
SL-1

2-Mb Remote Peripheral Equipment

Installation and acceptance procedures

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Reason for issue

90 11 02

Standard, Group F (Phase 6) - new Generic X11 Supplementary Feature

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General

This Northern Telecom Publication (NTP) provides installation procedures for the 2-Mb/s Remote Peripheral Equipment (RPE) feature and acceptance tests required by the SL-1 Generic X11 Supplementary Features, Group F (Phase 6).

Refer to NTP 553-2931-100 for feature and equipment descriptions as well as for engineering guidelines. NTP 553-2931-500 provides fault-clearing and maintenance information. Also refer to Appendix 1 to 553-2741-100/200/500 for RPE cabinets and shelves for the ST and SN machines.

Related documentation

Maintenance. Diagnostic program descriptions and input/output references are provided in NTP 553-2301-511.

Data administration. Information and detailed procedures on feature and service implementation are provided in NTP Appendix 1 to 553-2311-311.

Description. Refer to NTP 553-2931-100 for feature and equipment descriptions.

Fault-clearing. NTP 553-2931-500 provides fault-clearing and maintenance information.

ST, SN machines. Refer to Appendix 1 to 553-2741-100/200/500 for RPE cabinets and shelves.

Assembly and installation

The 2-Mb/s Remote Peripheral Equipment (RPE) may be shipped fully assembled in cabinets; or shelves and circuit packs may be shipped individually for installation in existing cabinets.

Equipment handling and unpacking

Before starting the installation refer to 553-YYY1-210 for instructions regarding the procedures for unpacking and handling of equipment.

Cabinet installation

If new cabinets are to be installed refer to 553-YYY1-210 for cabinet installation procedures. Refer to 553-2741-200 Appendix 1 for RPE cabinets at a remote site for ST or SN machines.

RPE group installation

RPE shelves in local or remote sites are located in any cabinet location that would normally house a Peripheral Equipment (PE) shelf. The local site RPE shelf must be located within 50 cable feet (15 m) of any connected network circuit packs. At the remote site the RPE shelf must be within 50 cable feet (15 m) of any connected PE shelves. Refer to 553-2741-200 Appendix 1 for RPE shelves for ST or SN machines.

One RPE shelf pair (local and remote shelf) can have a maximum of four network loops assigned to it. Each RPE shelf pair is defined as an RPE group. The installation procedures are detailed in Procedures 2-1 and 2-2.

Equivalent packs

The equivalent NT and TELI (Sweden) packs are as shown in Table 2-1.

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Table 2-1
NT and TELI (Sweden) packs

NT	TELI (Sweden)
QPC319	TPC24
QPC320	TPC25
QPC321	TPC29
QPC322	TPC26

RPE group power

QBL14 power distribution box

Power is distributed to RPE shelves (QSD21/QSD22) via the QBL14 located in a cabinet. The QBL14 unit is required at both local and remote sites.

RPE installation

Table 2-2
Installation/removal procedures

Title	Number
Local Site RPE Installation	2-1
Remote Site RPE Installation	2-2
RPE Circuit Pack Installation	2-3
RPE Circuit Pack Removal	2-4

Procedure 2-1

Local site RPE installation

1. Unpack and inspect the shelf. Refer to 553-YYY1-210.

2. Ensure that the proper terminating units are installed on the shelf backplane. Refer to Table 2-3.

—continued—

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Procedure 2-1 (continued)

Local site RPE installation

3. Position the shelf in the cabinet and secure with the mounting screws supplied. Refer to service order.

Note: The shelf must be within 50 cable feet (15m) of the assigned network circuit packs.

4. Install one NE-A18QA cable from the shelf to each network circuit pack served by the shelf. Refer to service order and Figure 2-1.

Note: Refer to Figure 2-3 when a left-hand, mount RPE shelf (QSD22) is provided.

5. Connect two 75-ohm coaxial cables from RPE shelf to Line Terminal Units (LTU) for each loop. Refer to service order and Figure 2-1.

Note: Computer grade 75 ohm coaxial cable should be used. This cable is supplied by the customer and must have BNC connectors supplied with the shelf attached.

6. Insert 5/12-V Converter circuit pack in shelf. Refer to Figure 2-2, and to Procedure 2-3.

7. If there is no existing RPE shelves in the cabinet it is necessary to install a QBL14 power distribution box. Refer to Figure 2-4.

8. Install power cable (supplied with RPE shelf); connecting from the shelf to the QBL14 unit. Refer to Figure 2-4.

Note: At the QBL14 unit, fuses for shelves being installed should be removed, and the associated switch set to OFF.

9. At the QBL14 unit, insert fuse and set switch for shelf to ON. Refer to Figure 2-4.

10. Unpack, inspect and insert circuit packs in RPE shelf as directed by the service order. Refer to 553-YYY1-210, Procedure 2-3, and Figure 2-2.

11. Add related office data. Refer to service order and Data Administration Implementation herein.

Table 2-3
BUS terminating unit assignment

Code	Location	Quantity
QPC164*44	Local RPE shelf	2 per shelf
QPC164*45	Remote RPE shelf	2 per shelf

Where * indicates the bus terminating unit vintage such as A, B, C or D.

