5.8 GHz 15/28/50 MB
PDH DIGITAL MICROWAVE RADIO SYSTEM
NLite L
(PDH 1+0/1+1 SYSTEM)

SECTION IV   MAINTENANCE

CONTENTS

CONTENTS

1. GENERAL

This section provides instructions for the maintenance of the 5.8 GHz 15/28/50 MB digital microwave radio system.

This section provides precautions and instructions on preventive maintenance and corrective maintenance.

This manual is described for the firmware version of as follows.
SW UNIT: 1.0.1
MD UNIT: 1.0.2

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2. PRECAUTIONS

The following precautions must be carefully observed during maintenance.

(a) The maintenance personnel should report arrival at 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 I/F cable between the MDP and the TRP. Connecting test equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.

2. Persons performing servicing must take necessary steps to avoid electro-static discharge which may damage the modules on the MDP 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 disconnect the I/F cable between the MDP and the TRP in operating condition, to avoid damaging the MDP and TRP. Do not remove/connect the I/F cable with the MDP power ON, turn the MDP power OFF before connecting/disconnecting the I/F cable.

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. Be careful that top surface of the MDP is considerably 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, Mute, CW, LB, 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) When the control such as TX MUTE, CW, LB, etc. is performed, set TX SW and RX SW to the same channel certainly. If it carries out in AUTO condition, it may not operate normally.

(i) Instantaneous interruption may occur when performing the TX SW manual switching operation.

(j) Before removing or installing the MDP/TRP, turn off the power switch on the MDP.

(k) For procedures to change the password, refer to the Appendix in this section.

(l) After equipment start-up, allow the equipment to warm up at least 30 minutes.

(m) After completing maintenance, restore all connections and manual switch(es) to normal and confirm that all red alarm LEDs are unlit.

FRONT VIEW FOR 1+1 SYSTEM
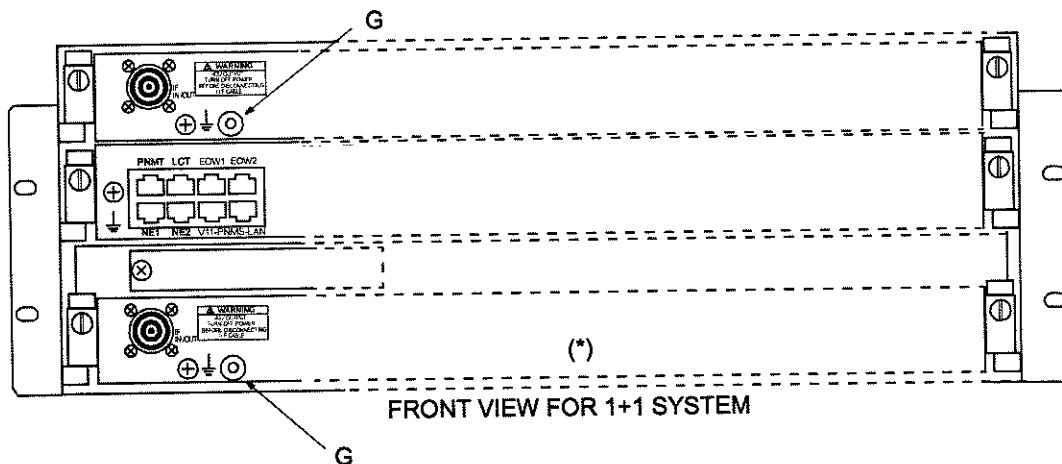
*Note: * The MD Unit No.2 is not provided for 1+0 system.*

MDP

Fig. 2-1 Location of G Terminal

Chart 2-1 Maintenance Mode Setting

Step	Procedure

---

1   Connect the RS-232C cable between the LCT and the MDP,

Note: * The MD Unit No.2 is not provided for 1+0 system.

