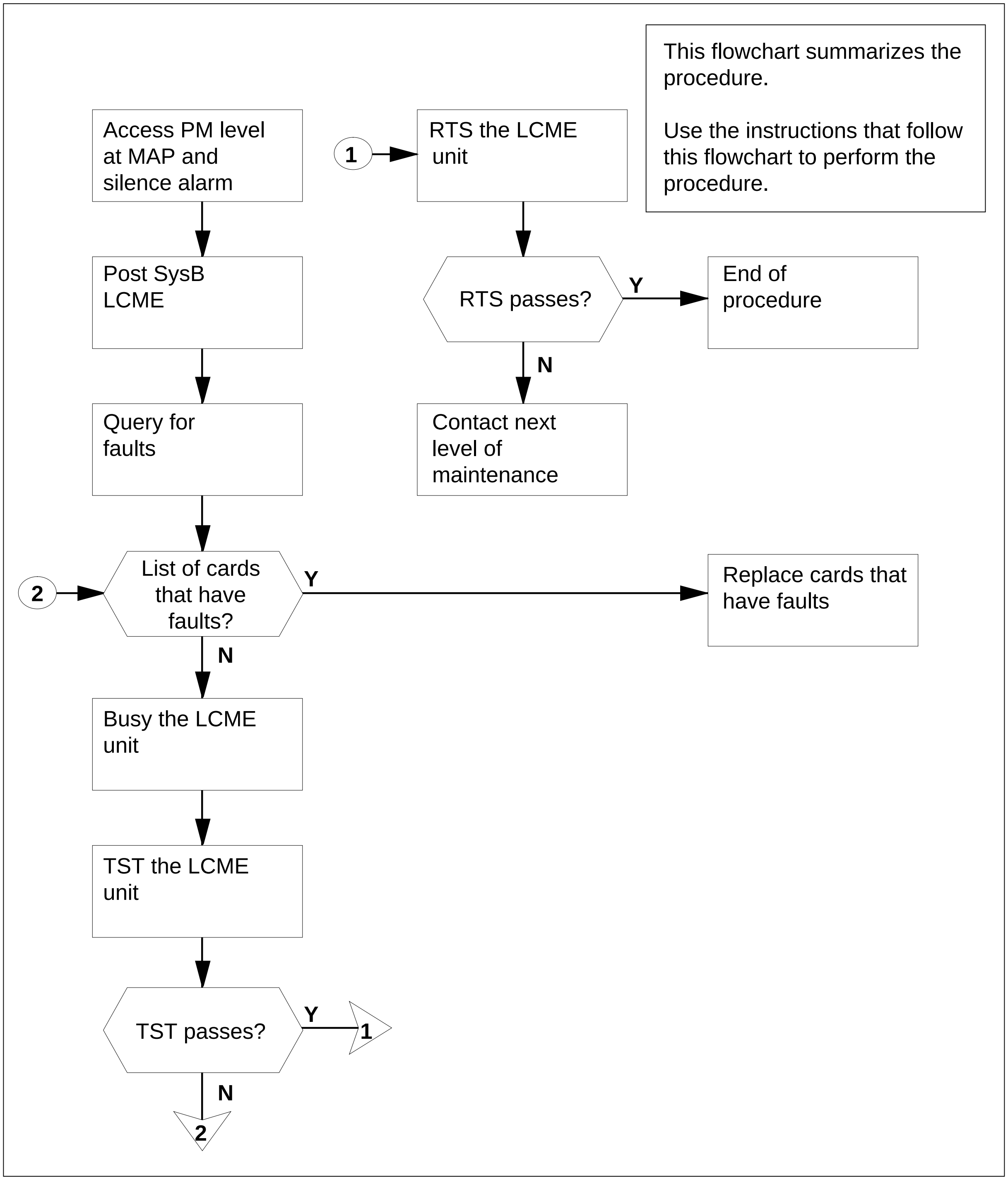
There are no common procedures.

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 identifies 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

Sample response on the MAP display:

PM LCME
minor (continued)

```
 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.

Sample response on the MAP display:

PM LCME
minor (continued)

```
 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

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 that associates with the LCME, type

>POST RCC2 rcc2_no

and press the Enter key.

where

rcc2_no
is the RCC2 unit from step 7

Sample response on the MAP display:

PM LCME
minor (continued)

```
 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: The system can identify other links that have faults. Execute steps 10 to 13 for each link until the links are busied, tested, and returned to service.

14 To post the 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

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 that have 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 system indicates the NTMX74 card, 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.

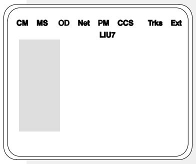
20 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 15.

21 For additional help, contact the next level of maintenance.

22 The procedure is complete. If other alarms appear at the MAP display, refer to the appropriate alarm clearing procedures.

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 alarm code is at the MTC level of the MAP display.

Meaning

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

Result

The 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

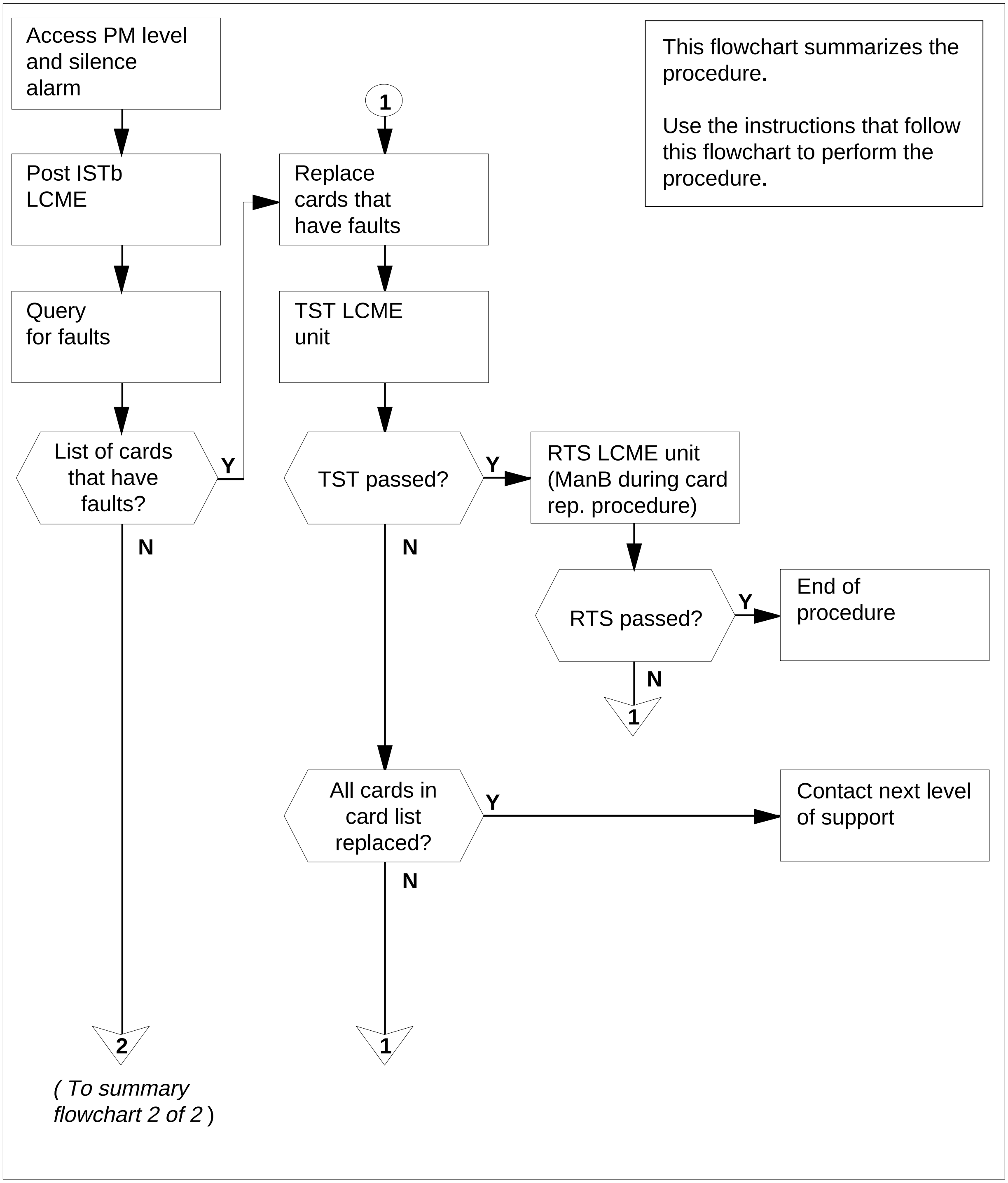
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

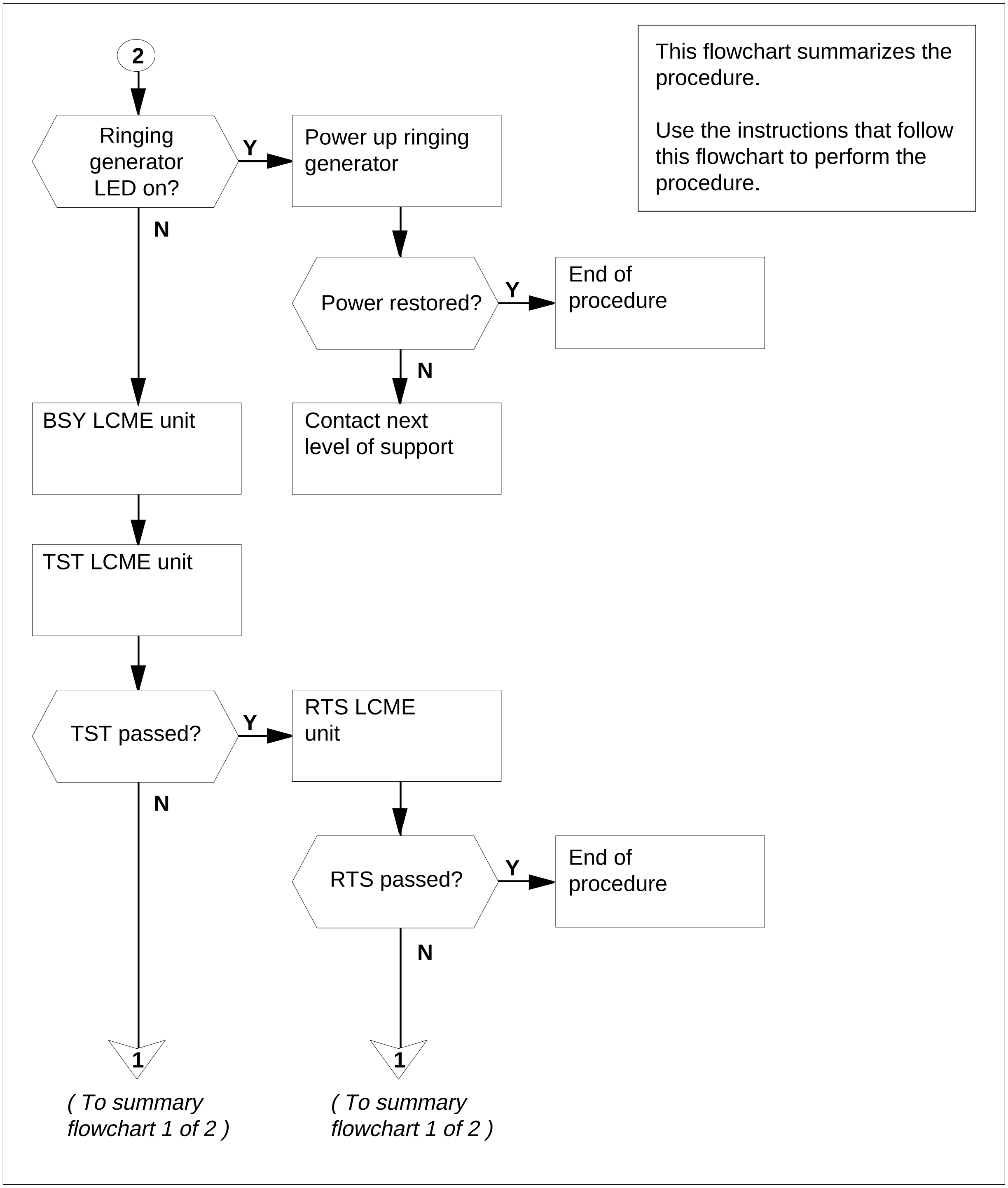
PM LCME(RG)
minor (continued)

Summay of clearing a PM LCME (RG) minor alarm (flowchart 1 of 2)



PM LCME(RG)
minor (continued)

Summay of clearing a PM LCME (RG) minor alarm (flowchart 2 of 2)



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

Sample response on the MAP display:

PM LCME(RG)
minor (continued)

```
  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: 0
 6 Tst_     Unit1:   ISTb                 /RG: 1
 7 Bsy_                            11  11  11  11  11  RG:Pref 1 InSv
 8 RTS_   Drwr:  01  23  45  67  89  01  23  45  67  89     Stby 0 ISTb
 9 OffL          ..  ..  ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 To check for fault indicators, type

>QUERYPM FLT

and press the Enter key.

Sample response on the MAP display:

PM LCME(RG)
minor (continued)

```
 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 codes RG 0 and RG 1 identify these switches.

If	Do
swtiching ON the RG restores power	step 15

PM LCME(RG)
minor (continued)

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 circuit card.

If you	Do
replaced the NT6X30 card	step 15
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.

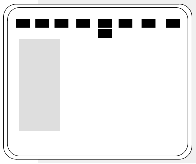
13 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 8 of this procedure.

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

15 The 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

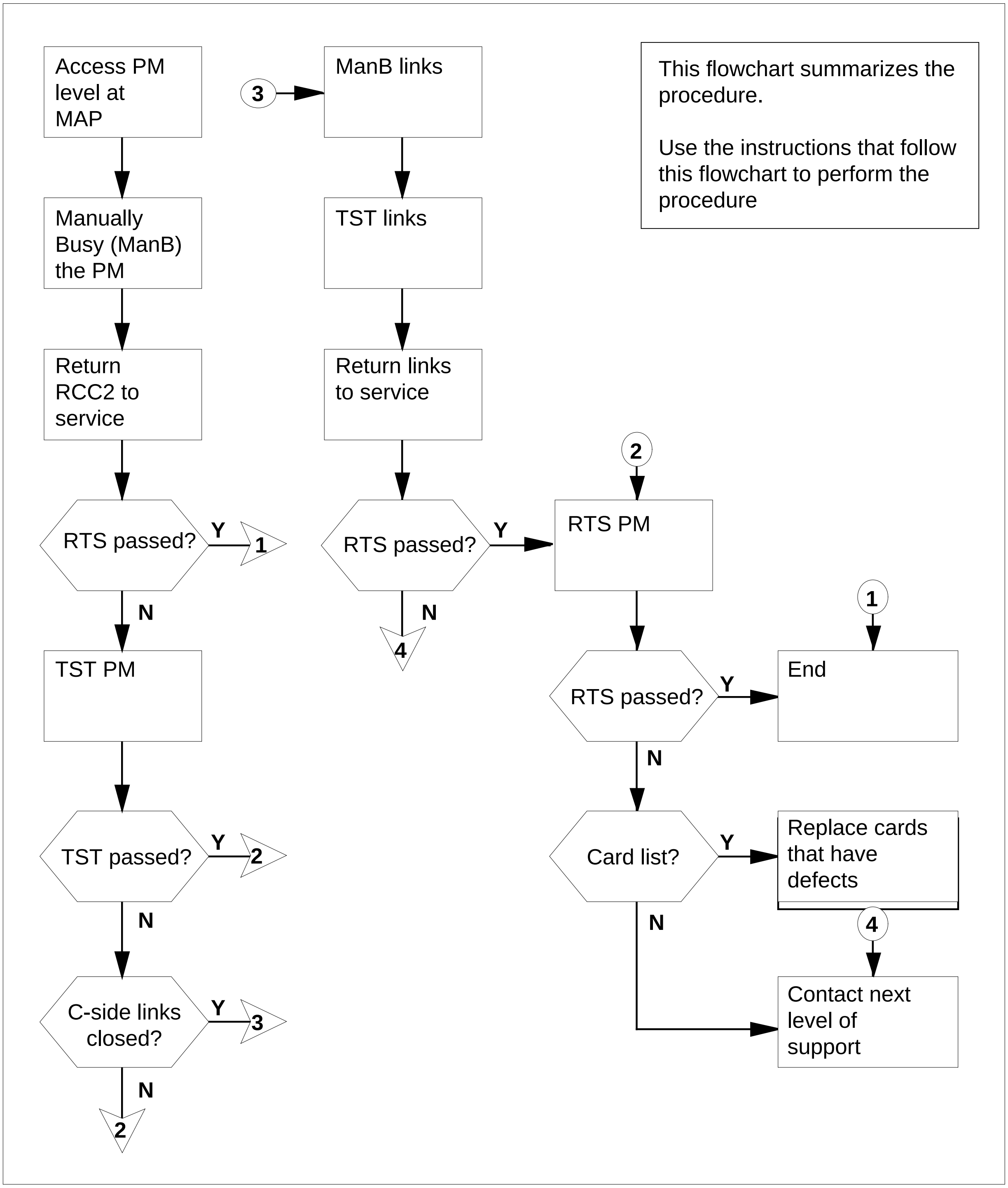
There are no common procedures.

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 clearing a PM RCC2 critical alarm



PM RCC2
critical (continued)

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 identified 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 RCCS, 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 in step 2

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
```

PM RCC2
critical (continued)

4 To check for fault indicators, type

>querypm flT

and press the Enter key.

Example of a MAP display:

```
  CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
  .      .       .       .    1RCC2     .       .        .       .       .
                                *C*

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   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. These logs indicate 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). Perform this check according to local

PM RCC2
critical (continued)

operating company policy, and according to the type of device used to generate 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

>OPEN PM 180

>WHILE (BACK)(SLEEP 2)

and press the Enter key.

Note: Repeat the above command substituting PM181 for PM180.

9 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

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” “Y” OR “NO” “N”)
```

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	The alarm changed, refer to the *Alarm Clearing Procedures* for an RCC2 ISTb major alarm.

14 To perform an out-of-service (OOS) 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 27
failed because C-side links are closed	step 15
failed and the system generates a card list	step 31

15 To identify C-side links to the host PM that are CBsy, type

>trnsl c

and press the Enter key.

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.

PM RCC2
critical (continued)

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 LGCI or an LTCI

host_pm_no
is the number of the LGCI or LTCI

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:  SysB
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 identified in step 17

19 To test the link that has faults, type

>TST link **link_no**

and press the Enter key.

where

link_no
is the number of the link manually made busy in step 18

If TST	Do
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    <-.7  0   INSV
1  REMOTE BRSC 0   12  C        0    0    <-.7  0   INSV
2  REMOTE BRSC 0   13  C        0    0    <-.7  0   MANB

                                          MORE . . .
```

Note: The `MORE . . .` at the bottom of the display indicates that you can observe more links. To observe more links, type

PM RCC2
critical (continued)

>NEXT

and press the Enter key.

21 Carry out the repair or corrective procedure indicated in the MAP display in step 20.

Note: If the MAP display indicates message links that have 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.

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 two.

If TST	Do
passed and the alarm clears	step 23
failed	step 36
failed and the system generates a card list	step 31

23 To post the host PM, type

>pm;post **host_pm host_pm_no**

and press the Enter key.

where

host_pm
is the host PM 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
```

PM RCC2
critical (continued)

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 has faults 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 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 inactive RCC2 unit (0 or 1)

If TST	Do
passed	step 30
failed	step 31

PM RCC2
critical (continued)

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 inactive RCC2 unit (0 or 1)

If RTS	Do
passed	step 37
failed	step 36

31 Check the card listing that appears on the MAP display.

The RCC2s can have the optional NTAX74AA Cellular Access Processor (CAP). For RCC2s with the NTAX74AA CAP, the MAP response displays a card list that reflects AX74 in slot 03. For RCC2s that have the NTMX77AA Unified Processor (UP), the MAP response reflects MX77AA in slot 3. Both configurations 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 the cards on the list	step 32
did not replace all the cards on the list	step 34

PM RCC2
critical (end)

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 with the card replacement procedures, go to step 23 of this procedure.

34 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. When you finish the card replacement procedures, go to step 29 of this procedure.

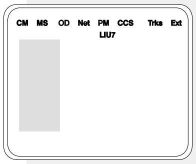
35 *Go to Recovery Procedures for instructions on recovering the RCC2.* When you complete the recovery procedure, return to step 4 and complete the alarm clearing procedure.

36 Contact the next level of support to obtain more help to clear this alarm.

37 The procedure is complete. If 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 M under the PM subsystem header indicates an RCC2 major alarm.

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

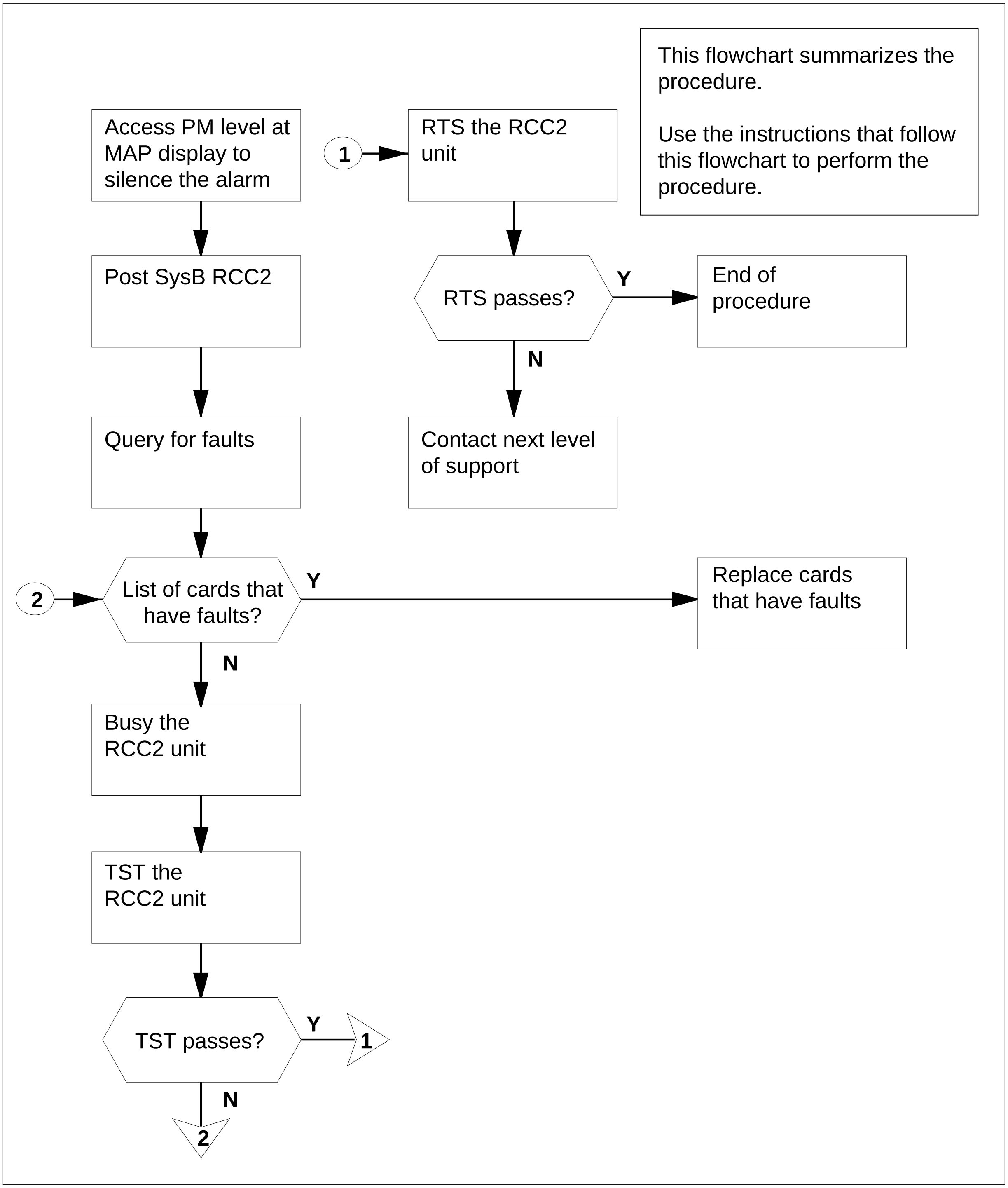
There are no common procedures.

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 procedure.

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.

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 inactive 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 ManB RCC2 unit (0 or 1)

Sample response on the MAP display:

PM RCC2
major (continued)

```
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 does not generate 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

PM RCC2
major (continued)

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
 .      .       .       .     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:SysB
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.

where

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

PM RCC2
major (continued)

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 with possible 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 you can check more links. To check 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

PM RCC2
major (continued)

link_no
is the number of the ManB link listed under the NO column that appears in the MAP display in step 12. The number for the ManB link in the example is 2.

If TST	Do
passes and alarms clears	step 15
fails	step 14
fails and this is not first repair attempt	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 with possible 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

PM RCC2
major (continued)

Note: This RCC2 must be SysB.

18 To return the *inactive* unit to service, type

>RTS UNIT unit_no

and press the Enter key.

where

unit_no
is the number of the RCC2 posted in step 17

If RTS	Do
passes	step 19
fails	step 28

19 Switch activity (SwAct) of the RCC2 units to make sure that unit being tested is *inactive*,. To switch activity, 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 initiates 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.

where

unit_no
is the number of the inactive RCC2 unit (0 or 1)

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 inactive RCC2 unit (0 or 1)

If RTS	Do
passes	step 29
fails	step 28

24 Check the card list that appears 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

Example of a MAP response for RCC2s configured with the optional NTAX74AA Cellular Access Processor:

PM RCC2
major (end)

```
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.

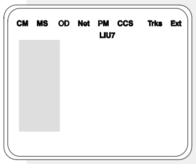
27 Go to the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Complete the card replacement procedures. Go to step 22 of this procedure.

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

At the MTC level of the MAP display, a 1RCC2 under the PM subsystem header 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

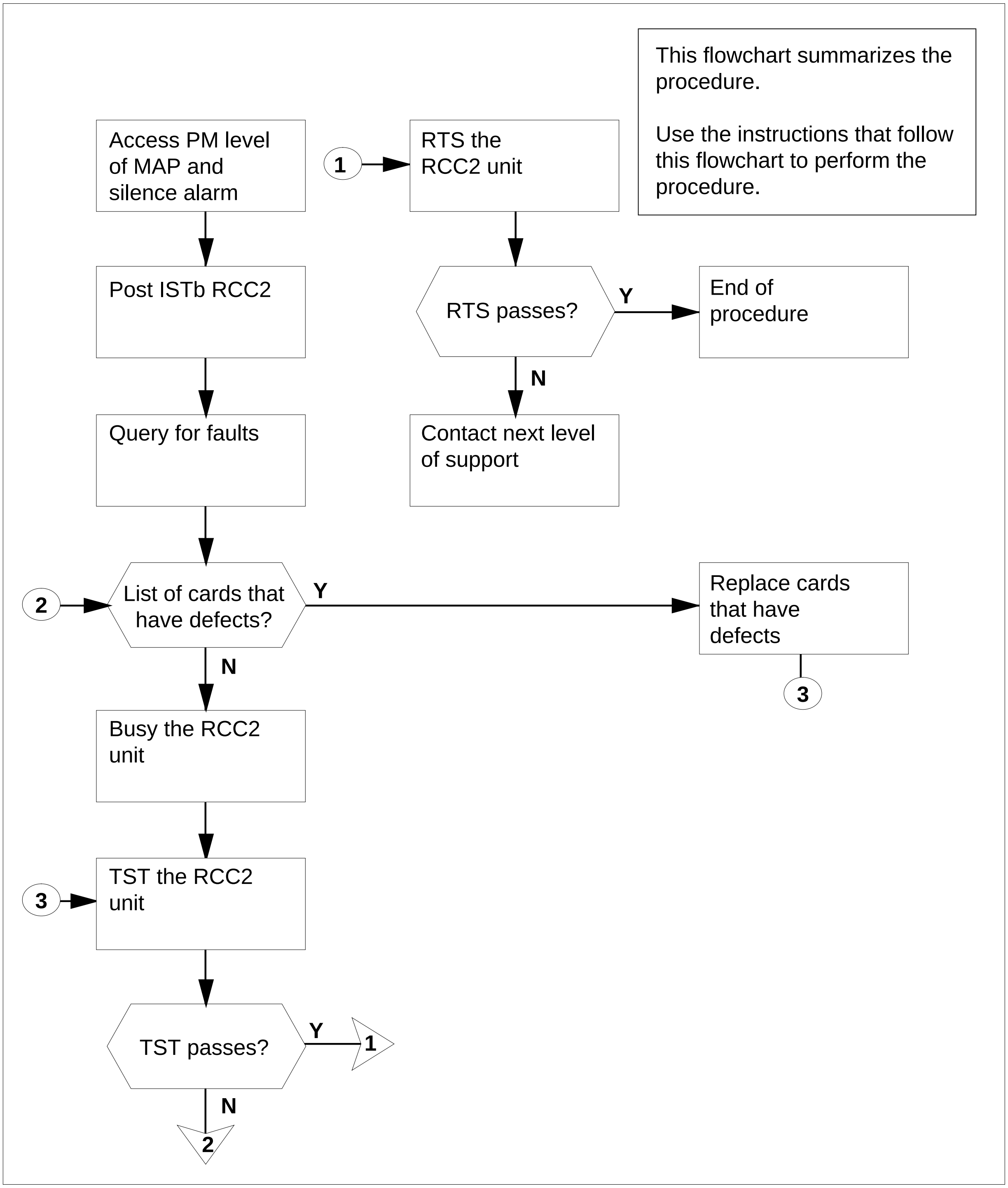
There are no common procedures.

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



Clearing a PM RCC2 minor 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 defective RCC2, type

>DISP STATE ISTB RCC2

and press the Enter key.

Typical 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 in step 2

Typical 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.

Typical response on the MAP display:

PM RCC2
minor (continued)

```
 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   2 ISTb  Links_OOS:  CSide  1, PSide   0
 5 TRNSL_   Unit0:   Act InSv
 6 Tst_     Unit1:   Inact ISTb
 7 Bsy_     QUERYPM FLT
 8 RTS_          Unit0  No fault exists
 9 OffL          Unit1  C-side links out of service
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

If the system	Do
indicates a defective card	step 26
does not indicate a defective card	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 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

Typical 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 C-side links to the host PM that are in a SysB condition, type

>TRNSL C

and press the Enter key.

A host PM may 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.

Typical 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

Typical response on the MAP display:

PM RCC2
minor (continued)

```
 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.

Typical 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 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 (ManB) 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.

Typical response on the MAP display:

```
CLASS ML  OS   ALARM     SYSB  MANB     UNEQ  OFFL     CBSY  PBSY  INSV
TRUNKS 0  0    0         0        0     0     0        0        0    0
REMOTE 0  0    0         5        0     0     0        0        0   10

NO  CLASS   SITE     RCC  CKT  D  ALARM  SLIP  FRAME    BER     SES  STATE
0   TRUNKS BRSCS      0    0   C          0     0      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. This link number is listed under the NO column as 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 the MAP display indicates in step 12.

> ***Note:*** If the system indicates message links that have defects, these links must be in a ManB state before these links can be returned to service (RTS).

15 To post the host PM, type

>PM;POST host_pm host_pm_no

and press the Enter key.

where

host_pm
is the host PM (LGCI or LTCI) in step 8

host_pm_no
is the number of the host PM (LGCI or LTCI)

16 Use the information 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 RTS the link, type

>RTS LINK link_no

and press the Enter key.

where

link_no
is the number of the link in step 9

18 To post the RCC2, type

>POST rcc2_no

and press the Enter key.

where

rcc2_no
is the number of the RCC2 in step 2

> ***Note:*** This RCC2 must be SysB.

19 To RTS the *inactive* unit, type

>RTS UNIT unit_no

and press the Enter key.

where

unit_no
is the number of the RCC2 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 verify that the unit you want to test is *inactive*, type

>SWACT

and press the Enter key.

Typical 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.

where

PM RCC2
minor (continued)

unit_no
is the number of the RCC2 units busied in step 23

If TST	Do
passes	step 25
fails	step 26

25 To RTS the *inactive* RCC2 unit, 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 in the following MAP display.

Typical response on the MAP display:

```
 SITE     FLR       RPOS BAY_ID         SHF  DESCRIPTION    SLOT EQPEC
RSCS0      01        A00 RCE    00       32  RCC2 :  000    : 09  MX81
RSCS0      01        A00 RCE    00       32  RCC2 :  000    : 08  6X69
```

If all cards	Do
are replaced	step 27
are not replaced	step 29

27 Determine if the NTMX81 circuit card was replaced.

If the NTMX81 card	Do
is replaced	step 30
is not replaced	step 28

28 Perform the card replacement procedure for the NTMX81 circuit card in *Card Replacement Procedures*. Finish the card replacement procedures and go to step 24.

PM RCC2
minor (end)

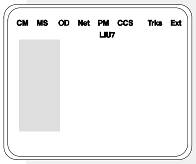
29 Perform the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Finish with the card replacement procedures and go to step 24.

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

31 This procedure is complete. If the system displays other alarms, perform the appropriate alarm clearing procedures.

PM RMM major

Alarm display



CM	MS	IOD	Net	**PM**	Lns	Trks	Ext	APPL
.	.	.	.	**1SysB**	.	.	.	.
				M				

Indication

At the MTC level of the MAP, the alarm code 1SysB under the PM subsystem header indicates an alarm associated with a remote maintenance module (RMM). The letter *M* under the alarm code indicates that the alarm class is major.

Meaning

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

Result

If the RMM unit fails, the system discontinues maintenance and line testing. The condition does not affect subscriber service.

Common procedures

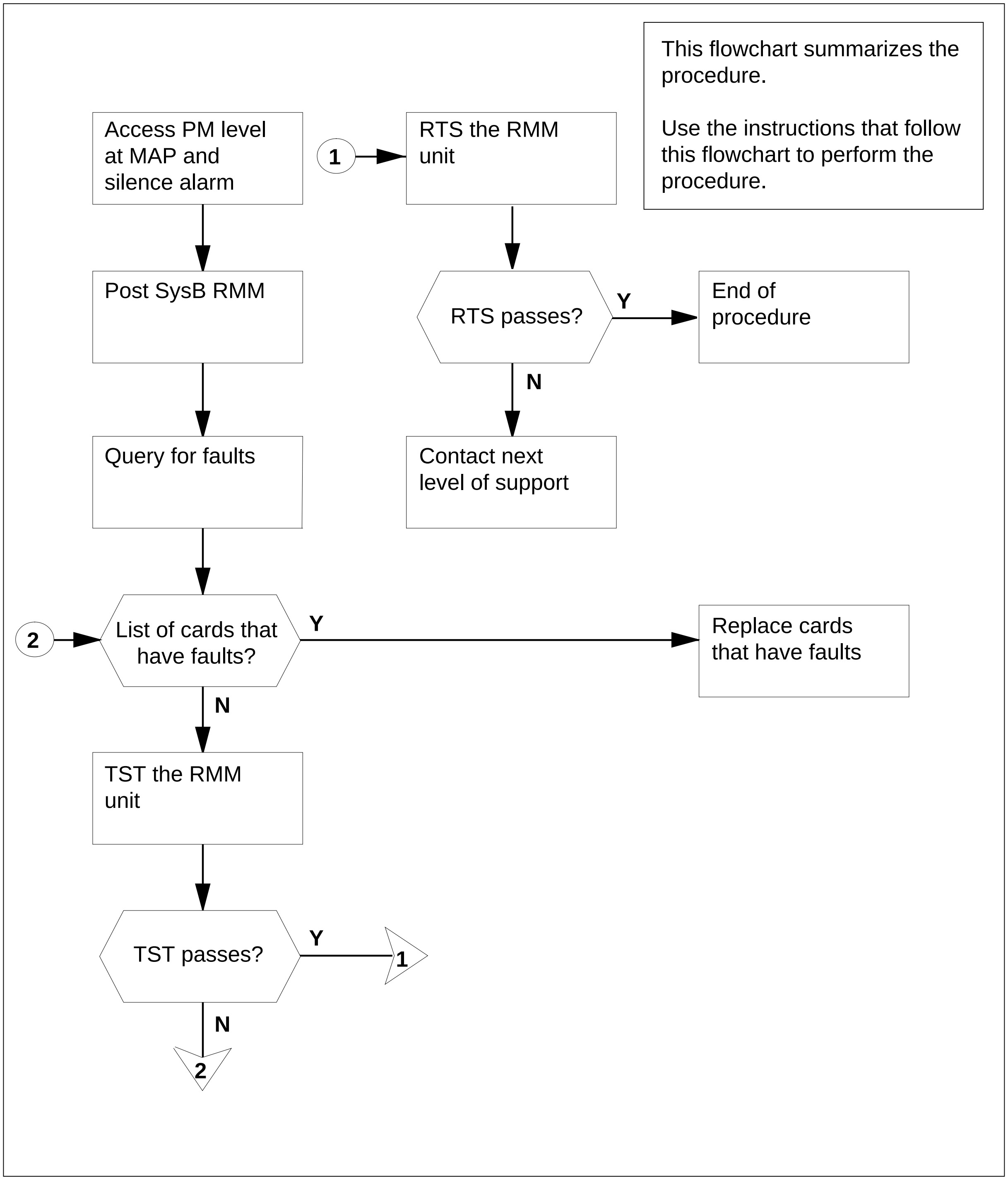
There are no common procedures.

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

> **ATTENTION**
> Enter this procedure from a PM system-level alarm clearing procedure step that identified an RMM-associated fault.

At the MAP terminal

1 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

Example of a MAP display:

PM RMM
major (continued)

```
   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    1         0         2         1         2          9
 3
 4          RMM    2      SysB
 5 Trnsl_
 6 Tst_
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 To check for fault indicators or cards that have faults, type

>querypm flt

and press the Enter key.

Example of a MAP display:

PM RMM
major (continued)

```
  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    1         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 all the links are busied, 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.

Example of a MAP display:

```
SITE FLR  RPOS BAY_ID      SHF     DESCRIPTION         SLOT      EQPEC
RSC0  01   A00 RCE    00   32      RMM:000             : 00       6X23
RSC0  01   A00 RCE    00   32      RMM:000             : 04       6X51
RSC0  01   A00 RCE    00   32      RMM:000             : 05       6X52
RSC0  01   A00 RCE    00   32      RMM:000             : 16       6X23
```

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

PM RMM
major (end)

17 Determine if the NTMX74 circuit card was replaced.

Note: If the display indicates the NTMX74 card, check if one link or several links have faults. Repeat the alarm clearing procedure.

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

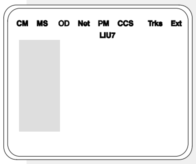
19 Perform the card replacement procedure in *Card Replacement Procedures* for the next card on the card list. Finish with the card replacement procedures. Go to step 14.

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

21 The procedure is complete. If other alarms appear at the MAP, perform the appropriate alarm clearing procedures.

PM RMM
minor

Alarm display



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

Indication

At the peripheral module (PM) level of the MAP display, the 1CBsy under the PM subsystem header indicates a minor alarm associated 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

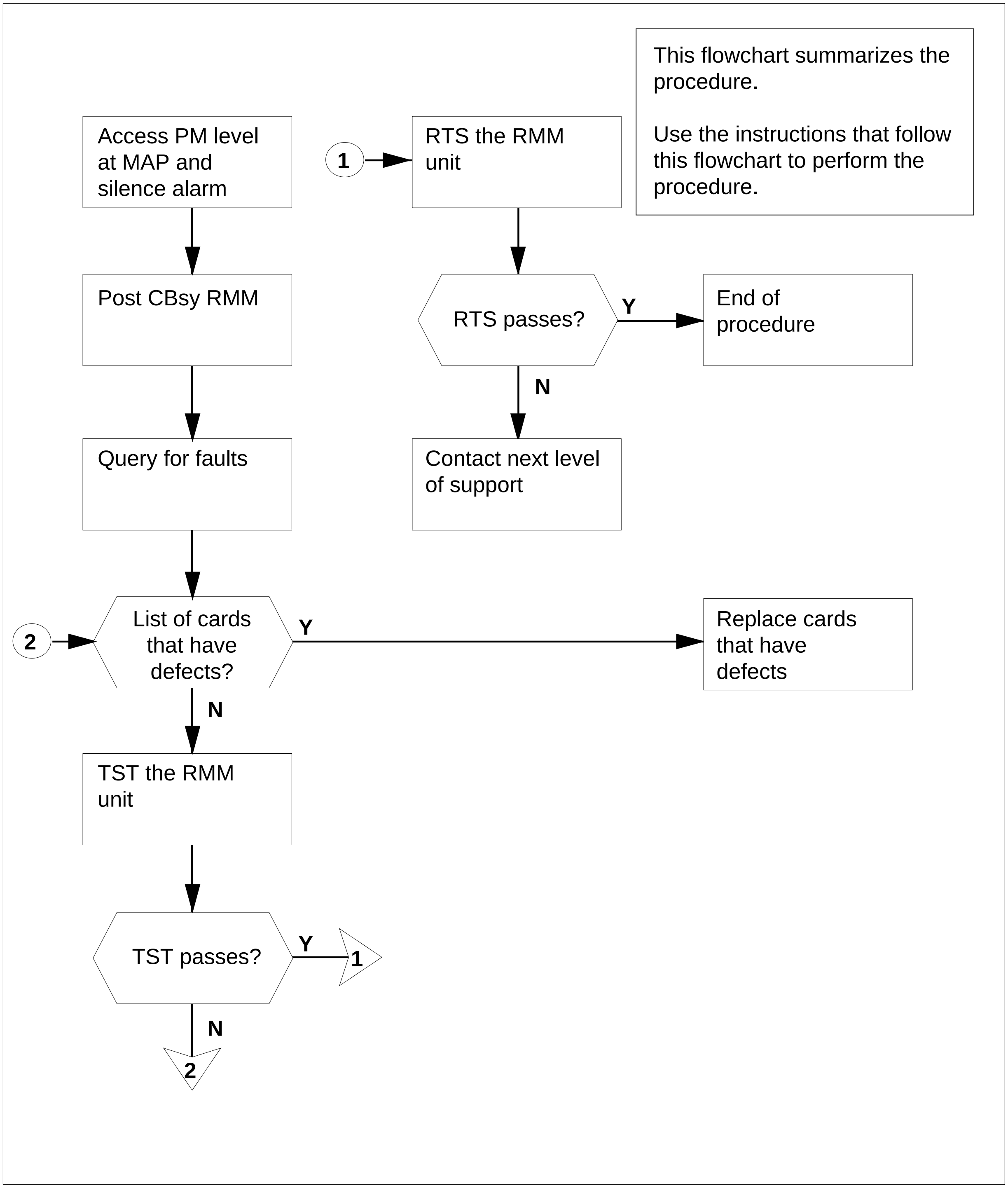
There are no common procedures.

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 PM RMM minor alarms



PM RMM
minor (continued)

Clearing PM RMM minor alarms

At the MAP display

1

> **ATTENTION**
> Enter this procedure from a PM system level alarm clearing procedure step that identifies an RMM-associated fault.

To silence the alarm, type

>MAPCI;MTC;PM;SIL

and press the Enter key.

2 To identify the RMM that has defects, type

>DISP STATE CBSY RMM

and press the Enter key.

Example of a MAP response:
CBsy RMM: 1

3 To post the CBsy RMM identified in step 2, type

>POST RMM rmm_no

and press the Enter key.

where

rmm_no
is the number of the RMM that has defects

Example of a MAP display:

PM RMM
minor (continued)

```
   CM     MS     IOD     Net     PM     CCS     Lns     Trks     Ext     APPL
   .      .      .       .     1CBsy     .       .       .        .       .


RMM              SysB      ManB      OffL      CBsy      ISTb       InSv
 0 Quit    PM      3         0         0         1         4         12
 2 Post_   RMM     0         0         0         1         2          9
 3
 4         RMM     1      CBsy
 5 Trnsl_
 6 Tst_
 7 Bsy_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 To check for fault indicators or cards that have defects, type

>QUERYPM FLT

and press the Enter key.

Example of a MAP display:

```
  CM    MS    IOD    Net    PM    CCS    Lns    Trks    Ext    APPL
  .     .      .      .   1CBsy   .      .       .       .      .


RMM             SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM      3        0        0        0        4        12
 2 Post_   RMM     0        0        0        0        2         9
 3
 4         RMM     1    CBsy
 5 Trnsl_
 6 Tst_
 7 Bsy_    QUERYPM FLT
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

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

5 To busy the RMM posted in step 3, type

>BSY

and press the Enter key.

6 To perform an in-service test on the RMM that has defects, type

>TST

and press the Enter key.

Example of a MAP response:

```
Test Passed
```
or
```
Test Failed
```

If TST	Do
passes	step 15

PM RMM
minor (continued)

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:  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
```

PM RMM
minor (continued)

9 To identify the peripheral-side (P-side) links that have defects, type

>TRNSL P

and press the Enter key.

Example of a MAP response:

```
LINK 22:  RMM  1    0;CAP MS;STATUS:    OK,;MSGCOND:   OPN,Restricted
LINK 23:  RMM  1    1;CAP  S;STATUS:    CBSY
```

10 To choose and busy link, type

>BSY LINK link_no

and press the Enter key.

where

link_no
is the number of the link identified in step 9 (22 or 23)

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 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 RTS all links.

PM RMM
minor (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 RTS the ManB RMM, type

>RTS

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    19   RMM:000         : 03        2X10
RSCS0       01  A00     RCE     00    19   RMM:000         : 04        2X11
RSCS0       01  A00     RCE     00    19   RMM:000         : 05        0X10
RSCS0       01  A00     RCE     00    19   RMM:000         : 06        3X09
```

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.

If the NTMX74 card	Do
is replaced	step 20

PM RMM
minor (end)

If the NTMX74 card	Do
is not replaced	step 18

Note: If the system indicates the NTMX74 card, check to see if one link or several links have defects Repeat the alarm clearing procedure as required.

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

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

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

21 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 cards.

NT0X10
in an RSC-S (DS-1) Model B RMM

Application

Use this procedure to replace an NT0X10 card in an RSC-S RMM.

PEC	Suffixes	Name
NT0X10	AA	Miscellaneous Scan Card (MSC)

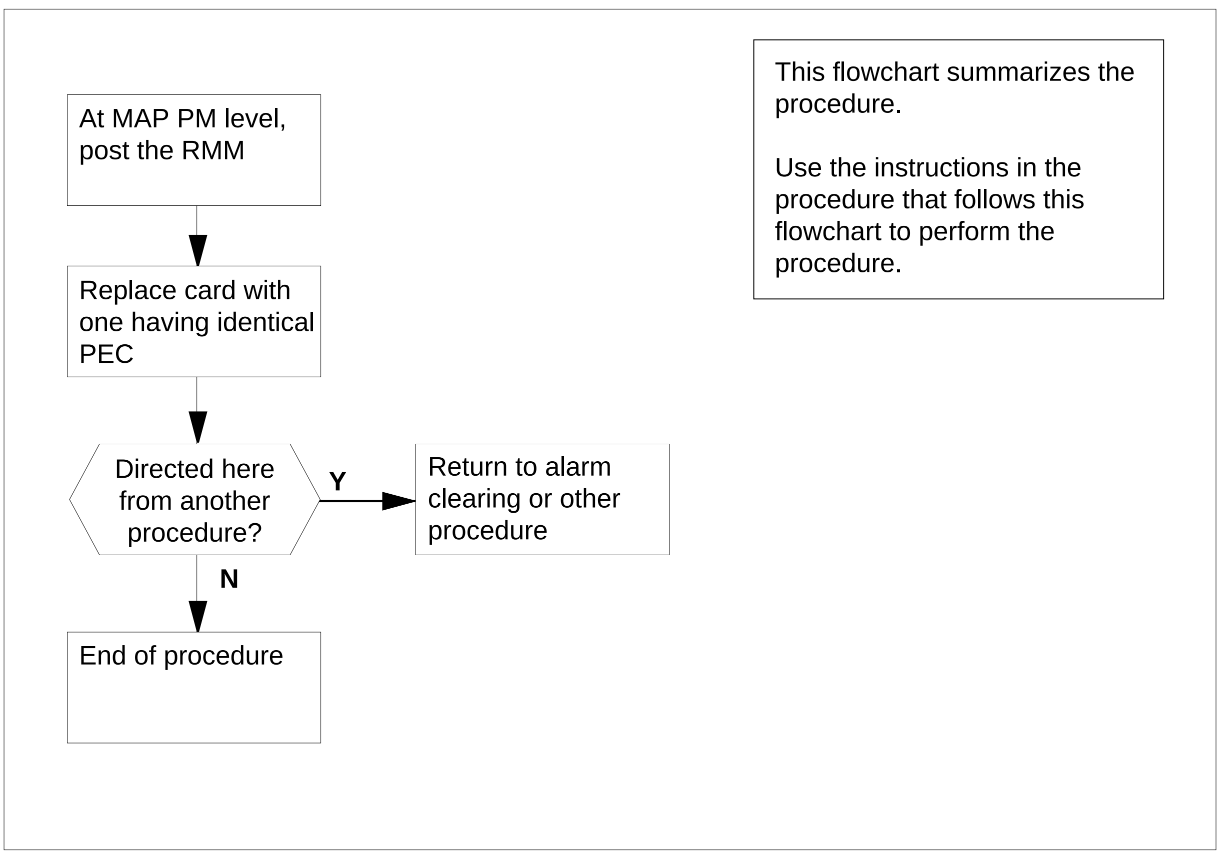
Common procedures

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 B 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.

At the MAP

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.

Example of a MAP display:

NT0X10
in an RSC-S (DS-1) Model B RMM (continued)

```
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

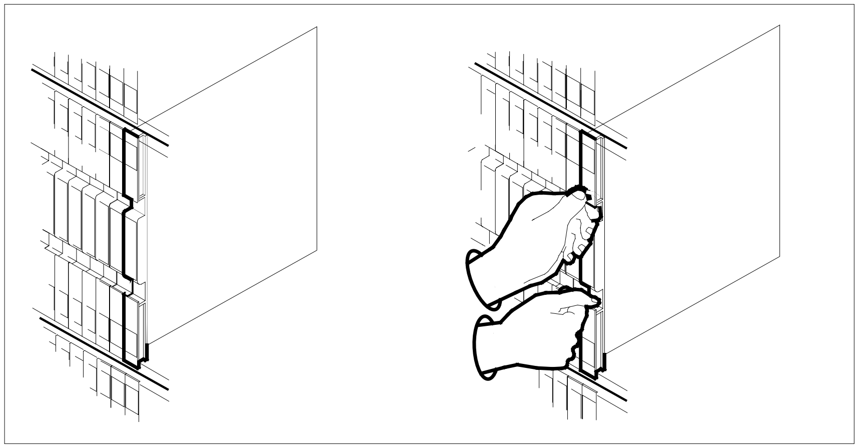
DANGER
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

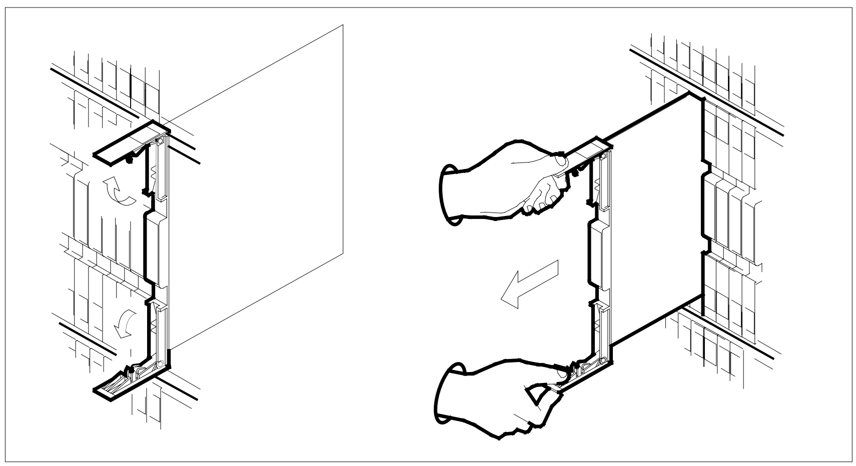
6 Remove the NT0X10 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT0X10 in an RSC-S (DS-1) Model B 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.

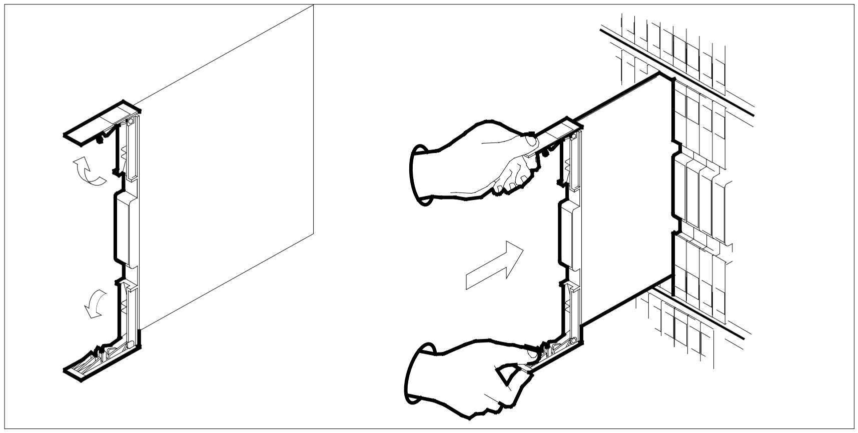
d Set the switch settings on the card to match those of the card you are replacing.

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 B RMM (continued)



8

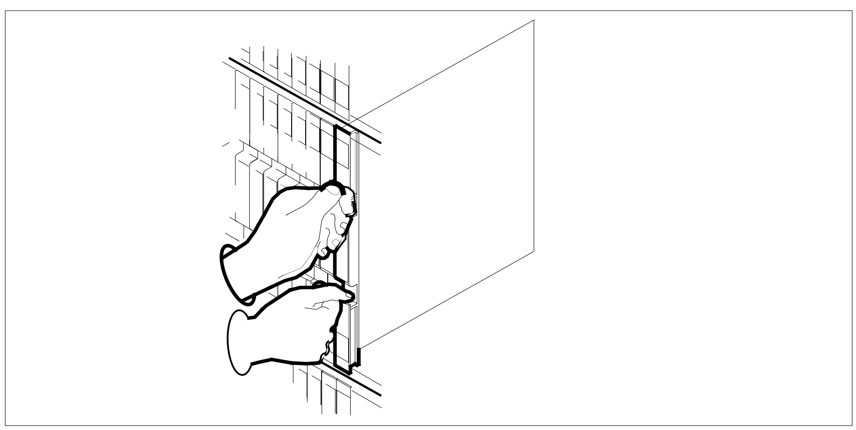
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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 B 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 B 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

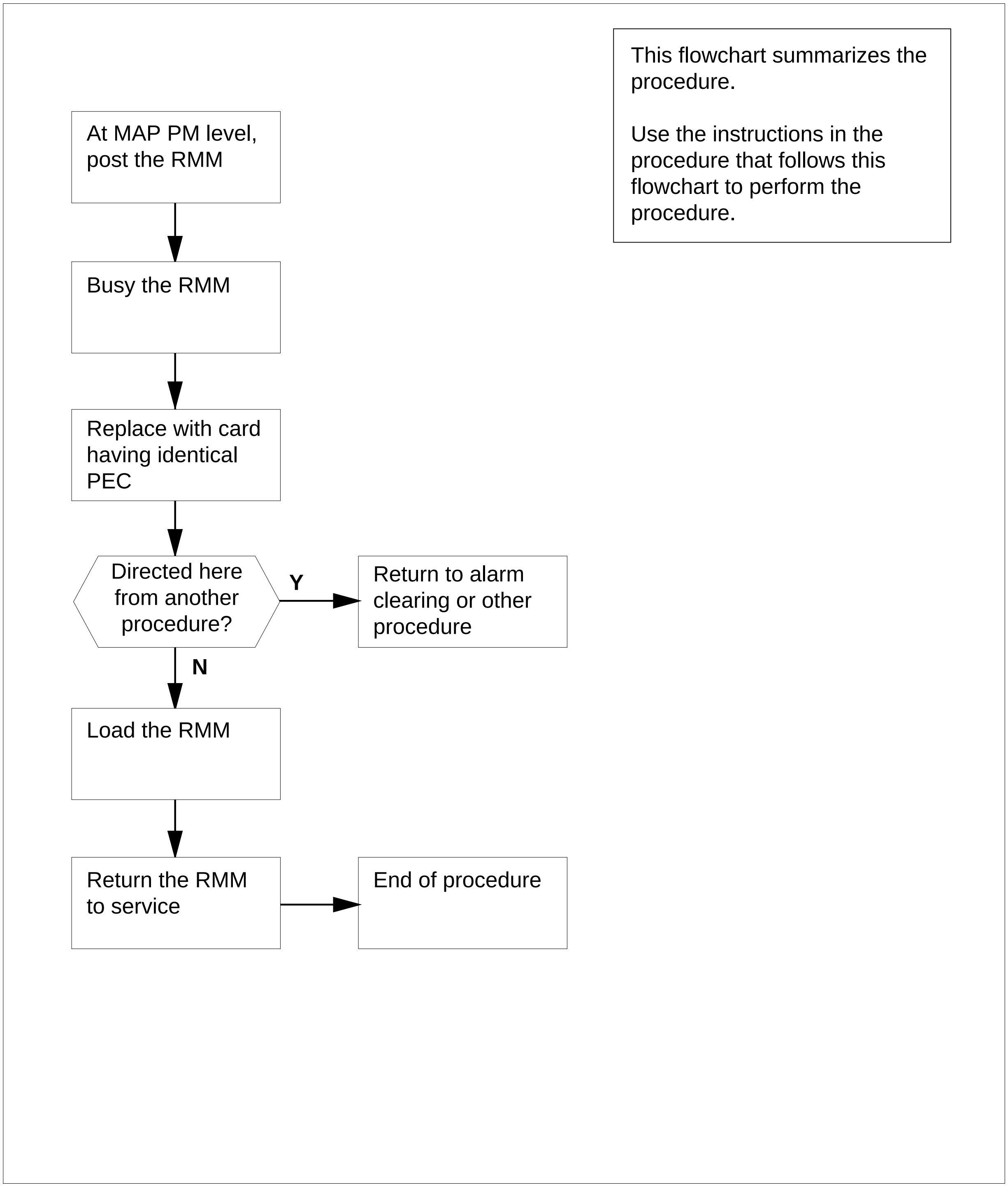
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X06 card in RSC-S RMM



NT2X06
in an RSC-S (DS-1) Model B RMM (continued)

Replacing an NT2X06 card in RSC-S RMM

At your Current Location

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT2X06 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Set the MAP display to PM level and post the RMM by typing

>MAPCI;MTC;PM;POST RMM rmm_no

and pressing the Enter key.

where

rmm_no
is the number of the RMM where the card is to be removed

Example of a MAP display:

```
  CM    MS    IOD    Net    PM    CCS    LNS    Trks    Ext    Appl
   .     .     .      .      .     .      .      .       .      .

RMM                 SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM          4        0       10        3        3       130
 2 Post_   RMM         0        1        1        0        0         2
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

NT2X06
in an RSC-S (DS-1) Model B RMM (continued)

```
  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 modular supervisory panel (MSP) will be ON. An audible alarm may sound. If an alarm does sound, return to the MAP terminal and silence the alarm by typing

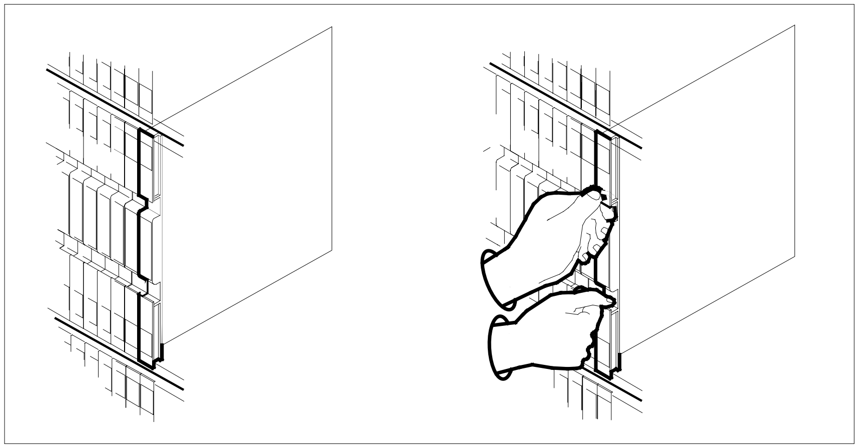
>sil

and pressing the Enter key.

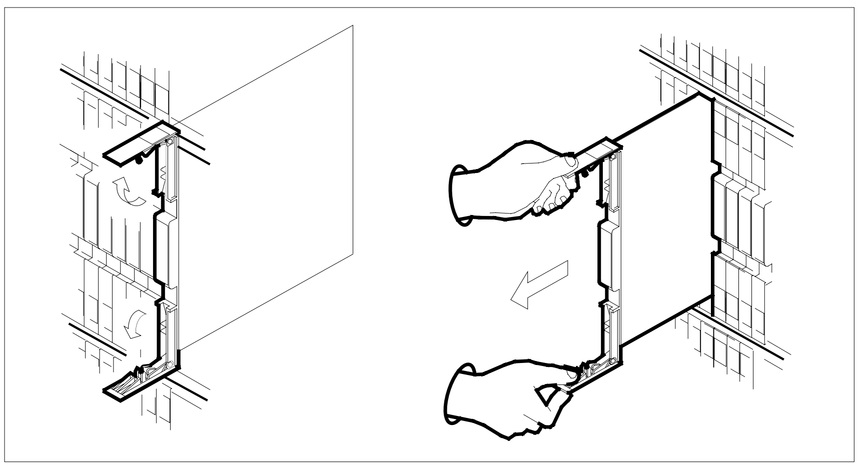
7 Remove the NT2X06 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT2X06
in an RSC-S (DS-1) Model B 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.



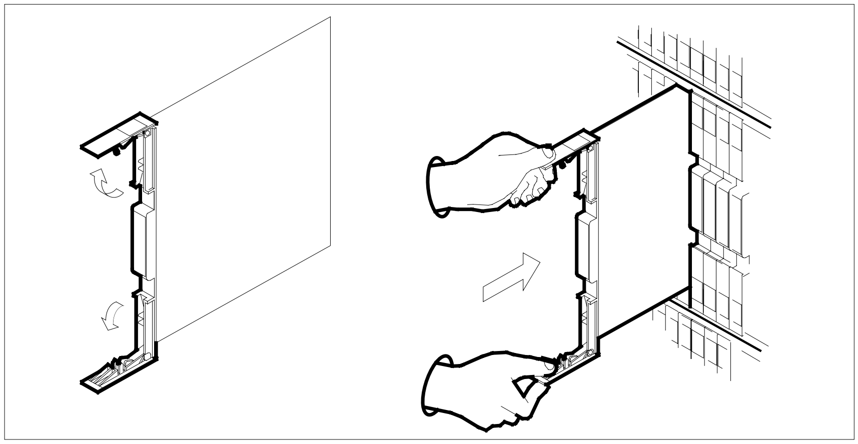
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



9

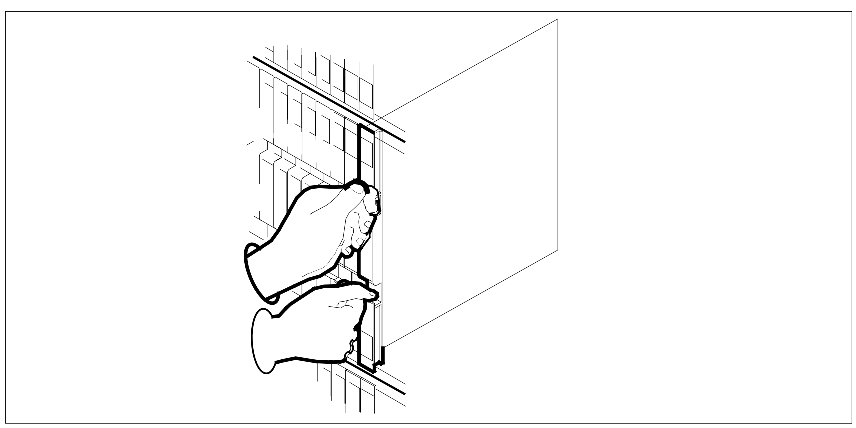
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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 B 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 MSP 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 MSP 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 MSP 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 B 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 B 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 B RMM

Application

Use this procedure to replace an NT2X09 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X09	AA	Power Converter

Common procedures

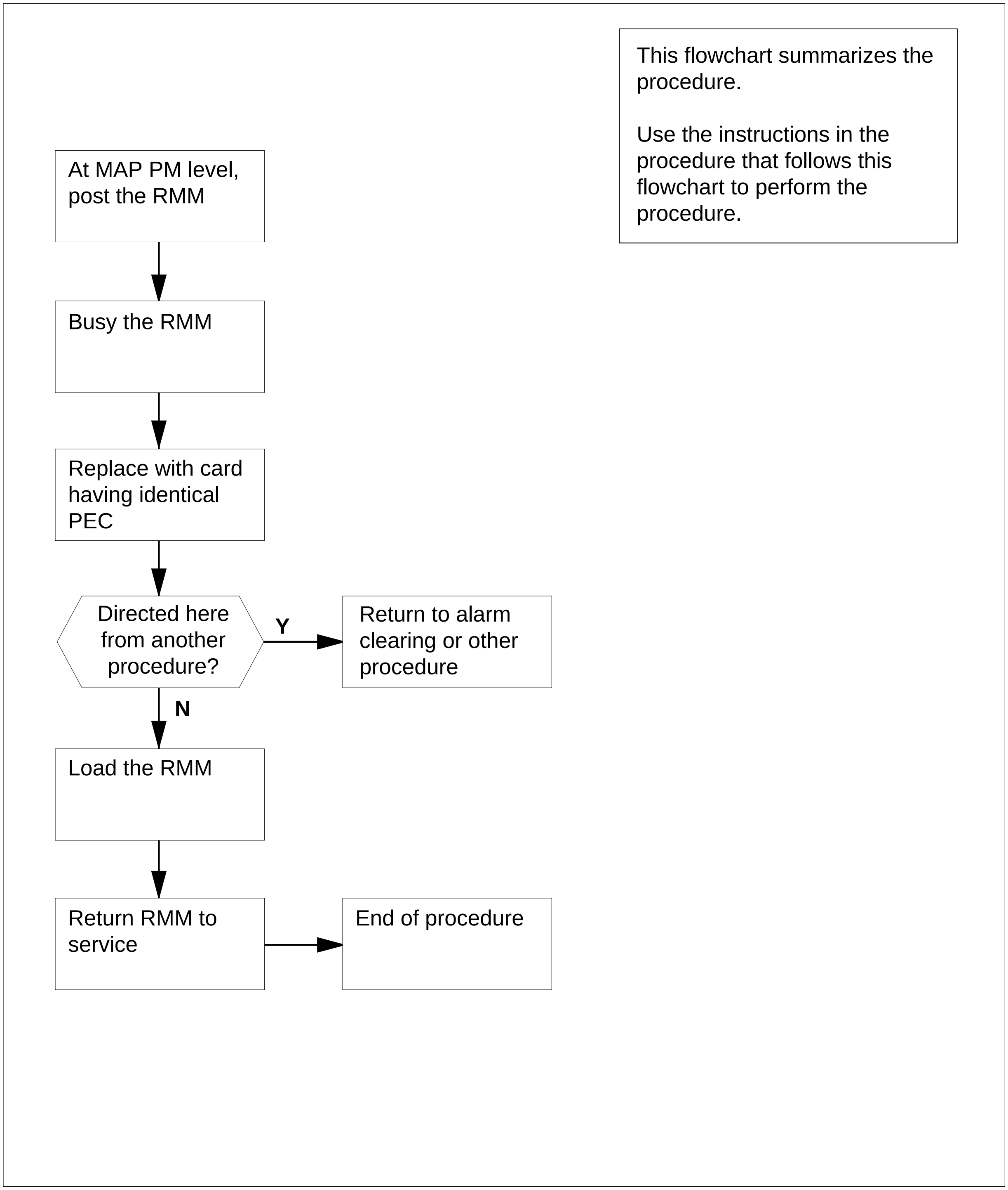
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X09 card in RSC-S RMM



NT2X09
in an RSC-S (DS-1) Model B RMM (continued)

Replacing an NT2X09 card in RSC-S RMM

At your Current Location

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NT2X09 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card to be removed.

At the MAP terminal

3 Set the MAP display to PM level by typing

>MAPCI;MTC;PM;POST RMM rmm_no

and pressing the Enter key.

where

rmm_no
is the number of the RMM unit where the card is to be removed

Example of a MAP display:

```
 CM    MS    IOD    Net     PM     CCS    LNS    Trks    Ext   Appl
  .     .     .      .      .       .      .      .       .     .

RMM              SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM       4        0       10        3        3       130
 2 Post_   RMM      0        1        1        0        0         2
 3
 4         RMM  5  INSV
 5 Trnsl
 6 Tst
 7 Bsy
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the RMM by typing

>BSY

and pressing the Enter key.

Example of a MAP display:

NT2X09
in an RSC-S (DS-1) Model B RMM (continued)

```
 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 modular supervisory panel (MSP) will be ON. An audible alarm may sound. If an alarm does sound, return to the MAP terminal and silence the alarm by typing

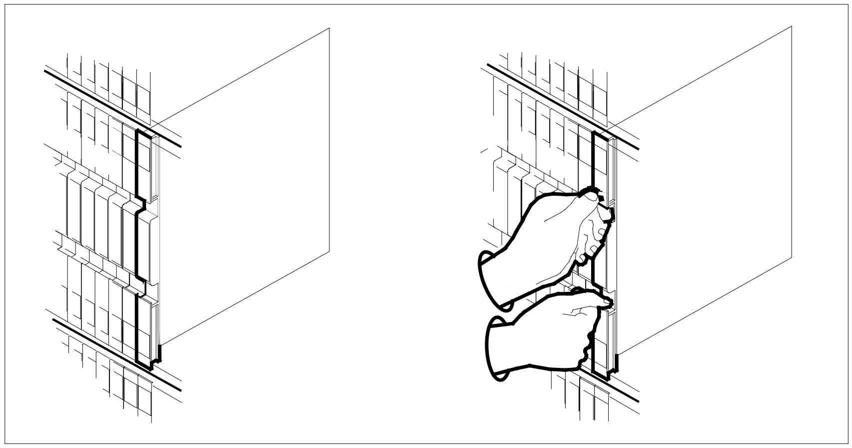
>sil

and pressing the Enter key.

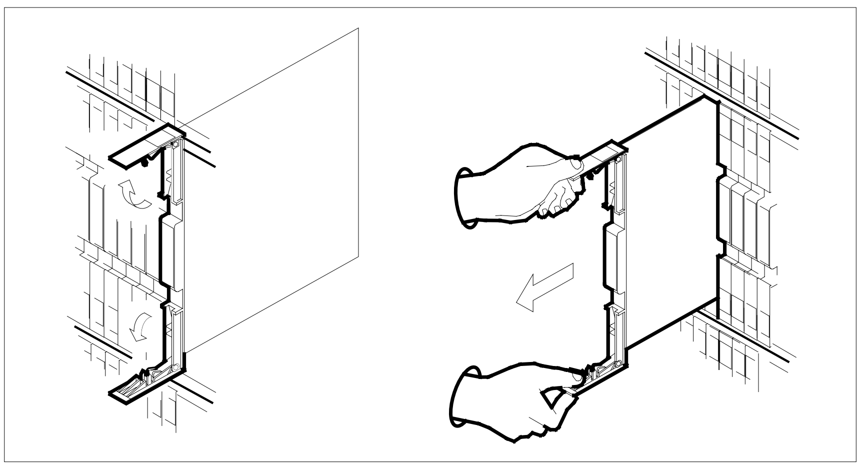
7 Remove the NT2X09 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT2X09
in an RSC-S (DS-1) Model B 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.



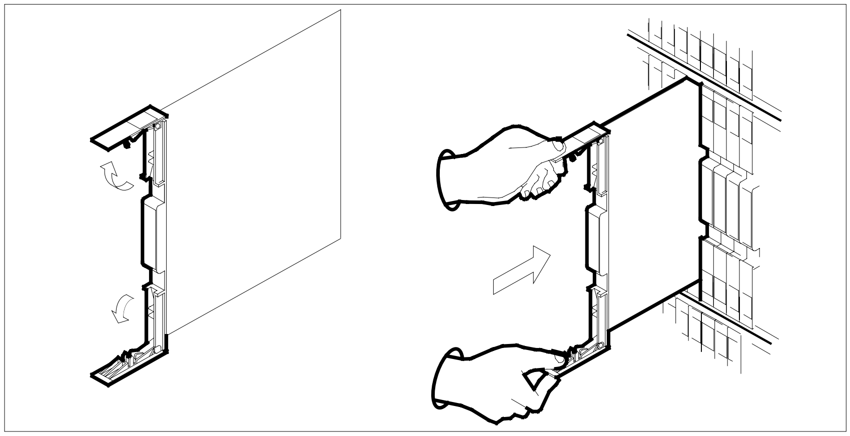
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



9

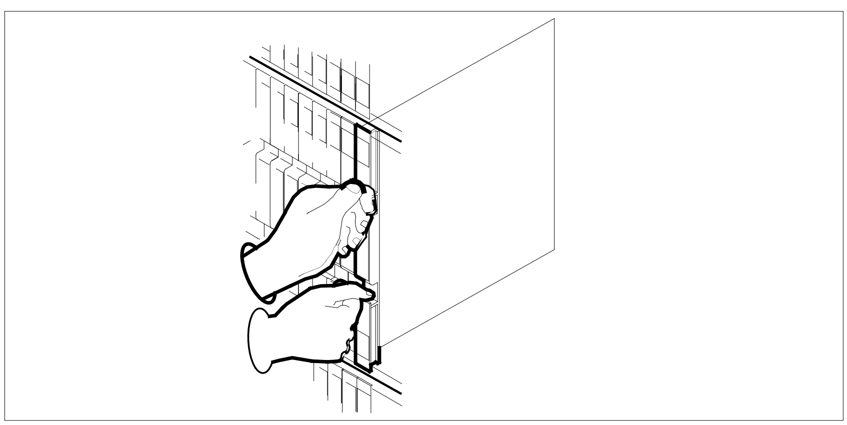
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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 B 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 MSP 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 MSP 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 MSP 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 B 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 B 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 B 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

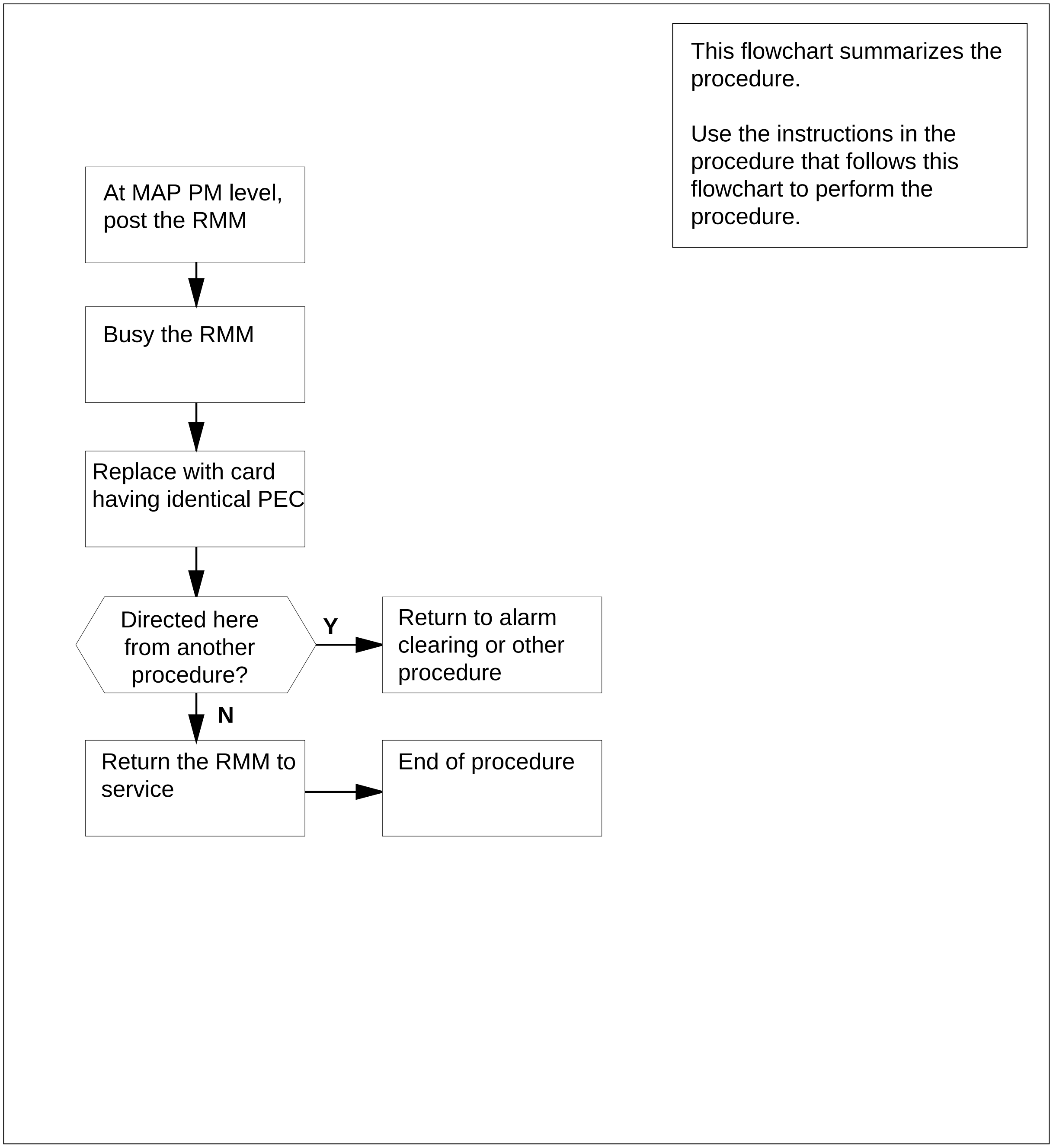
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X10 card in RSC-S RMM



NT2X10
in an RSC-S (DS-1) Model B 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 B RMM (continued)

and pressing the Enter key.

