

**NLite N**  
**6-38 GHz DIGITAL RADIO SYSTEM**

**Section III INSTALLATION AND INITIAL LINE UP**

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**CONTENTS****ROI-S07045**

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## **1. GENERAL**

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This section provides installation and initial line up information on the NLite N used for 6-38 GHz microwave radio system.

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## 2. INSTALLATION

The standard installation is summarized in this section. Included herein is information on typical installation work flow and guides for MDP installation, TRP installation, Antenna (ANT) installation, waveguide connection and coaxial cable connections. The installation flow diagram is shown below.

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.

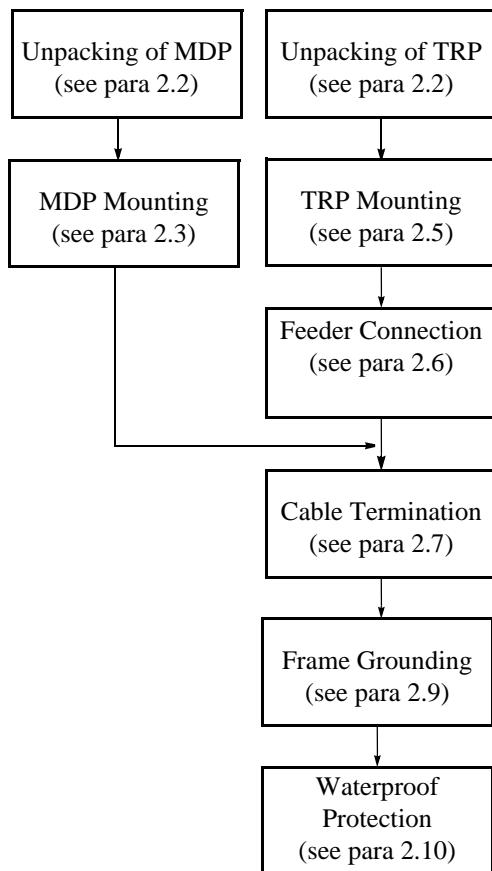
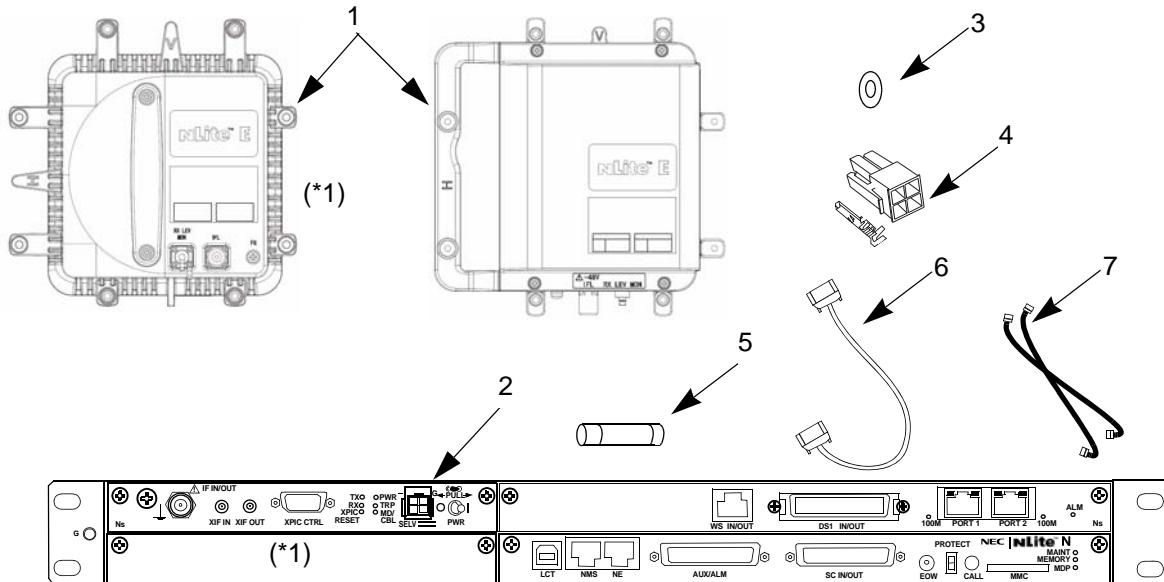


Fig. 2-1 Typical Installation Flow Diagram

## **2.1 Packages**

Each unpacked component of the [ ] GHz [ ] MB digital radio system must be checked as shown below.

<b>CONTENS LIST</b>	<b>DRAWING NO.</b>
MDP and TRP	Fig. 2-2
Mounting Bracket	Fig. 2-4
Installation Kit	Fig. 2-5 and Fig. 2-7



No.	DESCRIPTION
1	TRP-( )G-1B (NHG)/ TRP-( )G-5B (NHG2)/ TRP-6G-6AA (EHG)/ TRP-24G-2B*3
2	MDP-150MB-3AA (MDP)
3	O-Ring (Attached to the waveguide type TRP)
4	Power Connector (Molex Housing M5557-4R (×1ea) and Socket Contact (5556TL (× 4 each))
5	Cylindrical Fuse ((RKS-F91000-0107) (6.3A) (×1ea) *2)
6	XPIC CTRL Cable (×1) (apply for XPIC configuration only)
7	X-IF Coaxial Cable (×2) (apply for XPIC configuration only)

Notes:  
 \*1 One more TRP and MODEM module are provided for HS/Twinpath configuration.

\*2 One spare fuse is provided in the MODEM module.

\*3 TRP NHG Type: 6-38 GHz, TRP NHG2 Type: 6-8GHz/13-38 GHz, TRP Mx Type: 52 GHz

**Fig. 2-2 Contents of Basic Unit Package**



No.	DESCRIPTION
1	NWA-011060-[ ] DC-DC CONV UNIT (see Fig. 2-7 for details)

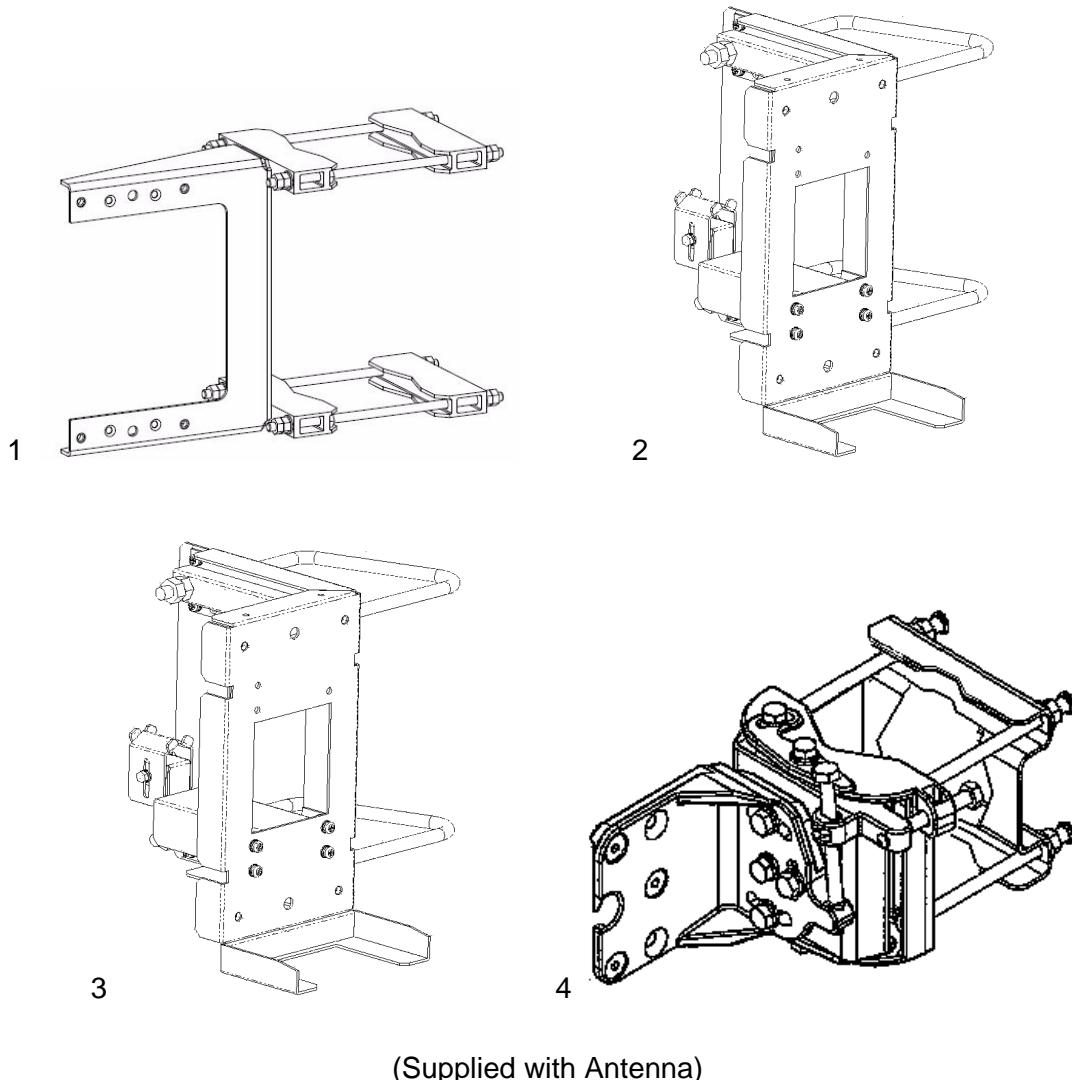
Fig. 2-3 Contents of Optional Unit Package

DC-DC CONV UNIT	NHG/NHG2/EHG	NHP	ALL INDOOR TRP
NWA-0011060-001 (24/48V type)	✓	*1	*2
NWA-011060-002 (48V type)	✓	*1	✓
NWA-011060-003 (24V type)	✓	*1	✓

Note: ✓: Usable

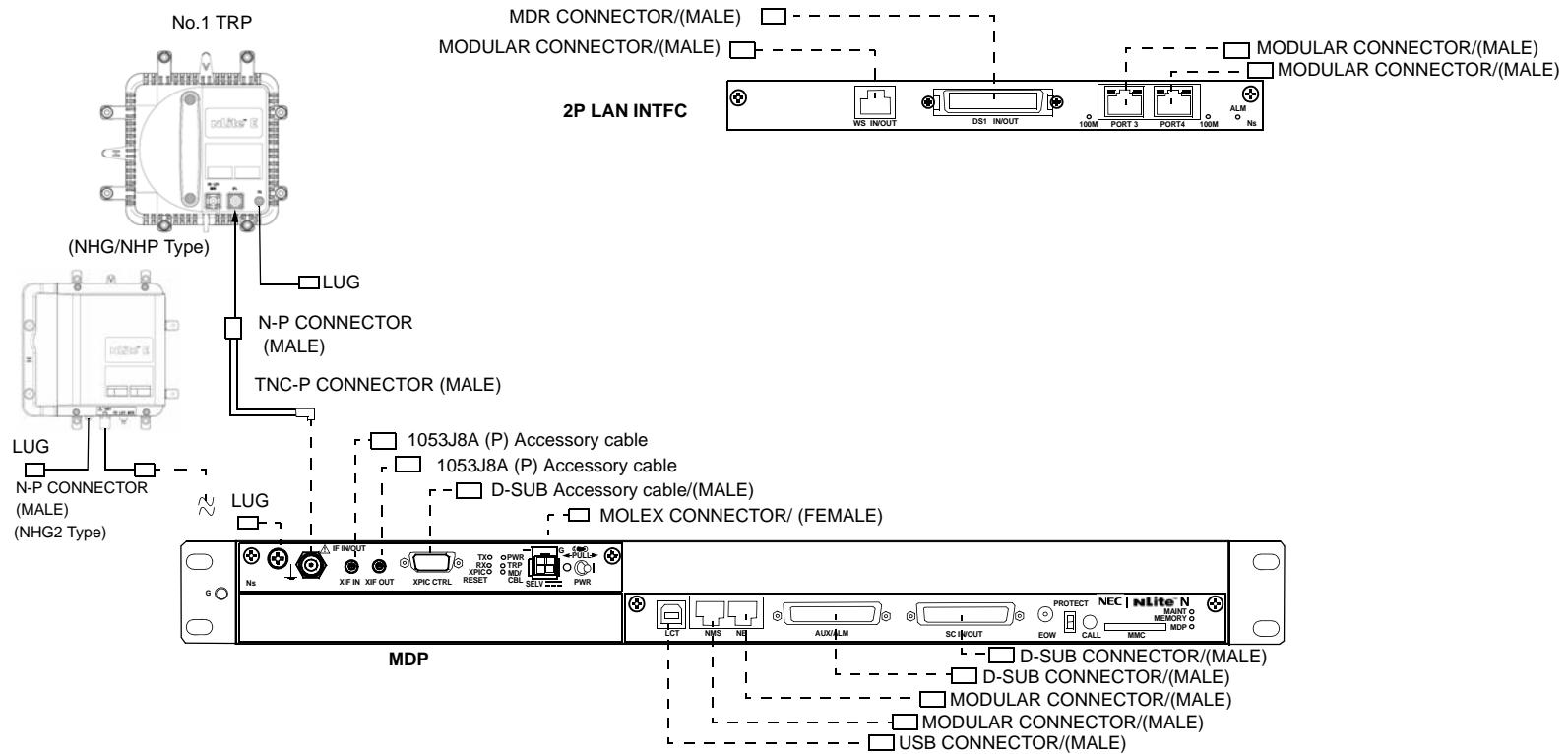
\*1: TRP (NHP type) can not be used with DC-DC CONV.

\*2: ALL INDOOR TRP can not be used with NWA-0011060-001 (24/48V type).



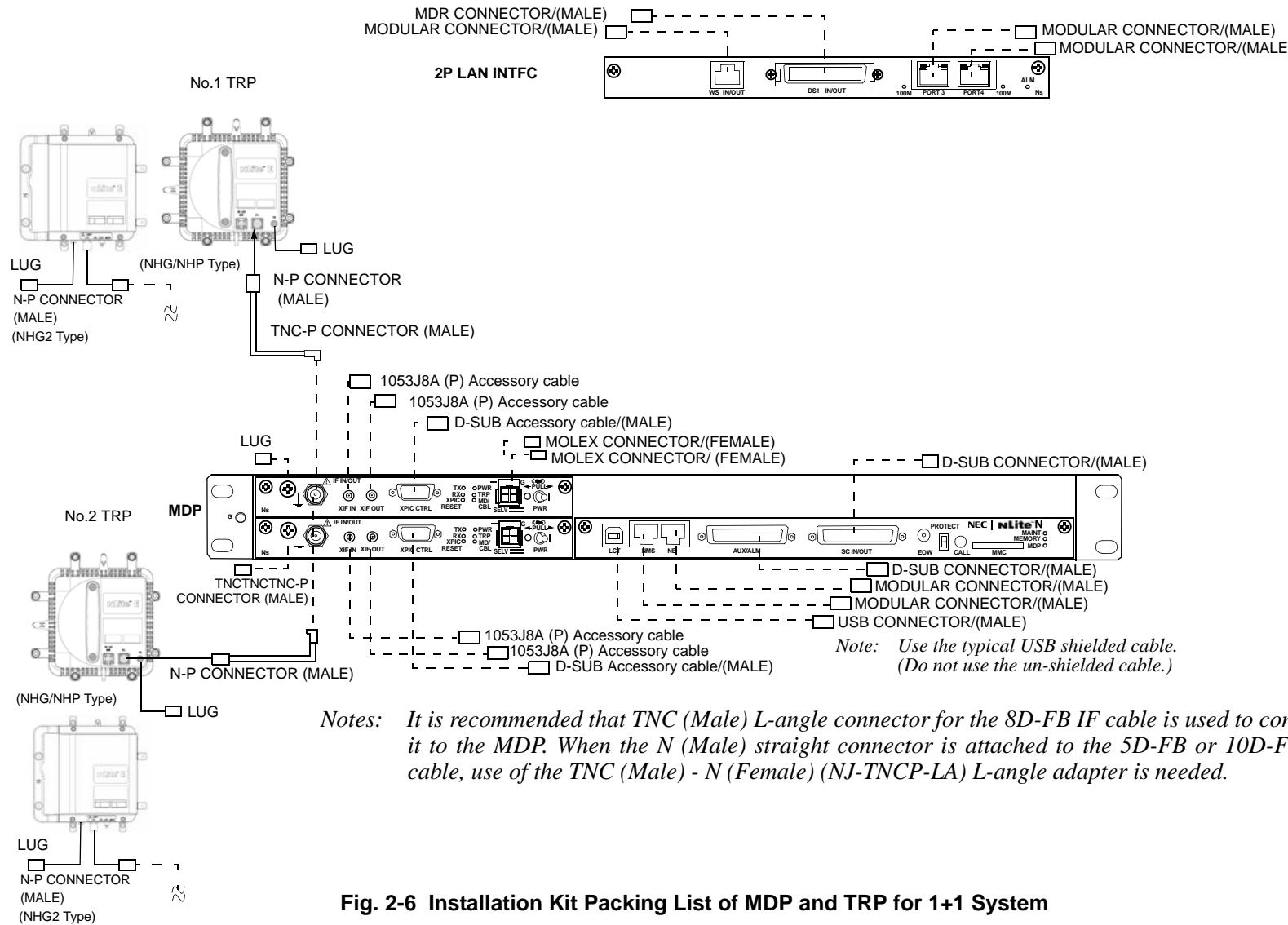
No.	DESCRIPTION
1	Pole Mounting Bracket for Coaxial Cable (6 GHz)/Waveguide Connection Type
2	Pole Mounting Bracket for Coaxial Cable Connection Type (6 GHz)
3	Pole Mounting Bracket for Wave Guide connection Type
4	Pole Mounting Bracket for Antenna direct Mounting Type

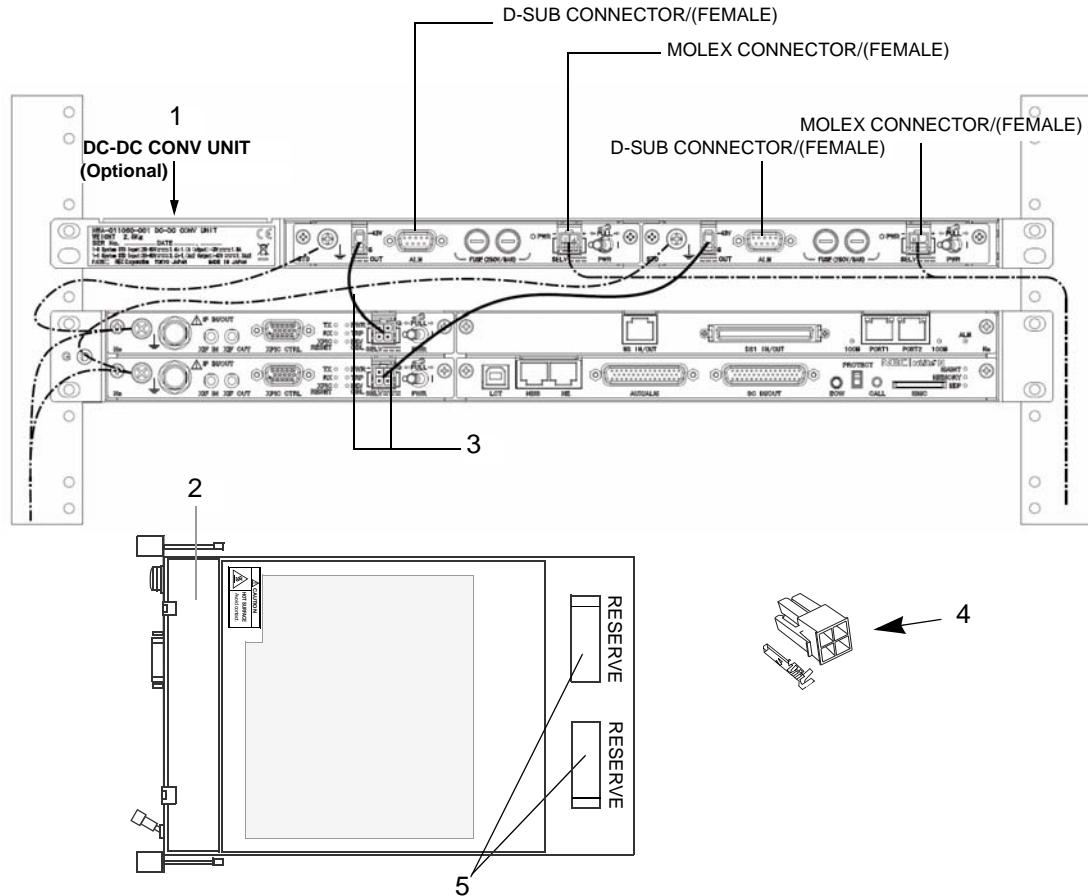
**Fig. 2-4 Pole Mounting Bracket**



**Notes:** 1. It is recommended that TNC (Male) L-angle connector for the 8D-FB IF cable is used to connect it to the MDP. 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.

**Fig. 2-5 Installation Kit Packing List of MDP and TRP for 1+0 System**





No.	DESCRIPTION
1	NWA-011060-[ ] DC-DC CONV UNIT
2	H3040[ ] DC-DC CONV
3	Power Cable (NWM-005773-001, attached to the DC-DC CONV)
4	Power Connector (Molex Housing M5557-4R (x1ea) and Socket Contact (5556TL (x4 each)))
5	Cylindrical Fuse ((CBE-006255-001) (8A) (x2 ea) *2)

Notes:  
 \*1 One more TRP and MODEM module are provided for HS/Twinpath configuration.

\*2 Two spare fuses are provided in the DC-DC CONV module.

**Fig. 2-7 Installation Kit Packing List of DC-DC CONV UNIT for 1+1 System**

## 2.2 Unpacking of MDP and TRP

The unpacking procedures for the MDP and TRP are shown in following chart.

- MDP: Chart 2-1
- TRP: Chart 2-2

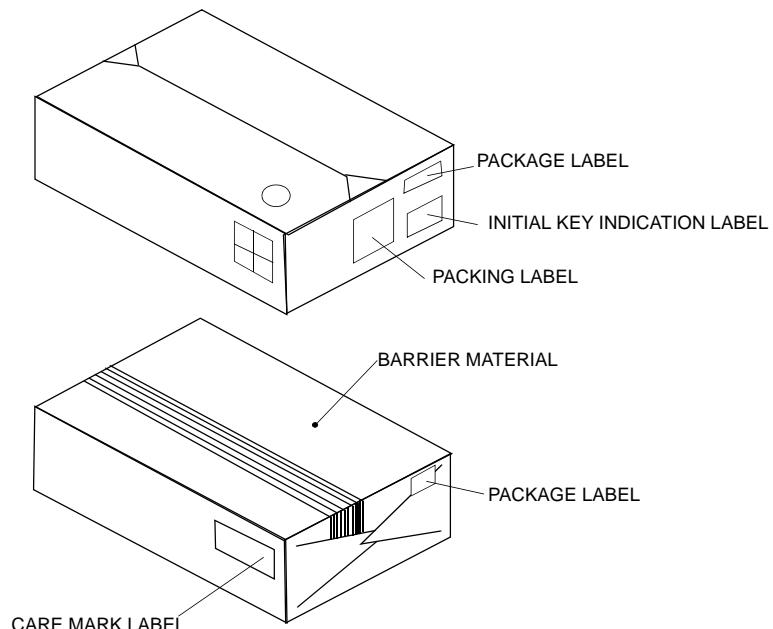
*Note: When conveying the MDP or TRP to another place, the original packing should be used to avoid damage.*

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**Chart 2-1 Unpacking Method for MDP**

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Step	Procedure
1	Cut the p.p. tape at top of the carton. Then open the carton,

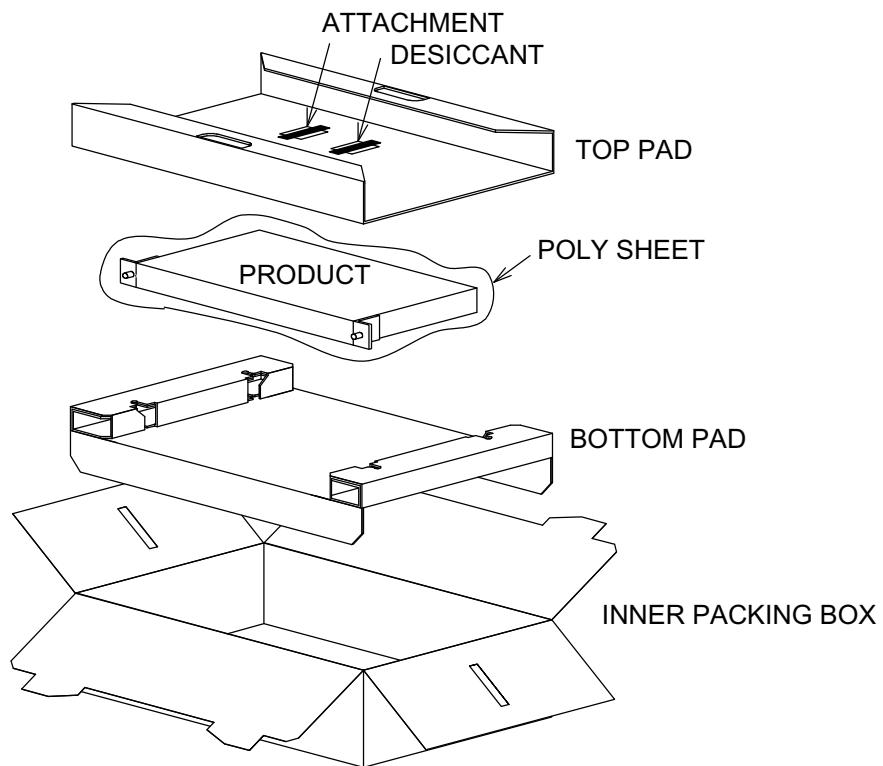


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**Chart 2-1 (Cont'd)**

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Step	Procedure
2	Take out the accessories, MDP wrapped in the poly sheet and cushioning materials (pads),



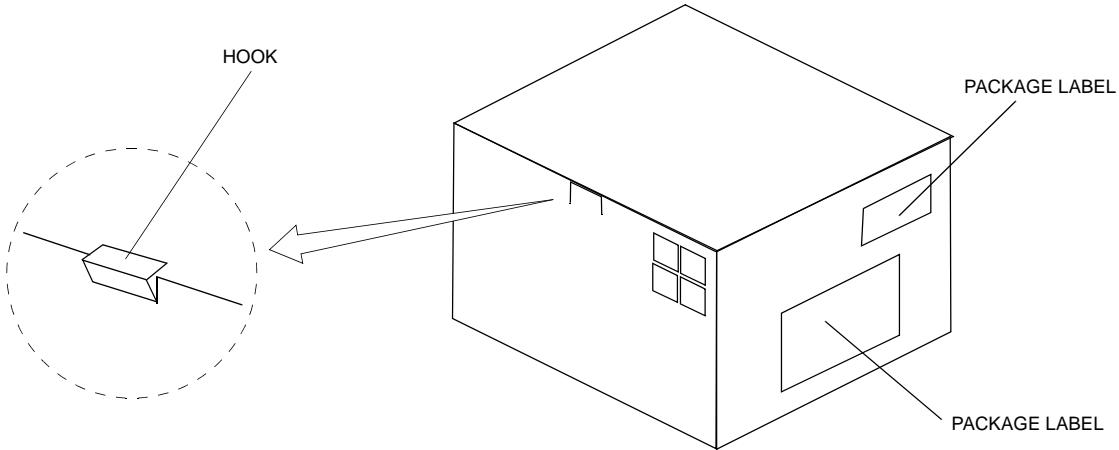
- 
- 3 Take out the MDP from the poly sheet,
  - 4 Inspect the MDP.
-

---

**Chart 2-2 Unpacking Method for TRP**

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Step	Procedure
1	Take off the hook of a cover as shown below. Then, open the top cover,

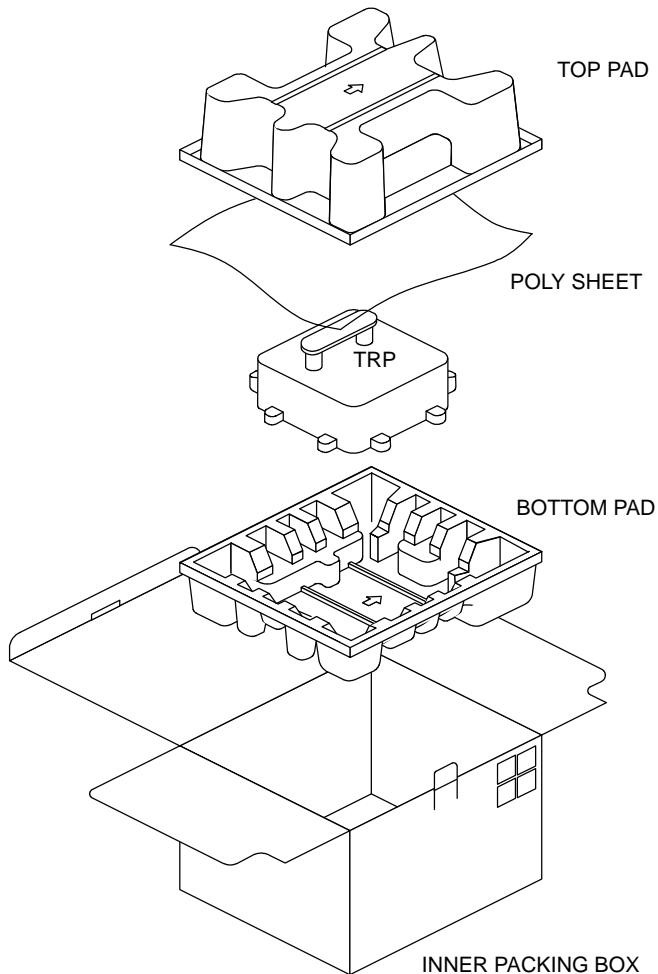


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**Chart 2-2 (Cont'd)**

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Step	Procedure
2	Take out the TRP, cushioning materials (pads) and poly sheet,



- 
- 3      Inspect the TRP.
-

## 2.3 MDP Mounting

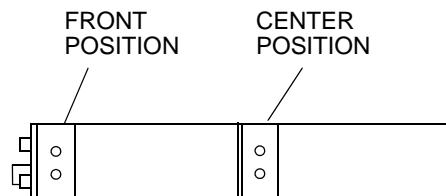
The installation procedure for the MDP explains in Chart 2-3. The MDP should be installed in the radio station.

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**Chart 2-3 Mounting Methods of the MDP**

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Step	Procedure
1	Change the two brackets to desired position on the MDP, if necessary,



SIDE VIEW

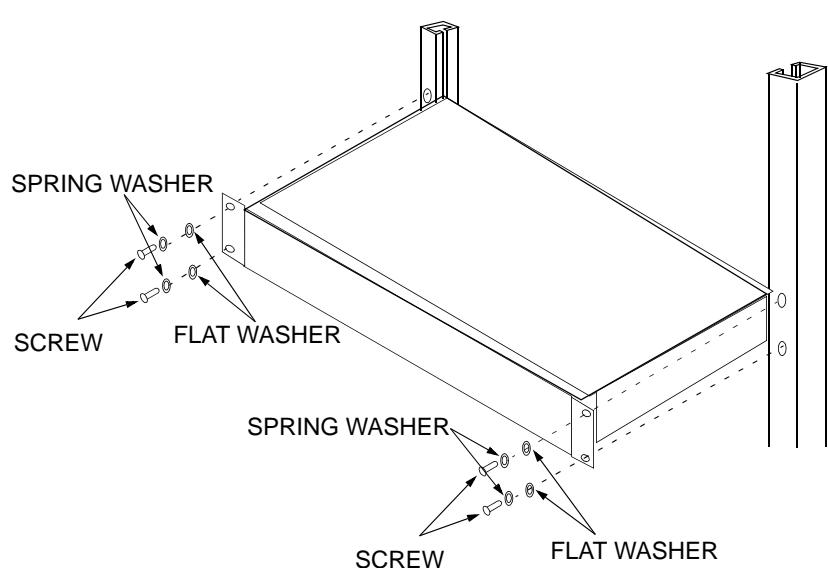
1+0/1+1 SYSTEM

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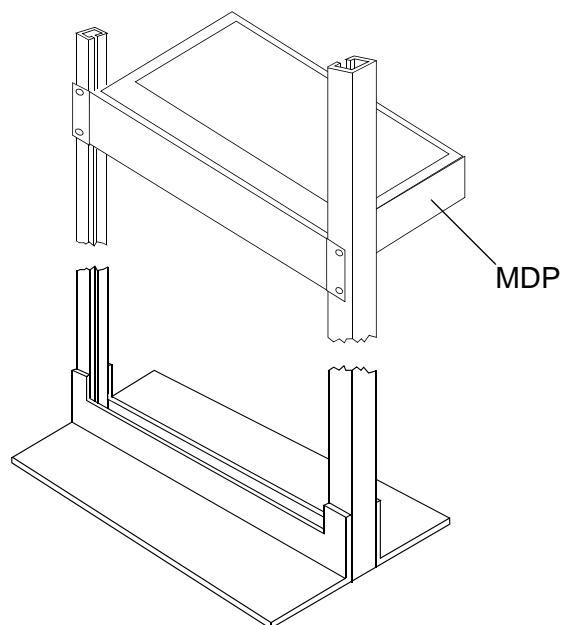
**Chart 2-3 (Cont'd)**

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Step	Procedure
2	Align the MDP to the mounting position on the 19-inch rack,



- 3 Fix each side of the MDP to the 19-inch rack with the two screws,

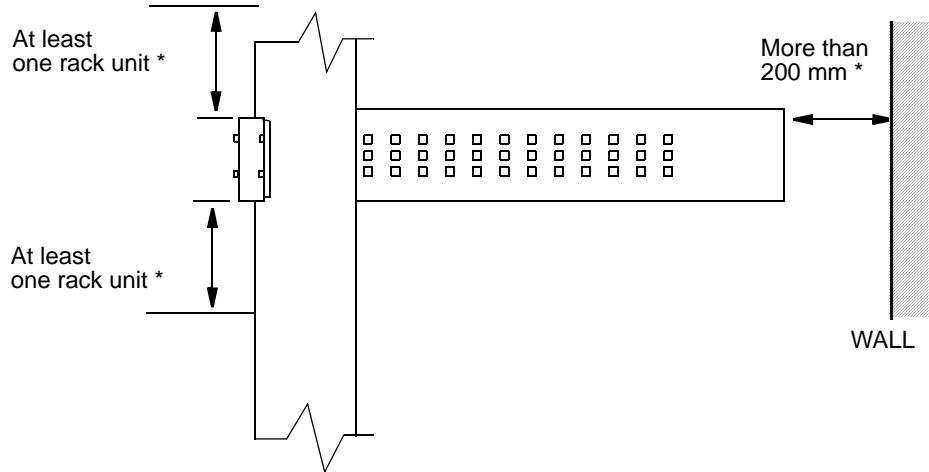


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**Chart 2-3 (Cont'd)**

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<b>Step</b>	<b>Procedure</b>
4	To mount the MDP in a 19-inch rack, take a 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, keep the environment temperature is lower than +40 °C.*

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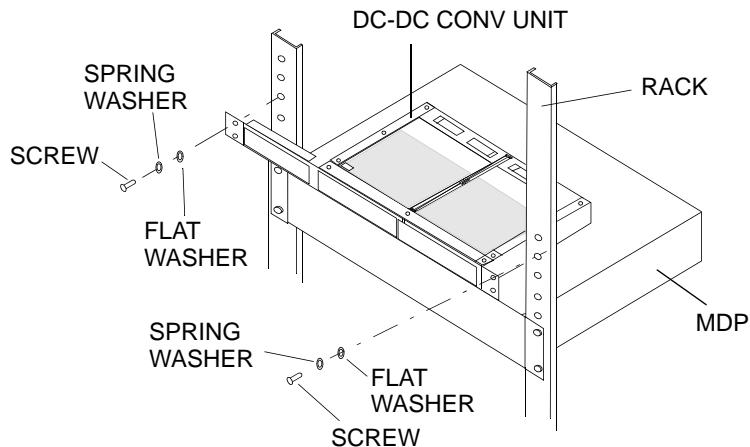
## 2.4 DC-DC CONV UNIT Mounting (Optional)

The installation procedure for the DC-DC CONV UNIT (optional) explains in Chart 2-4. The DC-DC CONV UNIT (optional) should be installed in the radio station.

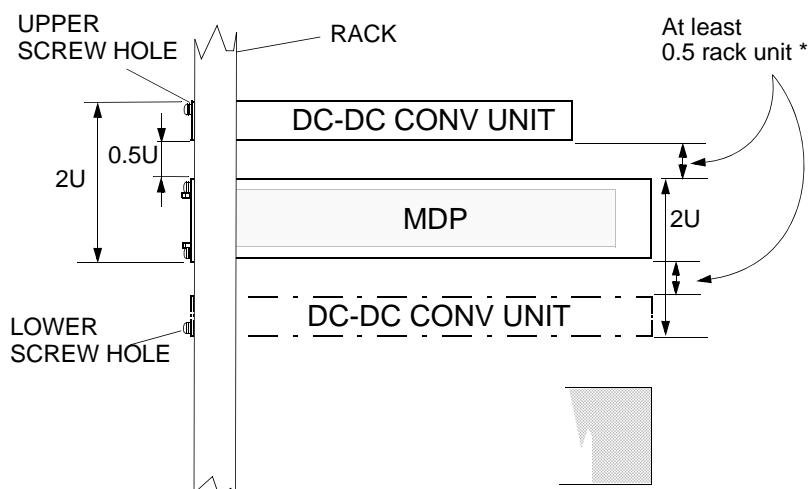
**Chart 2-4 Mounting Methods of the DC-DC CONV UNIT**

Step	Procedure
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- 1 Fix the DC-DC CONV UNIT to the 19-inch rack using the two screws.



*Note: \* Space 0.5 rack unit in the upper or lower DC-DC CONV UNIT.*



## 2.5 TRP Mounting

The procedures for mounting and demounting the TRP are described here. There are two types of mounting for the antenna direct mounting type and waveguide connecting type. The TRP should be installed in the radio station. The tools for installation are listed in Table 2-1.

**Table 2-1 Tools**

TOOLS
Wrench or Monkey wrench
Screwdriver
Torque Wrench

*Cautions:* 1. How to use small and large O-rings are shown in following table. Two (small and large) O-rings are attached in 18 to 38 GHz band Andrew/RFS direct mount antenna. 11 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 TRP direct mount installation, a gap may occur between TRP and antenna for RF interface. Therefore it may happen transmit or receive level down.

2. Do not apply silicon grease at O-ring.

SYSTEM	ATTACHMENT POSITION OF O-RING (BETWEEN:)	O-RING		REMARKS
		SMALL SIZE	LARGE SIZE	
1+0	ANT — TRP	Not used	Used	Antenna direct mounting
	ANT — WG/TRP (18-38 GHz BAND)	Used	Not used	Waveguide connection
1+1	ANT — HYB/COUPLER	Not used	Used	Antenna direct mounting
	ANT — WG/HYB/COUPLER (18-38 GHz BAND)	Used	Not used	Waveguide connection

*Note:* 11 GHz antenna for direct mount is not possible to connect the ordinary waveguide flanges.

## INSTALLATION

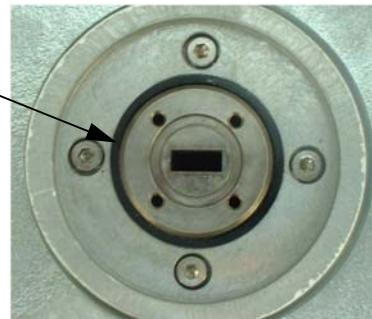
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FOR WAVEGUIDE CONNECTION

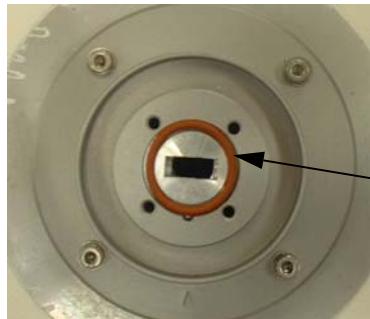
POSITION  
OF LARGE  
SIZE O-RING

POSITION  
OF SMALL  
SIZE O-RING



FOR ANTENNA DIRECT MOUNTING

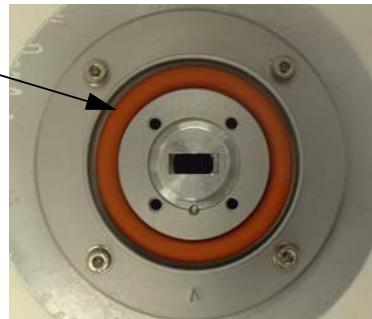
ANDREW ANTENNA



FOR WAVEGUIDE CONNECTION

POSITION  
OF LARGE  
SIZE O-RING

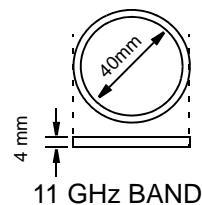
POSITION  
OF SMALL  
SIZE O-RING



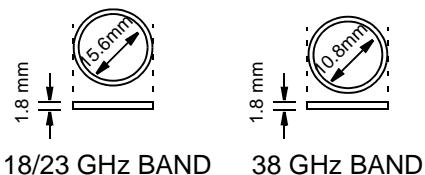
FOR ANTENNA DIRECT MOUNTING

RFS ANTENNA

- Notes:*
1. Do not use both small O-ring and large O-ring simultaneously.
  2. O-ring size is different with frequency band as follows:



LARGE SIZE O-RING FOR ANTENNA DIRECT MOUNTING



SMALL SIZE O-RING FOR WAVEGUIDE CONNECTION

## 2.5.1 Mounting

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

Installation manuals of NEC Pasolink Antenna are attached at Appendix NEC PASOLINK ANTENNA.