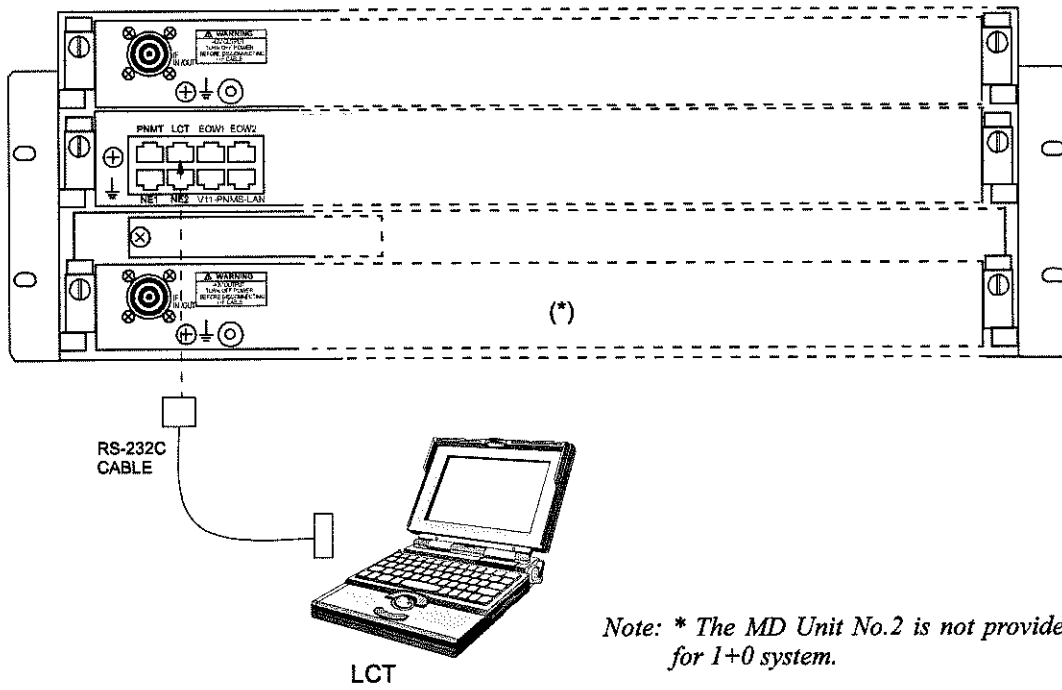**Fig. 2-2 LCT Setup**

2   Open the Terminal software (e.g; HyperTerminal),

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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	HP34401A	HP
3	OW/RX LEV Monitor*	X0818A	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   Enter Login name "Admin" and 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 :
```

2   Enter the valid password and press the "Enter" key,

Maintenance Mode Setting

3   Press the "7" key 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 :
```

4   Press the "1" key and press the "Enter" key,

5   Press the "1" key and press the "Enter" key for Mainte mode ON,

---

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

Step	Procedure

Restoring to Normal Mode

6   Press the "7" key 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
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 :
```

7   Press the "1" key and press the "Enter" key,

8   Press the "2" key and press the "Enter" key for Mainte mode OFF,

If any item has been controlled, an error message and controlled items are displayed. Release controlled item before Mainte mode OFF.

9   Press the "ESC" key to return to previous menu,

10   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. 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 "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.

Lower

Chart 3-2 Performance Monitoring (Cont'd)

Step	Procedure

Table 3-2 Meter Reading

Check Item	Normal Indication		Allowable Range
TX POWER	10.5 GHz	+21 to −7 dBm	Normal Indication ±3 dB (8 x 1.5 MB)
RX LEVEL	−30 dBm*	10.5 GHz	−15 to −84.0 dBm (8 x 1.5 MB)
TRP PS MON	−43 V**		−32 to −46 V DC

Notes:1. If an abnormal indication appears, proceed to 4.1 (Fault Location) in this chapter.

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

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

4. Record displayed indication values on the LCT.

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

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 ---
 1. RF Frequency
 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
16. LAN Device Reset
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.

- RF Frequency
  Sets the transmitting and receiving RF frequencies.

- 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.

- 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 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 signal from MUX is looped back and then output with 1.5 MB signal. 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

  The Antenna Alignment Mode is the mode used for Antenna Orientation. This mode is used for extending the dynamic range of the RX LEVEL MONITOR. The output of RX LEV MON in TRP can be enlarged and the meter indication of the OW/RX LEV Monitor can be enlarged. In this mode, since control of TX power stops, the normal operation can not be performed.

  > Note: The relation of the RX INPUT LEVEL and RX LEVEL MON is shown below.

- LAN Device Reset

  Used for reset control to Port 1 or Port 2, when LAN is optional provided.
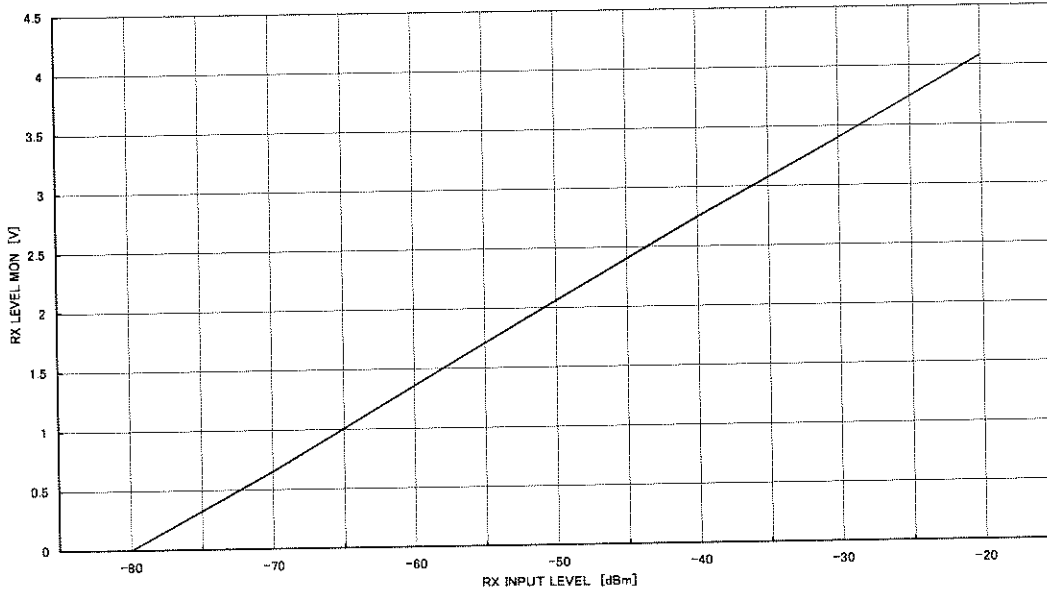
RX LEVEL MON vs RX INPUT LEVEL (Typical)

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 IF line cable*

Note: ○ indicates abnormal condition.
* If the IF line cable is open conditions, 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,

---

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