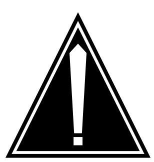
Example of a MAP display:

```
 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



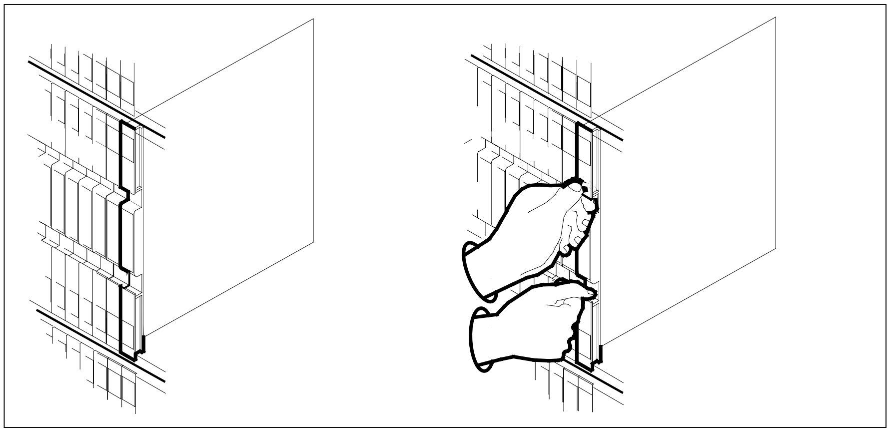
CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

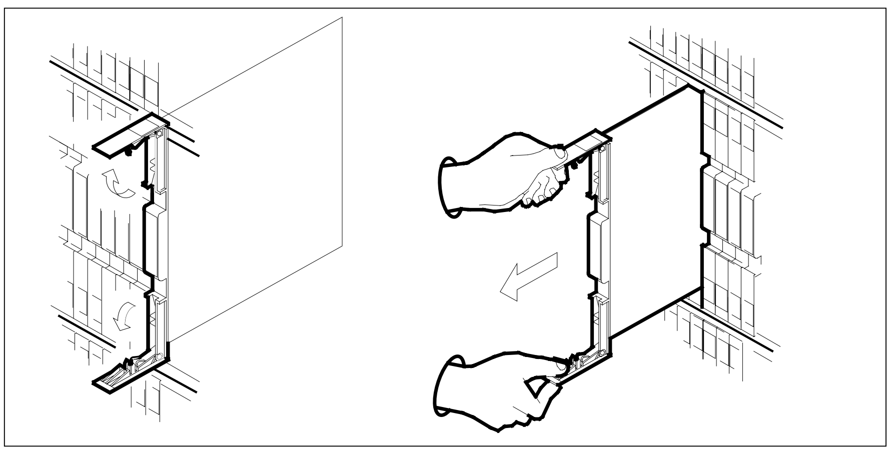
6 Remove the NT2X10 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT2X10
in an RSC-S (DS-1) Model B 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.



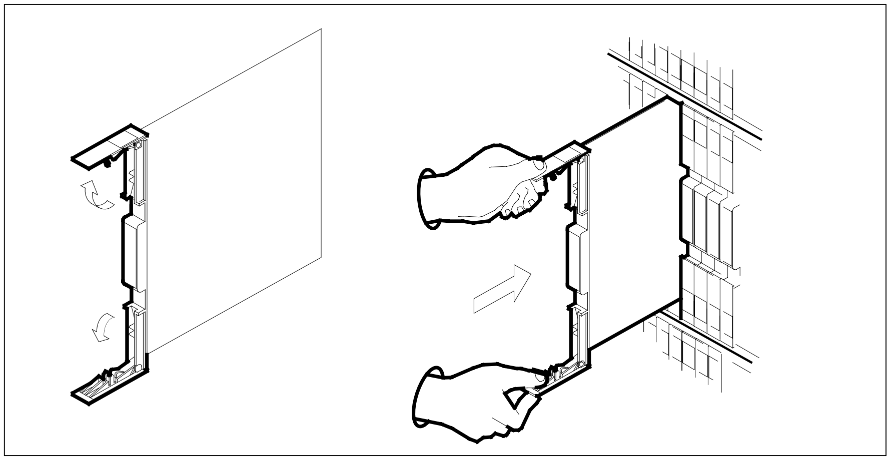
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



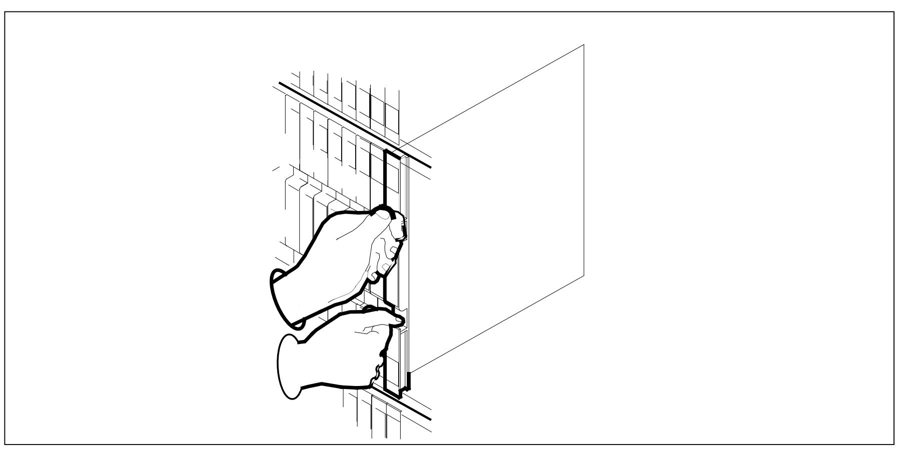
8

> **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 B 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 B 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

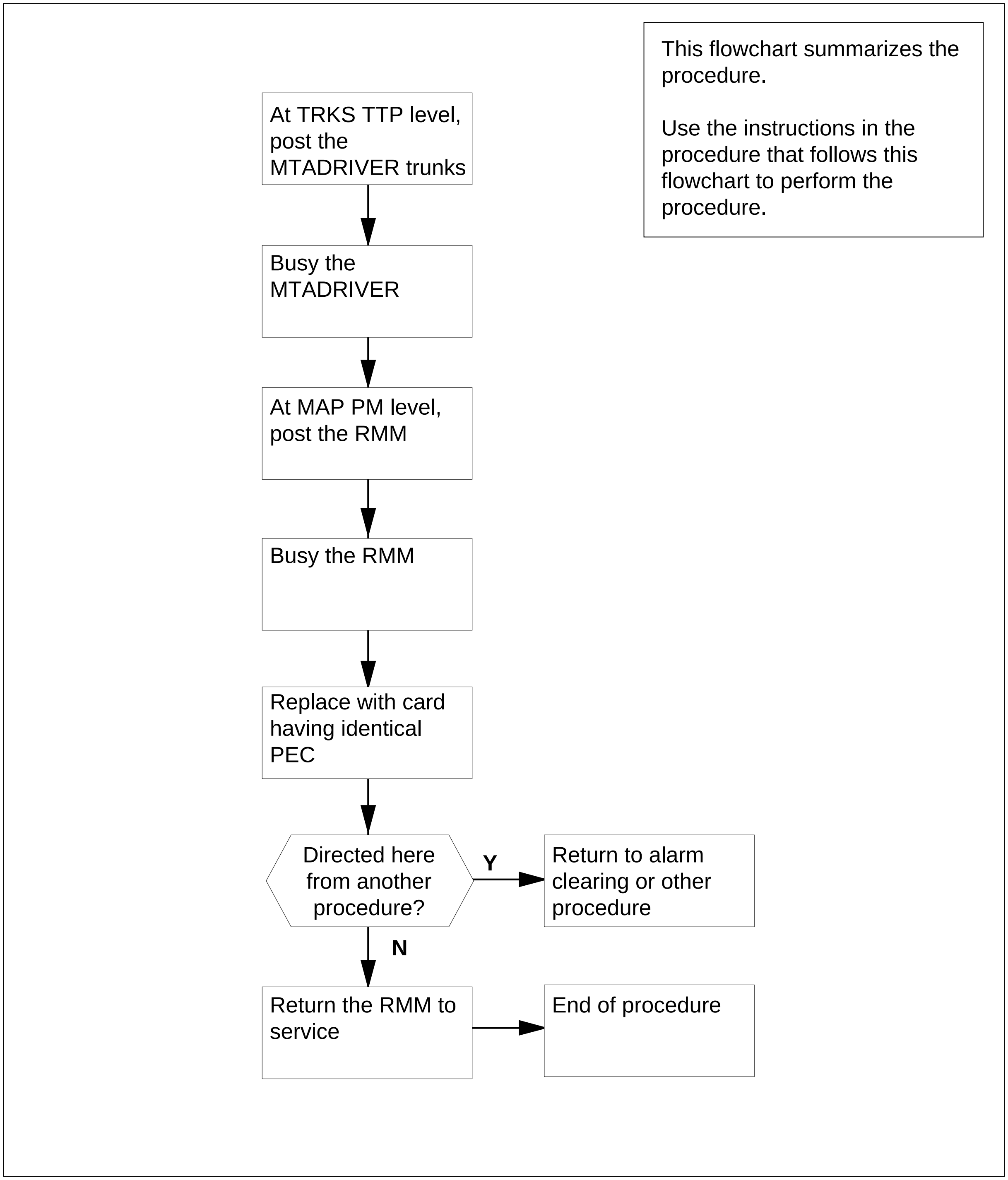
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X11 card in RSC-S RMM



NT2X11
in an RSC-S (DS-1) Model B 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 B 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 B 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 B RMM (continued)

At the RMM shelf

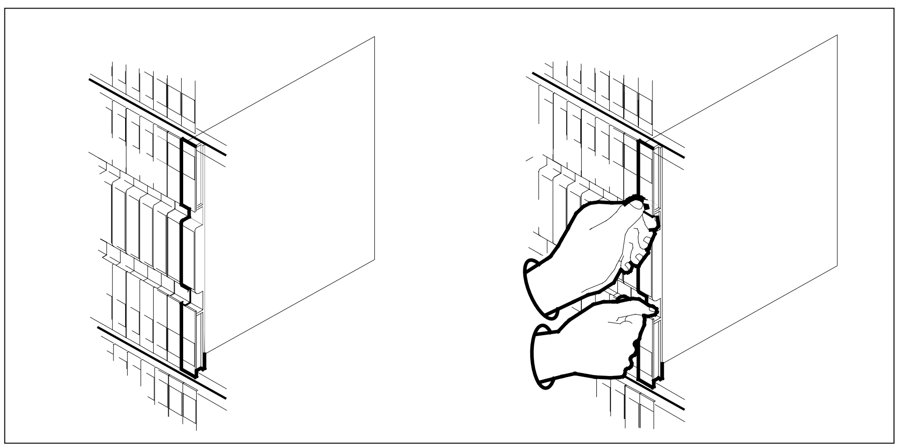
7

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.

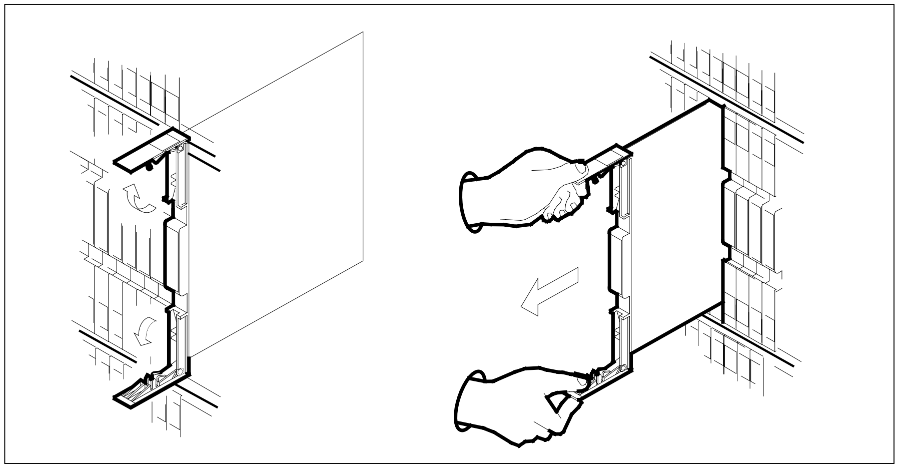
8 Remove the NT2X11 card as shown in the following figures.

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 B RMM (continued)

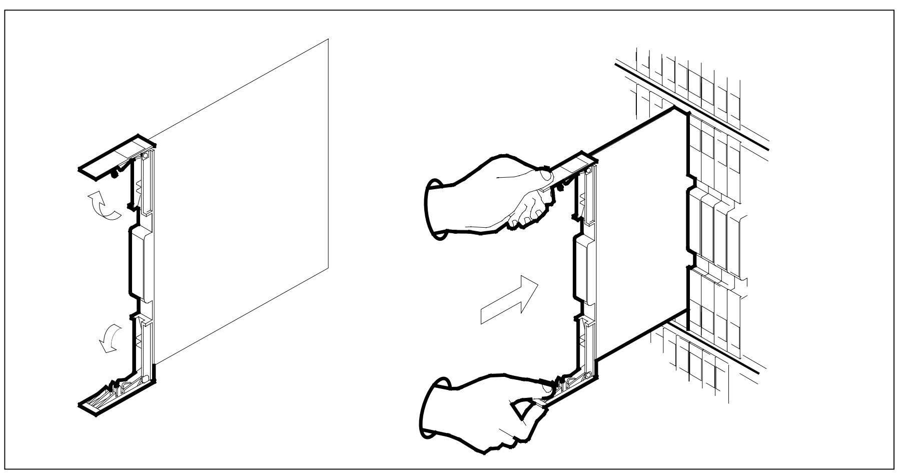


c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)

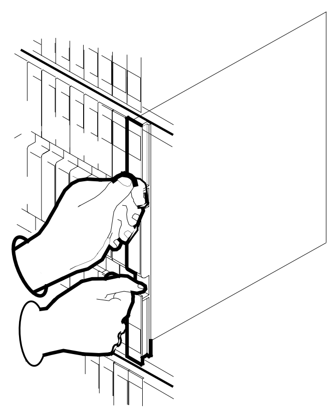
10

> **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 B 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 B RMM

Application

Use this procedure to replace an NT2X57 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X57	AA	Signal Distribution

Common procedures

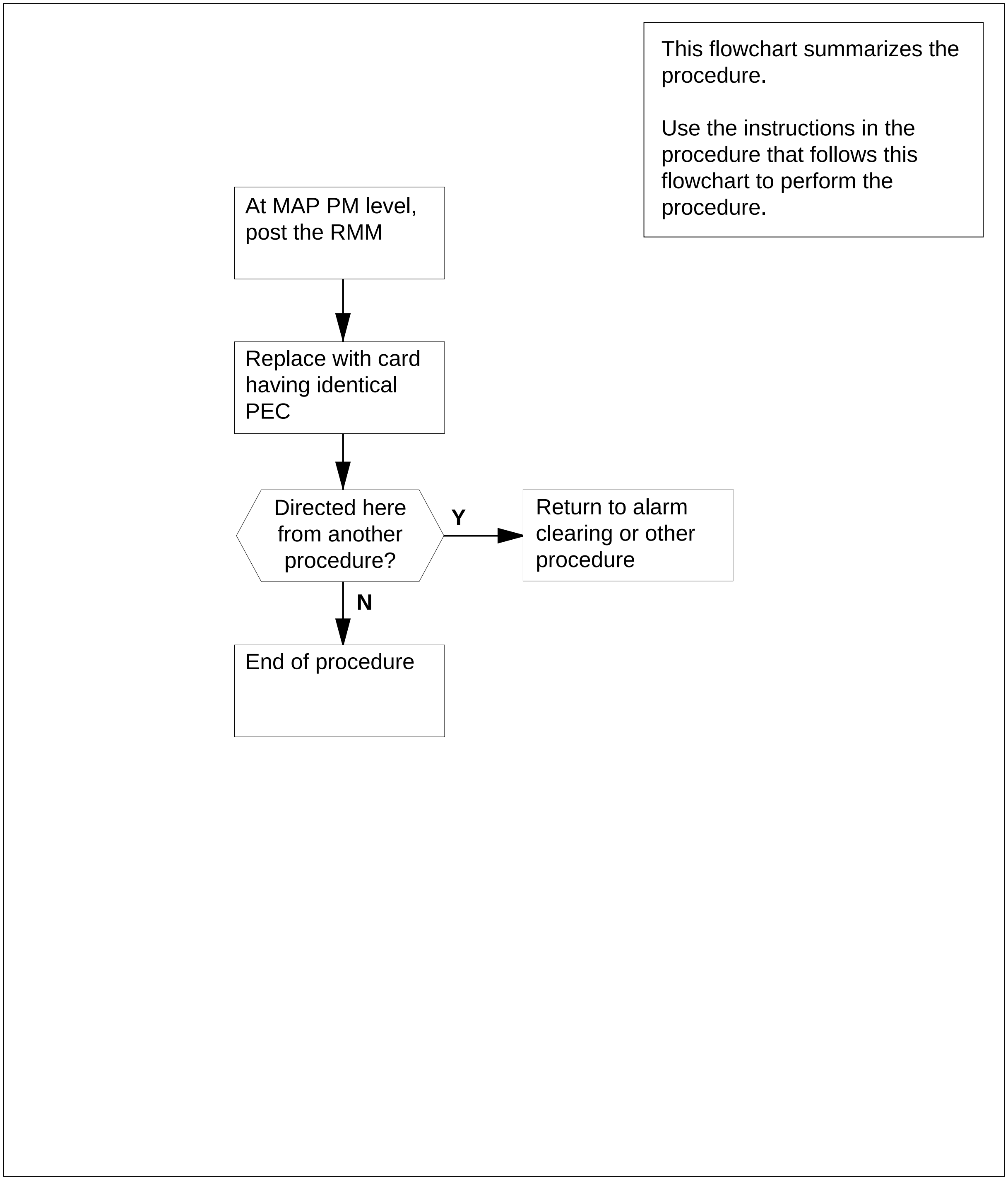
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X57 card in RSC-S RMM



NT2X57
in an RSC-S (DS-1) Model B 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 B 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

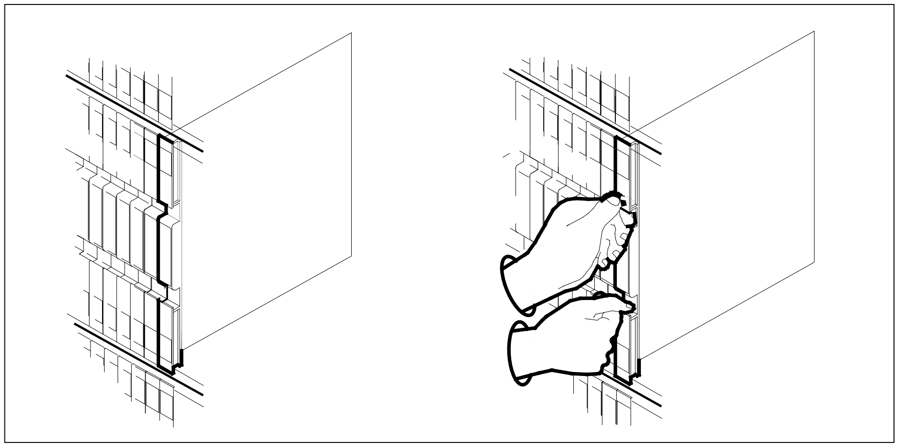
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

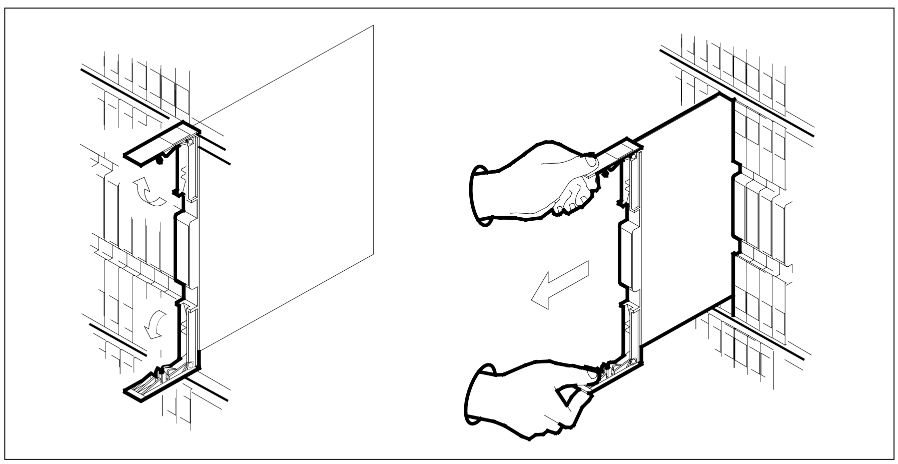
6 Remove the NT2X57 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT2X57
in an RSC-S (DS-1) Model B 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.

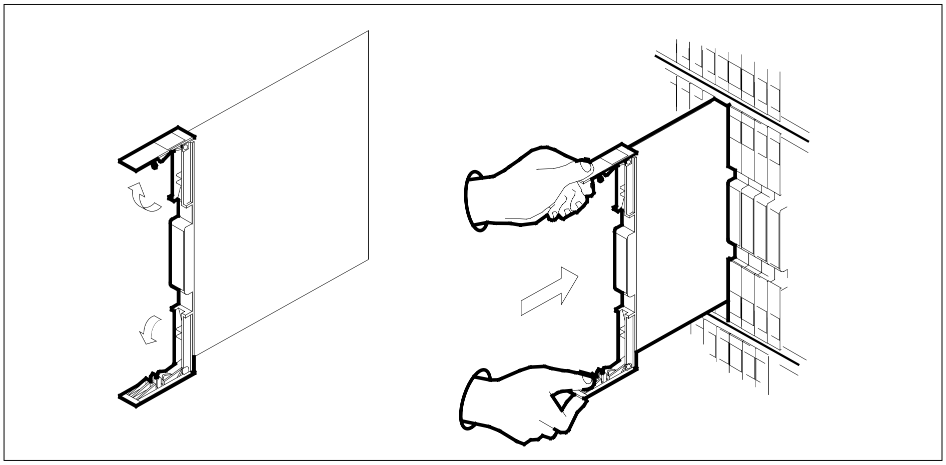


c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



8

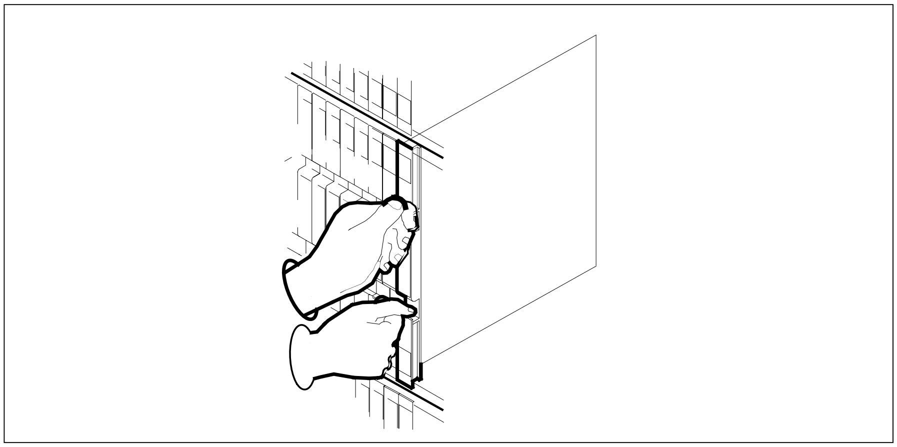
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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 B 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 B RMM

Application

Use this procedure to replace an NT2X59 card in an RSC-S RMM.

PEC	Suffixes	Name
NT2X59	AA	Group Codec

Common procedures

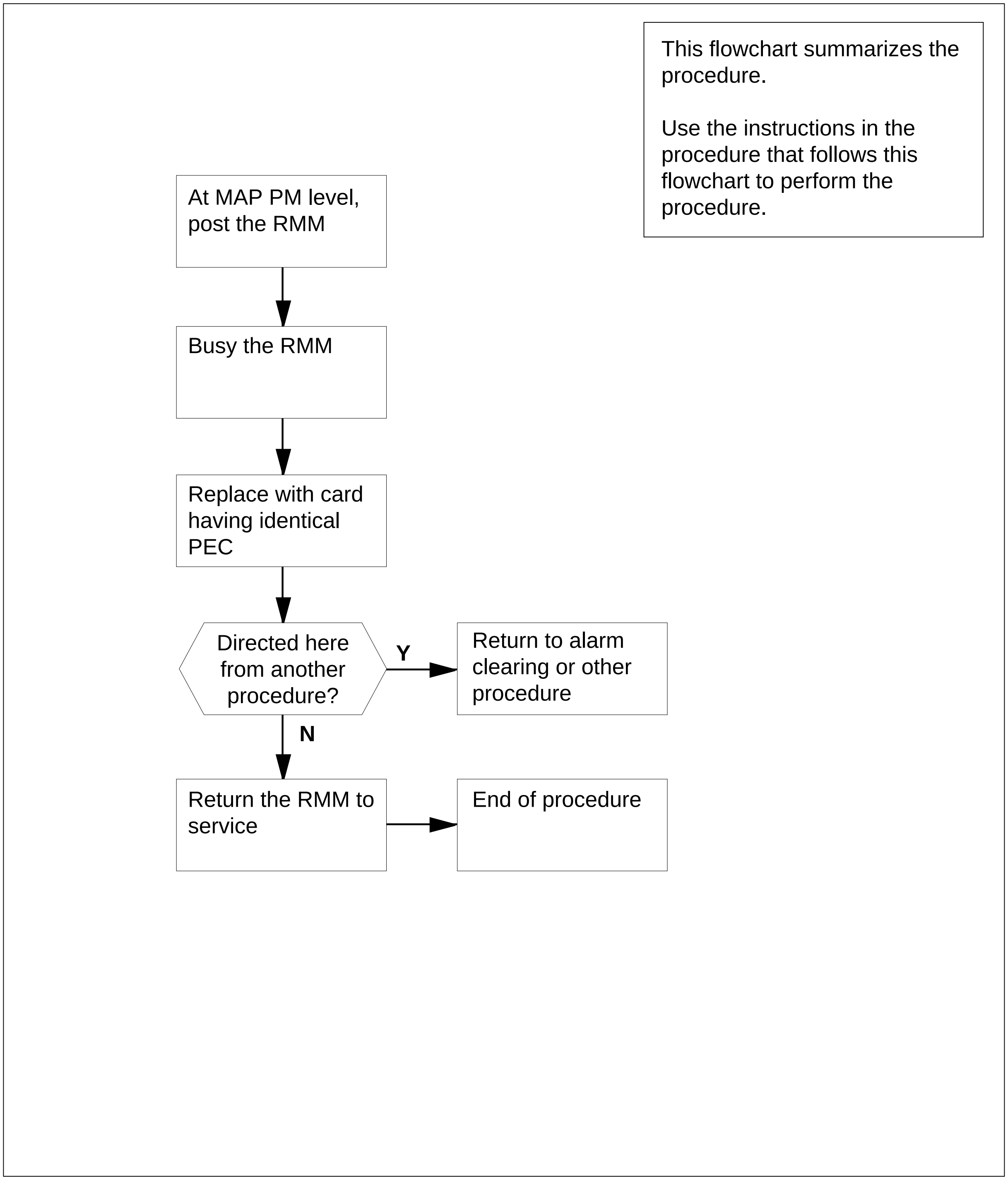
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X59 card in RSC-S RMM



NT2X59
in an RSC-S (DS-1) Model B 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 B 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

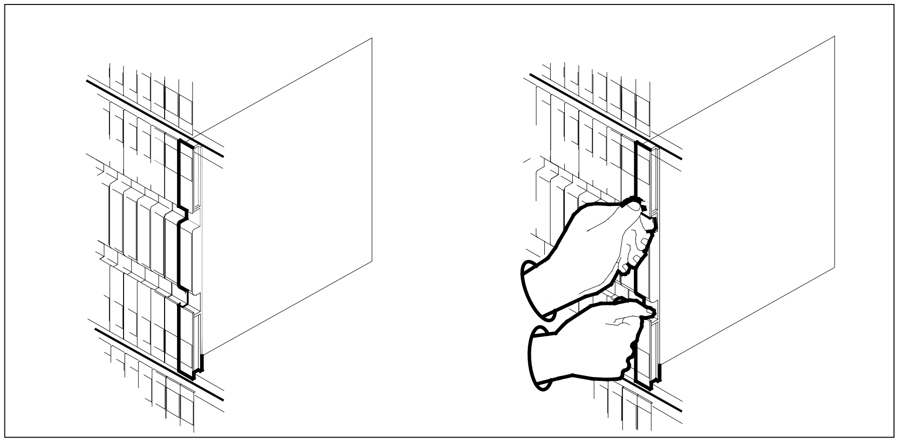
5

> **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.

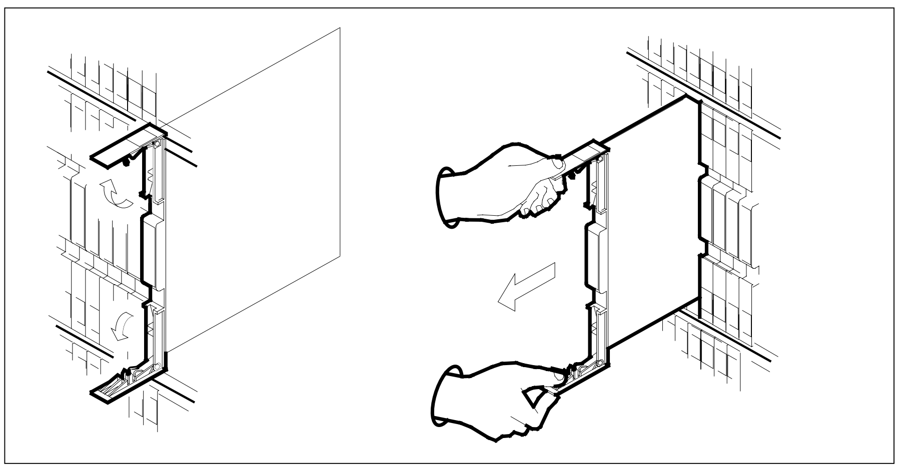
Put on a wrist strap.

6 Remove the NT2X59 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.



b Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



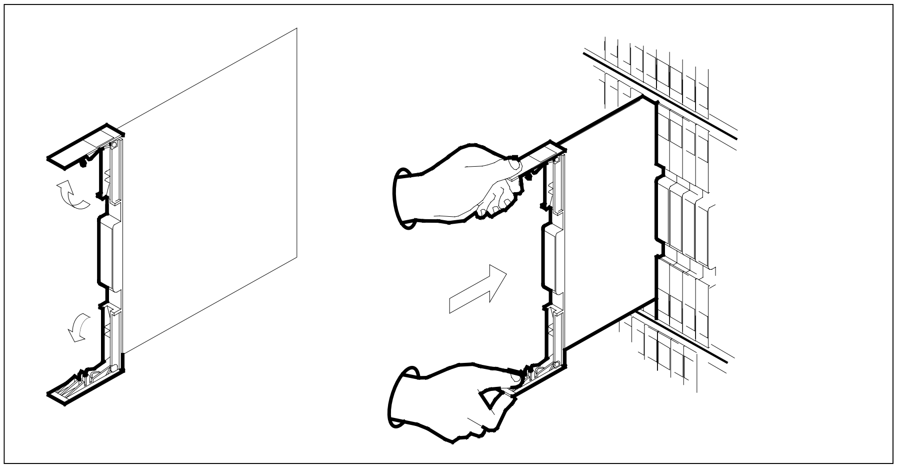
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



8

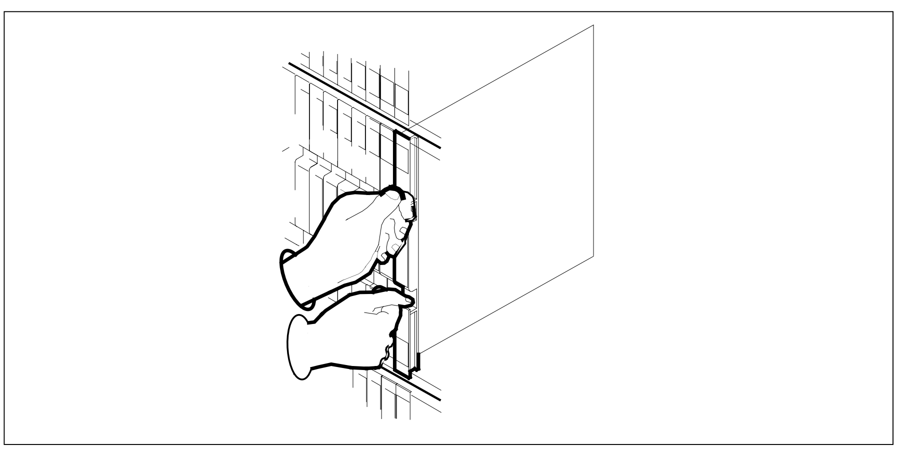
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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 B 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 B 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

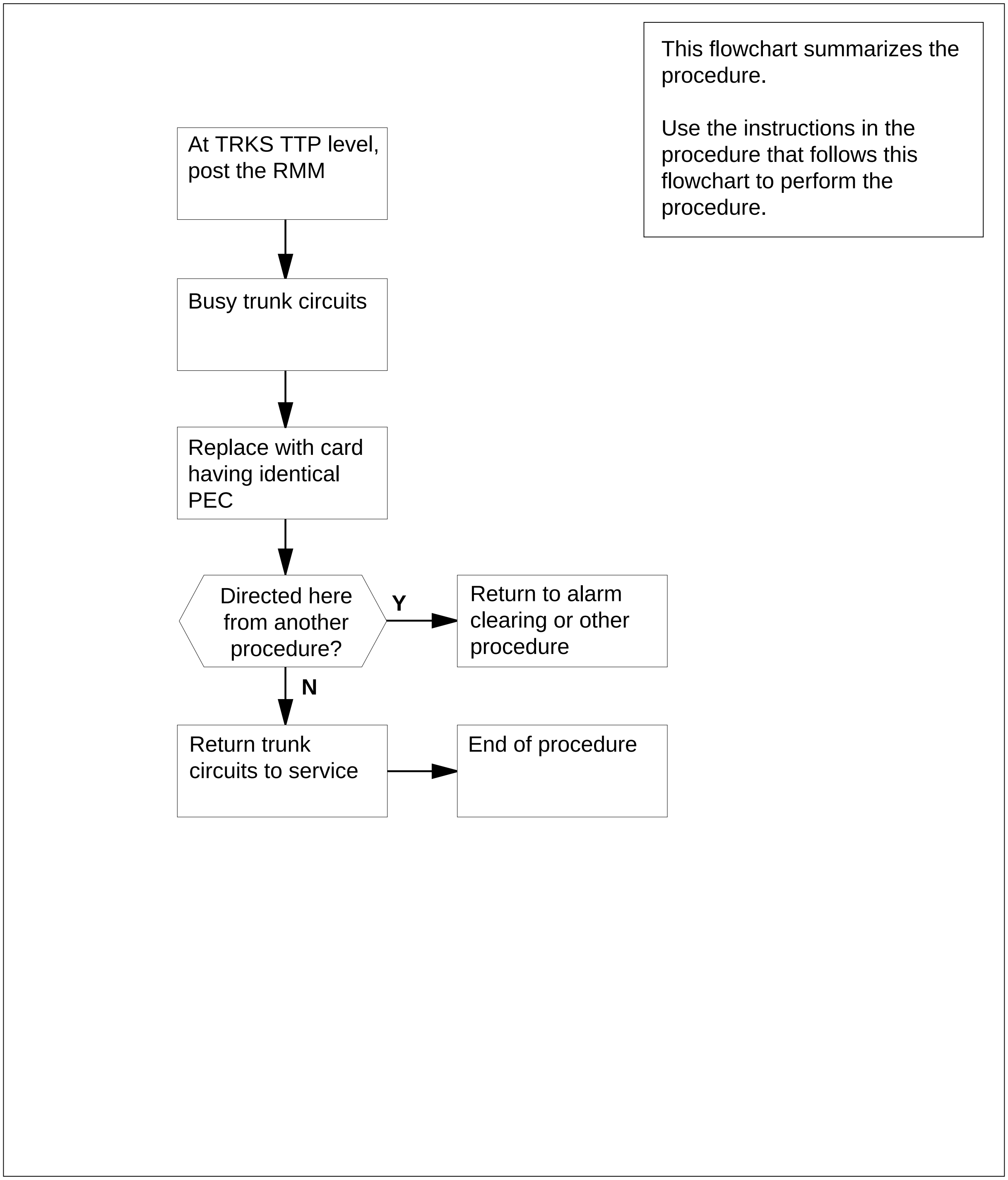
None

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 B RMM (continued)

Summary of card replacement procedure for an NT2X90 card in RSC-S RMM



NT2X90
in an RSC-S (DS-1) Model B 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.

Example of a MAP display:

NT2X90
in an RSC-S (DS-1) Model B RMM (continued)

```
 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

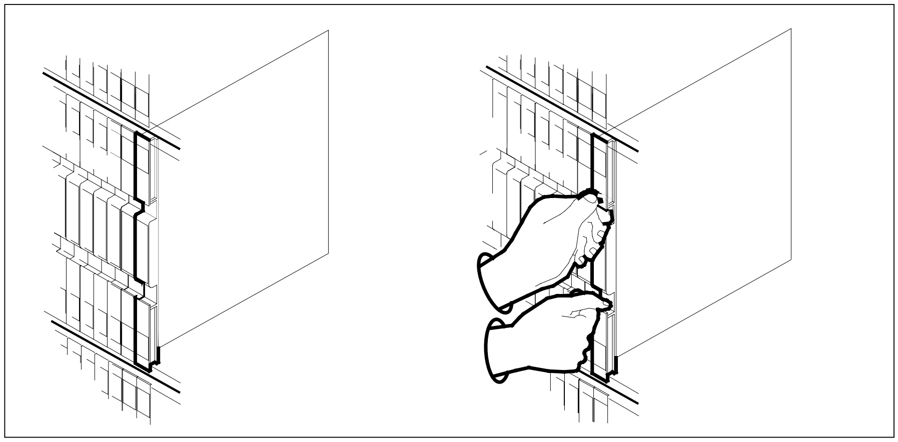
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

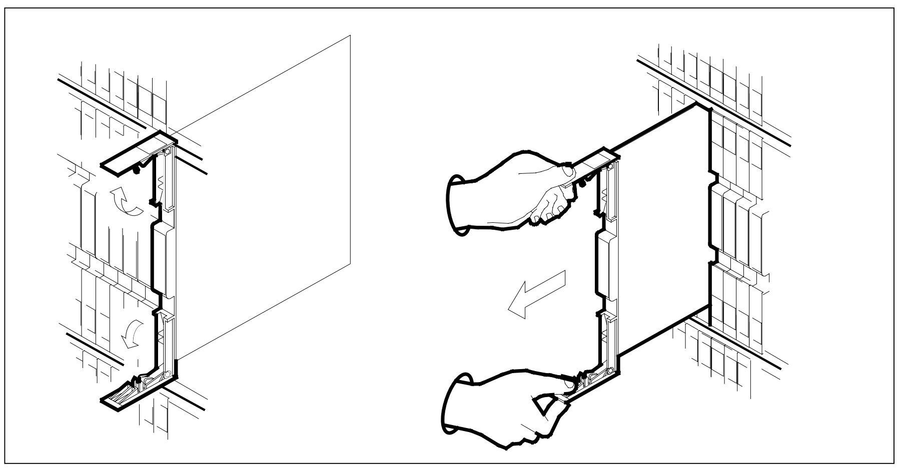
6 Remove the NT2X90 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT2X90
in an RSC-S (DS-1) Model B 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.



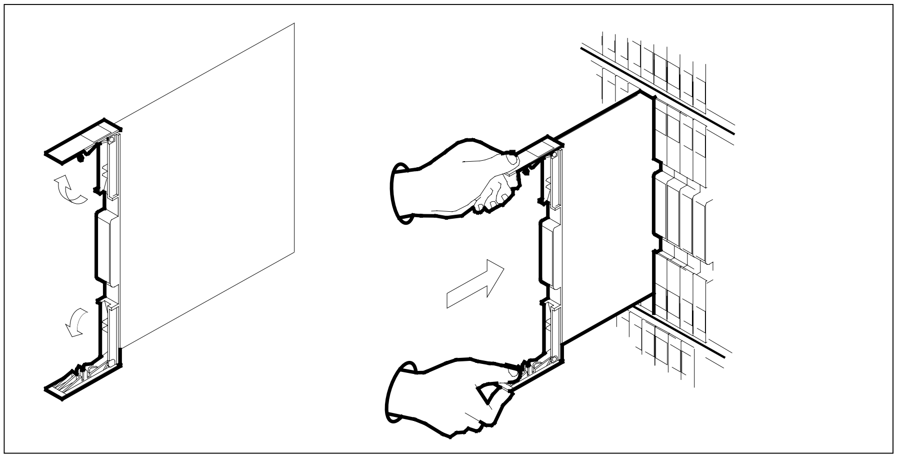
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

NT2X90
in an RSC-S (DS-1) Model B RMM (continued)



8

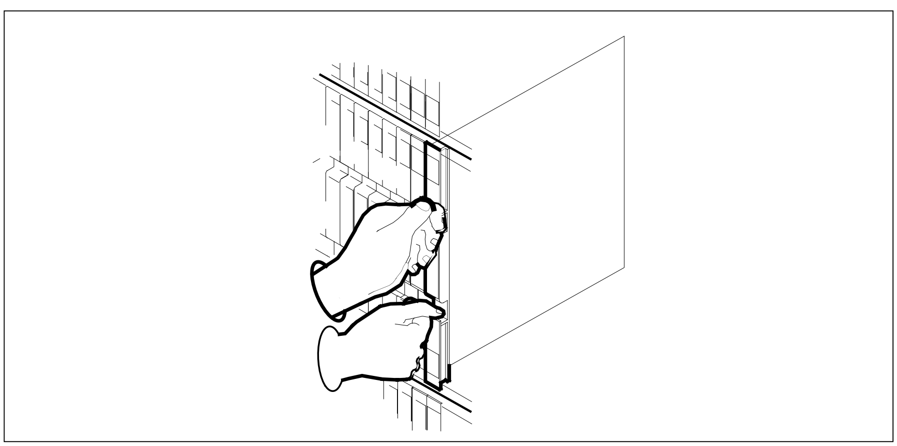
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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.



NT2X90
in an RSC-S (DS-1) Model B 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 B 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

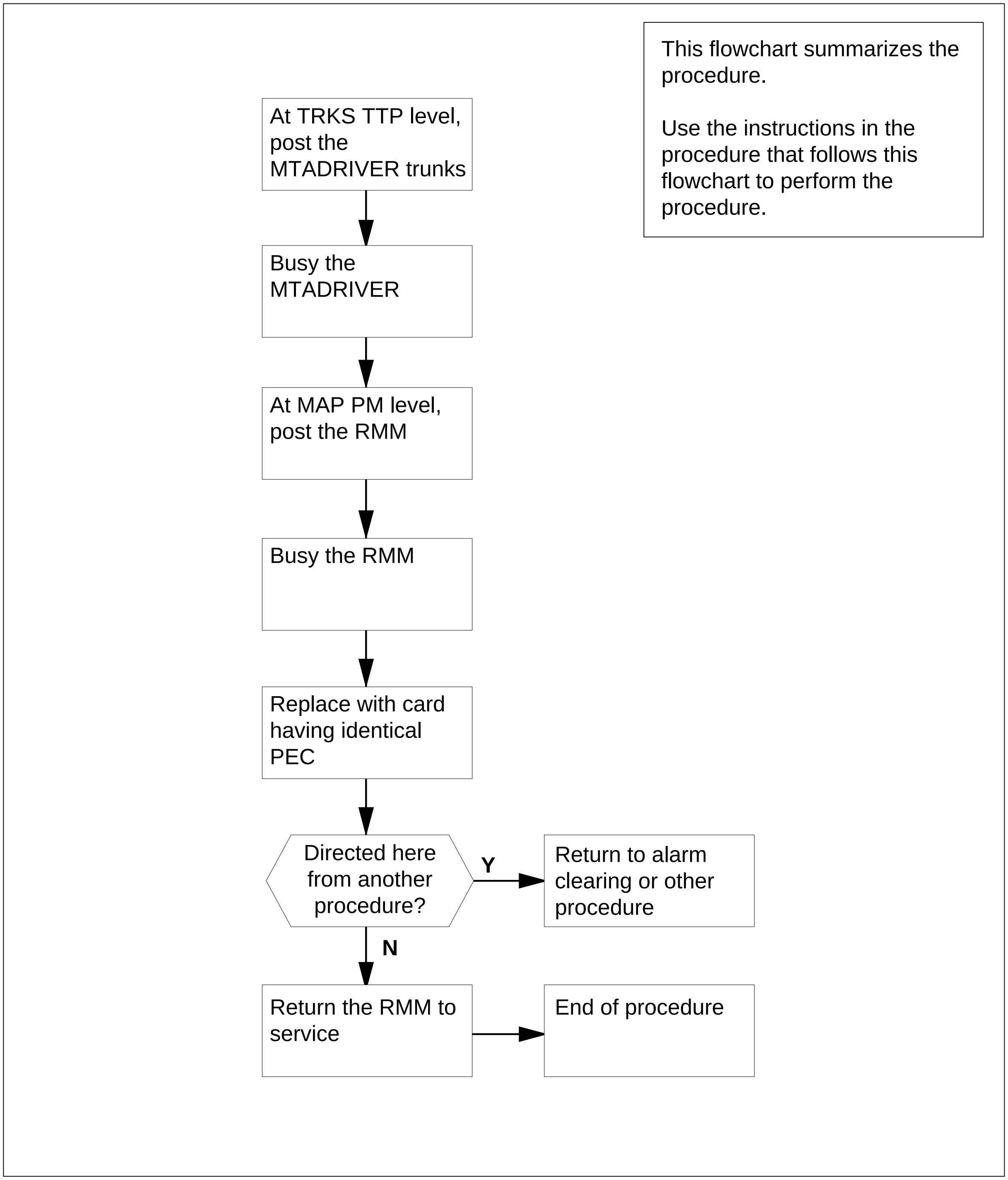
None

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 B RMM (continued)

Summary of card replacement procedure for an NT3X09 card in RSC-S RMM



NT3X09
in an RSC-S (DS-1) Model B 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.

Example of a MAP display:

NT3X09
in an RSC-S (DS-1) Model B 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 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

Example of a MAP display:

NT3X09
in an RSC-S (DS-1) Model B 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:

NT3X09
in an RSC-S (DS-1) Model B RMM (continued)

```
 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

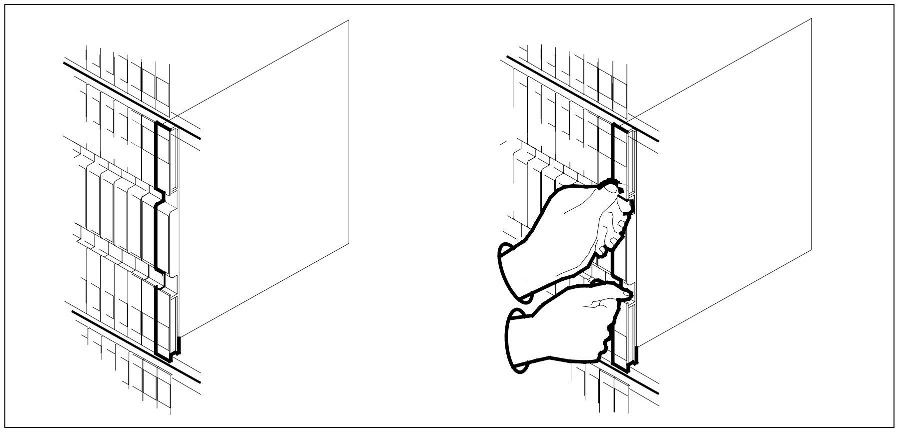
> **CAUTION**
> **Static discharge may cause damage to circuit packs**
> Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

Put on a wrist strap.

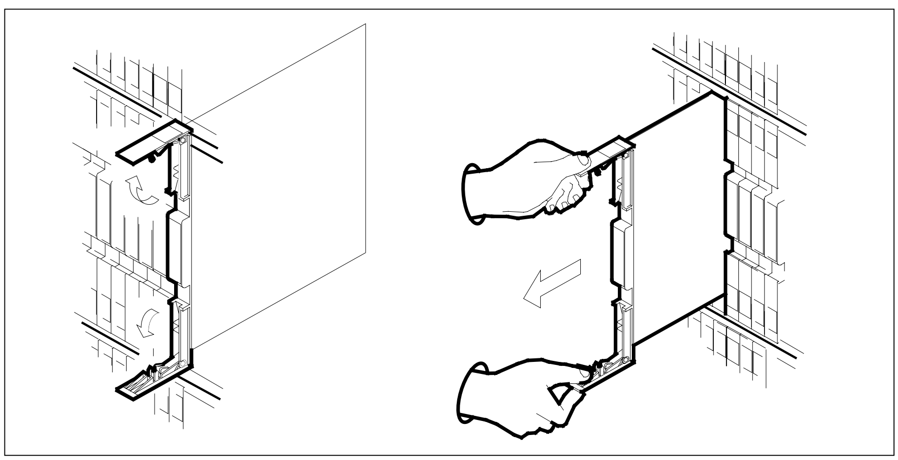
8 Remove the NT3X09 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT3X09
in an RSC-S (DS-1) Model B 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.



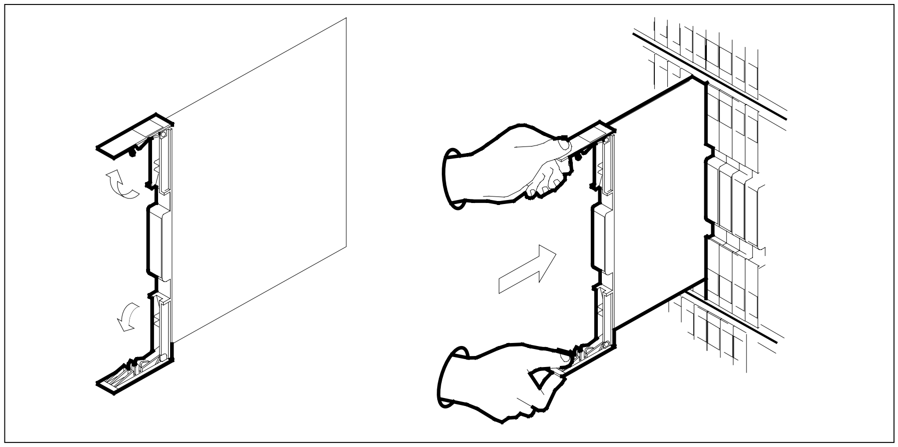
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



10

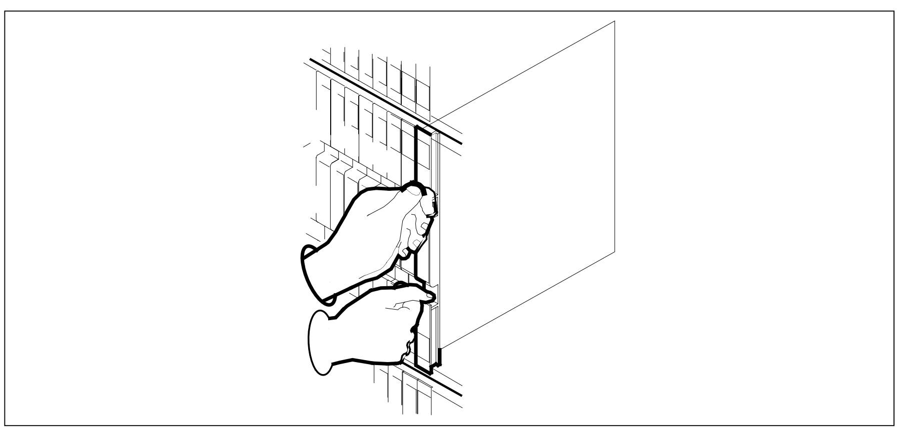
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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 B 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 B 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 B 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

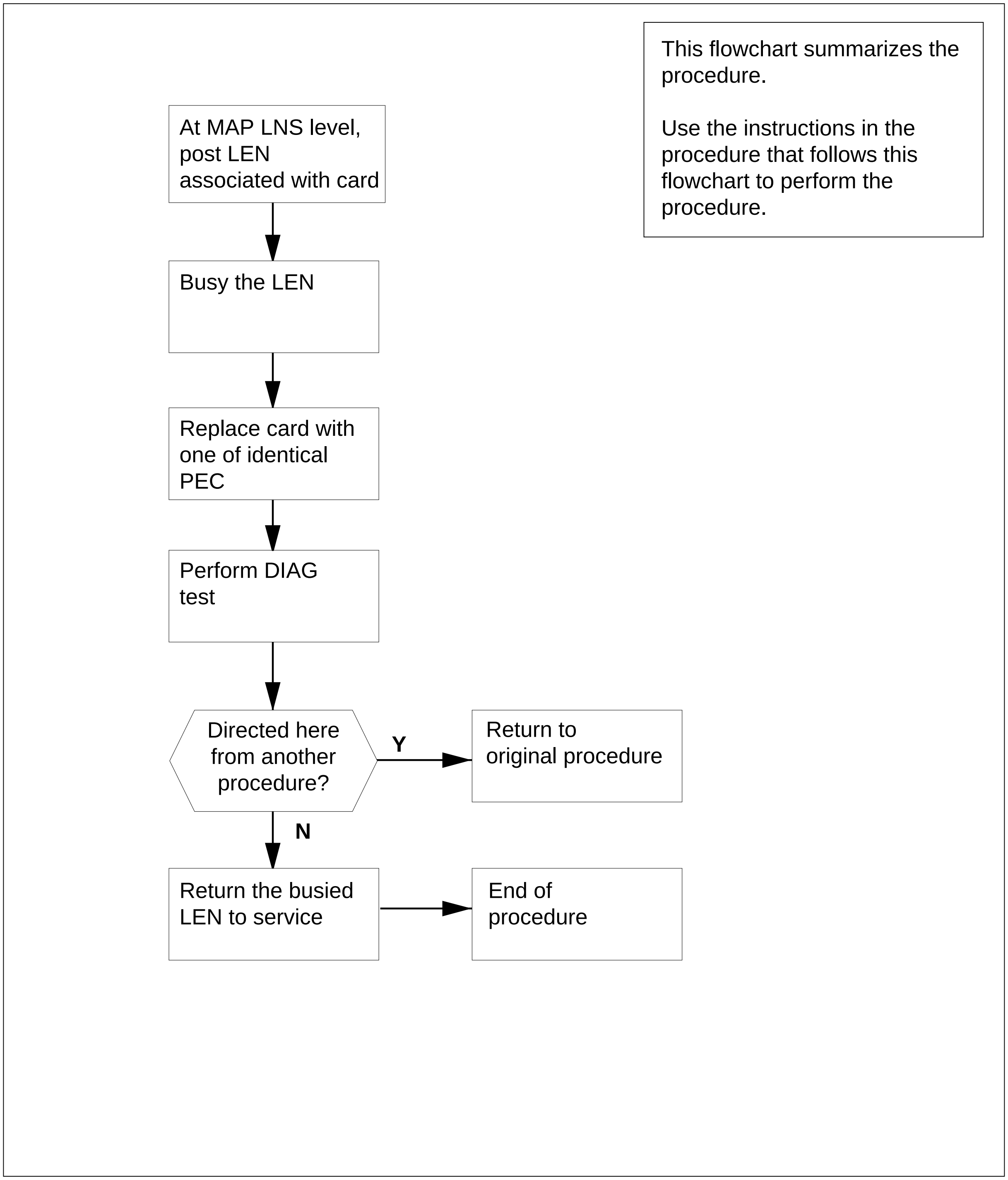
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X17 card in RSC-S LCME



NT6X17
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NT6X17
in an RSC-S (DS-1) Model B 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            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 B 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 modular supervisory panel (MSP) 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.

NT6X17
in an RSC-S (DS-1) Model B 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 B 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 B 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 B 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

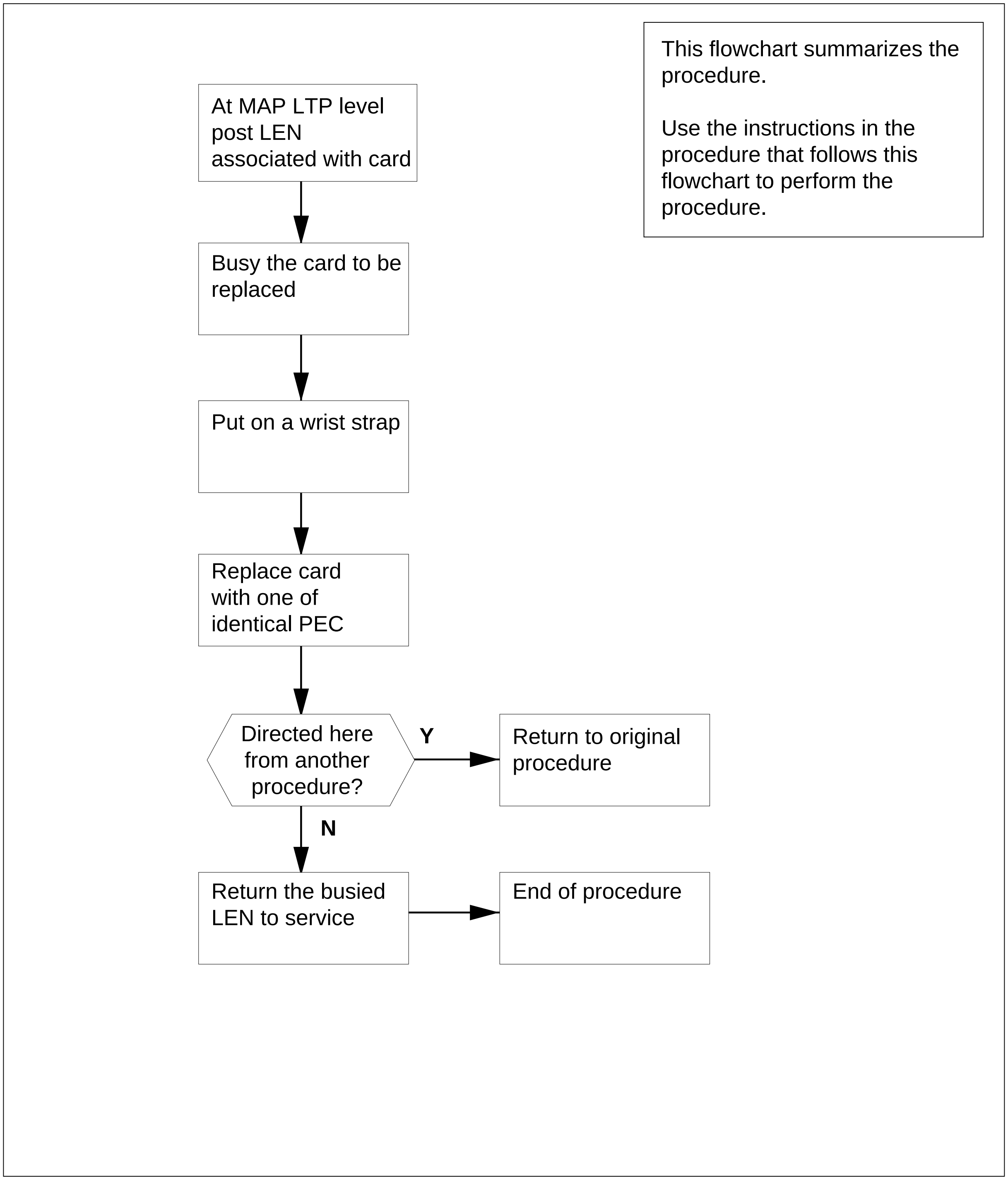
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X18 card in RSC-S LCME



NT6X18
in an RSC-S (DS-1) Model B 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 B 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 B 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 B 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 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 out the drawer until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.

c Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).

d While holding the drawer in this position push the bottom of the drawer, nearest the shelf with your left hand to a position about 1 cm (.5 in) to the right.

e Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.

f Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by using the following substeps:

a Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.

b Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.

c Squeeze the handles of the extractor together to grasp the card tightly.

d Hold the front cover of the line drawer to steady it using your left hand.

e Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

NT6X18 in an RSC-S (DS-1) Model B LCME (continued)

- **f** Continue pulling the card with the extractor until the card is clear of the shroud.
- **g** Insert the card removed into the ESD container and store using local procedures.

8 Replace the faulty card 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

> **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.

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

NT6X18
in an RSC-S (DS-1) Model B LCME (end)

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*.

11 Return the NT6X18 card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 13

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

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 B 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

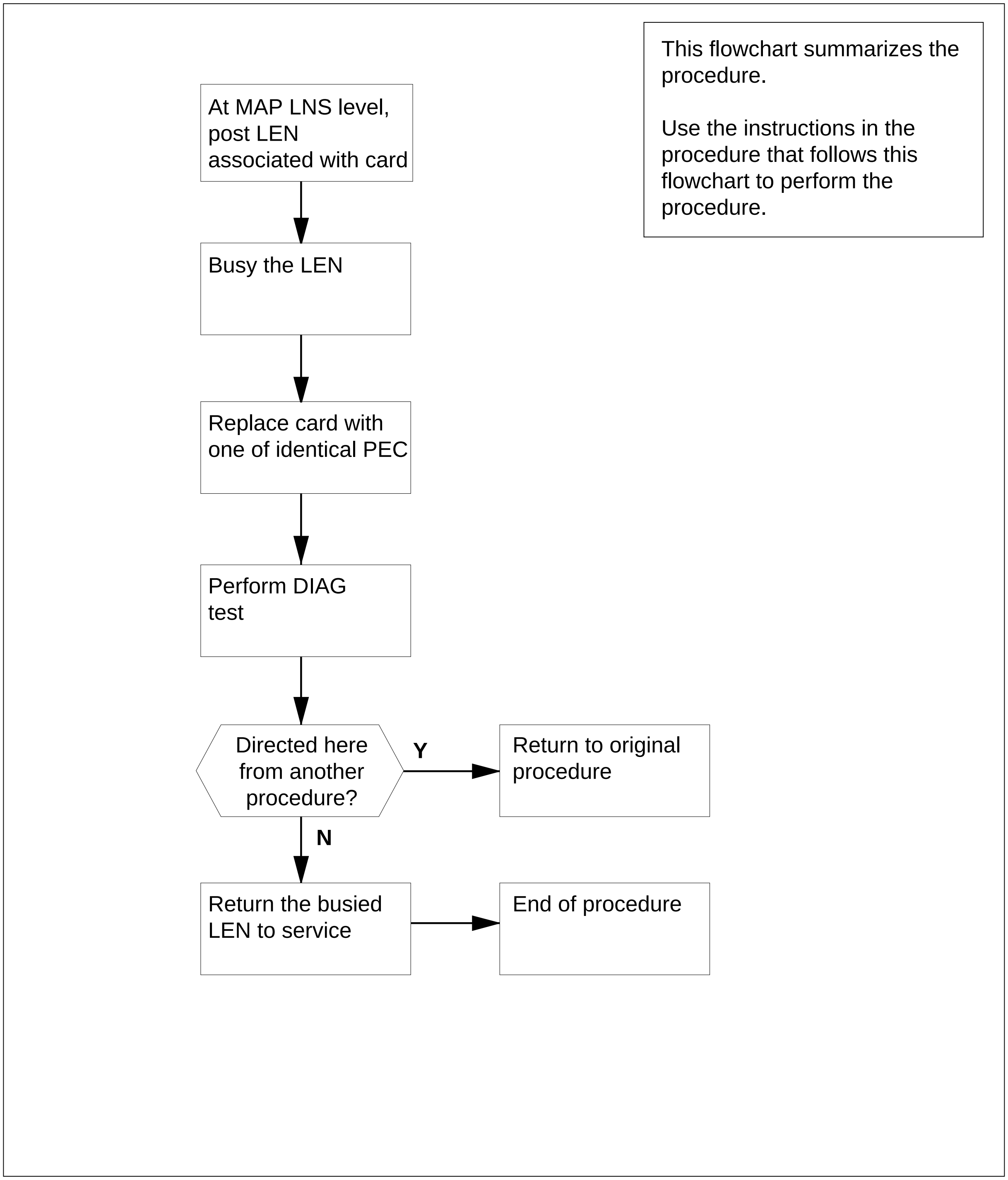
None

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 B LCME (continued)

Summary of card replacement procedure for NT6X19 card in RSC-S LCME



NT6X19
in an RSC-S (DS-1) Model B 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 B 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 B 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 modular supervisory panel (MSP) 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 B 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 B 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 B 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 B 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

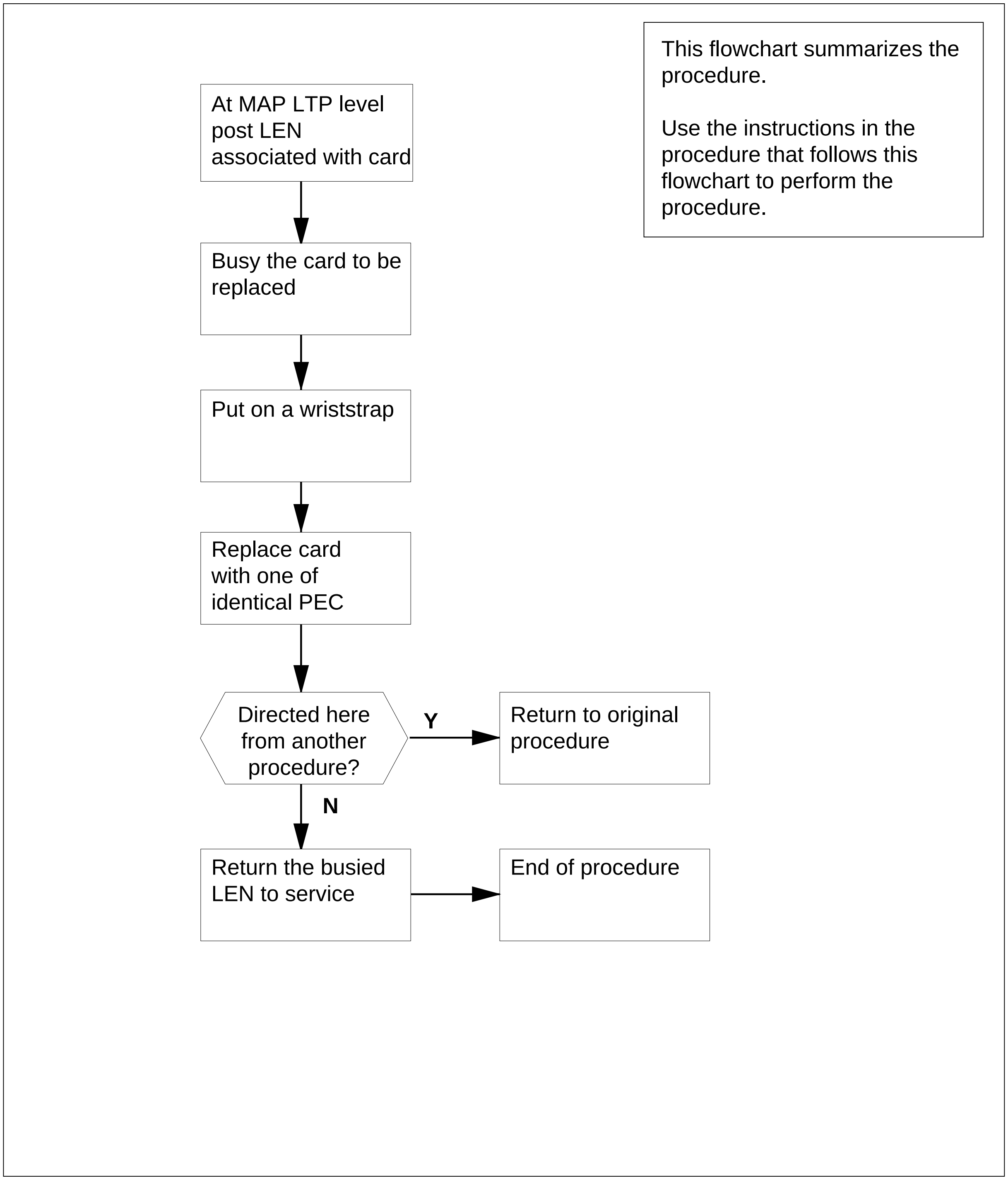
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X20 card in an RSC-S LCME



NT6X20
in an RSC-S (DS-1) Model B 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 B 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 B 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 modular supervisory panel (MSP) 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 B 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.

NT6X20
in an RSC-S (DS-1) Model B 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 14
other	step 10

At the MAP terminal

10 Test the NT6X20 line card by typing

`>DIAG`

and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 14

NT6X20
in an RSC-S (DS-1) Model B 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 B 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

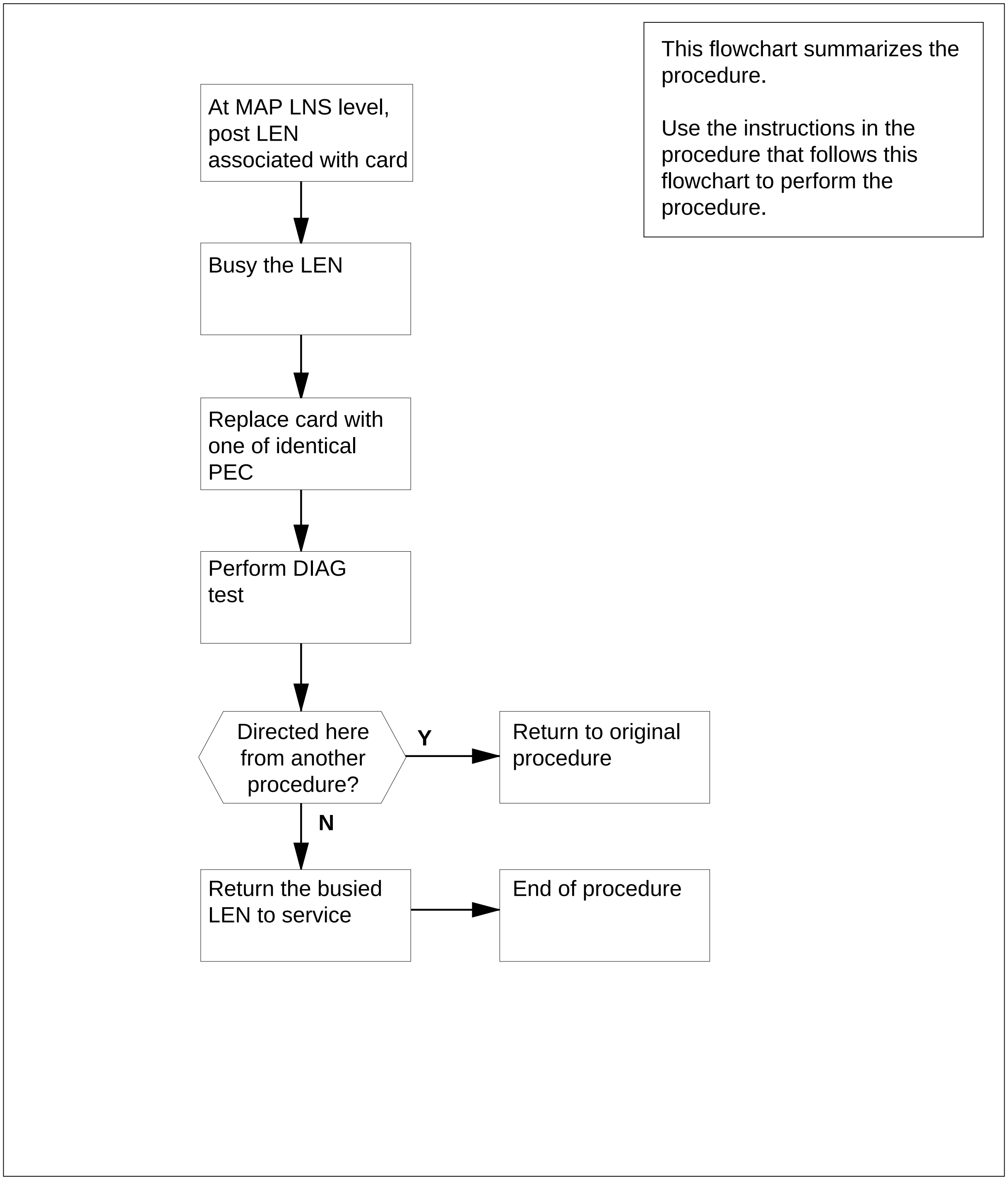
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X21 card in RSC-S LCME



NT6X21
in an RSC-S (DS-1) Model B 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 B 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 B 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 modular supervisory panel (MSP) 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 B 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 B 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 c
AD	step b

NT6X21
in an RSC-S (DS-1) Model B 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

	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**
Recommended application	**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	
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.

NT6X21 in an RSC-S (DS-1) Model B LCME (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 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 B LCME

Application

Use this procedure to replace an NT6X30 card in an RSC-S LCME.

PEC	Suffixes	Name
NT6X30	HA	Ringing Generator

Common procedures

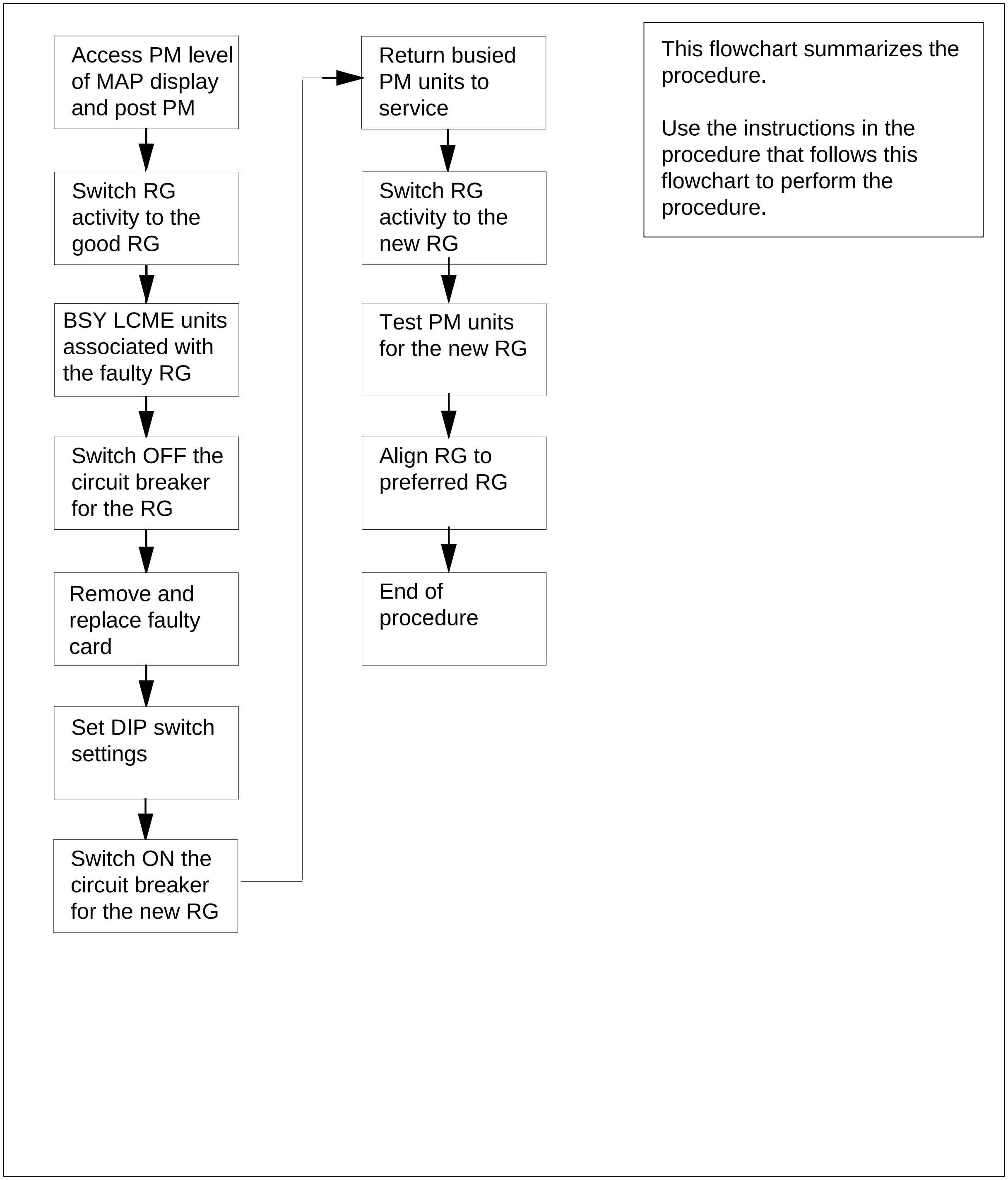
None

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 B LCME (continued)

Summary of replacing an NT6X30 card in RSC-S LCME



NT6X30 in an RSC-S (DS-1) Model B 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 RSC-S 14 0 ISTb Links  OOS: Cside 0 Pside 0
 Unit 0:ISTb       /RG:0
Unit 1: InSv      /RG:0

                           11  11  11  RG: Pref 0 ISTb
Drwr:  01  23  45  67  89  01 23  45      Stby 1 InSv
          ..  ..  ..  ..  ..  ..  ..  ..
```

NT6X30
in an RSC-S (DS-1) Model B LCME (continued)

4 Check the state of the PM units.

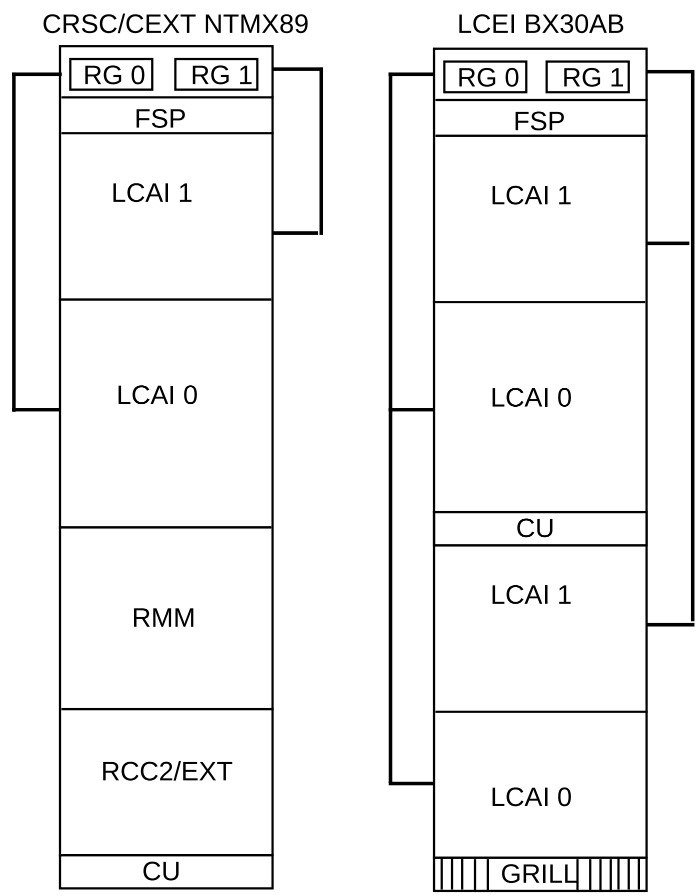
If the PM or PM units are	Do
`offl or SysB`	step 5
One unit is `InSv or ISTb` the other unit is `ISTb or SysB`	step 6

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 B 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 from the faulty unit, if necessary, by typing

>SWRG UNIT unit_no

and pressing the Enter key.

NT6X30
in an RSC-S (DS-1) Model B LCME (continued)

where

unit_no
is the PM unit number (0 or 1) assigned to the faulty RG

If the SWRG command	Do
passed	step 9
failed	step 38

9 Manually-busy (ManB) the PM unit associated with the faulty RG by typing

>BSY UNIT unit_no

and pressing the Enter key.

where

unit_no
is the PM unit number (0 or 1) associated with the faulty RG

Note: If clearing a critical alarm choose either unit to work on.

Example of a MAP response:

```
LCME RSC-S 14 0 Unit 0 Bsy Passed
```

Note: Repeat this command for the other PM in the frame.

10 The next action depends on how many LCMEs are provisioned in the equipment frame.

If there	Do
is one LCME provisioned in the frame	step 14
two LCMEs provisioned in the frame, and you have not switched RG activity for both LCMEs	step 11
two LCMEs provisioned in the frame, and you have switched RG activity for both LCMEs	step 12

11 Repeat step 3 through step 10 for the other LCME provisioned in the equipment frame.

12 Post both PMs in the frame and ensure all units are now on the good RG by typing

>POST LCME site frame_no lcme_no site frame_no lcme_no

and pressing the Enter key.

where

site
is the PM location (alphanumeric) of the first LCME

NT6X30
in an RSC-S (DS-1) Model B 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 RSC-S 14 0 RSC-S 14 1

Example of a MAP display:

```
LCME RSC-S 14 0 ISTb Links  OOS: Cside 0 Pside 0
 Unit 0:ISTb       /RG:1
Unit 1: InSv      /RG:1
                             11  11  11  RG: Pref 0 ISTb
Drwr:  01  23  45  67  89  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 RSC-S 14 1 ISTb Links  OOS: Cside 0 Pside 0
 Unit 0:ISTb       /RG:1
Unit 1: InSv      /RG:1
                             11  11  11 RG: Pref 0 ISTb
Drwr:  01  23  45  67  89  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 B 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 modular supervisory panel (MSP) 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 MSP as described below. Do not proceed until you have located and switched OFF the correct circuit breaker for the RG you are replacing.

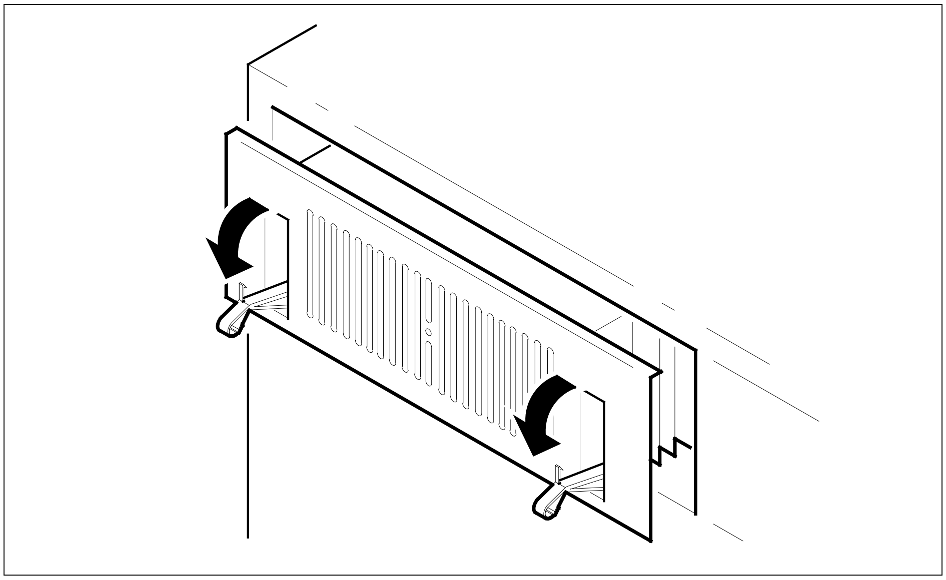
Turn the circuit breaker that powers the faulty ringing generator OFF. Ensure that ringing generator 0 is on circuit breaker 03-65-01. Ensure that ringing generator 1 is on circuit breaker 03-65-02.

16

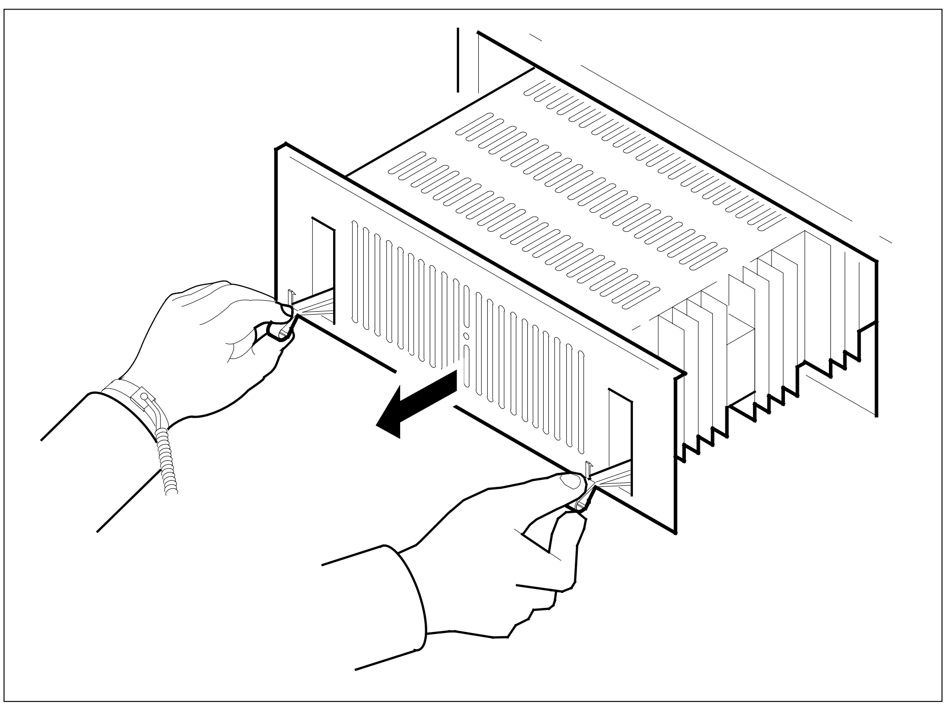
> **WARNING**
> **Do not hold the card by the levers only**
> Holding a card by the locking levers only may break one or both levers. Once the card has been pulled half way out of the shelf, carefully grasp the card underneath for more secure support and continue to remove the card from the shelf. Avoid 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 B 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 B 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.

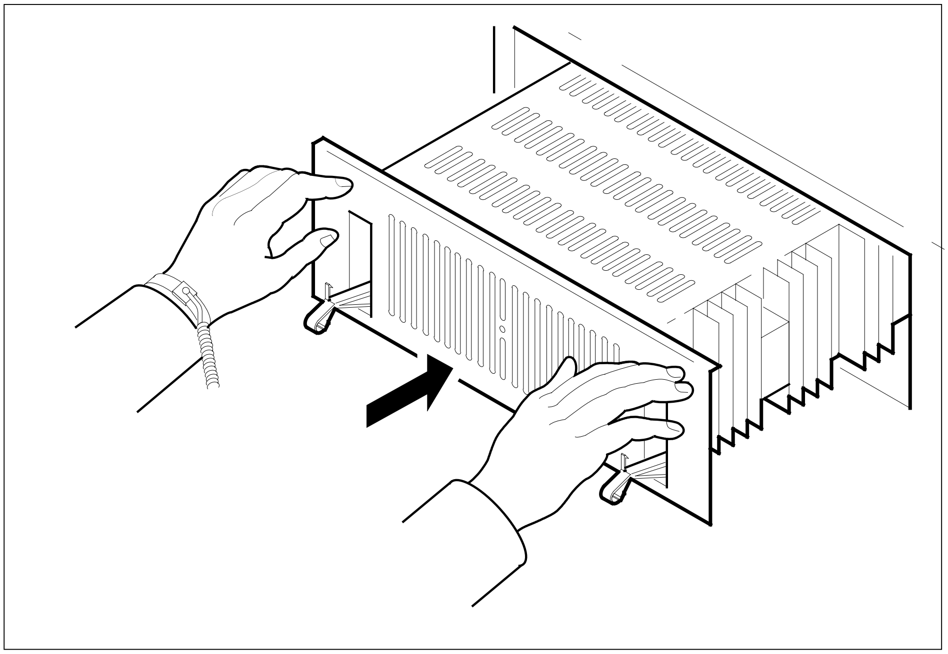
Note: If you are replacing an older version of the NT6X30 with a newer version (newer versions have suffixes BB, CA, DB, HA, or JA), switch 8 must be in the ON position on the replacement card. If in doubt, contact your next level of support.

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.

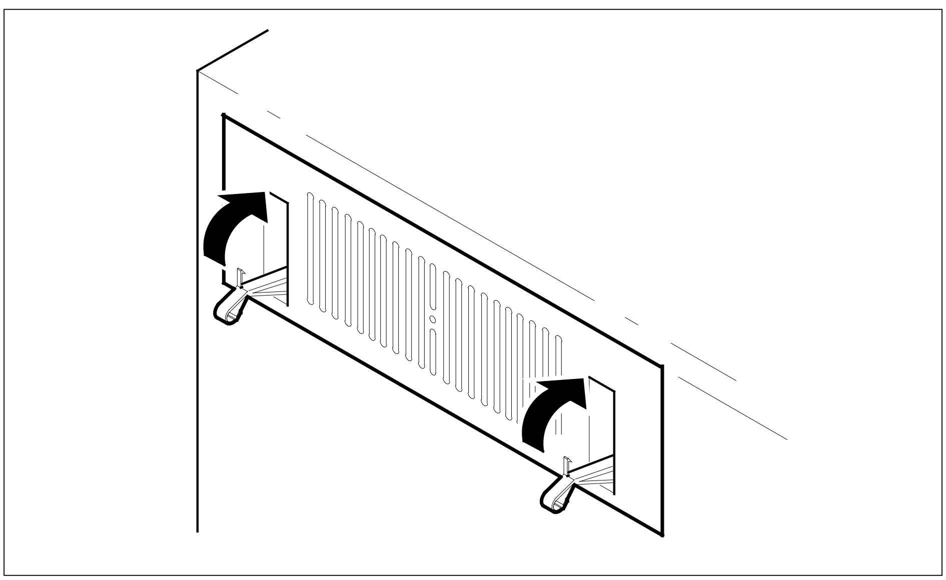
NT6X30
in an RSC-S (DS-1) Model B LCME (continued)



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 B 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 B 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 RSC-S 14 0 InSv Links  OOS: Cside 0 Pside 0
 Unit 0:  InSv      /RG:1
Unit 1: InSv      /RG:1

                           11  11  11 RG: Pref 0 InSv
Drwr:  01  23  45  67  89  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 RSC-S 14 0 Unit 1  InSvce Tests Initiated
LCME RSC-S 14 0 Unit 0  InSvce Tests Initiated
LCME RSC-S 14 0 Unit1  Tst Passed
LCME RSC-S 14 0 Unit 0  Tst Passed
```

If the TST command	Do
passed	step 32
failed	step 35

32 Align RG activity to the preferred RG by typing

>SWRG UNIT unit_no

NT6X30
in an RSC-S (DS-1) Model B LCME (end)

and pressing the Enter key.

where

unit_no
is the PM unit number (0 or 1)

Example of a MAP display:

```
LCME RSC-S 14 0 InSv Links  OOS: Cside 0 Pside 0
  Unit 0: InSv      /RG:0
Unit 1: InSv      /RG:0

                           11  11  11  RG: Pref 0 InSv
Drwr:  01  23  45  67  89  0123  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.

NT6X51
in an RSC-S (DS-1) Model B LCME

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

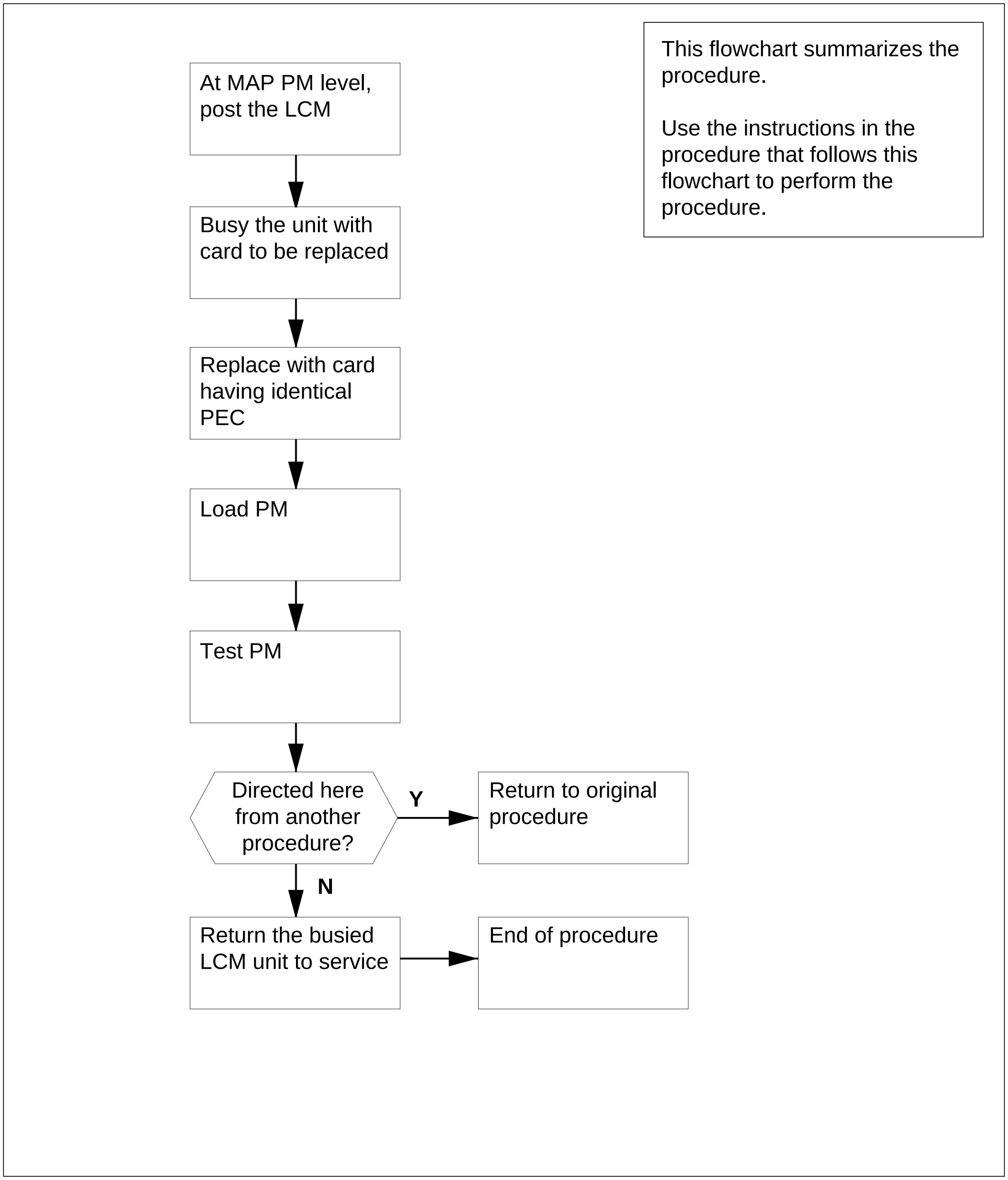
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X51 card in RSC-S LCM



NT6X51
in an RSC-S (DS-1) Model B LCME (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 Access the PM level of the MAP display and post the LCM with the faulty NT6X51 card by typing

>MAPCI;MTC;PM;POST LCM lcm_site_name lcm_frame_no lcm_no

and pressing the Enter key.

Example of a MAP response:

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 unit associated with the faulty card by typing

>BSY UNIT lcm_unit_no

and pressing the Enter key.

NT6X51
in an RSC-S (DS-1) Model B LCME (continued)

where

lcm_unit_no
is the number of the LCM unit associated with the faulty NT6X51 card

Example of a MAP response:

```
LCM    RemL  OO O ISTb   Links_OOS: CSide 1 PSide 0
Unit-0:  InSv  Mtce TakeOver   /RG:  0
Unit-1:  ManB  Mtce            /RG:  0
                      11 11 11 11 11       RG:Pref:0 InSv
Drwr:  01 23 45 67 89 01 23 45 67 89          Stby:1 InSv
       .. .. .. .. .. .. .. .. .. ..
```

At the LCE frame

4

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.

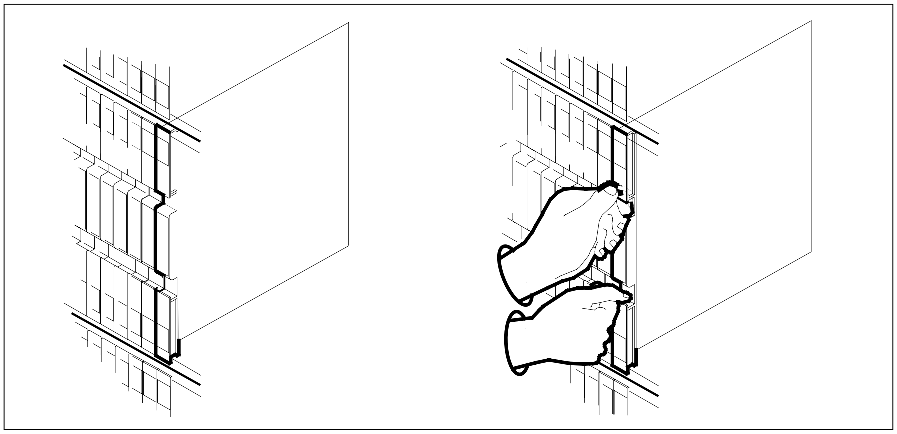
DANGER
Static electricity damage
Before removing any cards, put on a wriststrap and connect it to the wriststrap grounding point on the left side of the modular supervisory panel (MSP) of the LCM. This protects the equipment against damage caused by static electricity.

Put on a wriststrap.

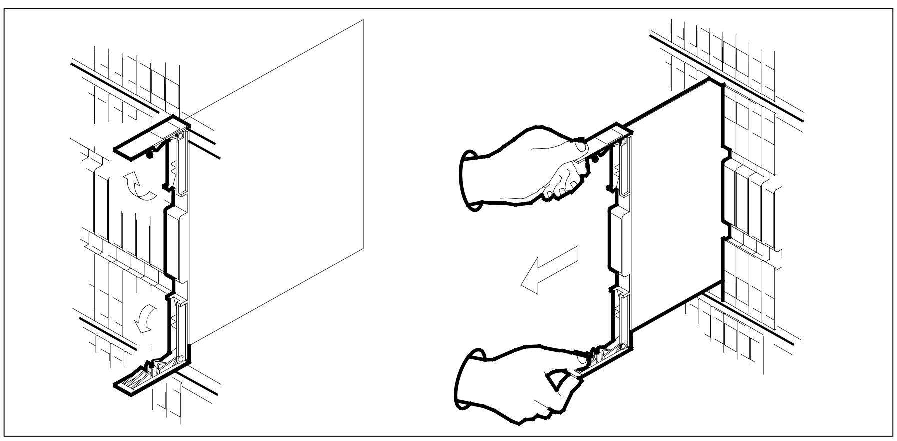
5 Remove the NT6X51 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT6X51 in an RSC-S (DS-1) Model B 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.



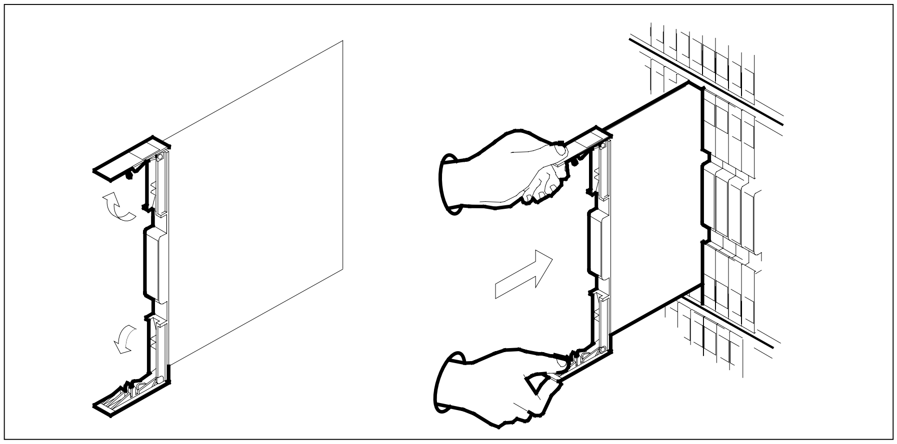
c Ensure the replacement card has the same PEC, including suffix, as the card just removed.

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 B LCME (continued)



7

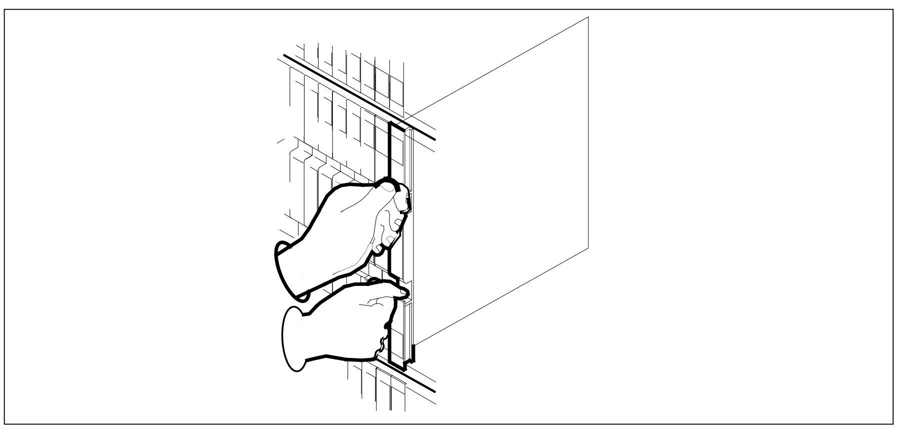
DANGER
Equipment damage
Take the following precautions when removing or inserting a card:

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 B LCME (end)

8 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 13
other	step 9

At the MAP terminal

9 Load the inactive LCM unit by typing

***>loadpm unit* lcm_unit_no CC**

and pressing the Enter key.

where

lcm_unit_no
is the number of the LCM unit busied in step 3

If load	Do
passed	step10
failed	step 14

10 Return the LCM unit to service by typing

>RTS UNIT lcm_unit_no

and pressing the Enter key.

where

lcm_unit_no
is the number of the LCM unit busied in step 3

If RTS	Do
passed	step 11
failed	step 14

11 Send any faulty cards for repair according to local procedure.

12 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 15.

13 Return to the Alarm Clearing Procedures that directed you to this procedure and continue as directed.

14 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

15 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X52 in an RSC-S (DS-1) Model B 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

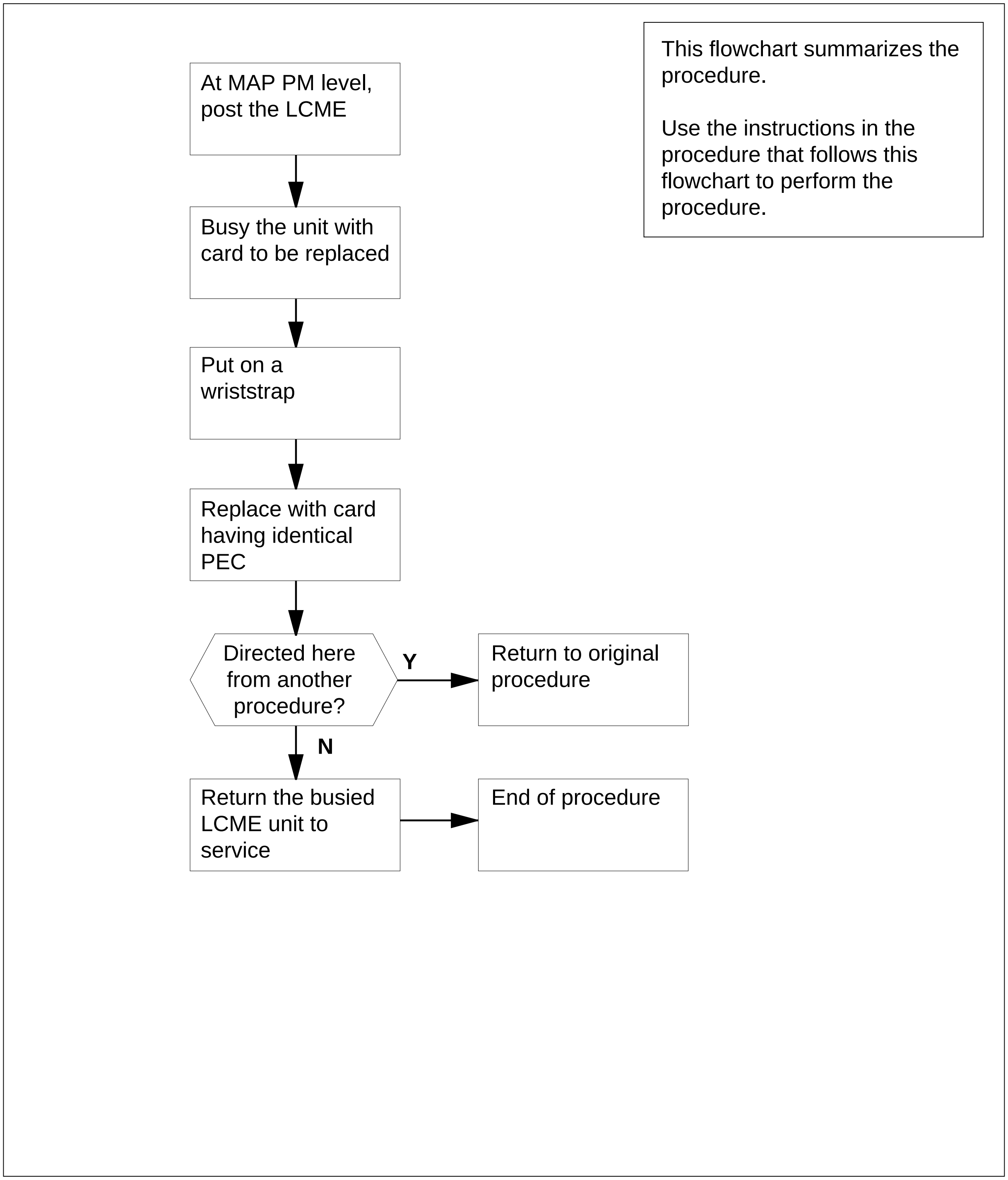
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X52 card in RSC-S LCME



NT6X52 in an RSC-S (DS-1) Model B LCME (continued)

Replacing an NT6X52 card in RSC-S LCME

At your Current Location

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP to the PM level and post the LCME by typing

>MAPCI;MTC;PM;POST LCME lcme_site_name lcme_frame_no lcme_no

and pressing the Enter key.

where

lcme_site_name
is the name of the site at which the LCME is located

lcme_frame_no
is the number of the frame in which the LCME is located

lcme_no
is the number of the LCME unit with the faulty card

Example of a MAP response:

```
 CM     MS     IOD    Net    PM    CCS    LNS    Trks    Ext     Appl
 .      .      .      .      .     .      .      .       .       .

