Chart 4-2 (Cont'd)

Step	Procedure
9	Click on "RMON(Line)(7days/day)" sub-menu button in "PMON (History)",

---RMON(Line)(1day)--- **Maintenance Mode: on**

Port1 ▼

Date	Time	Status	1	2	3	4	5	6

1: RX UNICAST
2: RX BROADCAST
3: RX MULTICAST
4: RX PAUSE
5: RX CEC ERR
6: RX ALIGNMENT ERR
7: RX SYMBOL ERR
8: RX UNDERSIZE
9: RX FRAGMENTS
10: RX 64
11: RX 65-127
12: RX 128-255
13: RX 256-511
14: RX 512-1023
15: RX 1024-1536
16: RX 1537-MAX
17: RX JABBERS
18: TX UNICAST
19: TX BROADCAST
20: TX MULTICAST
21: TX PAUSE
22: TX COLLISION

Detailed daily Line (LAN) RMON (Remote Network Monitoring) data are displayed.

Note: For the GbE INTFC, there are distinctions for the functions from the 10BASE-T/100BASE-Tx, refer to Notes of above "RMON(Line)(24H/15min)".

5. 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 module-level/unit-level faults.

Faults can be classified into those that cause deterioration of the transmission quality and those that interrupt the traffic 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.

5.1 Alarm/Status

When an alarm event has occurred, At first, check alarm indication on the front of the IDU. Continuously, connect the PC to the LCT jack on the IDU and check alarm/status indication, Meter Reading on the LCT.

(a) Check of the ALM LED Indications and LCT Indication

A faulty part can be located by checking the ALM LED indicators and LCT Alarm indications. For the explanation of the ALM LED indication, refer to Chapter 2 OPERATING EQUIPMENT in Section II. Also refer to Chapter 2 Alarm/Status in this Section IV APPENDIX LCT OPERATION.

(b) Meter Readings

Based on the meter readings during periodical inspection with LCT described in Chapter 4, a faulty part can be located by checking if the reading values exceed the permissible ranges.

(c) Loopback

In the case of an abnormal BER measurement result among the meter reading items, try to distinguish the faulty part by Chart 5.1.1 Loopback.

5.1.1 Alarm and Status

The alarm and status of each module and ODU are displayed. Each items is explained below.

ODU

TX Power: Indicates the status of the transmitter in the ODU. When the transmission level is decreased 3 dB or more from preset ATPC minimum level, “Alarm” is issued.

TX Input: Indicates the status of the ODU input signal from IDU. When the input signal from the IDU is lost, “Alarm” is issued.

RX Level: Indicates the status of the received RF signal level of the ODU. When the level decreased below the RX threshold level, “Alarm” is issued.

APC: Indicates the status of the synthesizer in the ODU. When any abnormality occurs in the synthesizer, “Alarm” is issued.

ODU CPU/Cable Open:
Indicates the status of the CPU in the ODU or IF cable, When any abnormality occurs the CPU operation or IF cable is open, “Alarm” issued.

Mute Status: Indicates the control status of the ODU TX power output. When the TX power is set to Mute, “On” is issued.

LO REF (for XPIC in SONET):
Indicates the status of reference LO signal used for V/H signal synchronization. When the reference signal in the ODU is lost, “Alarm” is issued.

TX SW Status (for 1+1 configuration):
Indicates the TX SW status for the No. 1 or No. 2 CH selection.

RX SW Status (for 1+1 configuration):
Indicates the RX SW status for the No. 1 or No. 2 CH selection.

MODEM

Unequipped:
Indicates the status of the MODEM existence. When the MODEM is loose contact or it is not mounted according to the “Equipment Setup”, “Alarm” is issued.

Module:
Indicates the status of the modulator-demodulator. When a failure occurred in the modulator-demodulator and as a result of a LSI failure, “Alarm” is issued.

LOF: Indicates the frame synchronization status. When the synchronization from DMR is lost, “Alarm” is issued,

Frame ID: Indicates the status of ID number against MODEM of opposite station or the other channel in Twinpath configuration. When ID number assignment is improper, “Alarm” is issued.

High BER: Indicates the quality severe deterioration status between radio sections. When the signal deteriorates below the threshold preset value, “Alarm” is issued. The settable threshold values are: 1E-3, 1E-4 and 1E-5.

Low BER: Indicates the quality unsevere deterioration status between radio sections. When the signal deteriorates below the preset threshold value, “Alarm” is issued. The settable threshold values are: 1E-6, 1E-7, 1E-8 and 1E-9.

Early Warning:
Indicates quality deterioration status. When the signal deteriorates below the preset threshold level, “Alarm” is issued. (When the Early Warning is used for protection switchover in 1+1 configuration, RX Hitless Switch is operated.) The preset threshold level is less than 1E-9.

MOD: Indicates the operating status of the MOD. When any failure occurs in the modulator section, “Alarm” is issued.

DEM: Indicates the operating status of the DEM. When any failure occurs in the demodulator section, “Alarm” is issued.

Input Voltage:
Indicates the power supply input voltage status. When power supply is exceeding the limited, “Alarm” is issued.

Power Supply:
Indicates the operating status of the power supply. When power supply is abnormal, “Alarm” is issued.

IF Cable Short:
Indicates the status of IF cable between IDU and ODU. When a short circuit is caused between ODU and the IDU, “Alarm” is issued.

Cable EQL: Indicates the status of IF cable equalizer. When equalizer characteristics control is lost, “Alarm” is issued.

XIF (for XPIC in SONET):
Indicates the status of XIF input signal of the Main Master IDU and Sub Master IDU. When the XIF input signal is lost, “Alarm” is issued and XPIC function is reset.

XPIC Status (for XPIC in SONET):
Indicates the status of XPIC operation. When the XPIC function is reset, “Reset” is indicated and the “Reset” LED on the front panel is lit.

XREF (for XPIC in SONET):
Indicates the status of reference CLK signal used for V/H signal synchronization. When the reference OSC in the MODEM failure occurs, “Alarm” is issued.

Linearizer Function:
Indicates the status of linearizer function.

OPR: When the linearizer function is used.

NO OPR: When the linearizer function is not used. In this case, TX output power decreases approx. 4 dBm from a standard value.

N/A: When the ODU is used without linearizer function.

Linearizer: Indicates the linearizer operating status. When linlearizer operation is improper in OPR condition, “Alarm” is issued.

ATPC Power Mode:
Indicates the status of ATPC operation mode. When the ATPC function is improper, stop the control and maintain the TX output level at HOLD/MAX/MIN selectable.

INTFC (Main/Sub)

INTFC(1/2) Module:
Indicates the operating status of the ( ) INTFC. When any failure occurs in the INTFC(1/2) Module, “Alarm” is issued.

INTFC(1) Unequipped:
Indicates the existence status of the ( ) INTFC. When the ( ) INTFC(1) is not equipped, “Alarm” is issued.

INTFC(2) Unequipped (for SONET):
Indicates the existence status of the ( ) INTFC. When the ( ) INTFC(2) is not equipped, “Alarm” is issued.

INTFC(1/2) Type Mismatch:
Indicates the mounted status of the ( ) INTFC. When the INTFC(1/2) type is not coincided with the inventory list, “Alarm” is issued.

INTFC(1) In-Phase:
Indicates the received signal DADE status between No. 1 and No. 2 at STM/( )E1 INTFC. When the received signal delay time is out of permissible range, Outphase alarm is issued.

OC-3(1) LOS (MUX) (for SONET):
Indicates the input signal status of the OC-3 from MUX. When the input is disconnected, “Alarm” is issued.

OC-3(1) LOF (MUX) (for SONET):
Indicates the input signal status of the OC-3 from MUX. When the input signal is out of frame synchronization, “Alarm” is issued.

E-BER(1) (MUX) (for SONET):
Indicates Excessive-BER of the input OC-3 signal from MUX. When the signal deteriorates below the preset threshold level, “Alarm” is issued. The settable threshold values are 1E-3, 1E-4 and 1E-5.

OC-3(1) SD (MUX) (for SONET):

Indicates the input signal status of the OC-3 from MUX. When the signal deteriorates below the preset threshold level, “Alarm” is issued. The settable threshold values are 1E-6, 1E-7, 1E-8 and 1E-9.

OC-3(1) LOS (DMR) (for SONET):

Indicates the signal status of the OC-3 from DMR. When the input is disconnected, “Alarm” is issued.

OC-3(1) LOF (DMR) (for SONET):
Indicates the status of the input OC-3 signal from DMR. When the input signal is out of synchronization, “Alarm” is issued.

OC-3(1) E-BER (DMR) (for SONET):
Indicates Excessive-BER of the input OC-3 signal at the Radio side. When the signal deteriorates below the preset threshold level, “Alarm” is issued. The setable threshold values are 1E-3, 1E-4 and 1E-5.

OC-3(1) SD (DMR) (for SONET):
Indicates the input signal status of the OC-3 from DMR. When the signal deteriorates below the preset threshold level, “Alarm” is issued. The setable threshold values are 1E-6, 1E-7, 1E-8 and 1E-9.

OC-3(1) TF (for SONET):
Indicates the signal interruption status. Indicates when MS-AIS Generation is set to “Disable”. When OC-3 output signal of OC-3 INTFC is stopped, “Under Execution” is indicated.

LAN Link (Port ( )) (LAN INTFC for SONET):
Indicates the status of Link between related equipment and Port ( ). Indicates “Link” when the Port is linked with related equipment and indicates “Alarm” in other case.

LAN Collision (Port ( )) (LAN INTFC for SONET):
Indicates the status of Collision in Half Duplex mode. In Full Duplex mode, “Normal” is always displayed. Indicates status when Port ( ) is in collision condition.

Link Loss Forwarding (LLF) (Port ( )) (LAN INTFC for SONET):
Indicates the operating status during the fault in opposite station or when the link of local Port ( ) LAN is disconnected by the fault of radio section. When any failure occurs in the MAIN INTFC, “Alarm” is also issued.

Speed & Duplex: (Port ( )) (LAN INTFC for SONET):
Indicates the operating mode of Port ( ).

CTRL

CTRL Module:
Indicates the operating status of the CTRL. When any failure occurs in the CTRL Module, “Alarm”

is issued.

MMC:
Indicates the MMC status. When the mounted MMC is detected, “On” is displayed.

APS SW Fail (for APS in SONET):
Indicates the APS status of the APS system. When the APS switchover failure occurs, “Alarm” is issued.

APS Online Status (for APS in SONET):
Indicates online channel on the APS system.

XCTRL (for XPIC in SONET):
Indicates the status of control signal between Main Master IDU and Sub Master IDU. When the out of control condition occurs, “Alarm” is issued.

XPIC Mode Mismatch (for XPIC in SONET):
Indicates the status of the Main Master IDU and Sub Master IDU definition. When the Main Master IDU and Sub Master IDU is not defined properly as like as Main Master-Main Master or Sub Master-Sub Master, “Alarm” is issued.

5.1.2 Control Item

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

Details of "Control" item is described as follows:

TXSW manual control:
Controls manual switchover of the TX SW at the transmitting side in the Hot standby (HS) configuration.

RXSW manual control:
Controls manual switchover of the RX SW in the 1+1 configuration. The switchover is carried out without traffic interruption when the DADE is In-phase. Adjustment of the delay time of No.1 and No.2 is automatically set.

Caution: When the RX SW mode is set to "Forced" in provisioning, RX SW manual control can select either No. 1 or No. 2 RX route though one is alarmed. Then, take care switching to avoid traffic interruption.

ATPC manual control:
Used when it is required ATPC operation ON/OFF or the change of the transmitting power range in ATPC operation.

TX mute: Turns off the transmitter output.

CW CONTROL (No.1/2):
Used for transmitting a unmodulated carrier wave (CW). Used to confirm the TX frequency stability.

APS Manual Control (for APS in SONET):
Controls manual switchover (Auto/Working/ Protection) of the Optical Line in the APS system.

Caution: When the APS Maintenance mode is set to "Forced" in provisioning, APS Manual Control can select either Working or Protection line though one is alarmed. Then, take care switching to avoid traffic interruption.

IF loopback: Used for distinguish equipment failure to ODU or IDU. The input traffic signal from MUX is looped back at IF stage. When no abnormality is found in the signal after IF loopback, it is assumed that the ODU has a problem.

Since the control is not interlocked with the RX SW, the RX SW control is needed to select CH which it is IF looped back in 1+1 configuration.

Main Loopback (NEAR END) (for SONET)/
Main Loopback (NEAR END) INTFC (1) or (2) (for SONET APS)/:
Used for distinguish equipment failure to MUX equipment or radio equipment. The input signal from MUX is looped back to the MUX. When no abnormality is found in the signal with NEAR END loopback, it is assumed that the radio equipment (IDU or ODU) has a problem.

Main Loopback (FAR END) (for SONET):
Used for distinguish equipment failure to MUX equipment or radio equipment. Signal is looped back at the IDU of the opposite station. When no abnormality is found in the signal through FAR END loopback, it is assumed that the local radio equipment (IDU or ODU) has no problem.

Note: This function is unavailable when 2-WAY/XC is enabled.

DADE Adjust:
Sets the DADE for Hot Standby SD/Twinpath configuration. Selects to make INTFC status In-phase.

Notes: 1. The DADE control applies in 1+1 configuration to adjust delay time for RX hitless switching when the INTFC status is indicated Outphase.

2. The DADE adjustment is needed in initial lineup or when the IF CABLE is replaced. It is not needed readjustment when the INTFC status is indicated In-phase.

LAN Device Reset (for LAN transmission only):
Used for reset control to LAN interface Port 1 or Port 2.

Linearizer Control:
Sets Auto/Forced Reset of linearizer function.

Forced Reset: When the linearizer function is not used.

Auto: When the linearizer function is used.

RF SUB Band select:
Used for changing the ODU sub band for radio link depending on the RF frequency assignment.

Antenna Alignment Mode:
The Antenna Alignment Mode is used for extending the dynamic range of the NLITE E Monitor unit. In order to measure in high range of AGC V, it is mandatory required to set Antenna Alignment Mode to ON. If not it set to ON, the indicated AGC voltage is not guaranteed value. For the antenna orientation, set the TX power to the required level by MTPC mode at the opposite site.

Note: It is necessary to set to Antenna Alignment Mode when monitor the RX level with the NLITE E Monitor unit.

ALS Restart (for SONET optical interface):
Sets the duration that the laser is emitted when ALS manual restart for test is performed.

XPIC Control Local (for XPIC in SONET):
Resets the XPIC function for Local IDU when propagation is deteriorated, either MODEM or ODU of Main Master or Sub Master is a failure or perform the link test.

XPIC Control Remote (for XPIC in SONET):
Resets the XPIC function for the IDU in the opposite station when either MODEM or ODU of Main Master or Sub Master in the local station is a failure or perform the link test.

5.1.3 Loopback

When loopback condition is necessary, set the system to loopback condition. (see Chart 5-1)

When there is an interruption of signals, use the STM/SONET/PDH analyzers and isolate the faulty section by checking the traffic signal by loopback. Setup the test equipment according to the following diagrams for PDH or SONET configuration.

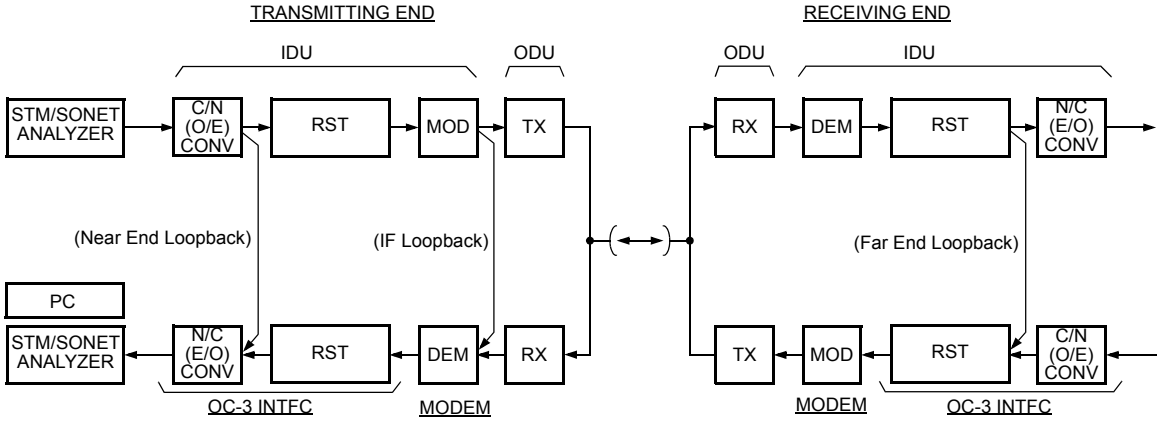


Fig. 5-1 Loopback Diagram for Fault Isolation for SONET

Note: The IF LOOPBACK and the RX SW is not operated interlock. In 1+1 configuration, The RX SW switching is needed to select the same CH that is testing in IF LOOPBACK.
When the RX SW manual control is disable, set it to Forced mode in Provisioning.

Chart 5-1 Loopback Control

Step	Procedure

For the LCT operation, refer to Chapter 6 of LCT Operation in Appendix of this Section IV.

This chart contains:
A. Preparation
B. IF Loopback Control
C. Main Loopback (Near End) Control (SONET)
D. Main Loopback (Far End) Control (SONET)

If loopback operation is performed, timing loop may occur (timing loop is described in ITU-T Recommendation G.781).

Step	Procedure

Caution: The Loopback control affects the radio link connection.

1. *Loopback control operation is not performed at the same time, or perform the Loopback reset control and perform either Loopback mode.*
   - *IF Loopback*
   - *Near End Loopback*
   - *Far End Loopback*
2. *Loopback operation is not performed with an opposite station simultaneously.*
3. *Far End Loopback control will be canceled when radio link failure occurs under the control has been executed.*

A. PREPARATION

1 Set up the BER measurement, (refer to Fig. 5-3)

2 Connect the LCT port and the USB port with a USB cable, (see Fig. 2-2 in Chart 2-2)

3 Login LCT with User name “Admin” and Admin password,

Chart 5-1 (Cont'd)

Step	Procedure
4	Click on the "Maintenance" button in "LCT MENU",

LCT MENU

Alarm/Status
Equipment Setup
Inventory
AUX I/O
Maintenance
Provisioning
Metering
PMON(History)

Maintenance1
Maintenance2

5 Click on the "Maintenance1" menu,

6 Click on the control button "On" and click "Set" button, to set to Maintenance On mode,

7 For 1+1 configuration, switchover the TX SW and RX SW for the channel is to be set loopback, (Refer to Chart 2.3 Manual Switchover Operation)

8 Click on the "IF Loopback ( )" button in "Maintenance1" menu and click on the setting button "On",

Note: The control affects Radio link connection.

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○ Off ● On	Set
IF Loopback (No.1)	On	○ Off ● On	Set
IF Loopback (No.2)	Off	● Off ○ On	Set

Note:The control applies to IF loopback in local MODEM.

9 Click on the "Set" button,

10 Click on the Alarm/Status on LCT MENU to check the status,

11 Refer to Fig. 5-7 to 5-9 Troubleshooting Flowchart to diagnose the problem,

12 Click on the setting button "Off" of the IF Loopback ( ) and click on the "Set" button,

Chart 5-1 (Cont'd)

Step	Procedure

For OC-3 (E)

13 Click on the setting button "On" and click on the "Set" button,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○Off ●On	Set
Main Loopback (Near End)	On	○Off ●On	Set
Main Loopback (Far End)	Off	●Off ○On	Set

Chart 5-1 (Cont'd)

Step	Procedure

For OC-3 (O) (APS)

14 Click on the "Main Loopback (Near End)" button in "Maintenance1" menu, click on the setting button "INTFC ( )" and click on the "Set" button,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○ Off ● On	Set
Main Loopback (Near End) INTFC (1)	On	○ Off ● On	Set
Main Loopback (Near End) INTFC (2)	Off	● Off ○ On	Set
Main Loopback (Far End)	Off	● Off ○ On	Set

15 Click on the Alarm/Status on LCT MENU to check the status,

16 Refer to Fig. 5-7 to 5-9 Troubleshooting Flowchart to diagnose the problem,

17 Click on the setting button "Off" of the Main Loopback (Near End) and click on the "Set" button,

18 Click on the setting button of Main Loopback (Far End) in "Maintenance 1" menu and click on the "Set" button,

19 Click on the Alarm/Status on LCT MENU to check the status,

20 Refer to Fig. 5-7 to 5-9 Troubleshooting Flowchart to diagnose the problem,

21 Click on the setting button "Off" of the Main Loopback (Far End),

22 Reset control for TX RX SW to "Off",

23 Reset Maintenance mode to "Off".

5.1.4 BER Measurement

Chart 5-2 BER Measurement

Apparatus:

Digital Multimeter with test leads

Screwdriver

SONET/SONET Analyzer (for SONET)

Optical Variable Attenuator (for OC-3 Optical Interface only)

Headset

Step	Procedure

A. 4P LAN INTERFACE

Note: The BER measurement can not be performed for the channel which is set to Not Used or the channels shared with LAN.

TRANSMITTING END

4P LAN INTFC

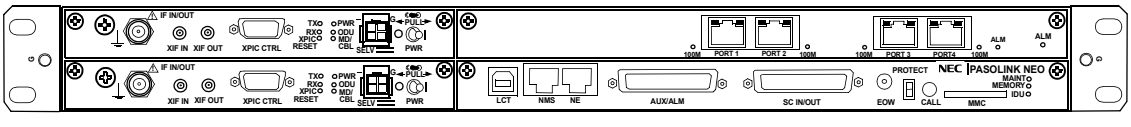


Chart 5-2 (Cont'd)

Step	Procedure
1	At both transmitting and receiving ends, set the BER test set as follows: *Note: Operation of the TX SW and RX SW are not required in 1+0 system for the following.*
2	In HS system, set the TX SW to No.1 or No.2 to "On" condition at transmitting end (refer to Chart 2-3),
3	At receiving end, set the RX SW to either No.1 or No.2 to "On" condition,
4	Measure BER at required CH and confirm that the values are indicated as follows: Requirement: 1×10^{-12} or less
5	At receiving end, change setting of the RX SW to opposite No.1 or No.2 from it in step 5 and confirm that the measured value satisfies requirement as in step 6,
6	Change setting of the TX SW to opposite No.1 or No.2 from it in step 4 and confirm that the measured value satisfies requirement given in step 6,
7	At receiving end, change setting of the RX SW to opposite No.1 or No.2 from it in step 7 and confirm that the measured value satisfies requirement given in step 6,
8	Restore all connections and controls to normal.

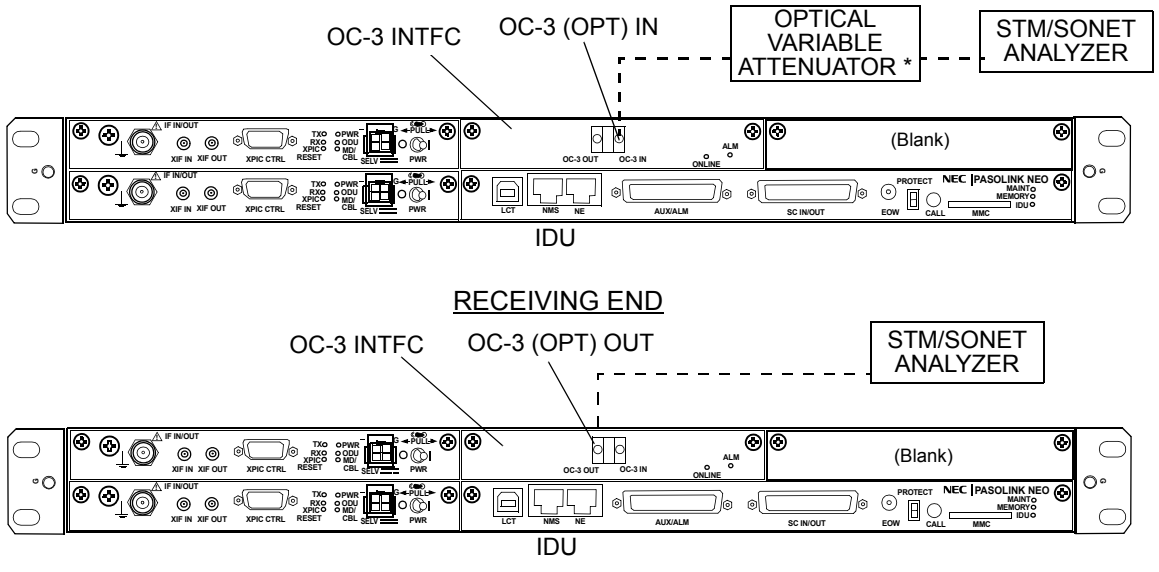
Chart 5-2 (Cont'd)

Step	Procedure

B. OPTICAL INTERFACE

Caution: To avoid damage to your eyes, do not stare into laser beam or view directly with optical instruments. (Class 1 Laser Product).

1 At the transmitting end, disconnect OPT cable from the STM1 IN connector on the OC-3 INTFC (see Fig. 5-2),



Equipped with OC-3 Optical Interface

Fig. 5-2 BER Measurement for OC-3 Signal

2 At the receiving end, disconnect the OPT cable from the STM1 OUT connector on the OC-3 INTFC (see Fig. 5-2),

3 At both transmitting and receiving ends, set the STM/SONET Analyzer as follows:

Chart 5-2 (Cont'd)

Step	Procedure

OC-3 INTFC(OPTICAL)

- Bit rate : 155.52 Mbps
- Code format : OC-3, NRZ
- Level

	S-1.1	L-1.1
IN	: –8 to –28 dBm/	–10 to –34 dBm
OUT	: –8 to –15 dBm/	0 to –8 dBm

- Wave length
  IN : 1310 nm
  OUT : 1310 nm

Note: Operation of the TX SW and RX SW are not required in 1+0 system.

4 In HS system, set the TX SW to No.1 or No.2 to On condition at transmitting end, (refer to Chart 2-3)

5 At receiving end, set the RX SW to either No.1 or No.2 to On condition,

6 Measure BER and confirm that the values are indicated as follows:

Requirement: 1×10^{-12} or less

7 At receiving end, change setting of the RX SW to opposite No.1 or No.2 from it in step 5 and confirm that the measured value satisfies requirement given in step 6,

8 Change setting of the TX SW to opposite No.1 or No.2 from it in step 4 and confirm that the measured value satisfies requirement given in step 6,

9 At receiving end, change setting of the RX SW to opposite No.1 or No.2 from it in step 7 and confirm that the measured value satisfies requirement given in step 6,

10 Restore all connections and controls to normal.

5.1.5 Trouble Shooting Flow

When alarm condition occurs, red alarm LEDs on the IDU are lit except when there is a power supply failure. Faults can be distinguished using the LED indicators on the front panel of the IDU. Connect the LCT to the equipment and check the equipment conditions in according with the flow chart are shown in Fig. 5-3 to Fig. 5-5.