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Figure 2-1
Local end network loop and shelf cabling

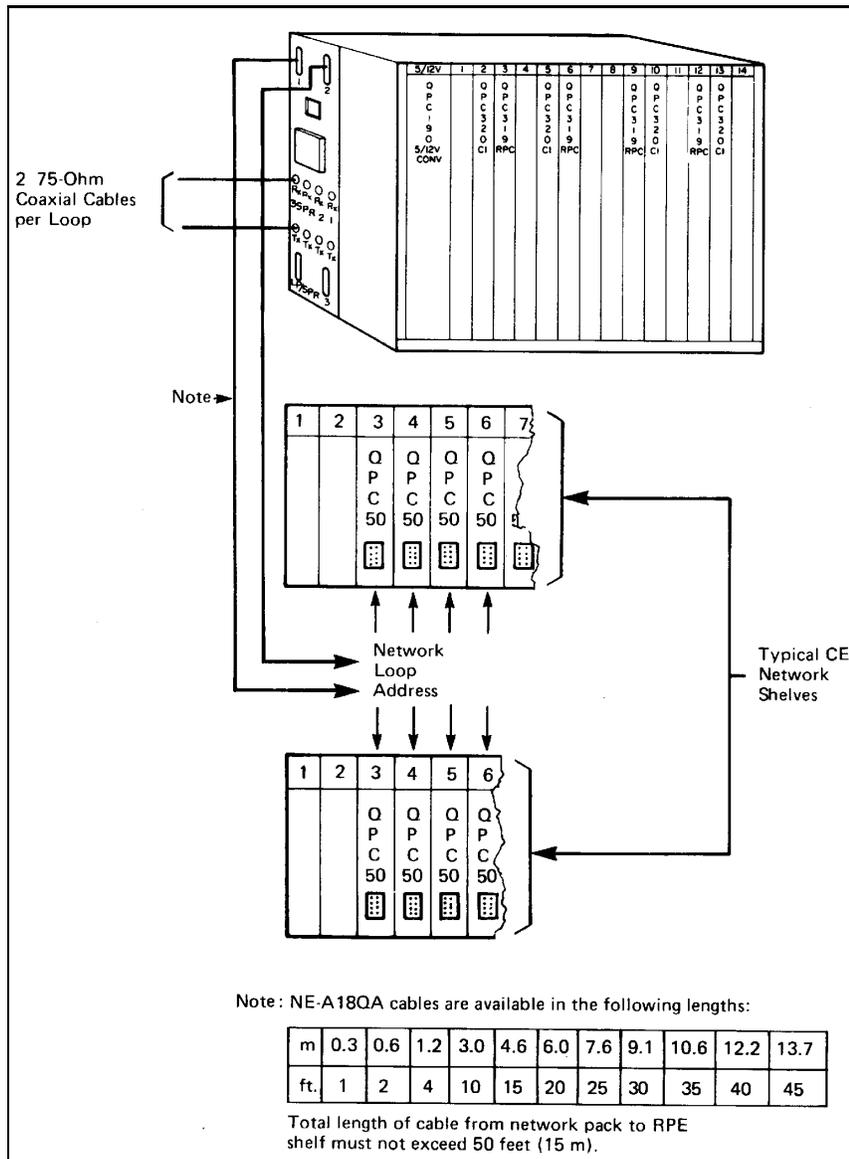
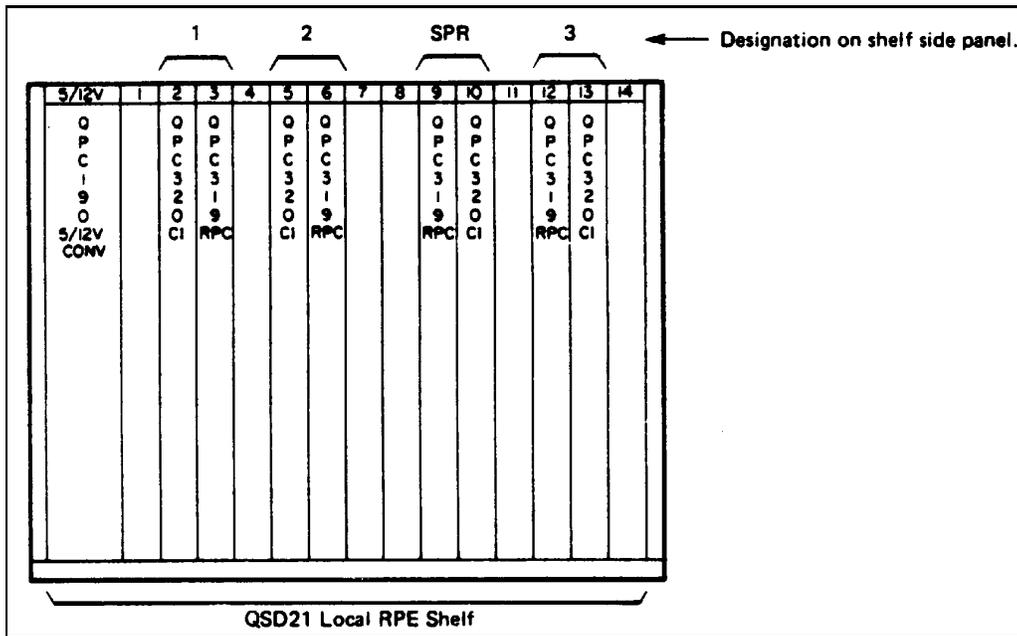


Figure 2-2
Local site circuit pack locations



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Figure 2-3
Typical layout of a left-hand mount RPE shelf (QSD22)

