

5.8/L6/U6/10.5/11/24 GHz 15/28/50 MB
PDH DIGITAL MICROWAVE RADIO SYSTEM
NLite L
(PDH 1+0/1+1 SYSTEM)

SECTION IV MAINTENANCE

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1. GENERAL

This section provides installation and initial line up information on the 5.8/ 1,6/06/10.5/11124 GHz 15/28/50 MB microwave radio system.

This manual is described for the firmware version of as follows. SW UNIT: 2.4.4
MD UNIT: 1.30

ATTENTION: TO REMAIN COMPLIANT WITH FCC PART 15 RULES INSTALLERS MUST UTILIZE SHIELDED CABLE WHEN CONNECTING TO THE "ALARM" CONNECTOR.

ATTENTION: TO REMAIN COMPLIANT WITH FCC PART 15 RULES INSTALLERS MUST UTILIZE SHIELDED CABLE WHEN CONNECTING TO THE "AUX" CONNECTOR.

ATTENTION: TO REMAIN COMPLIANT WITH FCC PART 15 RULES INSTALLERS MUST UTILIZE SHIELDED CABLE WHEN CONNECTING TO THE "CLUSTER ALARM" CONNECTOR.

ATTENTION: TO REMAIN COMPLIANT WITH FCC PART 15 RULES INSTALLERS MUST UTILIZE SHIELDED CABLE WHEN CONNECTING TO THE "DS1" CONNECTORS.

ATTENTION: TO REMAIN COMPLIANT WITH FCC PART 15 RULES INSTALLERS MUST UTILIZE SHIELDED CABLE WHEN CONNECTING TO THE "100M PORT 1 & PORT 2" CONNECTOR.

2. PRECAUTIONS

The following precautions must be carefully observed during maintenance.

- (a) The maintenance personnel should report arrival and departure from a station to the relevant station. The following are dangers and warnings to the maintenance personnel.

Warning: 1. *The -43 V DC power is superimposed on the center conductor of the IFL cable between the MDP and the TRP. Connecting test equipment directly to this terminal may damage it. Touching the coaxial cable core may cause electrical shock.*

2. *Engineers performing servicing must take necessary steps to avoid electro-static discharge which may damage the modules on the NLite L or cause error. Wear a conductive wrist strap connected to the grounded (G) jack on the front of the equipment shelf. This will minimize static build-up during servicing (see Fig. 2-1).*

3. *Do not remove/connect the IFL cable with the MDP power ON. Turn the MDP power OFF before connecting/disconnecting the IFL cable or equipment may be damaged.*

4. *After turning ON the equipment, wait at least 1 minute before turning it OFF again. Repeatedly turning the power ON and OFF within a short interval may cause the MDP to fail.*

5. *Contact NEC before program download on the LCT is performed. Equipment may not function correctly with improper operation.*

Caution: 1. *The top surface of the MDP is hot.*

- (b) During maintenance, the MDP should be set to maintenance condition by the local craft terminal (LCT) (see Chart 3-1).
- (c) To avoid service interruption under the maintenance, perform manual protection switching in 1+1 system.

Note: When protection switching has been automatically completed during a fault, keep this condition by manual protection switching operation.

- (d) First set the MAINT mode to "ON" before selecting the other items on the LCT maintenance menu.

- (e) Information on the maintenance and the control such as TX SW, RX SW, TX Mute, CW, Loopback, etc. is released if the power is turned off or the RESET switch is pressed.
- (f) While the CPU is initialized by pressing the RESET switch, alarm(s) is in normal condition. After initialization, the alarm information is properly provided through relay contacts.
- (g) Service will be interrupted instantly by pressing the RESET switch.
- (h) Service will be interrupted under the IF Loopback conditions.
- (i) When the control such as TX Mute, CW, Loopback, etc. is performed, set TX SW and RX SW to the same side No.1 or No.2. If it carries out in AUTO condition, it may not operate normally.
- (j) Traffic interruption may occur when performing the TX SW manual switching operation.
- (k) Before removing or installing the MDP/TRP, turn off the power switch on the MDP.
- (l) For procedures to change the password, refer to the Chapter 5 in this Maintenance Section.
- (m) After equipment start-up, allow the equipment to warm up at least 30 minutes.
- (n) After completing maintenance, restore all connections and manual switch(es) to normal and confirm that all red alarm LEDs are unlit.

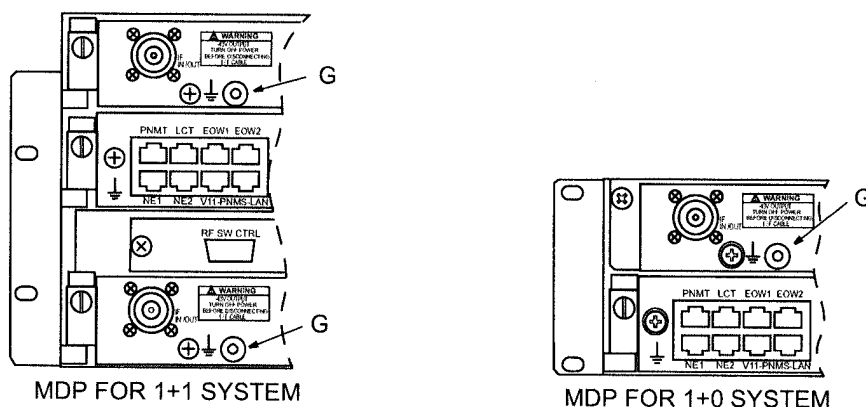
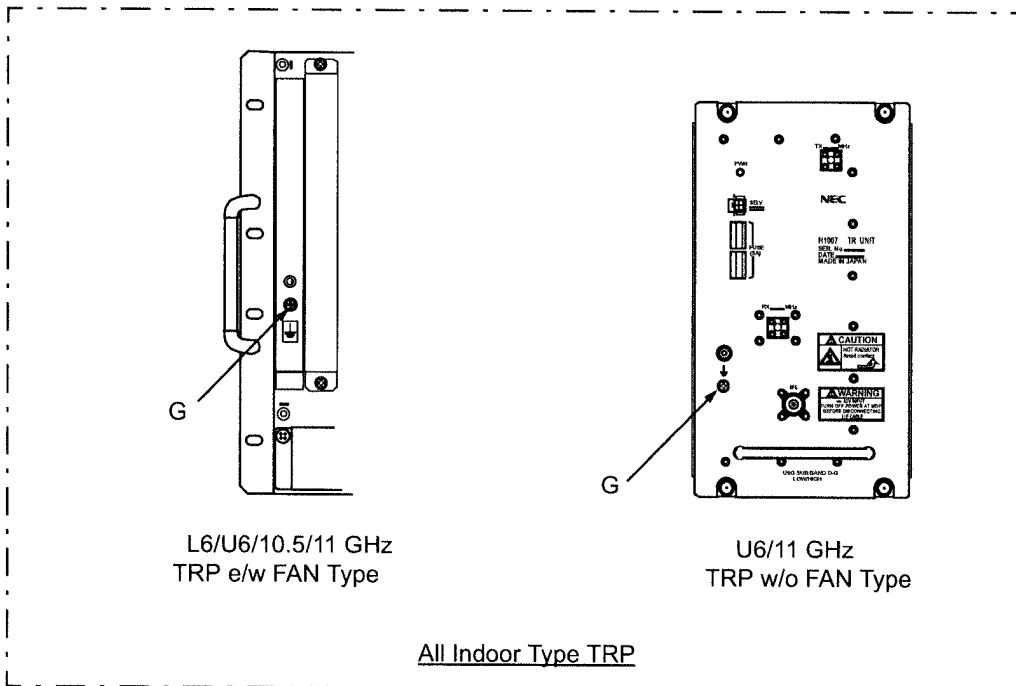
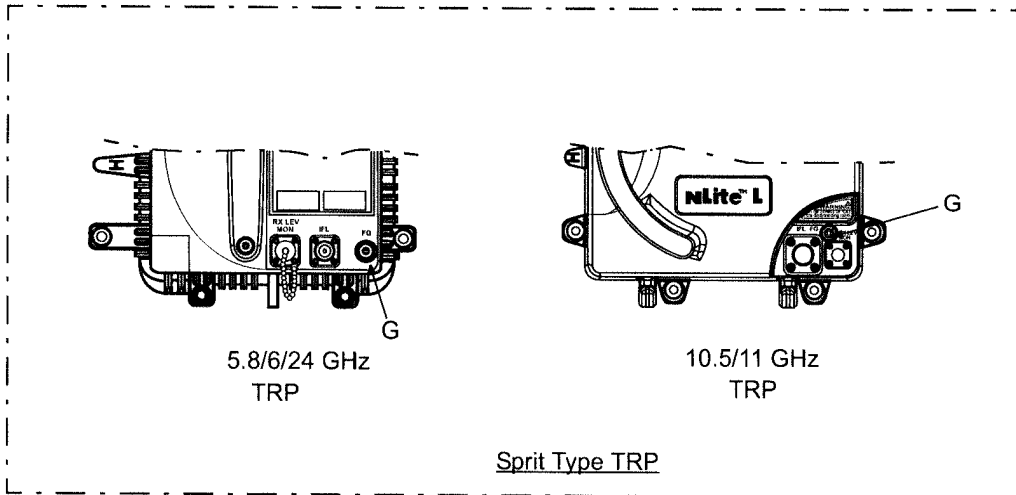


Fig. 2-1 Location of G Terminal (MDP)



Location of G Terminal (TRP)

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3. PREVENTIVE MAINTENANCE

This chapter provides the routine (annual) maintenance procedures to ensure the satisfactory operation of the equipment. During preventive maintenance, carefully observe the precautions given in chapter 2.

3.1 Test Sets and Accessories

The test sets and special accessories listed in Table 3-1 are required for maintenance. If recommended test sets and accessories are not available, equivalents may be used.

Table 3-1 Test Sets and Accessories

No.	Model Type	Model Number	Manufacture
1	PDH Analyzer	MP1550A	Anritsu
2	Digital Multimeter	34401A	Agilent
3	OW/RX LEV Monitor*	X0818	NEC
4	Screwdriver	—	—
5	T Type Hexagonal Driver	—	—
6	Torque Wrench	—	—
7	Local Craft Terminal (LCT) with RS-232C Cable	—	—

*Note: 1. * The OW/RX LEV Monitor operates on a dry battery (6F22/9V). When the OW/RX LEV Monitor will not be used for a long period, remove the battery to avoid damage from battery leakage and corrosion.*

3.2 LCT Maintenance Mode

Chart 3-1 Maintenance Mode Setting

Step	Procedure
1	Connect the LCT access cable (RS-232C) between the LCT and the MDP,

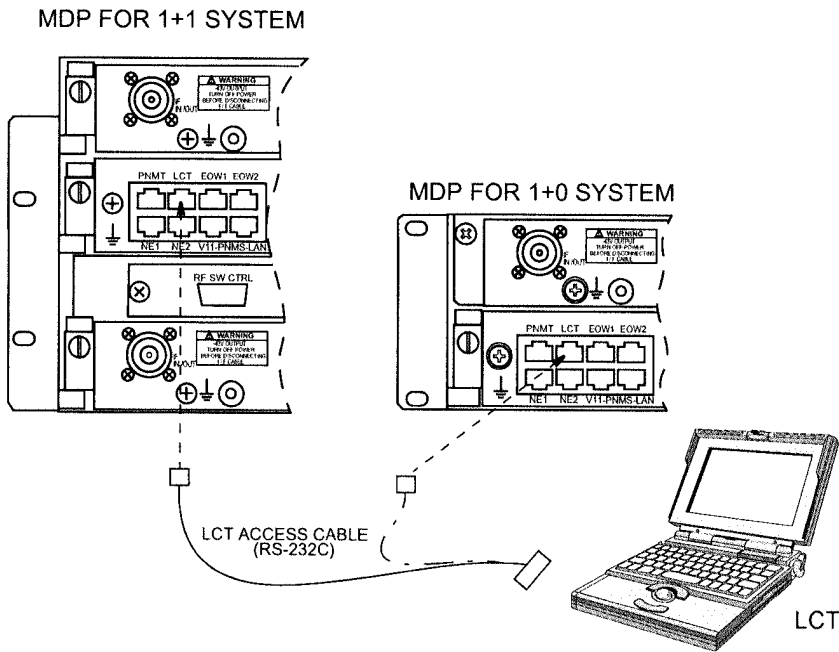


Fig. 3-1 LCT Setup

- 2 Open the Terminal software (e.g; HyperTerminal),
- 3 Enter Login name "Admin" and the "Enter" key,

Chart 3-1 Maintenance Mode Setting (Cont'd)

Step	Procedure
------	-----------

<pre> Login : Admin Password : ***** --- NEC PDH RADIO VER. X.XX.XX --- 0. Logout 1. Alarm / Status 2. Performance Monitor 3. Provisioning Data 4. System Configuration 5. Inventory Data 6. Relay / House Keeping 7. Maintenance Enter Selection :</pre>
--

4 Enter the valid password and press the “Enter” key,

Maintenance Mode Setting

5 Press the “7” key and press the “Enter” key,

<pre> Enter Selection : 7 --- Maintenance --- 1. MAINT Mode (OFF) 2. Control 3. Reset CPU 4. Set Calendar 5. Password Setting 6. Program Download Enter Selection : 1 --- MAINT Mode --- 1. On 2. Off Enter Selection : 1 --- Maintenance --- 1. MAINT Mode (ON) 2. Control 3. Reset CPU 4. Set Calendar 5. Password Setting 6. Program Download Enter Selection :</pre>
--

6 Press the “1” key and press the “Enter” key,

7 Press the “1” key and press the “Enter” key for Maint Mode (ON),

Chart 3-1 Maintenance Mode Setting (Cont'd)

Step	Procedure
<u>Restoring to Normal Mode</u>	
8	Press the “7” key and press the “Enter” key,
<pre> --- NEC PDH RADIO VER. X.XX.XX --- 0. Logout 1. Alarm / Status 2. Performance Monitor 3. Provisioning Data 4. System Configuration 5. Inventory Data 6. Relay / House Keeping 7. Maintenance Enter Selection : 7 --- Maintenance --- 1. MAINT Mode (ON) 2. Control 3. Reset CPU 4. Set Calendar 5. Password Setting 6. Program Download Enter Selection : 1 --- MAINT Mode --- 1. On 2. Off Enter Selection : 2 --- Maintenance --- 1. MAINT Mode (OFF) 2. Control 3. Reset CPU 4. Set Calendar 5. Password Setting 6. Program Download Enter Selection :</pre>	
9	Press the “1” key and press the “Enter” key,
10	Press the “2” key and press the “Enter” key for Mainte mode OFF,
<p>If any item has been controlled, an error message and controlled items are displayed. Release item(s) which is under control before Mainte mode OFF.</p>	
11	Press the “ESC” key to return to previous menu,
12	Press the “0” key to logout and press the “Enter” key,

3.3 Performance Monitoring

Chart 3-2 Performance Monitoring

Step	Procedure
1	Connect the RS-232C cable between the LCT and MDP (see Fig. 3-1 in Chart 3-1),
2	Open the Terminal software (e.g; HyperTerminal),
3	Enter Login name "User" and press the "Enter" key on the LCT,

```

Login : User
--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
Enter Selection :

```

- 4 Press the "2" key for Performance Monitor and press the "Enter" key,

Chart 3-2 Performance Monitoring (Cont'd)

Step	Procedure
5	Press the "1" key for Display Metering /BER and press the "Enter" key. Verify the all items listed in Table 3-2.

```

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
Enter Selection : 2

--- Performance Monitor ---
1. Display Metering / BER
2. Display Performance Monitor
3. Display Threshold Data
Enter Selection : 1

--- Display Metering / BER ---
TX POWER      +10dBm
RX LEVEL      -60dBm
TRP PS MON    -48V
BER           0.0E-10 (Calculating)

--- Performance Monitor ---
1. Display Metering / BER
2. Display Performance Monitor
3. Display Threshold Data
Enter Selection :

```

Notes: 1. In the 1+1 system, metering/BER values for No.1 CH is displayed in the left side and for No.2 CH is displayed in the right side.

2. "3.0E-4" indicates the bit error rate of 3×10^{-4} .
3. * BER (BER between radio) is calculated every one minute. "Calculating" is displayed till the value is fixed.
4. *If the performance data from the TRP are not received, **dBm and ***V are displayed.
5. TX POWER/RX LEVEL is indicated in 1 dB step.

