

NEC

PASOLINK V4

Installation Manual

**7-38GHz 4/8/17/34MB
DIGITAL MICROWAVE RADIO SYSTEM
(1+0/1+1 SYSTEM)**

NEC Corporation
TOKYO, JAPAN

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1. GENERAL

This manual describes information on the installation, and initial lineup of the NEC Pasolink 7/8/13/15/18/23/26/38 GHz 2/4/8/16 × 2 MB and/or 10/100BASE-T(X) point-to-point digital radio system.

This system consists of TRP-[]G-[] Transmitter-Receiver (Outdoor Unit (ODU)) and MDP-[]MB-[] Modulator-Demodulator (Indoor Unit (IDU)).

Outline of the ODU is shown in Fig. 1-1.

Outlines of the IDUs are shown in Fig. 1-2 and 1-3.

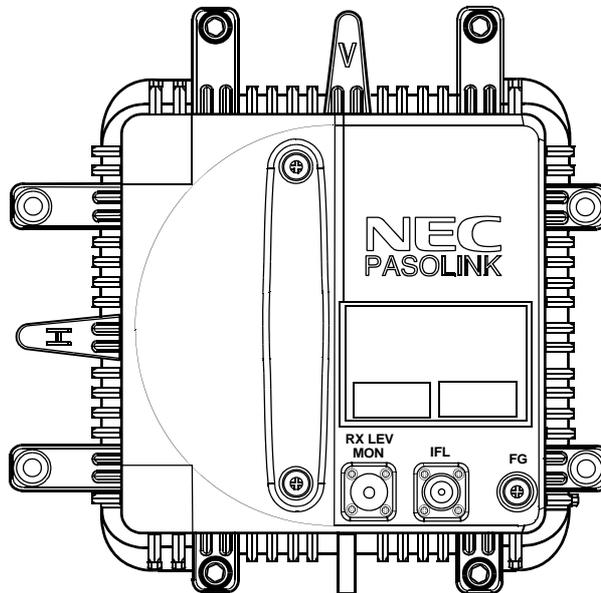
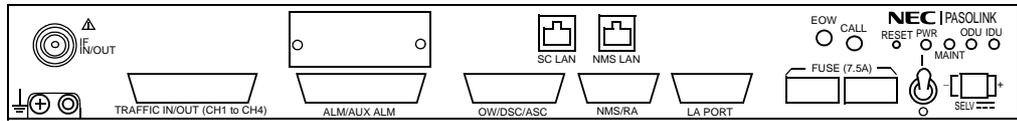
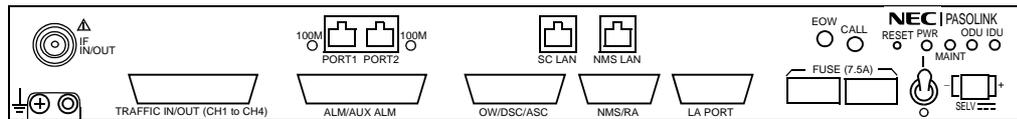


Fig. 1-1 Outline of the ODU

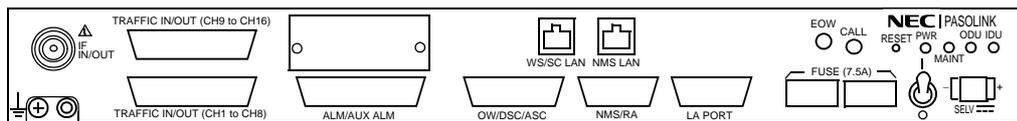
GENERAL



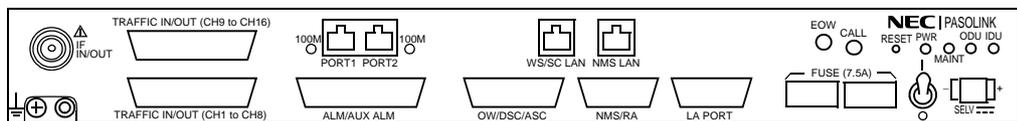
(a) 4 × 2MB Fix Bit Rate Composition



(b) 4 × 2MB Fix Bit Rate with LAN Interface Composition

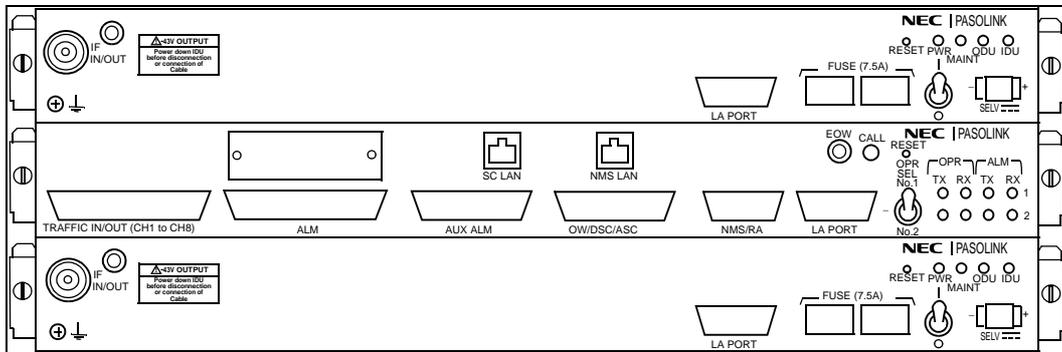


(c) 2/4/8/16 × 2MB Free Bit Rate Composition

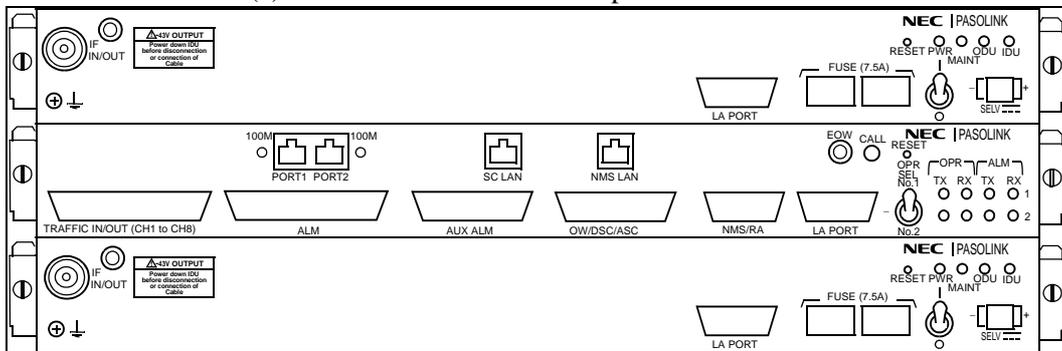


(d) 2/4/8/16 × 2MB Free Bit Rate with LAN Interface Composition

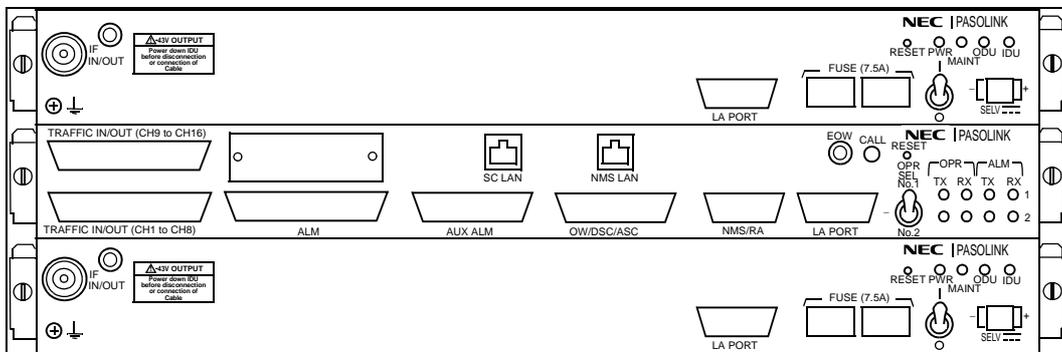
Fig. 1-2 Outline of the IDUs in 1+0 System



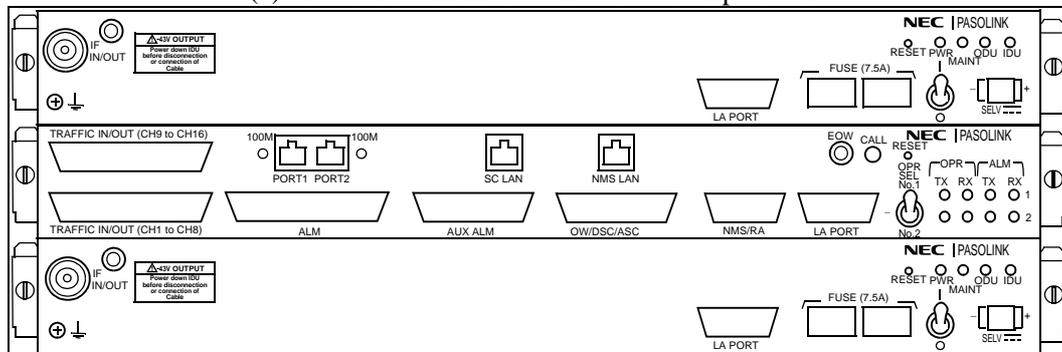
(a) 4 × 2MB Fix Bit Rate Composition



(b) 4 × 2MB Fix Bit Rate with LAN Interface Composition



(c) 2/4/8/16 × 2MB Free Bit Rate Composition



(d) 2/4/8/16 × 2MB Free Bit Rate with LAN Interface Composition

Fig. 1-3 Outline of the IDUs in 1+1 System

GENERAL

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2. OVERVIEW FOR INSTALLATION

The standard installation is summarized in this section. Included herein is information on typical installation work flow and installation guide for IDU installation, ODU installation, antenna (ANT) installation, waveguide connection and cable connections.

This product is a part of radio link system, and is intended to be connected with a external antenna.

This product will be installed and operated by professional.

After installation, the professional person shall make sure that the system shall comply with the relevant limits for general public exposure specified as basic restrictions or reference levels in the council Recommendation 1999/519/EC.

OVERVIEW FOR INSTALLATION

2.1 Detailed Work Flow Chart

The installation flow chart is shown below.

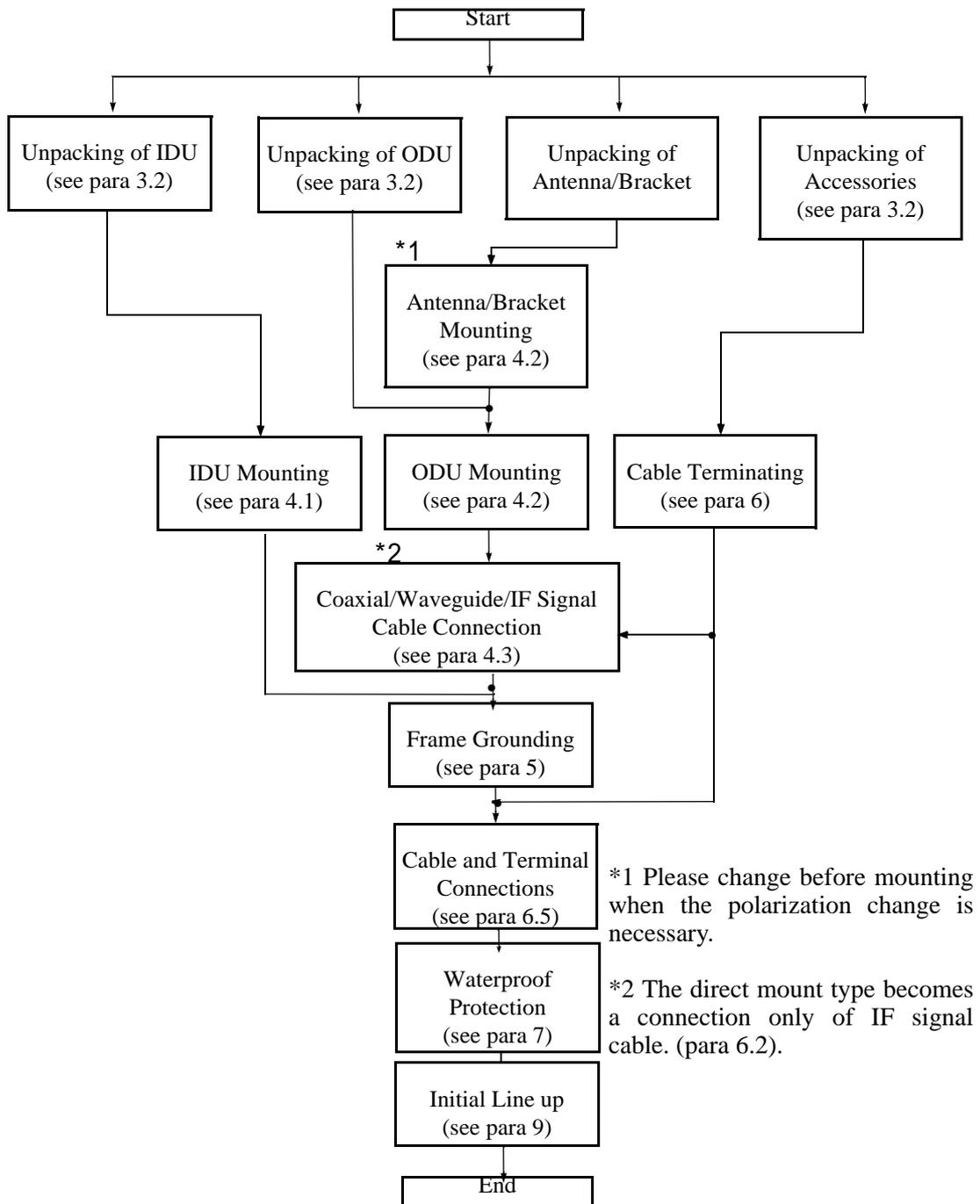


Fig. 2-1 Typical Installation Flow Diagram

2.2 Pasolink System Standard Overview

(1) Pasolink Installation Overview

The standard overall configuration of the Pasolink system is shown below.

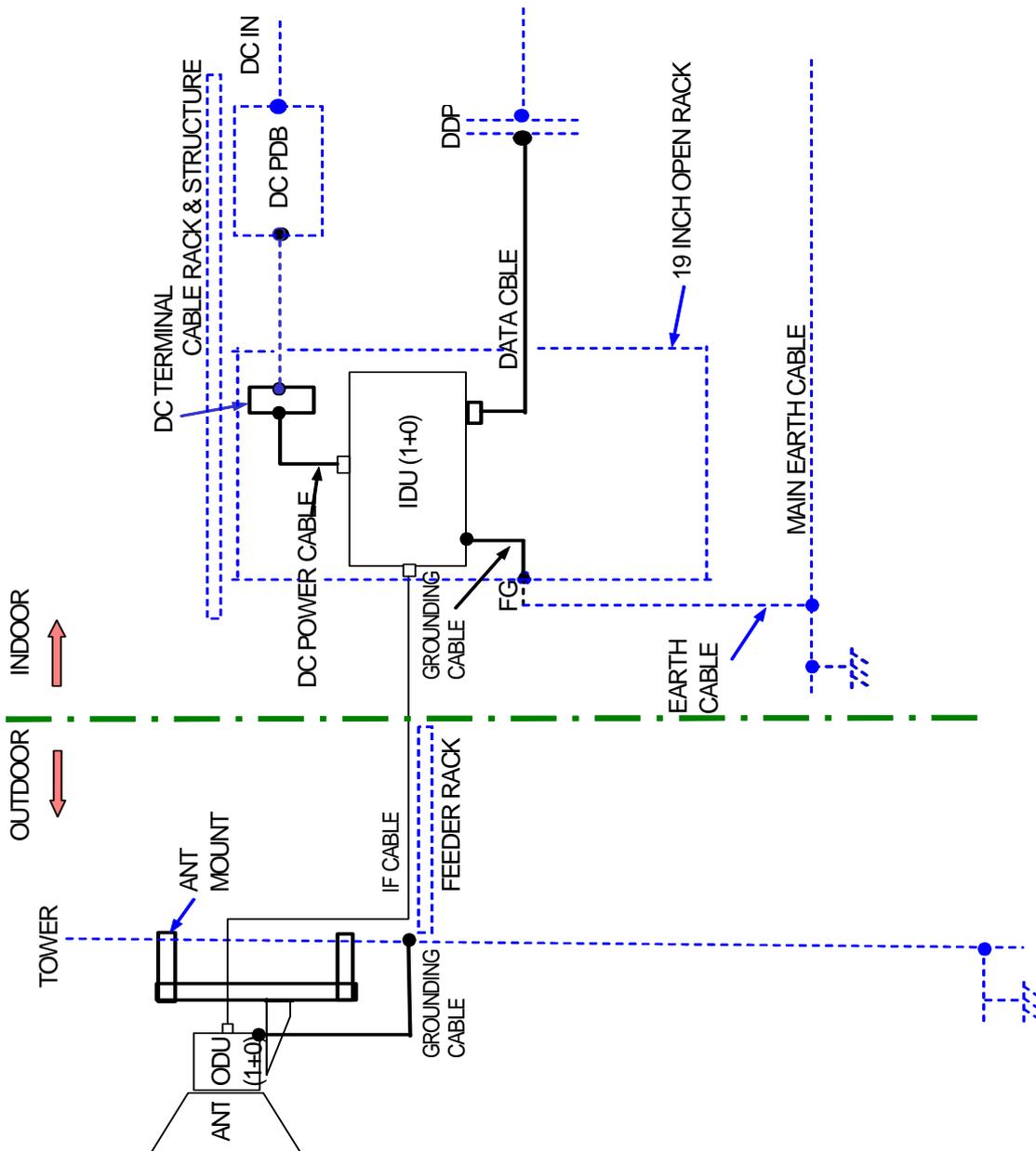


Fig. 2-2 Pasolink standard installation overview(1+0 system)

OVERVIEW FOR INSTALLATION

(2)Indoor Installation Overview

A general layout for indoor installation of the Pasolink is shown below.

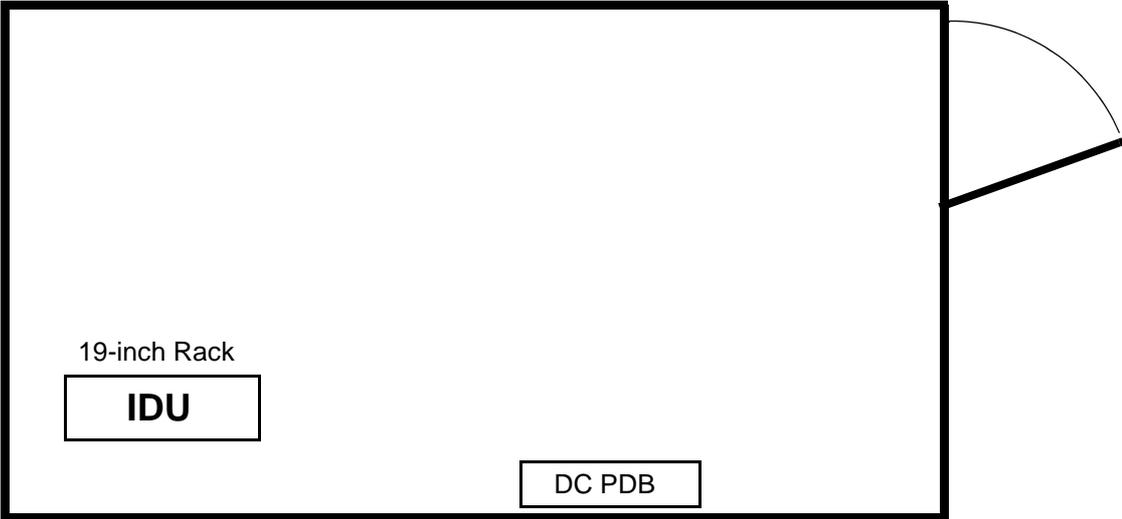


Fig. 2-3 Indoor Installation Overview

Fig. 2-3

3. UNPACKING

3.1 Checking Cargo

Detailed procedure is as follows:

STEP

1 Check the number of containers on the packing list.

NEC NEC Corporation (Packing List)				
PROJECT : 957451 GT MW (PASO/PASO+)		M/S NO : 100-04935 P/L NO : 731-210466-003-01 (E : 2004/07/28)		
SITE NO : 01/23 SITE : TEMA				
CASE No.	ITEM No.	DESCRIPTION	QUANTITY	CUSTOMER'S P.O. NUMBER
F01-PASO-034	1	PASOLINK 2/4/8/16E1 DIGITAL RADIO EQUIPMENT		
	1.1	OUTDOOR UNIT (ODU)		
	1.1.1	TRP-7G-3A (4PSK, 161MHZ SHIFT, ATPC) (27DBM OUTPUT, 1TR, DC -48V) 1) H0738A TRP-7G-3A TX= LOW MHz, RX= HIGH MHz TX/RX=161MHz, SUB BAND C SERIAL No.5989,6029	2 SET	
F01-PASO-035	1.2	INDOOR UNIT (IDU)		
	1.2.4	MDP-34MB-26C (4PSK, 2/4/8/16 E1) (BIT-FREE INTFC) (1+1 SYSTEM, 1MD, 2CH ASC, DC -48V) 1) H0161F MDP-34MB-26C 1+1, SERIAL NO.5123	1 SET	
			2 SET	
			1 SET	

Fig. 3-1 Example of packing list

2 Check the station name is correct.

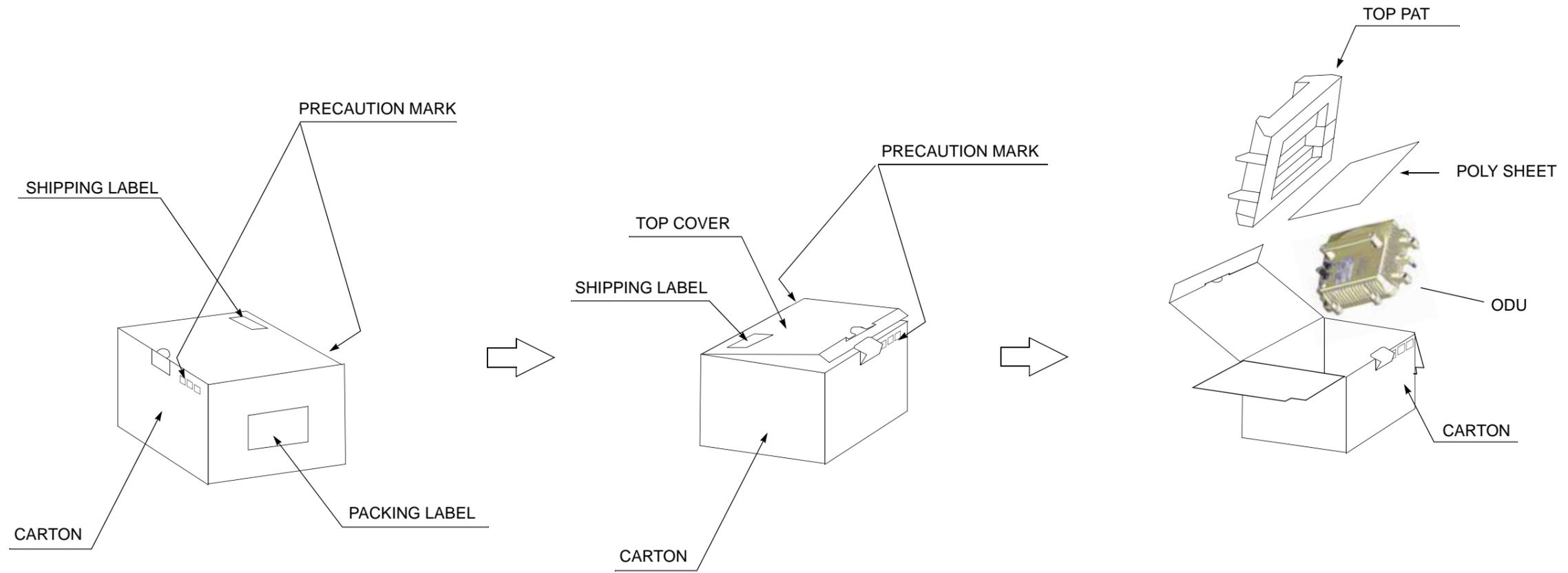
Check to see if the station name on the packing list shown in Fig.3-1. Note that the contents of the packing list depend on the contract.

3.2 Unpacking

The procedures to unpack the IDU and ODU are shown Fig.3-2 and Fig.3-3.

UNPACKING

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Step 1. Open top cover of the carton.

Step 2. Take out top pat from carton,

Step 3. Remove poly sheet,

Step 4. Take out the ODU from carton,

Step 5. Inspect ODU.

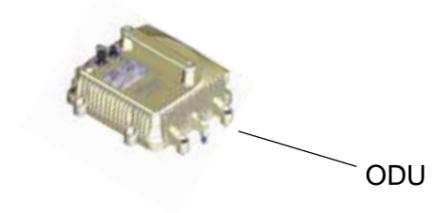
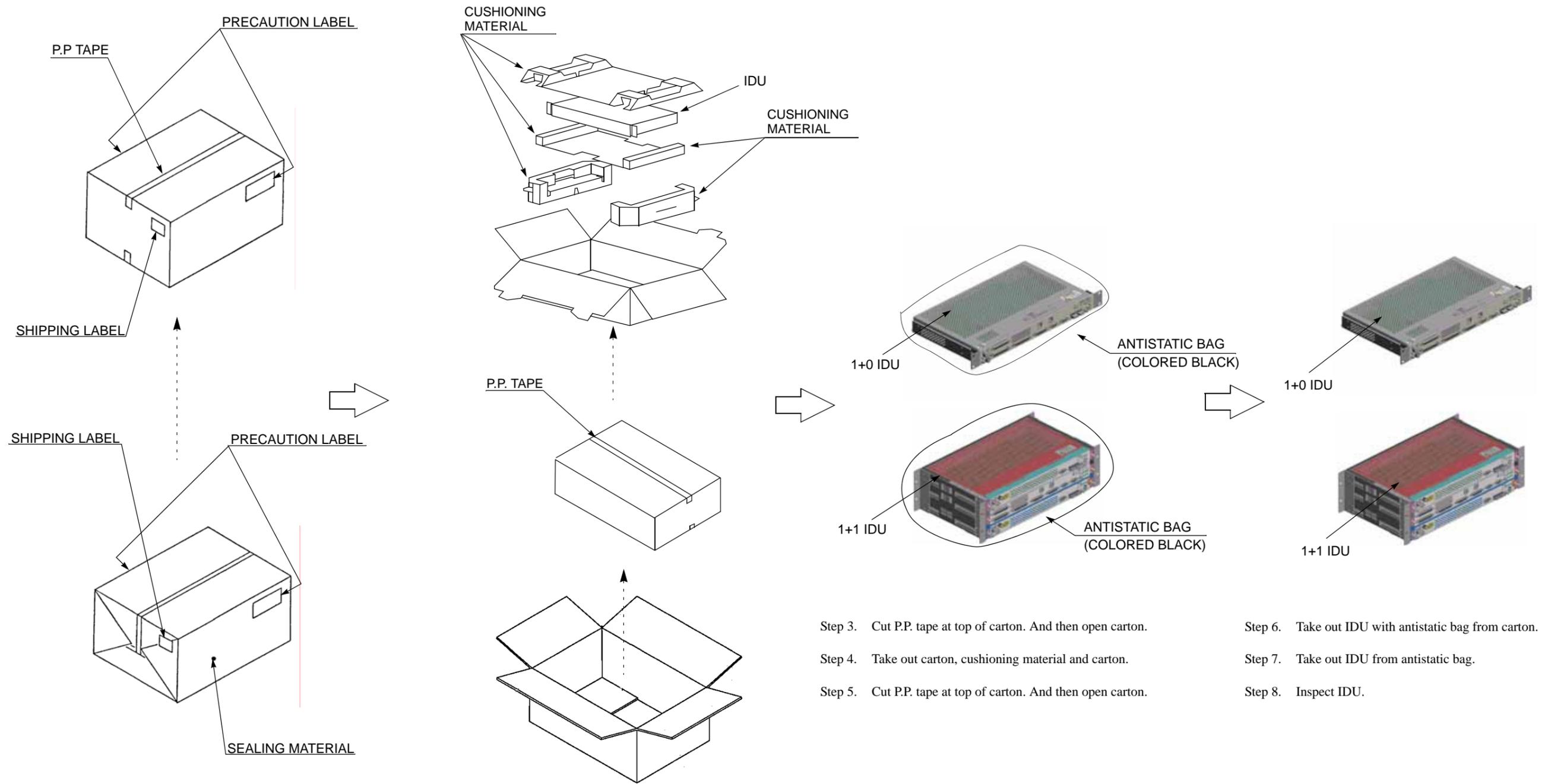


Fig. 3-2 Unpacking Method of ODU



- Step 1. Cut sealing material.
- Step 2. Take out carton from sealing material.

- Step 3. Cut P.P. tape at top of carton. And then open carton.
- Step 4. Take out carton, cushioning material and carton.
- Step 5. Cut P.P. tape at top of carton. And then open carton.
- Step 6. Take out IDU with antistatic bag from carton.
- Step 7. Take out IDU from antistatic bag.
- Step 8. Inspect IDU.

Note: Accessories are sacked or boxed with the IDU.

Fig. 3-3 Unpacking Method of IDU

3.3 Checking Installing Component

Each unpacked component of the pasolink System must be checked as shown below.

- (1) IDU and ODU

Table 3-1 Standard Installing component of ODU/IDU

No.	DESCRIPTION	QUANTITY		Remarks
		1+0	1+1	
1	TRP-()G()MB-()A (ODU)	1	2	
	O-Ring (Attached to the waveguide type ODU)	1	2	*1
2	MDP-()MB-() (IDU)	1	1	
	Power Connector (Molex Housing M5557-4R)	1	2	
	Cable Terminal (Molex 5556T)	4	8	
	7.5 A Fuse (SMP75)	2	4	
3	7-8 GHz HYB , with N-type coaxial connectors	0	1	*2, *3
4	13-38 GHz HYB	0	1	*3

Note :*1 Use O-ring which is attached to the antenna for the antenna direct mount ODU.

*2 Not available for SD system.

*3 The type and specification of the Hybrid Combiner/Divider NEC model will be described on page 4-13 of Chapter 4.