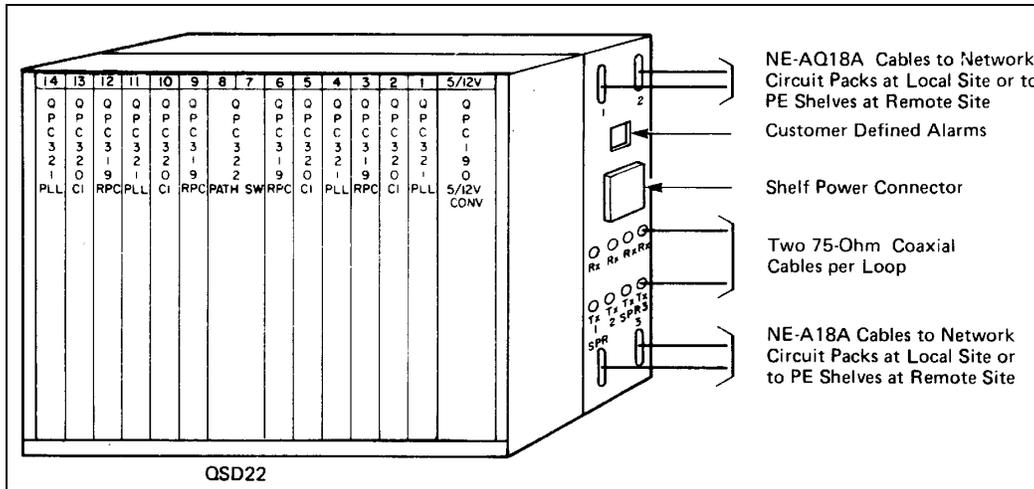
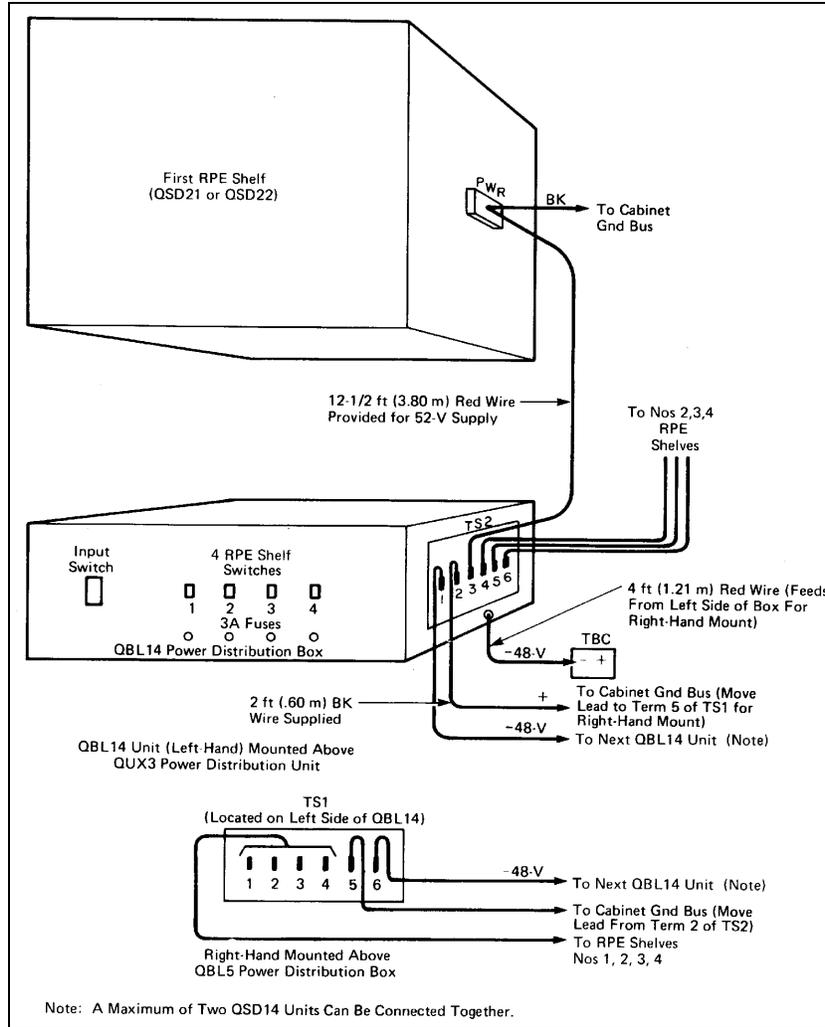


Figure 2-4
QBL14 power distribution box wiring and connections



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Procedure 2-2 Remote site RPE group installation

1. Unpack and inspect the shelf. Refer to 553-YYY1-210.
2. Ensure that the proper bus terminating units are installed on the shelfbackplane. Refer to Table 2-3
3. Position the shelf in the cabinet and secure with mounting screws supplied.
Note: The shelf must be within 50 cable feet (15 m) of all PE shelves served.
4. Install an NE-A18QA cable from the RPE shelf connector to the first PE shelf, connector F for each assigned loop.
Refer to Figures 2-5 and 2-10.
Note: Refer to Figure 2-3 when a left-hand mount RPE shelf (QSD22) is provided.
5. Install NE-A18QA cables between PE shelves. Refer to Figure 2-5.
6. Install two 75-ohm coaxial cables for each loop from LTU to associated Transmit (Tx) and Receive (Rx) connectors on the side of the RPE shelf. Refer to Figures 2-5 and 2-10.
7. Install four NE-A25B type cables from jacks A, B, C and D of each PE shelf to cross-connect terminal.
Refer to 553-YYY1-210 and to Figure 2-5.
8. Install alarm input cable if customer-defined alarms are required.
Refer to Figure 2-6.
9. Install power failure alarm. Refer to Figure 2-7.
10. If there are no existing RPE shelves in the cabinet it will be necessary to install a QBL14 power distribution box. Refer to Figure 2-4.
11. Install the power cable (supplied with the RPE shelf); connecting it from the QBL14 box to the RPE shelf. Refer to Figure 2-4.