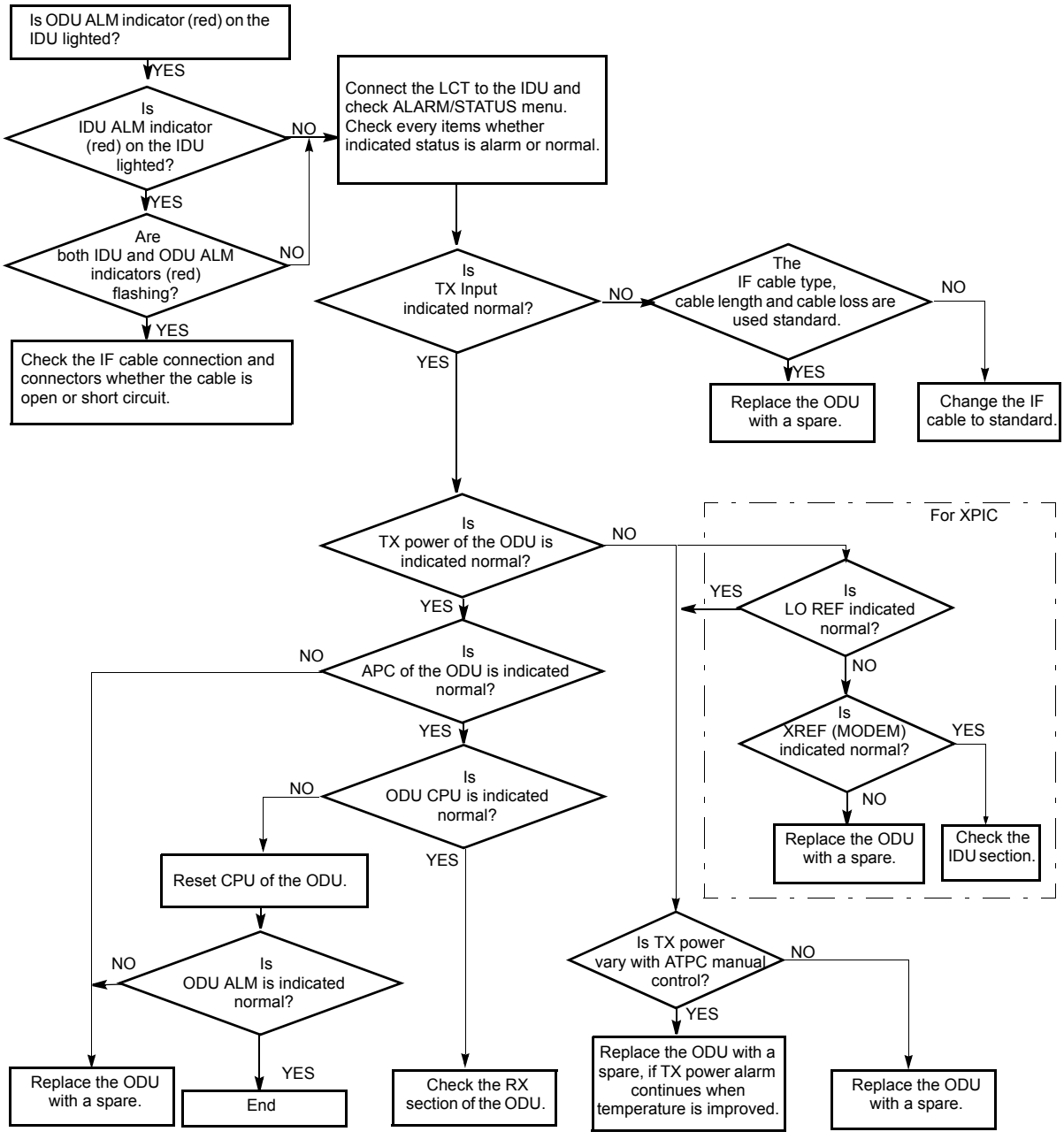


Fig. 5-3 ODU TX Section Troubleshooting Flowchart

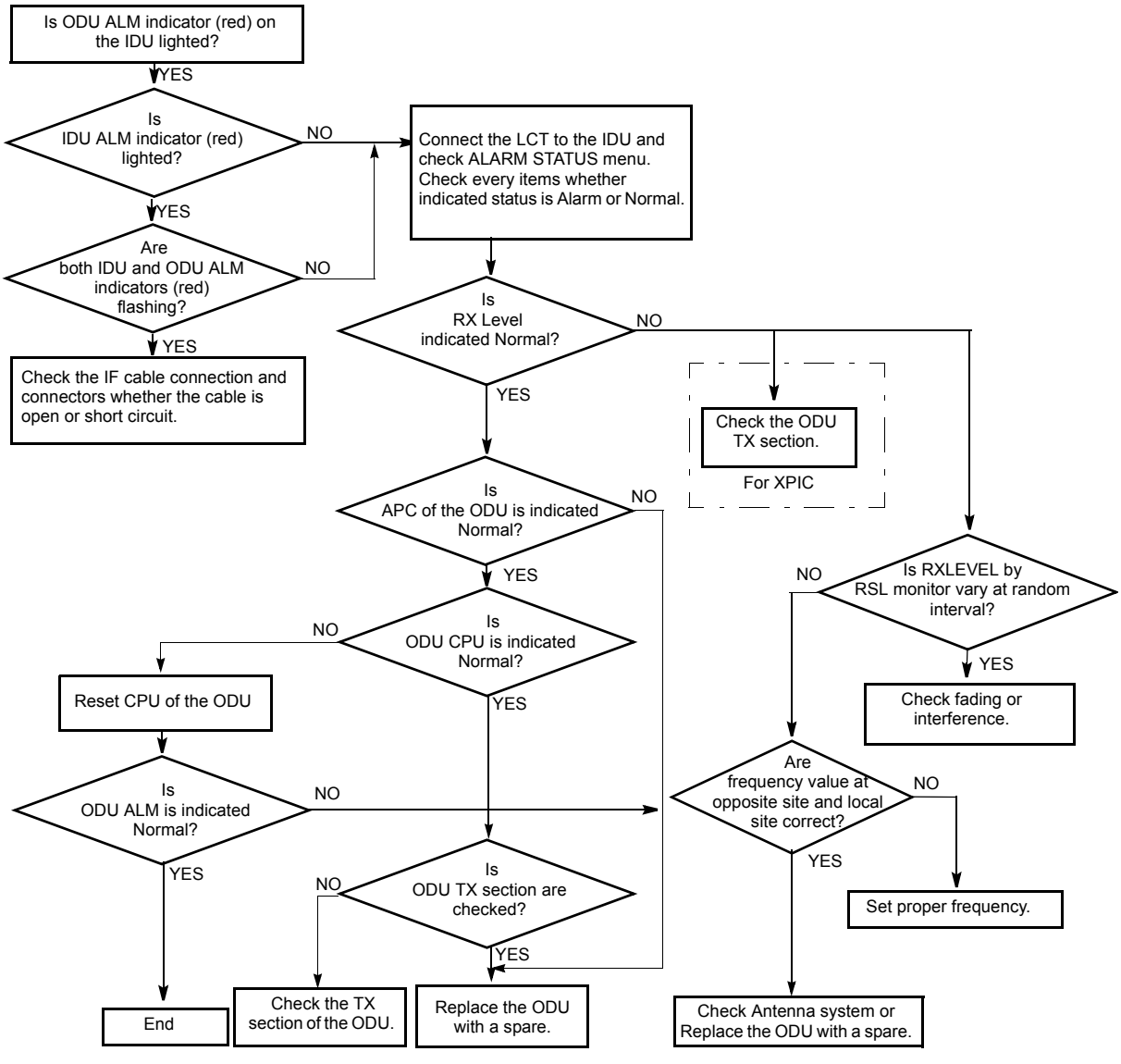


Fig. 5-4 ODU RX Section Troubleshooting Flowchart

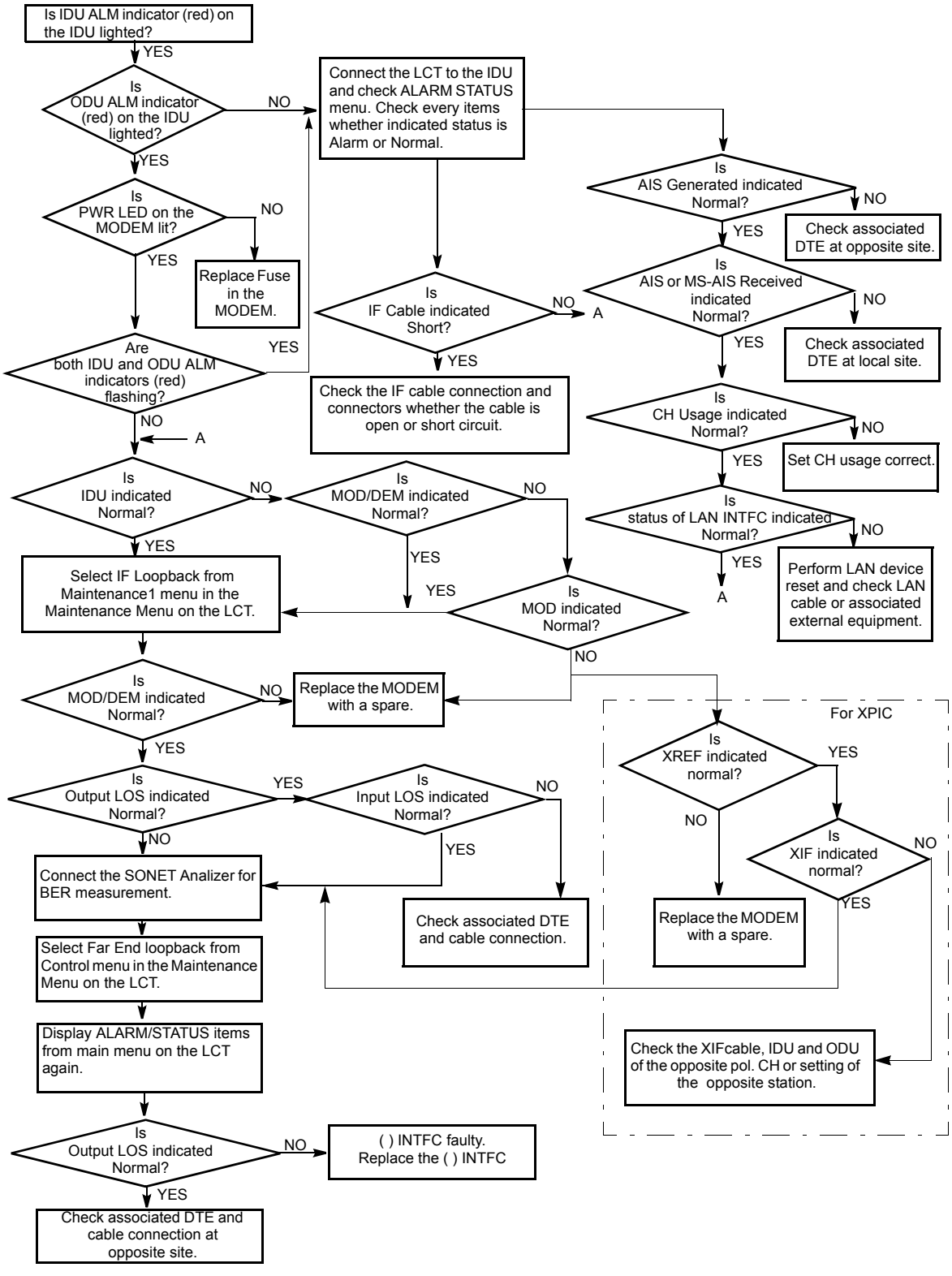


Fig. 5-5 IDU Section Troubleshooting Flowchart

5.2 Replacement

The replacement procedures of the IDU and ODU is described below.

5.2.1 ODU Replacement

The procedures for replacing the ODU with a spare are given in the Chart 5-3. The label attached to the side of ODU indicates the ODU type (see Fig 5-6). To replace the ODU, prepare another ODU of the same type as indicated on the label of the failed one.

Check the name plate of the spare ODU. When the indicated items are coincided, the ODU can be replaced.

Caution: Do not remove/connect the IF cable with the IDU power ON. Turn the IDU power OFF before connecting/ disconnecting the IF cable, or equipment may be damaged.

Caution: To avoid microfonic properties, occurrence of bit errors, when installing the ODU on the HYB or OMT, protect the ODU from mechanical knocks which is not be replaced.

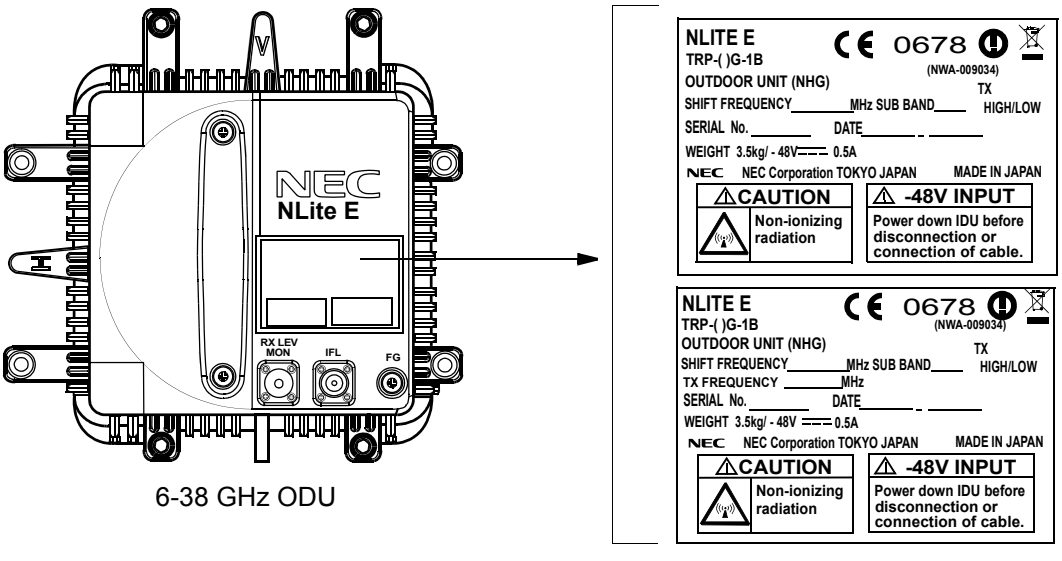


Fig. 5-6 ODU Type and Frequency Indication Label

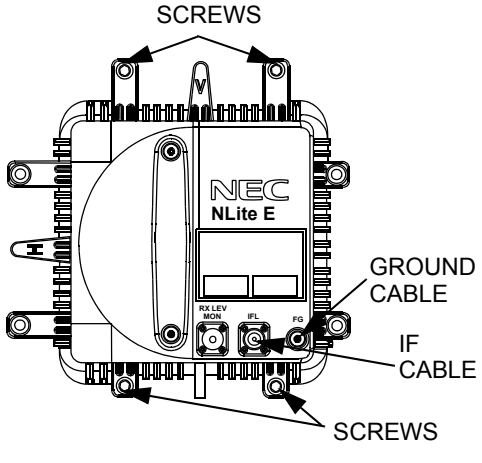
Note: Before replacing the ODU in XPIC, perform the control of XPIC Local and XPIC Remote Reset by the LCT for Main Master or Sub Master channel that is to be used online.

The mounting and demounting the ODU from/to antenna, refer to the Installation and Initial Line up in Section III.

Chart 5-3 ODU Replacement

Apparatus:
T type hexagonal driver

Step	Procedure
	REMOVING
1	For 1+1 configuration, switchover the TX SW and RX SW for the standby channel is to be replaced,
2	Turn off the power switch on the MODEM which is connected to the ODU is to be replaced,
3	Remove the self-bonding tape from the IF IN/OUT connector,
4	Disconnect the IF cable from the IF IN/OUT connector on the ODU,
5	Disconnect ground cable from the FG terminal on the ODU,
6	Loosen four bolts fixed the ODU with a T type hexagonal driver,



ODU

7	Remove the ODU from the bracket,

Chart 5-3 (Cont'd)

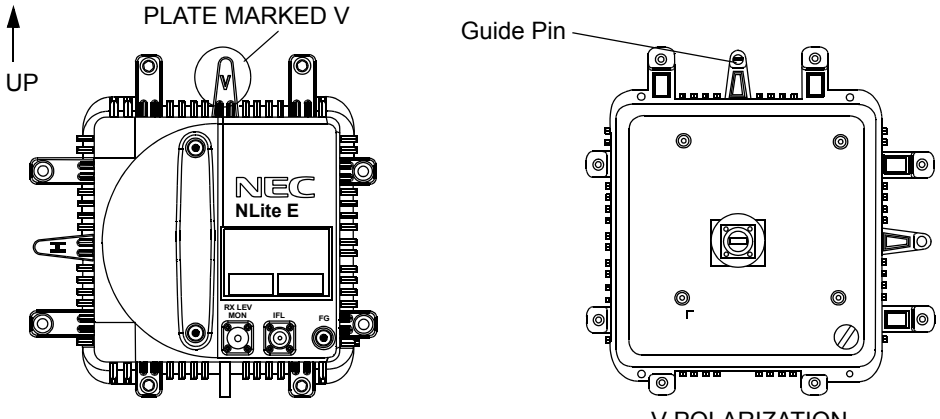
Step	Procedure

MOUNTING

8 When the ODU is used for vertical polarization, rotate the ODU so that the plate marked V is on top,

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

9 When the ODU is used for horizontal polarization, remove the guide pin fixed on the plate marked V,



10 Insert the guide pin removed in step 8 behind of the plate marked H,

11 Rotate the ODU so that the plate marked H is on top,

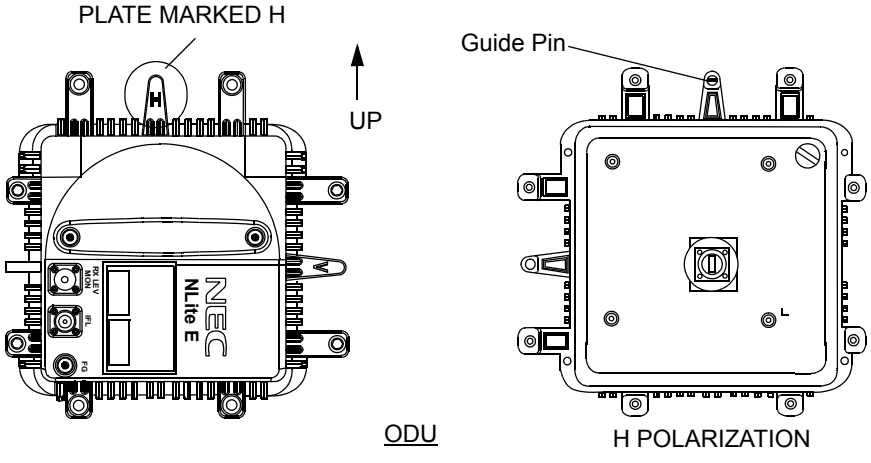
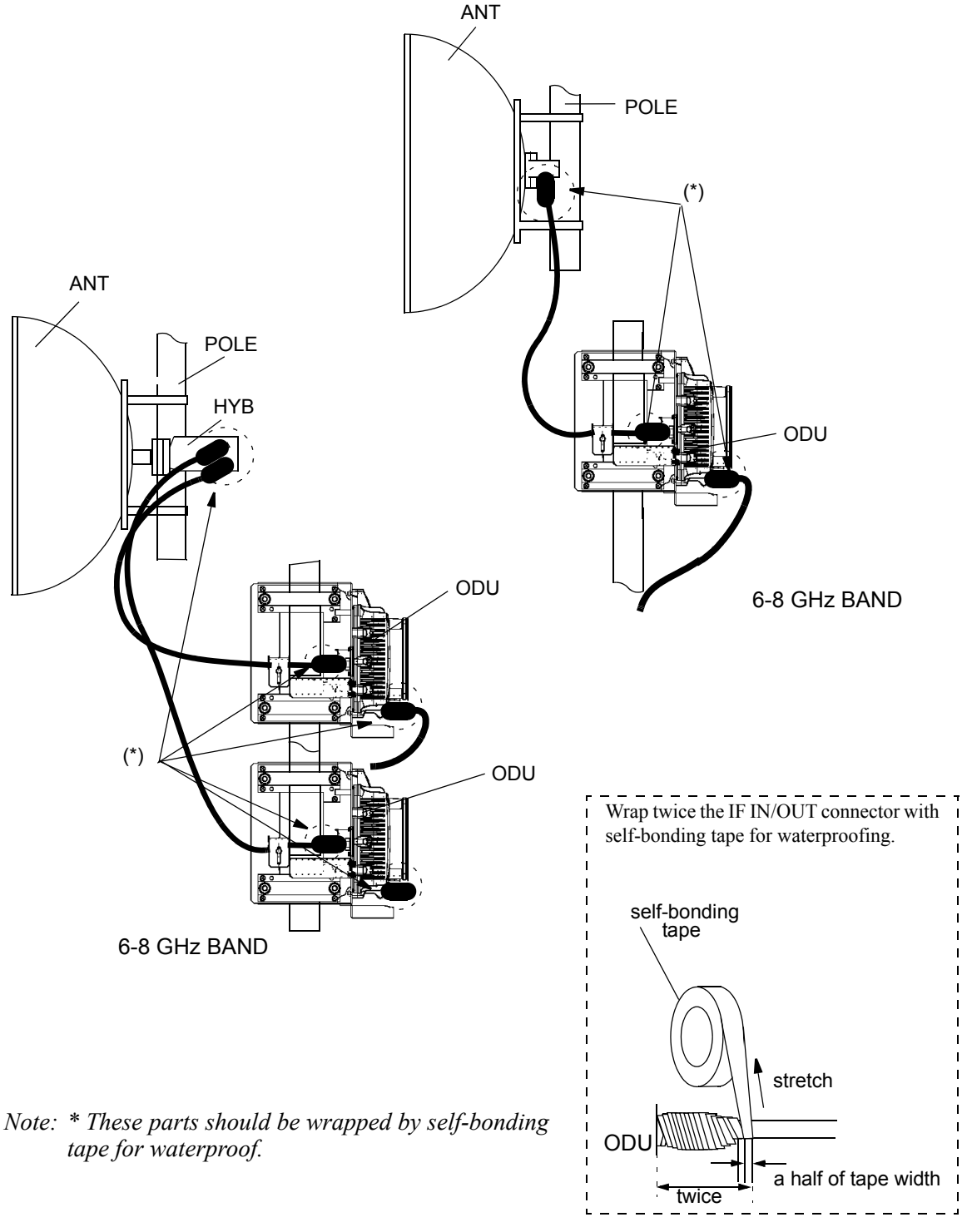


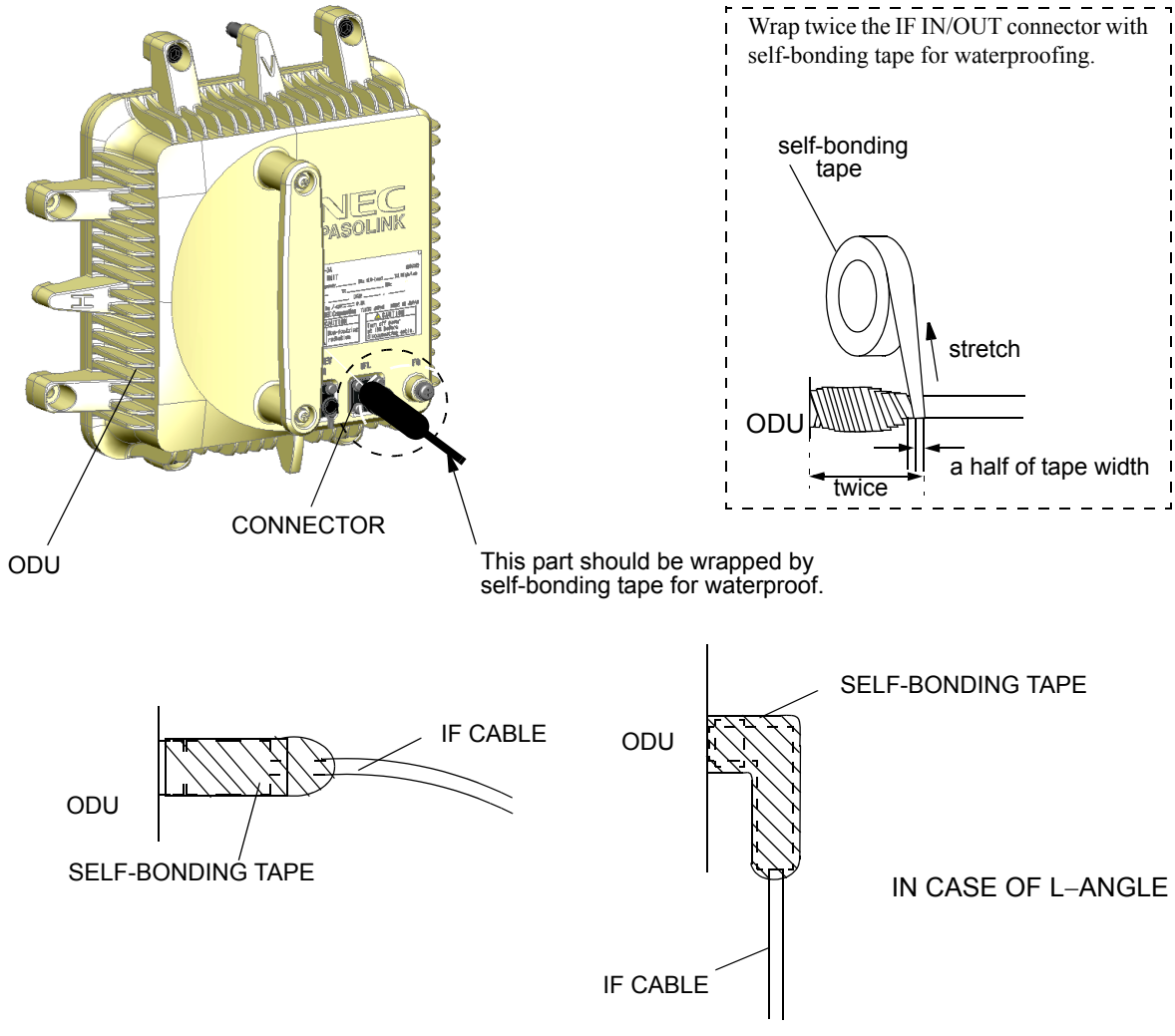
Chart 5-3 (Cont'd)

Step	Procedure
12	Fit the spare ODU onto the bracket, *Note: Be careful not to damage the flange and O-ring.*
13	Mount the spare ODU onto the bracket and tighten the four screws on the ODU,
14	Reconnect the IF cable to the IF IN/OUT connector on the ODU,
15	Wrap twice the IF IN/OUT connector with self-bonding tape for waterproofing. (see Fig. 5-7 (1/2) and (2/2))
16	Reconnect ground cable removed in step 4 to FG terminal,
17	Turn on the power switch on the IDU.