LCME                 SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM         0        0        0        0        0       130
 2 Post_   LCME       0        0        0        0        0         0
 3
 4 Swrg_    LCME   RemL  OO O Links_OOS:  CSide 0
 5 Trnsl_   Unit 0:  InSv               /RG:  0
 6 Tst_     Unit 1:  InSv               /RG:  1
 7 Bsy_                       11 11 11       RG:Pref:0 InSv
 8 RTS_      Drwr: 01 23 45 67 89 01 23 45          Stby:1 InSv
 9 OffL_    .. .. .. .. .. ..
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

NT6X52
in an RSC-S (DS-1) Model B 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 B 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 modular supervisory panel (MSP) 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:

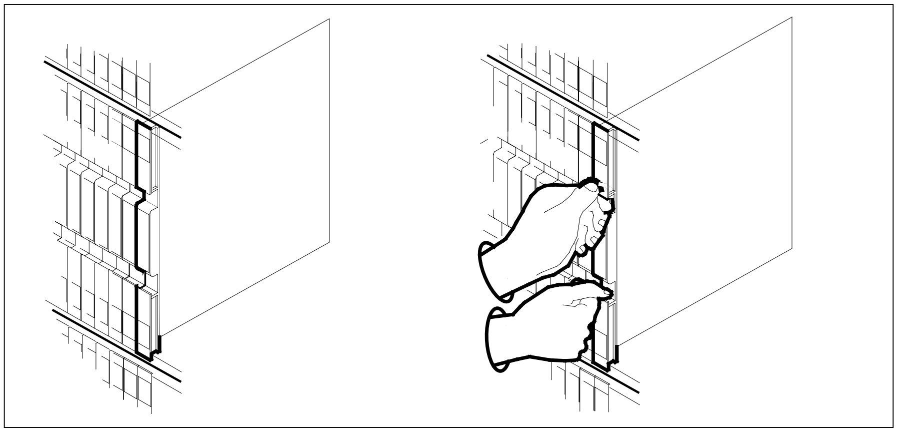
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wriststrap.

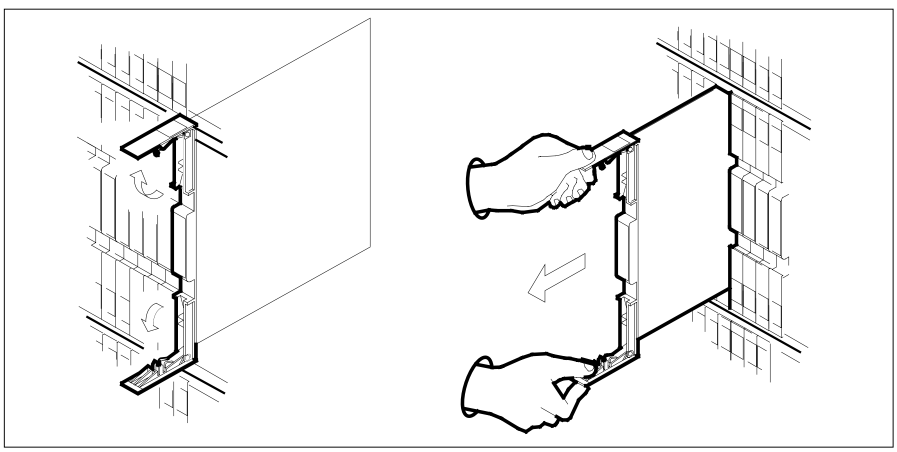
6 Remove the NT6X52 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT6X52
in an RSC-S (DS-1) Model B 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.



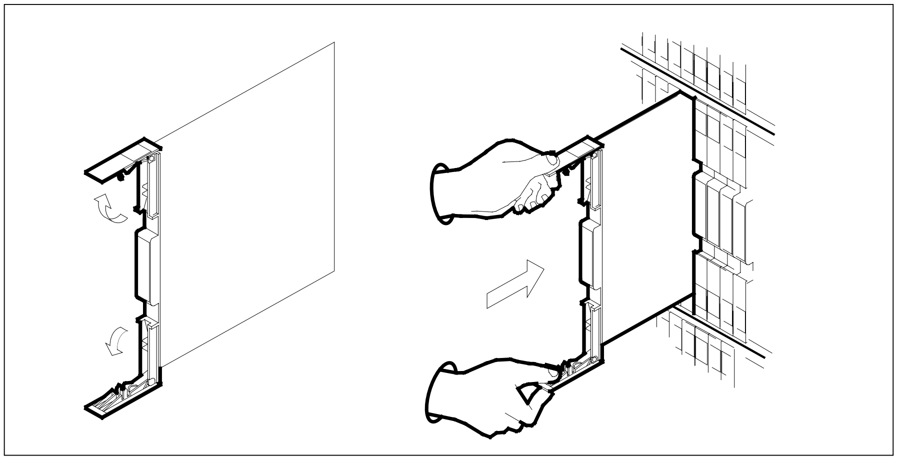
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B LCME (continued)



8

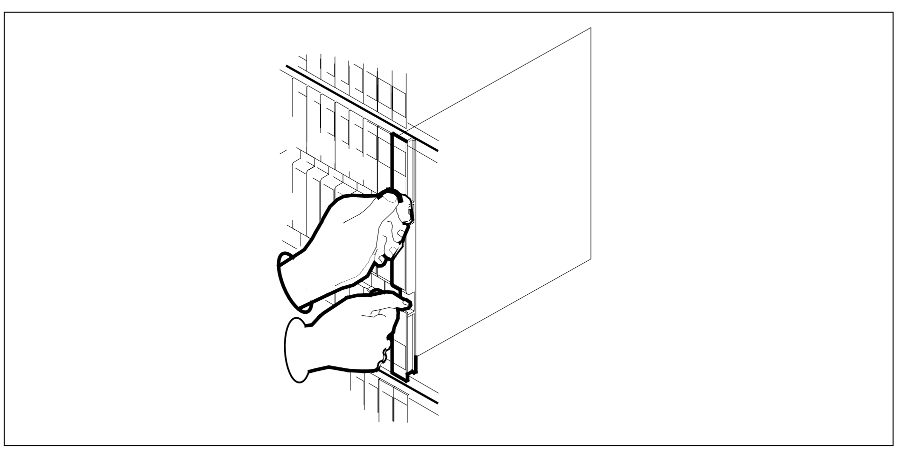
DANGER
Equipment damage
Take the following precautions when removing or inserting a card:

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 B 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 B 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 B 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

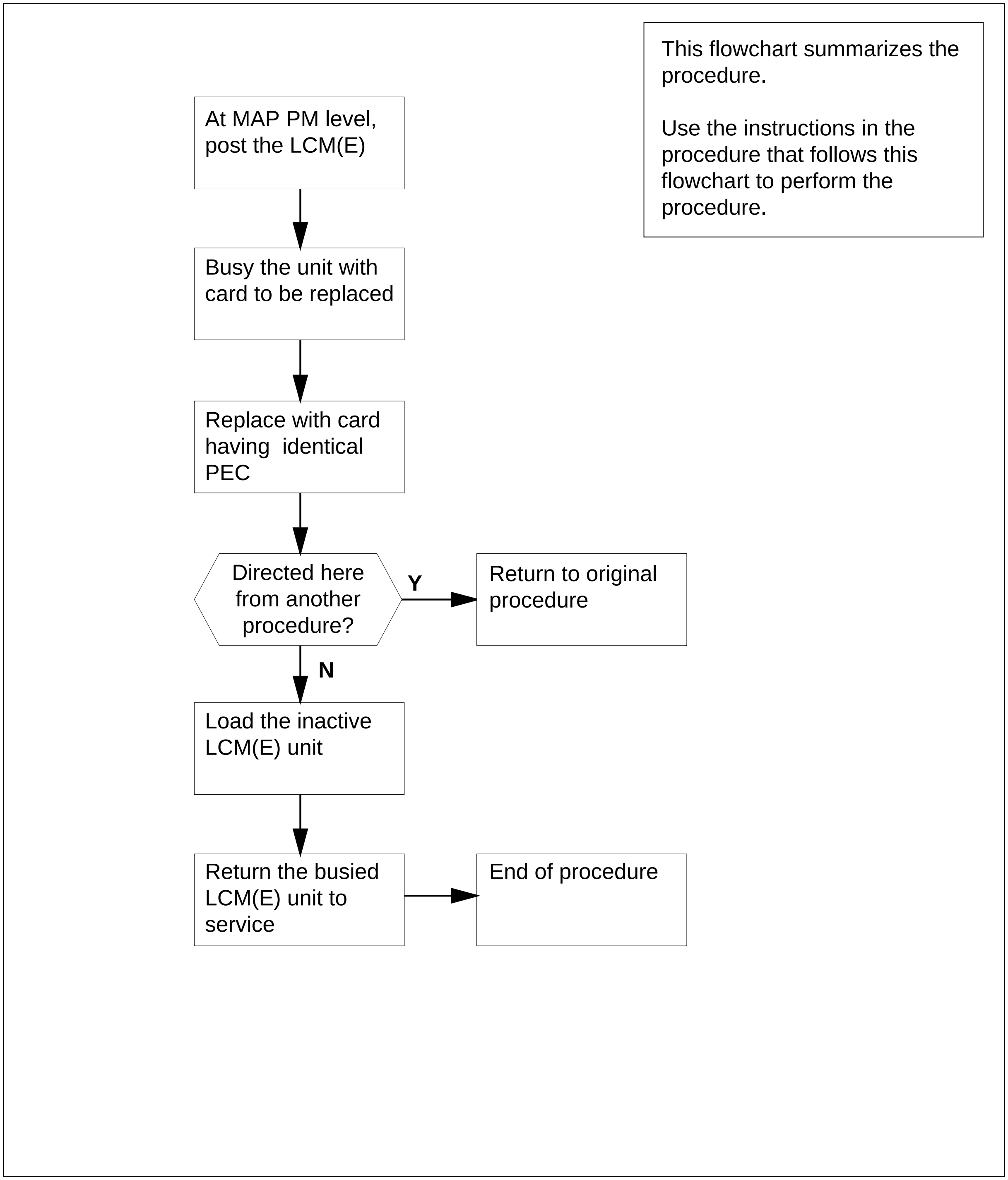
None

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 B 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 B 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 B 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 B 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 modular supervisory panel (MSP) 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 wrist strap.

6 Power down the shelf by setting the ON/OFF switch on the circuit breaker shelf to the OFF position. Both the converter FAIL LED and FRAME FAIL lamp on the MSP will be ON. An audible alarm may sound. If an alarm does sound, silence it by typing

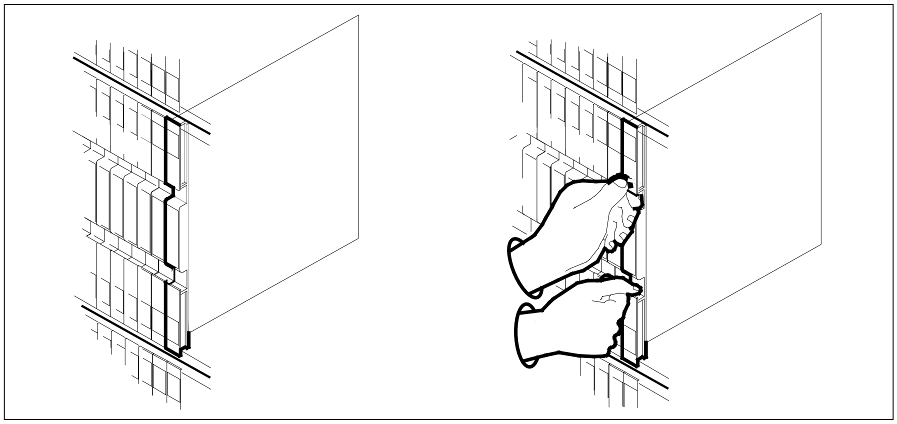
>sil

and pressing the Enter key.

7 Remove the NT6X53 card as shown in the following figures.

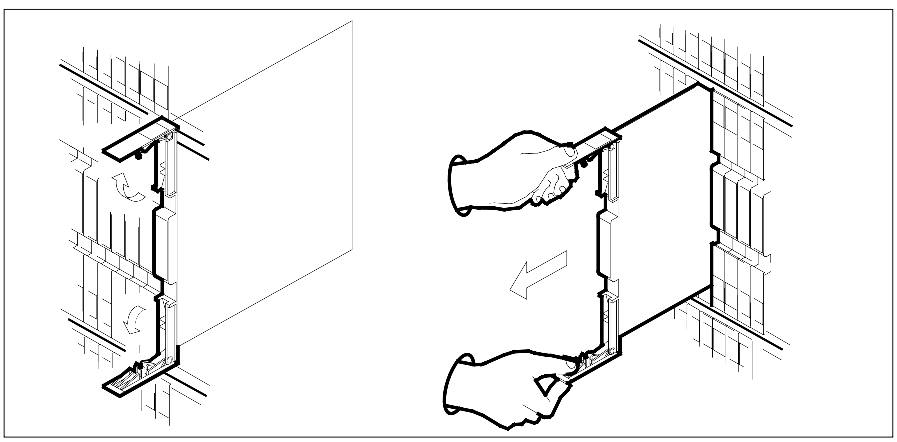
a Locate the card to be removed on the appropriate shelf.

NT6X53
in an RSC-S (DS-1) Model B 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.

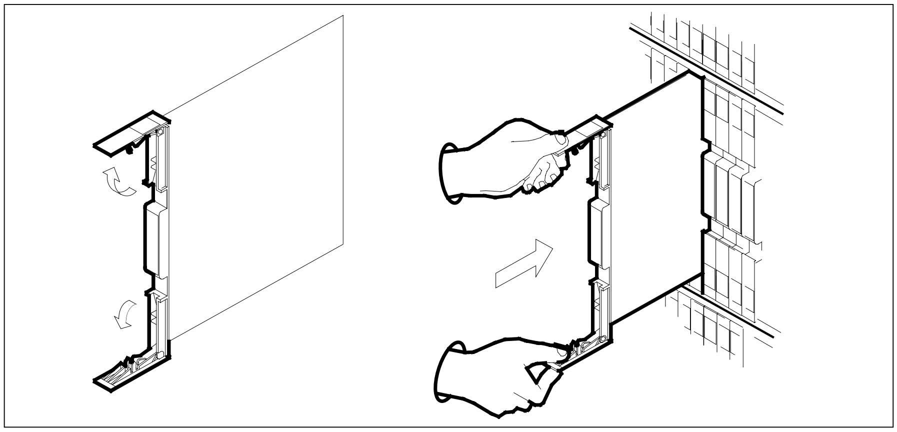


8 Open the locking levers on the replacement card.

a Align the card with the slots in the shelf.

b Gently slide the card into the shelf.

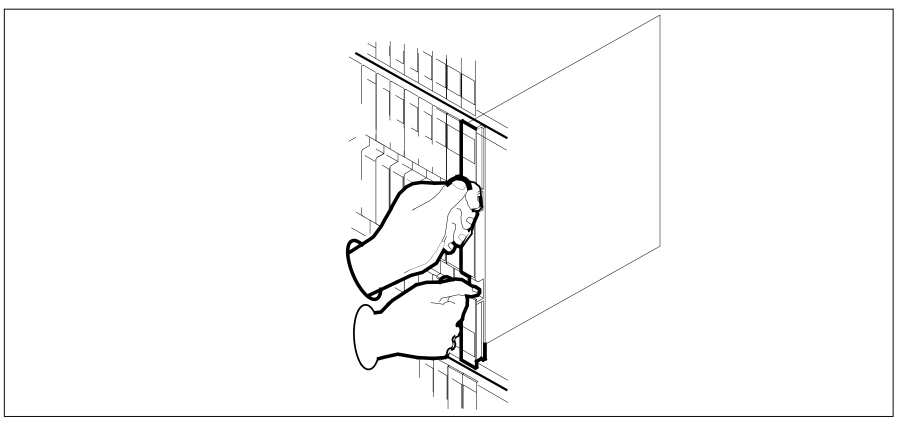
NT6X53
in an RSC-S (DS-1) Model B LCM(E) (continued)



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.

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

NT6X53
in an RSC-S (DS-1) Model B LCM(E) (continued)

lcm(e)_unit_no
is the number of the LCM(E) unit busied in step 4

If load	Do
passed	step 12
failed	step 18

12 Test the LCM(E) unit by typing

>TST UNIT lcm(e)_no

and pressing the Enter key.

where

lcm(e)_unit_no
is the number of the LCM(E) unit loaded in step 11

If TST	Do
passed	step 13
failed	step 17

13 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
alarm clearing procedures	step 17
other	step 14

14 Return the LCM(E) unit to service by typing

>RTS UNIT lcm(e)_unit_no

and pressing the Enter key.

where

lcm(e)_unit_no
is the number of the LCM(E) unit tested in step 12

If RTS	Do
passed	step 15
failed	step 18

15 Send any faulty cards for repair according to local procedure.

16 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 19.

NT6X53
in an RSC-S (DS-1) Model B LCM(E) (end)

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 B 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

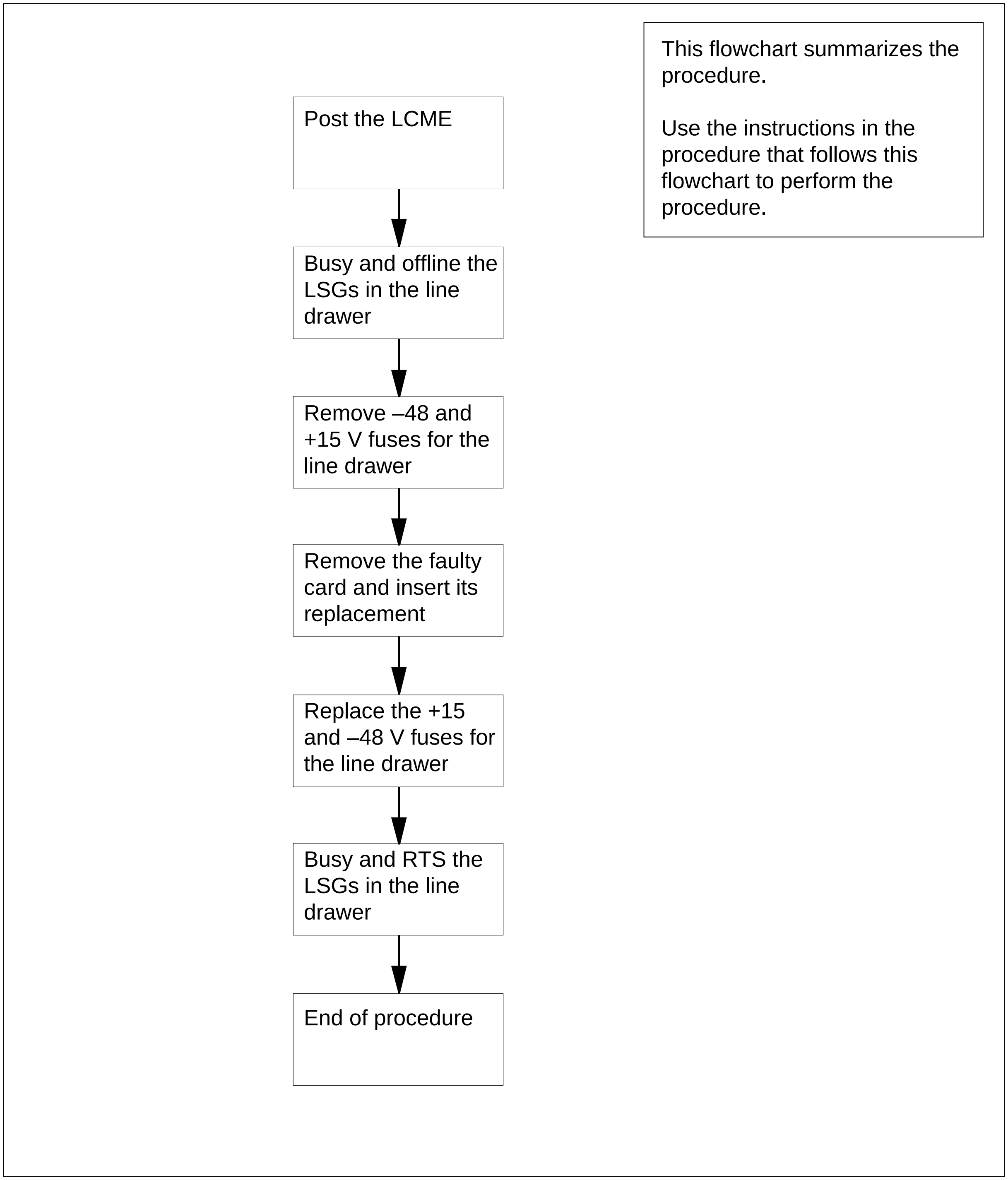
None

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 B 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 B 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 B 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
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 modular supervisory panel (MSP) of the LCME. This protects the equipment against damage caused by static electricity.

NT6X54
in an RSC-S (DS-1) Model B LCM(E) (continued)

> **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.

> **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.

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 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.

NT6X54 in an RSC-S (DS-1) Model B LCM(E) (continued)

b Close the locking levers on the card.

c Position the card in its backplane socket. In one steady motion, push against the closed locking levers with your thumbs until the card plugs fully into the backplane socket.

Note: Do not use a rocking motion to insert the card.

d Close the line drawer.

12 Replace the +15V fuse associated with the line drawer.

13 Replace the -48V fuse associated with the line drawer.

14 Use the following information to determine what step to go to next in this procedure.

If you entered this procedure from	Do
an alarm clearing procedure	step 19
other	step 15

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.

NT6X54
in an RSC-S (DS-1) Model B LCM(E) (end)

19 Return to *Alarm Clearing Procedures* or the other procedure that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

20 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level of support.

21 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NT6X69 in an RSC-S (DS-1) Model B 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

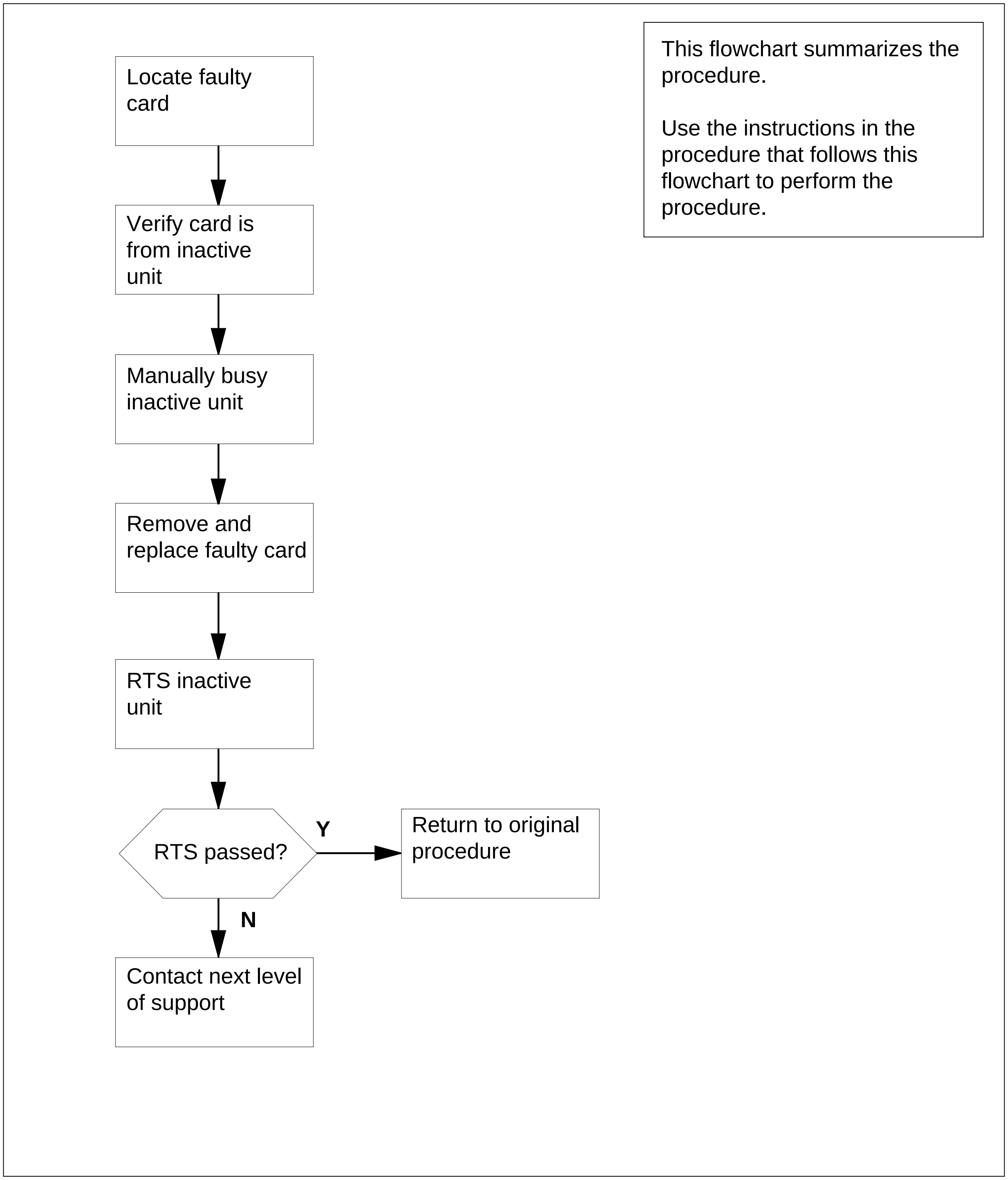
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NT6X69 card in RSC-S RCC2



NT6X69
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NT6X69
in an RSC-S (DS-1) Model B 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 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 B 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 modular supervisory panel (MSP) 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:

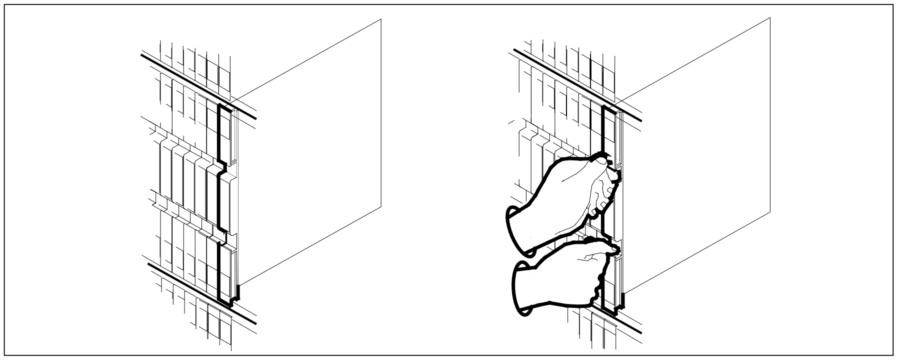
1. Do not apply direct pressure to the components. 2. Do not force the card into its slot.

Put on a wrist strap.

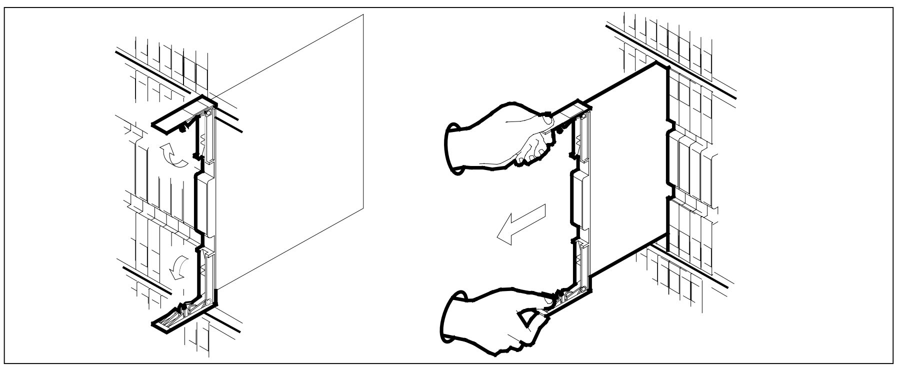
11 Remove the NT6X69 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT6X69
in an RSC-S (DS-1) Model B 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.

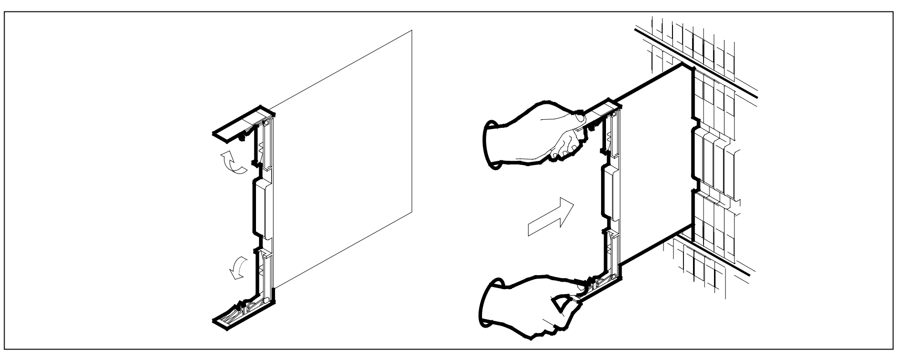


c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RCC2 (continued)

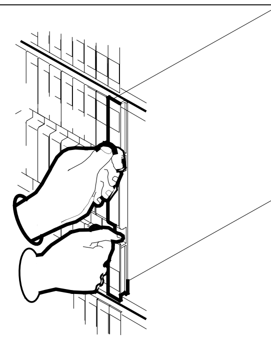
13

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.

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.

NT6X69
in an RSC-S (DS-1) Model B RCC2 (end)

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
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 B 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

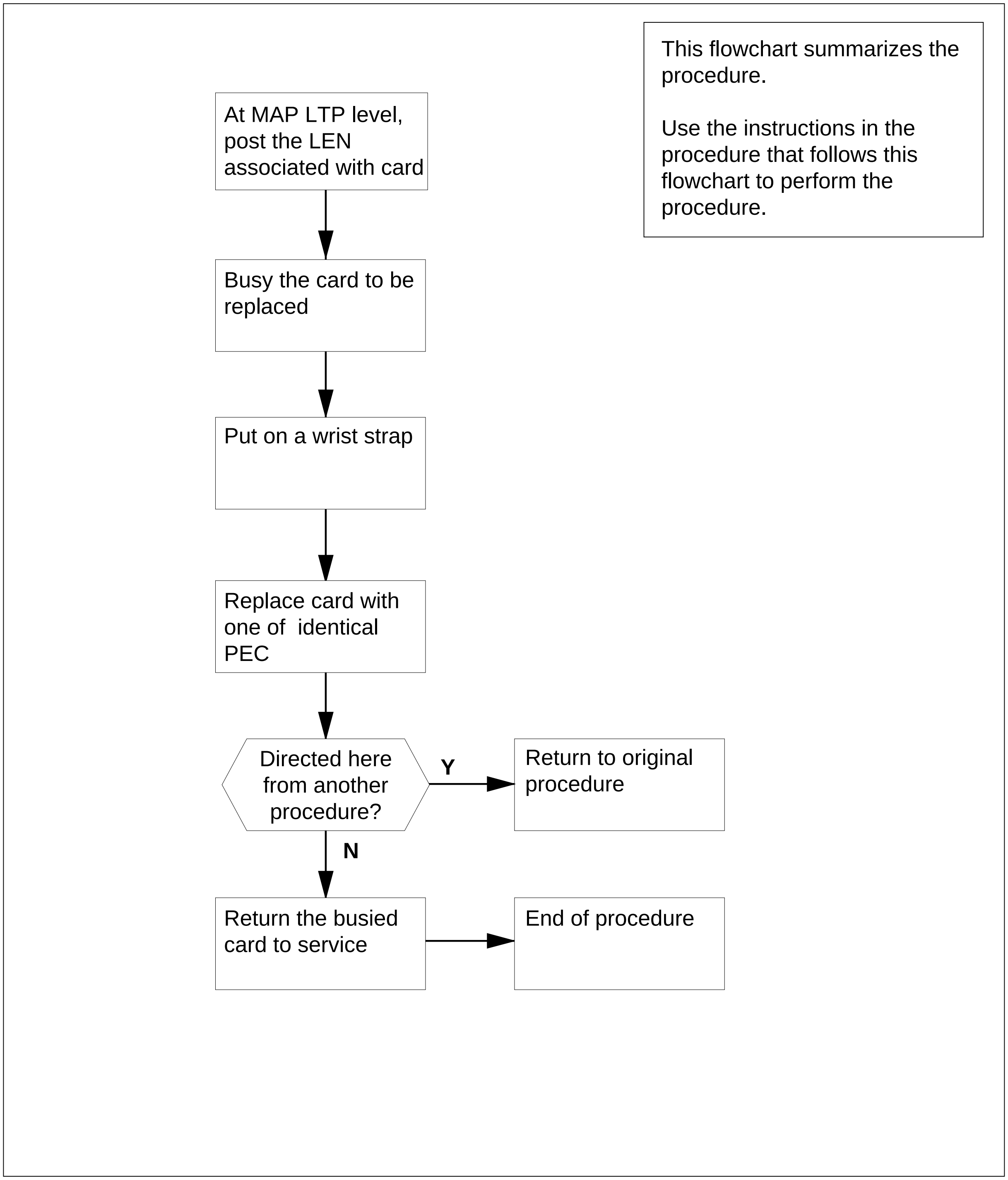
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X71 card in RSC-S LCME



NT6X71 in an RSC-S (DS-1) Model B 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 B 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 B 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.

Put on a wrist strap.

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.

NT6X71
in an RSC-S (DS-1) Model B 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.		

6 Prepare to remove the faulty card by opening the line drawer, determined in step 1, and following these substeps:

- **a** Face the drawer shelf and grasp the handle at the bottom of the drawer with your right hand.
- **b** Push up on the drawer latch with your thumb and pull the drawer out until fully withdrawn. It is fully withdrawn when the drawer stop, at the top, prevents further travel.
- **c** Maintain a slight pull on the handle and lift the faceplate of the drawer approximately 2.5 cm (1 in).
- **d** While holding the drawer in this position, push the bottom of the drawer, nearest the shelf with your left hand, to a position about 1 cm (.5 in) to the right.
- **e** Hold the drawer in this position with your left hand and lower the faceplate of the drawer by releasing the grip of your right hand.
- **f** Ensure a card shroud and line card extractor are available.

7 Remove the line card to be replaced by following these substeps:

- **a** Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.
- **b** Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.
- **c** Squeeze the handles of the extractor together to grasp the card tightly.
- **d** Hold the front cover of the line drawer to steady it using your left hand.
- **e** Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.

NT6X71
in an RSC-S (DS-1) Model B LCME (continued)

- **f** Continue pulling the card with the extractor until the card is clear of the shroud.
- **g** Insert the removed card into the ESD container and store using local procedures.

8 Replace the faulty card by following these substeps:

- **a** Remove the replacement card from the ESD container.
- **b** Slide the card in the shroud guide slots toward the drawer backplane.
- **c** Hold the front cover of the line drawer with your left hand to steady it.
- **d** Grasp the top and bottom edges of the card with the fingers of your right hand.
- **e** Push the card toward the backplane until it plugs fully into the backplane socket.

9 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 14
other	step 10

At the MAP terminal

10 Test the NT6X71 line card by typing

>DIAG

and pressing the Enter key.

If DIAG	Do
passed	step 11
failed	step 14

11 Return the NT6X71 card to service by typing

>RTS

and pressing the Enter key.

If RTS	Do
passed	step 12
failed	step 15

12 Send any faulty cards for repair according to local procedure.

13 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 16.

NT6X71
in an RSC-S (DS-1) Model B LCME (end)

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 B 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

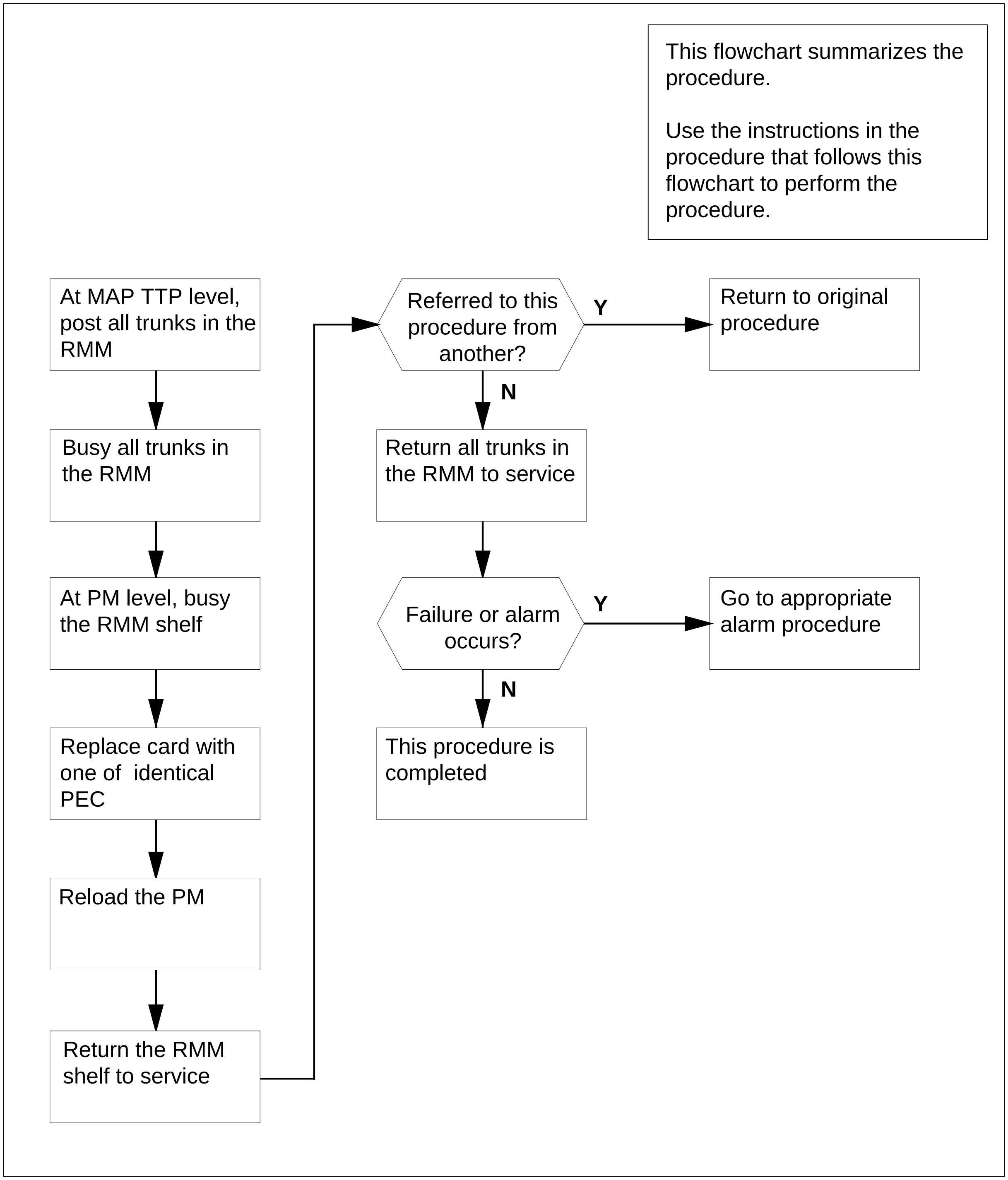
None

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 B RMM (continued)

Summary of card replacement procedure for an NT6X74 card in RSC-S RMM



NT6X74
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NT6X74
in an RSC-S (DS-1) Model B RMM (continued)

```
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 modular supervisory panel (MSP) of the RMM. This protects the equipment against damage caused by static electricity.

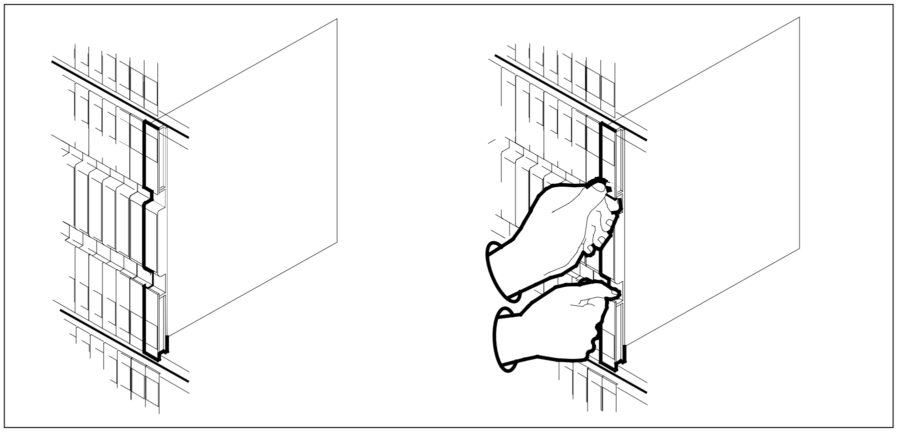
DANGER
Improper insertion may cause damage to circuit packs
1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Put on a wrist strap.

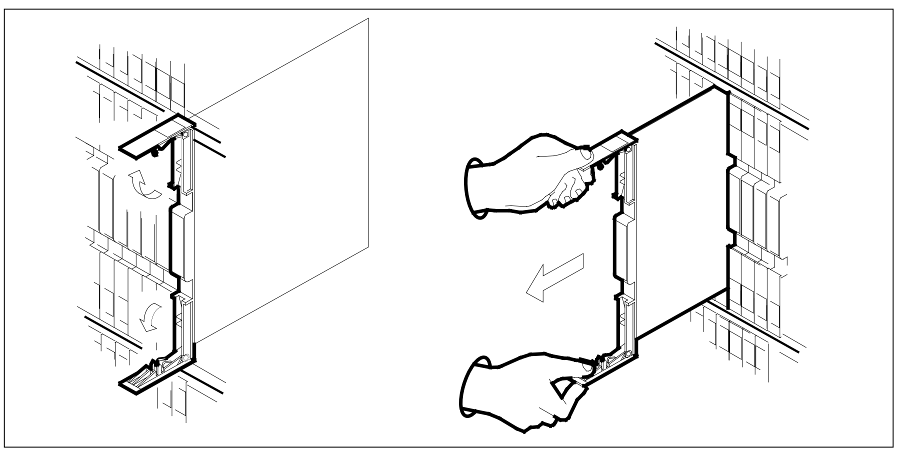
6 Remove the NT6X74 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT6X74
in an RSC-S (DS-1) Model B 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.



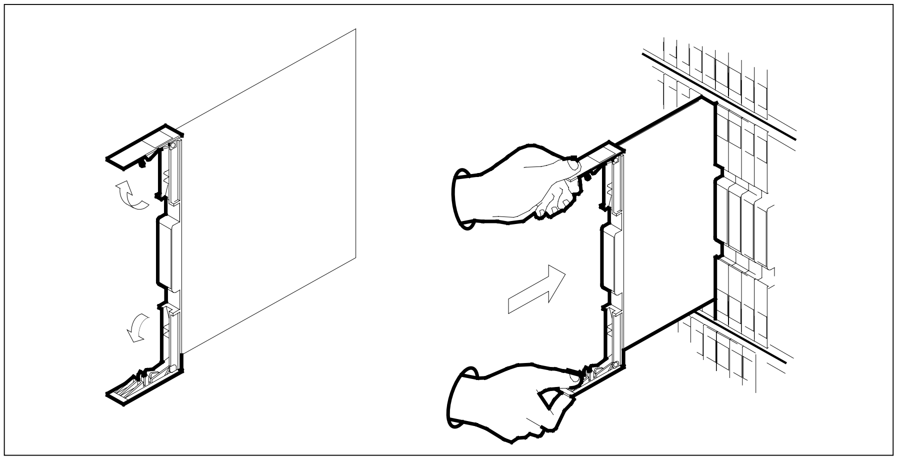
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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 B RMM (continued)



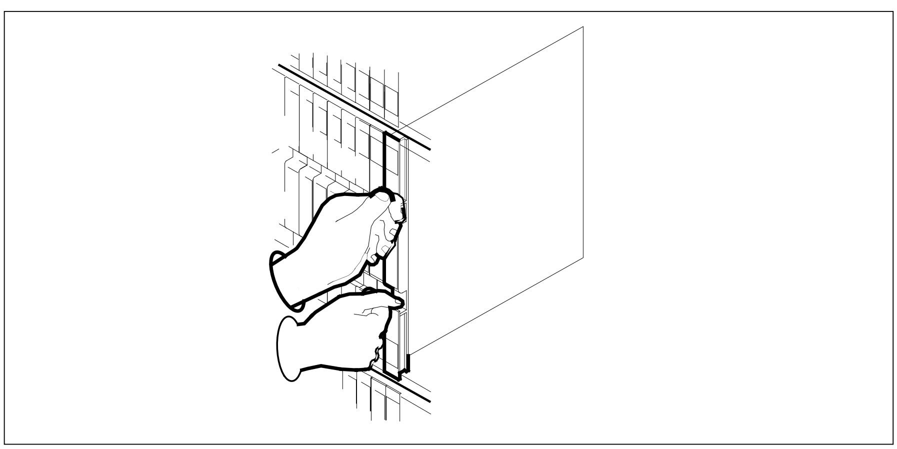
8

> **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 B 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 B 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 B 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 B 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

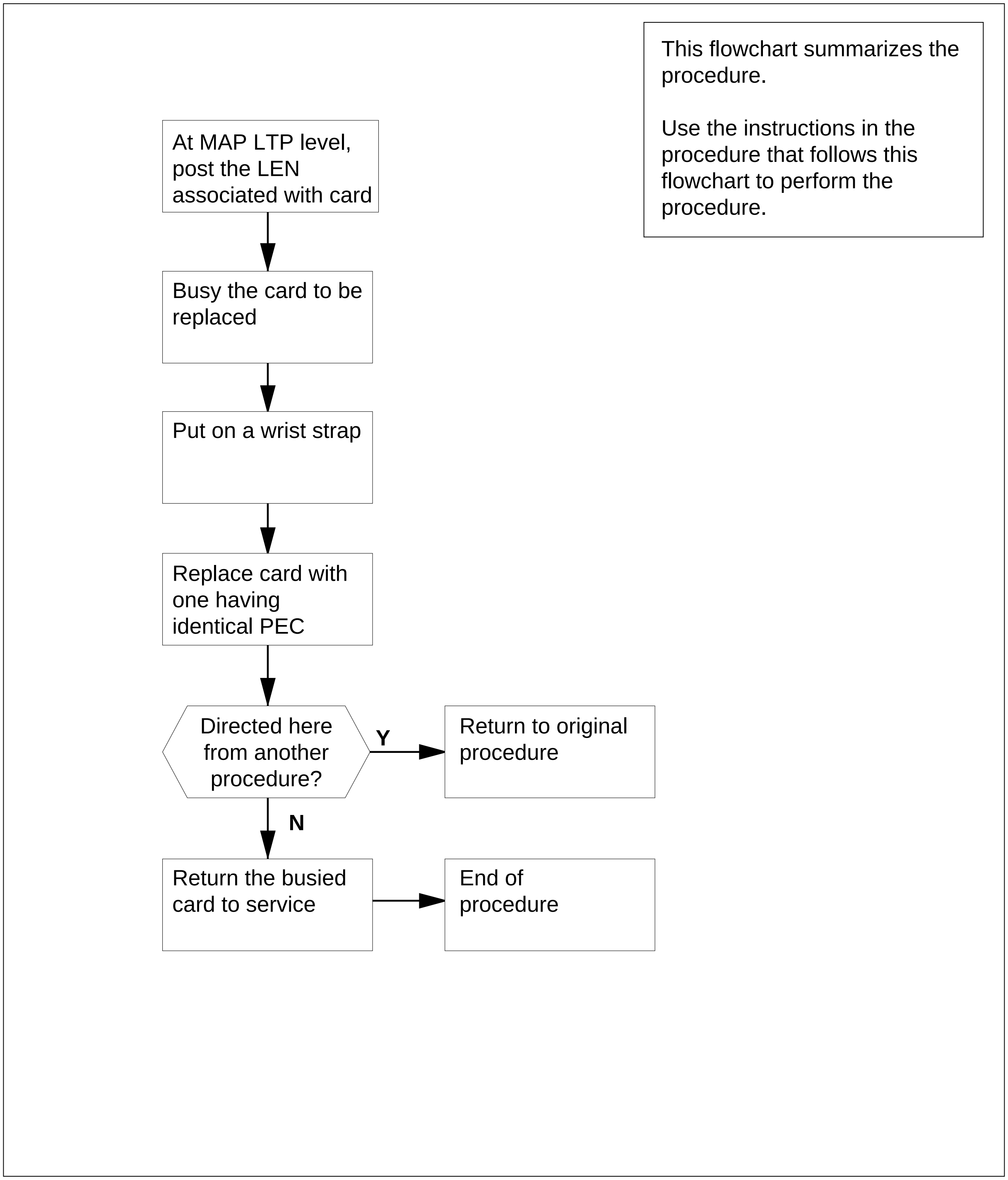
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X76 card in RSC-S LCME



NT6X76
in an RSC-S (DS-1) Model B LCME (continued)

Replacing an NT6X76 card in RSC-S LCME

At your Current Location

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain a replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Post the LEN of the card to be replaced by typing

`>MAPCI;MTC;LNS;LTP;POST LCME site lcm(e)_no unit_no lsg_no ckt_no`

and pressing the Enter key.

where

site
is the location name of the LCME with the faulty card

lcm(e)_no
is the number of the LCME with the faulty card

unit_no
is the number of the LCME unit with the faulty card

lsg_no
is the number of the LSG with the faulty card

ckt_no
is the number of the circuit associated with the faulty card

Example of a MAP display:

NT6X76
in an RSC-S (DS-1) Model B 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     SB
 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      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
```

NT6X76
in an RSC-S (DS-1) Model B 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 modular supervisory panel (MSP) 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 B 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 wrist strap.

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.

NT6X76
in an RSC-S (DS-1) Model B 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 B 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 B RCC2

Application

Use this procedure to replace an NT6X78 card in a Remote Switching Center (RSC)-SONET Remote Cluster Controller (RCC) 2.

PEC	Suffixes	Name
NT6X78	AA, AB, BA	CLASS Modem Resource (CMR)

Common procedures

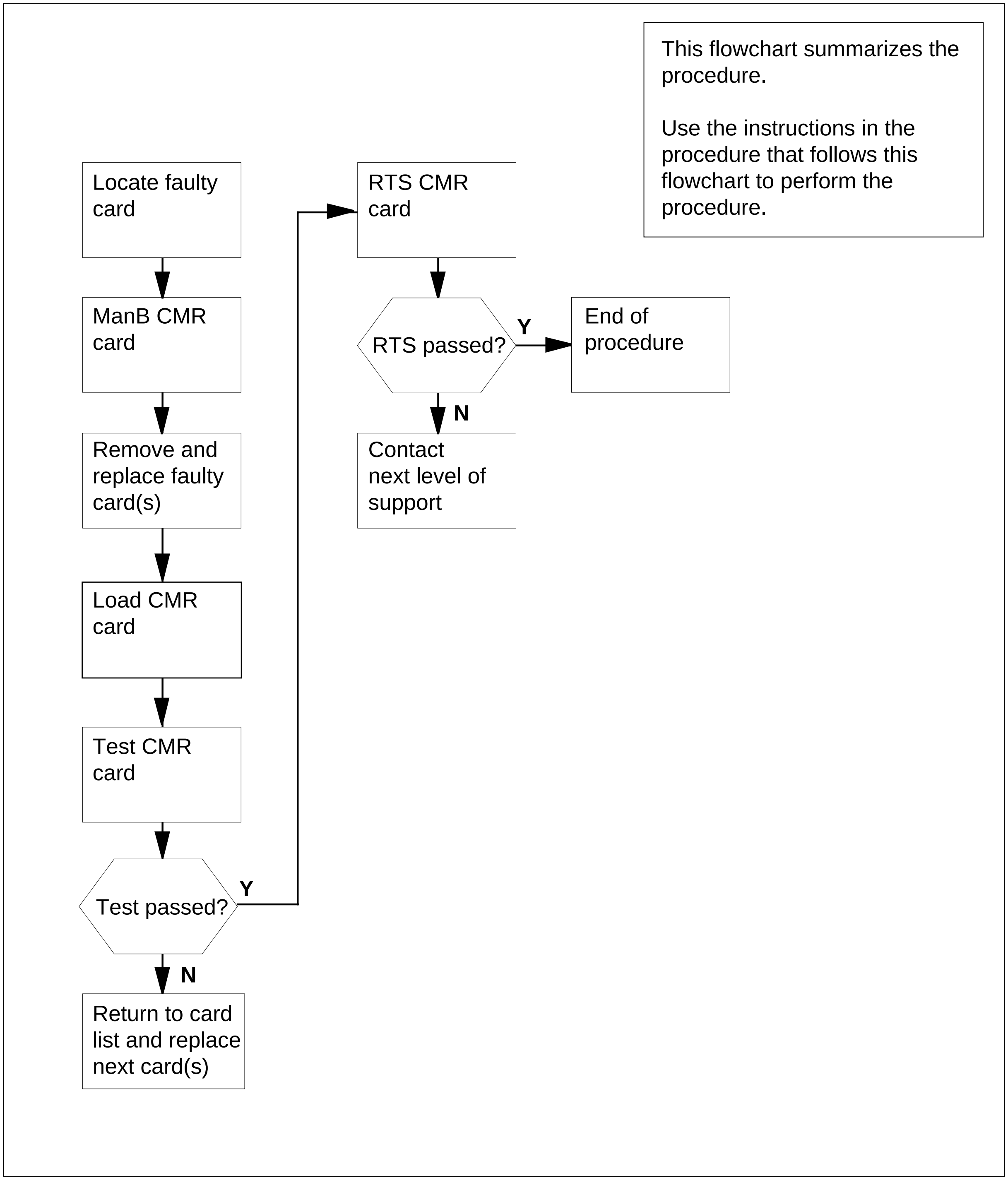
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NT6X78 card in RSC-S RCC2



NT6X78
in an RSC-S (DS-1) Model B 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 CMR card by typing

`>bsy UNIT` **`unit_no CMR`**

and pressing the Enter key.

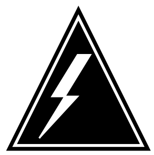
where

unit_no
is the number of the unit containing the faulty CMR card

NT6X78
in an RSC-S (DS-1) Model B 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 modular supervisory panel (MSP) of the RCC2. This protects the equipment against damage caused by static electricity.

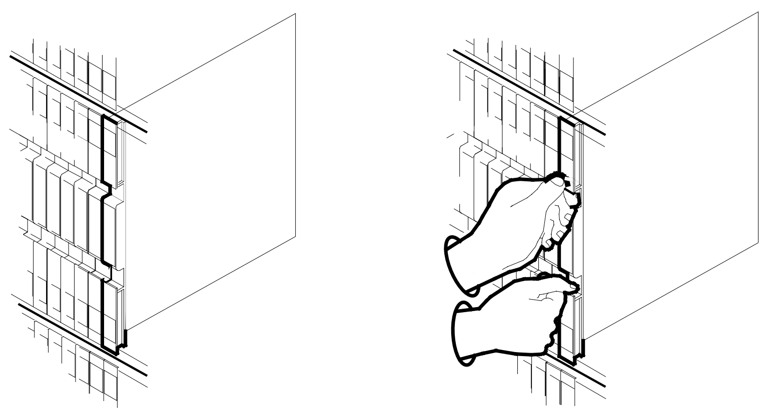
DANGER
Equipment damage
Take the following precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.
2. Do not force the card into its slot.

Put on a wrist strap.

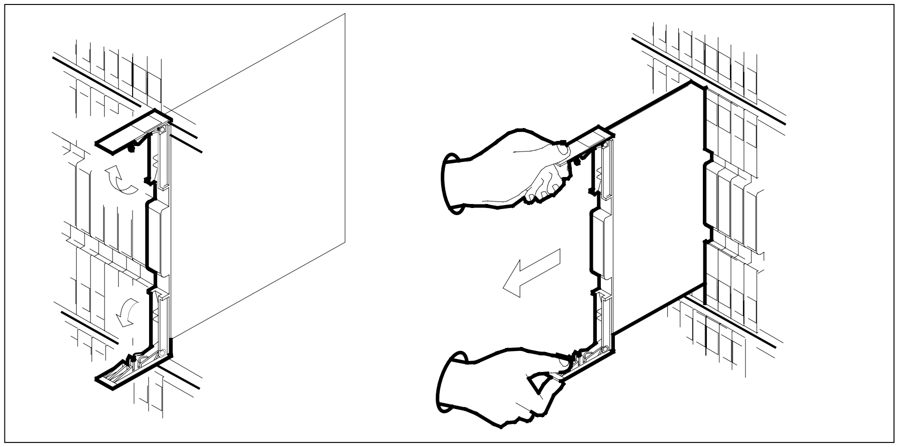
7 Remove the NT6X78 card as shown in the following figures.

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 B RCC2 (continued)

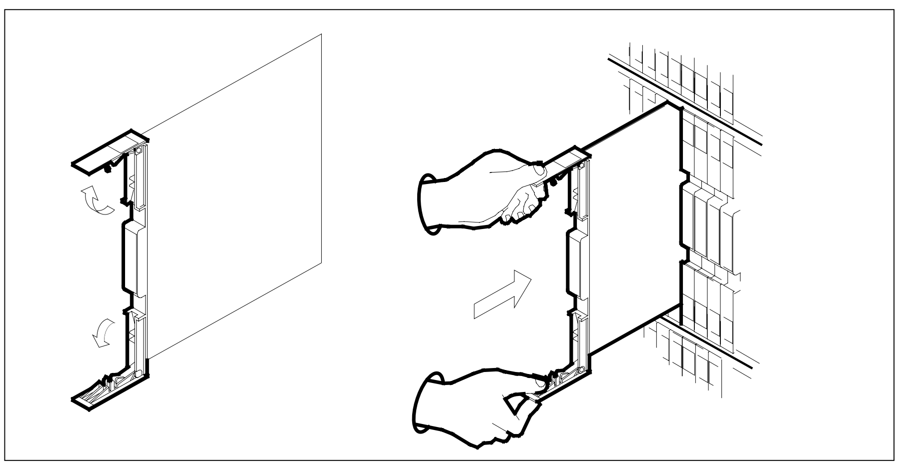


c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

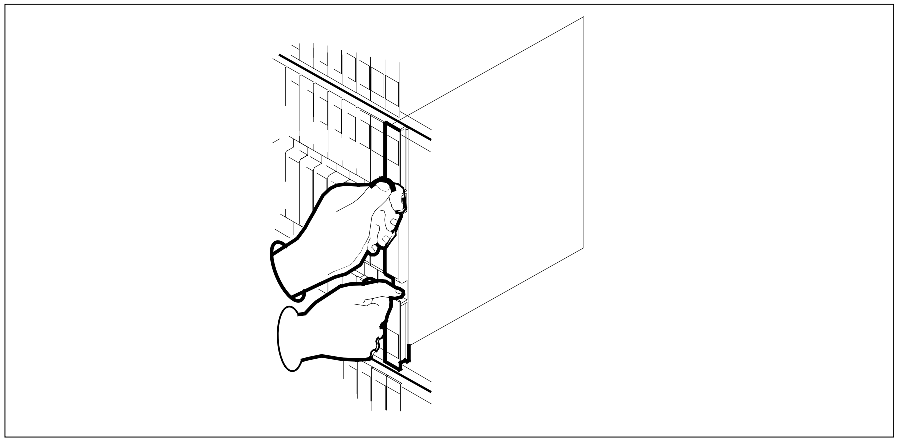


9 Seat and lock the card.

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 B 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.

where

NT6X78
in an RSC-S (DS-1) Model B RCC2 (end)

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 an RSC-S (DS-1) Model B 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

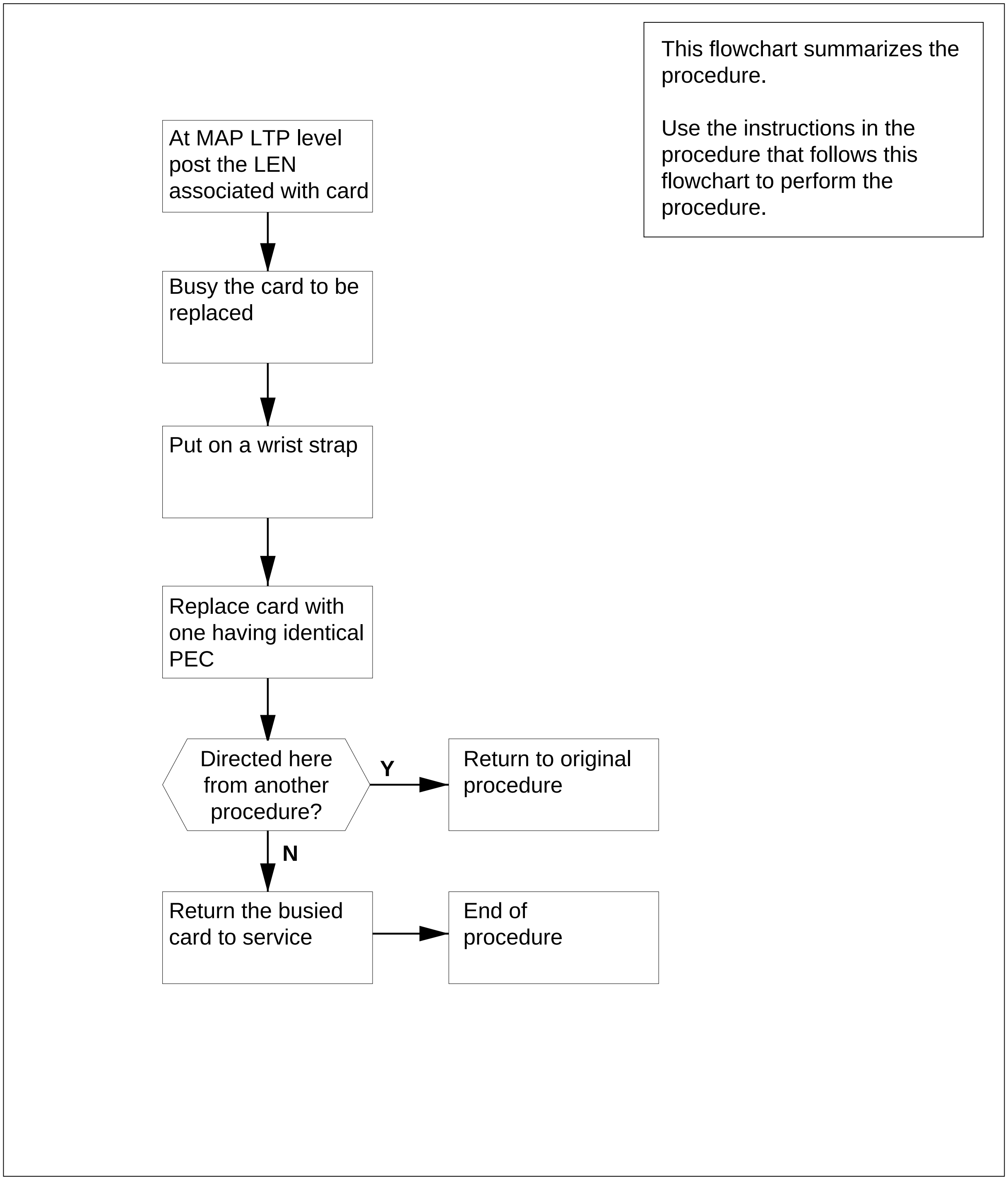
None

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 an RSC-S (DS-1) Model B LCME (continued)

Summary of card replacement procedure for an NT6X87 card in RSC-S LCME



NT6X87
in an RSC-S (DS-1) Model B LCME (continued)

Replacing an NT6X87 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 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 an RSC-S (DS-1) Model B 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 an RSC-S (DS-1) Model B 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 modular supervisory panel (MSP) 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 an RSC-S (DS-1) Model B 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.

NT6X87
in an RSC-S (DS-1) Model B 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 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

NT6X87
in an RSC-S (DS-1) Model B LCME (end)

11 Return the NT6X87 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 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 B 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

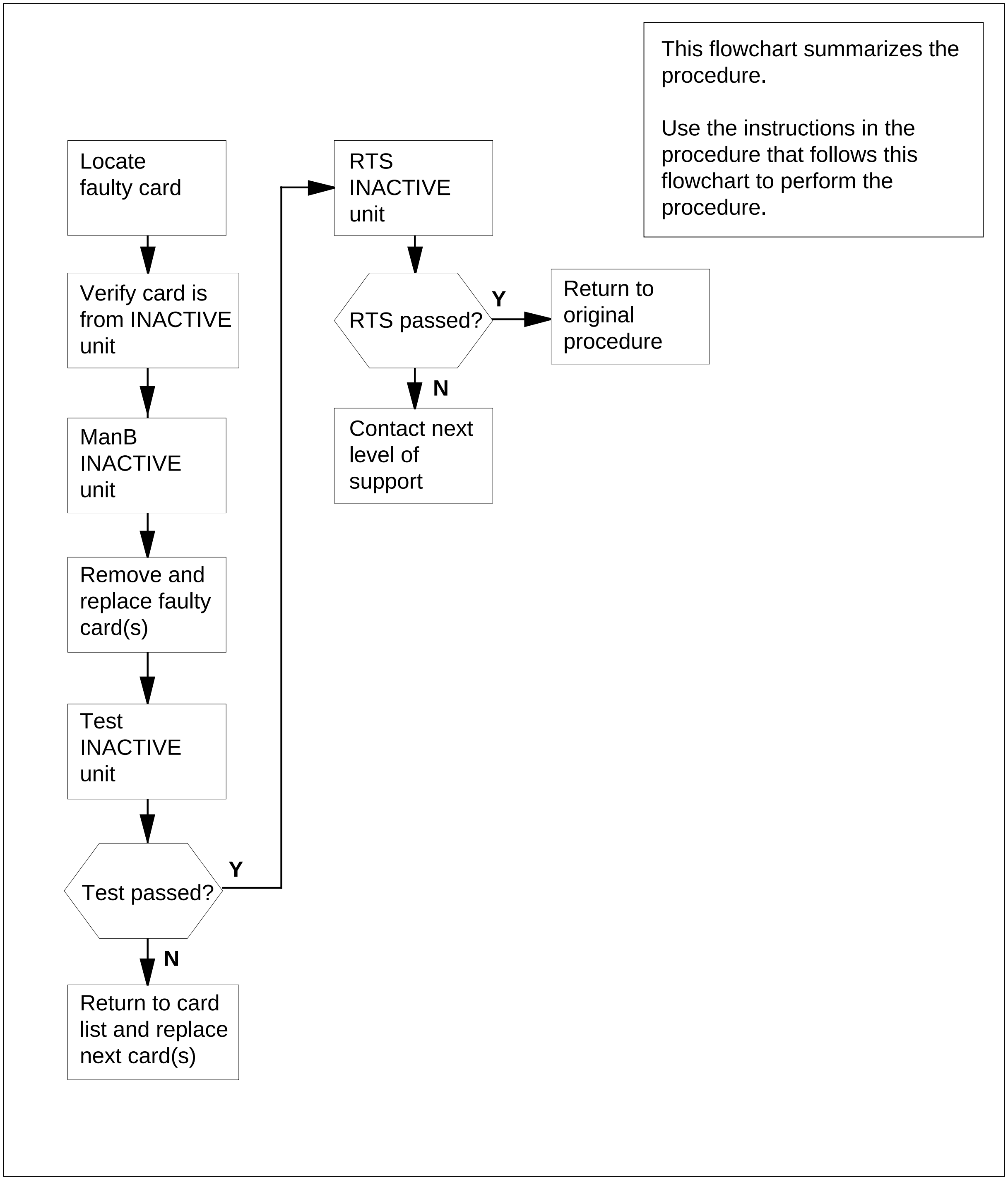
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NT6X92 card in RSC-S RCC2



NT6X92
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NT6X92
in an RSC-S (DS-1) Model B 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 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 B RCC2 (continued)

At the MAP terminal

8 Busy the inactive PM unit by typing

***>bsy unit* rcc2_unit_no**

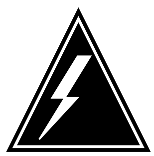
and pressing the Enter key.

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 modular supervisory panel (MSP) 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:

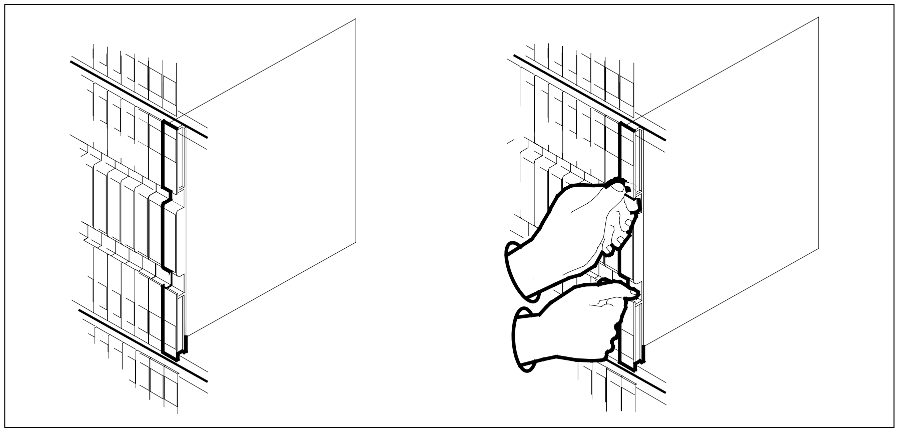
1. Do not apply direct pressure to the components.2. Do not force the card into its slot.

Put on a wrist strap.

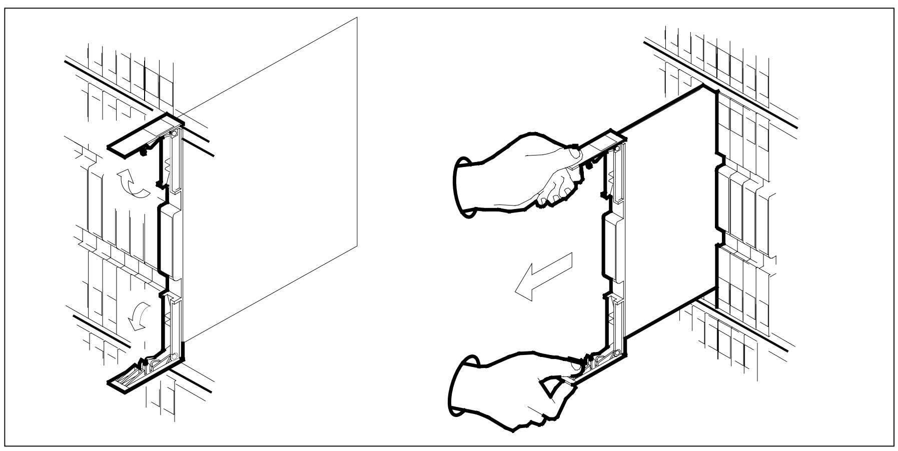
10 Remove the NT6X92 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NT6X92
in an RSC-S (DS-1) Model B 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.



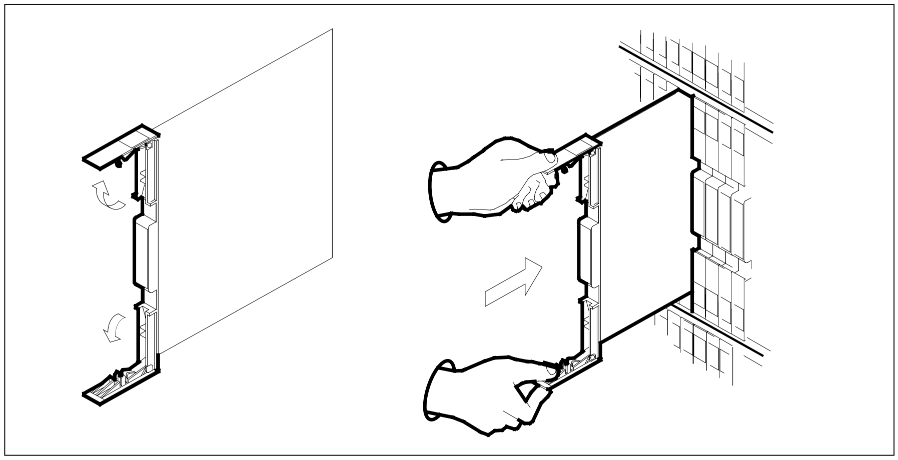
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

11 Open the locking levers on the replacement card.

a Align the card with the slots in the shelf.

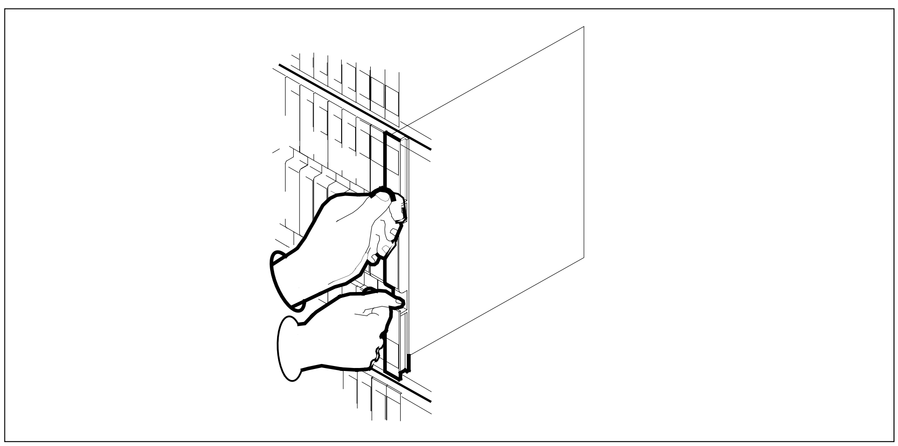
b Gently slide the card into the shelf.

