PASOLINK NEO
6-52 GHz PDH/SDH DIGITAL RADIO SYSTEM

Section II OPERATION

CONTENTS

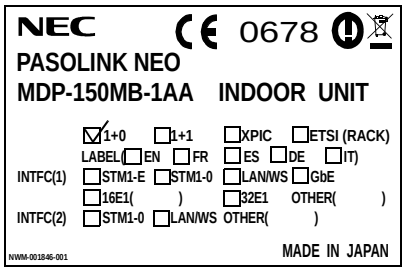
	TITLE	PAGE

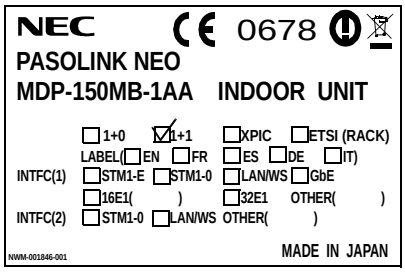
1. GENERAL

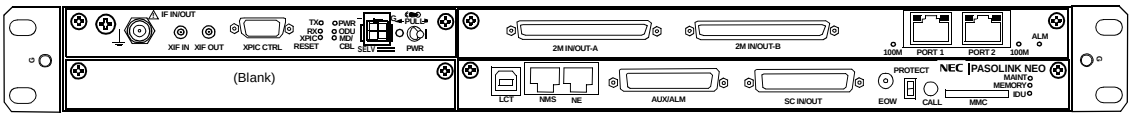
This section provides instructions for operation of the 6 to 52 GHz PDH/ SDH microwave radio system.

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 system and provisioning setup, refer to Section IV PASOLINK NEO LCT Manual.

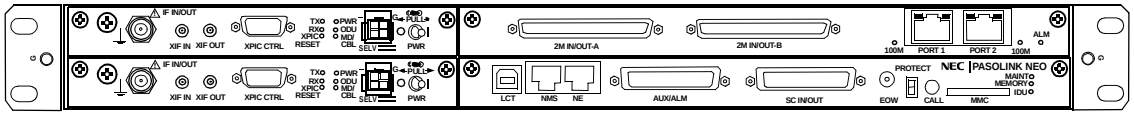
PASOLINK NEO







IDU 1+0



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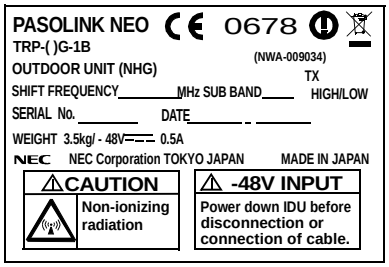
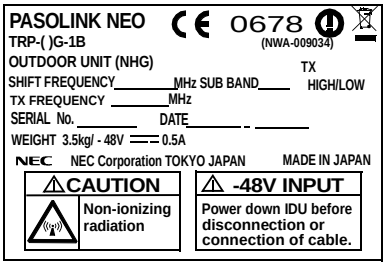
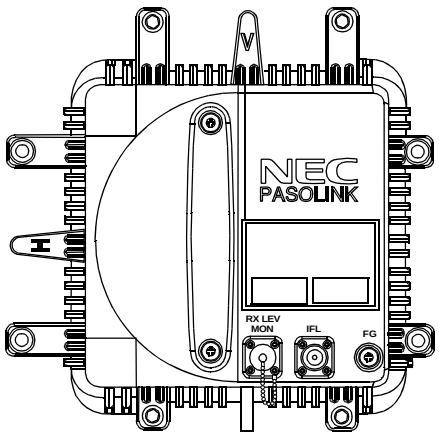






ODU

2. OPERATING EQUIPMENT

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

The IDU component modules are plugged-in from front of the IDU shelf. The mounting location of each module is shown in Fig. 2-1.

The component modules of the ODU are listed in Table 2-1.

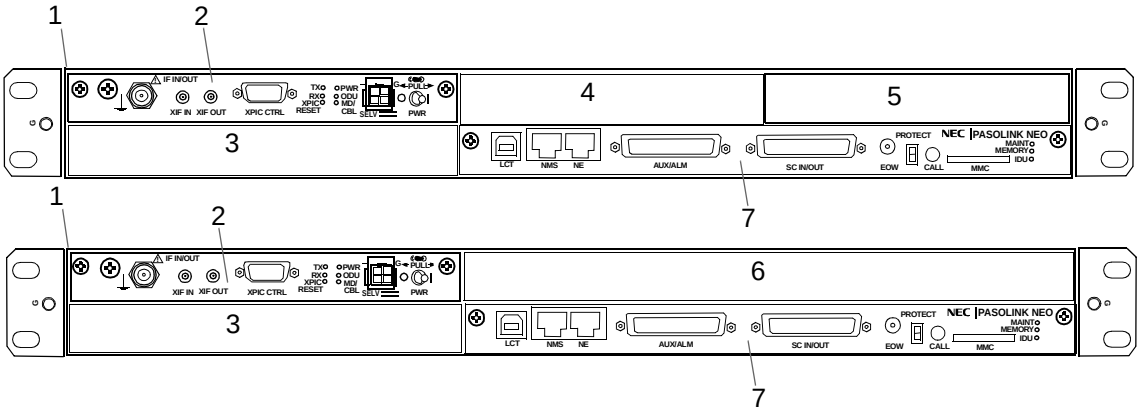


Table 2-1 IDU COMPOSITION

No.	UNIT/MODULE NAME		H2930 MDP-150MB-1AA		REMARKS
			Expandable 1 + 0 system	1 + 1 system	
1	H2931	RACK	√		
2	H2940	MODEM	√		QPSK/16QAM/32QAM/128QAM *1
3	H2940	MODEM	–	√	
	H3040	DC-DC CONV	(√)	—	-20 to -60/+20 to +60 VDC *2
4	H2960	STM-1 INTFC	(√)		STM1-E/O-S-1.1/L-S-1.1 *3
	H2965	LAN/WS INTFC	(√)		SDH 2-Port-LAN
	H3021	GbE INTFC	(√)		SDH-GbE
5	H2960	STM-1 INTFC	(√)		STM1-O-S-1.1/L-S-1.1 *3 for APS
	H2965	LAN/WS INTFC	(√)		WS-SC-LAN/WS/SC-LAN *3
6	H2980	16E1 INTFC	(√)		PDH-16E1 e/w 2 Port LAN*3
	H3000	48E1 INTFC	(√)		PDH-48E1
	H3010	E3 INTFC	(√)		PDH-E3 e/w 4/8E1, 2 Port LAN *3
7	H2950	CTRL	√		

Notes: 1. √ usually provide.

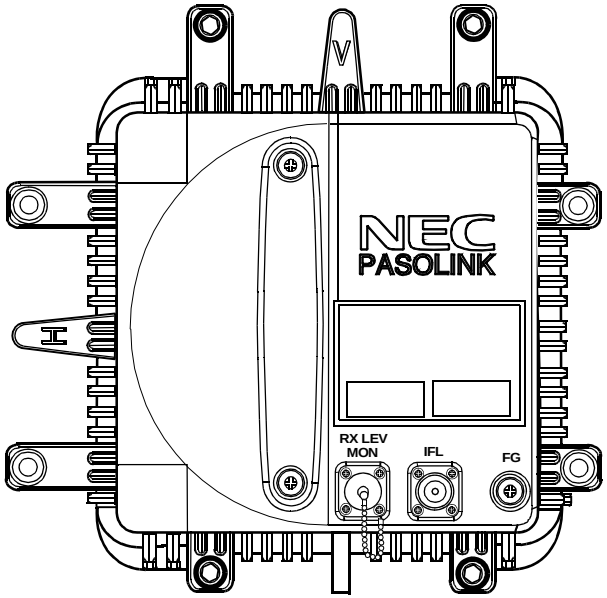
2. (√) optionally provide.

*1 selectable in setting program.

*2 for expanding power supply range

*3 selectable by changing the module type.

Fig. 2-1 IDU Composition



6 - 52 GHz ODU

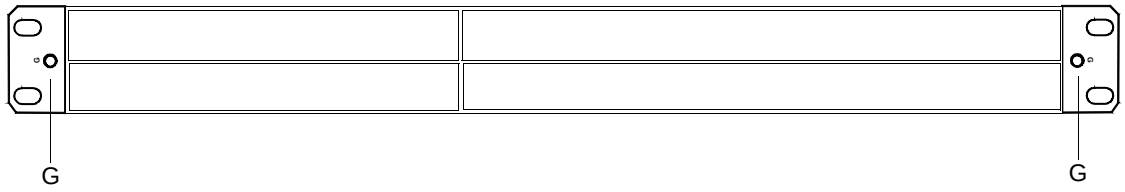
Table 2-2 ODU COMPOSITION

MODULE Name *		TRP-( )G-1B												
		6 GHz NWA-009024( )	7 GHz) NWA-009026( )	8 GHz NWA-009028( )	11 GHz NWA-009032( )	13 GHz NWA-009034( )	15 GHz NWA-009036( )	18 GHz NWA-009038( )	23 GHz NWA-009040( )	26 GHz NWA-009042( )	28 GHz NWA-009044( )	32 GHz NWA-009046( )	38 GHz NWA-009048( )	52 GHz NWA-009050( )
1	RF CKT	H2202( )	H2203( )	H2204( )	H2205( )	H2227( )	H2228( )	H2229( )	H2230( )	H2231( )	H2232( )	H2233( )	H2234( )	H0416( )
2	IF CKT													
3	PS													

Note: Component modules are enclosed in the ODU case.

Fig. 2-2 ODU Composition

2.1 IDU Shelf

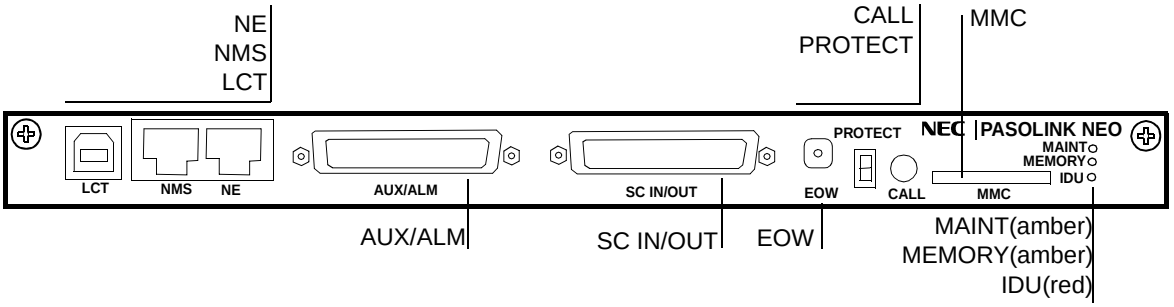


Jack (IDU)

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

Caution*:Persons for maintenance 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. Connecting 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/HK 4 input/outputs, Cluster 4 inputs
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 type connector with PC
NMS (RJ-45):	PNMS
Level:	10 Base-T

Indicators (CTRL)

LED	Indication	Remarks
MAINT	The maintenance “ON” mode is selected by the LCT.	Actively blinks: In progress of program data download. Inactively blinks: Protect Mode for CTRL replacement into effect.
MEMORY	Memory Card (MMC) is accepted.	ON: Enables to access Memory Card OFF: Disables to access Memory Card Blinks: Accessing Memory Card
IDU	Event occurred in IDU.	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.