**Table 2-2 Antenna Direct Mounting**

Change of Polarization	TRP/ Bracket	HYB/ COUPLER	TX SPAN ATT	OMT
Chart 2-5 ANT/TRP/HYB/COUPLER/TX SPAN ATT	Chart 2-6	Chart 2-7	Chart 2-8	Chart 2-11

**Table 2-3 Waveguide Connection**

Using 1+1 HYB	1+0 or Connecting Two Antennas
Chart 2-10	Chart 2-12

**Table 2-4 Coaxial Cable Connection**

With/Without HYB/COUPLER
Chart 2-15

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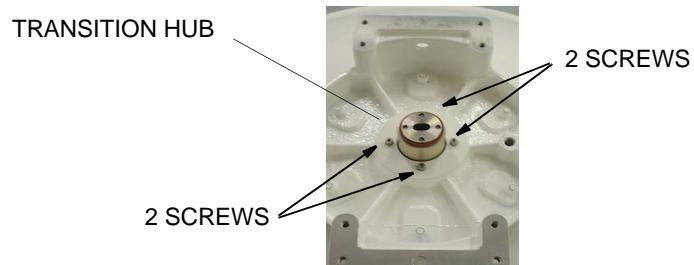
**Chart 2-5 Change of Polarization (Antenna Direct Mounting)**

---

Step	Procedure
<b><u>CHANGE OF POLARIZATION</u></b>	
TRP DIRECT MOUNTING TYPE ANTENNA (Example (ANDREW) 1/2)	
<p><i>Notes:</i> 1. The details are referred to the installation manual which is attached to the antenna. The installation or removal of the antenna requires qualified experienced personnel.</p> <p>2. The antenna is set to V-polarization when shipped from the factory.</p>	
1	Keep the antenna stand horizontally.



- 2 If you change to H polarization, loosen the four screws with the Allen key wrench and then rotate the Transition hub of feed, keeping the antenna stand horizontal.



**Chart 2-5 (Cont'd)**

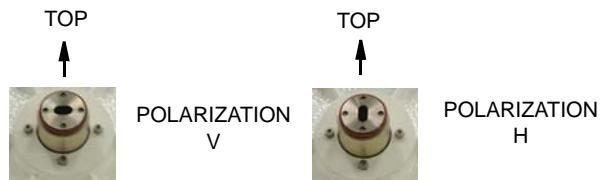
<b>Step</b>	<b>Procedure</b>
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*Note: Do not remove the screw complete from the screw hole.  
Hold the feed horn with hand.*



- 3 Holding the feed with hand, rotate the feed 90 degrees.

Check that the aperture part of the Transition hub is rotated 90 degrees, then fix it with the screws that were loosened in step 2.



- 4 Check that the aperture part of the Transition hub is rotated 90 degrees, then fix it with the screws that were loosened in step 2

*Note: When 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).*

**Chart 2-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
<b><u>CHANGE OF POLARIZATION</u></b>	
TRP DIRECT MOUNTING TYPE ANTENNA (Example (ANDREW) 2/2)	
<i>Notes:</i>	<p>1. The details are referred to the installation manual which is attached to the antenna. The installation or removal of the antenna requires qualified experienced personnel.</p> <p>2. The antenna is set to V-polarization when shipped from the factory.</p>
1.	Keep the antenna stand horizontally.
2.	Loosen six screws with Allen wrench until transition can rotate freely.



- Notes:*
1. Do not remove the screw complete from the screw hole.
  2. Because of the screwtight is applied, the strength to loosen screw is necessary.
  3. Rotate the transition hub 90 degrees until timing pin locates in timing concavity.

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**Chart 2-5 (Cont'd)**

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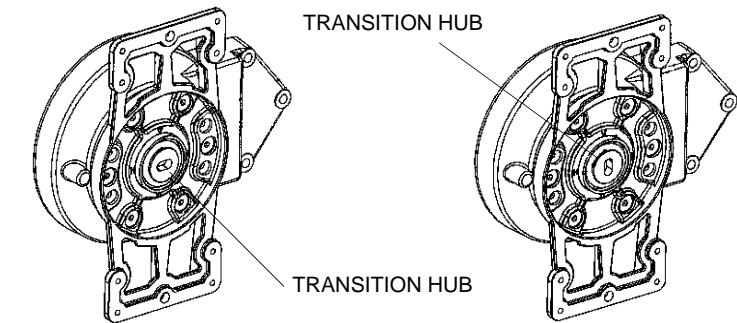
Step	Procedure
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TRANSITION HUB

TIMING PIN

VERTICAL POLARIZED APPLICATION



TRANSITION HUB

HORIZONTALLY POLARIZED APPLICATION

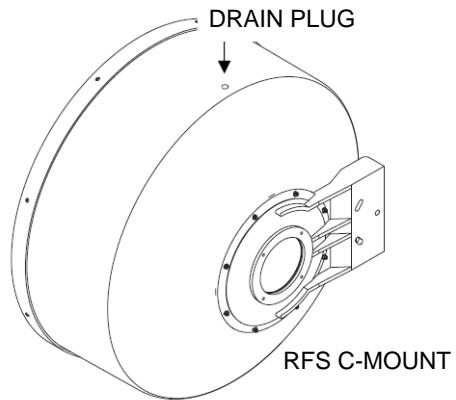
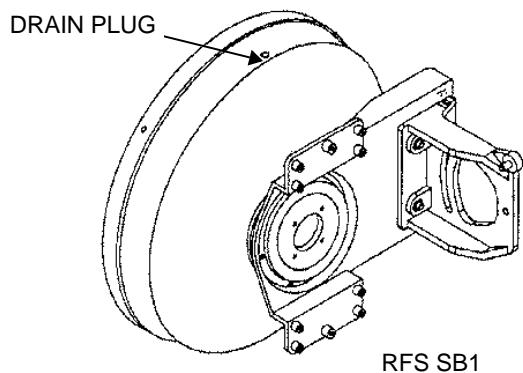
Tighten six screws when transition hub is located. (Tightening torque is  $5.0 \text{ N}\cdot\text{m} \pm 10\%.$ )

**Chart 2-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
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**CHANGE OF POLARIZATION****TRP DIRECT MOUNTING TYPE ANTENNA  
(Example (RFS))**

- Notes:*
1. The details are referred to the installation manual which is attached to the antenna. The installation or removal of the antenna requires qualified experienced personnel.
  2. The antenna is set to V-polarization when shipped from the factory.



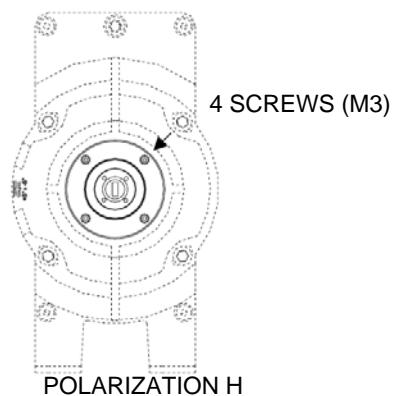
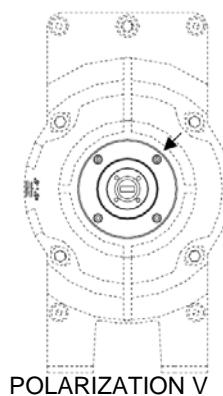
1. Unscrew the 4 screws M3 at the refined steel ring.
2. Hold the feed tightly at the waveguide.
3. Rotate carefully the feed 90 degrees.
4. Mount the feed to the refined steel ring and lock the 4 screws M3.

1. Loosen the 4 screws M3.
2. Hold the feed tightly at the waveguide.
3. Rotate the casting plate carefully the feed 90 degrees.
4. Lock the 4 screws M3.

**Antenna TOP**

Vertical

Horizontal



**Chart 2-5 (Cont'd)**

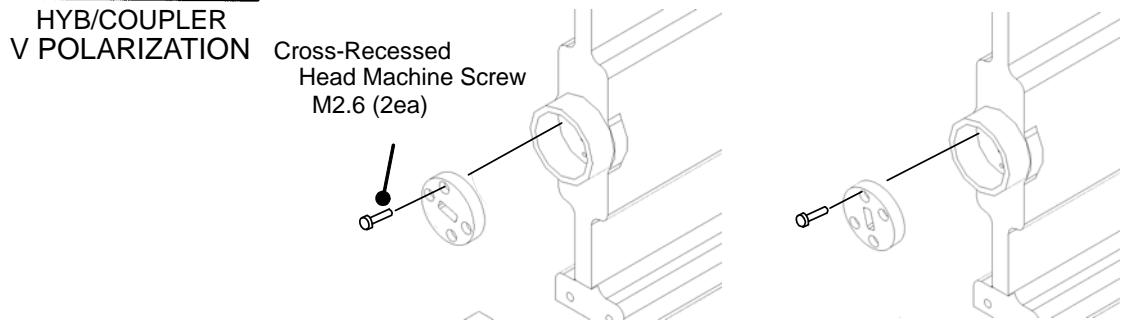
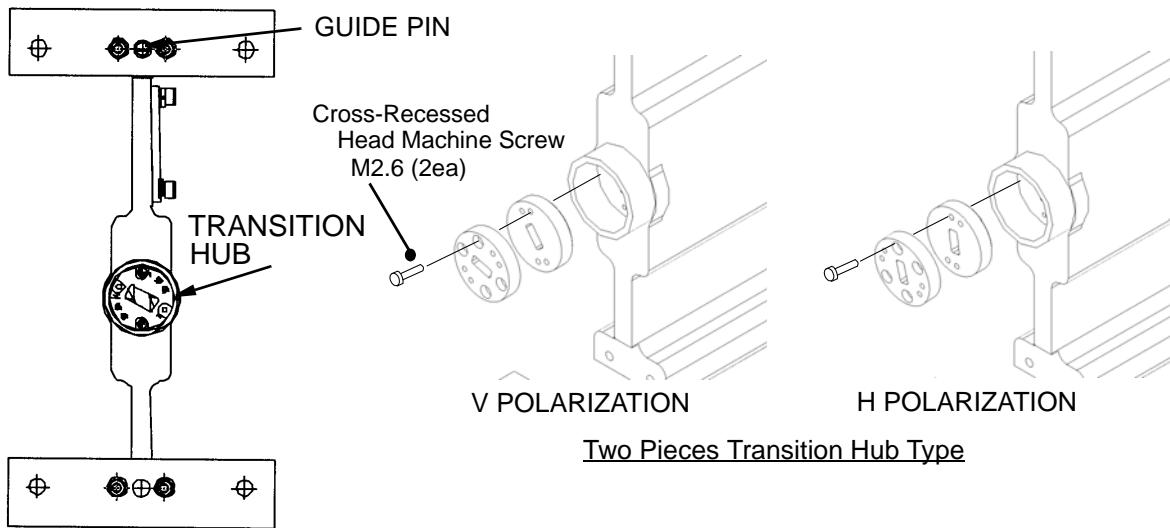
<b>Step</b>	<b>Procedure</b>
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**CHANGE OF POLARIZATION OF THE HYB/COUPLER****NEC HYBRID/COUPLER**

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

- 1 If you change the polarization from V to H, loosen two screws, rotate the transition hub and put it to the HYB/COUPLER.

*Note: There are two types NEC HYBRID/COUPLER. One uses two pieces transition hubs and another uses one piece.*



**One Piece Transition Hub Type**  
(Only for 11/18/23/24(26)/38 GHz HYBRID/COUPLER)

- 2 Then fix it with the two screws that were loosened in step 1.

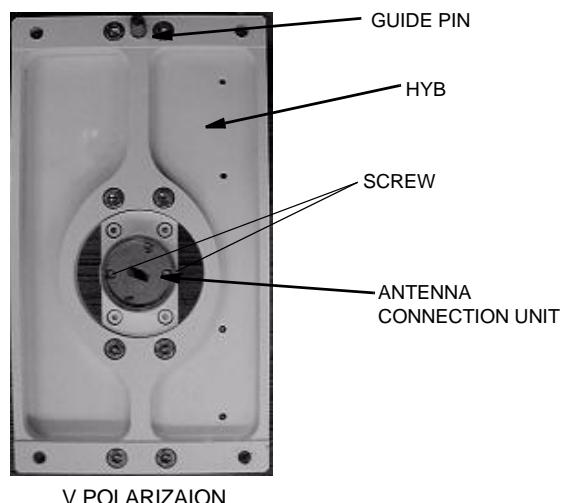
**Chart 2-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
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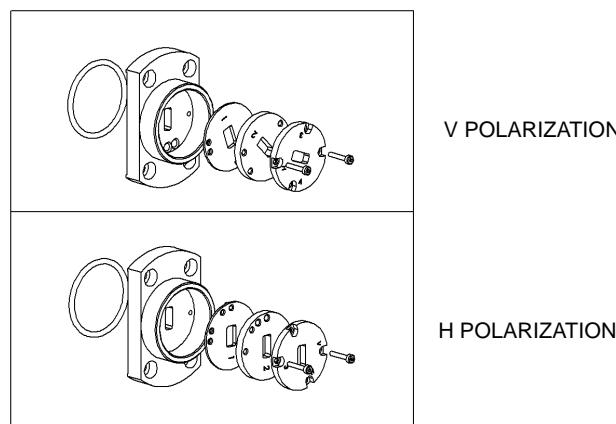
**Quasar HYBRID**

*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.

**Quasar HYB**

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



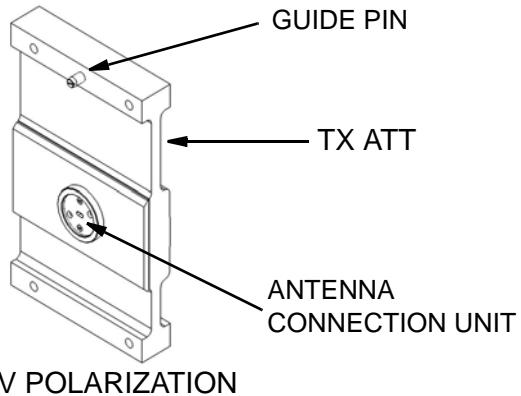
**Chart 2-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
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**CHANGE OF POLARIZATION OF THE TX SPAN ATT****TX SPAN ATT**

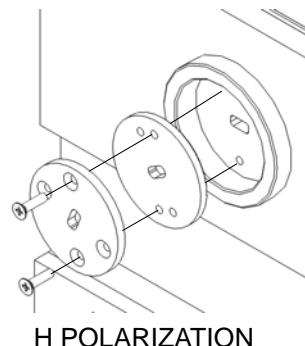
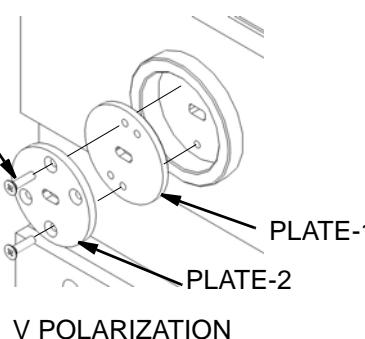
*Note: The TX ATT is set to V-polarization when shipped from the factory.*

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



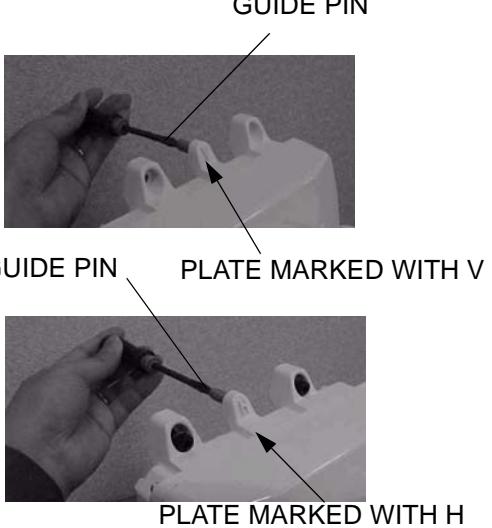
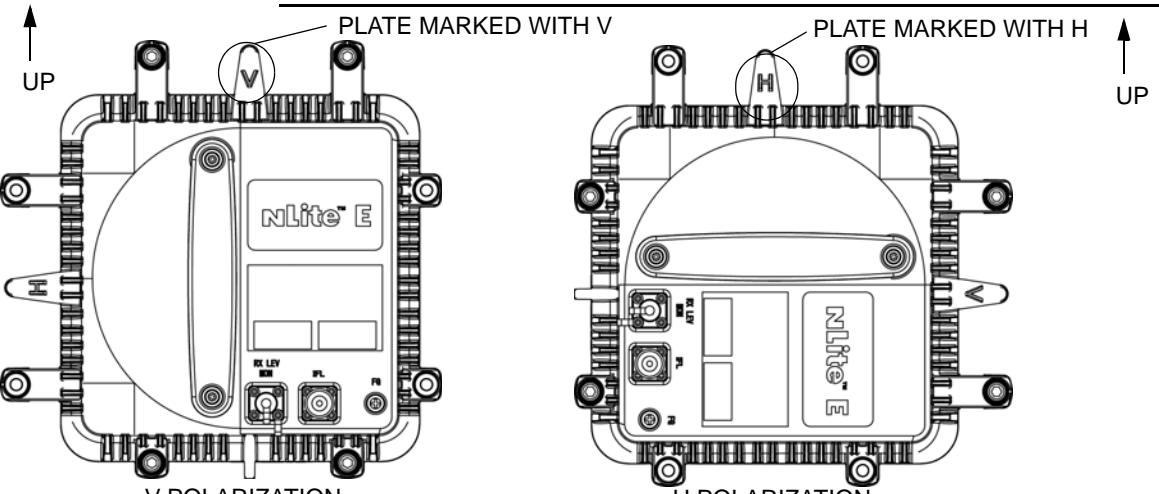
- 2 Check that aperture of the connection unit is rotated as shown below, then fix it with the two screws that were loosened in step 1.

CROSS-RECESSED  
HEAD MACHINE SCREW  
M2.6(2ea)



38 GHz Band TX SPAN ATT Polarization Change

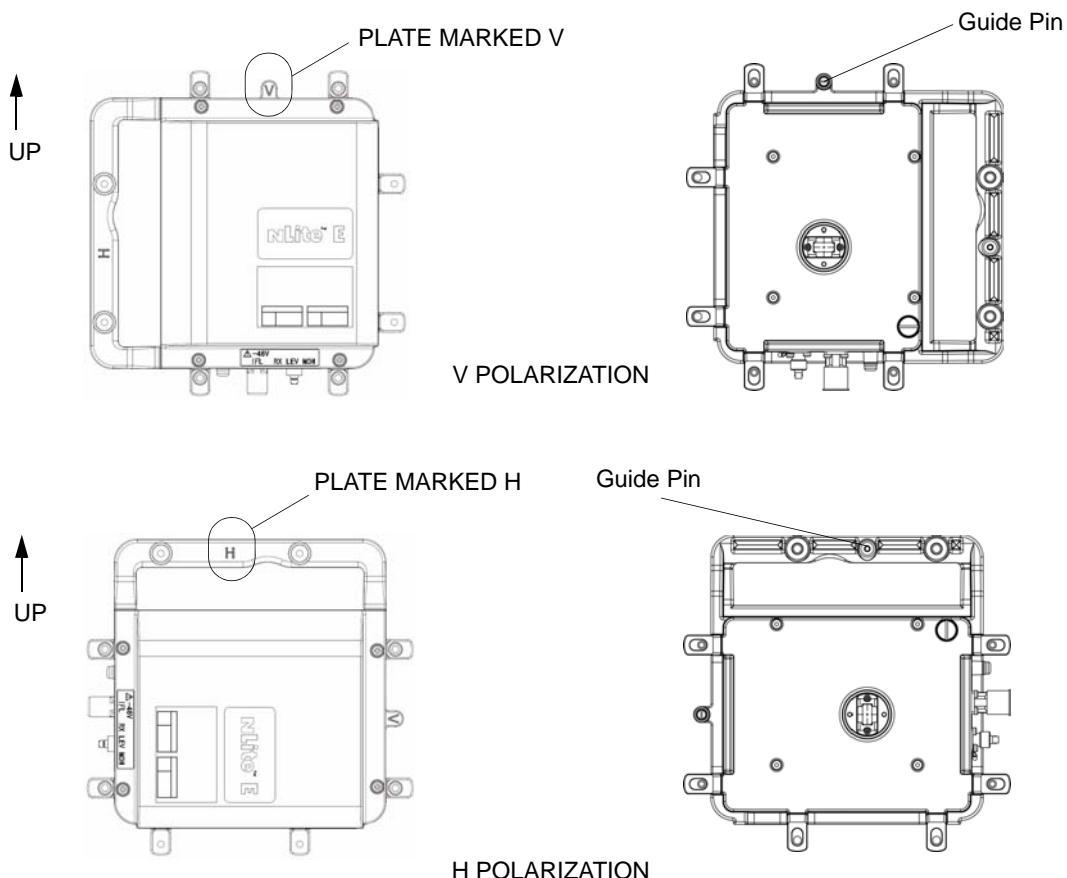
**Chart 2-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
<b><u>CHANGE OF POLARIZATION OF THE TRP</u></b>	
 <p>GUIDE PIN PLATE MARKED WITH V GUIDE PIN PLATE MARKED WITH H</p>	<p><u>Antenna Mounting TRP (11-38 GHz Band)</u></p> <ol style="list-style-type: none"> <li>When vertical polarization is required, rotate the TRP so as to go up the plate marked V.</li> <li>When horizontal polarization is required, remove the guide pin fixed on the plate marked with V.</li> <li>Screw in the guide pin removed in step 2 to the screw hole of the plate marked H.</li> <li>Rotate the TRP so as to go up the plate marked H.</li> </ol> <p><i>Notes:</i> 1. When the TRP is mounted on to the NEC HYB/COUPLER, only V polarization is applied.</p> <p>2. When the Waveguide or coaxial cable is connected between the TRP and antenna, the TRP in V polarization for up position is recommended for installation.</p>  <p>V POLARIZATION      H POLARIZATION</p> <p>11-38 GHz TRP (NHG Type) V/H Polarization Conversion</p>

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**Chart 2-5 (Cont'd)**

---

**Step**      **Procedure**

**Chart 2-6 TRP Antenna Direct Mounting (11 - 38 GHz)**

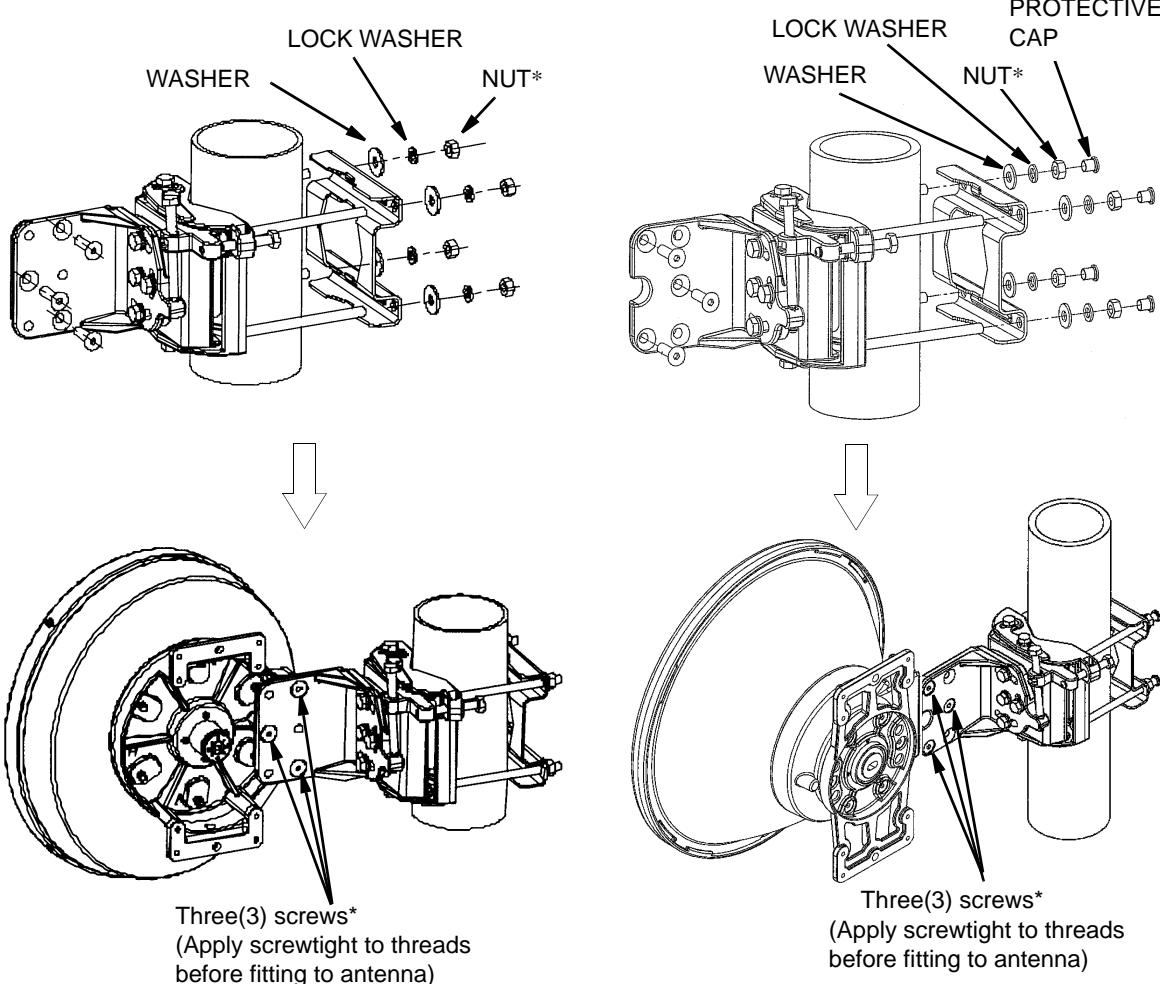
<b>Step</b>	<b>Procedure</b>
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**ANTENNA DIRECT MOUNTING (11-38 GHz Band TRP)**

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

**INSTALLATION OF BRACKET**

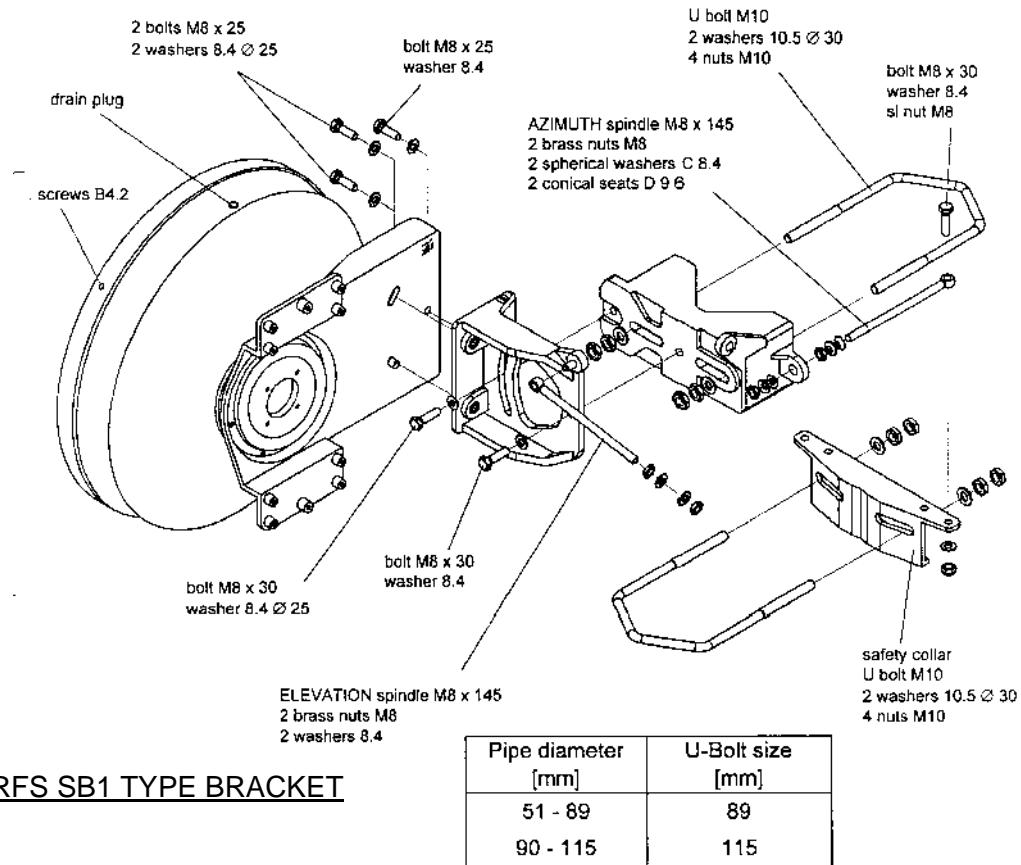
- 1 Install the bracket to the antenna pole.
- 2 Mount antenna to the bracket.

**ANDREW POLE MOUNT BRACKET**

*Note: \*: Tightening torque of 22 N·m for M10.*

## Chart 2-6 (Cont'd)

Step	Procedure
<u>ANTENNA DIRECT MOUNTING (11-38 GHz Band TRP)</u>	



**Chart 2-6 (Cont'd)**

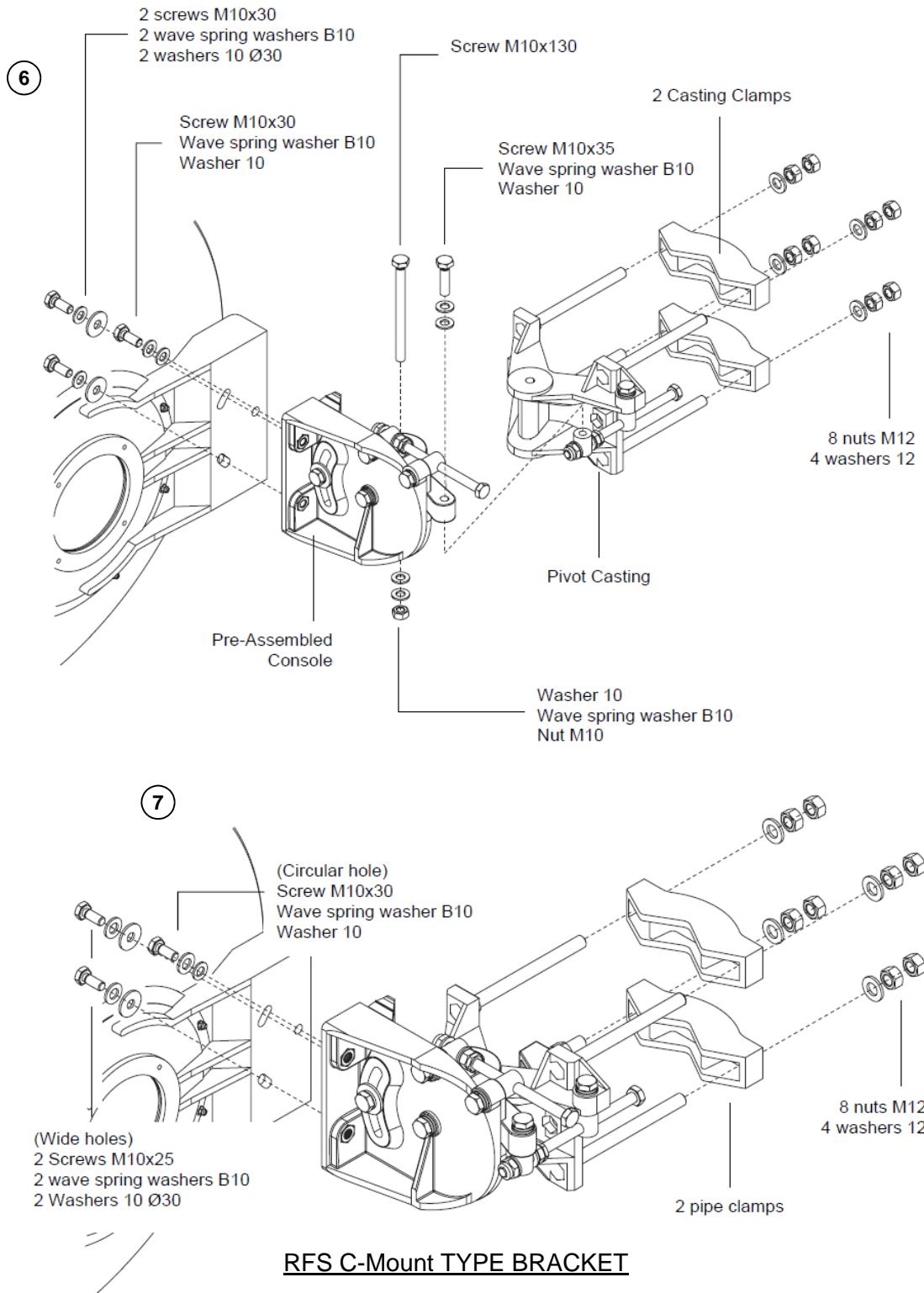
<b>Step</b>	<b>Procedure</b>					
<i>Note: The values in the following table are valid for screws and bolts which have been greased according to the installation instructions.</i>						
<b>Torques for RFS</b>						
Bolt						
	M5	5	Nm			
	M6	8	Nm			
	M8	17	Nm			
	M10	35	Nm			
	M12	50	Nm			
U-Bolt, V-Bolt (Pipe mount & safety collar)						
	M10	20	Nm			
Hexagonal brass nut of fine adjustment (Azimuth, Elevation)						
	M8	5	Nm			
	M10	10	Nm			
	M12	17	Nm			
Hexagonal socket stainless steel screws (Feed systems install on aluminium mounting plate)						
	M3	0.2	Nm			
	M4	0.4	Nm			
<b>Exceptions</b>						
Fixing screw of the azimuth fine adjustment spindle		M8 x 30	8 Nm			
		M12 x 55	17 Nm			
<b>Special application: NOT greased</b>						
Fixing screw of the plastic radome		B4.2	3 Nm			

**Chart 2-6 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
<b>ANTENNA DIRECT MOUNTING (11-38 GHz Band TRP)</b>	
<b>MOUNT ASSEMBLY (RFS C-Mount Type)</b>	
<p><b>1</b></p> <p>Screw M10x30 Wave spring washer B10 Washer 10</p> <p>Elevation Spindle (Pre-Assembled)</p>	
<p><b>2</b></p> <p>Screw M10x35 Wave spring washer B10 Washer 10</p> <p>Azimuth Spindle (Pre-Assembled)</p>	
<p><b>3</b></p> <p>4 screws M12x160</p> <p>4 nuts M12 (handtighten)</p>	
<p><b>4</b></p> <p>Screw M10x35 Wave spring washer B10 Washer 10</p> <p>Screw M10x130 Washer 10 Wave spring washer B10 Nut M10</p> <p>M-Mount Assembled</p>	
<p><b>5</b></p> <p>RFS C-Mount TYPE BRACKET</p> <p>Pipe diameter: 48-114mm</p>	

## INSTALLATION

ROI-S07045



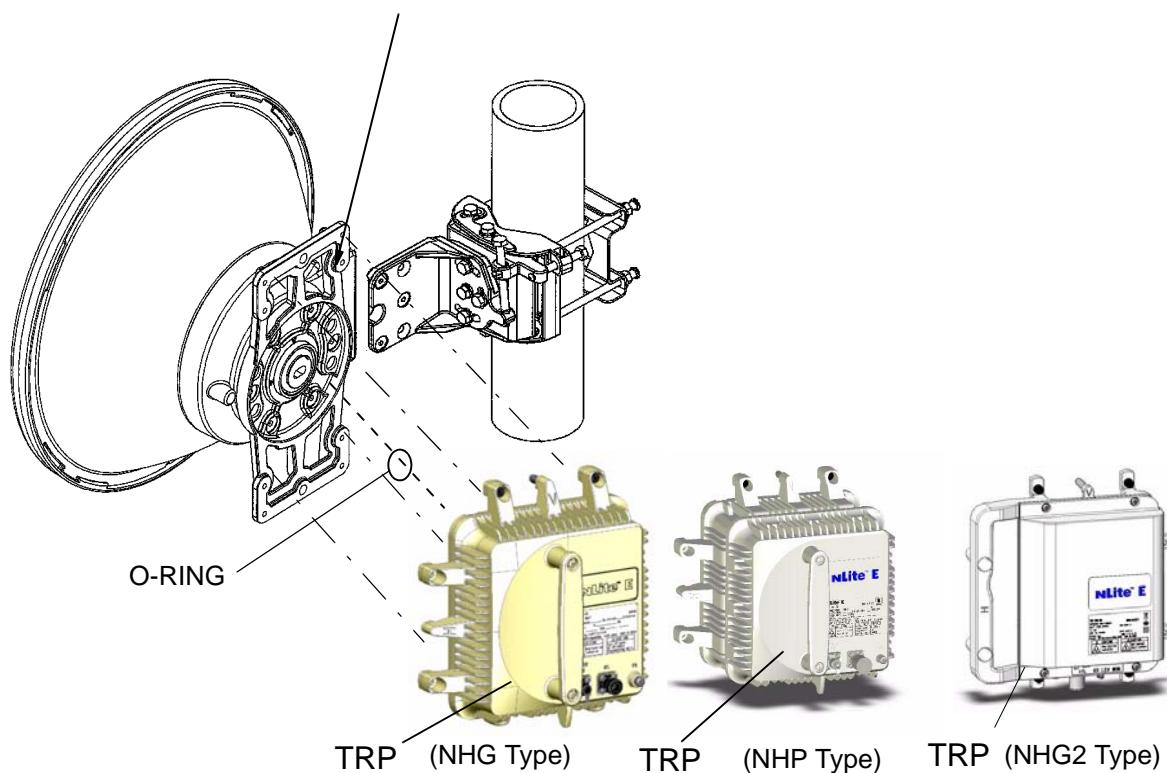
**Chart 2-6 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
3	Fix the TRP to the bracket by tightening the M6 screws (four locations).