```
--- 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      ⎫
TX Input                    Normal      ⎪
RX Level                    Normal      ⎬ *1
APC                         Normal      ⎪
Cable                       Alarm       ⎭

Next Data ? (Y/N) : y

--- MDP ---
MOD                         Alarm       ⎫
DEM                         Alarm       ⎪
High BER                    Normal      ⎬ *2
Low BER                     Normal      ⎪
LOF                         Normal      ⎭
MDCPU                       Alarm
BB Linearizer               OPR    ............. *6

Next Data ? (Y/N) :  y

--- Main INTFC ---
LOS              (CH01-08) : **--*---   ⎫
                 (CH09-16) : *-------   ⎪
Output LOS       (CH01-08) : **--*---   ⎪
                 (CH09-16) : *-------   ⎬
AIS Generated    (CH01-08) : --------   ⎫ ⎪ *3
                 (CH09-16) : *------- ⎬*4⎪
AIS Received     (CH01-08) : --------   ⎭ ⎪
                 (CH09-16) : *-------   ⎪
Channel Usage Error (CH01-08) : ---*---* ⎫*5 ⎭
                    (CH09-16) : --*-----  ⎭

Next Data ? (Y/N) :  y

--- Module ---
MODEM                       Alarm
Main INTFC                  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
Enter Selection :
```

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

Step	Procedure

Notes: 1. *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.*

2. **1 When an "Alarm" indication is displayed, the TRP has a failure.*

3. **2 When an "Alarm" indication is displayed, the MD UNIT on MDP is failure.*

4. **3 In the 8 x 1.5 MB system, (CH01-08) is indicated only.*

5. **3 In the 16 x 1.5 MB system, (CH01-08) and (CH09-16) are indicated*

6. **4 When an "*" indication is displayed, external equipment has a failure ("−" indication is normal condition).*

7. **5 Indicates main channel interface usage error when Report has been selected for the Channel Usage Error.*

8. **6 Indicates when Linearizer is controlled as follows.*

> *AUTO Control   :   "OPR"*
> *Reset Control   :   "NO OPR"*
> *Not Provided BB Linearizer: "N/A"*

9. *Alarm and status indication items should be displayed depending on system requirement.*

The alarm and status of each module and TRP are displayed. Each items 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, this alarm is issued.

TX Input:

Indicates the status of the modulated signal input from 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 RX signal level requirements, this alarm is issued.

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

Step	Procedure