Chart 3-2 Performance Monitoring (Cont'd)

Step Procedure

Table 3-2 Meter Reading

Check Item	Type	Normal Indication		Allowable Range
TX POWER *1	Split	5.8/L6/U6 GHz	+5 to +25 dBm (Standard Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
		10.5 GHz	+1 to +21 dBm (Standard Type)	Normal Indication ±3 dB (8/16DS1)
		11 GHz	+1.5 to +21.5 dBm (Standard Type)	Normal Indication ±3 dB (DS3)
		24 GHz	-2 to +18 dBm (Standard Type)	Normal Indication ±3 dB (28 DS1/DS3)
	All Indoor (e/w FAN)	L6 GHz	+10.5 to +30.5 dBm (Standard Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
			+13.5 to +33.5 dBm (High Power Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
		U6 GHz	+9.5 to +29.5 dBm (Standard Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
			+12.5 to +32.5 dBm (High Power Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
		10.5 GHz	+9 to +29 dBm (High Power Type)	Normal Indication ±3 dB (8/16DS1)
		11 GHz	+10 to +30 dBm (High Power Type)	Normal Indication ±3 dB (DS3)
	All Indoor (w/o FAN)	U6 GHz	+8.5 to +28.5 dBm (Standard Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
		11 GHz	+5.5 to +25.5 dBm (Standard Type)	Normal Indication ±3 dB (8/16/28DS1/DS3)
RX LEVEL		-30 dBm *2		
TRP PS MON		-43 V *3		-32 to -46 V DC

Notes: *1. When ATPC/MTPC range is set to 20 to 0 dB.

*2. Varies in proportion to the receiving RF signal level.

*3. Varies with cable length between the MDP and TRP.

- 6 Press the "ESC" key to go back to Main menu, and press "Enter",

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4. CORRECTIVE MAINTENANCE

Corrective maintenance done in the field is described in this chapter. Corrective maintenance in the field covers fault isolation, module/unit replacement and alignment. The fault location procedures describes how to isolate unit-level faults.

Faults can be classified into those that cause deterioration of the transmission quality and those that interrupt the service due to a malfunction of the equipment. This chapter explains the troubleshooting procedures for equipment faults and the corresponding remedial methods. The purpose of troubleshooting malfunctioning equipment is to restart the service by locating the faulty part and replacing it with a spare.

The faults that cause deterioration in the transmission quality are primarily originated by changes occurred in the state of propagation. Therefore, if a decline in the transmission quality or similar fault takes place frequently, the link design will have to be reviewed.

During the corrective maintenance, carefully observe the precautions given in chapter 2, until the alignment is completed.

4.1 Fault Location

The following 3 methods are available for checking the details of a fault:

- Checking the ALM LED Indications and LCT Indication
- Meter Readings
- Loopback.

(a) Checking the ALM LED Indications and LCT Indication

A faulty part can be located by checking the ALM LED indications and LCT indications. For the explanation of the ALM LED indication and LCT indication, refer to Section 2.4.1 (Alarm Indication and Reporting) of Chapter 2 in Description section. Also refer to Chart 4-1 in this Chapter.

(b) Meter Readings

Based on the meter readings during periodical inspection described in Chapter 4, a faulty part can be located by checking if the reading values exceed the permissible ranges. Table 4-1 shows the correspondence between the items for which abnormal readings are detected and the faulty parts. In the case of an abnormal BER measurement result, try to locate the faulty part by next (c) Loopback.

(c) Loopback

When there is an interruption of signals, use the PDH Analyzer and isolate the faulty part by checking the passage of the 1.5 MB signal by loopback. Locate the fault by using the following diagrams.

- Fig. 4-1 – Loopback Diagram for Fault Isolation
Shows the section from where the signal is turned back.
- Chart 4-2 – Loopback BER Measurement
- Fig. 4-2 – BER Measurement Setup
- Chart 4-3 – Loopback Control Setting

When maintenance such as isolating a faulty portion at the occurrence of failure and revising the software are carried out, the “Control” item in Maintenance is used.

```

Enter Selection : 2

--- Control ---
0. Current Status
2. ATPC Manual Control
3. TX SW Manual Control
4. TX Mute
5. RX SW Manual Control
6. CW
7. IF Loopback
8. Main Signal Loopback (Near End)
9. Main Signal Loopback (Far End)
11. Antenna Alignment Mode
Enter Selection :
    
```

Note: Setting items displayed on the LCT depend on setting condition of “System Configuration”.

The details of “Control” item are described below:

Control

Control items can be selected only under maintenance mode. As this “Control” is likely to cause disconnection of signal, take care during operation.

- Current status
Select for indicating present condition of every control items.
- ATPC Manual Control
Used when changing of the transmitting power is required during ATPC operation when the ATPC mode is selected in system configuration.

- TXSW Manual Control
Controls manual switchover of the TX SW at the transmitting side in only the 1+1 Hot standby (HS) system.

Note: Possible TX signal interruption caused by TX SW manual control.

- TX Mute
Turns off/disables the transmitter output.
- RXSW Manual Control
Controls manual switchover of the RX SW in the 1+1 system. The switchover is carried out without traffic interruption. Adjustment of the delay time of No.1 and No.2 is automatically set.
- CW
Used for outputting a clean carrier wave (CW). Used to confirm the transmitting output power and frequency stability.
- IF Loopback
Used for localizing equipment failure to MDP or TRP. The input 1.5 MB or 45 MB signal from MUX is looped back at IF stage. If no abnormality is found in the signal after IF loopback, it is assumed that the TRP has a problem.
- Main Signal Loopback (NEAR END)
Used for localizing equipment failure to MUX equipment or radio equipment. The input 1.5 MB or 45 MB signals from MUX is looped back and then output on individual channels. If no abnormality is found in the signal with NEAR END loopback, it is assumed that the radio equipment (MDP or TRP) has a problem.
- Main Signal Loopback (FAR END)
Used for localizing equipment failure to MUX equipment or radio equipment. Signal is looped back at the MDP of the opposite station. If no abnormality is found in the signal through FAR END loopback, it is assumed that the local radio equipment (MDP or TRP) has no problem. Check the Main Signal loopback (NEAR END) at the opposite station.
- Antenna Alignment Mode (This mode is applied for only Split Type TRP)
In order to measure exact performance of AGC V at the OW/RX LEV MON of the outdoor type TRP, it is mandatory required to set Antenna Alignment Mode to ON as the AGC voltage indication is not guaranteed outside Antenna Alignment Mode.
It is necessary to set to Antenna Alignment Mode every time monitor the RX level with the OW/RX LEV MON unit for the outdoor type TRP.

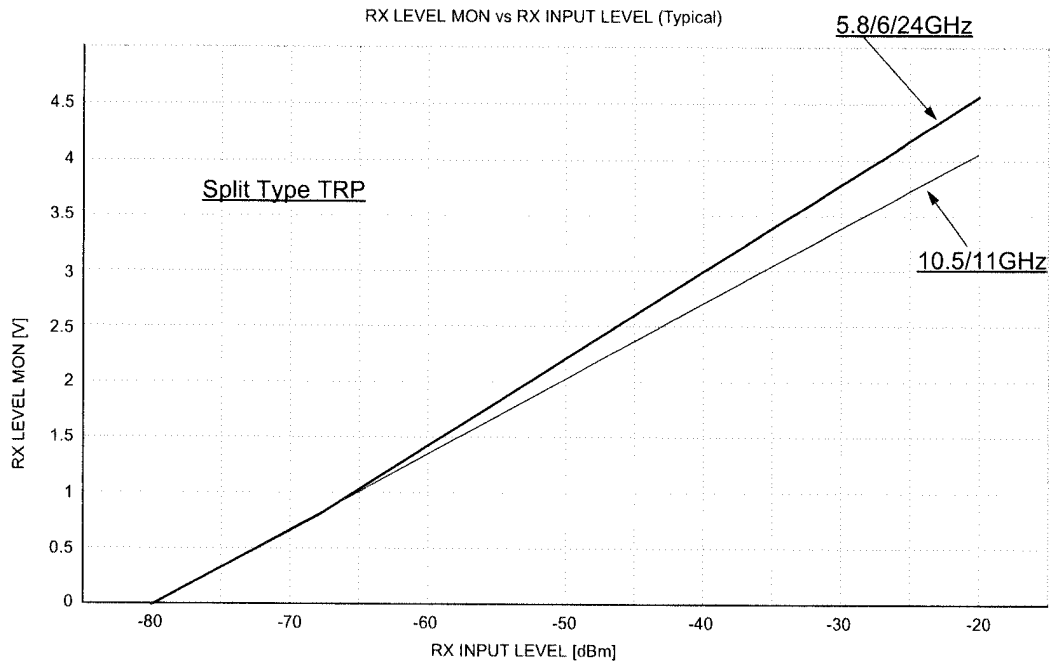


Table 4-1 Fault Isolation by Meter Reading

Condition	Meter Reading			Fault Isolation
	TX Power	RX Level	TRP PS MON	
1	○			TRP
2		○		Path propagation or TRP
3			○	DC-DC CONV module on MD UNIT of MDP or IFL cable*

Note: ○ indicates abnormal condition.

* If the IFL cable is open, the TRP ALM LED on the MDP turns to flashing.

Chart 4-1 Alarm and Status Monitoring

Step	Procedure
1	Connect the RS-232C cable between the LCT and MDP (see Fig. 2-2 in Chart 2-1),
2	Open the Terminal software (e.g; HyperTerminal),
3	Enter Login name "User" and press the "Enter" key on the LCT,

```

Login : User

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
Enter Selection :
    
```

4 Press the "1" key for Alarm/Status and press the "Enter" key,

```

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
Enter Selection : 1

--- TRP ---
TX Power           Normal  Normal
TX Input           Normal  Normal
RX Level           Normal  Normal
APC                Normal  Normal
Cable              Alarm   Normal
    } *1

Next Data ? (Y/N) : y
    
```

Chart 4-1 Alarm and Status Monitoring (Cont'd)

Step	Procedure
--- MDP ---	
MOD	Alarm Normal
DEM	Alarm Normal
High BER	Normal Normal
Low BER	Normal Normal
LOF	Normal Normal
MDCPU	Alarm Normal
BB Linearizer	OPR OPR *6
Next Data ? (Y/N) : y	
--- Main INTFC ---	
Input LOS	(CH01-08) : **--*--- (CH09-16) : *----- (CH17-24) : ----- (CH25-28) : ----
Output LOS	(CH01-08) : **--*--- (CH09-16) : *----- (CH17-24) : ----- (CH25-28) : ----
AIS Generated	(CH01-08) : **--*--- (CH09-16) : *----- (CH17-24) : ----- (CH25-28) : ----
AIS Received	(CH01-08) : ----- (CH09-16) : ----- (CH17-24) : ----- (CH25-28) : ----
Channel Usage Error	(CH01-08) : ---*---* (CH09-16) : ----- (CH17-24) : ----- (CH25-28) : ----
Next Data ? (Y/N) : y	
--- LAN INTFC ---	
Port1 Link	Link / Alarm
Port1 Collision	Normal / Collision
Port1 Mode	100BASE-TX / 10BASE-T
Port1 Duplex	Full Duplex / Half Duplex
Port1 Link Down Control	Normal / Under Execution
Port2 Link	Link / Alarm
Port2 Collision	Normal / Collision
Port2 Mode	100BASE-TX / 10BASE-T
Port2 Duplex	Full Duplex / Half Duplex
Port2 Link Down Control	Normal / Under Execution
Next Data ? (Y/N) : y	

Chart 4-1 Alarm and Status Monitoring (Cont'd)

Step	Procedure
--- Wayside INTFC ---	
LOS	Alarm / Normal
AIS Generated	Generated / Normal
AIS Received	Received / Normal
Next Data ? (Y/N): y	
--- Module ---	
MODEM	Alarm Normal
Main INTFC	Normal
LAN INTFC	Normal *7
Wayside INTFC	Normal *8
RF SW CTRL	Normal
Power Supply	Normal Normal
--- NEC PDH RADIO VER. X.XX.XX ---	
0. Logout	
1. Alarm / Status	
2. Performance Monitor	
3. Provisioning Data	
4. System Configuration	
5. Inventory Data	
6. Relay / House Keeping	

- Notes:
- In the 1+1 system, status for No. 1 CH is appeared in the left side and for No. 2 CH is appeared in the right side.
 - *1 When an "Alarm" indication is displayed, the TRP has a failure.
 - *2 When an "Alarm" indication is displayed, the MD UNIT on MDP is failure.
 - *3 In the 8 x 1.5 MB system, (CH01-08) is indicated only.
 - *3 In the 16 x 1.5 MB system, (CH01-08) and (CH09-16) are indicated
 - *3 In the 28 x 1.5 MB system, (CH01-08), (CH09-16), (CH17-24) and (CH25-28) are indicated
 - *3 In the 1 x 45 MB system, (CH01-08) and (CH09-16) are not indicated.
 - *4 When an "*" indication is displayed, AIS is generated ("-" indication is normal condition).
 - *5 Indicates main channel interface usage error when Report has been selected for the Channel Usage Error.

Chart 4-1 Alarm and Status Monitoring (Cont'd)

Step	Procedure
	<p>10. *6 Indicates when Linearizer is controlled as follows.</p> <p style="padding-left: 40px;"><i>AUTO Control</i> : "OPR" <i>Reset Control</i> : "NO OPR" <i>Not Provided BB Linearizer</i>: "N/A"</p> <p>11. *7 Item when "LAN function" is "Used".</p> <p>12. *8 When "Port2 Assignment" is "NA", not displayed.</p> <p>13. Alarm and status indication items should be displayed depending on system requirement.</p>

The alarm and status of each module and TRP are displayed. Each item is explained below.

TX Power:

Indicates the status of the transmitter in the TRP. When the normal transmission level can not be output due to failure in the transmitter or DC power failure in the TRP, this alarm is issued. To reset this condition, turn off the TRP/MDP and turn on again the TRP, then MDP.

TX Input:

Indicates the status of the modulated signal input from the MDP. If the input signal from the MDP is lost, this alarm is issued.

RX Level:

Indicates the status of the receiver in the TRP. If the receiving level exceeds the required range, this alarm is issued.

APC:

Indicates the status of the synthesizer in the TRP. If any abnormality occurs in the synthesizer, this alarm is issued.

Cable:

Indicates the status of communication between MDP and TRP. If a communication abnormality is caused between TRP and the MDP, this alarm is issued.

Note: When the IF cable is in an open condition, the TRP alarm indicator on the MDP turns to flashing.

Chart 4-1 Alarm and Status Monitoring (Cont'd)

Step	Procedure
FAN (only for e/w FAN Type):	Indicates operating conditions of the FAN UNIT. If the rotation rate of the fan is lower than the preset value, this alarm is issued and the ALM LED on the TR UNIT is lit.
MOD:	Indicates the status of the modulator. If a failure occurred in the modulator and as a result of a transmitter side LSI failure, this alarm is issued.
DEM:	Indicates the status of the demodulator. If a IF input loss occurred in the demodulator, this alarm is issued.
High BER:	Indicates the status of quality deterioration status between radio sections. If the signal is deteriorates below the threshold value, this alarm is issued.
Low BER:	Indicates bit error rate (BER) of the data signal. If the signal is deteriorated below the threshold values alarm is issued.
LOF:	Indicates the radio frame synchronization status.
MDCPU:	Indicates the status of communication between the MDP modules. If any abnormality in the response of a module in the MDP has occurred, this alarm is issued.
BB Linearizer:	Indicates the Linearizer control status. When the "Linearizer control" for the TRP corresponded to the BB Linearizer is set to "AUTO" mode, "OPR" appears, if it is reset, "NO OPR" appears. When the TRP has no BB Linearizer function, N/A appears.

Chart 4-1 Alarm and Status Monitoring (Cont'd)

Step	Procedure
Input LOS:	Indicates the input status of the 1.5 MB signal for Main INTFC. If the input is disconnected, this alarm is issued.
Output LOS:	Indicates the output status of the 1.5 MB signal of Main INTFC. If the received signal from radio link is lost, this alarm is issued.
AIS Generated:	Indicates the status of AIS generation for receiving channel in the Main INTFC.
AIS Received:	Indicates the status of AIS RCVD signal for transmitting channel in the Main INTFC.
Channel Usage Error:	In Main Channel Usage item of the Provisioning Data, when 1.5 MB bipolar signal is inputted into the channel which has chosen "Not Used", * mark is displayed. And the MDP ALM indicator on the front of the MDP is lighted.
Port1/2 Link:	Indicates the operating LINK status of the LAN Por1/2. If LINK DOWN occurs, alarm is issued.
Port1/2 Collision:	Indicates the Collision state of the LAN Por1/2 when the "Collision Report" is set to "Enable" in provisioning. If Collision occurs, this status is issued.
Port1/2 Mode:	Indicates the operating status of the LAN Por1 /2. Indicates either (preference mode) "100BASE-TX" or "10BASE-T".