*Note: Being careful, tighten alternately and gradually four screws.*

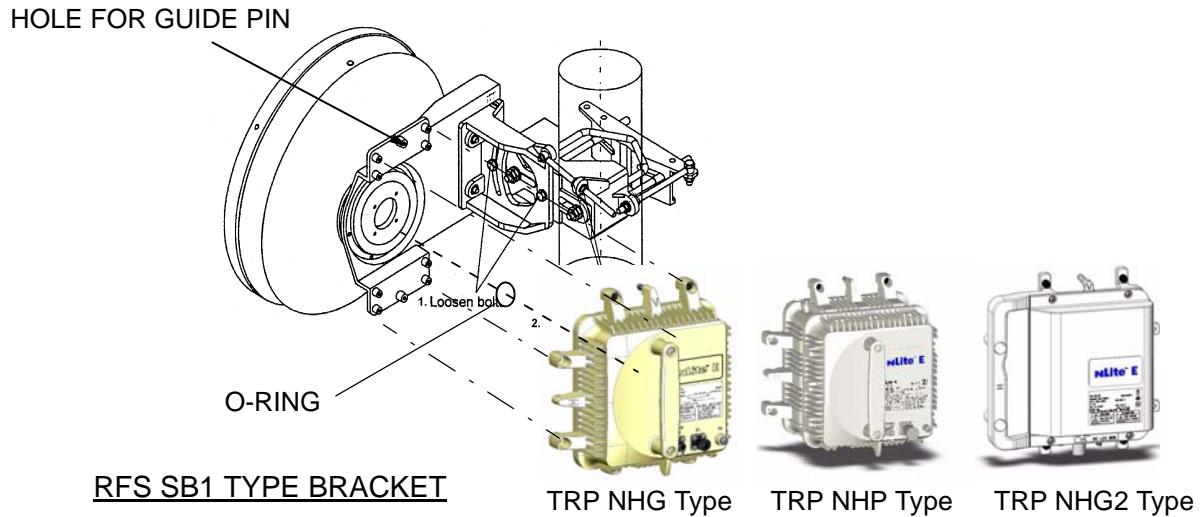
*Notes: 1. Figure shows V polarization.  
2. Be careful not to damage the O-ring (Antenna).  
3. The tightening torque is  $4.0 \text{ N}\cdot\text{m} \pm 10\%$ .*

HOLE FOR GUIDE PIN

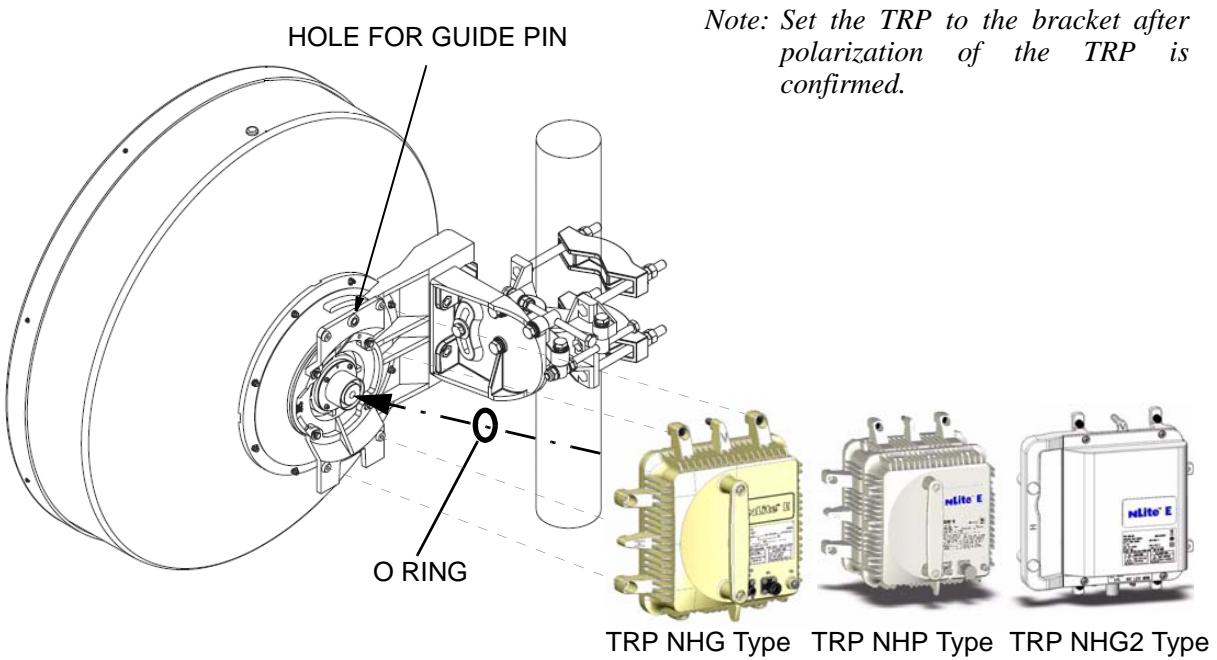
ANDREW VHLP TYPE BRACKET

## INSTALLATION

ROI-S07045



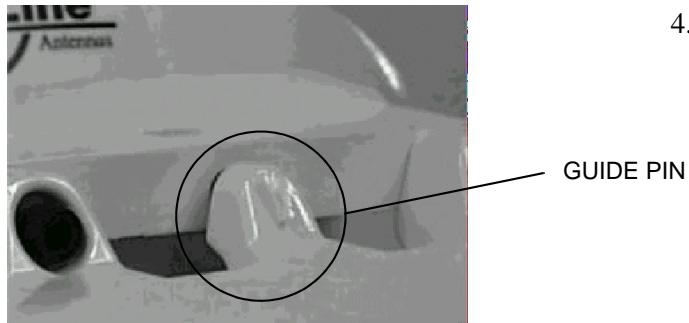
- Notes:*
1. Figure shows V polarization.
  2. Be careful not to damage the O-ring (Antenna).
  3. The tightening torque is  $4.0 \text{ N}\cdot\text{m} \pm 10\%$ .



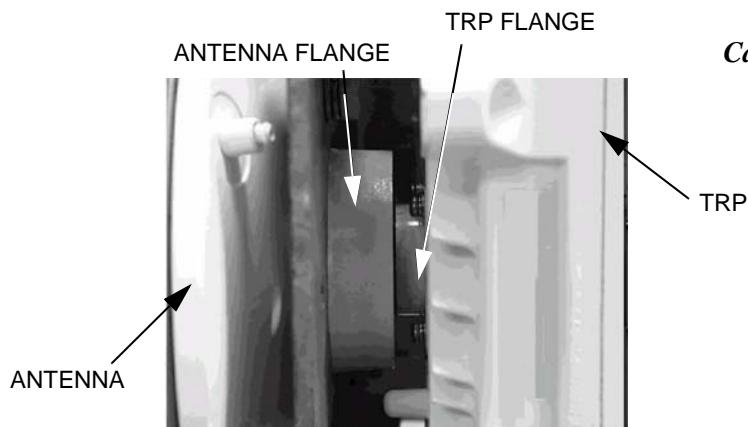
- Notes:*
1. Figure shows V polarization.
  2. Be careful not to damage the O-ring (Antenna).
  3. The tightening torque is  $4.0 \text{ N}\cdot\text{m} \pm 10\%$ .

## Chart 2-6 (Cont'd)

Step	Procedure
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- Insert guide pin on the hole of bracket to set the position of screws.



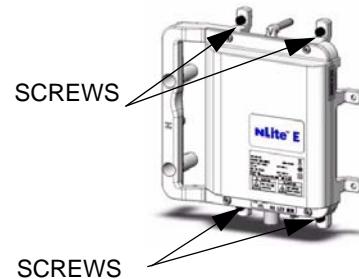
- Fix the TRP to the bracket with four screws.



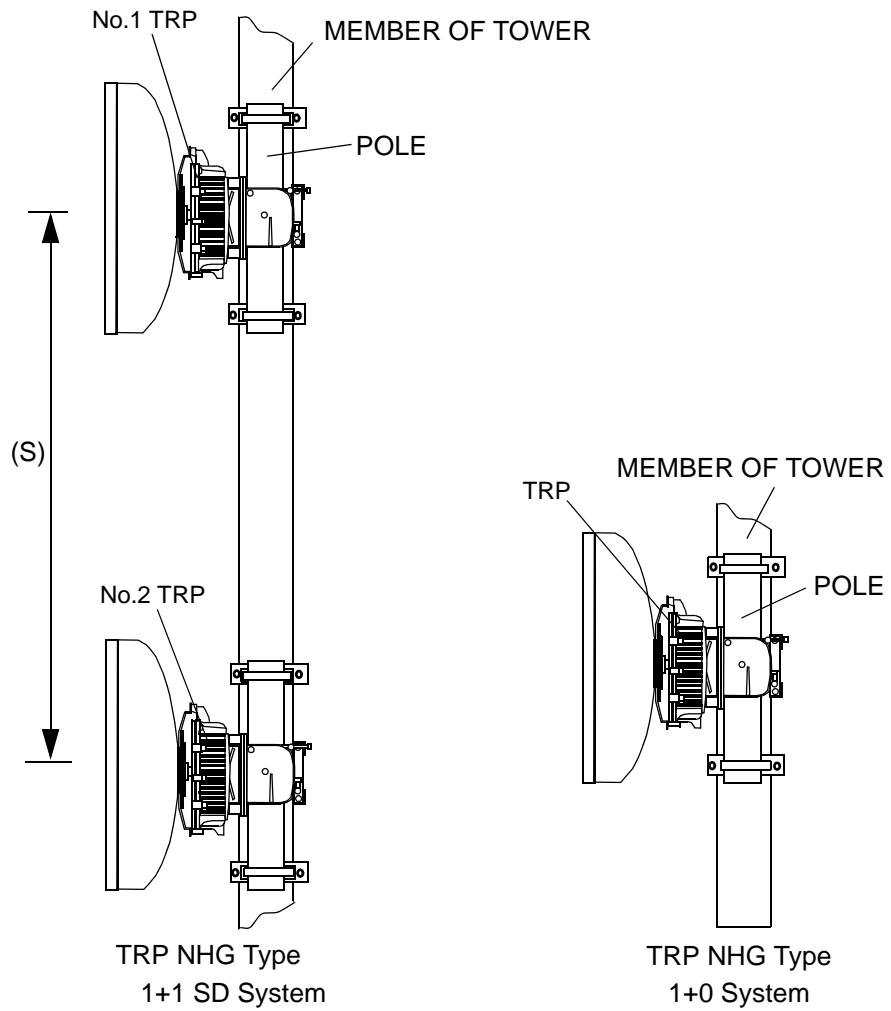
TRP NHG Type



TRP NHP Type



TRP NHG2 Type



*Note: Antenna separation (S) is given by path calculation depending on the system parameter.*

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**Chart 2-7 Antenna Direct Mounting Using HYB/  
COUPLER**

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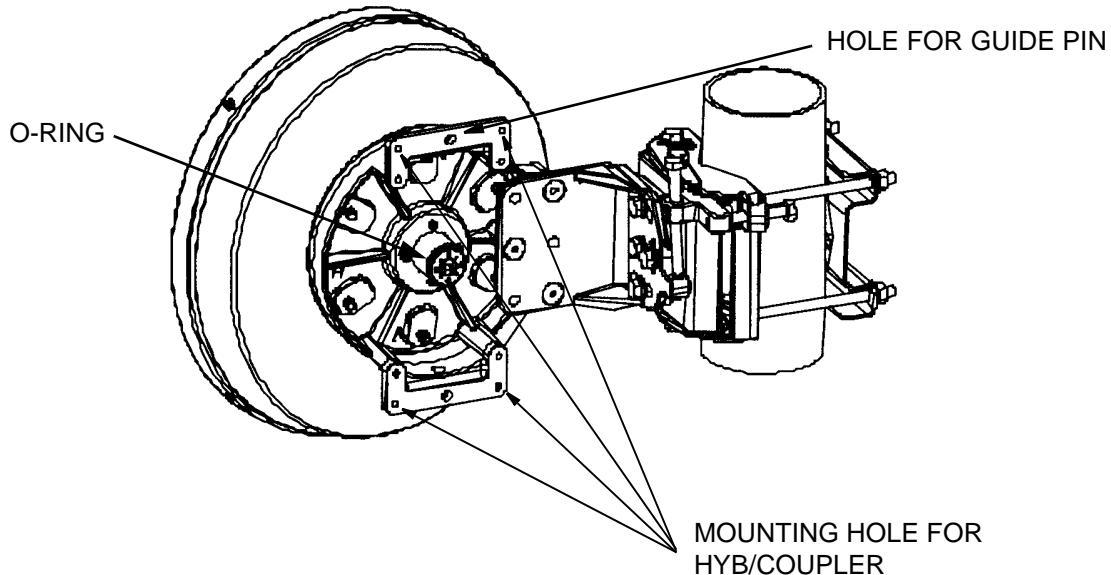
---

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

---

**MOUNTING**

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



*Note: The tightening torque is  $4.0 \text{ N}\cdot\text{m} \pm 10\%$ .  
Be careful not to damage the O-ring (Antenna).*

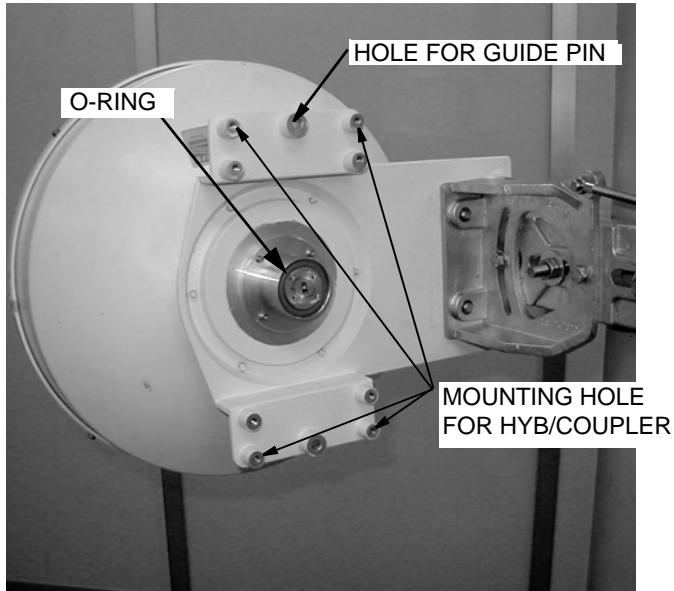
**ANDREW VHL TYPE BRACKET**

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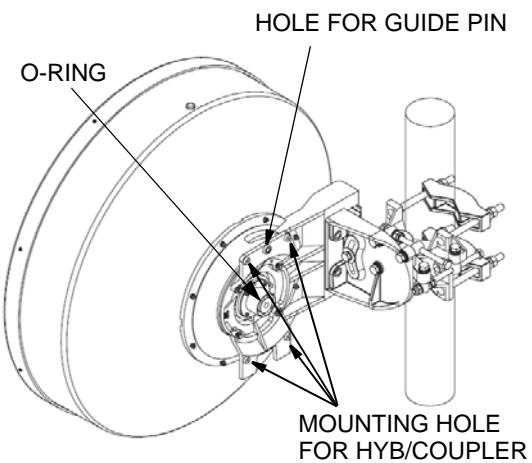
**Chart 2-7 (Cont'd)**

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Step	Procedure
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RFS SB1 TYPE BRACKET



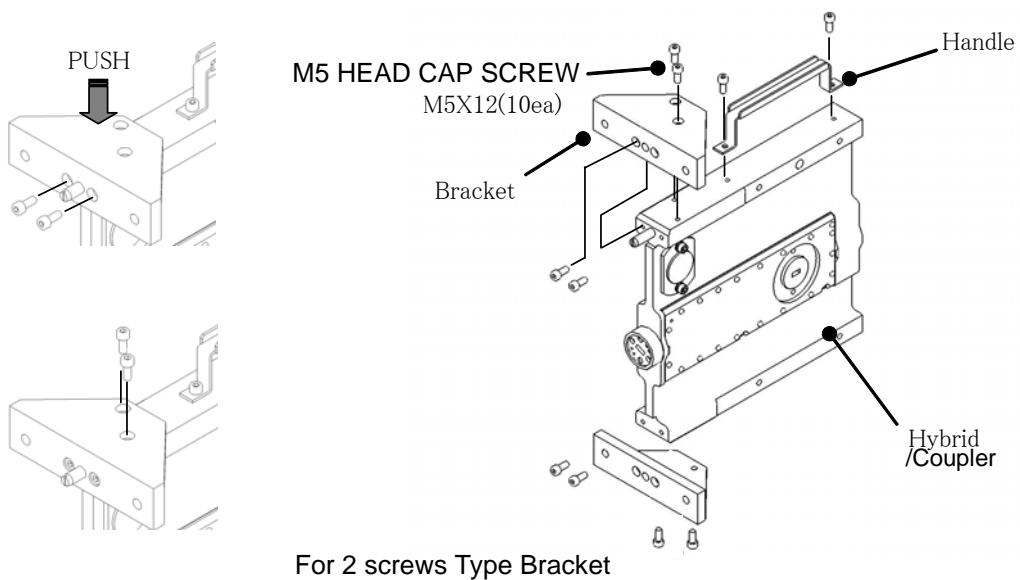
RFS C-Mount TYPE BRACKET

*Note: The tightening torque is  $4.0 \text{ N}\cdot\text{m} \pm 10\%$ .  
Be careful not to damage the O-ring (Antenna).*

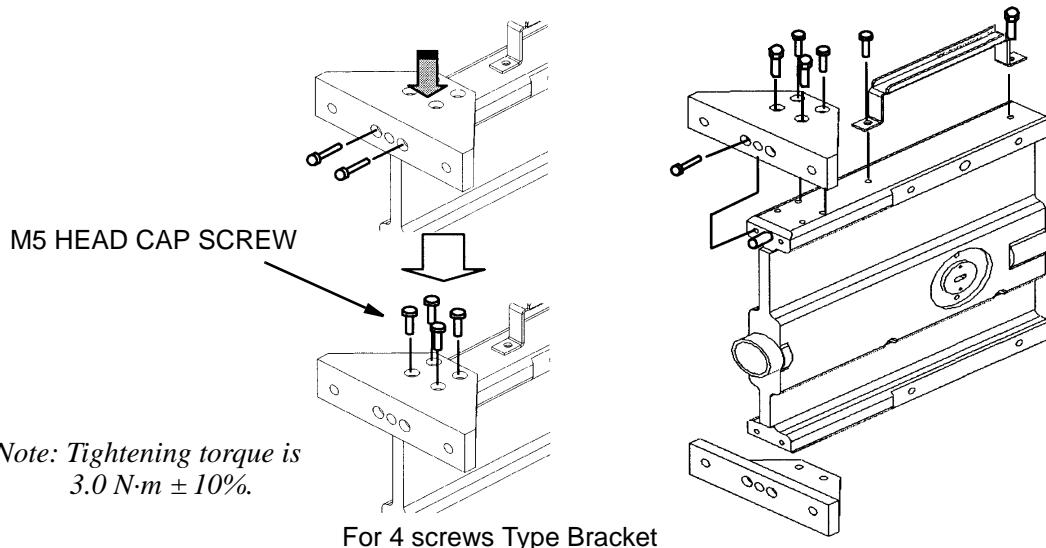
**Chart 2-7 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 1 Fix the bracket and handle to the HYB/COUPLER used for 11-38 GHz TRP.

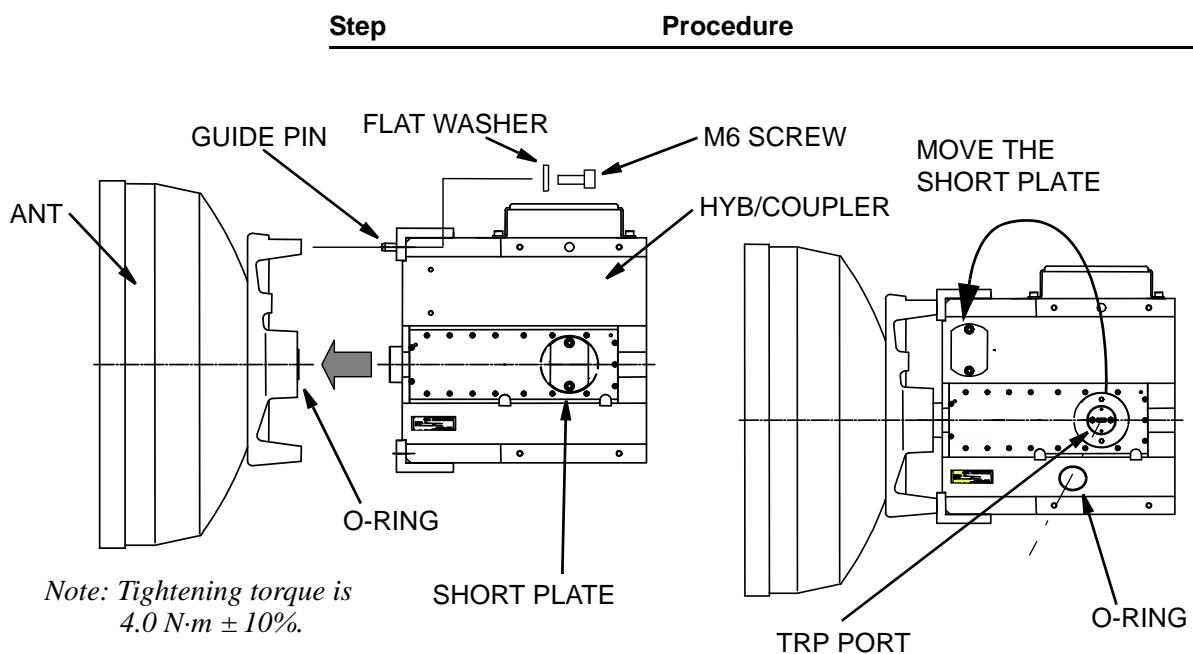


*Note: Tightening torque is  $3.0 \text{ N}\cdot\text{m} \pm 10\%$ .*



- 2 Check the polarization and install the HYB/COUPLER to the antenna by tightening the M6 screws (four locations).

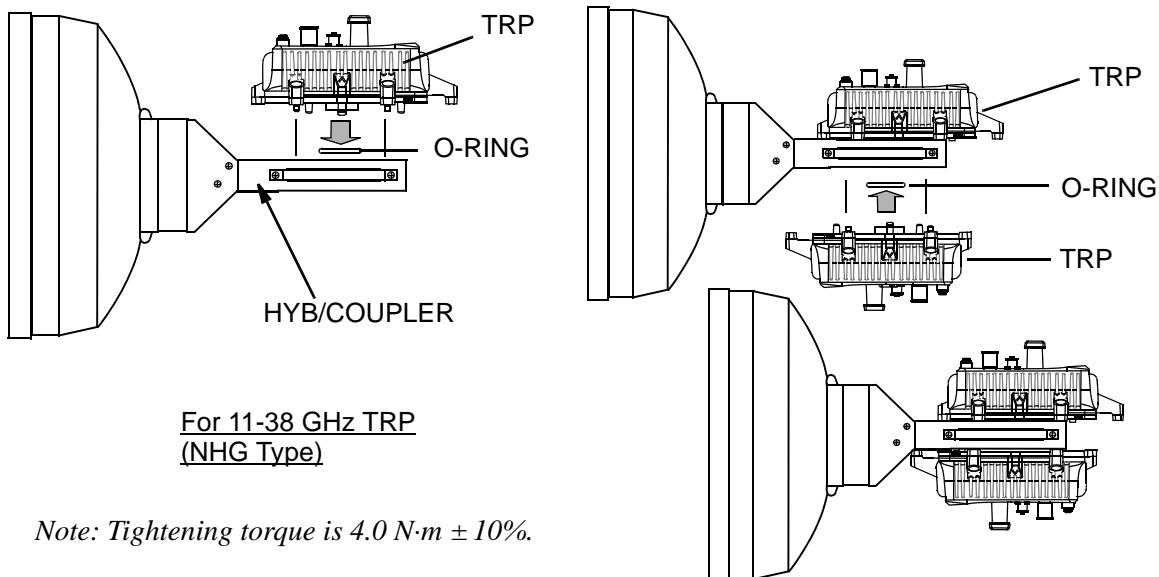
Chart 2-7 (Cont'd)



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

- 3 Insert the O-rings to the two TRP ports of the HYB/COUPLER.
- 4 Install the two TRPs with hex screws (four locations) using the Allen key wrench.

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



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Chart 2-7 (Cont'd)

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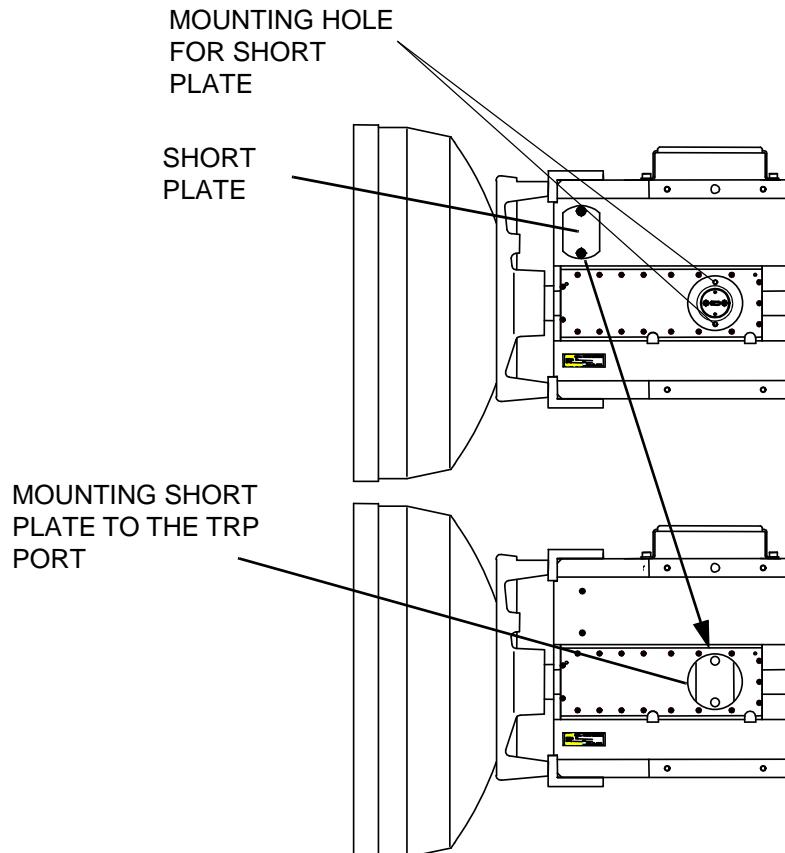
Step	Procedure
------	-----------

DEMOUNTINGFROM HYB/COUPLER

- 1 Remove the four (or six) fixed bolts from the TRP.
- 2 Then demount the TRP.

*Note: When demounting the TRP from HYB/COUPLER, mount the attached SHORT PLATE to the demounted port of the HYB/COUPLER to avoid RF power leaking from the hybrid/Coupler and for waterproofing.*

---



*Note: Tightening torque is  $3.0 \text{ N}\cdot\text{m} \pm 10\%$ .*

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**Chart 2-8 Antenna Direct Mounting Using  
TX SPAN ATT**

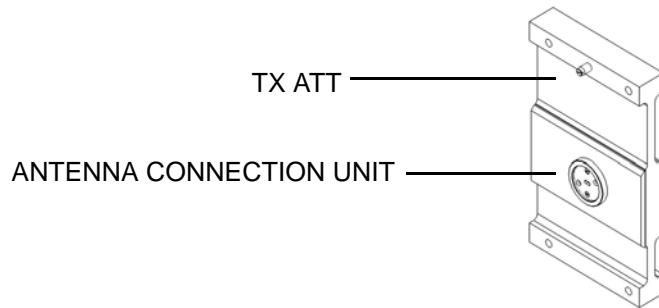
---

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

MOUNTING

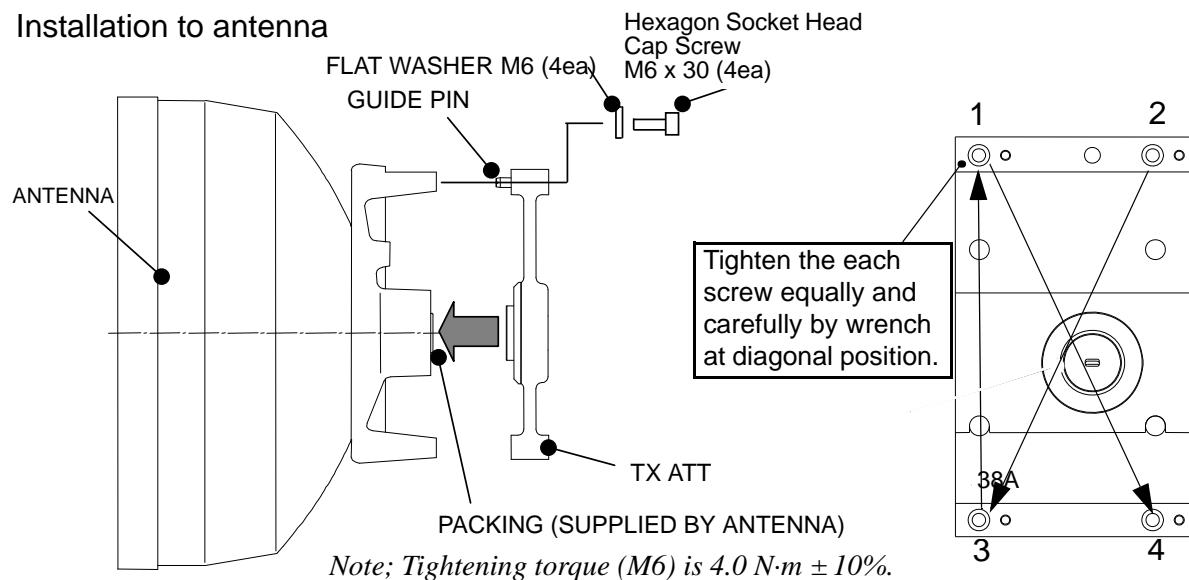
TX SPAN ATT

- 1 Check the polarization of the antenna connection unit of the TX ATT (Refer to CHANGING POLARIZATION description for the TX ATT.)



- 2 Fix the TX ATT to the antenna by tightening the M6 screws (four locations).

**Installation to antenna**

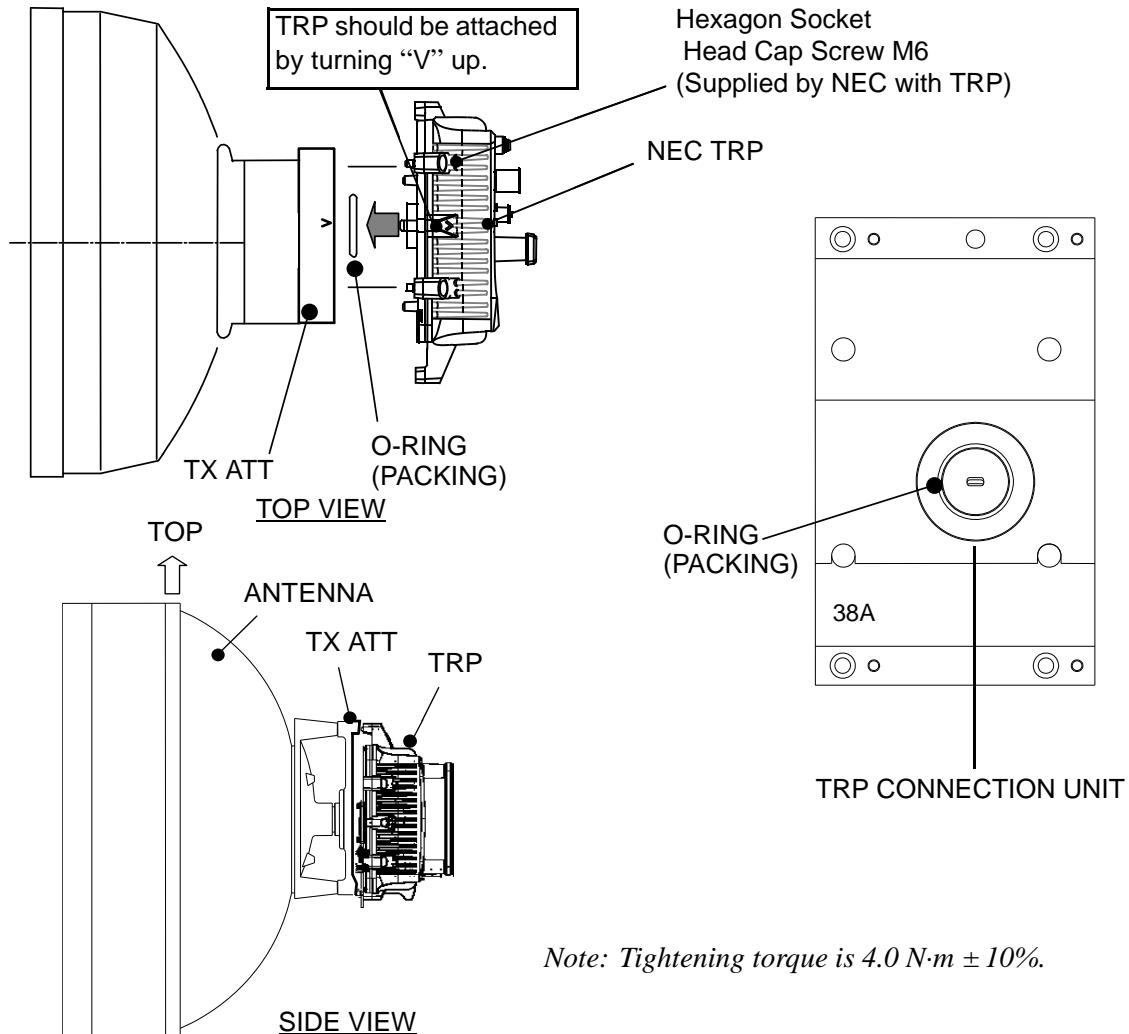


38 GHz Band TRP Mounting Using NEC TX SPAN ATT (1/2)

**Chart 2-8 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
3	Insert the O-rings to port of the TRP.
4	Fix the TRP with hex screws (four locations) using the Allen key wrench.

*Note: Be careful not to damage the O-rings (TX ATT).*

**Attachment of TRP**

38 GHz Band TRP Mounting Using NEC TX SPAN ATT (2/2)

**Chart 2-9 11-38 GHz TRP Mounting with HYBRID**

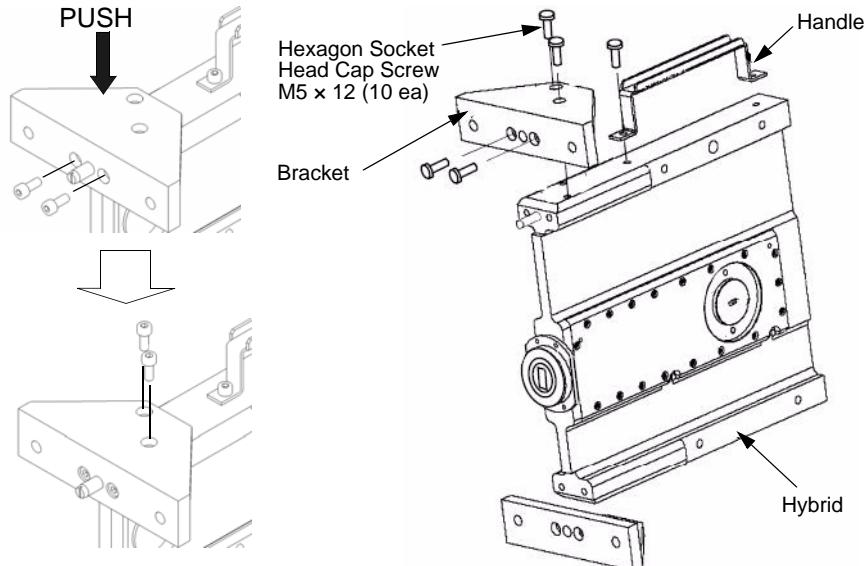
Step	Procedure
------	-----------

**18/23 GHz HYBRID (FI)**

This Hybrid is designed to be connect to waveguide with interface for direct mounting of NEC TRP. (Waveguide flange type: Hybrid side-PBR220, Waveguide side-UBR220.)

	Tightening Torque
M3	0.6 N·m $\pm 10\%$
M5	3.0 N·m $\pm 10\%$
M6	4.0 N·m $\pm 10\%$

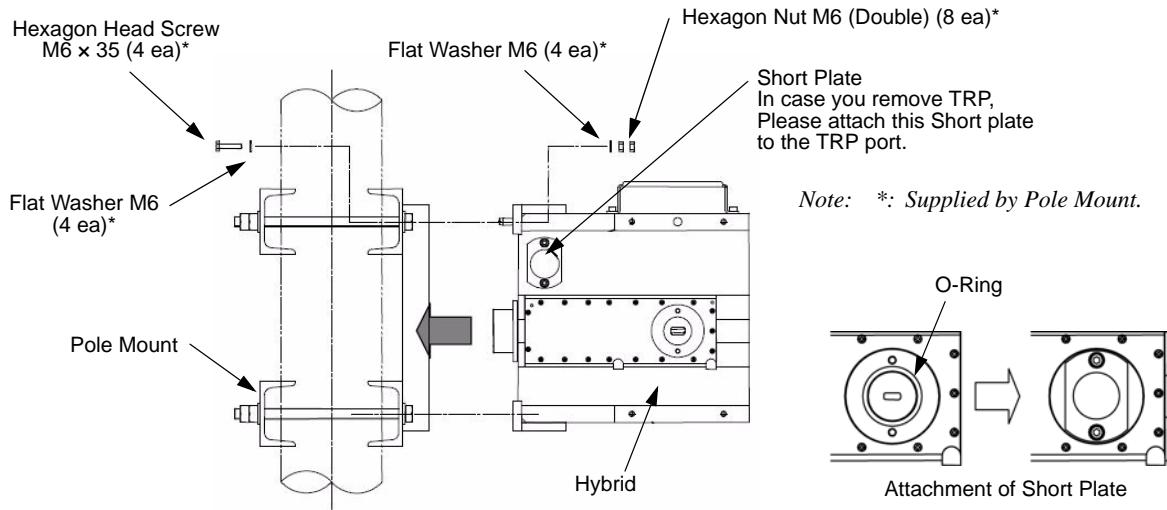
1      Hybrid assembly,



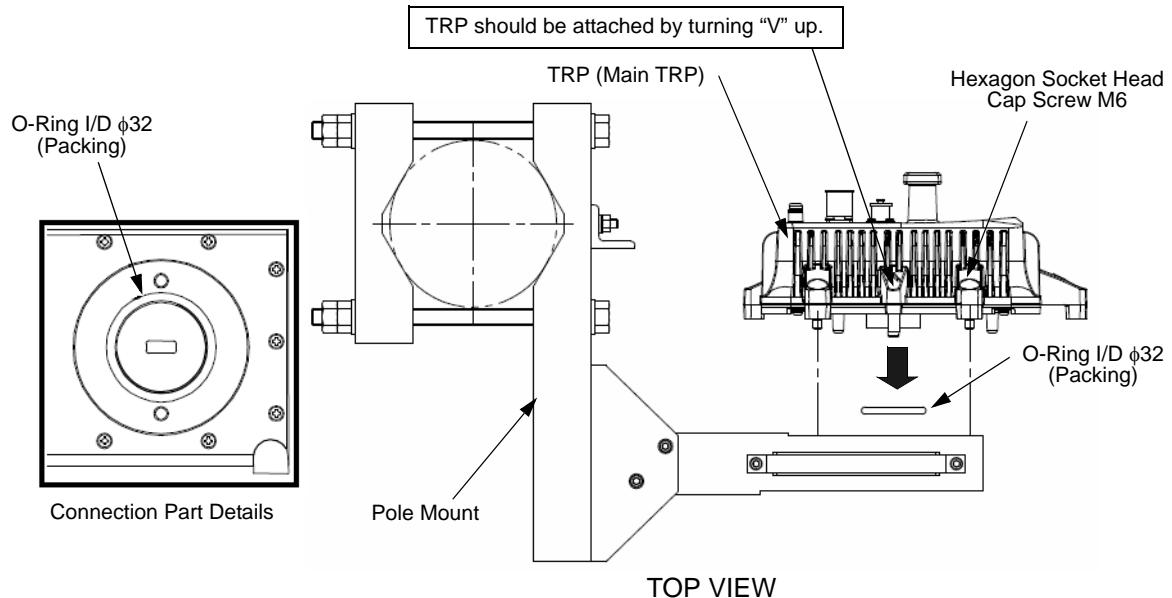
**Chart 2-9 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

2 Installation to pole mount,

**Case-1**

3 Attachment of main TRP,



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**Chart 2-9 (Cont'd)**

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**Step**                   **Procedure**

---

4         Attachment of standby TRP,

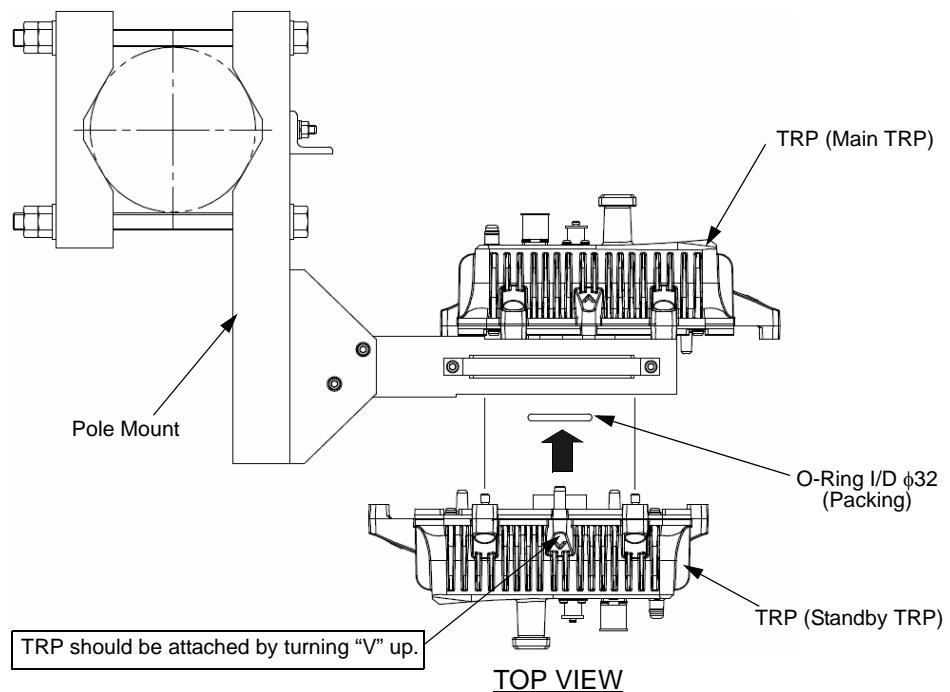
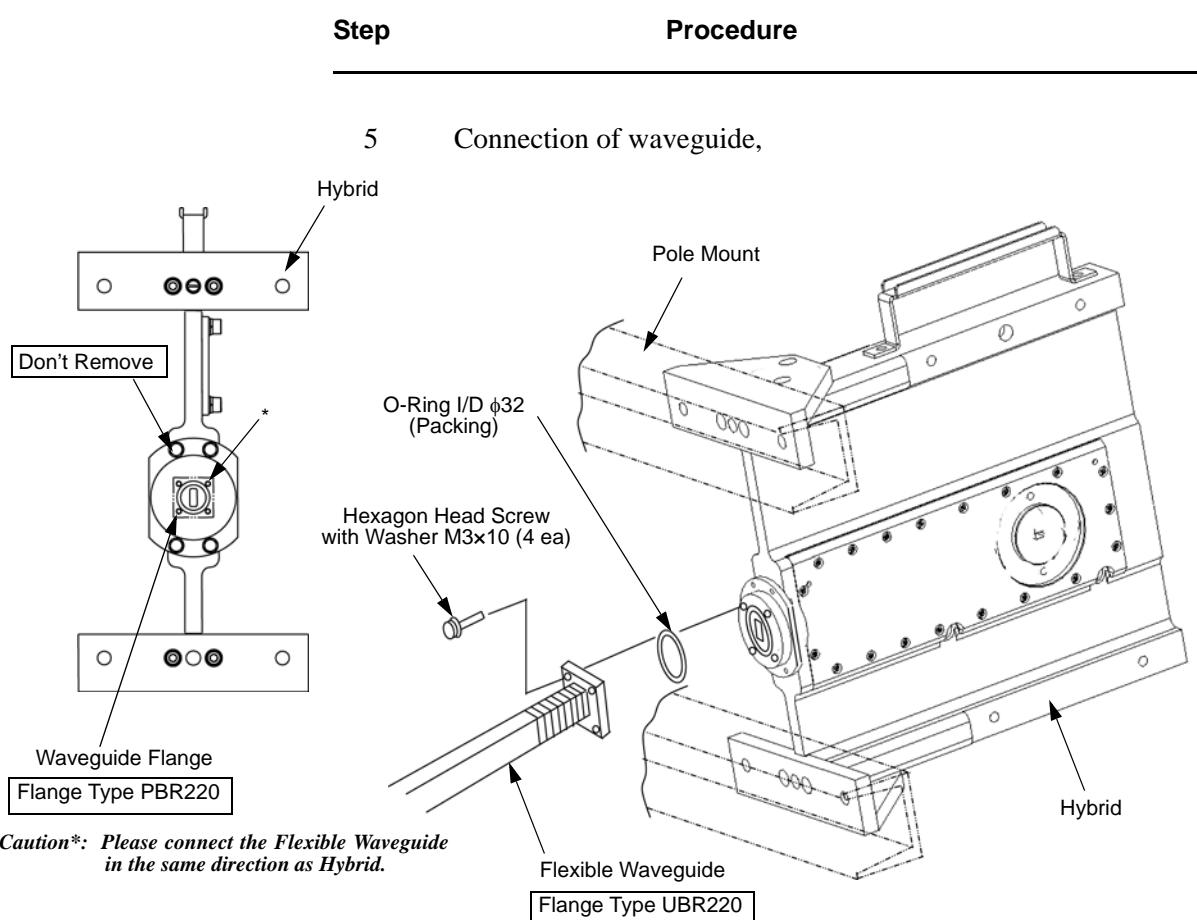


Chart 2-9 (Cont'd)



**Caution:** Be careful not to damage the Hybrid. Connection part will be damaged if excessive power is applied to the Hybrid by Waveguide.