CTRL User Interface Pin Assignment

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

CTRL User Interface Pin Assignment

Terminal	Description
Pins 22 (COM), 37 (NC) and 8 (NO) — RL4	ODU CPU1/ODU CPU2 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

CTRL User Interface Pin Assignment

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 data input
Pins 6 (+) and 7 (–)	V.11-1 data output
Pins 8 (+) and 9 (–)	V.11-2 data input
Pins 10 (+) and 11 (–)	V.11-2 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 clock input
Pins 21 (+) and 22 (–)	V.11-1 clock output
Pins 23 (+) and 24 (–)	V.11-2 clock input
Pins 25 (+) and 26 (–)	V.11-2 clock output
Pins 27, 28, 29	Ground
Pins 30 (+) and 31 (–)	NE2 RXD
Pin 32	Ground
Pins 33 (+) and 34 (–)	V.11-1 frame pulse input
Pins 35 (+) and 36 (–)	V.11-1 frame pulse output
Pins 37 (+) and 38 (–)	V.11-2 frame pulse input
Pins 39 (+) and 40 (–)	V.11-2 frame pulse output
Pins 41 and 42 (G)	RS-232C-1 data output
Pins 43 and 44 (G)	RS-232C-2 data output

CTRL User Interface Pin Assignment

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

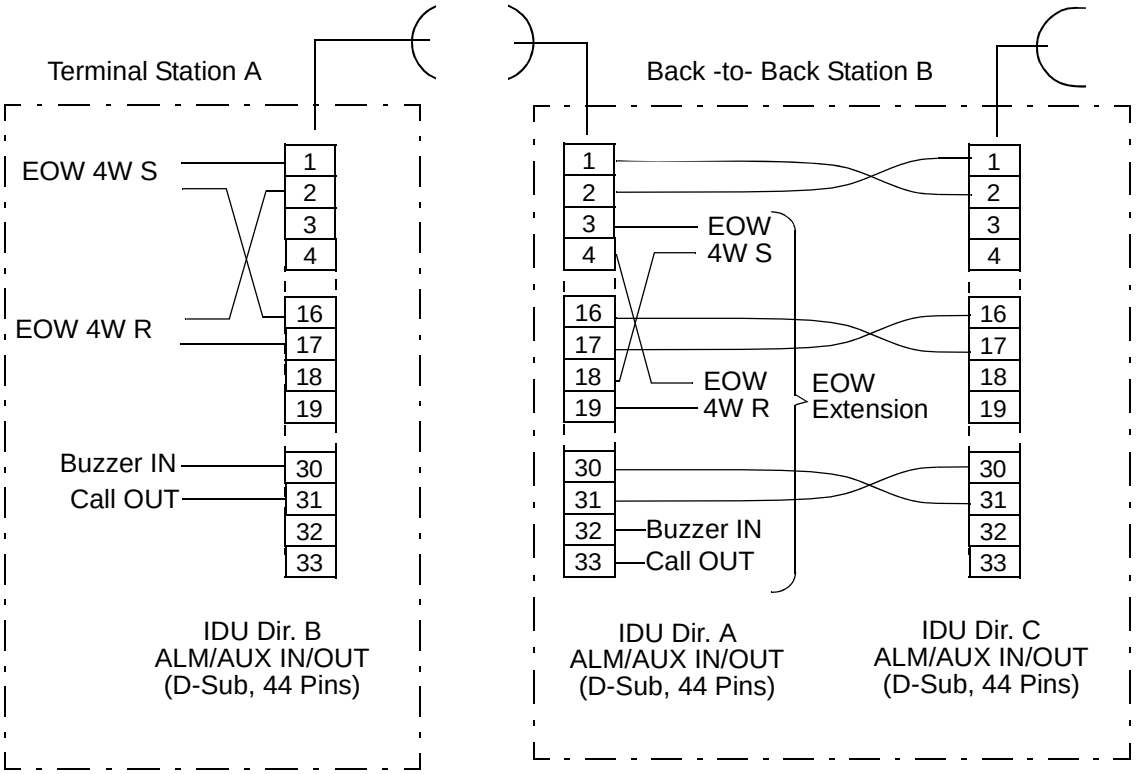
*Notes: *1: RL1 (Maintenance) and RL2 (IDU CPU/PS1/PS2 ALM OUTUT) are fixed and can not be changed to other items. The relay contact is rated at 0.2 A.*

**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).*

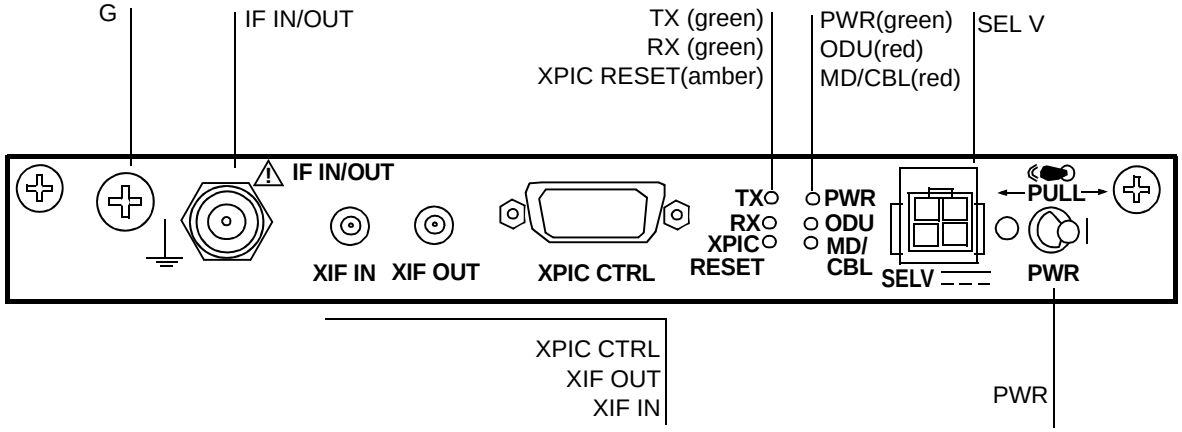
**3: Photocoupler interface; resistance of open input terminal is more than 200 kilo ohms. Closed input terminal is less than 50 ohms.*

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 may operate wrongly.

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: Do not insert/extract the MODEM with the power ON, turn the IDU power OFF and remove all cables connected to the IDU 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 QPSK/16QAM/32QAM/128QAM Modulation/Demodulation for E1/E3 (PDH), 10/100Base T(x)/1000 Base T (LAN) or STM-1 (SDH) 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.)
SEL V (Molex M5557-4R, 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 shorted 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.

Switchs (MODEM)

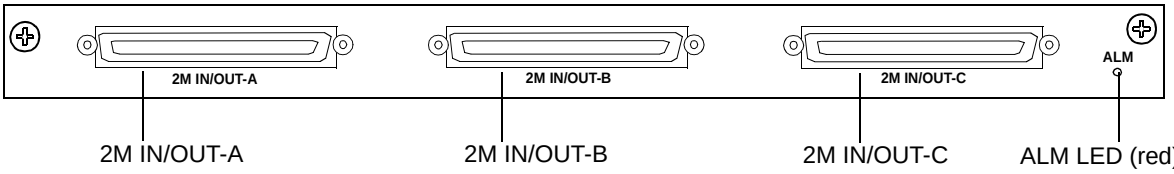
Switch	Operating	Remarks
PWR	IDU and ODU turn power on.	Refer to Start-up and Shut-down the Equipment in Maintenance Section

User Interface Pin Assignment (MODEM)

Terminal	Description
SEL V	
SEL V (DC IN) (Molex M5557-4R Connector, 4 Pins)	–48 V DC power input *Note: Only* –48 V (–40.5 to –57 V) is available.
Pins 1 and 3	0 V (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)	Only used inner connection between IDU - IDU for 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.*

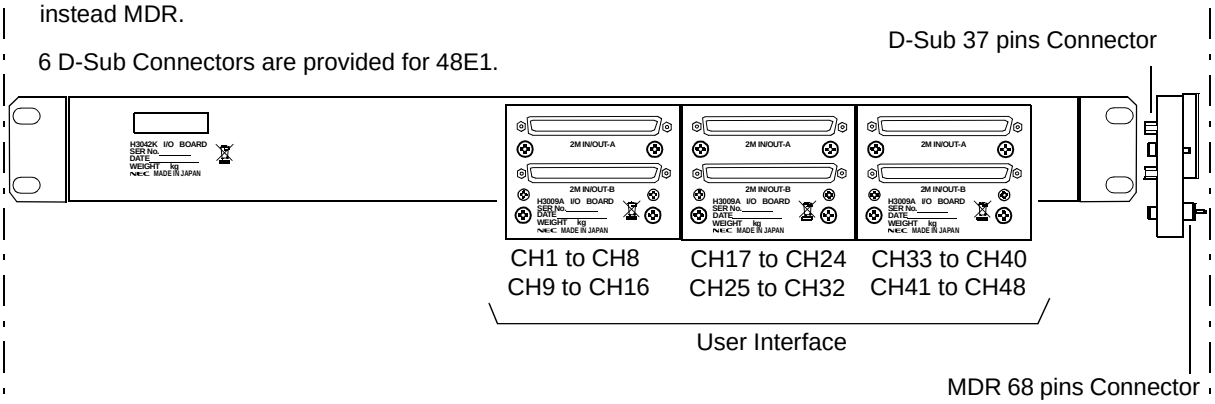
2.4 48E1 INTFC/(I/O BOARD)



Optional I/O BOARD

Following I/O BOARD can be provided when the D-SUB 37 pins interface is required to the 2M IN/OUT INTFC instead MDR.

6 D-Sub Connectors are provided for 48E1.



Note: One Unit space is necessary to install I/O BOARD above IDU.

The 48E1 INTFC applies for up to 48E1 (2.048 Mbps) signals interface. The module performs, Bipolar-Unipolar/Unipolar-Bipolar conversion, Stuffing/Destuffing, Multiplex/Demultiplex the radio section frame, Hitless Switching, AIS Detection/Generation and Near End/Far End loopback for each E1 CH. The interface impedance can be selected from 75 ohms and 120 ohms using LCT.