Chart 4-1 Alarm and Status Monitoring (Cont'd)

Step	Procedure
	<p>Port1/2 Duplex: Indicates the operating status of the LAN Por1/2. Indicates either (preference mode) "Full Duplex" or "Half Duplex".</p>
	<p>Port1/2 Link Down Control: Indicates "Under Execution" when control of Far End Link Down is operated.</p>
	<p>MODEM: Indicates the operating status of the MODEM. If an abnormal condition occurs in the equipment, this alarm is issued.</p>
	<p>Main INTFC: Indicates the operating status of the Main INTFC. If an abnormal condition occurs in the equipment, alarm is issued.</p>
	<p>LAN INTFC: Indicates the operating status of the LAN INTFC. If an abnormal condition occurs in the equipment, alarm is issued.</p>
	<p>Wayside INTFC: Indicates the WS operating status of the WS INTFC. If 1.5 MB WS input or WS output is lost, alarm is issued.</p>
	<p>LINK/ACT indicator (optional): Lights when line is linked. Blinks when data is sending and receiving.</p>
	<p>FD/COLL indicator (optional): Lights when FULL DUPLEX mode or lights when COLLISION occurs in HALF DUPLEX mode.</p>
5	Press the "0" key to logout and press the "Enter" key.

Chart 4-2 Loopback BER Measurement

Apparatus:
PDH Analyzer

Step	Procedure
1	<p>Disconnect the D-sub connectors from the CH1-CH8 TRAFFIC IN/OUT or CH9-CH16 TRAFFIC IN/OUT, on the MDP (see Fig. 4-2) (For 8/16 x DS1 System),</p> <p>Disconnect the coaxial cable from the TRAFFIC IN/OUT on the MDP (see Fig. 4-2) (For 1 x DS3 System),</p>
2	<p>Set the PDH Analyzer as follows:</p> <p><u>For 8/16/28 x DS1 system</u></p> <ul style="list-style-type: none"> • Bit rate : 1.544 Mbps (ANSI T1.107) • Code format : B8ZS or AMI • Impedance : 100 ohms, balanced <p><u>For 1 x DS3 system</u></p> <ul style="list-style-type: none"> • Bit rate : 44.736 Mbps (ANSI T1.107) • Code format : B3ZS • Impedance : 75 ohms, unbalanced
3	Set up corresponding connection as in Fig. 4-2 (1/6 to 6/6),
4	Measure the BER for each channel,

Requirement: 1×10^{-12} or less

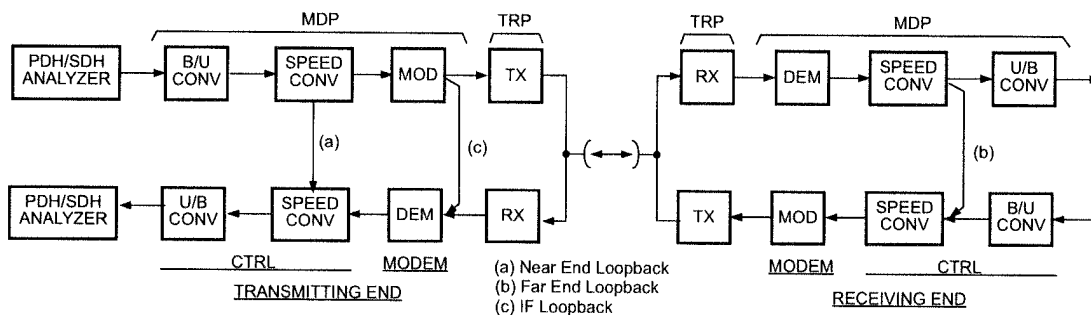
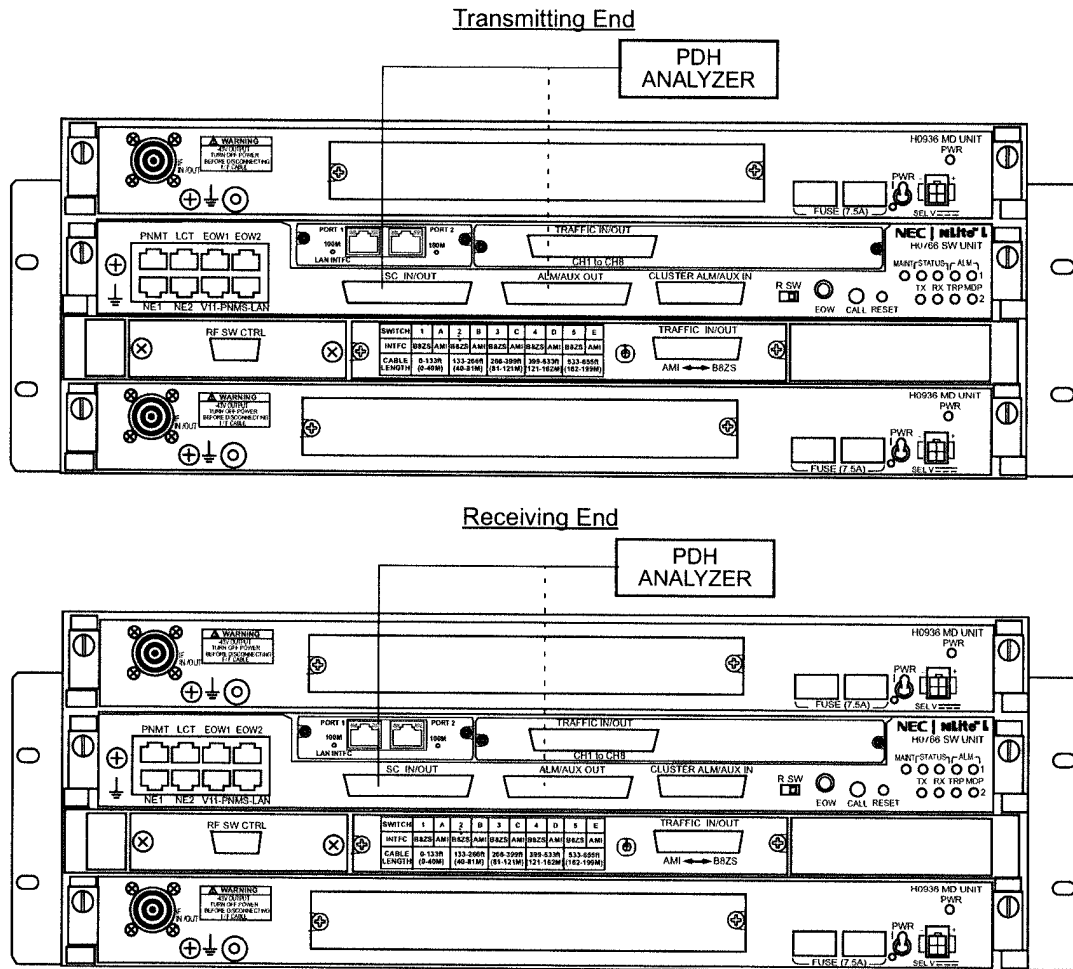


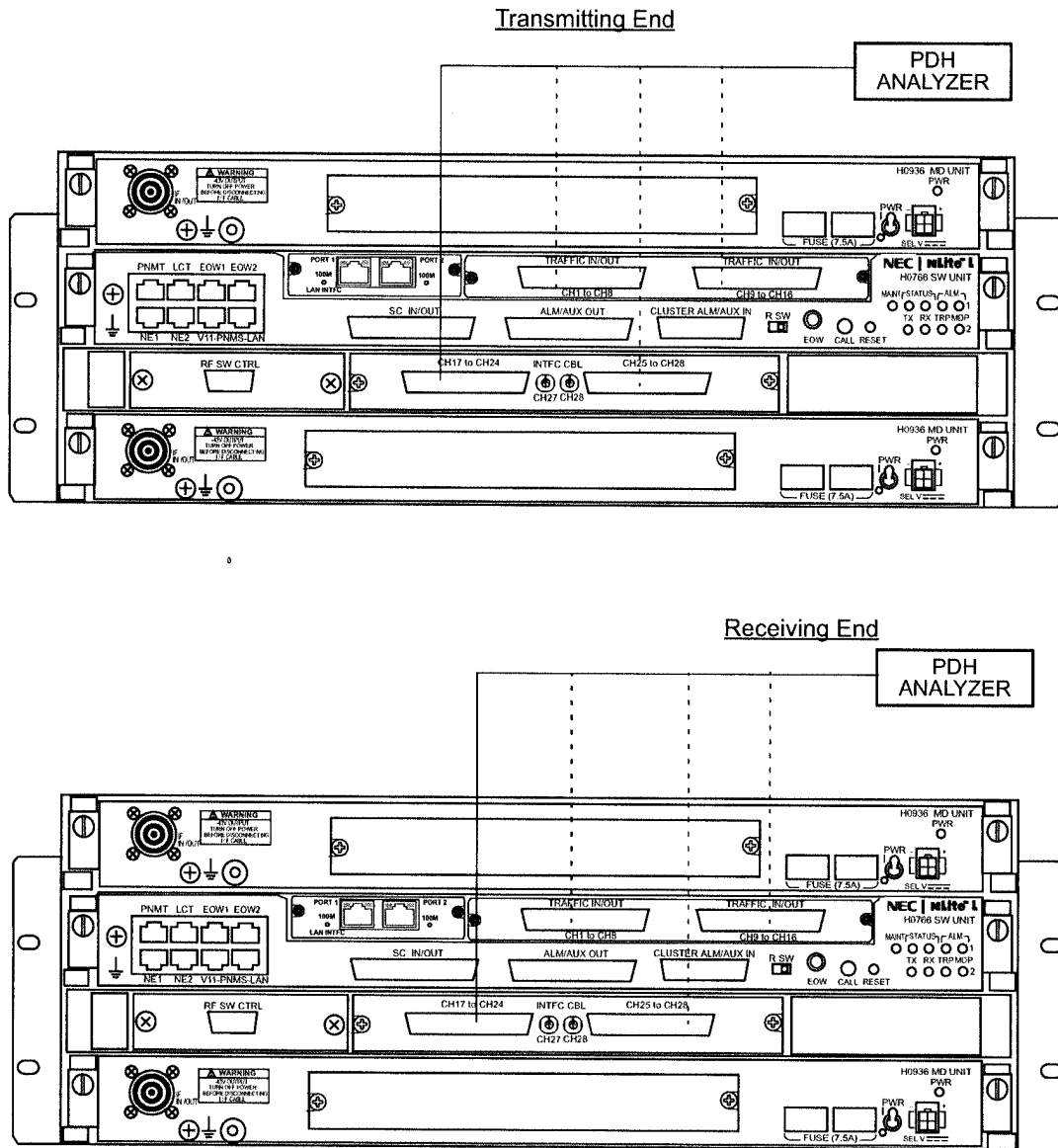
Fig. 4-1 Loopback Diagram for Fault Isolation



Pin assignment of D-sub connector is referred to Table 2-1 in Section II Operation.

For 1+1, 8/16 x DS1 System

Fig. 4-2 BER Measurement Setup (1/6)

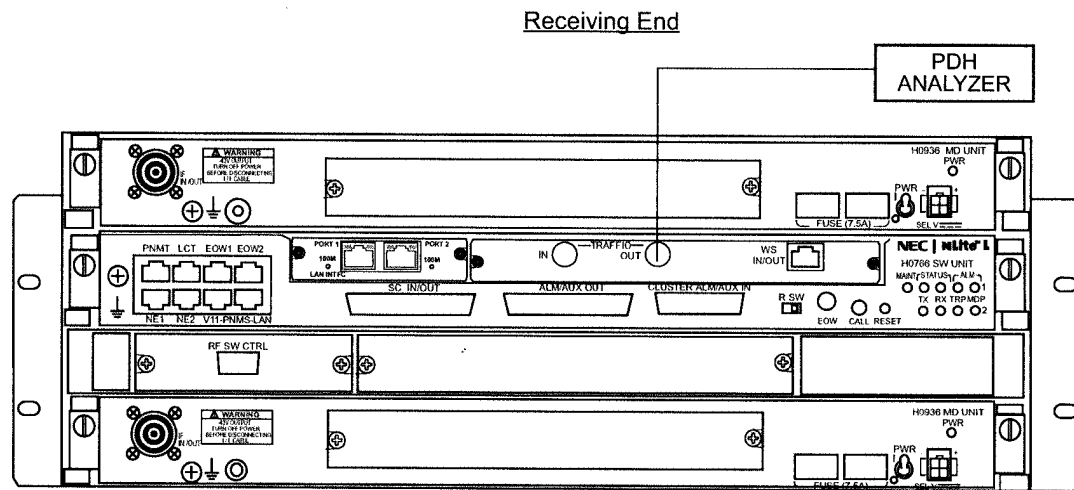
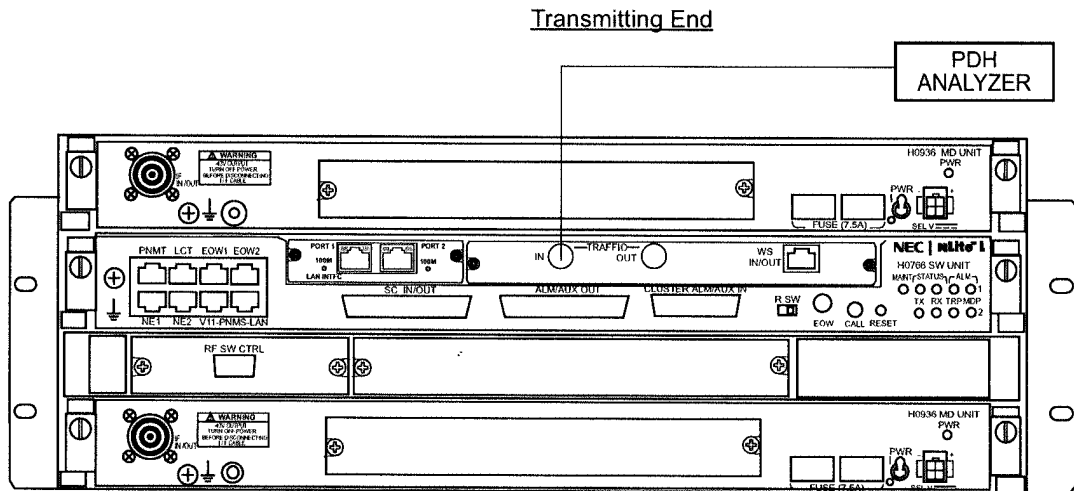


Notes: Pin assignment of D-sub connector is referred to Table 2-1 in Section II Operation.