UNPACKING

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UNPACKING

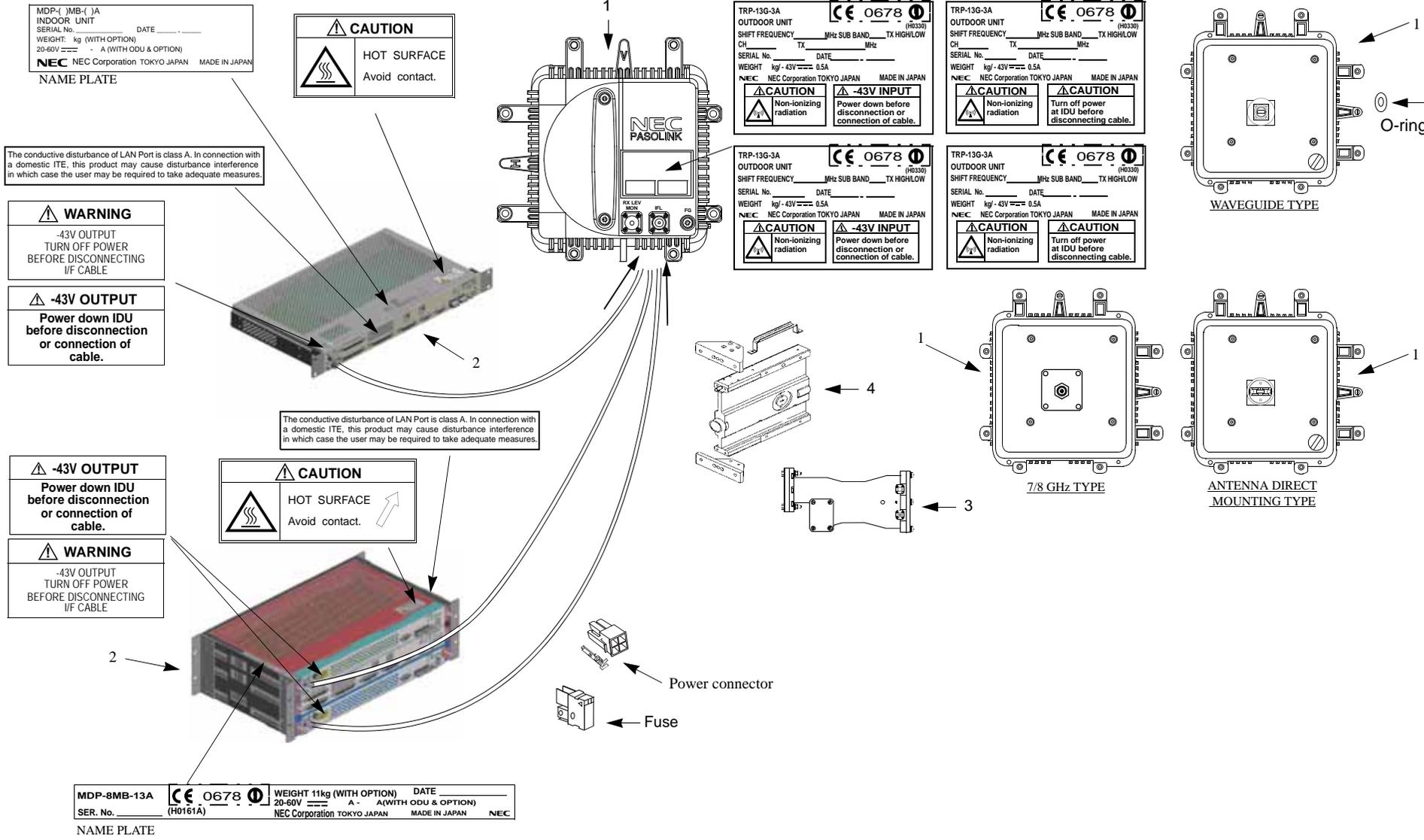
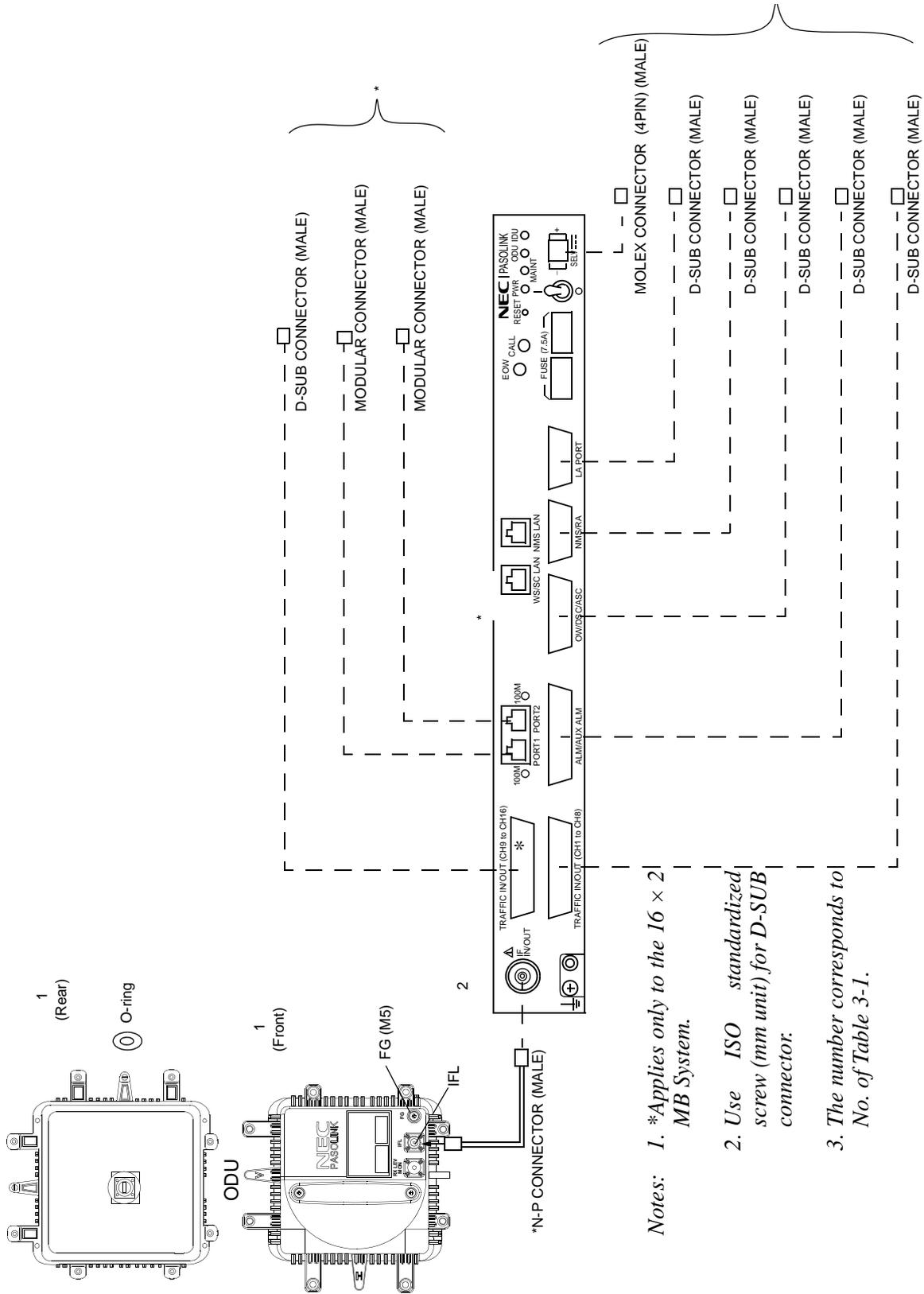


Fig. 3-4 Installation component for IDU and ODU



- Notes:
1. *Applies only to the 16 × 2 MB System.
 2. Use ISO standardized screw (mm unit) for D-SUB connector.
 3. The number corresponds to No. of Table 3-1.

Fig. 3-5 Component of Installing 1+0 System (1/2)

UNPACKING

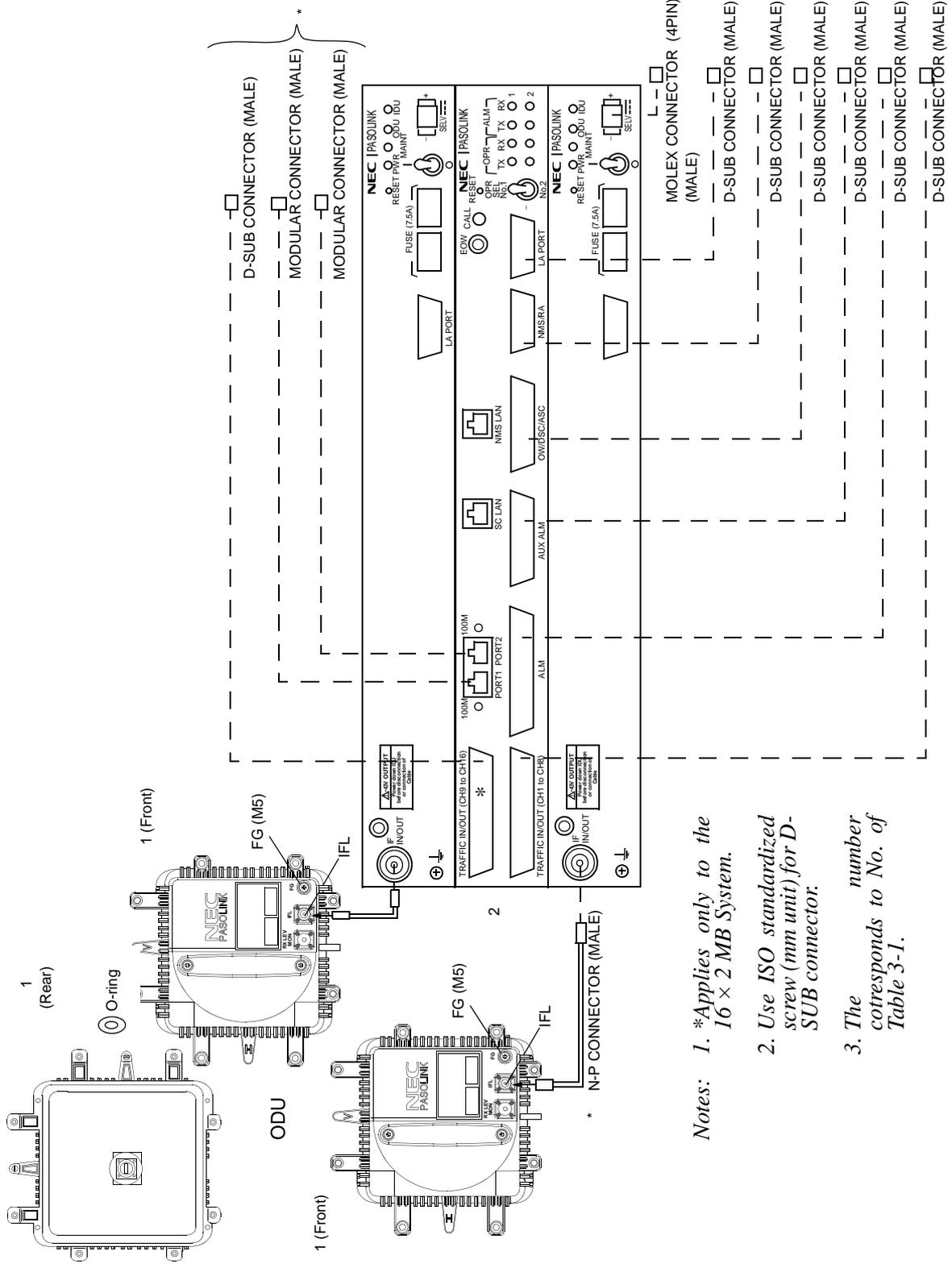
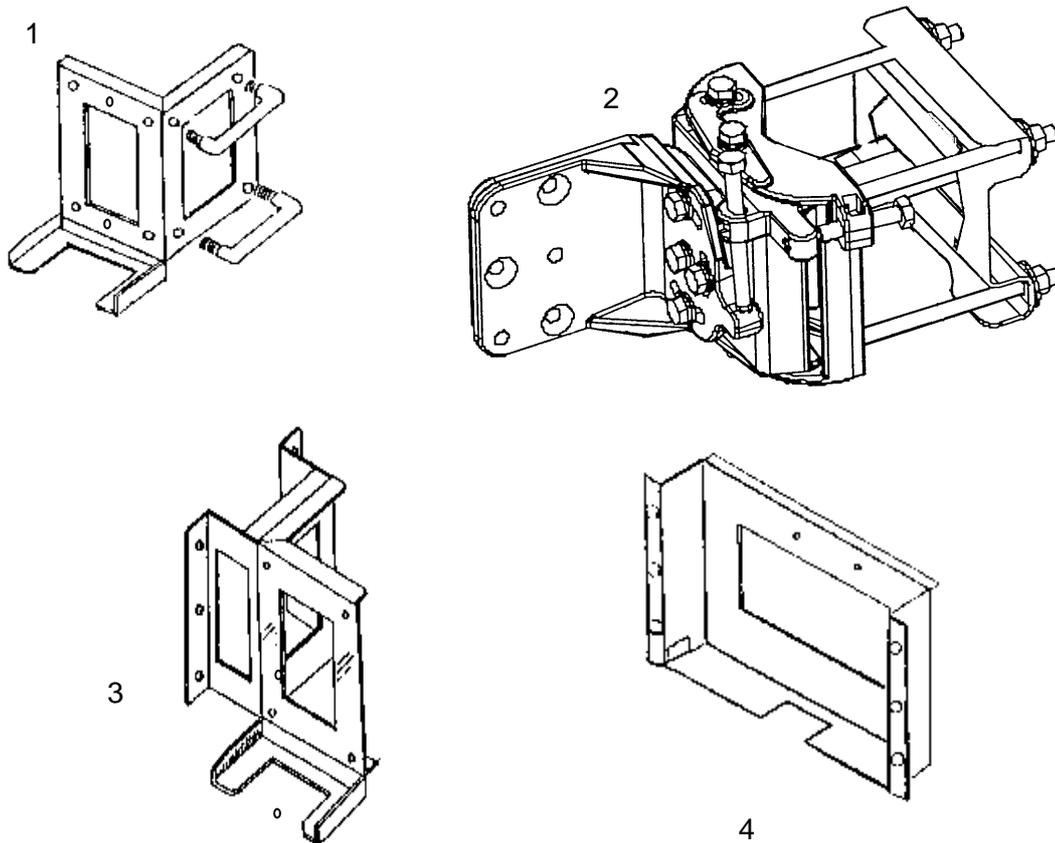


Fig. 3-5 Component of Installing 1+1 System (2/2)

- Notes:
- *Applies only to the 16 × 2 MB System.
 - Use ISO standardized screw (mm unit) for D-SUB connector.
 - The number corresponds to No. of Table 3-1.

(2)Mounting Bracket

There are four kinds the ODU mounting bracket by the mounting type, shown as follows.



No.	DESCRIPTION	QUANTITY		Remarks
		1+0	1+1	
1	Pole Mounting Waveguide Type	1	1	Fig4-5 See Para 4.3
2	Antenna Direct Pole Mounting Bracket	1	1 or 2	Fig 4-11
3	Wall Mounting Bracket	1	1 or 2	Fig4 -17
4	19"-rack Mounting Bracket	1	1 or 2	Fig4-19

Fig. 3-6 Packing List of Mounting Bracket(This page is intentionally left blank.)

UNPACKING

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4. MOUNTING

4.1 IDU Mounting

The installation procedure for the IDU is shown below.

(a) Accessories Required

- Screwdriver

(b) Procedure for Mounting and Dismounting

(1) Mounting

Mounting method of IDU is shown in Fig. 4-1 and Fig 4-2.

Note: When the IDU is mounted on the center position, refer to Fig. 4-1 (2/2) and Fig. 4-2 (2/2).

(2) Dismounting

For dismounting IDU (if necessary), use the following procedure.

<u>Step</u>	<u>Procedure</u>
1	Hold the IDU so that it does not drop, and remove two screws each from both sides,
2	Dismount the IDU from the 19-inch rack.

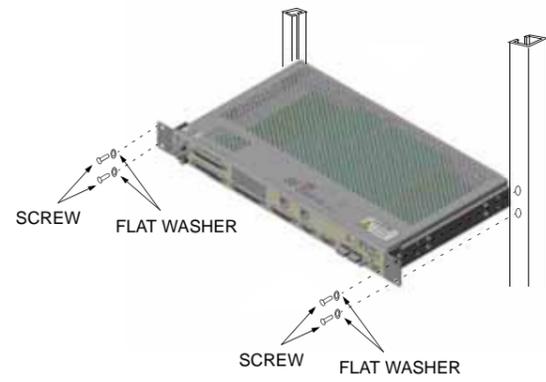
Note : Please rreftr to paragraph 4.4 or 4.5 when Rack Inatallation and Cable Rack Installation is necessary.

MOUNTING

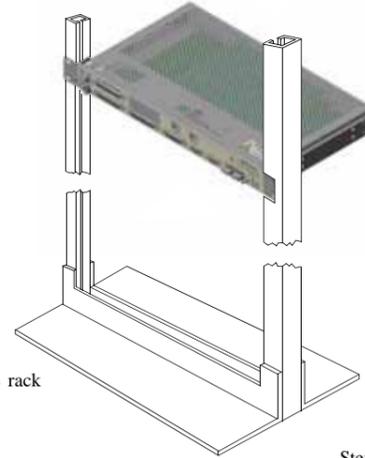
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MOUNTING

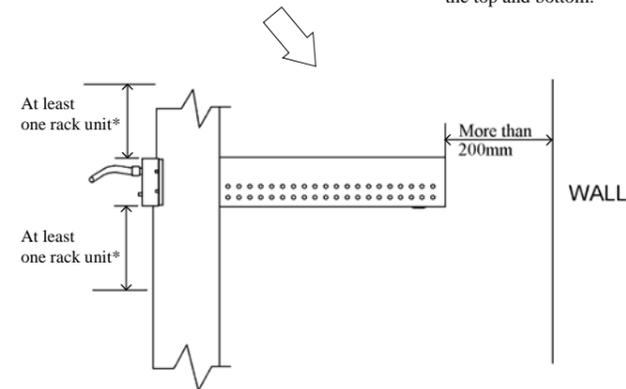
Step 1. Align the IDU to the mount position on the 19-inch rack.



Step 2. Fix each side of the IDU to the rack with the two screws (M5).



Step 3. To mount the IDU in a 19-inch rack, allow space more than 200 mm to the rear section and space for one unit to the top and bottom.



Note: * Normal setting for free space. When free space is closed within one rack unit, check the environmental temperature is lower than +40 °C.

Fig. 4-1 (1/2) Mounting of IDU for 1+0 System

MOUNTING

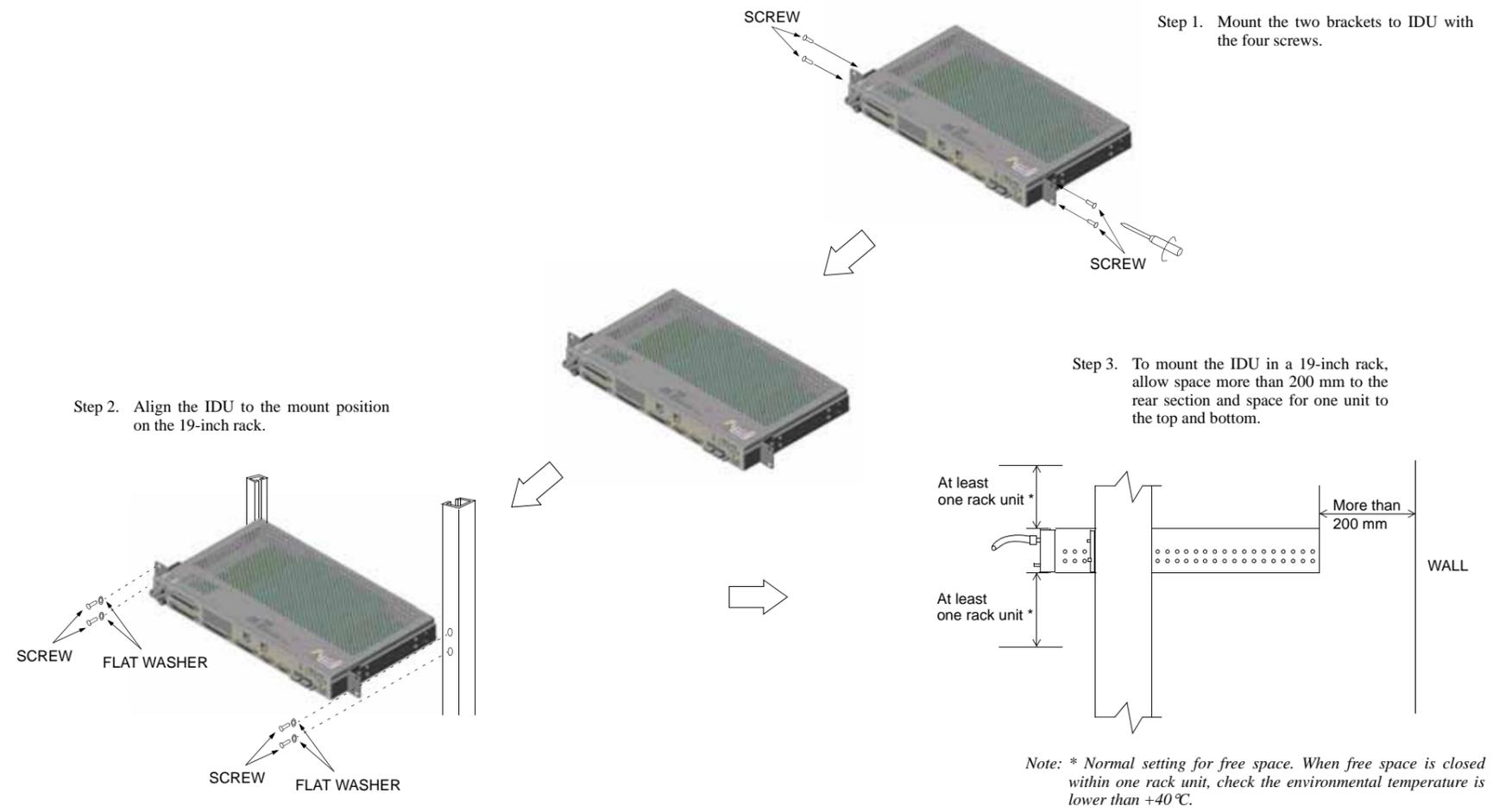
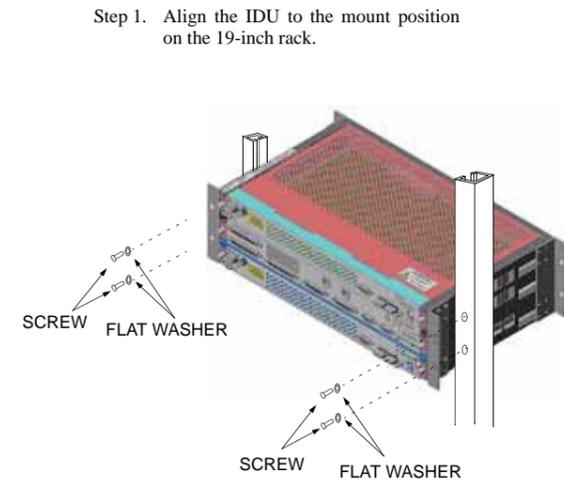
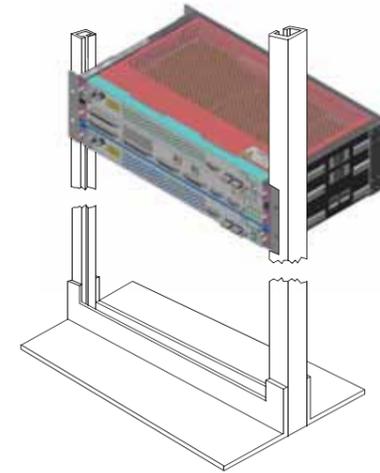


Fig. 4-1 (2/2) Mounting of IDU for 1+0 System

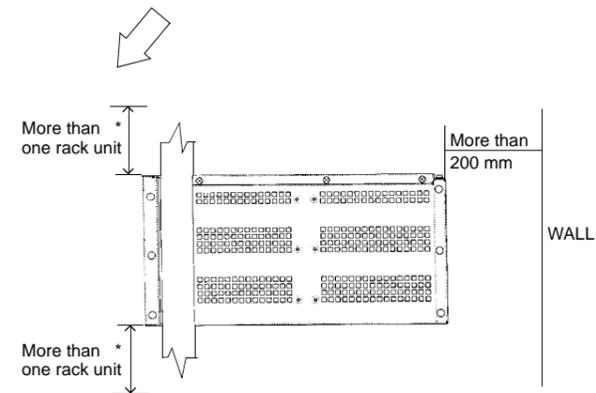
MOUNTING



Step 2. Fix each side of the IDU to the rack with the two screws (M5).



Step 3. To mount the IDU in a 19-inch rack, allow space more than 200 mm to the rear section and space for one unit to the top and bottom.



Note: * Normal setting for free space. When free space is closed within one rack unit, check the environmental temperature is lower than +40 °C.

Fig. 4-2 (1/2) Mounting of IDU for 1+1 System

MOUNTING

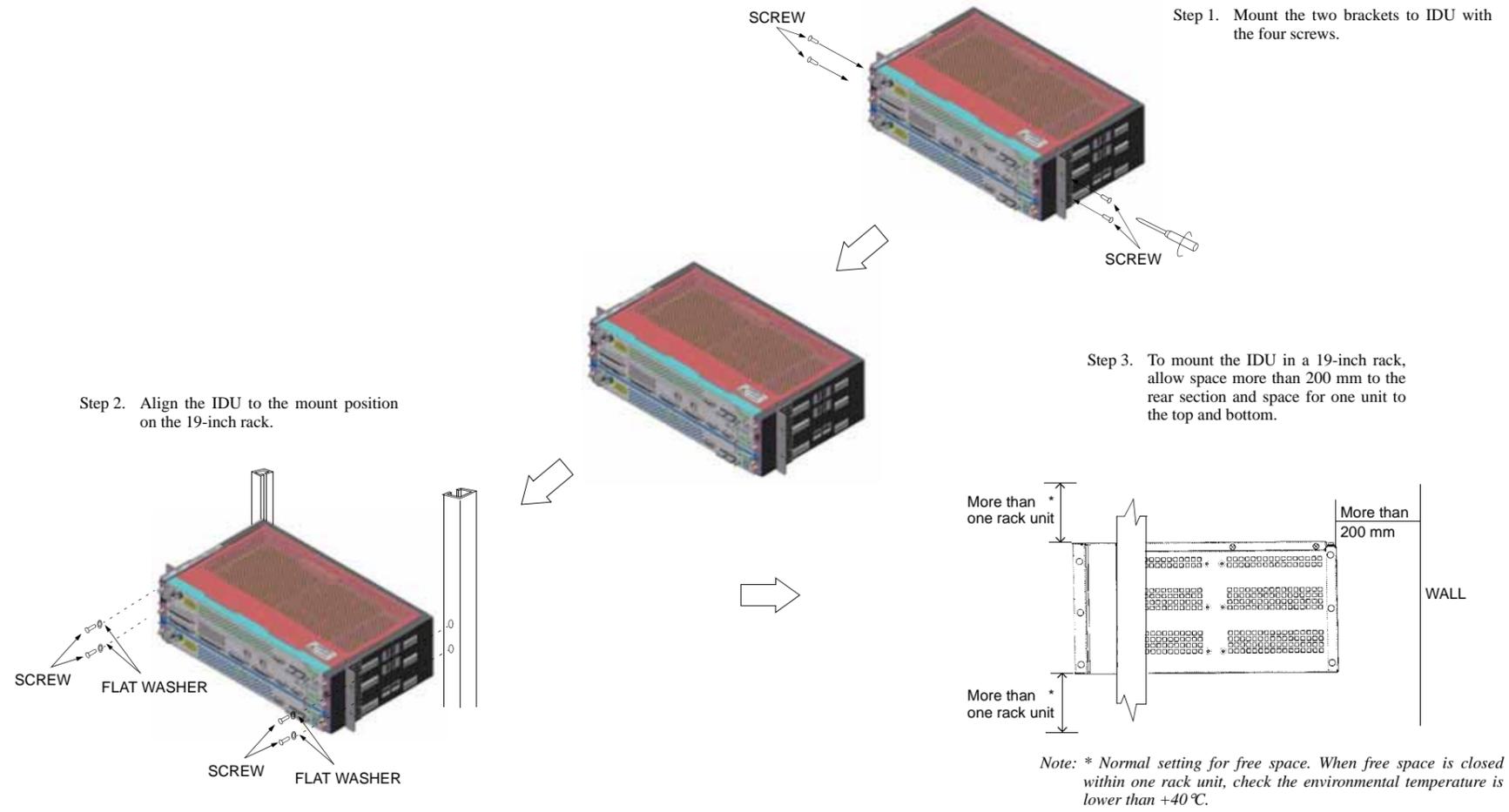
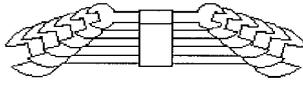
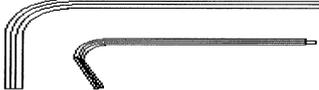
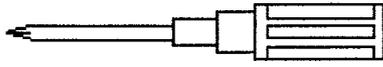
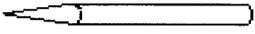
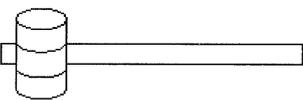
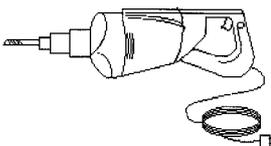


Fig. 4-2 (2/2) Mounting of IDU for 1+1 System

4.2 ODU Mounting

There are three types of mounting for the ODU: pole mounting, wall mounting and 19-inch rack mounting types. The tools for installation are listed in Table 4-1.

Table 4-1 Tools

	TOOLS	STANDARD	SKETCH
1	Torque wrench or Wrench set	M5, M6, M8, M10	
2	Hexagon wrench	M5, M6	
3	Screw driver	M2.6, M3, M4, M5	
4	Measure*	-	
5	Center punch*	-	
6	Hammer *	-	
7	Electric drill *	-	

*Note: * Used for wall mounting.*

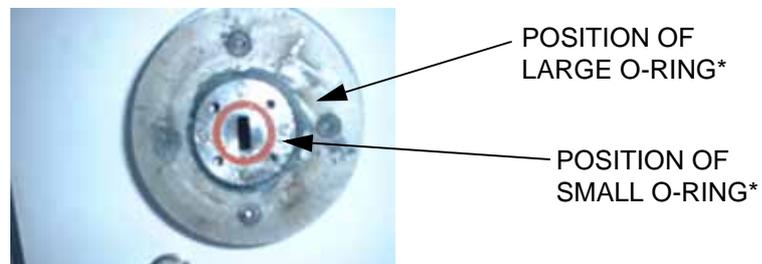
MOUNTING

How to use small and large O-rings

Caution: 1. How to use small and large O-rings are shown in the following table. Two (small and large) O-rings are attached in 18-38 GHz band Andrew/RFS direct mount antenna. 13/15 GHz band antenna does not have small O-ring (Small O-ring is not used for Andrew/RFS direct mount antenna). If the small O-ring is used for ODU direct mount installation, a gap may occur between ODU and antenna for RF interface. This may cause transmit or receive level down.

O-RING OF ATTACHEMENT OF ANTENNA	O-RING		REMARKS
	SMALL SIZE	LARGE SIZE	
ANT — ODU	Not used	Used	Antenna direct mounting
ANT — WG/ODU (18-38 GHz BAND)	Used	Not used	Waveguide connection

Note: 13/15 GHz antenna for direct mount is not possible to connect the ordinary waveguide flanges.



Notes: 1. * Do not use both small O-ring and large O-ring simultaneously.

2. Large O-ring size is different with frequency band as follows:



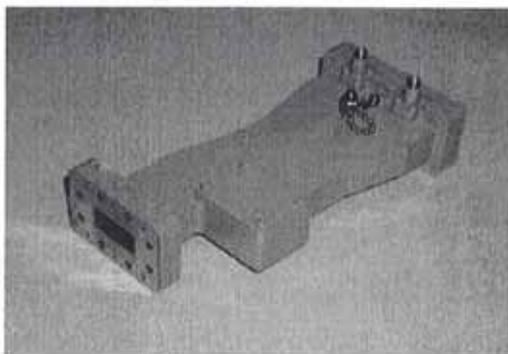
Caution: 2. Don't apply silicon grease to O-ring.

Fig. 4-3 O-ring Size

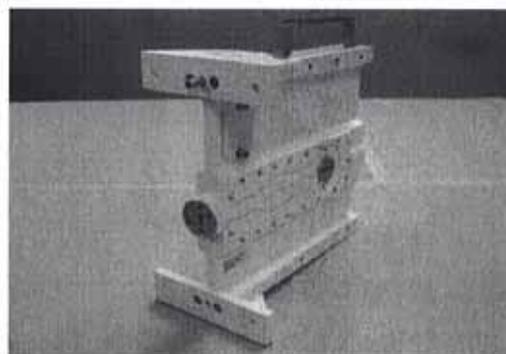
Hybrid Combiner/Divider

NEC has developed Hybrid Combiner/Divider over the full range of microwave frequencies for PASOLNK Series digital microwave radio point-to-point fixed wireless systems, This Hybrid Combiner/Divider comprises directional coupler, antenna interface, radio mounting interfaces and polarizers. The RF signal power received by the single polarized antenna is equally distributed and sent to two outdoor units through the Hybrid Combiner/Divider for 1+1 protected systems.

There are two types of NEC Hybrid Combiner/Divider, one is coaxial cable connection type for 7/8GHz Bands and the other is WG connection type for 11-38GHz Bands .NEC Hybrid Combiner/Divider is suited for Andrew or RFS Antenna, and all NEC ODUs.



7/8 GHz Hybrid



11 – 38 GHz Hybrid

SPECIFICATIONS

Freq. Band	Freq. Range [GHz]	Code No.	1-2 PORT Variation Max.(dB)	Loss Max. (dB)	Isolation Min.(dB)	VSWR Max.	Interface		Figure No.
							(ANT Side)	(Side)	
7G	7.125 - 7.9	G8546A	0.5	3.7	20	1.3	CPR112G /PDRB4	SMA Connector	1
		G9390A						N Connector	
8G	7.7 - 8.5	G8546B	0.5	3.7	20	1.3	CPR112G /PDRB4	SMA Connector	1
		G9390B						N Connector	
11G	10.7 - 11.7	G9051A	0.5	3.5	20	1.2	R100	R100	2
13G	12.75 - 13.25	G8451A	0.5	3.5	20	1.2	R140	R140	2
15G	14.5 - 15.35	G8452A	0.5	3.5	20	1.2	R140	R140	2
18G	17.7 - 19.7	G8453A	0.5	3.5	20	1.2	R220	R220	2
23G	21.2 - 23.6	G8454A	0.5	3.5	20	1.2	R220	R220	2
26G	24.5 - 26.5	G8455A	0.5	3.8	20	1.2	R260	R260	2
28G	27.5 - 29.5	G9245A	0.5	3.8	20	1.2	R260	R260	2
32G	31.8 - 33.4	G9389A	0.5	3.8	20	1.2	R320	R320	2
38G	37 - 39.5	G8456A	0.5	3.8	20	1.2	R320	R320	2

MOUNTING

4.2.1 Pole Mounting

Procedure for mounting and demounting are described below.

(a) Mounting

The method of mounting is listed in Table 4-2.

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

Table 4-2 Pole Mounting

POLE MOUNTING		
7/8 GHz BAND ODU	13-52 GHz BAND ODU	
	WAVEGUIDE TYPE	ANTENNA DIRECT MOUNTING TYPE
Coaxial Cable Type Fig. 4-4 *	With PBR adapter Fig4-5 (See Para 4.3 Waveguide Connection)	Fig. 4-10 and Fig. 4-11
—	—	(With HYB) Fig. 4-12

(b) Dismounting

For dismounting ODU (if necessary), use the following procedure.