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 open conditions, TRP alarm indicator on the MDP turns to flashing.

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 of the highway between radio sections. If the signal is deteriorates below the threshold value (3×10^{-4} fixed), this alarm is issued.

Low BER:

Indicates bit error rate (BER) of the data signal. If the signal is deteriorated below the threshold values (3×10^{-7}, fixed) 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.

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

Step	Procedure

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 is not corresponded to the BB Linearizer, N/A appears.

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.

MODEM:

Indicates the operating status of the MODEM. If failure occurs in the equipment, this alarm is issued.

Main INTFC:

Indicates the operating status of Main INTFC. If failure occurs in the equipment, alarm is issued.

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

Step	Procedure
5	Press the "0" key to logout and press the "Enter" key.

TRANSMITTING END RECEIVING END
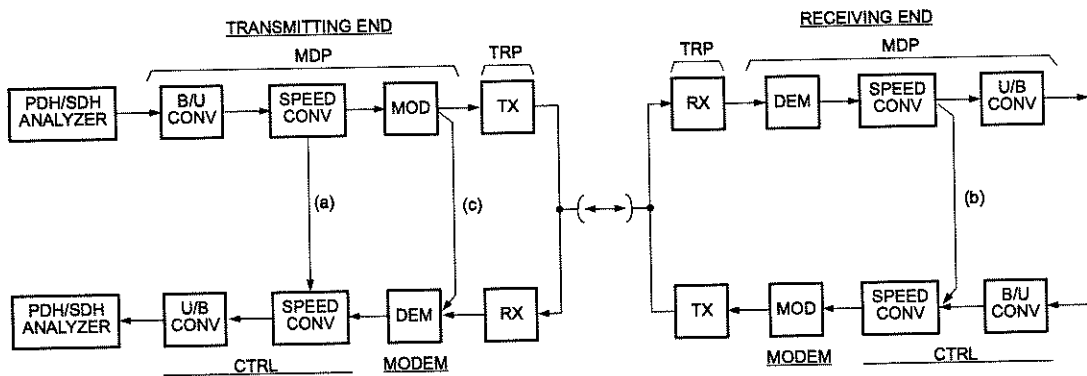
Fig. 4-1 Loopback Diagram for Fault Isolation

Chart 4-2 Loopback BER Measurement

Apparatus:
PDH Analyzer

Step	Procedure

---

1   Disconnect the D-sub connectors from the CH1-CH8 IN/OUT or CH9-CH16 IN/OUT on the MDP (see Fig. 4-2),

2   Set the PDH Analyzer as follows:

- Bit rate   : 1.544 Mbps (ANSI T1.102)
- Code format : B8ZS or AMI
- Impedance   : 100 ohms, balanced

3   Set up as in Fig. 4-2,

4   Measure the BER for each channel,

Requirement:1 x 10^{-12} or less

Transmitting End

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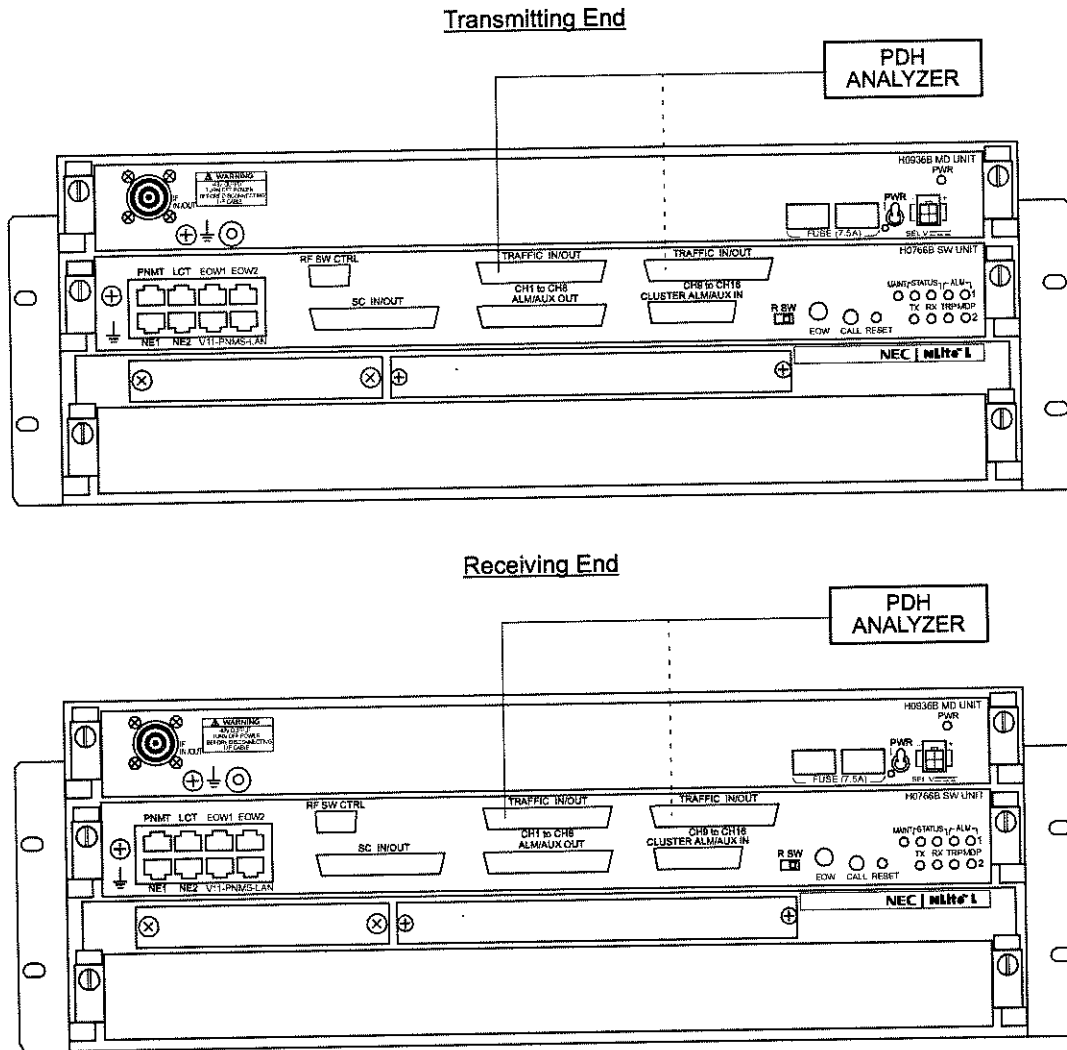
*Notes: Pin assignment of D-sub connector is referred to Table 2-1
in Section II Operation.*

For 8/16 x DS1 System

MDP

Fig. 4-2 BER Measurement Setup

Chart 4-3 Loopback Control Setting

This chart contains:
A. Preparation: Steps 1 to 8
B. IF Loopback Control: Steps 9 to 14
C. Main Signal Loopback (Near End) Control: Steps 15 to 22*
D. Main Signal Loopback (Far End) Control: Steps 23 to 30*

Note: * Applies to 8/16 × 1.5 MB system.

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 1.544 Mbps signal from MUX is looped back with IF signal via INTFC and MODEM and then output with 1.544 Mbps signal (see Fig. 4-1).*

PREVENTIVE MAINTENANCE

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

Step	Procedure

9   Press the "7" key for IF loopback and press the "Enter" key,