*Note: * These parts should be wrapped by self-bonding tape for waterproof.*

Fig. 5-7 Location of Connector for Waterproof (1/2)



Note: The self-bonding tape should be prepared by customer.

Fig. 5-7 Location of Connector for Waterproof (2/2)

5.2.2 IDU and Module Replacement

The procedures for replacing IDU/module with a spare are given in the Chart 5-4.

Chart 5-4 IDU and Module Replacement

Caution: Persons performing maintenance 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 maintenance. (see Fig. 2-1 in Chapter 2).

Caution: Do not remove/connect the IF cable with the IDU power ON. Turn the IDU power OFF before connecting/ disconnecting the IF cable, or equipment may be damaged.

This chart contains:

A. Module replacement
B. IDU replacement

Apparatus:
Suitable Screwdriver

Step	Procedure
	A. MODULE REPLACEMENT
	Note: Be careful do not touch the electric parts and printed circuit on the module.
	Note: The top surface of the IDU above MODEM is hot in operation.
	Note: The maintenance personnel should report starting replacement from a station to the relevant station.
1	Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,
2	For 1+1 configuration, switchover the TX SW and RX SW for the standby channel from the working channel which is to be replaced,

Chart 5-4 (Cont'd)

Step	Procedure
	Removing MODEM
3	When the MODEM will be replaced, turn off the power switch on the corresponding MODEM which is to be replaced,
4	Disconnect cables as following order, (1) Disconnect power supply cable from SELV connector. (2) Disconnect IF cable from IF IN/OUT connector. The adapter is reused. (3) Disconnect ground cable from the ground terminal.
5	Loosen two screws on the MODEM module, (See Fig. 5-8)
6	Remove the MODEM module from the IDU shelf,
	Mounting MODEM
1	When the MODEM is replaced, check that the power switch is set to Off position,
2	Align the MODEM to the shelf, then push it in until the multipin connector firmly fits,
3	Tighten the two screws on the module,
4	Connect cables as following order, (1) Connect ground cable to the ground terminal. (2) Connect IF cable with adapter to IF IN/OUT connector. (3) Connect power supply cable to SELV connector.
5	Turn on the power switch on the MODEM,
6	Check that the MODEM is normal on the Alarm/Status display,
7	Check that the installed MODEM module exists in the INVENTRY list,
8	Check the operation of the replaced MODEM module,
9	Referring to Chart 2-1, set the IDU to maintenance OFF condition by LCT.

Chart 5-4 (Cont'd)

Step	Procedure

Replacement of the OC-3 (Optical) INTFC in APS

Caution: Do not stare at the laser beam or look at it directly with optical instruments. Otherwise, it may hurt your eyes (Class 1 Laser Product)

For the OC-3 (OPTICAL) INTFC replacement in APS configuration, the OC-3 (OPTICAL) INTFC can be replaced without power OFF and not affect traffic when doing replacement as following order. (When the traffic is not applied to the system, turn off the power switch before performing the replacement of the module.). The maintenance personnel should report starting replacement from a station to the relevant station.

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

2 Click on "APS Manual Control" from "Maintenance 1" menu,

3 Switchover the module is to be replaced to OFF LINE. Click on the "Working" or "Protection" button and click on the "Set" button, then, value turns to selected side for ON LINE,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○Off ●On	Set
APS Manual Control	Working	○Auto ●Working ○Protection	Set

4 Check that the "ON LINE" LED is unlit on the OC-3 (OPTICAL) INTFC which is to be replaced,

5 Set the PROTECT SW on the module front to ON (for upper position), then the MAINT LED starts the blink,
The module can be replaced under the MAINT LED is blinking,

(a) There is need to install the MMC. The MEMORY LED blinks during the data is uploading to the MMC, the MAINT LED starts the blink after upload of the data has been completed.

(b) When the CTRL becomes the PROTECT mode, LCT connection takes timeout.

6 Disconnect optical cables from OC-3 OUT and OC-3 IN connectors on the OC-3 (OPTICAL) INTFC module is to be replaced,

Chart 5-4 (Cont'd)

Step	Procedure
7	Loosen two screws on the OC-3 (OPTICAL) INTFC module is to be replaced, (See Fig. 5-11)
8	Extract the OC-3 (OPTICAL) INTFC module from the IDU shelf, *Note: Be careful not catch the module on the cable when extracting the module. If the module caught on the live cables, it may be caused radio link error.*
9	Install the spare OC-3 (OPTICAL) INTFC module into the IDU shelf,
10	Connect the OPT cables to the OC-3 OUT and OC-3 IN connectors on the OC-3 (OPTICAL) INTFC module,
11	Set the PROTECT SW on the module front to OFF (for lower position), then the MAINT LED turns to lit, When the PROTECT SW turns to OFF, it will appear momentary that events have been latched.
12	Check that the OC-3(1) and OC-3(2) are normal on the Alarm/ Status display,
13	Check that the installed OC-3 (OPTICAL) INTFC module exists in the INVENTRY list,
14	Check the operation of the replaced OC-3 (OPTICAL) INTFC module,
15	Click on the "Auto" button and click on the "Set" button, then, value turns to Auto,
16	Click on the "Off" button of Maintenance and Click on the "Set" button,
17	This work finishes.

Chart 5-4 (Cont'd)

Step	Procedure

System Upgrade for APS of OC-3 (OPTICAL) INTFC

Caution: To avoid eye damage, do not stare at the laser beam or look at it directly with optical instruments. (Class 1 Laser Product)

For the change of OC-3 (OPTICAL) INTFC system to the APS system, perform system setup without power OFF and not affect traffic when doing replacement as following order. The maintenance personnel should report starting replacement from a station to the relevant station.

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

2 Click on the "Equipment Setup" button in **"**LCT MENU**"**, then "Equipment Setup" menu is displayed,

3 Select "OC-3 OPT for APS" from pull-down menu of the SUB(PROT),

4 Click on the "Available" setting button of the APS Function,

5 Click on the "SET" button in Common area, then "OK" is displayed in Progress area when the setup is properly executed,

---Equipment Setup---

User Interface	SONET OC-3	▼
Redundancy Setting	1+1(Hot Standby TERM)	▼
INTFC (Main)	OC-3(OPTICAL)	▼
INTFC (Prot)	OC-3 OPT for APS	▼
XPIC Usage	○ Not Used ○ Used(Main Master) ○ Used(Sub Master)	
APS Function	○ Unavailable ● Available	
Modulation Scheme	128QAM	▼
Transmission Capacity	156MB	▼

Chart 5-4 (Cont'd)

Step	Procedure
6	Click on the Provisioning button on "LCT MENU",
7	Click on the "Forced" control button of the APS Maintenance Mode item,

----Condition for APS---

APS Maintenance Mode	○ Manual ● Forced

8	Click on the "SET" button in Common area, then "OK" is displayed in Progress area when the setup is properly executed,
9	In the Maintenance1 menu, Click on the "Working" button of the APS Manual Control and Click on the "Set" button, then, value turns to "Working",

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○ Off ● On	Set
APS Manual Control	Working	○ Auto ● Working ○ Protection	Set

10	Remove the blank cover of the Slot2 for OC-3 INTFC(2),
11	Install the OC-3 (OPTICAL) INTFC module into the Slot2,
12	Tighten two screws of the OC-3 (OPTICAL) INTFC module, (See Fig. 5-11)
13	Connect the OPT cables to the OC-3 OUT and OC-3 IN connectors on the OC-3 (OPTICAL) INTFC module,
14	Check that the OC-3(1) and OC-3(2) are normal on the Alarm/ Status display,
15	Check that the installed OC-3 (OPTICAL) INTFC module exists in the INVENTRY list,
16	Check the operation of the installed OC-3 (OPTICAL) INTFC module,
17	Click on the "Auto" button and Click on the "Set" button, then, value turns to Auto,
18	Click on the "Off" button of Maintenance and Click on the "Set" button,
19	This work finishes.

Chart 5-4 (Cont'd)

Step	Procedure

System Change from e/w APS to w/o APS of OC-3 (OPTICAL) INTFC

Caution: Do not stare at the laser beam or look at it directly with optical instruments. Otherwise, it may hurt your eyes (Class 1 Laser Product).

For the change of OC-3 (OPTICAL) INTFC system of the APS system to without APS system, perform system setup without power OFF and not affect traffic when doing system change as following order. The maintenance personnel should report starting system change from a station to the relevant station.

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

2 In the Maintenance1 menu, Click on the "Working" button of the APS Manual Control and Click on the "Set" button, when the Protection side is ON LINE, value turns to "Working",

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○Off ●On	Set
APS Manual Control	Working	○Auto ●Working ○Protection	Set

3 Click on the "Auto" button of the APS Manual Control and Click on the "Set" button,

When the Working side is ON LINE, check that the APS Manual Control is "Auto" mode,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○Off ●On	Set
APS Manual Control	Auto	●Auto ○Working ○Protection	Set

4 Click on the "Equipment Setup" button in **"**LCT MENU**"**, then "Equipment Setup" menu is displayed,

5 Select "Not Used" from pull-down menu of the SUB(PROT),

6 Click on the "Unavailable" setting button of the APS Function,

Chart 5-4 (Cont'd)

Step	Procedure
7	Click on the "SET" button in Common area, then "OK" is displayed in Progress area when the setup is properly executed,
8	Perform step 8 to step 11 when it is needed,

---Equipment Setup---

User Interface	SONET OC-3	▼
Redundancy Setting	1+1(Hot Standby TERM)	▼
INTFC (Main)	OC-3(OPTICAL)	▼
INTFC (Prot)	Not Used	▼
XPIC Usage	○ Not Used ○ Used(Main Master)○ Used(Sub Master)	
APS Function	● Unavailable ○ Available	
Modulation Scheme	128QAM	▼
Transmission Capacity	156MB	▼

9	Disconnect optical cables from OC-3 OUT and OC-3 IN connectors on the OC-3 (OPTICAL) INTFC module in the Slot2,
10	Loosen two screws on the OC-3 (OPTICAL) INTFC module is to be replaced, (See Fig. 5-11)
11	Extract the OC-3 (OPT) INTFC module from the Slot2,
	Note: Be careful not catch the module on the cable when extracting the module. If the module caught on the live cables, it may be caused radio link error.
12	Fit the blank cover with two screws to the Slot2,
13	Click on the "Off" button of Maintenance and click on the "Set" button,

Chart 5-4 (Cont'd)

Step	Procedure

Removing OC-3 INTFC, GbE INTFC, CTRL

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

Note: When the CTRL is a failure, replace it with a spare as explained below.

Note: When the CTRL is replaced without power OFF, refer to the "Replacing the CTRL Used MMC or LCT".

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○Off ●On	Set

2 Turn off the power switch on the MODEM (both MODEM for 1+1 configuration),

3 Disconnect all the cables connected to the module,

4 Loosen two screws on the module, (See Fig. 5-11),

5 Extract the module,

Note: Be careful to avoid catching the module on the cable when extracting the module. If the module is caught on the live cables, it may cause a radio link error.

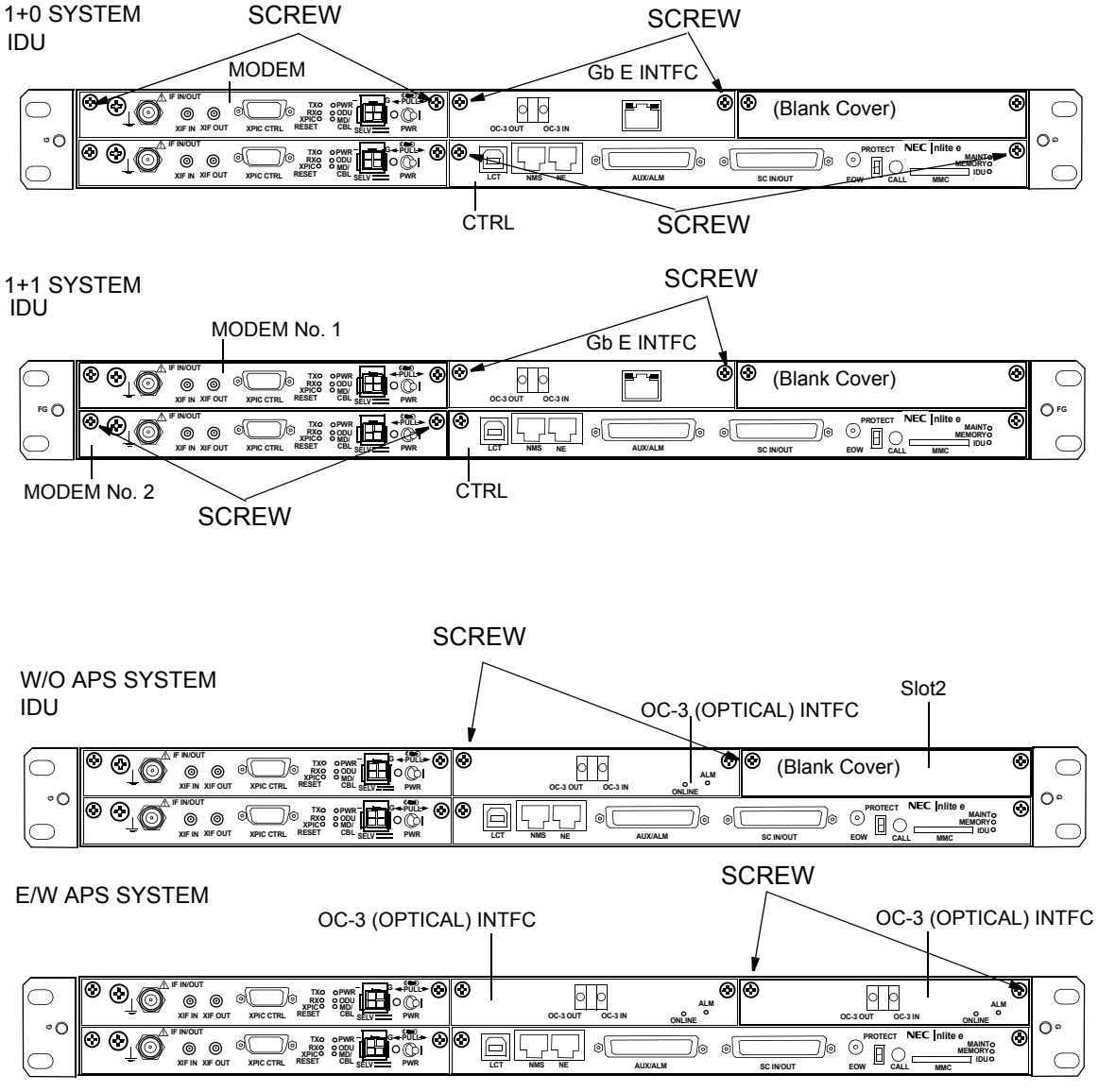


Fig. 5-8 Demounting and Remounting Module

Chart 5-4 (Cont'd)

Step	Procedure

Mounting OC-3 (OPTICAL) INTFC w/o APS

For the OC-3 (OPTICAL) INTFC mounting without APS, install the module as following order,

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○ Off ● On	Set

2 Turn OFF the power switch on the MODEM,

3 Align the OC-3 (OPTICAL) INTFC to the shelf, then push it in until the multipin connector firmly fits,

4 Tighten the two screws on the module,

5 Connect optical cables to OC-3 OUT and OC-3 IN connectors,

Caution: Do not stare at the laser beam or look at it directly with optical instruments. Otherwise, it may hurt your eyes (Class 1 Laser Product).

6 Turn ON the power switch on the MODEM,

7 Check that the "ON LINE" LED is lit on the OC-3 (OPTICAL) INTFC which is replaced,

8 Check that the OC-3(1) is normal on the Alarm/Status display,

9 Check that the installed OC-3 (OPTICAL) INTFC module exists in the INVENTRY list,

10 Check the operation of the installed OC-3 (OPTICAL) INTFC module,

11 Click on the "Off" button of Maintenance and Click on the "Set" button,

---Maintenance1---

Item	Value	Setting	
Maintenance	Off	● Off ○ On	Set

12 This work finishes.

Chart 5-4 (Cont'd)

Step	Procedure

Mounting GbE (OPTICAL) INTFC

For the GbE (OPTICAL) INTFC mounting, install the module as following order,

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○ Off ● On	Set

2 Turn OFF the power switch on the MODEM,

3 Align the GbE (OPTICAL) INTFC to the shelf, then push it in until the multipin connector firmly fits,

4 Tighten the two screws on the module,

5 Connect optical cables to 1000BASE-SX OUT and IN connectors,

Caution: Do not stare at the laser beam or look at it directly with optical instruments. Otherwise, it may hurt your eyes (Class 1 Laser Product).

6 Turn ON the power switch on the MODEM,

7 Check that the "ON LINE" LED is lit on the GbE (OPTICAL) INTFC which is replaced,

8 Check that the OC-3(1) is normal on the Alarm/Status display,

9 Check that the installed GbE (OPTICAL) INTFC module exists in the INVENTRY list,

10 Check the operation of the installed GbE (OPTICAL) INTFC module,

11 Click on the "Off" button of Maintenance and Click on the "Set" button,

---Maintenance1---

Item	Value	Setting	
Maintenance	Off	● Off ○ On	Set

Step	Procedure

OC-3/GbE INTFC, CTRL

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

---Maintenance1---

Item	Value	Setting	
Maintenance	On	○ Off ● On	Set

2 Turn OFF the power switch on the MODEM,

3 Check that the switch on the MODEM (both MODEM for 1+1 configuration) is off position,

4 Align the module to the IDU shelf, then push it in until the multipin connector firmly fits,

5 Tighten two screws on the module,

6 Connect all cables to the module,

7 Turn on the power switch on the MODEM.

8 Check that the 4P LAN INTFC, OC-3, GbE INTFC, CTRL is normal on the Alarm/Status display,

9 Check that the installed 4P LAN INTFC, OC-3, GbE INTFC, CTRL module exists in the INVENTRY list,

10 Check the operation of the replaced 4P LAN INTFC, OC-3, GbE INTFC, CTRL module,

11 Click on the “Off” button of Maintenance and click on the “Set” button,

---Maintenance1---

Item	Value	Setting	
Maintenance	Off	● Off ○ On	Set

Chart 5-4 (Cont'd)

Step	Procedure

Replacing the CTRL Using the MMC or LCT.

This procedure explains how to replace the CTRL using the MMC or LCT. This procedure is applied when the CTRL is not failed, or when the equipment configuration data are saved into the MMC or LCT/PNMx.

Note: If the NMS parameters (Network Config.) can not be restored, then the resetup with the PNMx is required.

The Use of the MMC for the CTRL Replacement

When the MMC is used, the replacement can be performed without the LCT operation.(The resetup with the PNMx for the Network Config. is necessary.)

1 Insert the MMC into the MMC slot on the CTRL front, (The data size to save is approximately 10 kbyte.)

2 Set the PROTECT SW on the CTRL front to ON position (for upper side). Then, the MAINT LED (amber) on the IDU is lit and the equipment configuration data gather up and the saving of data to the MMC start,

3 When the equipment configuration data gather up and data saving to the MMC has been completed, the MAINT LED on the IDU blinks slowly, (Check that the MAINT LED blinks slowly when remove the CTRL.)

4 Remove the cables connected to the CTRL, loosen two fixed screws and remove the CTRL,

Note: Be careful not catch the module on the cable when extracting the module. If the module caught on the live cables, it may be caused radio link error.

5 Prepare the spare CTRL. Set the PROTECT SW on the spare CTRL to ON position (for upper side), (The PROTECT SW setting distinguish the normal start up or protected start up.) Mount the CTRL into the IDU. Check that the MAINT LED on the IDU blinks. Tighten two screws and connect cables removed in step 4.

Chart 5-4 (Cont'd)

Step	Procedure
6	When the MAINT LED blinks, insert the MMC into the MMC slot on the CTRL front, which has equipment configuration data used in the former CTRL,
7	The download of the equipment configuration data start, the deployment is performed. When the CTRL has been made provision, MAINT LED on the IDU turns to light. Check that the MAINT LED lights and set the PROTECT SW to OFF position (for lower side). Then, the equipment configuration data deploys and data is restored.
8	In the Equipment Setup menu and the Provisioning menu, confirm that the equipment configuration and setting conditions are the same as before replacement. Check that neither alarm is indicated in the Alarm Status.
9	The CTRL replacement finishes. Perform the resetup for the Network Config. since the Network Config. data is not restored.

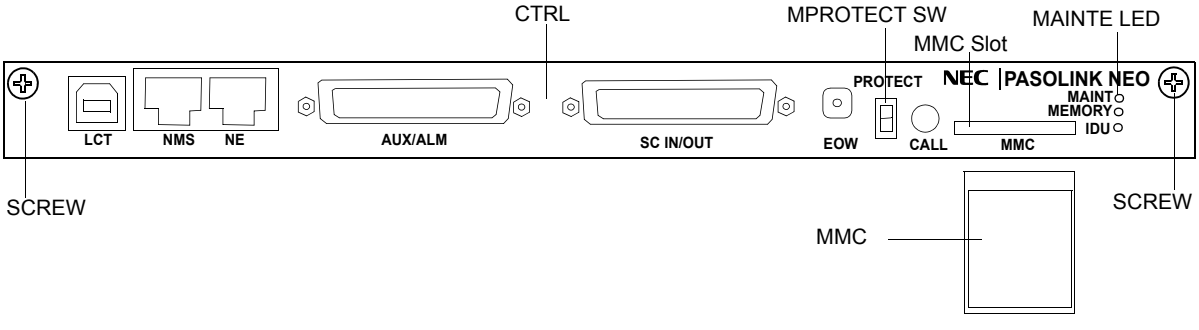


Chart 5-4 (Cont'd)

Step	Procedure

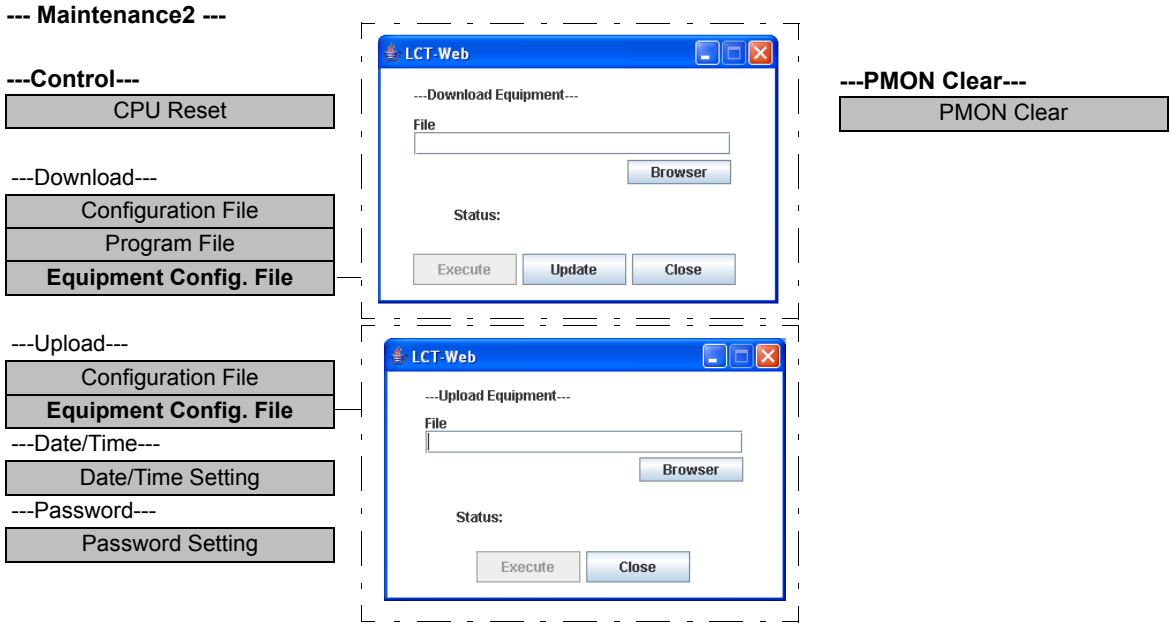
Note: If the NMS parameters (Network Config.) can not be restored, then the resetup with the PNMx is required.

The Use of the LCT for the CTRL Replacement

When the LCT is used, the replacement can be performed without the MMC. (The resetup with the PNMx for the Network Config. is necessary.)

1 Referring to Chart 2-1, set the IDU to Maintenance ON condition by LCT (Check that the MAINT LED lights.),

2 Set the PROTECT SW on the CTRL front to ON position (for upper side). Then, equipment configuration data gather up and the saving of data start,



3 Select the Maintenance2 from the Maintenance menu, select the Equipment Config. File of Upload. Enter the directory of the file name where the uploaded file will be saved (extension is .cfg),

4 When the upload to the LCT has completed, MAINT LED blinks slowly (Check that the MAINT LED blinks slowly when remove the CTRL.),

Chart 5-4 (Cont'd)

Step	Procedure
5	Remove the cables connected to the CTRL, loosen two fixed screws and remove the CTRL, *Note: Be careful to avoid catching the module on the cable when extracting the module. If the module is caught on the live cables, it may cause a radio link error.*
6	Prepare the spare CTRL. Set the PROTECT SW on the spare CTRL to ON position (for upper side), (The PROTECT SW setting distinguish the normal start up or protected start up.) Mount the CTRL into the IDU. Check that the MAINT LED on the IDU blinks. Tighten two screws and connect cables removed,
7	To download the equipment configuration data to the LCT, select Maintenance2 from the Maintenance menu, select the Equipment Config. File of Download. Enter the directory of the file name where the uploaded file is saved, click on the "Execute" button to start the download. When "Complete" appears in the Progress Status, click on the "Update" button to perform download.
8	When the CTRL has been provisioned, the MAINT LED on the IDU turns to light. Check that the MAINT LED lights, set the PROTECT SW to OFF position (for lower side). Then, the equipment configuration data deploys and data is restored.
9	In the Equipment Setup menu and the Provisioning menu, confirm that the equipment configuration and setting conditions are the same as before replacement. Check that neither alarm is indicated in the Alarm Status.
10	The CTRL replacement finishes. Perform the resetup for the Network Config. since the Network Config. data is not restored.