NT6X92
in an RSC-S (DS-1) Model B 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 B 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 B 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

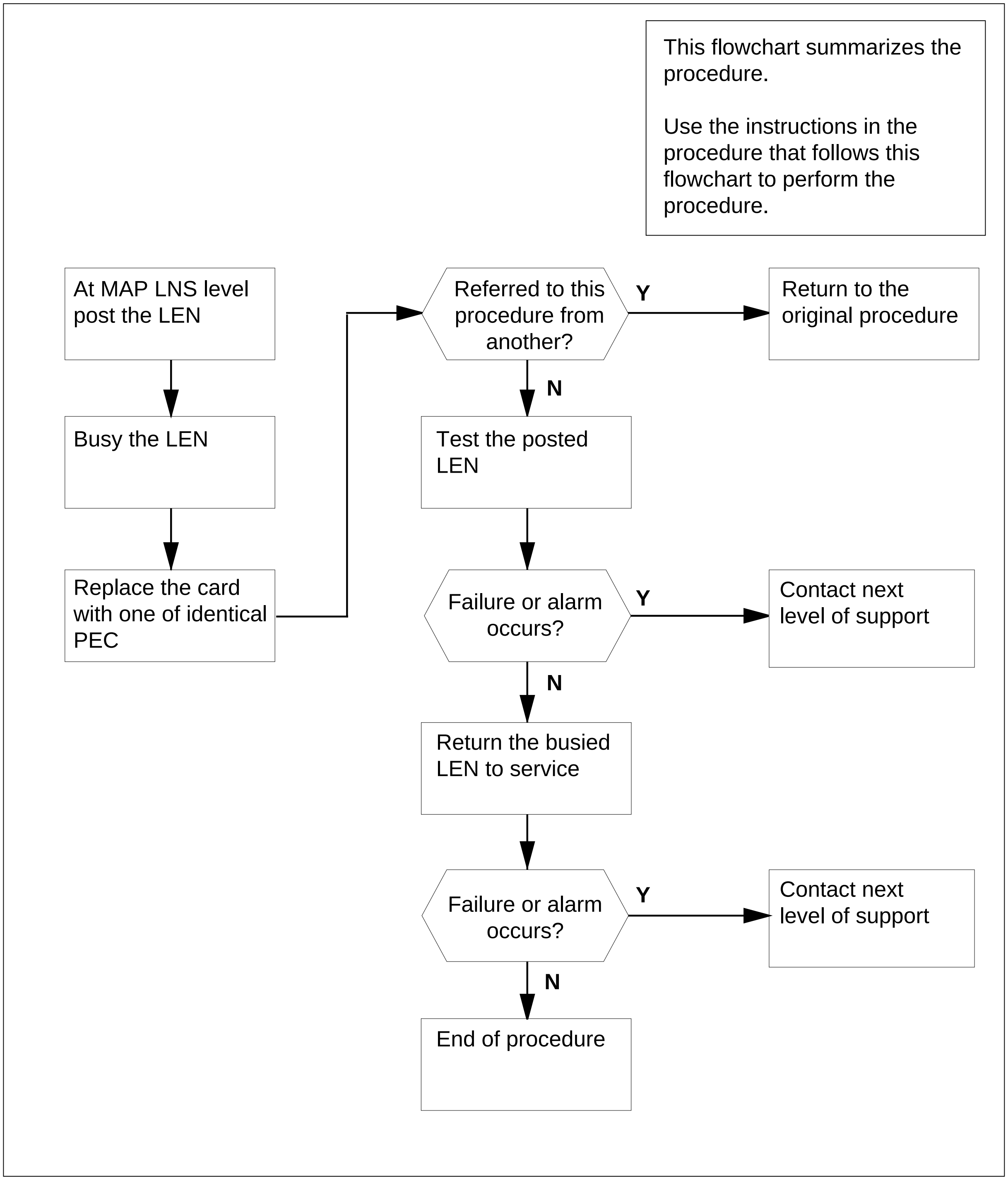
None

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 B LCME (continued)

Summary of card replacement procedure for an NT6X99 card in RSC-S LCME



NT6X99
in an RSC-S (DS-1) Model B 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)

NT6X99
in an RSC-S (DS-1) Model B LCME (continued)

```
 CM     MS     IOD     Net      PM     CCS     LNS     Trks     EXT    Appl
  .      .      .       .        .      .       .       .        .      .

LTP
 0 Quit
 2 Post_
 3           POST      DELQ     BusyQ     PREFIX
 4
 5 Bsy_      LCC      PTY RNG     LEN        DN    STA FS LTA TE RESULT
 6 RTS_      CKT TYPE FL Host 00 0 03 03 No DIRN Idl
 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 B 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 modular supervisory panel (MSP) 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 B 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 wrist strap.

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. The following table describes card shrouds.

Line card insertion / withdrawal tool for	Apparatus code	Common product code
3-inch cards	QTH56A	A0298291
6-inch cards	QTH58A	A0313317

Note: Card removal tools are required for removing cards from line drawers. Two sizes are available. The following table describes these tools.

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 B 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 B 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 B RCC2

Application

Use this procedure to replace the following cards in an RSC-RCC2.

PEC	Suffixes	Name
NT7X05	AA	Peripheral/Remote Loader-16

Common procedures

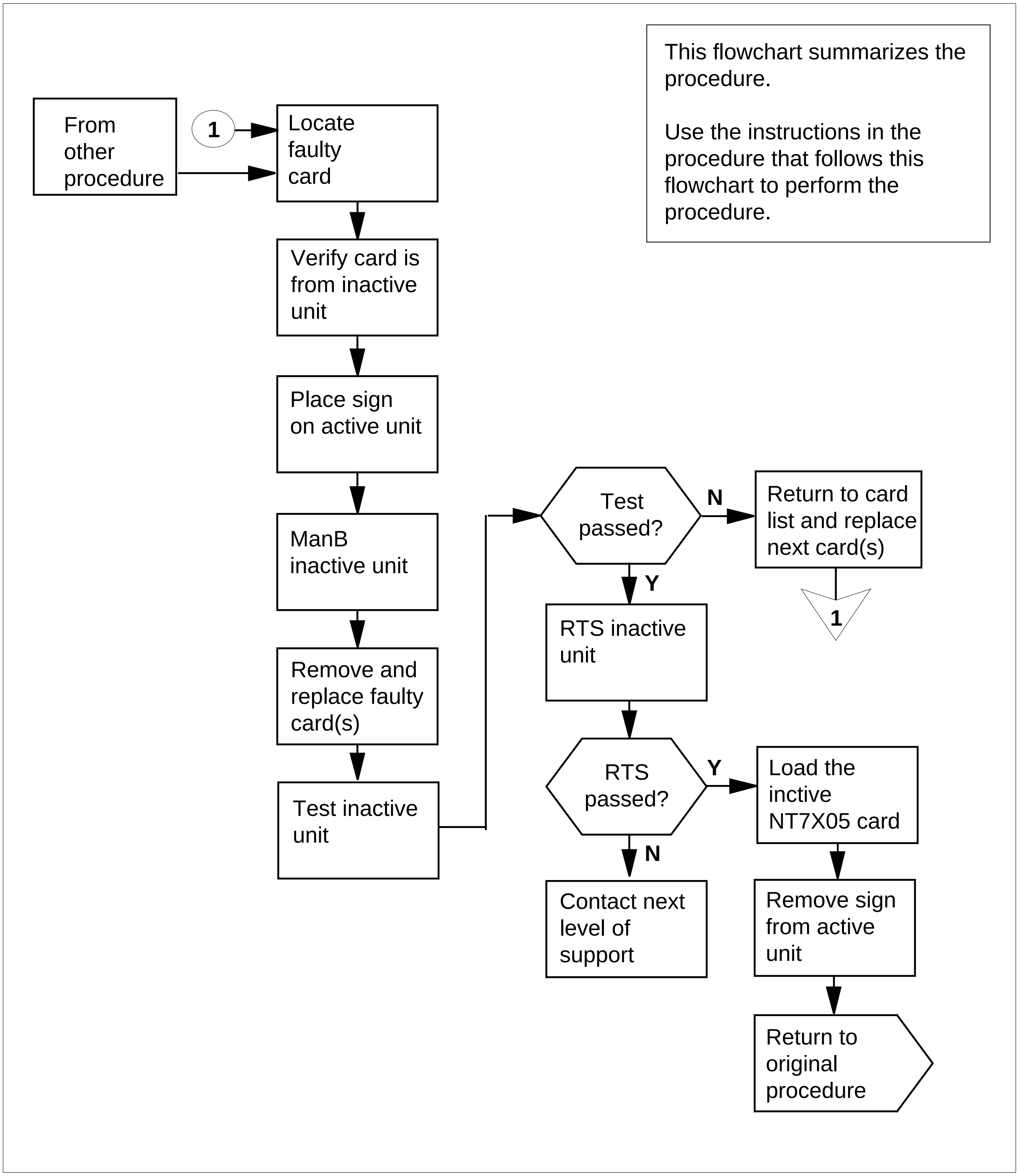
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NT7X05 card in an RSC-S RCC2



NT7X05
in an RSC-S (DS-1) Model B RCC2 (continued)

Replacing an NT7X05 in an 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

Example of a MAP display:

NT7X05
in an RSC-S (DS-1) Model B 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 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 B 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 B RCC2 (continued)

At the RCE frame

11

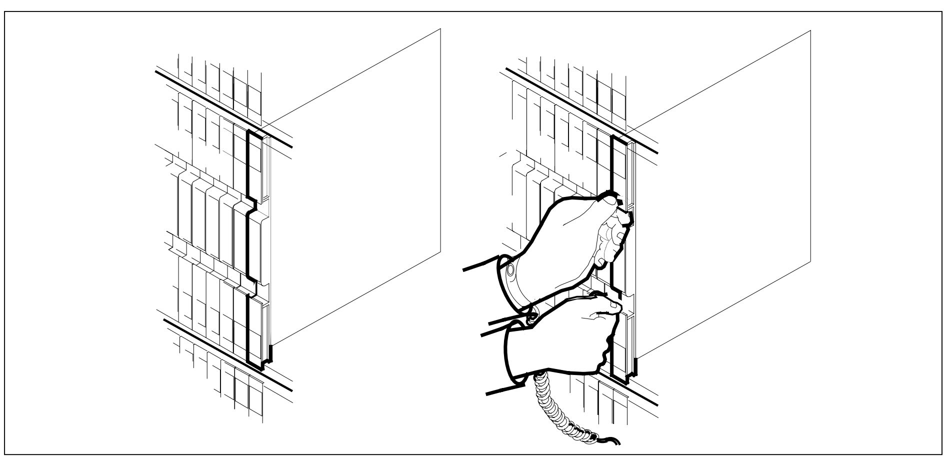
> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the frame supervisory panel of the RCC2. This protects the equipment against damage caused by static electricity.

> **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.

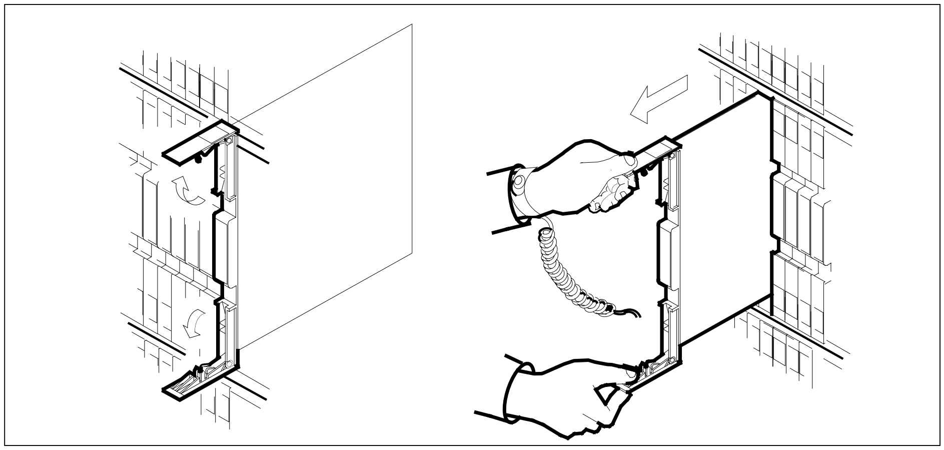
12 Remove the NT7X05 card as shown in the following figures.

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.

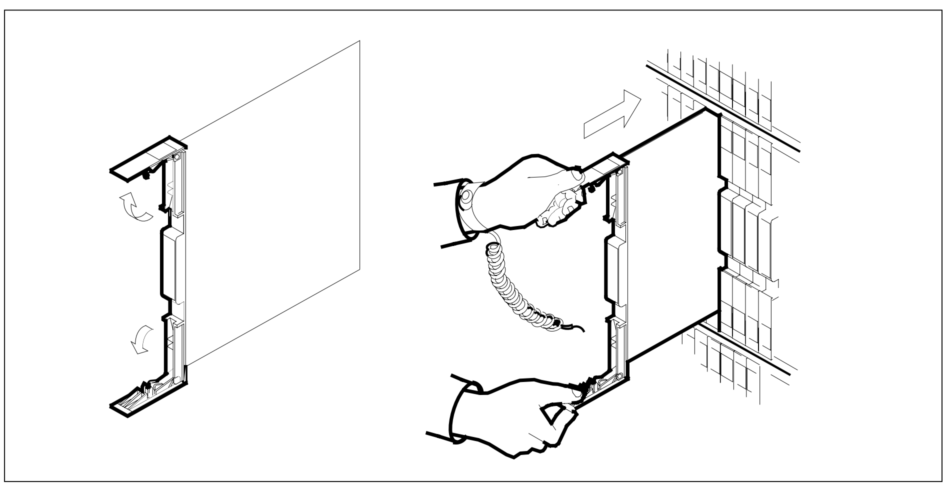
NT7X05 in an RSC-S (DS-1) Model B RCC2 (continued)



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.

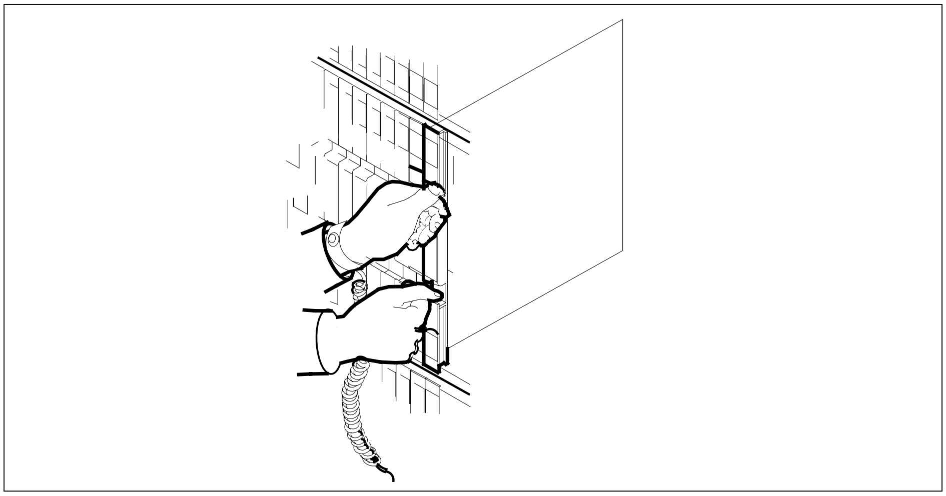


14 Seat and lock the card.

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 B 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.

where

NT7X05
in an RSC-S (DS-1) Model B RCC2 (end)

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 B 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

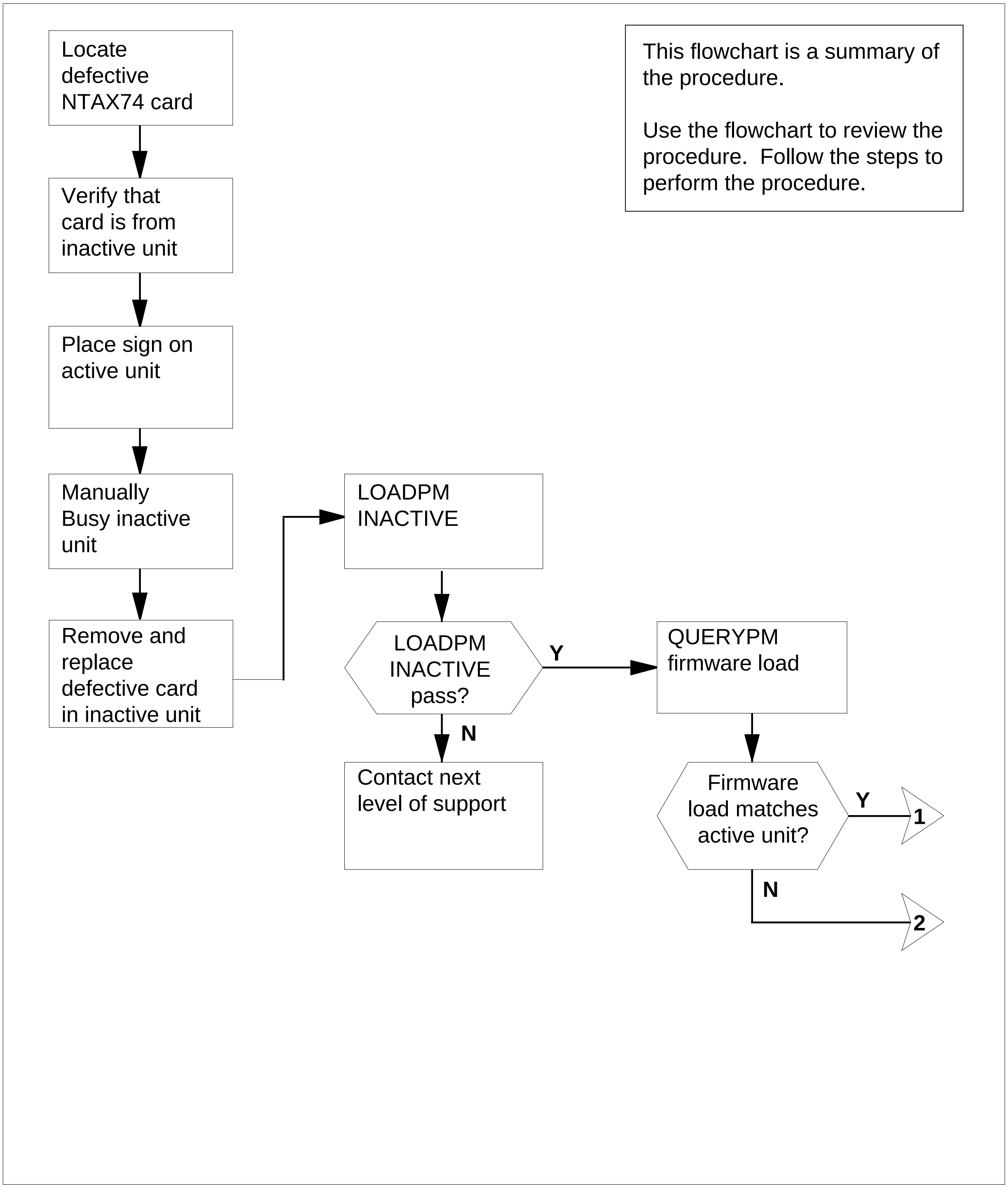
Does not apply

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.

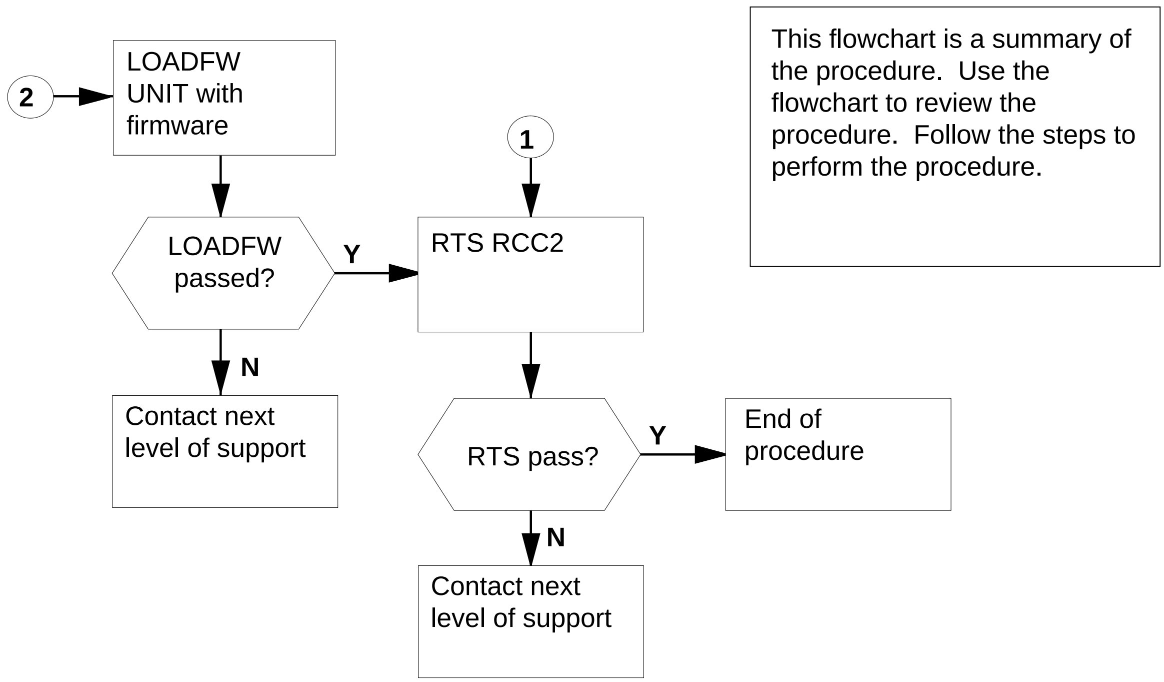
NTAX74
in an RSC-S (DS-1) Model B RCC2 (continued)

Summary of card replacement procedure for an NTAX74 card in RSC-S RCC2



NTAX74
in an RSC-S (DS-1) Model B RCC2 (continued)

Summary of card replacement procedure for an NTAX74 card in RSC-S RCC2 (continued)



NTAX74
in an RSC-S (DS-1) Model B 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 the current MAP display is at the peripheral module (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

Example of a MAP display:

NTAX74
in an RSC-S (DS-1) Model B 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 ISTb  Links_OOS:  CSide  0, PSide   0
 5 TRNSL_  Unit0:   Inact SysB
 6 TST_    Unit1:     Act InSv
 7 BSY_
 8 RTS_
 9 OffL
10 LoadPM_
11 Disp_
12 Next_
13 SwAct
14 QueryPM
15
16 IRLINK
17 Perform
18
```

4 To verify the defective NTAX74 card is in the inactive unit, make sure the light-emitting diode (LED) labled ACTIVE is OFF or check the MAP display.

If the defective card	Do
is in the active unit	step 5
is in the inactive unit	step 9

5 To switch the processing activity (SWACT) to the inactive unit, type:

>SWACT

and press the Enter key.

A confirmation prompt for the SWACT command appears at the MAP terminal.

If SWACT	Do
cannot continue at this time	step 6
can continue at this time	step 7

6 To reject the prompt to SWACT the units, type:

>NO

and press the Enter key.

The system stop the SWACT.

Return to step 5 during periods of low traffic.

NTAX74
in an RSC-S (DS-1) Model B RCC2 (continued)

7 To confirm the system prompt, type:

>YES

and press the Enter key.

The system runs a pre-SWACT audit to determine if the inactive unit can accept activity accurately.

> ***Note:*** A maintenance flag appears when maintenance tasks are in progress. Wait until the flag disappears before you proceed with the next maintenance action.

If the message	Do
is SWACT passed	step 9
is SWACT failed Reason: XPM SWACTback	step 8
is SWACT refused by SWACT Controller	step 8

8 To clear the alarm condition on the inactive unit return to the *Clearing an Alarm Procedures* when you clear the alarm, return to step 1 of this procedure.

At the RCE frame

9 Place a sign with the words *Active unit-Do not touch* on the active unit. Do not attach this sign with magnets or tape.

At the MAP terminal

10 Check the MAP display and determine the state of the inactive unit.

If the state	Do
is SysB, CBsy, ISTb, or InSv	step 11
is ManB	step 12

11 To busy the inactive 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.

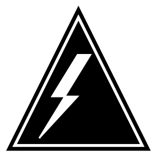
where

rcc2_unit_no
is the number of the inactive RCC2 unit zero and one

NTAX74
in an RSC-S (DS-1) Model B 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 protects the equipment against static electricity damage.

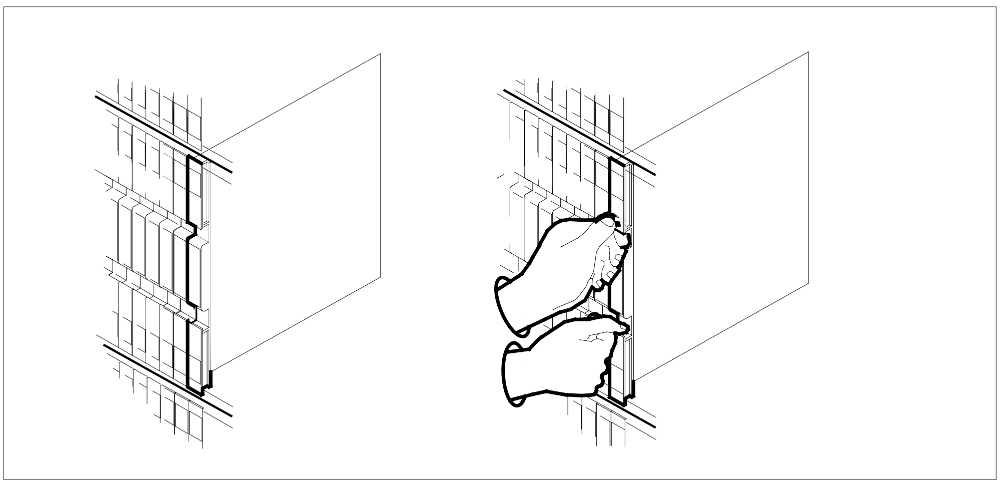
DANGER
Equipment damage
Take the following precautions when you remove or insert a card:

1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Wear a wrist strap.

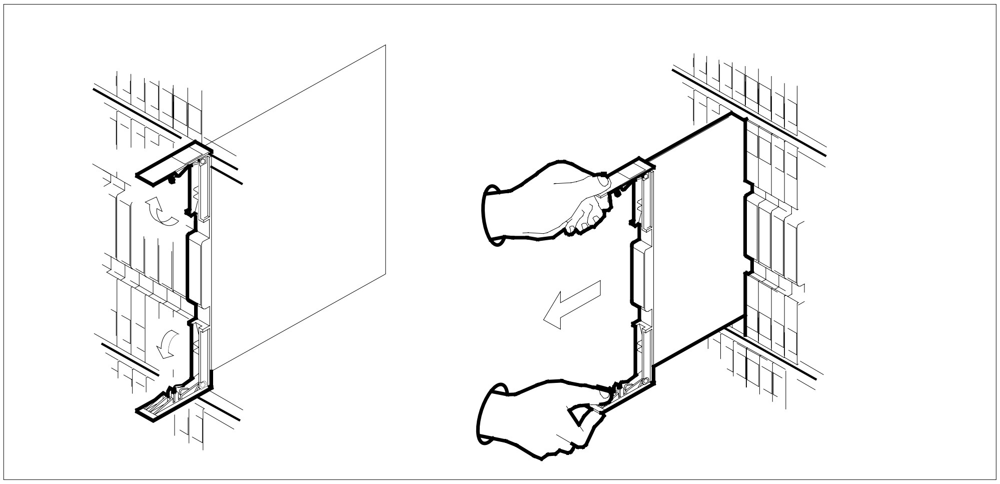
14 The following figures show how to remove the NTAX74 card:

a Locate the card to be removed on the appropriate shelf.



b Open the locking levers on the card to be replaced. Carefully pull the card toward you until the card clears the shelf.

NTAX74
in an RSC-S (DS-1) Model B 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

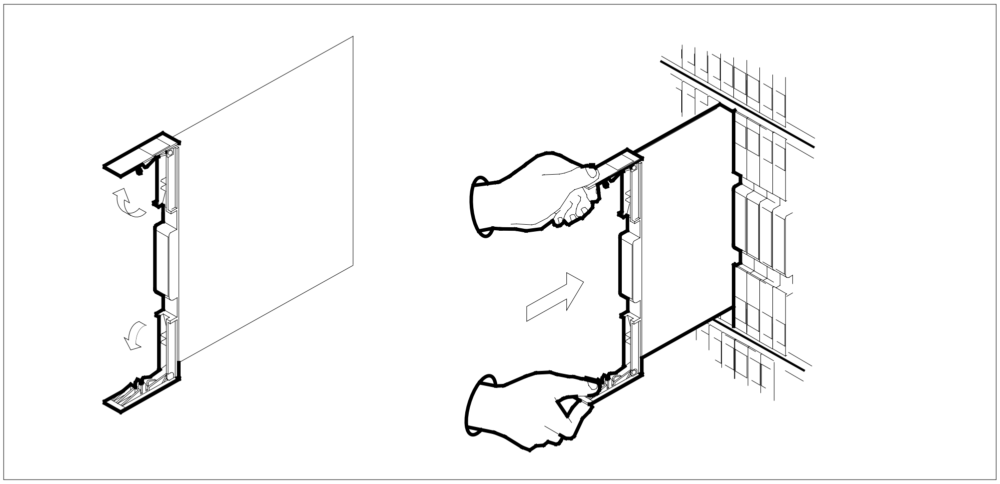
DANGER
Possible loss of P-side nodes
When you install the replacement NTAX74, monitor the LEDs on the faceplate of the NTAX74 for the following indicators:1. The INSV and ESA LEDs come ON and remain ON until loading begins.2. The ACT LED can come ON and light for less than 1 s. If the ACT LED remains 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.

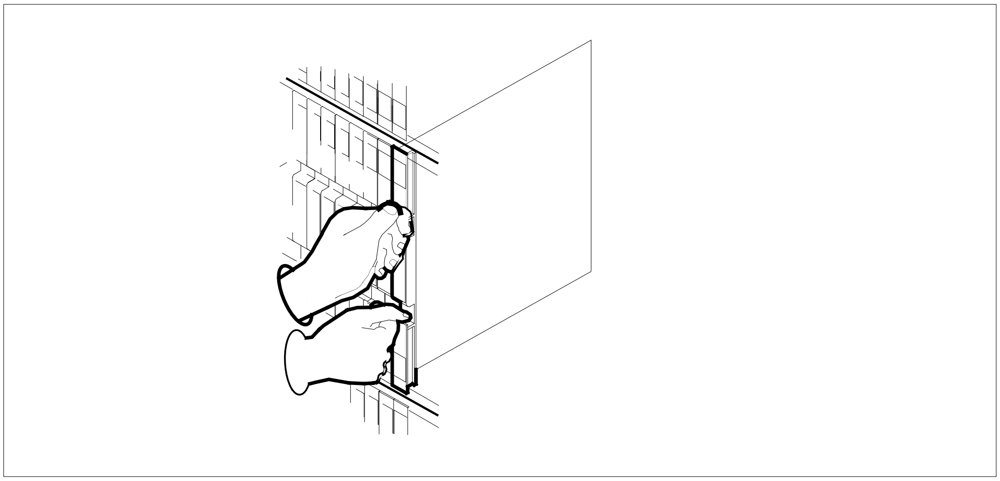
b Carefully slide the card in the shelf.

NTAX74
in an RSC-S (DS-1) Model B 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
Clearing an alarm procedures	step 26
other	step 18

NTAX74 in an RSC-S (DS-1) Model B 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 XMS-based peripheral module (XPM) counters for the firmware load on the NTAX74, type:

>QUERYPM CNTRS

and press the Enter key.

Example of a MAP response

```
Unsolicitited MSG limit = 250, Unit 0 = 0, Unit 1 = 0
Unit 0:
Ram Load: WRI07BE
EPRom Version: AB02
EEPRom Load: Loadable: AX74XE01, Executable: AX74XE01
CMR Load: CMR03A
CAP:AX74AA
Unit 1:
Ram Load: WRI07BE
EPRom Version: AB02
EEPRom Load: Loadable: AX74XE01 , Executable: AX74XE01
CMR Load: CMR03A
CAP:AX74AA
```

NTAX74 firmware load name

If firmware	Do
is valid	step 22
is invalid	step 20

20 To load the inactive unit firmware, type:

>LOADFW INACTIVE

and press the Enter key.

If LOADFW	Do
passed	step 21
failed	step 27

NTAX74
in an RSC-S (DS-1) Model B RCC2 (end)

21 To upgrade the inactive unit firmware, type:

>LOADFW INACTIVE UPGRADE

and press the Enter key.

If 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 *Alarm Clearing 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 B 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

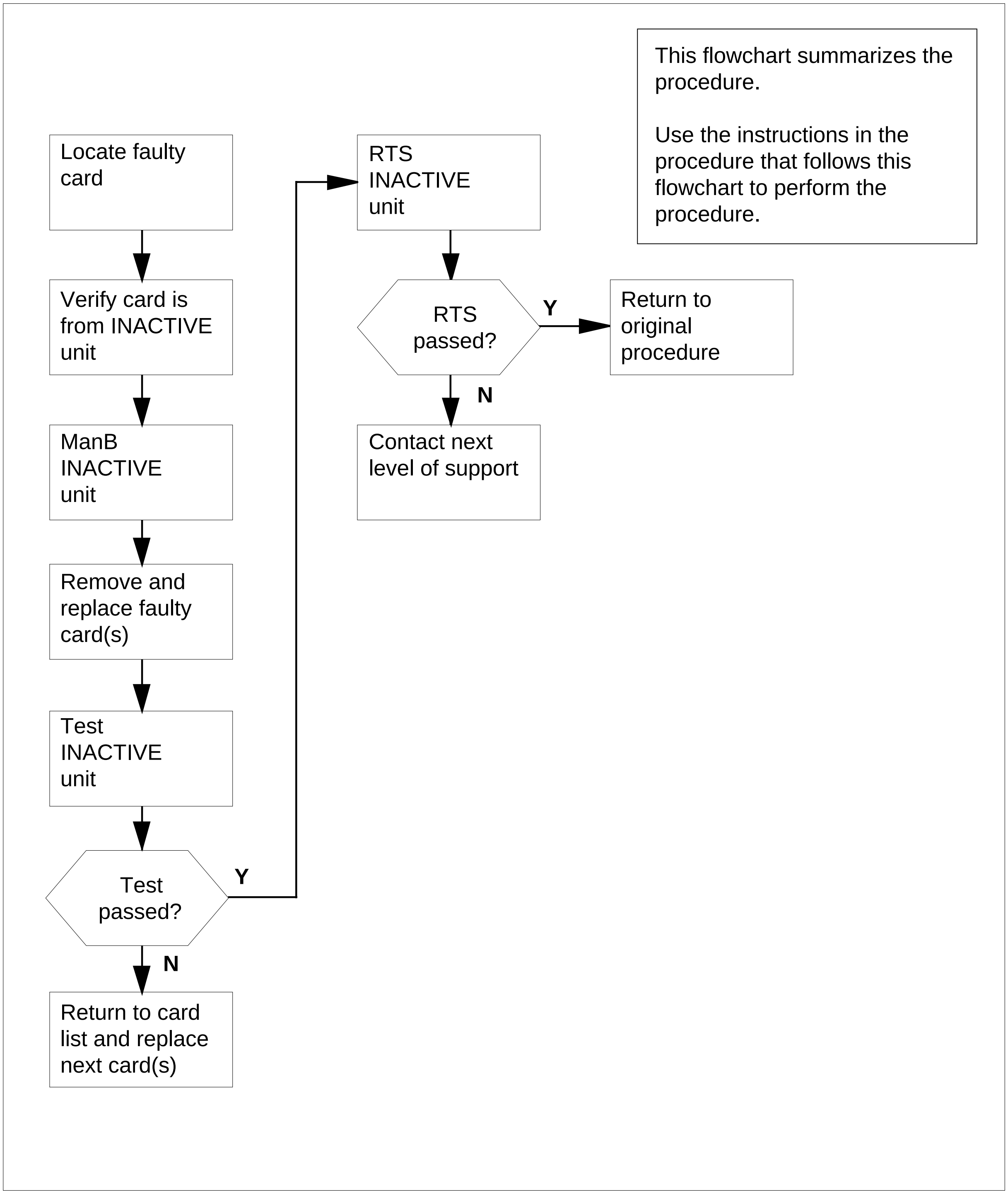
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NTBX01 card in RSC-S RCC2



NTBX01
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NTBX01
in an RSC-S (DS-1) Model B 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, 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 B 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

> **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.

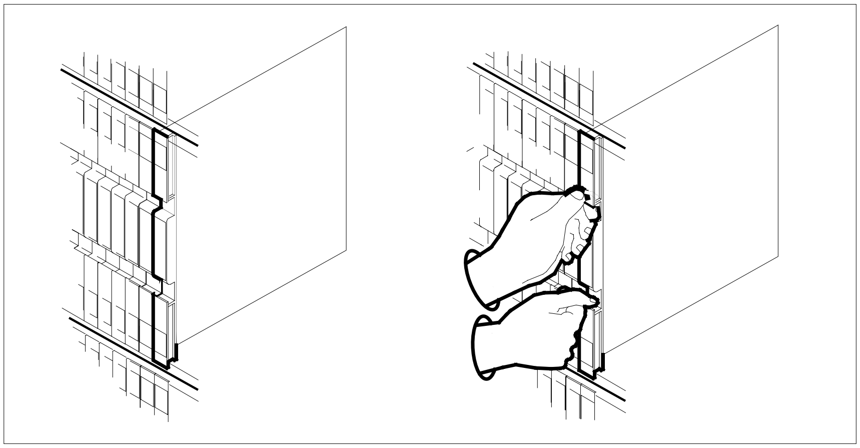
> **DANGER**
> **Equipment damage**
> Take these precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
> 2. Do not force the card into its slot.

Put on a wrist strap.

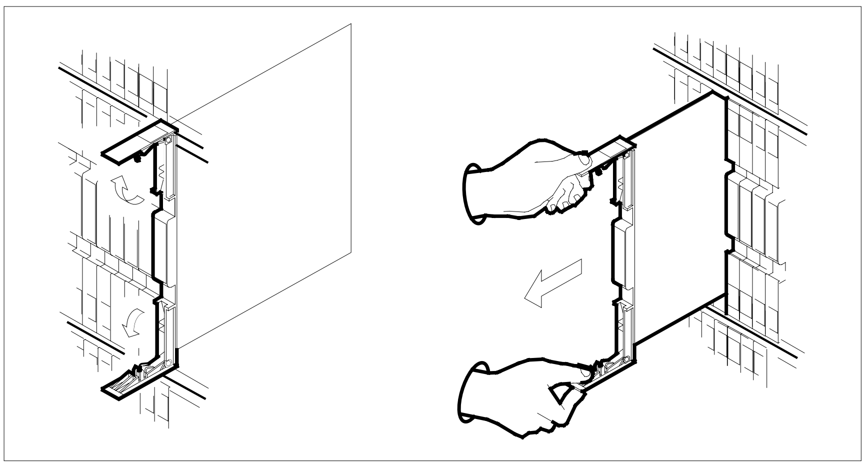
10 Remove the NTBX01 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTBX01
in an RSC-S (DS-1) Model B 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.



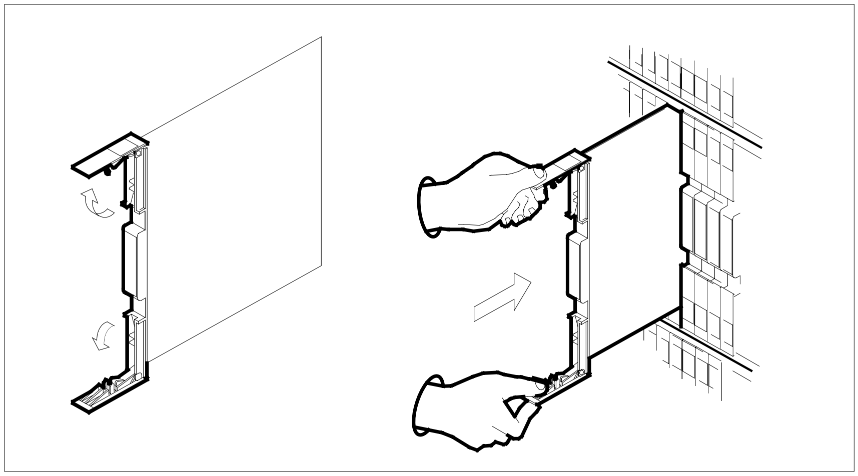
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

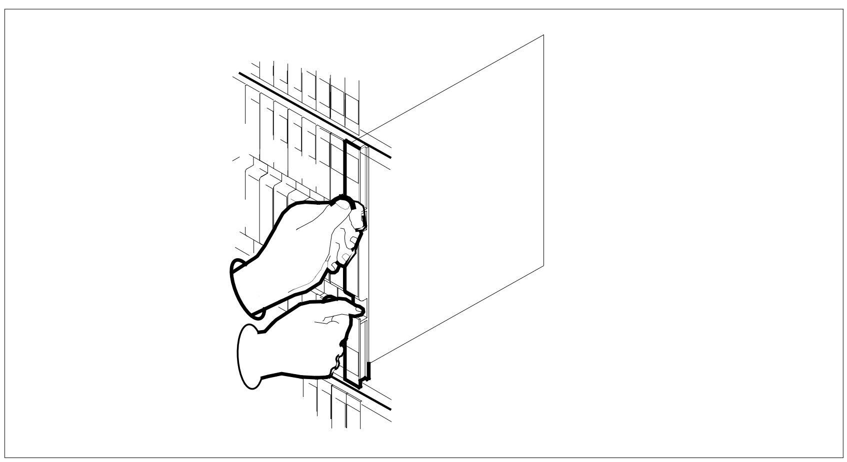
NTBX01
in an RSC-S (DS-1) Model B RCC2 (continued)



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 B 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 B 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 B 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

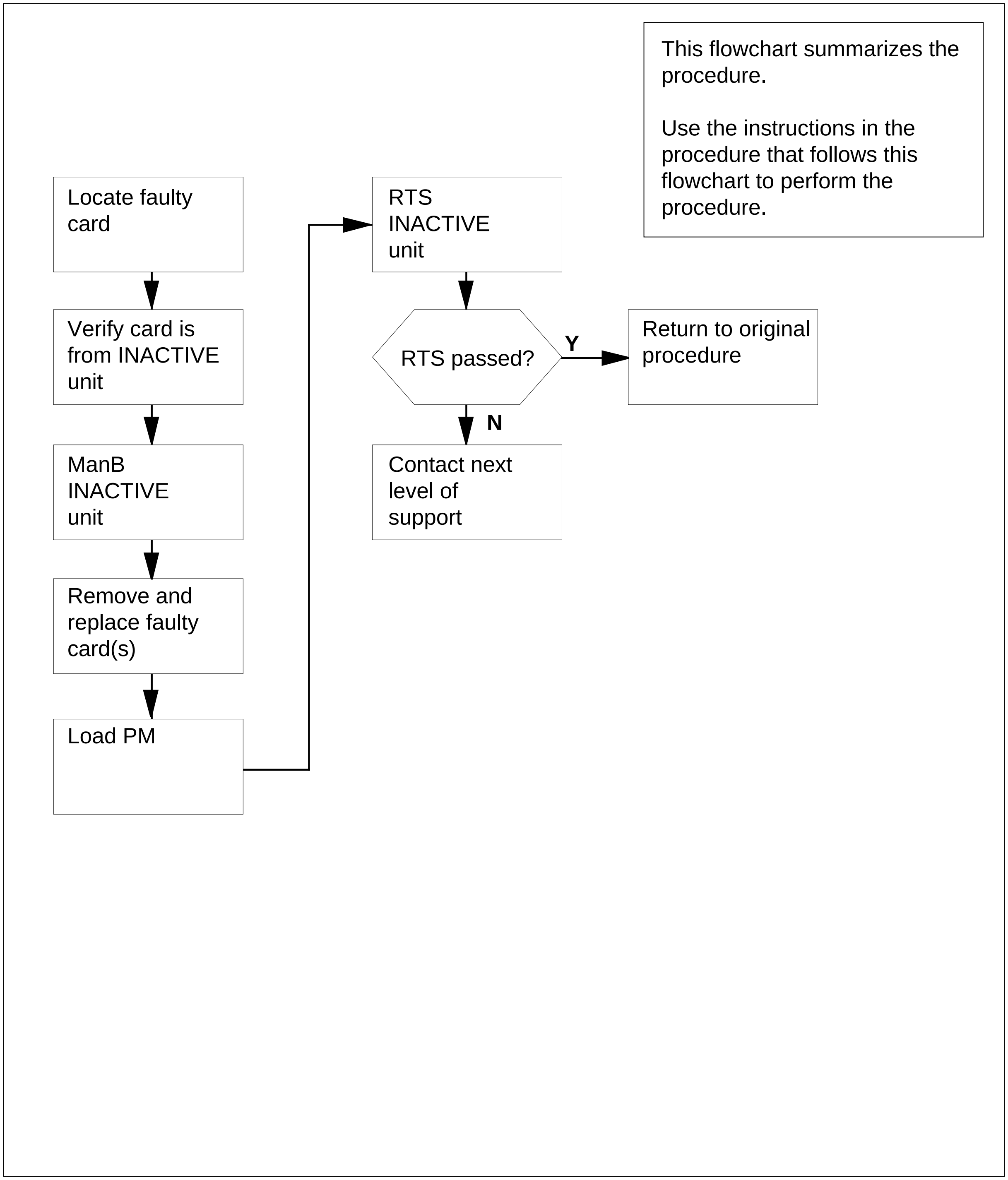
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NTBX02 card in an RSC-S RCC2



NTBX02
in an RSC-S (DS-1) Model B 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 B 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 B 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 1 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.

where

NTBX02
in an RSC-S (DS-1) Model B RCC2 (continued)

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.

Example of a MAP display:

NTBX02
in an RSC-S (DS-1) Model B RCC2 (continued)

```
 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.

or

>DSKUT;LISTVOL D010 DCH_load_file_name ALL

NTBX02 in an RSC-S (DS-1) Model B RCC2 (continued)

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

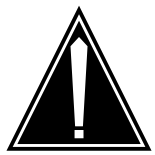
>BSY

and pressing the Enter key.

NTBX02
in an RSC-S (DS-1) Model B RCC2 (continued)

At the RCE frame

21



CAUTION
Static discharge may cause damage to circuit packs
Put on a wrist strap and connect it to the frame of the RMM before removing any cards. This protects the RMM against service degradation caused by static electricity.

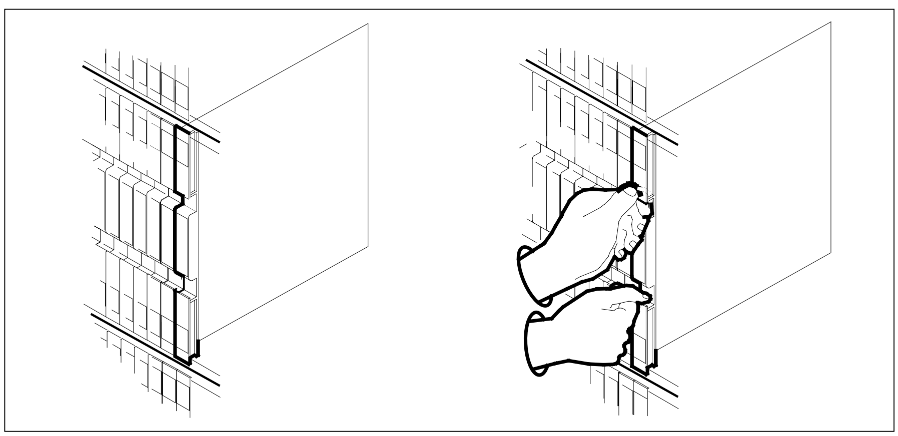
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.2. Do not force the cards into the slots.

Put on a wrist strap.

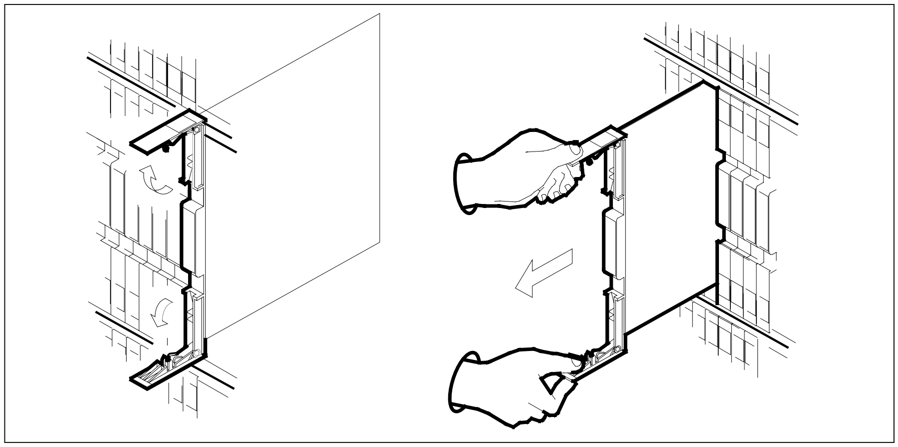
22 Remove the NTBX02 card as shown in the following figures.

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 B RCC2 (continued)

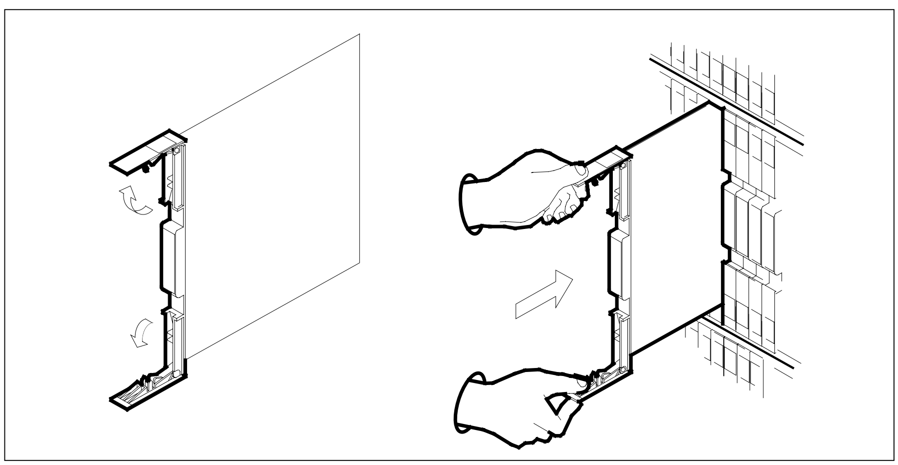


c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.



NTBX02
in an RSC-S (DS-1) Model B RCC2 (continued)

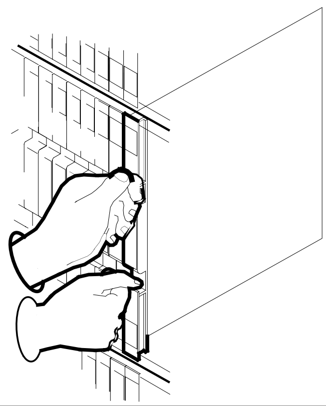
24

> **CAUTION**
> **Loss of subscriber service**
> Subscriber service may be lost in the active unit when reseating the NTBX02 card.
>
> It is recommended that this procedure be performed during low traffic periods.

Seat and lock the card.

a Using your fingers or thumbs, push on the upper and lower edges of the faceplate to ensure that the card is fully seated in the shelf.

b Close the locking levers.



At the MAP terminal

25 Load the DCH card by typing

>LOADPM

and pressing the Enter key.

26 Use the following information to determine the next step in this procedure.

If load	Do
passed	step 27
failed	step 34

27 Return the DCH card to service by typing

>RTS

NTBX02
in an RSC-S (DS-1) Model B RCC2 (continued)

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.

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
```

NTBX02
in an RSC-S (DS-1) Model B RCC2 (end)

Use the following information to determine the next step in this procedure.

If faults are	Do
not indicated	step 31
indicated	step 34

31 Send any faulty cards for repair according to local procedure.

32 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card.

If you entered this procedure from	Do
alarm clearing procedures	step 33
other	step 35

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 B 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

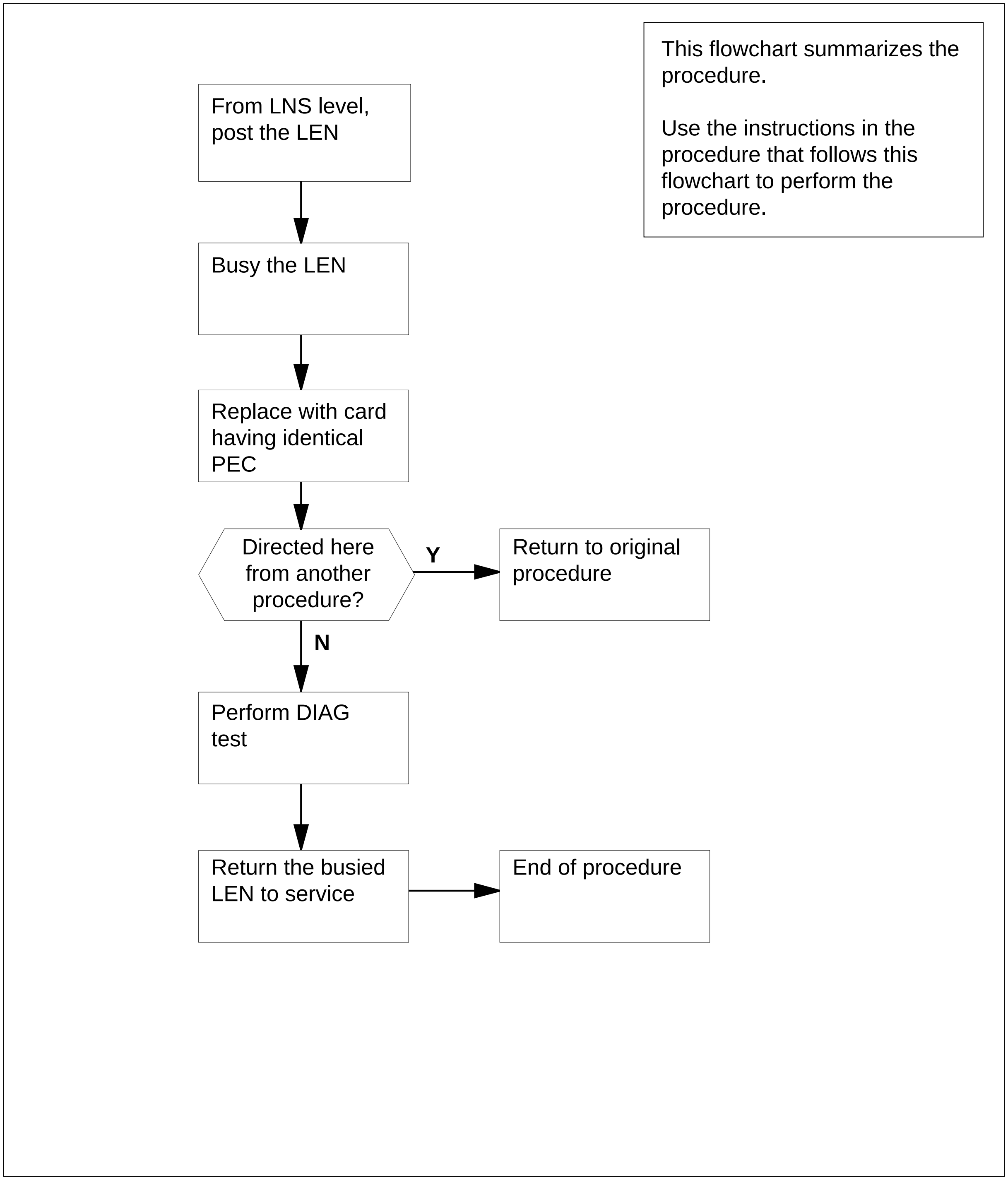
None

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 B LCME (continued)

Summary of card replacement procedure for an NTBX26 card in an RSC-S LCME



NTBX26 in an RSC-S (DS-1) Model B 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 B 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 B 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 modular supervisory panel (MSP) 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 B 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 B 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 B 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 B 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

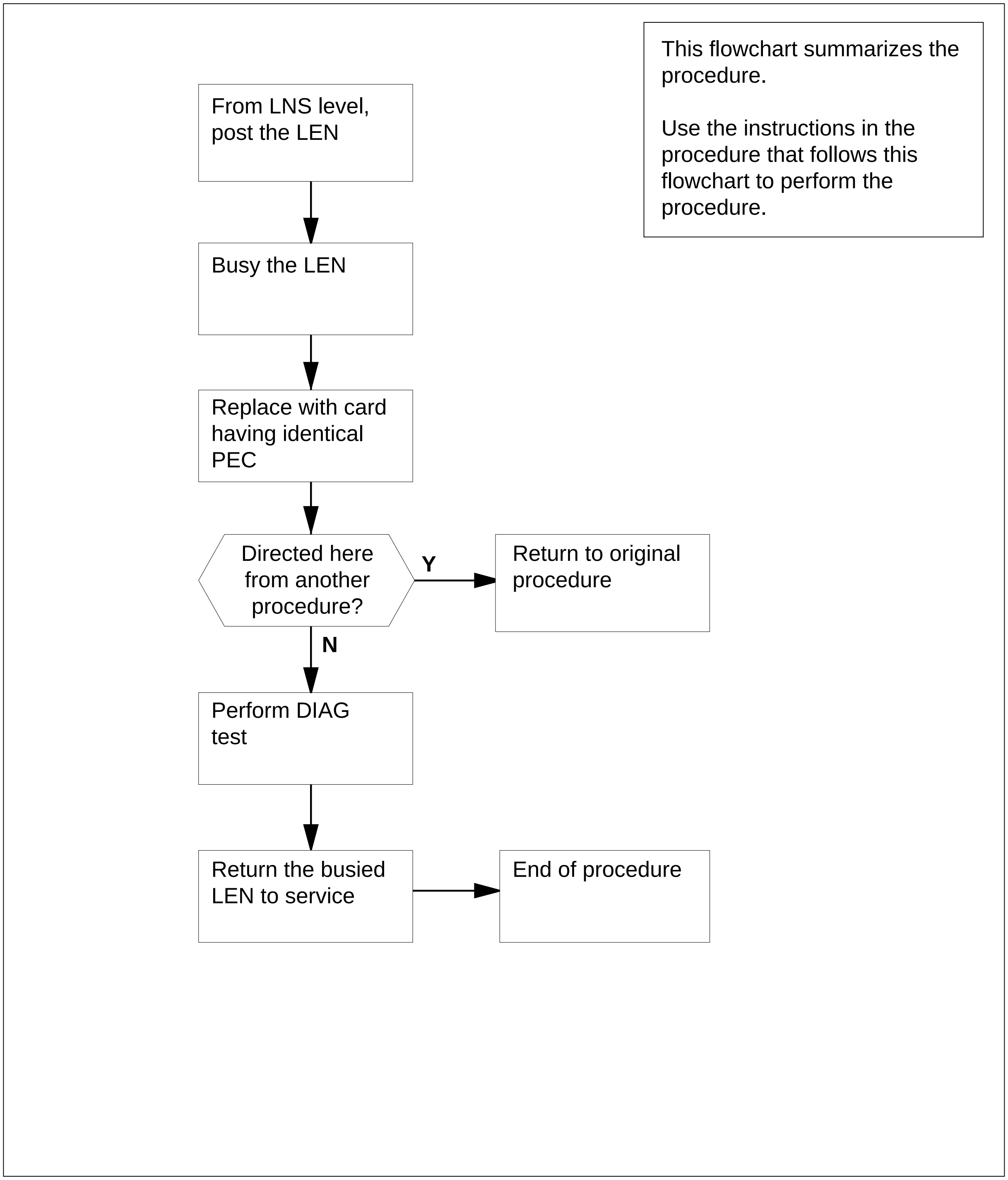
None

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 B LCME (continued)

Summary of card replacement procedure for an NTBX27 card in an RSC-S LCME



NTBX27
in an RSC-S (DS-1) Model B 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 B 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 B 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 modular supervisory panel (MSP) 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 B 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 B 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 B 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 B 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

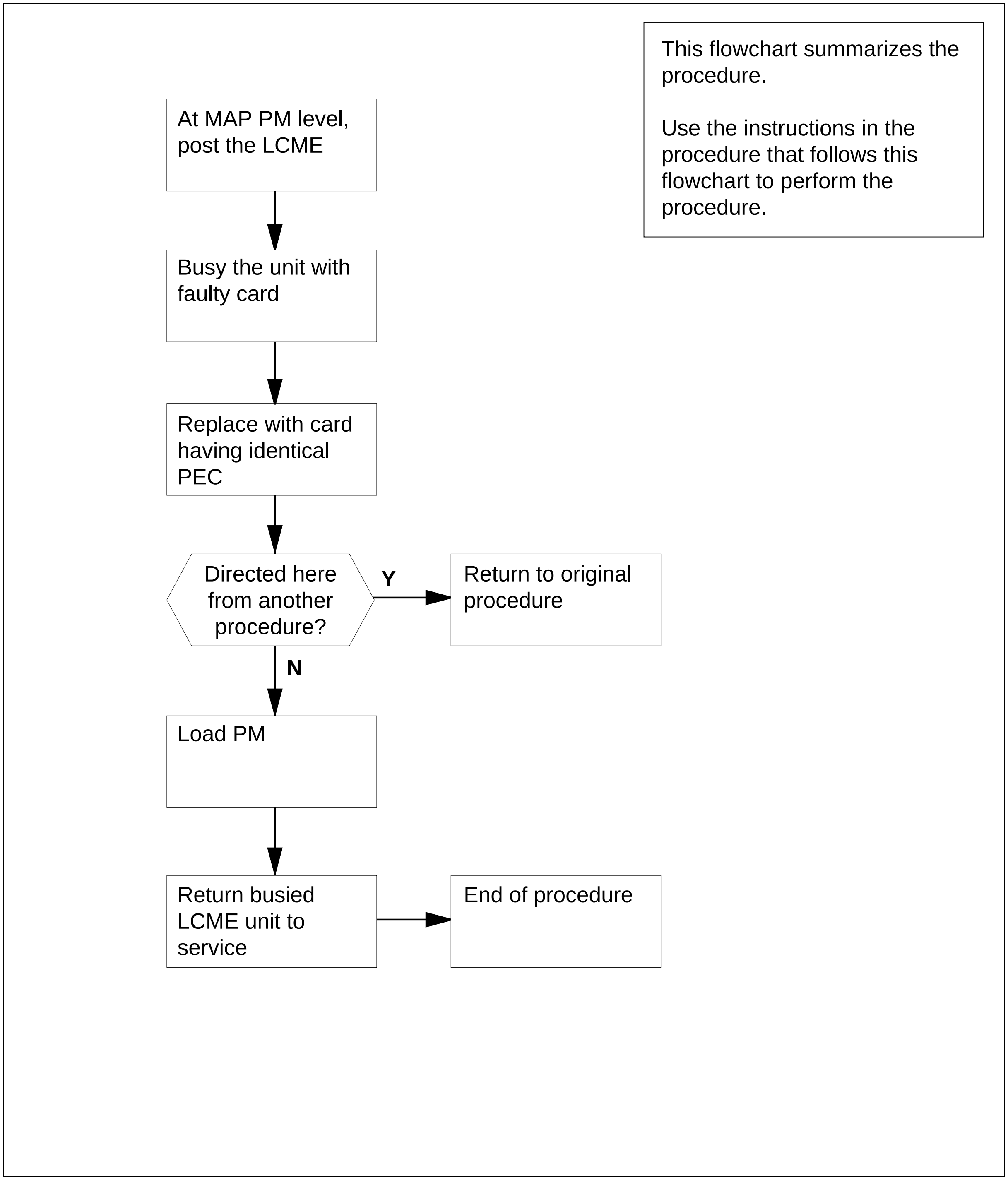
None

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 B LCME (continued)

Summary of card replacement procedure for an NTBX34 card in an RSC-S LCME



NTBX34 in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NTBX34
in an RSC-S (DS-1) Model B LCME (continued)

```
 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

Example of a MAP display:

NTBX34
in an RSC-S (DS-1) Model B LCME (continued)

```
 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 B 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 modular supervisory panel (MSP) of the LCME. This protects the equipment against damage caused by static electricity.

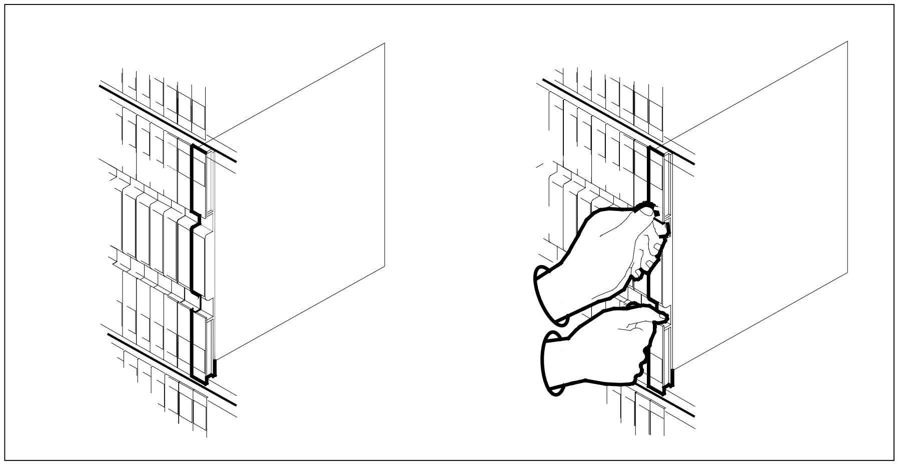
> **DANGER**
> **Equipment damage**
> Take the following precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

Put on a wriststrap.

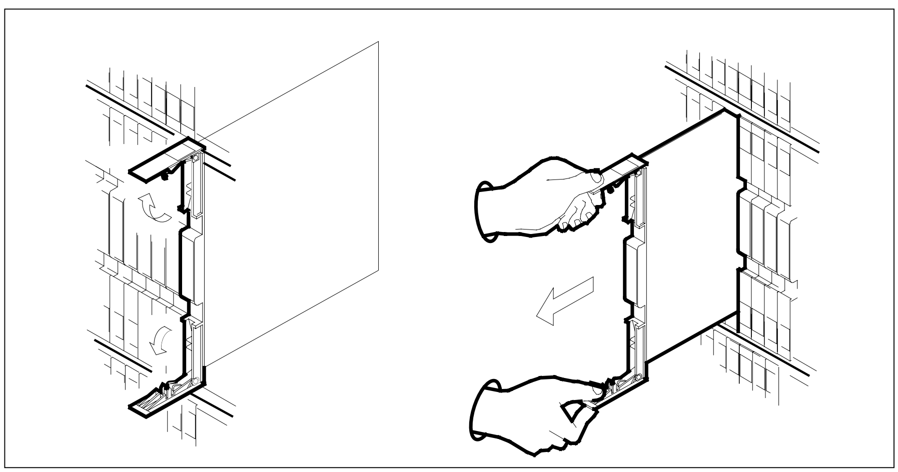
6 Remove the NTBX34 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTBX34
in an RSC-S (DS-1) Model B 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.



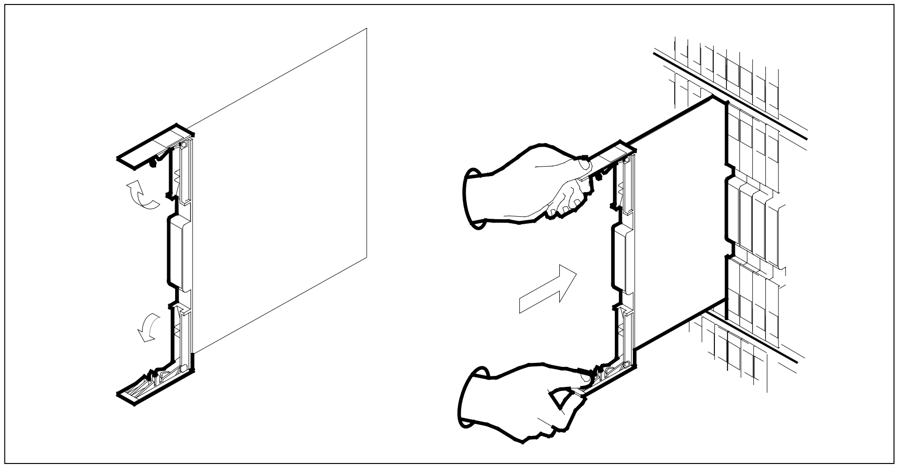
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

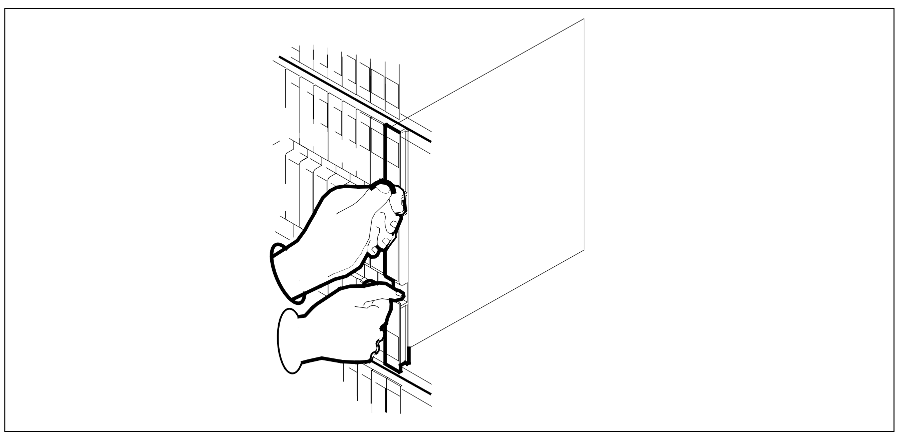
NTBX34
in an RSC-S (DS-1) Model B LCME (continued)



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 B 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 B 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 B 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

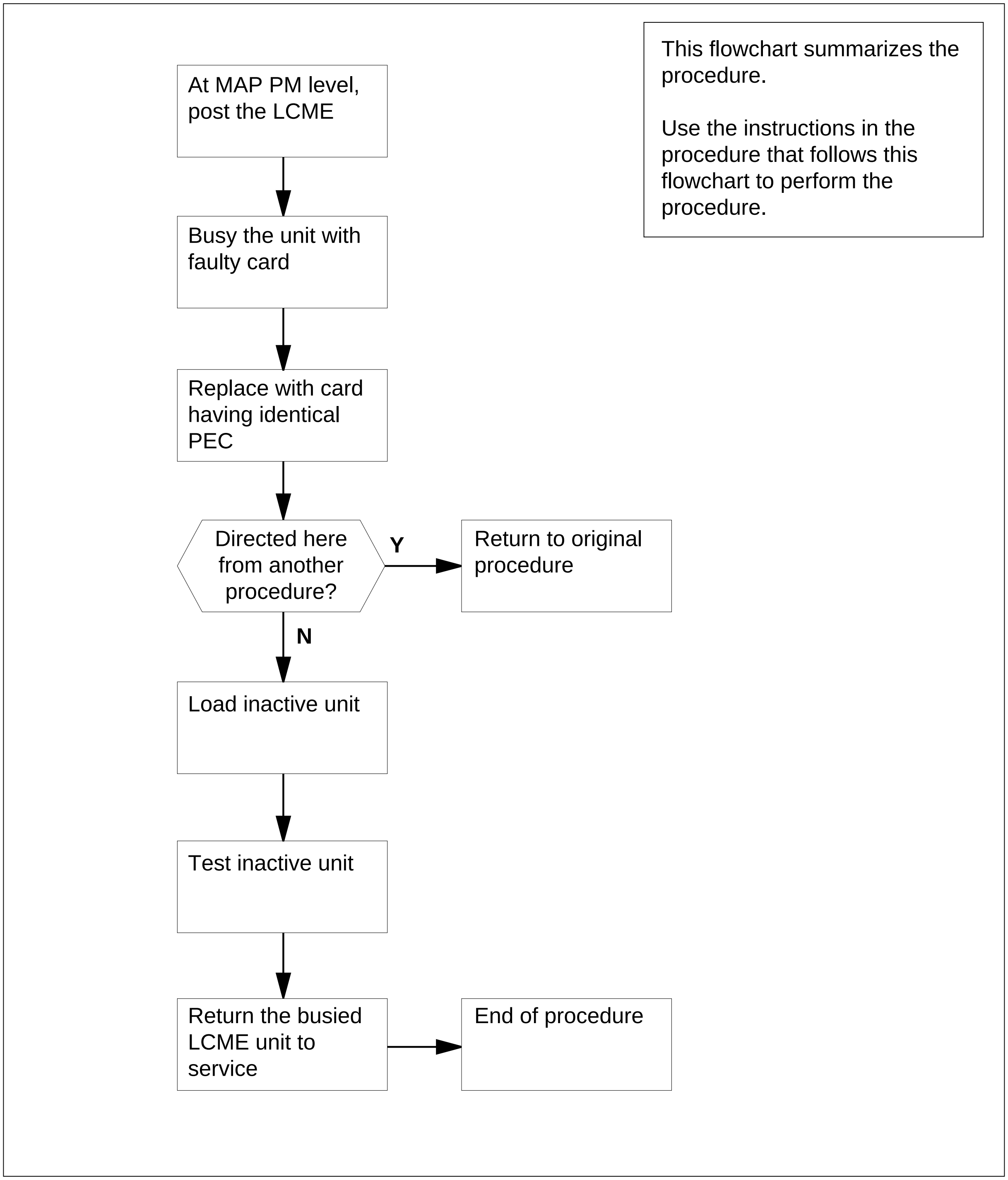
None

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 B LCME (continued)

Summary of card replacement procedure for an NTBX35 card in an RSC-S LCME



NTBX35
in an RSC-S (DS-1) Model B LCME (continued)

Replacing an NTBX35 card in an RSC-S LCME

At your Current Location

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NTBX35 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP to the PM level and post the LCME by typing

`>MAPCI;MTC;PM;POST LCME site frame_no unit_no`

and pressing the Enter key.

where

site
is the name of the site at which the LCME is located

frame_no
is the number of the frame in which the LCME is located

unit_no
is the number of the LCME with the faulty card

Example of a MAP display:

NTBX35
in an RSC-S (DS-1) Model B LCME (continued)

```
 CM     MS     IOD     Net     PM     CCS     LNS     Trks     Ext     Appl
 .      .       .       .       .      .       .       .        .       .

LCME                 SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM          o        0        0        0        0        130
 2 Post_   LCME        0        0        0        0        0          0
 3
 4 Swrg_
 5 Trnsl_   LCME   RemL  OO O   Links_OOS:  CSide 0
 6 Tst_     Unit-0:  InSv                /RG:  0
 7 Bsy_     Unit-1:  InSv                /RG:  0
 8 RTS_     RG: Preferred 0:  InSv   Standby1: InSv
 9 OffL_
10 LoadPM_
11 Disp_
12 Next_
13
14 QueryPM
15
16
17
18
```

4 Busy the LCME unit by typing

>BSY UNIT unit_no

and pressing the Enter key.

where

unit_no
is the number of the LCME unit with the faulty card

Example of a MAP display:

NTBX35
in an RSC-S (DS-1) Model B LCME (continued)

```
 CM     MS     IOD    Net    PM     CCS    LNS    Trks    Ext    Appl
 .      .       .      .      .      .      .       .      .      .

LCME                SysB     ManB     OffL     CBsy     ISTb      InSv
 0 Quit    PM         0        0        0        0        0       130
 2 Post_   LCME       0        1        0        0        0         0
 3
 4 SwRg     LCME   RemL  OO O   Links_OOS:  CSide 0
 5 Trnsl    Unit-0:  InSv  Mtce TakeOver /RG:  0
 6 Tst      Unit-1:  ManB Mtce           /RG:  0
 7 Bsy      RG: Preferred 0:  InSv   Standby1: InSv
 8 RTS
 9 OffL
10 LoadPM
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

NTBX35
in an RSC-S (DS-1) Model B 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 modular supervisory panel (MSP) 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:

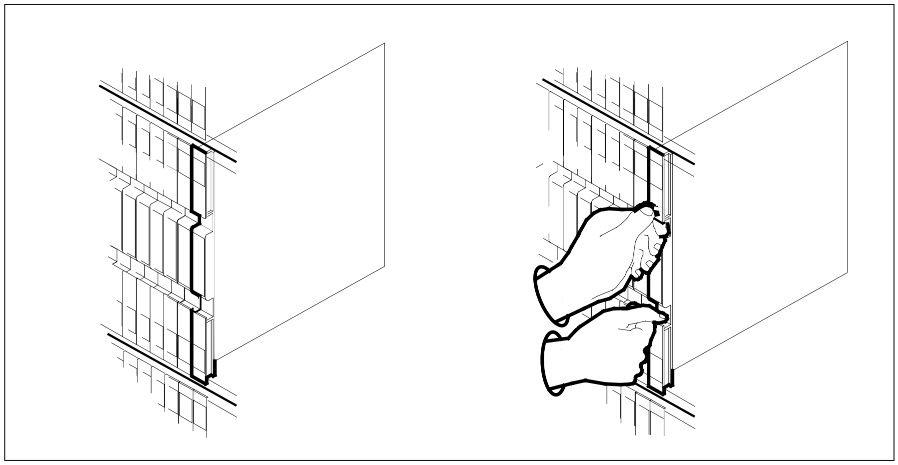
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wriststrap.

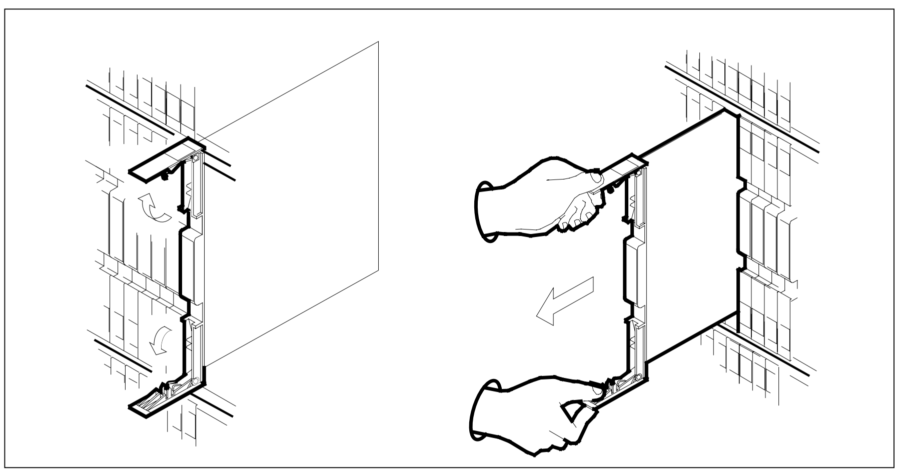
6 Remove the NTBX35 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTBX35
in an RSC-S (DS-1) Model B 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.



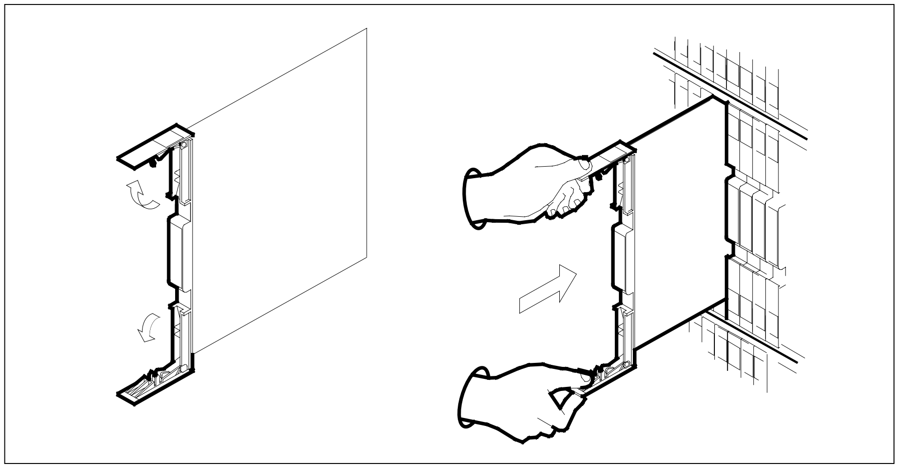
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

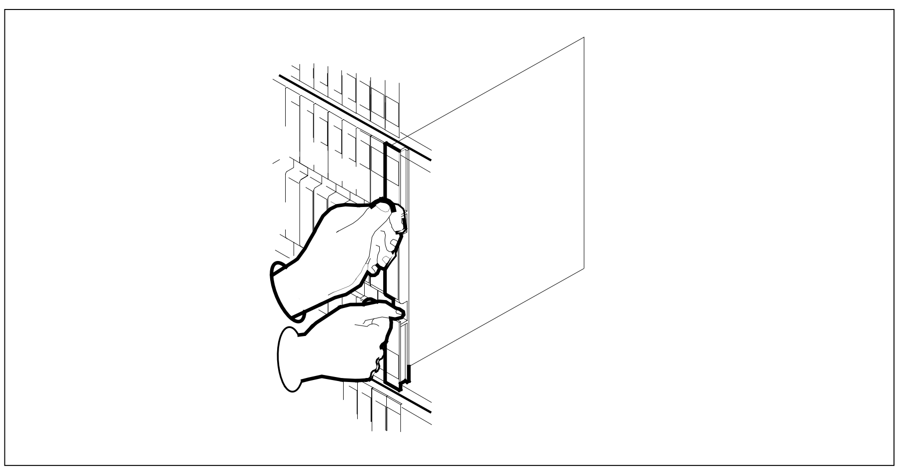
NTBX35
in an RSC-S (DS-1) Model B LCME (continued)



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

NTBX35
in an RSC-S (DS-1) Model B LCME (continued)

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 B 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 B 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

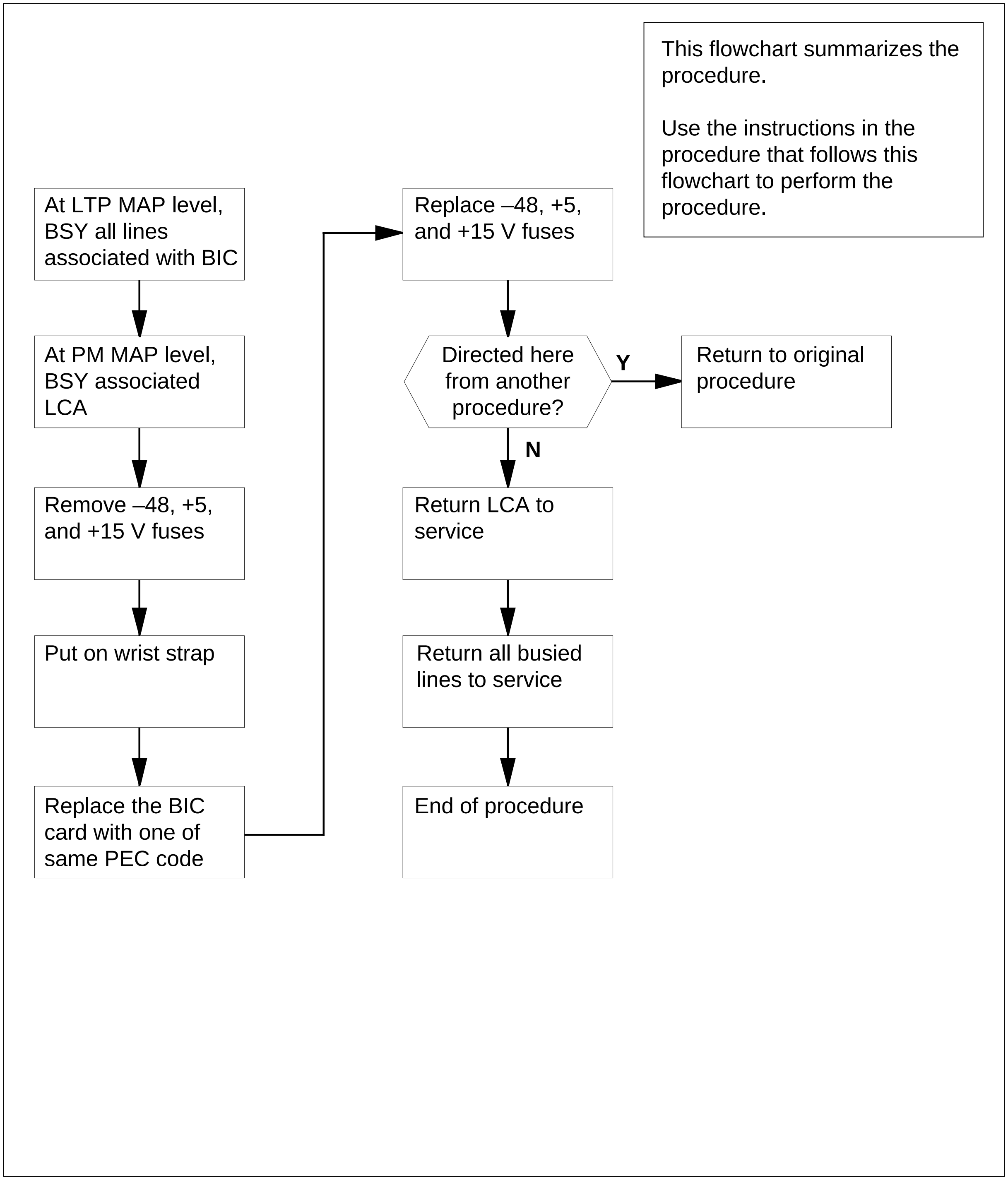
None

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 B LCME (continued)

Summary of card replacement procedure for an NTBX36 card in RSC-S LCME



NTBX36
in an RSC-S (DS-1) Model B 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 B 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 B 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 B LCME (continued)

At the LCE frame

10

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 modular supervisory panel (MSP) 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.

NTBX36
in an RSC-S (DS-1) Model B LCME (continued)

> **CAUTION**
> **Special tools required**
> Card shrouds and removal tools are required for removing cards from the line drawers.

Remove the -48V, +5V, and +15V fuses (in that order) for the line drawer containing the BIC to be replaced.

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.		

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.

NTBX36
in an RSC-S (DS-1) Model B 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.

12 Remove the line card to be replaced by following these substeps:

- **a** Slide a card shroud over the card to be removed and an adjacent card. If there is not an adjacent card on either side, do not use the card shroud.
- **b** Grasp the edge of the card with a line card extractor at a point midway between the top and bottom edges. Hold the extractor in your right hand.
- **c** Squeeze the handles of the extractor together to grasp the card tightly.
- **d** Hold the front cover of the line drawer to steady it using your left hand.
- **e** Pull the extractor away from the drawer, and the card will become unplugged from its socket on the drawer backplane.
- **f** Continue pulling the card with the extractor until the card is clear of the shroud.
- **g** Insert the card removed into the ESD container and store using local procedures.

13 Replace the faulty card by following these substeps:

- **a** Remove the replacement card from the ESD container.
- **b** Slide the card in the shroud guide slots toward the drawer backplane.
- **c** Hold the front cover of the line drawer with your left hand to steady it.
- **d** Grasp the top and bottom edges of the card with the fingers of your right hand.
- **e** Push the card toward the backplane until it plugs fully into the backplane socket.
- **f** Close the line drawer.

14 Replace the -48V, +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

NTBX36
in an RSC-S (DS-1) Model B LCME (continued)

At the MAP terminal

16 Return the LSGs to service by typing

>RTS DRWR x

and pressing the Enter key.

>RTS DRWR y

and pressing the Enter key.

where

x
is the first line subgroup busied in step 8

y
is the next line subgroup busied in step 8

17 Access the PM level of the MAP display and post the first LSG of the line drawer that contains the BIC to be replaced by typing

>MAPCI;MTC;PM;LNS;LTP;POST L site frame_no unit_no lcm_dr

and pressing the Enter key.

where

site
is the name of the site at which the LCME is located

frame_no
is the number of the frame in which the LCME is located

unit_no
is the number of the LCME unit with the faulty card

lcm_dr
is the number of the drawer with the faulty card

18 Return the busied lines in the first LSG to service by typing

>RTS ALL

and pressing the Enter key.

19 Post the next LSG of the same line drawer by typing

>NEXT D

and pressing the Enter key.

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

NTBX36
in an RSC-S (DS-1) Model B LCME (end)

frame_no
is the number of the frame in which the LCME is located

unit_no
is the number of the LCME unit with the faulty card

22 Test the LCME unit by typing

>TST UNIT lcm_unit_no

and pressing the Enter key.

where

lcm_unit_no
is the number of the LCME unit posted in step 21

If TST	Do
passed	step 23
failed	step 26

23 Return the LCME unit to service by typing

>RTS lcm_unit_no

and pressing the Enter key.

where

lcm_unit_no
is the number of the LCME unit tested in step 22

If RTS	Do
passed	step 24
failed	step 27

24 Send any faulty cards for repair according to local procedure.

25 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 28.

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 B 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

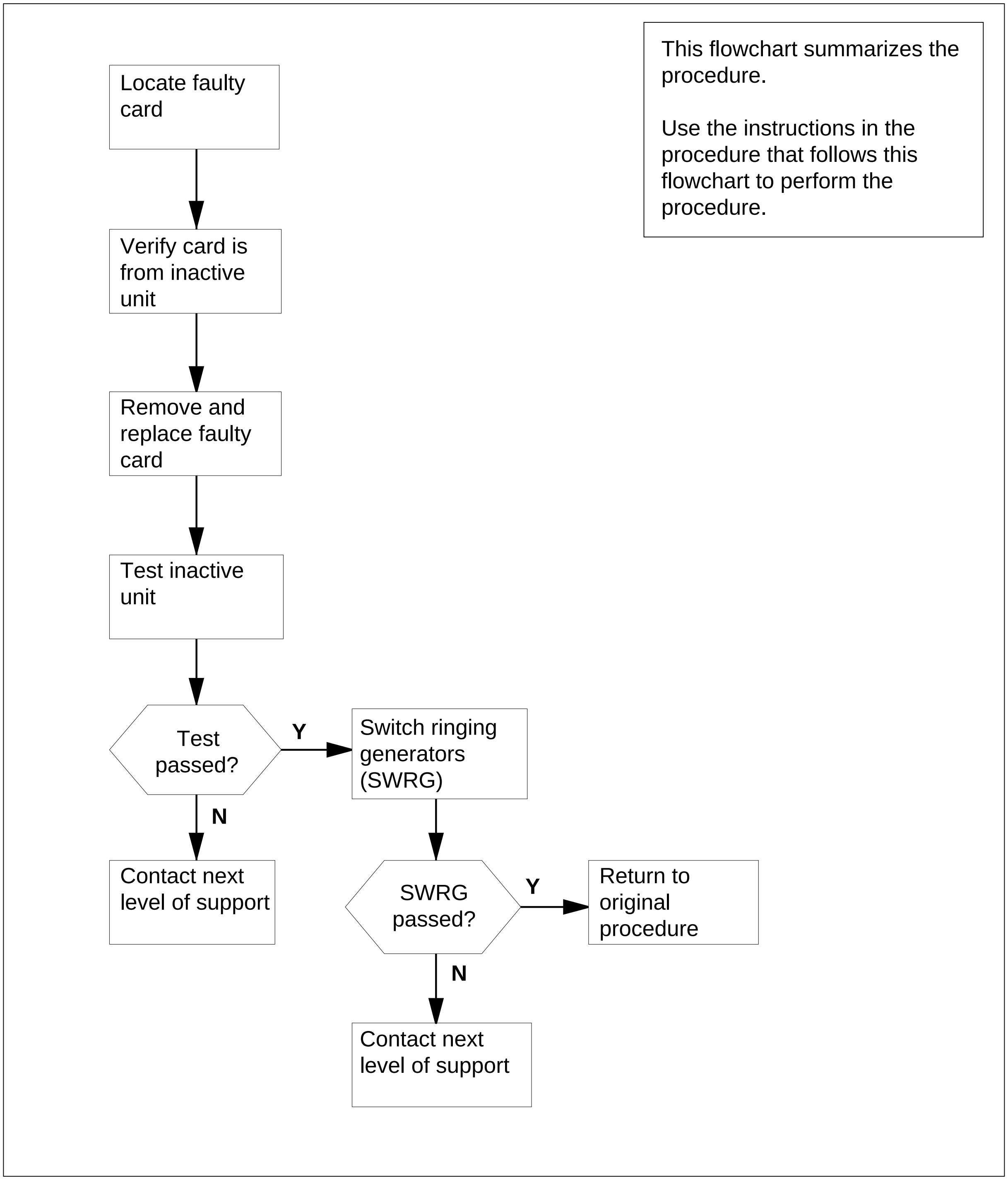
None

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 B LCME (continued)

Summary of card replacement procedure for an NTBX72 card in an RSC-S LCME



NTBX72
in an RSC-S (DS-1) Model B LCME (continued)

Replacing an NTBX72 card in an RSC-S LCME

At your Current Location

1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

2 Obtain an NTBX72 replacement card. Ensure the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the LCME by typing

`>MAPCI;MTC;PM;POST LCME site frame_no unit_no`

and pressing the Enter key.

where

site
is the name of the site at which the LCME is located

frame_no
is the number of the frame in which the LCME is located

unit_no
is the number of the LCME with the faulty card

Example of a MAP display:

NTBX72
in an RSC-S (DS-1) Model B LCME (continued)

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

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

4 Check for fault indicators by typing

>QUERYPM FLT

and pressing the Enter key.

Example of a MAP display:

NTBX72
in an RSC-S (DS-1) Model B LCME (continued)

```
 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.