The user interface signals conform to ITU-T as listed in the following tables.

Interface Signals (48E1 INTFC)

2M IN/OUT-A/-B/-C (MDR Connector)	16E1 interface in each 3 connectors.
Input/Output Signal:	up to 48E1 signals
Bit Rate:	2.048 Mbps +/–102.4 bitps
Code:	HDB3
Impedance:	75 ohms unbalanced or 120 ohms balanced *

Note: For unbalanced impedance, ground level is applied from associated equipment through interface cable.

Indicators (48E1 INTFC)

LED	Indication	Remarks
ALM	LOS from DTE is detected.	Check DTE and wiring.
	Loss of output signal to DTE is detected.	Check signal transmission at opposite site.
	Error of channel usage.	Signal is applied to unused channel.
	Mounting module is not matched with inventory.	Change LCT setting or other ( )INTFC module.

48E1 User Interface Pin Assignment

Terminal	Description
48E1 INTFC	
2M IN/OUT-A (CH 1 to CH 16) (MDR Connector, 68 pins)	2.048 Mbps HDB3 coded data signal input/output from/to DTE (CH 1 to CH 16), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 1, 34, 35 and 68	Ground
Pins 33 (+) and 67 (–)	CH1 data output
Pins 32 (+) and 66 (–)	CH1 data input
Pins 31 (+) and 65 (–)	CH2 data output
Pins 30 (+) and 64 (–)	CH2 data input
Pins 29 (+) and 63 (–)	CH3 data output
Pins 28 (+) and 62 (–)	CH3 data input
Pins 27 (+) and 61 (–)	CH4 data output
Pins 26 (+) and 60 (–)	CH4 data input
Pins 25 (+) and 59 (–)	CH5 data output
Pins 24 (+) and 58 (–)	CH5 data input
Pins 23 (+) and 57 (–)	CH6 data output
Pins 22 (+) and 56 (–)	CH6 data input
Pins 21 (+) and 55 (–)	CH7 data output
Pins 20 (+) and 54 (–)	CH7 data input
Pins 19 (+) and 53 (–)	CH8 data output
Pins 18 (+) and 52 (–)	CH8 data input
Pins 17 (+) and 51 (–)	CH9 data output
Pins 16 (+) and 50 (–)	CH9 data input
Pins 15 (+) and 49 (–)	CH10 data output
Pins 14 (+) and 48 (–)	CH10 data input
Pins 13 (+) and 47 (–)	CH11 data output

48E1 User Interface Pin Assignment

Terminal	Description
Pins 12 (+) and 46 (–)	CH11 data input
Pins 11 (+) and 45 (–)	CH12 data output
Pins 10 (+) and 44 (–)	CH12 data input
Pins 9 (+) and 43 (–)	CH13 data output
Pins 8 (+) and 42 (–)	CH13 data input
Pins 7 (+) and 41 (–)	CH14 data output
Pins 6 (+) and 40 (–)	CH14 data input
Pins 5 (+) and 39 (–)	CH15 data output
Pins 4 (+) and 38 (–)	CH15 data input
Pins 3 (+) and 37 (–)	CH16 data output
Pins 2 (+) and 36 (–)	CH16 data input

48E1 User Interface Pin Assignment

Terminal	Description
48E1 INTFC	
2M IN/OUT-B (CH 17 to CH 32) (MDR Connector, 68 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 17 to CH 32), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 1, 34, 35 and 68	Ground
Pins 33 (+) and 67 (–)	CH17 data output
Pins 32 (+) and 66 (–)	CH17 data input
Pins 31 (+) and 65 (–)	CH18 data output
Pins 30 (+) and 64 (–)	CH18 data input
Pins 29 (+) and 63 (–)	CH19 data output
Pins 28 (+) and 62 (–)	CH19 data input
Pins 27 (+) and 61 (–)	CH20 data output
Pins 26 (+) and 60 (–)	CH20 data input
Pins 25 (+) and 59 (–)	CH21 data output
Pins 24 (+) and 58 (–)	CH21 data input
Pins 23 (+) and 57 (–)	CH22 data output
Pins 22 (+) and 56 (–)	CH22 data input
Pins 21 (+) and 55 (–)	CH23 data output
Pins 20 (+) and 54 (–)	CH23 data input
Pins 19 (+) and 53 (–)	CH24 data output
Pins 18 (+) and 52 (–)	CH24 data input
Pins 17 (+) and 51 (–)	CH25 data output
Pins 16 (+) and 50 (–)	CH25 data input
Pins 15 (+) and 49 (–)	CH26 data output
Pins 14 (+) and 48 (–)	CH26 data input
Pins 13 (+) and 47 (–)	CH27 data output
Pins 12 (+) and 46 (–)	CH27 data input

48E1 User Interface Pin Assignment

Terminal	Description
Pins 11 (+) and 45 (–)	CH28 data output
Pins 10 (+) and 44 (–)	CH28 data input
Pins 9 (+) and 43 (–)	CH29 data output
Pins 8 (+) and 42 (–)	CH29 data input
Pins 7 (+) and 41 (–)	CH30 data output
Pins 6 (+) and 40 (–)	CH30 data input
Pins 5 (+) and 39 (–)	CH31 data output
Pins 4 (+) and 38 (–)	CH31 data input
Pins 3 (+) and 37 (–)	CH32 data output
Pins 2 (+) and 36 (–)	CH32 data input

48E1 User Interface Pin Assignment

Terminal	Description
48E1 INTFC	
2M IN/OUT-C (CH 33 to CH 48) (MDR Connector, 68 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 33 to CH 48), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 1, 34, 35 and 68	Ground
Pins 33 (+) and 67 (–)	CH33 data output
Pins 32 (+) and 66 (–)	CH33 data input
Pins 31 (+) and 65 (–)	CH34 data output
Pins 30 (+) and 64 (–)	CH34 data input
Pins 29 (+) and 63 (–)	CH35 data output
Pins 28 (+) and 62 (–)	CH35 data input
Pins 27 (+) and 61 (–)	CH36 data output
Pins 26 (+) and 60 (–)	CH36 data input
Pins 25 (+) and 59 (–)	CH37 data output
Pins 24 (+) and 58 (–)	CH37 data input
Pins 23 (+) and 57 (–)	CH38 data output
Pins 22 (+) and 56 (–)	CH38 data input
Pins 21 (+) and 55 (–)	CH39 data output
Pins 20 (+) and 54 (–)	CH39 data input
Pins 19 (+) and 53 (–)	CH40 data output
Pins 18 (+) and 52 (–)	CH40 data input
Pins 17 (+) and 51 (–)	CH41 data output
Pins 16 (+) and 50 (–)	CH41 data input
Pins 15 (+) and 49 (–)	CH42 data output
Pins 14 (+) and 48 (–)	CH42 data input
Pins 13 (+) and 47 (–)	CH43 data output
Pins 12 (+) and 46 (–)	CH43 data input

48E1 User Interface Pin Assignment

Terminal	Description
Pins 11 (+) and 45 (–)	CH44 data output
Pins 10 (+) and 44 (–)	CH44 data input
Pins 9 (+) and 43 (–)	CH45 data output
Pins 8 (+) and 42 (–)	CH45 data input
Pins 7 (+) and 41 (–)	CH46 data output
Pins 6 (+) and 40 (–)	CH46 data input
Pins 5 (+) and 39 (–)	CH47 data output
Pins 4 (+) and 38 (–)	CH47 data input
Pins 3 (+) and 37 (–)	CH48 data output
Pins 2 (+) and 36 (–)	CH48 data input

48E1 I/O BOARD User Interface Pin Assignment

Terminal	Description
8E1 INTFC	
2M IN/OUT-A (CH 1 to CH 8) (D-Sub Connector, 37 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 1 to CH 8), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH8 data input
Pins 3 (+) and 4 (–)	CH7 data input
Pins 6 (+) and 7 (–)	CH6 data input
Pins 8 (+) and 9 (–)	CH5 data input
Pins 11 (+) and 12 (–)	CH4 data input
Pins 13 (+) and 14 (–)	CH3 data input
Pins 16 (+) and 17 (–)	CH2 data input
Pins 18 (+) and 19 (–)	CH1 data input
Pins 20 (+) and 21 (–)	CH8 data output
Pins 22 (+) and 23 (–)	CH7 data output
Pins 25 (+) and 26 (–)	CH6 data output
Pins 27 (+) and 28 (–)	CH5 data output
Pins 29 (+) and 30 (–)	CH4 data output
Pins 31 (+) and 32 (–)	CH3 data output
Pins 34 (+) and 35 (–)	CH2 data output
Pins 36 (+) and 37 (–)	CH1 data output

48E1 I/O BOARD User Interface Pin Assignment

Terminal	Description
8E1 INTFC	
2M IN/OUT-B (CH 9 to CH 16) (D-Sub Connector, 37 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 9 to CH 16), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH16 data input
Pins 3 (+) and 4 (–)	CH15 data input
Pins 6 (+) and 7 (–)	CH14 data input
Pins 8 (+) and 9 (–)	CH13 data input
Pins 11 (+) and 12 (–)	CH12 data input
Pins 13 (+) and 14 (–)	CH11 data input
Pins 16 (+) and 17 (–)	CH10 data input
Pins 18 (+) and 19 (–)	CH9 data input
Pins 20 (+) and 21 (–)	CH16 data output
Pins 22 (+) and 23 (–)	CH15 data output
Pins 25 (+) and 26 (–)	CH14 data output
Pins 27 (+) and 28 (–)	CH13 data output
Pins 29 (+) and 30 (–)	CH12 data output
Pins 31 (+) and 32 (–)	CH11 data output
Pins 34 (+) and 35 (–)	CH10 data output
Pins 36 (+) and 37 (–)	CH9 data output

48E1 I/O BOARD User Interface Pin Assignment

Terminal	Description
8E1 INTFC	
2M IN/OUT-A (CH 17 to CH 24) (D-Sub Connector, 37 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 17 to CH 24), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH24 data input
Pins 3 (+) and 4 (–)	CH23 data input
Pins 6 (+) and 7 (–)	CH22 data input
Pins 8 (+) and 9 (–)	CH21 data input
Pins 11 (+) and 12 (–)	CH20 data input
Pins 13 (+) and 14 (–)	CH19 data input
Pins 16 (+) and 17 (–)	CH18 data input
Pins 18 (+) and 19 (–)	CH17 data input
Pins 20 (+) and 21 (–)	CH24 data output
Pins 22 (+) and 23 (–)	CH23 data output
Pins 25 (+) and 26 (–)	CH22 data output
Pins 27 (+) and 28 (–)	CH21 data output
Pins 29 (+) and 30 (–)	CH20 data output
Pins 31 (+) and 32 (–)	CH19 data output
Pins 34 (+) and 35 (–)	CH18 data output
Pins 36 (+) and 37 (–)	CH17 data output