#### Hybrid (FI) Parts List (for Pole Mount)

No.	Parts Name	Q'ty
1	Hybrid (Waveguide Flange Interface Type)	1
2	Bracket	2
3	Handle	1
4	O-Ring Inner Dia. φ32 (for TRP)	2
5	O-Ring Inner Dia. φ15.6 (for Waveguide)	1
6	M5 × 12 Hexagon Socket Head Cap Screw (SS)	14 (4 part for spare.)
7	M3 × 10 Hexagon Head Screw with Washer (SS)	4
*	M6 × 35 Hexagon Socket Head Cap Screw, Nut, Washer Set (SS)	4

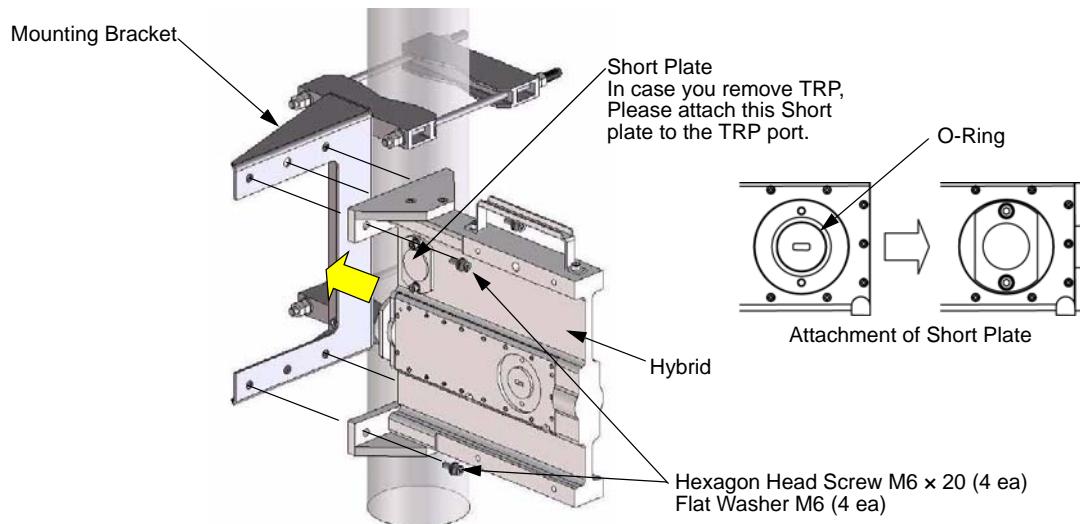
Note: \*: Supplied by Pole Mount.

Note: SS: Stainless Steel

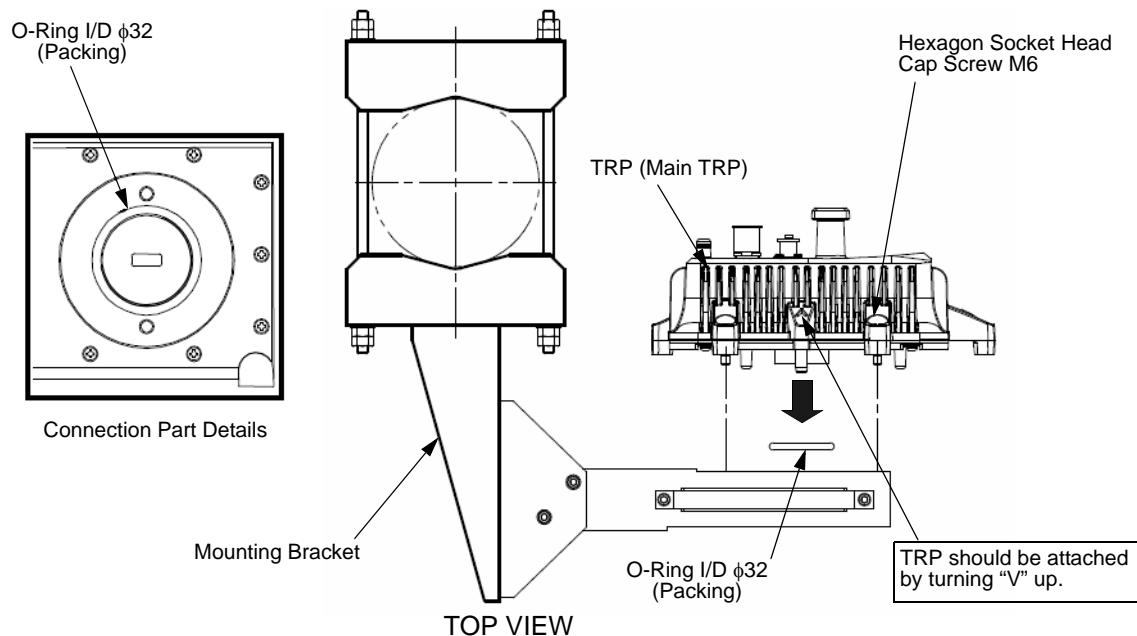
**Chart 2-9 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

2 Installation to mounting bracket,

**Case-2**

3 Attachment of main TRP,



---

**Chart 2-9 (Cont'd)**

---

---

**Step**                   **Procedure**

---

4         Attachment of standby TRP,

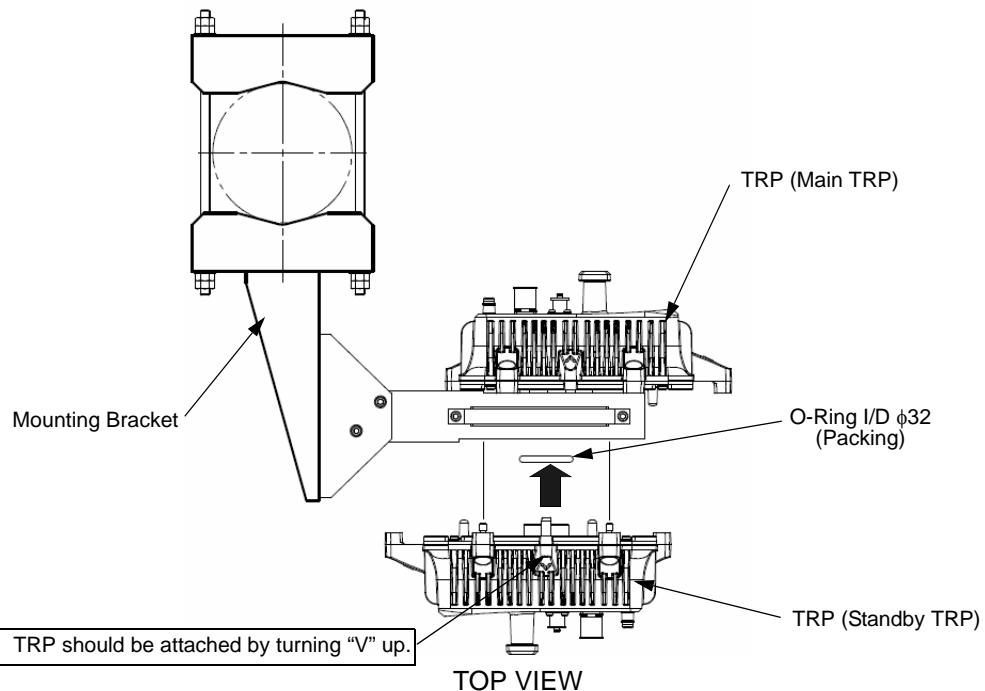
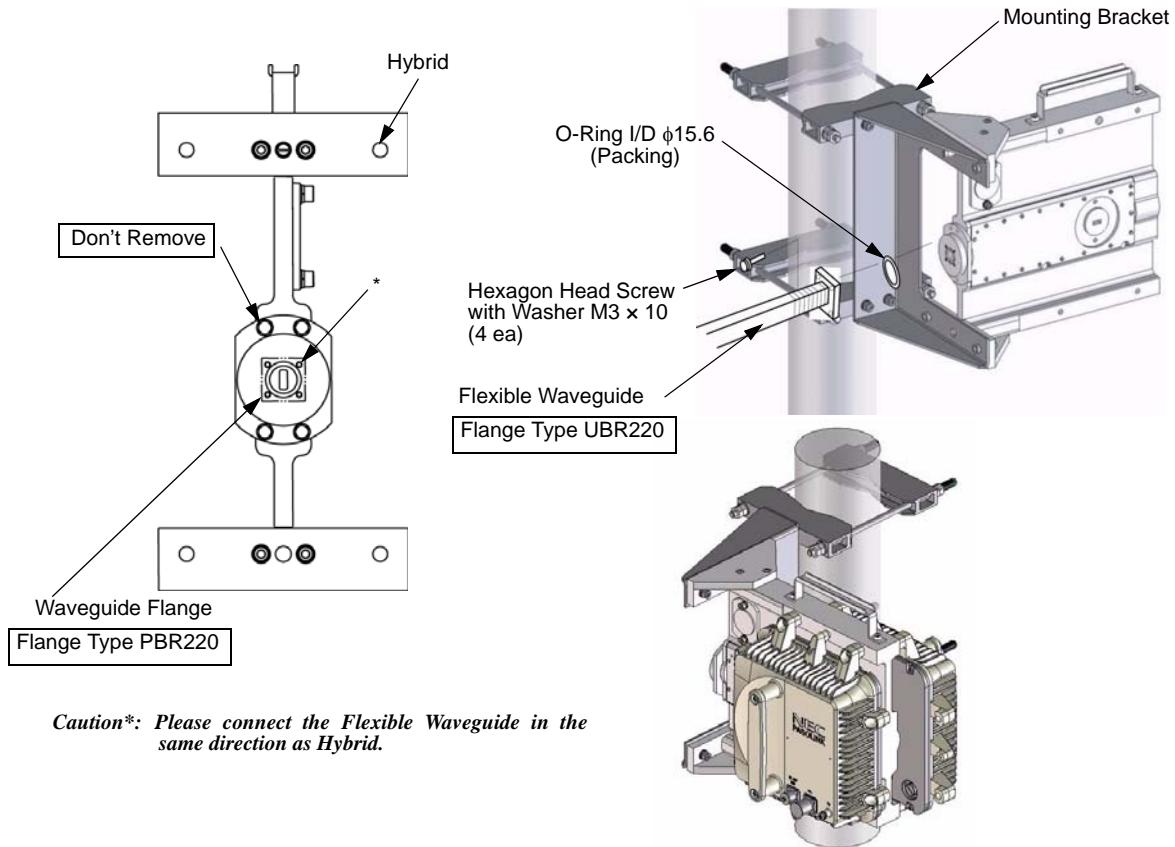


Chart 2-9 (Cont'd)

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

5 Connection of waveguide,



#### Hybrid (FI) Parts List (for Mounting Bracket)

No.	Parts Name	Q'ty
1	Hybrid (Waveguide Flange Interface Type)	1
2	Bracket	2
3	Handle	1
4	O-Ring Inner Dia. φ32 (for TRP)	2
5	O-Ring Inner Dia. φ15.6 (for Waveguide)	1
6	M5 × 12 Hexagon Socket Head Cap Screw (SS)	14 (4 part for spare.)
7	M6 × 20 Hexagon Socket Head Cap Screw (SS)	4
8	M6 Flat Washer (SS)	4
9	M3 × 10 Hexagon Head Screw with Washer (SS)	4

*Note: SS: Stainless Steel*

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**Chart 2-10 11-38 GHz Band TRP Mounting with HYB  
(Waveguide Connection)**

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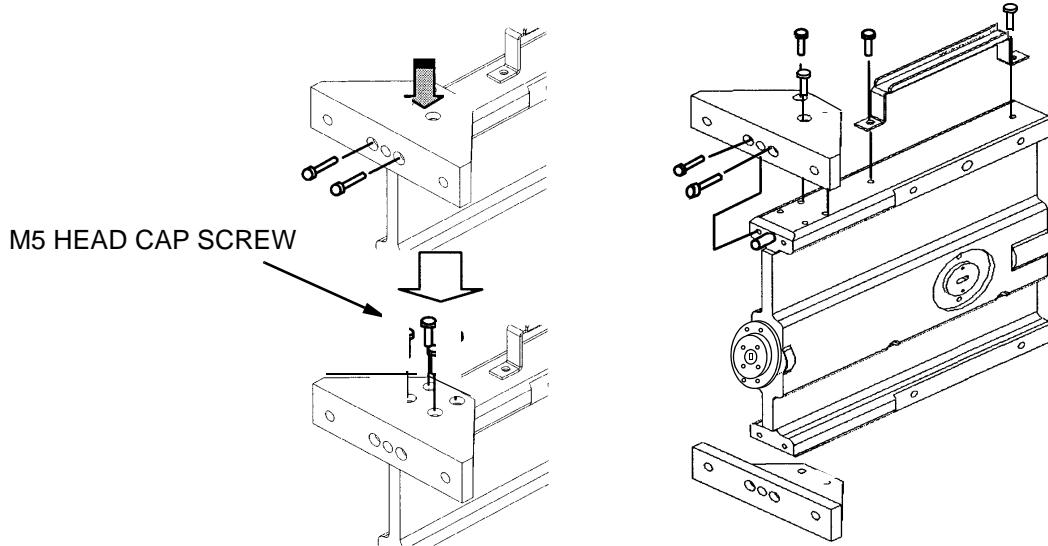
Step	Procedure
------	-----------

**WAVEGUIDE CONNECTION FOR 1+1 HYB**

No.	Parts Name	Q'ty
1	Hybrid (Waveguide Flange Interface Type)	1
2	Bracket	2
3	Handle	1
4	O-ring (for TRP)	2
5	O-ring (for Waveguide)	1
6	M5 × 12 Hexagon Socket Head Cap Screw (SS)	10 (14)*
7	M3 ×10 Hexagon Head Screw with Washer (x4) (SS)	4

*Note: \* For 4 screws Type Bracket*

- 1 Assemble the bracket and handle to the HYB.



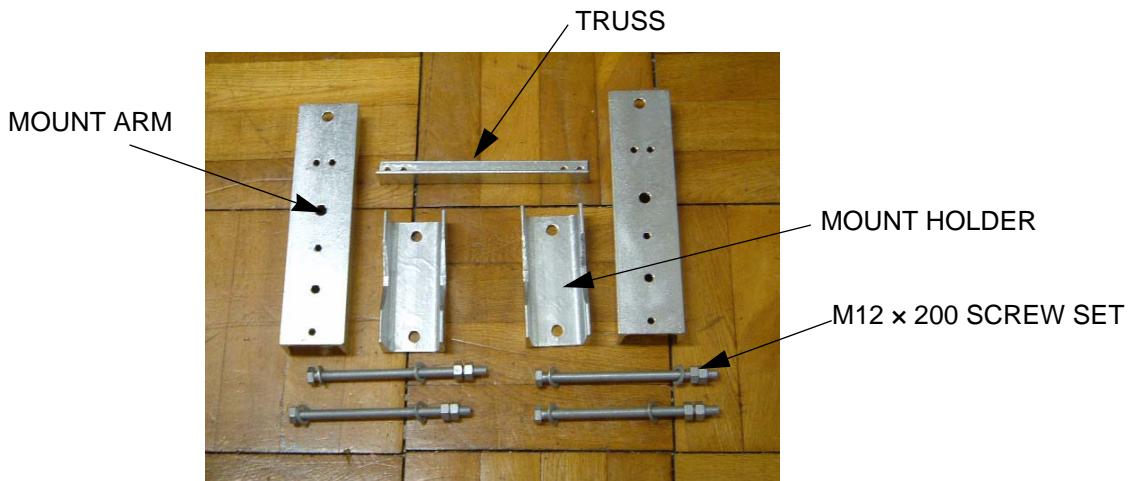
*Note: Tightening torque is 3.0 N·m ± 10%.*

**Chart 2-10 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 2 Assemble parts of the pole mounting bracket used to mount the HYB,

<b>No.</b>	<b>Parts Name</b>	<b>Q'ty</b>
1	Mount Arm	2
2	Mount Holder	2
3	Truss	1
4	M12 × 200 Hexagon Head Screw with Nut (x2), Flat Washer (x2)(ST)	4
5	M6 ×25 Hexagon Head Screw with Nut (x1), Flat Washer (x2), Spring Washer (SS)	4
6	M6 × 35 Hexagon Head Screw with Nut (x2), Flat Washer (x2)(SS)	4

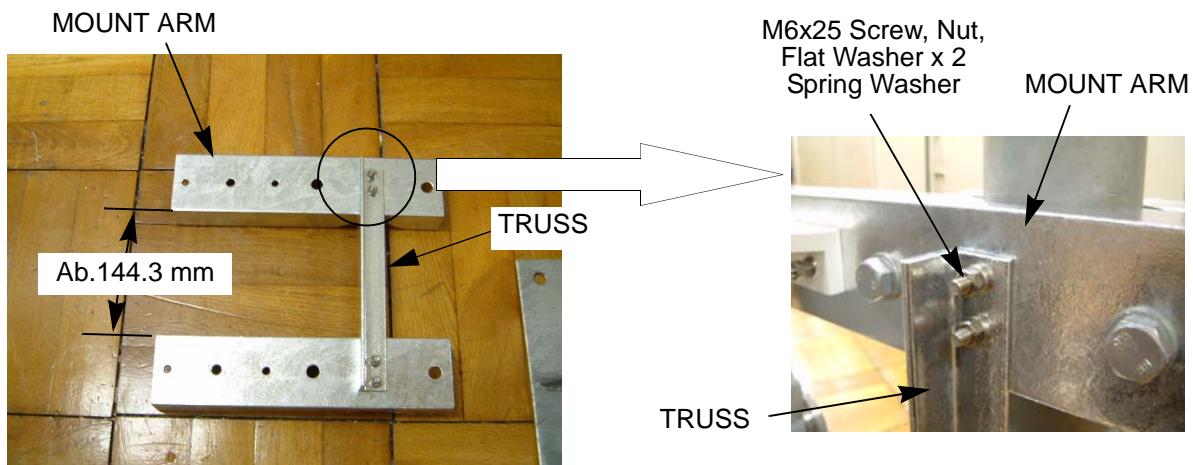
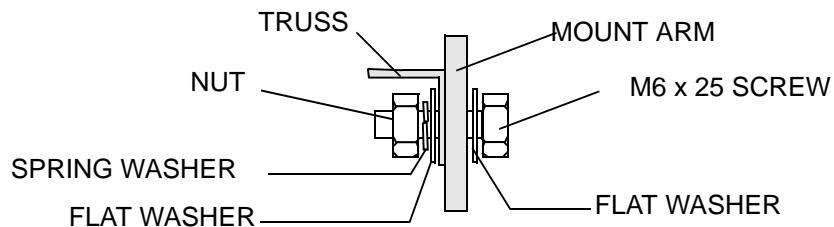


**Chart 2-10 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 3 Screw the Mount Arm and the Truss with the M6 × 25 Screw, Flat Washer (x2), Spring Washer (1), Nut, at four positions,

<b>Tightening Torque</b>	
M6	4.0 N·m ± 10%
M12	47 N·m ± 10%



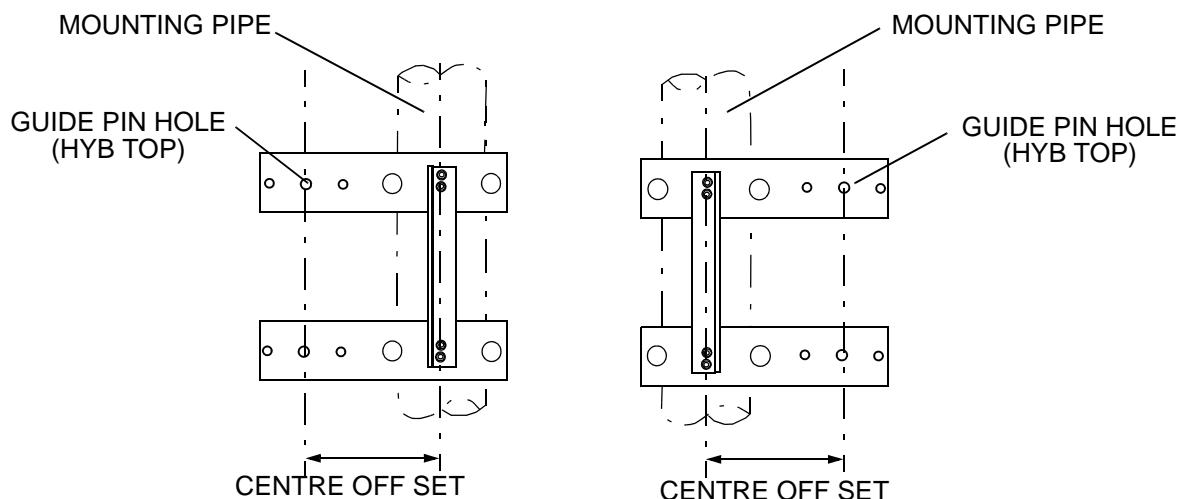
**Chart 2-10 (Cont'd)**


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<b>Step</b>	<b>Procedure</b>
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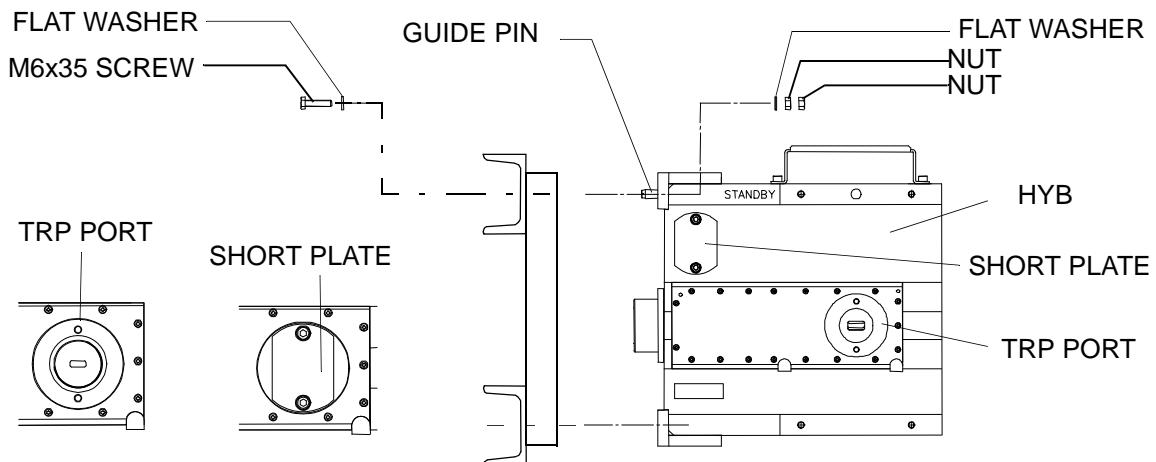
- 4      Determine centre off set,



- 5      Fit the guide pin of the HYB to the Guide Pin Hole of the Mount Arm,
- 6      Install the HYB onto the bracket with the M6 x 35 Screw, Flat Washer (x2), Nut (x2), at four positions,

## Chart 2-10 (Cont'd)

Step	Procedure
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*Note: When either Main or Standby TRP is removed, attach the short plate over the TRP port. Tightening torque is  $3.0 \text{ N}\cdot\text{m} \pm 10\%$ .*

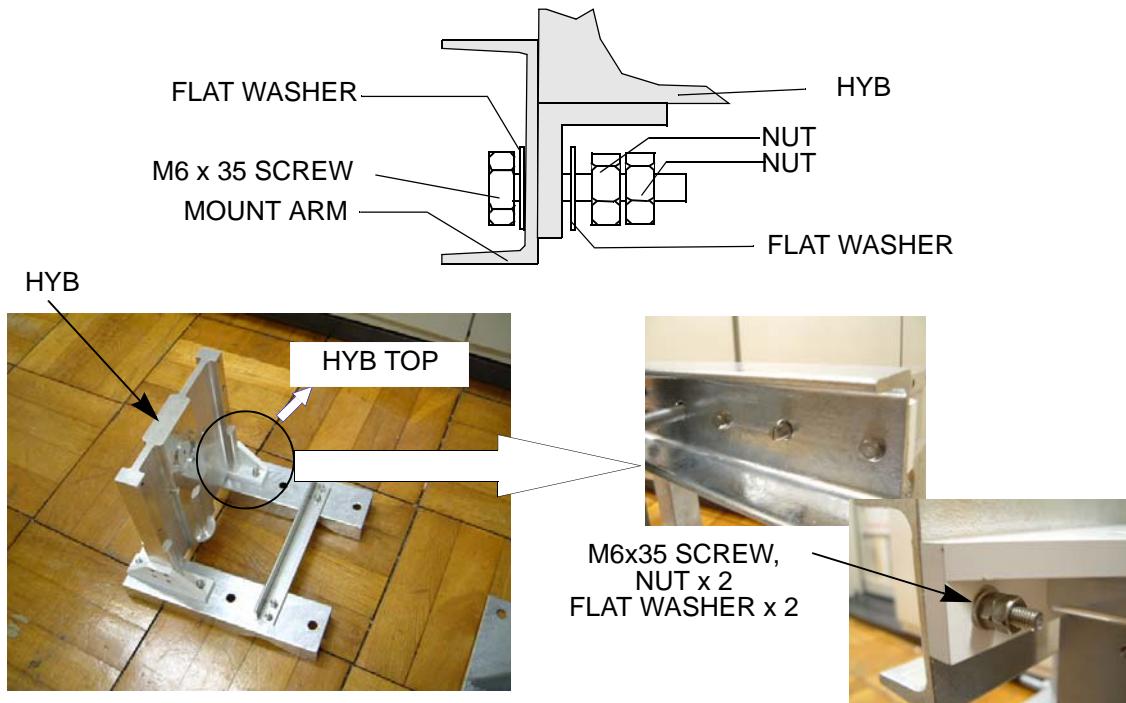
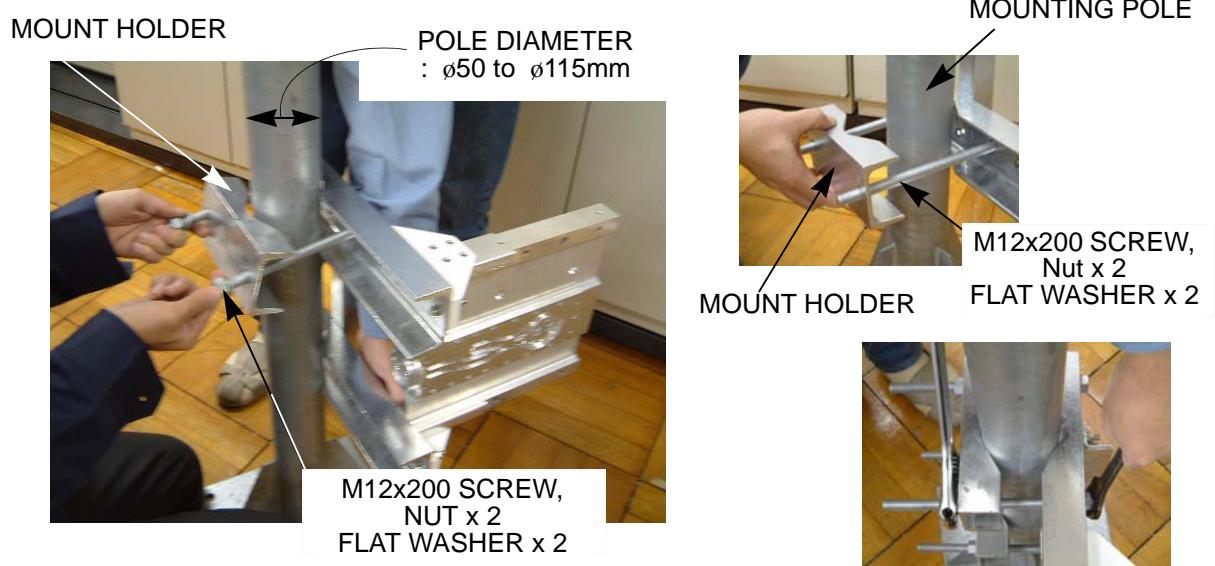
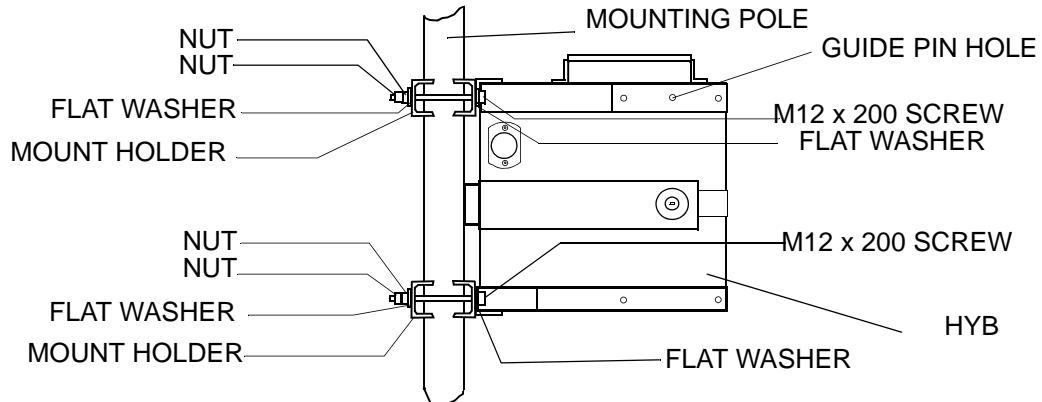


Chart 2-10 (Cont'd)

Step	Procedure
7	Install the HYB to the mounting pole using the M12 × 200 Screw, Flat Washer, Nut,



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Chart 2-10 (Cont'd)

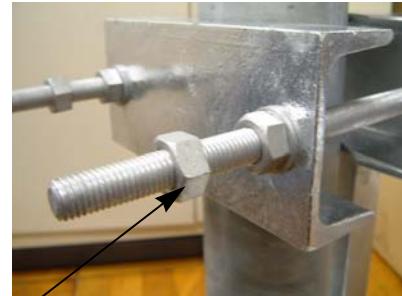
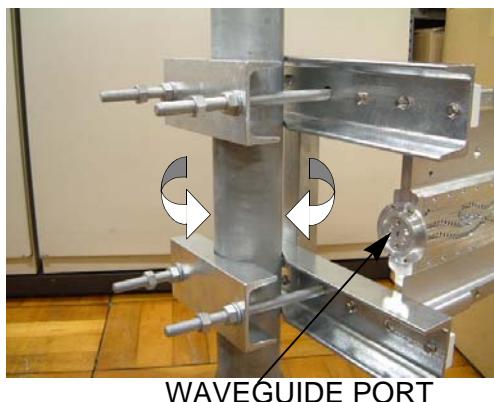
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Step	Procedure
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- 8     Adjust direction of the Bracket for Waveguide Port of the HYB orientation,

Double Nut tightening

Determination of the attachment direction.



Tighten double nut after orientation for waveguide connection has been decided.



- 9     Confirm the TRP Type, which is Master or Slave,

*Caution: The same type must be installed onto the HYB.*

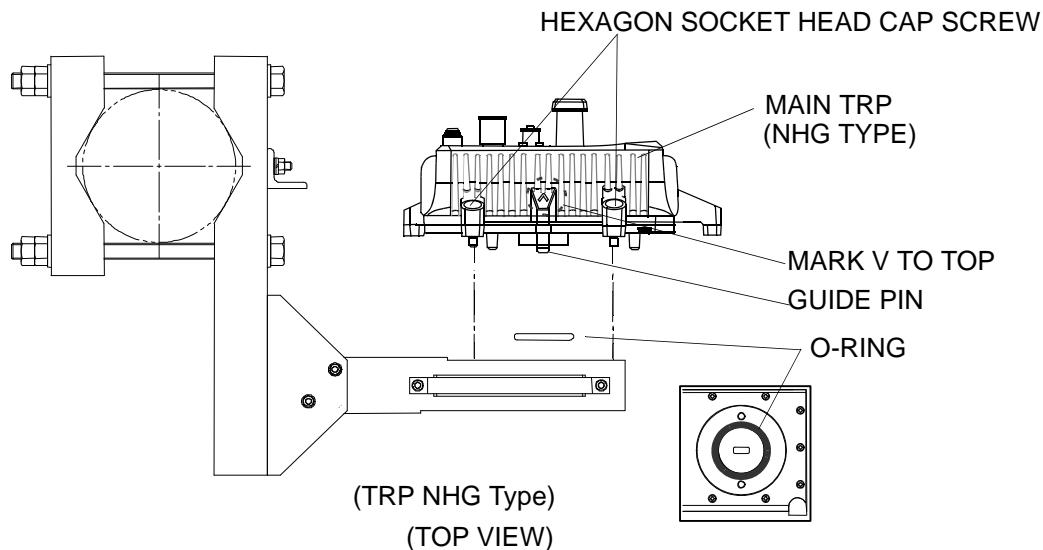
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**Chart 2-10 (Cont'd)**

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<b>Step</b>	<b>Procedure</b>
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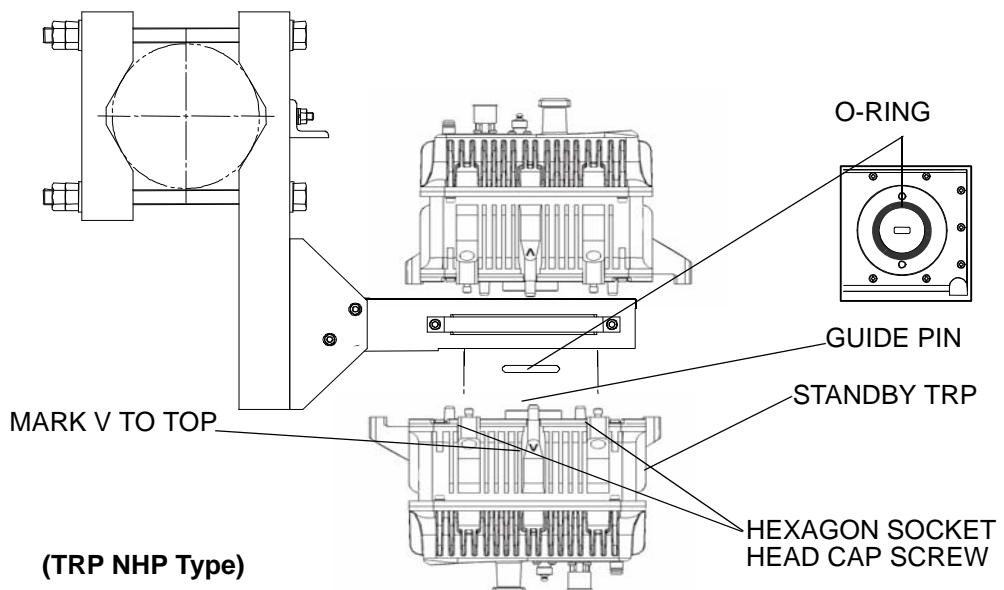
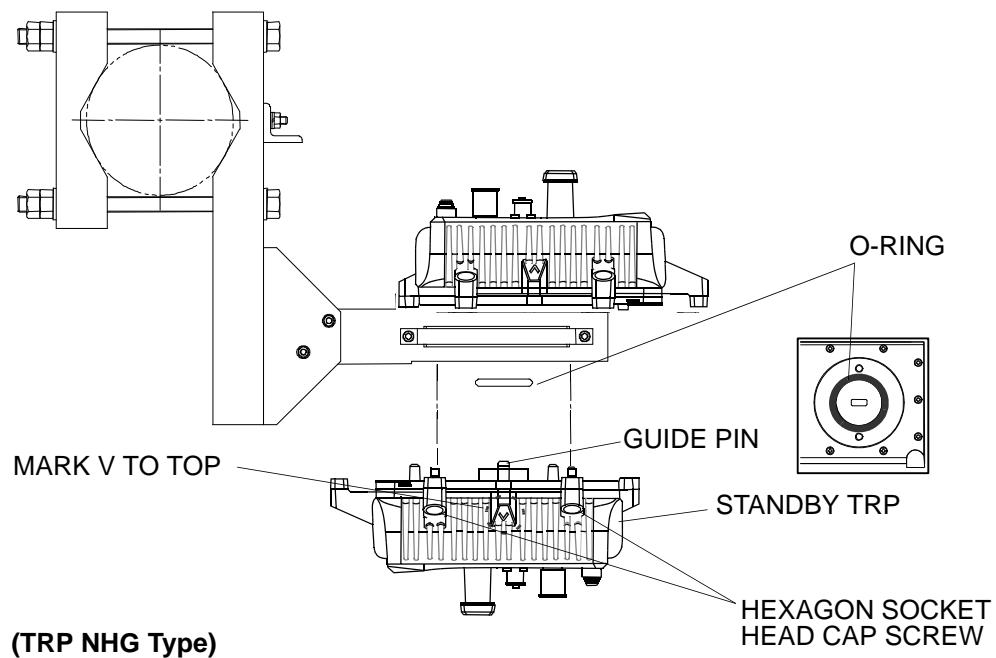
- 10      Install the TRP onto the HYB,



*Note: The TRP should be attached by turning the plate marked "V" up position for both Main TRP and Standby TRP.*

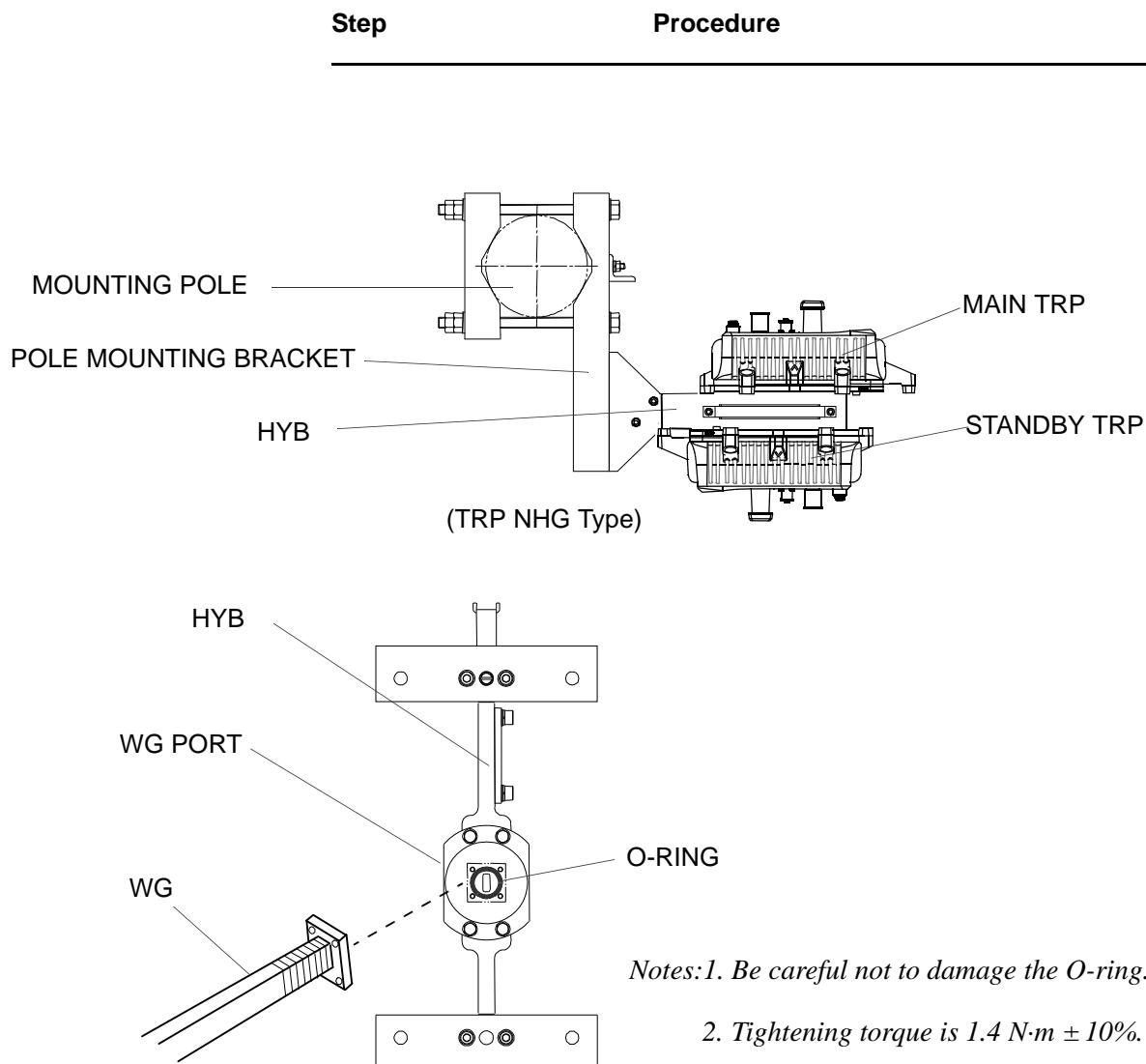
## Chart 2-10 (Cont'd)

Step	Procedure



*Note: The TRP should be attached by turning the plate marked "V" up position for both Main TRP and Standby TRP.*

## Chart 2-10 (Cont'd)



- 11 Connect the flexible waveguide (WG) to the TRP and fix the waveguide to the TRP with four (4) bolts.