For 1+1, 28 x DS1 System

MDP for 1+1 System (2/3)

Fig. 4-2 BER Measurement Setup (2/6)



For 1+1, DS3 System

Fig. 4-2 BER Measurement Setup (3/6)

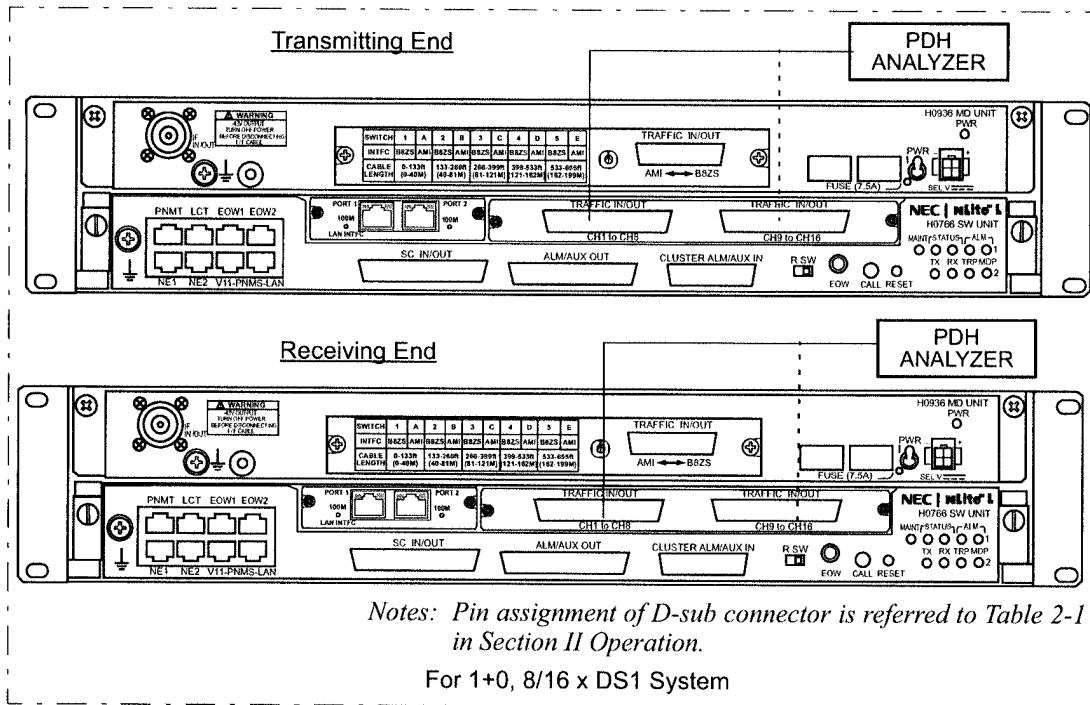


Fig. 4-2 BER Measurement Setup (4/6)

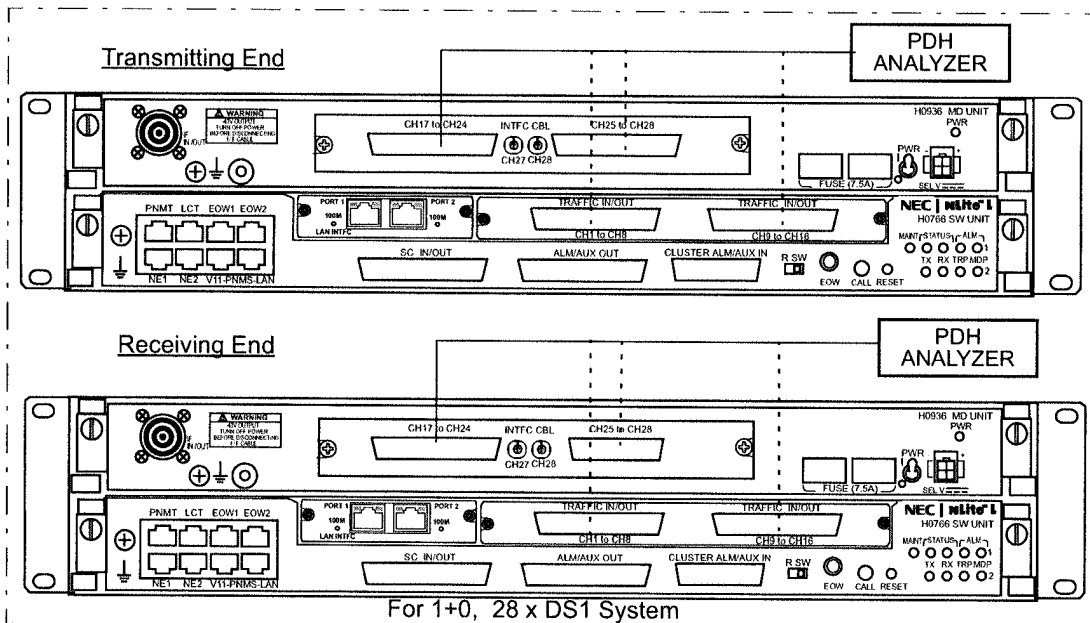


Fig. 4-2 BER Measurement Setup (5/6)

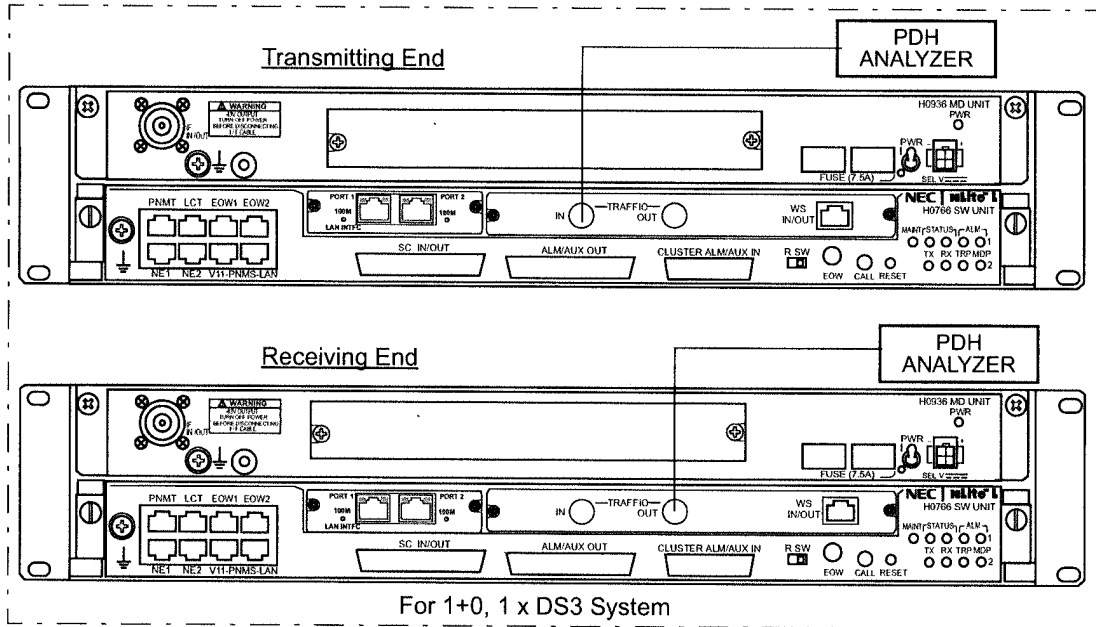


Fig. 4-2 BER Measurement Setup (6/6)

Chart 4-3 Loopback Control Setting

This chart contains:

- A. Preparation: Steps 1 to 8
- B. IF Loopback Control: Steps 9 to 15
- C. Main Signal Loopback (Near End) Control: Steps 16 to 22
- D. Main Signal Loopback (Far End) Control: Steps 23 to 30

Step	Procedure
------	-----------

Notes: 1. Service will be interrupted during Loopback condition.

2. Following Loopback operation is not performed simultaneously.

- *IF Loopback*
- *Near End Loopback*
- *Far End Loopback*

3. Loopback operation is not performed with an opposite station simultaneously.

A. PREPERATION

- 1 Connect the RS-232C cable between the LCT and MDP (see Fig. 2-2 in Chart 2-1),
- 2 Open the Terminal software (eg; HyperTerminal),
- 3 Enter Login name "Admin" and press the "Enter" key on the LCT,

```

Login : Admin
Password : *****

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
7. Maintenance
Enter Selection :
```

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
4	Enter specified password and press the "Enter" key,
5	Press the "7" key for Maintenance and press the "Enter" key,

Enter Selection : 7

```

--- Maintenance ---
1. MAINT Mode (OFF)
2. Control
3. Reset CPU
4. Set Calendar
5. Password Setting
6. Program Download
Enter Selection : 1

```

```

--- MAINT Mode ---
1. On
2. Off
Enter Selection : 1

```

```

--- Maintenance ---
1. MAINT Mode (ON)
2. Control
3. Reset CPU
4. Set Calendar
5. Password Setting
6. Program Download
Enter Selection :

```

- | | |
|---|---|
| 6 | Press the "1" key for MAINT Mode and press the "Enter" key, |
| 7 | Press the "1" key for ON and press the "Enter" key, |
| 8 | Press the "2" key for control and press the "Enter" key, |

B. IF LOOPBACK CONTROL

Note: Used for localization of equipment failure in the TRP or MDP. The input DS1 or DS3 signal from MUX is looped back with IF signal via INTFC and MODEM and then output with DS1 or DS3 signal (see Fig. 4-1 (c)).

Caution: Traffic service of all channels are interrupted under the IF loopback conditions.

Note: Before setting the IF loop back condition in 1+1 system, set the RX SW Manual Control to the loopback side via the LCT .

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
9	Press the “7” key for IF loopback and press the “Enter” key,
10	In 1+1 system, press the “1” or “2” key and press the “Enter” key,

```

Enter Selection : 2
--- Control ---
2. ATPC Manual Control
3. TXSW Manual Control
4. TX Mute
5. RXSW Manual Control
6. CW
7. IF Loopback
8. Main Signal Loopback (Near End)
9. Main Signal Loopback (Far End)
11. Antenna Alignment Mode
16. LAN Device Reset
Enter Selection : 7
--- IF Loopback ---
1. No.1
2. No.2
Enter Selection : 1
--- IF Loopback ---
1. On
2. Off
Enter Selection : 1

This will affect the radio link connection.
Are You Sure ? (Y/N) : Y

Success !!
    
```

Note: 1. Setting items displayed on the LCT depend on setting condition of “System Configuration”.

2. Item 3 and Item 5, No.1/No.2 selection are displayed in 1+1 system only.

- 11 Press the “1” key for IF Loopback ON and press the “Enter” key,
- 12 Press the “Y” key and press the “Enter” key, then “Success !!” is displayed,

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
13	After the Loopback test for BER, press the “7” key and press the “Enter” key,
14	Press the “2” key for IF Loopback OFF and press the “Enter” key,
15	Press the “Y” key and press the “Enter” key, then “Success !!” is displayed,

C. Main Signal LOOPBACK (NEAR END) CONTROL

Note: Used for localization of equipment failure in the MUX or Radio equipment. The input DS1 or DS3 or signal from MUX is looped back, and then immediately output in DS1 or DS3 signal without change (see Fig. 4-1 (a)).

- 16 Press the “8” key for Main Signal Loopback (Near End) and press the “Enter” key,

```

Enter Selection : 2
--- Control ---
2. ATPC Manual Control
3. TXSW Manual Control
4. TX Mute
5. RXSW Manual Control
6. CW
7. IF Loopback
8. Main Signal Loopback (Near End)
9. Main Signal Loopback (Far End)
11. Antenna Alignment Mode
16. LAN Device Reset
Enter Selection : 8

```

Note: Control items displayed on the LCT depend on the “System Configuration”.

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
17	Press the desired channel number key and press the “Enter” key, (Channel selection is required only for 8/16/28 × 1.5 MB system.)

```

--- Main Signal Loopback (Near End) ---
1. Selected CH Loopback
2. All CH Loopback Off
Enter Selection : 1

--- Main Signal Loopback (Near End) ---
Loopback Status      (CH01-08) : #####
                    (CH09-16) : *- *--- *-
                    (CH17-24) : -----
                    (CH25-28) : -----
CH Select             (CH01-28) : 16
    
```

*Note: The status of channels are indicated below.
: Assigned to LAN, * : loopback condition, - : Normal*

18	Press the “1” key for loopback ON and press the “Enter” key,
----	--

```

--- Main Signal Loopback (Near End) ---
1. On
2. Off
Enter Selection : 1

This will affect the radio link connection.
Are You Sure ? (Y/N) : Y

Success !!
    
```

19	Press the “Y” key and press the “Enter” key, then “Success !!” is displayed,
----	--

20	Press the “ESC” key and press the “Enter” key after setting,
----	--

```

--- Main Signal Loopback (Near End) ---
1. Selected CH Loopback
2. All CH Loopback Off
Enter Selection : 2

This will affect the radio link connection.
Are You Sure ? (Y/N) : Y

Success !!
    
```

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
21	Press the “2” key for All CH Loopback Off and press the “Enter” key,
22	Press the “Y” key and press the “Enter” key, then “Success !!” is displayed,
D. Main Signal LOOPBACK (FAR END) CONTROL	
<i>Note: Used for localization of equipment failure in the MUX or Radio equipment. Input DS1 or DS3 signal is sent to the opposite station and looped back in the INTFC of the MDP in DS1 or DS3 signal (see Fig. 4-1 (b)).</i>	
23	Press the “9” key for Main Signal Loopback (Far End) and press the “Enter” key,

```

--- Control ---
2. ATPC Manual Control
4. TX Mute
5. RXSW Manual Control
6. CW
7. IF Loopback
8. Main Signal Loopback (Near End)
9. Main Signal Loopback (Far End)
11. Antenna Alignment Mode
16. LAN Device Reset
Enter Selection : 9

```

Notes: 1. Control items displayed on the LCT depend on the “System Configuration”.

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
------	-----------

24 Press the “1” key and press the “Enter” key, (Channel selection is required only for 8/16/28 × 1.5 MB system.)

```

--- Main Signal Loopback (Far End) ---
1. Selected CH Loopback
2. All CH Loopback Off
Enter Selection : 1

--- Main Signal Loopback (Far End) ---
Loopback Status (CH01-08) #####
                  (CH09-16) ***-*-
                  (CH17-24) ***-*-
                  (CH25-28) Z-----
CH Select        (01-16) : 23
    
```

Notes: 1. When the loopback is controlled from opposite station, “Z” mark is indicated.
 2. The status of channels are indicated below.
 #: Assigned to LAN, *: loopback condition, -: Normal
 Z: Far End loopback from the opposite,

25 Press the desired channel number key and press the “Enter” key,

26 Press the “1” key for ON and press the “Enter” key,

```

--- Main Signal Loopback (Far End) ---
1. On
2. Off
Enter Selection : 1

This will affect the radio link connection.
Are You Sure ? (Y/N) : Y

Success !!
    
```

27 Press the “Y” key and press the “Enter” key, then “Success !!” is displayed,

28 Press the “ESC” key and press the “Enter” key after setting,

Chart 4-3 Loopback Control Setting (Cont'd)

Step	Procedure
	<pre>--- Main Signal Loopback (Far End) --- 1. Selected CH Loopback 2. All CH Loopback Off Enter Selection : 2 This will affect the radio link connection. Are You Sure ? (Y/N) : Y Success !!</pre>
29	Press the “2” key for All CH Loopback Off and press the “Enter” key,
30	Press the “Y” key and press the “Enter” key, then “Success !!” is displayed,

4.2 Replacement

The replacement procedures of the MDP and TRP is described below.

4.2.1 MDP Replacement

The procedures for replacing MDP with spare are given in the Chart 4-4.

Chart 4-4 MDP Unit Replacement

Warning: Persons performing servicing must take necessary steps to avoid electro-static discharge which may damage the modules or cause error. Wear a conductive wrist strap connected to the grounded (G) jack on the front of the equipment shelf. This will minimize static build-up during servicing. (see Fig. 2-1).

Warning: When replace the unit, turn off the power switch and allow some time for the unit to cool before handling the unit to be replaced.

This chart contains:

- A. No.1 MD UNIT replacement: Steps 1 to 7
 - B. No.2 MD UNIT replacement: Steps 18 and 719
 - C. SW UNIT replacement: Steps 20 to 28
-

Apparatus:
 Suitable Screwdriver

Step	Procedure
------	-----------

This MDP consists of three units (No. 1 MD UNIT/SW UNIT/ No. 2 MD UNIT) (see Fig. 4-4). If any unit fails, replace only the unit that fails with a spare following the procedure described below.

Caution: When the SW UNIT is replaced with spare, service is interrupted.

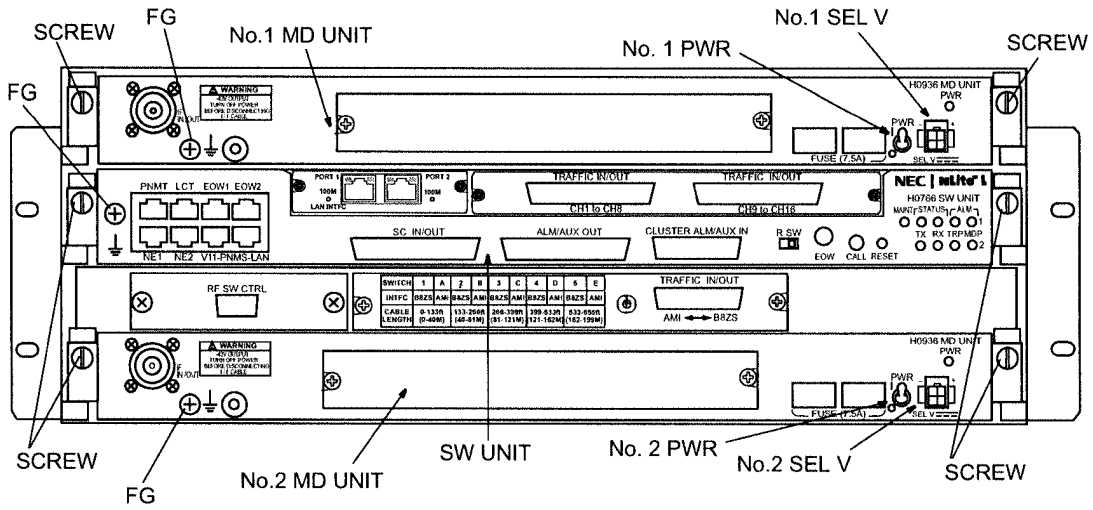
Note: No.2 MD UNIT is not provided for 1+0 system.