48E1 I/O BOARD User Interface Pin Assignment

Terminal	Description
8E1 INTFC	
2M IN/OUT-B (CH 25 to CH 32) (D-Sub Connector, 37 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 25 to CH 32), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH32 data input
Pins 3 (+) and 4 (–)	CH31 data input
Pins 6 (+) and 7 (–)	CH30 data input
Pins 8 (+) and 9 (–)	CH29 data input
Pins 11 (+) and 12 (–)	CH28 data input
Pins 13 (+) and 14 (–)	CH27 data input
Pins 16 (+) and 17 (–)	CH26 data input
Pins 18 (+) and 19 (–)	CH25 data input
Pins 20 (+) and 21 (–)	CH32 data output
Pins 22 (+) and 23 (–)	CH31 data output
Pins 25 (+) and 26 (–)	CH30 data output
Pins 27 (+) and 28 (–)	CH29 data output
Pins 29 (+) and 30 (–)	CH28 data output
Pins 31 (+) and 32 (–)	CH27 data output
Pins 34 (+) and 35 (–)	CH26 data output
Pins 36 (+) and 37 (–)	CH25 data output

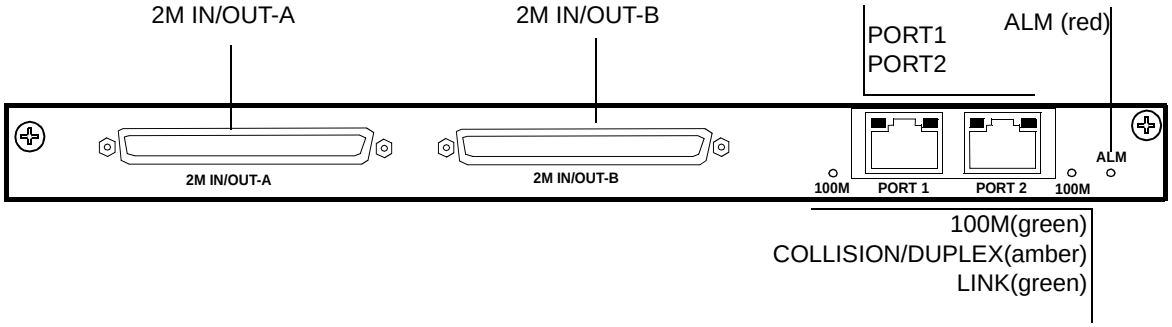
48E1 I/O BOARD User Interface Pin Assignment

Terminal	Description
8E1 INTFC	
2M IN/OUT-A (CH33 to CH 40) (D-Sub Connector, 37 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 33 to CH 40), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH40 data input
Pins 3 (+) and 4 (–)	CH39 data input
Pins 6 (+) and 7 (–)	CH38 data input
Pins 8 (+) and 9 (–)	CH37 data input
Pins 11 (+) and 12 (–)	CH36 data input
Pins 13 (+) and 14 (–)	CH35 data input
Pins 16 (+) and 17 (–)	CH34 data input
Pins 18 (+) and 19 (–)	CH33 data input
Pins 20 (+) and 21 (–)	CH40 data output
Pins 22 (+) and 23 (–)	CH39 data output
Pins 25 (+) and 26 (–)	CH38 data output
Pins 27 (+) and 28 (–)	CH37 data output
Pins 29 (+) and 30 (–)	CH36 data output
Pins 31 (+) and 32 (–)	CH35 data output
Pins 34 (+) and 35 (–)	CH34 data output
Pins 36 (+) and 37 (–)	CH33 data output

48E1 I/O BOARD User Interface Pin Assignment

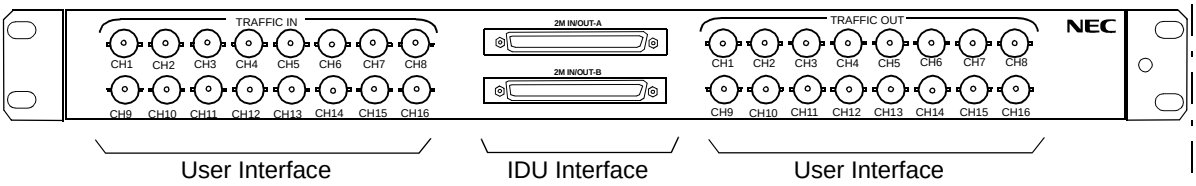
Terminal	Description
8E1 INTFC	
2M IN/OUT-B (CH41 to CH 48) (D-Sub Connector, 37 pins)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 41 to CH 48), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH48 data input
Pins 3 (+) and 4 (–)	CH47 data input
Pins 6 (+) and 7 (–)	CH46 data input
Pins 8 (+) and 9 (–)	CH45 data input
Pins 11 (+) and 12 (–)	CH44 data input
Pins 13 (+) and 14 (–)	CH43 data input
Pins 16 (+) and 17 (–)	CH42 data input
Pins 18 (+) and 19 (–)	CH41 data input
Pins 20 (+) and 21 (–)	CH48 data output
Pins 22 (+) and 23 (–)	CH47 data output
Pins 25 (+) and 26 (–)	CH46 data output
Pins 27 (+) and 28 (–)	CH45 data output
Pins 29 (+) and 30 (–)	CH44 data output
Pins 31 (+) and 32 (–)	CH43 data output
Pins 34 (+) and 35 (–)	CH42 data output
Pins 36 (+) and 37 (–)	CH41 data output

2.5 16E1 INTFC/(I/O BOARD)



Optional I/O BOARD

Following I/O BOARD can be provided when the BNC 16E1 interface is required to the 2M IN/OUT INTFC instead D-Sub 37 pins.



Note: One Unit space is necessary to install I/O BOARD above or below IDU and 2 D-Sub/D-Sub cables also.

The 16E1 INTFC applies for up to 16E1 (2.048 Mbps) signals interface. The module performs, Bipolar-Unipolar/Unipolar-Bipolar conversion, Stuffing/Destuffing, Multiplex/Demultiplex the radio section frame, Hitless Switching, AIS Detection/Generation and Near End/Far End loopback for each E1 CH. The interface impedance can be selected from 75 ohms and 120 ohms using LCT.

2 PORT LAN interface provides optionally to transmit up to 40 Mbps LAN with/without E1 signals.

The user interface signals conform to ITU-T/IEEE as listed in the following tables.

Interface Signals (16E1 INTFC)

2M IN/OUT-A/-B (D-Sub Connector)	8E1 interface in each 2 connectors.
Input/Output Signal:	up to 16E1 signals without LAN
Bit Rate:	2.048 Mbps +/–102.4 bitps
Code:	HDB3
Impedance:	75 ohms unbalanced or 120 ohms balanced *
PORT1/PORT2 (RJ-45) optional	LAN interface port 1 and 2 separated. 8 to 40 Mbps shared when 16E1 to 0E1 are used.
Input/Output Signal:	10/100Base-T(X) Auto-sensing or fixed
Flow control:	Full duplex or Half duplex
Forwarding mode:	Store-and-Forwarding

Note: For unbalanced impedance, ground level is applied from associated equipment through interface cable.

Indicators (16E1 INTFC)

LED	Indication	Remarks
ALM	LOS from DTE is detected.	Check DTE and wiring.
	Loss of output signal to DTE is detected.	Check signal transmission at opposite site.
	Error of channel usage.	Signal is applied to unused channel.
	Mounting module is not matched with inventory.	Change LCT setting or other ( )INTFC module.
	LAN link failure occurs. (e/w LAN PORT)	Check LAN cable connection.
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.	

16E1 User Interface Pin Assignment

Terminal	Description
16E1 INTFC	
2M IN/OUT-A (CH 1 to CH 8) (D-Sub Connector, 37 pins) (I/O BOARD IDU INTFC)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 1 to CH 8), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH8 data input
Pins 3 (+) and 4 (–)	CH7 data input
Pins 6 (+) and 7 (–)	CH6 data input
Pins 8 (+) and 9 (–)	CH5 data input
Pins 11 (+) and 12 (–)	CH4 data input
Pins 13 (+) and 14 (–)	CH3 data input
Pins 16 (+) and 17 (–)	CH2 data input
Pins 18 (+) and 19 (–)	CH1 data input
Pins 20 (+) and 21 (–)	CH8 data output
Pins 22 (+) and 23 (–)	CH7 data output
Pins 25 (+) and 26 (–)	CH6 data output
Pins 27 (+) and 28 (–)	CH5 data output
Pins 29 (+) and 30 (–)	CH4 data output
Pins 31 (+) and 32 (–)	CH3 data output
Pins 34 (+) and 35 (–)	CH2 data output
Pins 36 (+) and 37 (–)	CH1 data output