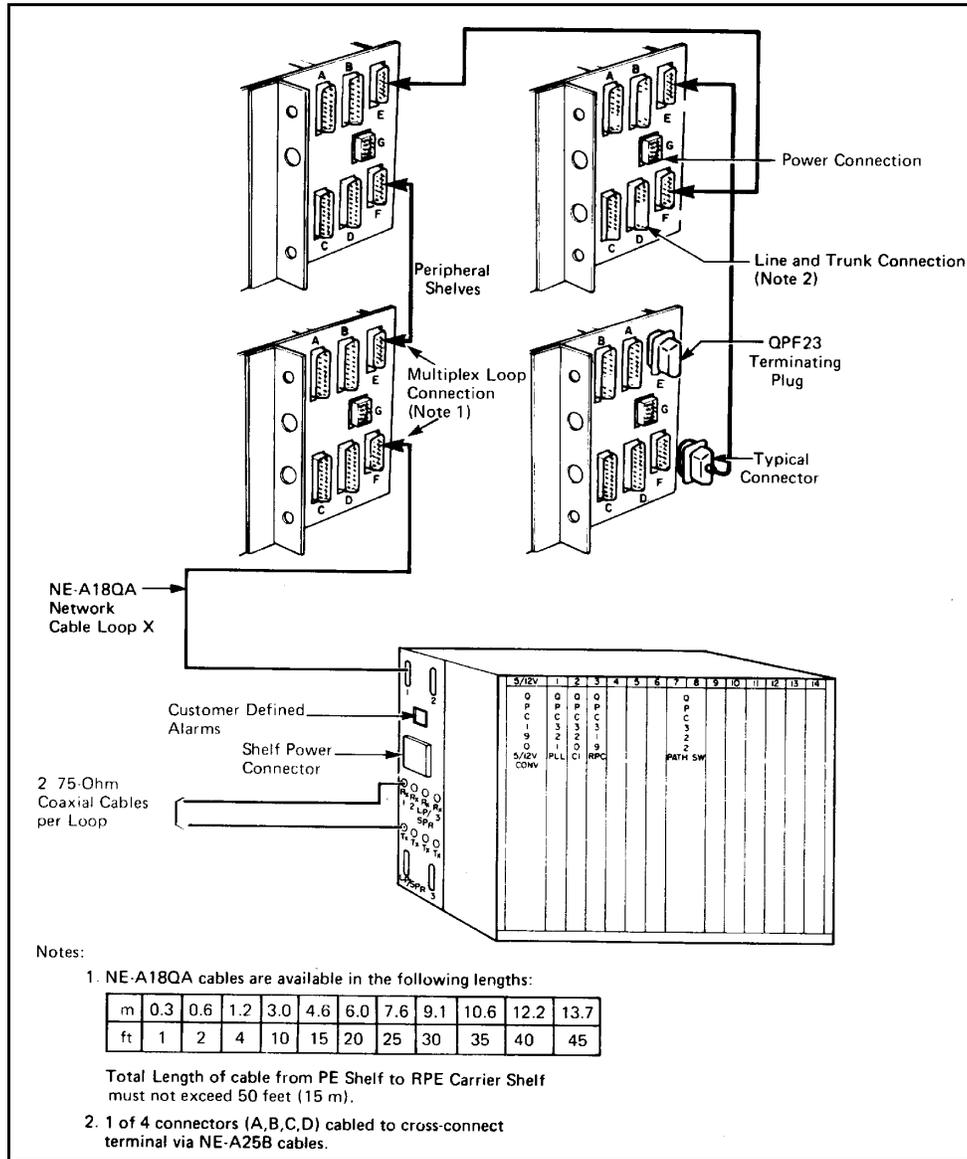
Note: At QBL14 unit, fuses for shelves being installed should be removed, and the associated switch set to OFF.

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Procedure 2-2 (continued) Remote site RPE group installation

12. Install 5/12-V converter circuit pack in RPE shelf. Refer to Figure 2-8 and to Procedure 2-3.
13. At the QBL14 install fuses for RPE shelf and set shelf power switch to ON. Refer to Figure 2-4.
14. Unpack, inspect and insert circuit packs into the RPE shelf as directed by the service order. Refer to Figure 2-8, Procedure 2-3 and service order.
15. Add related office data. Refer to Data Administration Implementation herein, service order and Figure 2-10.

Figure 2-5
Remote site RPE group cabling



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Figure 2-6
Alarm input lead connections

Note: A maximum of two Power Distribution Boxes can be connected together.