```
Enter Selection : 2

— Control —
1. RF Frequency
2. ATPC Manual Control
4. TX Mute
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. On
2. Off
Enter Selection :  1

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

Success !!
```

> Note: Setting items displayed on the LCT depend on setting
> condition of "System Configuration".

10   Press the "1" key for IF Loopback ON and press the "Enter"
        key,

11   Press the "Y" key and press the "Enter" key, then "Success !!" is
        displayed,

12   After the Loopback test for BER, press the "7" key and press the
        "Enter" key,

13   Press the "2" key for IF Loopback OFF and press the "Enter"
        key,

14   Press the "Y" key and press the "Enter" key, then "Success !!" is
        displayed,

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

Step	Procedure

C. Main Signal LOOPBACK (NEAR END) CONTROL

Note: Used for localization of equipment failure in the MUX or Radio equipment. The input 1.544 Mbps signal from MUX is looped back immediately, and then output with 1.544 Mbps signal (see Fig. 4-1).

15   Press the "8" key for Main Signal Loopback (Near End) and press the "Enter" key,

```
Enter Selection : 2

— Control —
1. RF Frequency
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

— 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) : *-*--*--
CH Select                 (CH01-08) :  15

— 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 !!
```

Notes :   1. Setting items displayed on the LCT depend on setting condition of "System Configuration".

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

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

Step	Procedure
16	Press the "1" key for selected CH Loopback and press the "Enter" key,
17	Press the desired channel number key and press the "Enter" key,
18	Press the "1" key for ON and press the "Enter" key,
19	Press the "Y" key and press the "Enter" key, then "Success !!" is displayed,

Note: In the loopback condition, * mark is indicated.

20	After the loopback control for BER, press the "ESC" key to return to previous menu,

```
--- 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 !!
```

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

Note: Used for localization of equipment failure in the MUX or Radio equipment. Input 1.544 Mbps signal is looped back with INTFC of MDP at the opposite station and then output with 1.544 Mbps signal (see Fig. 4-1).

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

Step	Procedure

---

23   Press the "9" key for Main Signal Loopback (Far End) and press the "Enter" key,

```
--- Control ---
1. RF Frequency
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

--- 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)  -------Z
CH Select          (01-16) :  15

--- 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 !!
```

Notes: 1. *Indication items on LCT display should be changed according to "system configuration".*
2. *When the loopback is controlled from opposite station, "Z" mark is indicated.*
3.*The status of channels are indicated below.*
    *# : Assigned to LAN, * : loopback condition, - : Normal*

24   Press the "1" key and press the "Enter" key,

25   Press the desired channel number key and press the "Enter" key,

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

Step	Procedure
26	Press the "1" key for ON and press the "Enter" key,
27	Press the "Y" key and press the "Enter" key, then "Success !!" is displayed,
28	After the loopback test for BER, press the "ESC" key to return to previous menu,