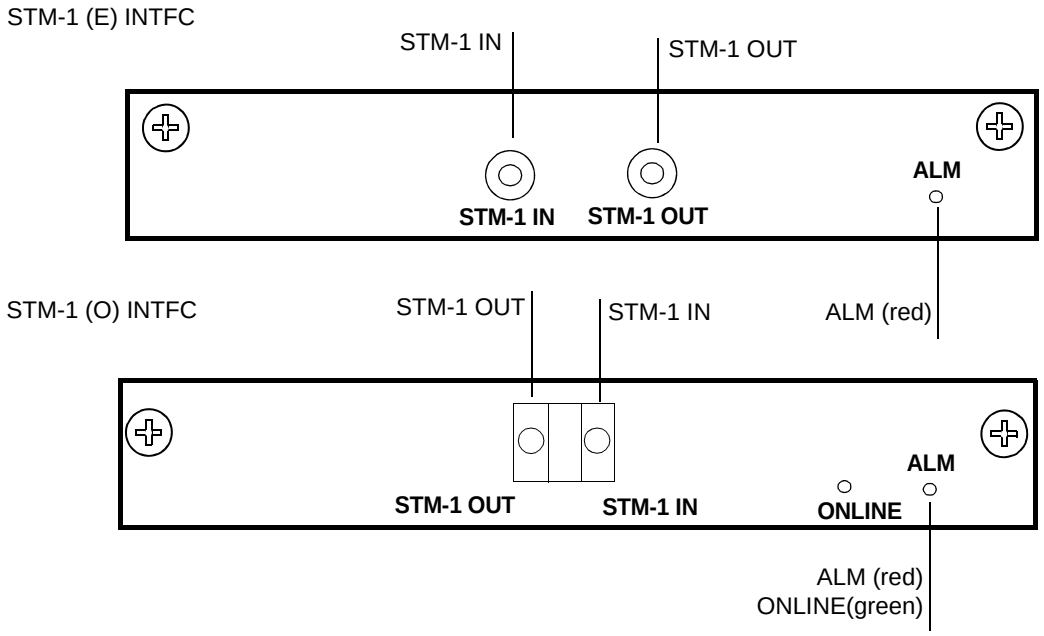
16E1 User Interface Pin Assignment

Terminal	Description
16E1 INTFC	
2M IN/OUT-B (CH 9 to CH 16) (D-Sub Connector, 37 pins) (I/O BOARD IDU INTFC)	2.048 Mbps HDB3 coded data input/output from/to DTE (CH 9 to CH 16), 75/120 ohms (selectable) *Note: Ground level is applied from DTE to (–) terminal through interface cable when unbalanced impedance is used.*
Pins 5, 10, 15, 24 and 33	Ground
Pins 1 (+) and 2 (–)	CH16 data input
Pins 3 (+) and 4 (–)	CH15 data input
Pins 6 (+) and 7 (–)	CH14 data input
Pins 8 (+) and 9 (–)	CH13 data input
Pins 11 (+) and 12 (–)	CH12 data input
Pins 13 (+) and 14 (–)	CH11 data input
Pins 16 (+) and 17 (–)	CH10 data input
Pins 18 (+) and 19 (–)	CH9 data input
Pins 20 (+) and 21 (–)	CH16 data output
Pins 22 (+) and 23 (–)	CH15 data output
Pins 25 (+) and 26 (–)	CH14 data output
Pins 27 (+) and 28 (–)	CH13 data output
Pins 29 (+) and 30 (–)	CH12 data output
Pins 31 (+) and 32 (–)	CH11 data output
Pins 34 (+) and 35 (–)	CH 10 data output
Pins 36 (+) and 37 (–)	CH 9 data output

16E1 User Interface Pin Assignment

Terminal	Description
LAN PORT1/PORT2 (RJ-45, 8 pins)	LAN PORT, optional
Pin 1	LAN TD^+ / LAN RD^+
Pin 2	LAN TD^- / LAN RD^-
Pin 3	LAN RD^+ / LAN TD^+
Pins 4 and 5	Not Connected
Pin 6	LAN RD^- / LAN TD^-
Pin 7 and 8	Not Connected
Note: Do not connect any cable to the "Not Connected" pins	

2.6 STM-1 INTFC



The STM-1 INTFC provides STM-1 signal interface with two types, one is electrical and the other is optical. The module performs,

- 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

*Note: * For the Optical INTFC only.*

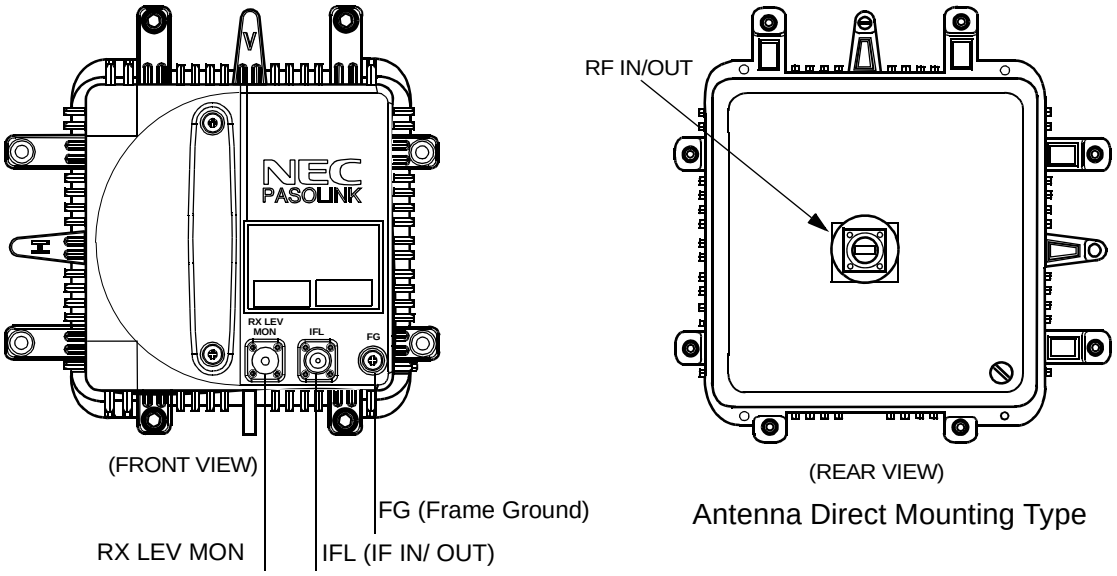
Interface Signals (STM-1 INTFC)

STM-1 IN/OUT IEC 169-29 (1.0/2.3)	Electrical STM-1 Input/Output, G.703
STM-1 IN/OUT LC	Optical STM-1 Input/Output, G.957
Input/Output Signal:	
Electrical	
Type:	G.703
Bit Rate:	155.520 Mbps
Level:	1 Vp-p (nominal)
Code:	CMI
Impedance:	75 ohms unbalanced
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

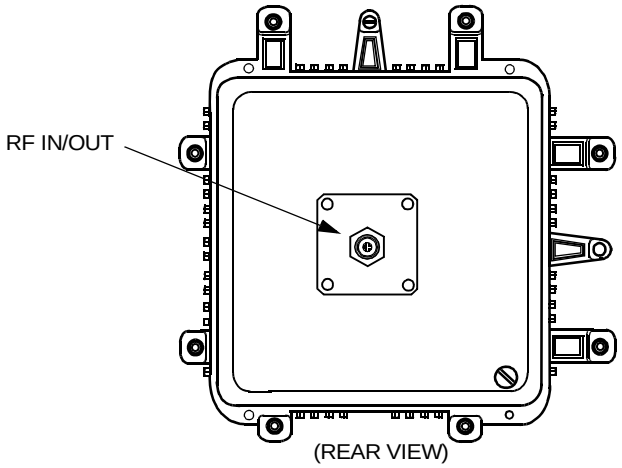
Indicators (STM-1 INTFC)

LED	Indication	Remarks
ALM	LOS of STM-1 from DTE is detected.	Check DTE and wiring.
	Frame synchronization of input STM-1 signal from DTE is los (Electrical INTFC).	Check DTE 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 STM-1 signal from radio is lost.	Check STM-1 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	

2.7 ODU



Antenna Direct Mounting Type



Coaxial Cable Type (6/7/8 GHz)

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/16QAM/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 peculiar flange for the 10 to 52 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 13 GHz: PBR120 15 GHz: PBR140 18/23 GHz: PBR220 26 GHz: PBR260 28/32/38 GHz:PBR320

Monitoring Terminal (ODU)

Terminal	Operating	Remarks
RX LEV MON:	Monitoring RX LEV in AGC voltages 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 PASOLINK MONITOR unit.

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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 details procedure, refer to Section IV Appendix LCT Operation Manual.

3.1 Equipment Setup

The equipment setup menu decides system fundamental configuration.

The setup of the equipment performs upon PDH system or SDH system as listed in the following table.

Equipment Setup for PDH

User Interface	PDH E1
	PDH E1 with LAN
Redundancy Setting	1+0(TERM)
	1+1(Hot Standby TERM)
	1+1(Twinpath TERM)
Main(Work)	16×E1 Standard PKG(E/W LAN)
	48×E1 PKG
Modulation Scheme	QPSK
	16QAM
	32QAM
Transmission Capacity	10MB
	20MB
	40MB
	80MB
	100MB
TX Start Frequency(No.1) [MHz]	
TX Start Frequency(No.2) [MHz]	
TX Stop Frequency(No.1) [MHz]	
TX Stop Frequency(No.2) [MHz]	
Frequency Step(No.1) [MHz]	
Frequency Step(No.2) [MHz]	
Shift Frequency(No.1) [MHz]	
Shift Frequency(No.2) [MHz]	
Upper/Lower(No.1)	
Upper/Lower(No.2)	
Sub Band(No.1)	
Sub Band(No.2)	

Equipment Setup for PDH

TX RF Frequency	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(No.1)	MTPC
		ATPC
	TX Power Control(No.2)	MTPC
		ATPC
LAN Port Usage	Not Used	
	P1-2 Shared/1Port Only(Main)	
	P1-2 Separated(Main)	
	P1-2 Shared/1Port Only(SC)	
LAN Capacity		

Equipment Setup for SDH

User Interface	SDH STM-1	
Redundancy Setting	1+0(TERM)	
	1+1(Hot Standby TERM)	
	1+1(Twinpath TERM)	
Main(Work)	STM-1(Optical)	
	STM-1(Electrical)	
SUB(PROT)	Not Used	
	STM-1 (Optical)	
XPIC Usage	Not Used	
	Use (Main Master)	
	Used (SUB Master)	
APS Function	Unavailable	
	Available	
TX Start Frequency(No.1) [MHz]		
TX Start Frequency(No.2) [MHz]		
TX Stop Frequency(No.1) [MHz]		
TX Stop Frequency(No.2) [MHz]		
Frequency Step(No.1) [MHz]		
Frequency Step(No.2) [MHz]		
Shift Frequency(No.1) [MHz]		
Shift Frequency(No.2) [MHz]		
Upper/Lower(No.1)		
Upper/Lower(No.2)		
Sub Band(No.1)		
Sub Band(No.2)		
TX RF Frequency	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(No.1)	MTPC
		ATPC
	TX Power Control(No.2)	MTPC
		ATPC

3.2 Provisioning Setup

The provisioning setup menu decides system fundamental functions.

The setup of the provisioning performs upon PDH system or SDH system as items listed in the following table.