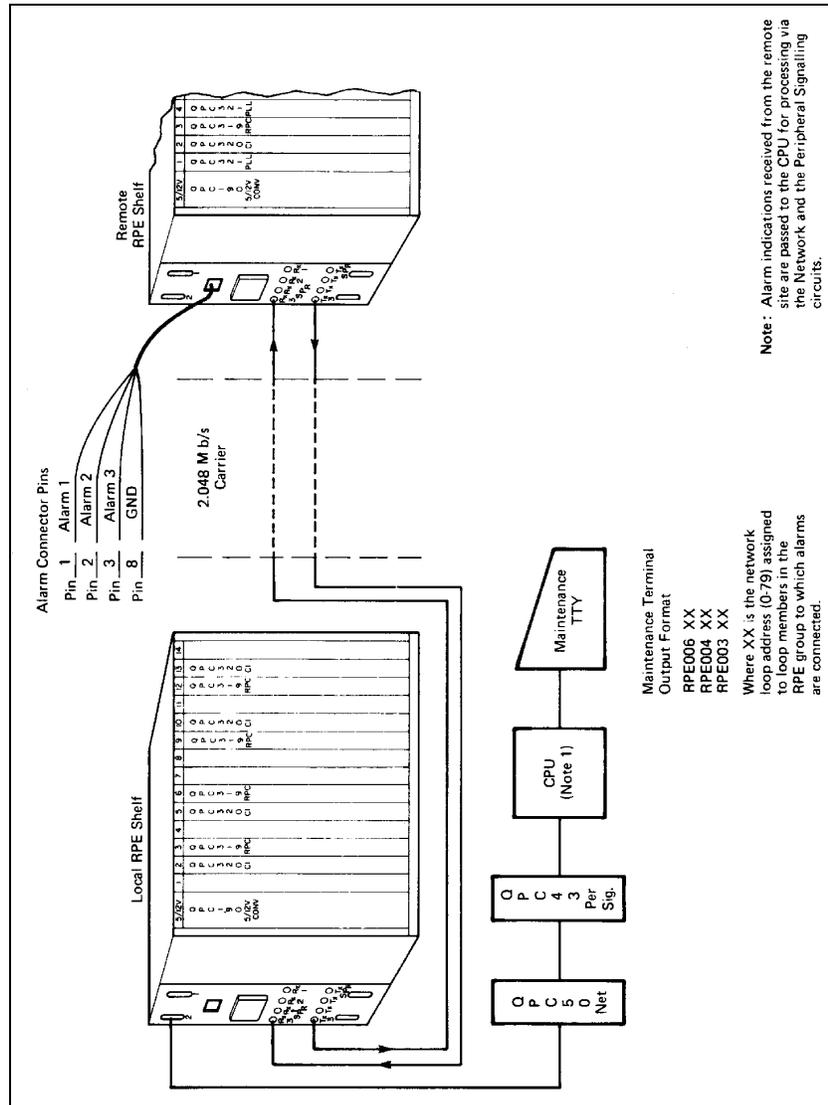
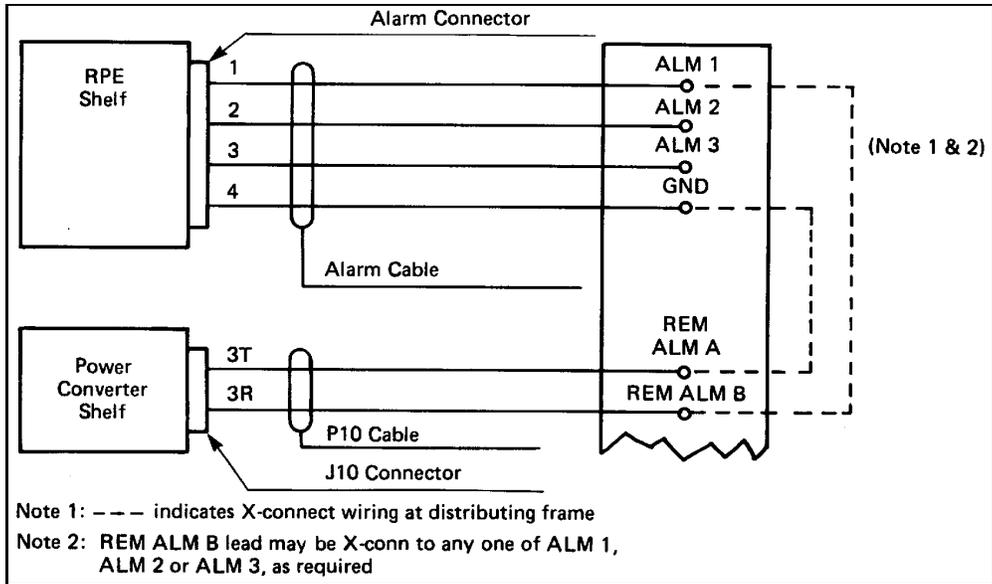
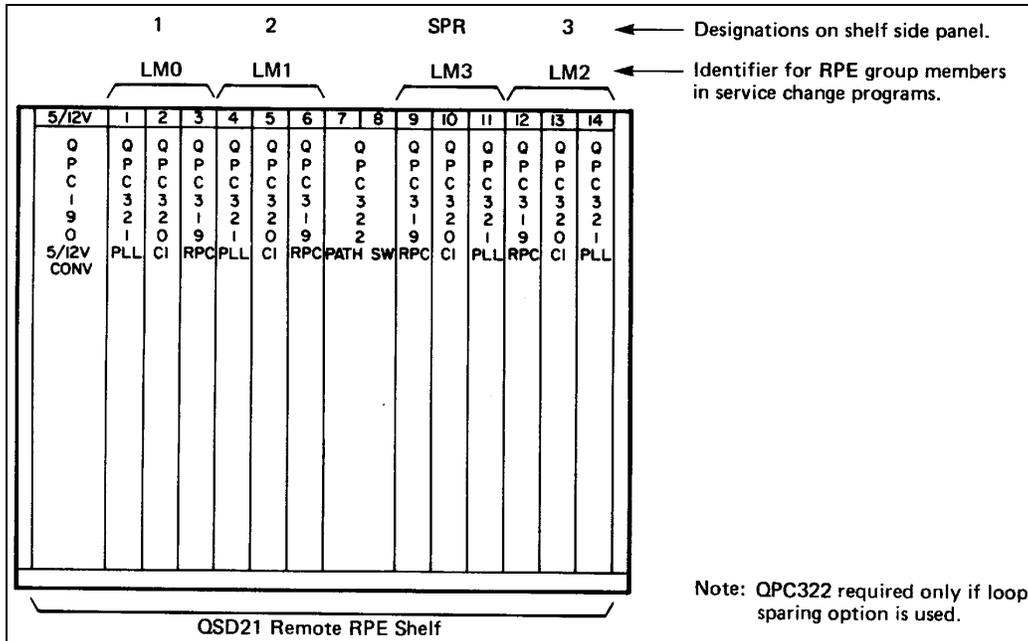


Figure 2-7
Typical wiring connections for power failure alarm at remote site



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Figure 2-8
Remote site circuit pack locations



Procedure 2-3
RPE circuit pack installation

CAUTION

Firmly touch the metal frame of the cabinet to discharge static electricity from your body before handling circuit packs.

N Before installing an RPE circuit pack the loop that the pack is assigned to should be replaced by the spare, if possible. When the circuit pack has been replaced and testing is completed, the loop should be enabled and placed back into service.
:

1. Remove the circuit pack from the shipping container.
Refer to 553-YYY1-210.
2. Add related office data from the service order into system memory, if required. Refer to Data Administration Implementation herein, service order, and Figure 2-10.
3. If the circuit pack has an ENB/DIS switch, set it to DIS before inserting pack in shelf. Refer to Figure 2-9.
4. Insert the edges of the circuit pack in the upper and lower aligning guides of the shelf. Ensure that pack is in correct location according to service order. Refer to Figure 2-2, Figure 2-8, and service order.
5. Push the circuit pack until resistance is felt..
6. Use the locking devices to firmly engage the pack in the shelf connector.
7. If equipped, set pack ENB/DIS switch to ENB.
8. Use the TTY, or maintenance set to software enable the circuit pack.
Refer to 553-2301-511 Program 53.
9. Test the circuit pack completely using overlay program 53.
Refer to 553-2301-511.