*Note: Before connecting the WG to the antenna, confirm which polarization is applied to the Master and Slave TRP.*

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**Chart 2-11 11-38 GHz Band TRP Mounting with OMT  
(Antenna Direct Mounting)**

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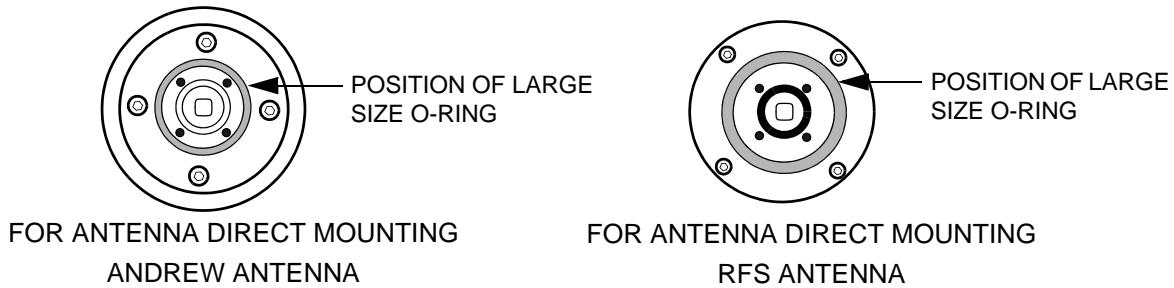
Step	Procedure
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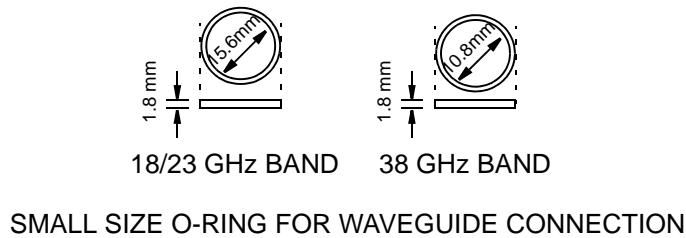
This section explains the installation of the OMT for XPIC system.

There are two types of O-rings for antenna mounting to the OMT depending on the frequency band.

***Caution: Do not apply silicon grease to O-ring.***



*Note: O-ring size is different with frequency band as follows:*



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Chart 2-11 (Cont'd)

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Step	Procedure
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For the antenna direct mounting of the TRP, following OMT is used in the XPICT system.

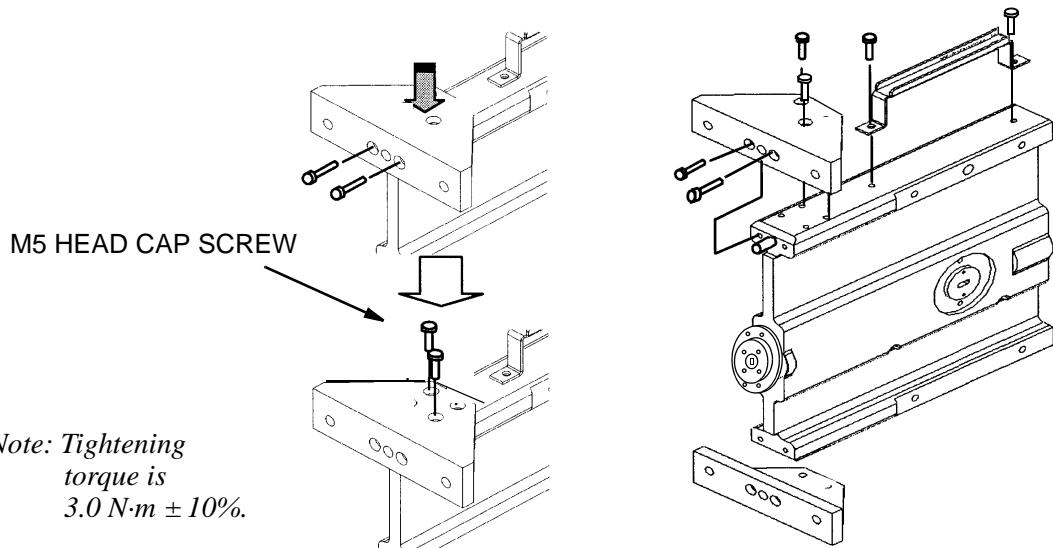
FREQUENCY BAND (GHz)	FREQUENCY RANGE (GHz)	INTERFACE WG INNER DIA.(mm) (ANT Side)	INTERFACE (TRP Side)
11	10.4 – 11.7	18.0	NEC Original
18	17.7 – 19.7	10.5	
23	21.2 – 23.6	9.0	
24(26)	24.25 – 26.5	8.0	
38	37 – 39.5	5.5	

- Caution:**
1. *For connecting the OMT to the antenna, the circular type waveguide flange of the antenna is applied to the XPICT system. When the V/H flange is mounted to the antenna, it must be changed to a circular type.*
  2. *When mounting the TRP to the OMT, confirm the polarization for Main Master and SUB Master TRP. The installation of the corresponding TRPs in the opposite station must have the same polarization in order to make into line Main Master and SUB Master MODEMs.*

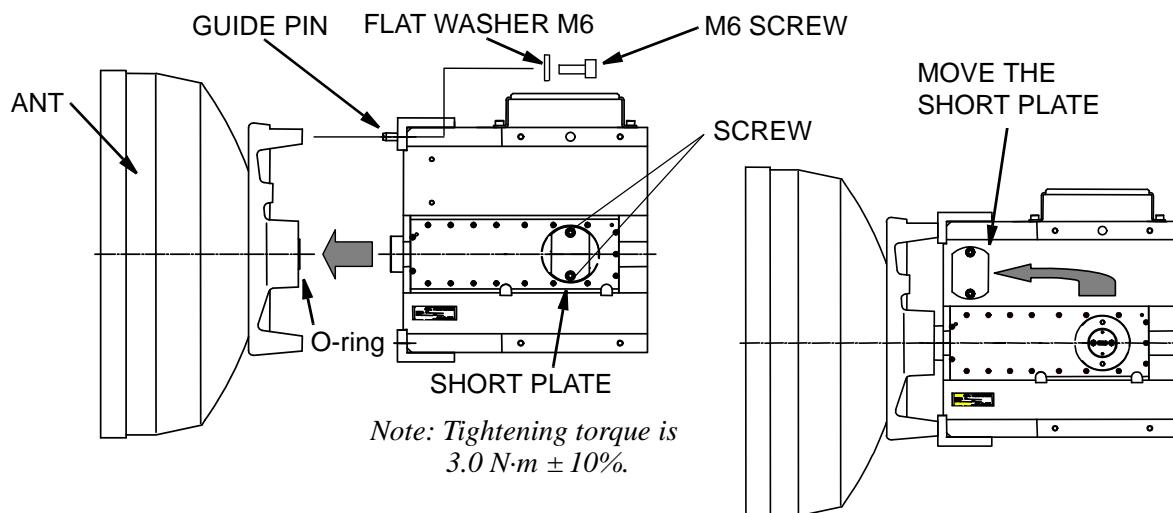
## Chart 2-11 (Cont'd)

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

- 1 Fix the bracket and handle to the OMT.



- 2 Fix the OMT to the antenna by tightening them with M6 screws (four locations),

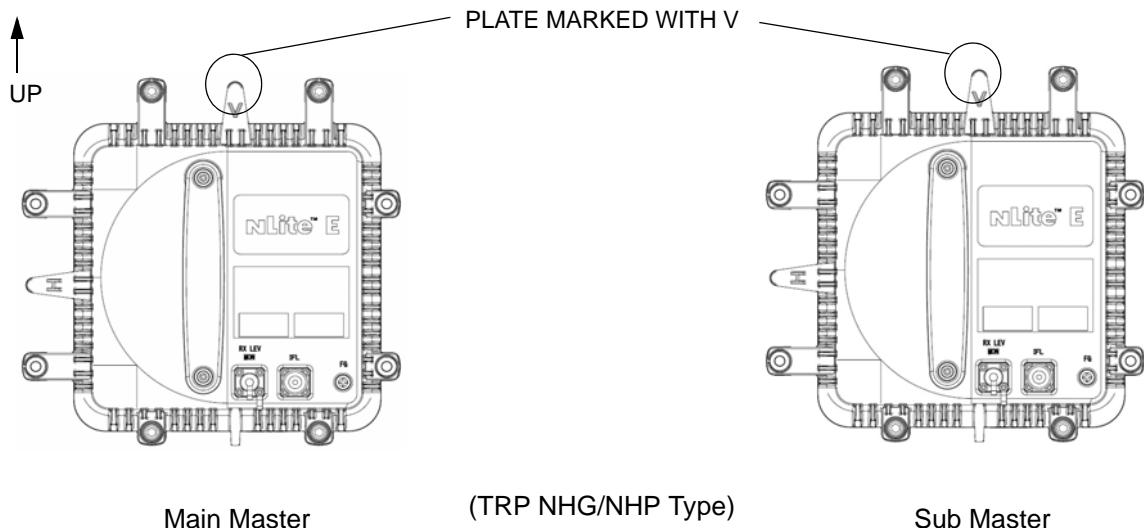
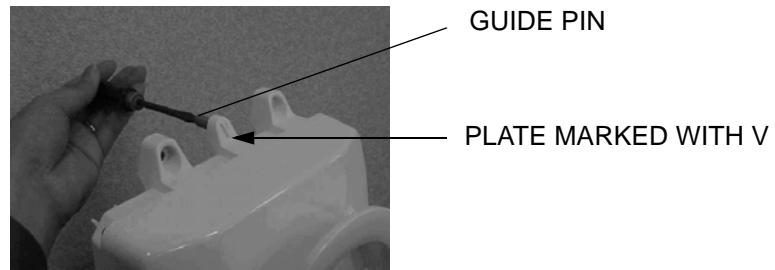


*Note: Tightening torque is 4.0 N·m ± 10%.*

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

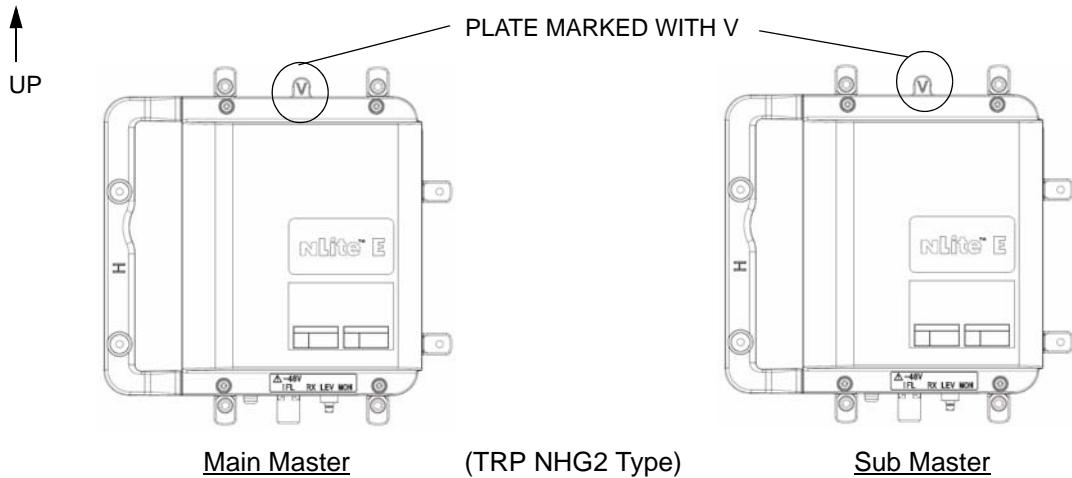
**Chart 2-11 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
3	Loosen the two screws and move the short plate if it is fixed to the TRP port. (see figure in step 9),
4	Set the two TRPs to vertical polarization for OMT mounting. If the guide pin behind the plate marked H is mounted, remove the guide pin,
	<i>Note: The TRP should be attached by turning the plate marked "V" up position for both Main Master TRP and SUB Master TRP.</i>
5	Insert the guide pin removed in step 4 behind the plate marked V,
	<i>Note: Remove the protection metallic plate covering the waveguide hole on TRP.</i>

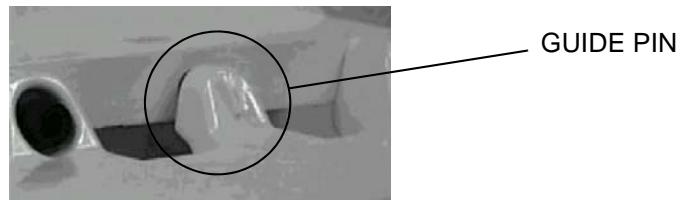


**Chart 2-11 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
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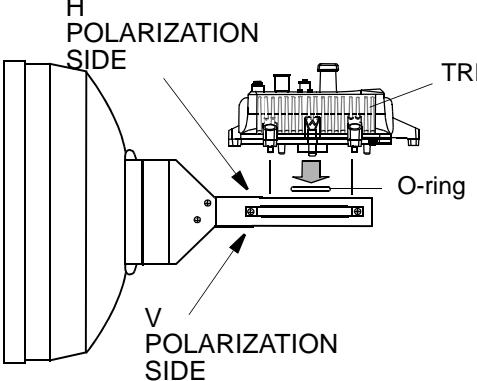
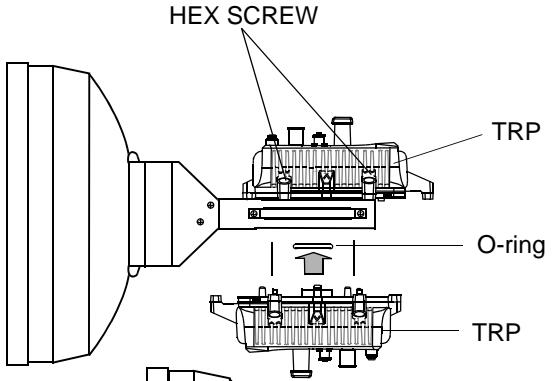
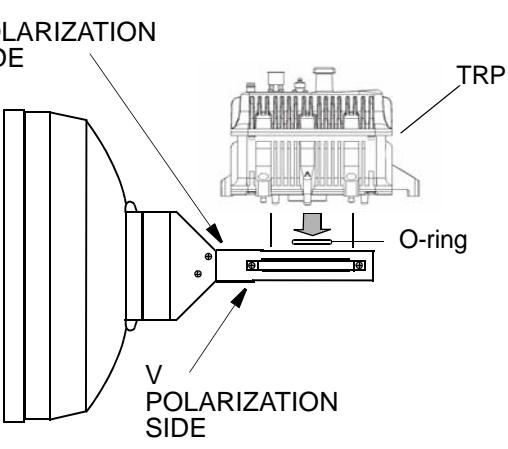
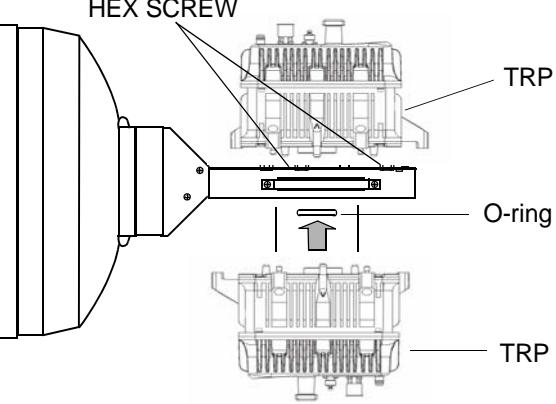
- 6 Insert the O-rings to the two TRP ports of the OMT (see figure in step 9),
- 7 Insert the guide pin into the hole of the OMT and set the position of screws,



- 8 Confirm which polarization is applied to the Master TRP.  
Check the indication of polarization on the upper side of OMT.
- 9 Fix the two TRPs with hex screws (four locations) using the allen key wrench,

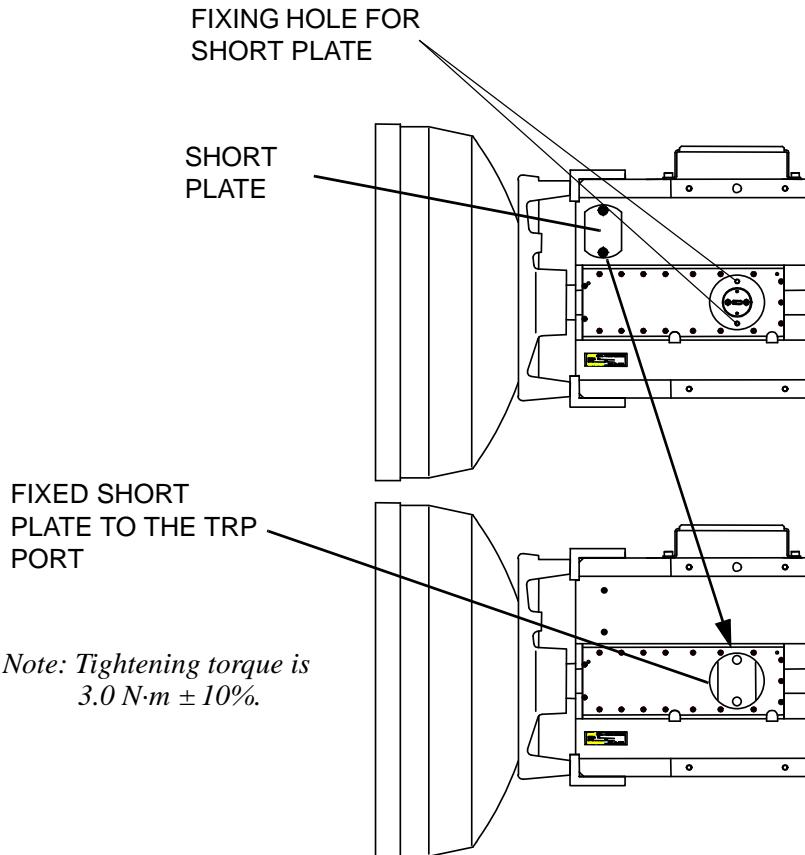
*Note: Be careful not to damage the O-rings.*

Chart 2-11 (Cont'd)

Step	Procedure
	
<i>Note: Tightening torque is 4.0 N·m ± 10%.</i>	
<b>(TRP NHG Type)</b>	
	
<i>Note: Tightening torque is 4.0 N·m ± 10%.</i>	
<b>(TRP NHP Type)</b>	

## Chart 2-11 (Cont'd)

Step	Procedure
<p><b>Cautions:</b></p> <ol style="list-style-type: none"> <li>1. Tighten all screws with lighter torque at first, then full torque as specified.</li> <li>2. When either TRP is demounting for TRP replacing or other reasons, fix the attached short plate to the demounted port of the OMT to avoid leaking of RF power from the OMT and for waterproof.</li> <li>3. To avoid occurrence of bit errors due to microphonic properties, when installing the SUB Master TRP, protect the Main Master TRP from mechanical knocks.</li> </ol>	



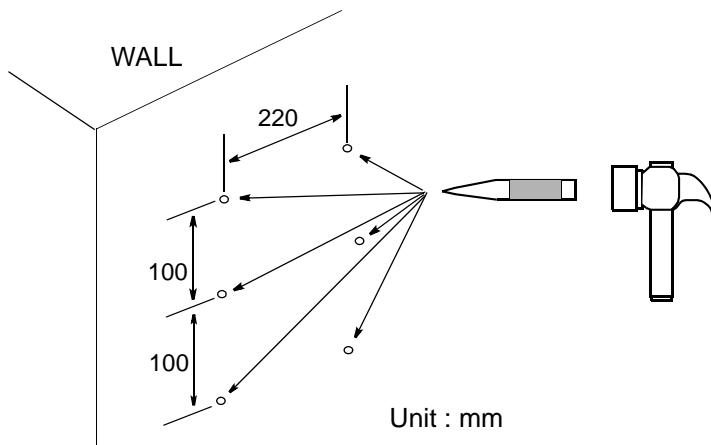
## 2.5.2 TRP Wall Mounting

For the antenna direct mounting type TRP, wall mounting installation is explained in following procedure.

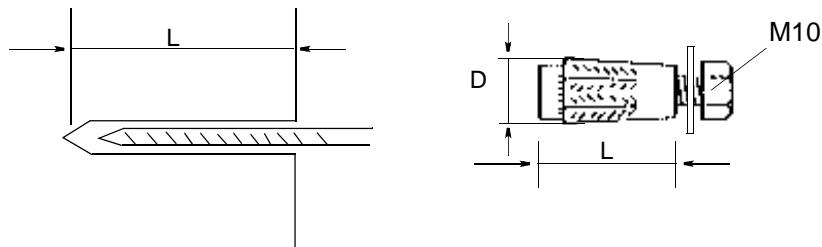
**Chart 2-12 TRP Wall Mounting**

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

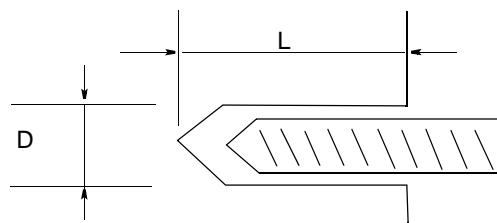
- 1 Using a center punch and hammer, mark the drilling holes for the TRP wall mount bracket. Dimensions are shown below.



- 2 Using an electric drill for concrete, drill the guide holes,



- 3 Change the concrete drill to enlarge the holes and drill the anchor bolt holes,



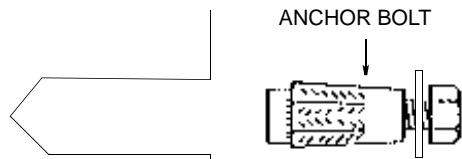
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Chart 2-12 (Cont'd)

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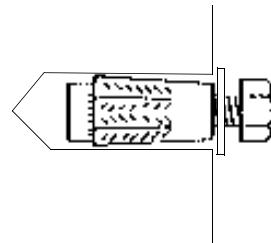
Step	Procedure
------	-----------

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

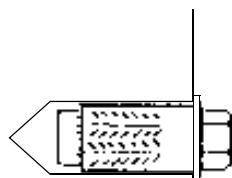


- 5 Make sure to insert the plug-bolt fully,

*Note: Anchor bolts of M10 bolt shall be prepared by the customer.*



- 6 Tighten hardly the bolt using a wrench or monkey wrench,



- 7 Loosen the bolt and remove it.

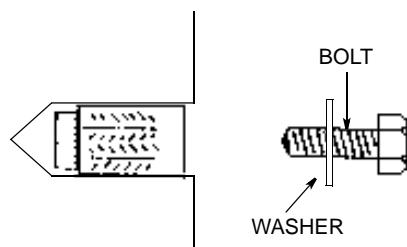
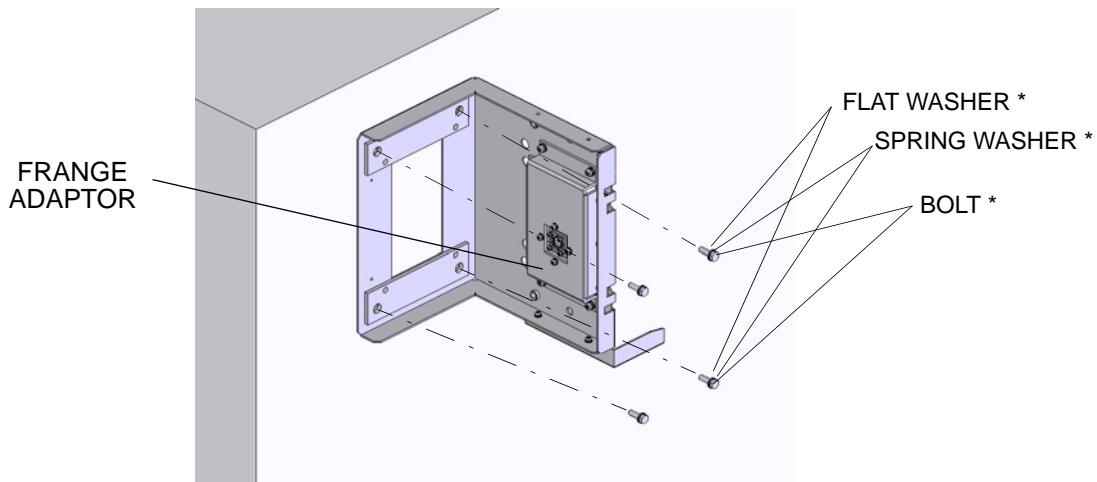


Chart 2-12 (Cont'd)

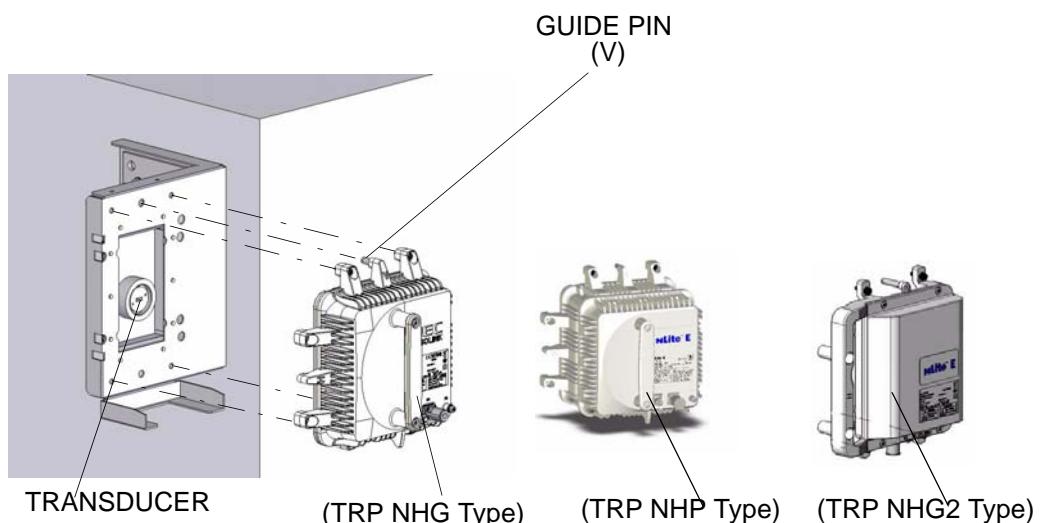
Step	Procedure
------	-----------

- 8 Fix the TRP wall mounting bracket to the wall with the six bolts (M6) of the anchor volt,



*Note: \* The BOLT, FLAT WASHER and SPRING WASHER are of the Anchor bolt.*

- 9 Mount the TRP onto the bracket and fix the TRP using the four bolts (M6) on the TRP,



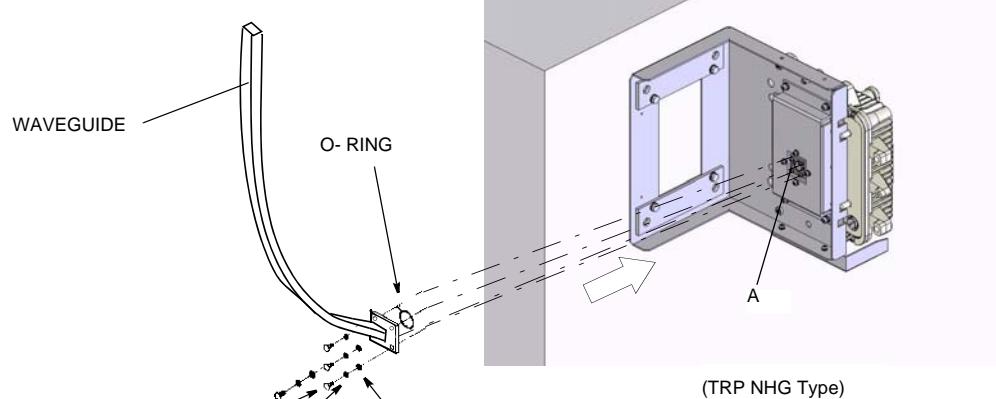
*Note: The tightening torque is 4.0 N·m ± 10%.*

**Chart 2-12 (Cont'd)**

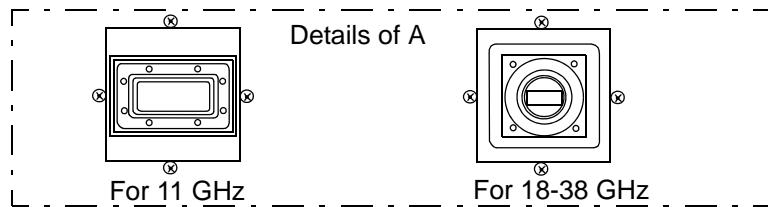
<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 10 Connect the wave guide to the transducer for the TRP.

*Note: Tightening torque is  $1.4 \text{ N}\cdot\text{m} \pm 10\%$ . (up to 15 GHz)  
Tightening torque is  $0.6 \text{ N}\cdot\text{m} \pm 10\%$ . (18 GHz or higher)*



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



Refer to Chart 2-6 Feeder Connection for the wave guide connection.

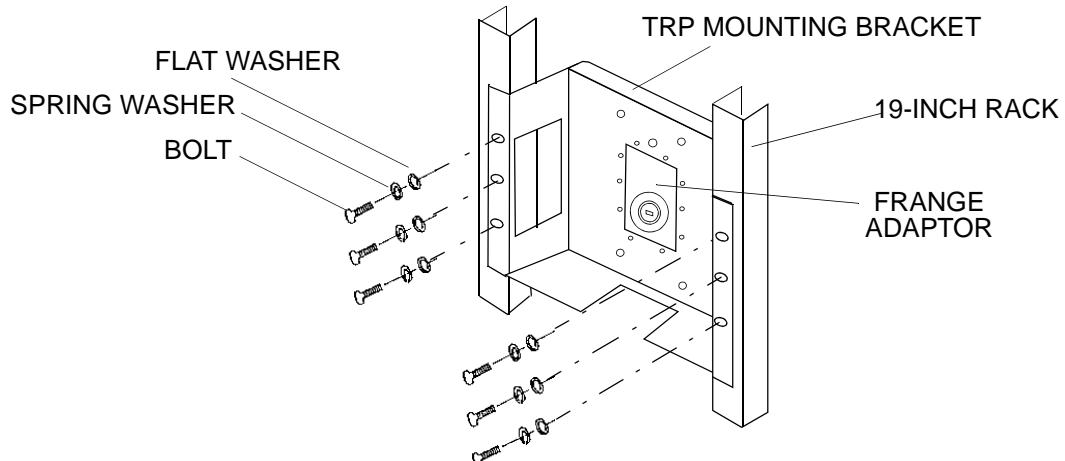
### 2.5.3 TRP Rack Mounting

For the antenna direct mounting type TRP, rack mounting installation is explained in following procedure.

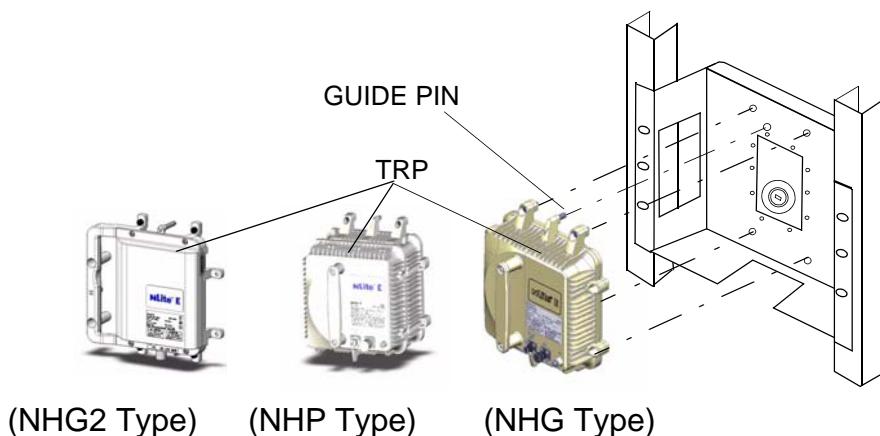
**Chart 2-13 TRP Rack Mounting**

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

- 1 Fix the TRP rack mounting bracket into the 19-inch rack using the six fixing bolts.



- 2 Mount the TRP onto the bracket and tighten the four fixing bolts (M6) on the TRP,

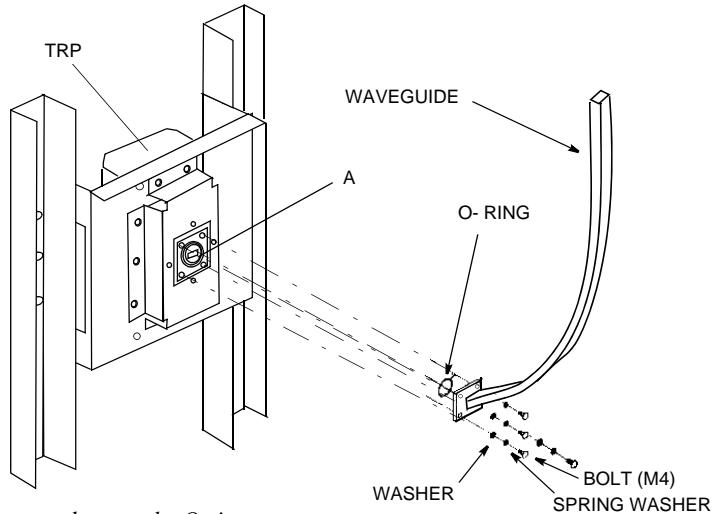


*Note: The tightening torque is  $4.0 \text{ N}\cdot\text{m} \pm 10\%$ .*

**Chart 2-13 (Cont'd)**

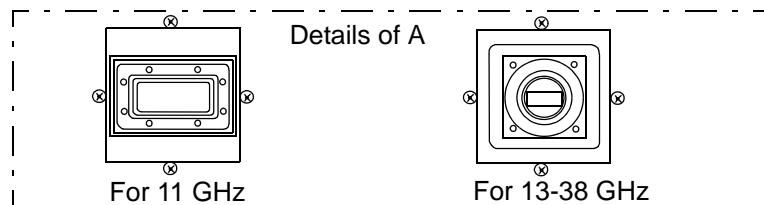
<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 3 Connect the wave guide to the transducer for the TRP.



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

*Note:* Tightening torque is  $1.4 \text{ N}\cdot\text{m} \pm 10\%$  (up to 15 GHz).  
Tightening torque is  $0.6 \text{ N}\cdot\text{m} \pm 10\%$  (18 GHz or higher).



Refer to Chart 2-6 Feeder Connection for the wave guide connection.

## 2.6 Feeder Connection

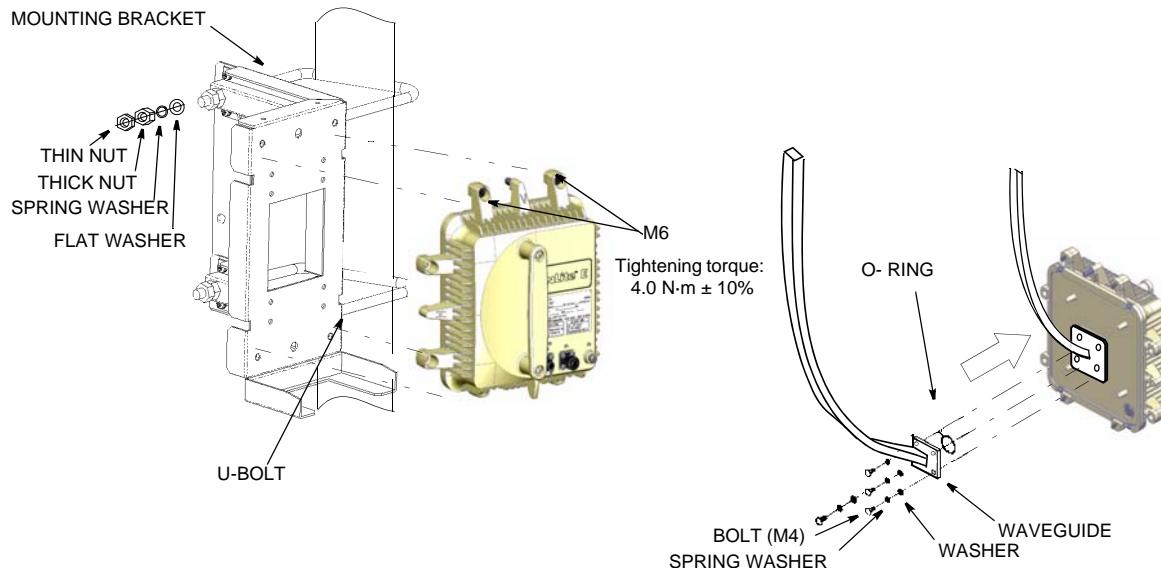
The connection method of the waveguide type TRP is described in following procedure.

**Chart 2-14 Wave Guide Connection**

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

- 1 Mount a waveguide to the TRP, fix the waveguide to the TRP with four bolts.

*Note: Being careful, not to damage the O-ring.*



*Note: Tightening torque is 1.4 N·m ±10% (up to 15 GHz).  
Tightening torque is 0.6 N·m ±10% (18 GHz or higher).*

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

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

The wave guide for the antenna direct mounting type TRP is flange adapter is required. Refer to the following procedure.