Chart 5-4 (Cont'd)

Step	Procedure

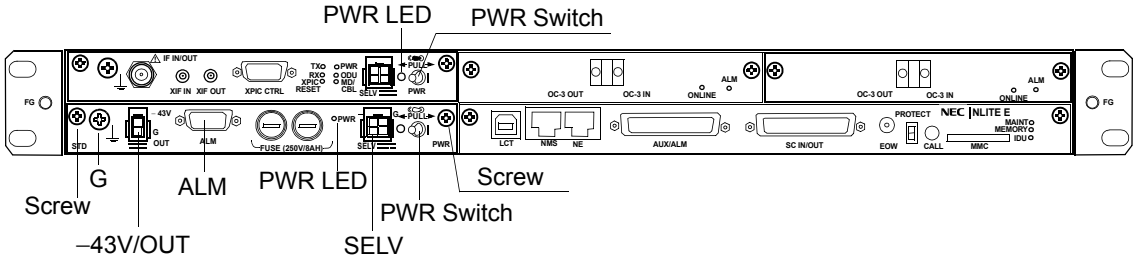
Replacing the DC-DC CONV (Optional).

When the power is supplied to the SELV of the DC-DC CONV (optional) but the PWR LED of the DC-DC CONV is not lit though the power switch is on, before replacing the DC-DC CONV, check the conduction of the fuse in the DC-DC CONV.

1 Referring to Chart 2-1, set the IDU to maintenance ON condition by LCT,

2 Set the power switch on the MODEM to Off position,

3 Set the power switch on the DC-DC CONV to Off position,



4 Disconnect cables connected to the DC-DC CONV as following order,

(1) Disconnect power supply cable from SELV connector,

(2) Disconnect power supply cable from –43/OUT connector,

(3) Disconnect ground cable from ground terminal,

(4) Disconnect ALM cable from ALM terminal,

5 Loosen two screws fixed the DC-DC CONV,

6 Extract the DC-DC CONV from the IDU shelf,

7 Check that the power switch on the spare DC-DC CONV is Off position

8 Mount the spare DC-DC CONV to the IDU shelf,

9 Tighten two screws to fix the DC-DC CONV,

10 Connect cables to the DC-DC CONV as reversed order in step 4,

Chart 5-4 (Cont'd)

Step	Procedure
11	Turn on the power switch on the DC-DC CONV,
12	Check that PWR LED on the DC-DC CONV is on,
13	Turn on the power switch on the MODEM,
14	Check that PWR LED on the MODEM is on,
15	Check that ALM LED on the IDU is unlited,
16	Set the IDU to maintenance OFF condition by LCT.

Chart 5-4 (Cont'd)

Step	Procedure

B. IDU REPLACEMENT

REMOVING

1 Turn off the power switch on the MODEM (both MODEM in 1+1 configuration),

2 Disconnect the IF cable, signal cables and the power cable, etc. as following order,

(1) Disconnect XPIC CTRL cables from opposite IDU. (XPIC configuration only.)

(2) Disconnect XIF coaxial cables from opposite IDU. (XPIC configuration only.)

(3) Disconnect OC-3, LAN, Aux. signal cables from connector.

(4) Disconnect power supply cable from SELV connector.

(5) Disconnect IF cable from IF IN/OUT connector.

(6) Disconnect ground cable from the ground terminal

Note: The adapter for IF cable connector is reused.

3 As shown in Fig. 5-9, loosen four screws and remove the IDU,

MOUNTING

4 Fix the two brackets to desired position on the IDU, if necessary (see Fig. 5-10),

5 Mount the IDU into the original position of the mounting rack and tighten the four screws,

6 Reconnect the IF cables, signal cables and the power cable to the original position as following order,

(1) Connect ground cable to the ground terminal

(2) Connect IF cable (with adapter) to IF IN/OUT connector.

(3) Connect power supply cable to SELV connector.

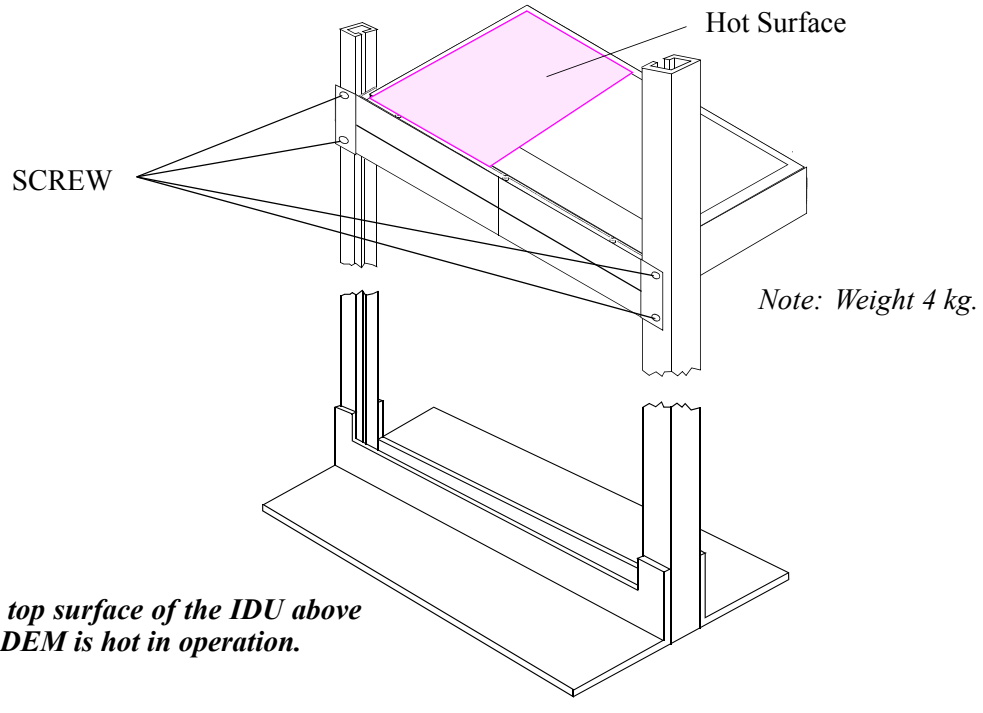
(4) Connect OC-3, LAN, Aux. signal cables to proper connector.

(5) Connect XIF coaxial cables to opposite IDU. (XPIC configuration only.)

(6) Connect XPIC CTRL cables to opposite IDU. (XPIC configuration only.)

Chart 5-4 (Cont'd)

Step	Procedure
7	Form the wiring, and fix the cables using cable binder to the mounting rack,
	Notes: 1. Do not cross the cables on front of indicators and power switch used for maintenance.
	2. Take suitable radius to wiring the IF cable. (e.g. 10D-FB: 70 cm)
8	Turn on the power switch on the IDU.



Caution: The top surface of the IDU above MODEM is hot in operation.

Fig. 5-9 Demounting and Remounting

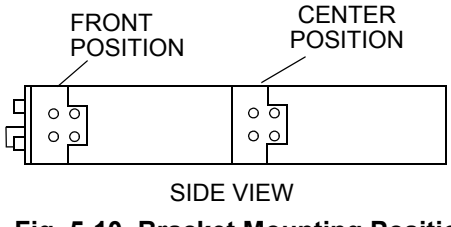


Fig. 5-10 Bracket Mounting Position

5.2.3 Fuse Replacement

When the power is supplied to the SELV but the IDU can not be powered on with the power switch, check the conduction of fuse in the MODEM.

Chart 5-5 Fuse Replacement

Step	Procedure
1	Set the power switch on the MODEM which is not powered to Off position,
2	Disconnect cables connected to the MODEM as following order, (1) Disconnect power supply cable from SELV connector. (2) Disconnect IF cable from IF IN/OUT connector. The adapter is reused. (3) Disconnect ground cable from the ground terminal.
3	Loosen two screws on the MODEM,
4	Extract the MODEM from the IDU shelf,
5	Remove protection cap over the fuse (see Fig. 5-11),
6	Remove the fuse from the fuse holder,
7	Check conduction of the broken fuse using tester,
8	Check conduction of the reserved fuse using tester,
9	Replace the broken fuse with reserved one,
10	Set the replaced fuse to the fuse holder,
11	Cap over the replaced fuse,
12	Mount the MODEM to the IDU shelf,
13	Tighten two screws on the MODEM,
14	Connect cables to the MODEM as reversed order in step 2,
15	Turn on the power switch on the MODEM,
16	Check that power is on.

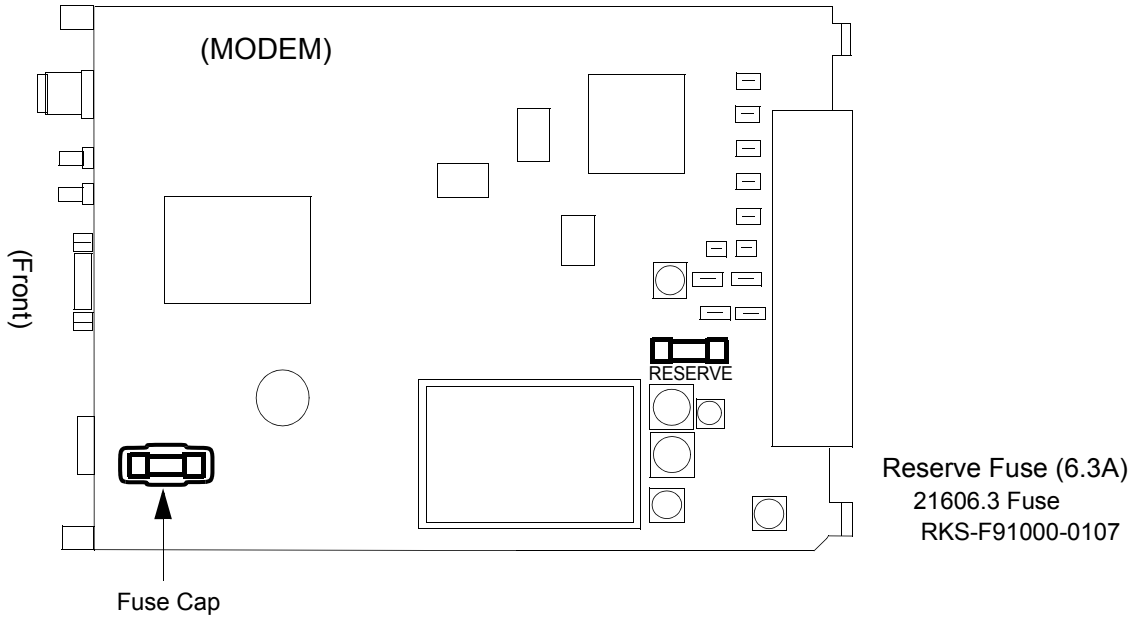


Fig. 5-11 Fuse in the MODEM

When the power is supplied to the SELV of the DC-DC CONV (optional) but the PWR LED of the DC-DC CONV is not lit though the power switch is on, check the conduction of the fuse in the DC-DC CONV.

Chart 5-6 DC-DC CONV Fuse Replacement

Step	Procedure
1	Set the power switch on the DC-DC CONV which is not powered to Off position
2	Disconnect cables connected to the DC-DC CONV as following order, (1) Disconnect power supply cable from SELV connector, (2) Disconnect power supply cable from –43/OUT connector, (3) Disconnect ground cable from ground terminal, (4) Disconnect ALM cable from ALM terminal,
3	Loosen two screws on the DC-DC CONV,
4	Extract the DC-DC CONV from the unit,
5	Put the screwdriver to the groove of the fuse holder and turns the fuse holder counter clockwise,
6	Remove the fuse from the fuse holder,
7	Check conduction of the broken fuse using tester,
8	Remove the reserved fuse as described in step 5,
9	Check conduction of the reserved fuse using tester,
10	Replace the broken fuse with reserved one,
11	Set the replaced fuse to the fuse holder,
12	Put the screwdriver to the groove of the fuse holder and push it into the DC-DC CONV,
13	Turn the screwdriver clockwise until the fuse holder is locked up, (When the fuse holder is locked up, the groove of the fuse holder is set to horizontal as shown in Fig 5-12.)
14	Check and replace another fuse in the same way as from Step 5 to Step 13,
15	Mount the DC-DC CONV to the unit,

Chart 5-6 (Cont'd)

Step	Procedure
16	Tighten two screws on the DC-DC CONV,
17	Connect cables to the DC-DC CONV as reversed order in step 2,
18	Turn on the power switch on the DC-DC CONV,
19	Check that power is on.
20	Turn on the power switch on the IDU/DC-DC CONV UNIT,
21	Check that power is on.

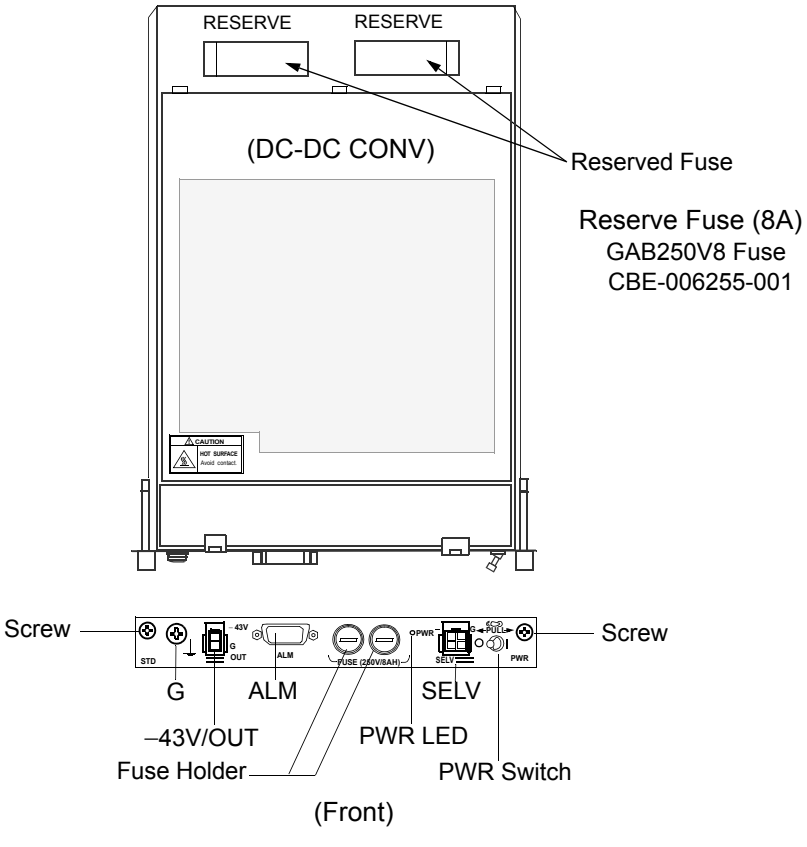


Fig. 5-12 Fuse in the DC-DC CONV

NEC NLite E
6-38 GHz SONET DIGITAL RADIO SYSTEM

Section II OPERATION

CONTENTS

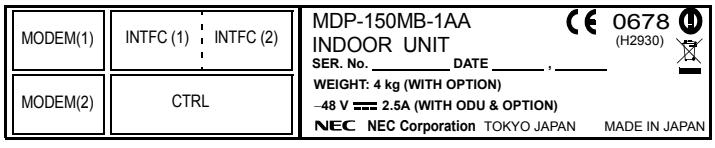
CONTENTS

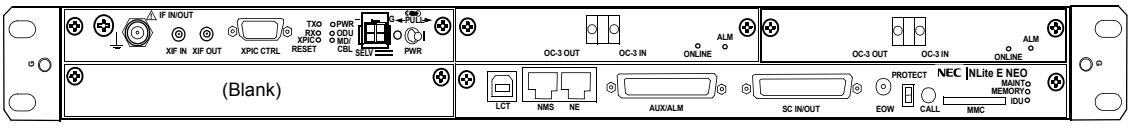
1. GENERAL

This section provides instructions for operation of the 6 to 38 GHz SONET microwave radio system.

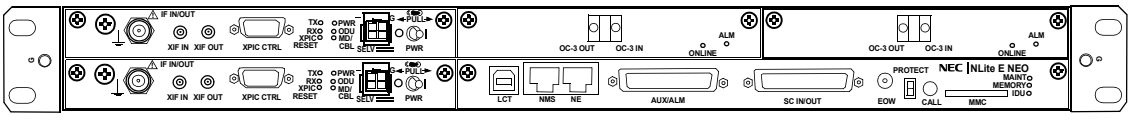
This section describes interface terminals and jacks, controls, indicators, and test jacks. Use of the LCT is required for local operation, monitoring, control and setup. For details of system and provisioning setup, refer to Section IV NLite E LCT Manual.

NEC NLite E

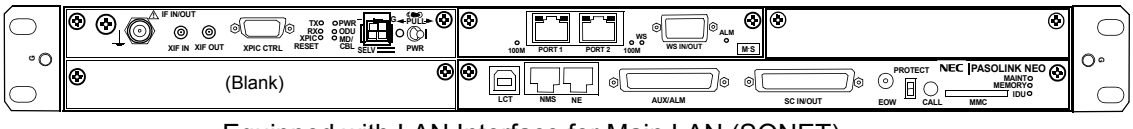




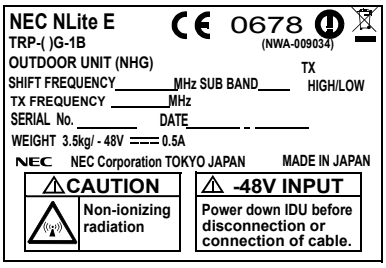
IDU 1+0

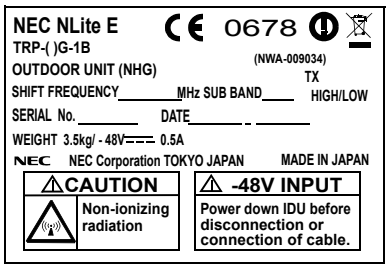


IDU 1+1



Equipped with LAN Interface for Main LAN (SONET)





2. OPERATING EQUIPMENT

The indicators, switches, interface terminals and jacks for wiring with the associated equipment are described here.

The IDU component modules listed in Table 2-1 are plugged-in from front of the IDU shelf as shown in Fig. 2-1.

The component modules of the ODU shown in Fig. 2-2 are listed in Table 2-2.

Note: Use shielded cables which are connected to the RJ-45 connectors to suppress interference from affecting the signal and to reduce electromagnetic radiation which may interfere with other signal cables.

Note:Twist power cables (+)/(–) to suppress inductive interference signals.

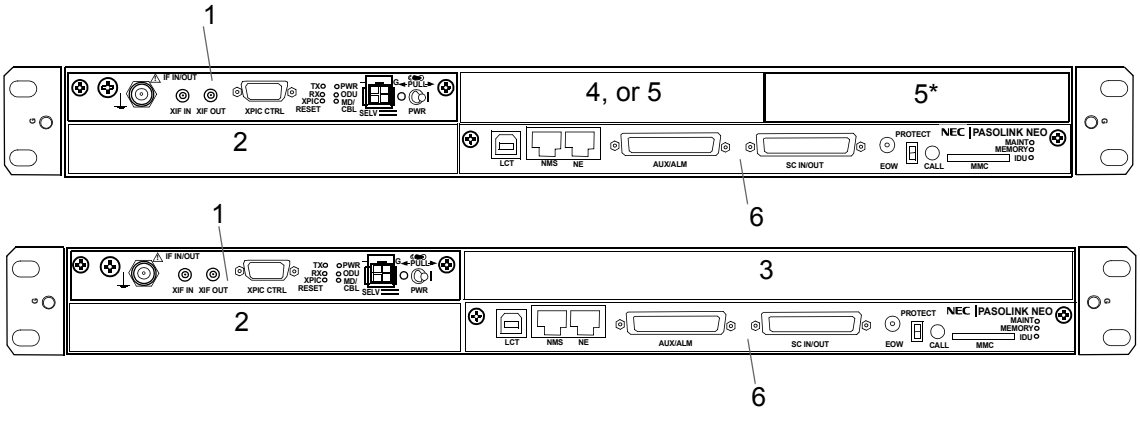
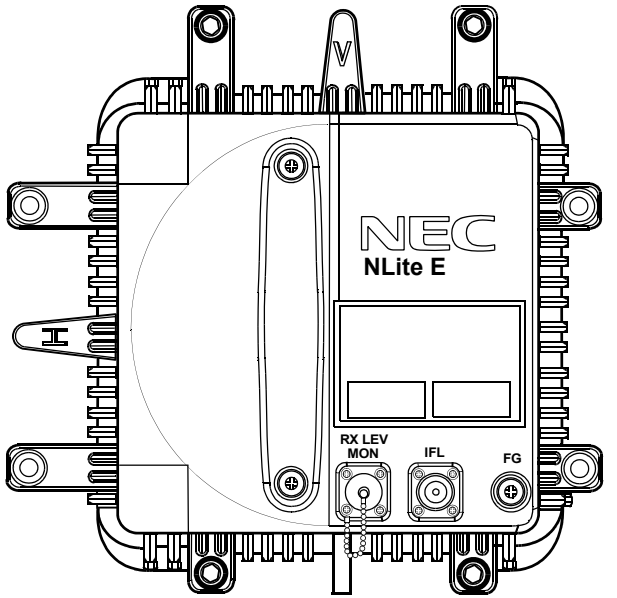


Table 2-1 IDU COMPOSITION

No.	UNIT/MODULE NAME	H2930 MDP-150MB-1AA		REMARKS
		Expandable 1 + 0 system	1 + 1 system	
1	MODEM	(X)	(X)	32QAM/128QAM *1
2	MODEM	–	(X)	32QAM/128QAM *1
	DC-DC CONV	(√)	–	-20 to -60/+20 to +60 VDC *2
3	LAN INTFC	(√)		4-Port-LAN (for SONET) *3
4	GbE INTFC	(√)		GbE (for SONET)
5	OC-3 INTFC	(√)		OC-3 *3 for APS
6	CTRL	(X)		

Notes: 1. *(X)* always equipped.
2. (√) optionally equipped.
*1 selectable in setting program.
*2 for expanding power supply range.
*3 for optional APS

Fig. 2-1 IDU Composition



6 - 38 GHz ODU

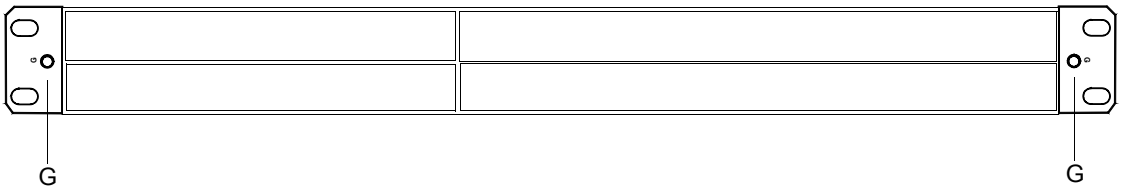
Table 2-2 ODU COMPOSITION

MODULE Name *		TRP-( )G-1B								
		6 GHz NWA-009024( )	7 GHz) NWA-009026( )	8 GHz NWA-009028( )	10 GHz NWA-009030( )	11 GHz NWA-009032( )	18 GHz NWA-009038( )	23 GHz NWA-009040( )	26 GHz NWA-009042( )	38 GHz NWA-009048( )
1	RF CKT	H2202( )	H2203( )	H2204( )	H2225( )	H2205( )	H2229( )	H2230( )	H2231( )	H2234( )
2	IF CKT	—								
3	PS	—								

Note: Component modules are enclosed in the ODU case.

Fig. 2-2 ODU Composition

2.1 IDU Shelf

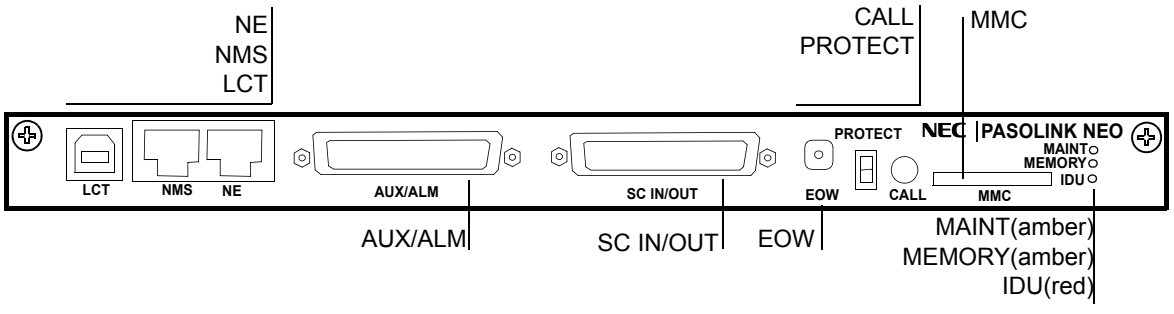


Jack (IDU)

G	Electrostatic Discharge (ESD) jack used to connect wrist strap band. *

Caution*:Engineers for maintenance of the equipment must take the necessary steps to avoid bit errors or cause damage to the modules due to electrostatic discharge. Wear a conductive wrist strap connected to the ground jack (G) on the front of the IDU to minimize static build-up during maintenance.

2.2 CTRL



The CTRL generates various control signals based upon LCT setup data and gathered operating status in the IDU and from the ODU, has SC, EOW, LAN, NE, EXT ALM, HK, Cluster ALM signals interface. By Connecting a PC, manual control, performance monitoring and system setup can be performed.