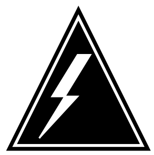
where

lcme_unit_no
is the number of the LCME unit with the faulty card

NTBX72
in an RSC-S (DS-1) Model B 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 modular supervisory panel (MSP) of the LCME. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

8

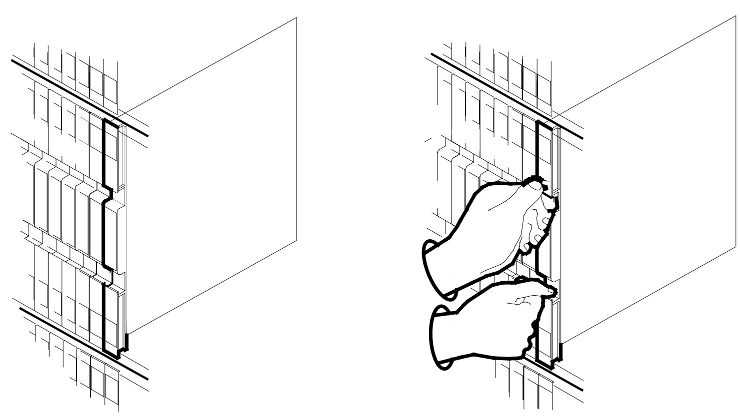
DANGER
Equipment damage
Take these precautions when removing or inserting a card:

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.

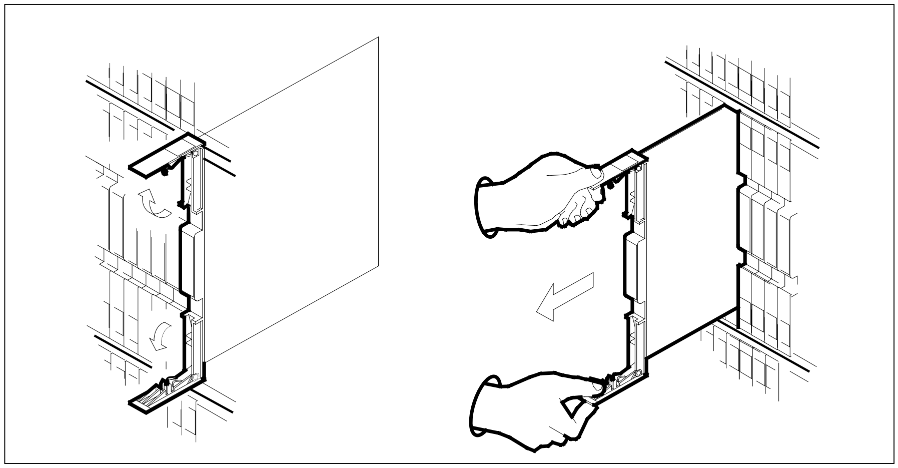
9 Remove the NTBX72 card as shown in the following figures.

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 B LCME (continued)

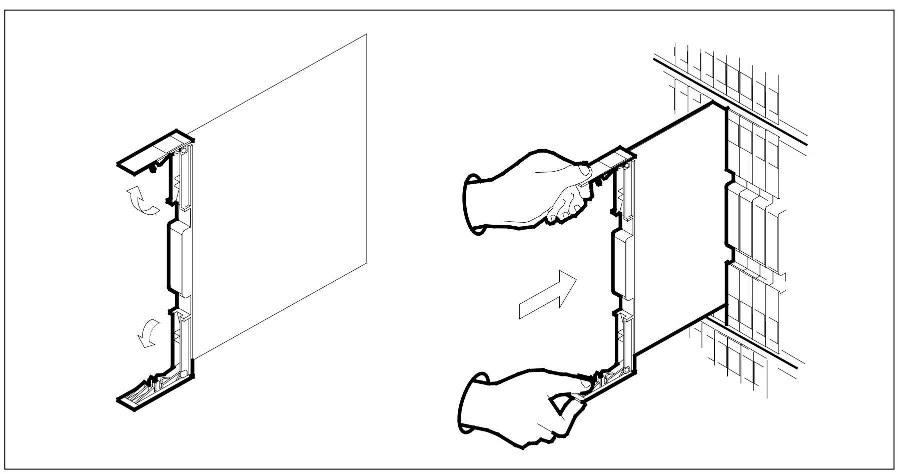


c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

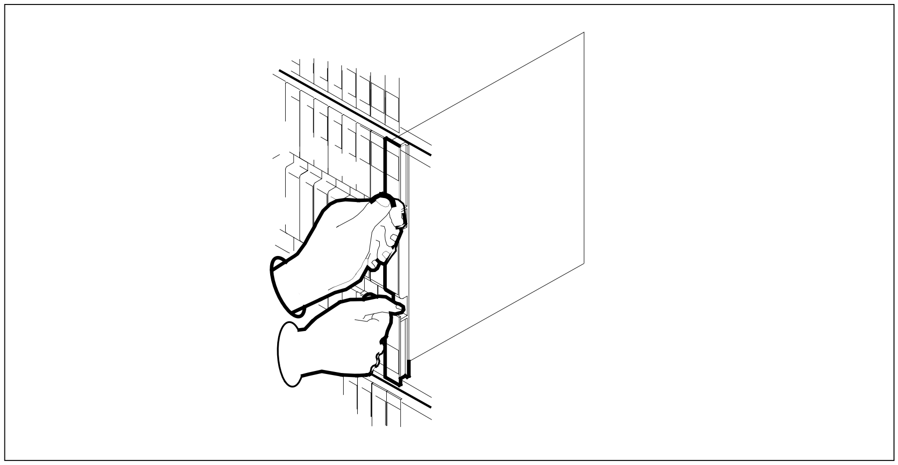


11 Seat and lock the card.

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 B 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 B 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 B LCM

Application

Use this procedure to replace the following card in an RSC-S LCM line drawer.

PEC	Suffixes	Name
NTEX17	AA	xDSL line card
NTEX17	BA	xDSL line card
NTEX17	CA	xDSL line card

Common procedures

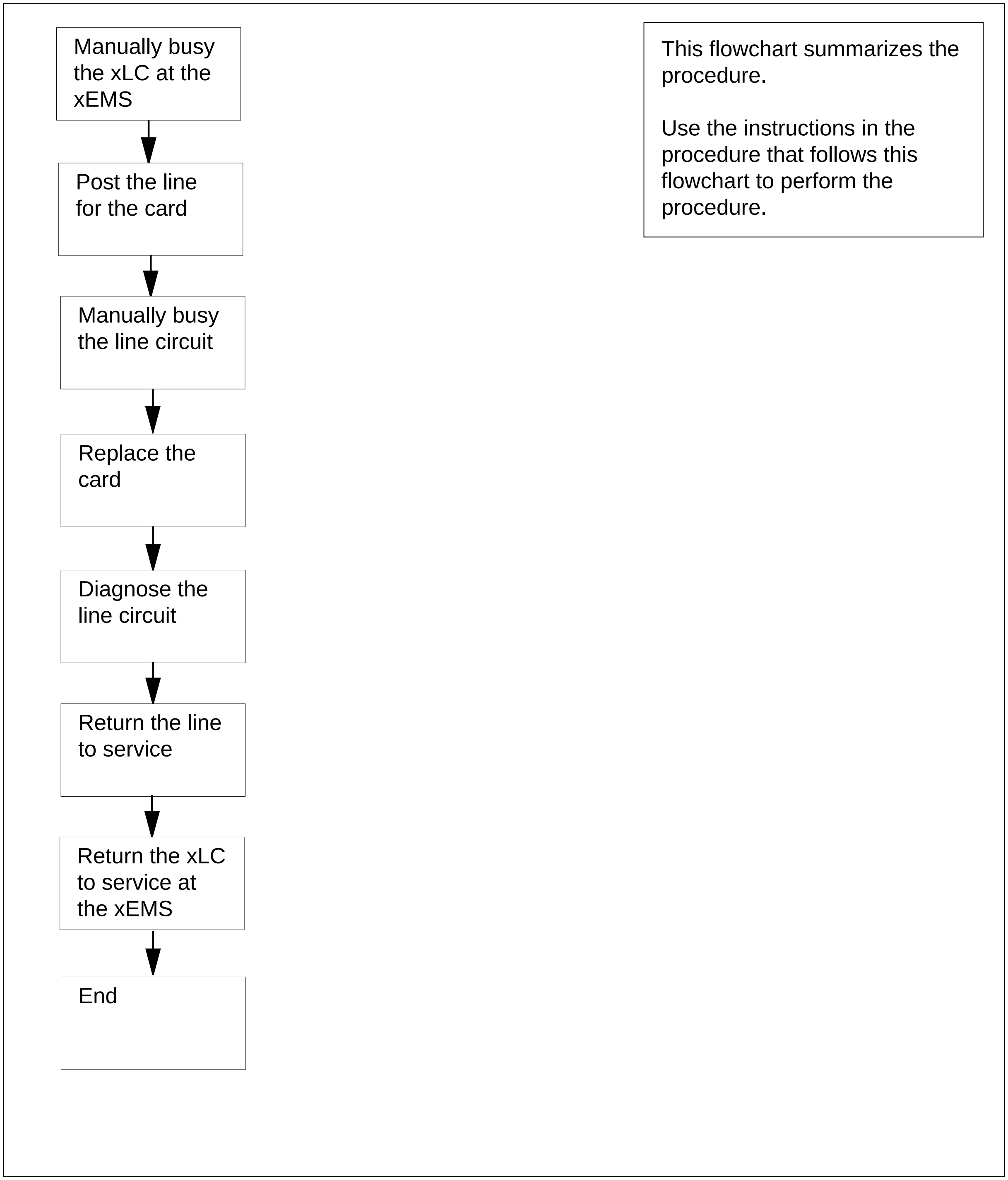
None

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 B LCM (continued)

Summary of replacing an NTEX17 in RSC-S LCM



NTEX17
in an RSC-S (DS-1) Model B LCM (continued)

Replacing an NTEX17 in RSC-S LCM

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)

NTEX17
in an RSC-S (DS-1) Model B LCM (continued)

ckt_no
is the card slot number (0 to 31)

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

NTEX17 in an RSC-S (DS-1) Model B LCM (continued)

At the MAP terminal

10 To display the cabinet location of the faulty line card, type

>CKTLOC

and press the Enter key.

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  EX17CA

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 B LCM (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.

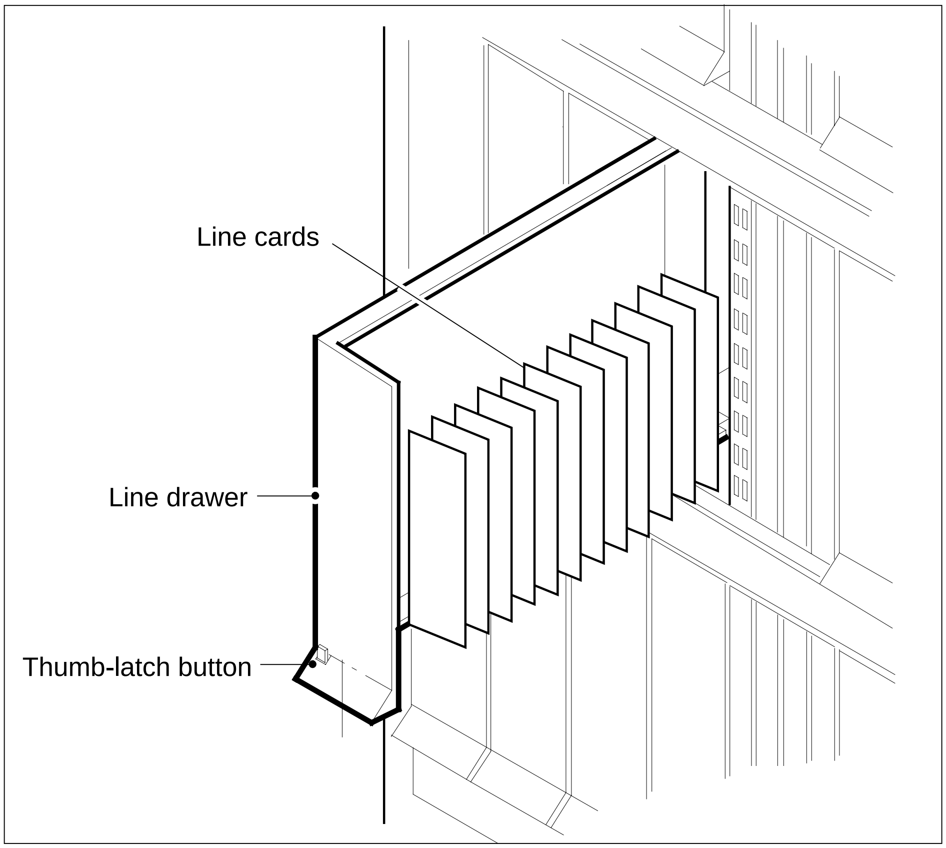
Note 1: A card shroud is required to insert or remove an NTEX17 card in line drawers. This is a 6-inch (152 mm) card, and requires the card shroud with apparatus code QTH58A and common product code A0313317.

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 B LCM (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.

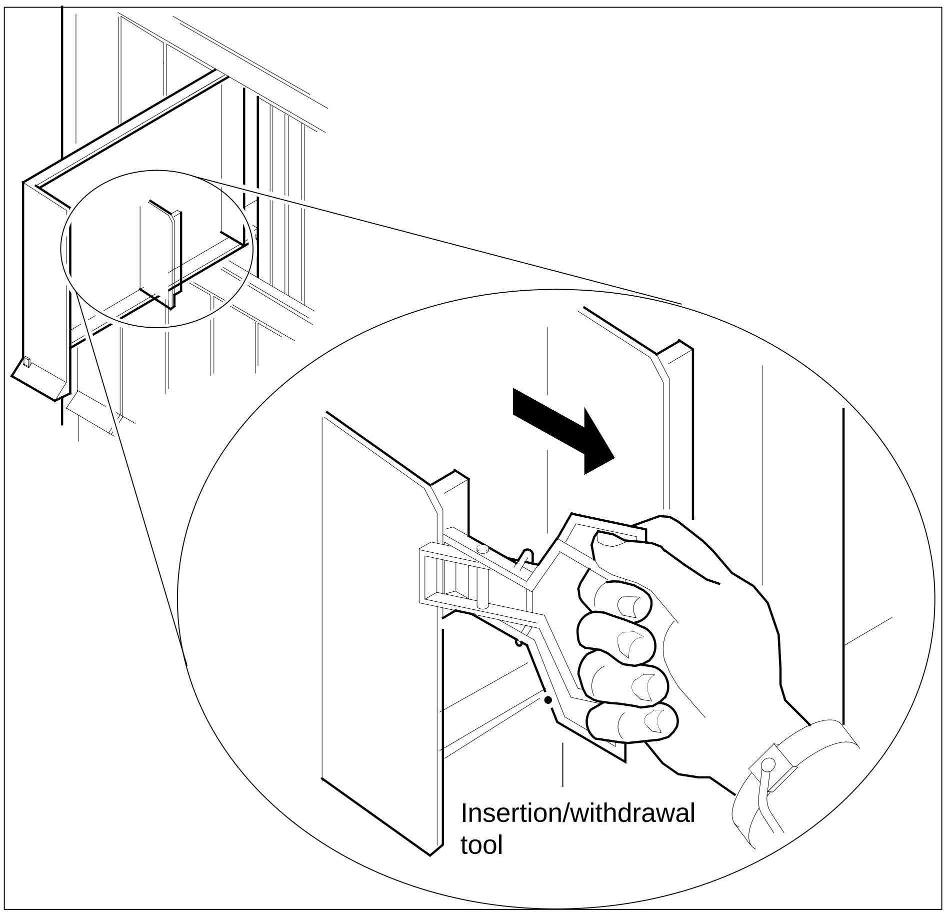
f Ensure a card shroud and line card extractor are available.

NTEX17
in an RSC-S (DS-1) Model B LCM (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 B LCM (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

NTEX17
in an RSC-S (DS-1) Model B LCM (end)

If RTS command	Do
failed	step 19

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 B LCM

Application

Use this procedure to replace the following cards in an RSC-S LCM 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

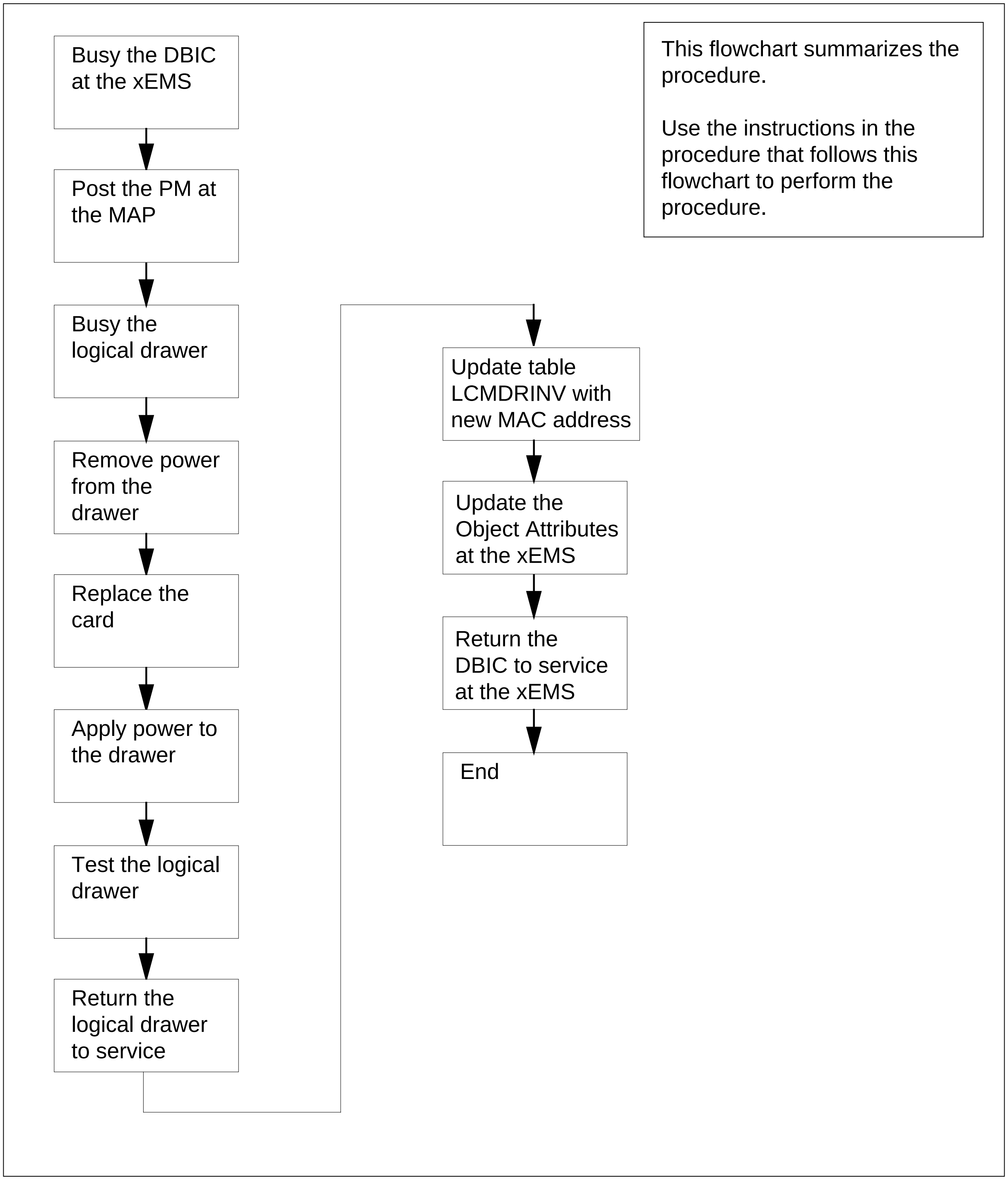
None

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 B LCM (continued)

Summary of replacing an NTEX54 in RSC-S LCM



NTEX54
in an RSC-S (DS-1) Model B LCM (continued)

Replacing an NTEX54 in RSC-S LCM

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 B LCM (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 B LCM (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 B LCM (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.

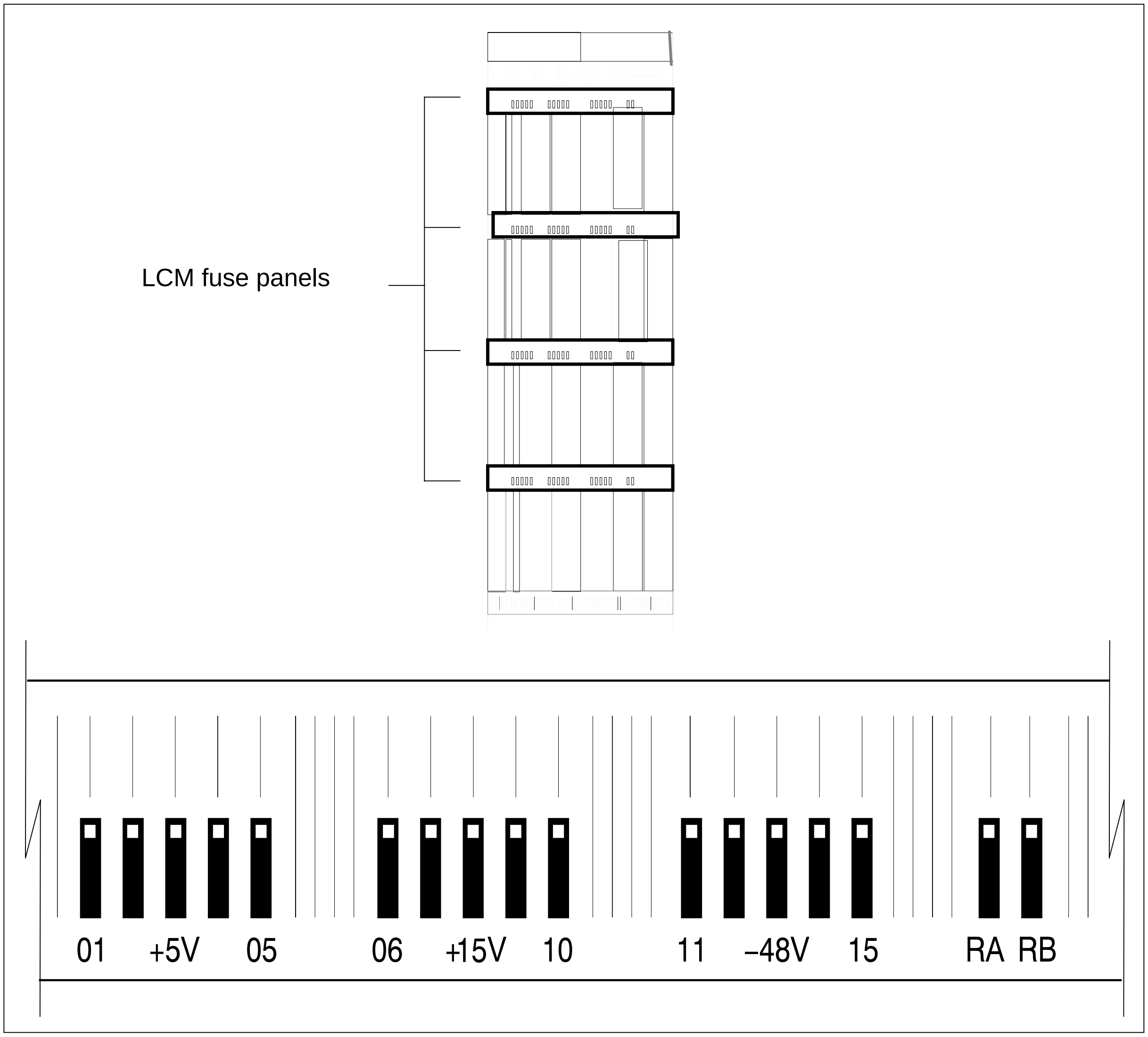
> ***Note:*** Fuse markings do not always identify voltage. Make sure that you note the fuses and the location of the fuses in the fuse panel.

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.

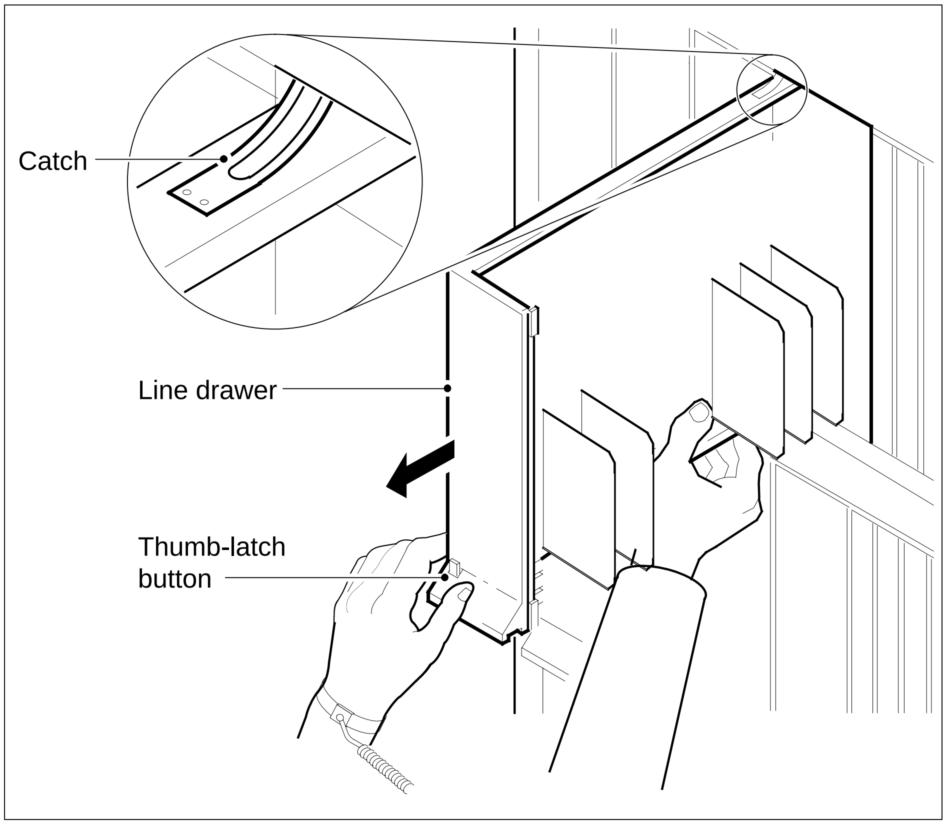
c Remove the +5V fuse for the line drawer that contains the faulty DBIC.

NTEX54
in an RSC-S (DS-1) Model B LCM (continued)



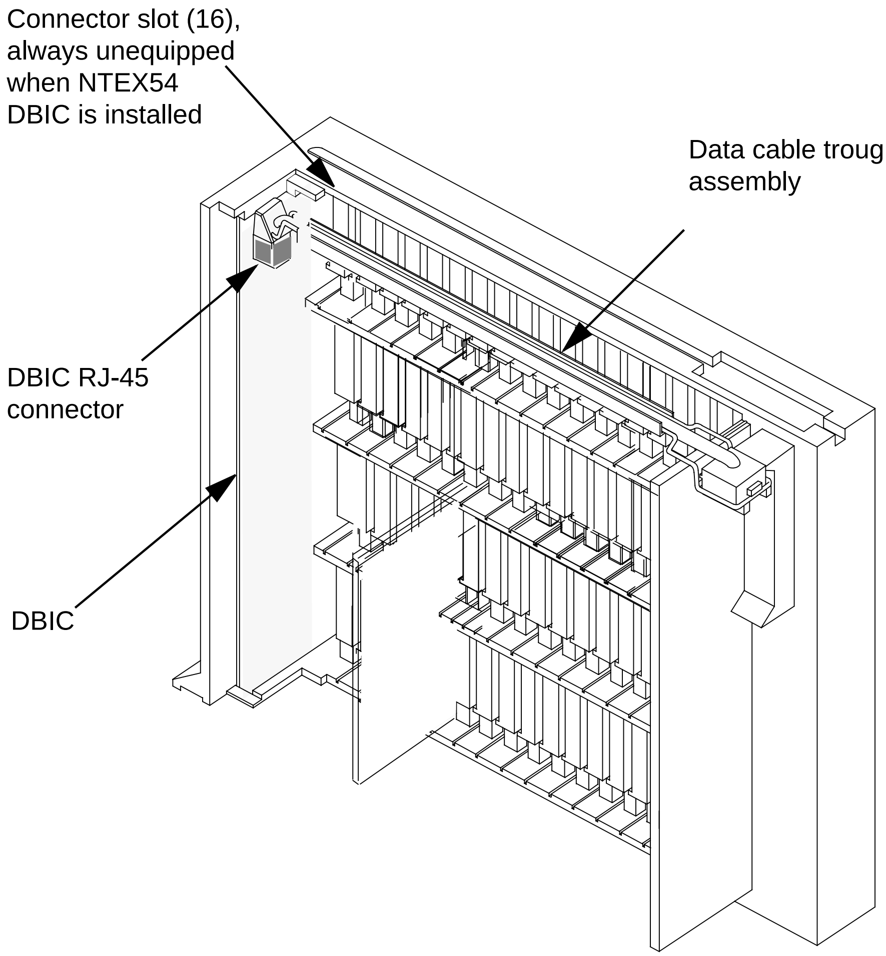
12 Identify the drawer. Press the small thumb-latch button on the lower left edge of the drawer. Pull the drawer out. To secure the drawer in a steady horizontal position, tip the drawer until the catch rests on the line drawer track.

NTEX54
in an RSC-S (DS-1) Model B LCM (continued)



13 Disconnect the data cable from the RJ-45 connector on the DBIC. 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 B LCM (continued)

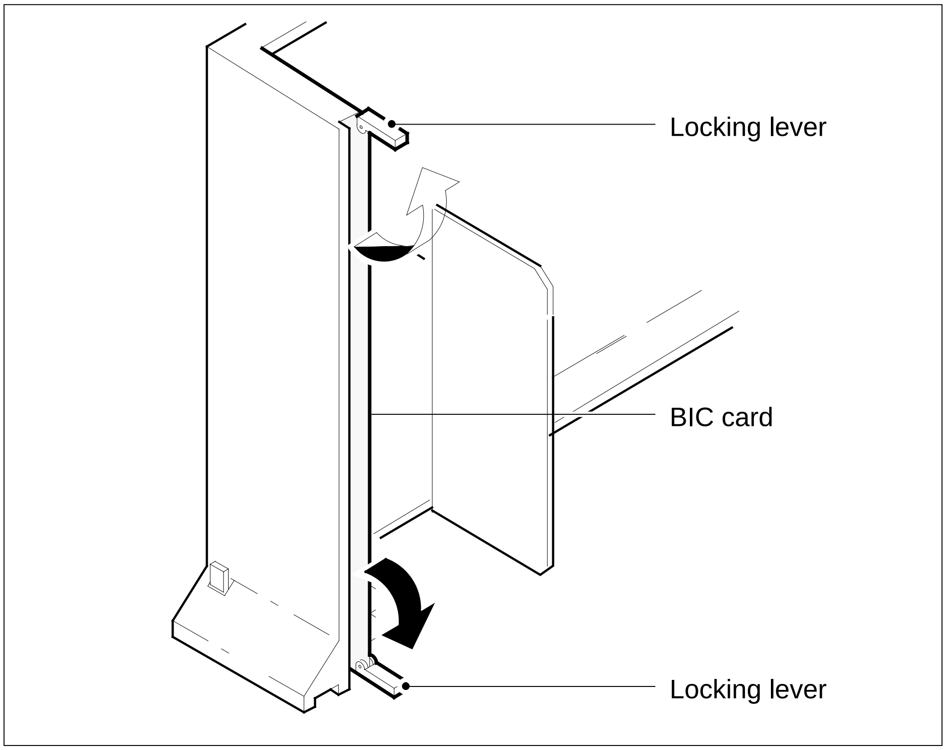


14

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 B LCM (continued)

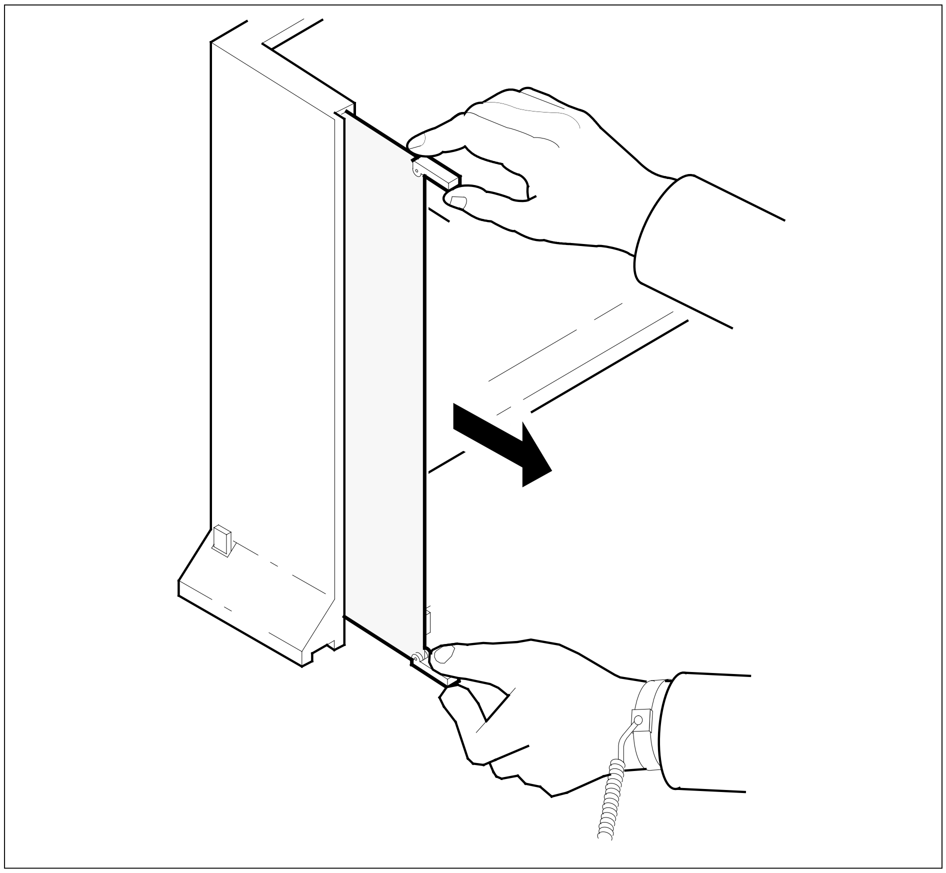
Open the locking levers on the face of the card.



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 B LCM (continued)



16 Place the card that you removed in an electrostatic discharge (ESD) protective container.

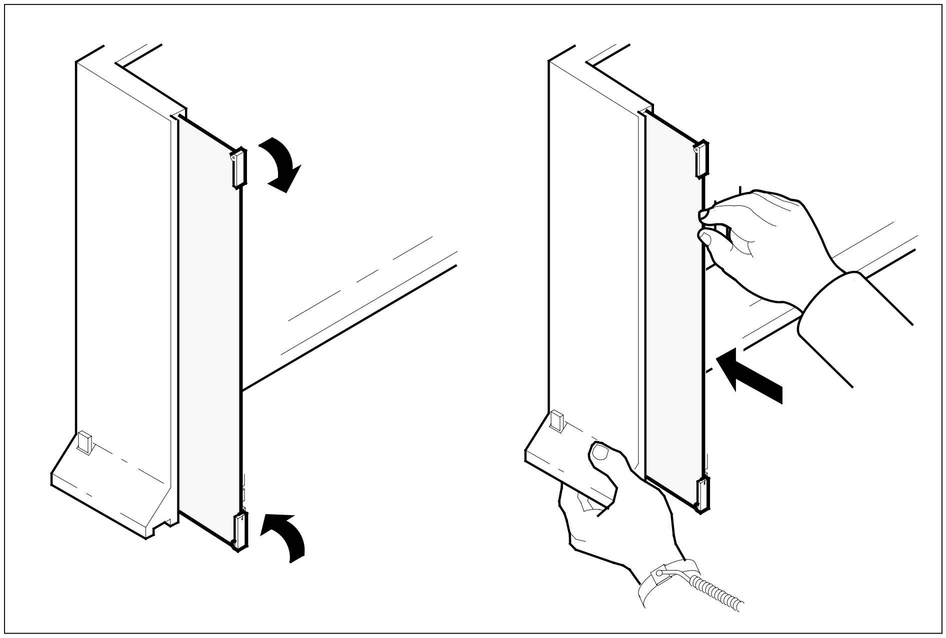
17 Make sure that the replacement card and the card that you remove have the same PEC and PEC suffix.

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.

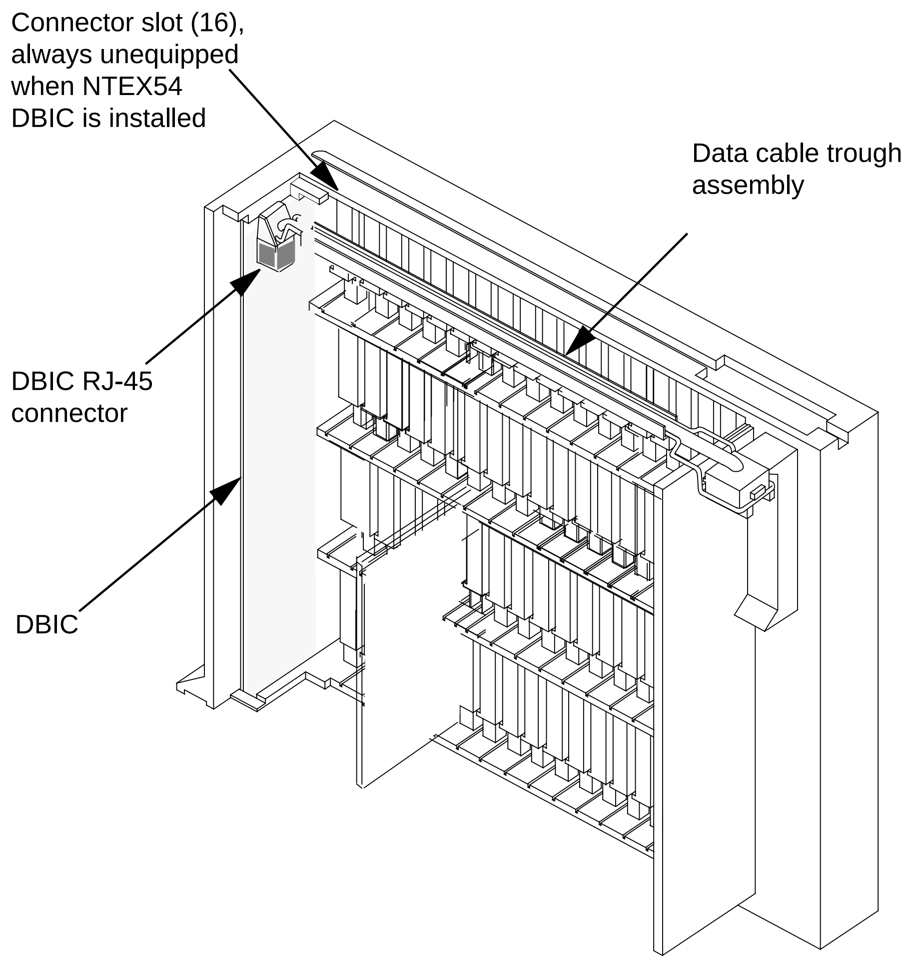
Note: Do not use a rocking motion to insert the card.

NTEX54
in an RSC-S (DS-1) Model B LCM (continued)



20 Connect the data cable RJ-45 connector that you disconnected in step 13. Refer to the following figure.

NTEX54
in an RSC-S (DS-1) Model B LCM (continued)



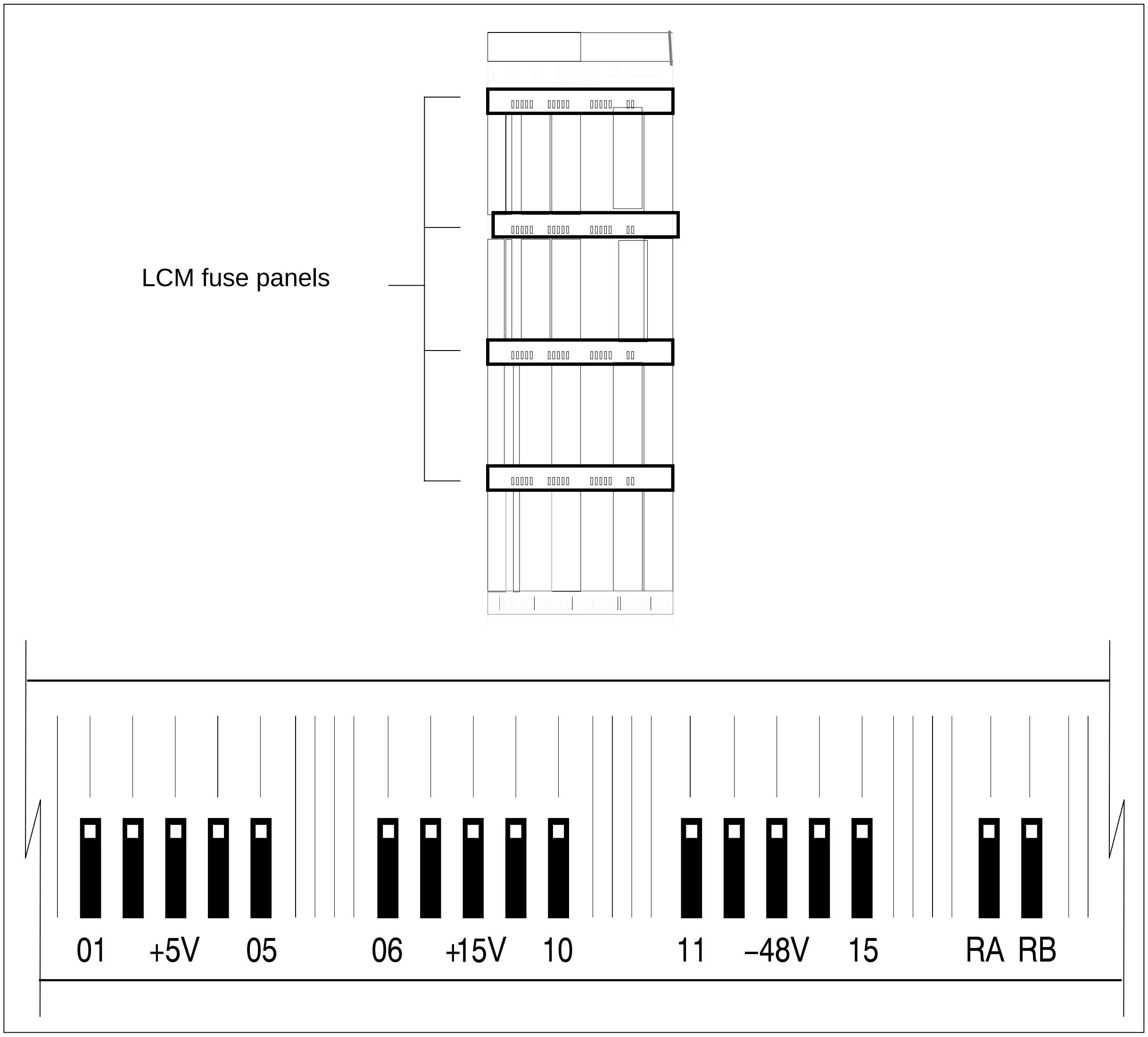
21 Close the line drawer.

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 B LCM (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 B LCM (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  Drwr 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 B LCM (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 B LCM (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 B 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

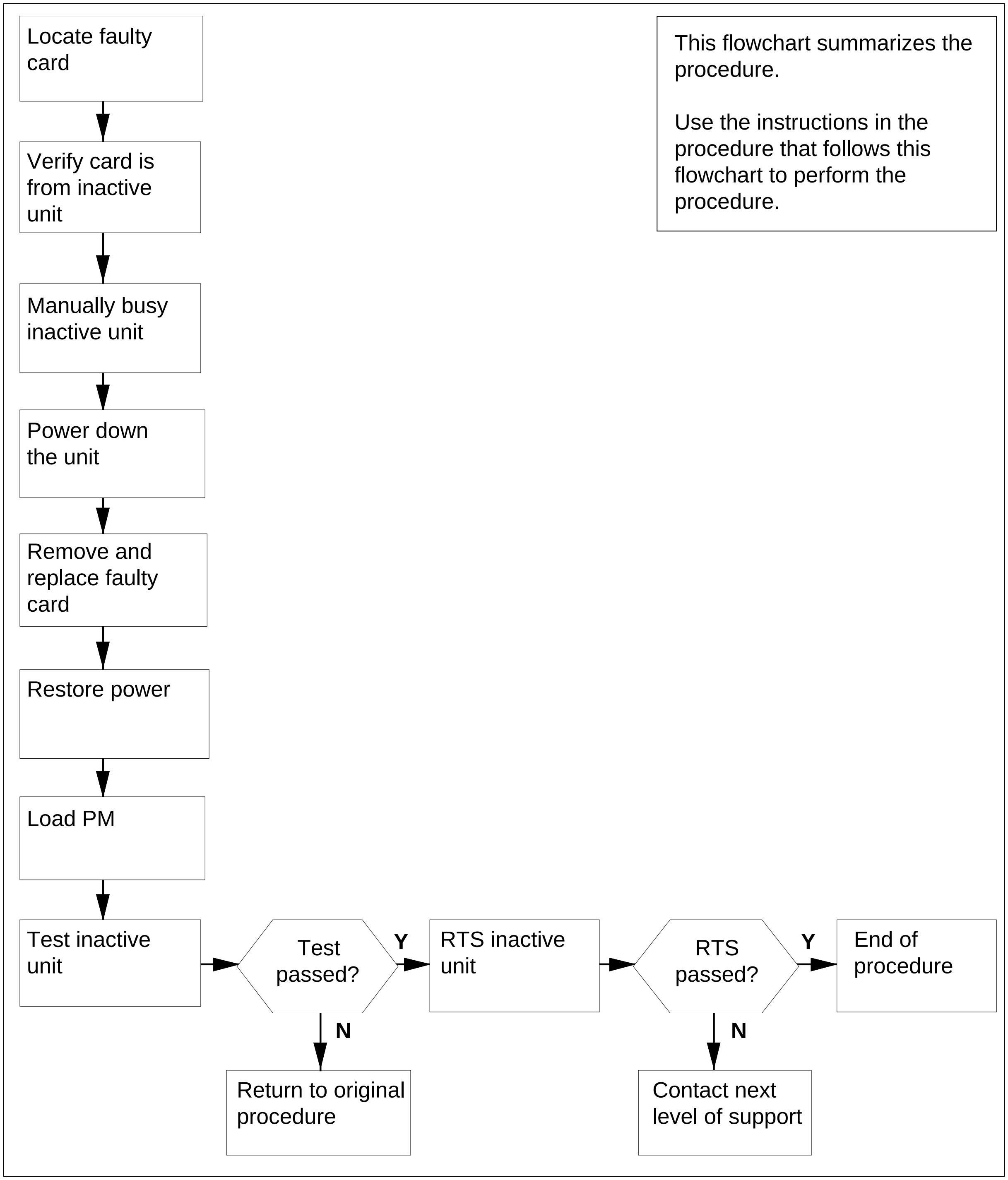
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NTMX72 card in an RSC-S RCC2



NTMX72
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NTMX72
in an RSC-S (DS-1) Model B 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 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 Place a sign on the active unit bearing the words *Active unit—Do not touch.* This sign should not be attached by magnets or tape.

8 Busy the inactive PM unit by typing

***>bsy* INACTIVE**

Example of a MAP response:

NTMX72
in an RSC-S (DS-1) Model B RCC2 (continued)

```
RCC2     0 ISTb  Links_OOS: CSide  0 , PSide  1
Unit0:   Inact ManB
Unit1:   Act   ISTb
bsy unit 0
RCC2 0 Unit 0    Bsy Passed
```

9 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 RSCE 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.

11 Use the following information to determine where to proceed:

If the card you are replacing has a suffix of	Do
AA	step 12
AB	step 13
anything else	step 14

12 Power down the NTMX72AA power converter by setting the POWER switch on the NTMX72 card to the OFF position.

13 Power down the NTMX72AB power converter by setting the circuit breaker on the MSP for the inactive unit to the OFF position.

14

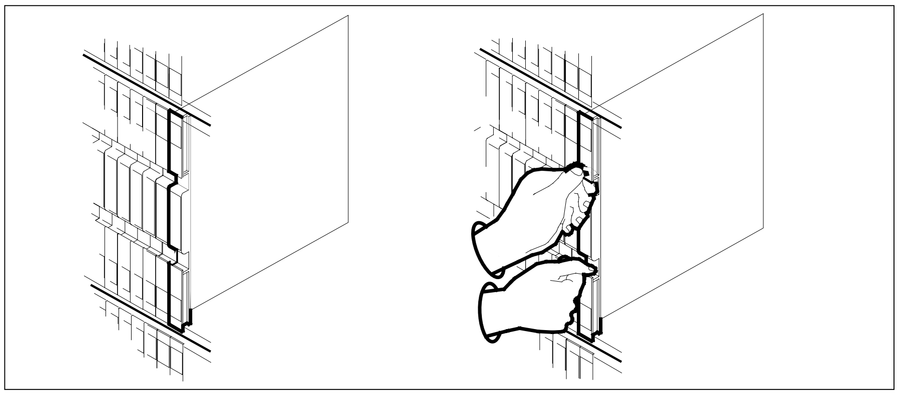
WARNING
Static electricity damage
Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP). This protects the equipment against damage caused by static electricity.

NTMX72
in an RSC-S (DS-1) Model B RCC2 (continued)

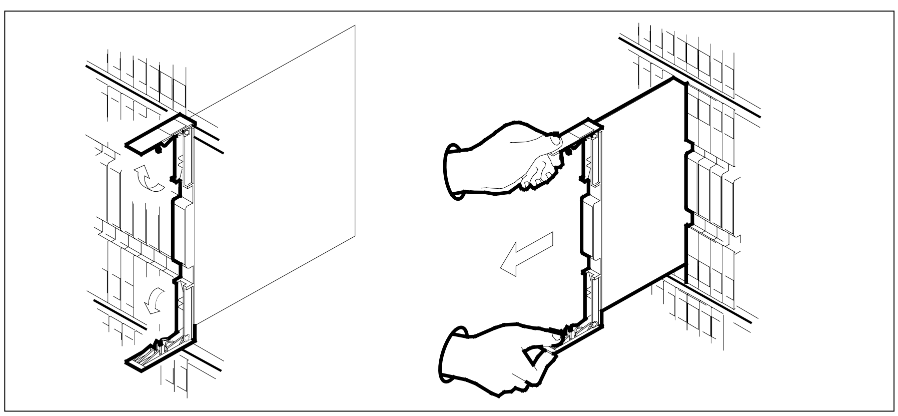
> **DANGER**
> **Equipment damage**
> Take the following precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

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.



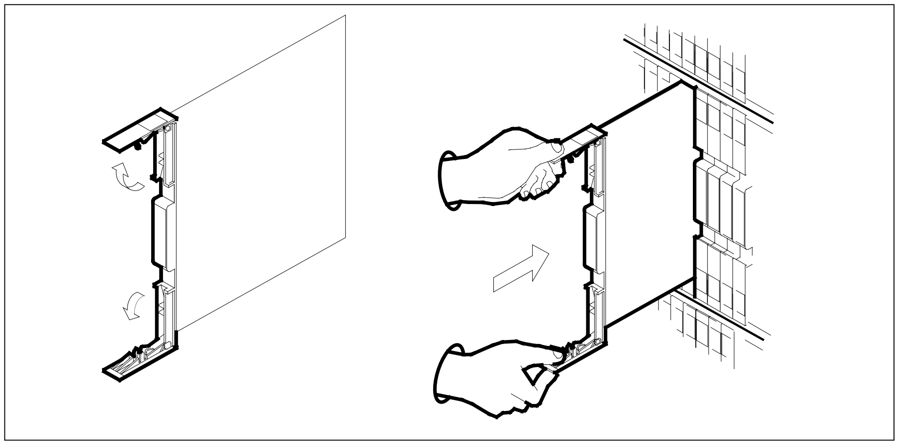
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

15 Open the locking levers on the replacement card.

a Align the card with the slots in the shelf.

NTMX72
in an RSC-S (DS-1) Model B RCC2 (continued)

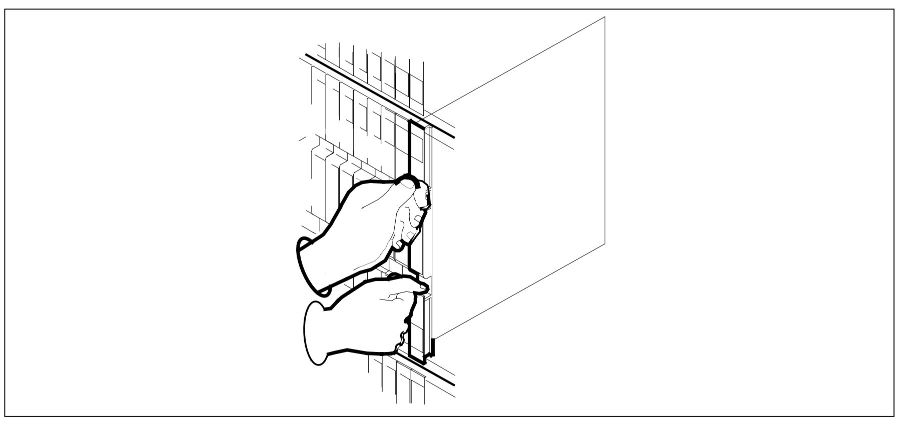
b Gently slide the card into the shelf.



16 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.



17 Power up the inactive RCC2 unit as follows:

a Ensure the NTMX72 circuit card is fully inserted. A major audible alarm may sound. The alarm is silenced when power is restored to the NTMX72 circuit card.

Note:

b If the power converter replaced is an NTMX72AA, set the switch on the power converter to the Reset position. Set the associated circuit breaker on the MSP to the ON position.

If both the converter FAIL LED and FRAME FAIL lamp on the MSP go OFF, go to step 18.

NTMX72
in an RSC-S (DS-1) Model B RCC2 (continued)

If both the converter FAIL LED and FRAME FAIL lamp on the MSP do not go OFF, hold the switch on the NTMX72AA power converter in the Reset position and simultaneously set the associated circuit breaker on the MSP to the ON position. Go to step 18.

c If the power converter replaced is an NTMX72AB, set the associated circuit breaker on the MSP to the ON position for the NTMX72AB converter that was powered down in step 13.

18 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 19
failed	step 26

19 Test the inactive unit by typing

>TST UNIT **unit_no**

and pressing the Enter key.

where

unit_no
is the number of the inactive RCC2 unit

If TST	Do
passed	step 20
failed	step 25

20 Use the following information to determine where to proceed.

If you entered this procedure from	Do
alarm clearing procedures	step 25
other	step 21

21 Return the inactive RCC2 unit to service by typing

>RTS UNIT **unit_no**

and pressing the Enter key.

where

NTMX72
in an RSC-S (DS-1) Model B RCC2 (end)

unit_no
is the number of the inactive RCC2 unit

If RTS	Do
passed	step 22
failed	step 26

22 Remove the sign from the active RCC2 unit.

23 Send any faulty cards for repair according to local procedure.

24 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 27.

25 Return to the procedure that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

26 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

27 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 B 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

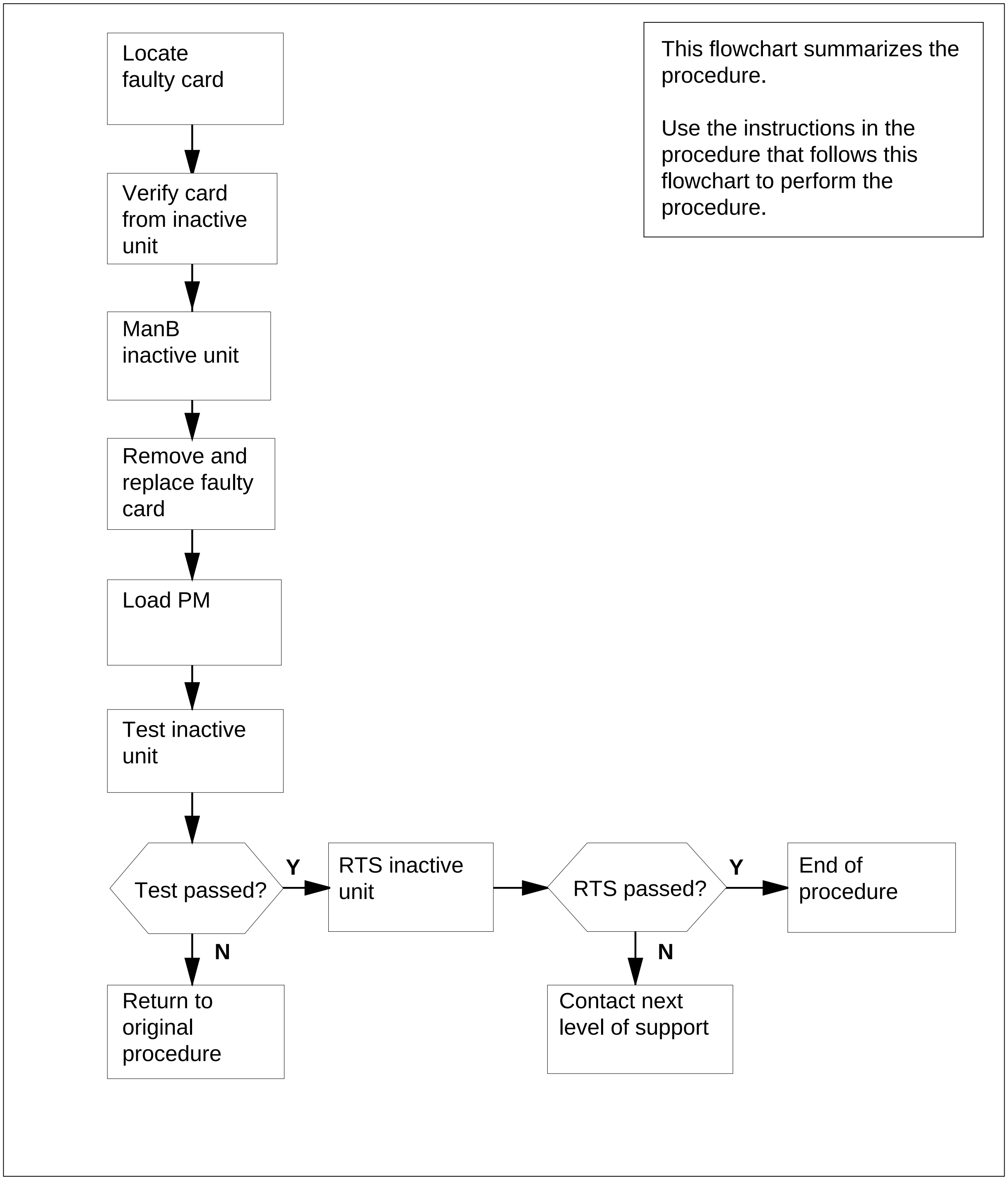
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NTMX73 card in RSC-S RCC2



NTMX73
in an RSC-S (DS-1) Model B 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 B 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 B 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 B 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

> **WARNING**
> **Static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

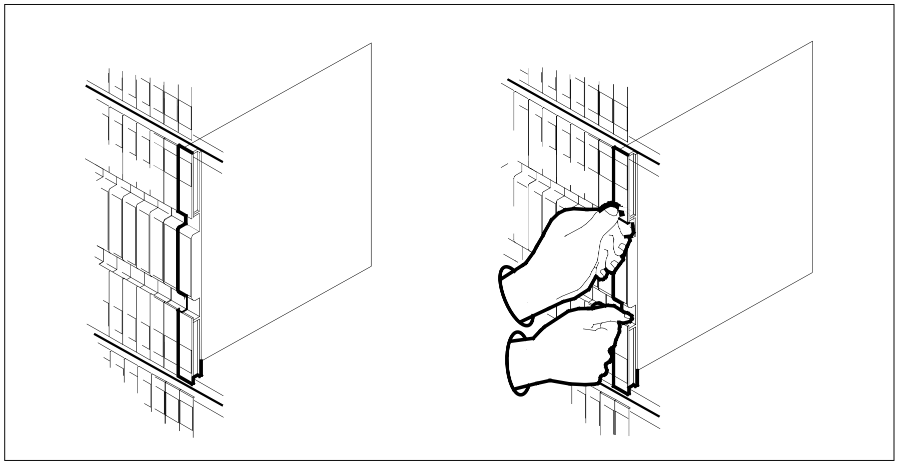
10

> **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.

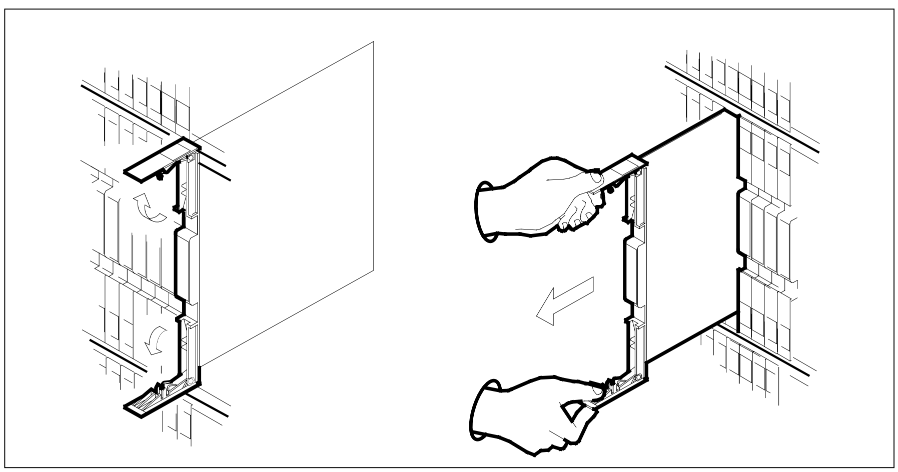
Remove the NTMX73 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTMX73
in an RSC-S (DS-1) Model B 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.

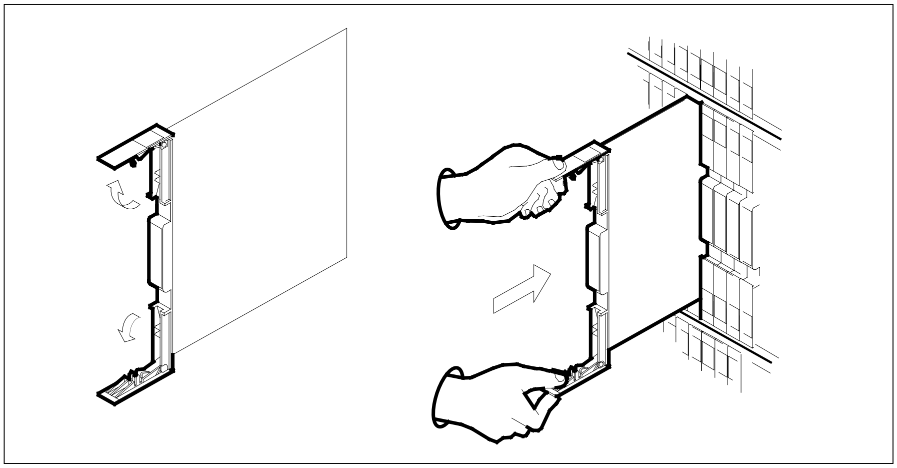
Note: Set dip switch S1 toward IC U1.

11 Open the locking levers on the replacement card.

a Align the card with the slots in the shelf.

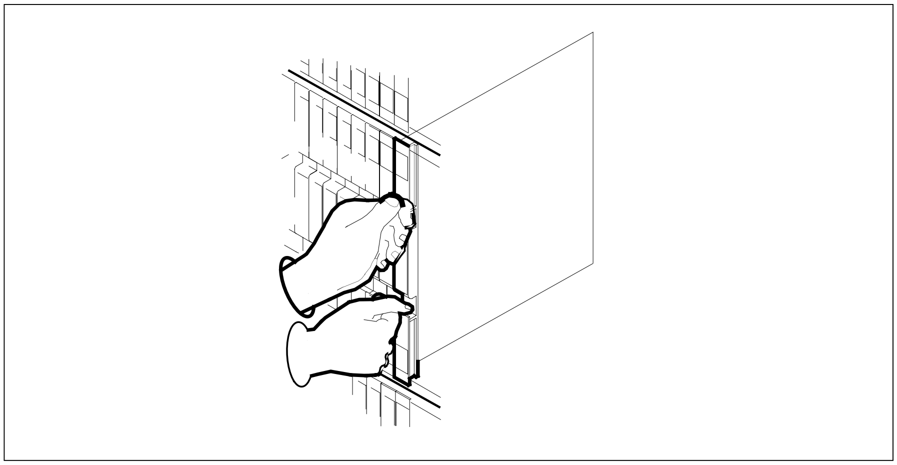
b Gently slide the card into the shelf.

NTMX73
in an RSC-S (DS-1) Model B 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 display

13 Load the inactive RCC2 unit by typing

***>loadpm unit* unit_no CC**

and pressing the Enter key.

where

NTMX73 in an RSC-S (DS-1) Model B RCC2 (continued)

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

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.

NTMX73
in an RSC-S (DS-1) Model B RCC2 (end)

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 B 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

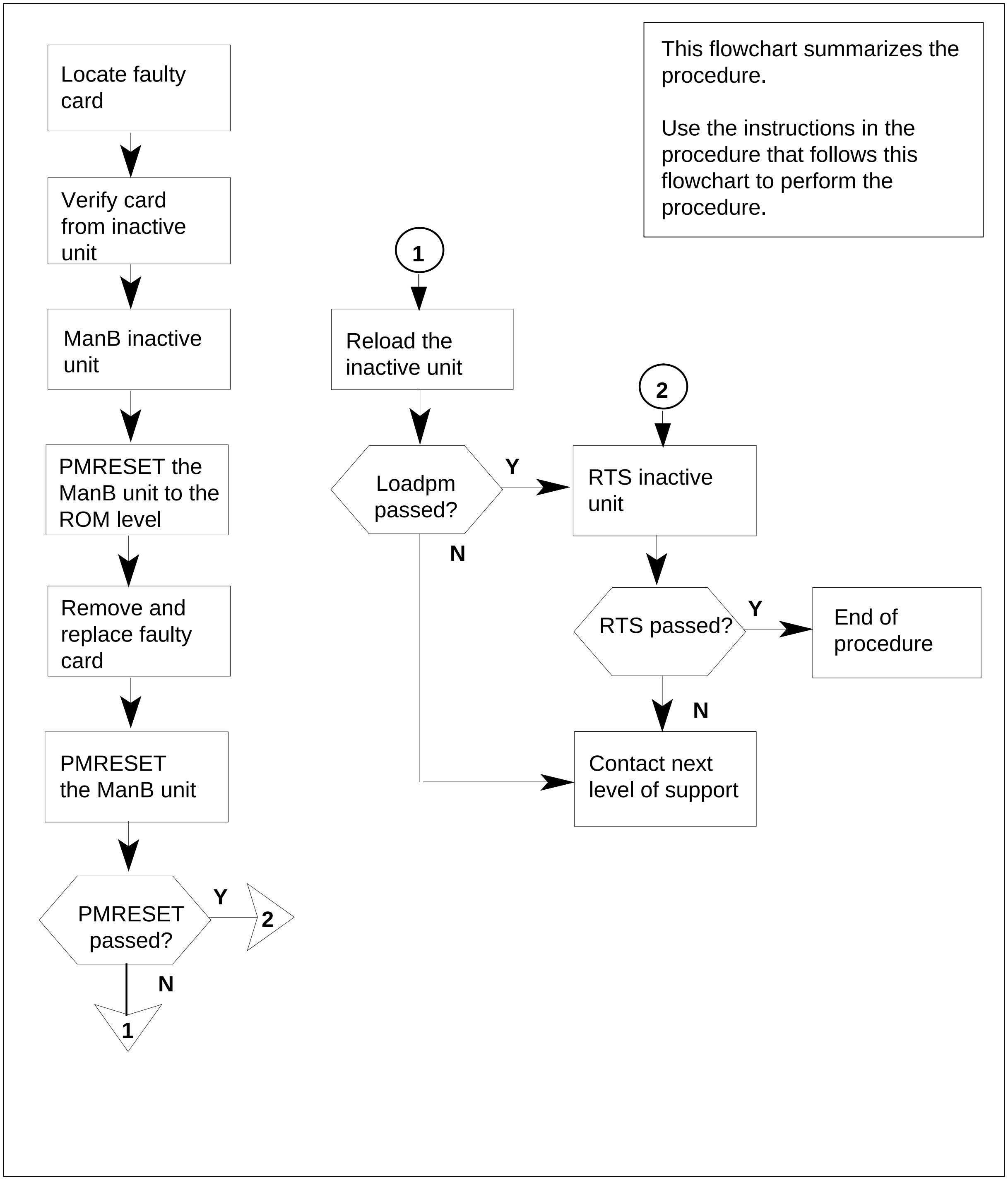
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NTMX74 card in RSC-S RCC2



NTMX74
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NTMX74
in an RSC-S (DS-1) Model B 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 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 B 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

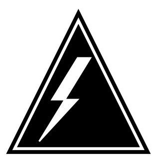
and pressing the Enter key.

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 modular supervisory panel (MSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Put on a wrist strap.

11

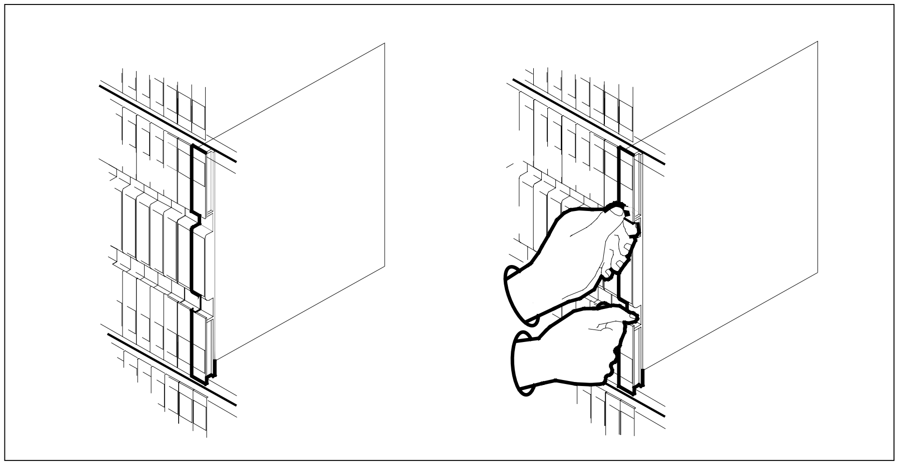
DANGER
Equipment damage
Take the following precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

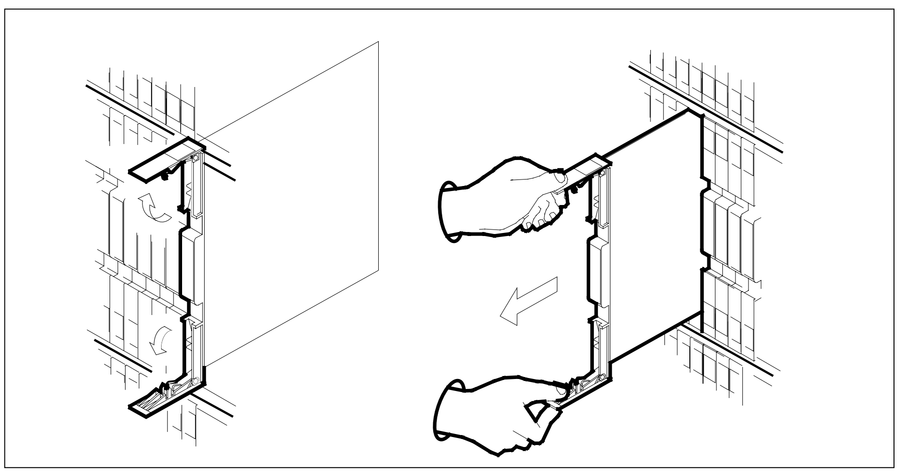
Remove the NTMX74 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTMX74
in an RSC-S (DS-1) Model B 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.



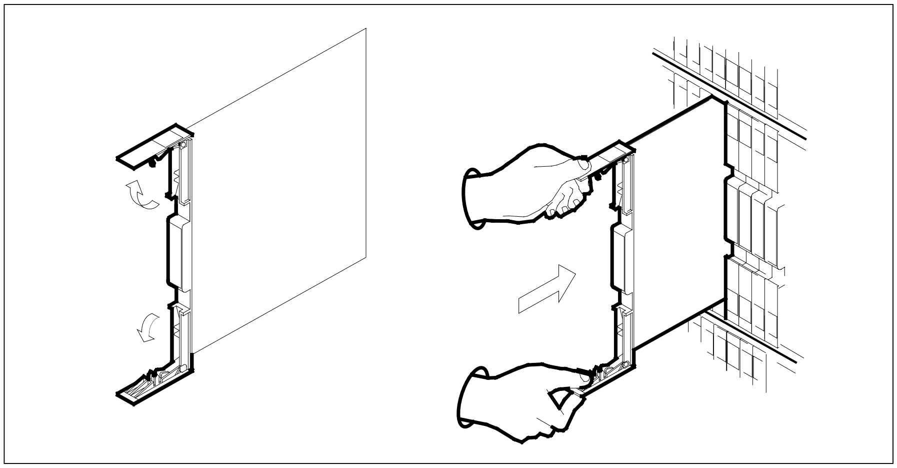
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

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.

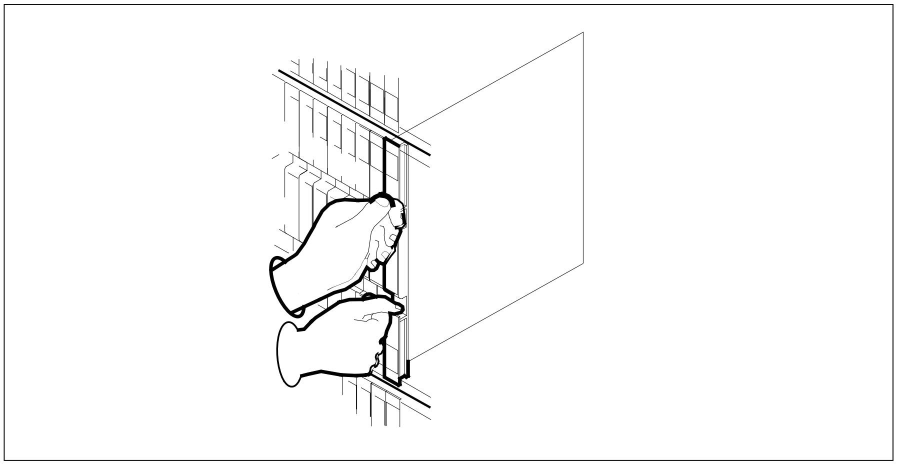
NTMX74
in an RSC-S (DS-1) Model B RCC2 (continued)



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 B 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 RCC2 unit (0 or 1)

If RTS	Do
passed	step 18
failed	step 21

18 Send any faulty cards for repair according to local procedure.

19 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card. Go to step 22.

20 Return to the procedure that directed you to this procedure. At the point where a faulty card list was produced, identify the next faulty card on the list and go to the appropriate card replacement procedure for that card in this manual.

21 Obtain further assistance in replacing this card by contacting operating company maintenance personnel.

NTMX74
in an RSC-S (DS-1) Model B 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 B 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

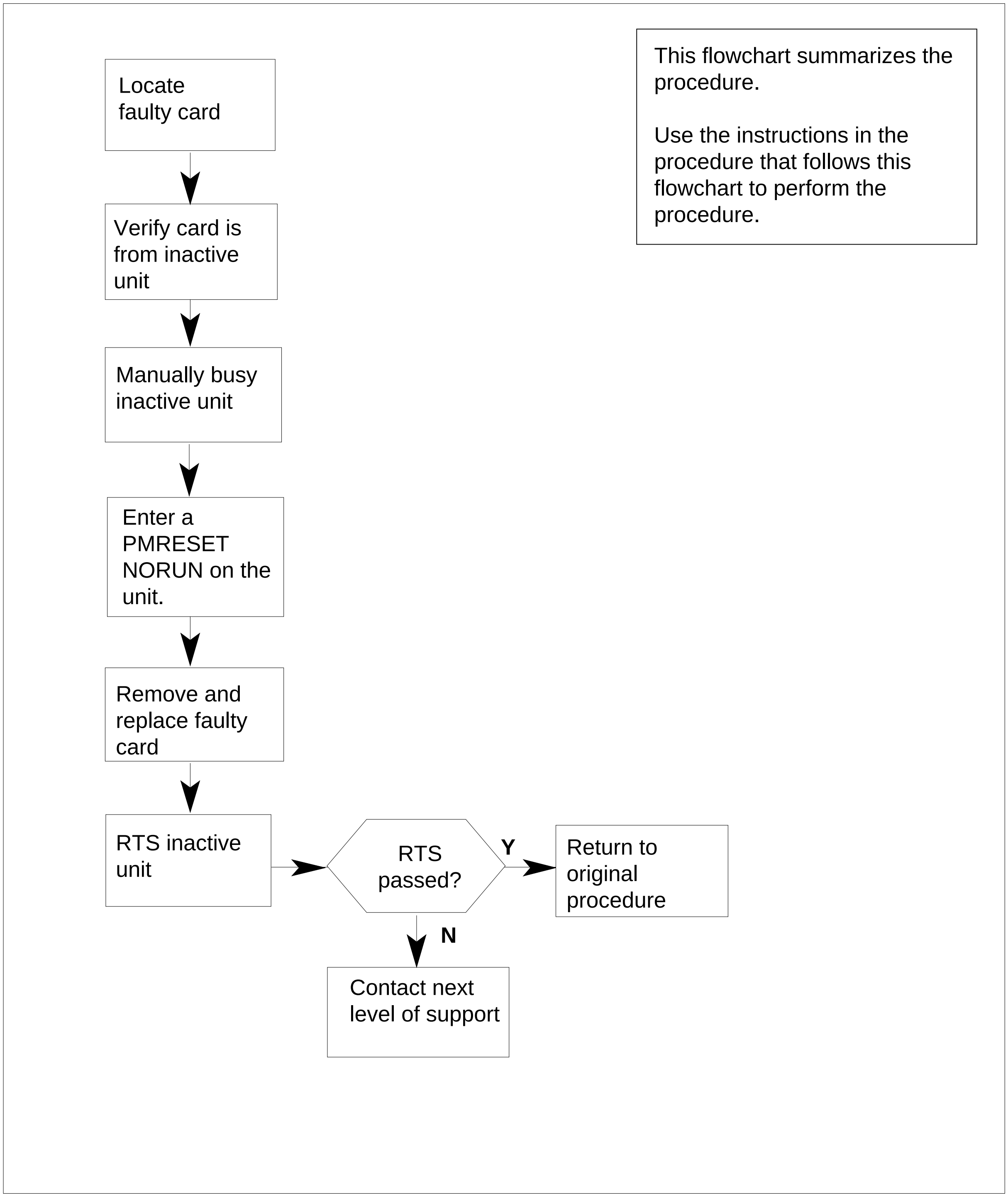
None

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 B RCC2 (continued)

Summary of card replacement procedure for NTMX75 card in RSC-S RCC2



NTMX75
in an RSC-S (DS-1) Model B RCC2 (continued)

Replacing an NTMX75 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 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 B 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 B 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 modular supervisory panel (MSP) of the RCC2. This protects the equipment against damage caused by static electricity.

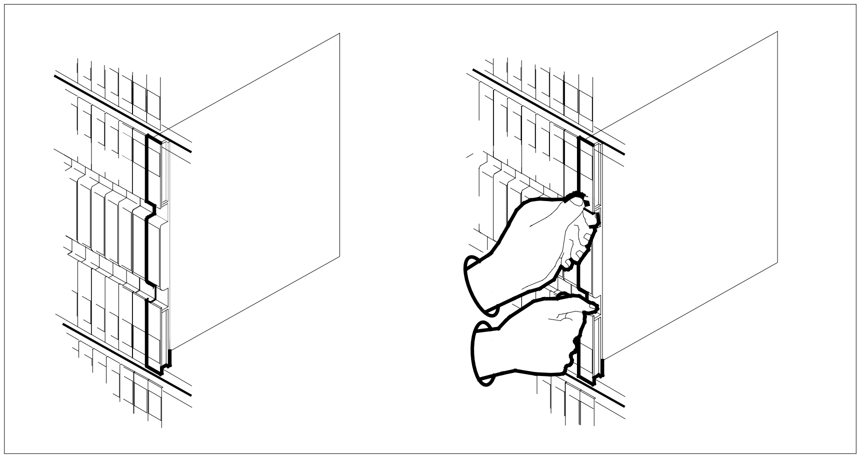
> **DANGER**
> **Equipment damage**
> Take the following precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
> 2. Do not force the cards into the slots.

Put on a wrist strap.

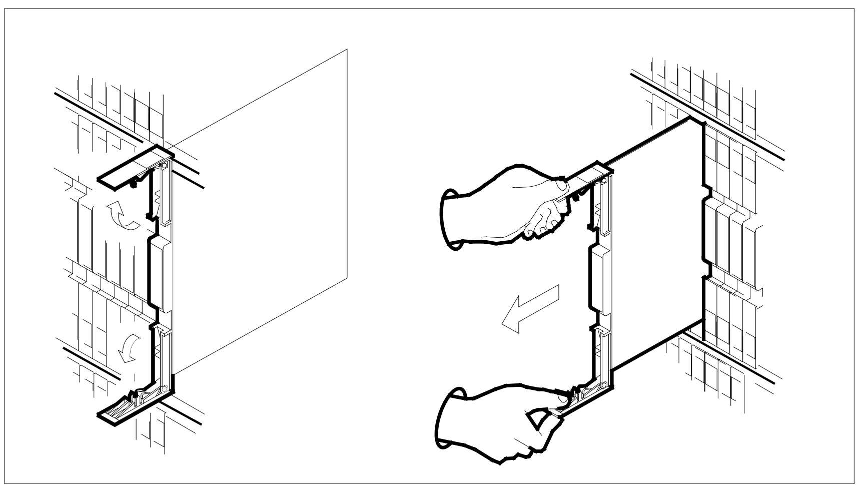
11 Remove the NTMX75 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTMX75
in an RSC-S (DS-1) Model B 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.



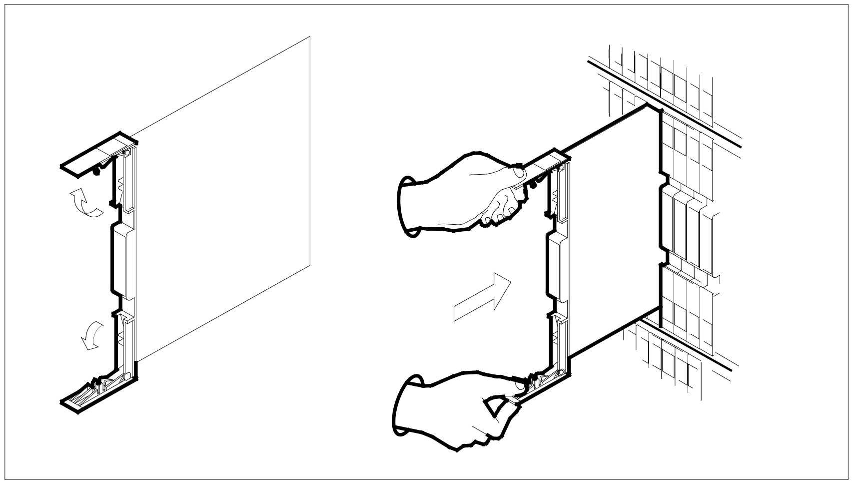
c Ensure that the replacement card has the same PEC, including suffix, as the card you just removed.

12 Open the locking levers on the replacement card.

a Align the card with the slots in the shelf.

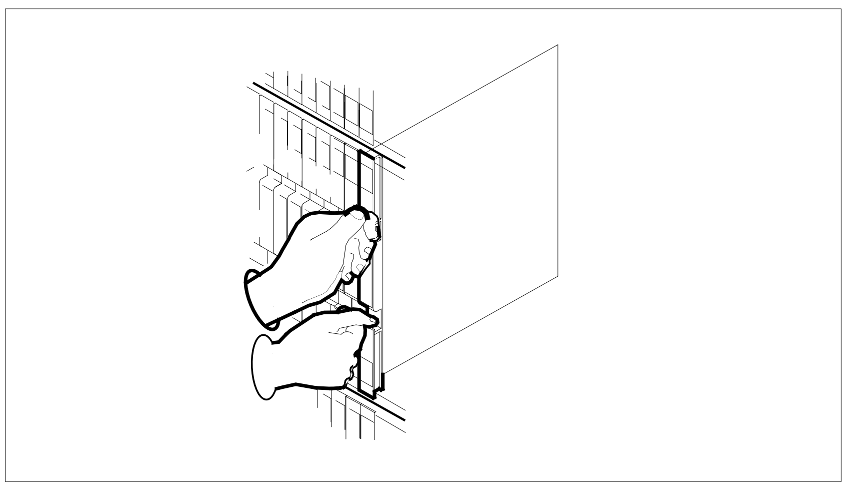
b Gently slide the card into the shelf.