Provisioning Setup PDH

Provisioning

LAN Port Setting	Disabled Enabled	
Port 1	Port Usage	Not Used Used
	Speed & Duplex	AUTONEG (Auto-MDI/MDI-X)
		10M-Half (MD1)
		10M-Full (MD1)
		100M-Half (MD1)
		100M-Full (MD1)
		10M-Half (MD1X)
		10M-Full (MD1X)
		100M-Half (MD1X)
		100M-Full (MD1X)
	Flow Control	Off On
	Collision Report	Not Report Report
	Link Loss Forwarding	Disabled Enabled
Port 2	Port Usage	Not Used Used
	Speed & Duplex	AUTONEG (Auto-MDI/MDI-X)
		10M-Half (MD1)
		10M-Full (MD1)
		100M-Half (MD1)
		100M-Full (MD1)
		10M-Half (MD1X)
		10M-Full (MD1X)
		100M-Half (MD1X)
		100M-Full (MD1X)
	Flow Control	Off On
	Collision Report	Not Report Report
	Link Loss Forwarding	Disabled Enabled
CH Setting (CH Setting 1)	E1 CH assignment Use Not Used	

Provisioning Setup PDH

CH Setting (CH Setting 2)	AIS Activation Condition	LOF+High BER LOF
	AIS Generated Report	Disabled Enabled
	AIS Received Condition	Alarm Status
	E1 Port Impedance (CH1)	120 [ohm] 75 [ohm]
	E1 Port Impedance (CH2)	120 [ohm] 75 [ohm]
	E1 Port Impedance (CH3)	120 [ohm] 75 [ohm]
	E1 Port Impedance (CH4)	120 [ohm] 75 [ohm]
	E1 Port Impedance (CH5-8)	120 [ohm] 75 [ohm]
	E1 Port Impedance (CH9-16)	120 [ohm] 75 [ohm]
BER Threshold Setting	High BER Threshold	1E-3 1E-4 1E-5
	Low BER Threshold	1E-6 1E-7 1E-8 1E-9
SC Assignment	RS-232C-1/2 V11-1/2 V-11-1/2 Direction Setting	Not Used SC1 SC2 SC3 SC4 Not Used SC1 SC2 SC3 SC4 Co-directional Contra-directional
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	 Hold Min
	MTPC TX Power (No.1/2) [dBm] ATPC Threshold Level(No.1/2) [dBm] Additional ATT (No.1/2) [dBm]	
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
Relay Setting	ALM HK output for RL1 to RL6 Cluster1 to Cluster4 input	Out HK Disabled Enabled
TCN Threshold(15min)	OFS UAS ES SES BBE SEP	
TCN Threshold(1day)	OFS UAS ES SES BBE SEP	
PMON Select	RX Level TCN Threshold (dBm) RX Level TCN Threshold(No.2) (dBm) SES Activation Condition	 30 (%) 15 (%)
Others	EOW2 External Setting Alarm Correlation Capacity	Normal Invert Off On

Provisioning Setup SDH

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
STM-1 Setting	MS-AIS Generation	Disable Enable
ALS	ALS Function	Disable Enable
	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 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 HK output for RL1 to RL6 Cluster1 to Cluster4 input	Out HK Disabled Enabled
TCN Threshold(15min)	DMR/ OCR/RCVR MUX OCR/RCVR	OFS UAS ES SES BBE SEP

Provisioning Setup SDH

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 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 PDH

Alarm/Status		
	ODU	
	TX Power	
	TX Input	
	RX Level	
	APC	
	ODU CPU/Cable Open	
	Mute Status	
	LO REF	
	TX SW Status	: only 1+1 configuration
	RX SW Status	: only 1+1 configuration
	MODEM	
	Unequipped	
	Module	
	LOF	
	Frame ID	
	High BER	
	Low BER	
	Early Warning	
	MOD	
	DEM	
	Input Voltage	
	Power Supply	: only 1+1 configuration
	IF Cable Short	
	Linearizer Status	
	Linearizer Fail	
	Cable EQL	
	ATPC Power Mode	
	CTRL	
	CTRL Module	
	MMC Mount	

Event List PDH

MAIN (1)/(WORK)

- Unequipped
- Type Mismatch
- Module
- Input LOS CH
- Usage Error CH
- AIS Generated CH
- AIS Received CH

: in respective E1 CH

- LAN Link
- LAN Collision
- Link Loss Forwarding (LLF)
- Speed & Duplex

: for LAN transmission

- Inphase

: only 1+1 configuration

UAE

- UAE

15min 1day

- 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-1day Total
- TCN-UAS-1day Total
- TCN-ES-1day Total
- TCN-SES-1day Total
- TCN-BBE-1day Total
- TCN-SEP-1day Total

TCN-RX LEV

- TCN-RX LEV-15min
- TCN-RX LEV-1day

PMON(Current)

RX Level

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

Total

- Status
- OFS
- SEP
- BBE
- ES
- SES
- UAS

RMON(Line)(15min) only for LAN

- Status
- RX UNICAST
- RX BROADCAST
- RX MULTICAST
- RX PAUSE
- RX CEC ERR

Event List PDH

	RX ALIGNMENT ERR		
	RX SYMBOL ERR		
	RX UNDERSIZE		
	RX FRAGMENTS		
	RX 64		
	RX 65 to 127		
	RX 128 to 255		
	RX 256 to 511		
	RX 512 to 1023		
	RX 1024 to 1536		
	TX JABBERS		
	TX UNICAST		
	TX BROADCAST		
	TX MULTICAST		
	TX PAUSE		
	TX COLLISION		
RMON(Line)(1day))		(*1)	only for LAN
RMON(DMR)(15min)		(*1)	only for LAN
RMON(DMR)(1day)		(*1)	only for LAN
PMON(Histry)			
RX Level(24H/15min)		(*1)	
RX Level(7days/day)		(*1)	
Totall(24H/15min)		(*1)	
Total(7days/day)		(*1)	
RMON(Line)-(24H/15min)		(*1)	only for LAN
RMON(DMR)-(24H/15min)		(*1)	only for LAN
RMON(DMR)-(7days/day)		(*1)	only for LAN

*Note:(*1) The items of RMON(History) and RMON(Current) are displayed the same.*

Event List SDH

Alarm/Status

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

Event List SDH

MAIN (WORK)

- STM-1(1) LOS (MUX)
- STM-1(1) LOS (DMR)
- STM-1(1) LOF (MUX)
- STM-1(1) LOF (DMR)
- STM-1(1) Output Control
- STM-1(1) E-BER (MUX)
- STM-1(1) E-BER (DMR)
- STM-1(1) SD (MUX)
- STM-1(1) SD (DMR)
- STM-1(1) In-Phase
- STM-1(1) TF

SUB (PROT)

- INTFC(2)
- INTFC(2) Unequipped
- STM-1(2) LOS (MUX)
- STM-1(2) E-BER (MUX)
- STM-1(2) E-BER (DMR)
- STM-1(2) SD (MUX)
- STM-1(2) SD (DMR)
- STM-1(2) Output Control
- STM-1(2) In-Phase
- STM-1(2) LOS (DMR)
- STM-1(2) LOF (MUX)
- STM-1(2) LOF (DMR)
- STM-1(2) TF

OPT INTFC applies APS

- WS Input LOS
- WS AIS Generated
- WS AIS Received

Only WS applies

TCN-RX LEV

- TCN-RX LEV-15min
- TCN-RX LEV-1day

Event List SDH

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

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 (PDH)

Control			
	Maintenance		
		TX SW Manual Control	*1
		RX SW Manual Control	*1
		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
		IF Loopback(No.1)	
		IF Loopback(No.2)	*1
		Main Near-End CH Loopback CHxx(xx-F01-48)	
		Main Far-End CH Loopback CHxx(xx-F01-48)	
		DADE Adjust	
		LAN Device Reset	
		Linearizer Control(No.1)	
		Linearizer Control(No.2)	*1
		XPIC Control(No.1)	
		XPIC Control(No.2)	
		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.*

Control List (SDH)

Control

Maintenance

TX SW Manual Control	*1	
RX SW Manual Control	*1	
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		only APS configuration
IF Loopback(No.1)		
IF Loopback(No.2)	*1	
Main Near-End Loopback		
Main Far-End Loopback		
DADE Adjust		
Linearizer Control(No.1)		
Linearizer Control(No.2)	*1	
ALS Restart		: Only Optical INTFC
XPIC Control(No.1)		
XPIC Control(No.2)		
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 (only for SDH OPT INTFC) (SDH)

The STM-1 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 STM-1 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 (STM-1 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).

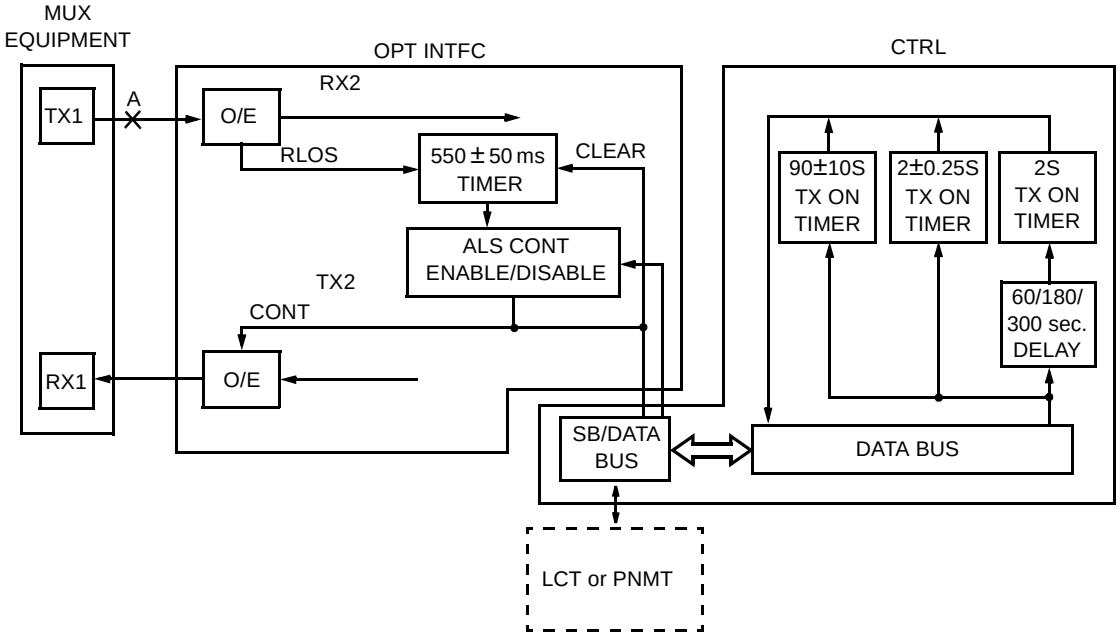


Fig. 3-1 ALS System Functional Block Diagram

3.5.2 Automatic Protection Switching (APS) (only for SDH OPT INTFC optional APS configuration) (SDH)

(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.