Interface Signals (CTRL)

AUX/ALM (D-Sub Female 44 pins) Input/Output Signal	
EOW:	1 CH
Frequency:	0.3 to 3.4 kHz (1020 Hz (Test Tone))
Level:	–6 dBm
Impedance:	600 ohms
ALM:	ALM 6 outputs/6 HK Inputs/ 4 HK Control outputs, Cluster 4 Inputs/outputs
Output:	Relay contact Form-C
Input:	Photocoupler
Bz 1,2 IN:	Signalling control extension input.
Call 1,2 OUT:	Signalling control extension output.
EOW:	EOW headphone jack

Interface Signals (CTRL)

SC IN/OUT (D-Sub Female 44 pins) Input/Output Signal	
NE2:	Network Element
Level:	RS-485
DSC (RS-232C):	2 CH
Bit rate:	9600 bps
Level:	RS-232C
DSC (V.11):	2 CH
Bit rate:	64 Kbps
Level:	V.11
Impedance:	100 ohms
NE (RJ-45):	Network Element
Level:	10 Base-T
LCT (USB):	Serial interface USB-B type connector with PC
NMS (RJ-45):	PNMS
Level:	10 Base-T

Indicators (CTRL)

LED	Indication	Remarks
MAINT	Maintenance mode can be selected by LCT, PNMT and PNMS "The maintenance Mode "ON" is selected".	Actively blinks: In progress of program data download. Inactively blinks: Protect Mode for CTRL replacement in effect.
MEMORY	Memory Card (MMC) status.	ON: Enable access to Memory Card OFF: Disable access to Memory Card Blinks: Accessing Memory Card
IDU	IDU Summary alarm.	Check ALM LEDs on each module to find the cause and/or connect LCT to check the performance condition. Blinks: CPU or peripheral event occurred.

Switch (CTRL)

Switch	Operating	Remarks
CALL	Transmits EOW calling signal to sound the buzzer in the opposite station.	
PROTECT	Prevent service interruption when the CTRL module is replaced.	Accessing the Memory Card (MMC) is required to apply the function.

User Interface Pin Assignment (CTRL)

Terminal	Description
CTRL	
ALM/AUX IN/OUT (D-sub Female, 44 Pins)	Service channel data input/output
Pins 1 (+) and 16 (–)	EOW input 1
Pins 2 (+) and 17 (–)	EOW output 1
Pins 3 (+) and 18 (–)	EOW input 2
Pins 4 (+) and 19 (–)	EOW output 2
Pin 5	Ground
Pins 25 (COM), 40 (NC) and 11 (NO) — RL1*1*	Maintenance alarm output Between Pins 25 and 40 / Between Pins 25 and 11 Normal state : Closed / Open Alarm state : Open / Closed
Pins 24 (COM), 39 (NC) and 10 (NO) — RL2*1*	IDU CPU/PS1/PS2 alarm output Between Pins 24 and 39 / Between Pins 24 and 10 Normal state : Closed / Open Alarm state : Open / Closed
Pins 23 (COM), 38 (NC) and 9 (NO) — RL3	ODU1/ODU2 alarm output*2 Between Pins 23 and 38 / Between Pins 23 and 9 Normal state : Closed / Open Alarm/Event state : Open / Closed

User Interface Pin Assignment (CTRL)

Terminal	Description
Pins 22 (COM), 37 (NC) and 8 (NO) — RL4	ODU CPU1/ODU CPU2/Cable Open alarm output*2 Between Pins 22 and 37 / Between Pins 22 and 8 Normal state : Closed / Open Alarm/Event state : Open / Closed
Pins 21 (COM), 36 (NC) and 7 (NO) — RL5	IDU total alarm output*2 Between Pins 21 and 36 / Between Pins 21 and 7 Normal state : Closed / Open Alarm/Event state : Open / Closed
Pins 20 (COM), 35 (NC) and 6 (NO) — RL6	High BER1/High BER2 alarm output*2 Between Pins 20 and 35 / Between Pins 20 and 6 Normal state : Closed / Open Alarm/Event state : Open / Closed
Pins 15 (+) and 14 (–)	HK1 alarm input*3 Normal state : Open Control/Event state : Closed
Pins 13 (+) and 12 (–)	HK2 alarm input*3 Normal state : Open Control/Event state : Closed
Pins 29 (+) and 28 (–)	HK3/Cluster4 alarm input*3 Normal state : Open Control/Event state : Closed
Pins 27 (+) and 26 (–)	HK4/Cluster3 alarm input*3 Normal state : Open Control/Event state : Closed
Pins 44 (+) and 43 (–)	HK5/Cluster2 alarm input*3 Normal state : Open Control/Event state : Closed
Pins 42 (+) and 41 (–)	HK6/Cluster1 alarm input*3 Normal state : Open Control/Event state : Closed
Pin 30	Buzzer input 1
Pin 31	Call output 1
Pin 32	Buzzer input 2
Pin 33	Call output 2

User Interface Pin Assignment (CTRL)

Terminal	Description
CTRL	
SC IN/OUT (D-sub Female, 44 Pins)	NE2/DSC Service channel data input/output
Pins 1 (+) and 2 (–)	NE2 TXD
Pin 3	Ground
Pins 4 (+) and 5 (–)	V.11-1 TX data input
Pins 6 (+) and 7 (–)	V.11-1 RX data output
Pins 8 (+) and 9 (–)	V.11-2 TX data input
Pins 10 (+) and 11 (–)	V.11-2 RX data output
Pins 12 and 13 (G)	RS-232C-1 data input
Pins 14 and 15 (G)	RS-232C-2 data input
Pin 16	NE2 RXD TERM
Pins 17, 18	Ground
Pins 19 (+) and 20 (–)	V.11-1 TX clock input (co-dir.) or output (contra-dir.) *4
Pins 21 (+) and 22 (–)	V.11-1 RX clock output
Pins 23 (+) and 24 (–)	V.11-2 TX clock input (co-dir.) or output (contra-dir.) 4*
Pins 25 (+) and 26 (–)	V.11-2 RX clock output
Pins 27, 28, 29	Ground
Pins 30 (+) and 31 (–)	NE2 RXD
Pin 32	Ground
Pins 33 (+) and 34 (–)	V.11-1 TX frame pulse input (co-dir.) or output (contra-dir.) *4
Pins 35 (+) and 36 (–)	V.11-1 RX frame pulse output
Pins 37 (+) and 38 (–)	V.11-2 TX frame pulse input (co-dir.) or output (contra-dir.) *4
Pins 39 (+) and 40 (–)	V.11-2 RX frame pulse output
Pins 41 and 42 (G)	RS-232C-1 data output
Pins 43 and 44 (G)	RS-232C-2 data output

User Interface Pin Assignment (CTRL)

Terminal	Description
LCT (USB connector type B)	Local craft terminal (LCT) data input/output
Pin 1	Vbus
Pins 2 (–) and 3 (+)	D
Pin 4	Ground
NMS (RJ-45)	PNMS data (10Base-T) input/output
Pins 1 (+) and 2 (–)	NMS TXD
Pins 3 (+) and 6 (–)	NMS RXD
Pins 4, 5, 7 and 8	Not Connected
NE (RJ-45)	NE data (10Base-T) input/output
Pins 1 (+) and 2 (–)	NMS TXD
Pins 3 (+) and 6 (–)	NMS RXD
Pins 4, 5, 7 and 8	Not Connected

*Notes: *1: RL1 (Maintenance) and RL2 (IDU CPU/PS1/PS2 ALM OUTUT) are fixed and can not be changed to other items. The relay contact is rated at 0.2 A.*

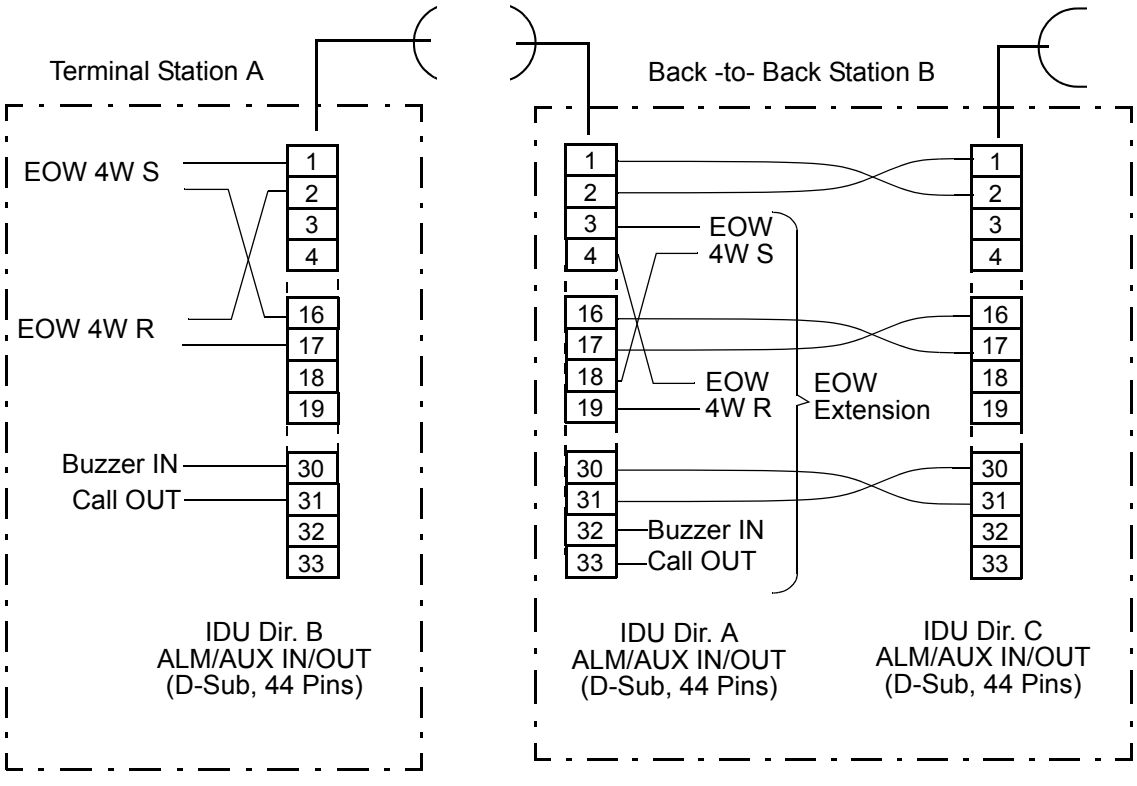
**2: These alarm items are assigned at the factory (default setting) and can be changed by the LCT as shown in Table 2-3 in Section 1 (Alarms may be selectively assigned to RL3 to RL6).*

**3: Photocoupler interface; resistance of open input terminal is more than 200 kilo ohms. Closed input terminal is less than 50 ohms.*

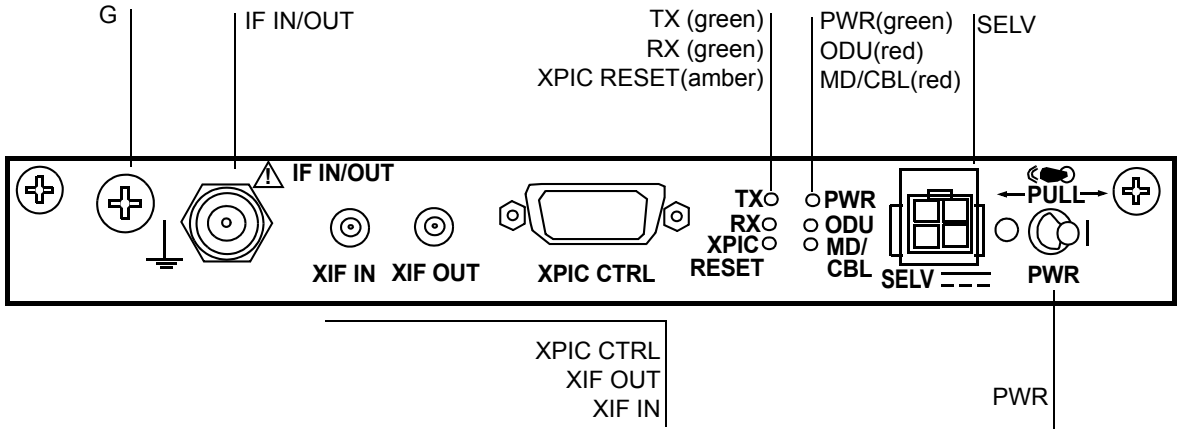
**4: V11 interface for the TX clock and frame pulse input/output depend on co-/contra-directional mode setting in the LCT provisioning menu.*

EOW Connection

When EOW signal is connected between two IDUs, perform wiring as follows.



2.3 MODEM



Caution: Do not apply to the equipment a voltage that varies sharply. The equipment operation may be impaired.

Caution: Do not remove/connect the IF cable with the IDU power ON, Turn the IDU power OFF before connecting/disconnecting the IF cable, or equipment may cause damaged.

Caution: Do not insert/extract the MODEM with the power ON, turn the IDU power OFF and remove all cables connected to the MODEM before insert/extract the MODEM, or MODEM may be damaged.

Caution: The top surface of the IDU shelf above MODEM is hot in operation.

The MODEM provides the 32QAM/128QAM Modulation/Demodulation for, 10/100Base T(x)/1000 Base T (LAN) or OC-3 (SONET) data transmission and following main functions.

- Forward Error Correction using RS/Interleave
- BER (High BER/Low BER) detection/indication/release for internal and external
- Reducing ODU output signal distortion using BB Linearizer
- Equalization using Transversal Equalizer
- XPIC ODU synthesizer synchronization control
- Interfered signal from opposite polarization cancellation (XPIC)
- IDU/ODU power supply
- System power on/off

Interface Signals (MODEM)

IF IN/OUT (TNC Female)	
TX Frequency:	340 MHz
RX Frequency:	140 MHz
Power supply:	–48 V
Impedance:	50 ohms
	Connecting IF Cable length: 5D-FB: less than 150 m 8D-FB: less than 300 m 10D-FB: less than 350 m
G (Screw):	Ground terminal *(5 mm square cable (more than 2.5 mm diameter cable) (AWG#10) is recommended to apply for the frame ground. The proper press fix terminal tool shall be used.)*
SELV (Molex M5569-04A1, 4 pins) (DC IN)	
Input Voltage:	–48 V DC (negative), + (positive, ground)
XIF IN/XIF OUT (Receptacle IEC 169-13 (1.0/ 2.3))	Only used for XPIC system between two IDUs
XIF IN:	IF signal of opposite polarization input. (connect to XIF OUT of the other MODEM)
XIF OUT:	IF signal for opposite polarization output. (connect to XIF IN of the other MODEM)
Frequency:	140 MHz
Impedance:	75 ohms
XPIC CTRL (D-Sub 15 pins, Serial Port)	Only used for XPIC system between two IDUs (connect to XPIC CTRL of the other MODEM)
Automatic/Remote XPIC reset control signal interface between mutual MODEM.	

Indicators (MODEM)

LED	Indication	Remarks
PWR	The PWR switch of the MODEM is turned on.	DC power is supplied to the ODU also.
ODU	Transmit RF power of the ODU decreased approx. –3 dB from preadjusted ATPC minimum (MIN) level in provisioning.	Check Metering using LCT for local and/or opposite site in Maintenance menu
	Receiver input level of the ODU falls below squelch level.	
	APC loop of local oscillator in ODU is unlocked.	
	IF signal from the MODEM to ODU is lost.	
	Blinks when IF cable is open circuit.	
	Connected ODU is not matched with inventory.	
MD/CBL	Blinks when IF cable is short circuit.	
TX (only 1+1)	Selected status of ODU TX	When TX mute control: LED Off
RX (only 1+1)	Selected status of MODEM RX output signal	When RX SWO switched to opposite: LED Off
XPIC RESET	XPIC function is OFF condition	Only XPIC configuration. Propagation condition deteriorated or XPIC is reset from LCT control.

Switches (MODEM)

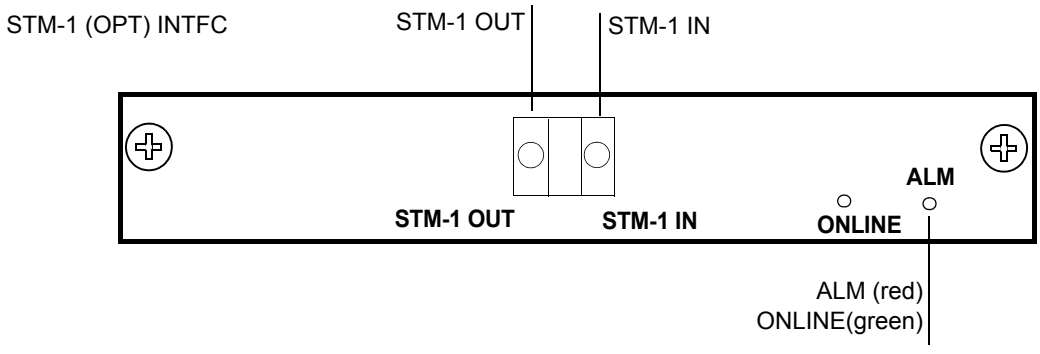
Switch	Operating	Remarks
PWR	IDU and ODU power On/Off switch.	Refer to Start-up and Shut-down the Equipment in Maintenance Section

User Interface Pin Assignment (MODEM)

Terminal	Description
SELV	
SELV (DC IN) (Molex M5569-04A1 Connector, 4 Pins)	–48 V DC power input *Note: Only* –48 V (–40.5 to –57 V) is available.
Pins 1 and 3	Ground
Pins 2 and 4	–48 V
IF IN/OUT	
TNC Jack (Female) *	IF signal IN/OUT and PS OUT to the ODU
XPIC CTRL	
(D-Sub Female, 15 pins)	Used for interconnection between IDUs in XPIC configuration.
Pins 1 (+) and 6 (–)	XPIC SV TXD
Pins 2 (+) and 7 (–)	XPIC SV RXD
Pin 3	Ground
Pins 4 (+) and 9 (–)	XPIC SEL IN
Pins 5 (+) and 10 (–)	XPIC SEL OUT
Pins 8 (+) and 12 (–)	XPIC RESET IN
Pin 11	Ground
Pins 13 (–) and 14 (+)	XPIC RESET OUT
Pin 15	Ground

*Note: * It is recommended that TNC (Male) L-angle connector for the 8D-FB IF cable is used to connect it to the IDU. When the N (Male) straight connector is attached to the 5D-FB or 10D-FB IF cable, use of the TNC (Male) - N (Female) (NJ-TNCP-LA) L-angle adapter is needed.*

2.4 OC-3 OPTICAL INTFC



Caution: Do not insert/extract the OC-3 INTFC with the power ON. Turn OFF the PWR switch on the MODEM and remove all cables connected to the OC-3 INTFC before inserting/ extracting theOC-3 INTFC, or that INTFC may be damaged.

The OC-3 INTFC provides an optical signal interface only. The module performs the following functions:

- Coded Mark Inversion (CMI) to Non Return to Zero (NRZ) conversion
- Optical to Electrical conversion
- RSOH termination
- Stuffing control
- Hitless switching (for 1+1 configuration)
- Performance monitoring (conforms to G.826/G.828)
- Automatic Laser Shut Down (ALS)
- Near End/Far End loopback

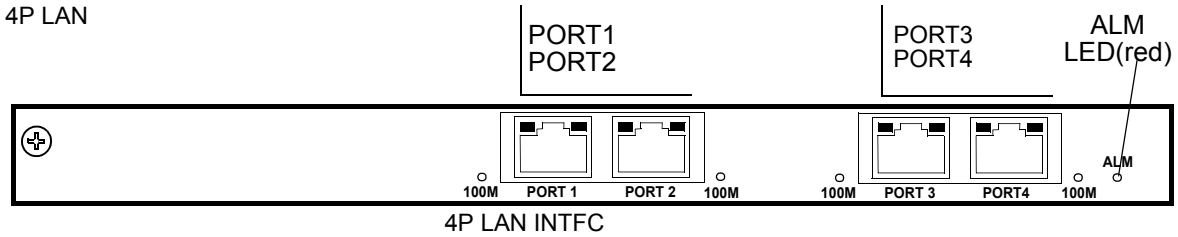
Interface Signals (OC-3 INTFC)

OC-3 IN/OUT LC	Optical OC-3 Input/Output, G.957
Optical	
Type:	G.957
Bit Rate:	155.520 Mbps
Level:	L-1.1: 0 to −8 dBm (TX)/−10 to −34 dBm (RX) S-1.1: −8 to −15 dBm (TX)/−8 to −28 dBm (RX)
Code:	NRZ
Wavelength:	1310 nm

Indicators (OC-3 INTFC)

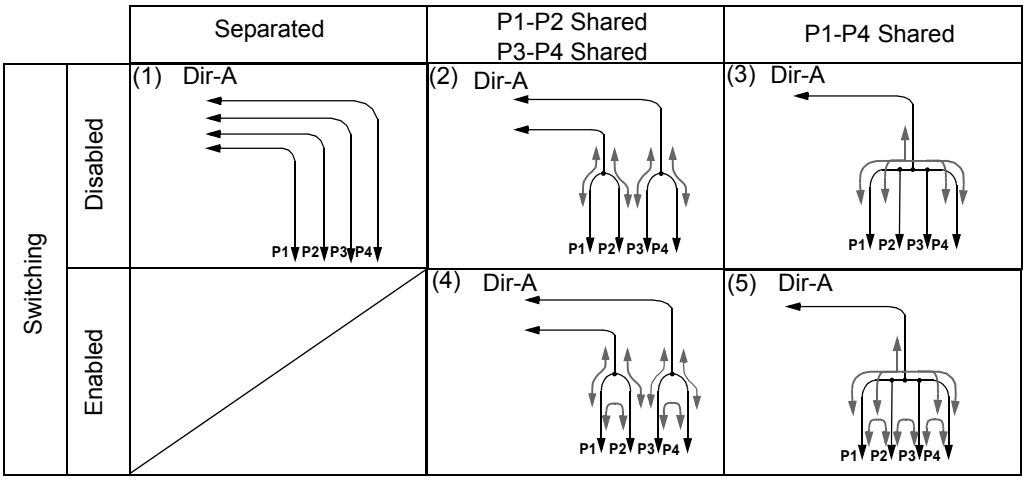
LED	Indication	Remarks
ALM	LOSS of OC-3 from MUX is detected.	Check MUX and wiring.
	Frame synchronization of input OC-3 signal from MUX is lost.	Check MUX and wiring.
	BER (E-BER, DMR or MUX) is worse than preset value (10^{-3} to 10^{-5}, selectable).	Check RSL, Interference and TX power at opposite site when BER ALM occurs.
	BER (SD, DMR or MUX) is worse than preset value (10^{-5} to 10^{-9}, selectable).	
	Frame synchronization of input OC-3 signal from radio is lost.	Check OC-3 transmission at the opposite site, ODU or MODEM in local.
	Mounting module is not matched with inventory.	Change LCT setting or other ( )INTFC module.
ONLINE	Online status of Working/Standby in APS: ON Offline status of Working/Standby in APS: OFF Online status of Working w/o APS: ON	

2.5 4P LAN INTFC



4P LAN INTFC

The 4P LAN INTFC (optional) is installed into the Main-INTFC slot (Slot1) in the system configuration and it provides 4 Port LAN Fast Ethernet interfaces. The LAN interface is used 4 Port shared (P1-P4) mode, 2 Port (P1-P2/P3-P4) shared mode or separated (P1/P2/P3/P4) mode.



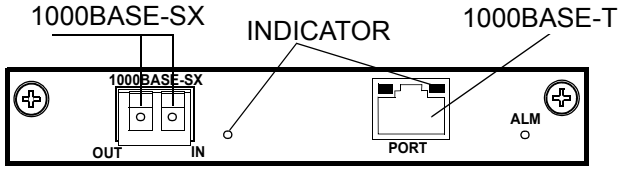
User Interface Signals (4P LAN INTFC)

LAN PORT1 to PORT4 (RJ-45)	LAN interface Port 1, Port 2, Port 3 and Port 4. Selectable 2 Mbps to 100 Mbps CH is assigned for LAN.
Input/Output Signal:	10/100Base-T(x) Auto-sensing or fixed
Flow control:	Full duplex or Half duplex
Forwarding mode:	Store-and-Forwarding

Indicators (4P LAN INTFC)

LED	Indication	Remarks
100M	LAN signal is in 100BASE-TX mode.	
LINK	LAN and associated equipment are linked and flashing under the exchanging the packet.	
COLLISION/ DUPLEX	Input/Output LAN signal is in Full Duplex mode. Flashing when a collision condition occurs.	
ALM		
	The module is extracted.	Mount the module.
	Mounting module is not matched with inventory.	Change LCT setting or other ( )INTFC module.
	LAN link failure occurs.	Check LAN cable connection.
	Module failure occurs.	Replace the module with a spare.

2.6 GbE INTFC



The GbE INTFC (optional) provides 1000BASE-SX/1000BASE-T interface. The GbE INTFC is installed into the Main-INTFC slot (Slot1) instead of the OC-3 INTFC in the SONET (128 QAM) system configuration. The signal is connected either SFP (for 1000BASE-SX) or RJ-45 (for 1000MASE-T).
These bytes (E1/F1/DCCr) are available between radio links. The RMON for LINE side is available but DMR side is unavailable. The maximum passed packet size is 9600 bytes.

The GbE INTFC ia applicable together with the LAN INTFC.

User Interface Signals (GbE INTFC)

1000BASE-SX:	Gigabit Ether signal, Optical Interface
1000BASE-SX IN: 1000BASE-SX OUT: (SFP Optical Interface Connector)	Ether signal Input Ether signal Output
Speed & Duplex:	1000 Mbits Full Duplex/Auto Negotiation fixed
Flow control:	Flow control ON or OFF selectable
Link Loss Forwarding:	Disabled/Enabled selectable
1000BASE-T:	Gigabit Ether signal, Electrical Interface
1000BASE-T Port: (RJ-45 Interface Connector)	Ether signal Input/Output
Speed & Duplex:	1000 Mbits Full Duplex/Auto Negotiation fixed
Flow control:	Flow control ON or OFF selectable
Link Loss Forwarding:	Disabled/Enabled selectable

User Interface Pin Assignment (GbE INTFC)

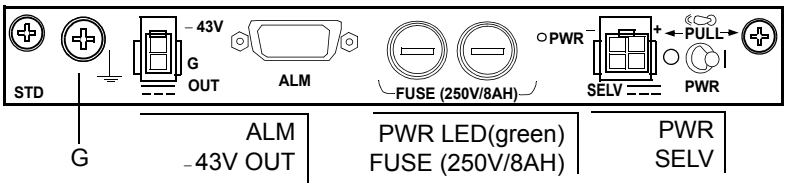
Terminal	Description
1000BASE-SX (SFP Fiber connector)	Multimode Fiber/LC Connector
IN (Right side)	1000BASE-SX Input
OUT (Left side)	1000BASE-SX Output
1000BASE-T (RJ-45, 8 pins)	1000BASE-T Input/Output (MDI/MDI-X)
Pin 1	DATA-A^+/ DATA-B^+
Pin 2	DATA-A^-/ DATA-B^-
Pin 3	DATA-B^+/ DATA-A^+
Pin 4	DATA-C^+/ DATA-D^+
Pin 5	DATA-C^-/ DATA-D^-
Pin 6	DATA-B^-/ DATA-A^+
Pin 7	DATA-D^+/ DATA-C^+
Pin 8	DATA-D^-/ DATA-C^-
Note: Cable connector: CAT5e/RJ-45	

Indicators (GbE INTFC)

LED	Indication	Remarks
Indicator	Indicates which Port is applied to the signal interface. When the indicator is flashing slowly, the input signal is off in the corresponding interface port which is set to be used. When the indicator is flashing fast, the input/output signal is on in the corresponding interface port which is set to be used. When the indicator is lit steady, the signal is linked in the corresponding interface port which is set to be used. When the indicator is unlit, the corresponding interface which port is set to no use.	
ALM	The module is extracted.	Mount the module.
	Mounting module is not matched with inventory.	Change LCT setting or other ( )INTFC module.
	Module failure occurs.	Replace the module with a spare.
	LOS from DMR is detected.	Check IDU/ODU and radio link.
	LOF from DMR is detected.	
	Excessive-BER alarm condition from DMR occurs.	
	SD from DMR is detected.	
	GbE output signal for fiber cable is interrupted.	Replace the module with a spare. (SFP mode only)
	LAN link failure occurs.	Check LAN cable connection.