NTMX75
in an RSC-S (DS-1) Model B 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 B 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 B 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:

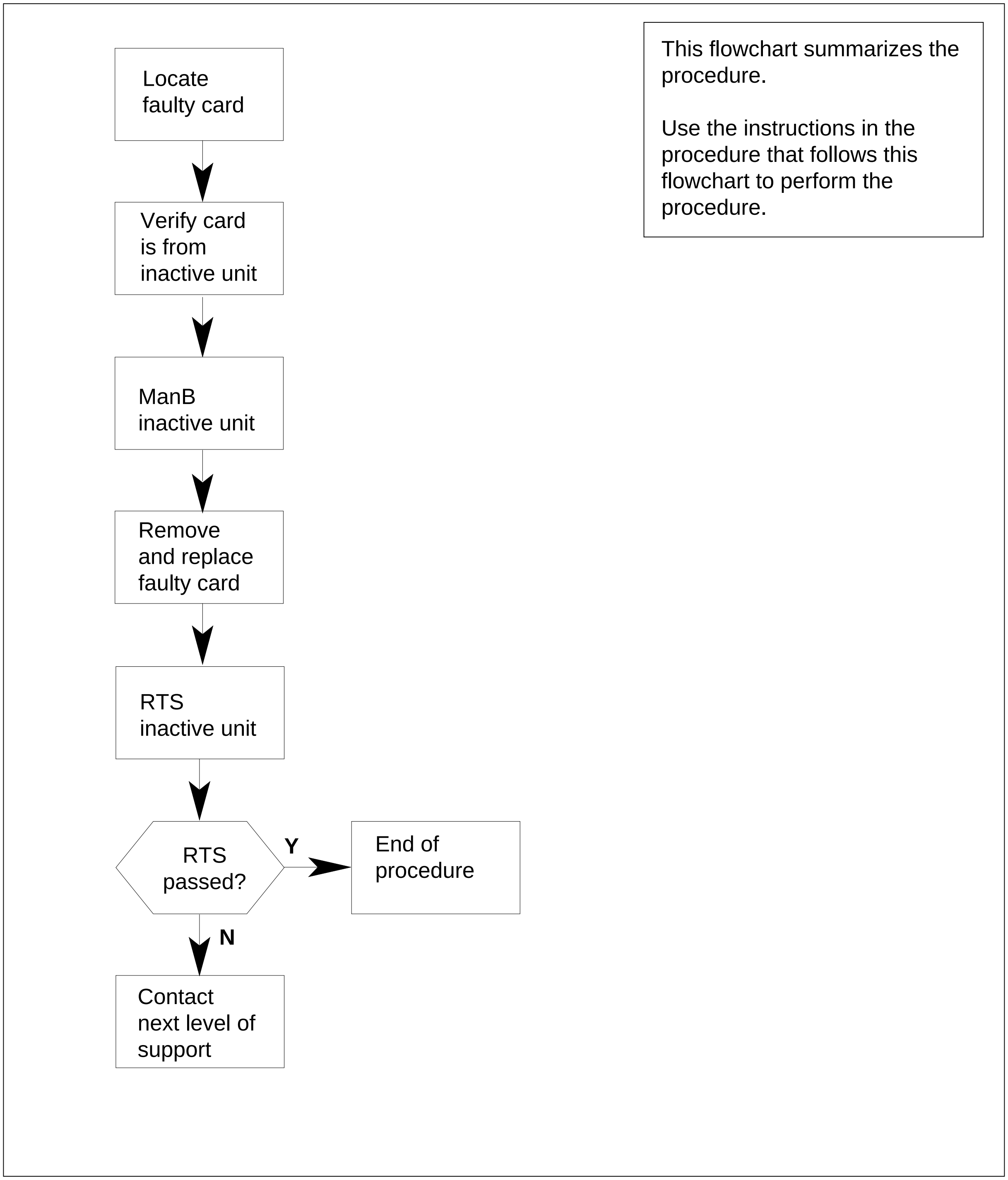
- replacing a card
- returning a card

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 B RCC2 (continued)

Summary of card replacement procedure for an NTMX76 card in RSC-S RCC2



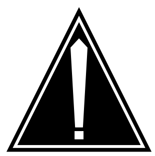
NTMX76
in an RSC-S (DS-1) Model B RCC2 (continued)

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 B 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 B 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 modular supervisory panel (MSP) of the RCC2. This protects the equipment against damage caused by static electricity.

Locate the circuit card to be replaced.

NTMX76
in an RSC-S (DS-1) Model B RCC2 (continued)

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.

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.

NTMX76
in an RSC-S (DS-1) Model B RCC2 (end)

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 B RCC2

Application

Use this procedure to replace an NTMX77 card in an RSC-S RCC2.

PEC	Suffixes	Name
NTMX77	AA	Unified Processor

Common procedures

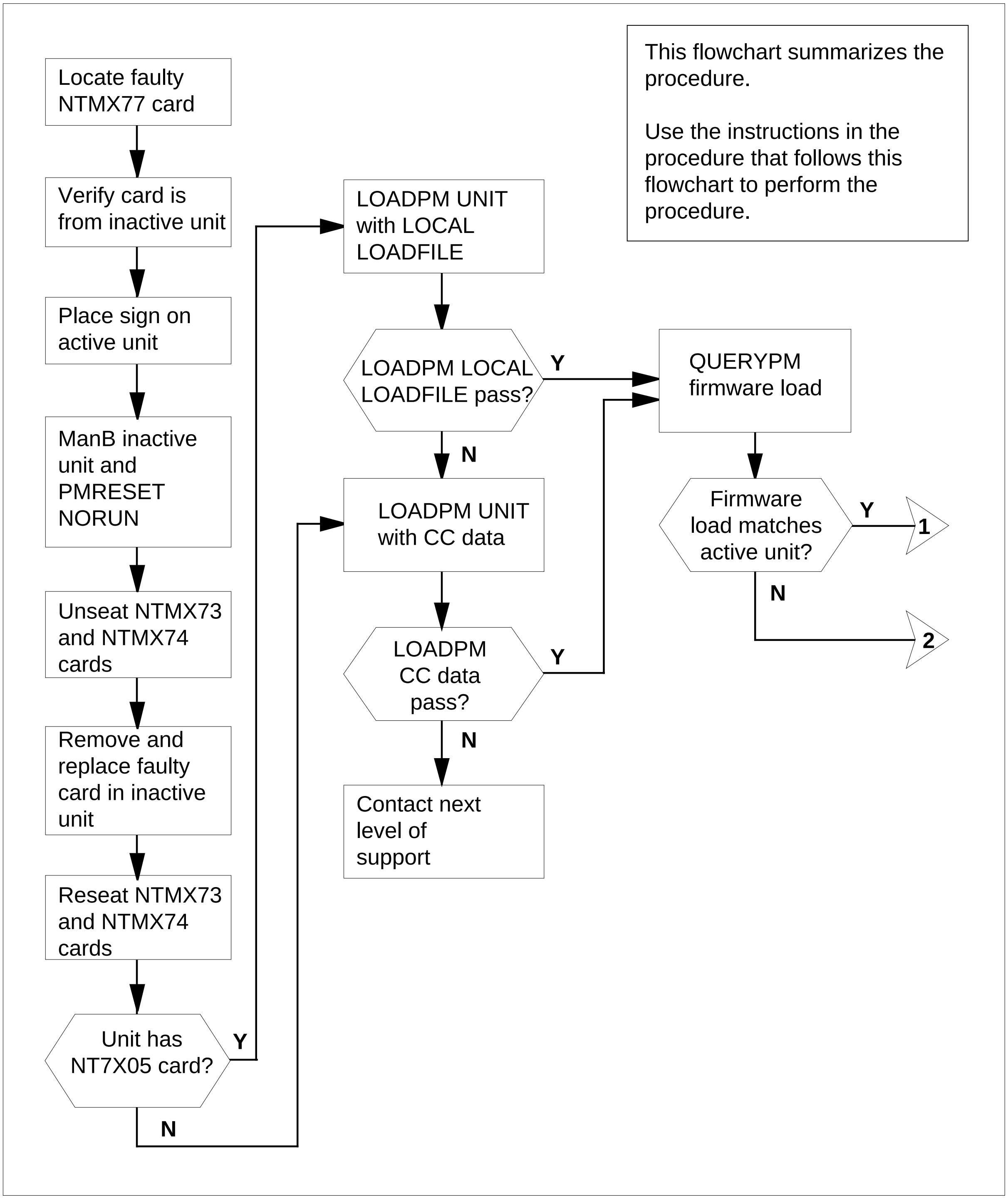
None

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.

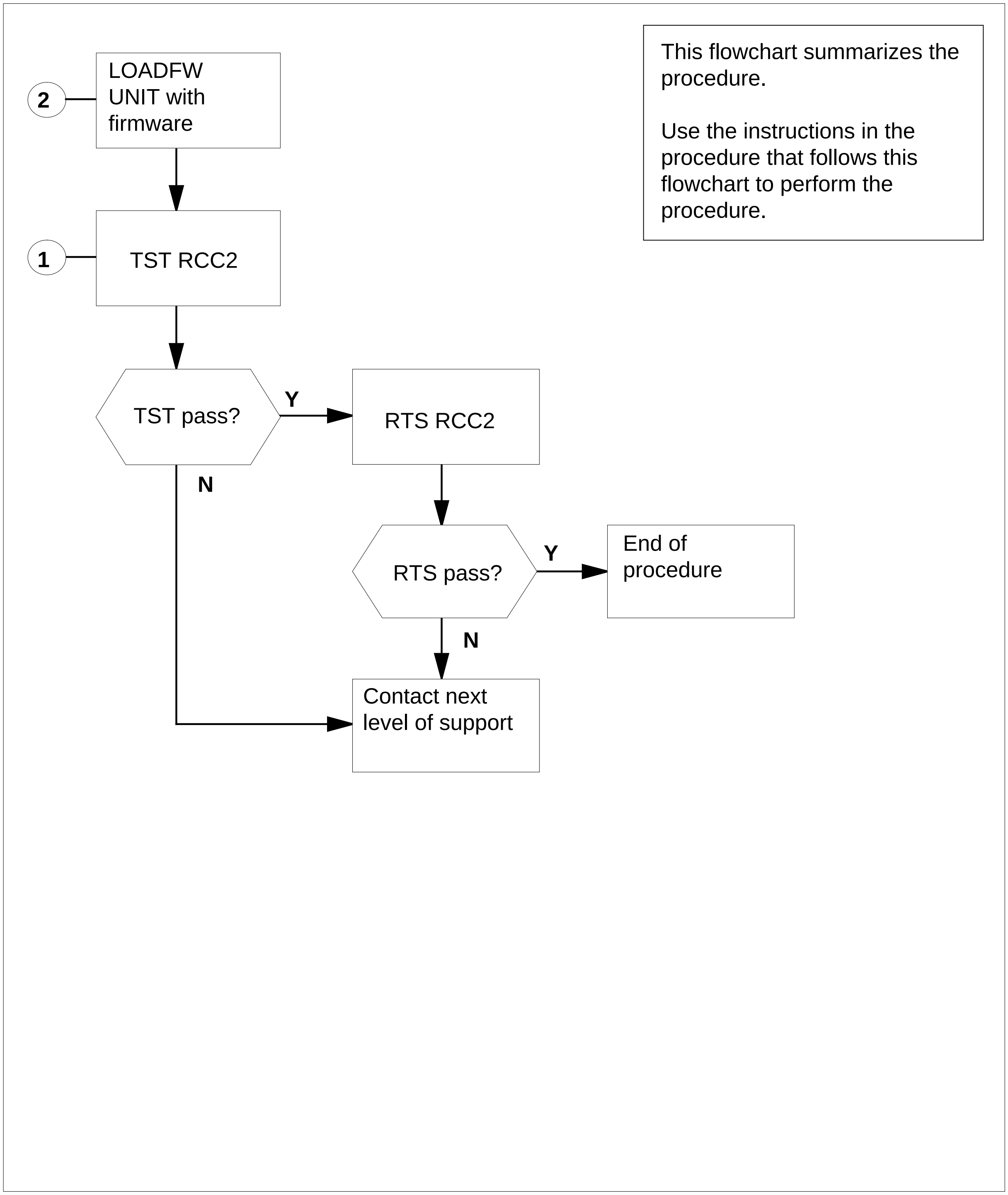
NTMX77
in an RSC-S (DS-1) Model B RCC2 (continued)

Summary of card replacement procedure for an NTMX77 card in RSC-S RCC2 (1 of 2)



NTMX77
in an RSC-S (DS-1) Model B RCC2 (continued)

Summary of card replacement procedure for an NTMX77 card in RSC-S RCC2 (2 of 2)



NTMX77
in an RSC-S (DS-1) Model B 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)

Example of a MAP display:

NTMX77
in an RSC-S (DS-1) Model B 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 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 at this time	step 6
can continue at this time	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.

Return to step 5 during a period of low traffic.

NTMX77
in an RSC-S (DS-1) Model B RCC2 (continued)

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 proceeding to 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 Procedures in this manual 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 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 B 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 (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:

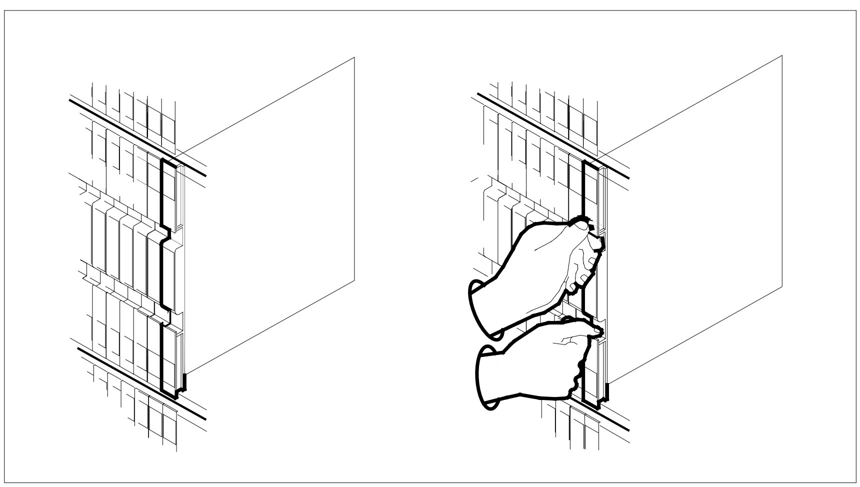
1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

13 Unseat the NTMX73 and NTMX74 circuit cards.

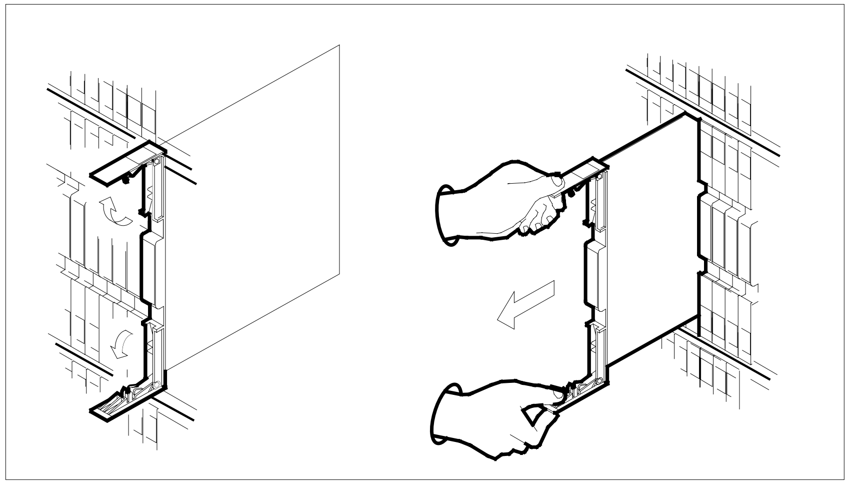
14 Remove the NTMX77 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.



b Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.

NTMX77
in an RSC-S (DS-1) Model B RCC2 (continued)



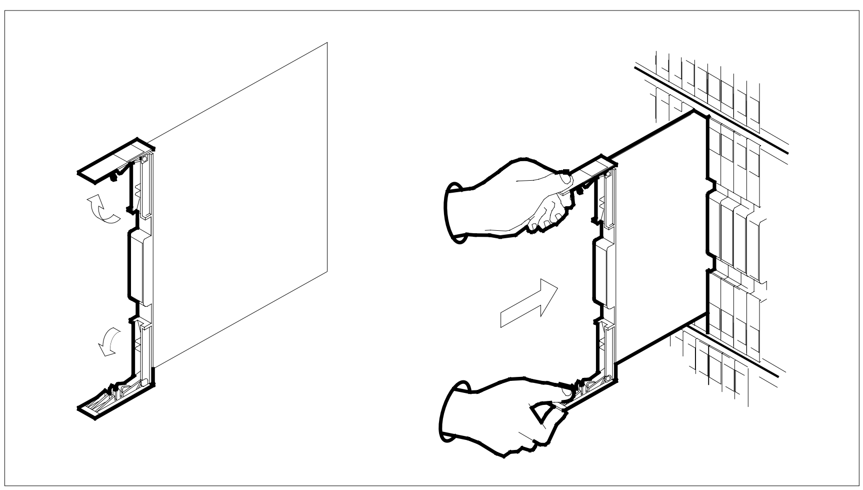
c Make sure the replacement card has the same PEC, including suffix, as the card you just removed. Also make sure the DIP switch settings on the replacement card match the settings of the card just removed.

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 Gently slide the card into the shelf.



NTMX77
in an RSC-S (DS-1) Model B RCC2 (continued)

16

DANGER
Possible loss of P-side nodes
Monitor LEDs on the faceplate of the replacement NTMX77 when installing.

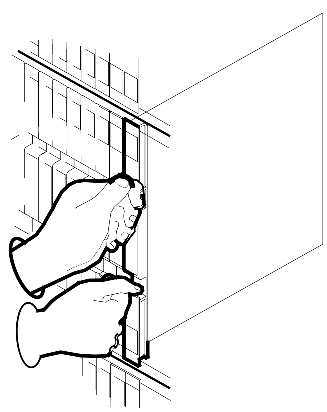
1. INSV and ESA LEDs may come ON and must go OFF in less than 4 seconds.

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 B RCC2 (continued)

If you entered this procedure from	Do
other	step 19

At the MAP terminal

19 The peripheralremote 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 B 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 the XPM counters, type

>QUERYPM CNTRS

and press the Enter key.

Example of a MAP response

NTMX77
in an RSC-S (DS-1) Model B RCC2 (continued)

```
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 B 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 and 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 B EXT

Application

Use this procedure to replace an NTMX79 card in an RSC-S EXT.

PEC	Suffixes	Name
NTMX79	AA	DS60 Extender

Common procedures

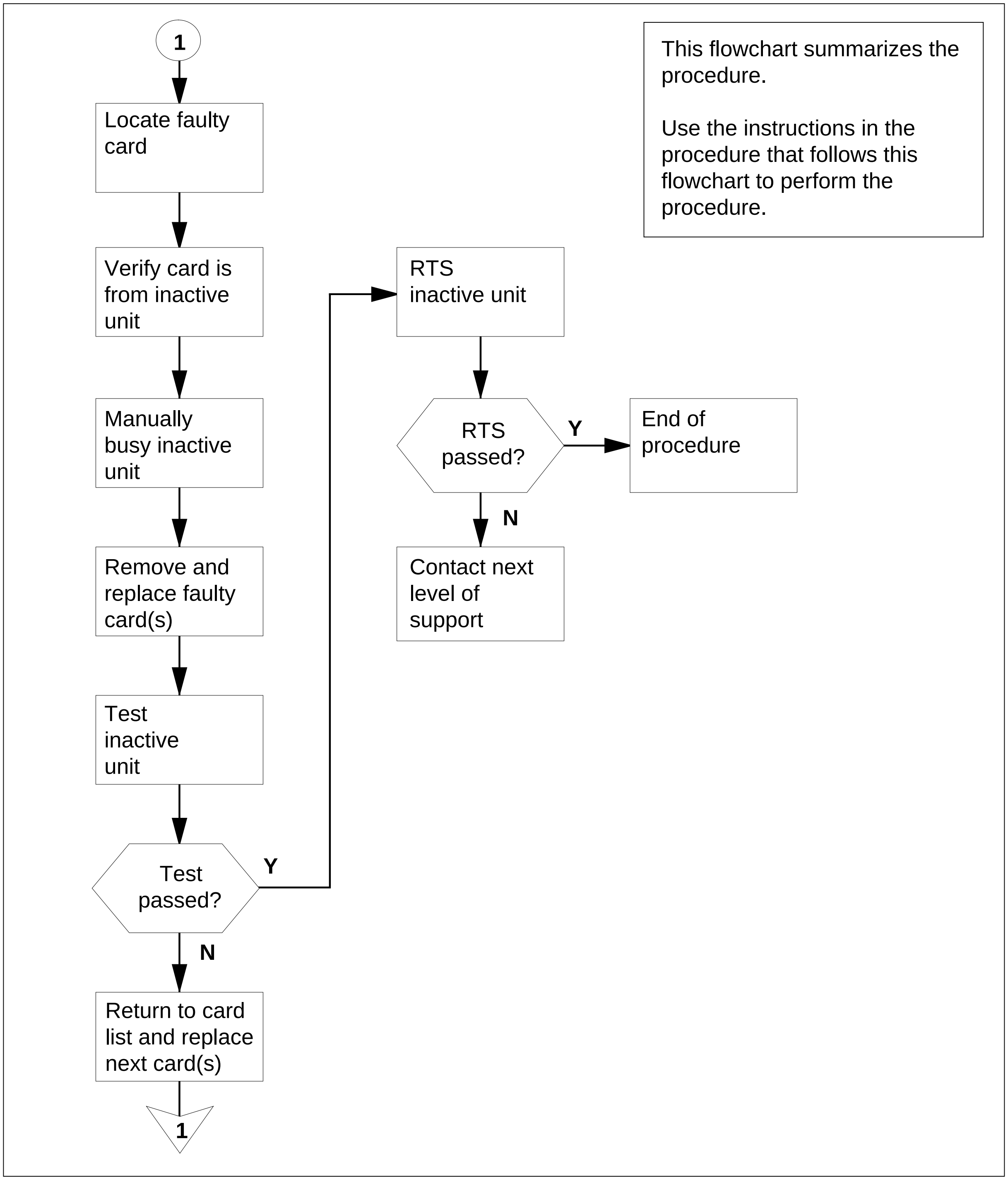
None

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 B EXT (continued)

Summary of card replacement procedure for an NTMX79 card in RSC-S EXT



NTMX79 in an RSC-S (DS-1) Model B 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 that the unit in which you are replacing the card is *inactive* and that the mate unit is *active*.

Obtain an NTMX79 replacement card. Verify the replacement card has the same product engineering code (PEC), including suffix, as the card that is to be removed.

At the MAP terminal

3 Set the MAP display to the PM level and post the 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.

Example of a MAP response:

NTMX79
in an RSC-S (DS-1) Model B EXT (continued)

```
PM Type: RCC2 PM Nol.: 0 PM Int. No.: 2 Node_No.: 126
PMs Equipped: 61  Loadname: CRI05AW
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)

5 By observing the LED on the extension shelf, be sure that the card to be removed is on the inactive unit. The LED is lit (ON) on the active unit, and not lit (OFF) on the inactive unit.

If faulty card is on	Do
active unit	step 6
inactive unit	step 8

6 Switch the processing activity (SWACT) to the inactive unit by typing

>SWACT

and pressing the Enter key.

> ***Note:*** If the system recommends using the SWACT command with the FORCE option, consult office personnel to determine if use of the FORCE option is advisable.

7 Confirm the system prompt by typing

>YES

and pressing the Enter key.

After both units are in service, proceed to the next step.

At the RCE frame

8 Place a sign on the active unit bearing the words *Active unit—Do not touch.* This sign should not be attached by magnets or tape.

At the MAP terminal

9 Busy the inactive 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 to be busied (0 or 1)

NTMX79
in an RSC-S (DS-1) Model B EXT (continued)

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 (MSP) 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 in the inactive RCC2.

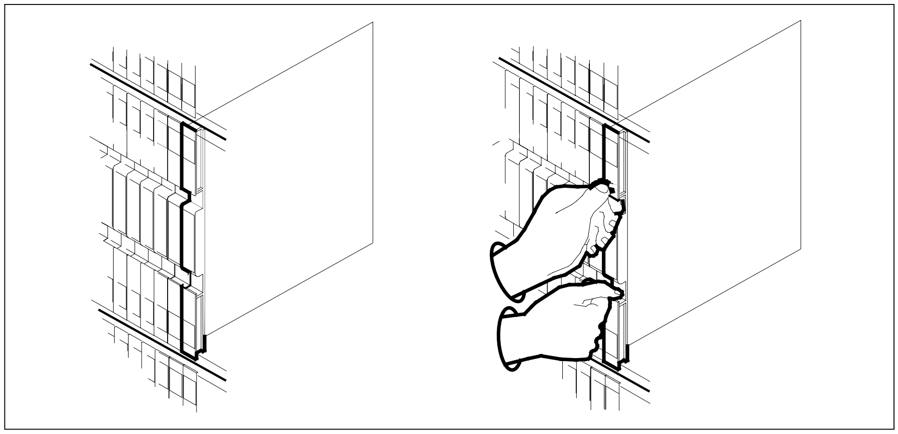
12

> **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.

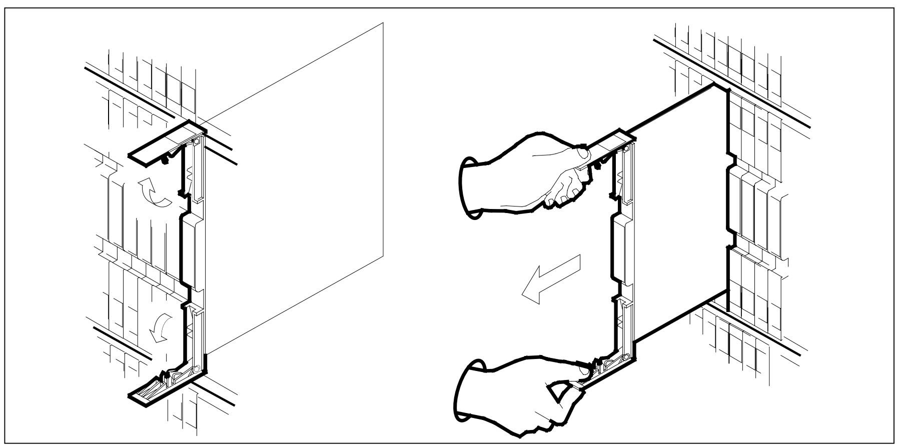
Remove the NTMX79 card as shown in the following figures.

a Locate the card to be removed on the appropriate shelf.

NTMX79
in an RSC-S (DS-1) Model B EXT (continued)



b Open the locking levers on the card to be replaced and gently pull the card toward you until it clears the shelf.



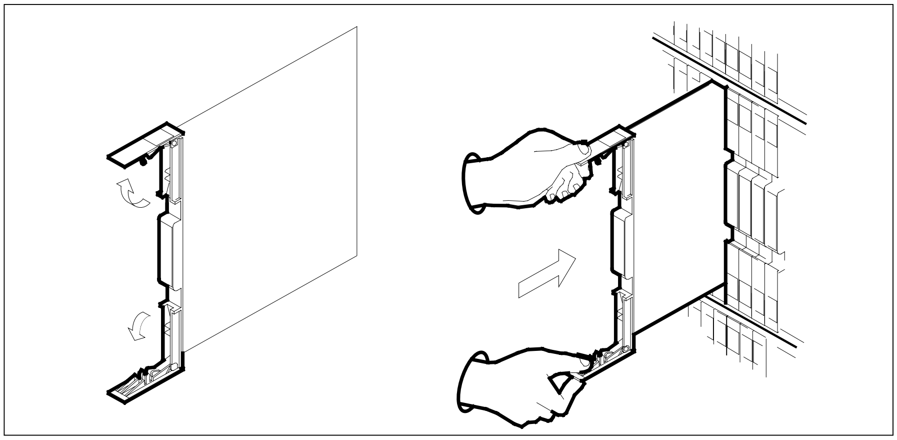
c Ensure the replacement card has the same PEC, including suffix, as the card you just removed.

13 Open the locking levers on the replacement card.

a Align the card with the slots in the shelf.

b Gently slide the card into the shelf.

NTMX79
in an RSC-S (DS-1) Model B EXT (continued)



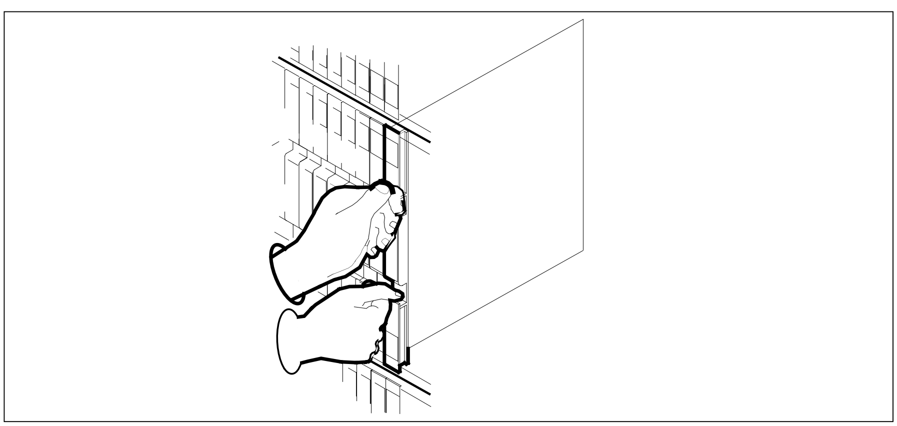
14

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 NTMX79 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:

NTMX79
in an RSC-S (DS-1) Model B EXT (continued)

a Ensure that the power converter (NTMX72) is fully inserted. A major audible alarm may sound. The alarm is silenced when power is restored to the converter.

Note:

b If the power converter replaced is an NTMX72AA, set the switch on the power converter to the Reset position. Set the associated circuit breaker on the MSP to the ON position.

If both the converter FAIL LED and FRAME FAIL lamp on the MSP go OFF, go to step 16.

If both the converter FAIL LED and FRAME FAIL lamp on the MSP do not go OFF, hold the switch on the NTMX72AA power converter in the Reset position and simultaneously set the associated circuit breaker on the MSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the MSP will go OFF. Go to step 16.

c If the power converter replaced is an NTMX72AB, set the associated circuit breaker on the MSP to the ON position. Both the converter FAIL LED and FRAME FAIL lamp on the MSP 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: CRI06AY
11 Disp_      NT7X05 Image File:
12 Next_      CMR Load:  CMR03A
13 SwAct   Unit 1:
14 QueryPM    NT7X05 load File: CRI06AY
15            NT7X05 Image File:
16 IRLINK     CMR Load:  CMR03A
17 Perform
18
```

NTMX79 in an RSC-S (DS-1) Model B EXT (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 17
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 load file by typing

`>LOADPM UNIT 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

NTMX79
in an RSC-S (DS-1) Model B EXT (continued)

19 Test the inactive RCC2 unit by typing

***>TST UNIT* rcc2_unit_no**

and pressing the Enter key.

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.

NTMX79
in an RSC-S (DS-1) Model B EXT (end)

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 B RCC2

Application

Use this procedure to replace the following card in an RSC-S RCC2.

PEC	Suffixes	Name
NTMX81	AA, BA	Dual DS-1 Interface

Common procedures

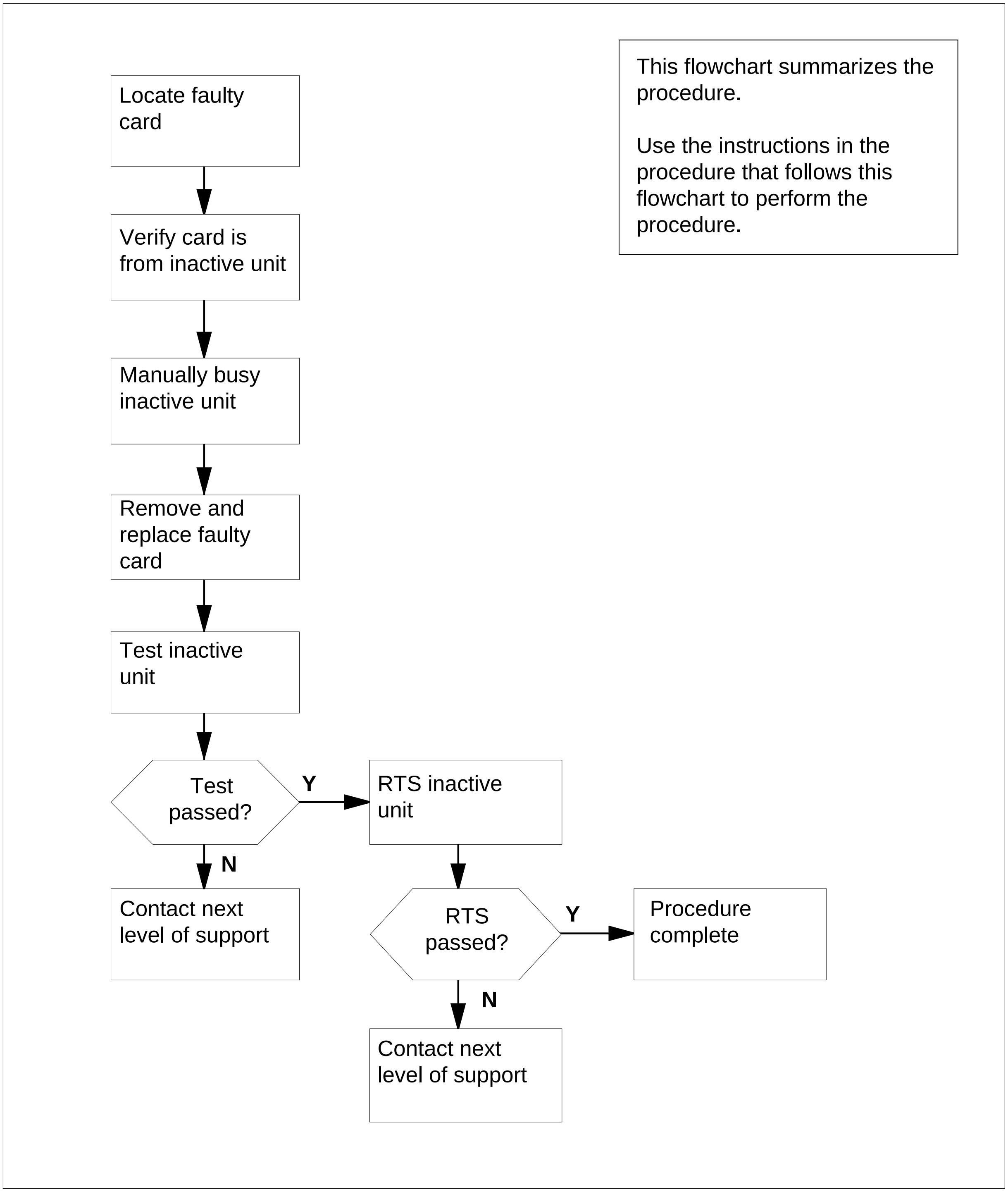
None

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 B RCC2 (continued)

Summary of card replacement procedure for an NTMX81 card in RSC-S RCC2



NTMX81
in an RSC-S (DS-1) Model B 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

Example of a MAP display:

NTMX81
in an RSC-S (DS-1) Model B 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 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 21

NTMX81
in an RSC-S (DS-1) Model B 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 responds with:

```
NO IRLINKS DATAFILLED, IRLINK LEVEL CANNOT BE ENTERED.
```

9 Before reconfiguring (adding, removing, or moving) interlinks of a posted RCC2 of a DRCC2, enter the following command from the IRLINK MAP level to disable interswitching capability:

>INTERSW DISABLE

Note: If the INTERSW DISABLE command is not entered before an attempt is made to busy (BSY) a specified IRLINK, the MAP terminal displays the following response:

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

10 To confirm that interswitching is disabled, enter the QUERYIR command. The QUERYIR command displays the status of interswitching capability 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
```

11 When the interswitching capability has been disabled, begin reconfiguring the IRLINKS by entering the BSY command with the IRLINK number(s), to be reconfigured. The BSY command is enhanced to display the number of interswitched calls that will be reverted to the network using available C-side channels, as seen in the following example:

>BSY 3

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

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.
```

12 Since the C-side channels of the RCC2 is a limited resource, reconfiguring IRLINKS should only be performed during periods of low traffic, otherwise some interswitched calls can be lost if there is an insufficient number of available C-side channels.

13 With the IRLINKS manually-busied (ManB), enter table IRLNKINV and make link changes for the desired IRLINK configuration. Static data is immediately downloaded to both units of both RCC2s of the DRCC2, if the units are InSv.

14 After DRCC2 IRLINKS are reconfigured, return to service the IRLINKS by entering the enhanced RTS command. 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.
```

15 To enable interswitching, enter the following command from the IRLINK MAP level:

>INTERSW ENABLE

16 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
```

17 IRLINKS and ForceESA static data are dynamically downloaded to both RCC2s of the DRCC2. However, the ESA lines, trunks and ESA table control data, components of the ESA static data for both RCC2s must also be downloaded. For this reason, the units of both RCC2s are set to in-service trouble (ISTb) with the reason `ESA STATIC DATA MISMATCH`.

18 ESA static data can be manually downloaded at the PM Level of the MAP display with the RCC2s posted, by entering the LOADPM command with the source of `CC.` and file of ESADATA. ESA static data can also be updated at

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

the automatic nightly static data updates as defined in table OFCENG tuples RSC_XPMESASDUPD_BOOL and RSC_XPMESASDUPD_HOUR.

Note: To load ESADATA the RCC2 units must be in service.

If the RCC2 is in a	Do
single configuration	step 21
dual configuration	step 19

19 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
```

20 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 28 for the main shelf.

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

21 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)

When both units are in-service, proceed to next step.

22 Display the C-side links associated with the DS-1 card by typing

>TRNSL C

and pressing the Enter key.

Example of a MAP response

```
LINK 0    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 24
not faulty	step 21

23 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 24
not faulty	step 38

24 Busy the links associated with the RCC2 by typing

>BSY LINK 0

and pressing the Enter key.

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

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
```

Note: To busy the other links associated with the RCC2, execute the procedures in this step for each link until all links are busied.

25 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
```

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

26 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 21

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.

At the RCE frame

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.

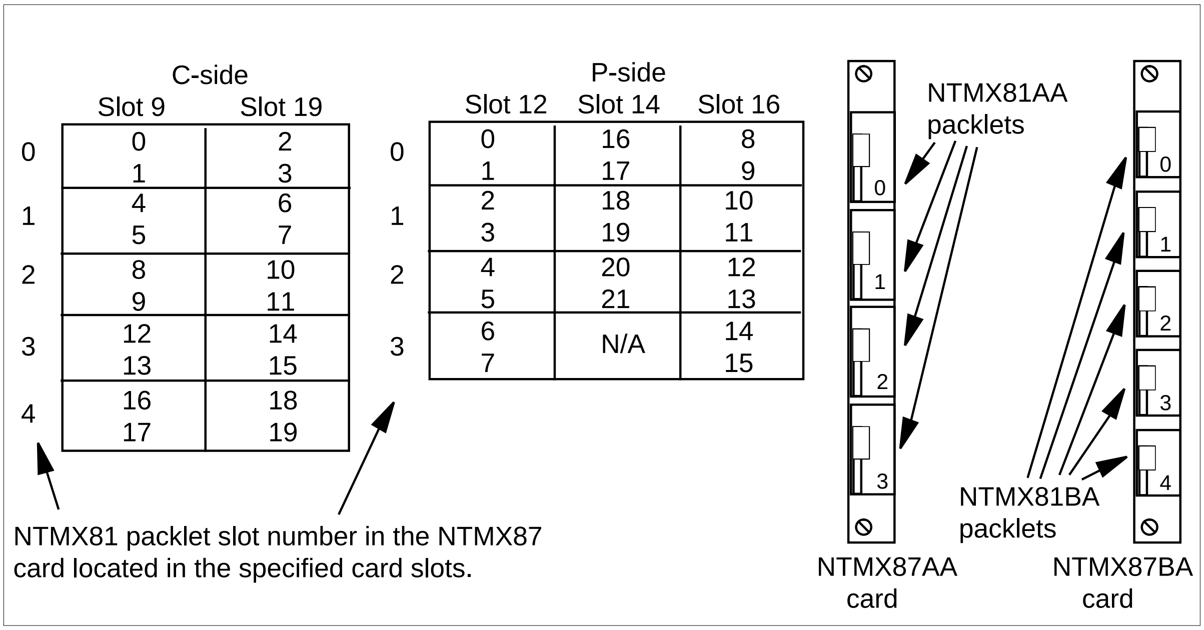
DANGER
Equipment damage
Take the following precautions when removing or inserting a card:

1. Do not apply direct pressure to the components.
2. Do not force the cards into the slots.

Put on a wrist strap.

28 After identifying the faulty link, use the following charts to determine which NTMX81 is to be removed. First identify whether the link is a C-side or P-side link, then by matching the link number with the slot number and packlet number to the left of each respective table.

NTMX81
in an RSC-S (DS-1) Model B 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.

29 Before inserting the replacement card, set the DS-1 switch settings according to the following table.

(Sheet 1 of 2)

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

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.

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

(Sheet 2 of 2)

Distance to cross connect		Dip switch settings		
Feet	**Meters**	**S3/6**	**S2/5**	**S1/4**
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.

30 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.

31 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.

32 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 39
other	step 33

At the MAP terminal

33 Test the busied network links from step 22 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 24. 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 34

NTMX81
in an RSC-S (DS-1) Model B RCC2 (continued)

If TST	Do
failed	step 40

34 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 35
failed	step 40

35 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

36 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 35

If RTS	Do
passes	step 37
fails	step 40

37 Send any faulty cards for repair according to local procedure.

38 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.

39 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.

40 Obtain further assistance in replacing this card by contacting the personnel responsible for higher level support.

NTMX81
in an RSC-S (DS-1) Model B RCC2 (end)

41 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 B 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

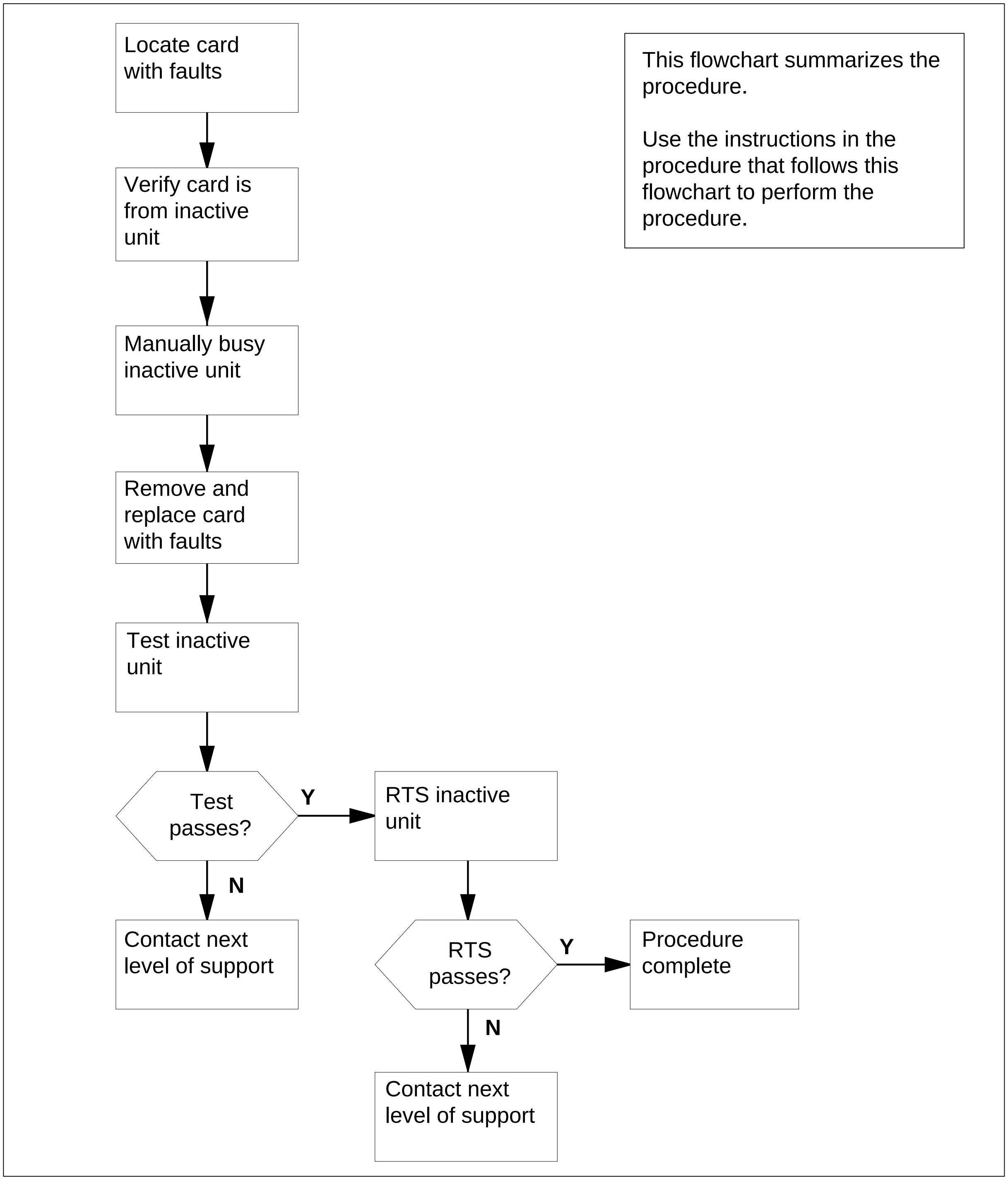
There are no common procedures.

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.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

Summary of card replacementprocedure for an NTMX87 card in RSC-S RCC2



NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

Replacing an NTMX87 card in RSC-S RCC2

At the Current Location

1 Proceed only if

- a step in a maintenance procedure directed you to this card replacement procedure
- you use the procedure to verify or accept cards
- your maintenance support group directed you to this procedure

2

> **WARNING**
> **This procedure describes several configurations of the NTMX87 carrier card.**
> Make sure you use the steps for the configuration of your RCC2. These steps include a single or dual RCC2 (DRCC2), main or extension shelf, or links compared to carrier trunks.

> **WARNING**
> **Loss of service**
> When you replace a card in the RCC2, make sure the unit that contains the card you want to replace is *inactive*. Make sure the mate unit is *active*.

Obtain an NTMX87 replacement card. Make sure the replacement card has the same product equipment code (PEC) and suffix, as the card you want to remove.

At the MAP terminal

3 To view the PM level of the MAP display, type

`>MAPCI;MTC;PM;POST RCC2 rcc2_no`

and press the Enter key.

where

rcc2_no
is the number of the RCC2 with the card with faults

Example of a MAP display:

NTMX87
in an RSC-S (DS-1) Model B 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 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 To display and record the central-side (C-side) link status of the posted RCC2 associated with the NTMX87 carrier card with faults, type

>TRNSL C

and press 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 To display and record the P-side link status of the posted RCC2 associated with the NTMX87 carrier card that has faults, type

>TRNSL P

and press the Enter key.

Example of a MAP response

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

```
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 Check the MAP display to make sure the card you want to remove is in the inactive unit.

If the card with faults	Do
is in the active unit	step 7
is in the inactive unit	step 9

7 To switch the processing activity (SWACT) to the inactive unit, type

>SWACT

and press the Enter key.

8 To confirm the system prompt, type

>YES

and press the Enter key.

When both units are in-service, proceed to the next step.

At the RCE frame

9 Place a sign on the active unit that bears the words *Active unit - Do not touch.* Do not attach this sign by magnets or tape.

If defective card	Do
is C-side of RCC2	step 10
is P-side defective	step 16

At the MAP terminal

10 To busy the inactive PM unit, type

***>bsy unit* unit_no**

and press the Enter key.

where

unit_no
is the number of the inactive RCC2 unit (unit 0 or 1)

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

11 To post the host PM, type

>POST host_pm host_pm_no

and press the Enter key.

where

host_pm
is a line group controller (LGC) or 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 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 To display the P-side links of the host peripheral associated with the RCC2, type

>TRNSL P

and press the Enter key.

Example of a MAP response

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

```
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 To manually busy the links connected to the defective NTMX87 card, type

>BSY LINK link_no

and press the Enter key.

where

link_no
is the number of the link associated with the defective NTMX87 card

Note 1: You must busy all provisioned links in the slot.

Note 2: Refer to the chart in step 14 for the RCC2 C-side link-to-slot assignments.

At the RCE frame

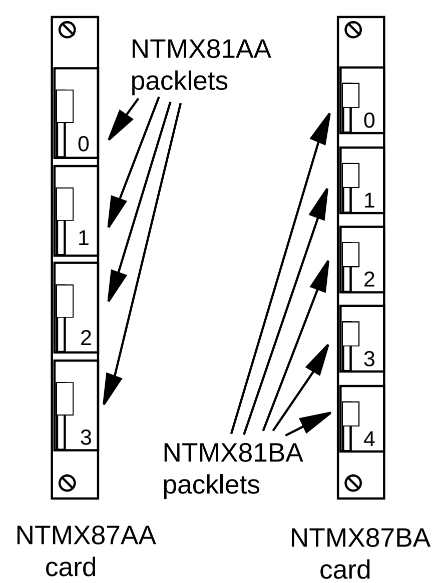
14 Use the following charts to determine which NTMX87 card you must remove. Match the provisioned link number with the slot number and the packlet number to the left of each table.

Main shelf

C-side

	Slot 9	Slot 19
0	0 1	2 3
1	4 5	6 7
2	8 9	10 11
3	12 13	14 15
4	16 17	18 19

NTMX81 packlet slot number in the NTMX87 card located in the specified card slots.



NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

At the MAP terminal

15

> **WARNING**
> **Static electricity damage**
> Put on a wrist strap before you remove any cards. Connect the wrist strap to the wrist strap grounding point. This point is on the left side of the modular supervisory panel (MSP) of the RCC2. This action protects the equipment against damage from static electricity.

Use the following steps to remove the NTMX81 packlet:

a Locate the NTMX81 packlet you want to remove on the correct NTMX87 carrier card slot.

b Open the locking lever on the NTMX81 packlet. Carefully pull the packlet toward you until the packlet clears the shelf.

c Make sure the NTMX81 packlets are stored in an electrostatic discharge (ESD) container. This container protects the circuit card until you reinstall the packlet in the NTMX87 carrier card.

d Go to step 42.

At the MAP terminal

16 To determine if the RCC2 is in a single or dual configuration, type

`>POST RCC2 rcc2_no ;IRLINK`

and press the Enter key.

where

rcc2_no
is the number of the RCC2 associated with the defective NTMX87 card

Note: If the posted RCC2 is in a single RCC2 configuration, the system responds with:
NO IRLINKS DATAFILLED, IRLINK LEVEL CANNOT BE ENTERED.

17 Before you add, remove, or move interlinks of a posted RCC2 of a DRCC2, enter the following command. Enter this command from the IRLINK MAP level. This command disables interswitching capability.

`>INTERSW DISABLE`

Note: If you do not enter the INTERSW DISABLE command before you attempt to busy (BSY) a specified IRLINK, the MAP terminal displays the following response:

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

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

18 To confirm that the system disabled interswitching, enter the QUERYIR command. The QUERYIR command displays the status of interswitching capability 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
```

19 When the system disables interswitching capability, reconfigure the IRLINKS. Enter the BSY command with the IRLINK number(s) to reconfigure. This action enhances the BSY command. The BSY command can display the number of interswitched calls. These calls use available C-side channels to revert to the network. The following example describes this process.

>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.
```

20 The C-side channels of the RCC2 are a limited resource. To prevent the loss of some interswitched calls, reconfigure IRLINKS only during periods of low traffic. The system can lose interswitched calls if not enough C-side channels are available.

21 Manually busy (ManB) the IRLINKS. Enter table IRLNKINV and make link changes for the required IRLINK configuration. The system downloads static data to both units of both RCC2s of the DRCC2. This action can only occur if the units are InSv.

22 When you reconfigured the DRCC2 IRLINKS, enter the enhanced RTS command to return to service the IRLINKS. The MAP terminal displays the following response to indicate that the system disabled interswitching.

>RTS 3

Example of a MAP response

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

23 To enable interswitching, enter the following command from the IRLINK MAP level:

>INTERSW ENABLE

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

>QUERYIR

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

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
```

25 The system downloads RLINKS and ForceESA static data to both RCC2s of the DRCC2. The system must download the components of the ESA static data for both RCC2s. These components include the ESA lines, trunks and ESA table control data. The system sets the units of both RCC2s to in-service trouble (ISTb) with the reason `ESA STATIC DATA MISMATCH`.

26 You can download ESA static data at the PM Level of the MAP display with the RCC2s posted. To download this data, enter the LOADPM command with the source of `CC.` and file of `ESADATA`. You can update ESA static data at the automatic nightly static data updates. The table OFCENG tuples RSC_XPMESASDUPD_BOOL and RSC_XPMESASDUPD_HOUR define these updates.

Note: To load `ESADATA` the RCC2 units must be in service.

If the RCC2	Do
is in a single configuration	step 27
is in a dual configuration	step 40

27 To determine if P-side ports are links or carrier trunks, refer to the information obtained in step 5.

If P-side port	Do
is links	step 28
is trunks	step 30

28 To manually busy all provisioned links connected to the defective NTMX87 circuit card, type

>bsy link **link_no**

and press the Enter key.

where

link_no
is the number of the link associated with the defective NTMX87 circuit card

Note 1: Each NTMX81 card has two links. The user must busy each link. Possible link pairs are 0 and 1, 2 and 3, 4 and 5, 6 and 7. This pair relationship continues in all 54 P-side links.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

Note 2: Refer to the charts in steps 36 and 38 for P-side link-to-slot assignments. You must busy all provisioned links in the slot.

29 Determine if the NTMX87 circuit card that has faults 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 defective NTMX87	Do
is on the main shelf	step 36
is on the extension shelf	step 38

30 Access the TRKS;TTP MAP display level. Busy the trunks assigned to the P-side carriers associated with the defective NTMX87. To perform these actions, type

>TRKS;TTP;POST D RCC2 rcc2_no carrier_no

and press the Enter key.

where

rcc2_no
is the number of the RCC2 associated with the NTMX87 that

has faults

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
```

31 To busy the trunks associated with the NTMX87 circuit card that has faults, type

>BSY ALL

and press the Enter key.

Note 1: Wait for the busy queue to clear.

Note 2: To busy other carriers associated with the NTMX87 circuit card that has faults, refer to the link-to-slot assignment charts. These charts appear in steps 36 and 38.

32 To installation busy all the trunks to prevent carrier alarms, type

>BSY INB ALL

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

and press the Enter key.

33 To access the CARRIER level and post the P-side carriers associated with the NTMX87 circuit card that has faults, type

>CARRIER;POST RCC2 rcc2_no carrier_no

and press the Enter key.

where

rcc2_no
is the number of the RCC2 associated with the NTMX87 that

has faults

carrier_no
is the number of the P-side carrier assigned

Note: Perform this step for each carrier span in the defective NTMX87 circuit card.

34 To busy and offline the P-side carriers associated with the NTMX87 circuit card that has faults, type

>BSY carrier_no ;OFFL carrier_no

and press 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 NTMX87 circuit card that has faults.

35 Determine if the NTMX87 circuit card that has faults 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 NTMX87 that has faults	Do
is on the main shelf	step 36
is on the extension shelf	step 38

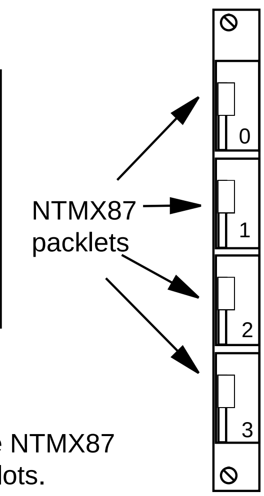
At the RCE frame

36 Use the following figure to determine slot assignments on the P-side of the main shelf.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

Main shelf

	Slot 12	P-side Slot 14	Slot 16
0	0 1	16 17	8 9
1	2 3	18 19	10 11
2	4 5	20 21	12 13
3	6 7	N/A	14 15



NTMX87 packlet slot number in the NTMX87 card located in the specified card slots.

NTMX87 card

37

> **WARNING**
> **Static electricity damage**
> Before you remove any cards, put on a wrist strap and connect the wrist strap to the wrist strap grounding point. This point is on the left side of the modular supervisory panel (MSP) of the RCC2. This action protects the equipment against damage from static electricity.

Remove the NTMX81 packlet as described in the following steps:

a Locate the NTMX81 packlet you want to remove on the correct NTMX87 carrier card slot.

b Open the locking lever on the NTMX81 packlet. Carefully pull the packlet toward you until the packlet clears the shelf.

c Make sure the NTMX81 packlets are stored in an electrostatic discharge (ESD) container. This container protects the circuit card until you reinstall the packlet in the NTMX87 carrier card.

d Go to step 42.

At the RCE frame

38 Refer to field SIDE of table RCCINV to determine which side of the extension shelf contains the NTMX87 circuit card that has faults

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

Extension shelf

Left side

P-side

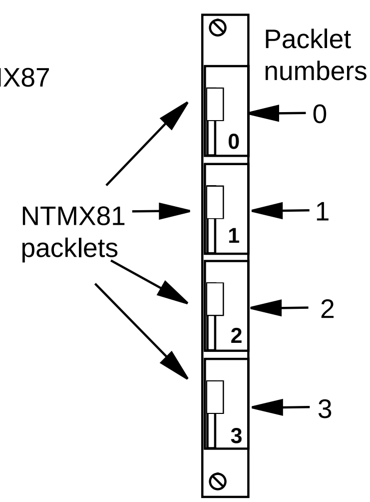
	Slot 4	Slot 6	Slot 8
0	24 25	32 33	40 41
1	26 27	34 35	42 43
2	28 29	36 37	44 45
3	30 31	38 39	46 47

Right side

P-side

	Slot 19	Slot 21	Slot 23
0	40 41	32 33	24 25
1	42 43	34 35	26 27
2	44 45	36 37	28 29
3	46 47	38 39	30 31

NTMX81 packlet slot number in the NTMX87 card located in the specified card slots.



NTMX87 card

39

> **WARNING**
> **Static electricity damage**
> Before you remove any cards, put on a wrist strap and connect the wrist strap to the wrist strap grounding point. This point is on the left side of the modular supervisory panel (MSP) of the RCC2. This action protects the equipment against damage from static electricity.

Remove the NTMX81 packlet as described in the following steps:

a Locate the NTMX81 packlet you want to remove on the correct NTMX87 carrier card slot.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

b Open the locking lever on the NTMX81 packlet. Carefully pull the packlet toward you until the packlet clears the shelf.

c Make sure the NTMX81 packlets are stored in an electrostatic discharge (ESD) container. This container protects the circuit card until you reinstall the packlet in the NTMX87 carrier card.

d Go to step 42.

40 To translate the dual RCC2s IRLINKS, type

>TRNSL

and press 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
```

41 To busy IRLINKS in the NTMX87 circuit card that has faults, type

>BSY irlink_no

and press the Enter key.

where

irlink_no
is the number of the irlink that must be busied

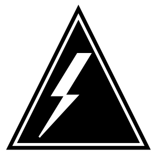
Note 1: You must perform this step for each provisioned link in the slot position.

Note 2: For link-to-slot assignments, refer to step 36 for the main shelf, and step 38 for the extension shelf.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

At the RCE frame

42



WARNING
Static electricity damage
Before you remove any cards, put on a wrist strap and connect the wrist strap to the wrist strap grounding point. This point is on the left side of the modular supervisory panel (MSP) of the RCC2. This action protects the equipment against damage from static electricity.

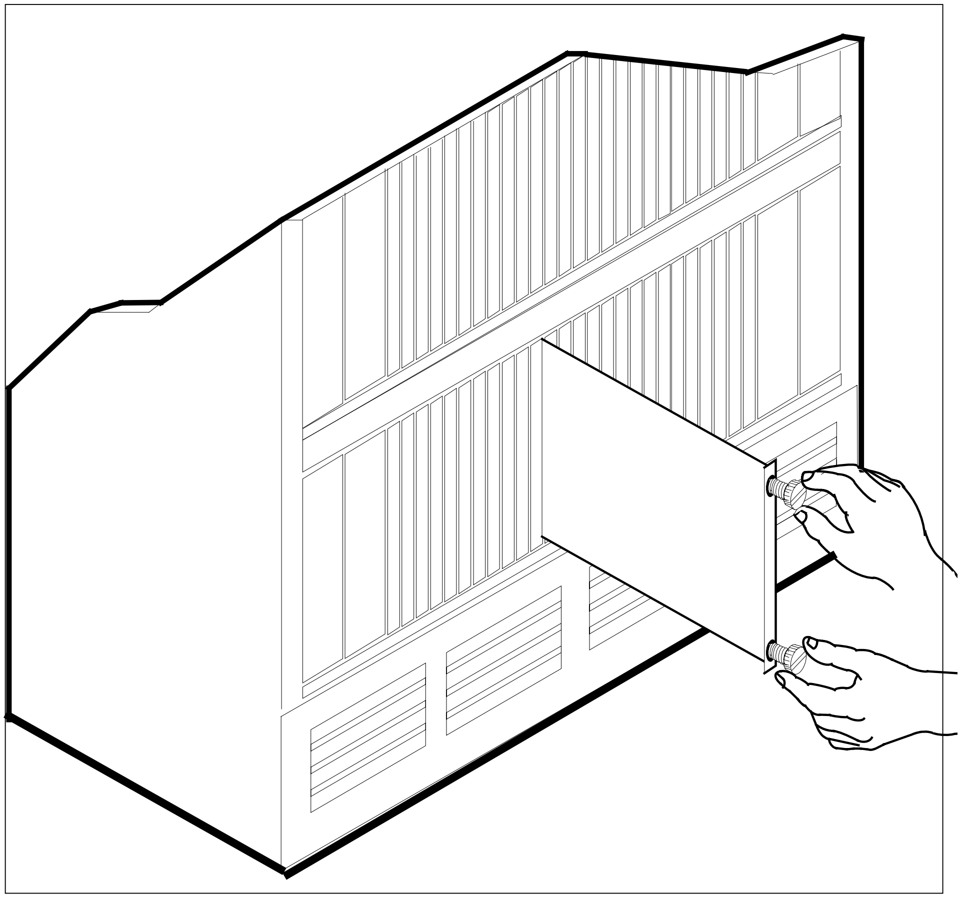
DANGER
Equipment damage
Take the following precautions when you remove or insert a card:

1. Do not apply direct pressure to the components
2. Do not force the cards in the slots.

Put on a wrist strap.

43 Use the T9908 wrist grounding strap and a T1324 screwdriver to remove the NTMX87 frame carrier circuit card. Insert the new carrier card and secure the card.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)



44 Replace the NTMX81 packlets you removed. Align the packlet with the slots in the shelf. Carefully slide the packlet in the circuit card slot in the NTMX87 circuit card.

45 Seat and lock the packlet.

- **a** Use your fingers or thumbs to push on the upper and lower edges of the faceplate of the packlet. This method makes sure the packlet is fully seated in the slot.
- **b** Close the locking lever.

46 Use the following information to determine the next step in this procedure.

If	Do
you entered this procedure from alarm clearing procedures	step 63
you entered this procedure from another point	step 47

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

47 Use the following information to determine the next step in this procedure.

If	Do
you entered this procedure from step 15 for a single RCC2 with C-side links affected	step 48
you entered this procedure from step 37 or 39 for an RCC2 with P-side trunks affected	step 56
you entered this procedure from step 37 or 39 for a single RCC2 with P-side links affected	step 52
you entered this procedure from step 41 for a DRCC2 with irlinks affected	step 54

At the MAP terminal

48 To test the busied network links from step 13, type

>TST LINK link_no

and press the Enter key.

where

link_no
is the number of the link associated with the new NTMX87

carrier card

Note 1: You must perform this step for each manually busied link.

Note 2: Test the other links associated with the RCC2. Perform this step for each link until the system tested all links.

If TST	Do
passes	step 49
fails	step 64

49 To return to service the P-side links, type

>RTS LINK link_no

and press the Enter key.

where

link_no
is the number of the link manually busied in step 13

Note 1: You must perform this step for each link that is manually busied.

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

Note 2: RTS the other links associated with the RCC2. To RTS these links, perform the procedures in this step for each link until all links return to service.

If RTS	Do
passes	step 50
fails	step 64

50 To post the inactive RCC2 that contains the NTMX87 card, type

`>POST RCC2 rcc2_no`

and press the Enter key.

where

rcc2_no
is the number of the RCC2 associated with the card that has faults

51 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 posted in step 50

If RTS	Do
passes	step 61
fails	step 64

At the MAP terminal

52 To test the busied links from step 28, type

`>TST LINK link_no`

and press the Enter key.

where

link_no
is the number of the link associated with the new NTMX87

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

carrier card

Note 1: You must perform this step for each manually busied link.

Note 2: To test the other links associated with the RCC2, perform this step for each link until you tested all links.

If TST	Do
passes	step 53
fails	step 64

53 To return to service the P-side links, type

>RTS LINK link_no

and press the Enter key.

where

link_no
is the number of the link manually busied in step 13

Note 1: You must perform this step for each link that is manually busied.

Note 2: RTS the other links associated with the RCC2. To RTS these links, perform the procedures in this step for each link until all links return to service.

If RTS	Do
passes	step 61
fails	step 64

At the MAP terminal

54 To test the IRLINKS, type

>TST irlink_no

and press the Enter key.

where

irlink_no
is the number of the link busied in step 41

Note 1: You must perform this step for each manually busied link.

Note 2: To test the other irlinks associated with the RCC2, perform this step for each irlink until you tested all links.

If TST	Do
passes	step 55
fails	step 64

NTMX87 in an RSC-S (DS-1) Model B RCC2 (continued)

55 To return to service the IRLINKS, type

>RTS irlink_no

and press the Enter key.

where

irlink_no
is the number of the link manually busied in step 41

Note 1: You must perform this step for each irlink that is manually busied.

Note 2: RTS the other links associated with the RCC2. To RTS these links, perform this step for each link until all links return to service.

If RTS	Do
passes	step 61
fails	step 64

At the MAP terminal

56 To busy and return to service P-side carriers offlined in step 34, type

>BSY carrier_no; RTS carrier_no

and press the Enter key.

where

carrier_no
is the number of the P-side carrier assigned

If carrier RTS	Do
passes	step 57
fails	step 64

57 To access the TTP MAP level to post the P-side links associated with the new NTMX87 circuit card, type

>TTP;POST D RCC2 rcc2_no carrier_no

and press 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 assigned

Example of a MAP response

NTMX87
in an RSC-S (DS-1) Model B RCC2 (continued)

```
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
```

58 To busy the trunks associated with the new NTMX87 circuit card, type

>BSY ALL

and press the Enter key.

Note 1: Wait for the busy queue to clear.

Note 2: Busy the other carriers associated with the NTMX87 circuit card that has faults. Refer to the link-to-slot assignment charts in steps 36 and 38.

59 To test the trunks associated with the new NTMX87 circuit card, type

>TST;NEXT

and press the Enter key.

Note: Perform this step for each carrier span associated with the new NTMX87 circuit card.

If trunks TST	Do
passes	step 60
fails	step 64

60 To return to service trunks assigned to links on the new NTMX87 circuit card, type

>RTS ALL

and press the Enter key.

If RTS	Do
passes	step 61
fails	step 64

61 Send any cards that have faults for repair according to local procedure.

62 Record the date card replaced, the serial number of the card, and the reason you performed card replacement. Go to step 65.

63 Return to *Alarm Clearing Procedures* or the procedure that directed you to this procedure. At the point where a list of card that have faults appeared,

NTMX87
in an RSC-S (DS-1) Model B RCC2 (end)

identify the next card on the list. Refer to the correct card replacement procedure for that card in this manual.

64 To replace this card, contact the next level of maintenance for help.

65 This procedure is complete. Remove the sign from the active unit. Return to the maintenance procedure that directed you to this card replacement procedure. Continue as directed.

NTRX41
in an RSC-S (DS-1) Model B MSP

Application

Use this procedure to replace an NTRX41 card in a modular supervisory panel (MSP) located in a

- cabinetized extension module (CEXT)
- cabinetized line concentrating equipment (CLCE)
- cabinetized line module ISDN (CLMI)
- cabinetized power distribution center (CPDC)
- cabinetized remote switching center (CRSC)
- cabinetized miscellaneous equipment (CMIS)
- cabinetized remote miscellaneous equipment (CRME)

PEC	Suffixes	Name
NTRX41	AA, BA, CA	Alarm Module

Common procedures

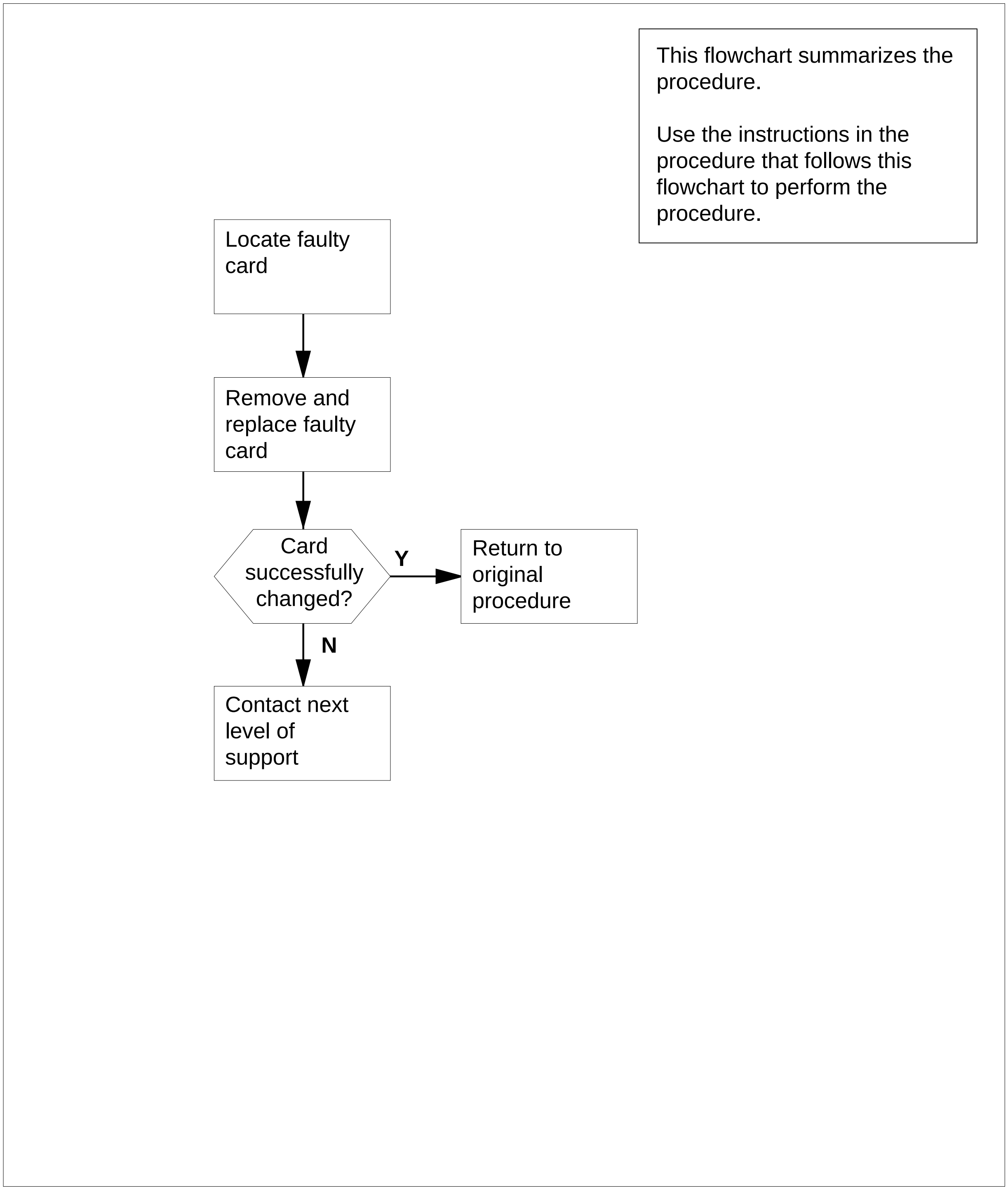
None

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.

NTRX41
in an RSC-S (DS-1) Model B MSP (continued)

Summary of card replacement procedure for an NTRX41 card in RSC-S MSP



NTRX41
in an RSC-S (DS-1) Model B MSP (continued)

Replacing an NTRX41 card in RSC-S MSP

At your Current Location

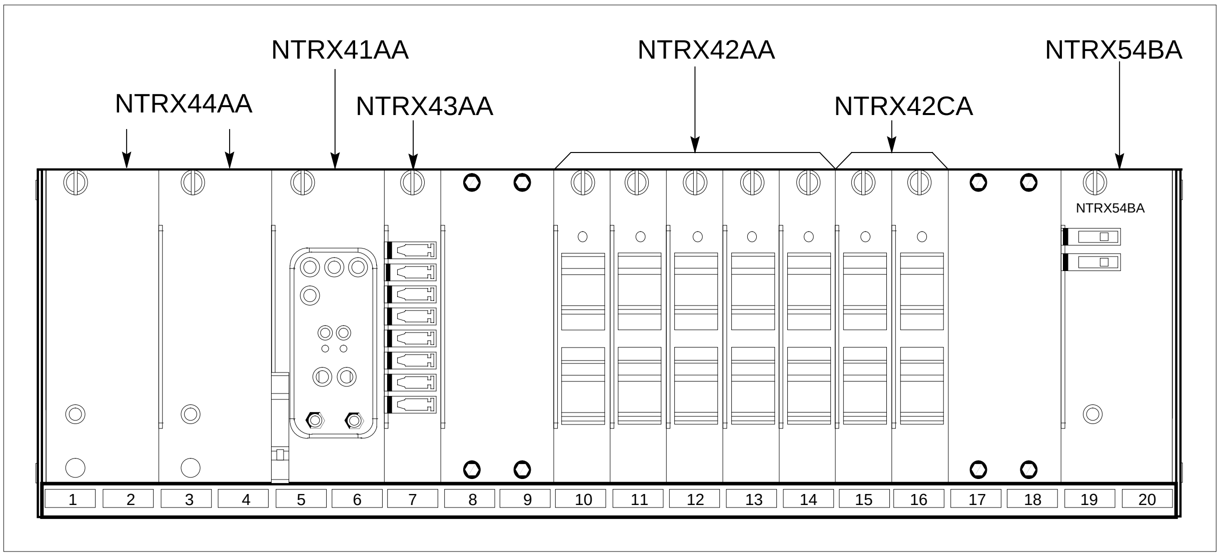
1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

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 front panel of the cabinet

3 Open the front cover of the MSP. Release the two cover latches and swing the cover down to the open position.

Note: The illustrations in this card replacement procedure are for the MSP shelf in an CRSC or CEXT module. The circuit breaker designation may vary depending on the type of cabinet you are working in.



4

DANGER
Risk of injury from high energy levels, 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). This protects the equipment against damage caused by static electricity.

NTRX41
in an RSC-S (DS-1) Model B MSP (continued)

DANGER
Risk of injury from high energy levels, equipment damage
Take these precautions when removing or inserting a card:

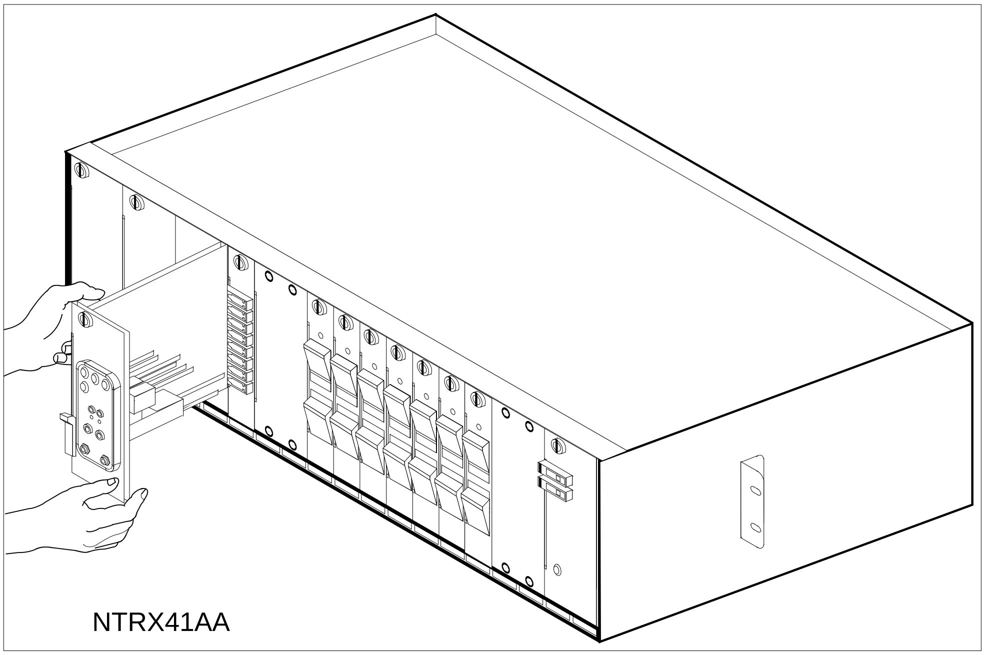
1. Do not apply direct pressure to the components.

2. Do not force the cards into the slots.

Put on a wrist strap.

5 Remove the NTRX41 circuit card as shown in the following figure.

a Open the front doors of the cabinet and locate the circuit card, it will be in slots 05 and 06.



NTRX41AA

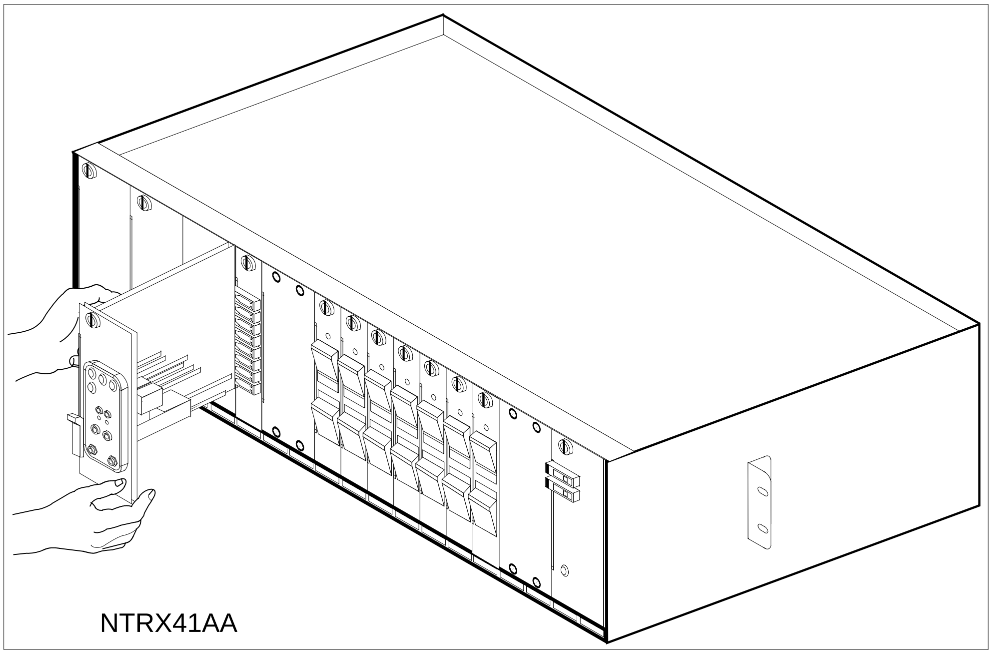
b At the front of the MSP, disengage the knurled thumbscrew at the top of the circuit card.

c Pull out the lever on the upper left side of the alarm module.

d Gently pull the circuit card toward you until it clears the shelf.

6 Ensure the replacement circuit card has the same PEC, including suffix, as the circuit card just removed.

NTRX41
in an RSC-S (DS-1) Model B MSP (end)



a Align the circuit card with the slots in the shelf and gently slide the circuit card into the shelf.

b Gently but firmly seat the circuit card.

c Push in lever on the upper left side of alarm module.

d Tighten the knurled thumbscrew at the top of the circuit card.

If alarm lights	Do
remain off	step 7
light up	step 9

7 Send any faulty cards for repair according to local procedure.

8 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 10.

9 Obtain further assistance in replacing this card by contacting the personnel responsible for the next higher level of support.

10 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTRX42
in an RSC-S (DS-1) Model B MSP

Application

Use this procedure to replace an NTRX42 card in a modular supervisory panel (MSP) located in a

- cabinetized extension module (CEXT)
- cabinetized line concentrating equipment (CLCE)
- cabinetized line module ISDN (CLMI)
- cabinetized power distribution center (CPDC)
- cabinetized remote switching center (CRSC)
- cabinetized miscellaneous equipment (CMIS)
- cabinetized remote miscellaneous equipment (CRME)

PEC	Suffixes	Name
NTRX42	AA, CA	Circuit Breaker Module

Common procedures

None

Action

A connector removal tool is available to facilitate removal of the AMP Faston receptacles from the power input and output connectors of the MSP modules. This tool comes in two lengths: P0746192 152 mm (6 in.), and P0747552 254 mm (10 in.). The shorter tool is used when access to the rear of the MSP is very limited. An example of limited access is, MSP modules located directly behind the cabinet bulkhead.

This tool is approximately 2 mm (.090 in.) thick and 17 mm (.65 in.) wide, with a jaw-like cut-out at each end. The cut-out profile conforms to the shape of the Faston receptacle. The shorter tip of each profile is used to position the receptacle in the tool.

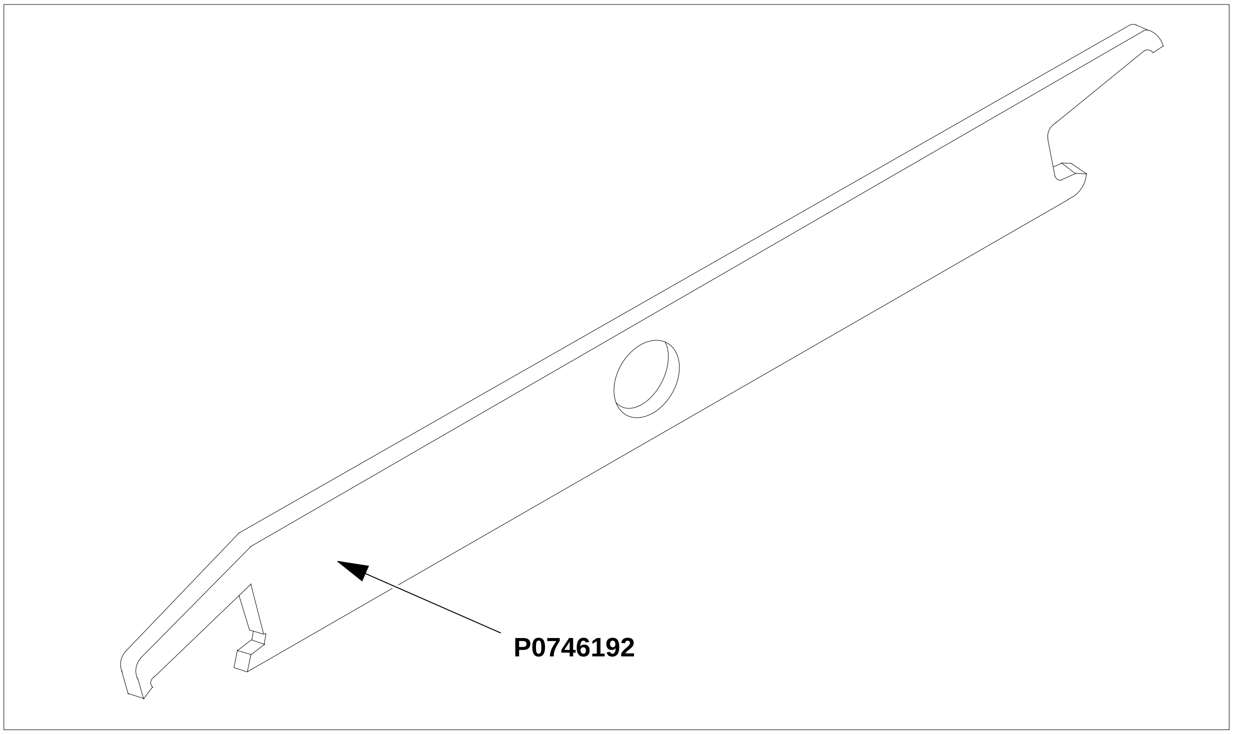
The first meeting point of the tool serves as the pivot point. By rotating the tool around this pivot point, the longer tip of the profile which has a hook on its end, is engaged with the action-arm of the power connector. As the action-arm of the connector is depressed, the receptacle is disengaged from the connector tab. The receptacle is removed by pulling the tool with the receptacle trapped in its jaw, away from the connector. The tool is disengaged

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

from the receptacle by rotating the tool's hook off the action-arm of the receptacle.

Although the shape of the cut-out is the same on each end of the tool, the orientation of the profile is off by 15 degrees. This difference allows for the use of the tool at different angles, which may be required due to limited access to the connectors.

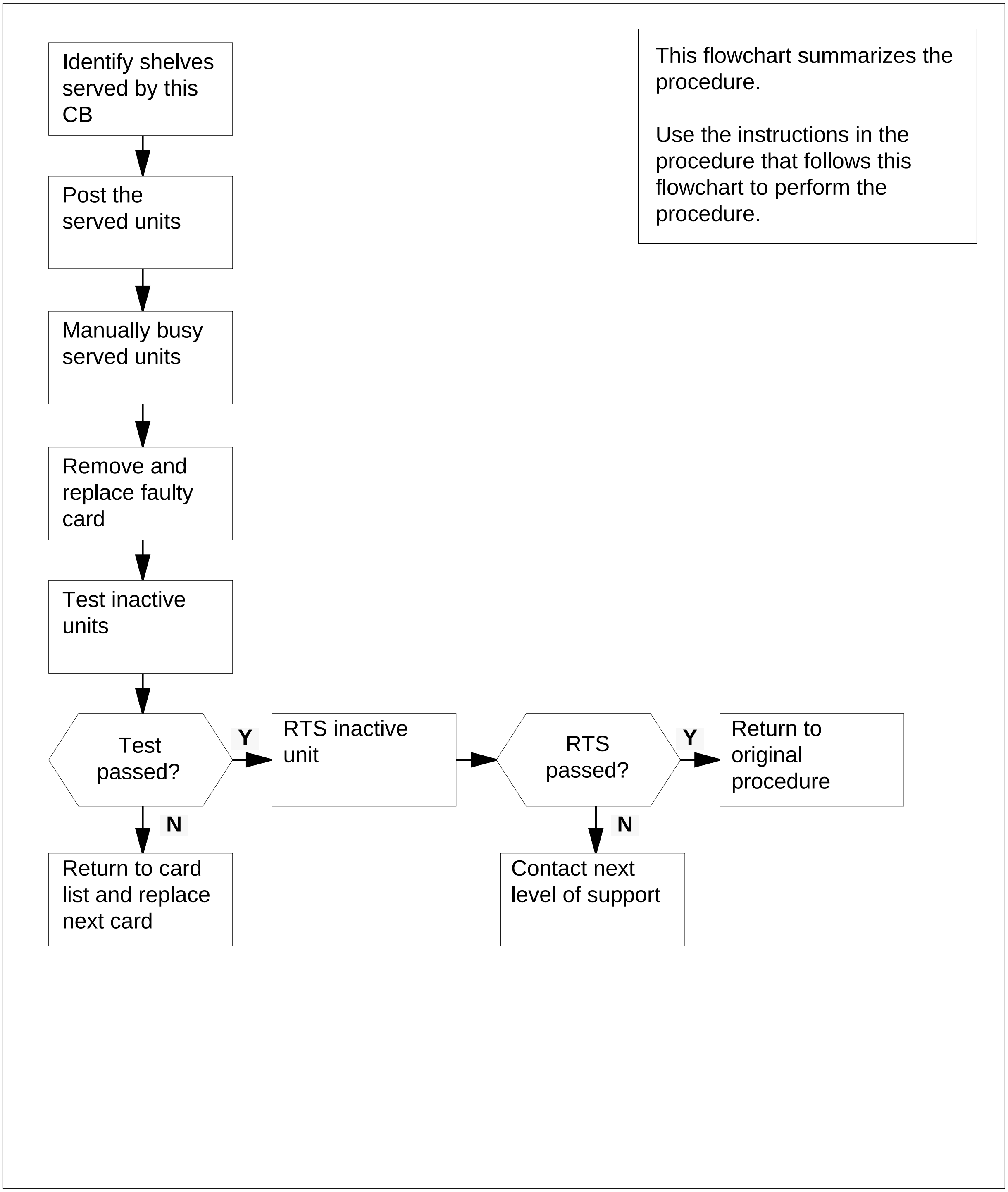
Connector removal tool



The following flowchart is a summary of this procedure. Use the instructions in the step-action table that follows the flowchart to perform the procedure. The detailed procedure depends on which circuit cards are served by the breaker module circuit card (NTRX42). You will be directed to the appropriate steps depending on your configuration.