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Figure 2-9
RPE circuit pack faceplate layout

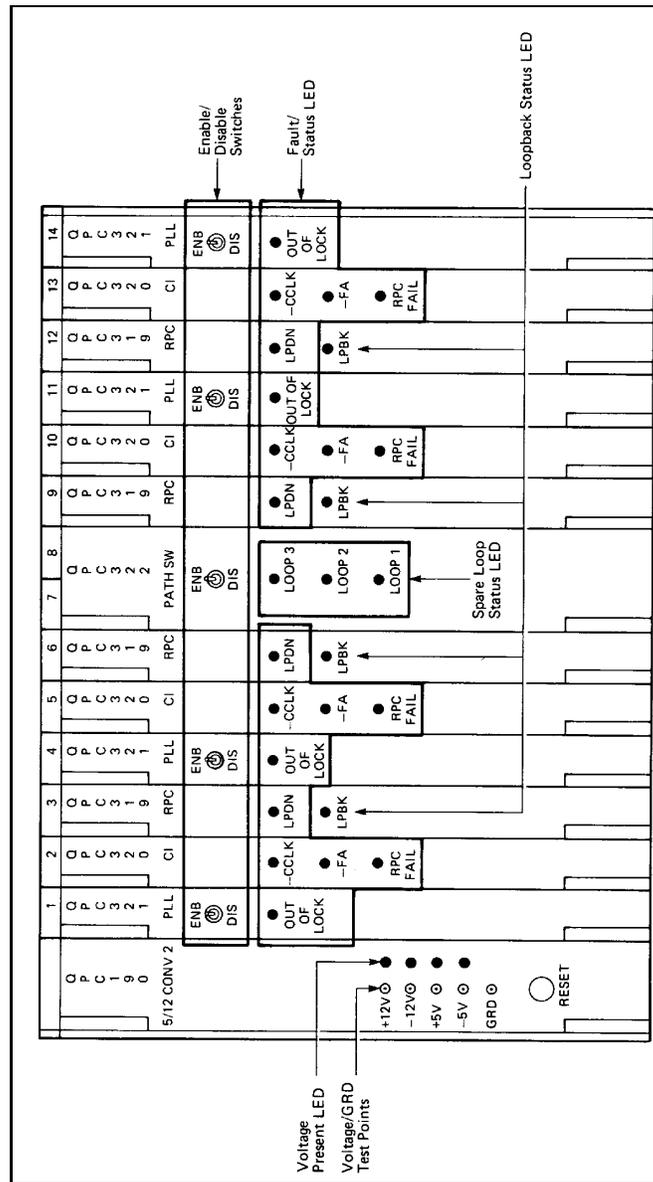
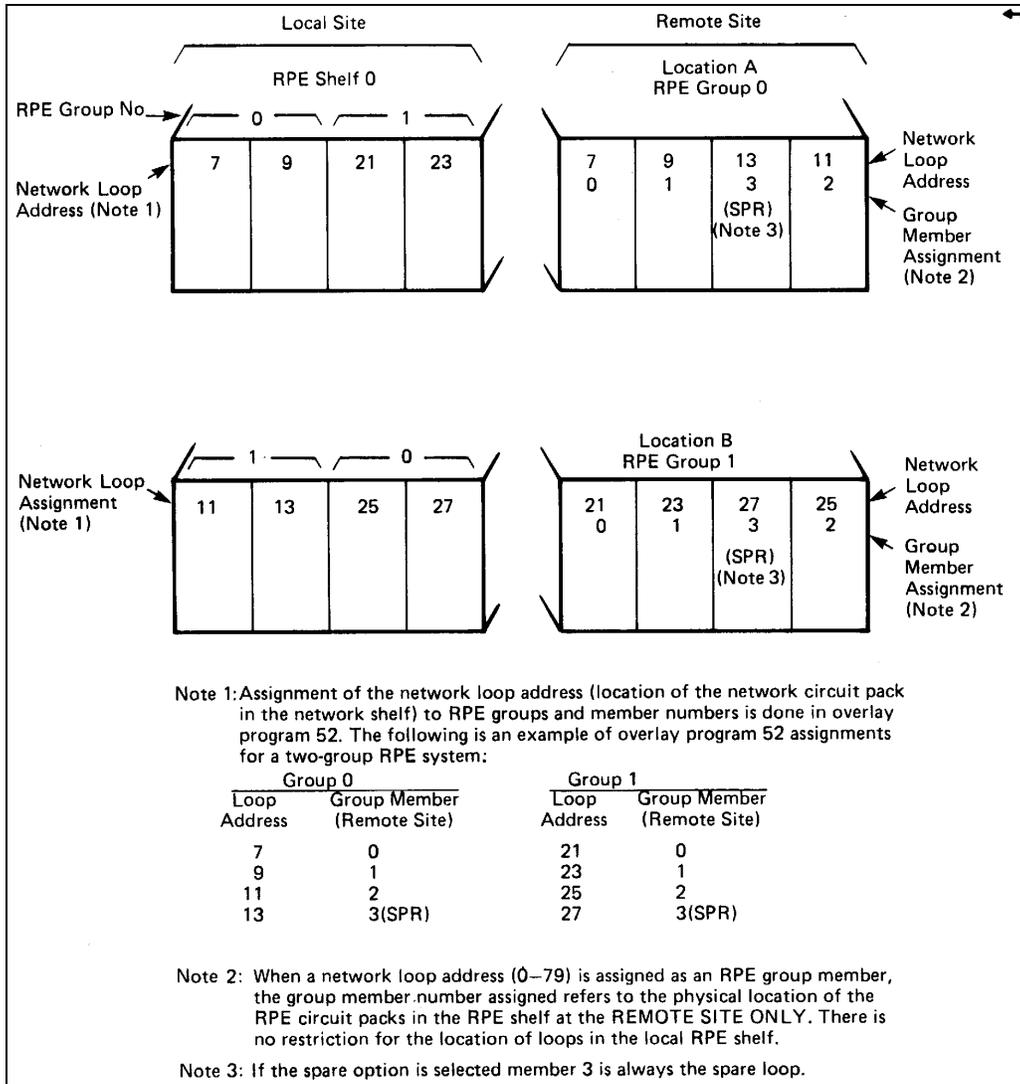