2.7 DC-DC CONV

DC-DC CONV



Note: If the PWR LED is not lit though the PWR switch has set to ON, set the PWR switch to OFF, remove two fuses from the module and check the conduction of them.

Caution: Do not apply to the equipment a voltage that varies sharply. The equipment operation may be impaired.

Caution: Do not remove/connect the power supply cable with the PWR switch ON, Turn the PWR switch OFF before connecting/disconnecting the power supply cable IN or OUT, if not, module may be damaged.

The DC-DC CONV (optional) converts 20 to 60 V or –20 to –60 V DC input to –43 V stable DC voltage. The module applies when the Nlite E $^{+}$ ODU is connected to the IDU.

Interface Signals (DC-DC CONV)

SELV (Molex M5569-04A1, 4 pins) (DC IN) Input Voltage:	 –20 to –60 V/+20 to +60 V DC
–43V OUT (Molex M5569-02A1, 2 pins) (DC OUT) Output:	 –43 V/1.6A
G (Screw):	Ground terminal *(5 mm square cable (more than 2.5 mm diameter cable) (AWG#10) is recommended to apply for the frame ground. The proper press fix terminal tool shall be used.)*
ALM:	Power supply ALM signal output

Indicators (DC-DC CONV)

LED	Indication	Remarks
PWR	The PWR switch of the DC-DC CONV is turned on.	

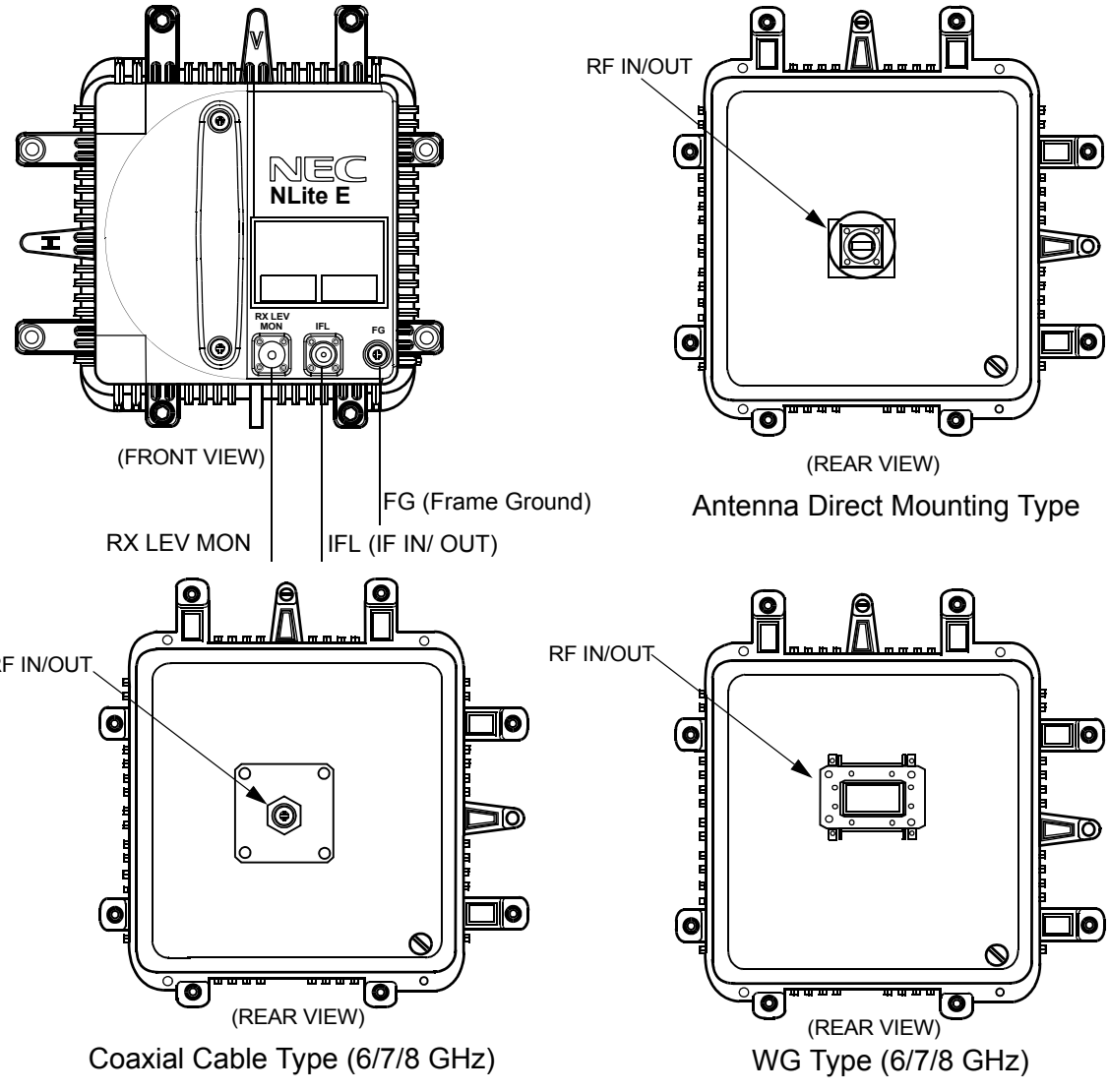
Switches (DC-DC CONV)

Switch	Operating	Remarks
PWR	IDU and ODU power on/off switch.	Refer to Start-up and Shut-down the Equipment in Maintenance Section

User Interface Pin Assignment (DC-DC CONV)

Terminal	Description
SELV	
SELV (DC IN) (Molex M5569-04A1 Connector, 4 Pins)	–20 to –60/20 to 60 V DC power input
Pins 1 and 3	0 V /(or +20 to +60 V)
Pins 2 and 4	–20 to –60 V/(or 0 V)
–43V OUT	
(Molex M5569-02A1, 2 pins) (DC OUT)	–43 V DC power output (connects to the SELV connector of the MODEM module using accessory cable)
Pin 1	Ground
Pin 2	–43 V
ALM	Power supply ALM signal output
(D-Sub Female, 9 pins)	
Pins 6 (COM), 1 (NC) and 2 (NO)	PS and input voltage alarm output Between Pins 1 and 6 / Between Pins 6 and 2 Normal state : Closed / Open Alarm state : Open / Closed
Pin 9	Ground
Pins3,4,5,7,8	No connected

2.8 ODU



The ODU receives 340 MHz IF signal from the IDU and converts it to an RF signal using a local signal generated by a synthesized local oscillator. This RF signal is then sent to the antenna through the BPF which limits the RF transmit signal dispersion. The TX output level is controlled to the specified from the IDU corresponded to the QPSK 32QAM or 128QAM modulation.

The RF signal received from the antenna is amplified to the required level. Afterward the signal is converted into the 140 MHz IF signal by mixing with a local signal generated by a synthesized local oscillator. Then the 140 MHz IF signal is sent to the IDU through the IF cable.

Interface Signals (ODU)

IFL (N Female) TX Frequency RX Frequency: Power supply: Impedance:	 340 MHz 140 MHz –48 V 50 ohms
	Connecting IF Cable length: 5D-FB: less than 150 m 8D-FB: less than 300 m 10D-FB: less than 350 m
FG (Screw)	Frame ground, connecting near by ground point.
RF IN/OUT	RF signal interface. - N female connector for the 6/7/8 GHz ODU with coaxial cable connection. - NEC proprietary flange for the 10 to 38 GHz ODU with antenna mounting (direct/OMT/HYB COMB/TX ATT). - Waveguide connection flange; 6 GHz: PDR70 7/8 GHz: PDR84 10/11 GHz: PDR100 18/23 GHz: PBR220 38 GHz: PBR320

Monitoring Terminal (ODU)

Terminal	Operating	Remarks
RX LEV MON:	Monitoring RX LEV in AGC voltage using the digital voltmeter or PASOLINK MONITOR unit * for antenna orientation.	Use LCT to check the RX LEV in Maintenance.

Note:In order to measure exact performance of AGC V at the RX LEV MON, 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 NLite E MONITOR unit.

3. SYSTEM SETUP

This section provides system setup to make up proper system configuration. The setup is performed accessing to the LCT program using the PC. For the detail procedure, refer to Section IV Appendix LCT Operation Manual.

3.1 Equipment Setup

The equipment setup menu decides system fundamental configuration.

Note: For the details of setup item of the LAN PORT USAGE, refer to the LAN INTERFACE (10/100BASE T(X)) Application and Setting in Section IV.

Equipment Setup for SONET

User Interface	OC-3	
	GbE over OC-3	
	2Port LAN over OC-3	
Redundancy Setting	1+0(TERM)	
	1+1(Hot Standby TERM)	
	1+1(Twinpath TERM)	
INTFC Main (WORK)	OC-3(Optical)	
	OC-3(Electrical)	
	GbE over OC-3	When the “SONET GbE over OC-3” is selected for User Interface.
	2Port LAN over OC-3	
INTFC SUB (PROT)	Not Used	
	OC-3 (Optical)	
	WS	
	WS/LAN	
XPIC Usage	Not Used	
	Used (Main Master)	
	Used (SUB Master)	
APS Function	Unavailable	
	Available	
Modulation Scheme	128QAM	(fixed)
Transmission Capacity	156MB	(fixed)

TX RF Frequency(No.1) [MHz]		
TX RF Frequency(No.2) [MHz]		
RX RF Frequency(No.1) [MHz]		
RX RF Frequency(No.2) [MHz]		
Frame ID(No.1)	(Up to #32)	
Frame ID(No.2)	(Up to #32)	
TX Power Control	MTPC	
	ATPC	
LAN Port Usage (Main)	USED	(fixed when GbE INTFC is applied.)
LAN Capacity(Main)	150Mbps	(fixed when GbE INTFC is applied.)
LAN Port Usage (Main)	P1=75MB/P2=75MB	(selectable when LAN INTFC is applied.)
	P1=100MB/P2=50MB	
	Best Effort	
	P1=100MB/P2=Not Used	
LAN Capacity(Main)	150Mbps	(fixed when LAN INTFC is applied.)
LAN Port Usage (SUB)	P1-2 Shared/1Port Only(WS)	
	P1-2 Shared/1Port Only(SC)	
LAN Capacity(SUB)	64kbps	
	128kbps	
	192kbps	
	256kbps	
	2Mbps	

Equipment Setup for SONET

---ODU FREQ INF---
TX Start Frequency(No.1) [MHz]
TX Stop Frequency(No.1) [MHz]
Frequency Step(No.1) [MHz]
Shift Frequency(No.1) [MHz]
Upper/Lower(No.1)
Sub Band(No.1)
TX Start Frequency(No.2) [MHz]
TX Stop Frequency(No.2) [MHz]
Frequency Step(No.2) [MHz]
Shift Frequency(No.2) [MHz]
Upper/Lower(No.2)
Sub Band(No.2)

3.2 Provisioning Setup

The provisioning setup menu determines system fundamental functions.

SONET Provisioning Setup

Provisioning

BER Threshold Setting	High BER Threshold Low BER/E BER(DMR) SD(DMR) E BER(MUX) SD(MUX)	
BER Threshold Setting	High BER Threshold	1E-3 1E-4 1E-5
	Low BER Threshold	1E-6 1E-7 1E-8 1E-9
	E-BER (DMR)	1E-3 1E-4 1E-5
	SD (DMR)	1E-6 1E-7 1E-8 1E-9
	E-BER (MUX)	1E-3 1E-4 1E-5
	SD (MUX)	1E-6 1E-7 1E-8 1E-9
SC Assignment	RS-232C-1/2	Not Used SC1 SC2 SC3 SC4 E1 (MUX)F1(MUX)E1(DMR)F1(DMR)
	V11-1/2	Not Used SC1 SC2 SC3 SC4 E1 (MUX) F1(MUX) DCCr(MUX) E1 (DMR) F1(DMR) DCCR(DMR) F1(DMR)
	V-11-1/2 Direction Setting	Co-directional Contra-directional
LAN Port Setting (For GbE INTFC)	LAN Port Setting	
	Switching Function	Disable Enable
	Port	
	Media Type	SFP RJ-45
	Speed & Duplex	AUTONEG (1000MB Full Duplex).)
	Flow Control	Off On
	Link Loss Forwarding	Disabled Enabled

LAN Port Setting (For LAN INTFC)	INTFC (Main) Setting	
	Switching Function	
	Clock Souce Setting	Internal Clock DMR Internal -> Clock
	Port1	
	Port Usage	Not Used Used
	Speed & Duplex	AUTONEG (Auto-MDI/MDX)
		10M-Half (MDI)
		10M-Full (MDI)
		100M-Half (MDI)
		100M-Full (MDI)
		10M-Half (MDIX)
		10M-Full (MDIX)
		100M-Half (MDIX)
		100M-Full (MDIX)
	Flow Control	Off On
	Collision Report	Not Report Report
	Port2	
	Port Usage	Not Used Used
	Speed & Duplex	AUTONEG (Auto-MDI/MDX)
		10M-Half (MDI)
		10M-Full (MDI)
		100M-Half (MDI)
		100M-Full (MDI)
		10M-Half (MDIX)
		10M-Full (MDIX)
		100M-Half (MDIX)
		100M-Full (MDIX)
	Flow Control	Off On
	Collision Report	Not Report Report
	Link Loss Forwarding	Disabled Enabled
LAN Port Setting (For LAN INTFC)	INTFC (SUB) Setting	
	Switching Function	Disabled Enabled
	Port1	
	Port Usage	Not Used Used
	Speed & Duplex	AUTONEG (Auto-MDI/MDX)
		10M-Half (MDI)
		10M-Full (MDI)
		100M-Half (MDI)
		100M-Full (MDI)
		10M-Half (MDIX)
		10M-Full (MDIX)
		100M-Half (MDIX)
		100M-Full (MDIX)
	Flow Control	Off On
	Collision Report	Not Report Report
	Link Loss Forwarding	Disabled Enabled

	Port2
	(Items for Port 2 are same as the Port1)

OC-3 Setting	MS-AIS Generation	Disabled Enabled
ALS	ALS Function	Disabled Enabled
	ALS Interval	60sec 180sec 300sec
TX Power Control	ATPC Threshold Level(No.1/2) [dBm] Additional ATT(No.1/2 [dB] ATPC Range(MAX)(No.1/2) [dB] ATPC Range(MIN)(No.1/2) [dB] ATPC Power Mode(No.1/2)	 HOLD Max MIN
	MTPC TX Power (No.1/2) [dBm] ATPC Threshold Level(No.1/2) [dBm] Additional ATT(No.1/2) [dB]	
Condition for TX/RX SW	TX SW Priority RX SW Priority RX SW Maintenance Mode RX SW Condition-Early Warning	Non-Priority Priority No.1 Non-Priority Priority No.1 Manual Forced Included EW Excluded EW
Condition for APS	APS Maintenance Mode APS Condition-SF(PROT) APS Condition-Signal Degrade-SD(B1) Lock in Usage Lock in Count [times] Lock in Detect Time [min] Lock in Hold Time [hours]	Manual Forced Priority High Priority Low Included SD Excluded SD Not Used Used
Relay Setting	ALM output for RL1 to RL6 HK output for RL3 to RL6 Cluster1 to Cluster4 input Cluster1 to Cluster4 output	Out HK Disabled Enabled Out
TCN Threshold(15min)	DMR/ OCR/RCVR MUX OCR/RCVR	OFS UAS ES SES BBE SEP
TCN Threshold(1day)	DMR/ OCR/RCVR MUX OCR/RCVR	OFS UAS ES SES BBE SEP
PMON Select	RX Level TCN Threshold [dBm] SES Activation Condition	 30[%] 15[%]
Others	EOW2 External Setting Alarm Correlation Capacity	Normal Invert Off On

3.3 Events and Performance

The alarm and status condition are based upon equipment setup and provisioning setup, therefore indication items vary depending on the those setup.

The summarized event and performance monitoring that are displayed on the LCT PC are listed in the following table. For the detailed items, refer to Section IV Appendix LCT OPERATION MANUAL.

Event List SONET

Alarm Status

ODU		
	ODU	
	TX Power	
	TX Input	
	RX Level	
	APC	
	ODU CPU	
	Mute Status	
	LO REF	: only XPIC configuration
	TX SW Status	: only 1+1 configuration
	RX SW Status	: only 1+1 configuration
MODEM		
	MODEM	
	MODEM Unequipped	
	LOF	
	Route ID	
	High BER	
	Low BER	
	Early Warning	
	MOD	
	DEM	
	Input Voltage	
	Power Supply	
	IF Cable Short	
	Linearizer Status	
	Linearizer Fail	
	Cable EQL	
	XIF	
	XCTRL	: only XPIC configuration
	XPIC Status	
	XREF	
	ATPC Power Mode	
CTRL		
	CTRL Module	
	MMC Mount	
	APS SW Fail	: only APS configuration
	APS Online Status	: only APS configuration
	APS Lock in Status	: only APS configuration
	XCTRL	: only XPIC configuration
	XCTRL Mode Mismatch	: only XPIC configuration
UAE		
	OC-3(1)/UAE(MUX)	
	OC-3(1)/UAE(DMR)	

Event List SONET

INTFC (Main)

- Unequipped
- Type Mismatch
- OC-3(1) LOS (MUX)
- OC-3(1) LOS (DMR)
- OC-3(1) LOF (MUX)
- OC-3(1) LOF (DMR)
- OC-3(1) Output Control
- OC-3(1) E-BER (MUX)
- OC-3(1) E-BER (DMR)
- OC-3(1) SD (MUX)
- OC-3(1) SD (DMR)
- OC-3(1) In-Phase
- OC-3(1) TF

INTFC (Main)

- Unequipped
- Type Mismatch
- Module
- LAN Link
- Link Loss Forwarding
- Speed & Duplex
- LOS (DMR)
- LOF (DMR)
- E-BER (DMR)
- SD DMR
- Inphase
- TF

GbE INTFC

Event List SONET

INTFC (Sub)			
	INTFC(2) Unequipped		OPT INTFC applies APS
	OC-3(2) LOS (MUX)		
	OC-3(2) E-BER (MUX)		
	OC-3(2) E-BER (DMR)		
	OC-3(2) SD (MUX)		
	OC-3(2) SD (DMR)		
	OC-3(2) Output Control		
	OC-3(2) In-Phase		
	OC-3(2) LOS (DMR)		
	OC-3(2) LOF (MUX)		
	OC-3(2) LOF (DMR)		
	OC-3(2) TF		
	Unequipped		
	Type Mismatch		
	Module		
	LAN Link	*1	When LAN Port
	LAN Collision	*1	
	Link Loss Forwarding	*1	
	Speed & Duplex	*1	
TCN-RX LEV			
	TCN-RX LEV-15min		
	TCN-RX LEV-1day		

Event List SONET

15min 1 day

- TCN-OFS-15min Total
- TCN-UAS-15min Total
- TCN-ES-15min Total
- TCN-SES-15min Total
- TCN-BBE-15min Total
- TCN-SEP-15min Total
- TCN-OFS-15min(MUX)
- TCN-UAS-15min(MUX)
- TCN-ES-15min(MUX)
- TCN-SES-15min(MUX)
- TCN-BBE-15min(MUX)
- TCN-SEP-15min(MUX)
- TCN-OFS-15min(MUX)(P)
- TCN-UAS-15min(MUX)(P)
- TCN-ES-15min(MUX)(P)
- TCN-SES-15min(MUX)(P)
- TCN-BBE-15min(MUX)(P)
- TCN-SEP-15min(MUX)(P)

only APS configuration

- TCN-OFS-1day Total
- TCN-UAS-1day Total
- TCN-ES-1day Total
- TCN-SES-1day Total
- TCN-BBE-1day Total
- TCN-SEP-1day Total
- TCN-OFS-1day(MUX)
- TCN-UAS-1day(MUX)
- TCN-ES-1day(MUX)
- TCN-SES-1day(MUX)
- TCN-BBE-1day(MUX)
- TCN-SEP-1day(MUX)
- TCN-OFS-1day(MUX)(P)
- TCN-UAS-1day(MUX)(P)
- TCN-ES-1day(MUX)(P)
- TCN-SES-1day(MUX)(P)
- TCN-BBE-1day(MUX)(P)
- TCN-SEP-1day(MUX)(P)

only APS configuration

Event List SONET

PMON(History)

RX Level
- RX Level(15min)
- RX Level(1day)

DMR (W) (1day)
- Status
- OFS
- SEP
- BBE
- ES
- SES
- UAS

DMR (W) (15min)
- Status
- OFS
- SEP
- BBE
- ES
- SES
- UAS

MUX (W) (day)
- Status
- OFS
- SEP
- BBE
- ES
- SES
- UAS

MUX (W) (15min)
- Status
- OFS
- SEP
- BBE
- ES
- SES

RMON(Line)(15min) only for LAN
- Status
- RX UNICAST
- RX BROADCAST
- RX MULTICAST
- RX PAUSE
- RX CEC ERR
- RX ALIGNMENT ERR
- RX SYMBOL ERR
- RX UNDERSIZE
- RX FRAGMENTS
- RX Pkts 64
- RX Pkts 65 to 127
- RX Pkts 128 to 255
- RX Pkts 256 to 511

Event List SONET

RX Pkts 512 to 1023
RX Pkts 1024 to 1536
TX JABBERS
TX UNICAST
TX BROADCAST
TX MULTICAST
TX PAUSE
TX COLLISION

*Notes : *1 When the LAN/WS INTFC is provided, status of each LAN PORT is displayed as follows.*

Status of LAN PORT

	Link	Collision	LLF	Speed & Duplex
Sub PORT1	Link	Normal	Normal	100M-Full (MDIX)
Sub PORT1	Link	Normal	Normal	100M-Full (MDIX)

Notes:For the GbE INTFC, there are distinctions for the following functions from the 10BASE-T/100BASE-Tx

1. *RX Undersize: Unavailable.*
2. *RX Fragments: Unavailable.*
3. *RX Symbol Errors:*
   For SFP: Available
   For RJ-45: Unavailable (un-counting, only "0" is indicated.)
4. *TX Multicast PKts (Including number of the TX pause packets.)*
5. *RX Multicast PKts (Including number of the RX pause packets.)*
6. *Countable packet size for the following items shown in right side of the table and reading must be taken place as follows. (The indication will not be taken placed.)*

	Indication	Reading
15	RX Pkts 1024-1536	RX Pkts 1024-1518
16	RX Pkts 1537-MAX	RX Pkts 1519-MAX

7. *The RX Alignments Error is counted as an RX CRC ERR.*

3.4 Control

The control condition is based upon equipment setup and provisioning setup, therefore control items vary depending on the those setup.

The control items that are displayed on the LCT PC are listed in the following table. the control operation can be performed in Maintenance "ON".

Control List (SONET)

Control

Maintenance

TX SW Manual Control	*1	
RX SW Manual Control	*1	
RX SWMaintenance Mode		
ATPC Manual Control(No.1)		
ATPC Manual Control(No.2)	*1	
TX Mute Control(No.1)		
TX Mute Control(No.2)	*1	
CW Control(No.1)		
CW Control(No.2)	*1	
APS Manual Control (Auto/Working/Protection)		: Only APS configuration
APS Maintenance Mode		: Only APS configuration
IF Loopback(No.1)		
IF Loopback(No.2)	*1	
Main Loopback (Near End)		
Main Loopback (Near End) INTFC (1)		: Only APS configuration
Main Loopback (Near End) INTFC (2)		: Only APS configuration
Main Loopback (Far End)		
Linearizer Control(No.1)		
Linearizer Control(No.2)	*1	
ALS Restart		: Only Optical INTFC
XPIC Control Local(No.1)		: Only XPIC configuration
XPIC Control Local(No.2)		: Only XPIC configuration
XPIC Control Remote(No.1)		: Only XPIC configuration
XPIC Control Remote(No.2)		: Only XPIC configuration

Offline Maintenance

DADE Adjust	
RF SUB Band Select(No.1)	
RF SUB Band Select(No.2)	*1
RF Shift Frequency Setting(No.1)	
RF Shift Frequency Setting(No.2)	*1
Antenna Alignment Mode(No.1)	
Antenna Alignment Mode(No.2)	*1

*Note *1: only for 1+1 Configuration.*

3.5 Setup Description

The following describes to select suitable functions for the system operation by the provisioning setup.

3.5.1 Automatic Laser Shutdown Control (OPT INTFC) (SONET)

The OC-3 INTFC (only for OPT) is provided with the Automatic Laser Shutdown (ALS) function that can be enabled or disabled. If the ALS function is enabled, the laser output is periodically turned ON and OFF when the optical cable carrying the OC-3 signal is disconnected inadvertently, or intentionally during maintenance. When the ALS function is disabled, the laser output is always ON even if the optical cable is disconnected. Fig. 3-1 shows a block diagram of the ALS function.

If a fault occurs at point A and the absence of the optical input signal in the RX 2 lasts for 550 ±50 msec (OC-3 LOS alarm condition), the optical signal bound for the RX 1 (MUX equipment) from the TX 2 (OPT INTFC module) is interrupted by a control signal generated inside the OPT INTFC module. The MUX equipment detects the loss of signal at RX1 and the ALS function in the MUX will, subsequently, turn off the laser output of TX1. When the fault at point A is cleared the system can be restored by controlling the laser output of TX2 through one of the following modes:

- Automatic control
- Manual restart (2 sec.) control
- Manual restart (90 sec.) control

(a) Automatic Control

When 60, 180 or 300 sec.(selectable) have elapsed after the optical signal entering RX 2 is cut off, the IDU emits laser signal from TX 2 to RX 1 for 2 sec. This would then cause the laser output of TX1 to turn on. If, at this time, the fault at point A has been cleared, the ALS function will be released and the operation will return to normal.