```
--- 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 !!
```

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 CH MD UNIT replacement: Steps 1 to 7
B. No.2 CH 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 CH MD UNIT/SW UNIT/No. 2 CH 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 CH MD UNIT is not provided for 1+0 system.

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

Step	Procedure
	A. No.1 CH MD UNIT REPLACEMENT
	REMOVING
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 No. 1 CH MD UNIT (see Fig. 4-3),
4	Disconnect the power cable from the SEL V connector on the No.1 CH MD UNIT,
5	Disconnect the IF cable from the IF IN/OUT connector on the No. 1 CH MD UNIT,
6	Disconnect the frame ground cable from the FG terminal,
7	Loosen two screws on the No. 1 CH MD UNIT,
8	To remove the MD UNIT, hold two screws then pull it forward,
	REMOUNTING
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 IF 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 CH MD UNIT REPLACEMENT

REMOVING

18   Repeat steps 1 to 7 for No.2 CH MD UNIT,

REMOUNING

19   Repeat steps 8 to 14 for No.2 CH MD UNIT,

C. SW UNIT REPLACEMENT

REMOVING

Note: When replacing SW UNIT with spare, replace quickly to minimize service interruption.

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 CH MD UNIT, (see Fig. 4-3),

22   Turn off the power switch on the No.2 CH MD UNIT,

23   Disconnect all cables from connectors on the MDP,

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,

REMOUNTING

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 CH MD UNIT.
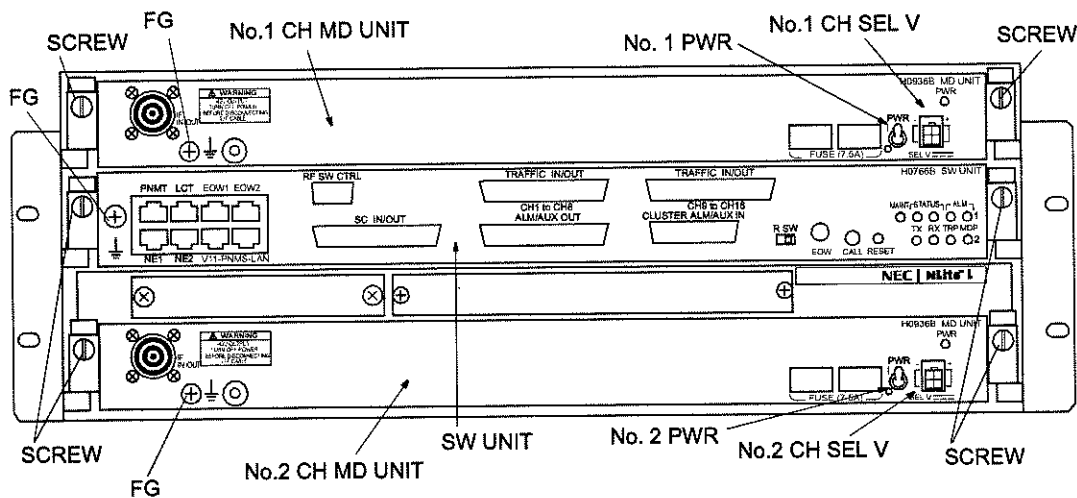

Note: *Other portions are the same as the equipment for 8 x DS1 system.*

FOR 16 × DS1 SYSTEM
MDP

Fig. 4-3 Screw, Connector and Switch Location

4.2.2 TRP Replacement

The procedures for replacing the TRP with a spare are given in Chart 4-5.
The label attached to the side of TRP indicates the TRP type (see Fig 4-3).
To replace the TRP, prepare another TRP of the same type as indicated on
the label of the failed one (see Appendix in Description section).
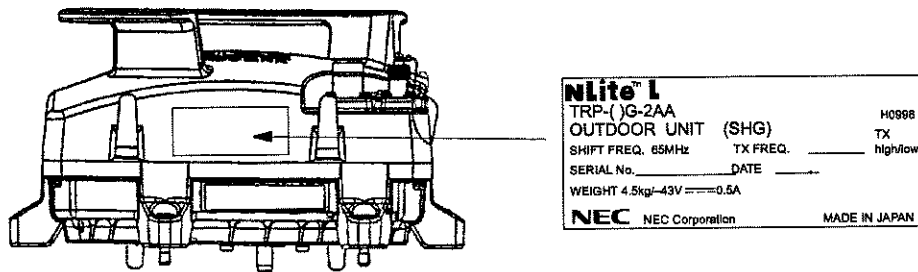
10.5 GHz Band TRP

Fig. 4-4 TRP Type and Frequency Indication Label