<u>Step</u>	<u>Procedure</u>
-------------	------------------

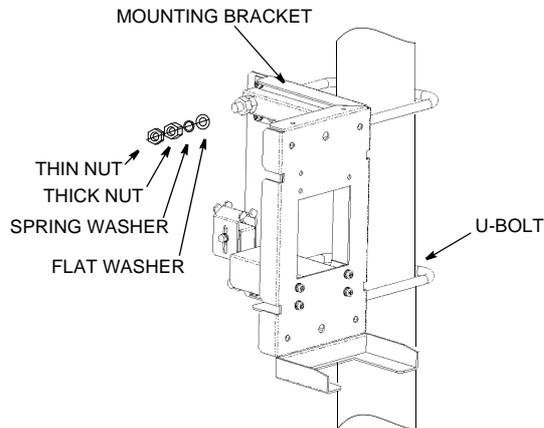
- | | |
|---|--|
| 1 | Remove the four fixed screws from the ODU, |
| 2 | Then dismount the ODU, |

Procedure for polarization change are described below.

Table 4-3 Polarization Change

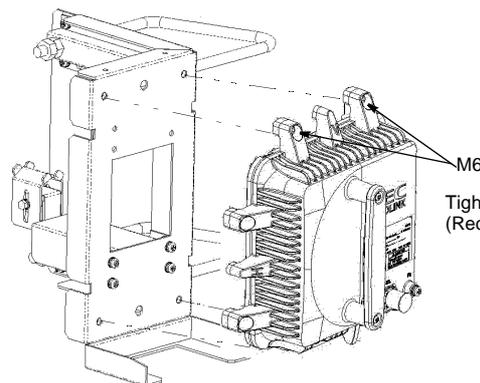
Polarization Change		
Antenna	ODU	HYB
Fig.4-6 Fig.4-7	Fig.4-9	Fig.4-8

7/8 GHz ODU MOUNTING (Connecting Coaxial Cable)



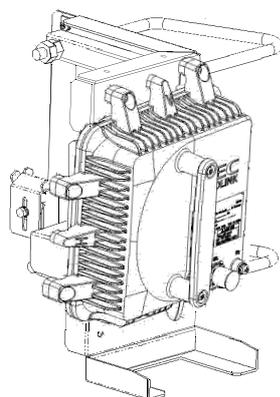
Step 1. Mount the bracket to the pole, point to the opposite station and tighten it with two U-bolts,

Note: The diameter of pole is from 48.5 to 114.5 millimeters.



Step 2. Mount the ODU on to the bracket and tighten four bolts (M6) at upper and lower parts of the ODU,

Tightening torque: 4.23 N-m (Recommended)

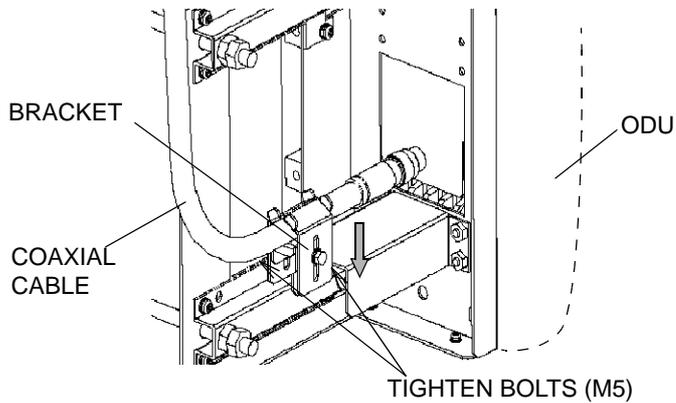


Step 3. Check that the ODU and the bracket are fixed firmly,

Caution: Before connecting the I/F cable between the IDU and ODU, using the circuit tester, check that the resistance of the I/F cable between center conductor and insulation is more than 100 MΩ.

Fig. 4-4 7/8 GHz Band ODU, Pole Mounting (1/3)

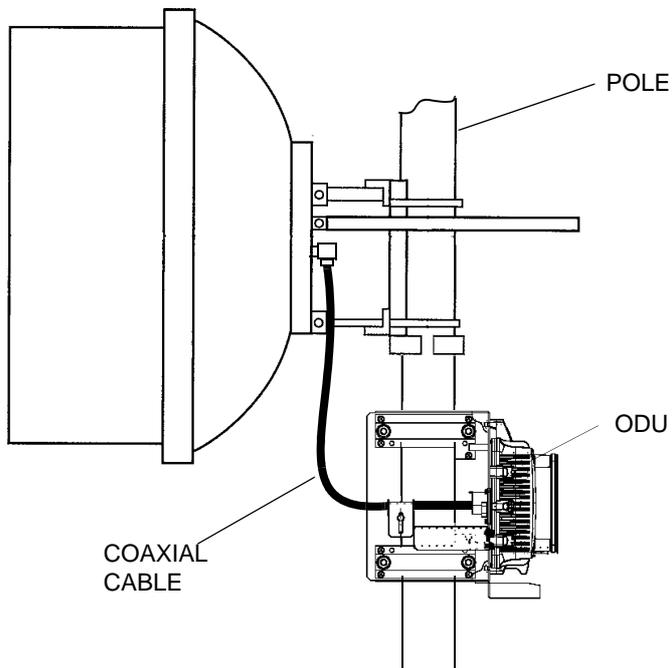
MOUNTING



Tightening torque: 3.14 N·m
(Recommended)

Step 4. Connect the Coaxial cable to the RF IN/OUT connector of the ODU,

Step 5. Down the cable fix bracket to fix the Coaxial cable, then tighten the two bolts,



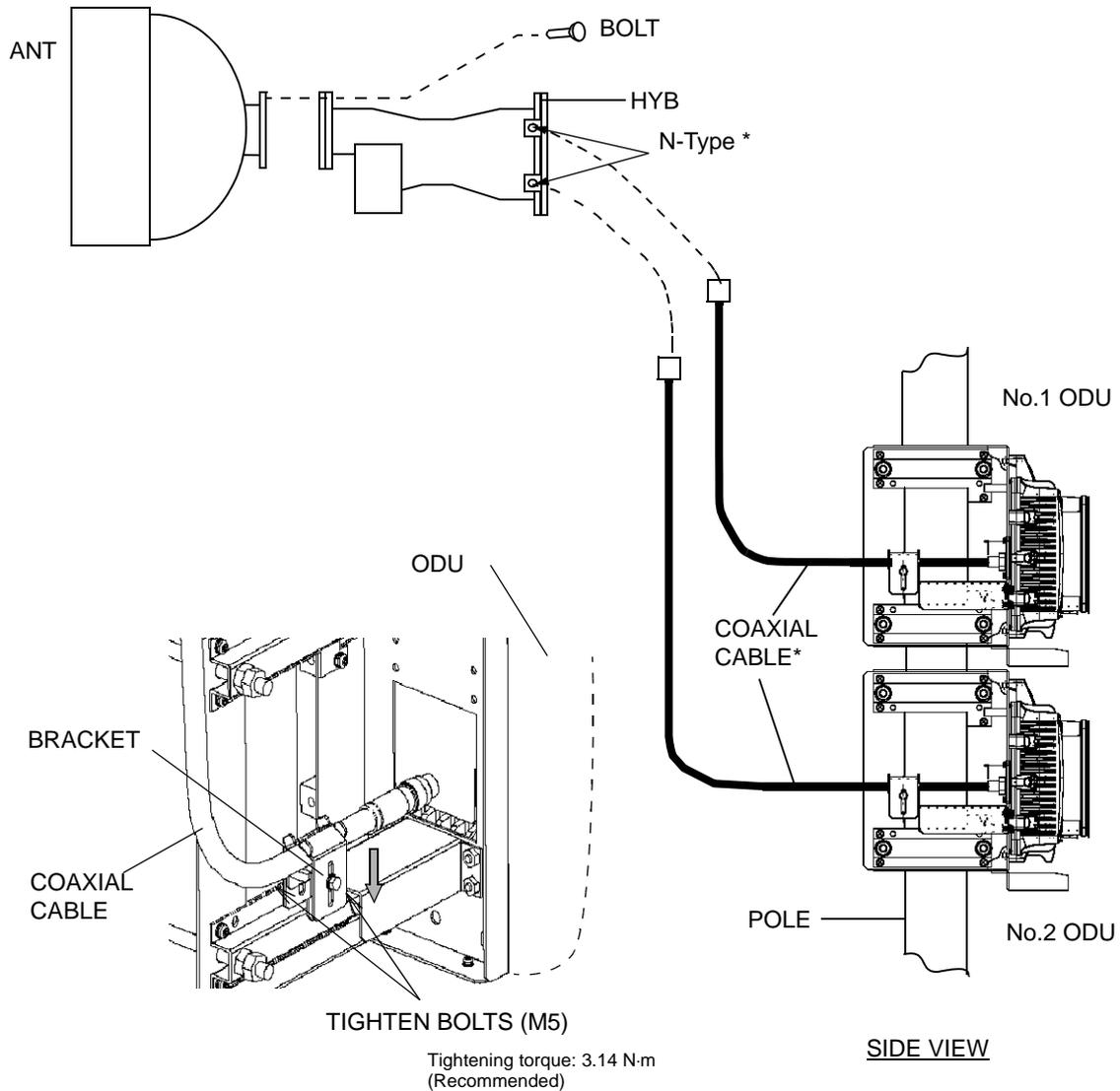
Step 6. Install the Coaxial cables between the antenna and ODU.

Note: Fix the coaxial cable to the pole or member with cable hanger or cable ties after antenna orientation has been completed.

Caution: *Wrap the coaxial cable connection points with a self-bonding tape for waterproof.*

Fig. 4-4 7/8 GHz Band ODU, Pole Mounting (2/3)

MOUNTING



*Note: * When coaxial cable with SMA connector is used, the connectors are supplied by NEC.*

Caution: Wrap the coaxial cable connection points with a self-bonding tape for waterproof.

USING HYB FOR 1+1 SYSTEM

Fig. 4-4 7/8 GHz Band ODU, Pole Mounting (3/3)

MOUNTING

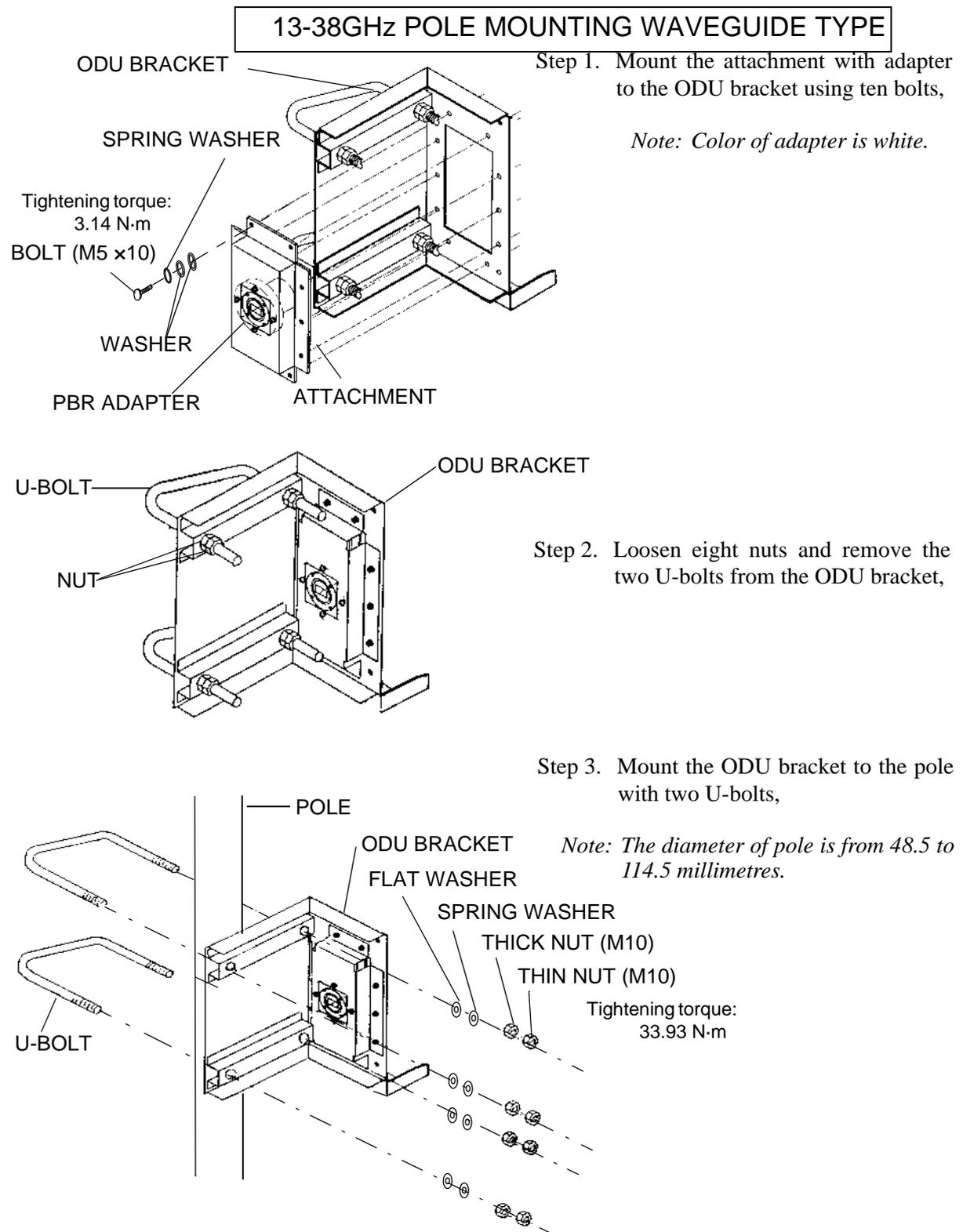


Fig. 4-5 Pole Mounting Bracket for 13-38 GHz Waveguide Connection, Assembling

ANTENNA POLARIZATION CHANGE

Note: The details are referred to the installation manual which is attached to the antenna.

ANTENNA

Step 1. Keep the antenna stand horizontally,



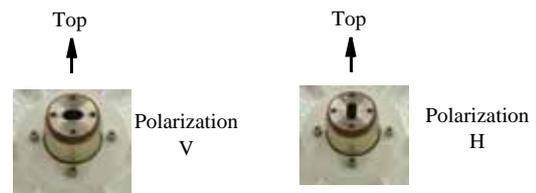
Step 2. Loosen screws with Allen wrench,



Note: Do not remove the screw complete from the screw hole.

Hold the feed horn with hand.

Step 3. Holding the feed horn with hand, rotate the feed horn by 90 degrees,



Step 4. Fix the feed horn, with screws that were loosened in step 2,



Fig. 4-6 Antenna Polarization Change (Example)

MOUNTING

ANTENNA DIRECT MOUNTING POLARIZATION CHANGE

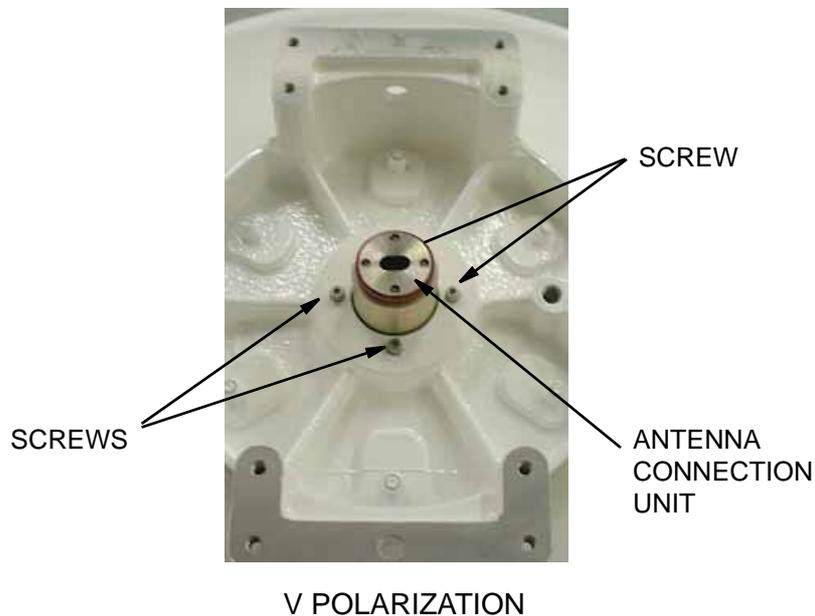
Step

Procedure

Note: -The details are referred to the installation manual which is attached to the antenna.

-The antenna is set to V-polarization when shipped from the factory.

- 1 If you change to H polarization, loosen the four screws with the Allen key wrench and then rotate the antenna connection unit, keeping the antenna stand horizontal.



Note: A large and a small gasket are included in the antenna package. Please use the large one (The small gasket is not used in antenna mount).

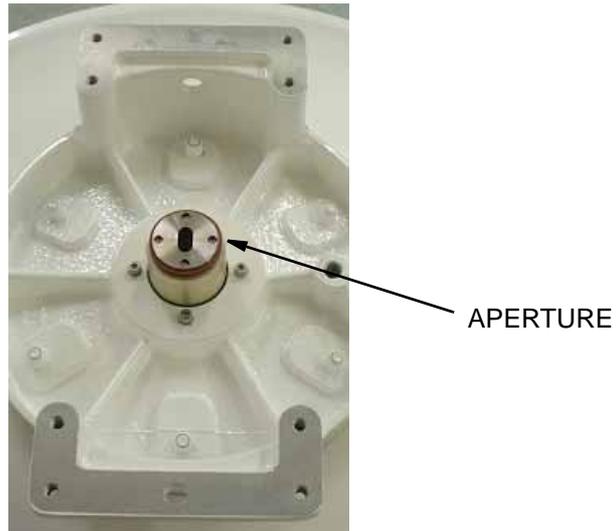
Fig. 4-7 13-38 GHz Band ODU Antenna Polarization Change for Direct Mounting (1/2)

MOUNTING

Step

Procedure

- 2 Check that the aperture part of the connection unit is rotated by 90 degrees, then fix it with the screws that were loosened in step 1.



H POLARIZATION

Fig. 4-7 13-38 GHz Band ODU Antenna Polarization Change for Direct Mounting (2/2)

MOUNTING

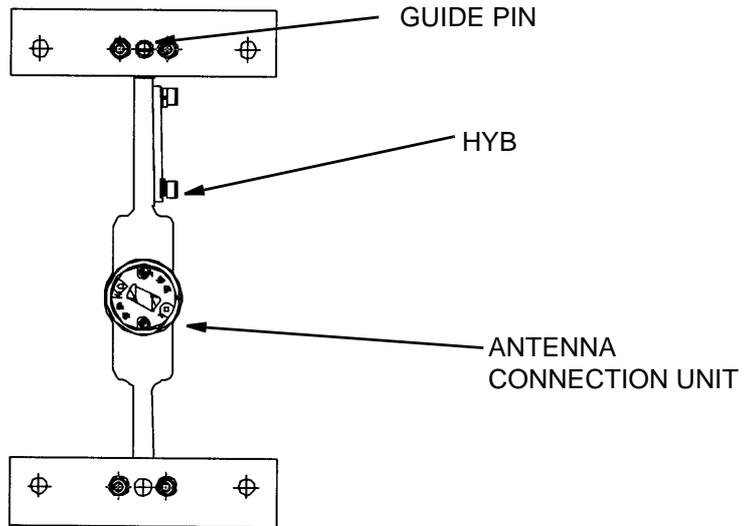
HYBRID POLARIZATION CHANGE

Step

Procedure

Note: The hybrid is set to V-polarization when shipped from the factory.

- 1 If you change to H polarization, loosen two screws, rotate the antenna connection unit and put the HYB horizontally.



V POLARIZATION

- 2 Check that aperture of the connection unit is rotated as shown below, then fix it with the two screws that were loosened in step 1.

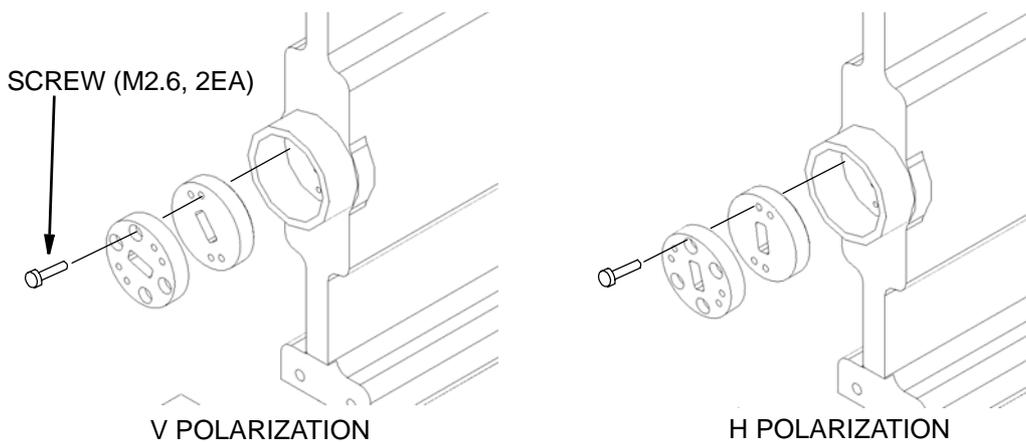


Fig. 4-8 13-38 GHz Band HYBRID Polarization Change

ODU POLARIZATION CHANGE

GUIDE PIN

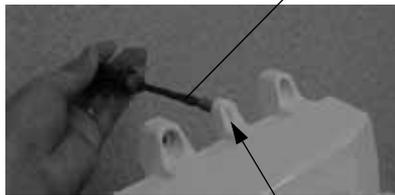


PLATE MARKED WITH V

Step 1. When vertical polarization is required, rotate the ODU so as to go up the plate marked V,

Step 2. When horizontal polarization is required, remove the guide pin fixed on the plate marked with V,

GUIDE PIN

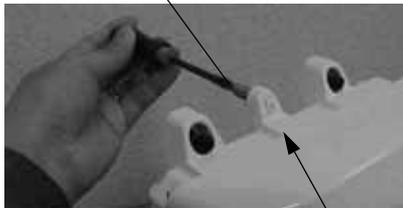


PLATE MARKED WITH H

Step 3. Screw in the guide pin removed in step 2 to the screw hole of the plate marked H,

Step 4. Rotate the ODU so as to go up the plate marked H,

Note: When the ODU is mounted on to the NEC HYB, only V polarization is applied.

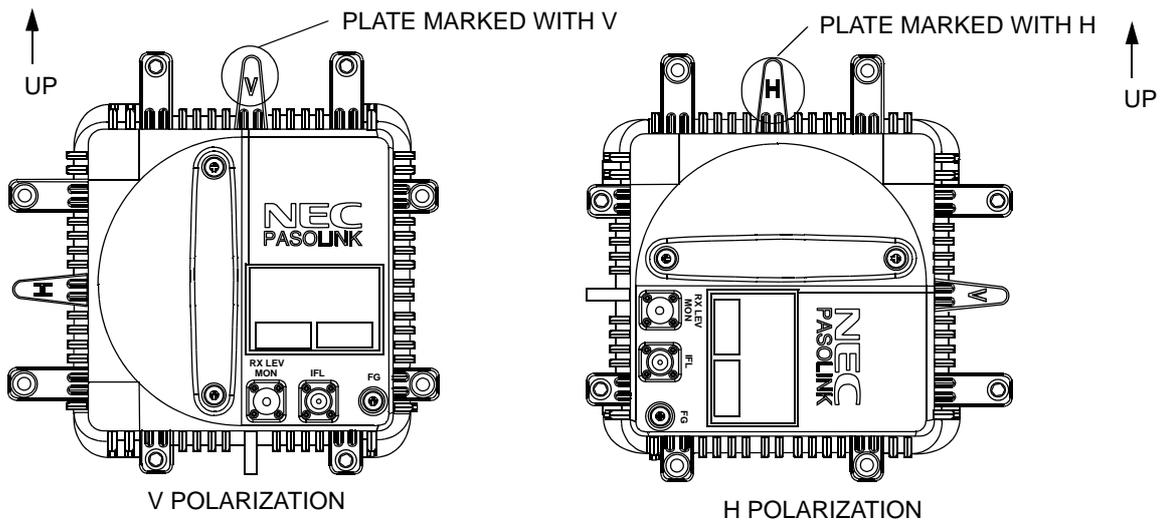


Fig. 4-9 13-38 GHz Changing V/H Polarization for Antenna/HYB Direct Mounting ODU

MOUNTING

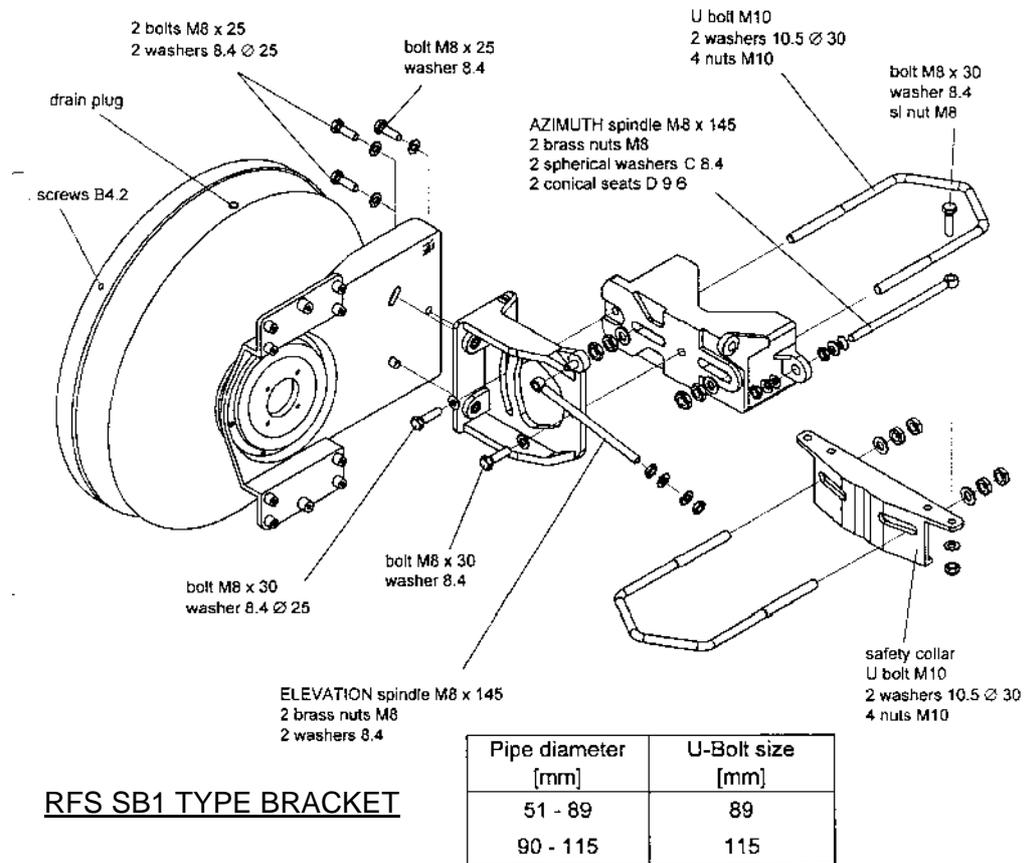
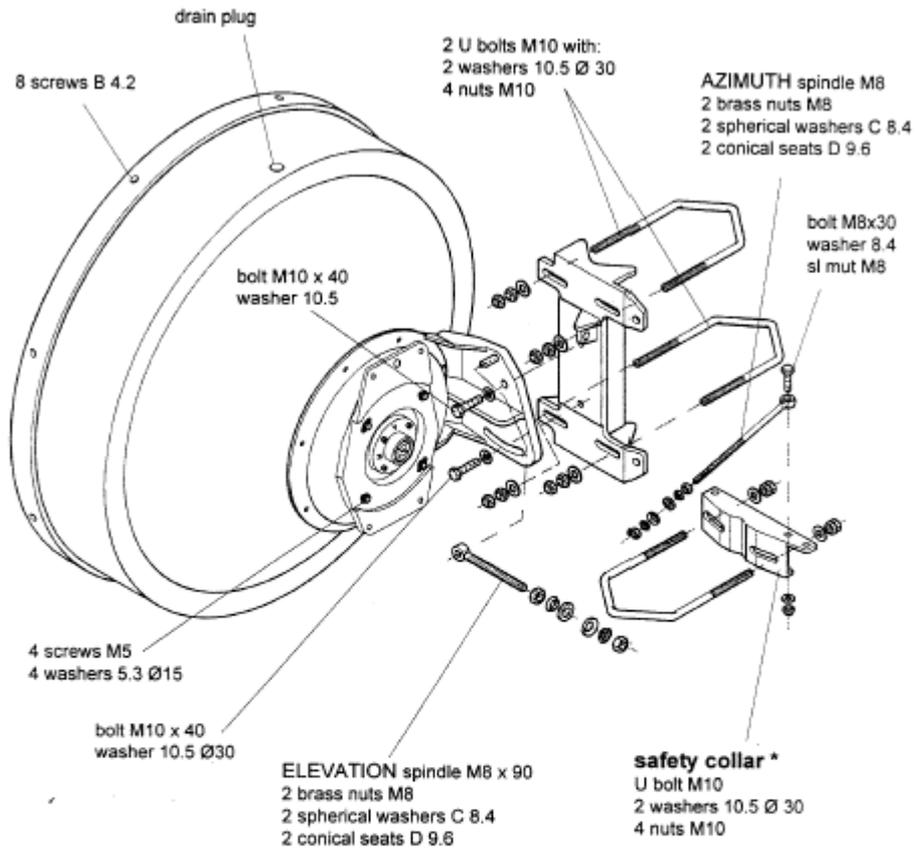


Fig. 4-10 13-38 GHz Band ODU Antenna Direct Mounting (2/6)

MOUNTING



* safety collar (on request)

Pipe diameter [mm]	Bolt size [mm]
48 - 51	51 (optional)
52 - 89	89
90 - 115	115 (standard)

RFS SB2 TYPE BRACKET

Fig. 4-10 13-38 GHz Band ODU Antenna Direct Mounting (3/6)

MOUNTING

<u>Step</u>	<u>Procedure</u>
3	Fix the ODU to the bracket by tightening the M6 screws (four locations),

*Notes: 1. Figure shows V polarization.
2. Be careful not to damage the O-ring (Antenna).
3. The tightening torque is 4.0 N-m \pm 10%.*

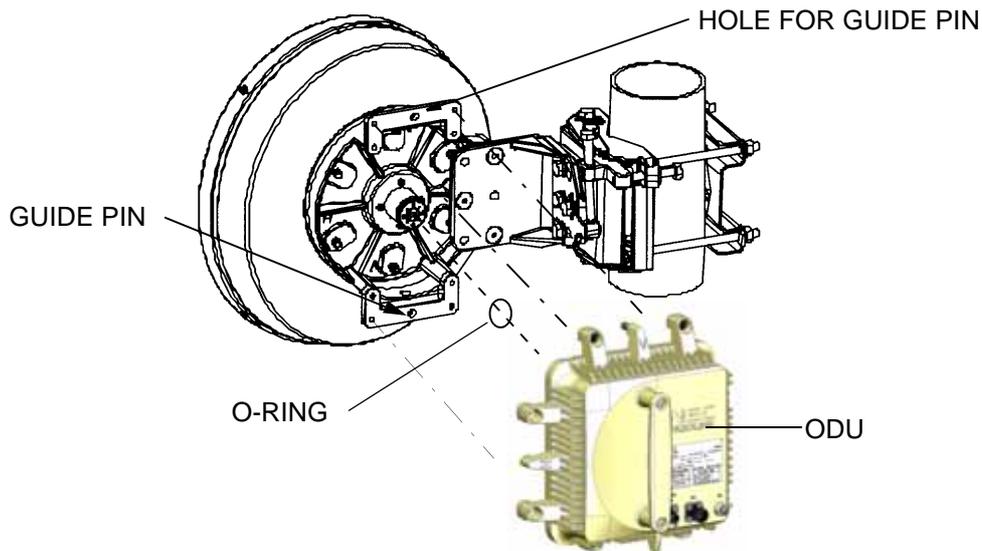
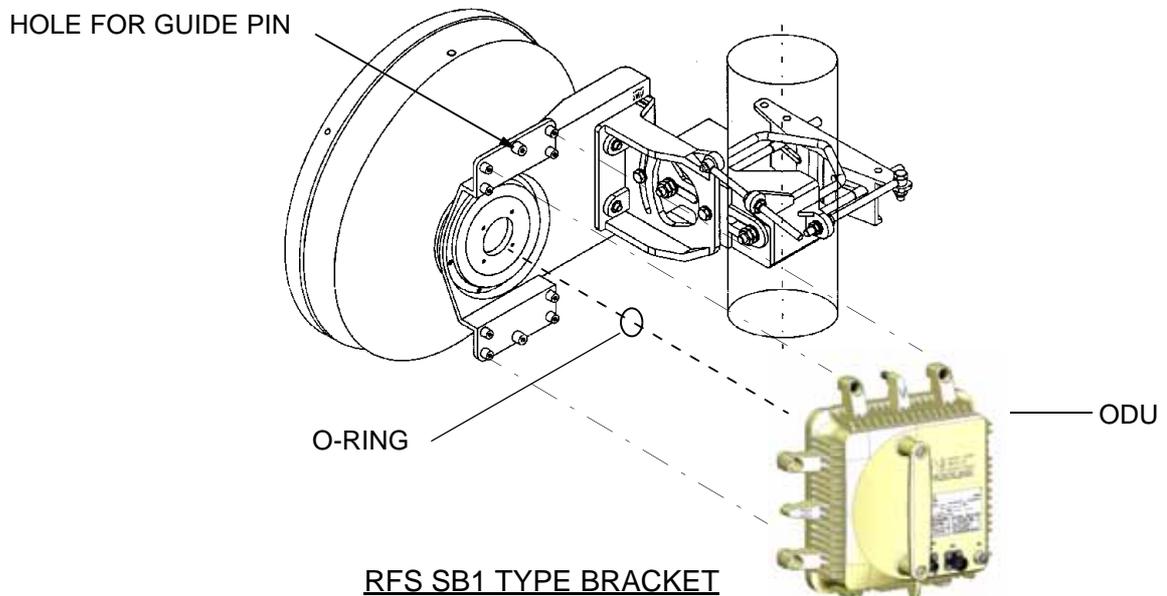