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

Summary of replacing an NTRX42 card in an RSC-S MSP



NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

Replacing an NTRX42 card in RSC-S MSP

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.

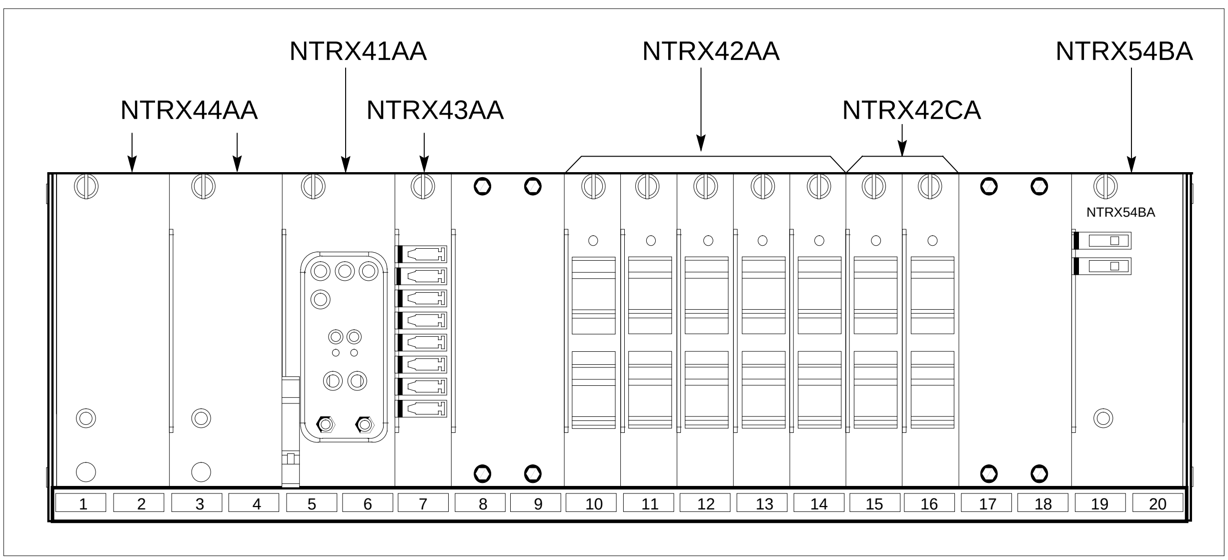
2 Obtain a replacement card. Ensure that the replacement card has the same product equipment code (PEC), including suffix, as the card that is to be removed.

At the front panel of the cabinet

3 Open the front cover of the MSP. Release the two cover latches and swing the cover down to the open position.

Note: The illustrations in this card replacement procedure are for the MSP shelf in an CRSC or CEXT module. The circuit breaker designation may vary depending on the type of cabinet you are working in.

Modular supervisory panel



4 Use the breaker designation label to identify which cards are serviced by each circuit breaker (CB). For example, the label CB01-47-01 identifies circuit breaker 01 as controlling circuit card position 01 on shelf 47. Many RX42 modules service two separate devices (or units); both units must be powered down prior to removal of the associated RX42 circuit card.

5 Use the following table to determine which step to do next.

If the CB powers the	Do
RMM shelf containing 2X09 or 2X06 cards	step 6

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

If the CB powers the	Do
RCC2 shelf containing MX72 card	step 9
LCME shelf containing 6X30, 6X53 or BX72 cards	step 15

At the MAP terminal

6 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 unit 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       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
```

7 Busy the RMM by typing

>BSY

and pressing the Enter key.

Example of a MAP display

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

```
 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

8 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 MSP will be ON. An audible alarm may sound. If an alarm does sound, silence it by typing

`SIL`

and pressing the Enter key.

Go to step 28.

9 Access the PM level and post the RCC2 by typing

`>MAPCI;MTC;PM;POST rcc2_no`

and pressing the Enter key.

where

rcc2_no
is the number of the RCC2 unit that will be busied.

Example of a MAP display

NTRX42
in an RSC-S (DS-1) Model B MSP (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 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
```

10 The NTRX42 you are replacing should be controlling the INACTIVE side of the RCC2.

If NTRX42 card is on the	Do
active unit	step 11
inactive unit	step 13

11 Switch the processing activity (SWACT) to the INACTIVE unit by typing

>SWACT

and pressing the Enter key.

12 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

13 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.

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

At the MAP terminal

14 Busy the inactive PM unit by typing

> *bsy unit* unit_no

where

unit_no
is the number of the INACTIVE RCC2 unit that will be busied.

Go to step 28.

15 Use the following information to determine where to proceed.

If top circuit breaker of NTRX42 powers	Do
NT6X53 or NTBX72	step 17
NT6X30	step 21

16 Use the following information to determine where to proceed.

If bottom circuit breaker of NTX42 powers	Do
NT6X53 or NTBX72	step 17
NT6X30	step 21

17 Set the MAP display to the PM level and post the LCME powered by the circuit breaker by typing

***>MAPCI;MTC;PM;POST LCME* site lcme_frame_no lcme_no**

and pressing the Enter key.

where

site
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 LCME the circuit breaker supplies power to

Example of a MAP display

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

```
 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
```

18 Busy the LCME unit powered by the circuit breaker by typing

>BSY UNIT **lcme_unit_no**

and pressing the Enter key.

where

lcme_unit_no
is the unit number of LCME to which the circuit breaker supplies power.

Example of a MAP display

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

```
 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
```

19 An alarm may sound. If this occurs, silence the alarm by typing

>SIL

and pressing the Enter key.

20 Use the following information to determine where to proceed.

If	Do
Circuits associated with bottom circuit breaker of NTRX42 have not been busied or otherwise addressed	step 16
Circuits associated with both circuit breakers of NTRX42 have been busied or otherwise addressed	step 28

21 Set the MAP display to the PM level and post the LCME in the same frame as the circuit breaker by typing

***>MAPCI;MTC;PM;POST LCME* site lcme_frame_no lcme_no**

and pressing the Enter key.

where

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

site
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 in the same frame as the circuit breaker

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        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
```

22 Busy the LCME unit associated with the ring generator by typing

>BSY UNIT **lcme_unit_no**

and pressing the Enter key.

where

lcme_unit_no
is zero when the circuit breaker powers ring generator zero

is one when the circuit breaker powers ring generator one

Example of a MAP display

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

```
 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 0 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
```

23 An alarm may sound. If this occurs, silence the alarm by typing

>SIL

and pressing the Enter key.

24 If there is a second LCME in the same frame as the circuit breaker, post the other LCME by typing

***>MAPCI;MTC;PM;POST LCME* site lcme_frame_no lcme_unit_no**

and pressing the Enter key.

where

site
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_unit_no
is the number of the LCME in the same frame as the circuit breaker

25 Busy the LCME unit associated with the ring generator by typing

***>BSY UNIT* lcme_unit_no**

and pressing the Enter key.

where

lcme_unit_no
is zero when the circuit breaker powers ring generator zero.

is one when the circuit breaker powers ring generator one

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

26 An alarm may sound. If this occurs, silence the alarm by typing

>SIL

and pressing the Enter key.

27 Use the following information to determine where to proceed.

If	Do
Circuits associated with bottom circuit breaker of NTRX42 have not been busied or otherwise addressed	step 16
Circuits associated with both circuit breakers of NTRX42 have been busied or otherwise addressed	step 28

At the front panel of the cabinet

28 Verify and switch off associated power converter.

Note: Not applicable to the CPDC and CRME.

29 Determine faulty circuit breaker on MSP and switch both breakers on that circuit card to the OFF position. Safety tag the front of the circuit breaker.

30 An alarm may sound. If this occurs, silence the alarm by typing

>SIL

and pressing the Enter key.

31 Power down and safety tag the ABS fuse in the power room.

Note: This step applies to the CPDC and CRME.

32 Pull out corresponding line shelf approximately 152 mm (6 in.). The line shelf is located below the MSP. This approach permits easier hand access to the connectors on the rear of the MSP.

Note: This step does not apply to the CMIS, CPDC, and CRME.

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

At the rear panel of the cabinet

33

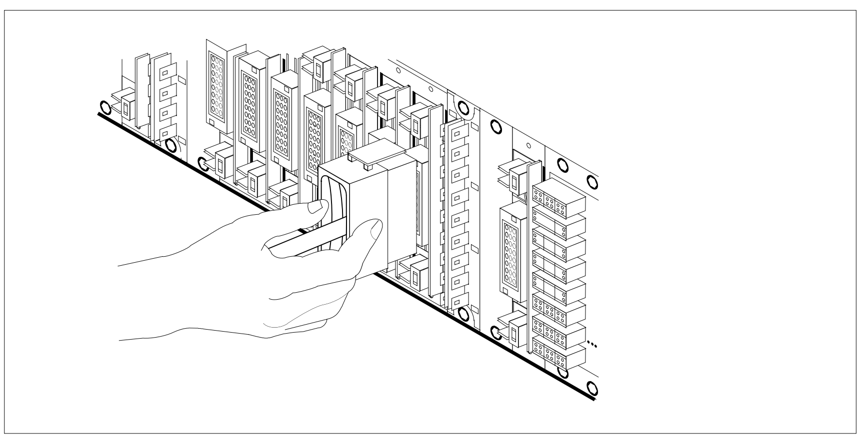
> **DANGER**
> **Risk of injury from high energy levels, static electricity damage**
> Before removing any cards, put on a wrist strap and connect it to the wrist strap grounding point on the left side of the modular supervisory panel (MSP). This protects the equipment against damage caused by static electricity.

> **DANGER**
> **Risk of injury from high energy levels, 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.
>
> 3. Do not insert metallic objects into the black connectors. Voltage is present and equipment damage could result.

Put on a wrist strap.

34 Open the rear door and locate the NTRX42 circuit card. Verify the card location by checking the slot number stamped into the chassis.

a Note wire color and location to facilitate re-connection.



b Safety tag the front of the circuit breaker to indicate maintenance activity.

c Using the connector removal tool, manually disconnect the power connectors to the circuit card. Working from the bottom of the MSP shelf to the top of the MSP shelf, manually disconnect and tag the smaller black power connectors located below the larger blue power connector.

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

Manually disconnect and tag the large blue power connector. Disconnect and tag the smaller black power connectors located above the large blue power connector. Ensure you disconnect the black connectors *before* removing the circuit card.

d Although the connectors have voltage present on them, they are insulated. Secure the connectors to the power-connector bundle with a line-tie until it is time to reconnect them.

35 Disconnect and tag any jumper connectors and cables which may be present and set them aside for use on the replacement unit.

At the front panel of the cabinet

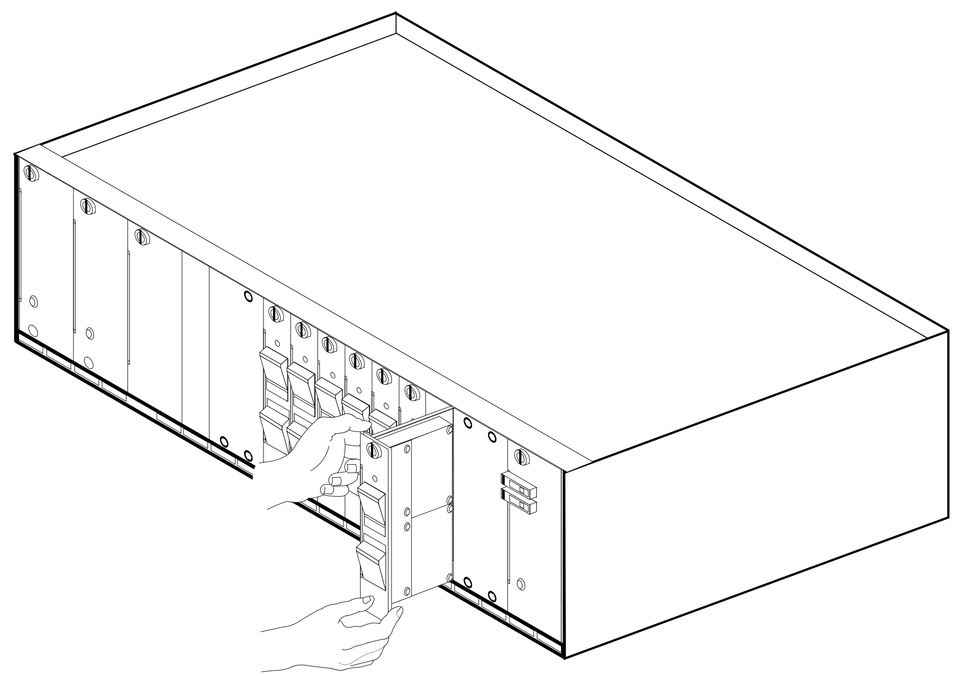
36 Remove the NTRX42 card.

a Disengage the spring-loaded captive screw at the top of the circuit card.

b Grasping the top and bottom of unit, gently pull the circuit card towards you until it clears the shelf.

c Replace the circuit card. Ensure the replacement circuit card has the same PEC, including suffix, as the circuit card being replaced.

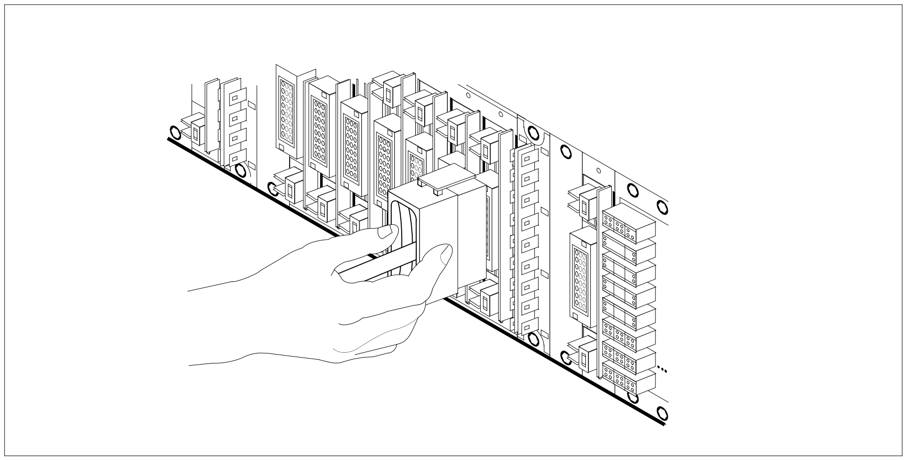
d Tighten the spring-loaded captive screw at the top of the circuit card.



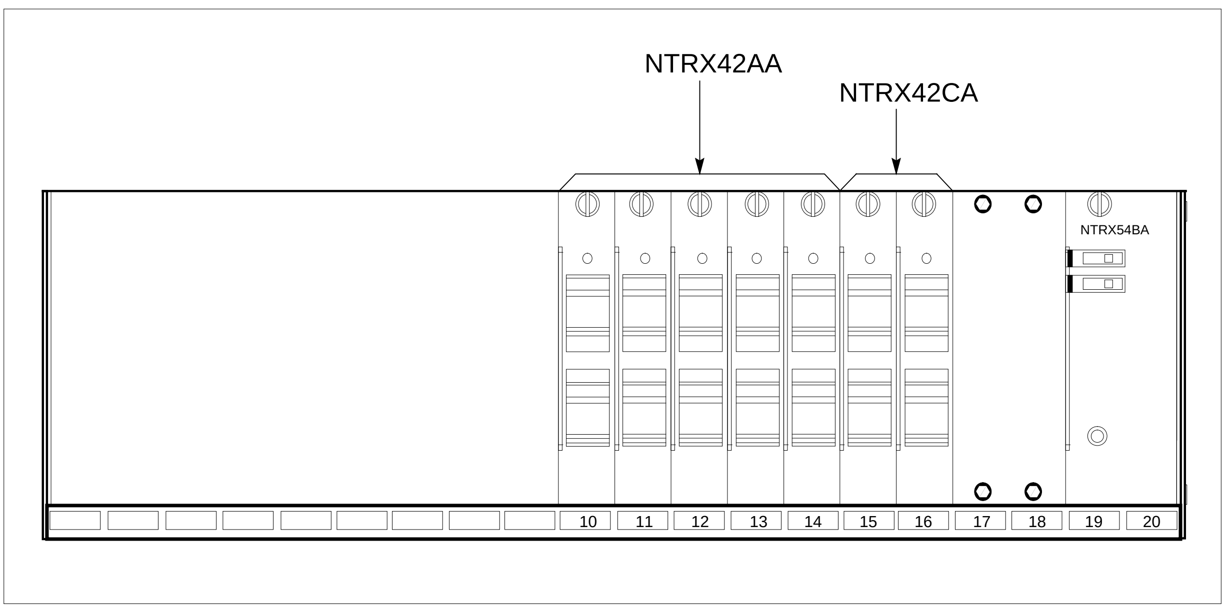
NTRX42CA

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

37 Replace any jumper connectors and cables removed in step 35. Reinsert the power connectors at the rear of the circuit card.



38 Push in corresponding line shelf. This step does *not* apply to the CMIS, CPDC, and CRME.



39 Apply appropriate label from spare parts on replacement NTRX42 circuit card.

40 Power up the ABS fuse in the power room, remove safety tag from ABS fuse.

Note: This step applies to the CPDC and CRME.

41 Switch on associated power converter.

Note: This step does not apply to the CPDC and CRME.

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

42 Reset the circuit breakers to ON (upward). If any card controlled by this breaker includes a reset switch, hold the RESET button downward while setting the circuit breaker to the ON position.

43 Remove safety tag from front of circuit breaker.

44 Close the front cover of the MSP. Swing the cover up to the closed position and lock the two cover latches.

45 Proceed according to the following table.

If circuit breakers power the	Do
LCME shelf containing 6X30, 6X53 or BX72 cards	step 46
RCC2 shelf containing MX72 card	step 51
RMM shelf containing 2X09 or 2X06 cards	step 56

46 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 busied.

If test	Do
passed	step 47
failed	step 65

47 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 46

If RTS	Do
passed	step 48
failed	step 65

48 Send any faulty cards for repair according to local procedure.

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

49 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card.

50 Go to step 66.

51 Test the RCC2 unit by typing

>TST UNIT **rcc2_unit_no**

and pressing the Enter key.

where

rcc2_unit_no
is the number of the RCC2 unit

If test	Do
passed	step 52
failed	step 65

52 Return the 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 51

If RTS	Do
passed	step 53
failed	step 65

53 Send any faulty cards for repair according to local procedure.

54 Record the date the card was replaced, the serial number of the card, and the symptoms that prompted replacement of the card.

55 Go to step 66.

At the MAP terminal

56 Determine the system load version.

If	Do
System Load Module is Version 1	step 57
System Load Module is Version 2	step 58

NTRX42
in an RSC-S (DS-1) Model B MSP (continued)

57 List the loadfile in the directory by typing

> DSKUT;listvol d000 all

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 step 59.

58 List the loadfile in the directory by typing

>DISKUT;LV S00d

>LF

or

> diskut;LV s01d

>LF

and pressing the Enter key.

59 Leave the disk utility by typing

>QUIT

and pressing the Enter key.

60 Reload the RMM by typing

>LOADPM

and pressing the Enter key.

If	Do
load passes	step 61
load fails	step 65

61 Test the RMM unit by typing

***>TST UNIT* rmm_unit_no**

and pressing the Enter key.

where

rmm_unit_no
is the number of the RCC2 unit

If RTS	Do
passed	step 62
failed	step 65

NTRX42
in an RSC-S (DS-1) Model B MSP (end)

62 Return the RMM shelf to service by typing

>RTS *UNIT* rmm_unit_no

and pressing the Enter key.

where

rmm_unit_no
is the number of the RCC2 unit tested in step 61

If RTS	Do
passes	step 63
fails	step 65

63 Send any faulty cards for repair according to local procedure.

64 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 66.

65 Obtain further assistance in replacing this card by contacting the personnel responsible for the next higher level of support.

66 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTRX43
in an RSC-S (DS-1) Model B MSP

Application

Use this procedure to replace an NTRX43 card in a modular supervisory panel (MSP) located in a

- cabinetized extension module (CEXT)
- cabinetized line concentrating equipment (CLCE)
- cabinetized line module ISDN (CLMI)
- cabinetized power distribution center (CPDC)
- cabinetized remote switching center (CRSC)
- cabinetized miscellaneous equipment (CMIS)
- cabinetized remote miscellaneous equipment (CRME)

PEC	Suffixes	Name
NTRX43	AA	Fuse Module

Common procedures

None

Action

A connector removal tool is available to facilitate removal of the AMP Faston receptacles from the power input and output connectors of the MSP modules. This tool comes in two lengths: P0746192 152 mm (6 in.), and P0747552 254 mm (10 in.). The shorter tool is used when access to the rear of the MSP is very limited. An example of limited access is, MSP modules located directly behind the cabinet bulkhead.

This tool is approximately 2 mm (.090 in.) thick and 17 mm (.65 in.) wide, with a jaw-like cut-out at each end. The cut-out profile conforms to the shape of the Faston receptacle. The shorter tip of each profile is used to position the receptacle in the tool.

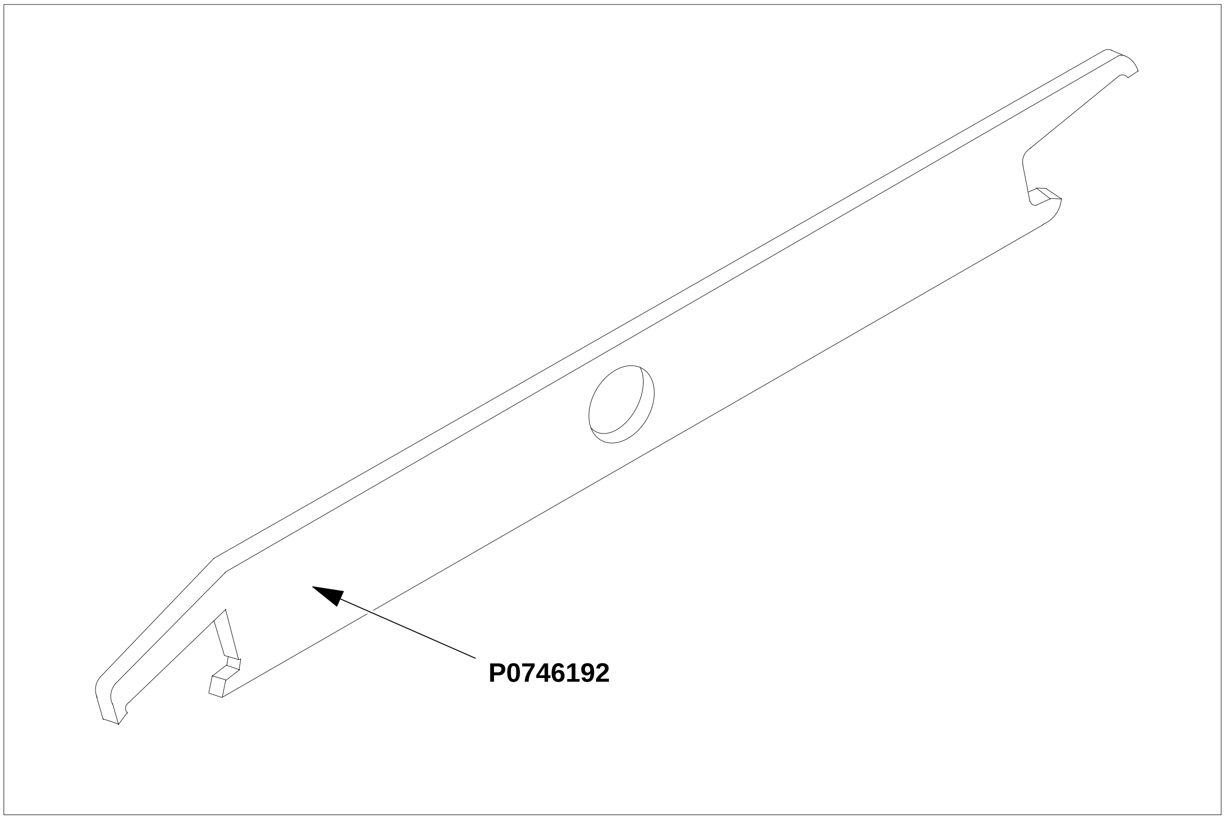
The first meeting point of the tool serves as the pivot point. By rotating the tool around this pivot point, the longer tip of the profile which has a hook on its end, is engaged with the action-arm of the power connector. As the action-arm of the connector is depressed, the receptacle is disengaged from the connector tab. The receptacle is removed by pulling the tool with the receptacle trapped in its jaw, away from the connector. The tool is disengaged

NTRX43
in an RSC-S (DS-1) Model B MSP (continued)

from the receptacle by rotating the tool's hook off the action-arm of the receptacle.

Although the shape of the cut-out is the same on each end of the tool, the orientation of the profile is off by 15 degrees. This difference allows for the use of the tool at different angles, which may be required due to limited access to the connectors.

Connector removal tool



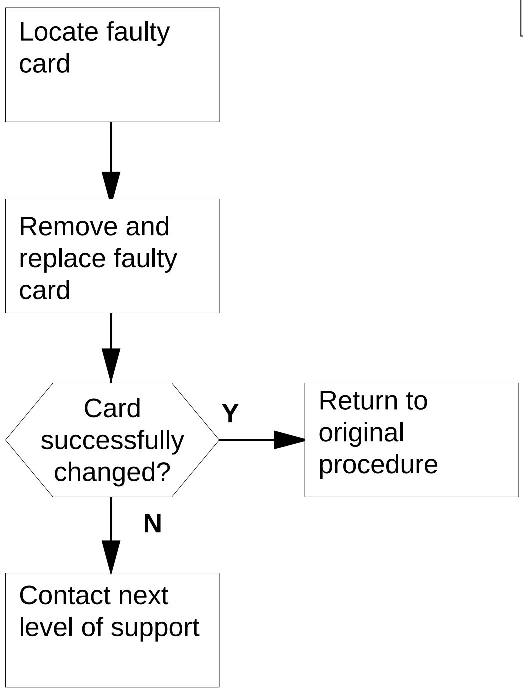
The following flowchart is a summary of this procedure. Use the instructions in the step-action table that follows the flowchart to perform the procedure.

NTRX43
in an RSC-S (DS-1) Model B MSP (continued)

Summary of card replacement procedure for an NTRX43 card in RSC-S MSP

This flowchart summarizes the procedure.

Use the instructions in the procedure that follows this flowchart to perform the procedure.



NTRX43
in an RSC-S (DS-1) Model B MSP (continued)

Replacing an NTRX43 card in RSC-S MSP

At your Current Location

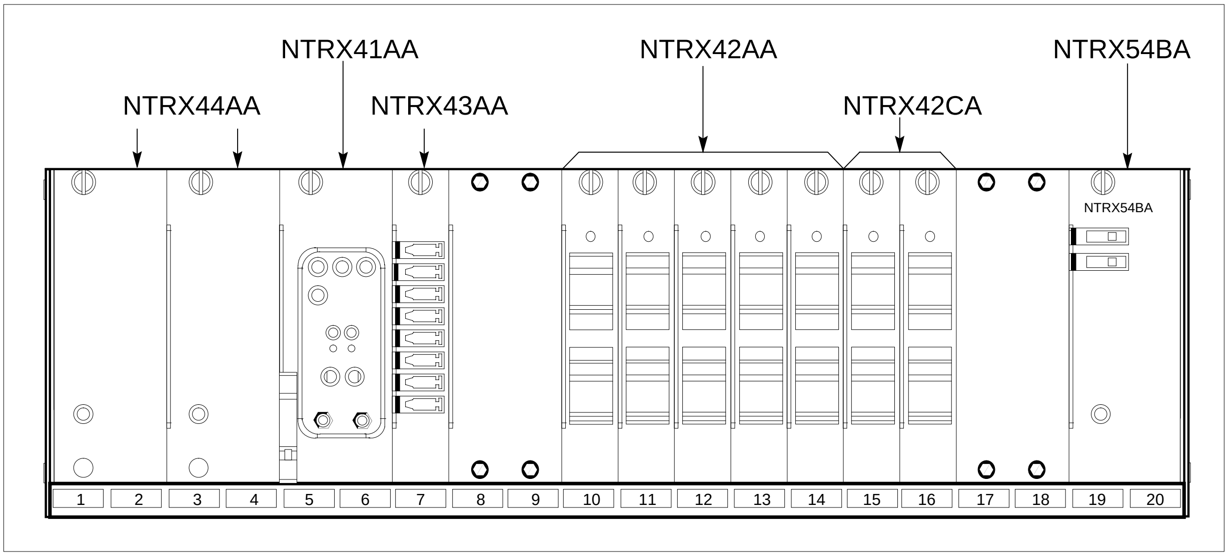
1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

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 front panel of the cabinet

3 Open the front cover of the MSP. Release the two cover latches and swing the cover down to the open position.

Note: The illustrations in this card replacement procedure are for the MSP shelf in an CRSC or CEXT module. The circuit breaker designation may vary depending on the type of cabinet you are working in.



4 Power down circuit breaker supplying fuse module. Safety tag the front of the circuit breaker. When servicing the fuse module, fans may shut down, alarms may sound, or there may be a loss of alarms.

NTRX43
in an RSC-S (DS-1) Model B MSP (continued)

5

> **DANGER**
> **Risk of injury from high energy levels, 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). This protects the equipment against damage caused by static electricity.

> **DANGER**
> **Risk of injury from high energy levels, equipment damage**
> Take these precautions when removing or inserting a card:
>
> 1. Do not apply direct pressure to the components.
>
> 2. Do not force the cards into the slots.

Put on a wrist strap.

6 Remove fuses from fuse module.

Note: Observe fuse colors, values, and positions before removing fuses from fuse module.

7 Pull out corresponding line shelf approximately 152 mm (6 in.). The line shelf is located below the MSP. This approach permits easier hand access to the connectors on the rear of the MSP. This step does *not* apply to the CMIS, CPDC, and CRME.

At the rear panel of the cabinet

8

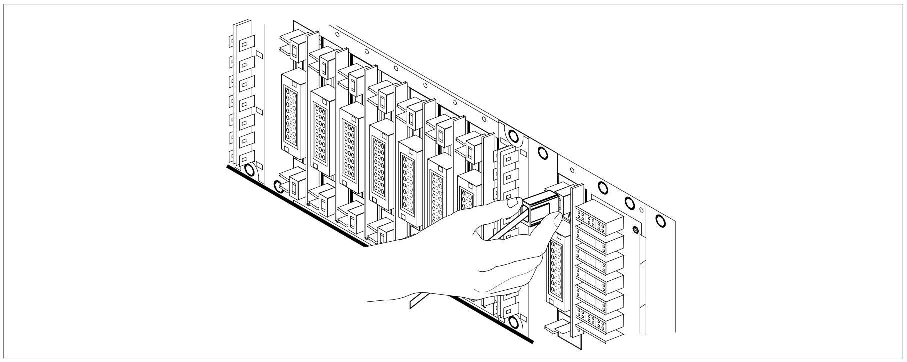
> **DANGER**
> **Risk of injury from high energy levels, voltage present**
> Do not insert metallic objects into the black connectors. Voltage is present and equipment damage could result.

Remove the NTRX43 circuit card as shown in the following figures.

a Open the rear doors of the cabinet and locate the back of the card to be replaced.

b Note wire color and location to facilitate re-connection.

NTRX43
in an RSC-S (DS-1) Model B MSP (continued)



c Using the connector removal tool, manually disconnect the power connectors to the circuit card. Working from the bottom of the MSP shelf to the top of the MSP shelf, manually disconnect the smaller black power connectors located below the larger blue power connector. Manually disconnect the large blue power connector. Disconnect the smaller black power connectors located above the large blue power connector. Ensure you disconnect the black connectors *before* removing the circuit card.

d Although the connectors have voltage present on them, they are insulated. Secure the connectors to the power-connector bundle with a line-tie until it is time to reconnect them.

e Remove and tag jumper connectors and cables, which may be present on the back of the circuit card and save for use on the replacement circuit card.

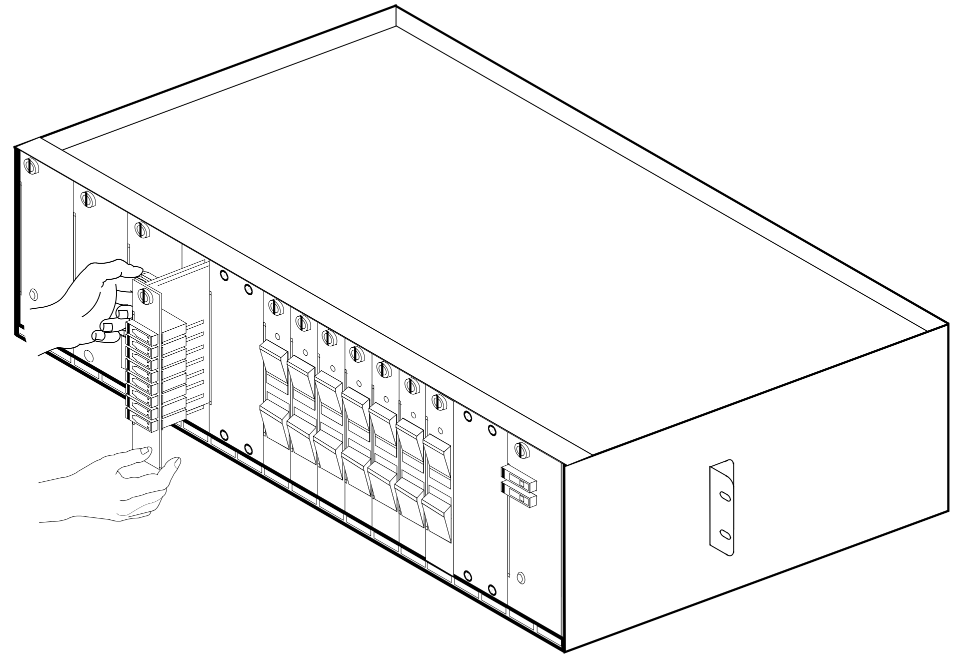
At the front panel of the cabinet

9 Remove the NTRX43 card.

a Disengage the knurled thumbscrew at the top of the card.

b Gently pull the card towards you until it clears the shelf.

NTRX43
in an RSC-S (DS-1) Model B MSP (continued)



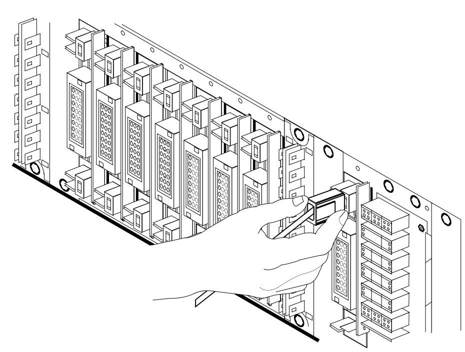
NTRX43AA

10 Ensure the replacement circuit card has the same PEC, including suffix, as the circuit card just removed.

- **a** Align the circuit card with the slots in the shelf and gently slide the circuit card into the shelf.
- **b** Gently but firmly seat the circuit card.
- **c** Tighten the knurled thumbscrew at the top of the circuit card.

At the rear panel of the cabinet

11 Locate the replaced circuit card and re-attach the power connectors.



NTRX43
in an RSC-S (DS-1) Model B MSP (end)

12 Install the jumper connectors and cables removed in step 8 onto the replacement circuit card.

At the front of the cabinet

13 Push in corresponding line shelf. Please note this step does *not* apply to the CMIS, CPDC, and CRME.

14 Replace fuses removed in step 6.

15 Power up circuit breaker supplying fusEve module and remove safety tag.

If fuses	Do
do not blow	step 16
blow (protrude)	step 18

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 19.

18 Obtain further assistance in replacing this card by contacting the personnel responsible for the next higher level of support.

19 You have successfully completed this procedure. Return to the maintenance procedure that directed you to this card replacement procedure and continue as directed.

NTRX44
in an RSC-S (DS-1) Model B MSP

Application

Use this procedure to replace an NTRX44 card in a modular supervisory panel (MSP) located in a

- cabinetized extension module (CEXT)
- cabinetized line concentrating equipment (CLCE)
- cabinetized line module ISDN (CLMI)
- cabinetized power distribution center (CPDC)
- cabinetized remote switching center (CRSC)
- cabinetized miscellaneous equipment (CMIS)

PEC	Suffixes	Name
NTRX44	AA	Talk Battery Module

Common procedures

None

Action

A connector removal tool is available to facilitate removal of the AMP Faston receptacles from the power input and output connectors of the MSP modules. This tool comes in two lengths: P0746192 152 mm (6 in.), and P0747552 254 mm (10 in.). The shorter tool is used when access to the rear of the MSP is very limited. An example of limited access is, MSP modules located directly behind the cabinet bulkhead.

This tool is approximately 2 mm (.090 in.) thick and 17 mm (.65 in.) wide, with a jaw-like cut-out at each end. The cut-out profile conforms to the shape of the Faston receptacle. The shorter tip of each profile is used to position the receptacle in the tool.

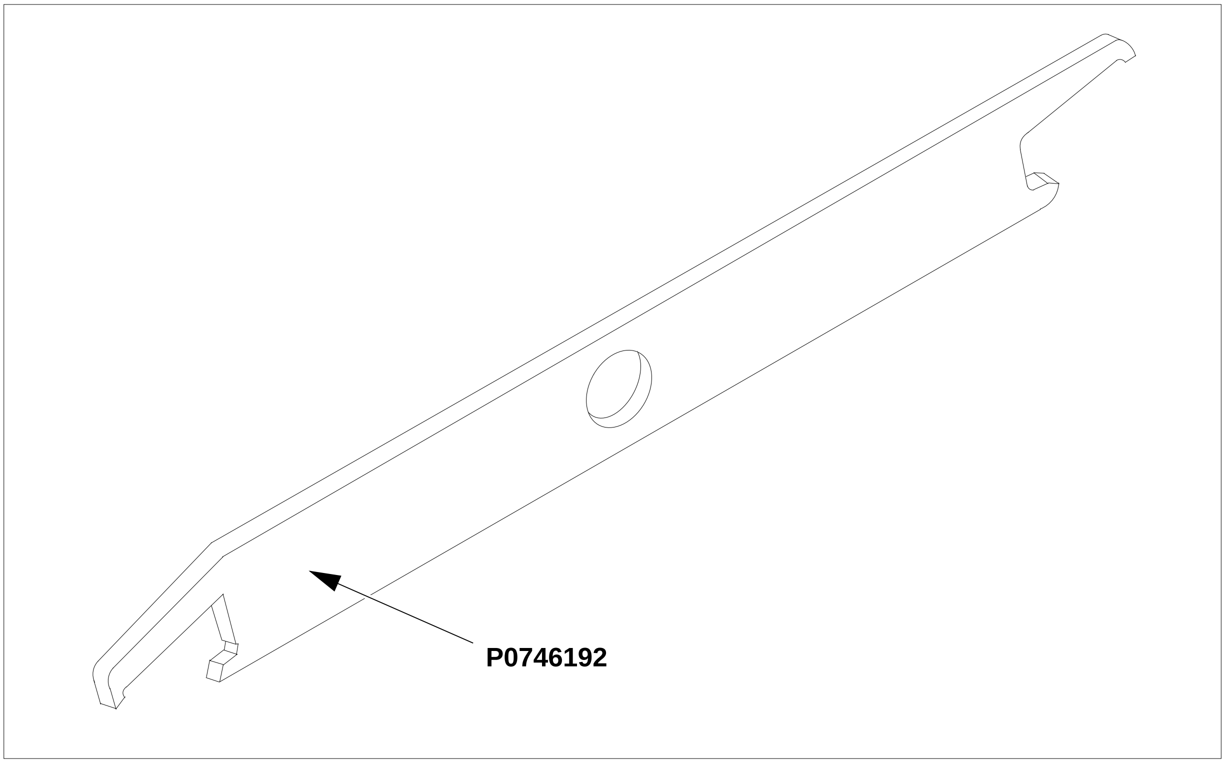
The first meeting point of the tool serves as the pivot point. By rotating the tool around this pivot point, the longer tip of the profile which has a hook on its end, is engaged with the action-arm of the power connector. As the action-arm of the connector is depressed, the receptacle is disengaged from the connector tab. The receptacle is removed by pulling the tool with the receptacle trapped in its jaw, away from the connector. The tool is disengaged

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)

from the receptacle by rotating the tool's hook off the action-arm of the receptacle.

Although the shape of the cut-out is the same on each end of the tool, the orientation of the profile is off by 15 degrees. This difference allows for the use of the tool at different angles, which may be required due to limited access to the connectors.

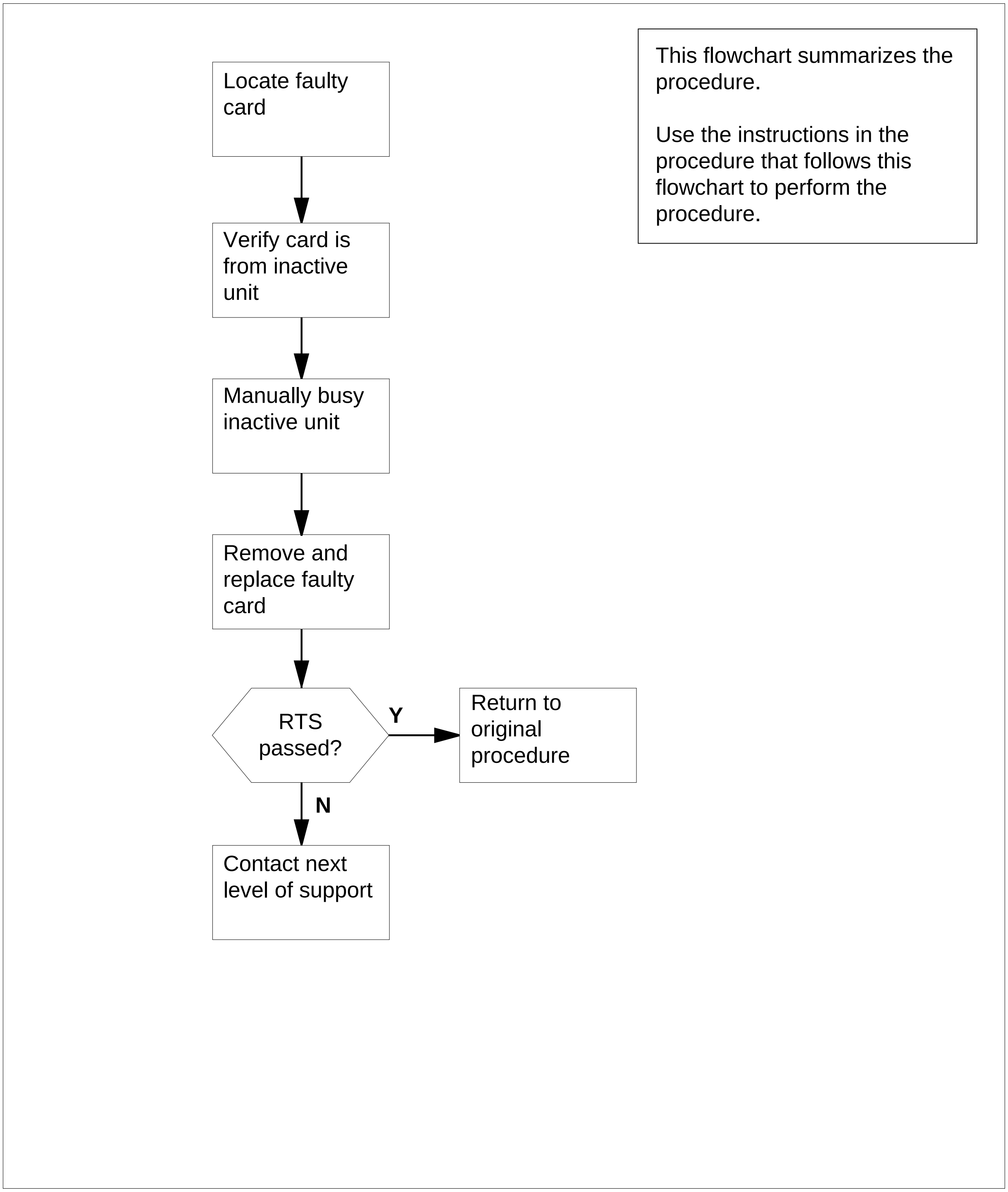
Connector removal tool



The following flowchart is a summary of this procedure. Use the instructions in the step-action table that follows the flowchart to perform the procedure.

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)

Summary of card replacement procedure in an NTRX44 card in RSC-S MSP



NTRX44 in an RSC-S (DS-1) Model B MSP (continued)

Replacing an NTRX44 card in RSC-S MSP

At your Current Location

1

> **CAUTION**
> **Loss of service**
> A loss of service *will* occur when this procedure is used as an acceptance procedure or when talk battery is already available on the affected LCM unit. Busying the LCM unit is a precaution only and does not transfer talk battery to the other LCM unit. Talk battery is *not redundant*, and therefore a loss of service occurs on the affected LCM unit. Perform this procedure only during periods of low traffic.

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 Set the MAP display to the PM level and post the LCME powered by the talk battery module by typing

>MAPCI;MTC;PM;POST LCME **site lcme_frame_no lcme_no**

and pressing the Enter key.

where

site
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 powered by the talk battery module

Example of a MAP display

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)

```
  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      RG:Pref 1 ISTB
 8 RTS_     Drwr:  01  23  45  67  89  01  23  4       Stby 0 InSv
 9 OffL            ..  ..  ..  ..  ..  ..  ..  ..
10 LoadPM_
11 Disp_
12 Next
13
14 QueryPM
15
16
17
18
```

4 Busy the affected in-service PM unit by typing

>BSY UNIT lcme_unit_no

and pressing the Enter key.

where

lcme_unit_no
is the number of the LCME unit.

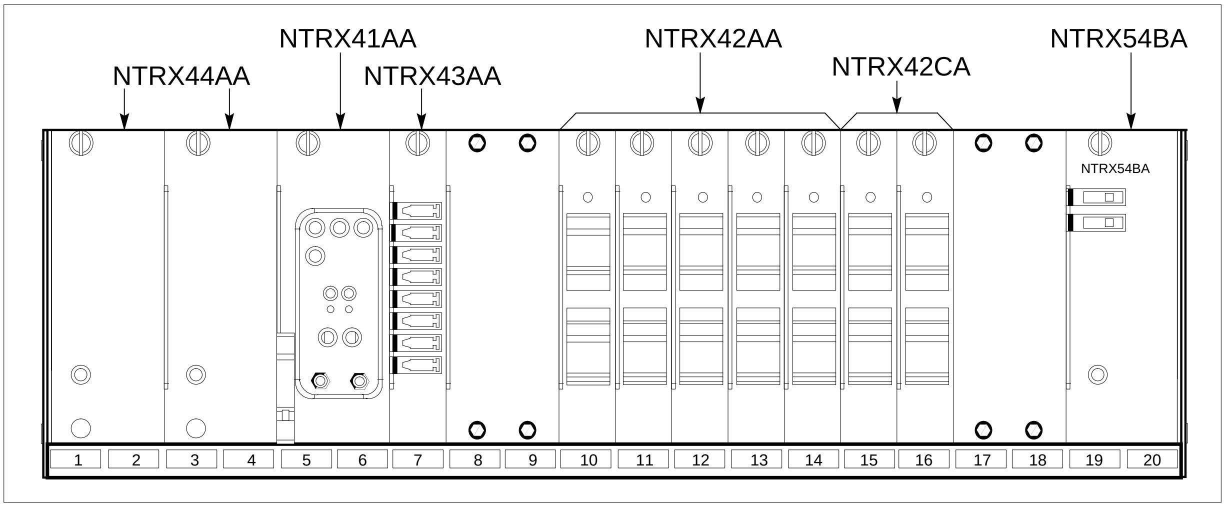
Note: The talk battery module in slots 1 and 2 controls unit number 0; the module in slots 3 and 4 controls unit number 1.

At the front panel of the cabinet

5 Open the front cover of the MSP. Release the two cover latches and swing the cover down to the open position.

Note: The illustrations in this card replacement procedure are for the MSP shelf in an CRSC or CEXT module.

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)



6

> **DANGER**
> **Risk of injury from high energy levels, 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). This protects the equipment against damage caused by static electricity.

> **DANGER**
> **Risk of injury from high energy levels, 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.

7 Turn off the circuit breaker at slot 15 (circuit breaker 12) if replacing the talk battery module in slots 1 and 2. Turn off the circuit breaker at slot 16 (circuit breaker 14) if replacing the talk battery module in slots 3 and 4. These circuit breaker locations correspond to the CRSC and CEXT modules.

Note: The circuit breaker designation may vary depending on the type of cabinet where you are replacing the talk battery module. Verify the circuit breaker designation at shelf position 61 before replacing the talk battery.

8 Pull out corresponding line shelf approximately 152 mm (6 in.). The line shelf is located below the MSP. This approach permits easier hand access to the

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)

connectors on the rear of the MSP. This step does not apply to the CMIS, CPDC, and CRME.

At the rear panel of the cabinet

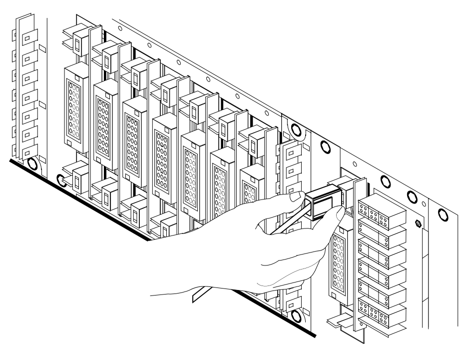
9

DANGER
Risk of injury from high energy levels, voltage present
Do not insert metallic objects into the black connectors. Voltage is present and equipment damage can result.

Remove the NTRX44 circuit card as shown in the following figures.

a Open the rear doors of the cabinet and locate the back of the circuit card to be replaced. The circuit card is located in slots 1 and 2 for talk battery “A" or in slots 3 and 4 for talk battery “B".

b Note wire color and location to facilitate re-connection.



c Using the connector removal tool, manually disconnect the power connectors to the circuit card. Working from the bottom of the MSP shelf to the top of the MSP shelf, manually disconnect the smaller black power connectors located below the larger blue power connector. Manually disconnect the large blue power connector. Disconnect the smaller black power connectors located above the large blue power connector. Ensure you disconnect the black connectors before removing the circuit card.

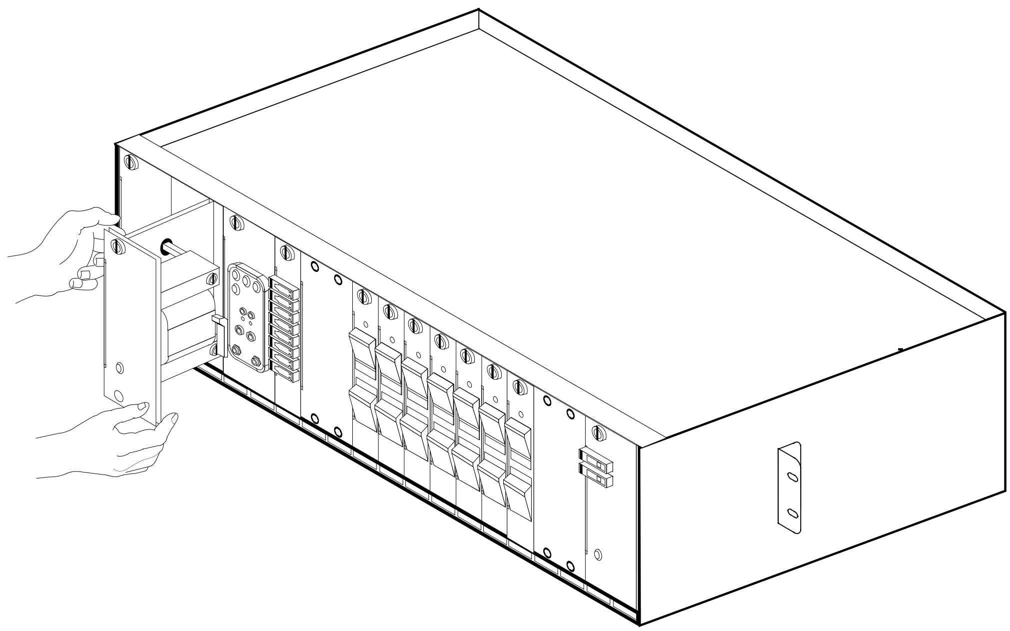
d Although the connectors have voltage present on them, they are insulated. Secure the connectors to the power-connector bundle with a line-tie until it is time to reconnect them.

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)

At the front panel of the cabinet

10 Remove the NTRX44 card.

- **a** Disengage the knurled thumbscrew at the top of the card.
- **b** Gently pull the card towards you until it clears the shelf.



NTRX44AA

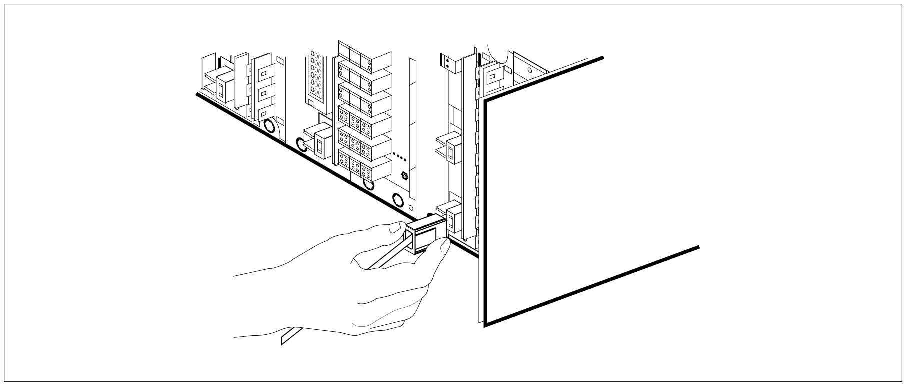
11 Ensure the replacement circuit card has the same PEC, including suffix, as the circuit card just removed.

- **a** Align the circuit card with the slots in the shelf and gently slide the circuit card into the shelf.
- **b** Gently but firmly seat the circuit card.
- **c** Tighten the knurled thumbscrew at the top of the circuit card.

At the rear panel of the cabinet

12 Locate the replaced circuit card and re-attach the power connectors.

NTRX44
in an RSC-S (DS-1) Model B MSP (continued)



13 Install the jumper connectors and cables removed in step 9 9 onto the replacement circuit card.

At the front of the cabinet

14 If talk battery A, in slots 1 and 2, was replaced, turn on the circuit breaker at slot 15 (circuit breaker 12). If Talk Battery B, in slots 3 and 4, was replaced, turn on the circuit breaker at slot 16 (circuit breaker 14).

> ***Note:*** The circuit breaker designation may vary depending on the type of cabinet where you are replacing the talk battery module. Verify the circuit breaker designation at shelf position 61 before replacing the talk battery.

15 Push in corresponding line shelf. Note that this step does *not* apply to the CMIS, CPDC, and CRME.

At the MAP terminal

16 Return the LCME 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.

If RTS	Do
passed	step 17
did not pass	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 20.

19 Obtain further assistance in replacing this card by contacting the personnel responsible for the next higher level of support.

NTRX44
in an RSC-S (DS-1) Model B MSP (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.

NTRX54
in an RSC-S (DS-1) Model B MSP

Application

Use this procedure to replace an NTRX54 card in a modular supervisorb(MSP) located in a

- cabinetized extension module (CEXT)
- cabinetized line concentrating equipment (CLCE)
- cabinetized line module ISDN (CLMI)
- cabinetized power distribution center (CPDC)
- cabinetized remote switching center (CRSC)
- cabinetized miscellaneous equipment (CMIS)

PEC	Suffixes	Name
NTRX54	BA	Fan Power Control Module

Common procedures

None

Action

A connector removal tool is available to facilitate removal of the AMP Faston receptacles from the power input and output connectors of the MSP modules. This tool comes in two lengths: P0746192 152 mm (6 in.), and P0747552 254 mm (10 in.). The shorter tool is used when access to the rear of the MSP is very limited. An example of limited access is, MSP modules located directly behind the cabinet bulkhead.

This tool is approximately 2 mm (.090 in.) thick and 17 mm (.65 in.) wide, with a jaw-like cut-out at each end. The cut-out profile conforms to the shape of the Faston receptacle. The shorter tip of each profile is used to position the receptacle in the tool.

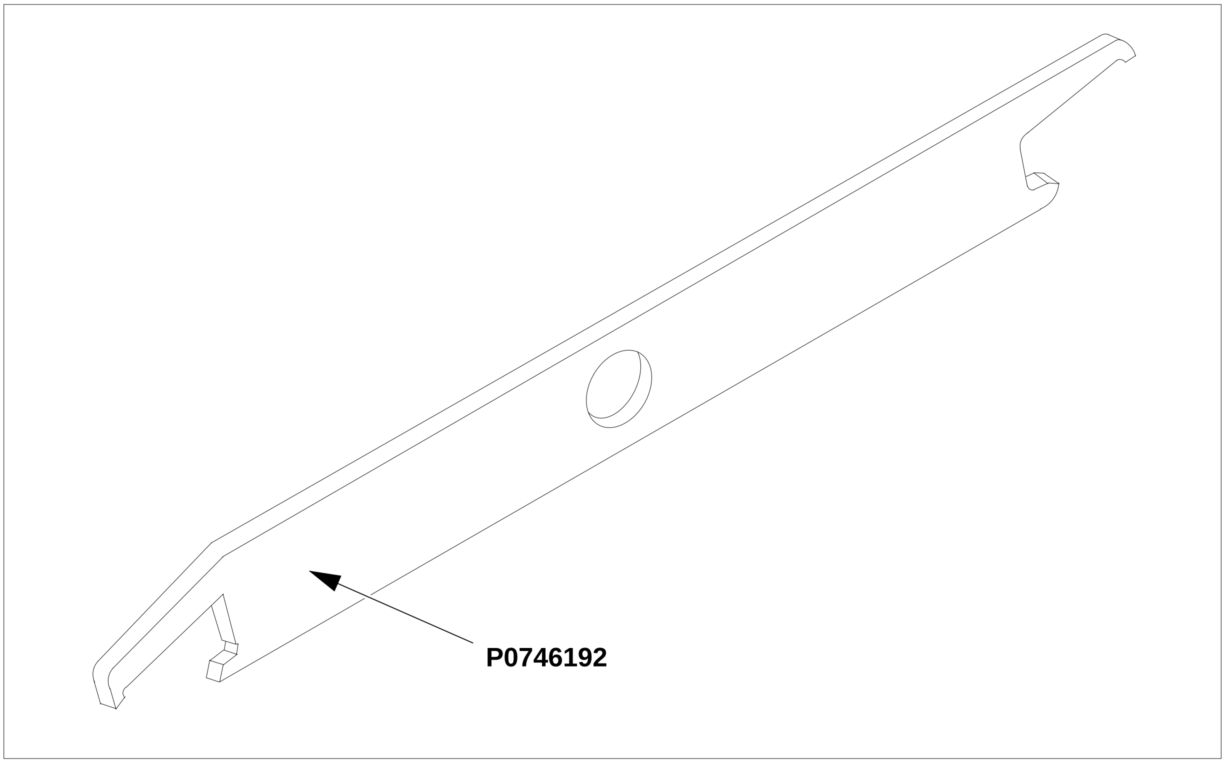
The first meeting point of the tool serves as the pivot point. By rotating the tool around this pivot point, the longer tip of the profile which has a hook on its end, is engaged with the action-arm of the power connector. As the action-arm of the connector is depressed, the receptacle is disengaged from the connector tab. The receptacle is removed by pulling the tool with the receptacle trapped in its jaw, away from the connector. The tool is disengaged

NTRX54
in an RSC-S (DS-1) Model B MSP (continued)

from the receptacle by rotating the tool's hook off the action-arm of the receptacle.

Although the shape of the cut-out is the same on each end of the tool, the orientation of the profile is off by 15 degrees. This difference allows for the use of the tool at different angles, which may be required due to limited access to the connectors.

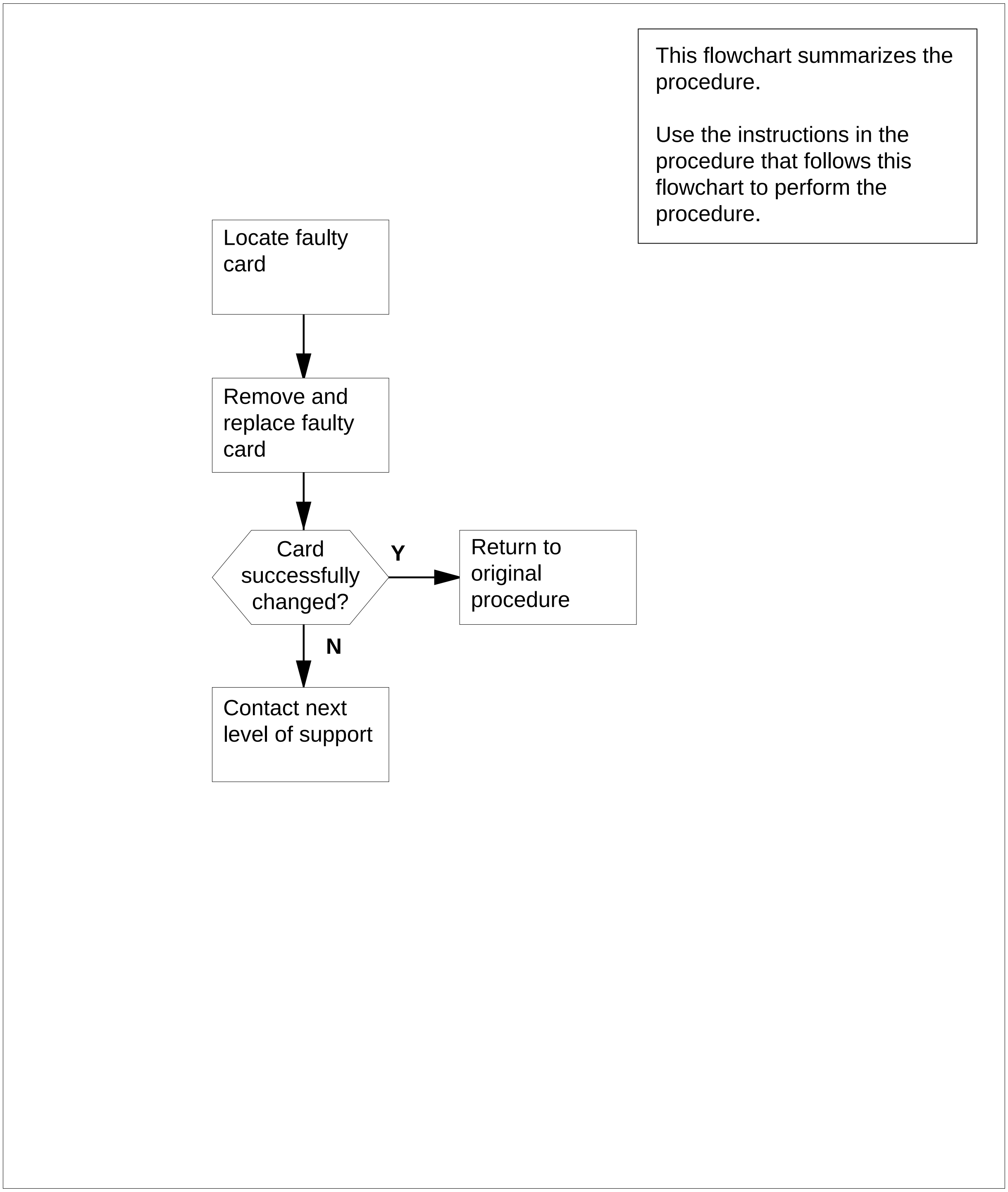
Connector removal tool



The following flowchart is a summary of this procedure. Use the instructions in the step-action table that follows the flowchart to perform the procedure.

NTRX54
in an RSC-S (DS-1) Model B MSP (continued)

Summary of card replacement procedure for an NTRX54 card in RSC-S MSP



NTRX54
in an RSC-S (DS-1) Model B MSP (continued)

Replacing an NTRX54 card in RSC-S MSP

At your Current Location

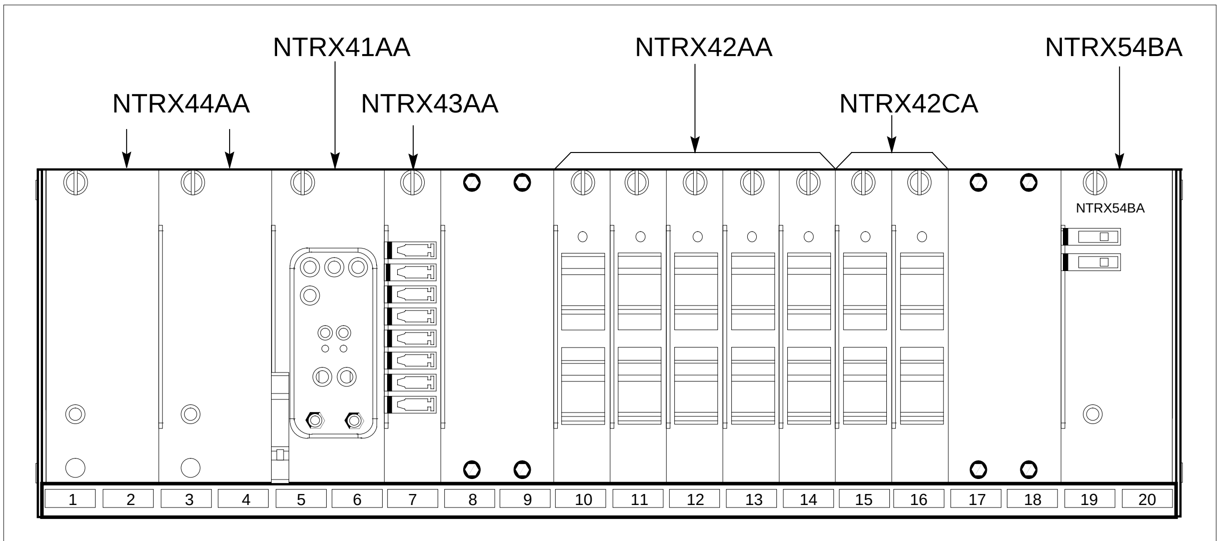
1 Proceed only if you have been directed to this card replacement procedure from a step in a maintenance procedure, are using the procedure for verifying or accepting cards, or have been directed to this procedure by your maintenance support group.

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 front panel of the cabinet

3 Open the front cover of the MSP. Release the two cover latches and swing the cover down to the open position.

Note: The illustrations in this card replacement procedure are for the MSP shelf in an CRSC or CEXT module. The circuit breaker designation may vary depending on the type of cabinet you are working in.



4

DANGER
Risk of injury from high energy levels, 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). This protects the equipment against damage caused by static electricity.

NTRX54
in an RSC-S (DS-1) Model B MSP (continued)

> **DANGER**
> **Risk of injury from high energy levels, 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**
> **Heat damage**
> Avoid leaving this card out of service for more than 30 minutes. Extensive damage to the entire cabinet may occur if cooling is lost for more than 30 minutes.

Put on a wrist strap.

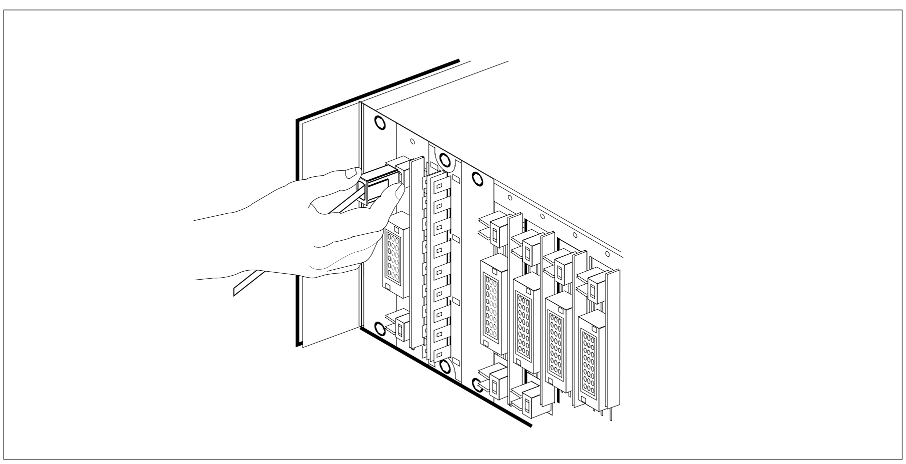
5 Remove the two fuses in the fan power control module.

At the rear panel of the cabinet

6 Remove the NTRX54 circuit card as shown in the following figures.

a Open the rear doors of the cabinet and locate the circuit card, it will be in slots 19 and 20.

b Note the wire color and location to facilitate re-connection.



c Using the connector removal tool, manually disconnect the power connectors to the circuit card. Working from the bottom of the MSP shelf to the top of the MSP shelf, manually disconnect the smaller black power connectors located below the larger blue power connector. Manually disconnect the large blue power connector. Disconnect the smaller black

NTRX54
in an RSC-S (DS-1) Model B MSP (continued)

power connectors located above the large blue power connector. Ensure you disconnect the black connectors *before* removing the circuit card.

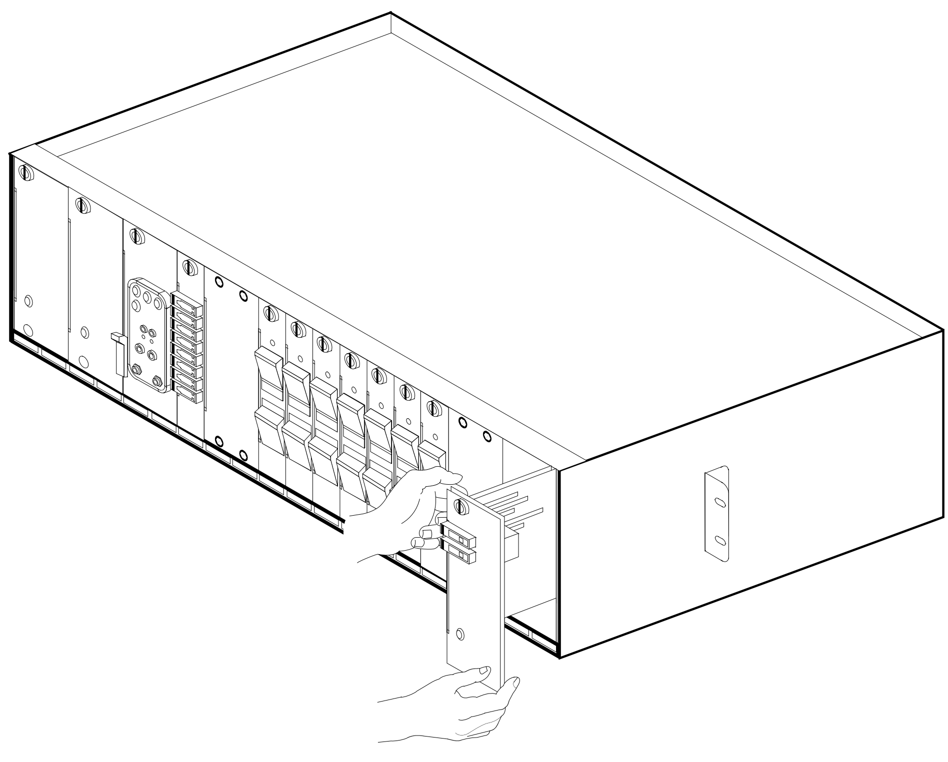
d Although the connectors have voltage present on them, they are insulated. Secure the connectors to the power-connector bundle with a line-tie until it is time to reconnect them.

At the front panel of the cabinet

7 Remove the NTRX54 card.

a Disengage the knurled thumbscrew at the top of the card.

b Gently pull the card towards you until it clears the shelf.



NTRX54BA

8 Ensure the replacement circuit card has the same PEC, including suffix, as the circuit card just removed.

a Align the circuit card with the slots in the shelf and gently slide the circuit card into the shelf.

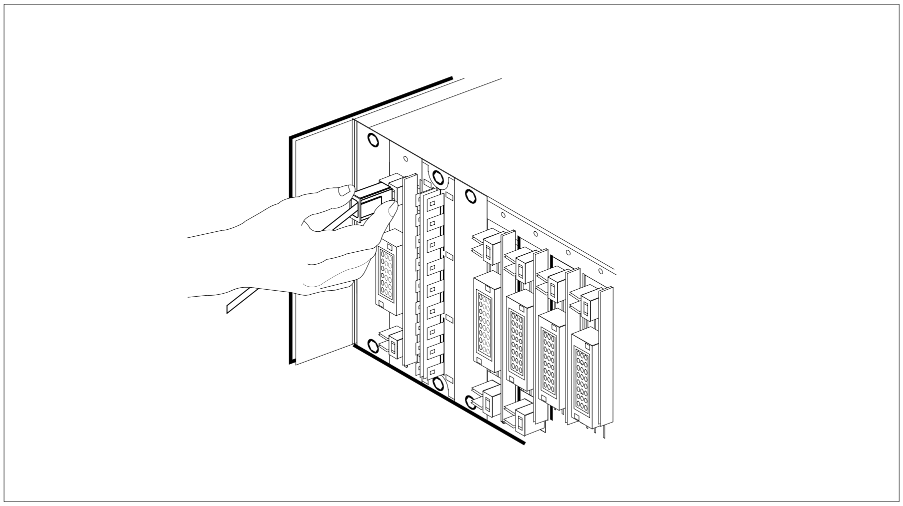
b Gently but firmly seat the circuit card.

c Tighten the knurled thumbscrew at the top of the circuit card.

NTRX54
in an RSC-S (DS-1) Model B MSP (end)

At the rear panel of the cabinet

9 Locate the replaced circuit card and re-attach the power connectors, as noted in step 6.



10 Replace the two fuses removed in step 5.

If fuses	Do
do not blow	step 11
blow (protrude)	step 13

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 14.

13 Obtain further assistance in replacing this card by contacting the personnel responsible for the next 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.

7 Locating and clearing RSC problems

Maintenance engineering and field maintenance personnel use this section on how to locate and clear RSC problems. The personnel must have basic knowledge of the Digital Multiplex System-100 (DMS-100) Family of switches, and of the Remote Switching Center-SONET (RSC-S). Operating company personnel that need exact procedures to perform maintenance tasks do not use this section.

8 Trouble isolation and correction

The Remote Switching Center-SONET (RSC-S) consists of the remote cluster controller 2 (RCC2) or the RCC2 with:

- integrated services digital network (ISDN)
- line concentrating devices (LCD)
- trunks
- links that connect the components.

This section describes how to troubleshoot for these components.

Description of troubleshooting

The RCC2 is the primary component of the RSC-S configuration. The state of the RCC2 can determine the state of the other RSC-S components.

Locating and clearing faults

This section describes fault location and clearance in terms of trouble condition indicators and trouble conditions.

Trouble condition indicators

The following indicate the presence of trouble conditions:

- operational measurements (OMs)
- log reports
- alarms.

Operational measurements

The OMs monitor and count events in the system. The OMs detect both real and potential system troubles. The OM thresholding feature must be used to monitor and report key RSC-S with ISDN activity. These reports must be daily or weekly and must be the primary method of trouble detection.

Log reports

Logs are an analysis tool, and provide detailed information on call errors, diagnostic results, and system status. Logs indicate trouble conditions when one of the following conditions are present:

- sudden increase in the volume of logs
- message not printed reports
- large number of logs that are the same.

Alarms

Audible and visual alarms indicate that corrective action is required. Proper performance of routine system maintenance and use of OMs and logs can minimize the occurrence of alarms.

The level of the alarm indicates alarm severity and corresponding urgency for corrective action. The alarm level can be minor, major, or critical. The following table describes these alarm conditions:

Table 8-1 Alarm description

Alarms	MAP display	Description
Minor	(blank)	non-service affecting
Major	(M)	indicates a service-degrading, threatening condition
Critical	(*C*)	indicates a service outage or potential service outage

Assessing alarms A MAP display subsystem produces alarms for the RSC-S configuration. The following table lists the alarms and alarm meanings. The following table lists log reports that can accompany the alarm:

Table 8-2 Assessing PM alarms from the MAP display (Sheet 1 of 2)

MTC level	PM level	Possible scenarios
PM RCC2	**ISTb 1**	One or both units have minor problems, that do not always involve the peripheral processor (PP). A static data mismatch is present between an RCC2 unit and central control (CC). A non-messaging central-side (C-side) link is out-of-service (OOS). A peripheral-side (P-side) link is OOS.
PM RCC2 M	**ISTb 1**	One unit is system busy (SysB), because of a PP card failure. If the unit is the active unit, peripheral module (PM) software executes 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 ESA is entered: • PM109 The carrier is busy. • PM128 The RCC2 is in-service trouble (ISTb). • PM107 The RCC2 is C-side busy (CBsy). • PM107 The line controller modules (LCM) are CBsy. • PM102 The RCC2 is SysB. • PM181 The RCC2 tries to restart the message links. Another possible reason is that the two PPs have faults, so the two units are SysB.
PM RCC2	**ISTb 1**	One or two units have minor problems, that do not always involve the PP. For RCC2 with ISDN, the following problems can occur: The D-channel handler (DCH) card malfunctions. If a spare DCH is available, the DCH is put in-service (InSv). If a spare DCH is not available, D-channel capability is lost. In each event, the RCC2 is set ISTb. The ISDN signaling preprocessor (ISP) card malfunctions. The RCC2 cannot process ISDN calls,but the system still processes 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 scenarios
PM RCC2 M	**ISTb 1**	One RCC2 unit is OOS. The RCC2 can still process voice and data calls.
PM RCC2 *C*	**SysB 1**	The two RCC2 units are OOS. Voice and data services are lost. 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 when you respond to alarms:

- When more than one alarm of the same severity appears on the MAP display, clear the alarms from the left of the screen to the right.
- If at the same time that you fix an alarm, an alarm of greater severity occurs, respond to the new alarm. Do not continue attempts to clear the less severe alarm.

For information on how to clear alarms, refer to *Alarm Clearing Procedures*.

Trouble conditions

The following are possible RSC-S trouble conditions:

- 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 a fault is isolated to an LCD, maintenance procedures are like the procedures at the host office. Make sure faults in an LCM are not the result of a fault from another location.

DS30A

The DS30A links are on:

- the P-side of the RCC2
- the C-side of the enhanced line concentrating module (LCME)

- the LCM
- the remote maintenance module (RMM).

When these links are defective, the associated components are affected.

DS-1 links

The links are used on the C-side and P-side of the RCC2. Links on the C-side of the RCC2 are used to send voice and messages to the host. Some of the channels can be used as trunks. Two channels, links zero and two, are used for messaging.

Links on the P-side of the RCC2 connect remote line concentrating modules (RLCM) or other offices. The links function as trunks. These trunks can be static or dynamic.

Dual remote cluster controller 2

Primary sources of trouble for the DRCC2 are:

- the condition of the interlinks
- the possibility that the condition of the messaging links to the host office can cause the RCC2 to enter dual ESA (DESA).

The following table summarizes trouble indicators for faults that can occur on the interlinks. The table summarizes indicators that appear when the problem is corrected:

Table 8-3 Indicators for interlink maintenance (Sheet 1 of 3)

Trouble indicator	Meaning	Indicators when cleared
PM110—MTCE LIMIT SET >QUERYIR displays ML under the BER heading.	Bipolar violation (BpV) at the maintenance limit (ML) BpV at the ML indicates a decrease of the DS-1 link. Set in table CARRMTC.	PM110—*Carrier BPV Limit Cleared* >QUERYIR indicates the ML alarm is gone.
PM110—MTCE LIMIT SET PM222—Interlink is system busied. PM128—RCC2 goes ISTb. The system drops calls on that link. >QUERYIR displays OS under the BER heading and the state as SysB.	BpV at the OOS limit BpV problems at the OOS limit are set in table CARRMTC.	PM110—*Carrier BPV Limit Cleared* PM106—RCC2 returns to service from ISTb. PM223—Interlink returns to service. >QUERYIR displays 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 PM222—Interlink is system busied. PM128—RCC2 goes ISTb. The system drops calls on that link. >QUERYIR displays LCGA under the ALRM heading and the state as SysB. For the interconnected RCC2, >QUERYIR shows RCGA under ALRM.	Local alarm is set	PM106—RCC2 returns to service from ISTb. PM223—Interlink returns to service. >QUERYIR indicates the ML alarm is gone, and the link is OK.
PM109—Carrier Card Removed PM128—RCC2 goes ISTb. PM222—Interlink is system busied. The system drops calls on that link. >QUERYIR displays (-) under the C heading and the state as SysB. For the interconnected RCC2, >QUERYIR displays LCGA under ALRM.	DS-1 card is not present	PM106—RCC2 returns to service from ISTb. PM223—Interlink returns to service. >QUERYIR indicates the ML alarm is gone, and the link is OK.
PM110—Carrier Slip Maintenance Limit Set >QUERYIR displays ML under the slip heading. For the interconnected RCC2, >QUERYIR displays RCGA under ALRM.	Slips at the ML	>QUERYIR indicates 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 >QUERYIR displays OS under the SLIP heading. For the interconnected RCC2, >QUERYIR shows RCGA under ALRM.	Slips at the OOS limit	>QUERYIR indicates the OS alarm is gone.
PM110—Carrier LOF Maintenance Limit Set >QUERYIR displays ML under the FRME heading. For the interconnected RCC2, >QUERYIR displays RCGA under ALRM.	Frame loss at the ML	>QUERYIR indicates the ML alarm is gone.
PM110—Carrier LOF Maintenance Limit Set >QUERYIR displays OS under the FRME heading. For the interconnected RCC2, >QUERYIR displays RCGA under ALRM.	Frame loss at the OOS limit	>QUERYIR indicates the OS alarm is gone.

Forced emergency stand-alone

When an RCC2 is forced in ESA, the system sends a PM189 log to the host with a FORCE DOWN message. The PM189 log simulates link faults on messaging links zero and two. If these links are posted at the CARRIER level of the MAP display for example, POST LTC 2, the alarm remote carrier group alarm (RCGA) appears.

To know if the RCGA is a real alarm, you must receive the PM189 log. The links zero and two can break while the RCC2 is in forced ESA. If the links break, the links at the CARRIER level have the local carrier group alarm (LCGA) alarm.

> ***Note:*** Real faults at the RCC2 can be one-way. Because the alarm continues to be RCGA, operating company personnel have the PM189 log. The presence of this log can mislead operating company personnel. Real faults on the messaging links are normally two-way and produce LCGA alarms.

Remote cluster controller 2 with ISDN

The following list contains procedures used 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 main difference between an RCC2 that does not have an ISDN and an RCC2 with ISDN is the enhanced ISDN signaling preprocessor (EISP). If the EISP is at fault, the RCC2 with ISDN does not work. Enter the QUERY PM FAULT command to check for defective cards before you take other maintenance action.

Integrated services digital network lines

The following table lists possible states for the:

- ISDN line card
- equipment that is most likely OOS
- suggested maintenance action.

Table 8-4 Restoring service to the line (Sheet 1 of 2)

ISLC	Equipment OOS	Suggested maintenance action
CUT	Line	Post the ISDN line by line equipment number (LEN) and enter the DIAG command to determine if the relay is stuck. If the relay is stuck, replace the line card.
LMB	RCC2, LCME, or message link between RCC2 and LCME	Post the ISDN line by LEN. Enter the CKTLOC command to display the status of all PMs and links that associate with the line. Access the MAP level that associates with the item that does not have the correct status. 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. Take 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.

Table 8-4 Restoring service to the line (Sheet 2 of 2)

ISLC	Equipment OOS	Suggested maintenance action
DMB (continued)	Speech link OOS	Access the PM level of the MAP display. Identify the defective speech link. Test the speech link and return the link-to-service to restore LENs that associate with that speech link.
	ISG channel	Busy and RTS the ISG channel at the ISG level of the MAP display.
	Path fault in RCC2	Perform a SWACT to check if the fault is still present.
	Path fault in LCME	Busy and return the LCME to service.
	I-flag is set	Use MAP commands to test for a defective connection or a babbling terminal.
LO	Line	Loss of sync between the ISDN line card and the network termination 1 (NT1). This loss is a system-detected fault. The change out of this state occurs when the system detects a sync condition. Use commands available at the LTP level of the MAP display to locate defective hardware.
INB	Line	Line that undergoes office data modifications. An entry is present in table LNINV. If the line cannot go out of the installation busy state, use the CKTLOC command to verify if: • a DCH channel associates with the ISDN line • the path between the DCH and the LEN is complete.
MB	Line	Indicates line is ready for routine maintenance by input of commands at the LTP level of the MAP display. Indicates the line is removed from service for maintenance as a result of a customer complaint.
MB	Line	Line undergoes that finds tests.
CPD	Line	Line currently processes a circuit-switched call. The line is removed from service for possible maintenance activity when the call terminates. Operating company personnel can access the line from the MAP display for maintenance when the state changes to manually busy. To cancel maintenance, post the deload queue at the LTP level of the MAP display.
NEQ	Line	Use the table editor (TE) to enter data in tables LNINV and DCHINV.

Posting ISDN lines with the POST DK command

The following POST command parameters can be activated if the customer purchases the SOC NI000050 2B-FIT/NIT feature:

POST DK dn_number [<key#>| `all']

The POST DK command displays a DN appearance on the specified key on an ISDN terminal, as the following figure indicates:

If the DN appearance is active, the following information can appear:

- 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

```
   CM     MS     IOD     Net     PM     CCS     Lns      Trks     Ext    Appl
    .      .      .       .    4 SysB    .       .        .        .       .
                                  M
 LTP
 0  Quit       POST  95    DELQ            BUSYQ           PREFIX
 2  Post_
 3             LCC PTY RNG ....LEN....       DN    STA F S LTA TE Result
 4             ISDN LOOP   HOST 02 1 08 02 6215986 CPB      613 6215982
 5  Bsy                                      33 SP
 6  RTS
 7  Diag                                          Bearer capability
 8
 9  AlmStat                                   Key number
 10 CktLoc
 11 Hold
 12 Next
 13
 14
 15
 16 Prefix
 17 LCO_
 18 Level_
    userid
 TIME  hh : mm>
```

The line below the control position displays the key number and bearer capability. This information appears after the ISDN line is posted with the POST DK command. In the previous example, the customer premises equipment (CPE) has DN 621-5986 assigned to key 33, and 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 adapts to 56 kHz	56C
Circuit mode data 64 kHz	64C
Packet data	PMD

The DN state is checked one time each second and the display updates.