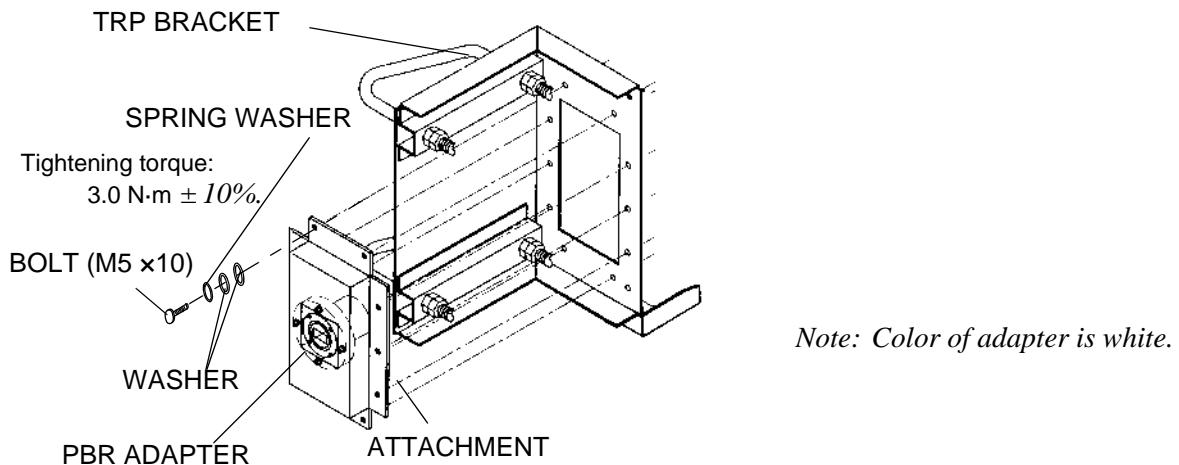
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Chart 2-14 (Cont'd)

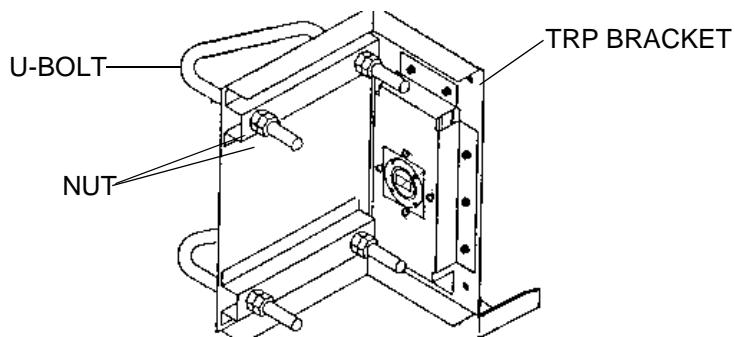
---

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

- 1      Mount the attachment with adapter to the TRP bracket using ten bolts,



- 2      Loosen eight nuts and remove the two U-bolts from the TRP bracket,

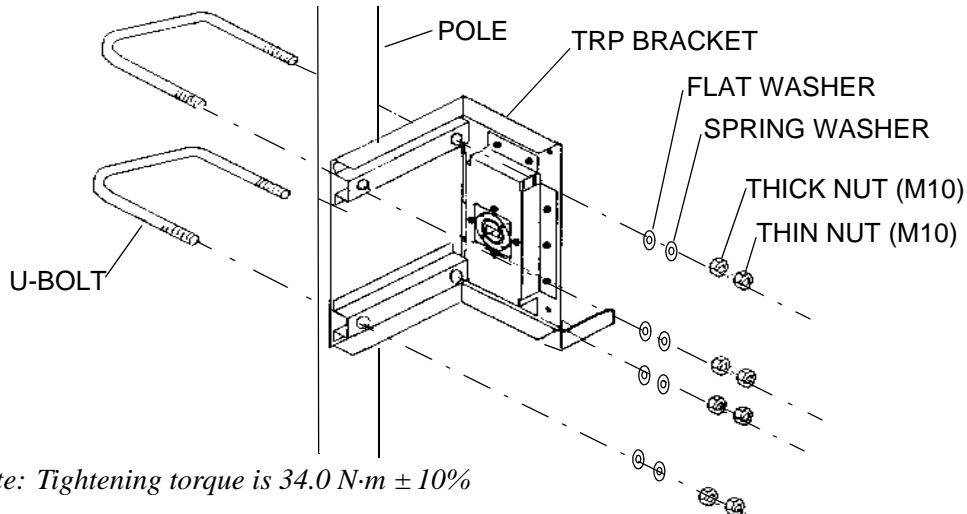


## Chart 2-14 (Cont'd)

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

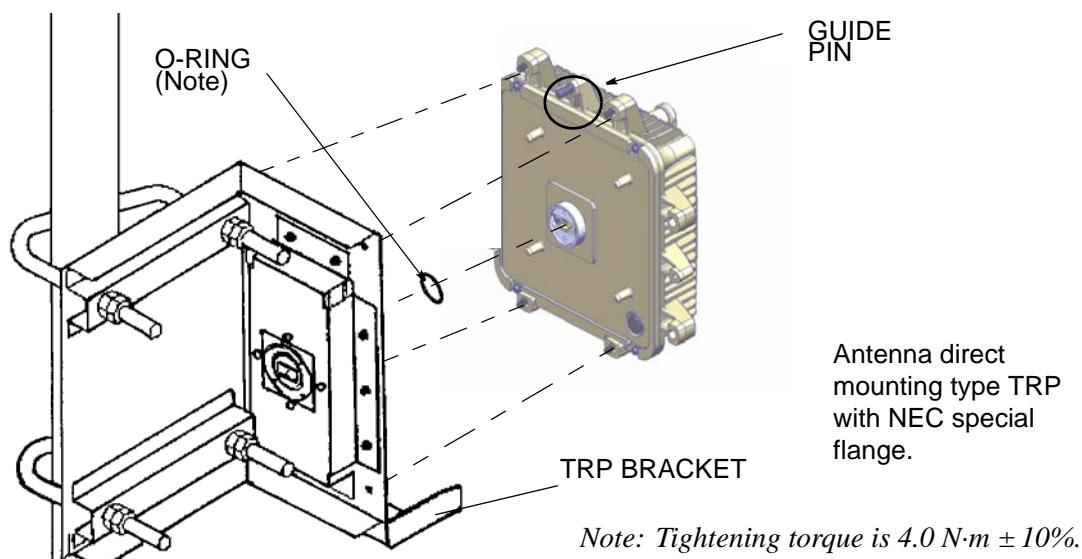
- 3 Mount the TRP bracket to the pole with two U-bolts,

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



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

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



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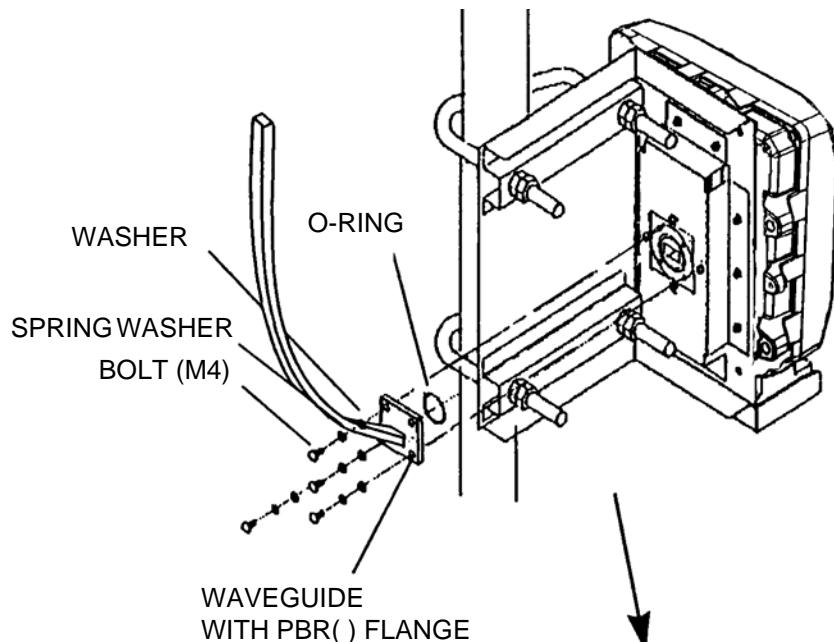
Chart 2-14 (Cont'd)

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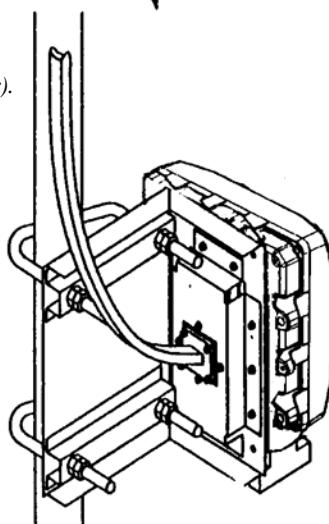
Step	Procedure
5.	Make sure that the TRP and the TRP bracket are fixed at specified values.
6	Mount the waveguide to the TRP with four bolts.

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

---



*Note:* Tightening torque is  $1.4 \text{ N}\cdot\text{m} \pm 10\%$  (up to 15 GHz).  
Tightening torque is  $0.6 \text{ N}\cdot\text{m} \pm 10\%$  (18 GHz or higher).

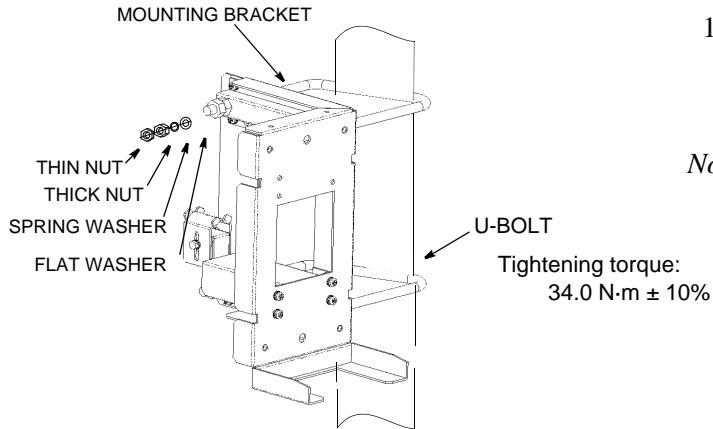


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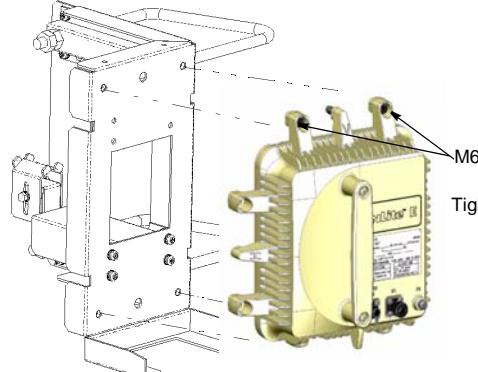
**Chart 2-15 TRP Mounting for Connecting Coaxial Cable**


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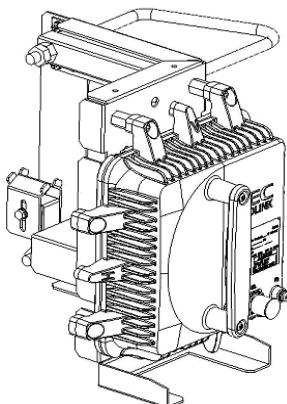
Step	Procedure
------	-----------

**6 GHz TRP MOUNTING (Connecting Coaxial Cable)**


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



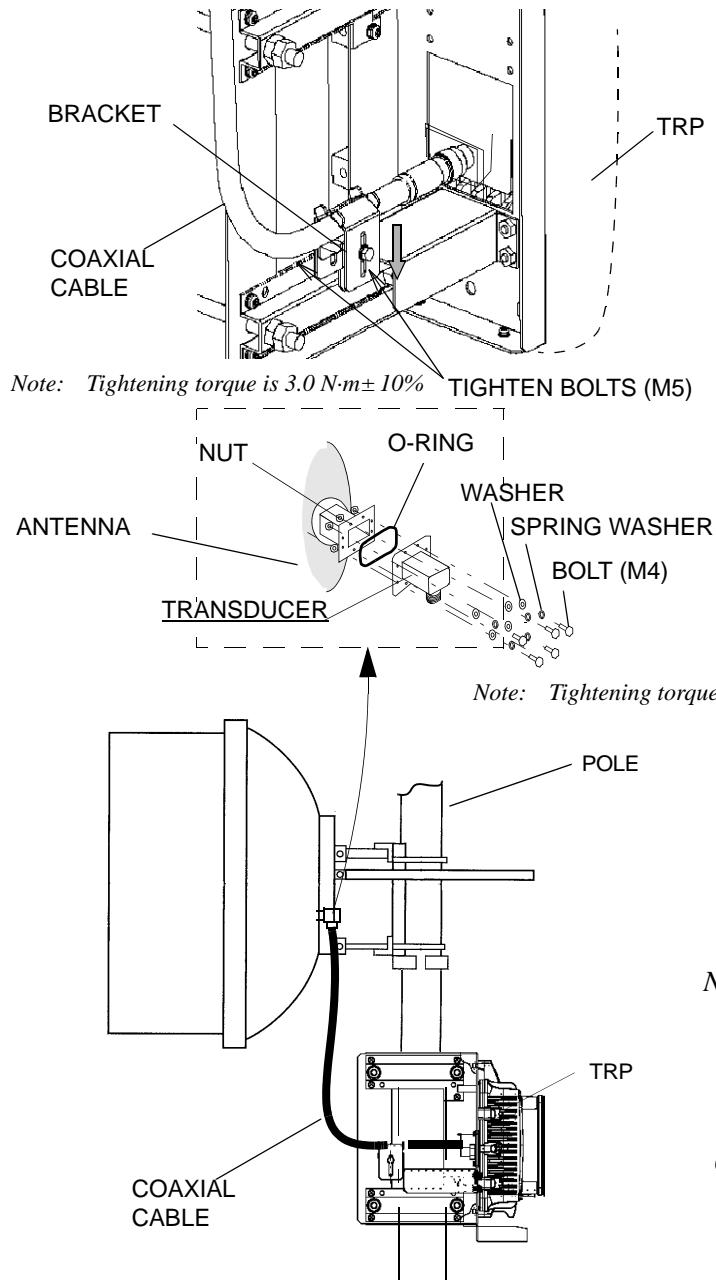
2. Mount the TRP on to the bracket and tighten four bolts (M6) at upper and lower parts of the TRP,



3. Check that the TRP and the bracket are fixed firmly,

**Chart 2-15 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

**6 GHz TRP MOUNTING (Connecting Coaxial Cable)**

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

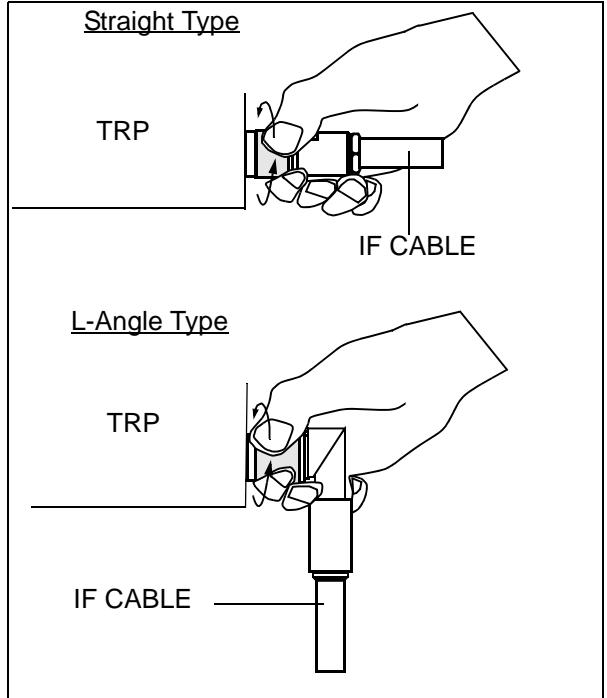
5. Down the cable fix bracket to fix the Coaxial cable, then tighten the two bolts,

(When the wave guide flange is provided to the antenna port, fit the transducer with eight bolts.)

6. Install the Coaxial cables between the antenna and TRP.

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

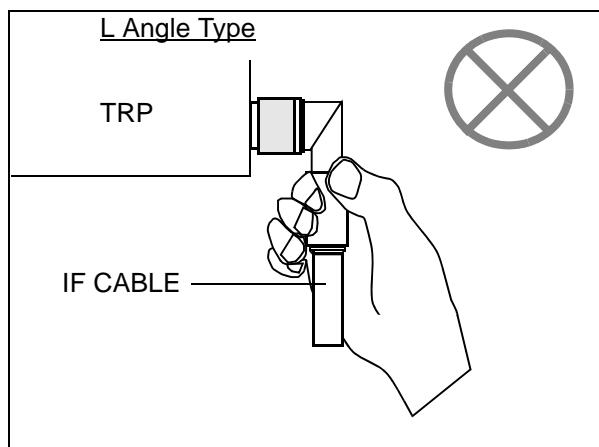
**Caution:** Wrap the coaxial cable connection points with a self-bonding tape for waterproof.



**Caution:** When connecting the IF cable to the TRP, tighten the N-male connector with engage connector nut only using fingers and holding the cable with another hand.

Tighten the engage connector nut only for the L-angle connector also.

(Tightening Torque: 0.7 to 1.2 N·m  
(7 to 12 kg·cm))



**Caution:** If rotate other parts of the L-angle connector as illustrated left, it can cause connector damage.

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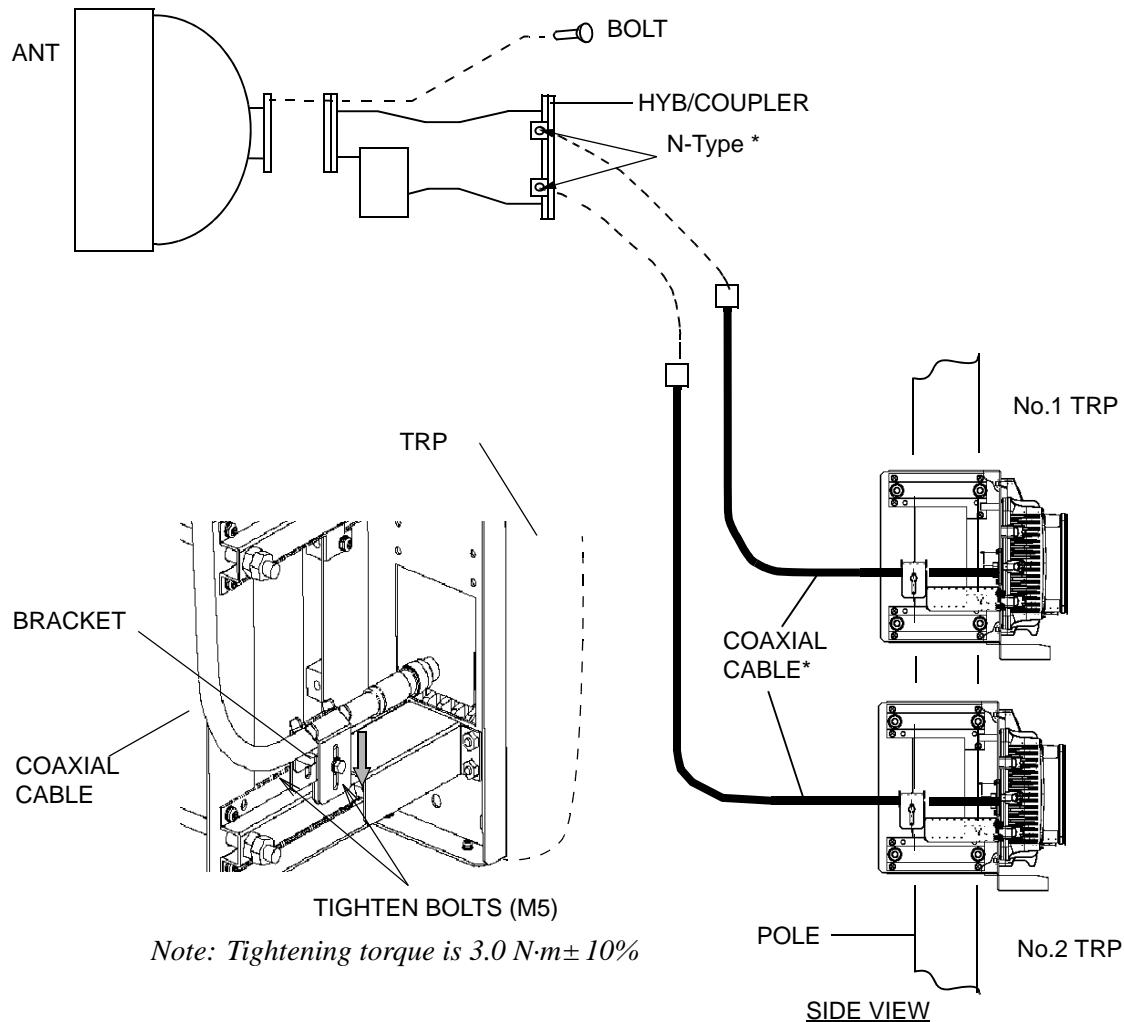
Chart 2-15 (Cont'd)

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**Step**                   **Procedure**

---

6 GHz TRP MOUNTING (Connecting Coaxial Cable)

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.

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USING HYB/COUPLER FOR 1+1 SYSTEM

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**Chart 2-16 TRP Mounting for Connecting Coaxial Cable or Waveguide**

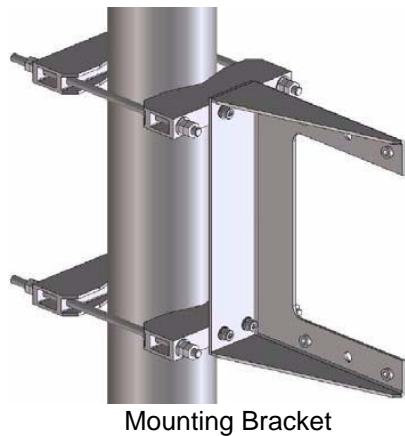
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Step	Procedure
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**6 GHz TRP MOUNTING BRACKET INSTALLATION**

This Mounting Bracket is designed in order to install 6 GHz TRP with N-type connector or Waveguide interface to a pole. The diameter of the pole is from 48.5 to 114.3 millimeters.

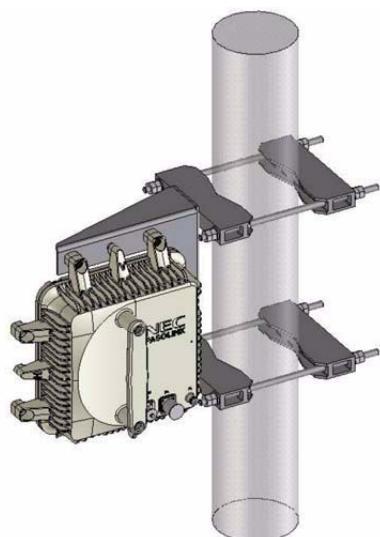


**Mounting Bracket Parts List**

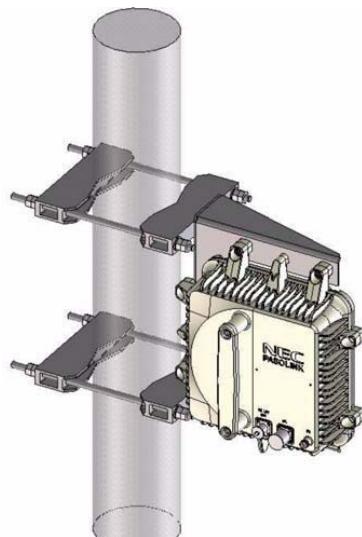
Item	Description	Q'ty
1	Bracket	1
2	Holder-1 (with two M6 taps)	2
3	Holder-2	2
4	M8 Stud Bolt (SS)	4
5	M8 Hexagon Nut (SS)	20
6	M8 Flat Washer (SS)	8
7	M6×16 Hexagon Socket Head Screw (SS)	4
8	M6 Spring lock Washer (SS)	4
9	M6 Flat Washer (SS)	4
10	Cap	4
11	Band (Cable Clamp)	2

*Note:* SS: Stainless Steel

*Note:* Tightening torque is 4 N·m ±10% (M6 Screw).  
Tightening torque is 11 N·m ±10% (M8 Screw).



Standard Installation

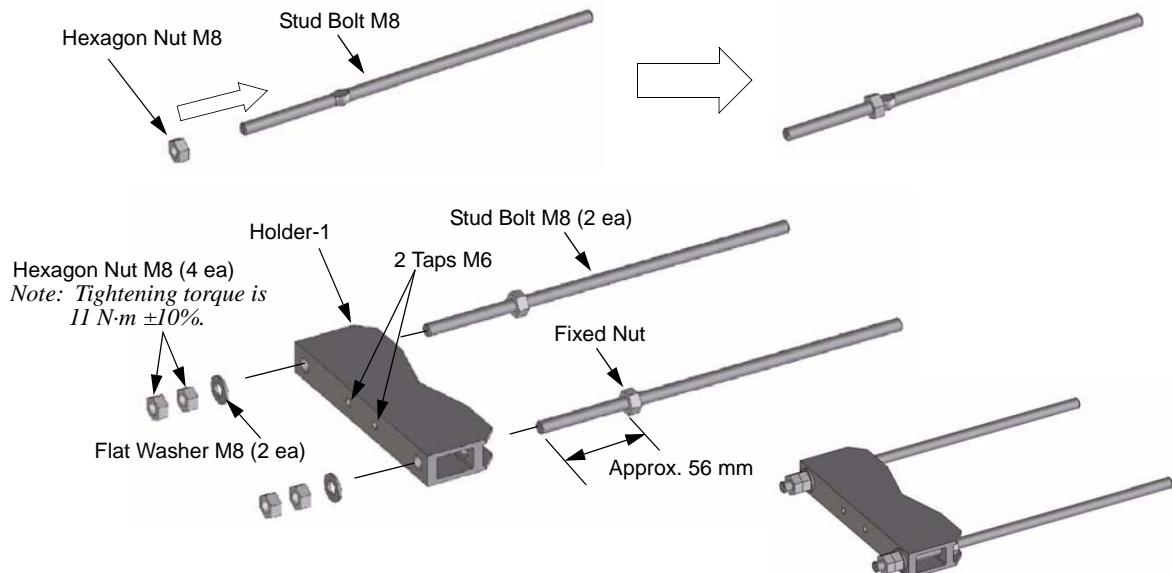


Reverse Installation

**Chart 2-16 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 1 A nut is assembled to a stud bolt until a nut has come to a complete stop,

**Assembly of the Holder-1 (2 sets)**

- 2 Fix the two Holder-1 to the Bracket at four bolts,

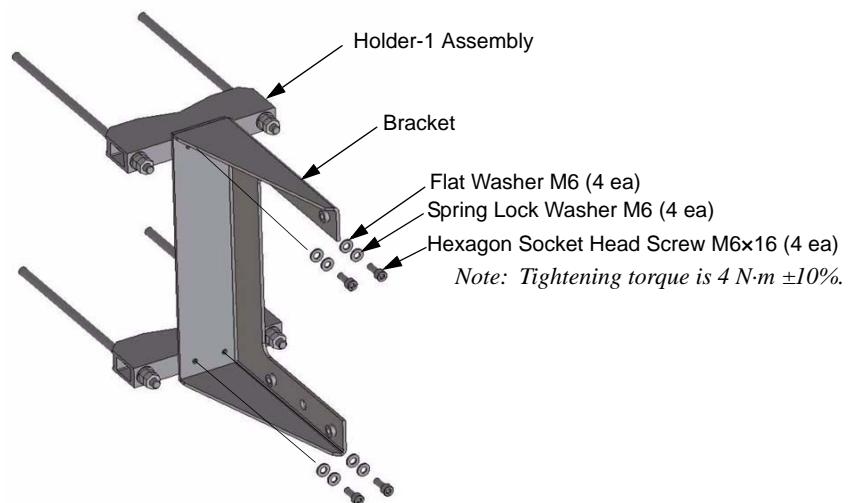
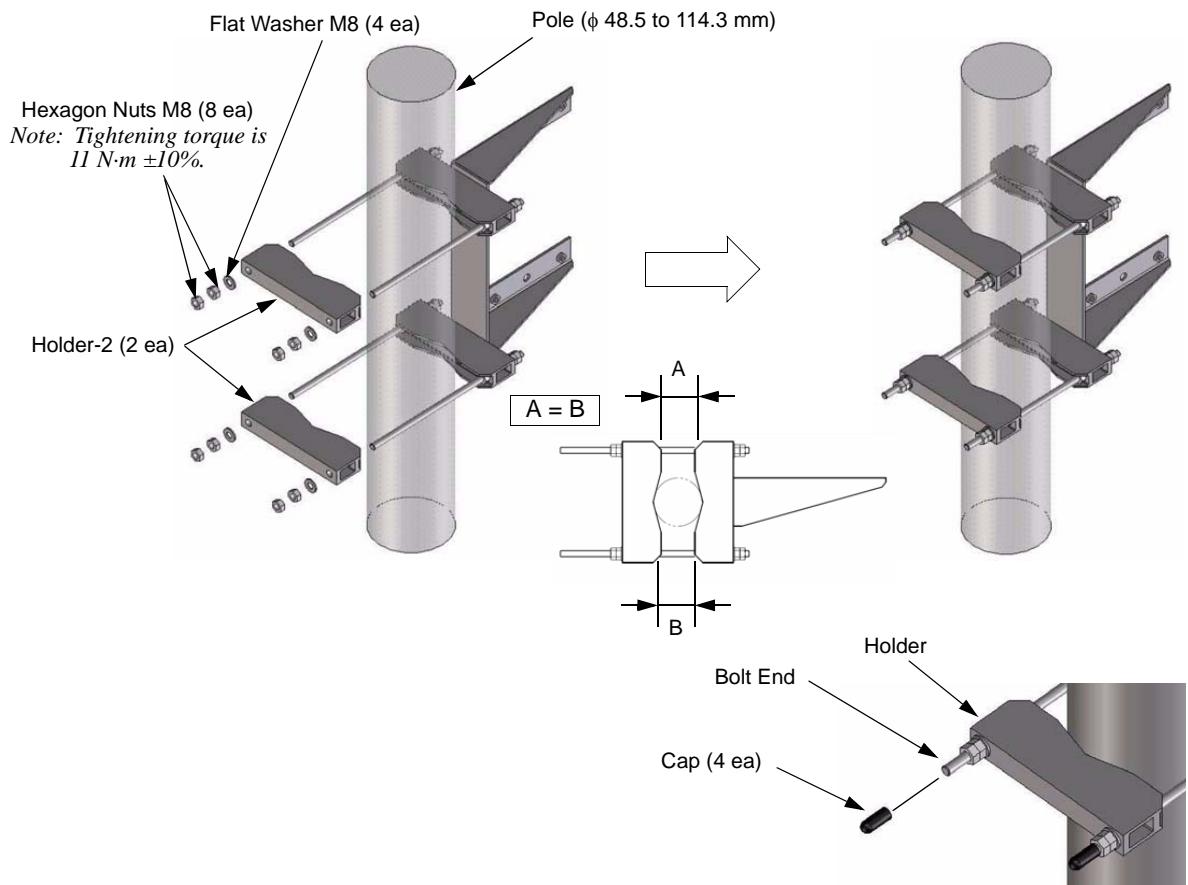
**Assembly of the Bracket**

Chart 2-16 (Cont'd)

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

- 3 Mount the Bracket to the pole, point to the opposite station and tighten it with four Stud bolts,

#### Installation to the Pole

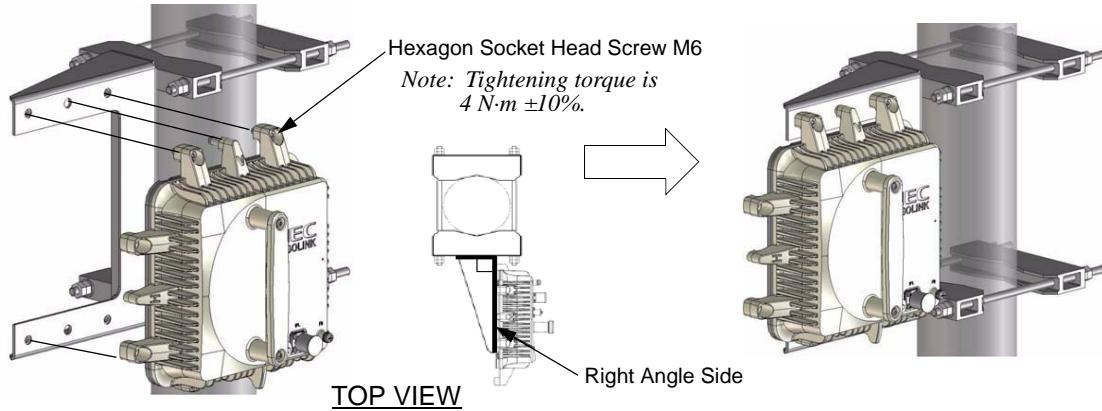


*Note: Since a bolt projects from a Holder when a pole diameter is small, please attach the Cap to a bolt end.*

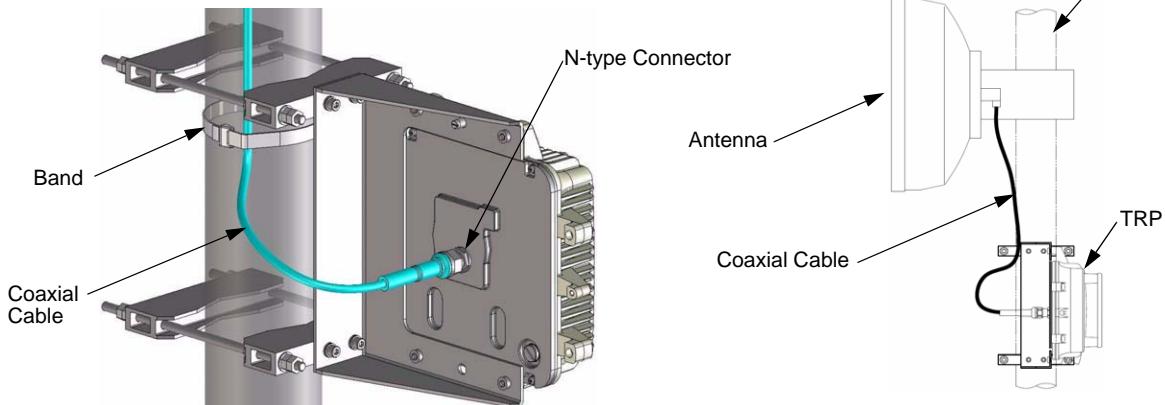
**Chart 2-16 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 4 Mount the TRP on to the Bracket and tighten four bolts (M6) at upper and lower parts of the TRP,

**Attachment of the TRP**

- 5 Connect the Coaxial cable to the RF IN/OUT connector of the TRP,

**Example****Connection of the Coaxial Cable**

- 6 Install the Coaxial cables between the antenna and the TRP.

- Notes:*
1. Fix the Coaxial cable to the pole or member with Band (cable ties) after antenna orientation has been completed.
  2. Wrap the Coaxial cable connection points with a self-bonding tape for waterproof. (The self-bonding tape shall be prepared by customer.)

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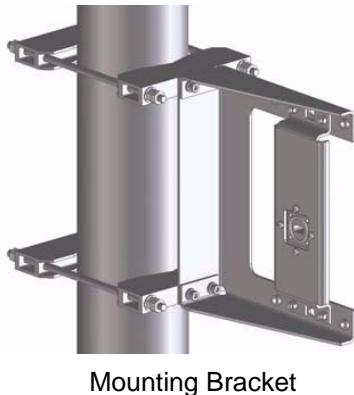
**Chart 2-17 TRP Mounting for Connecting Waveguide**


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Step	Procedure
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**10-38 GHz TRP MOUNTING BRACKET INSTALLATION**

This Mounting Bracket is designed in order to install 11-38 GHz TRP with antenna direct mount interface to a pole. The diameter of the pole is from 48.5 to 114.3 millimeters.



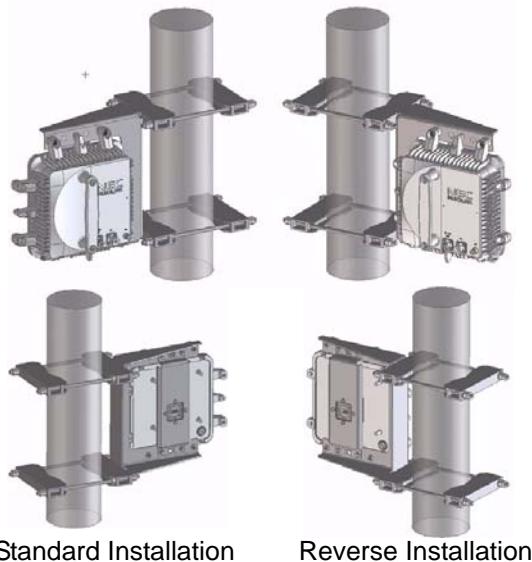
Mounting Bracket

**Mounting Bracket Parts List**

Item	Description	Q'ty
1	Bracket (with Adapter)	1
2	Holder-1 (with two M6 taps)	2
3	Holder-2	2
4	M8 Stud Bolt (SS)	4
5	M8 Hexagon Nut (SS)	20
6	M8 Flat Washer (SS)	8
7	M6×16 Hexagon Socket Head Screw (SS)	4
8	M6 Spring Lock Washer (SS)	4
9	M6 Flat Washer (SS)	4
10	Cap	4
11	O-Ring (for TRP)	1
12	O-Ring (for Waveguide)	1
13	Screw of Waveguide Connecting for 10/11 GHz M4×14 Hexagon Head Screw with Washer (SS) for 13/15 GHz M4×12 Hexagon Head Screw with Washer (SS) for 18/23/26/28/32/38 GHz M3×10 Hexagon Head Screw with Washer (SS)	8 4 4

Note: SS: Stainless Steel

Note: Tightening torque is 4 N·m ±10% (M6 Screw).  
Tightening torque is 12 N·m ±10% (M8 Screw).