Fig. 4-10 13-38 GHz Band ODU Antenna Direct Mounting (4/6)

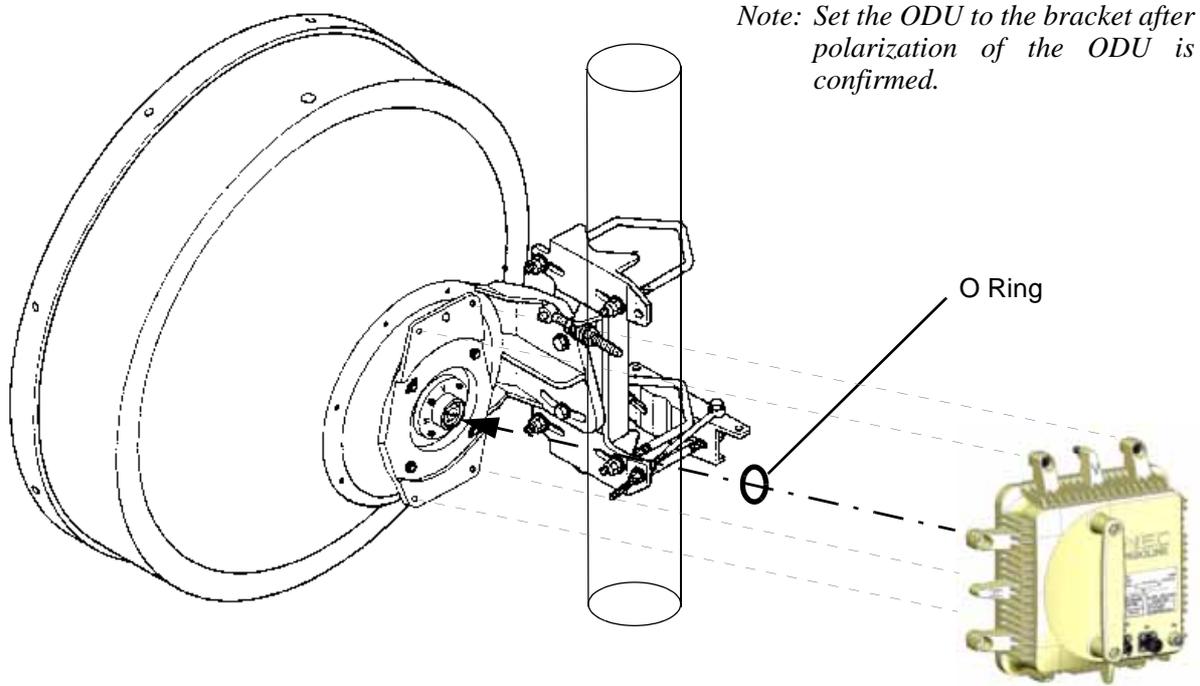


RFS SB1 TYPE BRACKET

*Notes: 1. Figure shows V polarization.
2. Be careful not to damage the O-ring (Antenna).
3. The tightening torque is 4.0 N-m \pm 10%.*

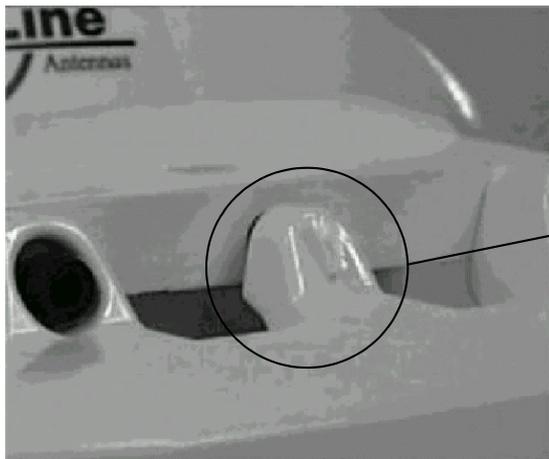
Fig. 4-10 13-38 GHz Band ODU Antenna Direct Mounting (5/6)

MOUNTING



- Notes: 1. Figure shows V polarization.
2. Be careful not to damage the O-ring (Antenna).
3. The tightening torque is $4.0 \text{ N}\cdot\text{m} \pm 10\%$.

Fig. 4-10 13-38 GHz Band ODU Antenna Direct Mounting (6/6)



Step 4. Insert guide pin on the hole of bracket to set the position of screws,

Fig. 4-11 Mounting of ODU for Antenna Direct Mounting Type (1/3)

MOUNTING

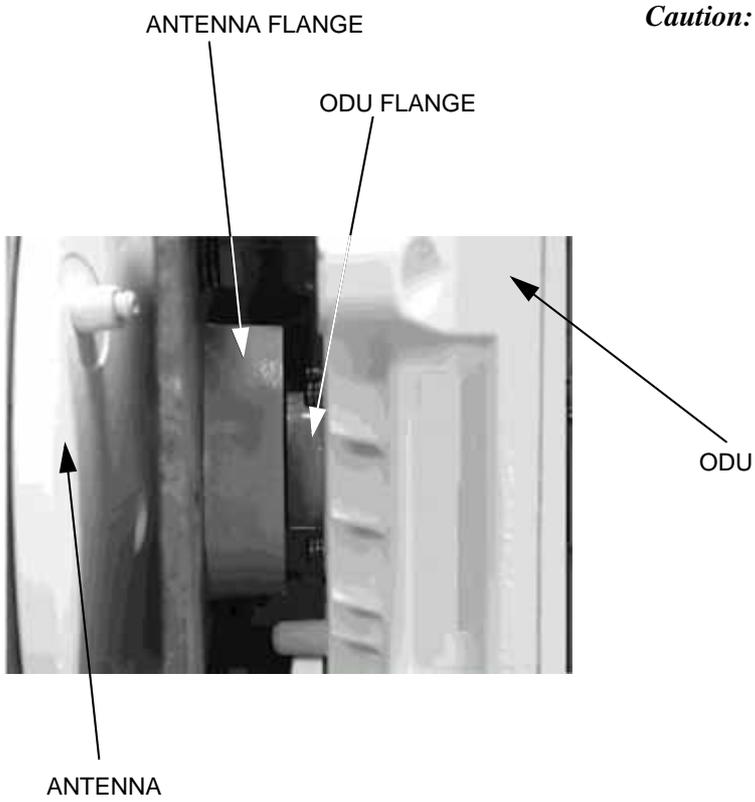


Fig. 4-11 Mounting of ODU for Antenna Direct Mounting Type (2/3)

MOUNTING

Step 5. Fix the ODU to the bracket with four screws.

Note: Torque: 4.23 N·m

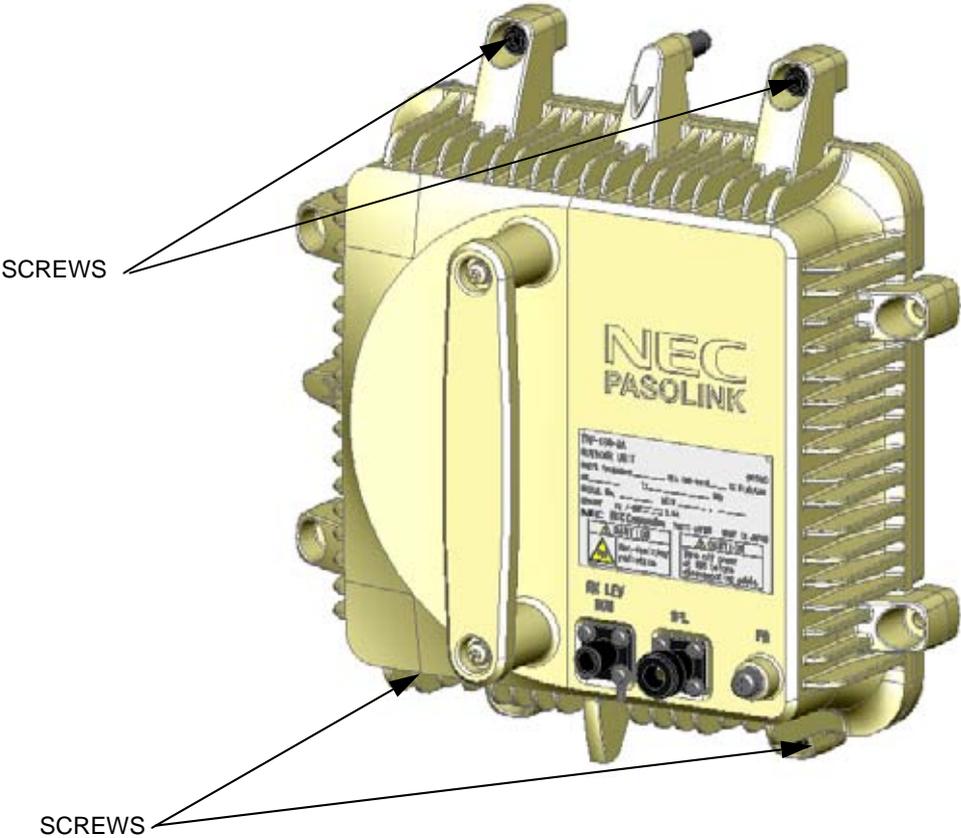
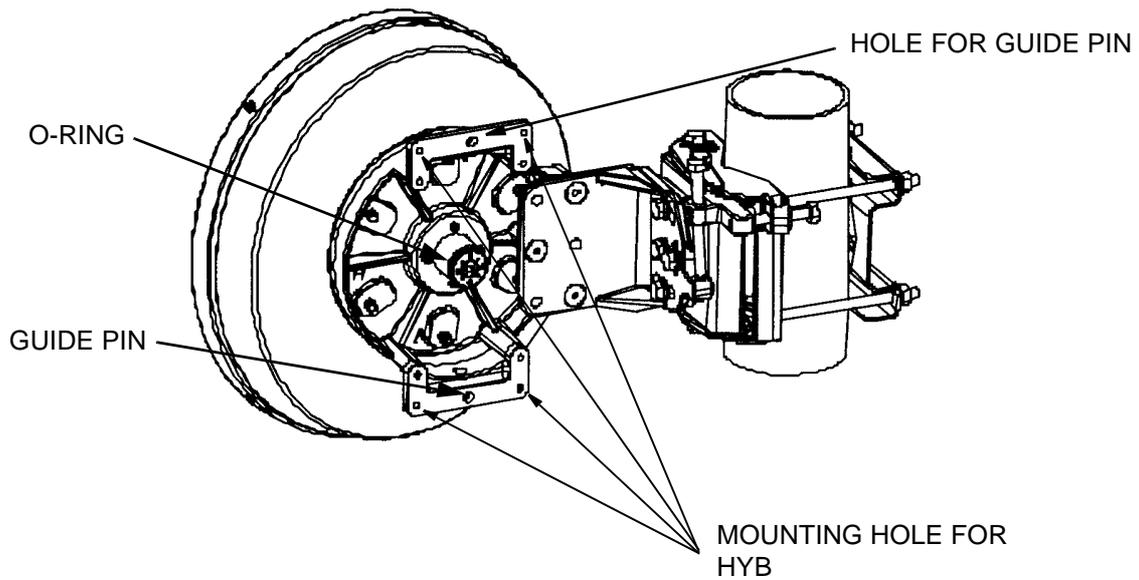


Fig. 4-11 Mounting of ODU for Antenna Direct Mounting Type (3/3)

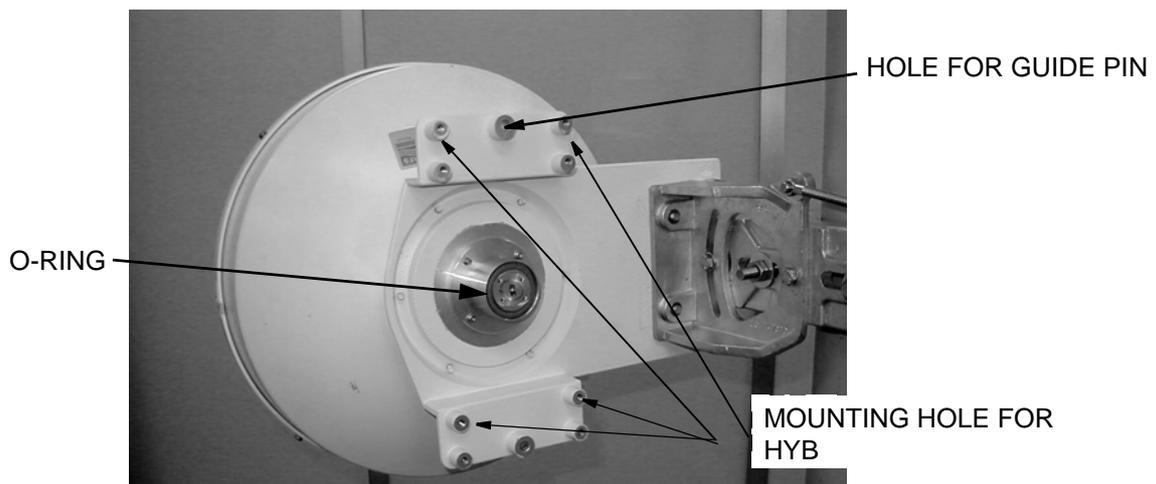
ANTENNA DIRECT MOUNTING WITH HYB

Note: The details are referred to the installation manual which is attached to the antenna.



*The tightening torque is 4.0 N·m ± 10%.
Be careful not to damage the O-ring(Antenna).*

ANDREW VHLP TYPE BRACKET



*Note: The tightening torque is 4.0 N·m ± 10%.
Be careful not to damage the O-ring (Antenna).*

RFS SB1 TYPE BRACKET

Fig. 4-12 13-38 GHz Band ODU Mounting Using NEC Hybrid (1/3)

MOUNTING

- | <u>Step</u> | <u>Procedure</u> |
|-------------|---|
| 4 | Insert the O-rings to the two ODU ports of the HYB. |
| 5 | Fix the two ODUs with hex screws (four locations) using the Allen key wrench. |

Note: Be careful not to damage the O-rings (Hybrid).

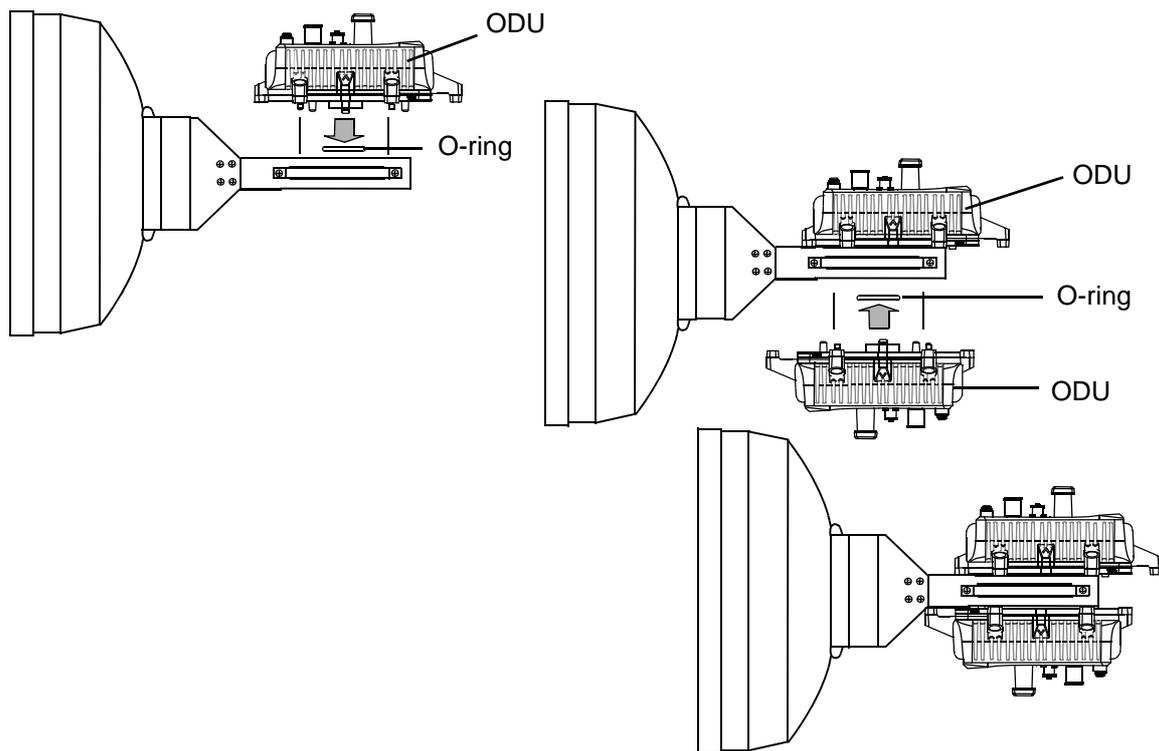


Fig. 4-12 13-38 GHz Band ODU Mounting Using NEC Hybrid (3/3)

4.2.2 Wall Mounting

Procedure for mounting and demounting are described below.

(a) Mounting

The method of mounting is listed in Table 4-4.

Table 4-4 Wall Mounting

Notes	WALL MOUNTING
1	Fig. 4-14
2	Fig. 4-15

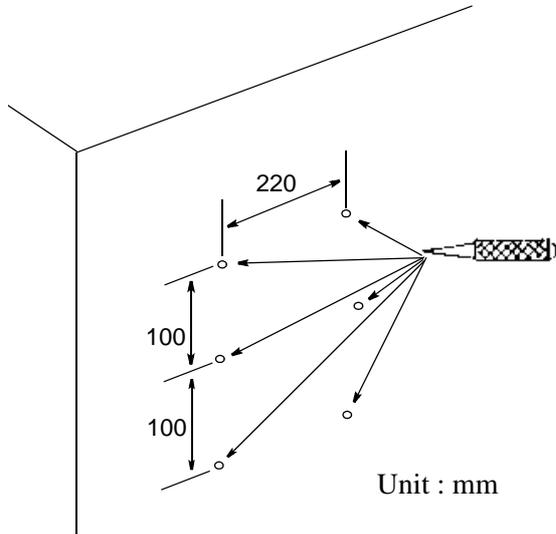
1. *When the ODU is mounted on the opposite side, reassemble the bracket to the right position by the procedure described in Fig. 4-16.*
2. *7/8 GHz band ODU does not apply for waveguide interface.*

(b) Demounting

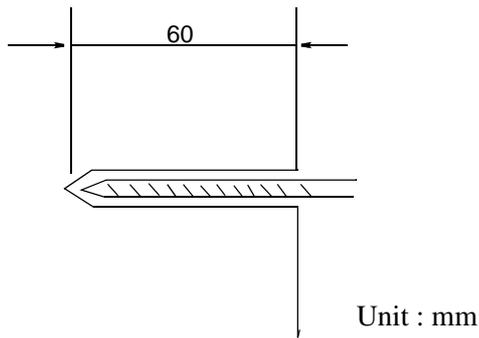
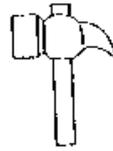
For demounting ODU (if necessary), use the following procedure.

<u>Step</u>	<u>Procedure</u>
1	Remove the four fixed bolts from the ODU,
2	Then demount the ODU.

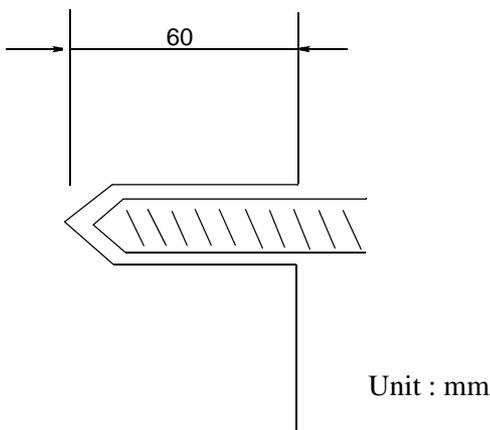
MOUNTING



Step 1. Using a center punch and hammer, mark the ODU wall for drilling holes with dimensions shown at left,



Step 2. Using an electric drill, drill the guide holes ($\phi 4.8$),

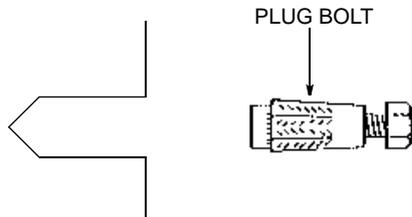


Step 3. Also,drill the specified holes ($\phi 18$),

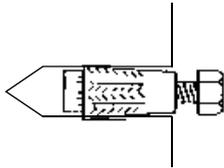
Fig. 4-14 ODU, Waveguide Type of Wall Mounting (1/2)

MOUNTING

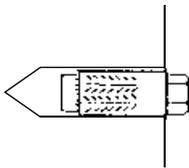
Step 4. Remove debris from the specified hole and insert a plug-bolt into it,



Step 5. Make sure to insert the plug-bolt fully,



Step 6. Screw the bolt using a wrench or monkey wrench,



Step 7. Remove the bolt only.

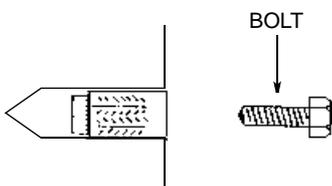


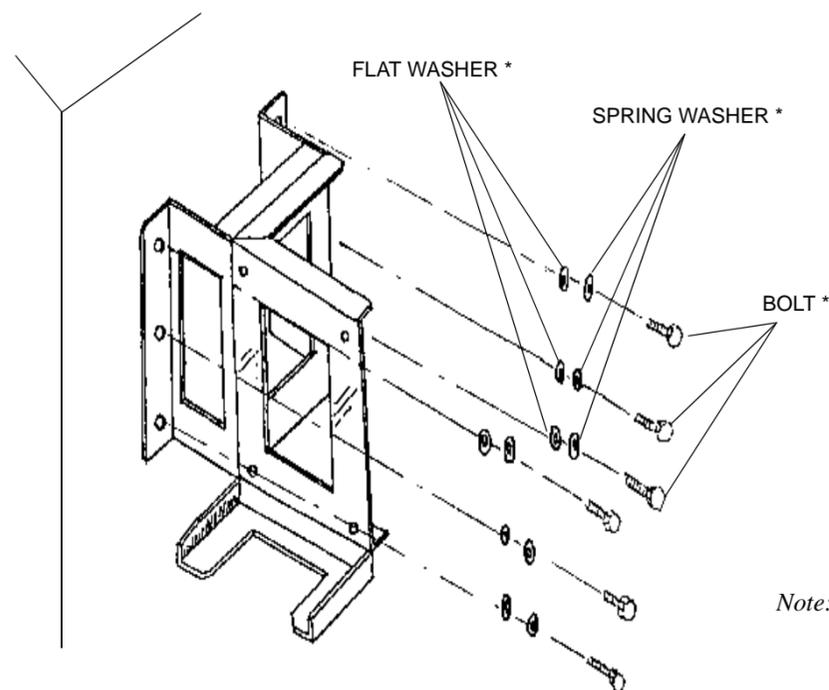
Fig. 4-14 ODU, Waveguide Type of Wall Mounting (2/2)

MOUNTING

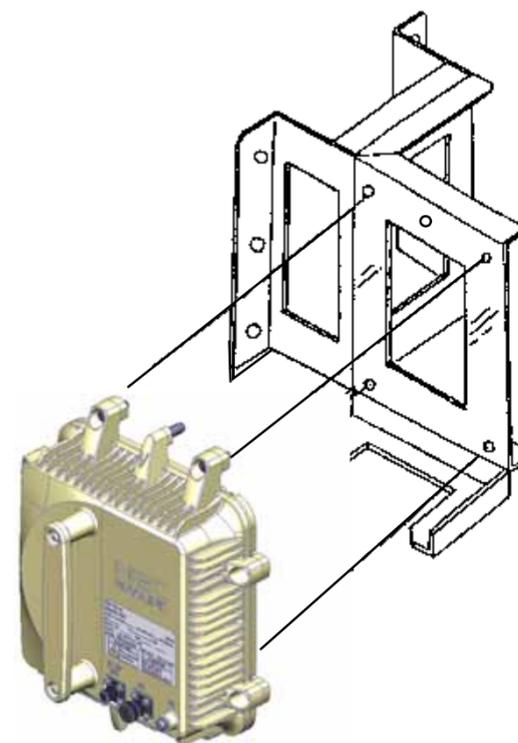
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Step 1. Fix the wall mounting bracket to the wall with the six bolts (M6).

Note: When the ODU is mounted on the opposite side, reassemble the ODU to the right position by the procedure described in Fig. 4-16.



Step 2. Mount the ODU on the mounting bracket with four bolts (M6) on the ODU, after the guide pin of the ODU and the guide hole of the bracket is matched.



Note: Tighten to 4.23 N-m torque. (Recommended)

*Note: *Anchor bolts of 10 mm dia. shall be prepared by the customer.*

Step 3. Check that the ODU and mounting bracket are fixed firmly and vertically.

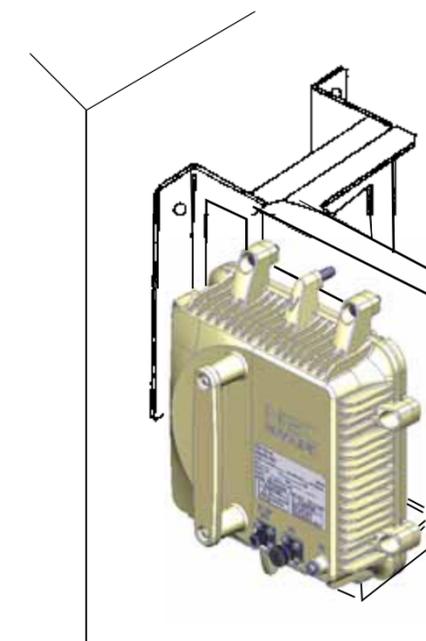
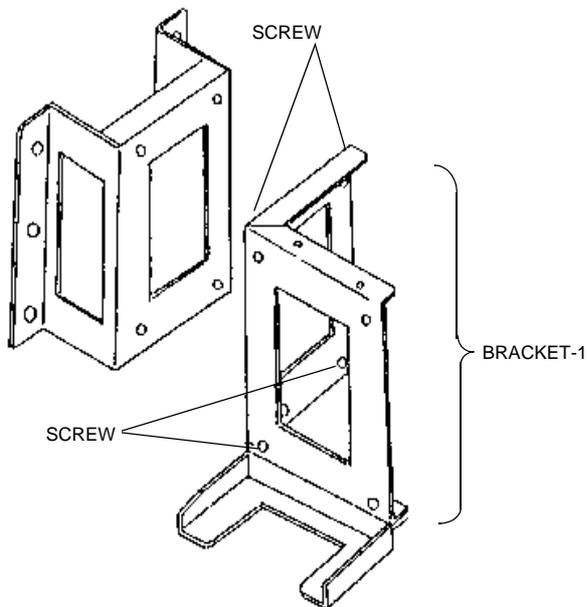


Fig. 4-15 ODU, Waveguide Type of Wall Mounting

MOUNTING

Step 1. Loosen four screws, remove bracket-1 from wall mounting type bracket,



Step 2. Loosen two screws, remove bracket-2 from the bracket-1,

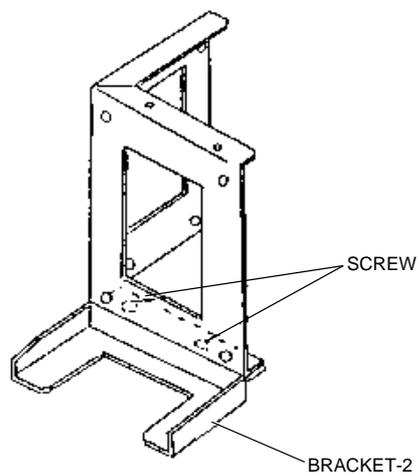
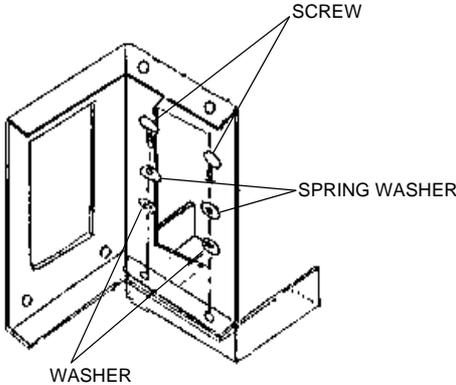
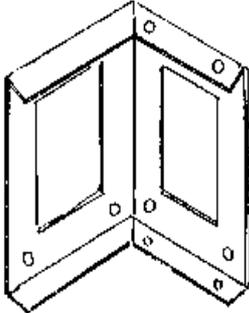


Fig. 4-16 Wall Mounting Bracket, Reassembly (1/2)

MOUNTING

Step 3. Turn the bracket-1 as shown at left,



Step 4. Mount the bracket shown at left with four screws.

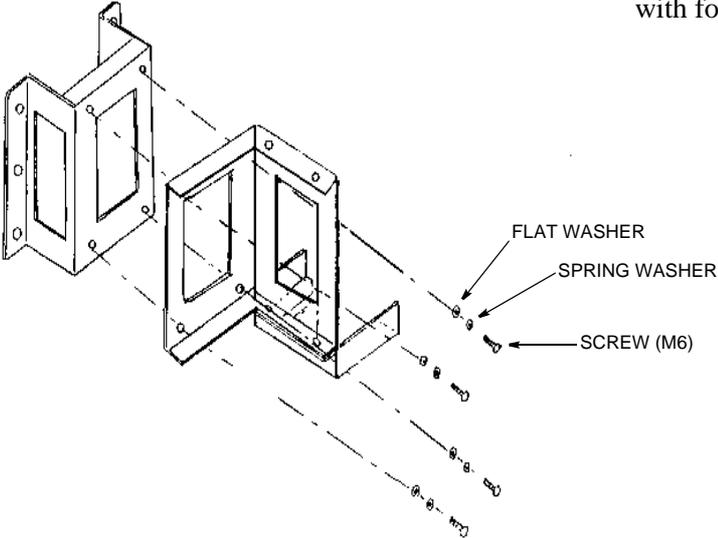


Fig. 4-16 Wall Mounting Bracket, Reassembly (2/2)

4.2.3 19-inch Rack Mounting

Procedure for mounting and demounting are described below.

(a) Mounting

The method of mounting is shown in Fig. 4-17.

(b) Demounting

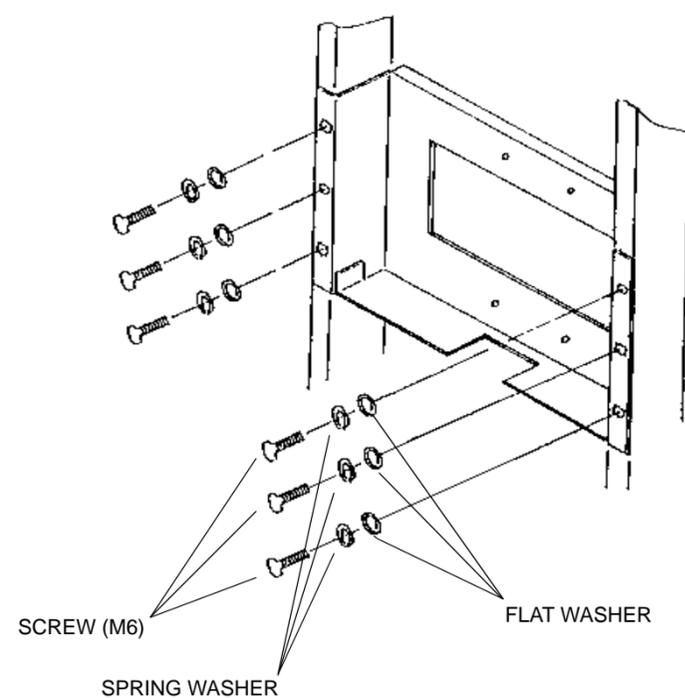
For demounting ODU (if necessary), use the following procedure.

<u>Step</u>	<u>Procedure</u>
1	Remove the four fixed bolts from the ODU,
2	Then demount the ODU.