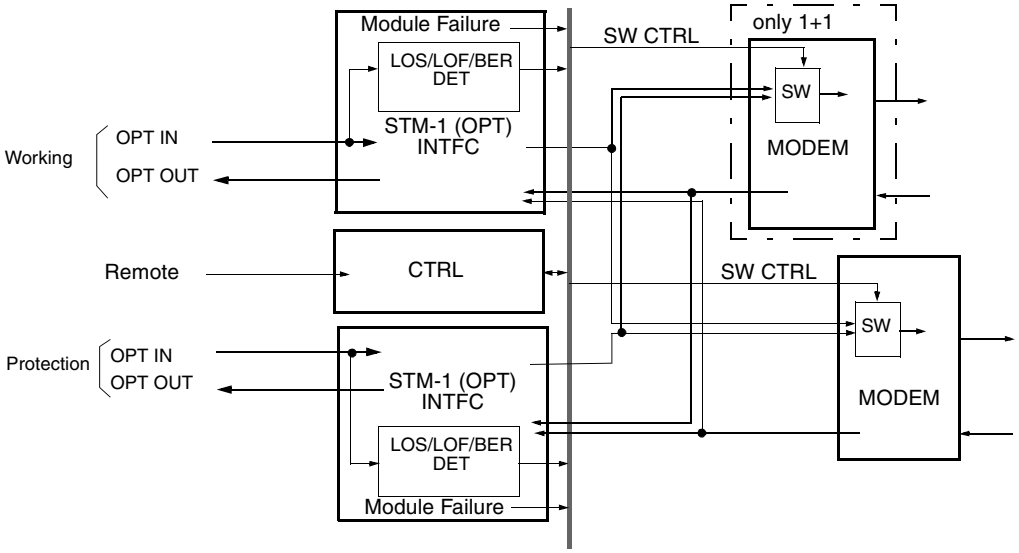


Fig. 3-2 OPT APS System

The STM-1 (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.

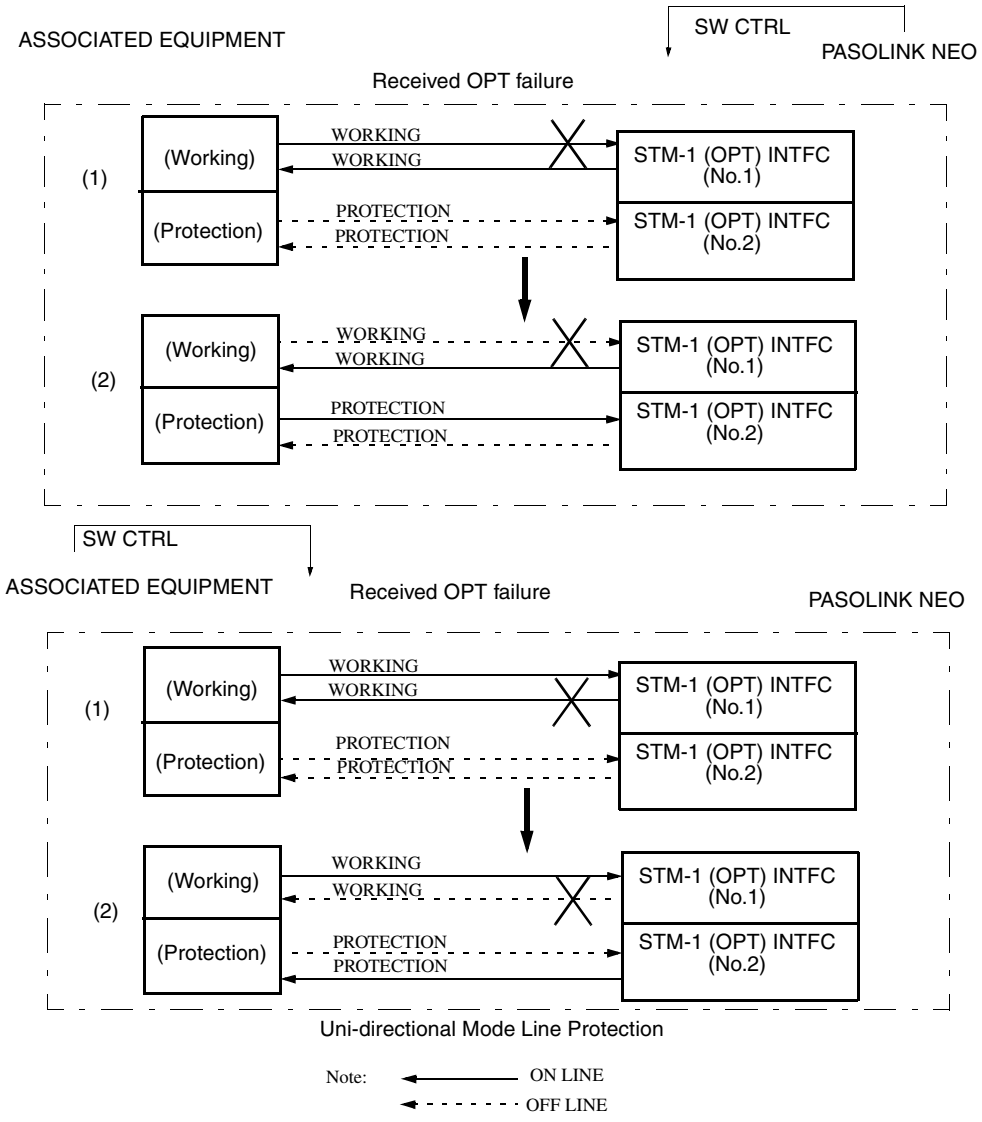


Fig. 3-3 Line Protection

(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 STM-1 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 Assignement
STM-1 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 Warking 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 Working side (installed in INTFC Slot1) under occurance 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 occurrance.

  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 duaring 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, perfom 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

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.

.

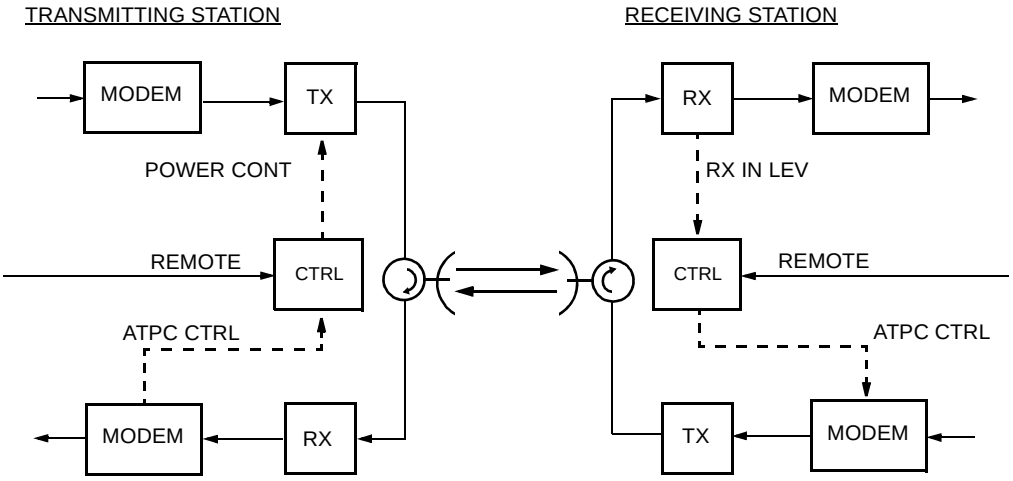
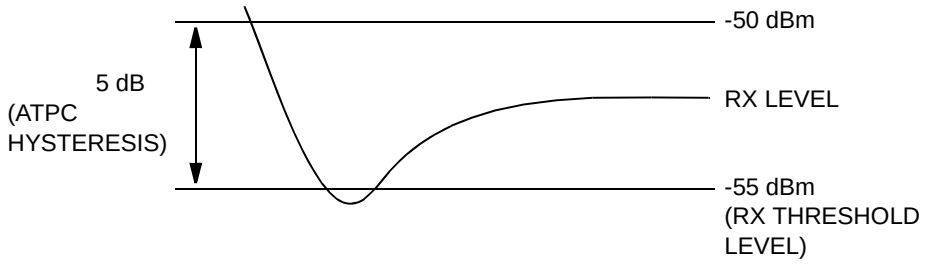


Fig. 3-4 ATPC, Functional BLock Diagram

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.

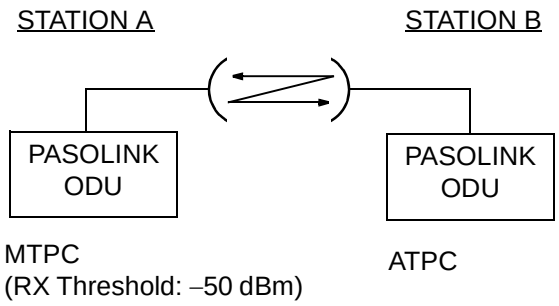


Using MTPC-ATPC

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.

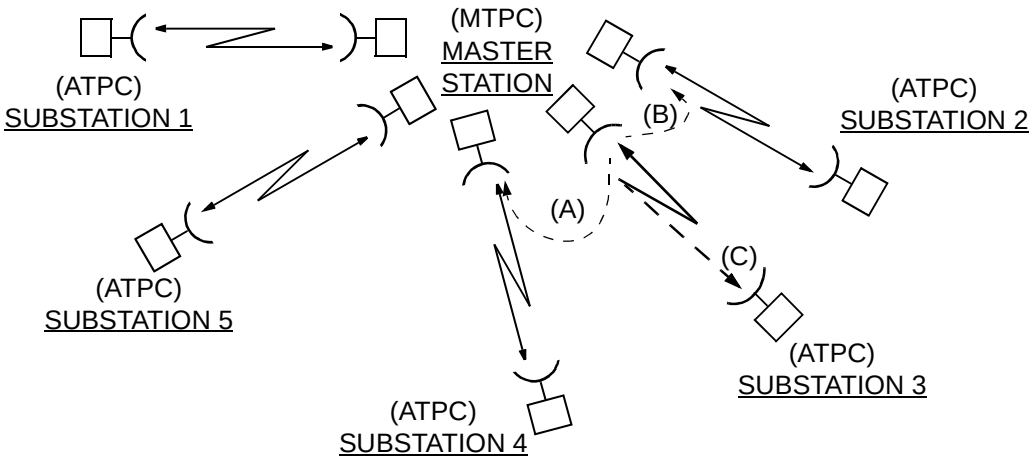
Even if the station is set in the MTPC mode, the opposite station is likely to be set in the ATPC mode. Therefore, setting the RX Threshold (ATPC Threshold level) is required for controlling the transmission level of the opposite station. Between the stations that are respectively set in the MTPC mode, 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 is malfunction, 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 time of the ATPC had malfunction.
MIN: Maintain the TX output level at ATPC minimum level.