(b) Manual Restart (2 sec.) Control

Upon receiving a command signal for manual restart from the LCT or the PASOLINK network management terminal (PNMT) while the optical input signal to the RX 2 is off, the IDU emits the laser signal from the TX 2 to the RX 1 for 2 ±0.25 sec. This would then cause the laser output of TX1 to turn on. If, at this time, the fault at point A has been cleared, the ALS function will be released and the operation will return to normal (if not it returns to automatic condition).

(c) Manual Restart (90 sec.) Control

Upon receiving a command signal for manual restart for test from the LCT or the PNMT while the optical input signal to the RX 2 is off, the IDU emits the laser signal from the TX 2 to the RX 1 for 90 ±10 sec. This would then cause the laser output of TX1 to turn on. If, at this time, the fault at point A has been recovered, the ALS function will be released and the operation will return to normal (if not it returns to automatic condition).

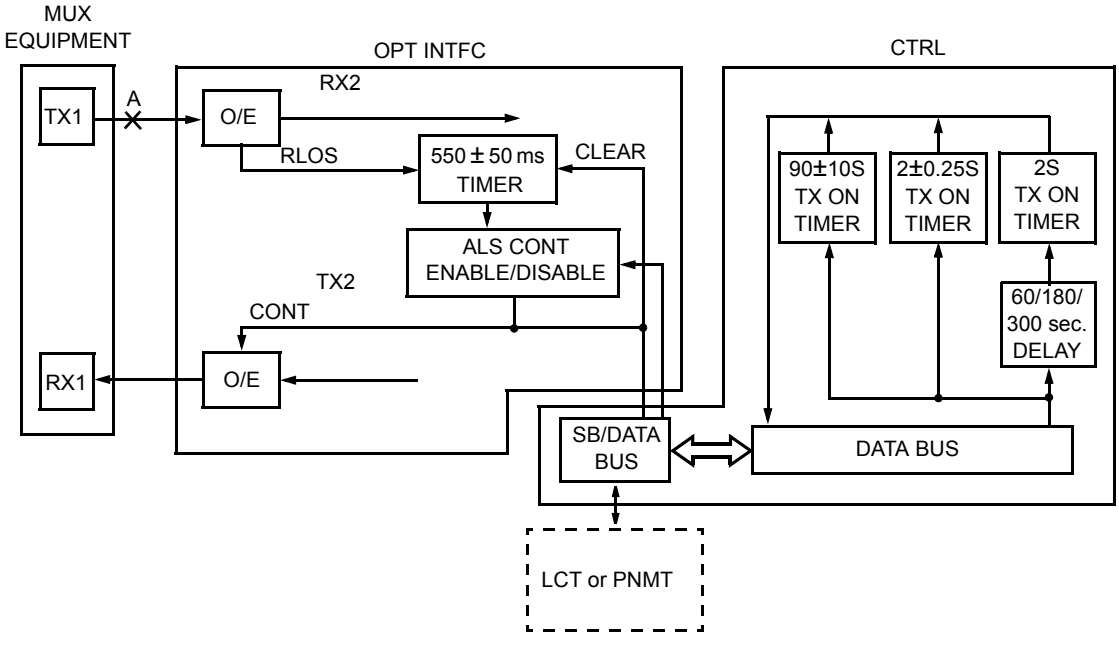


Fig. 3-1 ALS System Functional Block Diagram

3.5.2 Automatic Protection Switching (APS) (OPT INTFC Optional APS Configuration) (SONET)

(a) Line Protection

The Automatic Protection Switching (APS) provides for uni-directional line protection against optical cable interface failures. It is performed by detected alarm condition or remote control signal.

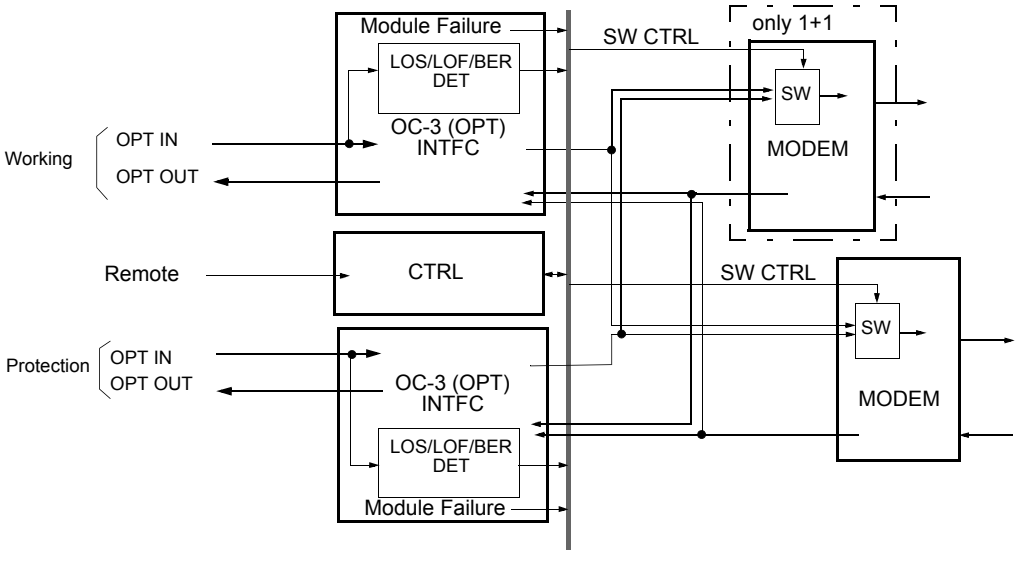


Fig. 3-2 OPT APS System

The OC-3 (OPT) INTFC monitors the OPT line input signal interface condition and when an alarm condition occurs in the optical cable or optical interface module, APS is activated. Also the APS is activated when remote control signal is received.

Uni-directional APS is performed only in the receiving section of the local side when a failure or signal degradation of the received signal is detected in one direction. Fig. 3-3 shows APS switching mode.

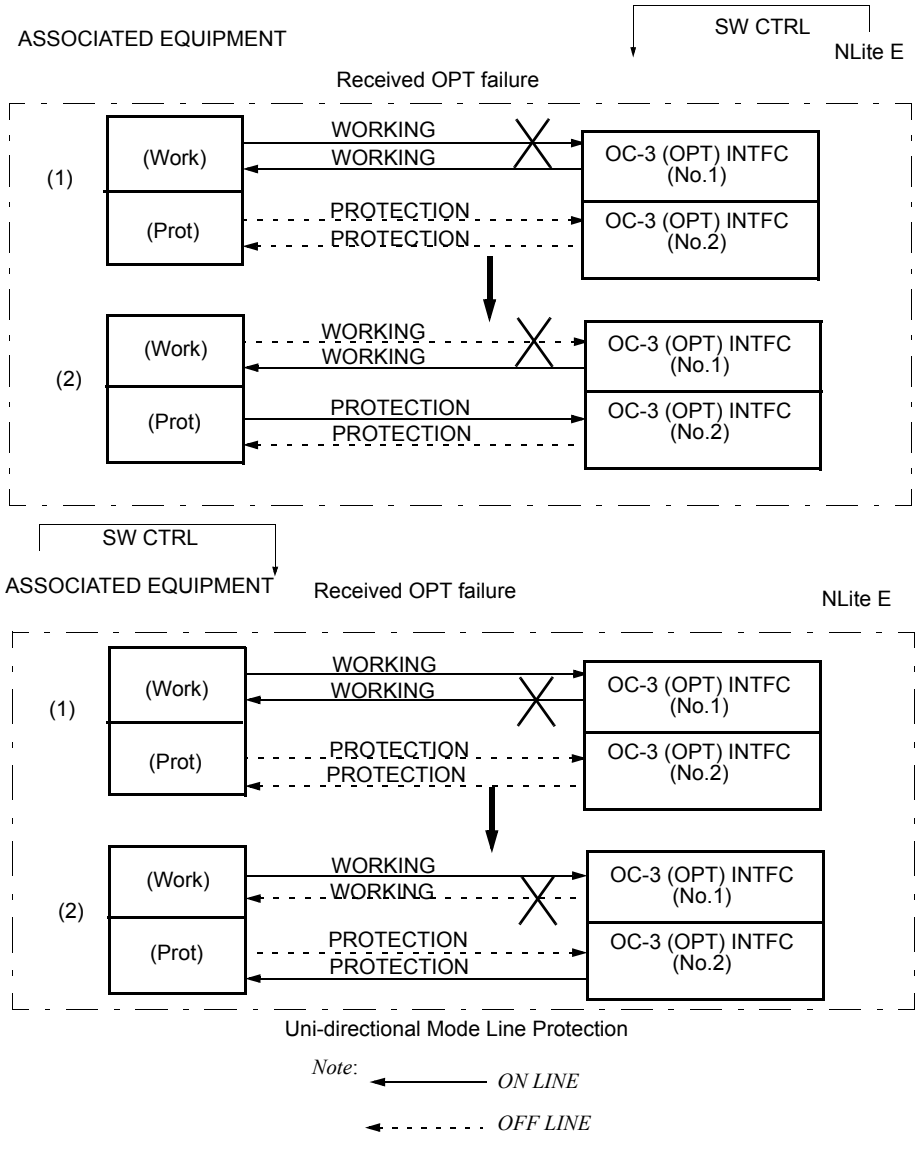


Fig. 3-3 Line Protection

(b) APS Function Setup

The APS switchover is performed with the following order of priority of two (2) modes.

(1) When "APS Condition-SF" is lower priority (default).

- UNEQUIP > LKI*1 > FSW > SF > SD*2 > MSW

(2) When "APS Condition-SF" is higher priority.

- UNEQUIP > LKI*1 > SF(P) > FSW > SF(W) > SD*2 > MSW

*Notes: *1 Excluding when the Lock in Usage is set Not Used.*

**2: Excluding when the APS Condition-SD(B1) is set to Excluded SD.*

UNEQUIP: Unequipped redundant OC-3 INTFC (OPT).

LKI: Lock in (see following descriptions Lock in for detail)

FSW: Forced Control (see following descriptions when APS Maintenance Mode is set to Forced)

SF: Signal Fail (see following descriptions of APS Condition-SF(PROT)
SF(P); Signal Fail of Protection side
SF(W); Signal Fail of Working side

SD; Signal Degrade (see following descriptions APS Condition-SD(B1) for detail)

MSW; Manual control (see following descriptions when APS Maintenance Mode is set to Manual)

LCT MENU

Alarm/Status
Equipment Setup
Inventory
AUX I/O
Maintenance
Provisioning
BER Threshold Setting
SC Assignment
OC-3 Setting
TX Power Control
Condition for TX/RX SW
Condition for APS
Relay Setting
TCN Threshold (15min)
TCN Threshold (1day)
PMON Select
Others
Metering
PMON(Current)
PMON(History)

---Condition for APS---		Range
APS Maintenance Mode	● Manual ○ Forced	
APS Condition-SF(PROT)	● Priority High ○ Priority Low	
APS Condition-SD(B1)	○ Included SD ● Excluded SD	
Lock in Usage	○ Not Used ● Used	
Lock in Detect Count [times]	4	1 to 255
Lock in Detect Time [min]	10	1 to 60
Lock in Hold Time [hours])	24	1 to 48

- APS Maintenance Mode

  This is a setup to give priority to manual control operation in maintenance.

  Manual: Give priority to alarm events in maintenance operation. In this mode, manual control disables the operation under alarm condition.

  Forced: Give priority to forced control in maintenance operation. In this mode, manual control enables the operation under alarm condition and the alarmed side can be selected.

  Caution: When the APS Maintenance Mode is set to "Forced" in provisioning, APS manual control can select either Working or Protection line though one is alarmed. Then, take care switching to avoid traffic interruption.

- APS Condition-SF(PROT):

  This is a setup to give higher priority to switchover by SF in Protection side.

  Priority High: This setup gives highly priority to SF of Protection side (installed in INTFC Slot2) for switchover control condition. Since the setup gives priority higher than the Forced Control, the ONLINE is maintained in Main side (installed in INTFC Slot1) under occurrence of SF condition of Protection side.

- APS Condition-SD(B1)

  This is a setup that it includes the SD or excludes SD for the switchover control condition. When including it, the switchover is performed when SD reaches the threshold value which is set in BER Threshold/SD (MUX) in provisioning.

  Include SD: Including SD for switchover condition

  Exclude SD: Excluding SD for switchover condition

- Lock in

  The function is used to pause the switchover activation for a period of time when in the switchover of frequent occurrence.

  The following setting is needed to be used for it.

  Lock in Count: Setup for the Lock in threshold value of the switchover number of times.
  (setting range: 1 to 255 times)

  Lock in Detect time: Setup for the watching interval of counting number of times for Lock in.
  (setting range: 1 to 60 minutes)

  Lock in Hold time: Setup for the duration of pause of switchover in the Lock in condition.
  (setting range: 1 to 48 hours)

  The Lock in status can be observed on the Alarm/Status of LCT display.

  The Lock in condition may be released after passing the Lock in Hold time or the change of setting.

  The following is an example in default value.

  - Lock in Count: 4
  - Lock in Detect time: 10
  - Lock in Hold time: 24

  This sets into the Lock in condition when the switchover is activated more than 4 times within 10 minutes interval of watching number of times. The switchover activation pauses during 24 hours after set in the Lock in condition. The Lock in condition will be released after passing of 48 hours and it sets into normal mode.

  When it will be manually released that under the Lock in condition, perform resetting by changing parameter value or changing the setting condition to “Lock in Usage Not Used”.

3.5.3 Automatic Transmitter Power Control

The automatic transmit power control (ATPC) function automatically varies the TX output power according to path conditions. In the SHF and EHF band, fading exerts heavy influences on propagation, causing the receive signal level at the opposite station to vary. The ATPC function operates by controlling the transmit output power of the opposite station according to the variation of the received signal level at the local station. ATPC provides the following advantages:

- Improvement in up fading characteristics
- Improvement in residual BER characteristics
- Reduction of interference to intra system
- Reduction of interference to inter system

Note: In the XPIC configuration, ATMC/MTPC setup and action control in the Sub Master station are applied from the Main Master station.

A functional block diagram of the ATPC operation is shown in Fig. 3-4.

ATPC improves the BER characteristics under adverse changes in climatic conditions and reduces the possibility of interference. To implement ATPC, the received level (RX LEV) is detected by the Receiver (RX) in the ODU and passed to the CPU in the CTRL module. The CPU then determines whether the transmit output power needs to be controlled. This is based on the transmit output power and the minimum and maximum values of the output control range (ATPC range). ATPC is relevant for the receiving threshold level that were previously specified using the LCT or PNMT (as ATPC Threshold Level).

A control signal (POWER CTRL), whose function is to maintain the received RX signal level (RSL) by decreasing or increasing the TX output power of the opposite station, is generated by the CTRL module through the MD Unit. This control signal is based on the result of comparison between the current receiver input level and the preset receiving threshold level. This control signal is sent to the opposite station to control its transmit output power.

At the opposite station, this control signal is detected by the CTRL module. The TR Unit, in accordance with this control signal, produces a control that will either raise, lower or maintain the current TX output power.

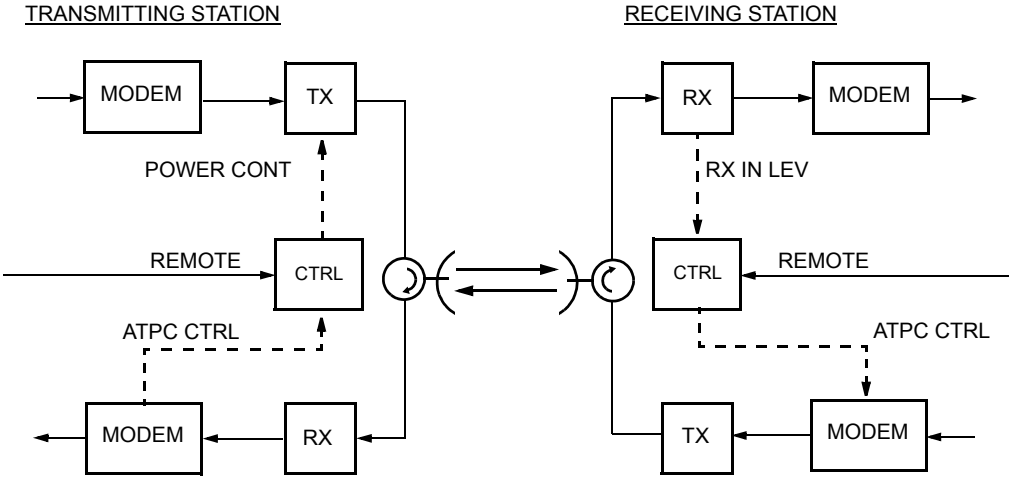
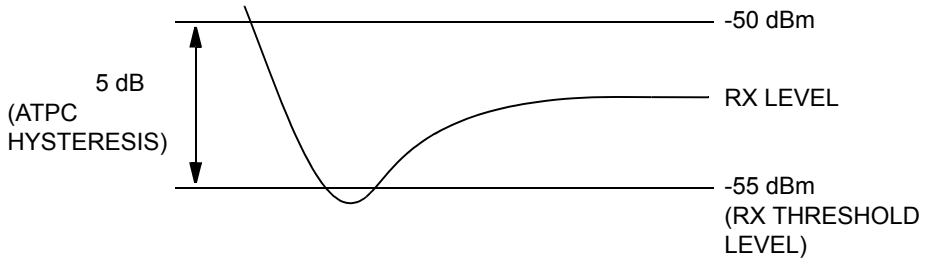


Fig. 3-4 ATPC, Functional BLock Diagram

Example of ATPC setting.

Where ATPC MAXIMUM PWR of ATPC Range is set to 0 dB, ATPC MINIMUM PWR is set to -10 dB and RX Threshold to -55 dBm. In this case, if RX level is lower than -55 dBm, monitor/control is performed with the interval of 8 msec. RX level is monitored in 1 dB step, and TX output is controlled in 1 dB step.
However, a fixed hysteresis of 5 dB referred to the RX Threshold is implemented for ATPC operation.
Example: If RX Threshold is set to -55 dBm, no output control is made unless the RX level goes below -55 dBm or goes above -50 dBm, so that the receive level is maintained within -55 to -50 dBm by ATPC.

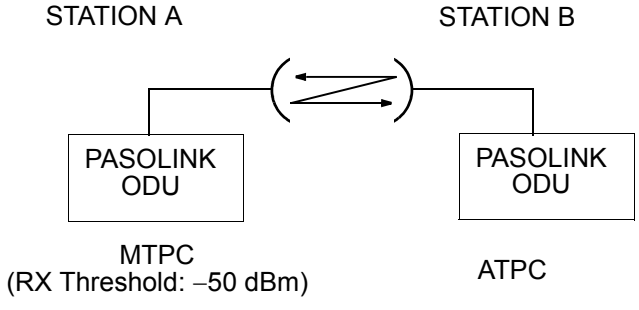


Using MTPC-ATPC

The ATPC Control System of the PASOLINK transmits the information on the receiving level to the opposite station and controls the transmission level of its local station in accordance with the receiving level of the opposite station. Transmission level control can be used not only for setting the same operation (ATPC-ATPC) between local station and opposite station but also for operation in combination of stations with different operations (MTPC-ATPC, ATPC-MTPC). The station set in MTPC mode is not controlled by the information from opposite station but is fixed in its transmitting output level.

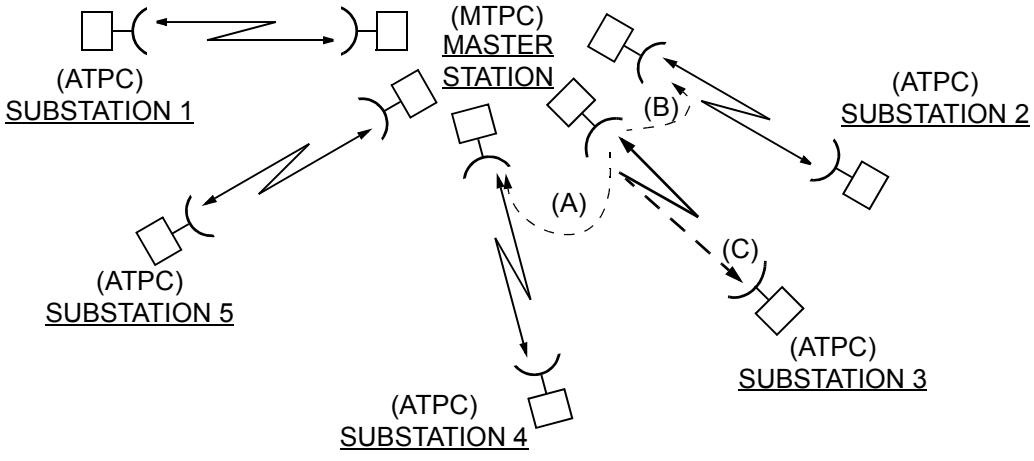
Even if the station is set in the MTPC mode, the opposite station is likely to be set in the ATPC mode. Therefore, setting the RX Threshold (ATPC Threshold level) is required for controlling the transmission level of the opposite station. Between the stations that are respectively set in the MTPC mode, however, the setting is disabled.

The following is an example of operation between stations set in MTPC-ATPC mode.



The transmitting level of station B is controlled so that the receiving level of station A in the above figure reaches the RX Threshold set level (–50 dBm) set in station A. This method is used in station A for reducing the level of interference to other route. As station A is set in the MTPC mode, the transmitting level is kept unchanged.

An example of using MTPC-ATPC is shown below. As shown in the figure, in the master station communicating with many substations, waves gather from substations possibly causing interferences. Therefore, substations must be set in the ATPC mode to minimize the diffraction (interference) to other routes while reducing the receiving levels from individual substations to the minimum. In substations, there is little possibility of occurring interferences; therefore, the master station is set in the MTPC mode to permit transmission at a constant level.



(A),(B) : Diffraction to other route.
(C) : RX received level down.

A constant transmit output power in both MTPC and ATPC is maintained using the ALC function which is provided in the RF CKT module. The ALC circuit detect the transmit output power using a diode to obtain a DC voltage proportional to the transmit power. The gain of the RF amplifier is controlled inversely with this detected DC voltage to maintain the transmit output power within the specified limits.

When the ATPC malfunction occurs, transmitter output power is maintained at the following level according to the ATPC mode. The ATPC mode is set in provisioning using LCT.

Hold:Maintain the TX output level at the current level, when the ATPC malfunction occurs.

MAX:Maintain the TX output level at ATPC maximum level, when the ATPC malfunction occurs.

MIN:Maintain the TX output level at ATPC minimum level, when the ATPC malfunction occurs.

3.5.4Loopback Control

The loopback function is provided for checking the system quality during maintenance and/or to quickly isolate a fault location on the SONET configuration. The control is performed by the LCT, the PNMT or the PNMS.

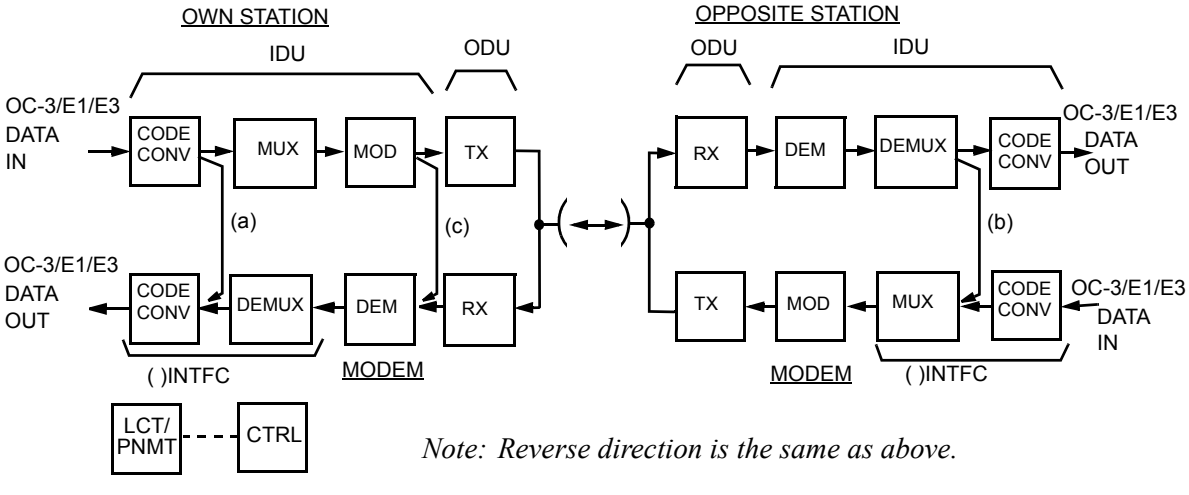
Provided here is the control of the:

- Near-End loopback is performed at the OC-3 INTFC module.
- Far-End loopback is performed at the OC-3 INTFC module.
- IF loopback (IF-LB) is performed at the MODEM module ((c) in Fig. 3-5) for IF signal.

Notes: 1. During the IF loopback is in execution, monitoring of the opposite and the subsequent stations are disabled on the PNMS and PNMT.

2. Loopback control will interrupt the radio link condition.

3. The IF LOOPBACK and the RX SW is not operated interlock. The RX SW switching is necessary to select the same CH with IF LOOPBACK in 1+1 configuration.



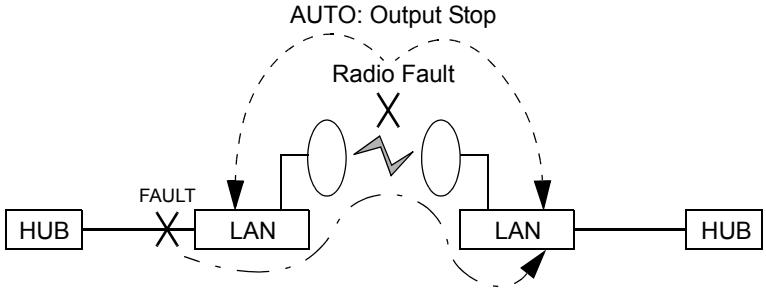
Note: Reverse direction is the same as above.