MOUNTING

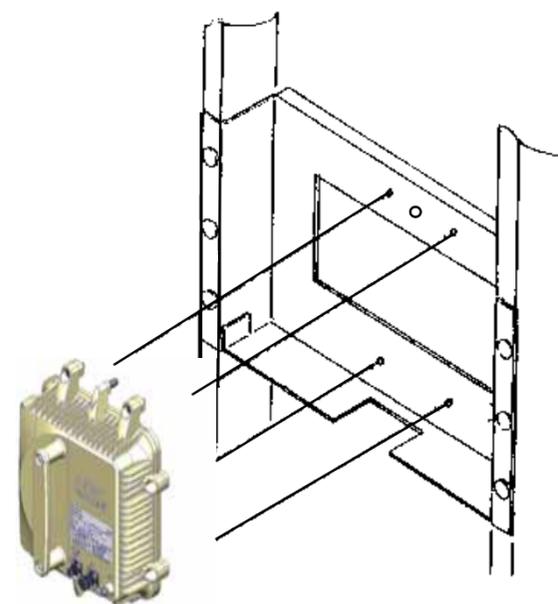
(This page is intentionally left blank)

Step 1. Fix the bracket on the 19-inch rack with six fixing screws.



Step 2. Mount the ODU on the bracket with four fixing screws after the guide pin of the guide holl of the bracket is matched.

Note: Tighten to 4.23 N·m torque. (Recommended)



Step 3. Check that the ODU and mounting bracket are fixed firmly, and vertically.

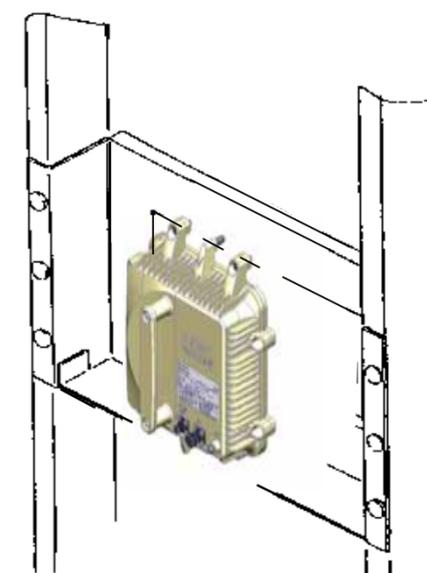


Fig. 4-17 ODU, 19-inch Rack Mounting

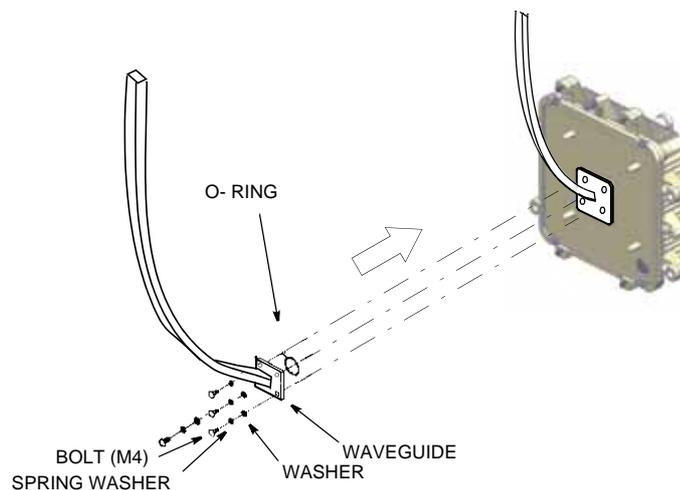
4.3 Waveguide Connection

The connection method of the waveguide type ODU is described in following procedure.

<u>Step</u>	<u>Procedure</u>
1	Insert the O-ring to the flange face of the ODU.
2	Conect the waveguide to the ODU, fix the waveguide to the ODU with four bolts. (M4).

Note: -Be careful not to damage the O-ring.

-Four bolts are tightened so that there is space on the flange face by even torque.



Notes: 1. Use suitable flange adapter between ODU and waveguide depending on the waveguide type.

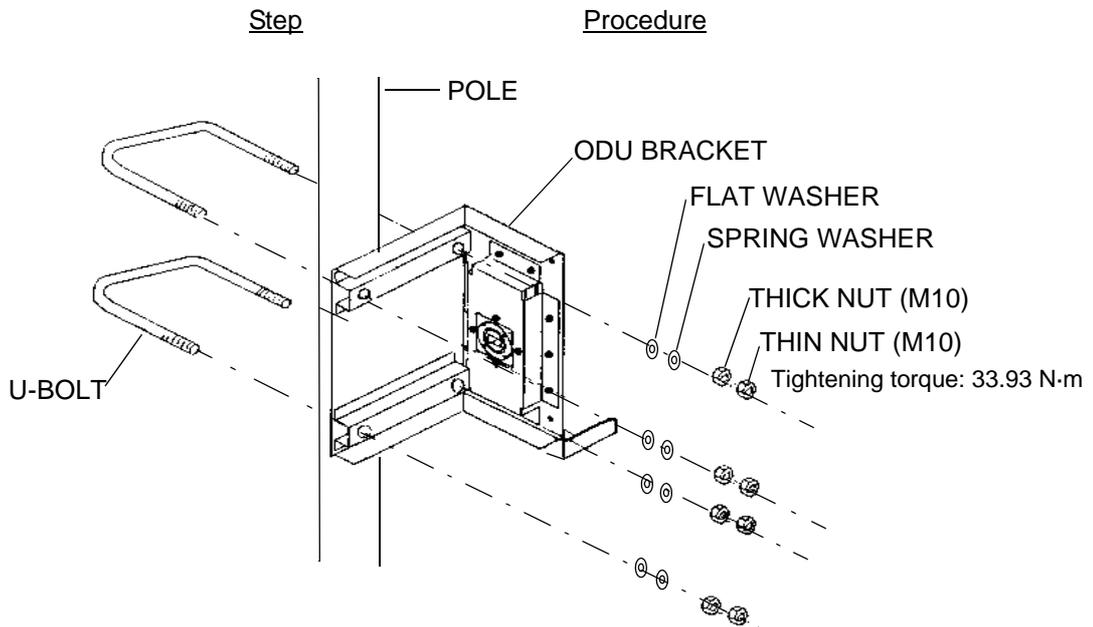
2. Connection of the waveguide is the same way as ODU is wall mounted or 19-inch rack mounted.

The connection method of the antenna direct mounting type ODU is referred to the following procedure.

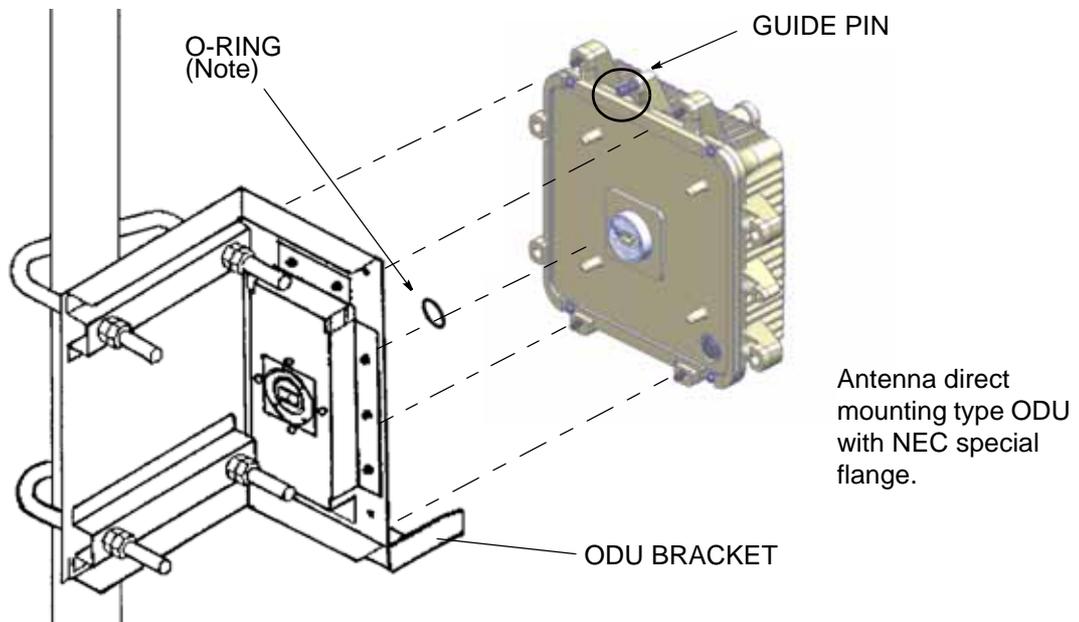
<u>Step</u>	<u>Procedure</u>
1	Mount the ODU bracket to the pole with two U-bolts,

Note: The diameter of the pole is from 48.5 to 114.5 millimeters.

MOUNTING



- 2 Mount the ODU to the ODU bracket with attached four bolts (Align the guide pins on the ODU and the guide holes on the bracket),



Note: Be careful not to damage the O-ring.

- 3 Make sure that the ODU and the ODU bracket are fixed at specified values.

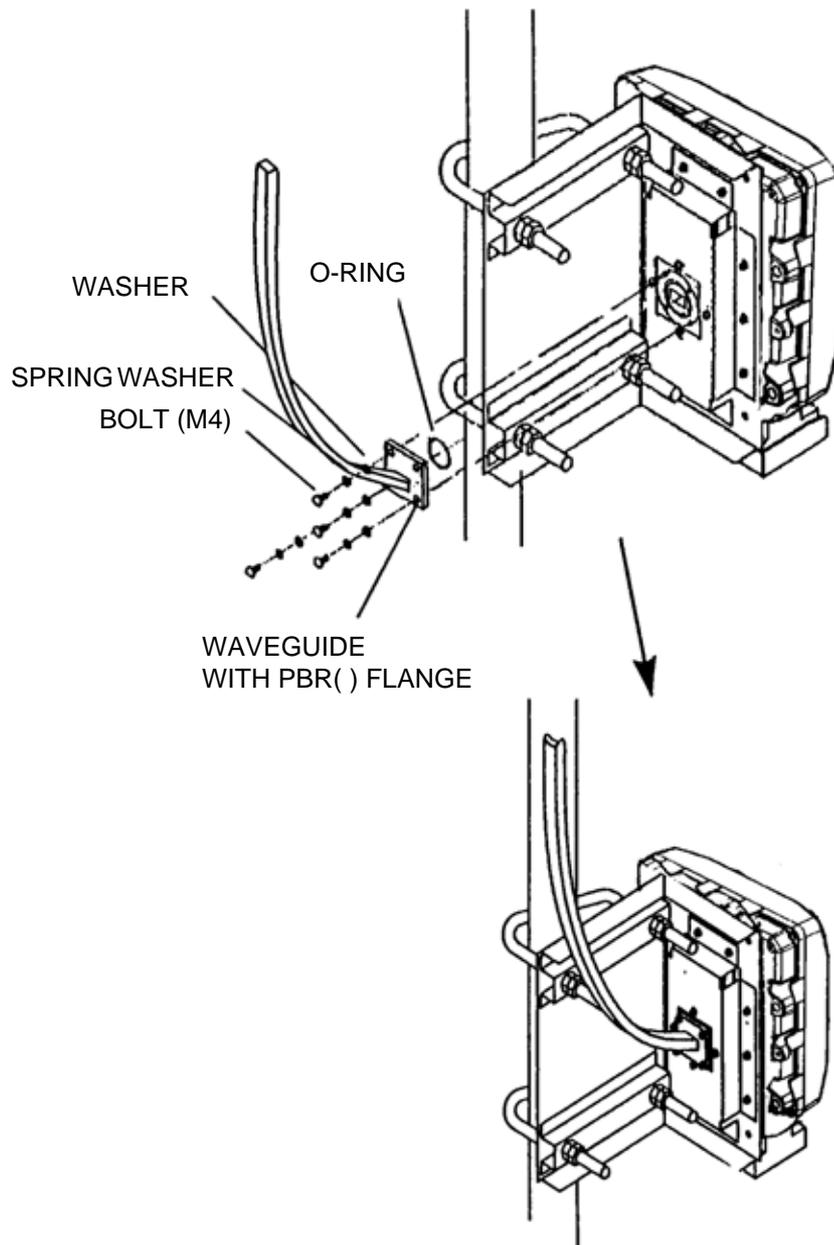
MOUNTING

Step

Procedure

- 4 Mount the waveguide to the ODU with four bolts.

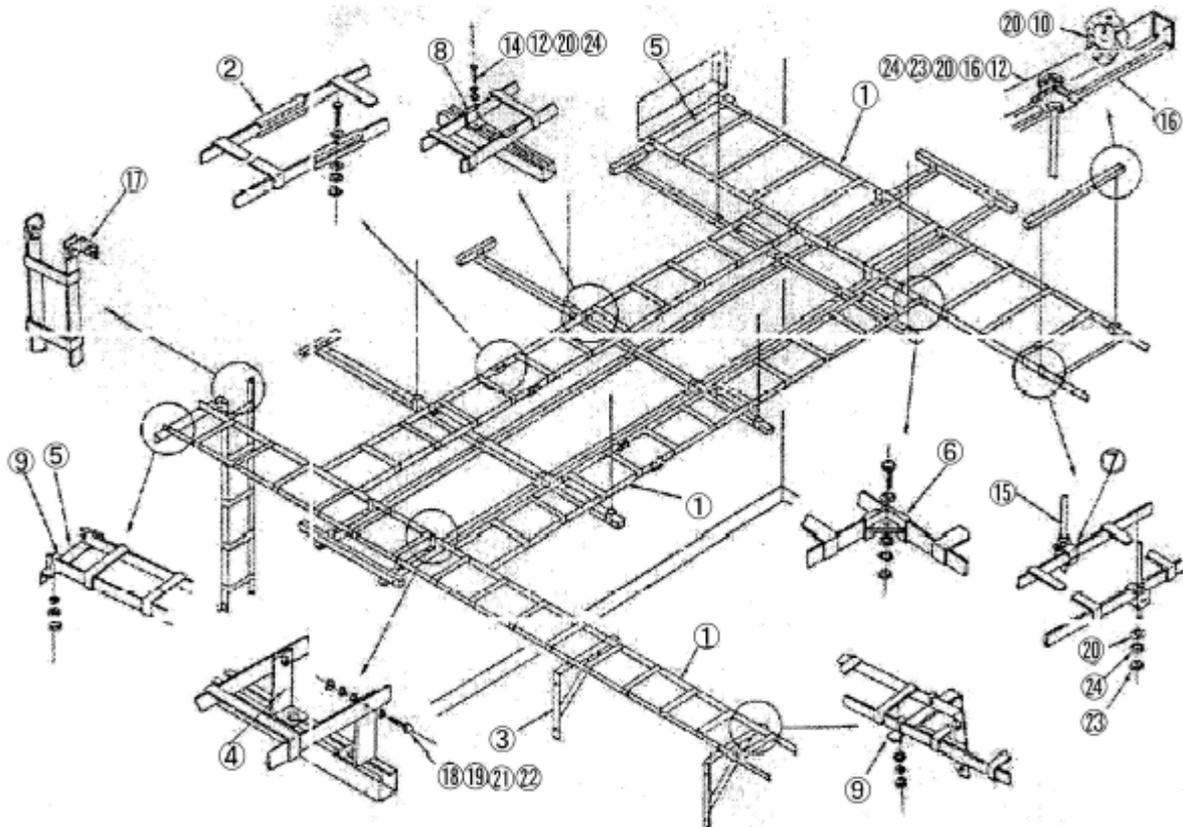
Note: Be careful not to damage the O-ring attached to the PBR adapter.



4.5 Cable Rack Installation

This paragraph describes the cable rack installation procedure. Before installing, check the materials according to Table 4-5 and Fig.4-19. Typical installation method is shown in Fig.4-20.

<u>Step</u>	<u>Procedure</u>
1	Perform marking, leveling and drilling to the wall and ceiling.
2	Prepare the cable rack by cutting and drilling according to the engineering drawing and prepare the C-45 channel for the desinated dimensions of wall or ceiling fixtures.
3	Secure the PY-4005 anchor bolts.
4	Fasten the wall and ceiling fixtures and secure the supporting metals.
5	Secure the cables.



Note Numbers in circle for materials can be identifier by Table 4-5.

Fig. 4-20 Cable Rack Installation Method

MOUNTING

Table 4-5 Typical Inatallation Materials for Cable Rack

No.	Name	Remarks
1	Cable Rack	
2	Longitudinal Joint	
3	Wall Support	
4	L-Joint (B)	
5	Wall Fixtur	
6	Corner Clamp	
7	U-Clamp	
8	Cable Rack Clamp	
9	J-Bolt	
10	PY-4005 Anchor Bolt	
11	C-45 Channel	
12	Univer Nut	
13	F-19 Hanger	
14	Bolt (M10-1.5x20)	
15	Hanger Bolt (M10-1.5)	
16	C-45 Washer	
17	L-Joint	
18	Bolt (M8-1.25x25)	
19	Nut (M8-1.25)	
20	Flat Washer (for M10)	
21	Flat Washer (for M8)	
22	Spring Washer (for M8)	
23	Nut (M10-1.5)	
24	Spring Washer (for M10)	

5. FRAME GROUNDING

In mounting IDU and ODU, perform frame grounding. Location of frame grounding in each of the IDU and ODU is shown in Fig. 5-1, and connection for frame grounding is shown in Fig. 5-2.

Note: Connections for frame grounding are examples.

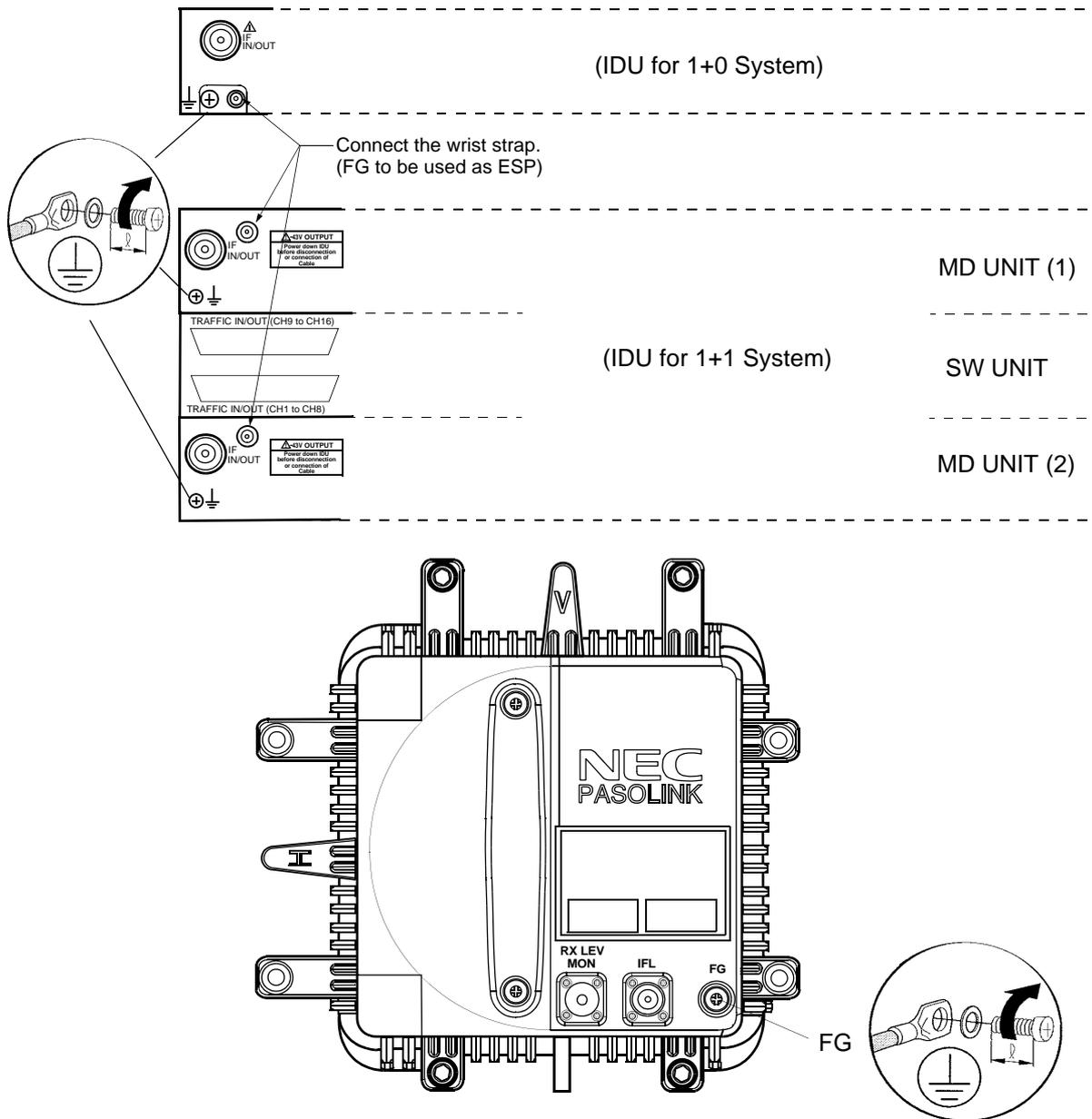
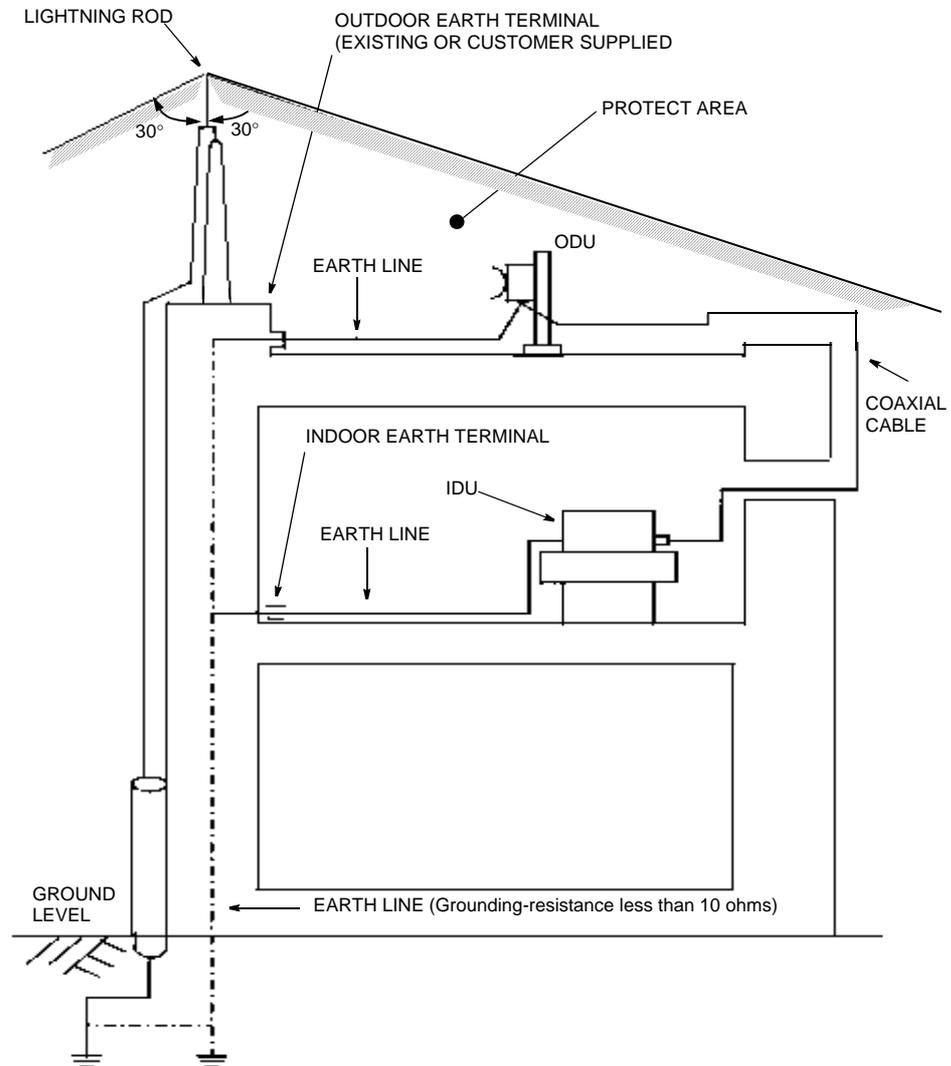


Fig. 5-1 Location of Frame Ground

FRAME GROUNDING



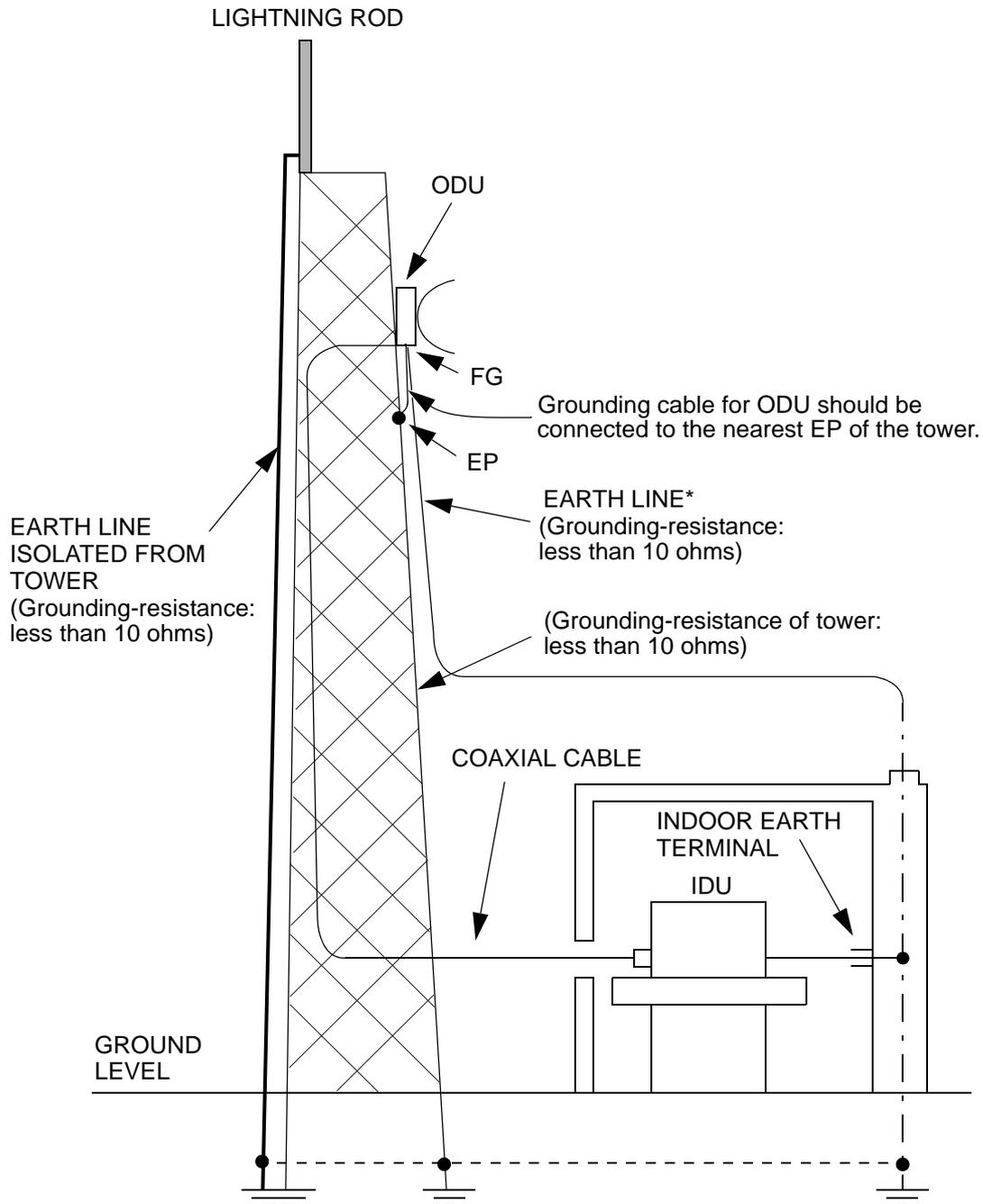
Caution 1: *Install the ODU within the area protected by lightning rod.*

Caution 2: *To avoid surge currents caused by lightning circulating in the equipment earth system, connect the equipment earth system (frame ground) to ground of lightning rod at ground level.*

Note: This connection is an example.

Fig. 5-2 Connection for Frame Grounding (1/2)

FRAME GROUNDING



Note: * NEC recommends that frame ground of ODU should be connected to earth line as NEC's standard installation.
 EP : Earthing Point of tower
 FG : Frame Ground terminal
 This connection is an example.

Fig. 5-2 Connection for Frame Grounding (2/2)

FRAME GROUNDING

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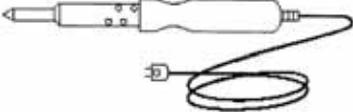
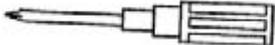
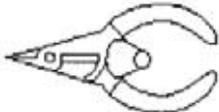
6. CABLE TERMINATION

This section describes the cable termination method. The necessary tools and materials are summarized in Table 6-1. The following cables are described for reference.

- D-sub connector
- N-P connector of the L angle type
- N-P connector of the straight type
- Molex M5557-4R connector

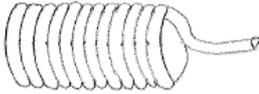
Note: Use ISO standardized screw (mm unit) for D-SUB connector.