Responses to LTP level commands

The following table lists responses to commands from the LTP level:

Table 8-6 Responses to LTP level command (Sheet 1 of 2)

POST		
Response	*What it means*	*What to do*
`Option NI000050 is not enabled`	The user attempts to use the POST DK command but does not enable software selection control (SOC) option NI000050.	Use a different POST command to post the DN.
`The DN is not an ISDN DN Posted circuits unchanged`	The POST DK command issued on a non-ISDN line. This command is valid for ISDN lines.	Enter the command again on an ISDN line, or use a different POST command.
The system responds and displays `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.	Use the SLT ATT command to map the LTID to a LEN before you post the DN.

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 may be different than the actual key in use`	The DN Appearance is a member of a group of Appearances for the DN. This association occurs when you post a DN Appearance that has additional functional calls (AFC) or ACO provisioned. The key numbers for these DNs are not always the same as the keys on the ISDN set. This difference is caused by the Q.931 message protocol which first refers to the DN and does not reference the key number in use. The user or the ISDN set determine which key is used for a call. That information is never communicated to the CM or XPM.	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 can mirror 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 scenarios
`All C-side Links are Down`	The C-side PM cannot talk with the RCC2.
`Audit Detected Inconsistent PM Activity`	For example, CC determines that unit zero is active, when unit one is active. This error indicates CC does not determine that a SWACT occurs. The CC busies and returns the two units to service. The units come back with the 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 error is normally a software error. The CC busies and returns both the RCC2 and the C-side links to service.
`Autonomous Activity Drop`	A system-generated SWACT occurs, normally because of a trap or facility audit.
`Diagnostics Failed`	Unit fails test or RTS.
`Inact Unit Lost Data Synch`	Unit-to-unit communication fails; the system cannot perform a SWACT.
`PM Audit Detect Fault`	One of the background hardware audits detects 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 by the maintenance system.
`Reset While InSv`	An error occurs on a DS-1 link to the unit. The unit waits for a reset by the maintenance system.
`REx Incomplete` (Terminated)	The routine exercise (REX) test cannot complete the series of tests because of a not normal condition. A minimum of one unit is ISTb. Inactive unit is BSY.
`REx Failed`	A failure occurs while a test runs. The messages are the result of what the system does to compensate for the failure. Achieves superframe and data sync. Inactive OOS Tests. Inactive RTS. Inactive OOS Tests after SWACT.
`Self Test Failed`	One of the background hardware audits detects a fault.

Table 8-7 Assessing SysB alarms for the RCC2 (Sheet 2 of 2)

Message at RCC2 level	Possible scenarios
`Trap Message Received From PM`	Unit sends a start 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 can mirror the QUERYPM FLT response.

Table 8-8 Assessing ISTb alarms for the RCC2 (Sheet 1 of 2)

Message at RCC2 level	Alarm	Possible scenarios
`One/Both Unit(s) ISTb`	minor	One or two 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 for example, to the LCME or RMM, goes 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 bad.
`Bad 6X69 IMC link`	minor	An intermodule communication link is bad.
`PM node table mismatch`	minor	The node table data in the RCC2 and CC do not match.
`Dynamic data sync`	minor	The RCC2 has to achieve dynamic data sync.
`ESADATA`	minor	The RCC2 does not have an ESA load, or the current load of the RCC2 is corrupted 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 scenarios
`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 by CC.

Lines

When the MAP screen displays an LCM alarm, enter the LCM MAP level and post the LCMs that match that state. Post the LCM by site to make sure 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, normal RCC2 maintenance is required. When normal RCC2 maintenance is complete, LCM maintenance is the same as for the host office.

Remote cluster controller 2 with ISDN

When you 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 pack diagnostics

Feature AF4342, NTMX76 Pack Diagnostics, provides message and high-level data link control diagnostics on the Channel Supervisory Messaging NTMX76AA memory and hardware.

Tests are run from the CC or PMDEBUG level and are destructive or nondestructive. Destructive tests are performed on inactive and manually busied units. The test that the system performs, depends on the: message card data entered in the inventory table of the RCC2 shelf and the message card

NT6X69AC or NTMX76AA located on the RCC2 shelf. The following tests are available:

- message tests—current tests for the NT6X69AC card used for the NTMX76AA card.
  - — tone diagnostic
  - — message
- high-level data link control tests—new hardware tests for NTMX76AA. These tests diagnose the Q.703 part of NTMX76AA.
  - — NTMX76 card presence
  - — 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 destructive.

Message tests

The same tests are used for the NT6X69AC circuit card and the NTMX76AA circuit card.

NTMX76AA card existence test

This test verifies that the NTMX76AA circuit card and not the NT6X69AC circuit card is used. This test is nondestructive.

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 destructive.

Receive connection memory test

This test verifies the ability to route data from the receive data memory to the correct channel according to the receive connection memory. This test is destructive.

Data routing test

This test verifies the ability to route data from the transmit and receive data memories to the correct channels. The receive and transmit connection memories determine these abilities. This test verifies data is received by the transmit and receive data memories from the associated channels. This test is destructive.

High-level data link control messaging system test

This test verifies the functionality of the high-level data link control messaging system. This test sends a high-level data link control message and loops the message back. This test is nondestructive.

Intermodule communication test

This test verifies the presence of bidirectional intermodule communication connection with the mate unit. This test uses two channels in each direction. These channels cannot be used for other purposes. This test is nondestructive.

Enhanced line testing 1

Feature AF4838, RSC-S Enhanced Line Testing 1, verifies the provisioning of functionality in phases 1 and 2 of the DMS-100 switch translation language 1 project. Functionality is provided for ISDN 2B1Q loops subtending LCMEs that attach to an ISDN RCC2.

An operating system is an operating company system that supports operations, administration, and maintenance (OAM) of:

- subscriber loops
- trunks
- POTS
- special services
- other services that the DMS-100 switch provides.

An operating system communicates with a DMS-100 switch through 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:

- to support X.25 data links between operating systems and the DMS-100 switch
- to decode and encode translation language 1 commands and responses
- to execute maintenance that translation language 1 commands specify, and generation of responses that contain the results of maintenance
- to support test equipment required to execute maintenance
- to support 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 an ISDN 2B1Q loop to be posted in order to function. The TEST command consists of many options. These options are called as *unlisted menu* commands. Each option or *unlisted menu* of the TEST command is a test provided in support of a corresponding translation language 1 command. These tests implement ISDN loop and line maintenance activities.

All tests occur at the LTPISDN MAP level except for one. The *ac* resistance test that is run at the LTPLTA MAP display level, does not occur at the LTPISDN MAP level. Each test at the LTPISDN MAP display level is run with the TEST command with a specific option. The ac resistance test is run with the RES command with *ac* as an option. The RES command is a menu command that requires a line to be posted in order to function.

The following table provides a description of the correct commands and activities:

Table 8-9 MAP commands, options, and activities (Sheet 1 of 4)

Command	Option and activity
CONN-DTAC-ISDN	Indicates the beginning of a test session. Tests and measurements that require digital test access can be performed. The system seizes the tested line. The system keeps the line OOS for the duration of the test session.
CONN-MTAC-ISDN	Indicates the beginning of a test session. Tests and measurements that require metallic test access (MTA) can be performed. The system seizes the tested line. The system 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 a 2B1Q loop component. The system terminates this test when the system encounters a fault.
DISC-TACC	Indicates the end of a test session. Connections set up through the connect commands are released and the line returns to previous state.
MEAS IMPNSE	Measures the impulse noise on the loop for a specified time.
MEAS-LOOP-LOSS	This command measures the 2B1Q signal level that the NT1 generates. This command measures the signal to identify the presence of load coils on the loop. This command measures the signal to verify if the amount of loss is acceptable.
MEAS-NSE	Measures wideband noise interference on the digital subscriber loop.

Table 8-9 MAP commands, options, and activities (Sheet 2 of 4)

Command	Option and activity
MEAS-SCUR-DSL	Measures the sealing current that the ISDN 2B1Q line card generates on the digital subscriber loop.
REPT-ALM	The DMS-100 switch generates this command when the system encounters a failure on one or more test sessions.
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 switch undergoes a reinitialization.
REPT-STAT	Checks the X.25 data link operation. The operating system sends this command to the DMS-100 switch if additional messages are not sent in the last 60 s.
RES AC	Implements the measurement of two-terminal *ac* resistance. Two-terminal *ac* resistance is used to calculate three-terminal resistance to identify terminations and high resistance open circuits.
RMV-TOTS	Removes services from an ISDN 2B1Q line and places the line in a *manual* OOS state.
RST-TOTS	Restores service to an ISDN 2B1Q line and places the line in an *idle* InSv state.
RTRV-COND-ISDNL2	Instructs the DMS-100 switch to retrieve the current line state and standing condition alarm or status for one or more lines.
RTRV-DNCT	Retrieves the equipment for 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 the two directions of the transmission path.
RTRV-TRNSL	Retrieves the translation information for an ISDN line. This information helps to determine if an ISDN 2B1Q line is not operational because of data entry problems.
TEST ALM	Verifies the ability of the DMS-100 switch to detect and report loss of signal and not use an NT1 *Dying Gasp*.

Table 8-9 MAP commands, options, and activities (Sheet 3 of 4)

Command	Option and activity
TEST COLDST	Implements the cold start test. The cold start test checks the ability of the ISDN 2B1Q line card to train: • echo cancellors • equalizers
TEST DCSIG	Implements the NT1 signature test. This command measures the direct current metal termination characteristic of the NT1.
TEST DET	Implements the performance monitoring test. This command checks the ability of the ISDN 2B1Q line card to detect: • bit block errors • errored seconds • severely errored seconds.
TEST ILOSS	Implements the measurement of insertion loss test. This command is used to implement the measurement of insertion loss on an ISDN 2B1Q digital subscriber loop.
TEST IMP	Implements the impulse noise measurement test. This command is used to implement the measurement of impulse noise on an ISDN 2B1Q digital subscriber loop.
TEST NSE	Implements the measurement of wideband noise interference test. This command is used to implement 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. While this test runs, sealing current is applied continuously while the test equipment verifies the current is in the acceptable range.
TEST THR	Implements the performance monitoring threshold test. This command checks the ability of the ISDN 2B1Q line card to report threshold crossings for: • bit block errors • ES • severely ES
TST-LPBK-ISDN	Performs bit error tests on an ISDN line card, and on 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 • severely errored seconds
TST-QISDN	Performs loop measurements on the ISDN 2B1Q digital subscriber loop.
TST-THRS	Checks the ability of the ISDN 2B1Q line card to report threshold crossings for: • bit block errors • errored seconds • severely errored seconds

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 zero to 63.

Link access procedure on the D-channel cleanup

The layer 2 state machine software in the DCH, and the EISP changes. These components change to comply with specifications in *Bellcore Technical Reference*, ISDN D-Channel Exchange Access Signaling and Switching Requirements (Layer 2).

The LAPD cleanup creates an audit of the resources that are important for correct messaging in the DCH and EISP.

Digital test access

Digital test access provides the ability to monitor:

- circuit-switched B-channels
- packet-switched B-channels
- D-channels
- Bd-channel traffic from an ISDN BRI loop.

The MTA allows test equipment to connect to subscriber lines through the use of a test access bus in the LCM. Test equipment connects to line cards in the drawer. Digital test access (DTA) is established through the broadcast of the digital data streams to and from subscriber lines to a protocol analyzer. Normally, a metal path between the subscriber line and the test equipment establishes DTA. This test equipment is used in the MTA process. The DTA monitors in the LCME for loop monitors, and in the XPM that hosts the LCME for Bd connections. Digital test access does not affect service on the loop to which DTA is applied.

When the DTA monitors loop channels or Bd connections, the DTA obtains two streams of digital data. The first type is upstream data, the data that flows *toward* the DMS switch and *away* from the subscriber. The second type is downstream data, the data that flows *toward* the subscriber and *away* from the DMS switch.

The upstream and downstream data of the loop or channel that the DTA monitors are 64-kb/s serial digital data streams to:

- two DS-0 channels of a DS-1 interface, entered for 64-kb/s transmission
- the B1 and B2 channels of an ISDN line card.

The monitoring point for the upstream and downstream data of the loop channels B or D is the LCME time switch. The monitoring point is the LCME time switch at the point the LCME connects to the line card. The monitoring point for the upstream data of Bd channels is the RCC2 time switch. The monitoring point is at the point the time switch connects to the DCH. 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 the DTA to monitor

Digital test access monitors the following:

- provisioned B-channels
- TDM D-channels

- circuit switched B-channels
- Bd channels that the system routes to a DS-1 interface that connects to a DPN switch.

Each loop can have one digital test access Bd connection at a time. Multiple taps can be present on one Bd connection. Multiple taps allow different loops that use the same Bd connection to have concurrent digital test access connections.

When DTA monitors a D-channel, all four TDM channels go to the protocol analyzer. The TDM group member number for a particular line is available from the LTP level of the MAP display with the CKTLOC command. The TDM number is available at the LTPDATA level of the MAP display with the EQUIP DTA QUERY command.

Equipment that the DTA monitors is reserved for digital test access use. Two commands at the MAP display are used to connect this equipment to the monitored BRI channel or Bd connection. The connection between the monitoring equipment and the monitored channel is established through a nailed-up connection. This connection remains in place until operating company personnel use a MAP command to remove the connection.

Digital test access connections remain in place over CC restarts and XPM SWACTs. A user or a REX test can initiate the connections. Digital test access connections remain in place when DCH takeovers occur and when LCME takeovers and takebacks occur.

Protocol analyzer requirements

The protocol analyzer must be able to interconnect with a DS-1 digital interface or an ISDN S/T loop interface. The protocol analyzer must be able to resolve separate D-channel members from the TDM group.

Preparation for digital test access monitoring

Several steps must be taken before digital test access monitoring can start. The DMS switch network must be provisioned for data transmission to preserve the data streams. Failure to provision the DMS switch network can result in damage of 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 with digital trunk facilities or an ISDN line card.

Provision DS-1 monitoring equipment If a DS-1 facility is used for digital test access monitoring, the facility must be provisioned to support 64 kbps clear data transmission.

This requirement has implications in the following areas of the DMS switch:

- hardware that supports the DS-1 interface
- carrier data entries.

The RCC2 DS-1 circuit card must be NTMX81AA or NTMX81BA.

Provision ISDN line card monitoring equipment An ISDN line card can be used to monitor the digital data from the digital test access on an ISDN line. Enter the line card in table LNINV as *hardware assigned software unassigned (HASU)*. Entry of the line card as HASU prevents assignment of DCH resources when assignment is not necessary. The B-channels of an ISDN line card cannot be nailed-up for provisioned B-channel service. The loop state must be installation busy.

Reserve equipment for digital test access monitoring The equipment used to monitor the upstream and downstream data are two channels of a DS-1 digital trunk, or an ISDN line card. The data are from the monitoring points that result from each digital test access application.

The operating company personnel can monitor the upstream and downstream data from a distance. The digital trunk must be entered in an appropriate way for RCC2 DS-1 digital test access. The operating company personnel use two channels of a digital trunk to monitor the data.

When digital test access uses a digital trunk for monitoring, the channels must be unequipped from digital test access use. These connections cannot be nailed-up to the two DS-0 channels. The channels cannot be entered in table TRKMEM until the channels are unequipped. The EQUIP DTA RESET command at the LTPDATA level of the MAP display makes the channels unequipped.

A line card is equipped for digital test access use with the EQUIP command at the LTPDATA level of the MAP display. An LEN specifies the ISDN line card. The B1 channel receives the upstream data from the monitored line, and the B2 channel receives the downstream data.

Establish digital test access connection

With the monitoring equipment provisioned, operating company personnel can establish and verify the digital test access connections from the LTPDATA MAP level. The CONNECT command makes the connection between the monitoring equipment and the BRI loop or Bd connection that the DTA must monitor.

If the monitoring equipment and monitored loop or Bd connection are supported on different peripherals, a network connection occurs between the two end-points. A network connection is required if the Bd-channel that the DTA monitors is nailed-up to a digital trunk. The digital trunk is supported from a different peripheral. Connections in the network are nailed-up connections and are retained 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. A broadcast connection is used at the time switch to monitor the digital data for the upstream and downstream directions. A broadcast connection allows present connections to remain in the present state. For each data stream, connections are made to the RCC2 that hosts the LCME, and to the monitoring equipment. If the monitoring equipment resides in an XPM other than the RCC2, the system allocates bidirectional network connections. The following table contains a summary of 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)	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 Bd-channel that the DTA monitors come from different points in the DMS switch. The upstream monitor point resides at 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. A broadcast connection is used at the time switch to monitor the digital data for the upstream and downstream directions. If the monitoring equipment resides on another XPM, bidirectional network connections are established. If monitoring equipment resides on the same XPM, connections remain in the XPM. The following table summarizes end-points for Bd-channels:

Table 8-11 Timeswitch 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, use the CONNECT command at the LTPDATA MAP level to verify connection integrity. This command makes sure connection information is delivered to XPMs that support the monitoring connection. This verification replaces the channel supervision message (CSM) for circuit-switched connections. If the system encounters a bad connection segment, the system updates the status information that appears at the MAP display.

Use the following procedure to use the digital test access feature in the correct way:

Procedure 8-1 Steps for digital test access use

1 Identify a loop to monitor.

Note: Only ISDN BRI loops are valid.

2 Identify the monitor equipment.

Note: The monitor equipment can be a digital trunk or an ISDN line card.

3 Make sure the monitor equipment is provisioned in the correct way.

Note: Check carrier or line entries.

4 Connect protocol analyzer to the selected access point.

5 Enter the LTPDATA level of the MAP display.

Note: The digital test access commands are at this level.

6 Post the loop that the DTA must monitor.

7 Reserve the monitoring equipment.

Note: Use the EQUIP command, note the equipment number that returns.

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:

>CONNECT equip# VERIFY

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 DTA does not monitor Bd connections that terminate to the DMS PH.
- The number of digital test access connections active in the office that office parameter MAX_DTA_ON_SWITCH in table OFCENG limits.
- A maximum of six digital test access connections are allowed in an XPM at the same time.
- Channels are allocated on links between the loop monitoring point and the monitoring equipment. Connections are made across peripheral and network modules between these channels. These channels are not available for call processing while the digital test access connection is active.
- Be careful when you add or remove digital test access connections if a unit of the RCC2 is OOS. Digital test access connections are downloaded as part of the XPM static data. Changes to static data impact the RCC2 as follows:
  - — If the RCC2 is OOS, static data for the RCC2 is downloaded as part of the RTS sequence. This process can increase recovery time.
  - — If the RCC2 is RTS and static data is downloaded, the change results in a static data mismatch between CC and the RCC2. This static data mismatch does not allow ESA static data to download to the RCC2.
- Link rearrangement of an LCME off an RCC2 is not allowed when DTA connections are active on lines on that LCME.
- Removal a digital test access connection while an XPM is OOS can increase the time required to return that XPM to service. Digital test access connection information is downloaded as static data. Removal of a digital test access connection while the XPM is OOS requires static data to

download to the XPM. The static data must download to the XPM when the XPM RTS.

> ***Note:*** The impact of the addition and removal of digital test access connections of host XPMs is identical to the RCC2. The addition and removal of these connections does not affect ESA-related items in the same way.

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
- multi-point 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 P-side link of a logical terminal in loopback mode. This loopback helps to determine if a fault is present:

- outside the DCH
- inside the DCH.

This loopback is asserted at the DCH end of the connection, and not at the PH end. When the logical loopback is implemented for a logical terminal, the DCH loops back the test frame or test packet. The DCH receives the test frame or test packet from the PH. This loop back occurs through the use of the logical terminal identifier (LTID) for that logical terminal.

A command at the LTPISDN level of the MAP display places a logical terminal P-side link in logical loopback mode. 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 active SVCs on the P-side link before the P-side link goes to loopback mode. The DPN PH drops current permanent virtual circuits (PVC) on the P-side link while the P-side link is in loopback mode.

The logical terminal can send LAPD frames when a corresponding P-side link is not in logical loopback mode. The logical terminal can send frames when the DPN PH logically enables the P-side link. Operating company personnel bring the P-side link out of loopback mode when the loopback timer that associates with the logical timer expires. Operating company personnel can bring the P-side link out of loopback mode when the LTLOOPBK command is in use. The LTLOOPBK is at the LTPISDN level of the MAP display. If the PH sends LAPD frames on this LTID, the DCH loops the frames back to the PH.

> ***Note 1:*** The loopback timer is one of the parameters entered when the logical terminal P-side link is in the logical loopback mode.
>
> ***Note 2:*** This feature does not support attempts to logically loop back a logical terminal P-side link that terminates on a DMS PH.

Emergency stand-alone effects

In ESA, SWACT, and restart conditions, the result of loopback maintenance is not known. Remove Bd-channel loopbacks before or after these maintenance activities.

Layer 1 performance monitoring

Layer 1 performance monitoring provides layer 1 monitoring capabilities for a 2B1Q loop. Layer 1 monitoring comprises performance monitoring of cyclic redundancy checks (CRC), block error events and the monitoring of loop conditions like:

- synchronization
- signal presence
- NT1 power status.

Monitoring capabilities

These capabilities include the ability to enable or disable loop reports of performance monitoring alerts and status alarms. Logs for each loop and each office are used to enable or disable the reports.

Loop status monitoring permits loops to report the following layer 1 conditions that are not normal:

- 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 line performance monitoring data:

- Define a maximum of 16 performance monitoring threshold sets for the generation of alerts by subscriber loops. Each set contains a maximum of four thresholds:
  - — errored seconds (ES)—each hour one to 4095
  - — ES—each day one to 16383
  - — severely ES—each hour one to 4095
  - — severely ES—each day one to 16383.

  Note: An ES is one or more CRC problems in a single direction of transmission in a 1 s interval. A severely ES is three or more CRC problems in a single direction of transmission in a 1 s interval.

- Set one of 16 predefines threshold sets to a 2B1Q loop. Presthreshold set values provide the performance monitoring threshold process for each loop. The performance monitoring threshold process is not limited to prethreshold set values. The system delivers threshold data to line card hardware. The system preserves 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 the threshold level on an ISDN line card. If a parameter meets or exceeds the threshold level, 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 (TOD) reference clock of each 2B1Q loop synchronizes with the master clock of the DMS-100 switch.
- Detect and correct threshold and TOD values on line cards through periodic audits of each line.
- The 2B1Q diagnostic functionality, from the MAP display, which verifies threshold levels in the ISDN line card.

Tables added or modified for layer 1 performance monitoring

Tables BLMTHRSH and LNTHRSH are added to support 2B1Q lines off an RCC2.

Table BLMTHRSH helps to define threshold groups for 2B1Q loops. Table LNTHRSH supports the preservation of threshold and alarm reporting data over a BCS application for 2B1Q and S/T loops. An entry is present for each 2B1Q loop with a nondefault threshold group or nondefault alarm reporting capability.

Table Office Variable (OFCVAR) controls the default alarm reporting status of loops entered in a table. The following table OFCVAR parameters support 2B1Q lines off an RCC2:

- ISDN_PERFORMANCE_MON_ALARM
  - — controls reports of performance monitoring log LINE131 for each office
- ISDN_LOSS_OF_SYNC_WORD_ALARM
  - — controls reports of layer 1 loss of sync
- ISDN_LOSS_OF_SIG_NO_DGASP_ALARM
  - — controls reports of layer 1 loss of signal that does not have *dying gasp* by 2B1Q loops for each office
- ISDN_LOSS_OF_SIG_DGASP_ALARM
  - — controls reports of layer 1 loss of signal with *dying gasp* by 2B1Q loops for each office
- ISDN_NT1_TEST_MODE_ALARM
  - — controls reports of NT1 test mode by 2B1Q loops for each office
- ISDN_T_SYNC_LOST_ALARM
  - — controls reports of T-SYNC by 2B1Q and S/T loops for each office

Emergency stand-alone effects

Data changes can occur while the RSC-S is in ESA. These changes are not guaranteed in the subtending nodes of the remote after a warm ESA exit. When communication with the host office is restored, the following condition occurs: the state of the RSC-S is guaranteed to be equal to the state before entry to the ESA.

Table BLMTHRSH contains 16 PM threshold sets. There is a high possibility that these values do not change often. There is a higher possibility that these values do not change while 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. Changes can occur on a line while the RSC-S is in ESA. If changes do occur the line continues to use the old value or default value. An audit corrects 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. To disable this audit, set office parameter LCDI_SYNC_BURST to zero. Do not disable this audit under normal conditions. The system generates log LINE148 if the audit detects and corrects mismatches.

The following steps describe the procedure to restore the data in the RSC-S and RSC-S subtending nodes. The data that changes during ESA determine if the data requires an update in the LCME after warm exit ESA. Use this procedure to update the data. Operating company personnel can determine if the data requires an update in the LCME.

Procedure 8-2 Updating 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 duplicate of the current static data of the CC . The inactive RSC-S unit undergoes a full RTS, which updates static data.

2 Perform a SWACT on the RSC-S. This SWACT occurs between the active and inactive units. The previously active unit becomes inactive and undergoes a complete initialization. Static data is downloaded.

3 For each LCME that attaches to the RSC-S, busy and RTS each unit in in sequence. This process allows the other unit to takeover call processing during the busy and RTS procedure. This process makes sure that new data downloads to the two units of the PM.

4 The procedure is complete.

Multi-point embedded operations channel

Multi-point EOC permits operating company personnel to determine the multi-point EOC configuration of a 2B1Q loop. Multi-point EOC allows operating company personnel to perform diagnostics on 2B1Q lines that have multi-point EOC. Multi-point EOC permits operating company personnel to set and release a B1, B2, or 2B+D loopback at the multi-point EOC nodes.

The original EOC plan was for the digital subscriber line, to give access to necessary operations functionality in the NT1. Two EOC configurations are possible:

- standard EOC
- multi-point EOC.

The standard EOC defines the operations interface that sends operation messages across the customer to network interface. Standard EOC is another name for point-to-point EOC. Point-to-point EOC occurs when two end nodes access the EOC. When the NT1 uses point-to-point capability, the NT1 connects to the ISDN line card. The channel between the ISDN line card and the NT1 used for OAM purposes is the point-to-point EOC channel. The EOC channel is used to conduct exercises like the logical loopback on separate B-channels or the whole 2B+D loop.

Multi-point EOC occurs when additional nodes are placed on the 2B1Q loop between the ISDN line card and NT1. These additional nodes access the same EOC and allow the transport of basic rate 2B+D information over a T1 span line. Additional nodes pass the EOC signals from a digital subscriber line to a digital carrier facility. Signals are passed from a digital carrier facility to a digital subscriber line.

The additional nodes can monitor information on an ISDN line card, and store errors of different types. Through the use of enhanced EOC messaging, data transfer takes place between these nodes and the ISDN line card. This messaging allows the DMS-100 switch to monitor the performance of an ISDN loop at an exact node. This messaging allows the switch instruct a node to set a loopback on a specified channel. The EOC specification for multi-point EOC builds on the point-to-point EOC specification. Between one and six multi-point EOCs can be present on a 2B1Q line.

> ***Note:*** The point-to-point EOC differs from the multi-point EOC in that multipoint EOC loopback can occur at different points in the loop.

Multi-point EOC provides the following capabilities:

- a table that provides operating company personnel with the ability to list all 2B1Q loops with multi-point EOC nodes. The term node refers to line unit.
- the ability to determine the multi-point EOC configuration of the loop
- enhanced SUSTATE and QLEN commands to display multi-point EOC configurations and status information
- the ability to perform diagnostics on 2B1Q lines equipped with multi-point EOC line units
- the ability to set and release a B1, B2, or 2B+D loopback at multi-point EOC node.

A 2B1Q loop has multipoint capability when the associated LEN and the number of nodes in the loop are in table LNMPEOC. Table LNMPEOC supports 2B1Q lines off an RCC2. Multipoint EOC messages from the LCME enter data in table LNMPEOC. The user can read Table LNMPEOC. The LENs that support multi-point EOC are in sequential order. All 480 lines on an LCME can support multi-point EOC capability. The system maintains multi-point EOC data in table LNMPEOC over restarts and BCS applications.

When multi-point hardware is placed on a loop, the LCME detects this change and reports the change to the computing module (CM). An audit in the LCME reports this detection of hardware. The audit cycles through the 2B1Q loops on an LCME and checks for the presence of multi-point EOC nodes. When the CM receives this message, the system validates the data and adds a tuple to table LNMPEOC. The system generates log LINE148. This log states that the loop contains multi-point EOC nodes.

When a change to the multi-point EOC configuration of a loop occurs, the LCME informs the CM. The change occurs in table LNMPEOC. The system generates a LINE149 log. The LCME performs a second audit to make sure that multi-point EOC accuracy is present between the LCME and the CM.

The time required to poll a multipoint EOC loop depends on the location of the loop in the LCME. With a logical drawer complete with 2B1Q loops, the audit can detect changes in the multi-point EOC configuration. The audit can take a maximum of 8 min to detect a change. Spread the 2B1Q loops across the logical drawers so that an audit can report the 2B1Q loops in the same time period.

> ***Note:*** The system releases multi-point EOC loopbacks. The system returns the loop to the idle state with restarts.

Emergency stand-alone effects

A loopback set before the ESA entry, is maintained on ESA exit. The loopback remains manually busy (ManB). The following are affected when multipoint EOC line units, are added to or deleted from an LEN while RSC-S is in ESA. The CC provides the QLEN command with information and is not affected:

- line diagnostics
- output that appears from the SUSTATE command

The following four figures contain examples of what appears at the MAP display when the system sets and releases loopbacks. The system sets and releases these loopbacks at a multipoint EOC line unit.

The following figure is an example of the LTPdata MAP display of an ISDN loop. For this loop, a B1 loopback is set at multipoint EOC line unit 3. The following command sets 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 LTPdata MAP display of an ISDN loop. For this loop, a B1 loopback is set at multipoint EOC line unit 3 and a loopback query is issued. The following command queried 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. For this loop, a B1 loopback is released from multipoint EOC line unit 3. The following command released 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. For this loop, a 2B+D loopback is set at multipoint EOC line unit 6. The following command 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. The system retains data in the history database over warm, cold, and reload restarts. This feature is not optional and is part of software package New Peripheral Maintenance NTX270AA.

An XPM can execute diagnostics to test hardware functionality. Diagnostics can run as a result of CC or XPM requests. Diagnostics that the XPM performs are normally part of XPM audits. Feature AF5006 provides diagnostic results that operating company personnel use for system analysis.

Operating company personnel analysis

Feature AF5006 provides data on the failure history of diagnostics. This data is in the form of the number of failures that occur and cards that are at fault. The MAP commands display data for a given XPM or the XPMs that this feature supports. Two sets of data are available through MAP commands: short-term failure counts and long-term failure counts.

Short-term failure counts

Short-term failure counts accumulate from the last time a unit gains activity. This data can help operating company personnel to guide maintenance activities and support organizations for outage analysis. If an outage occurs, the XPM diagnostic history data for that peripheral must accompany other important data.

Long-term failure counts

Long-term failure counts accumulate from the last time long-term failure counts are reset. The user or a BCS application can reset the counts. Long-term failure counts must 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.

Functionality that this feature describes is implemented on 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. This NT-40 data store requirements cause this restriction.

Description of diagnostics

Because different PMs contain different hardware, different diagnostics run on each type of PM. There are approximately 75 diagnostics for XPMs. A part of the 75 diagnostics is run on a PM. This feature captures failures for the following diagnostics:

- InSv
- OOS
- single diagnostic
- facility audit
- other audits.

Each diagnostic implicates zero or more cards. The XPM determines the number of cards to implicate. The CC can generate card lists for display at the MAP terminal or in logs. A list of card failures contains cards that an XPM implicates for diagnostic or audit, and reports to the CC.

> ***Note:*** Feature AF5006 records cards that an XPM implicates. The feature does not record cards that the CC generates.

The system can group diagnostics and run the diagnostics as a set of tests or a single test. Sets that are often defined 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 solicited tests. These tests run as a result of CC requests. When the CC requests to test an XPM unit, the XPM runs a set of diagnostics. The CC uses the manual TST command, manual or system RTS, SWACT, BSY, or REX commands to request a test. Diagnostics in the set differ according to the:

- PM type of the XPM
- state of the XPM unit
- activity of the XPM unit.

The system returns the results of each diagnostic test to the CC with a final result for the whole set. If a card is defective, the system generates a card list. The system transfers the 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 to self test. If the system encounters problems, the system sends a message to the CC. The message indicates the problem and provides a list of defective cards.

Mate diagnostics

If one unit loses communications, the mate unit can diagnose that unit. The mate unit sends the results to the CC.

Read-only memory diagnostics

If the XPM is at ROM level, a set of read-only memory (ROM) diagnostics can be implemented.

This feature does not capture failures. This feature does not capture cards that mate and ROM diagnostics implicate. For each diagnostic,the system generates a card list or log at the MAP terminal. The system does not record a card list or diagnostic failure in the diagnostic history.

The following table describes diagnostics that this feature supports. The classes of diagnostics are solicited or audit, or solicited and audit.

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	solicited and audit
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	solicited and audit
TONES DG	Tone Diag	solicited and audit
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 that this feature supports has a set of counters. This feature keeps counters for diagnostic failures and defective cards. This feature keeps three types of counters:

- diag

  the number of times a diagnostic fails
- card

  the number of times a card is reported as defective
- diag and card combination

  the number of times a diagnostic and card combination occurs

This feature keeps two subcounters for each of the three counters: a short-term failure counter and a long-term failure counter. Short-term failure counters are reset often in the BCS cycle. Long-term failure counters record the diagnostic history of a peripheral or office over an extended period of time. Long-term failure counters are reset through the QUERYPM DIAGHIST RESET command or a BCS application.

A single test failure can report one or more diagnostic failures and zero or more defective cards. A diagnostic that runs in one unit to report cards in that unit and the mate unit. Some diagnostics report failures on the mate unit. When a diagnostic fails, that exact 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 zero
  - — the time when short-term failure counters for unit zero are last reset
  - — the time when the last diagnostic failure occurs on unit zero
- for unit one
  - — the time when short-term failure counters for unit one are last reset
  - — the time when the last diagnostic failure occurs on unit one

Short-term counters are internally reset to zero on a unit basis when a unit gains activity. This gain of activity can occur as a result of an RTS or SWACT command. 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. The log includes a summary of the data collected for that node before the reset.

A BCS application resets the diagnostic history data, like short- and long-term failure counts. The system does not generate a log with long-term failure counts.

The user performs diagnostic tests for the RSC-S and RSC-S with ISDN on the following components:

- RCC2
- lines
- DRCC2
- RCC2 with ISDN
- ISDN lines.

Remote cluster controller 2

The user performs diagnostic tests for the RCC2 when the user issues the TST command.

Lines

When you perform a test on a subscriber line, you must perform the command several times. Perform the command several times to make sure DS-1 links do not affect the results.

Dual remote cluster controller 2

The user performs diagnostic tests for DRCC22 when the user issues the TST command at the IRLINK level.

Remote cluster controller 2 with ISDN

The user performs diagnostic tests for the RCC2 when the user issues the TST command.

ISDN lines

When you perform a test on a subscriber line, you must perform the command several times, as with non-ISDN lines. Perform the command several times to make sure the DS-1 links do not affect 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 for XPMs, apply to RSC-S components.

Real-time performance monitoring for NTMX73AA and NTMX76AA

Feature AF4903, Real-Time Time Performance Monitoring for NTMX73AA and NTMX76AA, supplies information about two components. Feature AF4903 provides real-time performance information about the:

- Pulse Code Modulation (PCM) Signaling circuit card NTMX73AA
- optional Message Processor
- Tone Generator circuit card NTMX76AA.

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 categories: call processing occupancy and low priority background. These two categories apply to the UP and EISP.

Information for the NTMX73AA circuit card appears at the PMACT sublevel. The information appears as the percentage of time required at the interrupt level call processing occupancy, in the last minute. Information for the NTMX76AA circuit card appears as the time required to communicate with the HDLC protocol in the last minute. The time appears as a percentage.

The real time used for the NTMX73AA and NTMX76AA processors is not classified into categories. The information that appears for the UP and EISP is classified in categories. For both circuit cards, the average time that appears, represents the time elapsed from the start of the recording. If the elapsed time is greater than 15 min, the average time is available for the last 15 min.

The following is an example of the command used to monitor the performance in RCC2 unit one.

>MAPCI;MTC;PM;POST RCC2 1;PERFORM;PMACT;START

The following figure is an example of the display for the previous command.

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
```

The following is an example of the command used to monitor performance in line trunk controller (LTC) unit one.

>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 contains tables to help troubleshoot conditions that cause alarms in the Remote Switching Center-SONET (RSC-S). This chapter contains separate tables for each RSC-S component. These tables include the remote cluster controller 2 (RCC2) or RCC2 with integrated services digital network (ISDN). These tables also include line concentrating modules (LCM) or enhanced line concentrating modules (LCME), and the remote maintenance module (RMM).

The following table lists possible causes and actions to take to clear LCM or LCME alarms.

Table 9-1 Clearing a RSC-S alarm for an LCM or an LCME (Sheet 1 of 2)

Alarm condition	Possible cause	Action
Critical	Indicates the number of system busy (SysB) or central-side busy (CBsy) LCM (or LCME) units.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME critical alarm. 2. Check for peripheral module (PM), ISDN, or LINE logs that indicate problems in the LCM or LCME. 3. Check operational measurements (OM) that indicate problems in the LCM or LCME.
	Both LCM or LCME ringing generators (RG) are in-service trouble (ISTb).	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME critical alarm. 2. Check for PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3. Check for OMs that indicate problems in the LCM or LCME.

Table 9-1 Clearing a RSC-S alarm for an LCM or an LCME (Sheet 2 of 2)

Alarm condition	Possible cause	Action
Major	Indicates of the number of LCM (or LCME) units that are ISTb or SysB.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME major alarm. 2. Check for PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3. Check for OMs that indicate problems in the LCM or LCME.
Major (continued)	One of the two RGs in an LCM (or LCME) is ISTb.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME RG major alarm. 2. Check for PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3. Check for OMs that indicate problems in the LCM or LCME.
Minor	Indicates the number of LCM or LCME units that are ISTb.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an LCM or LCME minor alarm. 2. Check for PM, ISDN, or LINE logs that indicate problems in the LCM or LCME. 3. Check for OMs that indicate problems in the LCM or LCME.

The following table lists possible causes and actions to take to clear RCC2 or RCC2 with ISDN alarms.

Table 9-2 Clearing a RSC-S alarm for an RCC2 or an RCC2 with ISDN (Sheet 1 of 2)

Alarm condition	Possible cause	Action
Critical	RCC2 (or RCC2 with ISDN) units that are SysB or CBsy. Loss in subscriber service.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCC2 critical alarm. When necessary, go to step 1. 2. Refer to *Recovery Procedures*. Follow the procedures to recover an RCC2. 3. Check for emergency stand-alone (ESA) and PM logs, or both, that indicate problems in the RCC2. The ESA and PM logs include ESA101-ESA109, PM181 and PM171. For dual RCC2 (DRCC2), check for PM logs that associate with dual ESA (DESA). Logs: PM221-PM223, and PM189 4. When ISDN is present, check for ISDN or LINE logs that indicate problems in the RCC2. Logs: ISDN100-ISDN109 and LINE131. 5. Check for OMs that indicate problems in the RCC2.
	The RCC2 is in ESA. Communication to the CC in the host switch is not available.	Proceed as follows: 1. Refer to *Recovery Procedures*. Follow the procedures to recover an RCC2 in ESA. 2. Check for ESA or PM logs, or both, that indicate problems in the RCC2. Logs: ESA101-ESA109, PM181, and PM171. For DRCC2, check for PM logs that associate with DESA. Logs: PM221-PM223, and PM189. 3. Check for OMs that indicate problems in the RCC2.

Table 9-2 Clearing a RSC-S alarm for an RCC2 or an RCC2 with ISDN (Sheet 2 of 2)

Alarm condition	Possible cause	Action
Major	Indicates the number of RCC2 units that are CBsy or SysB. Subscriber service does not change. Loss in subscriber service occurs when both RCC2s or units fail.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCC2 major alarm. 2. Check for PM logs that indicate problems in the RCC2. 3. Check for OMs that indicate problems in the RCC2.
Minor	Indicates the number of RCC2 units that are ISTb. Does not affect subscriber service.	Proceed as follows: 1. Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RCC2 minor alarm. 2. Check for PM181 and PM128 logs that indicate problems in the RCC2. 3. Check for OMs that indicate problems in the RCC2.

The following table lists possible causes and actions to take to clear RMM alarms.

Table 9-3 Clearing a RSC-S alarm for an RMM

Alarm condition	Possible cause	Action
Major	Indicates the number of RMM units that are SysB.	Refer to *Alarm Clearing Procedures*. Follow the procedure to clear an RMM major alarm.
Minor	Indicates the number of RMM units that are 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

Use advanced troubleshooting procedures when normal troubleshooting procedures do not clear a problem. Maintenance personnel can attempt the PMRESET procedure more than one time on the remote cluster controller 2 (RCC2). If an error message occurs after each PMRESET attempt, you must perform advanced troubleshooting procedures. Use the advanced troubleshooting tool PMDEBUG. Refer to the *PMDEBUG User Guide*, TAM-1001-004, for additional information.

Bigfoot utility

The Bigfoot utility stores information on diagnostics that passed and failed. The system implements feature AF5008, XMS-based Peripheral Module (XPM) Routine Exercise (REX) Control and Trouble Notification Improvements. The Bigfoot utility maintains error log information that occurs as a result of failed diagnostics. This utility improves debugging results. The diagnostics code maintains results graphs for each set of diagnostics that runs. The results graph contains data on each diagnostic test in the 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: PFNNNNNNNNNNNNNNNNN
```

Powering up the RSC-S

Use this procedure when you take RSC-S components out-of-service (OOS) and cut 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.

To power up the RSC-S, perform the following steps:

- Return the RCC2 to service (RTS).
- RTS the enhanced line concentrating module (LCME) or line concentrating module (LCM) off the RCC2.
- RTS the remote maintenance module (RMM).
- Post the RCC2. RTS all P-side DS-1 links.

Use the following procedure to power up an RSC-S.

Power-up procedure

At the RSC-S:

1 To begin the first part of the RSC-S power-up procedure, post the C-side peripheral of the RCC2. Return the message links to service with the RCC2. Busy these links when the RSC-S powers down.

2 Set the power switch to ON for one of the RCC2 units.

3 Set the reset button of this RCC2 unit, and at the same time, flip the associated circuit breaker (CB) up and release the CB. The CB must stay in the up position. If the CB does not stay in the up position, a problem is present in the power circuitry.

4 Repeat 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. Make sure you list the correct device like S01DPMLOADS. For example:

`>LOADPM UNIT unit_no LOADFILE IMAGE`

8 Return the unit to service. Do not use parameters. Make sure the RTS sequence includes diagnostics.

9 Repeat steps 7 and 8 for the other 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. To begin the procedure, set the power switch of one of the LCME or LCM units to ON

12 Set the associated CB up and 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.

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. Make sure 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 To begin the third part of the RSC-S power-up procedure, set the power switch of the RMM to ON.

20 Press the reset button on the NT2X09 power converter of this RMM. At the same time, flip the CB that connects to the RMM to the up position. Release the CB. The CB must stay in the up position. If the CB does not stay in the up position, a problem is present in the power circuitry.

21 Load the RMM. Make sure you list the correct device like S01DPMLOADS. For example:

>LOADPM

22 Return the unit to service. Do not use parameters. Make sure 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. Busy the P-side DS-1 links when the RSC-S powers down.

25 This 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 module (PM) off of the RCC2. Busy all RMMs and line concentrating devices (LCD).

3 Offline all P-side PMs off the RCC2. PMs to busy include RMMs and the LCD.

4 Busy all P-side links off 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 Post the associated line trunk controller (LTC). Busy the message link that connects to the busied RCC2 unit.

8 Power down the inactive unit of the RCC2. Set the power converter of the unit to OFF.

9 Busy the active unit of the RCC2. Override any warning.

10 Post the associated LTC. Busy the message link that connects to the busied RCC2 unit.

11 Power down the previously active unit of the RCC2. Set the power converter of the unit to OFF.

12 Post the RCC2 and OFFL the PM.

13 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.

Inspecting cooling unit filters

Application

Use this procedure to inspect 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 every two weeks.

Common procedures

There are no common procedures.

Action

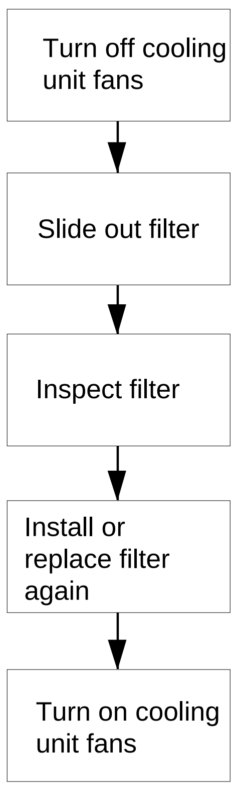
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

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

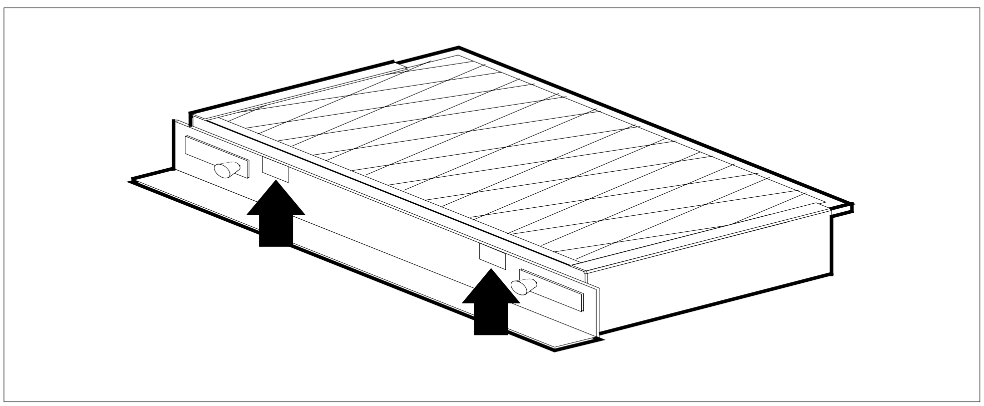
At your Current Location

1

> **DANGER**
> **To prevent overheating**
> Do not leave the cooling unit fans off for longer than 30 min.

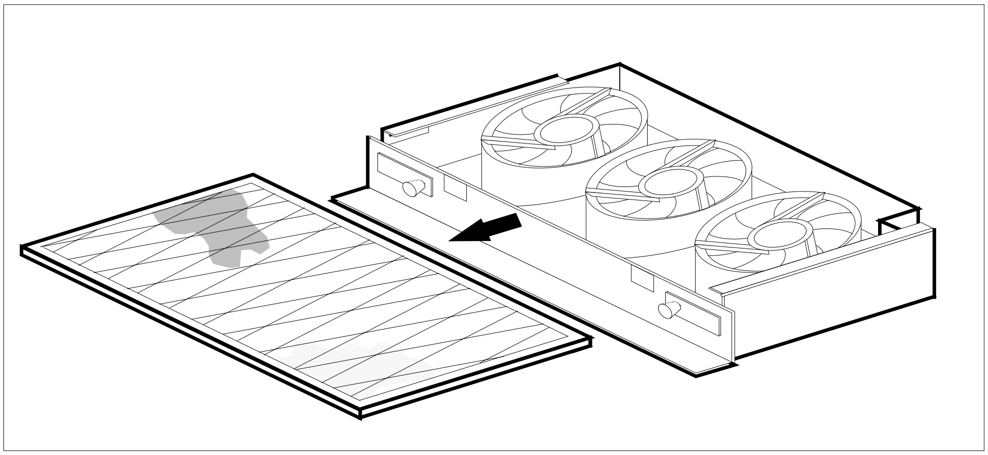
Remove the two fuses in slot position19 on the faceplate of the modular supervisory panel (MSP). This action makes sure the cooling unit fans are off.

2 Use the two filter access tabs to grip the filter.



3 Slide the filter out of the cabinet.

Inspecting cooling unit filters (end)



If filter surfaces	Do
appear dirty	step 4
appear clean	step 5

4 Replace the filter with the same part number as the number of the old unit. Go to step 6.

5 Install the filter in the cabinet again.

6 Replace the two fuses that you removed in step 1.

7 The procedure is complete.

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

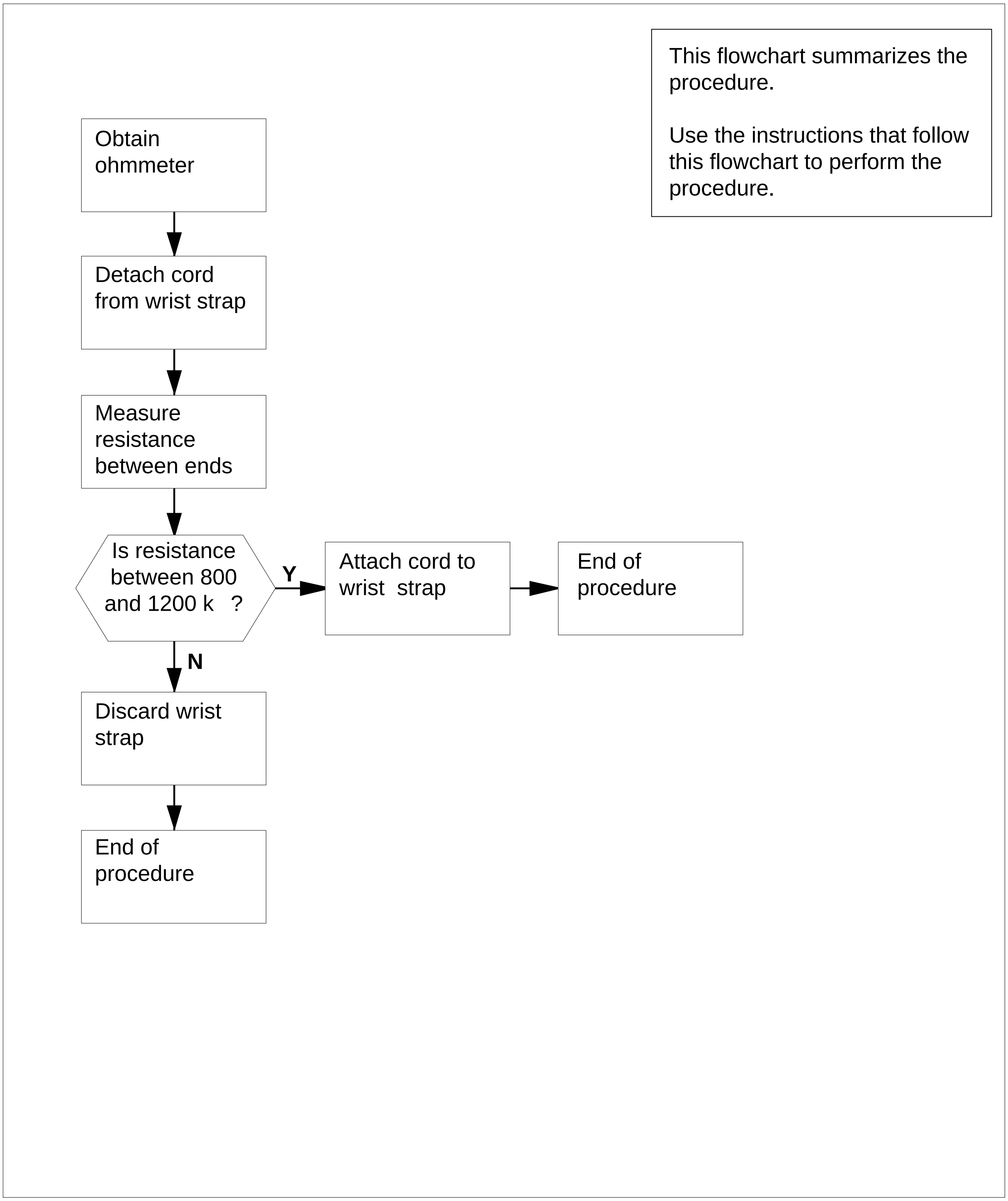
There are no common procedures.

Action

This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform this procedure.

Testing wrist strap grounding cords (continued)

Summary of Testing wrist strap grounding cords



Testing wrist strap grounding cords (continued)

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 ανδ 1200 κΩ	step 4
is not between 800 kΩ ανδ 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
A grounding cord is only safe to use if resistance of the grounding cord is higher than 800 kΩ. Lower resistance exposes the user to the risk of electrocution. Electrocution can occur if equipment short-circuits while the user wears the wrist strap.

DANGER
Risk of electrocution
A grounding cord is only safe to use if resistance of the grounding cord is higher than 800 kΩ. Lower resistance exposes the user to the risk of electrocution. Electrocution can occur if 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.

Testing wrist strap grounding cords (end)

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.

Fuse replacement in the LCME

Application

Use this procedure to replace fuses in the enhanced line concentrating module (LCME) fuse panel. This panel is the LCME fuse panel of the CRSC and CEXT cabinets on a remote switching center-SONET (RSC-S) site.

Interval

Perform this action as required.

Common procedures

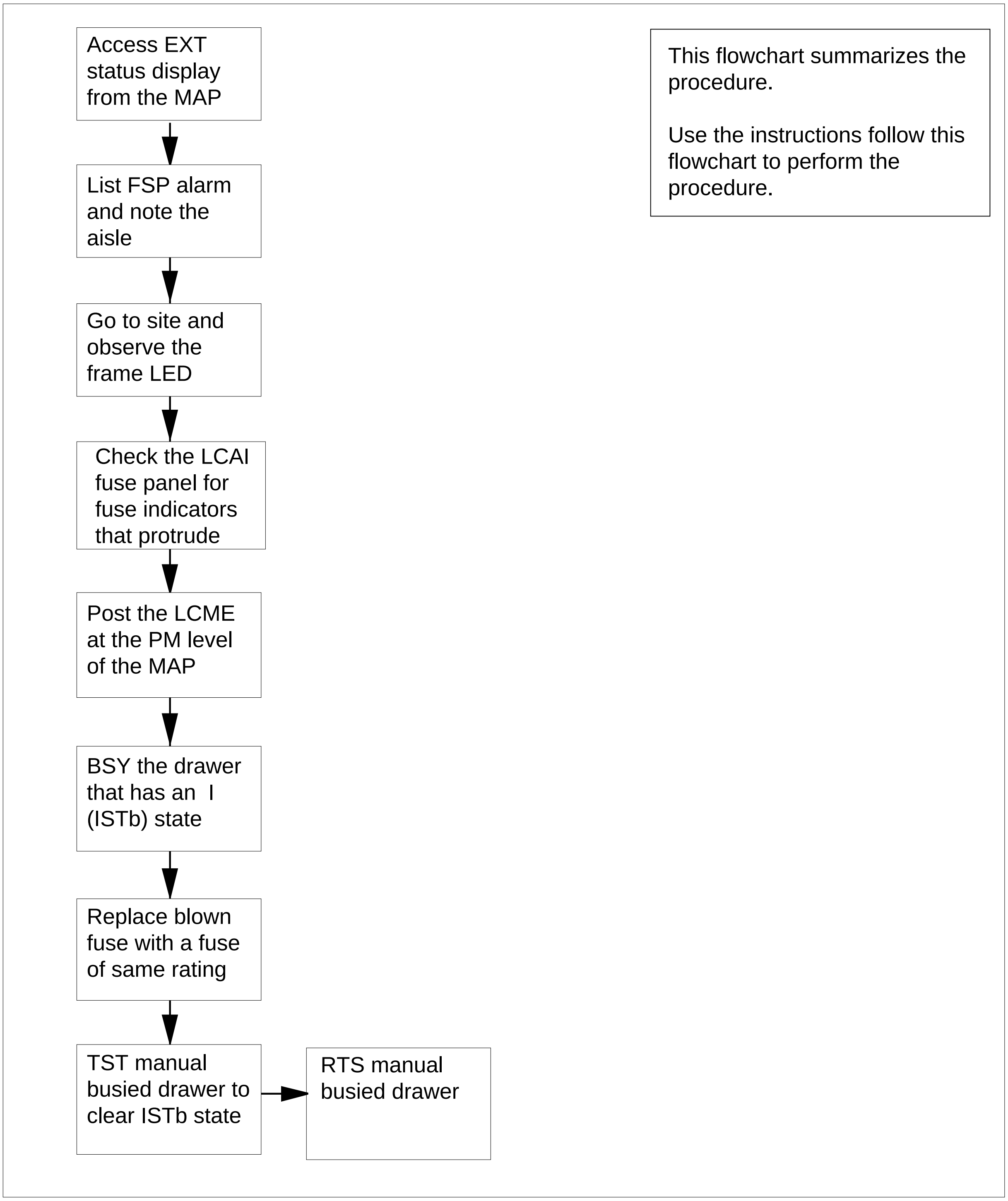
There are no common procedures.

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.

Fuse replacement in the LCME (continued)

Summary of fuse replacement in the LCME



Fuse replacement in the LCME (continued)

Fuse replacement in the LCME

At the MAP terminal

1 To access the EXT level of the MAP terminal, type

>MAPCI;MTC;EXT

and press the Enter key.

2 To list the MSP alarm, type

>LIST FSP

and press the Enter key.

3 Note the location of the MSP alarm.

At the RSC-S site

4 Observe the frame LED. The LED must be on.

5 Check both ISDN line concentrating array (LCAI) fuse panels for fuse indicators that protrude.

6 To post the LCME, type

>POST LCME site cabinet module

and press the Enter key.

where

site
is the name of the RSC-S site

cabinet
is the CRSC or CEXT cabinet number

module
is the LCME module number

Example of a MAP display:

```
LCME    RemL  00 0 ISTb   Links_OOS:  CSide 1
Unit0:   InSv               /RG:  0
Unit1:   InSv               /RG:  0
                     11 11 11     RG:Pref 0 InSv
Drwr: 01 23 45 67 89 01 23 45        Stby:1 InSv
      II .. .. .. .. .. .. .. .. ..
```

7 To busy (BSY) the drawers that have an I (in-service trouble[ISTb]) condition, type

>BSY DRWR number

and press the Enter key.

where

number
is the line subgroup number

Fuse replacement in the LCME (continued)

8 Replace the blown fuse with a new fuse of the same rating. Refer to figure LCME fuse panel.

If the fuse	Do
blows again, suspect defective NTBX36 card	*Card Replacement Procedures* for card replacement.
does not blow and alarm clears	step 9

9 To test the drawer with the new fuse installed, type

`>TST DRWR number`

and press the Enter key.

where

number
is the line subgroup number

10 To return to service (RTS) the drawer with the new fuse installed, type

`>RTS DRWR number`

and press the Enter key.

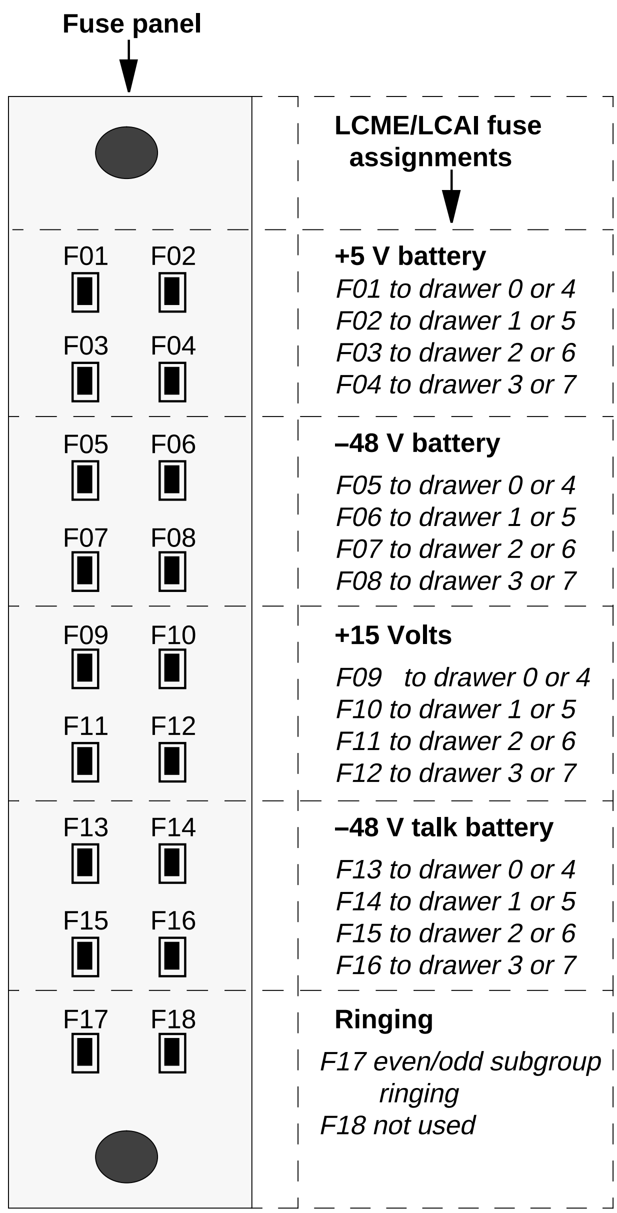
where

number
is the line subgroup number

The following figure shows an example of an LCME fuse panel and fuse assignments.

Fuse replacement in the LCME (end)

LCME fuse panel



Note: Drawers: 0–3, shelf position 33; 4–7, shelf position 47.

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 in three month intervals.

Common procedures

There are no common procedures.

Action

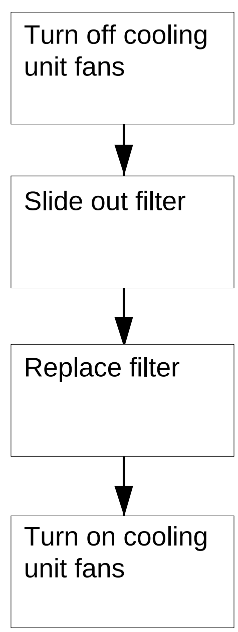
This procedure contains flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

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.



Replacing cooling unit filters (continued)

Replacing cooling unit filters

At your Current Location

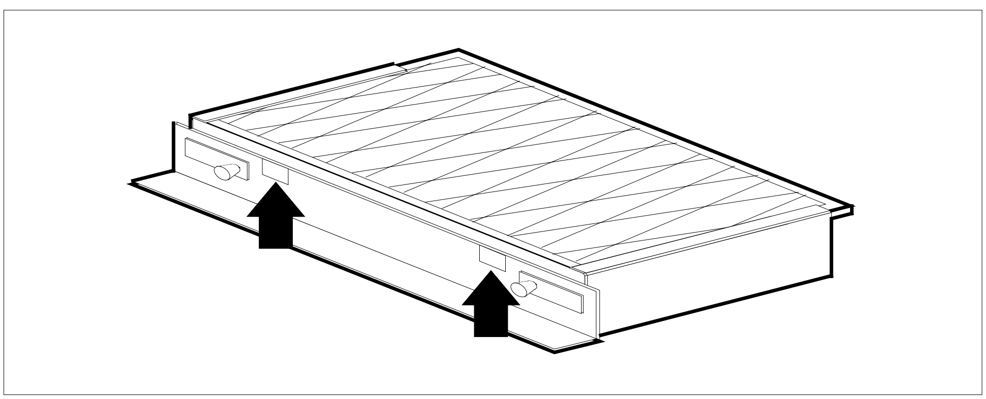
1

> **DANGER**
> **To prevent overheating**
> Do not leave the cooling unit fans off longer than 30 min.

> **DANGER**
> **To prevent overheating**
> Do not leave the cooling unit fans off longer than 30 min.

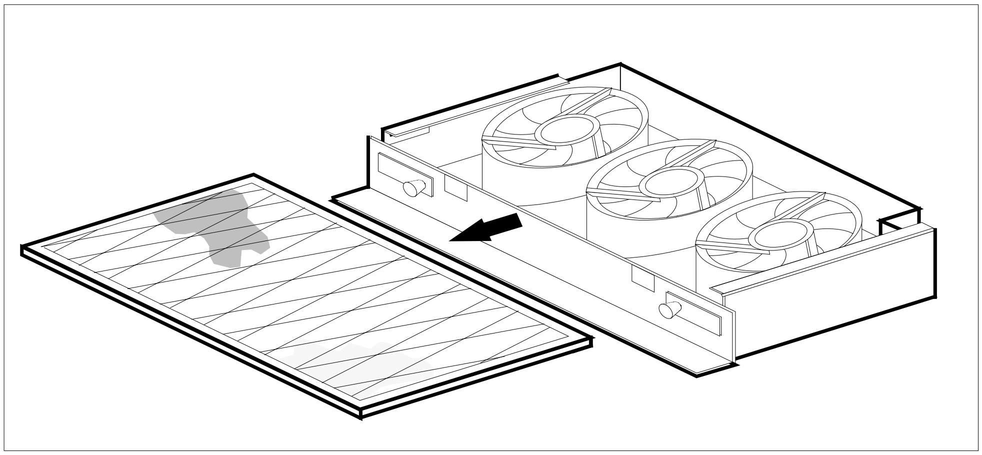
To make sure the cooling unit fans are turned off, remove the two fuses in slot position 19 on the faceplate of the MSP.

2 Use the two filter access tabs to grip the filter.



3 Slide the filter out of the cabinet.

Replacing cooling unit filters (end)



If filter surfaces appear	Do
dirty	step 4
clean	step 5

4 Replace the filter with the same part number as that of the old unit.

5 Replace the fuses removed in step 1.

6 The 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

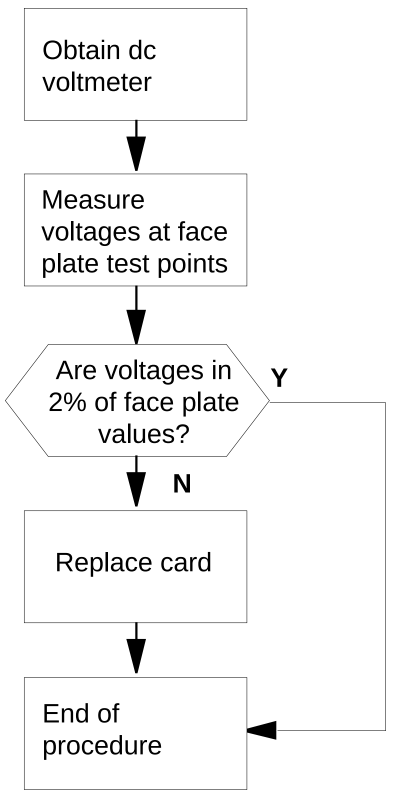
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Use the steps to perform the procedure.

Testing power converter voltages (continued)

Summary of Testing power converter voltages

This flowchart is a summary of the procedure.

Use the flowchart to review the procedure. Follow the steps to perform the procedure.



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.

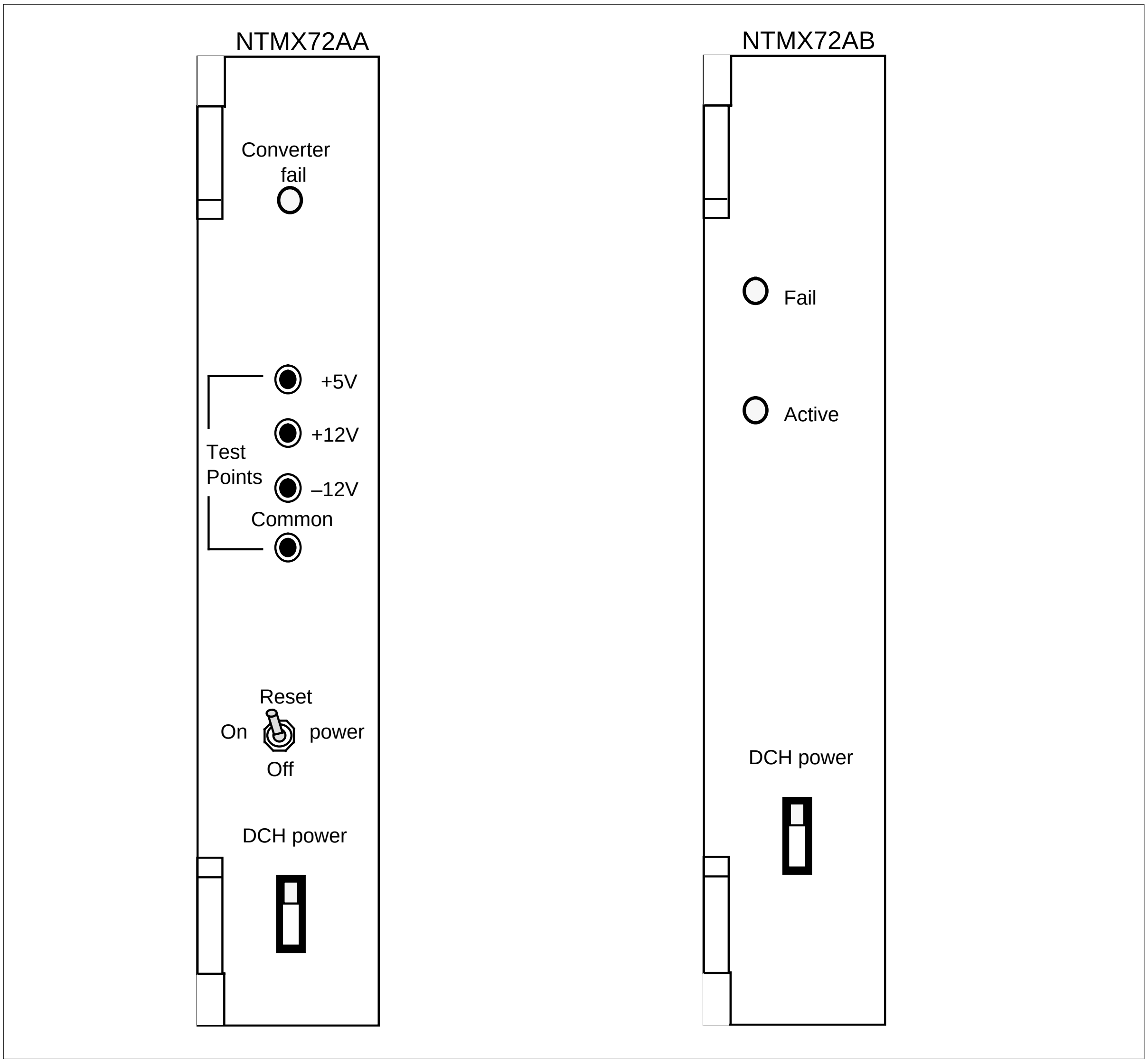
If the NTMX72 card version	Do
is AA	step 4
is AB	step 3

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 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 that appear on the faceplate. Compare the voltages measured in step 4 with the acceptable voltage ranges that appear in the following table:

(Sheet 1 of 2)

Test point voltage	Acceptable range
+12 V	+11.76 V to + 12.24 V
-12 V	-12.24 V to -11.76 V

Testing power converter voltages (end)

(Sheet 2 of 2)

Test point voltage	Acceptable range
+ 5 V	+4.9 V to +5.1 V
-5 V	-5.1 V through -4.9 V

If test point voltages	Do
are in acceptable range	step 7
are not in acceptable range	step 6

6 Replace the power converter according to *Card Replacement Procedures*.

7 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 (Nortel) for repair or replacement. Your location, Canada or the United States, determines the documents you must complete. Your location determines to which address you must return the card.

Interval

Perform this procedure as required.

Common procedures

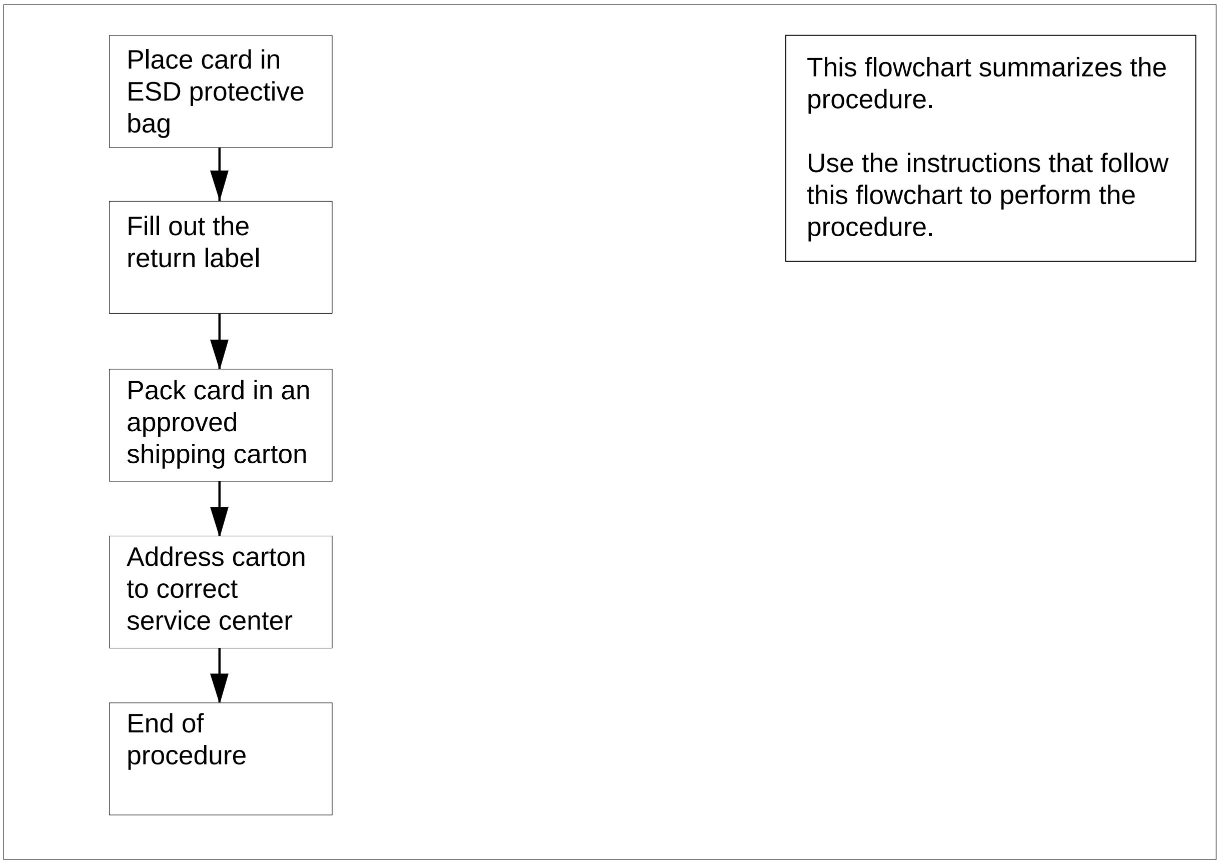
There are no common procedures.

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 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 that you return. If return labels are not available, use a blank label. For help to complete these 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 another 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 it to Nortel as follows:

`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 that you return.

Make sure to 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 in use at the time of replacement
- peripheral module load name
- description of the failure and action taken to repair
- fault code that describes the fault best (see the bottom of the label)
- name of your company
- office identifier code
- your name
- site name

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 another available carton. Make sure that you

- 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

Returning a card for repair or replacement (end)

10 Address the carton to the following address:

Nortel Customer Operations
c/o Wesbell Transport
1630 Trinity Road
Unit #3, Door #4
Mississauga, Ontario
L5T 1L6

11 This 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.

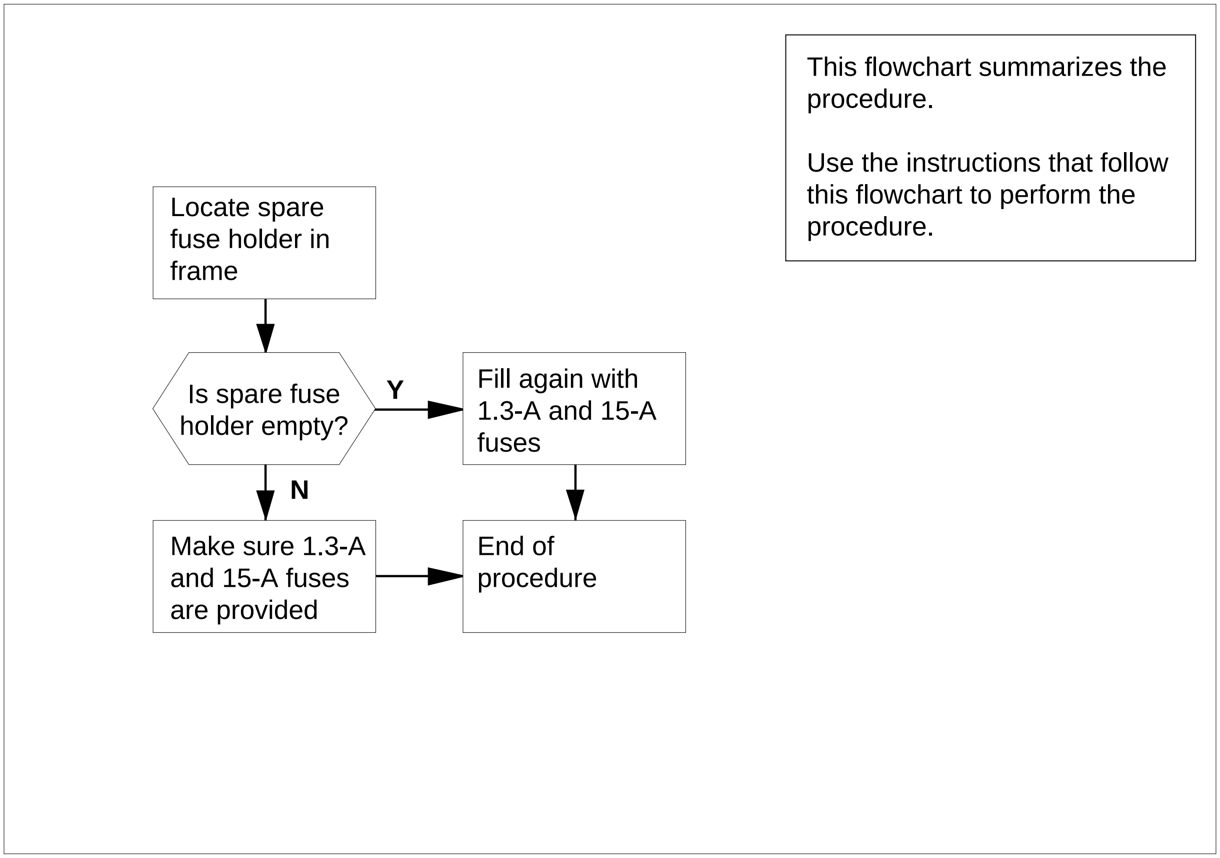
Common procedures

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.

Summary of Inspecting spare fuse holders



Inspecting spare fuse holders (end)

Inspecting spare fuse holders

At your current location

1 Locate the spare fuse holder in the MSP.

If spare fuse holder	Do
is empty	step 2
is not empty	step 3

2 Fill the spare fuse holder again with the following fuses and circuit breakers:

- 15-A circuit breakers (for the -48 V shelf feeds)
- 1.3-A fuses (for the alarm battery supply [ABS] feeds)

Go to step 4.

3 Make sure that enough of the following fuses and circuit breakers are provided:

- 15-A circuit breakers (for the -48 V shelf feeds)
- 1.3-A fuses (for the ABS feeds)

4 The procedure is complete.

Checking torque on grounding bolts

Application

Use this procedure to check the correct torque of grounding bolts.

Interval

Perform this procedure every month.

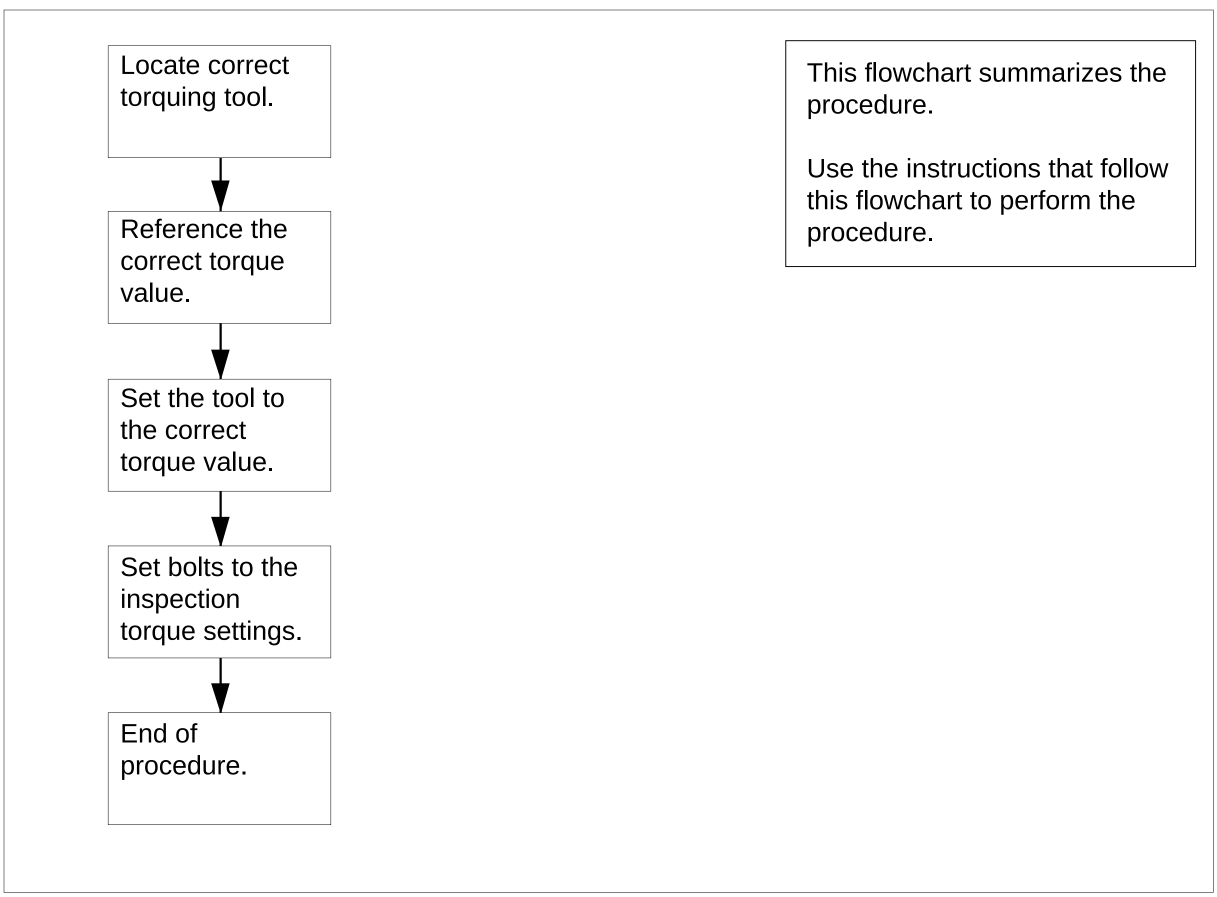
Common procedures

Does not apply

Action

This procedure contains a summary flowchart as an overview of the procedure. Follow the steps to perform this procedure.

Summary of checking torque on grounding bolts



Checking torque on grounding bolts (end)

Checking torque on grounding bolts

At your Current Location

1 Locate the T9958 click-type preset torque wrench.

2 Align the small fractions on the edge of the handle with the center of the main torque scale.

3 To set the correct inspection torque value, turn clockwise to increase value or turn counter-clockwise to decrease value.

If grounding bolts are type	Do
1/4-20 backplane, -48 V ground first nut	step 4
1/4-20 backplane, -48 V ground second nut	step 5

4 Set inspection torque to 5 ft/lb. Proceed to step 6.

5 Set inspection torque to 25 in./lb.

6 Position the wrench on the grounding bolts and tighten to the inspection torque specifications.

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 modular supervisory panel (MSP) bulbs.

Interval

Perform this procedure one time each month.

Common procedures

There are no common procedures.

Action

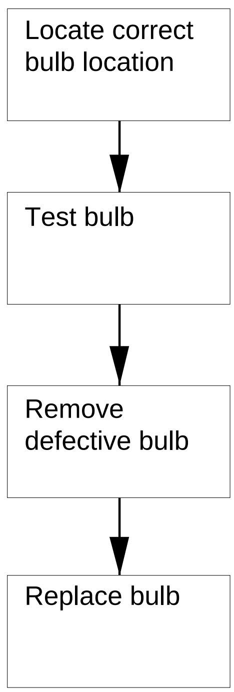
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

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 MSP bulbs.

If bulbs	Do
are fan fail bulbs	step 2
are aisle end bulbs	step 3
are MSP bulbs	step 4

2 Flip the alarm (ALM) override switch, located on the MSP, to ON.

If fan fail bulb	Do
does not light	step 5
lights	step 9

3 Press a fuse on the fuse pad located on the MSP.

If aisle end bulb	Do
does not light	step 6
lights	step 9

4 Press a fuse on the fuse pad located on the MSP.

If MSP 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 5.

6 Remove the bulb frame casing. Grasp the aisle end or MSP bulb tight with two fingers, squeeze, and pull to remove end or bulb. Go to step 5.

7 Replace with new bulb.

8 Attach bulb cover or bulb frame casing again.

9 This procedure is complete.

Cooling unit replacement

Application

Use this procedure to replace a defective cooling unit (NTRX91AA) 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 when a cooling unit cannot operate. An illuminated fan fail indicator on the front of the MSP indicates a defective cooling unit.

Common procedures

There are no common procedures.

Action

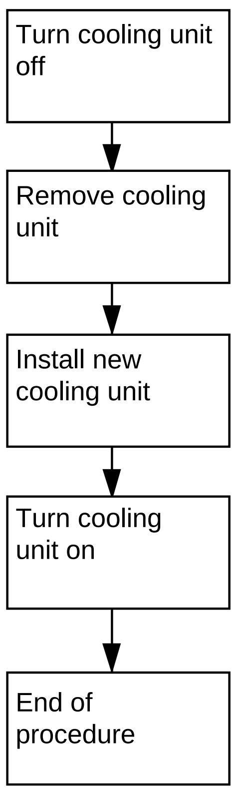
This procedure contains a summary flowchart and a list of steps. Use the flowchart to review the procedure. Follow the steps to perform the procedure.

Cooling unit replacement (continued)

Summary of cooling unit replacement

This flowchart summarizes the procedure.

Use the instructions that follow this flowchart to perform the procedure.



Cooling unit replacement (end)

Cooling unit replacement

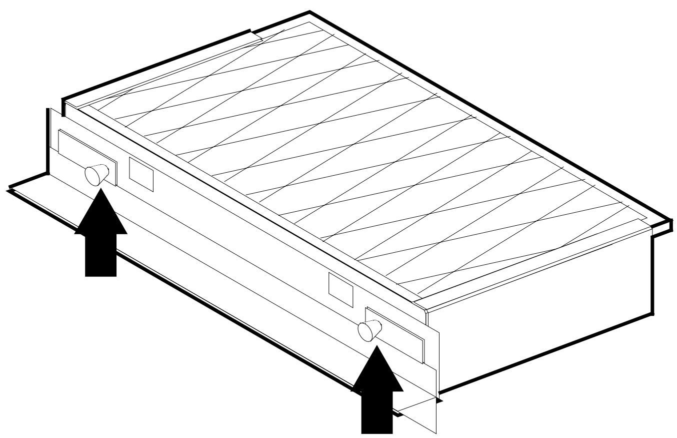
At your current location

1

DANGER
To 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 the two fuses in slot position 19 on the faceplate of the MSP.

2 Turn the two knobs on the front panel of the cooling unit counterclockwise and slide the cooling unit out.



3 Replace with the same part number as the part number of the old unit. Slide in the new cooling unit until both sides lock in place.

4 Replace the two fuses removed in step 1.

5 This procedure is complete.

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DMS-100 Family

Remote Switching Center

Remote Switching Center-SONET Model B Maintenance Manual

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