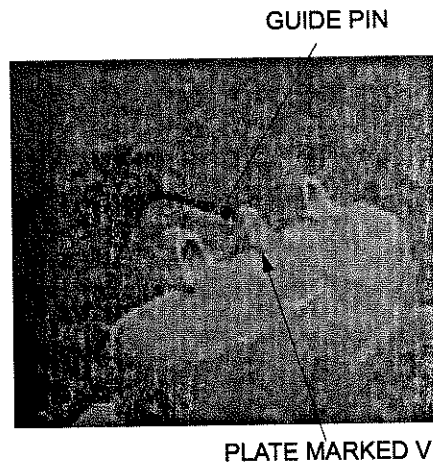
Chart 4-5 TRP Replacement

Step	Procedure

10.5 GHz BAND TRP

REMOVING

1   Turn off the power switch on the associated MDP,

Caution: Do not remove the IF line cable before turn OFF the power switch on the MDP.

2   Remove the self-bonding tape from the IF IN/OUT connector,

3   Disconnect the IF cable from the IF IN/OUT connector on the TRP,

4   Disconnect ground cable from the FG terminal on the TRP,

5   Loosen the four bolts fixing the TRP with a T type hexagonal driver,

SCREWS

SCREWS
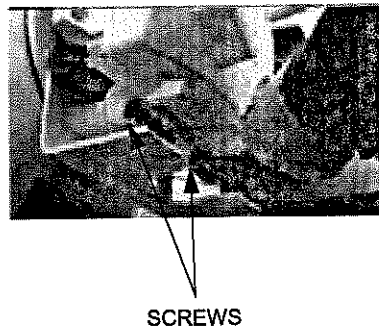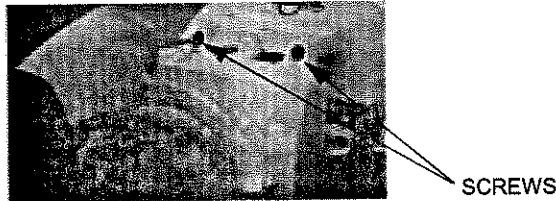
6   Remove the TRP from the bracket with both hands,

Chart 4-5 TRP Replacement (Cont'd)

Step	Procedure

MOUNTING

7 When vertical polarization is required, rotate the TRP so that the plate marked V turns to top,

   Note: Remove the protection metallic plate covering the waveguide hole on the TRP.

8 When horizontal polarization is required, remove the guide pin fixed on the plate marked V.

GUIDE PIN

PLATE MARKED V

9 Insert the guide pin removed in previous step behind of the plate marked H.

10 Rotate the TRP so that the plate marked H turns to top.

Chart 4-5 TRP Replacement (Cont'd)

Step	Procedure

GUIDE PIN

PLATE MARKED H
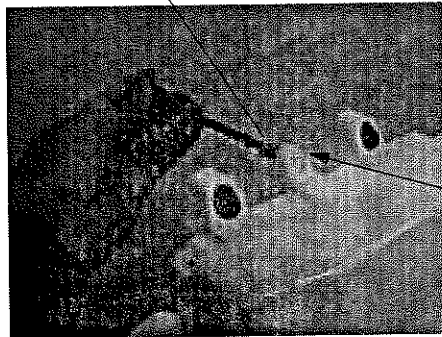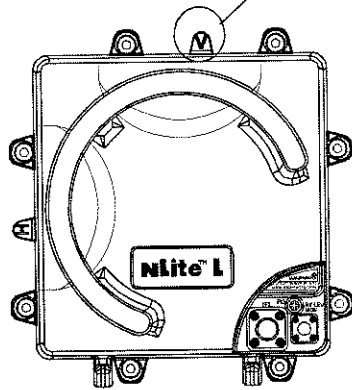
PLATE MARKED V   PLATE MARKED H

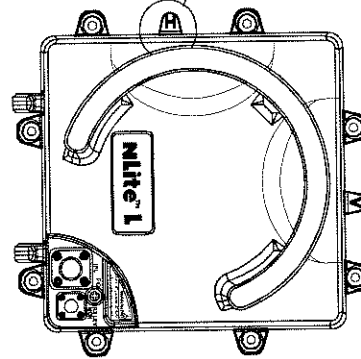UP   UP

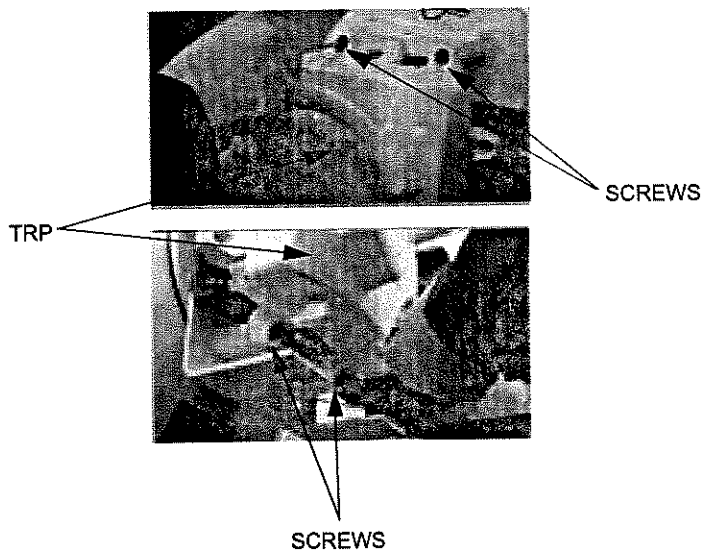V POLARIZATION   H POLARIZATION

V/H Polarization Conversion

11   Put the spare TRP onto the bracket,

Note: Be careful not to damage the flange.

Chart 4-5 TRP Replacement (Cont'd)
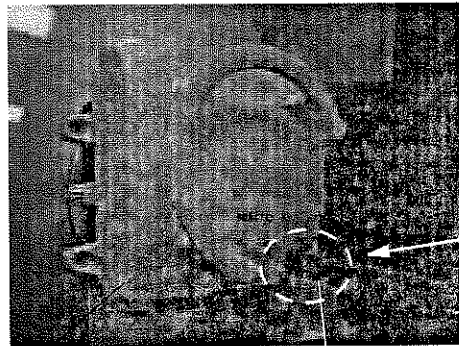
Step	Procedure

12   Mount the spare TRP onto the bracket, and tighten the four screws on the TRP,

13   Reconnect the IF cable to the IF IN/OUT connector on the TRP,

---

Chart 4-5 TRP Replacement (Cont'd)

Step	Procedure
14	Wrap the IF IN/OUT connector with self-bonding tape for waterproofing.

This part should be wrapped by
self-bonding tape for waterproofing.

TRP   IFL CONNECTOR

IF CABLE

TRP

SELF-BONDING TAPE

TRP

IF CABLE

SELF-BONDING TAPE

IN CASE OF "L" ANGLE
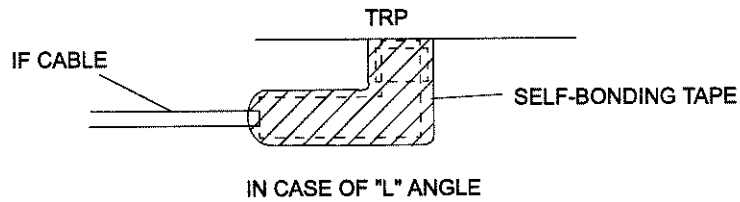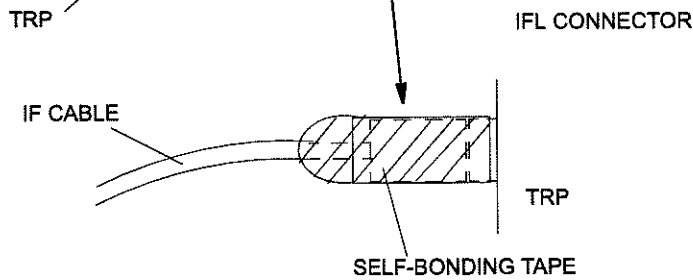