Chart 4-4 MDP Unit Replacement (Cont'd)

Step	Procedure
A. No.1 MD UNIT REPLACEMENT	
<u>REMOVING</u>	
1	Referring to Chart 2-1, set maintenance mode to maintenance "ON" position by LCT,
2	Lockout the automatic switching with the LCT for the TX SW and RX SW in 1+1 system, (Set the TX SW and RX SW to No. 1 when the unit in No. 2 is replaced or when the unit in No. 1 is replaced, set those SWs to No. 2.),
3	Turn off the power switch on the No. 1 MD UNIT (see Fig. 4-3),
4	Disconnect the power cable from the SEL V connector on the No. 1 MD UNIT,
5	Disconnect the IFL cable from the IF IN/OUT connector on the No. 1 MD UNIT,
6	Disconnect the frame ground cable from the FG terminal,
7	Loosen two screws on the No. 1 MD UNIT,
8	To remove the MD UNIT, hold two screws then pull it forward,
<u>REMOUNTING</u>	
9	Place a new MD UNIT at the location for mounting, then push along the guide rail until the multi-pin connector exactly fits,
10	Tighten two screws on the MD UNIT (see Fig. 4-3),
11	Reconnect IFL cable to IF IN/OUT connector,
12	Reconnect power cable to SEL V connector,
13	Reconnect frame ground cable to FG terminal,
14	Turn on the power switch,
15	Reset the protection switching to Auto mode in 1+1 system,
16	Confirm that the all alarm LED are OFF,
17	Referring to Chart 2-1, reset maintenance mode to maintenance "OFF" position,

 Chart 4-4 MDP Unit Replacement (Cont'd)

Step	Procedure
B. No. 2 MD UNIT REPLACEMENT	
<u>REMOVING</u>	
18	Repeat steps 1 to 7 for No. 2 MD UNIT,
<u>REMOVING</u>	
19	Repeat steps 8 to 14 for No. 2 MD UNIT,
C. SW UNIT REPLACEMENT	
<u>REMOVING</u>	
<i>Note: When replacing SW UNIT with spare, replace quickly to minimize service interruption.</i>	
20	Before removing the SW UNIT from the MDP, mark corresponding terminal name for all cables connected to the SW UNIT,
21	Turn off the power switch on the No. 1 MD UNIT, (see Fig. 4-3),
22	Turn off the power switch on the No. 2 MD UNIT,
23	Disconnect all cables from connectors on the SW UNIT,
24	Disconnect ground cable from the FG terminal.
25	Loosen two screws on the SW UNIT,
26	To remove the SW UNIT, hold two screws then pull it forward,
<u>REMOVING</u>	
27	Place a new SW UNIT at the location for mounting, then push along the guide rail until the multi-pin connector exactly fits,
28	Tighten two screws on the SW UNIT (see Fig. 4-3),
29	Reconnect ground cable to FG terminal,
30	Reconnect correctly all cables removed in step 19,
31	Turn on the power switches on the No.1 and No. 2 MD UNIT.



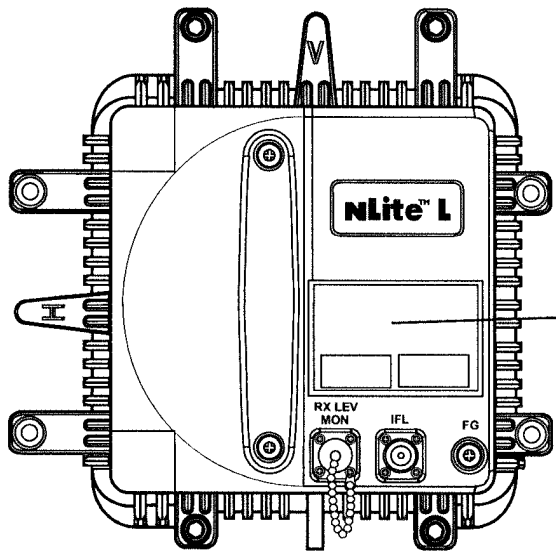
Note: Other portions are the same as the equipment for 8 x DS1 system.

FOR 16 x DS1 SYSTEM
MDP

Fig. 4-3 Screw, Connector and Switch Location of the MDP

4.2.2 TRP Replacement

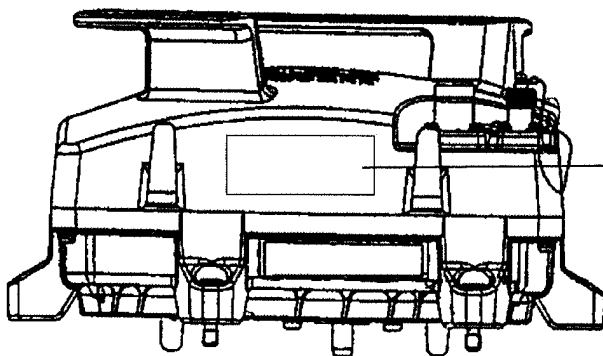
The procedures for replacing the TRP with a spare are given in Chart 4-5. The label attached on the TRP indicates the TRP type and TX frequency, RX frequency and High/Low are indicated on the TRP (see Fig 4-4). To replace the TRP, prepare another TR UNIT of the same type as indicated on the label of the failed one.



5.8/6/24 GHz TRP UNIT (Split Type)

nLite™ L (H2600)	
TRP-6G-6AA	
OUTDOOR UNIT (EHG)	
TX HIGH / LOW	
SERIAL No. _____	DATE _____
WEIGHT 3.5kg/-43V == 0.6A	
NEC NEC Corporation TOKYO JAPAN MADE IN JAPAN	
CAUTION Non-ionizing radiation	-48V INPUT Power down IDU before disconnection or connection of cable.

nLite™ L (NWA-027874)	
TRP-24G-2B	
OUTDOOR UNIT (NHG)	
TX HIGH / LOW	
SERIAL No. _____	DATE _____
WEIGHT 3.5kg/-43V == 0.6A	
NEC NEC Corporation TOKYO JAPAN MADE IN JAPAN	
CAUTION Non-ionizing radiation	-48V INPUT Power down IDU before disconnection or connection of cable.

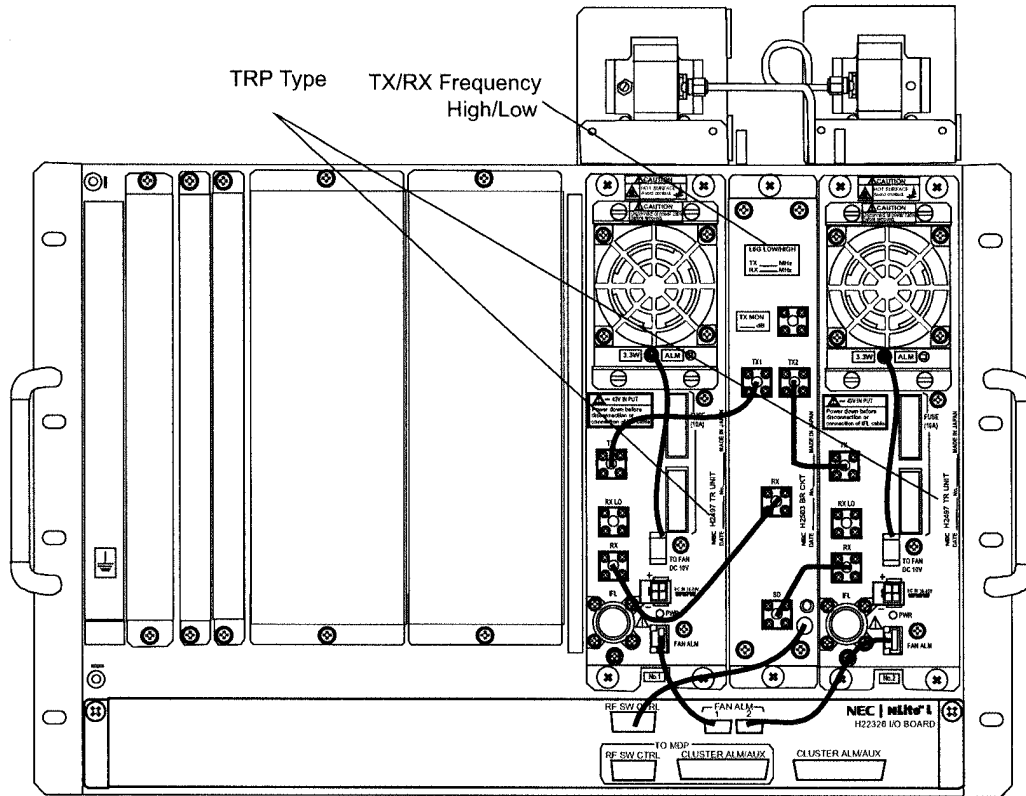


10.5/11 GHz TRP UNIT (Split Type)

nLite™ L155 0678	
TRP-11G-1AA (G8737B)	
OUTDOOR UNIT (SHG)	
shift frequency 490 MHz	SUB BAND _____ TX high/low
SERIAL No. _____	DATE _____
WEIGHT 4.5kg/-43V == 0.5A	
NEC NEC Corporation TOKYO JAPAN MADE IN JAPAN	

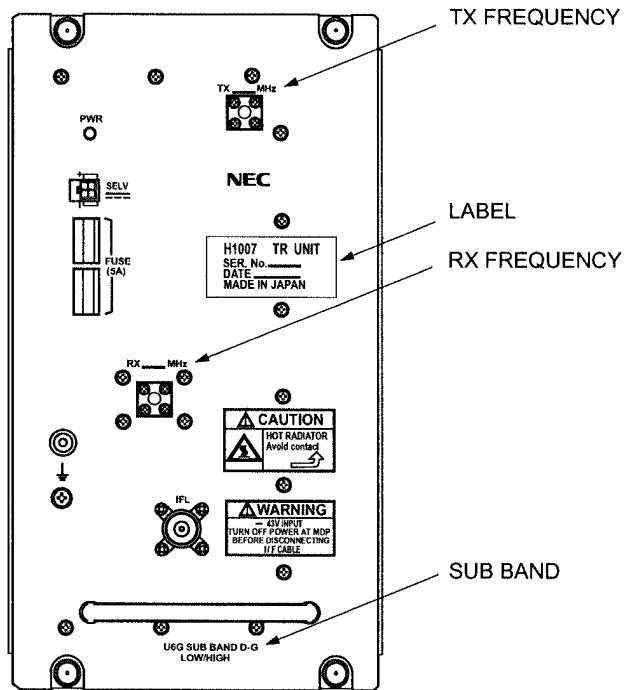
nLite™ L155 0678	
TRP-10G-2AA (H0998A)	
OUTDOOR UNIT (SHG)	
shift frequency 65 MHz	SUB BAND _____ TX high/low
SERIAL No. _____	DATE _____
WEIGHT 4.5kg/-43V == 0.5A	
NEC NEC Corporation TOKYO JAPAN MADE IN JAPAN	

Fig. 4-4 TR Unit Type and Frequency Indication (1/3)



TRP UNIT (e/w FAN Type)

Fig. 4-4 TR Unit Type and Frequency Indication (2/3)



TRP UNIT (w/o FAN Type)

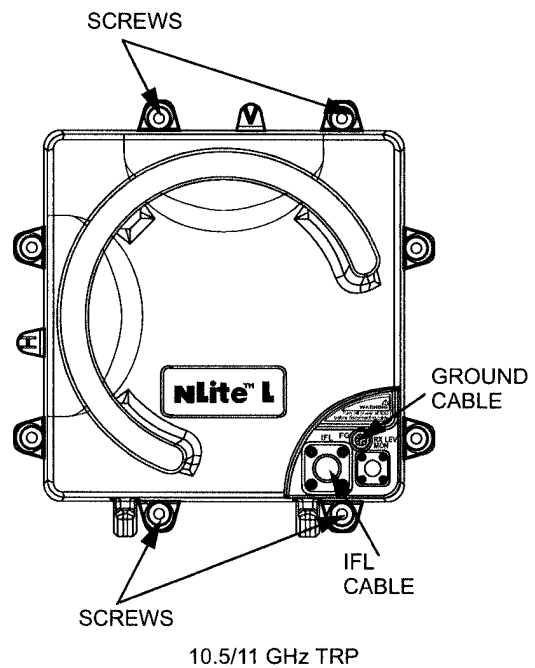
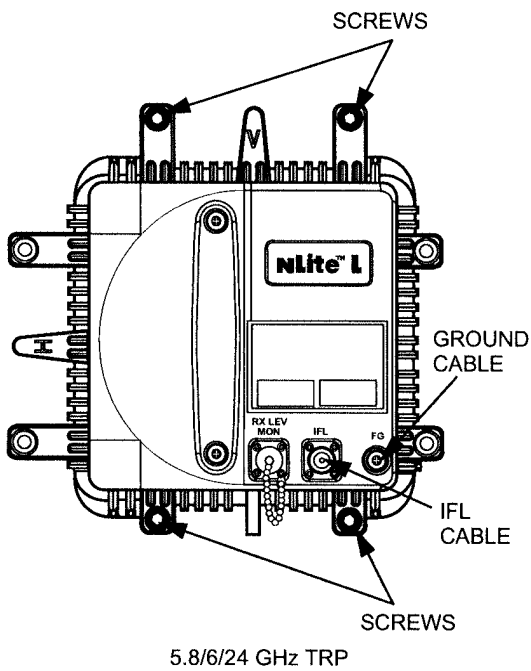
Fig. 4-4 TR Unit Type and Frequency Indication (3/3)

Chart 4-5 TRP Split Type Replacement

Step	Procedure
------	-----------

REMOVING (Split Type TRP)

- 1 Referring to Chart 2-1, set maintenance mode to Maint "ON" by the LCT,
- 2 Lockout the automatic switching with the LCT for the TX SW and RX SW in 1+1 system, (Set the TX SW and RX SW to No. 1 when the unit in No. 2 is replaced or when the unit in No. 1 is replaced, set those SWs to No. 2.),
- 3 Turn off the power switch on the associated MD UNIT,



- 4 Disconnect the IFL cable from the IFL connector on the TRP which is to be replaced,

Warning: Do not remove the IFL cable before turning OFF the power switch on the MD UNIT.

- 5 Disconnect the ground cable from the FG connector on the TRP which is to be replaced,

Chart 4-5 TRP Split Type Replacement (Cont'd)

Step	Procedure
6	Loosen four screws holding the TRP which is to be replaced,
7	Remove the TRP from the bracket with both hands,
<u>REMOUNTING (Split Type TRP)</u>	
8	Check that the power switch on the associated MD UNIT is set to OFF,
9	Rotate the ODU so that the plate marked V is on top,

Note: Remove the metallic short plate over the waveguide hole on TRP.