Fig. 3-5 Loopback Location

3.5.5 Link Loss Forwarding Control (LAN)

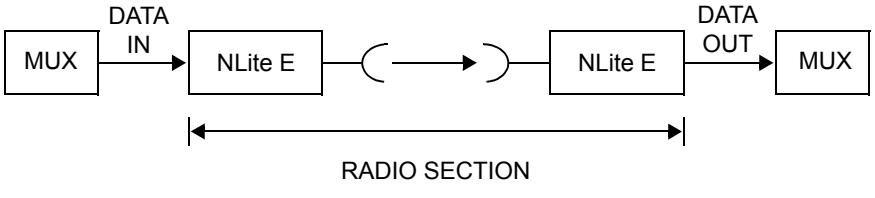
Link Loss Forwarding (LLF) control provides two kinds of functions for 10/100BASE-T interface. One is to automatically stop the output from the

LAN port to alert the equipment connected with the LAN port when the system has been disconnected by the fault in the radio section. The other is to transmit the information for cutting the link interconnected with the LAN port in the opposite station when the link between the LAN port and equipment is faulty. This function can be selected by setting "Provisioning" on LCT to "Enable" or "Disable".



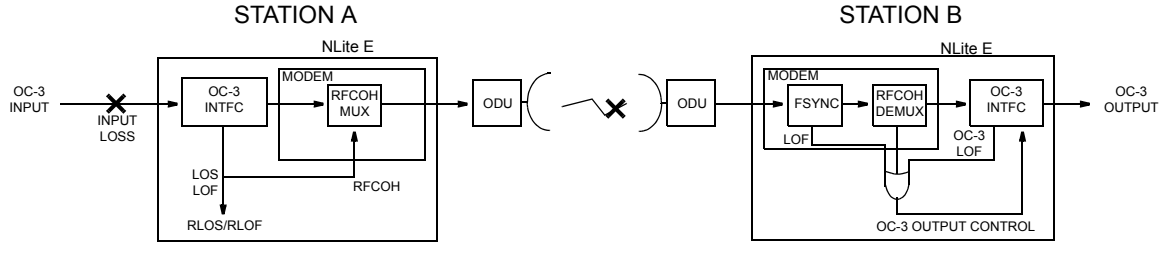
3.5.6 MS-AIS Generation (SONET)

When any fault occurs in the NLite E equipment, or when OC-3 input signal disappears, or when any fault occurs in radio section, The function of MS-AIS Generation causes the OC-3 output signal from the NLite E equipment to be stopped and/or non-frame signal (all "1") to be output, to detect the fault in the MUX equipment of the opposite station.



This function can be selected by setting "Provisioning" on LCT to "Enable" or "Disable". Normally, this function is set to "Enable". If this function is set to "Disable", the function of MS-AIS Generation is stopped.

For example, at the station A, when the NLite E equipment detects the OC-3 input Loss Of Signal (LOS) and/or Loss Of Frame (LOF), the information is transmitted to the station B by using RFCOH. When the station B detects the information, NLite E equipment stops the OC-3 output signal. Similarly, it is the same even if a receiving input level down or loss of radio frame (LOF) appear in station B.

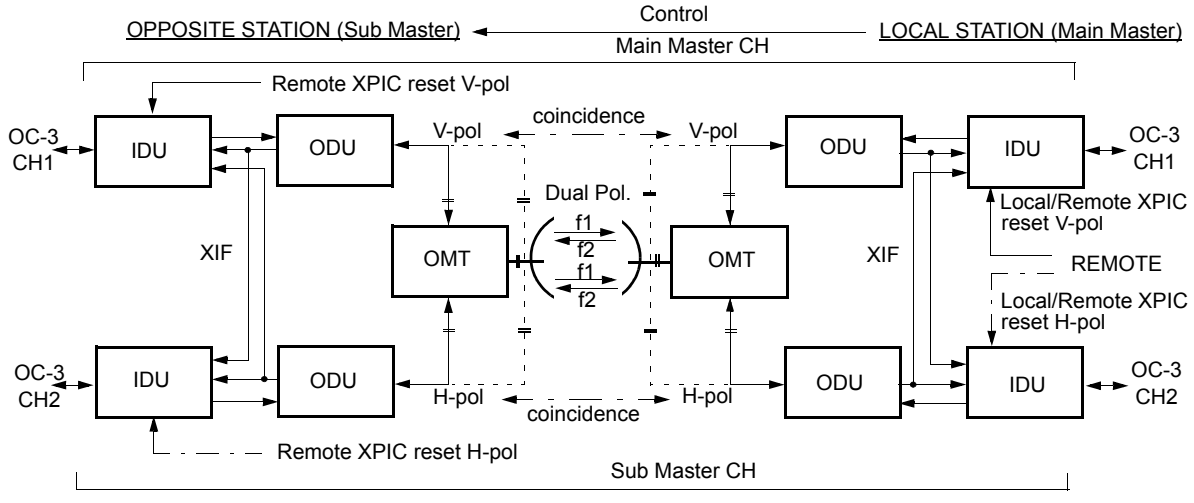


Event	Station A		Station B		
	LED	LCT	LED	LCT OC-3 Output Control	OC-3 OUTPUT
OC-3 Input Loss at Station A	IDU ALM	MAIN INTFC LOS	—	Under Execution	Shutdown * (or all "1")
OC-3 Loss of Frame at Station A	IDU ALM	MAIN INTFC LOF	—	Under Execution	Shutdown * (or all "1")
RX Level Down	—	N/A	ODU ALM	Under Execution	Shutdown * (or all "1")
Loss of Radio Frame at Station B	—	N/A	IDU ALM	Under Execution	Shutdown * (or all "1")
BER Degrade ($\leqq 1E^{-4}$) at Station B	—	N/A	IDU ALM	Normal	N/A

*Notes:1. * Optical interface: Shutdown*
Electrical interface: all "1"
2. When the MS-AIS Generation is "Enable", status indication of MS-AIS Generation on LCT is not indicated.

3.5.7 Cross Polarization Interference Canceller (XPIC) Reset Control

For the Cross Polarization Interference Canceller (XPIC) to function properly, signals for both Main Master and Sub Master sides must be received normally. For this reason, when either signal is in abnormal condition, the XPIC RESET function provides a way for turning off the XPIC operation. Local/Remote XPIC reset can be controlled separately to the Main Master and Sub Master.



Note : - - - - Feeder Connection for Dual Pole Feed Antenna.

Fig. 3-6 XPIC Reset Control

The LOCAL RESET and/or REMOTE RESET control is performed to the channel which is working online when the system is following conditions.

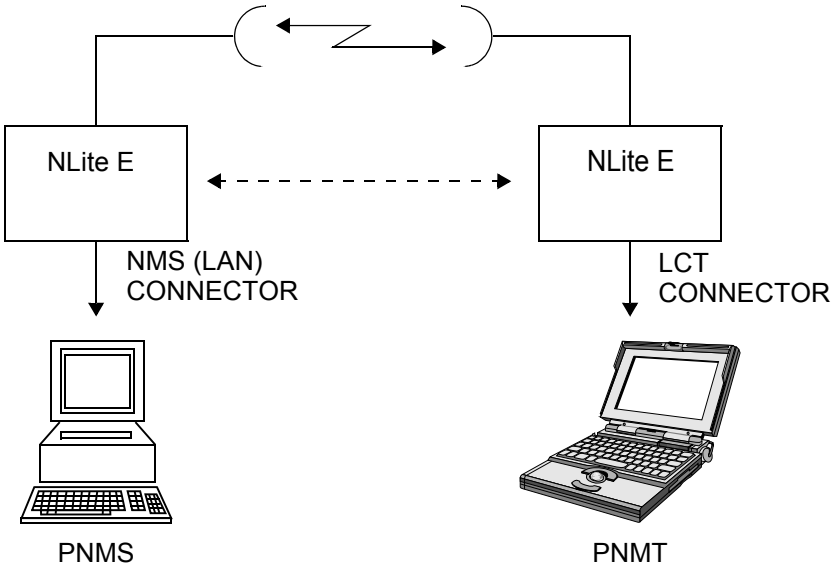
- When the MODEM or ODU is replaced.
- Frame Synchronization is lost (FASYNC) at the MODEM module in the Co-pol. channel.
- At the MODEM module in the Co-pol. channel, IF signal from X-pol. channel is lost (XIF alarm).
- The system is controlled in IF loopback (IF-LB) condition with the LCT, PNMS or PNMT.
- The XPIC RESET control is executed from the LCT, PNMS or PNMT.
- The XPIC RESET control is applied from the MODEM module in the X-pol. channel.
- The XREF or LO REF alarm condition occurs.

Note: The SD system can not be applied for the XPIC configuration.

3.5.8 Network Management (Optional)

The Network Management System (NMS) configuration is shown in Fig. 3-7. The PASOLINK network management system (PNMS) is connected to the NMS (LAN) connector of the IDU located at the designated maintenance center while the PASOLINK network management terminal (PNMT) is connected to the LCT USB connector on the IDU of remote stations. The PNMT/PNMS provides monitoring and control of the actual microwave link status and its associated Nlite E equipment. Status information form and control signals to remote stations are transmitted using RFCOH.

For detailed information, refer to the related PNMS or PNMT manual.



PNMS : PASOLINK Network Management System
PNMT : PASOLINK Network Management Terminal

Fig. 3-7 Network Management System

3.5.9 Functionality Classification

The functionality of the NLite E is defined by optional system parameters, interface card and transmission capacities as listed in the following categories. The functionality is found in the Software Key in the LCT Inventory menu.

Functionality Classification of the NLite E

1		2	3	4
Capacity and Redundancy		**Bit Rate**	**LAN Interface**	**XPIC Functionary**
1+0 System	1+1 System	Fixed	Available	Available
1. 10 MB	1. 10 MB	Free	Unavailable	Unavailable
2. 20 MB	2. 20 MB			
3. 40 MB	3. 40 MB			
4. 80 MB	4. 80 MB			
5. 100 MB	5. 100 MB			
6. 156 MB	6. 156 MB			

Optional System, Interface Card and Transmission Capacity

		System and Transmission Capacity	
		1+0	1+1
	OC-3 Opt S1.1	156MB	156MB
	OC-3 Opt L1.1	156MB	156MB
	2P LAN	156MB	156MB
	GbE	156MB	156MB

3.6 Protection Switching

Protection switching is provided in the 1+1 Twin-path and the HS systems.

3.6.1 1 + 1 Twin-path System

Protection switching in this system is performed by a hitless switch (HL SW) on the ( )INTFC module of the IDU at the receiving end.

When both the No. 1 and No. 2 channels are in normal operating condition, the OC-3 data streams from the associated MUX equipment are sent to the receiving end through the No. 1 and No. 2 channels. At the receiving end, the output data streams of the No. 1 and No. 2 channels MODEM enter the HL SW. The data signal selected by HL SW is fed to associated MUX equipment.

At the receiving end, when the low bit error alarm (LOW BER ALM) is detected in the MODEM of the No. 1 channel, the alarm signal is sent to the switch control logic circuit on the CTRL module. The switch control logic circuit send the HL SW control signal to the ( ) INTFC module. Then, the HL SW selects the data signal from No.2 channel. The switching condition is shown on the RX1 and RX2 STATUS indicators on the IDU.

3.6.2 Hot-standby System

Protection switching in this system is performed by the TX switches* on the No. 1 and No. 2 channel ODUs at the transmitting end and by the HL SW** on the ( ) INTFC module of the IDU at the receiving end.

*Note: 1. * Transmit switching is actually accomplished by muting the output of either No.1 or No.2 channel ODU, using a control signal from the IDU.*

When both the No. 1 and No. 2 channels are in normal operating condition, the OC-3 data signal from the associated MUX equipment are sent to the No. 1 and No. 2 channel ODUs through the No. 1 and No. 2 channel IDUs. Here, either of the No. 1 or No. 2 channel signal is selected at the TX switch on the ODU and fed to the receiving end. At the receiving end, the output data signal of the No. 1 and No. 2 channels MODEM enter the HL SW on the ( ) INTFC module. The data signal selected by HL SW is fed to associated MUX equipment.

When the modulator alarm is detected in the MODEM or when the TX IF input alarm, TX power alarm or APC alarm is detected in the ODU, the alarm signal is sent to the switch control logic circuit on the CTRL module. The switch control logic circuit produces a TX switch control signal for selecting the ODU that is in the normal condition. When the ODU receives the TX switching control signal, the output of the ODU that is currently active (on-line) is muted and the output of the other ODU is un-muted. The switching condition is shown on the TX1 and TX2 STAUS indicators on the IDU.

At the receiving end, when the low bit error alarm (LOW BER ALM) is detected in the MODEM of the No. 1 channel, the alarm signal is sent to the switch control logic circuit on the CTRL module. The switch control logic circuit send the HL SW control signal to the ( )INTFC module. Then, the HL SW selects the data signal from No.2 channel. The switching condition is shown on the RX1 and RX2 STATUS indicators on the IDU.

3.6.3 Switchover Control

The following explains the protection switching function in the 1+1 Twin-path and HS system.

(a) TX Switching

TX switching in HS system is accomplished by muting the TX output power of either No.1 or No.2 channel ODU. Two mode of TX switch controls are provided: automatic switching that is initiated by detection of a failure in the transmit section of the IDU or ODU, and manual switching is performed by using the LCT. TX switching, either manually or automatically, may cause a momentary interruption of the traffic. TX switching have the following operational mode:

- Switching Mode:

  1. Manual : Applied in Maintenance mode.
  2. Auto: Normal operating mode.

TX SW Setup in provisioning has following features:

- Switching Priority:

  1. Non Priority: Selecting non revertive mode.
  2. Priority No.1: This mode is applied to select No.1 when both No.1 and No.2 are normally operating.

(b) RX Switch

RX switching in 1+1 Twin-path/HS system is performed by the HL SW on the ( ) INTFC module.

Two types of RX switch controls are provided: automatic switching that is initiated by the quality deterioration of the received signal and manual switching that is initiated by the operator using the LCT.

The switching mode and switching priority for automatic and manual switching are identical to those of TX switching. However, the switching priority is only valid under automatic switching control. This is because automatic switching is implemented by hardware logic and manual switching is implemented by software logic. That is, automatic switching and manual switching are completely independent and separate operations. Thus, when the operator reverts to automatic switching after performing manual switching, the channel will be re-selected by the switch control logic circuit.

- Switching Mode:

  1. Manual : Applied in Maintenance mode.
  2. Auto: Normal operating mode.

RX SW Setup in provisioning has following features:

- Switching Priority:

  1. Non Priority: Selecting non revertive mode.
  2. Priority No.1: This mode is applied to select No.1 when both No.1 and No.2 are normally operating.

- RX SW Maintenance Mode:

  1. Manual mode, this disables the RX SW manual control when either No. 1 or No. 2 RX route is in alarm status.

  2. Forced mode, this enables the RX SW manual control though either or both No. 1 and No. 2 RX routes are in alarm status.

Caution: When the RX SW mode is set to "Forced" in provisioning, RX SW manual control can select either No. 1 or No. 2 RX route though one is alarmed. Then, take care switching to avoid traffic interruption.

- RX SW Condition-Early Warning

  1. Included Early Warning, this switch over the RX SW at less than 1E-9.

  2. Excluded Early Warning, this switch over the RX SW at Low BER setting values 1E-6, 1E-7, 1E-8 or 1E-9. (default value is 1E-7)

- RX Switching Condition Cross Reset
  (only XPIC 1+1 configuration):

  1. Included Cross Reset, this switch over the RX SW when XPIC reset control is acted.
  2. Excluded Cross Reset, this does not switch over the RX SW though XPIC reset control is acted.

SAFETY INFORMATION

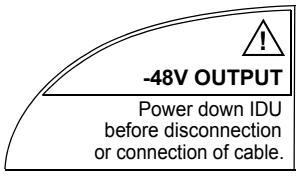
This safety instruction is prepared to protect accident resulting personal injury or death and also physical damage of the equipment during maintenance or installation. To avoid hazardous conditions, read this Instruction Manual thoroughly before equipment operation. The signal words (Danger, Warning and Caution) are used in the Instruction manual as follows:

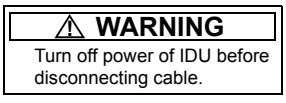
GENERAL SAFETY

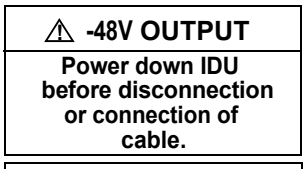
DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates an imminently hazardous situation which, if not avoided, could result in serious injury or physical damage.
CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or physical damage. It is also said to alert against inappropriate practice.

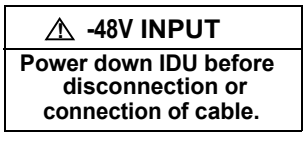
LABELS

Caution and Warning labels attached to the IDU and ODU as follows:







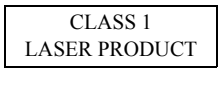


Do not disconnect I/F cable between the IDU and the ODU in operation condition, to avoid damaging the IDU and the ODU.

The –48 V DC power is superimposed on the center conductor of the I/F cable between the IDU and the ODU. Connecting a test equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.

Be careful that top surface of the IDU is hot.

Caution that the Non-ionizing radiation from the equipment may effect on health.



In a system using the OPT INTFC module, do not stare at the laser beam or look at it directly with optical instruments. Otherwise, it may hurt your eyes (Does not apply to PDH).

The mark on the electrical and electronic products only applies to the current European Union Member States.

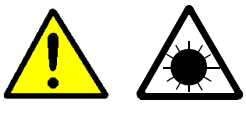
WARNING

WARNING

The –48 V DC power is superimposed on the center conductor of the coaxial cable between the IDU and the ODU. Connecting a test set equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.

WARNING

Do not touch the I/F cable jack core before turning off the power switch. If touching the coaxial cable core may cause electrical shock.



WARNING

In a system using the OPT INTFC module, do not stare nor use optical instruments to look at the laser beam directly as this may cause eye damage. (Class 1 Laser Product).

WARNING

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

CAUTION

CAUTION

While the power supply is ON, do not connect/disconnect the power supply connector. Otherwise, the DC-DC CONV may break down.

CAUTION

Locate the ODU within the area protected by lightning rod. To avoid surge currents caused by lightning circulating in the equipment earth system, connect the equipment earth system (frame ground) to ground of the lightning rod at ground level.

CAUTION

Interrupt operation and turn off the power switch on the IDU, if in the event of an emergency situation with appearance such as smoking, burning smell, and strange sound. Continuation of operation may cause burning or resulting in electric shock. As there is risk, do not attempt to repair.

CAUTION

Introduction of spilling liquid, piece of metal, smoke, corrosive gas or dust into the equipment, or approach of birds or animals may cause burning or break-down.

CAUTION

Do not perform overhaul, modification or repairing of the equipment. As it may cause burning or resulting in electric shock.

NOTICE (PLACING)

1. *When the ODU is installed in the indoor, as the ODU generates Non-ionizing radiation and it may cause health effect, then, it is required to take adequate measures.*

2. *Do not block the vents of the equipment. It may cause break down due to heating up of inner equipment in stuffy condition. Ensure to follow the set up and usage rules as follows.*

   Do not set up the equipment on the carpet, heating floor or bare concrete.

   Do not cover or wrap the equipment with table cloth, lace, rubber or plastic material.

   Do not set up the equipment in the bookshelves or rocker or in a stuffy place.

   Do not put anything like books or paper on and against the equipment.

3. *The equipment must be installed in correct place. Do not install turning sideways or slanting. If not properly installed, it may cause break down due to rise of inner temperature.*

4. *Do not install the equipment in the following locations. If installed, it may cause harmful influence for the equipment.*

   The equipment must be installed and maintained in a clean, and dry place where temperature and humidity remain stable, non-condensing into dew and within the ranges specified by the manufacturer.

5. *Because of the equipment is an indoor type, do not install the equipment in the location where it could be caused harm influence by salt-air, sand-dust, sulphuric acid gas etc..*

   If the equipment will be installed necessarily in such location, the following must be heeded.

   (a) Construction of the Equipment Room

   Install the equipment in the airtight room or shelter where it could not be suffered by external influence mentioned above.

(b) Environmental Temperature Impact for the Equipment

In the airtight room, it may be caused rising in temperature with the heat generation of the equipment.

Furnish an air-conditioner for industrial use in accordance with the situation.

Do not apply air directly from the air-conditioner to the equipment. When the equipment is located in face of the air from the air-conditioner, it could be condensed into dew by temperature variation.

(c) In the case of using at marine and coastal areas (within 3 km from the seaside), it is necessary to make measures against the damage from salt water. For measures against the damage from salt water to an ODU, request them to NEC.

6. The place of installation is restricted to Telecommunication Center and similar environment.

ABBREVIATIONS

The following abbreviations are used in the manual for the NLite E equipment.

ABBREVIATION	DESCRIPTION
A	
AIS	Alarm Indication Signal
ALM	Alarm
ALS	Automatic Laser Shutdown
ANT	Antenna
APC	Automatic Phase Control
APS	Automatic Protection System
ASYNC	Asynchronization
ATPC	Automatic Transmitting Power Control
ATT	Attenuator
AUX	Auxiliary
B	
BBE	Background Block Error
BER	Bit Error Rate
BNC	Bayonet Navy Connector
BPF	Band Pass Filter
C	
CAS	Channel Associated Signaling
CBL	Cable
CD	Compact Disk
CH	Channel
CKT	Circuit
CLK	Clock
CMI	Coded Mark Inversion
COM	Common
COMB	Combiner
CONN	Connection
CONT	Control

ABBREVIATION	DESCRIPTION
CONV	Converter
CPU	Central Processing Unit
CTRL	Control
CW	Carrier Wave
D	
DADE	Differential Absolute Delay Equalizer
DC	Direct Current
DCCr	Data Communication Channel in RSOH
DCK	Drop Clock
DDT	Drop Data
DEM	Demodulator
DFP	Drop Frame Pulse
DMR	Digital Microwave Radio
DSC	Digital Service Channel
E	
E	Electrical
E/O	Electrical/Optical
E-BER	Excessive-Bit Error Rate
EMC	Electro Magnetic Compatibility
EOW	Engineering Orderwire
EP	Earthing Point
EQL	Equalizer
ERR	Error
ES	Errored Seconds
EXT	External

ABBREVIATION	DESCRIPTION
F	
FAS	Frame Alignment Signal
FEC	Forward Error Correction
FG	Frame Ground
FIL	Filter
FPGA	Field Programable Gate Array
FREQ	Frequency
F/W	Firmware
G	
G	Ground
GND	Ground
H	
HD	Hard Disk
HK	House Keeping
I	
ICK	Insert Clock
ID	Identification
IDT	Insert Data
IDU	Indoor Unit
IE	Internet Explorer
IEEE	Institute of Electrical and Electronic Engineers
IF	Intermediate Frequency
I/F	Inter Facility
IFL	Inter Facility Link
IN	Input
INTFC	Interface
I/O	Input/Output
IP	Internet Protocol
ITU	International Telecommunication Union

ABBREVIATION	DESCRIPTION
L	
LAN	Local Area Network
LB	Loop Back
LCD	Liquid Crystal Display
LCT	Local Craft Terminal
LED	Light Emitting Diode
LLF	Link Loss Forwarding
LEV	Level
LO	Local
LOF	Loss of Frame
LOS	Loss of Signal
M	
MAC	Media Access Control
MAINT	Maintenance
MD	Modulator Demodulator
MDI	Media Dependent Interface
MDIX	Media Dependent Interface with Crossover
MFAS	Multi Frame Alignment Signal
MIX	Mixer
MII	Media Independent Interface
Mib	Management Information Base
MLC	Multi-Level Coding
MMC	Memory Card
MOD	Modulator
MODEM	Modulator-Demodulator
MON	Monitor
MPX	Multiplexer
MS-AIS	Multiplexer Section Alarm Indication Signal
MTPC	Manual Transmitter Power Control
MUX	Multiplexing Equipment

ABBREVIATION	DESCRIPTION
N	
NC	Normal Closed
NE	Network Element
NMS	Network Management System
NO	Normal Open
NORM	Normal
NRZ	Nonreturn to Zero
O	
O	Optical
O/E	Optical/Electrical
ODU	Outdoor Unit
OFS	Out of Frame Second
OH	Overhead
OMT	Orthogonal Mode Transducer
OPT	Optical
OS	Operating System
OUT	Output
OW	Orderwire
P	
P	Protection
PC	Personal Computer
PDH	Plesiochronous Digital Hierarchy
PH	Phase
PKG	Package
PM	PASOLINK Management
PMON	Performance Monitor
PNMS	PASOLINK Network Management System
PNMT	PASOLINK Network Management Terminal
PROT	Protection
PS	Power Supply
PWR	Power

ABBREVIATION	DESCRIPTION
Q	
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
R	
RAM	Random Access Memory
REC	Rectifier
LO REF	Local Reference Frequency
RF	Radio Frequency
RFCOH	Radio Frame Complementary Overhead
RL	Relay
RMON	Remote Network Monitoring
ROM	Read Only Memory
RS	Reed Solomon
RSOH	Regenerator Section Overhead
RST	Regenerator Section Termination
RSL	Received Signal Level
RX	Receive
S	
SC	Service Channel
SD	Signal Degrade
SDH	Synchronous Digital Hierarchy
SELV	Safety Extra Low Voltage
SES	Severely Errored Seconds
SEP	Separation
SEP	Severely Errored Period
SOH	Section Overhead
SONET	Synchronous Optical Network
STM	Synchronous Transport Module
SV	Supervisory
SW	Switch
SYNC	Synchronizer
SYNTH	Synthesizer

ABBREVIATION	DESCRIPTION
SYS	System
T	
TCN	Threshold Crossing Notification
TRP	Transmitter-Receiver Equipment
TX	Transmit
U	
UAE	Unavailable Event
UAS	Unavailable Second
URL	Uniform Resource Locator
USB	Universal Serial Bus
V	
VF	Voice Frequency
V/H	Vertical/Horizontal
VOL	Volume
Vo-p	Volt zero (0) to Peak
W	
W	Working
Web	World Wide Web
WG	Waveguide
X	
XC	Cross Connect
XIF	IFof Cross Polarization
XPIC	Cross Polarization Interference Canceller
XPD	Cross Polarization Discrimination

(This page is intentionally left blank.)

APPENDIX

1.0 FCC INFORMATION

The device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference. (2) This device must accept any interference received. This device must be professionally installed.

MADE IN JAPAN

The NLite E 5.8 GHz radios will be used for fixed Point to Point applications. The NLite L radio utilizes a parabolic antenna that requires professional installers for path alignment.

The maximum RF transmit power of the NLite E 5.8 GHz radios is less than 0.3162 watts (+25 dbm).

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The peak RF transmit power of the NLite E 5.8 GHz radios is less than 1.0 watts (+30 dbm).

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.