Figure 2-10
Typical layout for 2-group 2-location RPE system



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Procedure 2-4 RPE circuit pack removal

CAUTION

Firmly touch the metal frame of the cabinet to discharge static electricity from your body before handling circuit packs.

Note: Before removing an RPE circuit pack, the loop that the pack is assigned to should be replaced by the spare, if possible. When the circuit pack has been replaced and testing is completed, the loop should be enabled and placed back into service.

1. Verify that the service order contains removal information in accordance with the customer request. Remove related data from memory, if pack is not to be replaced. Refer to Data Administration Implementation herein and service order.
2. Set circuit pack ENB/DIS switch to DIS position, if equipped. Refer to Figure 2-9.
3. Use the locking devices to remove the circuit pack from the shelf.
4. Pack the circuit pack and return it to the supply depot. Refer to 553-YYY1-210.

Data administration implementation

To configure the operation of the 2-Mb/s Remote Peripheral Equipment (RPE) complete the following tasks. Refer to 553-2311-311 Appendix 1 for overlay program details.

Task - buffers/loops

To define RPE output buffer sizes and to add/remove RPE loops, respond to the following prompts in overlay program 17.

1. RPEB: This specifies the number of RPE buffers. Respond with values 16-1000.
2. REMO: This specifies the single density loops. Respond with 0-15 for ST machines/System Option 21, 0-31 for NT machines/System Options 51, 61, or 0-159 for XT machines/System Option 71.
3. REMD: This specifies the double density loops. Respond with 0-159.
4. REMQ: This specifies the quad density loops. Respond with 0-159.
5. DROL: This specifies the daily routine program number. Respond with 53.
6. TRLL: This specifies whether to complete RPE loop testing (including local loop back) in the RPE group as part of a daily routine. Respond with RPE group 1-31 1-31 ... Remove a group by responding with X1 X2 ...X31 as required.

Task - group member data

To define the RPE group data respond to the following prompts in overlay program 52.

1. GRP: This specifies the RPE group number. Respond with 1-31.
2. TASK: This specifies the task selection. Respond with GMBR.
3. ID: This specifies the group identification. Respond with one to sixteen alphanumeric characters.
4. LM0: This specifies the loop number for member 0 in the group (first primary loop). Respond with 0-15 for ST machines/System Option 21, 0-31 for NT machines/System Options 51, 61, or 0-159

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for XT machines/System Option 71. Precede with an X to delete a loop.

5. LM1: This specifies the loop number for member 1 in the group (second primary loop). Respond with 0-15 for ST machines/System Option 21, 0-31 for NT machines/System Options 51, 61, or 0-159 for XT machines/System Option 71. Precede with an X to delete a loop.
6. LM2: This specifies the loop number for member 2 in the group (third primary loop). Respond with 0-15 for ST machines/System Option 21, 0-31 for NT machines/System Options 51, 61, or 0-159 for XT machines/System Option 71. Precede with an X to delete a loop.
7. LM3: This specifies the loop number for member 3 in the group (fourth primary loop). Respond with;
0-15 for ST machines/System Option 21,
0-31 for NT machines/System Options 51, 61, or
0-159 for XT machines/System Option 71.
Precede with an X to delete a loop.
8. SPAR: This specifies the loop option. Respond with YES to set the option or the default NO (only prompted if LM3 is configured).

Task - timing threshold.

To define the RPE timing thresholds data respond to the following overlay program 52.

1. GRP: This specifies the RPE group number. Respond with 1-31.
2. TASK: This specifies the task selection. Respond with TTHS.
3. LFAL: This specifies the loss of frame alignment, in seconds, at the local site. Respond with 2-999. Default is 10.
4. FAEL: This specifies the frame alignment error rate, in seconds, at the local site. Respond with 2-999. Default is 600.
5. PCML: This specifies the PCM error rate, in seconds, at the local site. Respond with 2-999. Default is 600.
6. LFAR: This specifies the loss of frame alignment, in seconds, at the remote site. Respond with 2-999. Default is 10.

7. FAER: This specifies the frame alignment error rate, in seconds, at the remote site. Respond with 2-999. Default is 10.
8. PCMR: This specifies the PCM error rate, in seconds, at the remote site. Respond with 2-999. Default is 600.
9. RPF: This specifies the remote processor failure rate in milliseconds. Respond with 128-9999. Default is 1024.

Task - counter threshold

To define the RPE counter threshold data, respond with the following prompts in overlay program 52.