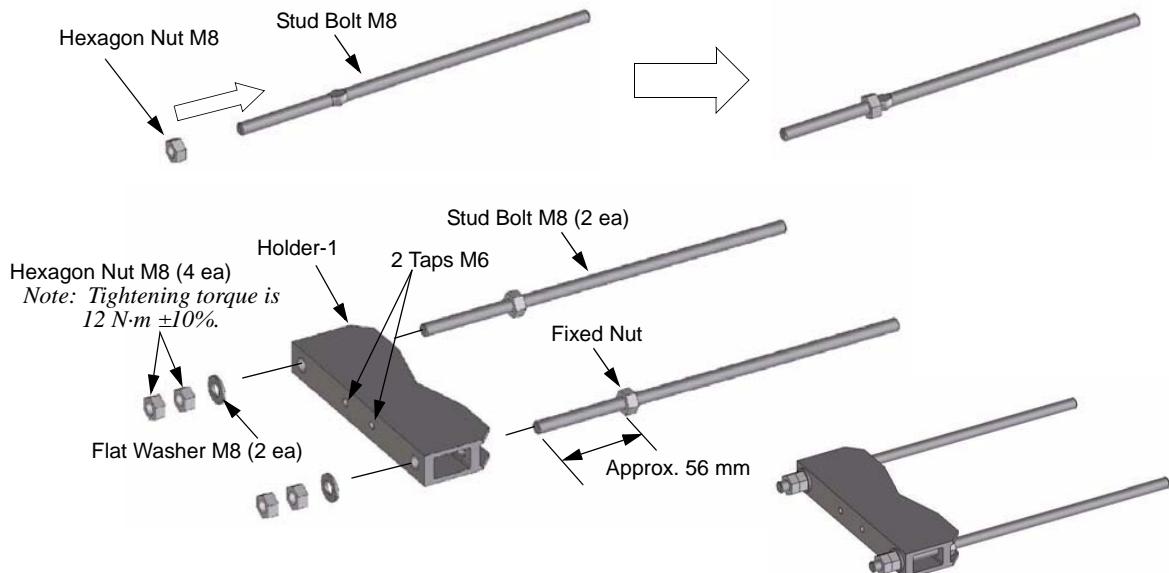
Standard Installation

Reverse Installation

**Chart 2-17 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 1 A nut is assembled to a stud bolt until a nut has come to a complete stop,

**Assembly of the Holder-1 (2 sets)**

- 2 Fix the two Holder-1 to the Bracket at four bolts,

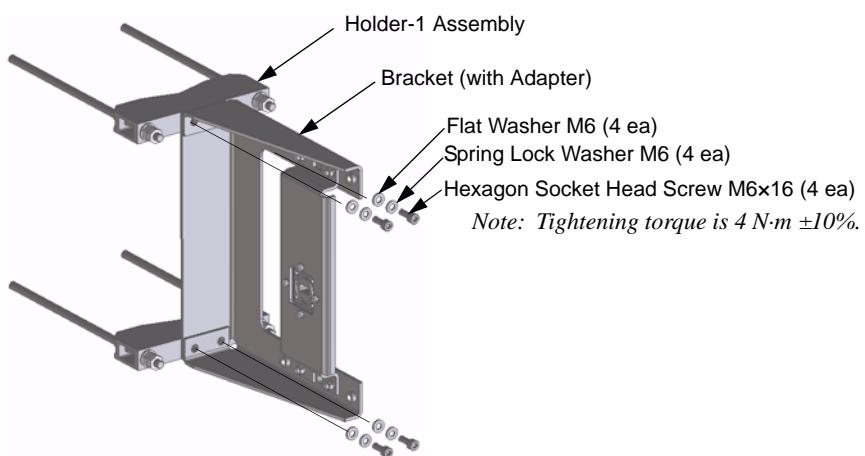
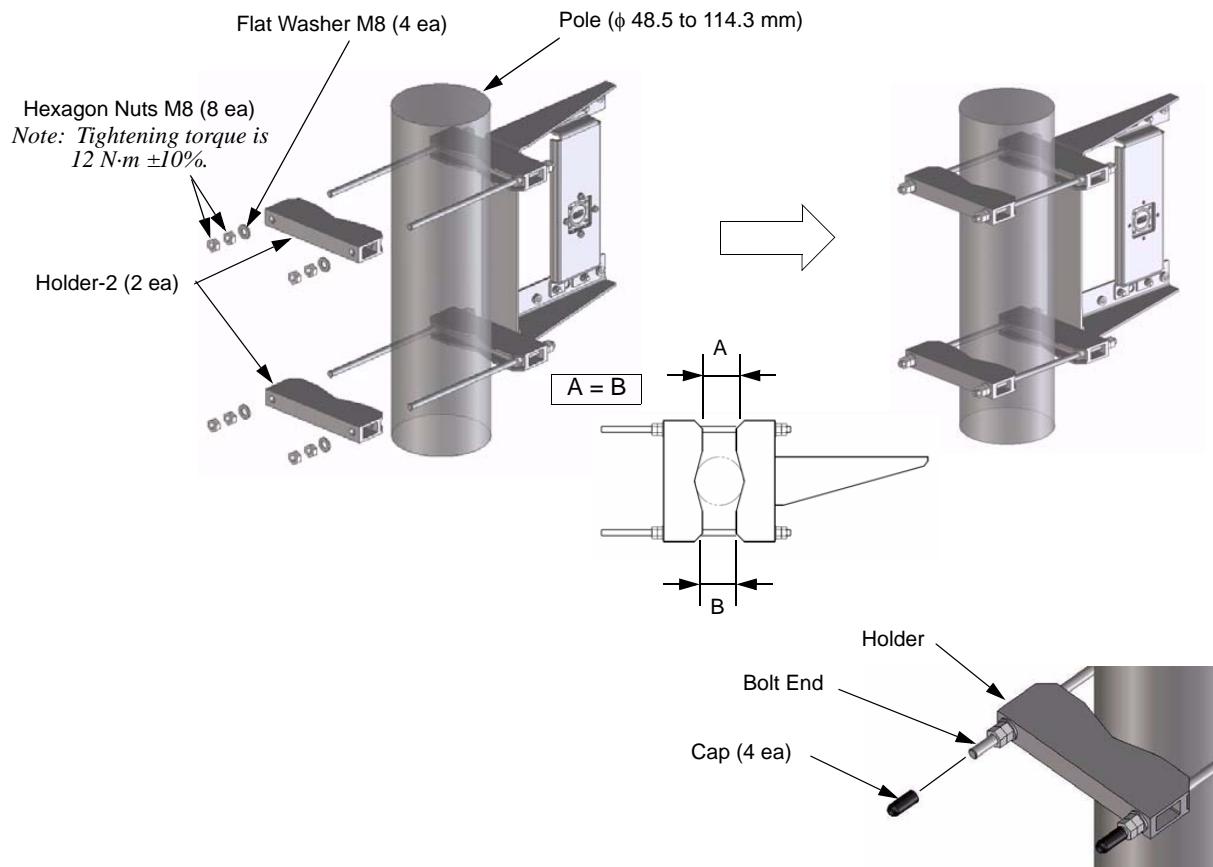
**Assembly of the Bracket**

Chart 2-17 (Cont'd)

Step	Procedure
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- 3 Mount the Bracket to the pole, point to the opposite station and tighten it with four Stud bolts,

#### Installation to the Pole

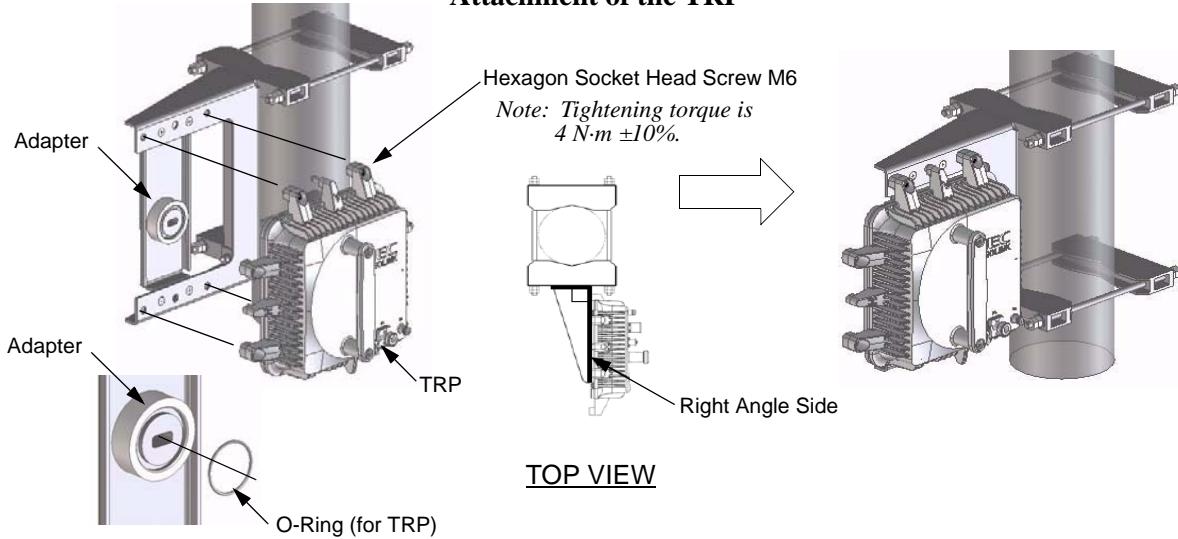


Note: Since a bolt projects from a Holder when a pole diameter is small, please attach the Cap to a bolt end.

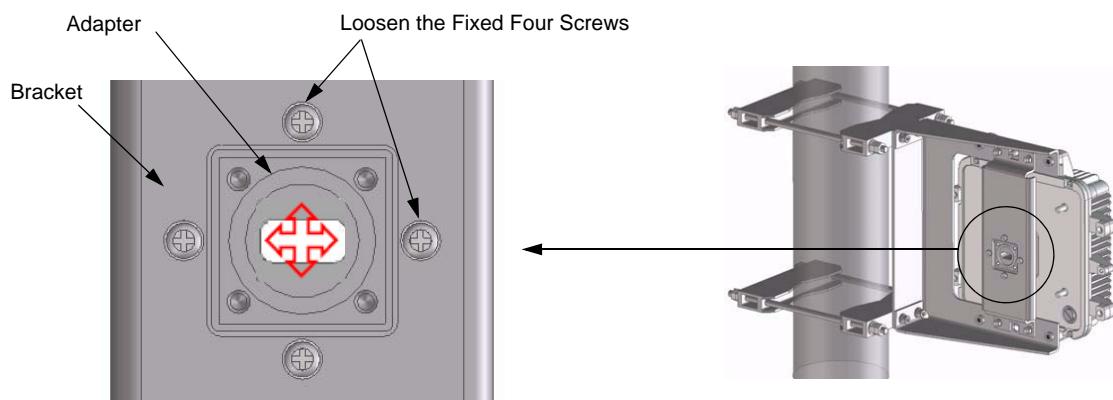
**Chart 2-17 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 4 Mount the TRP on to the Bracket and tighten four bolts (M6) at upper and lower parts of the TRP. Please equip the terminal area of TRP and Adapter with O-ring, and join together after that,

**Attachment of the TRP**

- 5 When the attachment screw of the TRP is hard, please loosen the fixed four screw of adapter once,



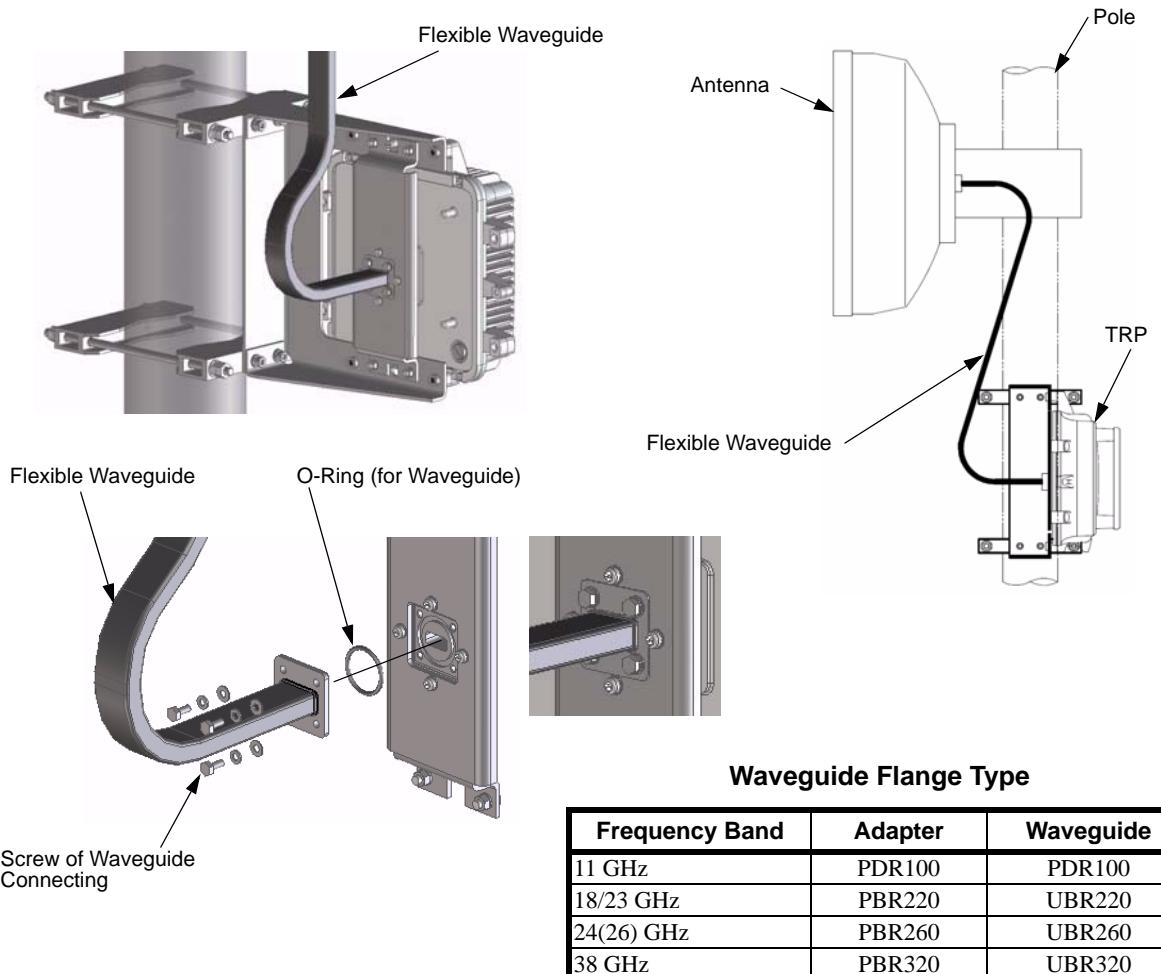
- 6 Please adjust the position of adapter to compensate for attachment of TRP. Then tighten four bolts (M6) of the TRP,

**Chart 2-17 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

7 Connect the waveguide to the adapter of the mounting bracket,

**Example      Connection of the Waveguide**



8 Install the waveguide between the antenna and the TRP.

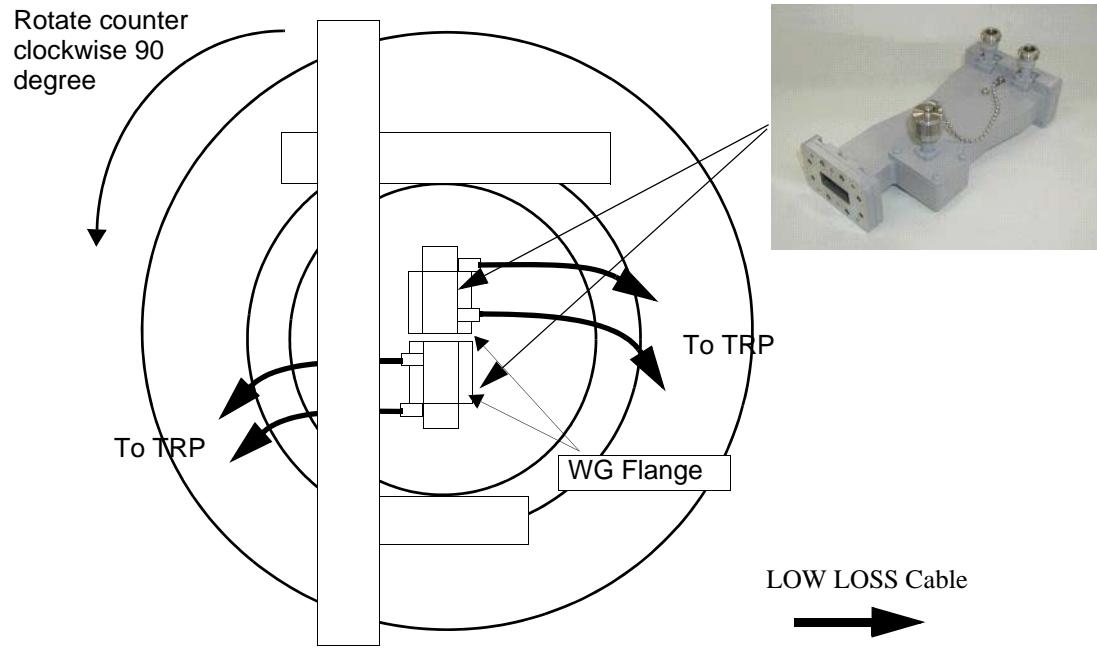
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**Chart 2-18 Hybrid combiner installation for dual Polarized antenna**

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Step	Procedure
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When you attach two Hybrids to one Dual pol. antenna, rotate the antenna 90 degree counter clockwise, as shown below, to avoid hitting the hybrids to the antenna pole and its structures if necessary.

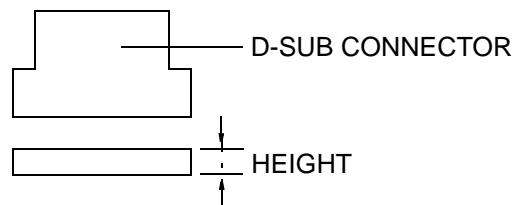


## 2.7 Cable Termination

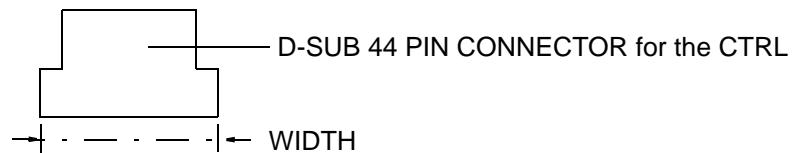
In this section, list of tools and material and the method for cable termination method are described. The following cables are described for reference.

- D-sub connector (refer to Chart 2-19)\*
- TNC-P connector of the L angle type for MDP (refer to Chart 2-20)\*\*
- N-P connector of the L angle type for TRP (KOMINE made) (refer to Chart 2-21)\*\*
- N-P connector of the L angle type for TRP (HIROSE made) (refer to Chart 2-22)\*\*
- N-P connector of the straight type for TRP (HIROSE made) (refer to Chart 2-23)\*\*
- N-P connector of the straight type for TRP (KOMINE made) (refer to Chart 2-24)\*\*
- Molex 5557-04R connector (refer to Chart 2-25)
- BNC connector soldering type (refer to Chart 2-26)
- BNC connector crimping type (refer to Chart 2-27)
- D-Sub High Density Crimp Contacts assembly (refer to Chart 2-28)\*

*Notes:* 1. \*Use D-sub connectors of less than 16 mm in height as illustrated below.



2. \*Use D-sub 44-pins connector for the CTRL of less than 57 mm in width as illustrated below.



3. \*\*In 1+1 system, the difference between the No.1 channel IF cable length and the No.2 channel IF cable length should be within 100m. (differential absolute delay time: within 500 ns).

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

The tools and materials summarized in Table 2-5 are necessary.

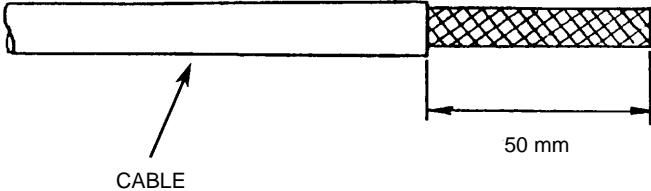
**Table 2-5 Tools and Material List**

No.	NAME	REMARKS	
1	Soldering Iron		
2	Solder		
3	Knife		
4	Measure/Ruler		
5	Wire Stripper		
6	Adjustable Wrench		
7	Hand Crimping Tool	CL250-0012-2/ CL250-0013-5	For D-Sub connector
		57026-5000/ 57027-5000	For Molex connector
		09 99 000 0596/ 09 99 000 0513	For D-Sub High density connector

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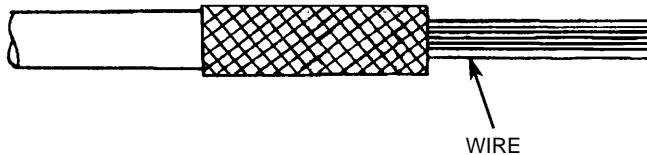
**Chart 2-19 Terminating Supervisory Cables with D-Sub Connector**

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Step	Procedure
1	<p>Strip back the cable sheath, taking care not to damage the braided shield.</p>  <p style="text-align: center;">CABLE</p> <p style="text-align: right;">50 mm</p>

*Note: Use shielded cables which are connected to the D-Sub connector to suppress interference from affecting the signal and to reduce electromagnetic radiation which may interfere with other signal cables.*

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

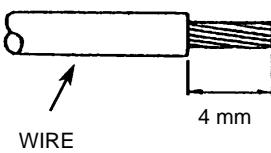


- 3 Remove 4 mm of insulation from the end of the wire.

**CONFORMABLE  
WIRE SOCKET CONTACT**

AWG#20-24: CD-PC-111

AWG#24-28: CD-PC-121



**Chart 2-19 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 4 Insert the cable into the socket contact.



- 5 The cable should be fitted so that insulation and bare wire are arranged as shown.

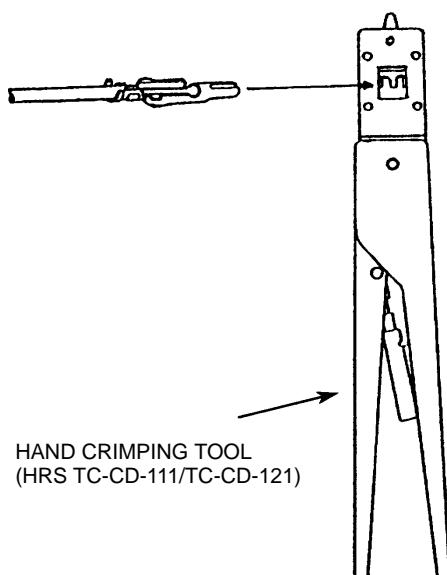


- 6 Insert the socket contact into the hand crimping tool.

CONFORMING  
WIRE SOCKET CONTACT

AWG#20-24: TC-CD-111

AWG#24-28: TC-CD-121

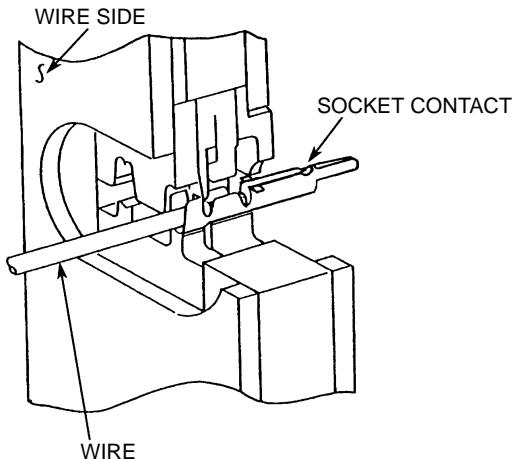


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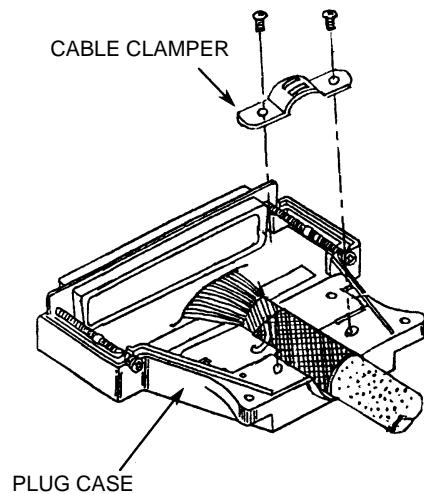
**Chart 2-19 (Cont'd)**

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Step	Procedure
7	Recheck that the wire position is as shown in step 5 before crimping the socket contact (see illustration below).
8	Wind the metallic shield tape over the braided shield.



8	Wind the metallic shield tape over the braided shield.
9	Set the cable into the plug case as shown in figure below. Then, fix the cable using the cable clamper and two screws.

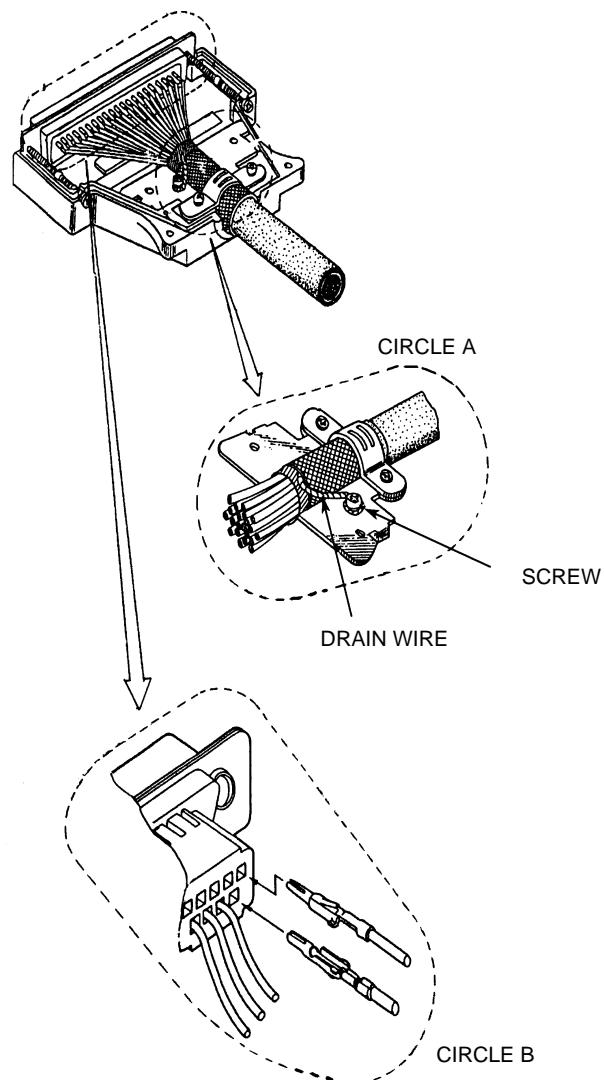


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**Chart 2-19 (Cont'd)**

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<b>Step</b>	<b>Procedure</b>
10	Referring to circle A, fix the drain wire with screw.
11	Referring to circle B, insert each wire to the specified position (Refer Interface Terminals and Jacks for MDP in Section II OPERATING EQUIPMENT.). Insert the socket contacts into the upper and lower row positions while taking care that the socket contacts are inserted the right way.



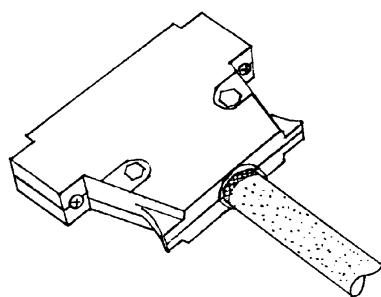
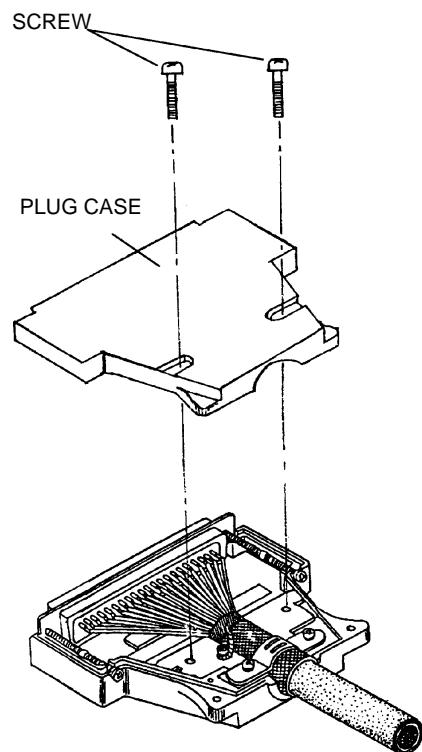
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**Chart 2-19 (Cont'd)**

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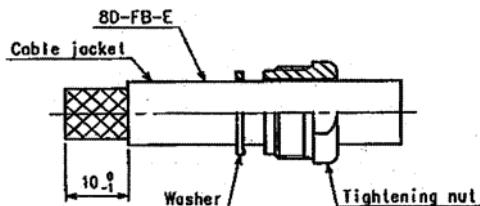
<b>Step</b>	<b>Procedure</b>
12	Fix the plug case with two screws, as shown in the figure.

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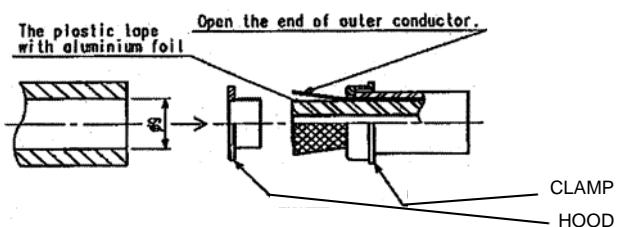
**Chart 2-20 Terminating IF Coaxial Cable with TNC-P Connector (L Angle Type) (HIROSE made) used for MDP IF IN/OUT**

Step	Procedure
<i>Note: It is recommended that TNC (Male) L-angle connector for the 8D-FB IF cable is used to connect it to the MDP. 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.</i>	
1	<p>Pass the tightening nut, the washer and the gasket on the cable in the order shown in the figure. Then, strip the cable jacket in the diameter shown in the figure. [Applicable cable: 8D-FB-E]</p>
<i>Notes:</i>	
<ol style="list-style-type: none"> <li>1. Be careful of insertion direction for the gasket and the tightening nut.</li> <li>2. Be careful not to damage the outer conductor.</li> <li>3. Do not reuse the gasket because the clamp deforms it after tightening.</li> </ol>	



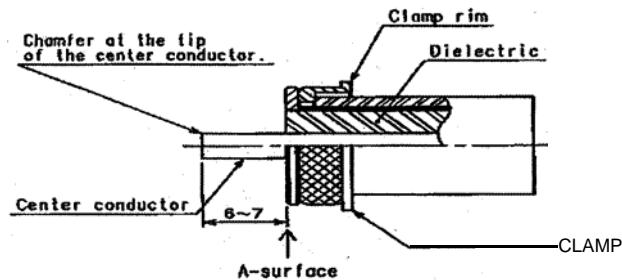
- 2 Insert the clamp to clamp the stripped cable jacket end. Open the end of the outer conductor a little,
- 3 Insert the hood between the plastic tape with aluminium foil and the outer conductor,

*Note: Use the insertion stick to open the hole of about  $\phi 9$ . No gap is allowed in between the clamp, the outer conductor and the hood.*



**Chart 2-20 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
4	After inserting the hood, cut off the plastic tape with aluminium foil and the dielectric at A-surface,
5	Cut off the part of the outer conductor exceeding the clamp rim with a knife,
6	Check that distance between the tip of the center conductor and A-surface is 6 to 7 mm,  If it is more than 7 mm, cut the center conductor to correct length,
<p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1. Be careful not to damage the center conductor;</li> <li>2. Chamfer at the tip of the center conductor;</li> <li>3. There shall be no evidence of deviation or deformation or burr at the tip of the center conductor.</li> </ol>	

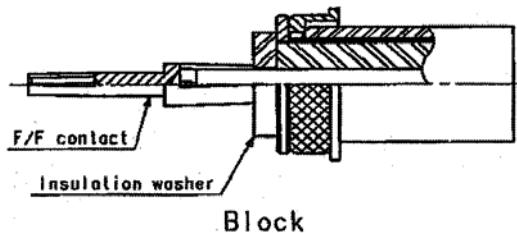


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Chart 2-20 (Cont'd)

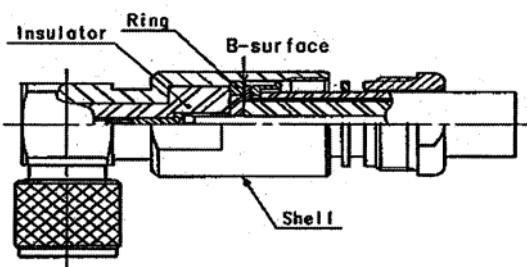
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Step	Procedure
7	Insert the insulation washer over the center conductor, and engage it with the F/F contact,  <i>Notes:</i> 1. No gap is allowed in between the F/F contact, the insulation washer, and the dielectric. 2. The assembly unit after the completion of this process is called "block".



- 8      Combine the convex part of the clamp to the concave part of the gasket. Then insert this block to the shell,

*Note: Insert the hood until it hits the B-surface.*

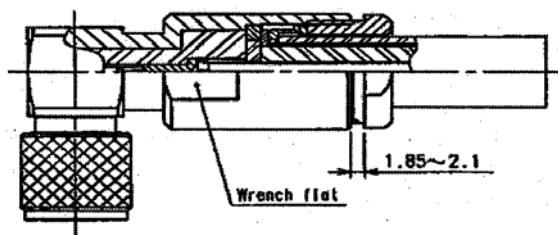


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Chart 2-20 (Cont'd)

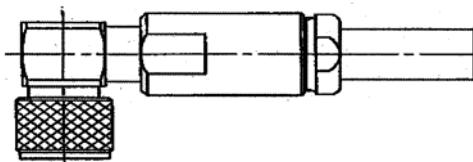
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Step	Procedure
9	<p>Tighten the tightening nut sufficiently until the gasket is cut by the clamp and the tip of the clamp hits the washer,</p> <p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1. <i>Torque for the tightening nut shall be 8 to 30 N•m.</i></li> <li>2. <i>When tightening the nut, tighten with wrench at the wrench flat.</i></li> <li>3. <i>Distance between the tightening nut and the LP shell is 1.85 to 2.1 mm for reference.</i> <i>Tighten the nut sufficiently.</i></li> </ol>



L-type dimension and cutting length of the cable.

Specified length L: Cutting length L-25.



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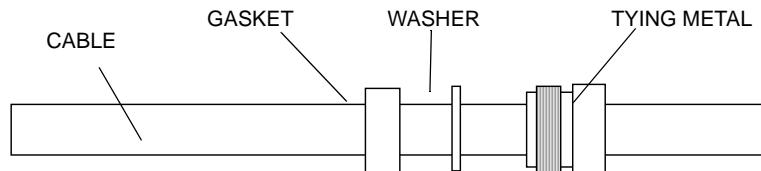
**Chart 2-21 Terminating Coaxial (IF Signal) with N-P Connector (L Angle Type) used for TRP IF IN/OUT (KOMINE made)**

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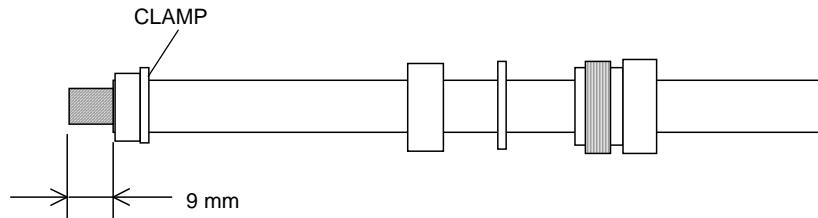
Step	Procedure
------	-----------

*Note: It is recommended that TNC (Male) L-angle connector for the 8D-FB IF cable is used to connect it to the MDP. 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.*

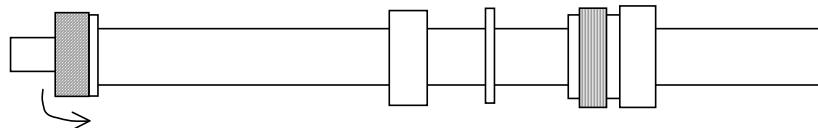
- 1 First fit the tying metal, washer and gasket on the cable.



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

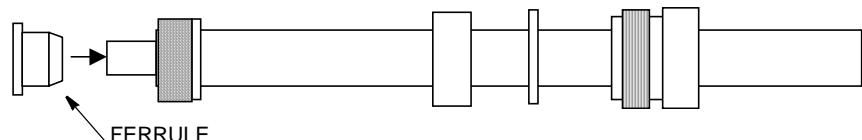


- 3 Fold back the braided shield (separating the strands of the braid) and trim it.



*Note: Pay attention not to damage the plait.*

- 4 Insert the ferrule.



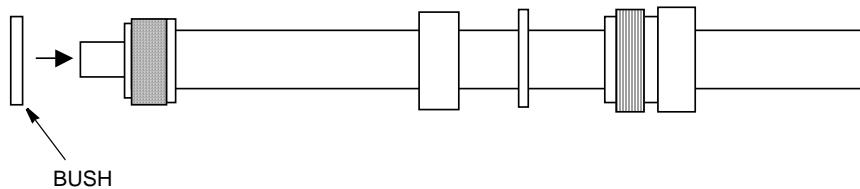
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**Chart 2-21 (Cont'd)**

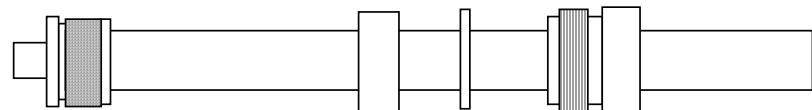
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<b>Step</b>	<b>Procedure</b>
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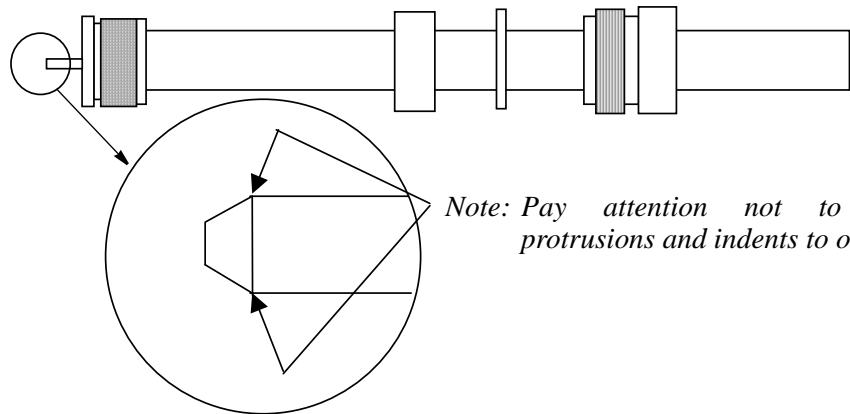
- 5 Fit the bushing.



- 6 Cut the aluminium foil and inner insulator away along the bushing and retain the inner conductor.



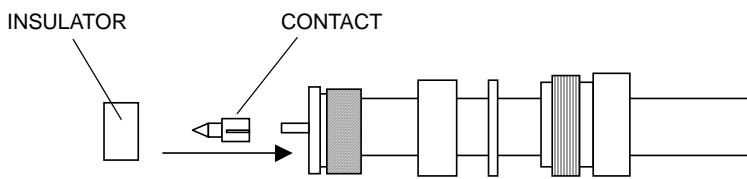
- 7 Taper the edge of the center conductor using a file as shown in the enlarged view below.

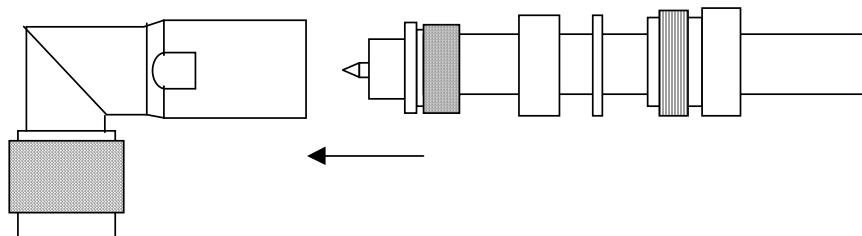


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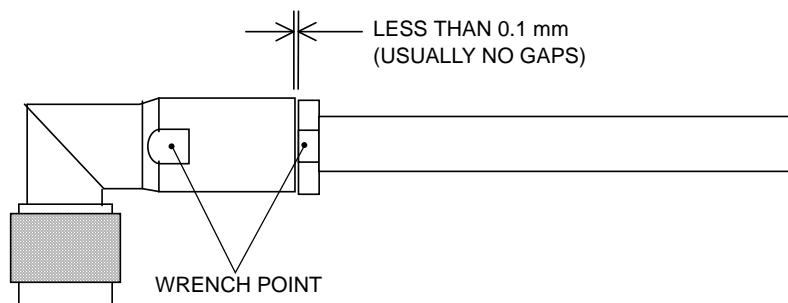
Chart 2-21 (Cont'd)

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Step	Procedure
8	Mount the contact onto the center conductor and mount the insulator onto the contact.
	
9	Insert the cable into the shell.

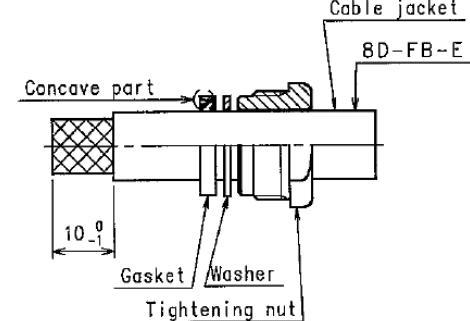


- 10 Tighten the tying metal by wrench using the wrench points.  
(Tighten with torque of 4 to 10 N·m)



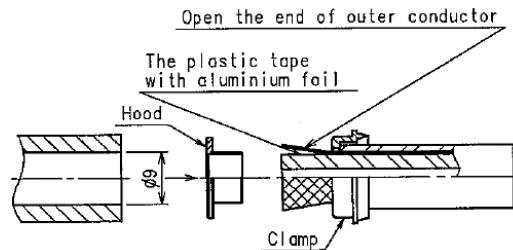
**Chart 2-22 Terminating IF Coaxial Cable with N-P Connector (L Angle Type) used for the TRP IF IN/OUT (HIROSE made)**

Step	Procedure
<i>Note: It is recommended that TNC (Male) L-angle connector for the 8D-FB IF cable is used to connect it to the MDP. 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.</i>	
1	<p>Pass the tightening nut, the washer and the gasket on the cable in the order shown in the figure. Then, strip the cable jacket in the diameter shown in the figure. [Applicable cable: 8D-FB-E]</p> <p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1. Be careful of insertion direction for the gasket and the tightening nut.</li> <li>2. Be careful not to damage the outer conductor.</li> <li>3. Do not reuse the gasket because the clamp deforms it after tightening.</li> </ol>



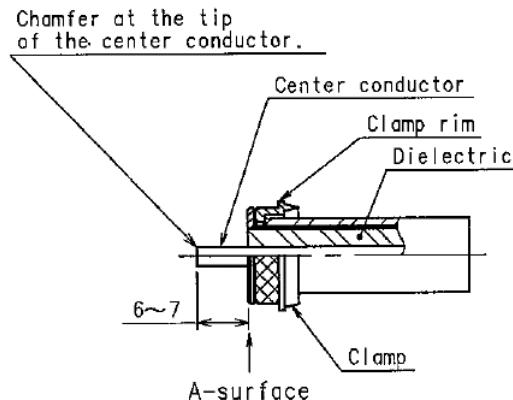
- 2 Insert the clamp to clamp the stripped cable jacket end. Open the end of the outer conductor a little,
- 3 Insert the hood between the plastic tape with aluminium foil and the outer conductor,

*Note: Use the insertion stick to open the hole of about φ9. No gap is allowed in between the clamp, the outer conductor and the hood.*



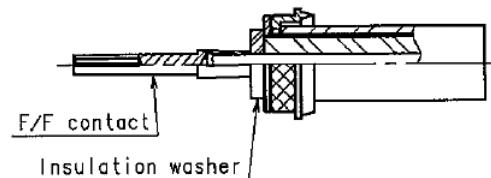
**Chart 2-22 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
4	After inserting the hood, cut off the plastic tape with aluminium foil and the dielectric at A-surface,
5	Cut off the part of the outer conductor exceeding the clamp rim with a knife,
6	Check that distance between the tip of the center conductor and A-surface is 6 to 7 mm,  If it is more than 7 mm, cut the center conductor to correct length,
<p><i>Notes:</i> 1. Be careful not to damage the center conductor;</p> <p>2. Chamfer at the tip of the center conductor;</p> <p>3. There shall be no evidence of deviation or deformation or burr at the tip of the center conductor.</p>	



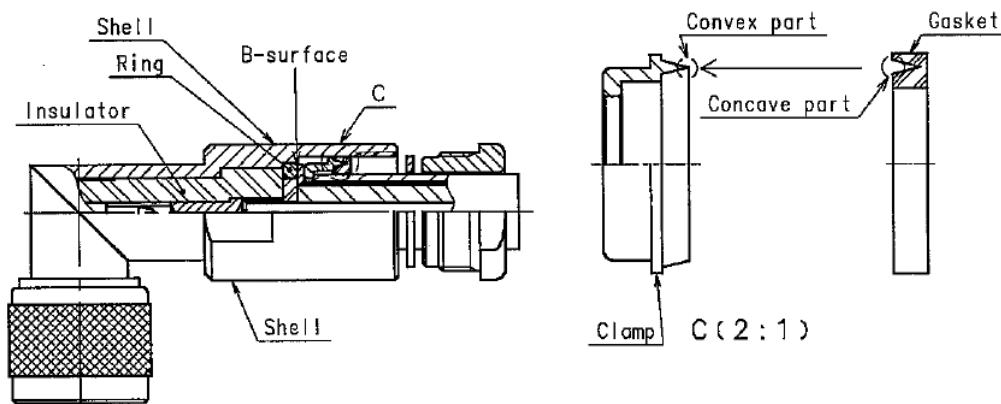
**Chart 2-22 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
7	Insert the insulation washer over the center conductor, and engage it with the F/F contact,  <i>Notes:</i> 1. No gap is allowed in between the F/F contact, the insulation washer, and the dielectric.  2. The assembly unit after the completion of this process is called "block".