3.5.4 Loopback Control

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

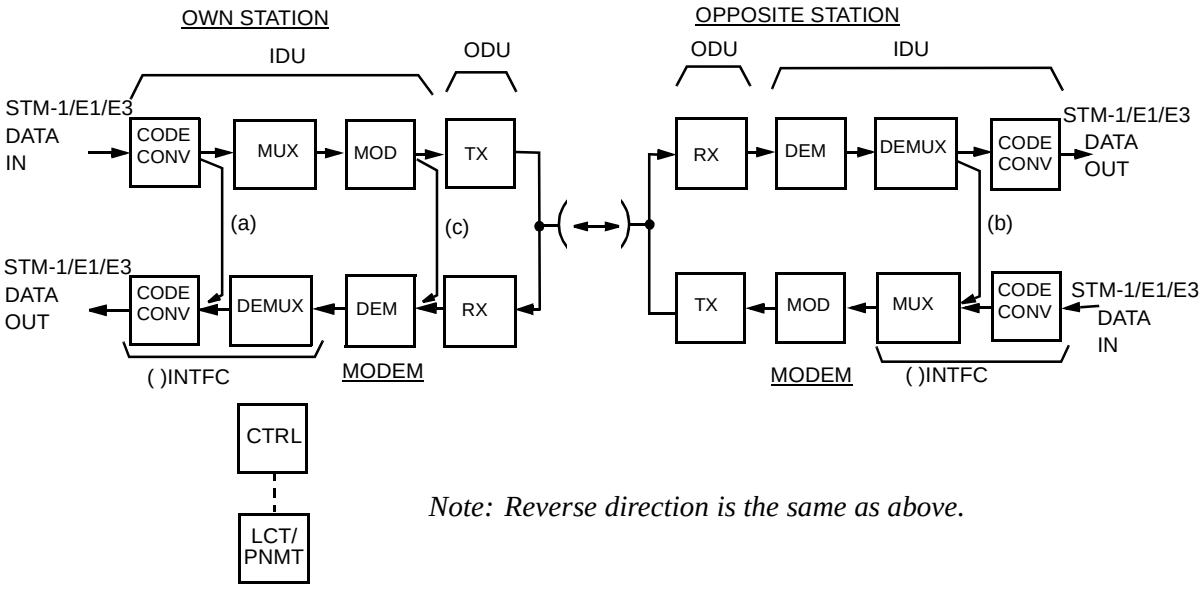
Provided here is the control of the:

- Near-End loopback (STM-1/E1/E3 LB1) is performed at the STM-1 INTFC/( )E1/E3 INTFC module ((a) in Fig. 3-5) for STM-1/E1/E3 signal.
- Far-End loopback is performed at the STM-1 INTFC/( )E1/E3 INTFC module at the opposite end station ((b) in Fig. 3-5) for STM-1/E1/E3 signal.
- 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.

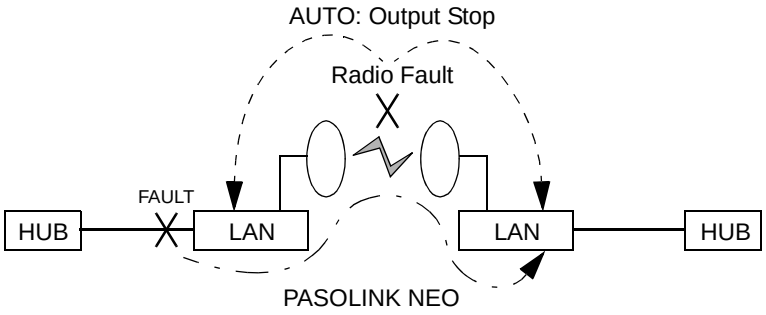


Note: Reverse direction is the same as above.

Fig. 3-5 Loopback Location

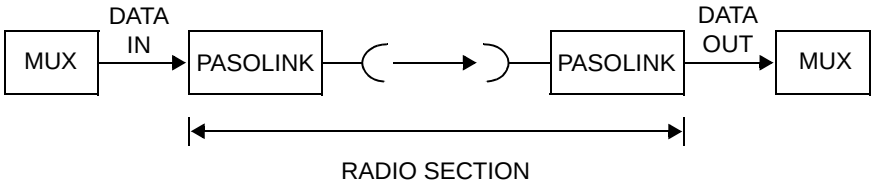
3.5.5 Link Loss Forwarding Control (LAN)

Link Loss Forwarding 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".



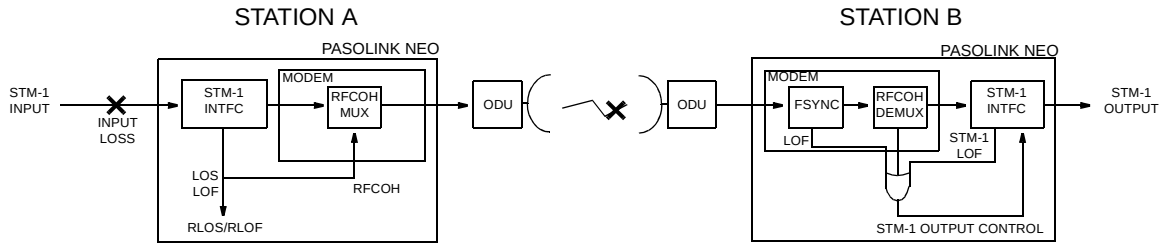
3.5.6 MS-AIS Generation (SDH)

When any fault occurs in PASOLINK NEO equipment, or when STM-1input signal disappears, or when any fault occurs in radio section, The function of MS-AIS Generation causes the STM-1 output signal from PASOLINK NEO 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 PASOLINK NEO equipment detects the STM-1 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, PASOLINK NEO equipment stops the STM-1 output signal. Similarly, it is the same even if a receiving input level down or loss of radio frame (LOF) appear in station B.

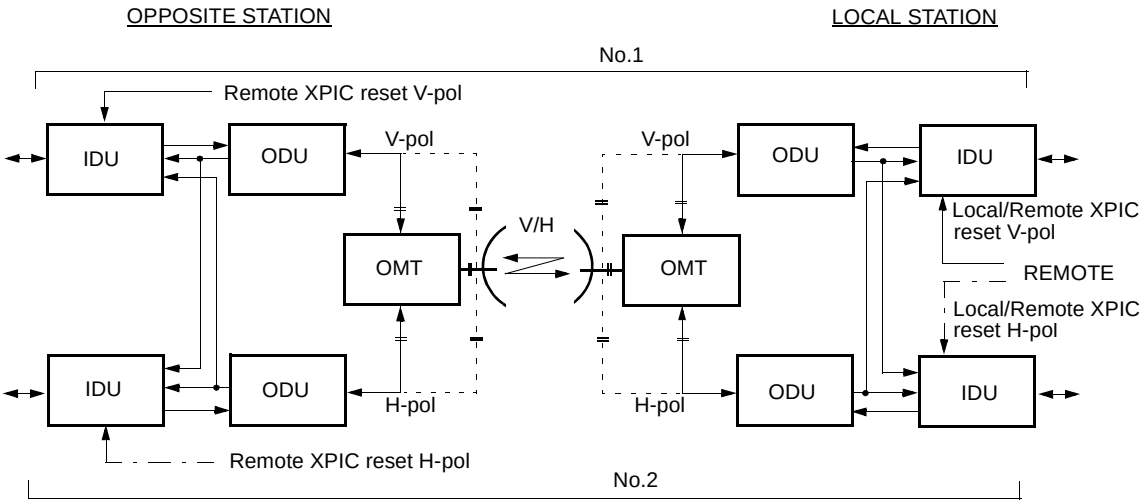


Event	Station A		Station B		
	LED	LCT	LED	LCT STM-1 Output Control	STM-1 OUTPUT
STM-1 Input Loss at Station A	IDU ALM	MAIN INTFC LOS	—	Under Execution	Shutdown * (or all “1”)
STM-1 Loss of Frame at Station A	IDU ALM	MAIN INTFC LOF	—	Under Execution	Shutdown * (or all “1”)
RX Level Down	—	N/A	ODU ALM	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 ($\leq 1E^{-4}$) 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 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.



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

Fig. 3-6 XPIC Reset Remote Control

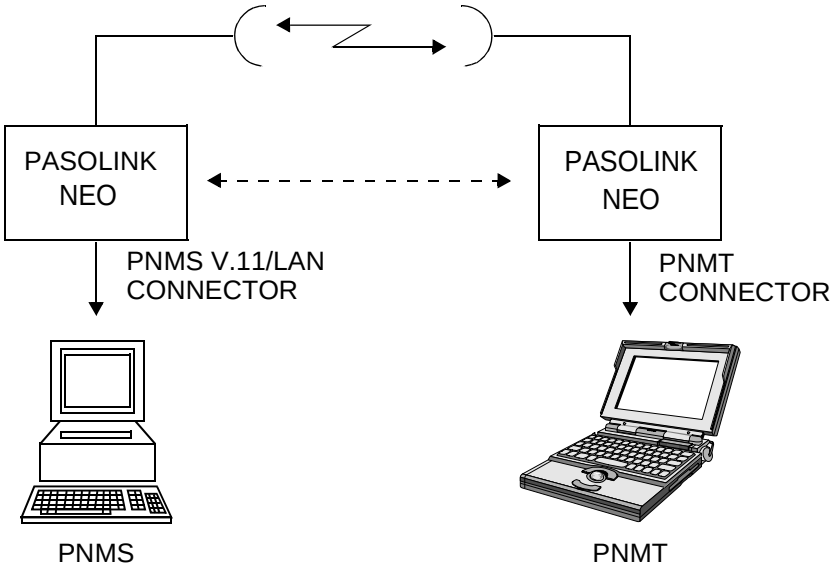
The XPIC RESET control is performed when the system is in following conditions.

- Frame Synchronization is lost (FASYNC) at the DEM module in the Co-pol. channel.
- At the DEM module in the Co-pol. channel, IF signal from X-pol. channel is lost.
- 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 DEM module in the X-pol. channel.

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 PNMS V.11/LAN connector of the IDU located at the designated maintenance center while the PASOLINK network management terminal (PNMT) is connected to the PNMT connector on the IDU of remote stations. The PNMT/PNMS provides monitoring and control of the actual microwave link status and its associated PASOLINK NEO equipment. Status information form and control signals to remote stations are transmitted using RFCOH (SDH) or SC CH (PDH).

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

3.6 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 STM-1/E1/E3 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 STM-1/E1/E3 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 : This mode is applied in Maintenance ON.
  2. Auto: This mode is applied usually.

TX SW Setup in provisioning has following features:

- Switching Priority:

  1. Non Priority: This mode is applied no revertible.
  2. Priority No.1: This mode is applied to select No.1 when both No.1 and No.1 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 : This mode is applied in Maintenance ON.
  2. Auto: This mode is applied usually.

RX SW Setup in provisioning has following features:

- Switching Priority:

  1. Non Priority: This mode is applied no revertible.
  2. Priority No.1: This mode is applied to select No.1 when both No.1 and No.1 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 alarm status.

  2. Forced mode, this enables the RX SW manual control though either or both No. 1 and No. 2 RX route is 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 activated.
  2. Excluded Cross Reset, this does not switch over the RX SW though XPIC reset control is activated.

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