Table 6-1 Tools and Material List

No.	NAME	REMARKS
1	Soldering Iron	
2	Knife	
3	Measure	
4	Screw driver	
5	Wire Stripper	

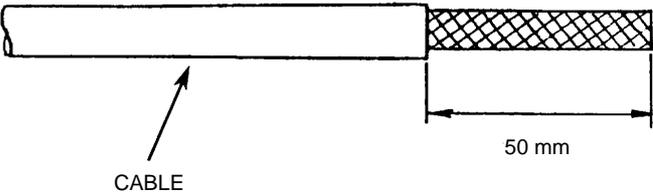
CABLE TERMINATION

Table 6-1 Tools and Material List

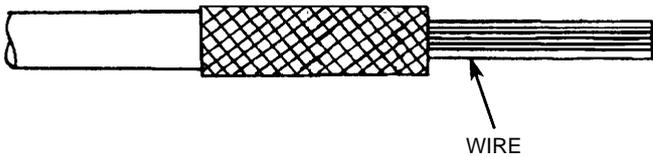
No.	NAME		REMARKS
6	Adjustable Wrench		
7	Hand Crimping Tool	CL250-0012-2/ CL250-0013-5	For D-Sub connector
		57026-5000/ 57027-5000	For Molex connector
8	Solder		

CABLE TERMINATION

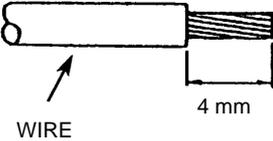
6.1 Terminating Supervisory Cables with D-Sub Connector



Step 1. Strip back the cable sheath, taking care not to damage the braided shield,

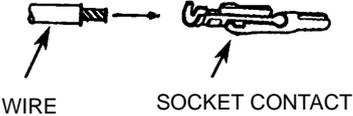


Step 2. Fold back the braided shield (do not separate the strands) and trim it as shown,



Step 3. Remove the insulation over a length of 4 mm from the end of the wire,

<u>WIRE</u>	<u>CONFORMABLE SOCKET CONTACT</u>
AWG#20-24 :	CD-PC-111
AWG#24-28 :	CD-PC-121

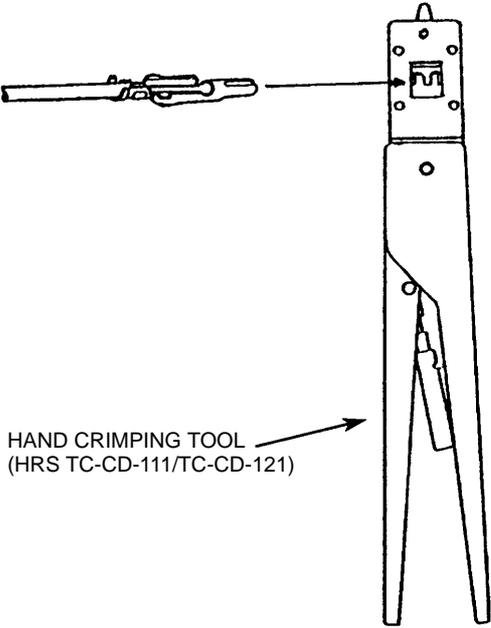


Step 4. Insert the cable into the socket contact,



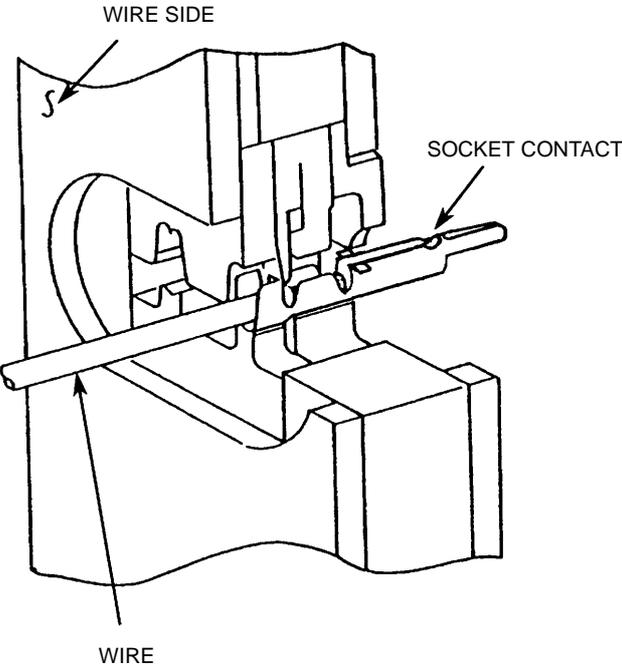
Step 5. Cable should be fitted, so that insulation and bare wire are arranged as shown,

CABLE TERMINATION



Step 6. Mount the socket contact using a hand crimping tool,

<u>WIRE</u>	<u>CONFORMING SOCKET CONTACT</u>
AWG#20-24 :	TC-CD-111
AWG#24-28 :	TC-CD-121



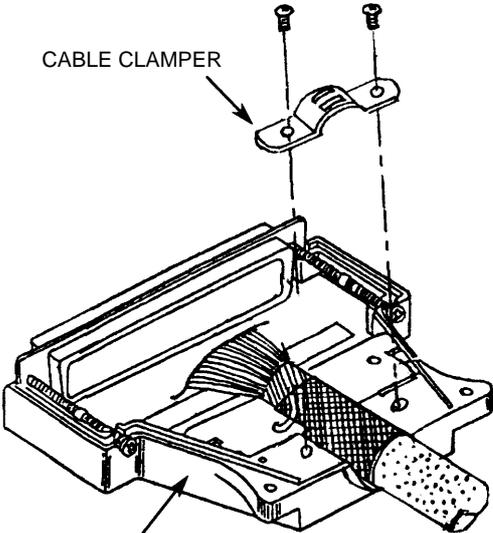
Step 7. Recheck that the wire position is as shown in step 5 before crimping the socket contact (see illustration at left),

CABLE TERMINATION



METALLIC SHIELD TAPE

Step 8. Wind the metallic shield tape on the braided shield,



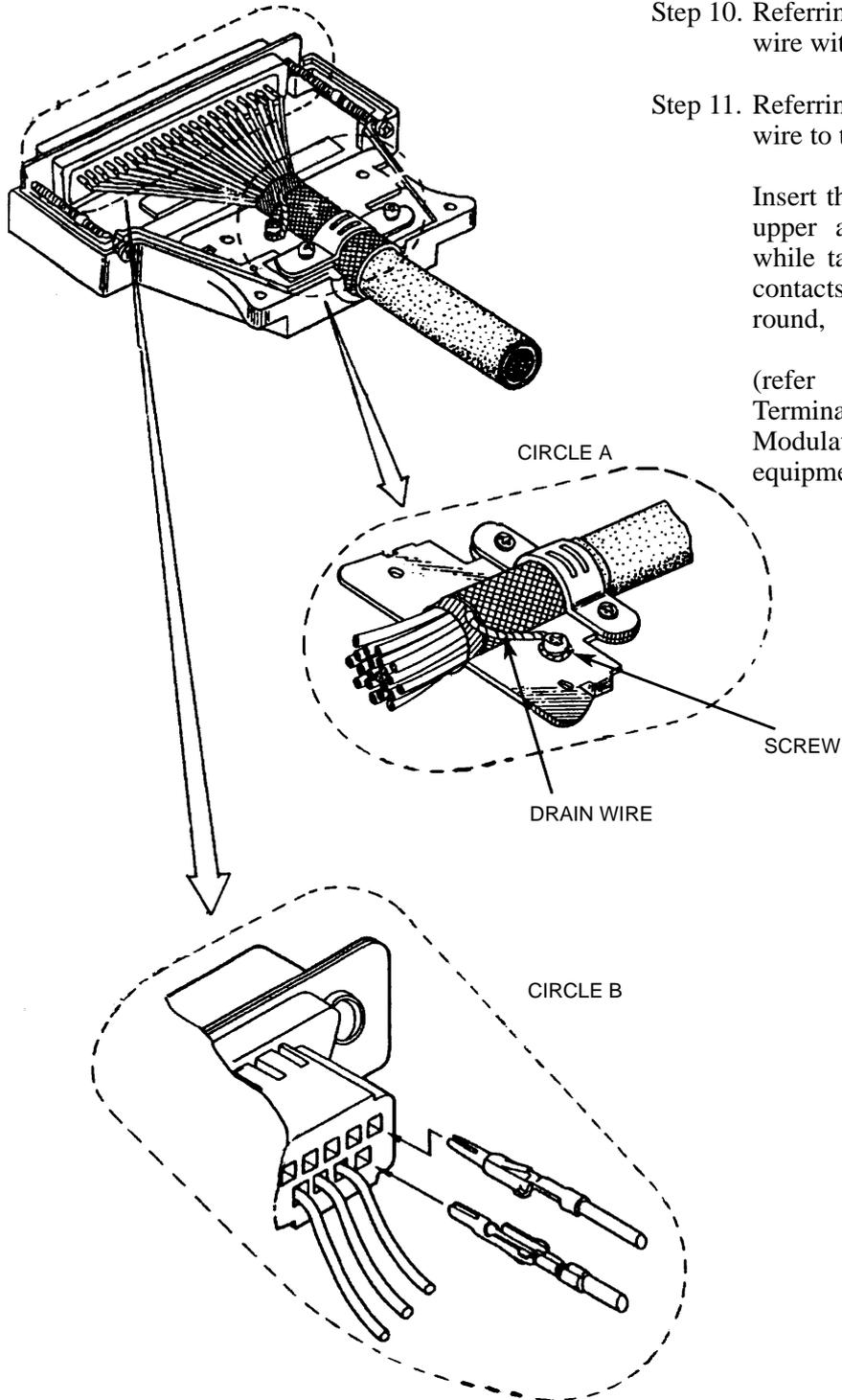
CABLE CLAMPER

PLUG CASE

Step 9. Set the cable into the plug case as shown in figure,

Then, fit the cable using the cable clamper and two screws,

CABLE TERMINATION



Step 10. Referring to circle A, fix drain wire with screw,

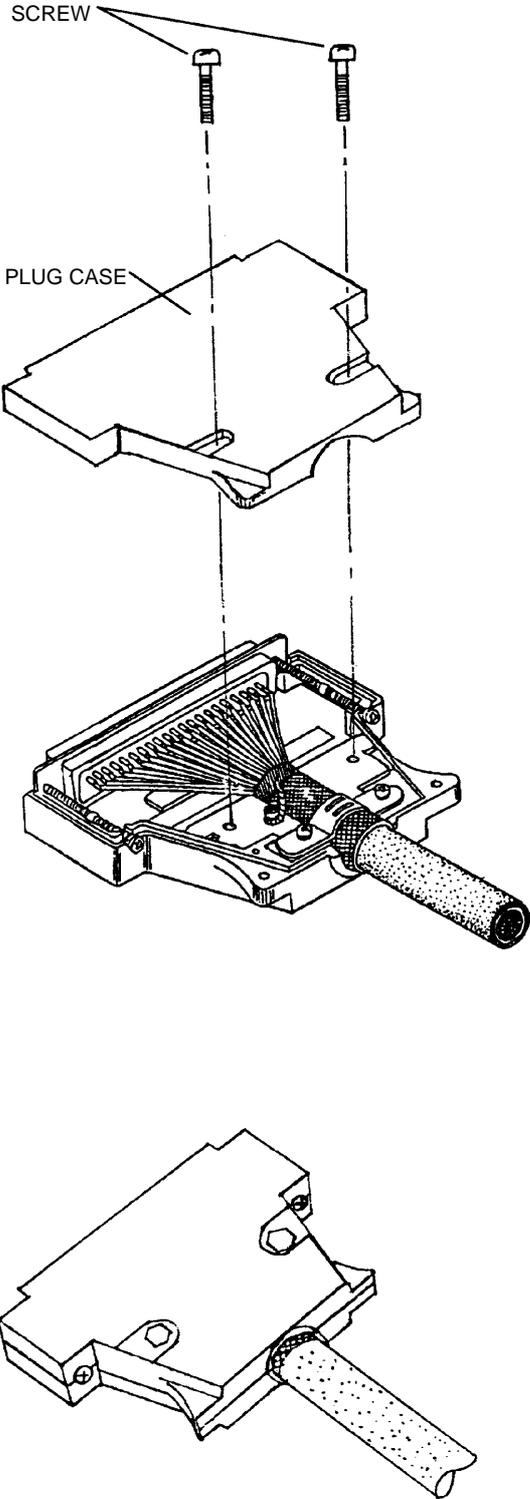
Step 11. Referring to circle B, insert each wire to the specified position,

Insert the socket contacts into the upper and lower row positions while taking care that the socket contacts are inserted the right way round,

(refer to para 3.1 Interface Terminal and Jacks in the MDP Modulator-Demodulator in MDP equipment description)

CABLE TERMINATION

Step 12. Fix the plug case with two screws, as shown in the figure.

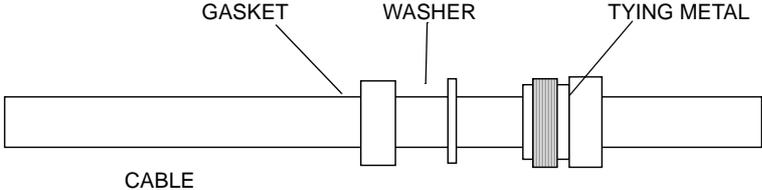


CABLE TERMINATION

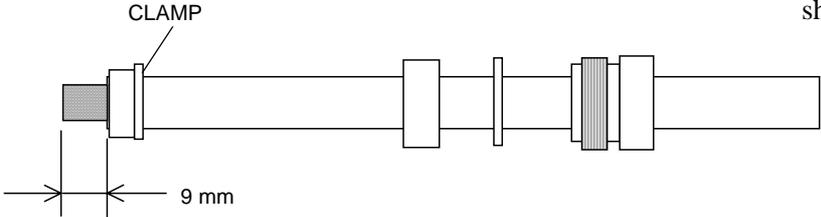
6.2 Terminating Coaxial (IF Signal) with N-P Connector (L Angle Type)

KOMINE made

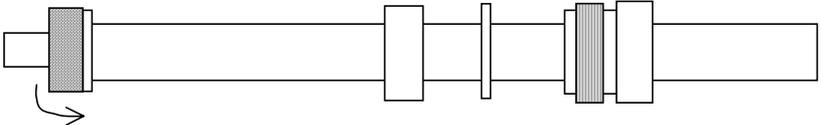
Step 1. First fit the tying metal, washer and gasket on the cable,



Step 2. Strip back the cable sheath, taking care not to damage the braided shield, and fit the clamp,



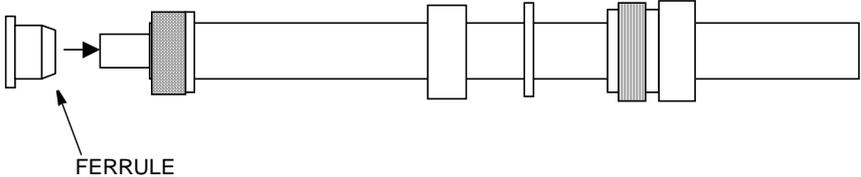
Step 3. Fold back the braided shield (separating the strands of the braid) and trim it,



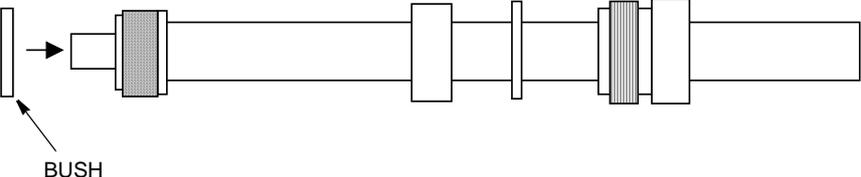
Note: Pay attention not to damage the plait.

CABLE TERMINATION

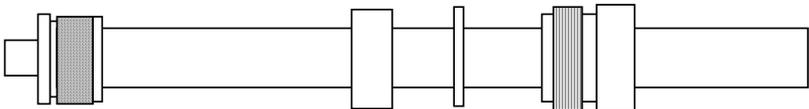
Step 4. Insert the ferrule,



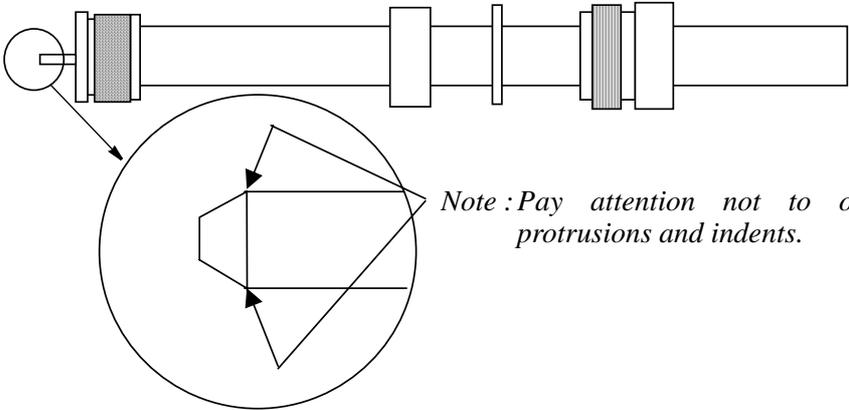
Step 5. Fit the bush,



Step 6. Cut the aluminium foil and inner insulator away along the bush and remain the inner conductor,

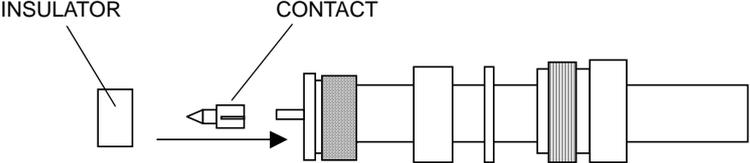


Step 7. Taper the edge of the center conductor using a file as shown in the circle,

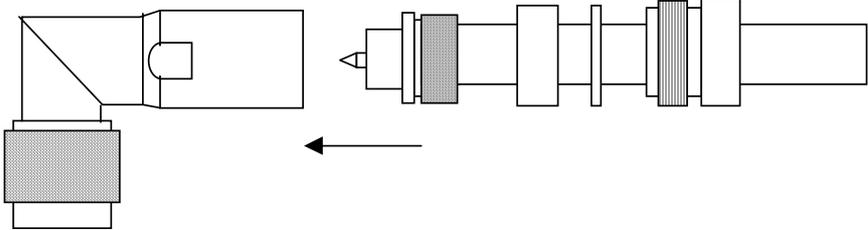


CABLE TERMINATION

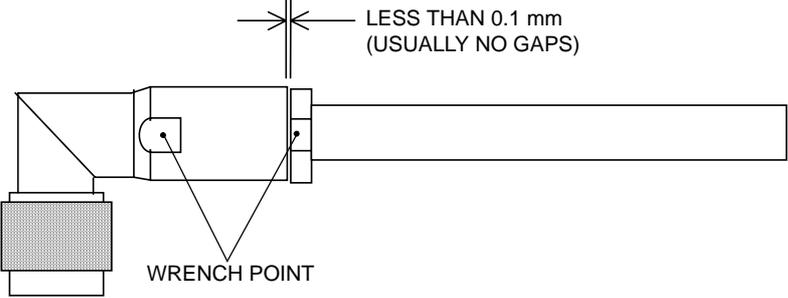
Step 8. Mount the contact onto the center conductor and mount insulator onto the contact,



Step 9. Insert the cable into the shell,



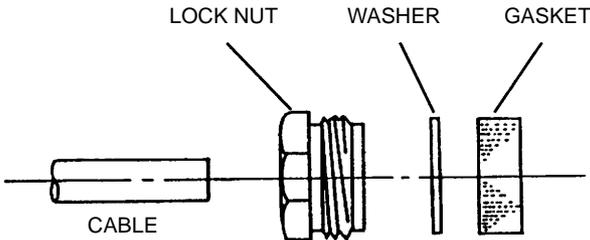
Step 10. Tighten tying metal with wrench point by wrench (Tighten with torque 4 to 10 N·m).



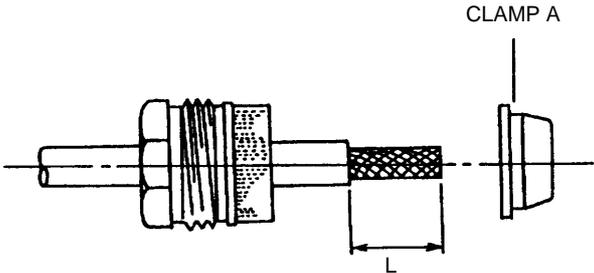
CABLE TERMINATION

6.3 Terminating Coaxial (IF Signal) Cables with N-P Connector (Straight Type)

In case of marking “NDK” on connector, please ask NEC for cable processing.



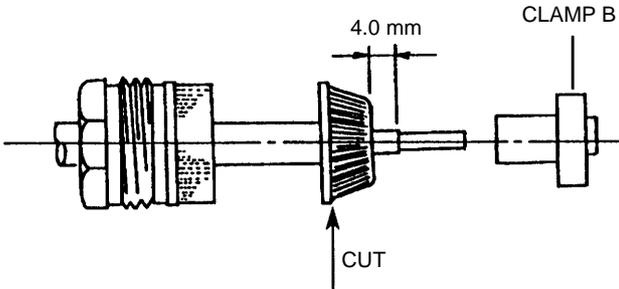
Step 1. First fit the lock nut, washer and gasket on the cable as shown,



Step 2. Strip back the cable sheath, taking care not to damage the braided shield, and fit the clamp A,

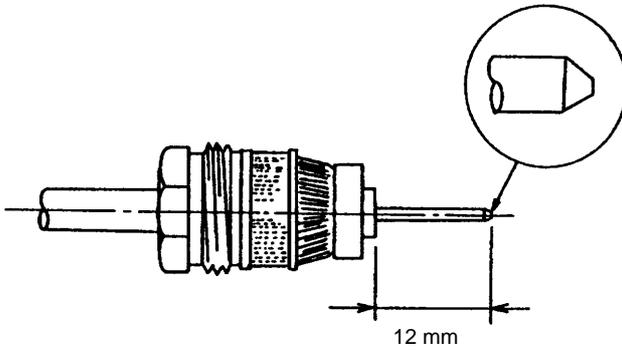
CONNECTOR	CABLE TYPE	LENGTH (L)
N260	5D-FB	25 mm
N227	8D-FB	25 mm
N228	10D-FB	27 mm
N229	12D-FB	27 mm

Step 3. Fold back the braided shield (separating the strands of the braid) and trim it,

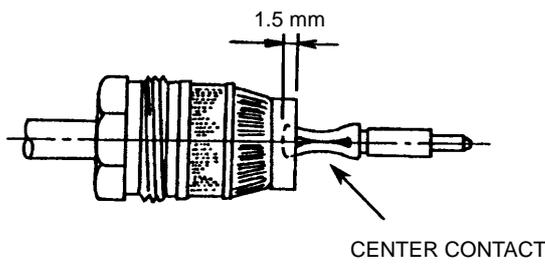


Step 4. Cut away the insulation from the center conductor and fit the clamp B. Be sure not to cut or scratch the conductor while stripping the insulation,

CABLE TERMINATION

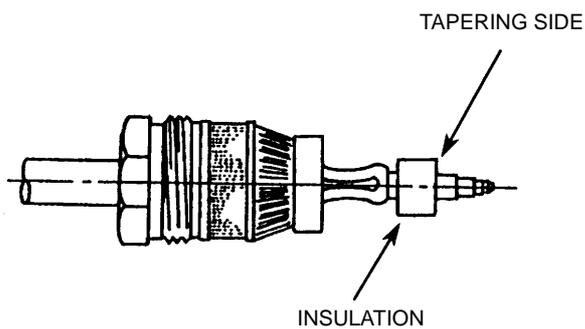


Step 5. Cut the center conductor. Taper the end of the center conductor using a file as shown in the circle,



Step 6. Mount the center contact onto the center conductor as shown,

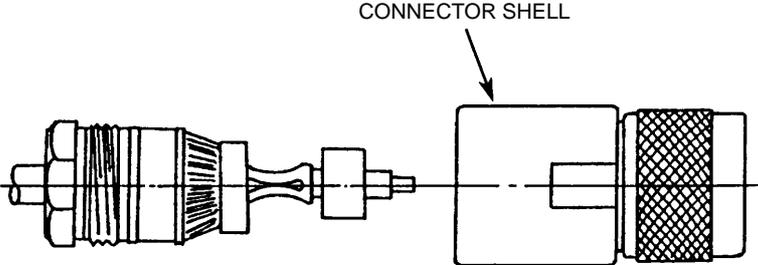
Note: Insert the center contact into insulator (1.5 mm).



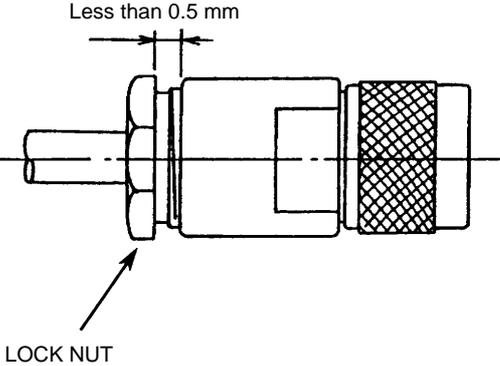
Step 7. Mount the insulation onto the center contact,

CABLE TERMINATION

Step 8. Insert the cable into the connector shell,

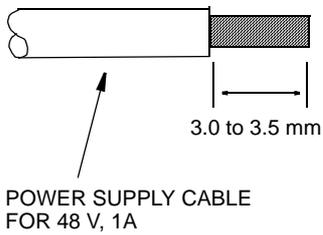
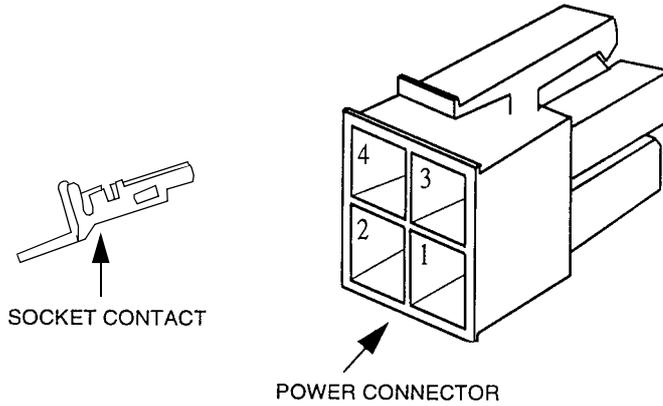


Step 9. Tighten the lock nut.



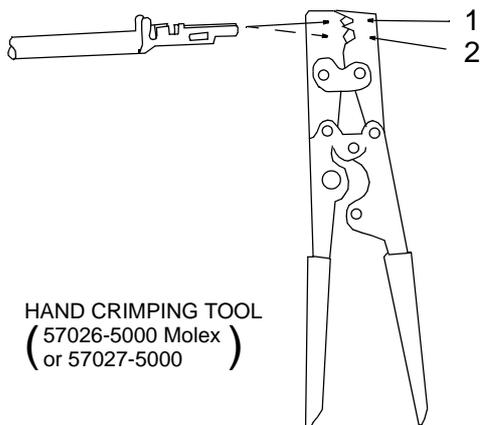
CABLE TERMINATION

6.4 Terminating Power Supply Cables with Molex Connector



Step 1. Remove 3.0 to 3.5 mm of insulation,

CABLE
AWG#18-24



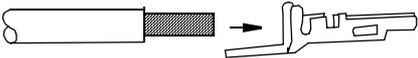
Step 2. Set the socket contact to the following position onto a hand crimping tool,

HAND CRIMPING TOOL TYPE	OUTSIDE DIAMETER OF CABLE	SET POSITION
57026-5000	ϕ 1.5 to 1.8	1
	ϕ 1.8 to 2.2	2
57027-5000	ϕ 2.3 to 2.6	1
	ϕ 2.6 to 3.1	2

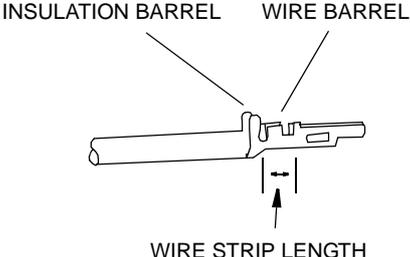
HAND CRIMPING TOOL
(57026-5000 Molex
or 57027-5000)

CABLE TERMINATION

Step 3. Squeeze the handle of the hand crimping tool, insert cable into socket contact,

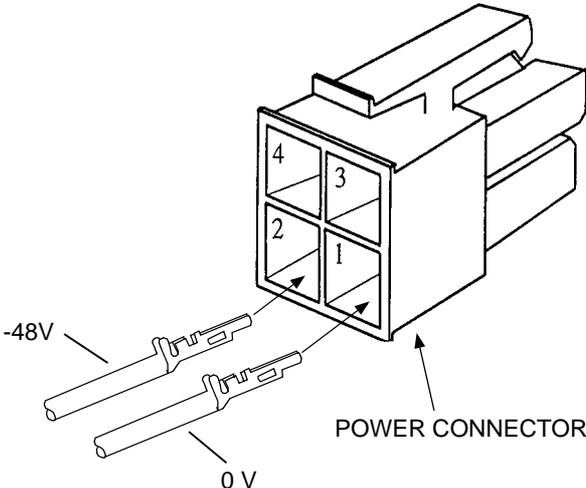


Step 4. Cable should fit, so insulation and bare wire are arranged as shown,



Step 5. Squeeze the handle of the hand crimping tool until ratchet is released,

Step 6. Insert socket contacts into the power connector till they lock.



CABLE TERMINATION

6.5 Cable and Terminal Connections

Set up as in Fig. 6-1 and Fig 6-2 referring to the following connecting method.

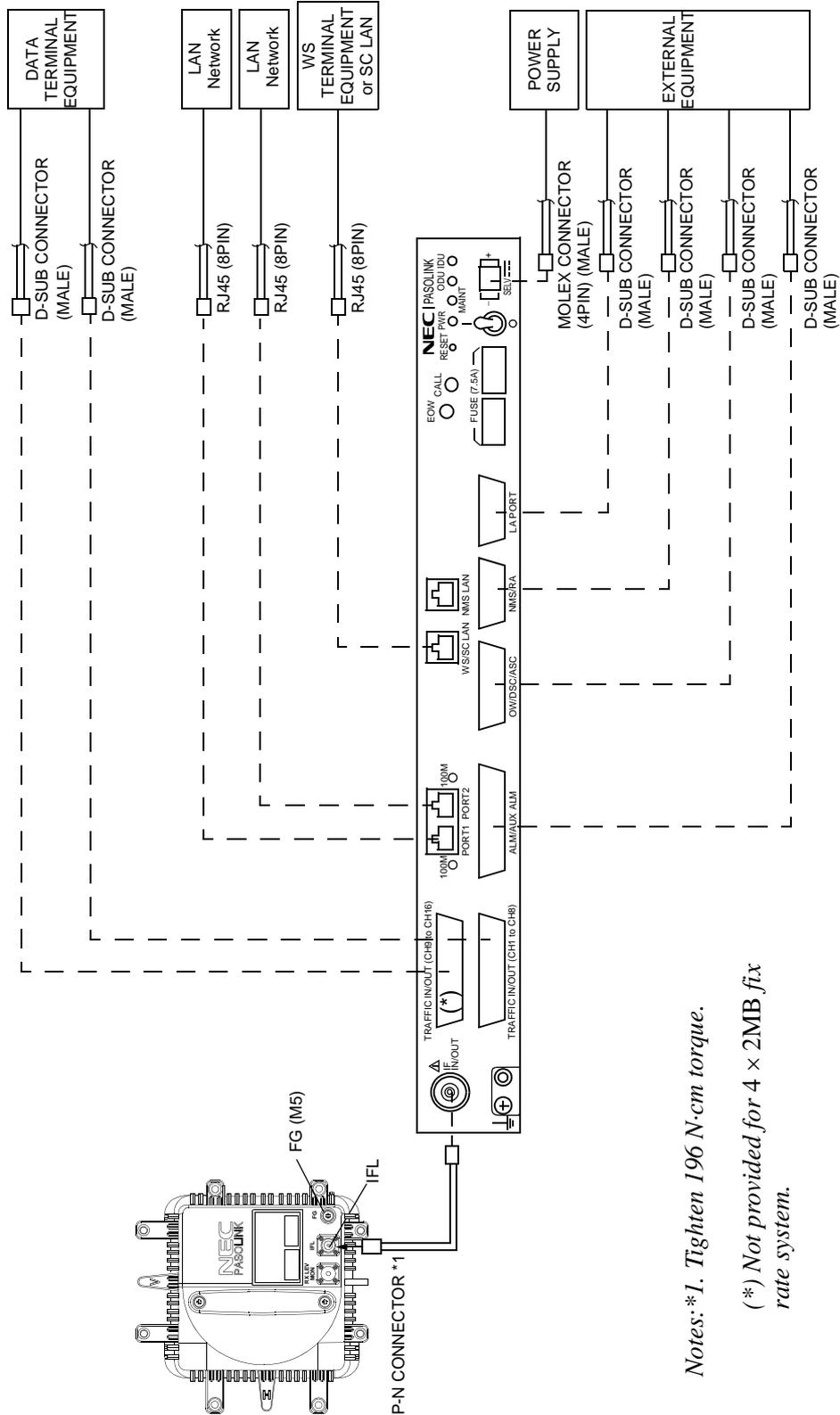
Caution: *In back -to-back connection, the interface conditions of the PM CARD must be matched between two IDUs. Then, check the setting of the interface if it is RS-485 or RS-232C before connecting the cable.*

- (a) Connect baseband signal cable(s)
Take care to connect the D-sub connector and fix it with two screws (M3).
- (b) Connect 10/100BASE-T(X) LAN cable
Take care to connect the Modular connector and check that it is locked.
- (c) Connect IF signal cable
Connect the connector and tighten it by turning the tightening ring clockwise.
- (d) Connect supervisory cable(s)
Take care to connect the D-sub connector and fix it with two screws (M3).
- (e) Connect power supply cable
Take care to catch the Molex connector.
- (f) Connect terminal
Take care to connect the D-sub connector and fix it with two screws (M3).

Note: Use ISO standardized screw (mm unit) for D-SUB connector.

For the details of pin assignment in the IDU and ODU, refer to para 3.1 Interface Terminal and Jacks in the MDP Modulator-Demodulator and TRP Transmitter-Receiver equipment description.

CABLE TERMINATION



Notes: *1. Tighten 196 N-cm torque.

(*) Not provided for 4 x 2MB fix rate system.

Fig. 6-1 Connections of IDU and ODU

CABLE TERMINATION

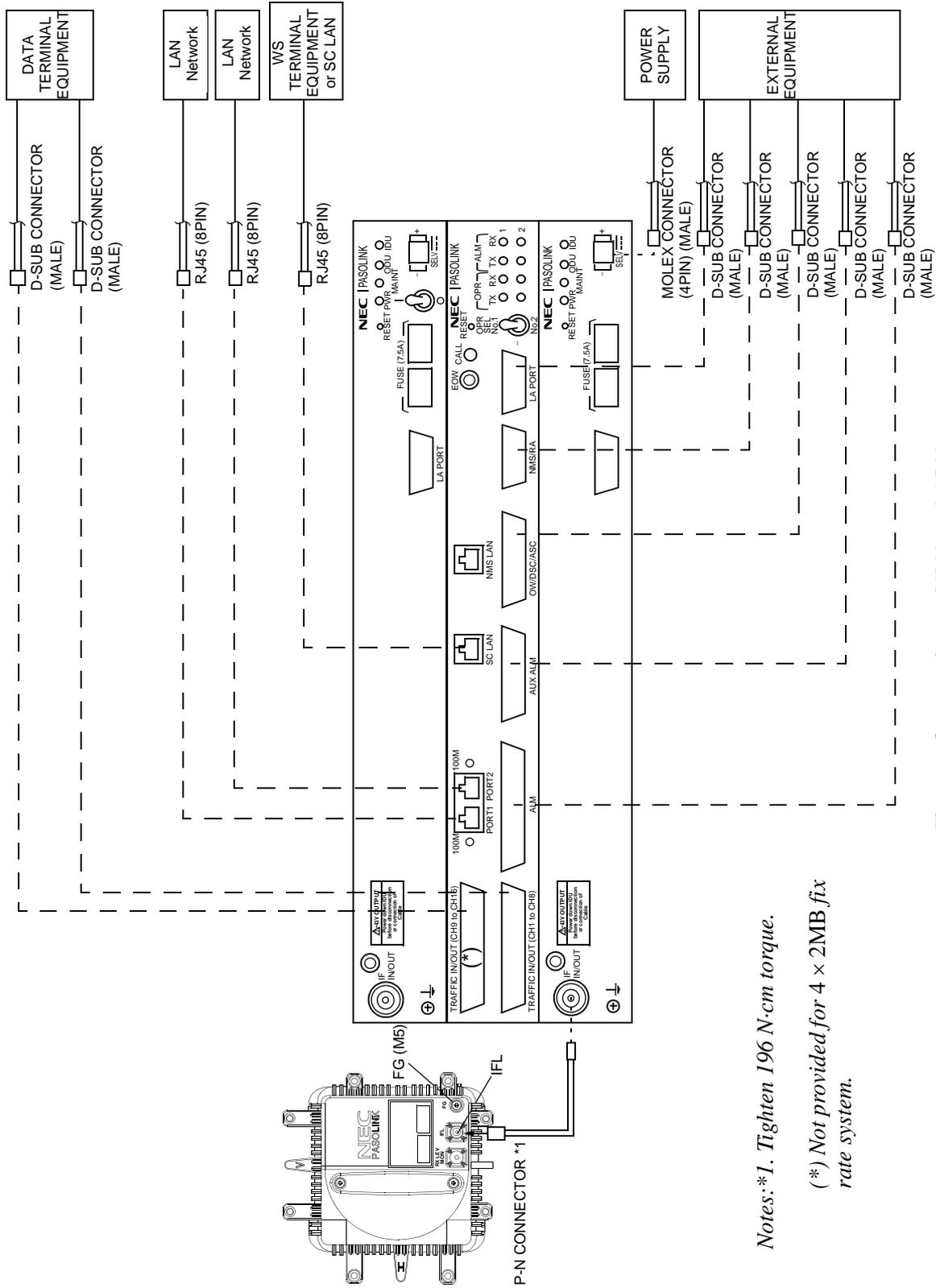


Fig. 6-2 Connections of IDU and ODU

Notes: *1. Tighten 196 N·cm torque.
 (*) Not provided for 4 × 2MB fix rate system.