1. GRP: This specifies RPE group number. Respond with 1-31.
2. TASK: This specifies the task selection. Respond with CTHS.
3. LFAL: This specifies the loss of frame alignment, in seconds, at the local site. Respond with 0-255. Default is 5.
4. FAEL: This specifies the frame alignment error rate, in seconds, at the local site. Respond with 0-255. Default is 5.
5. PCML: This specifies the PCM error rate, in seconds, at the local site. Respond with 0-255. Default is 5.
6. LFAR: This specifies the loss of frame alignment, in seconds, at the remote site. Respond with 0-255. Default is 5.
7. FAER: This specifies the frame alignment error rate, in seconds, at the remote site. Respond with 0-255. Default is 5.
8. PCMR: This specifies the PCM error rate, in seconds, at the remote site. Respond with 0-255. Default is 5.
9. RPF: This specifies the remote processor failure rate in seconds. Respond with 0-255. Default is 3.
10. LINT: This specifies the Remote Peripheral Controller (RPC) initialization, in seconds. Respond with 0-255. Default is 2.
11. BGTH: This specifies the number of unsparing attempts allowed by background. Respond with 0-7. Default is 3. A response of 0 deactivates the background processing of overlay program 53 for this RPE group.

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Task - No-New-Data call timing

To define the RPE no-new-data (NND) timing data respond to the following prompts in overlay program 52.

1. GRP: This specifies the RPE group number. Respond with 1-31.
2. TASK: This specifies the task selection. Respond with NND.
3. ERTH: This specifies the error threshold in seconds (time after which the no-new-data state is entered). Respond with 10-30. Default is 14.
4. NNDT: This specifies the no-new-data call time in seconds (time to stay in the no-new-data state). Respond with 0-1800. Default is 60.

Acceptance tests

This part contains testing information and references to publications that contain complete testing information for equipment associated with the RPE installation.

Carrier equipment tests

The carrier equipment used with the RPE installation must be tested according to the manufacturers specifications. Any carrier system that is used to interface with the 2-Mb/s RPE feature must meet CCITT recommendation G703 for interface at 2.048 Mb/s.

Loop-around tests

The 2-Mb/s RPE feature includes a loop-around test facility which tests:

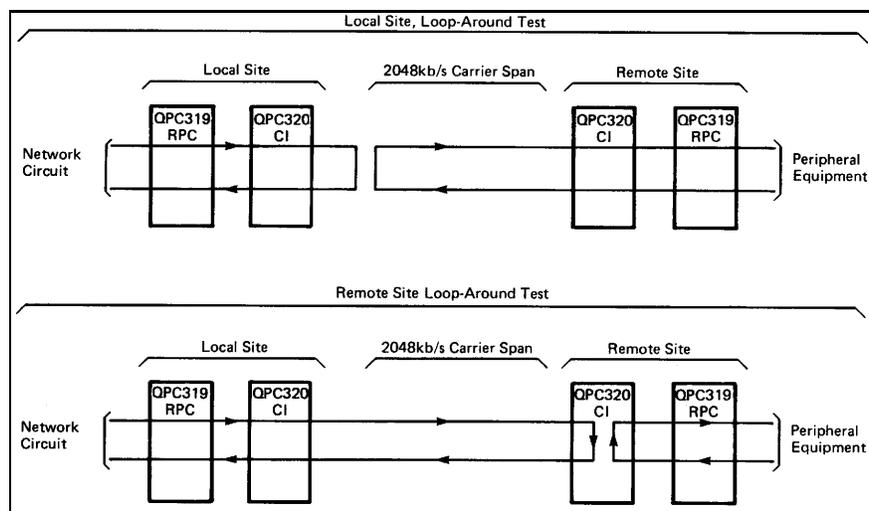
- registers within the local site RPC circuit pack
- the continuity of speech channels
- network connection memory
- the continuity of signaling channels.

Loop-around tests can be performed for both the local and remote sites. Local loop-around tests, test circuitry at the local site only. The remote loop-around test, tests circuitry at the local site, and the carrier facility. Figure 3-1 illustrates the portion of RPE equipment that is tested for local and remote loop-around tests. A successfully completed loop-around test ensures that the above tests were completed without faults being found.

3-2 Acceptance tests

Loop-around tests can be used to isolate faults to the local, carrier, or remote sites. Faults not recognized by a remote loop-around test will in most cases be located in the remote equipment. Faults recognized by the local test will be in the local equipment in most cases. Faults that are recognized by the remote test but not by the local test will in most cases be in the carrier facility.

Figure 3-1
Local and remote loop-around tests



RPE group acceptance tests

Before turning the equipment over to the customer the following tests must be completed successfully:

- Network Loop Tests
- Telephone Set, Console and Add-on Module Tests
- Customer-Defined Alarm Tests

Network loop tests

Each loop in the RPE group should be tested using the following tests from the RPE diagnostic overlay program 53:

LOOP L (L is the network loop address)

REML L

TSTL L

TRPL L

TSTR L

Note: If the spare loop option is used, the path switch circuit pack is tested by successfully completing a sparing operation of one of the loops in the RPE group. To complete a sparing operation the command SWSP L from overlay program 53 is used. When the sparing operation is completed, switch the spared loop back into service using the command UNSP L (where L is the RPE loop number) from overlay program 53.

Telephone set, console, and add-on module tests

Refer to 553-2311-310 Appendix 1 or 553-2311-105 Appendix 2 as required.

Customer defined alarm tests

Simulate an alarm condition for each alarm defined at the remote site. An alarm condition generates one of the following messages on the maintenance terminal at the local site:

- RPE006 L (Alarm 1 highest priority alarm)
- RPE004 L (Alarm 2)
- RPE003 L (Alarm 3)

Note: Each message is printed once for each loop (L) that is assigned in the RPE group.

Daily routines

The RPE diagnostic overlay program 53 should be included in the daily routines for any system having RPE. The inclusion of the RPE diagnostic program performs tests on RPE on a daily basis, reporting any faults found via the maintenance terminal and the console minor alarm lamp. The running of the RPE diagnostic overlay program 53 as part of the daily routines identifies faults in the RPE to the operating company. The program can also be run in background mode. Refer to 553-2301-511 for information about the daily routines.

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Remote Peripheral Equipment

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