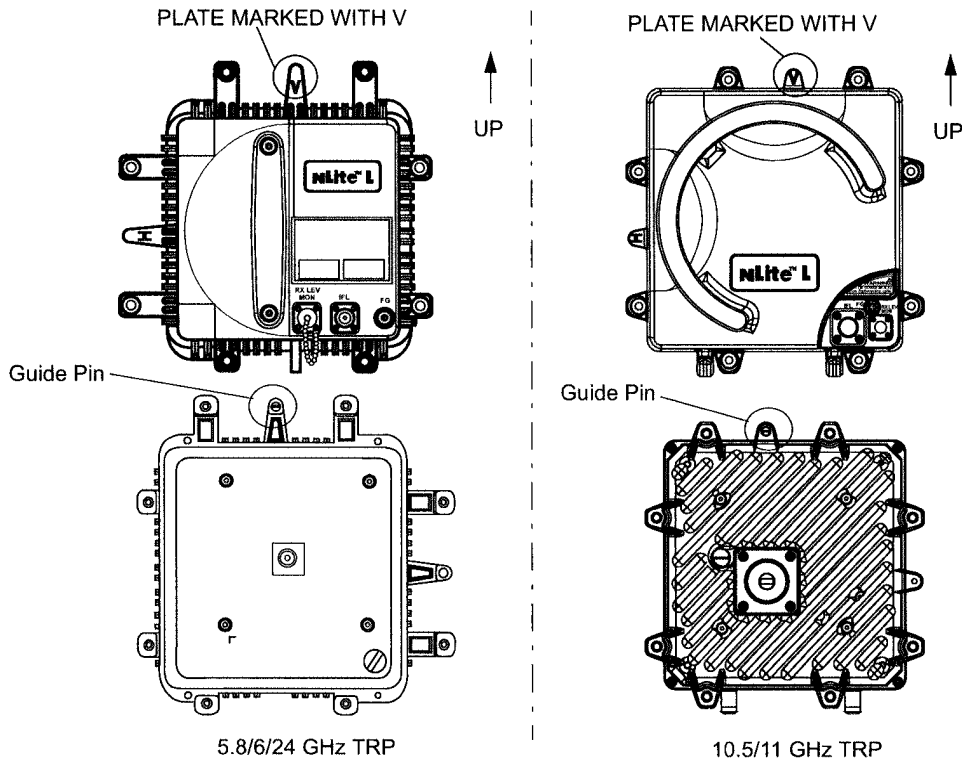


Chart 4-5 TRP Split Type Replacement (Cont'd)

Step	Procedure
10	Mount the TRP onto the bracket
11	Tighten four screws alternately to fix the TRP,
12	Connect the RF coaxial cable to the TRP and to the antenna,
13	Connect the IFL cable to the IFL connector on the TRP front panel,
	<i>Warning: Do not connect the IFL cable before turn OFF the power switch on the MD UNIT.</i>
14	Connect the ground cable to the GF terminal on the TRP,
15	Wrap the IF IN/OUT with self-bonding tape for waterproofing,
16	Wrap the RF IN/OUT of the TRP with self-bonding tape for waterproofing,
17	Wrap the antenna port or coaxial connectors of the HYB with self-bonding tape for waterproofing,

Chart 4-5 TRP Split Type Replacement (Cont'd)

Step	Procedure
------	-----------

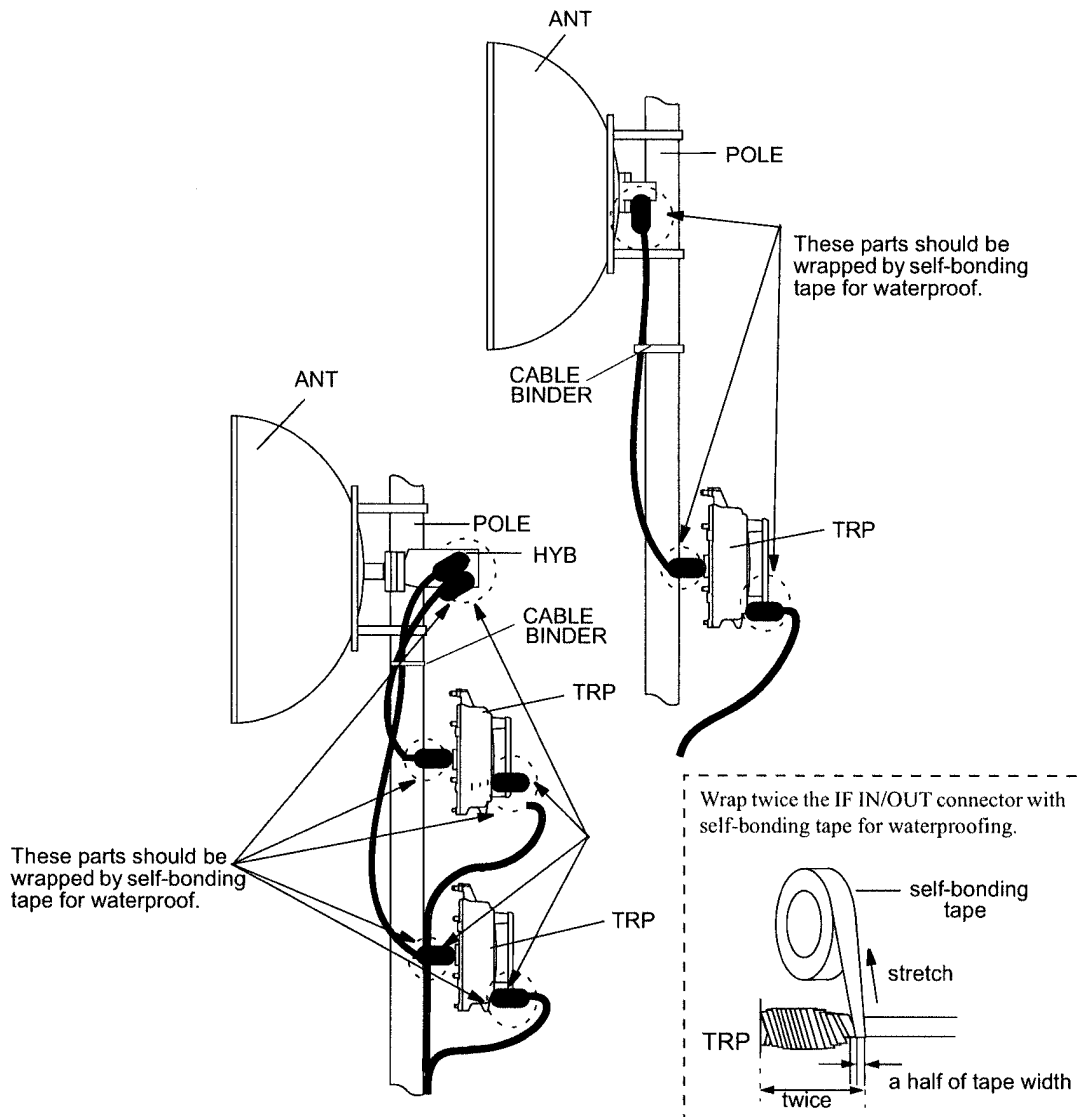


Fig. 4-5 Location of Connector for Waterproof

Chart 4-5 TRP Split Type Replacement (Cont'd)

Step	Procedure
18	Turn on the power SW on the MD UNIT,
19	Confirm that alarm LEDs on the MD UNIT and CTRL UNIT are unlit,
20	Reset the protection switching to Auto mode in the 1+1 system referring to Chart 2-1,
21	Reset the Maintenance mode to off with the LCT,
22	Check that the MAINT LED on the CTRL UNIT goes off.

Chart 4-6 TRP e/w FAN Type Replacement (Cont'd)

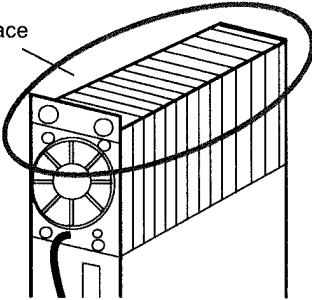
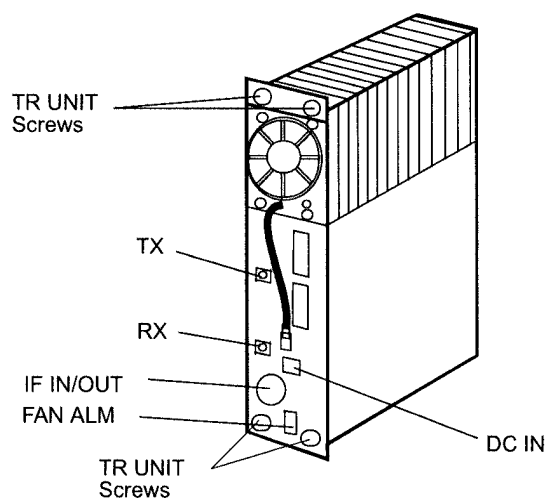
Step	Procedure
<u>REMOVING (All Indoor e/w FAN Type TRP)</u>	
1	Referring to Chart 2-1, set maintenance mode to Maint "ON" by the LCT,
2	Lockout the automatic switching with the LCT for the TX SW and RX SW in 1+1 system, (Set the TX SW and RX SW to No. 1 when the unit in No. 2 is replaced or when the unit in No. 1 is replaced, set those SWs to No. 2.),
3	Turn off the power switch on the associated MD UNIT,
<i>Warning: Because the TR UNIT becomes hot during operation, do not touch the upper side of the TR UNIT.</i>	
 <p>The diagram shows a perspective view of a rectangular TRP unit. On the left side, there is a circular fan grille. A curved line is drawn along the top surface of the unit, and a label 'Hot Surface' with a pointer indicates this area.</p>	
4	Disconnect the IFL cable from the IFL connector on the TR UNIT which is to be replaced,
<i>Warning: Do not remove the IFL cable before turning OFF the power switch on the MD UNIT.</i>	
5	Disconnect the power supply cable from the DC IN (SEL V) connector on the TR UNIT which is to be replaced,
6	Disconnect SJ cables from the TX terminal and RX terminal on the TR which is to be replaced,
<i>Note: Being careful, loosen alternately and gradually the two connectors of the SJ cable.</i>	
7	Disconnect FAN ALM cable from the FAN ALM terminal on the TR UNIT which is to be replaced,

Chart 4-6 TRP e/w FAN Type Replacement (Cont'd)

Step	Procedure
8	Loosen four screws holding the TR UNIT which is to be replaced,
9	Hold the two screws of upper and lower part of the TR UNIT and pull out the TR UNIT from the shelf,



REMOUNTING (All Indoor e/w FAN Type TRP)

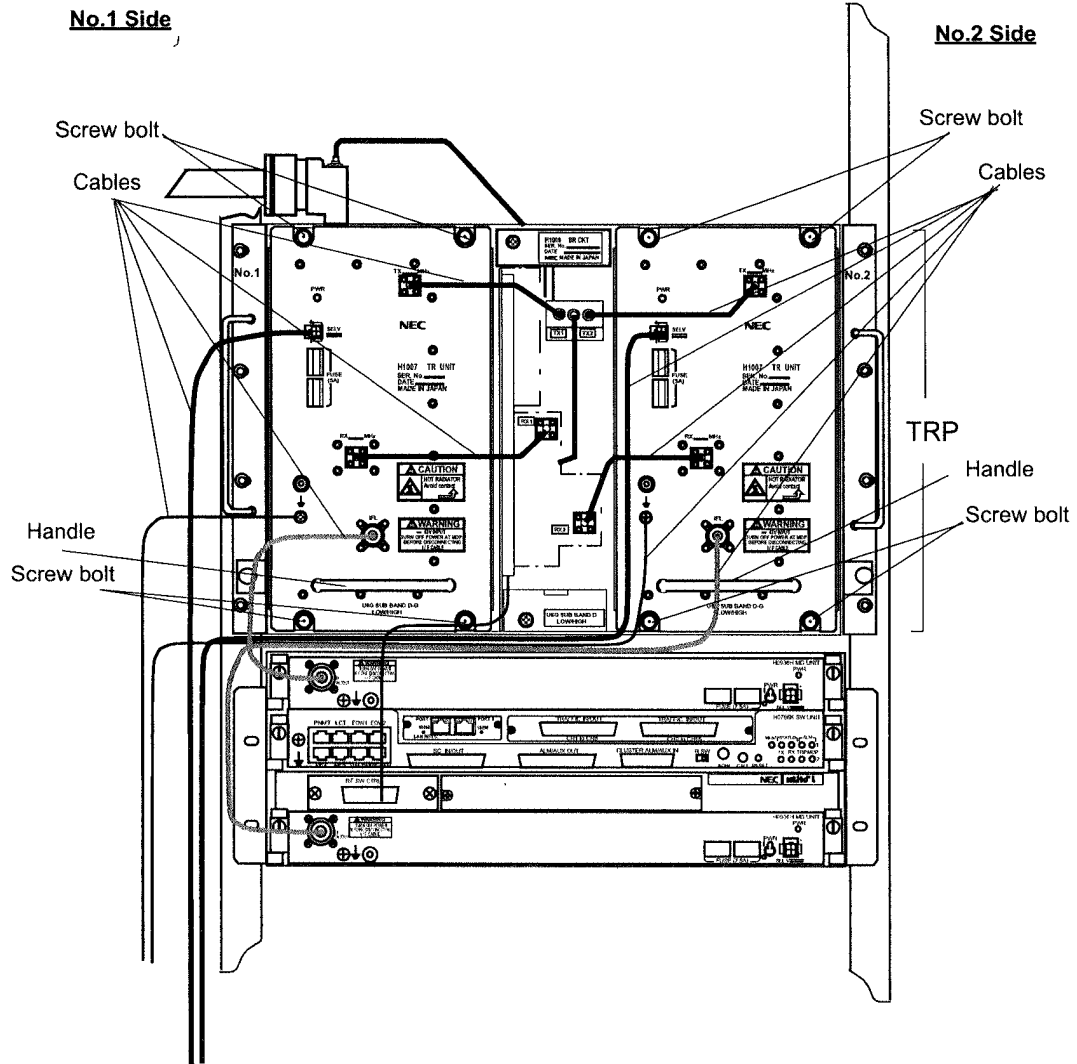
- 10 Check that the power switch on the associated MD UNIT is set to OFF,
 - 11 Insert the TR UNIT into the shelf,
 - 12 Using a screw driver, tighten four screws to hold the TR UNIT in the shelf,
 - 13 Connect the IFL cable to the IFL connector on the TR UNIT front panel,
- Warning: Do not connect the IFL cable before turn OFF the power switch on the MD UNIT.**
- 14 Connect the power supply cable to the DC IN (SEL V) connector on the TR UNIT front panel,

Chart 4-6 TRP e/w FAN Type Replacement (Cont'd)

Step	Procedure
15	Connect the SJ cables to the TX terminal and the RX terminal on the TR UNIT, <i>Note: Being careful, fasten alternately and gradually the two connectors of the SJ cable.</i> <i>Tightening torque: 0.6 N·m</i>
16	Connect the FAN ALM cable to the FAN ALM terminal on the TR UNIT,
17	Turn on the power switch on the associated MD UNIT,
18	Confirm that alarm LEDs on the TR UNIT, MD UNIT and CTRL UNIT are unlit,
19	Reset the protection switching to Auto mode in the 1+1 system referring to Chart 2-1,
20	Reset the Maintenance mode to off with the LCT,
21	Check that the MAINT LED on the CTRL UNIT goes off.

Chart 4-7 TRP w/o FAN Type Replacement

Step	Procedure
	<u>REMOVING (All Indoor w/o FAN Type TRP)</u>
1	Referring to Chart 2-1, set maintenance mode to maintenance "ON" position by LCT,
2	Perform the protection switching to protect the system in 1+1 system,
3	Turn off the power switch on the associated MDP,
	<i>Warning: Do not remove the IF line cable before turn OFF the power switch on the MDP.</i>
4	Disconnect the IF cable from the IFL connector on the TRP,
5	Disconnect the power supply cable from the SEL V connector on the TRP,
6	Disconnect ground cable from the FG terminal on the TRP,
7	Disconnect SJ cable from the TX terminal on the TRP,
	<i>Note: Being careful, loosen alternately and gradually two connectors of the SJ cable.</i>
8	Disconnect SJ cable from the RX terminal on the TRP,
9	Loosen four screw bolts fixing the TRP,
10	Grip the handle of the TRP and pull out the TRP from the shelf,



Note: Use torque wrench for connecting/disconnecting SJ cable

Chart 4-8 TRP w/oFAN Type Replacement (Cont'd)

Step	Procedure
<u>MOUNTING (All Indoor w/o FAN Type TRP)</u>	
11	Insert the TR UNIT into the shelf,
12	Using a screw driver, tighten four screw bolts to fix the TR UNIT,
13	Connect the IF cable to the IFL connector on the TR UNIT,
14	Connect the power supply cable to the SEL V connector on the TR UNIT,
15	Connect ground cable to the FG terminal on the TR UNIT,
16	Connect SJ cable to the TX terminal on the TR UNIT,
<i>Note: Being careful, fasten alternately and gradually two connectors of the SJ cable. Tightening torque: 0.6 N·m</i>	
17	Connect SJ cable to the RX terminal on the TR UNIT,
18	Turn on the power switch on the associated MDP.

4.3 Alignment

After replacing the unit with spares, the equipment must be aligned as listed in Table 4-2. The inventory information of each module in the equipment is displayed as shown in Chart 4-11.

Table 4-2 Equipment Alignment

Equipment	Replaced Module/Unit	Alignment Item	Reference Procedure
MDP	MD UNIT	1. System Configuration Setting	Chart 5-1 in Section II
		2. Provisioning Setting	Chart 5-4 in Section II
		3. BER Measurement **	Chart 4-2 in this Section
		4. Meter Reading	Chart 3-2 in this Section
	SW UNIT	1. System Configuration Setting	Chart 5-1 in Section II
		2. Date and Time Setting	Chart 4-10 in this Section
		3. Provisioning Setting	Chart 5-4 in Section II
		4. Relay/House Keeping Setting*	Chart 5-5 in Section II
		5. BER Measurement **	Chart 4-2 in this Section
		6. Meter Reading	Chart 3-2 in this Section
TRP	TRP	1. System Configuration Setting	Chart 5-1 in Section II
		2. BER Measurement **	Chart 4-2 in this Section
		3. Meter Reading	Chart 3-2 in this Section

- Notes:
1. * This procedure is to be performed, as required.
 2. ** The BER measurement is optional, perform if necessary.
 3. All configuration items must be restored to original condition.