IDU (1+0) CONNECTORS

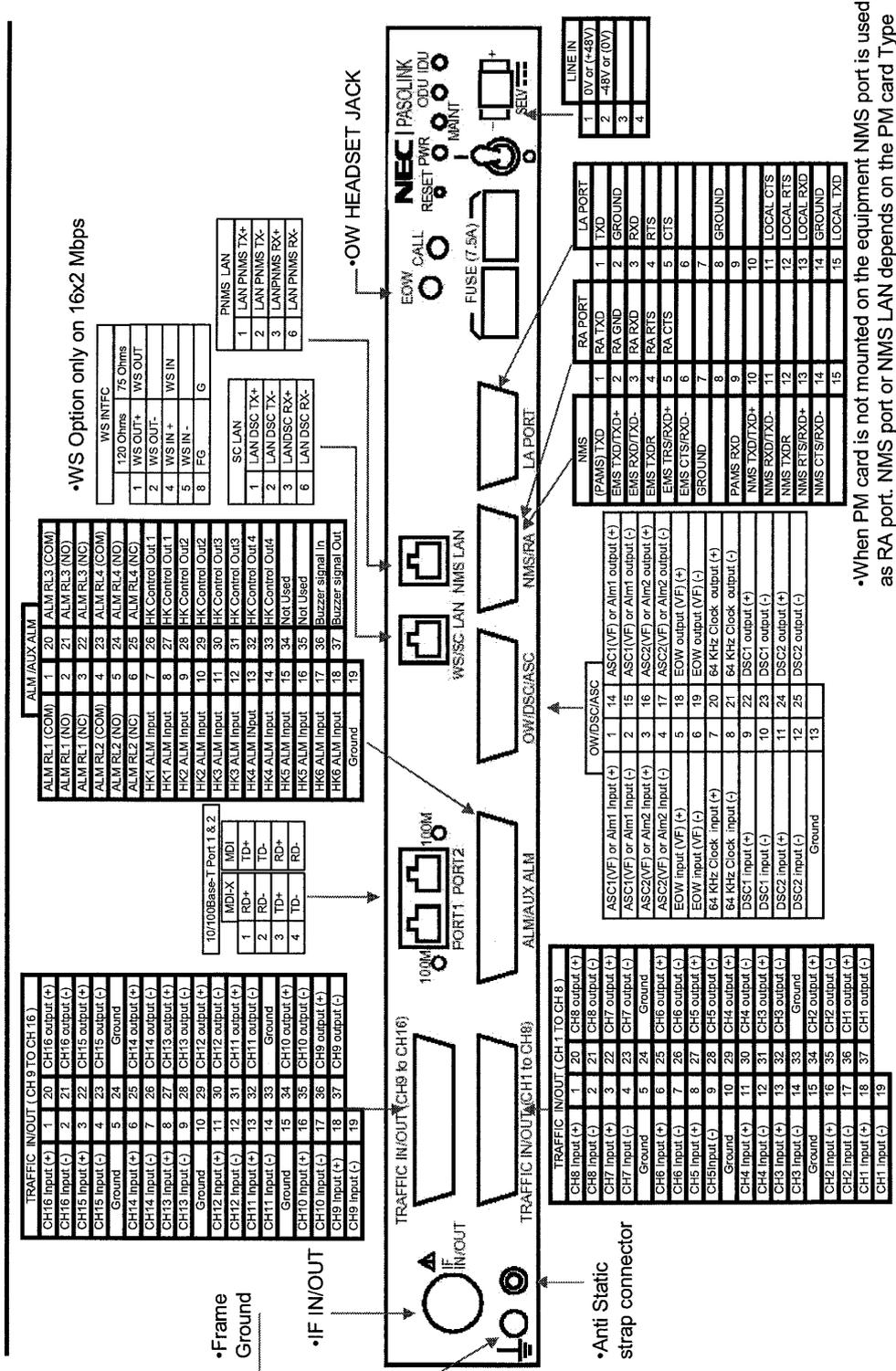
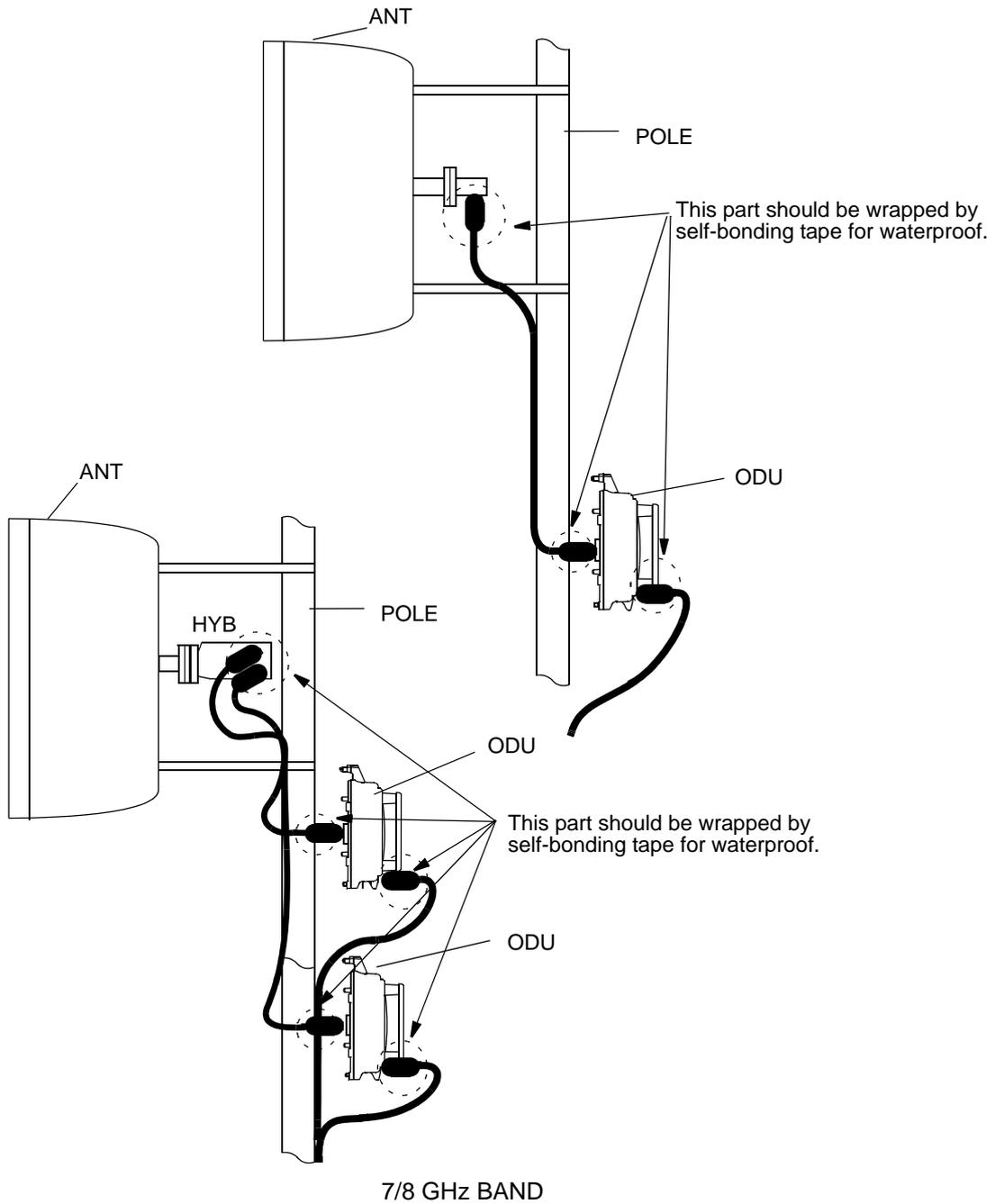


Fig. 6-3 Pin/Assignment for IDU (1+0) connectors

7. WATERPROOF PROTECTION

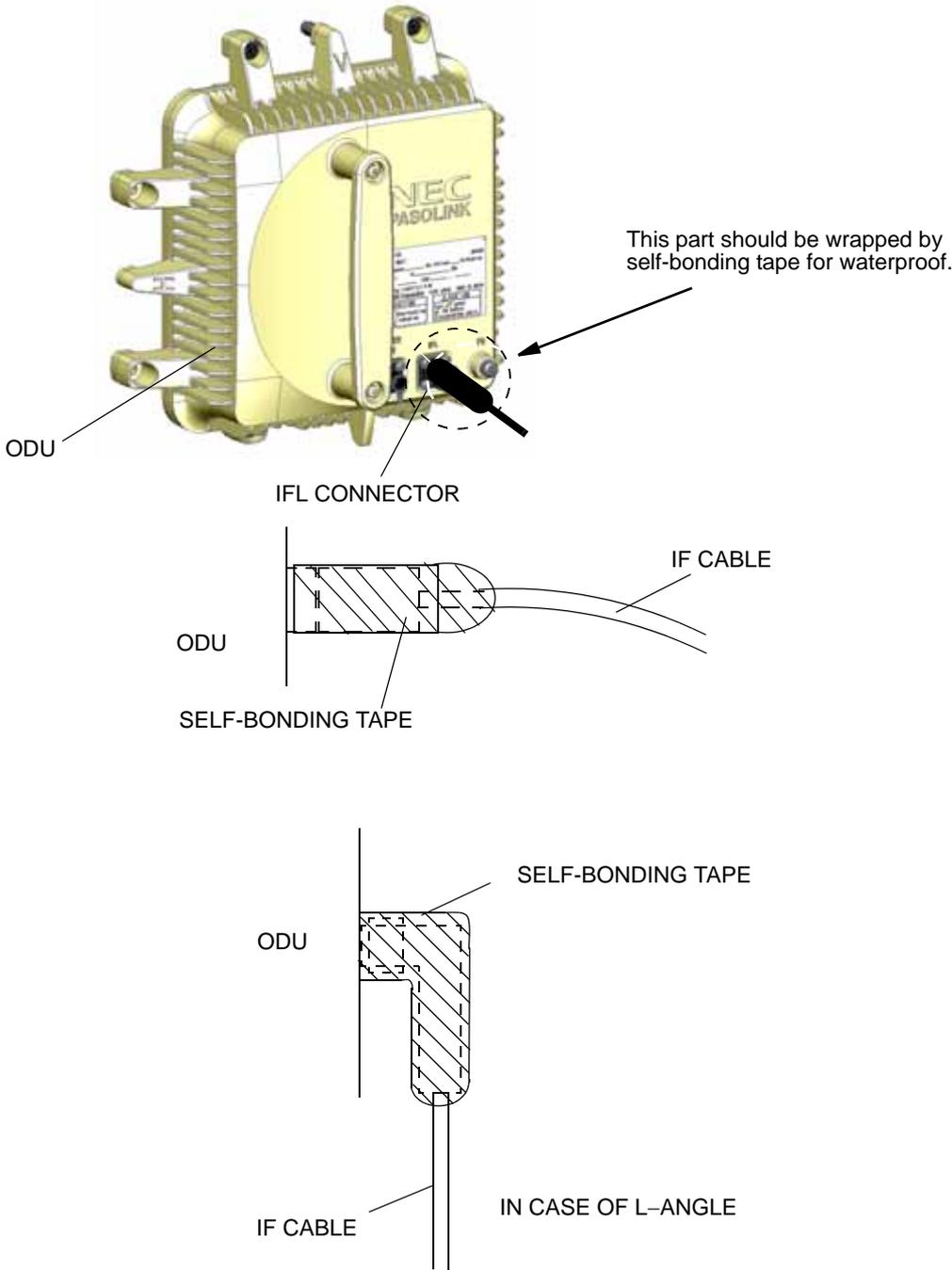
After cable connection, the following part should be wrapped by self-bonding tape for waterproof (see Fig. 7-1),



7/8 GHz BAND

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

WATERPROOF PROTECTION



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

7-38 GHz BAND

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

8. INITIAL LINEUP

This paragraph provides instructions for initial lineup of the [] GHz [] MB digital radio system. Included is information on start-up, shut-down, antenna orientation and lineup test for the equipment.

If orderwire communication is required, connect the X0818A OW/RX LEV MONITOR to the ODU. The OW/RX LEV MONITOR is operated with a dry battery (6F22/9V).

- Notes:*
1. Insert the battery with correct polarity.
 2. Do not charge the dry battery.
 3. When the OW/RX LEV MONITOR is not being used for long period of time, remove the battery to avoid damage from battery leakage and corrosion.
 4. Set to the OW switch to ON when orderwire is used. If the OW indicator is not lit even after the OW switch is set to ON, replace the battery since the battery becomes weak.

8.1 Start-up

Caution: *It is recommended that you connect the IDU to ODU after the TX/RX frequency and TX power control setting has been set on the IDU.*

This process is most important for the following ODUs that may be emitted TX power if you set the channel number to "0ch" which is not defined (excepting 13/26/38 GHz band) by the Radio Frequency Assignment.

Code No. of Corresponding ODU:
**H0738 (7 GHz), H0739 (8 GHz), H0330 (13 GHz),
 H0331 (15GHz), H0332 (18GHz), H0333 (23 GHz),
 H0334 (26 GHz), H0335 (38 GHz)**

Test Equipment and Accessories Required

- Agilent 34401A Digital Multimeter (or equivalent) with Test Leads

<u>Step</u>	<u>Procedure</u>
1	<p>Check that the LINE IN voltage is between +20 V to +60 V/ -20 V to -60 V with the digital multimeter, before connecting the power connector to the IDU,</p> <p><i>Note: The range of DC power input depends on system requirement.</i></p>

INITIAL LINEUP

- Turn on the POWER switch on the IDU (refer to Fig. 8-1),

Note: In 1+1 system,

When neither No.1 nor No.2 channel is working, first set the OPE SEL switch to the desired (No.1 or No.2) position and power on the selected MD Unit or set the OPE SEL switch to neutral (Auto) position and power on both MD units.

When either No.1 or No.2 channel is working, perform MAINT ON condition with the LCT, set the OPR SEL No.1-No.2 switch on the IDU to the working channel side, then, turn on the power switch of the not working channel.

- Allow equipment to warm up for at least 30 minutes.

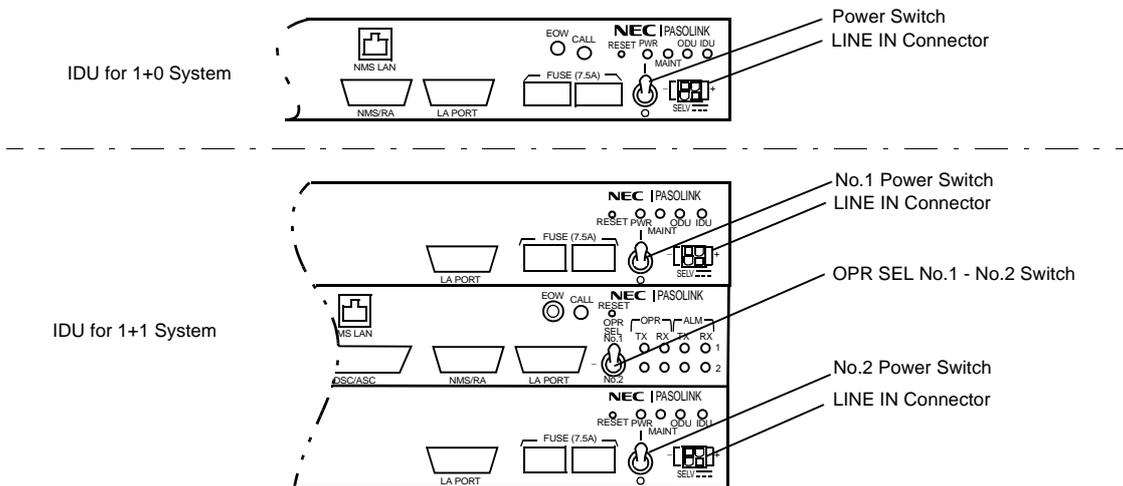


Fig. 8-1 Front View of the IDU for Powering Up

8.2 Shut-down

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

For 1+0 system

- Turn off the POWER switch on the front of the IDU.

For 1+1 system

- Perform the setting for MAINT ON condition with the LCT,
- Set the OPR SEL No.1 - No.2 switch to the channel position to

- be on-line,
- 3 Turn off the power switch on the channel of off-line.

Note: In 1+1 system, before turn off the POWER switch of No.1 or No. 2 channel, perform MAINT ON condition with the LCT.

8.3 Radio Frequency and TX Output Power Setting

Test Equipment and Accessories Required

- Personal Computer
- RS-232C cable
- Screw Driver

The control of the IDU and ODU digital radio system can be carried out via the LA PORT or NMS/RA of the IDU. Connect a Personal Computer to the IDU with an RS-232C cable. The specifications of the required communication port condition of the personal computer are listed below.

- Baud rate : 9600
- Data Length : 8
- Parity Check : None
- Stop bit : 2
- Flow control: None
- Emulation : VT100 Video Terminal
- Transmission:
 - HyperTerminal*: Send line ends with line feeds : Yes
 - Local echo : No
- Receiving:
 - CR : No
 - Return on the right edge : Yes
 - Force incoming data to 7-bit ASCII : No

*Notes: 1. HyperTerminal : Microsoft
 * For Windows 95/98/Me/NT4.0/2000/XP
 2. When Windows NT4.0 and HyperTerminal is used,
 "Program Download" function is not available.
 In this case, please use other terminal software.
 (e.g. TeraTerm Pro 2.3:
<http://hp.vector.co.jp/authors/VA002416/teraterm.html>)*

INITIAL LINEUP

The pin assignment is shown in Fig. 8-2. The cable length of RS-232C between the personal computer and IDU equipment shall be less than 15 m.

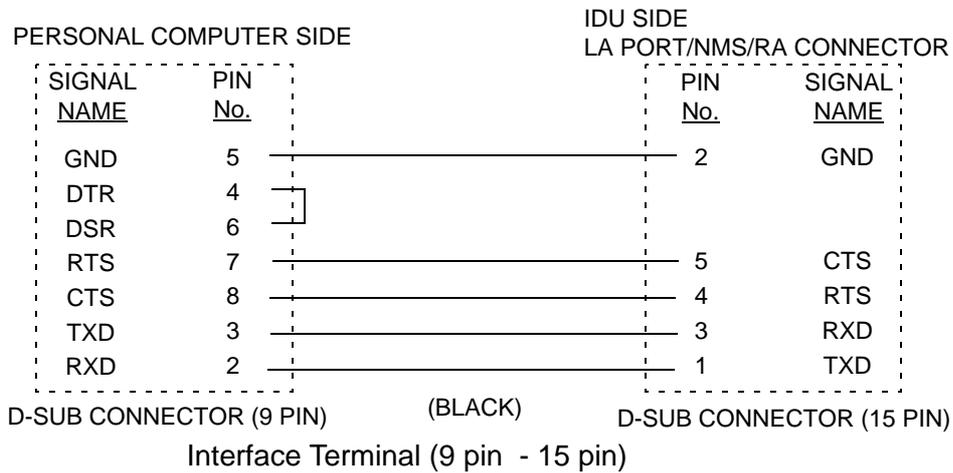


Fig. 8-2 RS-232C Cable Pin Assignment

8.3.1 Setting Procedure from LCT

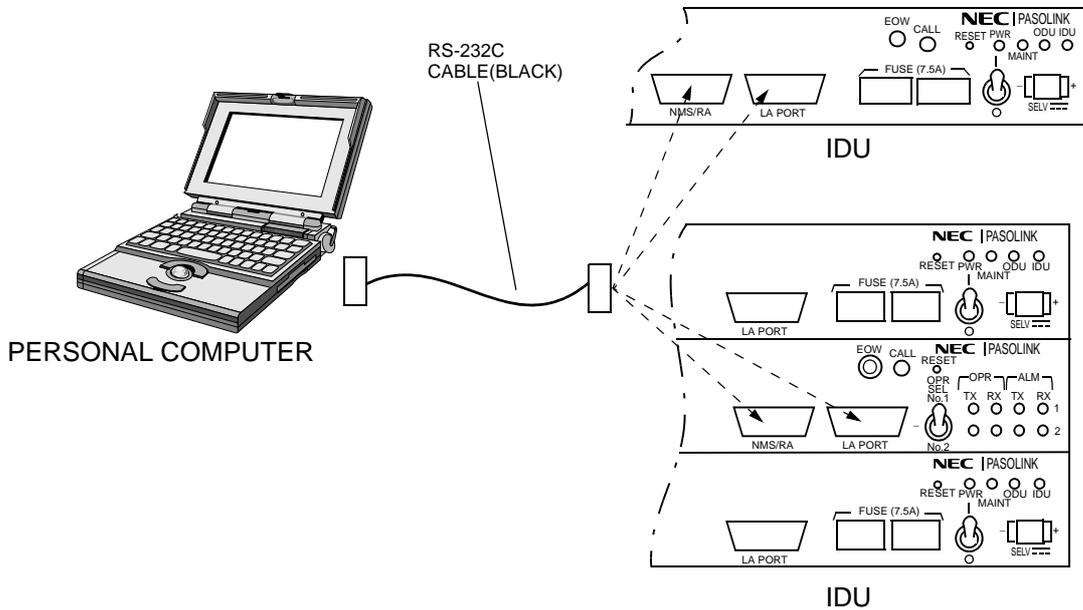
The setting of each item for the IDU is performed by the PC as follows:

Caution: *When login is not possible, check if settings of the communication format are proper.*

Caution: *Do not turn on the power of the IDU leaving cable connection between the PC and RA PORT of the IDU.*

<u>Step</u>	<u>Procedure</u>
1	Connect the personal computer (PC) to the LA PORT or NMS/RA terminal of the IDU using an RS-232C cable as shown in Fig. 8-3,

INITIAL LINEUP



Note: When the controlling or setting of own station are performed, connect the cable to the LA PORT. When the controlling or setting of opposite station are performed, connect the cable to the NMS/RA port. But, if the following cases are applied, the NMS/RA terminal can not be used.

- When the PM CARDS are mounted on Local and Remote equipment.
- When BER is degraded.

Fig. 8-3 Equipment and Monitoring Setup

Step

Procedure

Note: The keys, "0" to "9" are used for selection of the menu or entering values. "Enter" key is used for confirmation of entering values. "Esc" key is used for cancellation of entering values and display the higher rank menu.

- 2 Turn on the power on the PC. Then, start the communication software (e.g. HyperTerminal),

Note: At the end of LCT operation log out from LCT menu by keying "99" and then exit from the communication software. In case if you have exit from the communication software without logging out from LCT, repeat connecting and disconnecting of the RS 232C cable once to reset.

- 3 Press the "CTRL" and "D" keys at the same time,

INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
-------------	------------------

- 4 Enter the specified password from the keyboard and press the “Enter” key,

```
Password :
```

Note: When the PC is connected to the NMS/RA terminal to control the opposite station, enter password of the opposite station.

- 5 Press the “0” key and “Enter” key. Then, perform step 8. If the password should be changed, press the “1” key and “Enter” key,

```
Password :*****  
Change Password? (no:0 / yes:1) :
```

- 6 Enter the new password from the keyboard and press the “Enter” key,

```
Password :*****  
Change Password? (no:0 / yes:1) : 1  
New Password :
```

Note: For password, “0” to “9”, “A” to “Z” and “a” to “z” are available (31 letters maximum).

- 7 To confirm the password, re-enter the password from the keyboard and press the “Enter” key,

```
Password :*****  
Change Password? (no:0/yes:1) : 1  
New Password :*****  
New Password (Re-enter) :*****
```

- 8 Following menu item is displayed,

```
1. Setting  
2. Maintenance  
3. Monitoring  
99. Exit  
  
Select function No. :
```


INITIAL LINEUP

- | <u>Step</u> | <u>Procedure</u> |
|-------------|--|
| 10 | Press the “6” key and “Enter” key in the Maintenance menu shown in step 9, |

For 1+0 System

```
6. Power mute (off)
Power mute (off:0 / on:1):
```

- | | |
|----|--|
| 11 | Press the “1” key and “Enter” key to mute TX power, if not, press the “Esc” key, |
|----|--|

For 1+1 System

- | | |
|----|---|
| 12 | Press the “6” key for No. 1CH or “7” key for No. 2CH and “Enter” key, then the following appears, |
|----|---|

For No. 1 CH ODU

```
6. Power mute 1 (off)
Power mute (off:0 / on:1) :
```

For No. 2 CH ODU

```
7. Power mute 2 (off)
Power mute (off:0 / on:1)
```

- | | |
|----|--|
| 13 | Press the “1” key and “Enter” key to mute TX power, if not, press the “Esc” key, |
|----|--|

- | | |
|----|--|
| 14 | Enter 00 and press the "Enter" key to go back to the main menu, then, the following appears, |
|----|--|

```
1. Setting
2. Maintenance
3. Monitoring
99. Exit

Select Function No.:
```

INITIAL LINEUP

- | <u>Step</u> | <u>Procedure</u> |
|-------------|---|
| 15 | Press the “1” key and “Enter” key, then, following setting menu is displayed, |

Setting

1. Bit rate (4x2MB)
2. AIS RCVD alarm/status (status)
3. AIS SEND alarm/status (status)
4. TX/RX frequency (5ch)
5. TX power ctrl(0dB)
6. Main channel usage 1-16 (used: UNNN NNNN #### #####)
7. BER alarm threshold (10-4)
8. Frame ID (0)
9. WS channel usage (not used)
10. DSC 1 (232)
11. DSC 2 (232)
12. DEM invert (off)
13. Alarm table
14. Next items
00. Menu
99. Exit

Select item No. :

Notes: 1. In item No. 1, the required bit rate is indicated in the parenthesis () on “Bit rate”.

Bit rate 2x2MB / 4x2MB / 8x2MB / 16x2MB

Changing the bit rate will cause temporary communication loss until the bit rate of the opposite site is changed. The buzzer may be issued until then. 16x2MB bit rate is not supported on MDP-17MB-3/4A.

2. *In item No. 2 and item No. 3, setting for alarm indication of AIS RCVD/AIS SEND as follows, alarm: to include ALARM LED indication item, status: to exclude ALARM LED indication item.*
3. *In item No. 4, both channel numbers are indicated as No.1: *ch / No.2: *ch if twin path configuration is selected.*
4. *In item No. 5 shows in case of MTPC system, TX power ctrl (ATPC) ^{*1} or TX power ctrl (No. 1: ATPC / No. 2: ATPC) ^{*2} is indicated.*

In case of ATPC system,
*Note: *1 1+0 or Hot standby system.*
**2 Twin path system.*
5. *In item No. 6, following significant symbol letters are used to display the status for each channel.*

“#” : signifies E1 channel which is inhibited by the hardware restriction or LAN signal transmission.

INITIAL LINEUP

Step

Procedure

“N” : signifies not used channel.

“U” : signifies E1 channel which is used.

6. In item No. 10 and item No. 11, 232 (i.e. RS232C) is standard.

- 16 Press the “4” key and “Enter” key, then, following item is displayed,

For 1+0 / HS System

4. TX/RX frequency (5ch)

TX/RX frequency (0ch - 255ch):

- 17 Enter the channel No. and press the “Enter” key, if not, press the “Esc” key,

INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
23	Press the “1” key and “Enter” key, then, following item is displayed, <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>1. ATPC/MTPC (MTPC) ATPC/MTPC (MTPC:0 / ATPC:1):</pre></div>
24	Press the “0” key and “Enter” key, when the “0” key is pressed to select MTPC TX power setting, press the “2” key and “Enter” key, the following appears, <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>2. MTPC TX power (0dB) MTPC TX power (-30dB to 0dB):-0</pre></div>
25	Enter the MTPC TX power level for setting and press the “Enter” key, if not, press the “Esc” key,
26	When the “1” key is pressed to select ATPC TX power setting in step 23, press “3” key and “Enter” key to select ATPC TX power range setting, the following appears, <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>3. ATPC TX power range(MAX : 0dB / MIN : -30dB) MAX power (-30 to 0dB):-0 MIN power (-30 to 0dB):-30</pre></div>
	<i>Notes: 1. The MAX power must be set to a value larger than MIN power;</i> <i>2. When the TX power control mode is changed from MTPC to ATPC, if the MAX power is set to -30dB in MTPC, both MAX and MIN power may be set to -30dB.</i>
27	Enter the ATPC TX power maximum level and minimum level and press the “Enter” key for setting, if not, press the “Esc” key,

INITIAL LINEUP

- | <u>Step</u> | <u>Procedure</u> |
|-------------|---|
| 28 | Press the “9” key and “Enter” key in the Maintenance menu shown in step 15, |

```
9. RX SW ctrl (AUTO)
RX SW ctrl (AUTO:0 / No.1:1 /No.2:2):
```

- | | |
|----|--|
| 29 | Press the “1” key and “Enter” key for No.1 RX selection or the “2” key and “Enter” key for No.2 RX selection, if not, press the “Esc” key, |
| 30 | Press the “7” key and “Enter” key for 1+0 system or “10” key and “Enter” key for 1+1 system, in the Maintenance menu shown in step 15, |

For 1+0 /Hot standby System

```
10. ATPC manual ctrl (off)
ATPC manual ctrl (off:0 / on:1):
```

- | | |
|----|---|
| 31 | Press the “1” key and “Enter” key for ATPC manual control, if not, press the “Esc” key, |
|----|---|

```
ATPC manual ctrl (off:0 / on:1):1
ATPC current (-15dB)
ATPC current (-30 to 0dB):
```

- | | |
|----|--|
| 32 | Enter attenuation value and “Enter” key, |
|----|--|

For Twin path System

```
10. ATPC manual ctrl (No.1:off /No.2:off)
1. No.1 ATPC manual ctrl (off)
2. No.2 ATPC manual ctrl (off)
00. Menu
99. Exit
Select item No. :
```

INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
33	Press the “1” key and “Enter” key for No.1 TX selection or the “2” key and “Enter” key for No.2 TX selection, if not, press the “Esc” key, <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>1. No.1 ATPC manual ctrl (off) No.1 ATPC manual ctrl (off:0 / on:1):</pre></div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>2. No.2 ATPC manual ctrl (off) No.2 ATPC manual ctrl (off:0 / on:1):</pre></div>
34	Press the “1” key and “Enter” key to ATPC manual control, if not, press the “Esc” key, <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>No.1 ATPC manual ctrl (off:0 / on:1):1 ATPC current (-15dB) ATPC current (-30 to 0dB):</pre></div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"><pre>No.2 ATPC manual ctrl (off:0 / on:1):1 ATPC current (-15dB) ATPC current (-30 to 0dB):</pre></div>
	<p><i>Note: 1. The MAX power must be set to a value larger than MIN power.</i></p> <p><i>2. When the TX power control mode is changed from ATPC to MTPC, current value in ATPC is applied to the MTPC.</i></p>
35	Enter attenuation value and “Enter” key,
36	Restore all setting items which are changed in setting maintenance in referring to step 4 to step 35,

INITIAL LINEUP

- | <u>Step</u> | <u>Procedure</u> |
|-------------|---|
| 37 | Press the “0” key and “Enter” key to reset status from maintenance to normal in step 8, |
| 38 | Then, MAINT indicator goes off, |

For 1+0 System

```
Maintenance
 1. MAINT (NORM)
 2. FE loop back ctrl 1-16 (ctrl:*Z#- ---- ----)
 (ans :*--- ---- ----)
 3. NE loop back ctrl 1-16 (ctrl:*-#- ---- ----)
 (ans :*--- ---- ----)
 4. BER ALM >> AIS (on)
 5. CW (off)
 6. Power mute (off)
 7. ATPC manual ctrl (off)
 00. Menu
 99. Exit

Select item No. :
```

For 1+1 System

```
Maintenance
 1. MAINT (NORM)
 2. FE loop back ctrl 1-16 (ctrl:*Z#- ---- ----)
 (ans :*--- ---- ----)
 3. NE loop back ctrl 1-16 (ctrl:*-#- ---- ----)
 (ans :*--- ---- ----)
 4. BER AIS ALM >> AIS (on)
 5. CW (off)
 6. Power mute 1 (off)
 7. Power mute 2 (on)
 8. TX SW ctrl (AUTO)
 9. RX SW ctrl (AUTO)
 10. ATPC manual ctrl (off)
 00. Menu
 99. Exit

Select item No. :
```

- 39 Press the “99” keys and press the “Enter” key to exit maintenance mode.