Note: The self-bonding tape should be prepared by the customer.

| 15 | Reconnect ground cable to FG terminal, |
| 16 | Turn on the power switch on the 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 4-8.

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 5-3 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 4-7 in this Section
		3. Provisioning Setting	Chart 5-3 in Section II
		4. Relay/House Keeping Setting*	Chart 5-4 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 setting items must be restored to original condition.

Chart 4-6 System Configuration Setting

This chart describes the procedure for setting the system configuration after system has modified or replaced equipment. 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 4-7 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     : 2001
Enter Month   : 2
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 4-7 Date and Time Setting (Cont'd)

Step	Procedure
4	Set all items according to display of the LCT,
5	After setting the time, proceed to Chart 5-8 for the Provisioning setting.

Chart 4-8 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      | G7965A   | 2001/01/27  | 004004     | 001S     | 1.00
TRP No.2      | G7965A   | 2001/01/27  | 004002     | 001S     | 1.00
MD UNIT No.1  | G8538A   | 2001/02/20  | 004002     | -        | 1.00
SW UNIT       | G8540A   | 2001/02/20  | 004002     | -        | 1.00
MD UNIT No.2  | G8538A   | 2001/02/20  | 004002     | -        | 1.00
```

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 4-8 Inventory Data Monitoring (Cont'd)

Step	Procedure

- 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.

Note: The end of HW Type signifies the type of TRP.
S: Super High Grade (SHG)
H: High Grade (HG)

6	Press the "ESC" key,
7	Press the "0" key to Logout and press the "Enter" key.

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 the password, login of LCT as Administrator is impossible. When you change the login password, be careful enough.

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,

```
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 :
```

Step	Procedure
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.