Chart 4-9 System Configuration Setting

This chart describes the procedure for setting the system configuration after system has been modified or equipment replaced. The items to be set are as follows:

- Equipment Configuration
- Main Interface
- RF Frequency
- TX Power Control
- Frame ID

Step	Procedure
1	Referring to Fig. 2-2 in Chart 2-1, connect the RS-232C cable between the LCT and the MDP,
2	Open the Terminal software (e.g; HyperTerminal),
3	Enter Login name "Admin" and press the "Enter" key,
4	Enter password "12345678" and press the "Enter" key,

```

Login : Admin
Password : *****

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
7. Maintenance
Enter Selection :
```

- | | |
|---|---|
| 5 | Setting of the system configuration should be performed according to the procedure chart 5-1 in Section II Operation. |
|---|---|
-

Chart 4-10 Date and Time Setting

This chart describes the procedure for setting date and time. When the MDP is turned off for an extended period (i.e. approx. 1 week or more), the equipment time setting could have been cleared. In such case, verify and re-enter the time setting after turning on the MDP.

Step	Procedure
------	-----------

- 1 Press the “ESC” key to go back to the following menu,

```

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
7. Maintenance
Enter Selection :
    
```

- 2 Press the “7” key for Maintenance and press the “Enter” key,

```

Enter Selection : 7

--- Maintenance ---
1. MAINT Mode (OFF)
2. Control
3. Reset CPU
4. Set Calendar
5. Password Setting
6. Program Download
Enter Selection : 4

--- Set Calendar ---
Enter Year   : 2004
Enter Month  : 4
Enter Day    : 28
Enter Hour   : 18
Enter Min    : 20
Enter Sec    : 40

Success !!
    
```

- 3 Press the “4” key for setting the Set Calendar and press the “Enter” key,

Chart 4-10 Date and Time Setting (Cont'd)

Step	Procedure
4	Set every item according to display of the LCT,
5	After setting the time, proceed to Chart 5.5 in the Section 2 for Provisioning.

Chart 4-11 Inventory Data Monitoring

Step	Procedure
1	Referring to Fig. 2-2 in Chart 2-1, connect the RS-232C cable between the LCT and the MDP,
2	Open the Terminal software (e.g. HyperTerminal),
3	Enter Login name "Admin" and press the "Enter" key,
4	Enter the specified password and press the "Enter" key,

```

Login : Admin
Password : *****

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
7. Maintenance
Enter Selection :
    
```

5 Press the "5" key for Inventory Data and press the "Enter" key,

Display Inventory data					
Module	Code No.	Date	Serial No.	HW Type.	SW Ver.
TRP No.1	H2497A	2007/08/27	000104	001S	1.00
TRP No.2	H2497A	2007/08/27	000102	001S	1.00
MD UNIT No.1	H0936A	2007/09/20	004002	-	1.00
SW UNIT	H0766A	2007/09/20	004002	-	1.00
MD UNIT No.2	H0936A	2007/09/20	004002	-	1.00
LAN INTFC	H0934B	20075/09/20	009002	-	-

Note: The data for No.2 CH TRP and MDP are not displayed for 1+0 system.

Each item in the inventory data is explained below.

- TRP No.1 : Indicates the information on the No.1 channel TRP.
- TRP No.2 : Indicates the information on the No.2 channel TRP.
- MD UNIT No.1 : Indicates MD UNIT mounted on the top layer of the three-layer equipment.

Chart 4-11 Inventory Data Monitoring (Cont'd)

Step	Procedure
	<ul style="list-style-type: none">• SW UNIT : Indicates the UNIT located at the middle layer of the three-layer.• MD UNIT No.2 : Indicates the UNIT mounted on the lower layer of the three-layer equipment.• LAN INTFC : Indicates the MODULE mounted on the SW UNIT.
	<p><i>Note: The end of HW Type signifies the type of TRP.</i> <i>S: Super High Grade (SHG)</i> <i>H: High Grade (HG)</i> <i>E: Enhanced High Grade (HG)</i> <i>N: Neo High Grade (NHG)</i></p>
6	Press the "ESC" key,
7	Press the "0" key to Logout and press the "Enter" key.

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5. CHANGING PASSWORD

5.1 General

This Section provides the procedure for changing the login password to access the LCT.

Note: If you enter invalid password, login as Administrator is impossible. When you change the login password, be careful to record new password.

5.2 Procedure

Procedures for changing the password is referred to the Chart 5-1.

Chart 5-1 Changing Password

Step	Procedure
1	Connect the RS-232C cable between the LCT and MDP,
2	Open the Terminal software (ex. HyperTerminal),
3	Enter Login name "Admin" and press the "Enter" key,

```

Login : Admin
Password : *****

--- NEC PDH RADIO VER. X.XX.XX ---
0. Logout
1. Alarm / Status
2. Performance Monitor
3. Provisioning Data
4. System Configuration
5. Inventory Data
6. Relay / House Keeping
7. Maintenance
Enter Selection :
    
```

Chart 5-1 Changing Password (Cont'd)

Step	Procedure
4	Enter the current login password and press the “Enter” key,
5	Press the “7” key and press the “Enter” key,
<pre> Enter Selection : 7 --- Maintenance --- 1. MAINT Mode (XXX) 2. Control 3. Reset CPU 4. Set Calendar 5. Password Setting 6. Program Download Enter Selection : 5 --- Password Setting --- Enter CurrentPassword : ***** Enter NewPassword : ***** Enter NewPassword : ***** --- Maintenance --- 1. MAINT Mode (XXX) 2. Control 3. Reset CPU 4. Set Calendar 5. Password Setting 6. Program Download Enter Selection : </pre>	
6	Press the “5” key for password setting and press the “Enter” key,
7	Enter the current password and press the “Enter” key,
8	Enter the new password (8 figures) and press the “Enter” key,
9	To confirm the password, re-enter the new password and press the “Enter” key,
10	Press the “ESC” key to return to previous menu,
11	Press the “0” key to logout.

5.8/L6/U6/10.5/11/24 GHz 15/28/50 MB
PDH DIGITAL MICROWAVE RADIO SYSTEM
NLite L
(PDH 1+0/1+1 SYSTEM)

SECTION I DESCRIPTION

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1. GENERAL

This section provides descriptive information on the 5.8/L6/U6/10.5/11/24 GHz 15/28/50 MB digital microwave radio system for the plesiochronous digital hierarchy (PDH).

The NLite L digital microwave radio system is designed to transmitting Digital Signal Level-1/-3 (DS-1/DS-3) signals and 10/100BASE-T(X) LAN. It operates in the 5.8, L6, U6, 10.5, 11 or 24 GHz radio frequency band using the 32, 128 or 64 Quadrature Amplitude Modulation (QAM) method and has a transmission capacity of 8 x 1.544 MB, 16 x 1.544 MB 28 x 1.544 MB or 1 x 44.736 MB. Included herein are system description and subsystem description.

1.1 Notice (Operation)

1. *To prevent unexpected MDP power switch lever movement, the power switch lever is locked. When set the power switch to on/off, it must be pulled out power switch lever knob to unlock the switch lever.*
2. *Provide a stable power source for proper equipment operation. A voltage that varies sharply may cause abnormal equipment operation.*
3. *When the radio frequency is changed in maintenance, first, set frequency in the opposite station. If you set radio frequency in the local station at first, you can not change radio frequency of the opposite station using PC menu at the local station. Because the opposite station can not receive the control signal to be set radio frequency.*
4. *In 1+1 system, when the SW UNIT is replaced with a spare, the service is interrupted.*
5. *Apply SELV power supply to the TRP before turn on the PWR switch on the MDP.*
6. *When remove SJ cables, loosen alternately and gradually two connectors of the SJ cable carefully.*

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2. SYSTEM DESCRIPTION

The system description outlines the system configuration, system performance, RF channel plan, alarm and control, protection switching, and power supply.

2.1 System Configuration

The system consists of the Modulator-Demodulator (MDP), Transmitter-Receiver (TR) Unit(s) and the Antenna (see Fig. 2-3 to Fig 2-6). The MDP types are as follows:

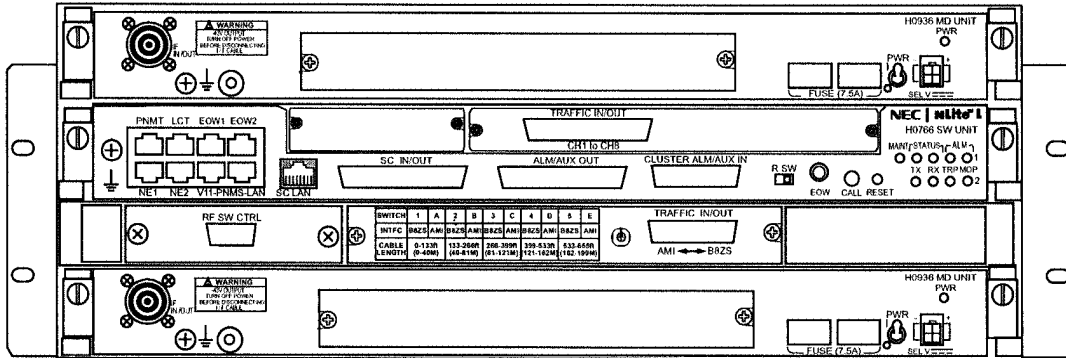
Table 2-1 Type of MDP

Equipment	Bit Rate (Fixed)	System
MDP-15MB5T-1A	8 x 1.5 MB	1+1
MDP-15MB5T-1C	8 x 1.5 MB + LAN	
MDP-28MB7T-1A	16 x 1.5 MB	
MDP-28MB7T-1C	16 x 1.5 MB + LAN	
MDP-50MB6T-2C	28 x 1.5 MB + LAN	
MDP-50MB6T-1A	1 x 45 MB	
MDP-50MB6T-1C	1 x 45 MB + LAN	
MDP-15MB5T-1B	8 x 1.5 MB	1+0
MDP-15MB5T-1D	8 x 1.5 MB + LAN	
MDP-28MB7T-1B	16 x 1.5 MB	
MDP-28MB7T-1D	16 x 1.5 MB + LAN	
MDP-50MB6T-2D	28 x 1.5 MB + LAN	
MDP-50MB6T-1B	1 x 45 MB	
MDP-50MB6T-1D	1 x 45 MB + LAN	

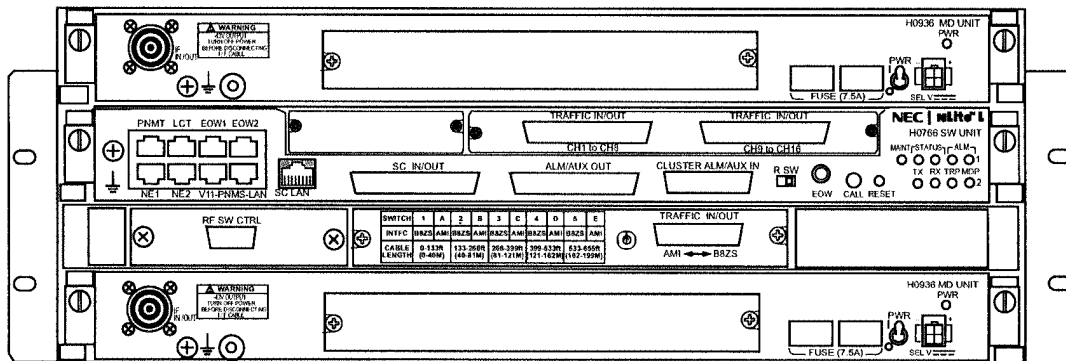
The TRP types are as follows:

Table 2-2 Type of TRP

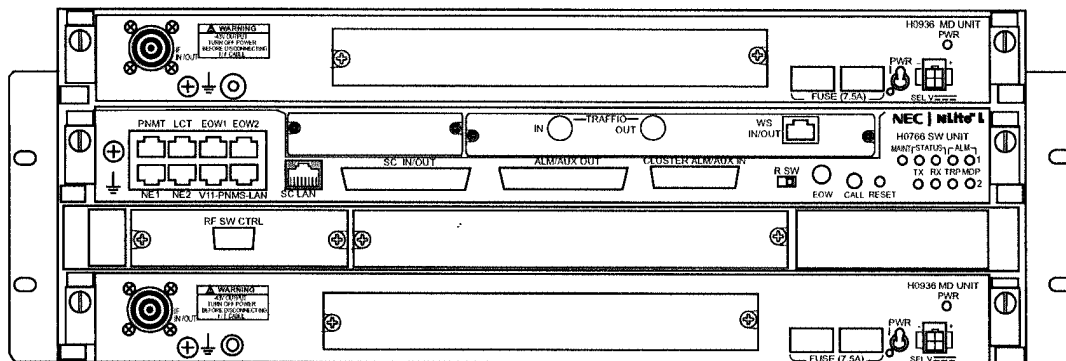
Equipment	Frequency Range	Transmit/ Receive Separation	Transmit Capacity	TR Unit per TRP
Split Type				
TRP-6G-6AA	5725-5850 MHz (FCC Part101)	77 MHz	8DS1/16DS1/ 28DS1/1DS3	1TR
TRP-6G-6AA	5925-6425 MHz (FCC Part101)	252.04 MHz		1TR
TRP-6G-6AA	6525-7125 MHz (FCC Part101)	160 MHz		1TR
TRP-10G-2AA	10550-10680 MHz (FCC Part101)	65 MHz	8DS1/16DS1	1TR
TRP-11G-1AA	10700-11700 MHz (FCC Part101)	490 MHz	1DS3	1TR
TRP-24G-2B	24250-25250 MHz (FCC Part110)	800 MHz	28DS1/1DS3	1TR
All Indoor Type (e/w FAN UNIT)				
TRP-L6G-2F	5925-6425 MHz (FCC Part101)	252.04 MHz	8DS1/16DS1/ 28DS1/ 1DS3	2TR
TRP-L6G-101A				4TR
TRP-U6G-102A	6525-6875 MHz (FCC Part101)	160 MHz		2TR
TRP-U6G-101A				4TR
TRP-10G-101A	10550-10680 MHz (FCC Part101)	65 MHz	8DS1/16DS1	4TR
TRP-11G-102A	10700-11700 MHz (FCC Part101)	490 MHz	28DS1/1DS3	2TR
TRP-11G-101A	10700-11700 MHz (FCC Part101)			4TR
All Indoor Type (w/o FAN UNIT)				
TRP-U6G-3AA	6525-6875 MHz (FCC Part101)	160 MHz	8DS1/16DS1/ 28DS1/ 1DS3	2TR
TRP-11G-3AA	10700-11700 MHz (FCC Part101)	490 MHz		2TR



MDP-15MB5T-1A(8 x 1.5 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM (e/w optional CODE CONV)

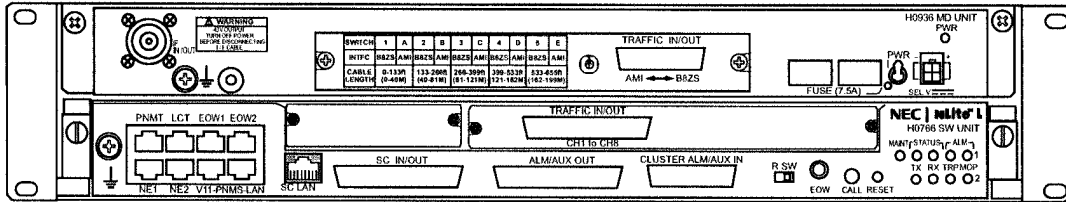


MDP-28MB7T-1A(16 x 1.5 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM (e/w optional CODE CONV)