INITIAL LINEUP

8.4 Antenna Orientation

(a) Test Equipment and Accessories Required

- Agilent 34401A Digital Multimeter (or equivalent) with test leads or X0818A OW/RX LEV MONITOR
- Screwdriver

(b) Procedure for the ODU

<u>Step</u>	<u>Procedure</u>
1	At each station, remove the cap from the RX LEV MON jack (see Fig. 8-4),
2	At each station, set up as in Fig. 8-4 (Connect cables to RX LEV MON jack in that order using F-type plug),
3	At each station, adjust azimuth and elevation angle for the antenna direction alternately so that the voltage measuring value becomes maximum,

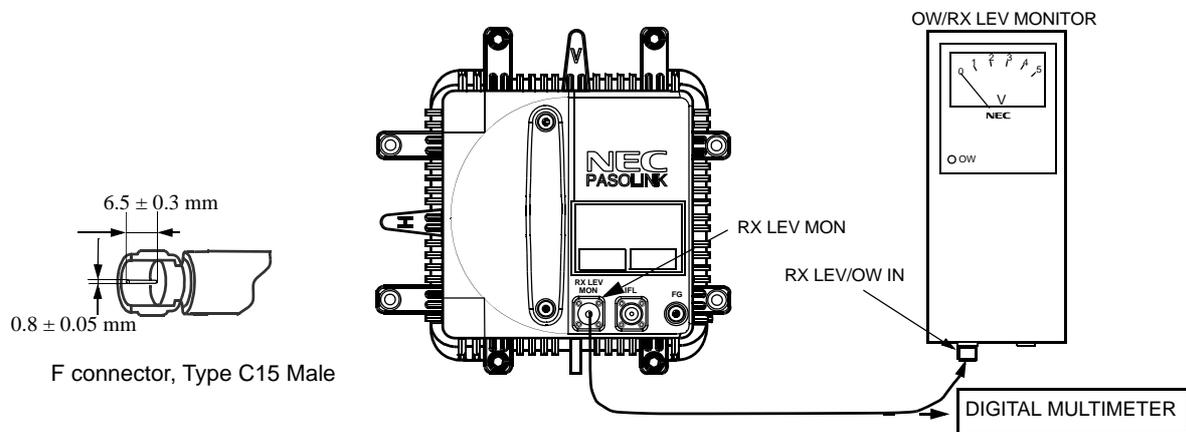
INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
	A. USING ANDREW VHLP TYPE BRACKET
	<u>AZIMUTH ANGLE ADJUSTMENT</u>
3-1	Loosen bolts (1 in Fig. 8-5 (1/3)),
3-2	Adjust the azimuth angle by bolt (2 in Fig. 8-5 (1/3)),
3-3	Secure bolts loosened in step 8-1,
	<u>ELEVATION ANGLE ADJUSTMENT</u>
3-4	Loosen bolts (3 in Fig. 8-5 (1/3)),
3-5	Adjust the elevation angle by bolt (4 in Fig. 8-5 (1/3)),
3-6	Secure bolts loosened in step 3-4,
	B. USING RFS SB1 TYPE BRACKET
	<u>AZIMUTH ANGLE ADJUSTMENT</u>
3-7	Loosen nuts of the U-bolt (3 in Fig. 8-5 (2/3)),
3-8	Loosen nuts (4 in Fig. 8-5 (2/3)),
3-9	Adjust the azimuth angle by nuts (5 in Fig. 8-5 (2/3)),
3-10	Secure nuts loosened in step 3-15 and 16,
	<u>ELEVATION ANGLE ADJUSTMENT</u>
3-11	Loosen bolts (1 in Fig. 8-5 (2/3)),
3-12	Adjust the elevation angle by nuts (2 in Fig. 8-5 (2/3)),
3-13	Secure bolts loosened in step 3-19,
	C. USING RFS SB2 TYPE BRACKET
	<u>AZIMUTH ANGLE ADJUSTMENT</u>
3-14	Loosen nuts (4 in Fig. 8-5 (3/3)),
3-15	Adjust azimuth angle by adjusting nuts (3 in Fig. 8-5 (3/3)),
3-16	Secure nuts loosened in step 3-22,

INITIAL LINEUP

ELEVATION ANGLE ADJUSTMENT

- 3-17 Loosen bolts (1 in Fig. 8-5 (3/3)),
- 3-18 Adjust elevation angle by adjusting nut (2 in Fig. 8-5 (3/3)),
- 3-19 Secure bolts loosened in step 3-25,
- 4 At each station, disconnect digital multimeter or OW/RX LEV MONITOR from RX LEV MON jacks,
- 5 At each station, reconnect the cap removed in step 1.

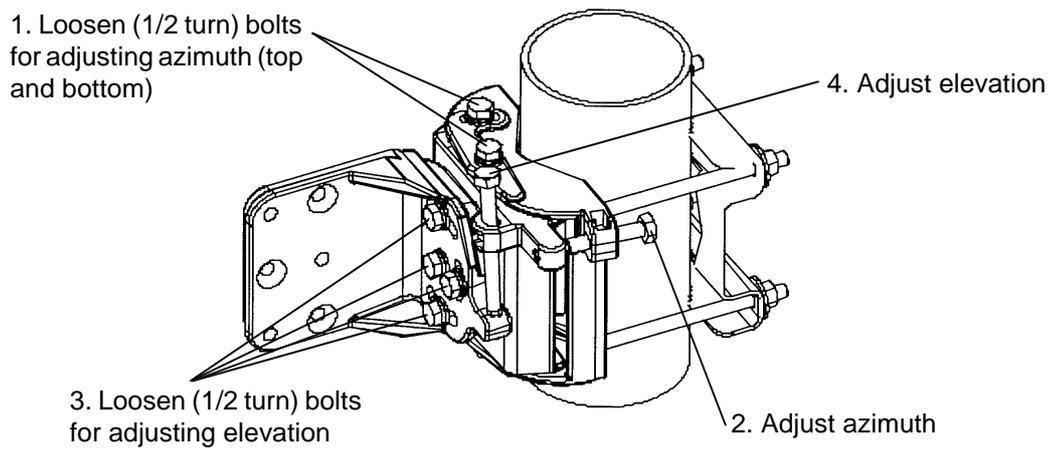


Caution: Connect an RF cable with F connectors (Type C15 Male) to the RX LEV MON terminal when the RX LEV is measured with the digital multimeter or OW/RX LEV MONITOR unit. The measurement of pin contact of the F connector (Type C15 Male) is specified as shown in the figure. Do not connect the connectors of other type nor insert the probe of the voltmeter as this may cause connector damage.

Following translating connector (optional) is to provide facilities when the F connector (Type C15 Female) is translated to the BNC connector (Female).

Name of product : 1821K091 F(C15)[F]-BNC[F]

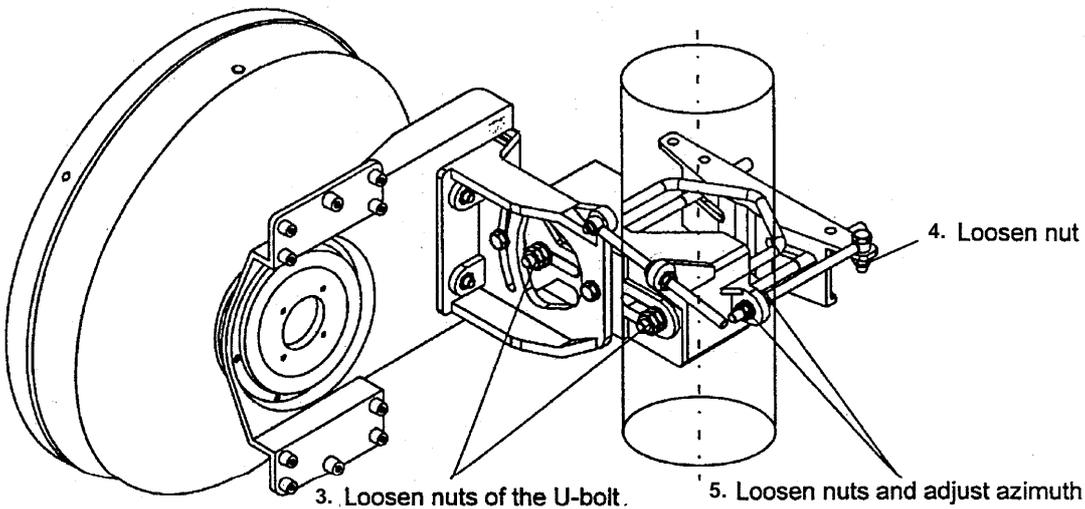
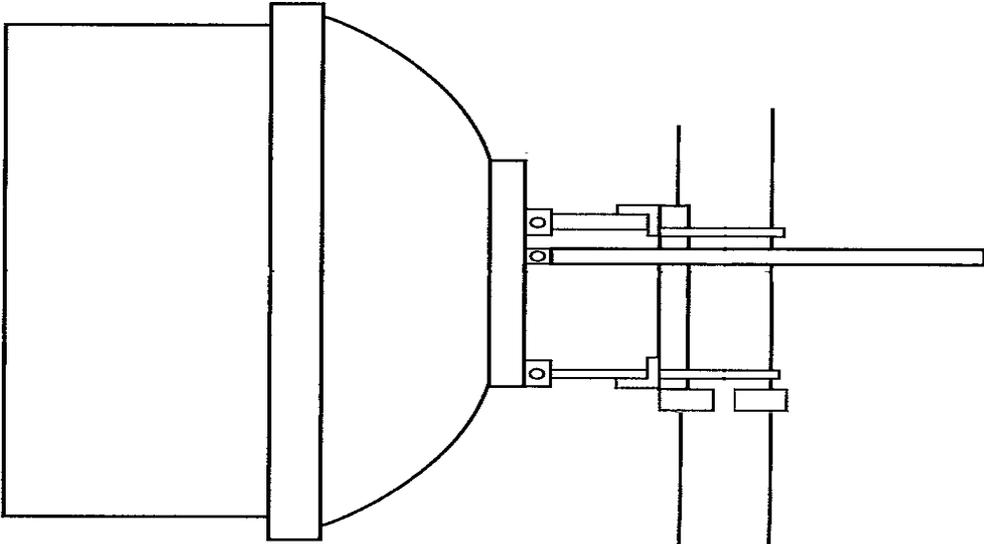
Fig. 8-4 Antenna Orientation Test Setup



ANDREW VHLP TYPE BRACKET

Fig. 8-5 Location of Adjusting Nuts (1/3)

INITIAL LINEUP

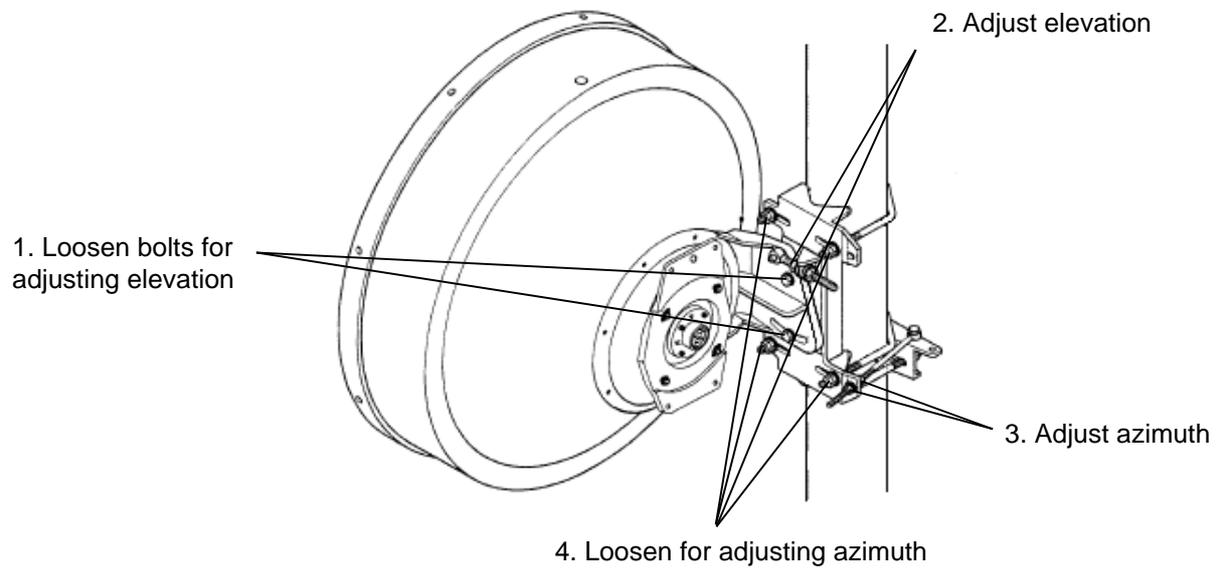


0.3 ϕ m Antenna

C. RFS SB1 TYPE BRACKET

Fig. 8-5 Location of Adjusting Nuts (2/3)

INITIAL LINEUP



0.6 ϕ m Antenna

D. RFS SB2 TYPE BRACKET

Fig. 8-5 Location of Adjusting Nuts (3/3)

INITIAL LINEUP

8.5 Lineup Test

BER measurement can not be performed on channels which are occupied with LAN signal, therefore change the setting from LAN to 2MB signal transmission using LCT before the measurement. (Refer to para 3.4 Equipment Setting and Monitoring of the Modulator-Demodulator description)

Procedures for BER measurement between two stations are described for both (1+0) and (1+1) systems as follows.:

(a) Test Equipment and Accessories Required

- Agilent 34401A Digital Multimeter (or equivalent) with test leads or X0818A OW/RX LEV MONITOR
- Screwdriver
- HP E7580A BER test set (or equivalent)
- Headset
- Personal Computer

(b) Procedure

<u>Step</u>	<u>Procedure</u>
1	Set up as in Fig. 8-6,
2	At station A, the output signal from BER test set (SENDING UNIT) is set as follows: <ul style="list-style-type: none">• Bit rate: 2.048 Mbps• Code format: HDB-3 code• Level: 2.37 Vo-p or 3.0 Vo-p• Impedance: 75 ohms, unbalanced or 120 ohms, balanced

Note: The Traffic IN/OUT interface impedance for each channel is selectable with Dip switches.

Caution: Do not turn on the power of the IDU leaving cable connection between the PC and RA PORT of the IDU.

Caution: Before the start of maintenance, including operation of the OPR SEL SW on the front panel of the equipment, select the equipment to maintenance mode using the LCT.

After all operation for maintenance have been completed, perform MAINT OFF setting.

INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
3	At station B, the input signal mode to BER test set (RECEIVING UNIT) is set as follows: <ul style="list-style-type: none">• Bit rate: 2.048 Mbps• Code format: HDB-3 code• Impedance: 75 ohms, unbalanced or 120 ohms, balanced

Table 8-1 Meter Reading of the ODU

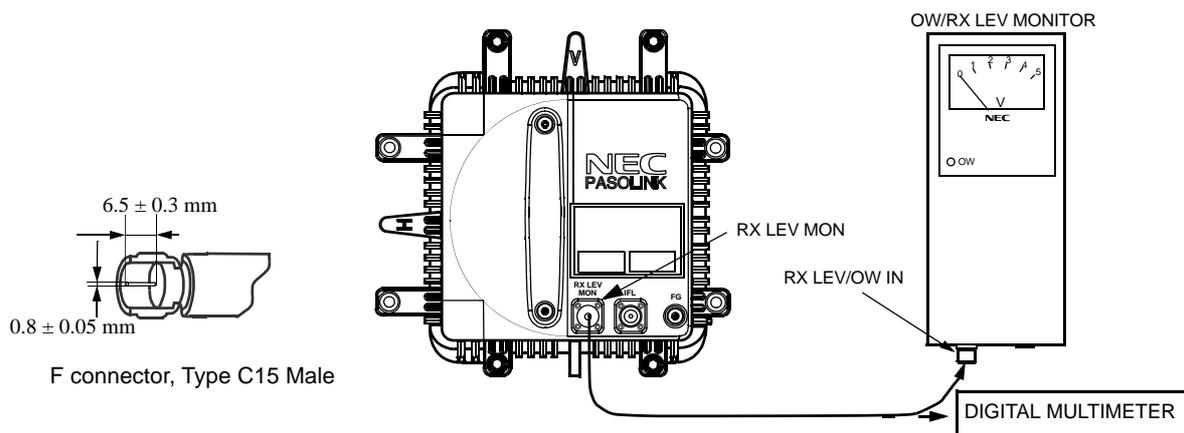
CHECK ITEM		ALLOWABLE RANGE
TX power	0	Depends on transmitter power (0 to 4.6 V DC)
RX level	1	Depends on received signal level (0.8 to 4.4 V DC)

INITIAL LINEUP

- | Step | Procedure |
|---------------------------------|---|
| <u>Meter Reading of the ODU</u> | |
| 4 | Remove the cap from the RX LEV MON jack (see Fig. 8-3), |
| 5 | Connect an RF cable with F connectors (Male) to RX LEV MON jack. With the digital multimeter or OW/RX LEV Monitor unit, confirm that the meter indication is as described in Table 8-2, |
| 6 | Disconnect RF cable, the digital multimeter or OW/RX LEV MONITOR and reconnect the cap removed in step 4, |

Table 8-2 Meter Reading of the ODU

CHECK ITEM	ALLOWABLE RANGE
RX level	Depends on received signal level (0.8 to 4.4 V DC)



Caution: Connect an RF cable with F connectors (Type C15 Male) to the RX LEV MON terminal when the RX LEV is measured with the digital multimeter or OW/RX LEV MONITOR unit. The measurement of pin contact of the F connector (Type C15 Male) is specified as shown in the figure. Do not connect the connectors of other type nor insert the probe of the voltmeter as this may cause connector damage.

Following translating connector (optional) is to provide facilities when the F connector (Type C15 Female) is translated to the BNC connector (Female).

Name of product : 1821K091 F(C15)[F]-BNC[F]

Fig. 8-6 Lineup Test Setup

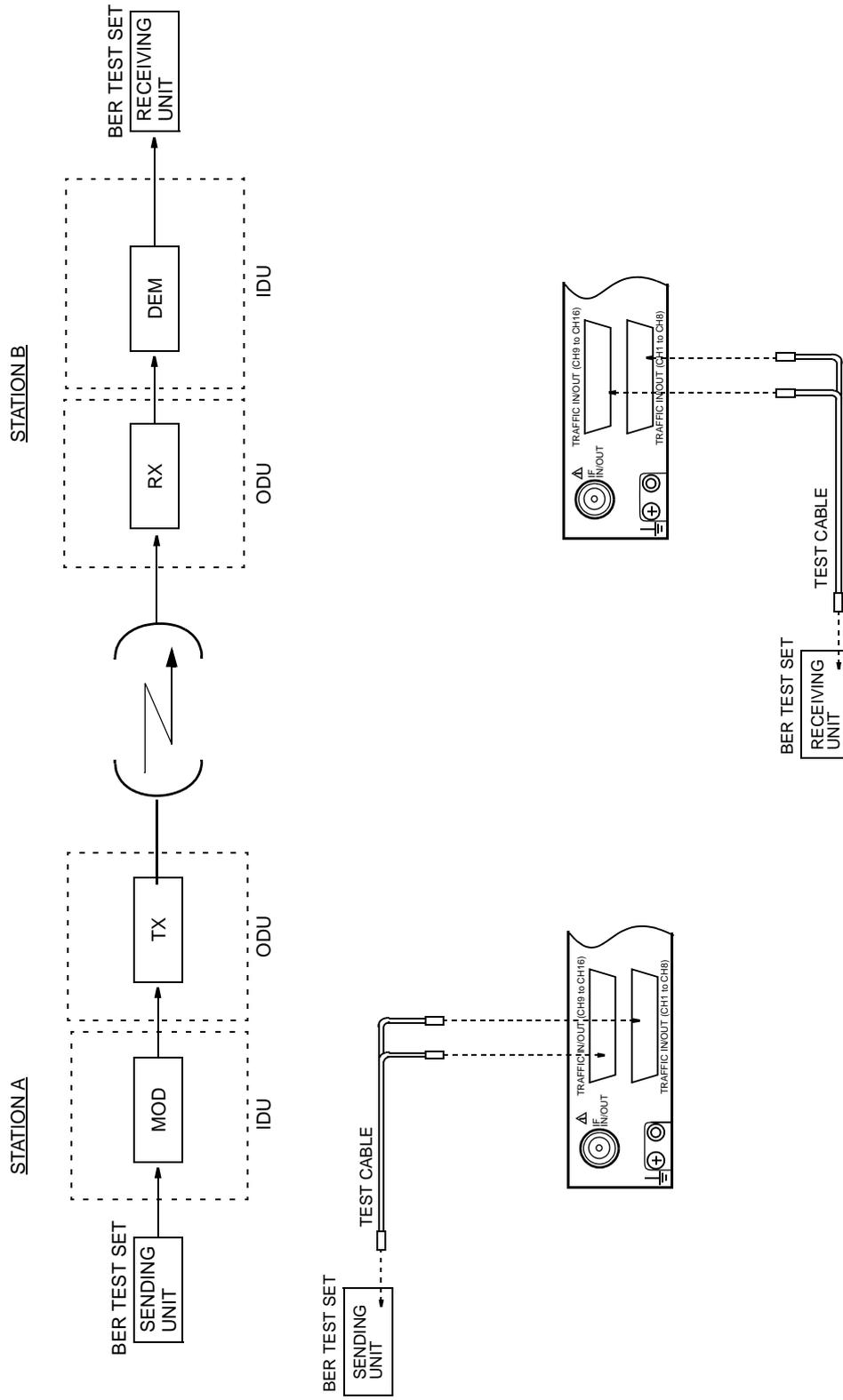


Fig. 8-7 Lineup Test Setup (1+0 System)

INITIAL LINEUP

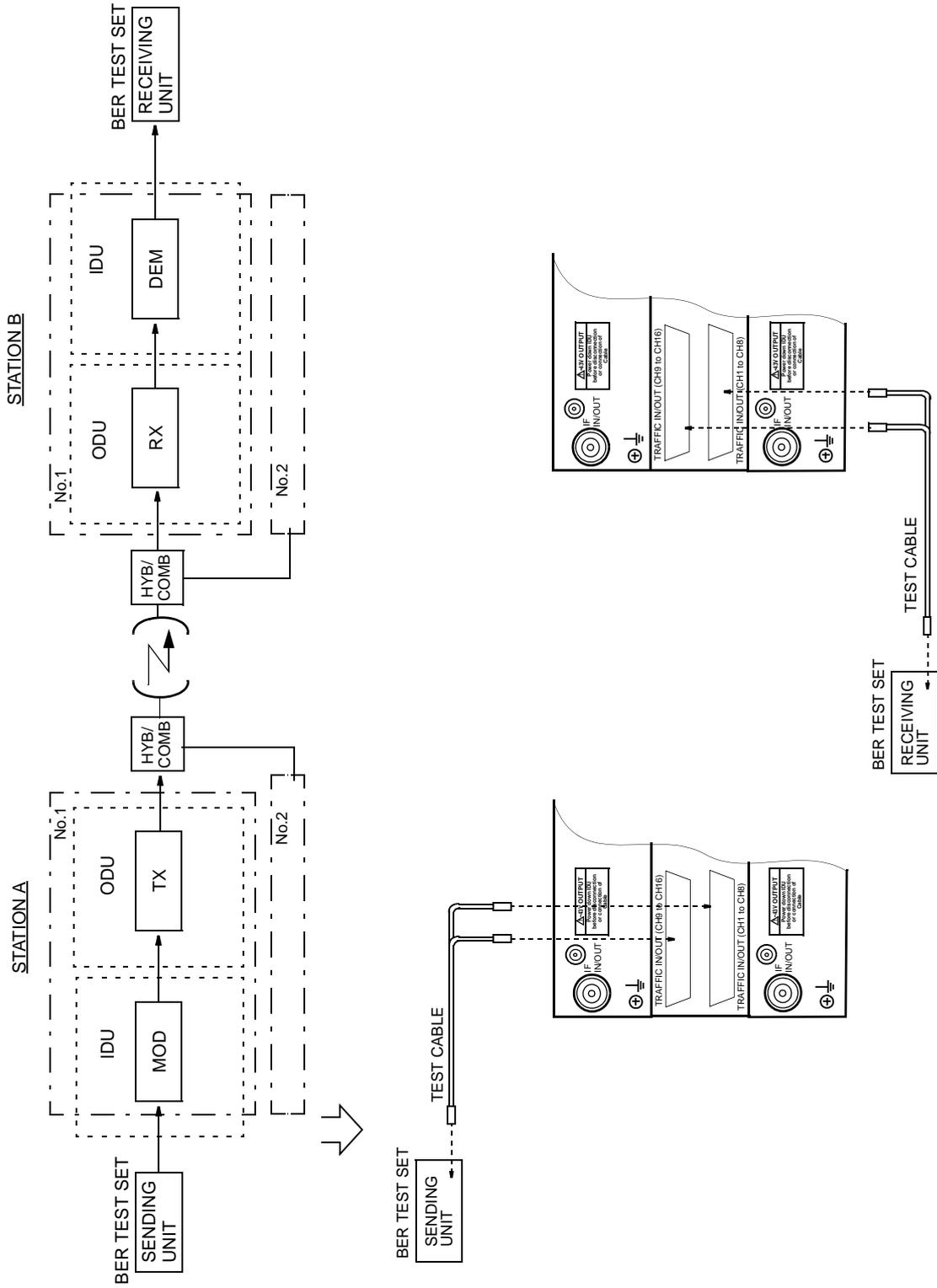


Fig. 8-8 Lineup Test Setup (1+1 System)

INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
-------------	------------------

11 Following display appears,

- 1. Setting
- 2. Maintenance
- 3. Monitoring
- 99. Exit

Select function No. :

12 Press the “3” key and “Enter” key, the following appears,

For 1+0 System

Monitoring

- 1. Monitoring voltage
- 2. Monitoring voltage (continuous mode)
- 3. Alarm/status
- 4. Inventory
- 00. Menu
- 99. Exit

Select item No. :

For 1+1 System

Monitoring

- 1. Monitoring voltage
- 2. Alarm/Status
- 3. Inventory
- 00. Menu
- 99. Exit

Select item No. :

13 Press the “1” key and “Enter” key, the following results are displayed,

Note: TX Power indicated in dB is a relative level to the nominal output power.

For 1+0 System

1. Monitoring voltage	
TX power	: 4.33V (-1 dB)
RX level	: 3.55V (-32 dBm)

INITIAL LINEUP

<u>Step</u>	<u>Procedure</u>
	<u>Orderwire Test</u>
16	Connect the OW/RX LEV MONITOR to the RX LEV MON jack on the ODU (see Fig. 8-10),
17	Connect headset(s) to the EOW jack on the front panel of the IDU and/or to EOW jack on the OW/RX LEV MONITOR (see Figs. 8-9 and 8-10),
18	Press the CALL button switch on the front panel of the IDU, Requirement: At opposite station, the buzzer on the IDU is activated,
19	Check that orderwire telephone between stations can be connected by using headsets,
20	Set OW switch on the OW/RX LEV MONITOR to ON (OW indicator on the OW/RX LEV MONITOR is turned on),
21	Check that orderwire telephone between IDU and ODU can be connected by using headsets,
22	Set OW switch on the OW/RX LEV MONITOR to OFF (OW indicator on the OW/RX LEV MONITOR is turned off),
	<i>Notes: 1. The battery becomes weak if the OW switch is kept ON.</i>
23	Disconnect headset(s) from EOW jack on the front panel of the IDU, and/or from EOW jack on the OW/RX LEV MONITOR,
24	Disconnect the OW/RX LEV MONITOR from the RX LEV MON jack on the ODU.

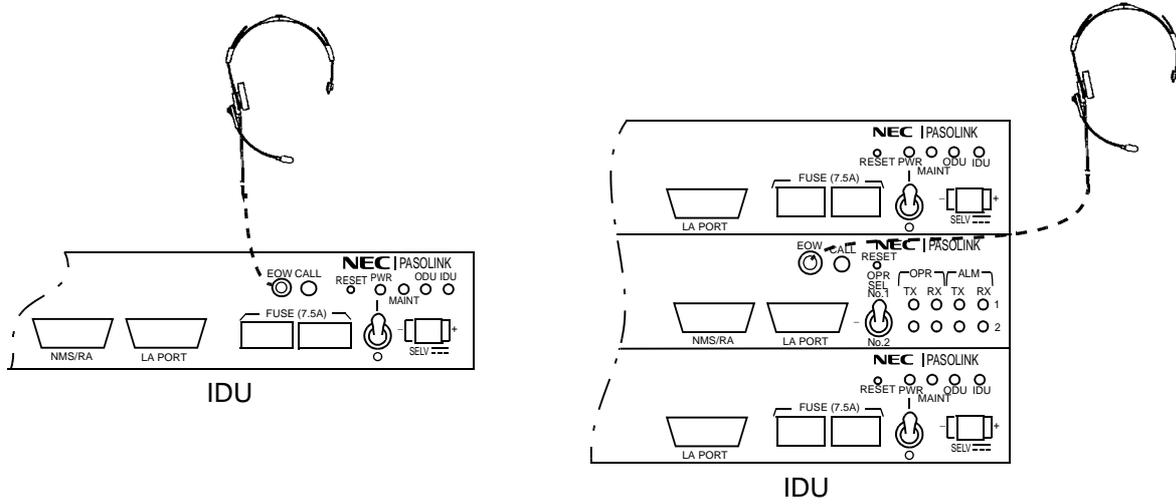
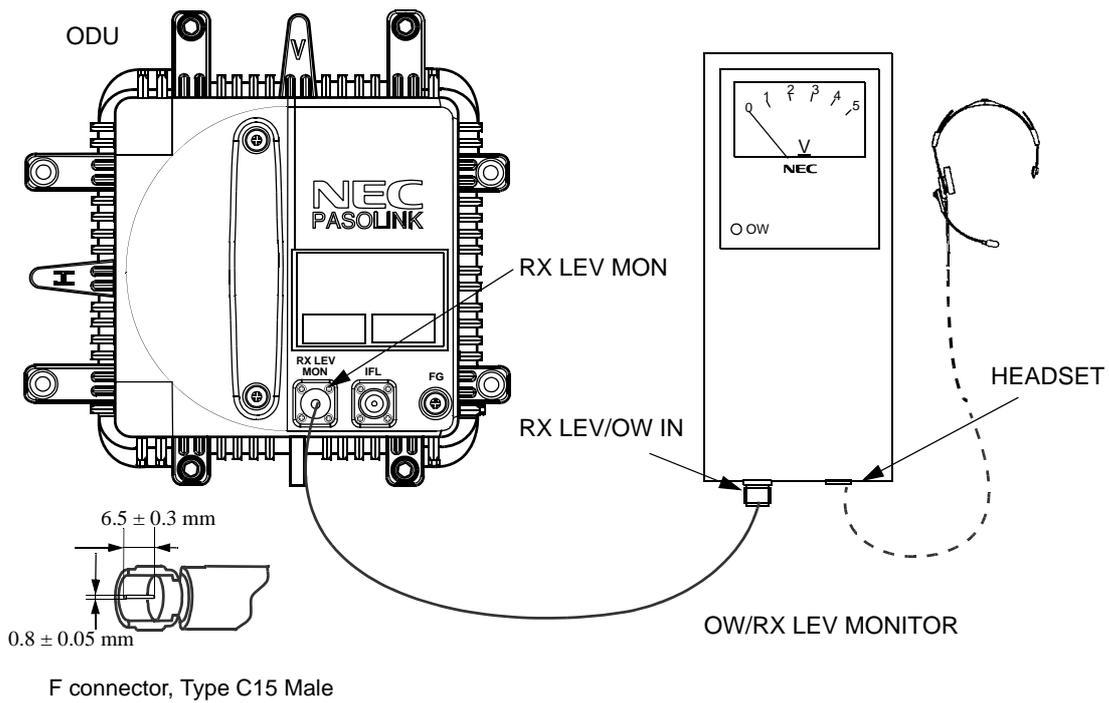


Fig. 8-10 Lineup Test Setup for IDU



F connector, Type C15 Male

Note: Use a connection cable which is attached to the OW/RX LEV MON unit.

Fig. 8-11 OW Test Setup for ODU

INITIAL LINEUP

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