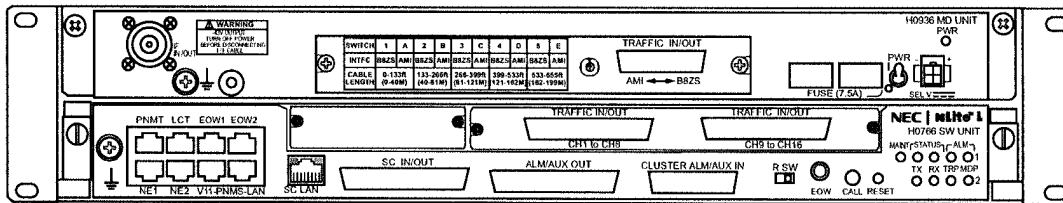


MDP-50MB6T-1A(1 x 45 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM

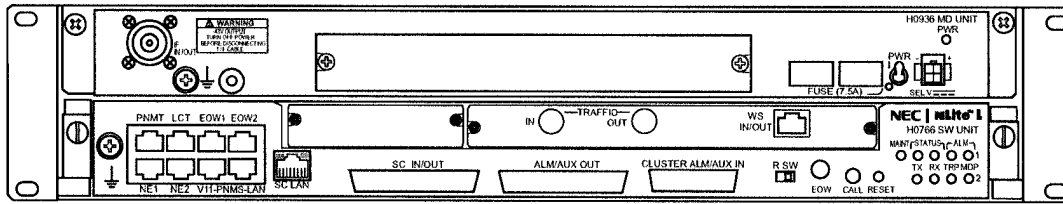
Fig. 2-1 Outline of the MDP (1/5)



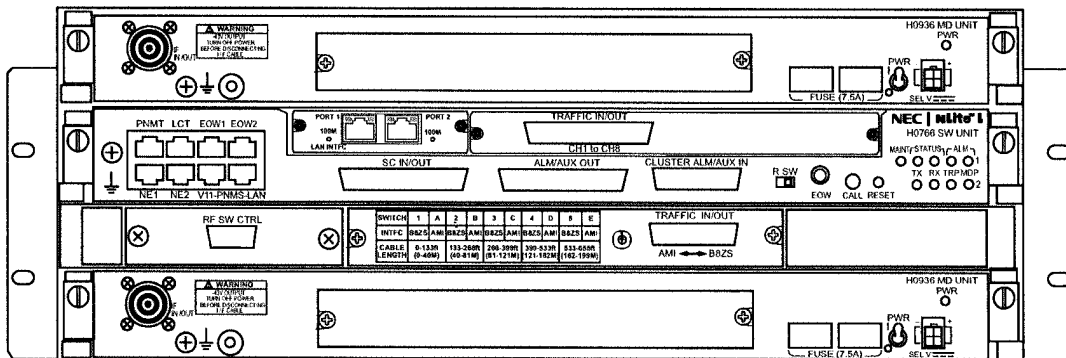
MDP-15MB5T-1B (8 x 1.5 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM
(e/w optional CODE CONV)



MDP-28MB7T-1B (16 x 1.5 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM
(e/w optional CODE CONV)

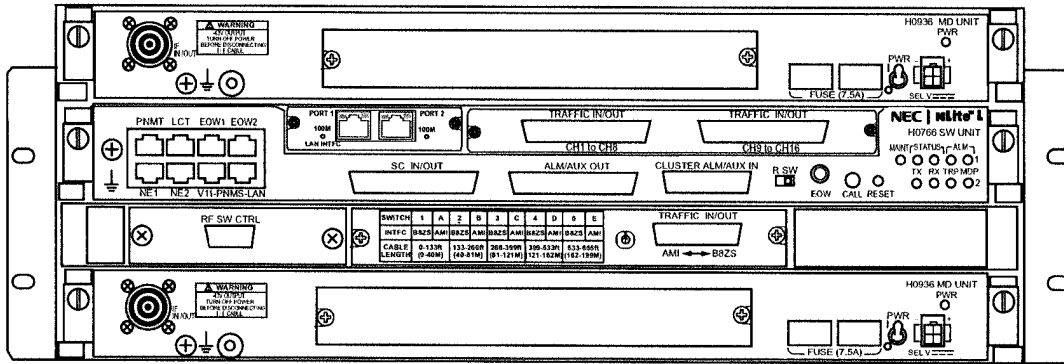


MDP-50MB6T-1B (1 x 45 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM

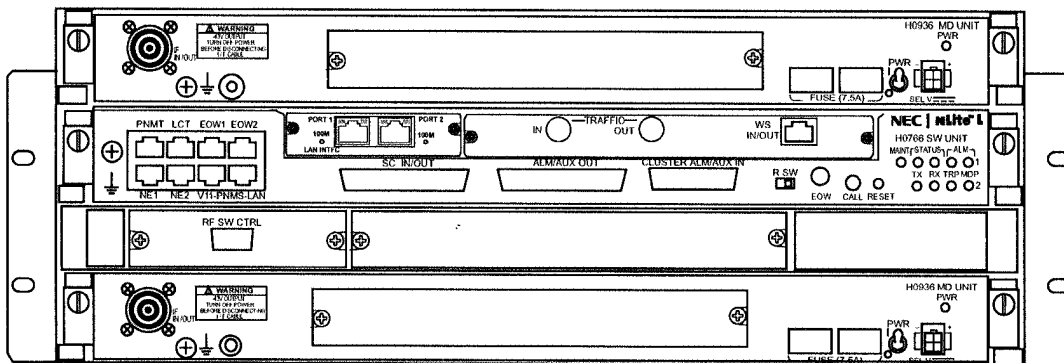


MDP-15MB5T-1C (8 x 1.5 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM
(e/w optional CODE CONV and LAN INTFC)

Fig. 2-1 Outline of the MDP (2/5)

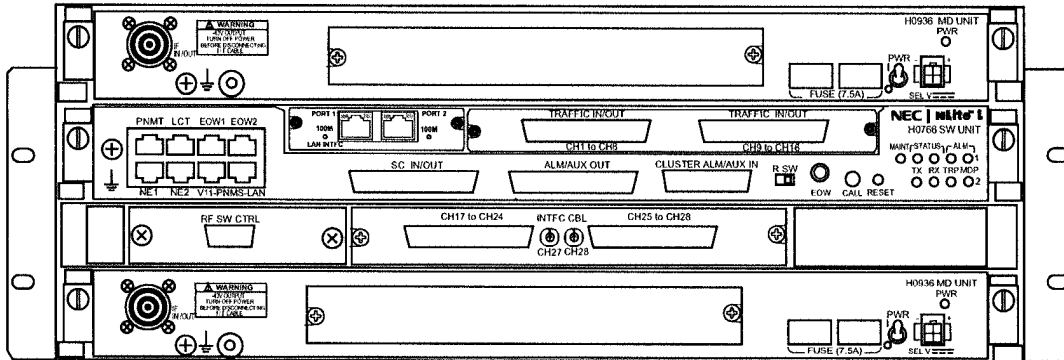


MDP-28MB7T-1C (16 x 1.5 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM
(e/w optional CODE CONV and LAN INTFC)

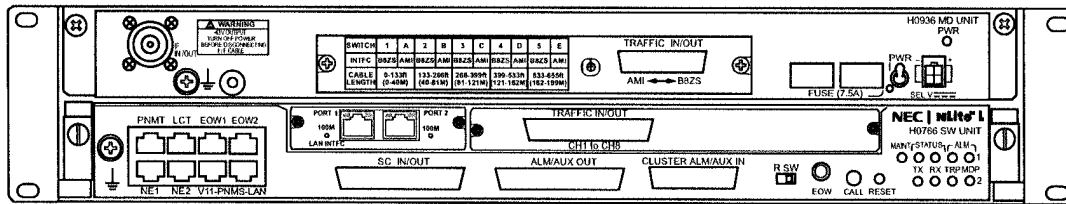


MDP-50MB6T-1C (1 x 45 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM
(e/w optional LAN INTFC)

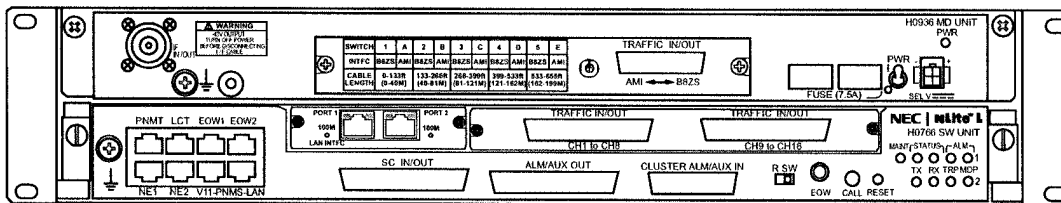
Fig. 2-1 Outline of the MDP (3/5)



MDP-50MB6T-2C (28 x 1.5 MB FIXED BIT RATE TYPE) for 1+1 SYSTEM
(e/w optional LAN INTFC)

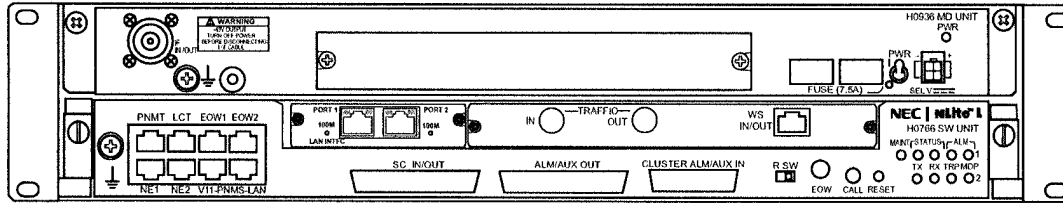


MDP-15MB5T-1D (8 x 1.5 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM
(e/w optional CODE CONV and LAN INTFC)

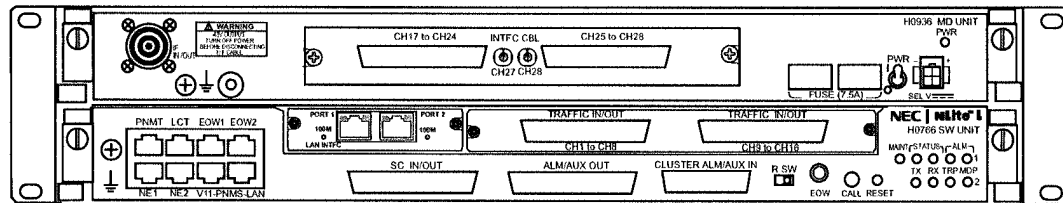


MDP-28MB7T-1D (16 x 1.5 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM
(e/w optional CODE CONV and LAN INTFC)

Fig. 2-1 Outline of the MDP (4/5)

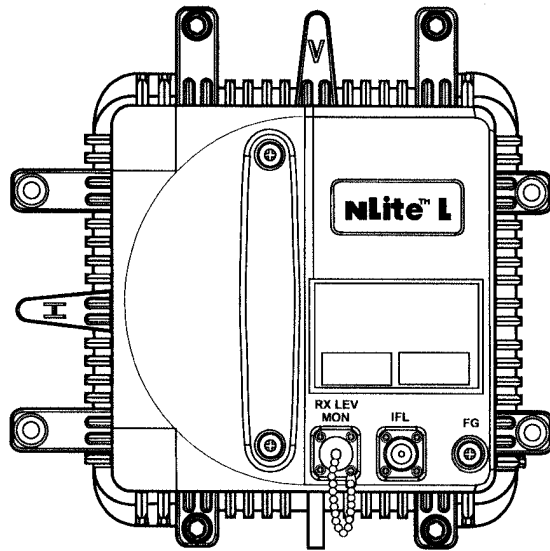


MDP-50MB6T-1D (1 x 45 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM
(e/w optional LAN INTFC)

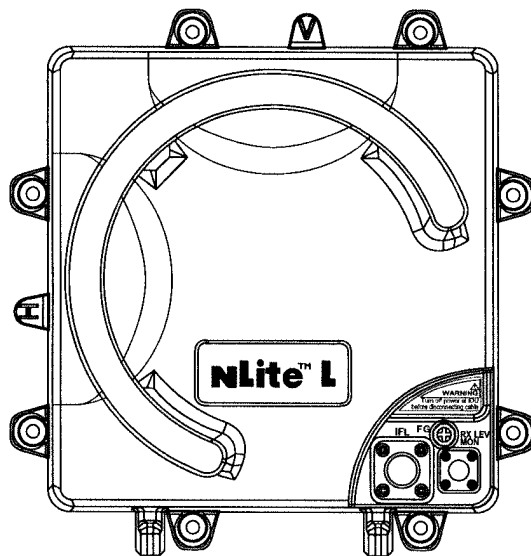


MDP-50MB6T-2D (28 x 1.5 MB FIXED BIT RATE TYPE) for 1+0 SYSTEM
(e/w optional LAN INTFC)

Fig. 2-1 Outline of the MDP (5/5)



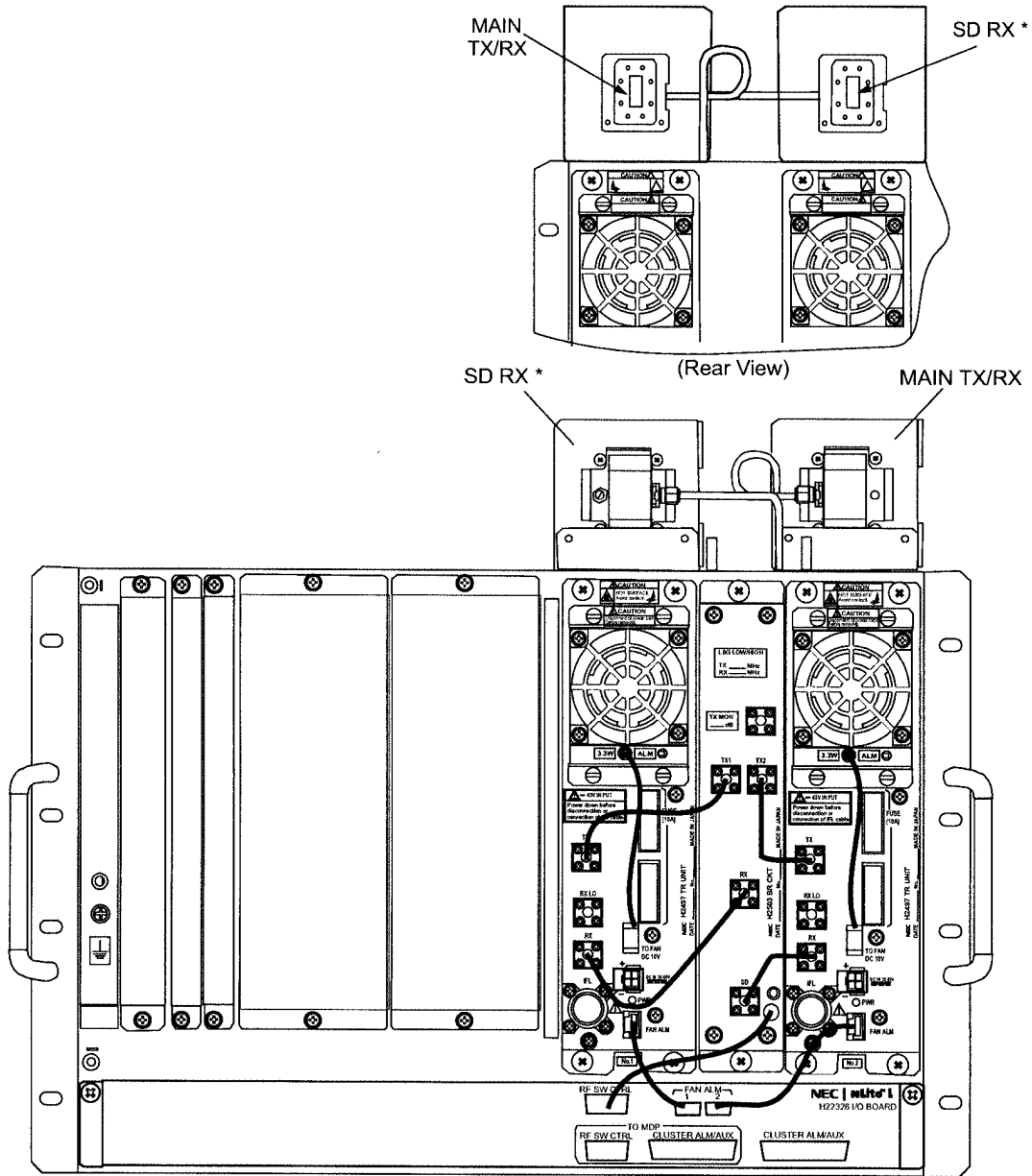
5.8/L6/U6/24 GHz TRP



10.5/11 GHz TRP

TRP-L6/U6/10.5/11/24G-() Split Type TRP

Fig. 2-2 Outline of the TRP (1/4)



- Notes: 1. SD RX Waveguide Flange is not provided in HS/HS system.
 2. The TX/RX port orientation can be changed (see Section III).
 3. TX MON terminal on the BR CKT is optional.

TRP-L6/U6/10/11/24G-() All Indoor, 2 × TRP e/w FAN Type

Fig. 2-2 Outline of the TRP (2/4)