**Block**

- 8      Combine the convex part of the clamp to the concave part of the gasket, Then insert this block to the shell,

*Note: Insert the hood until it hits the B-surface.*

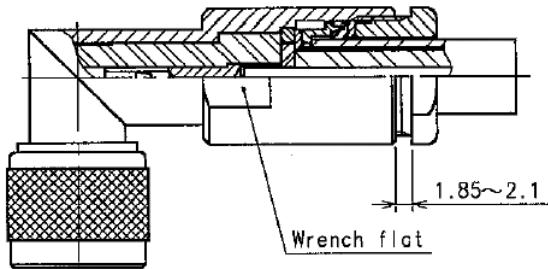


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Chart 2-22 (Cont'd)

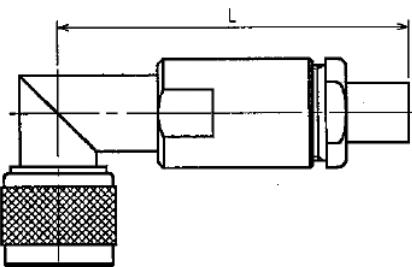
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Step	Procedure
9	<p>Tighten the tightening nut sufficiently until the gasket is cut by the clamp and the tip of the clamp hits the washer,</p> <p><i>Notes:</i></p> <ol style="list-style-type: none"> <li>1. <i>Torque for the tightening nut shall be 8 to 30 N·m.</i></li> <li>2. <i>When tightening the nut, tighten with wrench at the wrench flat.</i></li> <li>3. <i>Distance between the tightening nut and the LP shell is 1.85 to 2.1 mm for reference.</i> <i>Tighten the nut sufficiently.</i></li> </ol>



L-type dimension and cutting length of the cable.

Specified length L: Cutting length L-25.



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**Chart 2-23 Terminating IF Coaxial Cable  
with N-P Connector (Straight Type) used for  
TRP IF IN/OUT (HIROSE made)**

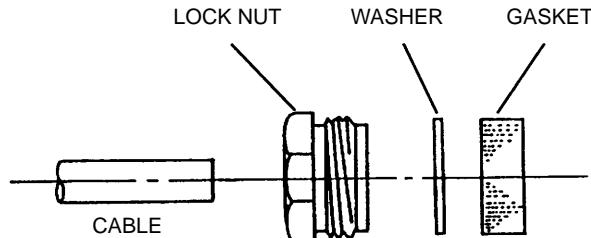
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N-type connector is used for the TRP side.

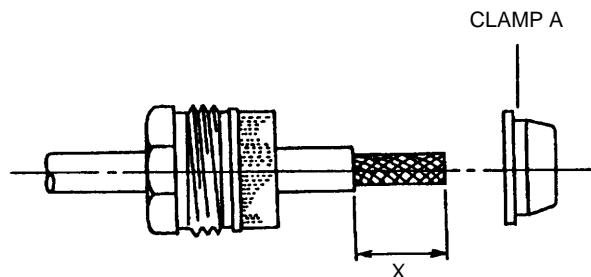
*Note: When the N (Male) straight connector is attached to the IF coaxial cable for the MDP IF IN/OUT, use of the TNC (Male) - N (Female) (NJ-TNCP-LA) L-angle adapter is needed.*

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

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



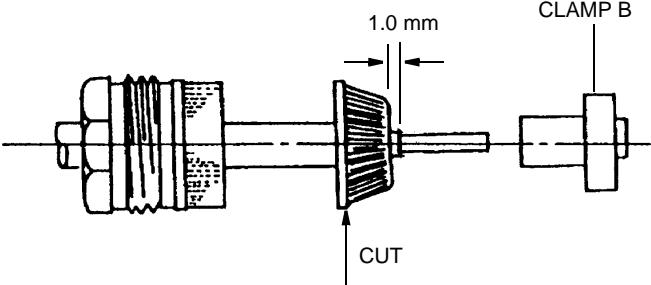
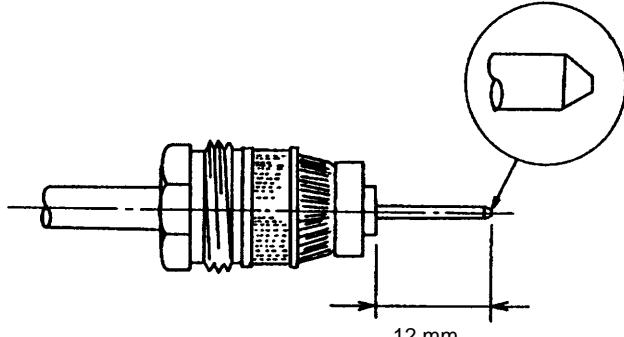
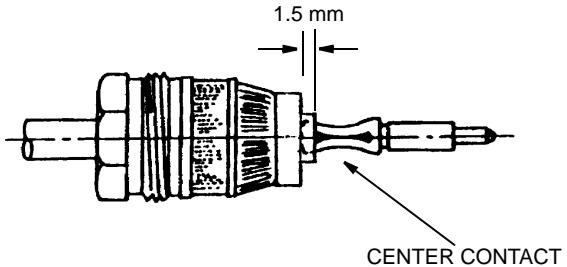
- 2 Strip back the cable sheath, taking care not to damage the braided shield, and fit clamp A.



CONNECTOR	CABLE	X
N260	5D-FB	25 mm
N227	8D-FB	25 mm
N228	10D-FB	27 mm
N229	12D-FB	27 mm

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

**Chart 2-23 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
4	Cut away the insulation from the center conductor and fit clamp B. Be sure not to cut or scratch the conductor while stripping the insulation.
	
5	Cut the center conductor. Taper the end of the center conductor using a file as shown in the enlarged view below.
	
6	Mount the center contact onto the center conductor as shown. <i>Note: Insert the center contact into insulator (1.5 mm).</i>
	

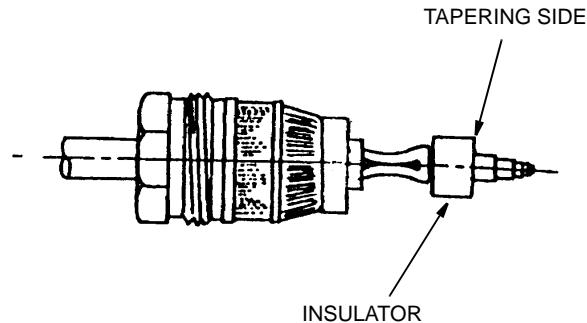
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**Chart 2-23 (Cont'd)**

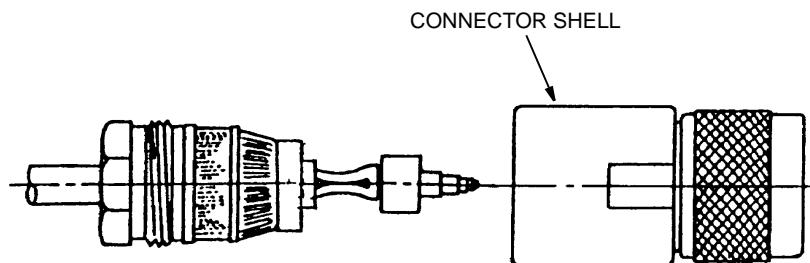
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Step	Procedure
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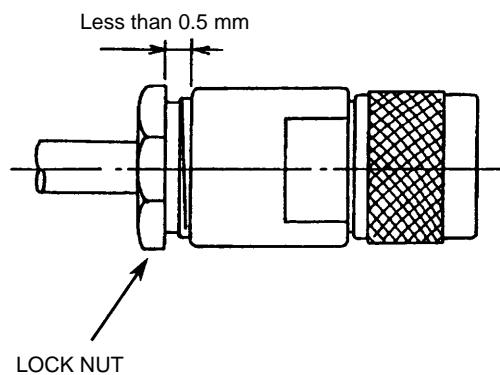
- 7 Mount the insulator onto the center contact.



- 8 Insert the cable into the connector shell.



- 9 Tighten the lock nut.



---

**Chart 2-24 Terminating IF Coaxial Cable  
with N-P Connector (Straight Type) used for  
TRP IF IN/OUT (KOMINE made)**

---

N-type connector is used for the TRP side.

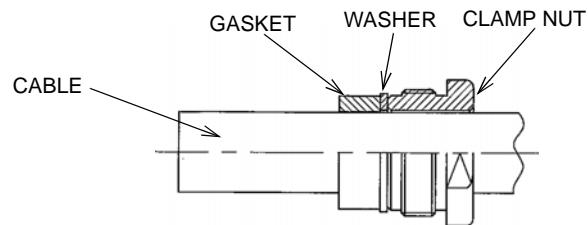
*Note: When the N (Male) straight connector is attached to the IF coaxial cable for the MDP IF IN/OUT, use of the TNC (Male) - N (Female) (NJ-TNCP-LA) L-angle adapter is needed.*

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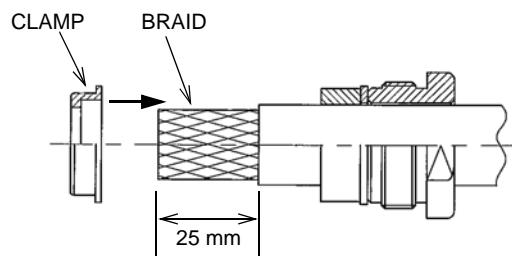
Step	Procedure
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- 1 The clamp nut, the washer and the gasket are inserted in the cable,

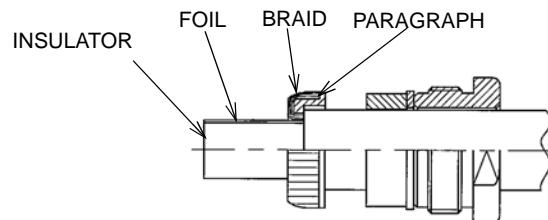


- 2 Strip the cable as below and disentangle the braid and insert the clamp in the cable,



*Do not scratch the braid wire.*

- 3 Turn the braid on the clamp inserted and cut the braid according to the paragraph,



## Chart 2-24 (Cont'd)

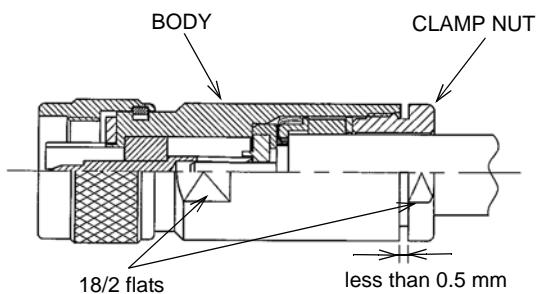
Step	Procedure
4	Cut the cable-insulator according to the surface that is turned the braid and insert the ferrule,
	<p>FERRULE</p> <p>The surface that is turned the braid.</p> <p>CENTER CONDUCTOR</p> <p><i>Do not scratch the center conductor.</i></p>
5	Insert the insulator,
	<p>INSULATOR</p> <p>CENTER CONTACT</p>
6	Cut the center-conductor as following size. Process the tip of center-conductor like a taper with a file. ( <i>Do not have a curve and burr.</i> ) Insert the center-contact in the center-conductor and insert the insulator in the center-contact,
	<p>INSULATOR</p> <p>CENTER CONTACT</p> <p>12 mm</p> <p>Processing chart of the tip of the center-conductor.</p>

---

**Chart 2-24 (Cont'd)**

---

Step	Procedure
7	<p>Connector body is fit to the cable. Fit in the cable end into the body and screw the clamp nut by your hand first and tighten it with a torque wrench.</p> <p>Confirm the space that it is less than 0.5 mm between the body and the cramp nut.</p>



Tightening torque is more than 9.8 N·m (100 kgf·cm)

*Note: Use torque wrench.*

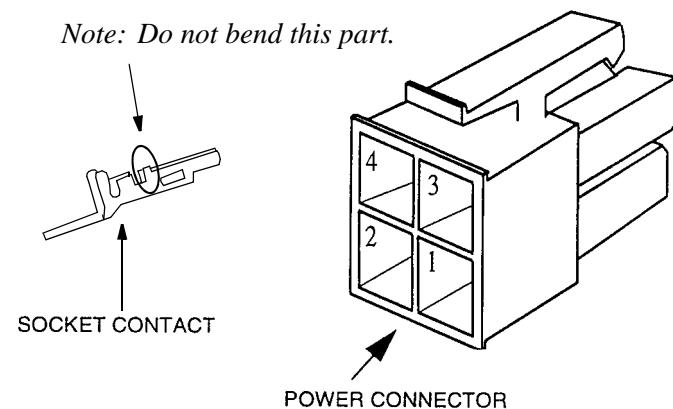
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**Chart 2-25 Terminating Power Supply Cables with  
Molex Connector**

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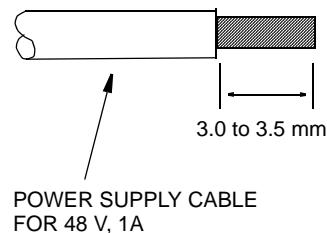
Step	Procedure
------	-----------



- 1 Remove 3.0 to 3.5 mm of insulation.

CABLE

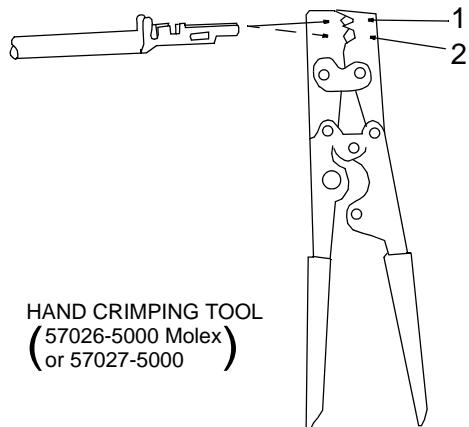
AWG#18-24



**Chart 2-25 (Cont'd)**

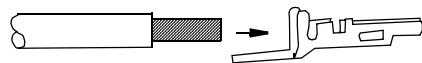
<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 2 Set the socket contact to position 1 or 2 of the hand crimping tool.



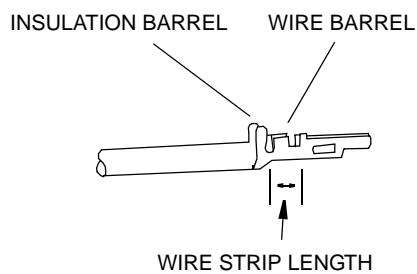
<u>HAND CRIMPING TOOL TYPE</u>	<u>OUTSIDE DIAMETER OF CABLE</u>	<u>SET POSITION</u>
57026-5000	$\phi$ 1.5 to 1.8	1
	$\phi$ 1.8 to 2.2	2
57027-5000	$\phi$ 2.3 to 2.6	1
	$\phi$ 2.6 to 3.1	2

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



- 4 The cable should fit, so insulation and bare wire are arranged as shown.

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



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**Chart 2-25 (Cont'd)**

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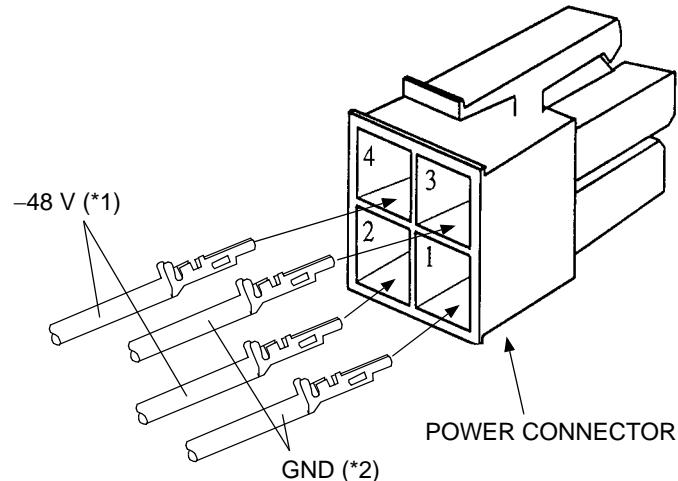
Step	Procedure
------	-----------

- 6 Twist cables for the power supply,



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

- 7 Insert the socket contacts into the power connector until they lock.



*Note: For H3040 DC-DC CONV,*

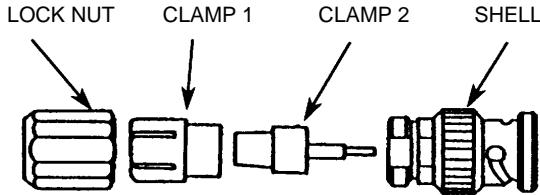
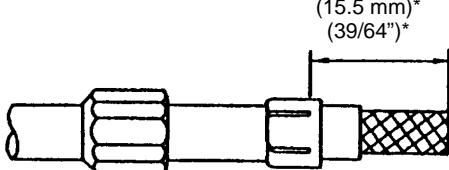
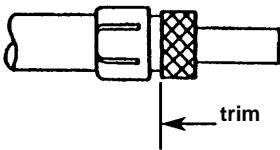
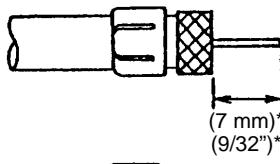
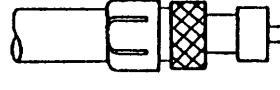
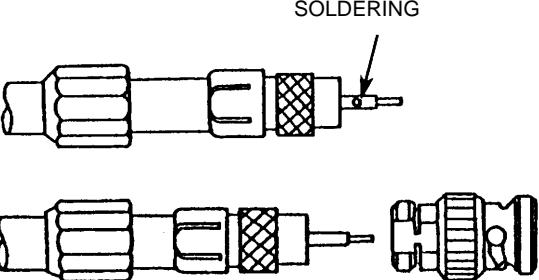
(\*1): -20 to -60 V (or 0 V)

(\*2): 0 V (or +20 to +60V)

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**Chart 2-26 BNC Connector for 3C-2V Coaxial Cable  
Assembling, Solder Type**

---

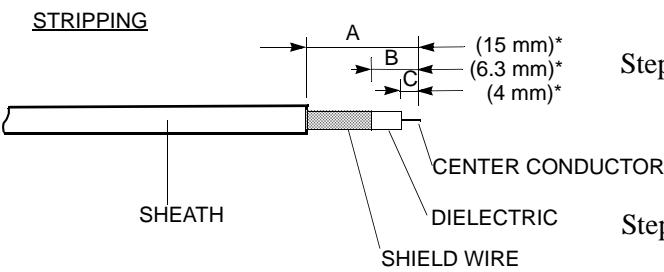
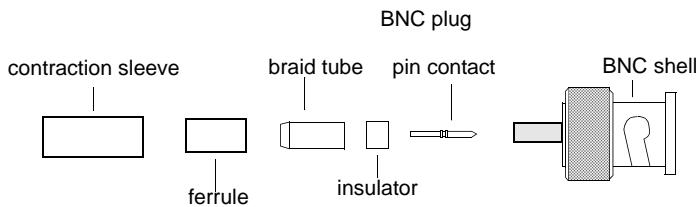
Step	Procedure
<p>The following explains how to assemble BNC solder type as an example.</p>	
	 <p>LOCK NUT      CLAMP 1      CLAMP 2      SHELL</p>
	 <p>(15.5 mm)* (39/64")*</p>
	<p>Step 1. Slide the lock nut onto the cable. Strip the cable sheath, taking care not to damage the braided shield wires, and fit CLAMP 1.</p>
	 <p>trim</p>
	<p>Step 2. Fold back the braided shield wire around the CLAMP 1 (without separating the strands of the braid) and trim it.</p>
	 <p>(7 mm)* (9/32")*</p>
	<p>Step 3. Cut away the insulator from the centre conductor and fit CLAMP 2. (Be sure not to cut or scratch the conductor while stripping the insulation.)</p>
	 <p>Note *:Stripping measurements vary depend on the BNC</p>
	 <p>SOLDERING</p>
	<p>Step 4. Solder the pin contact to center conductor. Use a knife to remove excess solder.</p>
	<p>Step 5. Insert the connectorized cable into the BNC shell and fasten the lock nut with a wrench.</p>

---

**Chart 2-27 BNC Connector for 3C-2V Coaxial Cable  
Assembling, Crimping Type**

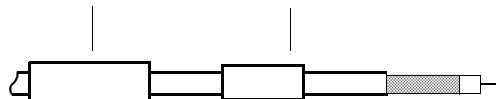
Step	Procedure
------	-----------

The following explains how to assemble BNC crimping type as an example.

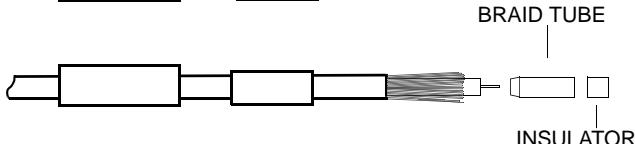


*Note\*: Stripping measurements vary depending on the BNC type.*

CONTRACTION SLEEVE FERRULE



BRAID TUBE



INSULATOR



PIN CONTACT

Step 1. Strip coaxial cable as illustrated left, (taking care not to damage braided shield wire),

Step 2. Cut braided shield wire (without unravel the strands of braid) and trim it,

Step 3. Cut dielectric, (be sure not to cut or scratch the centre conductor while stripping the dielectric),

Step 4. Slide contraction sleeve and ferrule onto the cable,

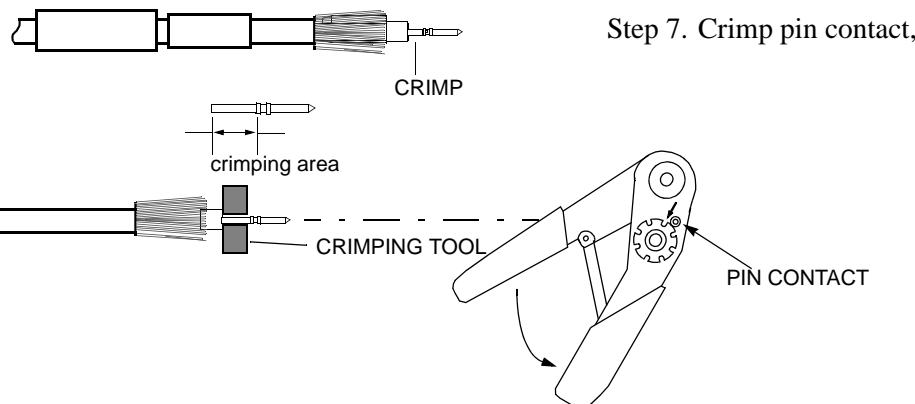
Step 5. Fan braided shield wire,

Step 6. Slide braid tube and insulator among braided shield wire and dielectric,

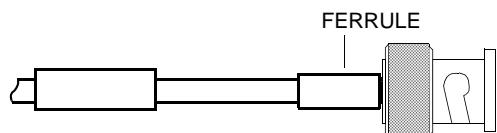
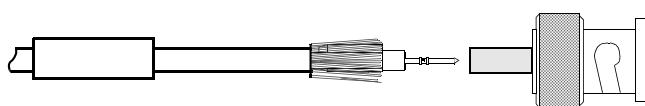
Step 6. Slide pin contact until it bottoms against the centre conductor,

## Chart 2-27 (Cont'd)

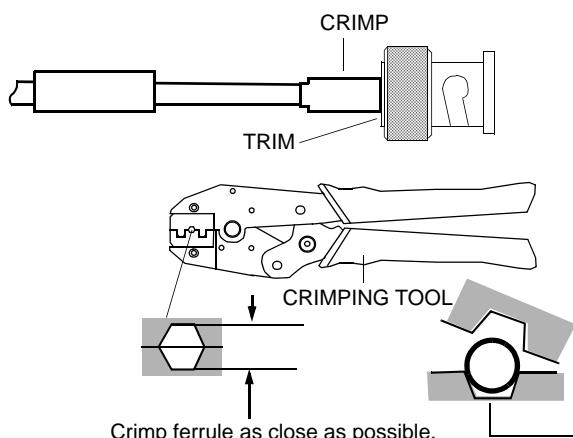
<b>Step</b>	<b>Procedure</b>
-------------	------------------



Step 8. Slide carefully the cable into BNC shell until insulator butts against BNC body,



Step 9. Slide ferrule over shield wire until it bounds against the BNC shell body,



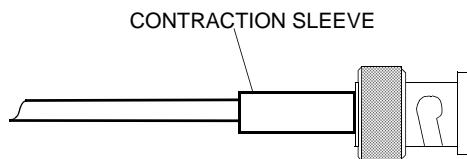
Step 10.Crimp ferrule as close as possible to the BNC shell body and trim the excess of braid,

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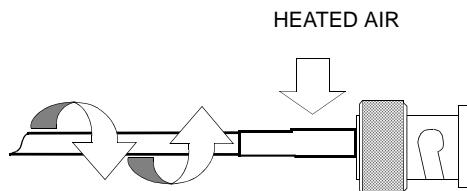
**Chart 2-27 (Cont'd)**

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<b>Step</b>	<b>Procedure</b>
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Step 11. Position contraction sleeve over ferrule and BNC,



Step 12. Heat contraction sleeve until it contracts.

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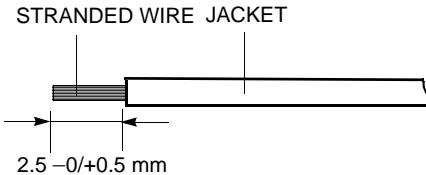
---

**Chart 2-28 D-Sub High Density Crimp Contacts Assembly**

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Step	Procedure
<p>The following explains how to assemble high density crimp contacts used for HARTING hand crimp tool as an example.</p>	

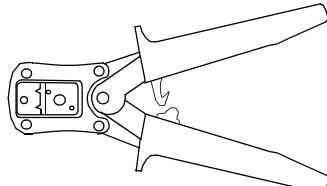
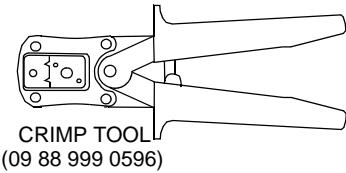
**Crimping/inserting contacts process**



Applicable wire size: 0.14 - 0.22 mm<sup>2</sup> (AWG26 - 24),  
stranded, maximum insulation: Ø1.38 mm

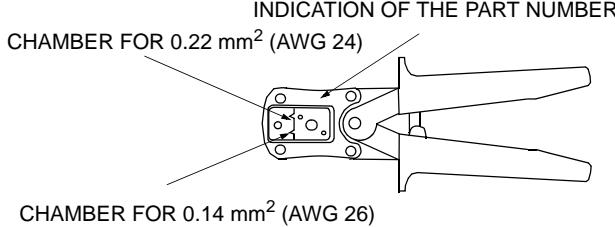
Stamped male contacts: 09 56 000 8175 (Level S4),  
High density male connectors: 09 56 300 5601 (#44)

Step 1. Strip the jacket for 2.5 -0/+0.5 mm as shown left and check if stranded wire is not damaged,



Step 2. Place the handles in the open position as shown left,

*Note: When the handles are in close position, squeeze handles completely until safety ratchet is released.*



Step 3. Select the suitable chamber for the selected wire,

Step 4. Insert contact in the selected chamber,

Step 5. Insert the prepared wire in the contact,

Step 6. Squeeze the handles together completely until the safety ratchet clicks to open,

Step 7. Take out the crimped contacts from the chamber. Check if it should not be scratched or transformed.

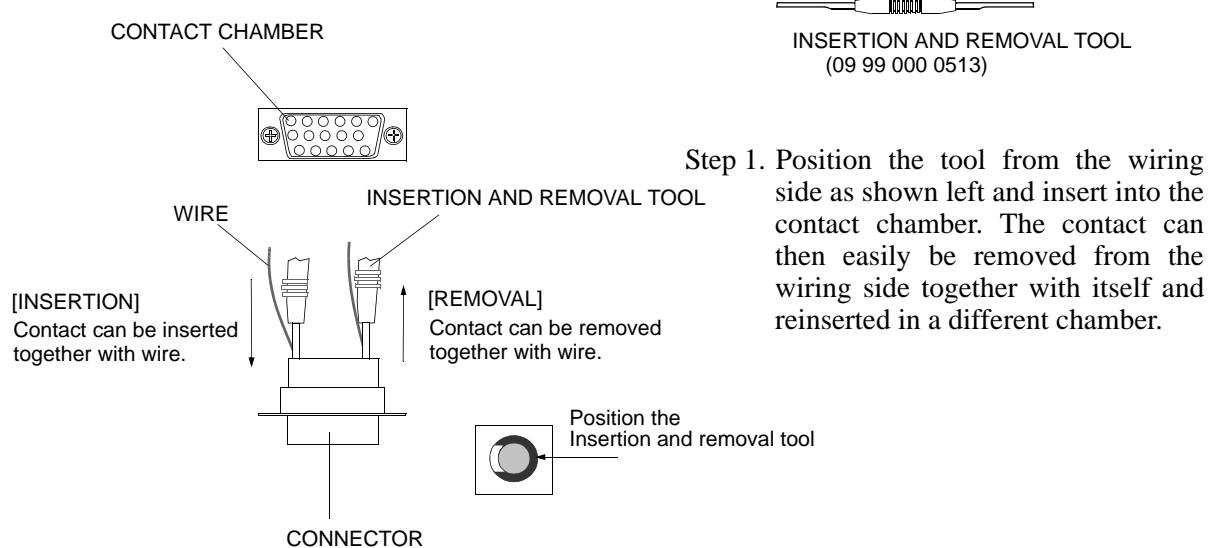
**Chart 2-28 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

Step 8. After crimping the stranded wire to the contact using a hand tool, insert the contact into the contact chamber with the tool, working from the wiring side,

Step 9. You can here the contacts snap home, audible "click",

Step 10. Check if they are securely in place with giving the wire a gentle pull.

**Removing crimp contacts**

## 2.8 Wiring and Forming

**Chart 2-29 Wiring and Forming**

Step	Procedure
1	<p>Connect cables for, signal interface, power supply, IF IN/OUT and ground to the proper connector of the MDP.</p> <ul style="list-style-type: none"> <li>(1) Connect ground cable to the ground terminal</li> <li>(2) Connect IF cable to IF IN/OUT connector.</li> <li>(3) Connect power supply cable to SELV connector.</li> <li>(4) Connect STM-1, Aux. signal cables to proper connector.</li> <li>(5) Connect XIF coaxial cables to opposite MDP. (XPIC configuration only.)</li> <li>(6) Connect XPIC CTRL cables to opposite MDP. (XPIC configuration only.)</li> </ul>
2	<p><i>Note: When disconnect cables, perform it in revers steps.</i></p> <p>Fix the cables using cable binder to the rack as like as indicated position.</p>

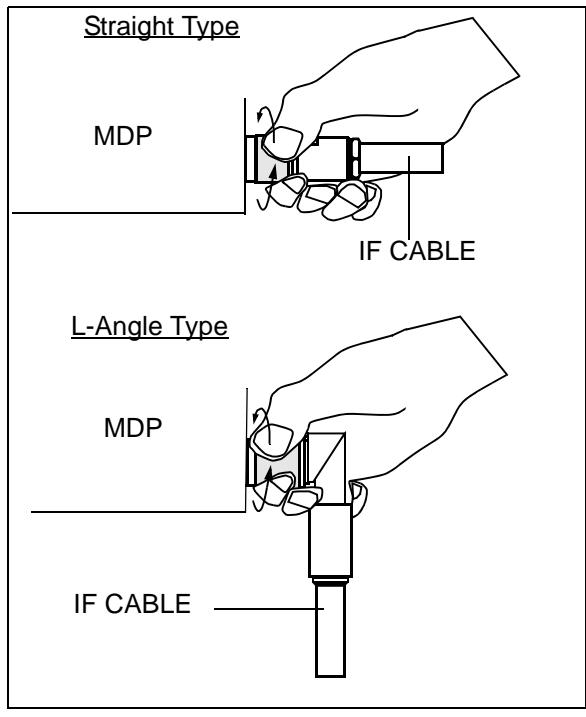
*Notes:* 1. Do not cross the cables on front of indicators and power switch used for maintenance.

2. Take suitable bend radius to wiring the IF cable.  
(5DFB: 45mm or more, 8DFB, 10DFB: 70mm or more)

3. For the IF cable connection, it is recommended to use adapter. (Applicable adapters are listed table below).

**Table 2-6 IF Cable Adapter**

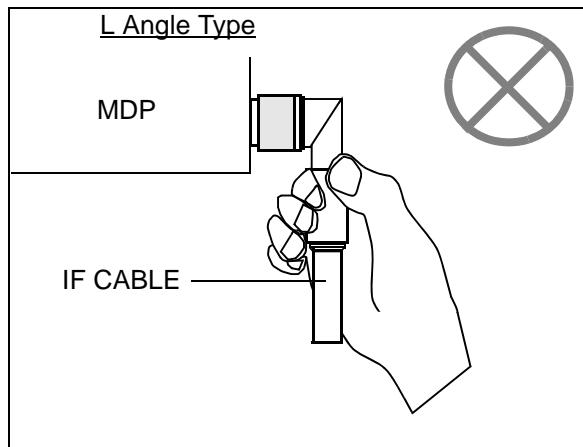
IF Cable	Adapter	
	TNC(P) - N(J)	TNC(P) - TNC(J)
5D-FB	√	
8D-FB	√	√
10D-FB	√	



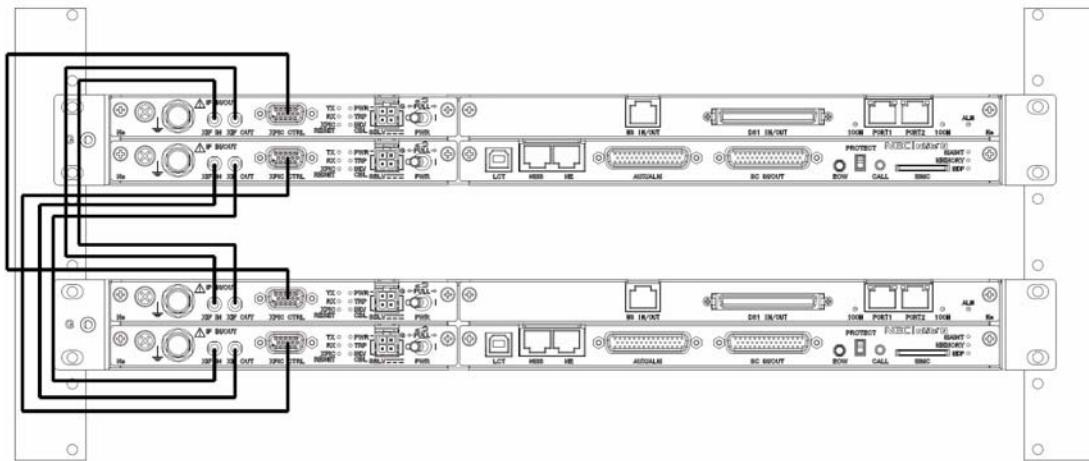
**Caution:** Tighten the TNC-male connector of IF cable to the MDP with engage connector nut only using fingers and holding the cable with another hand.

Tighten the engage connector nut only for the L-angle connector also.

(Tightening Torque: 0.3 to 0.5 N·m  
(3 to 5kg·cm))



**Caution:** If rotate other parts of the L-angle connector as illustrated left, it can cause connector damage.



- Notes:*
1. Connect XIF cable to between XIF IN (Main Master) and XIF OUT (Sub Master), and XIF OUT (Main Master) and XIF IN (Sub Master).
  2. Connect XPIC CTRL cables to between XPIC CTRL (Main Master) and XPIC CTRL (Sub Master).

**Fig. 2-8 Cable Wiring for the XPICT System**

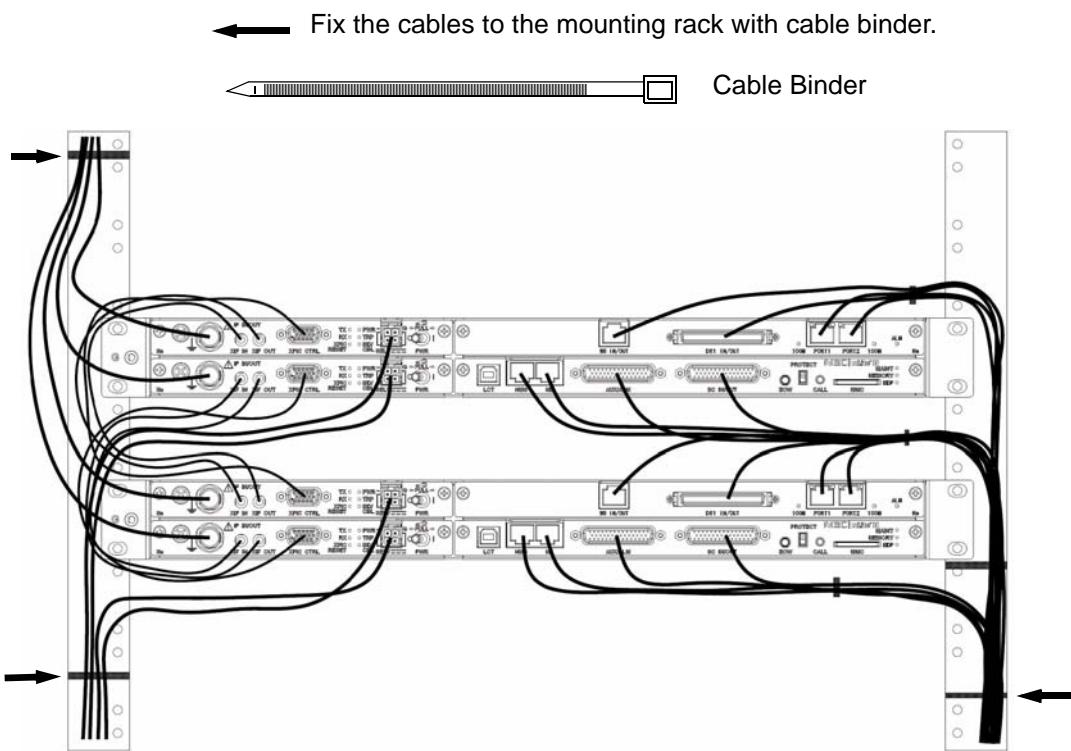


Fig. 2-9 Cable Wiring and Forming

## 2.9 Frame Grounding

In mounting the MDP and TRP, perform frame grounding. The location of the frame grounding in each MDP and TRP is shown in Fig. 2-10, and the connection for frame grounding is shown in Fig. 2-11.

*Note: Connect the Frame Ground (FG) terminal on the MDP to the mounting rack with the earth cable. In addition, connect the mounting rack to the indoor earth terminal with the earth cable and connect the FG terminal on the TRP to the ground (refer to Fig. 2-11).*

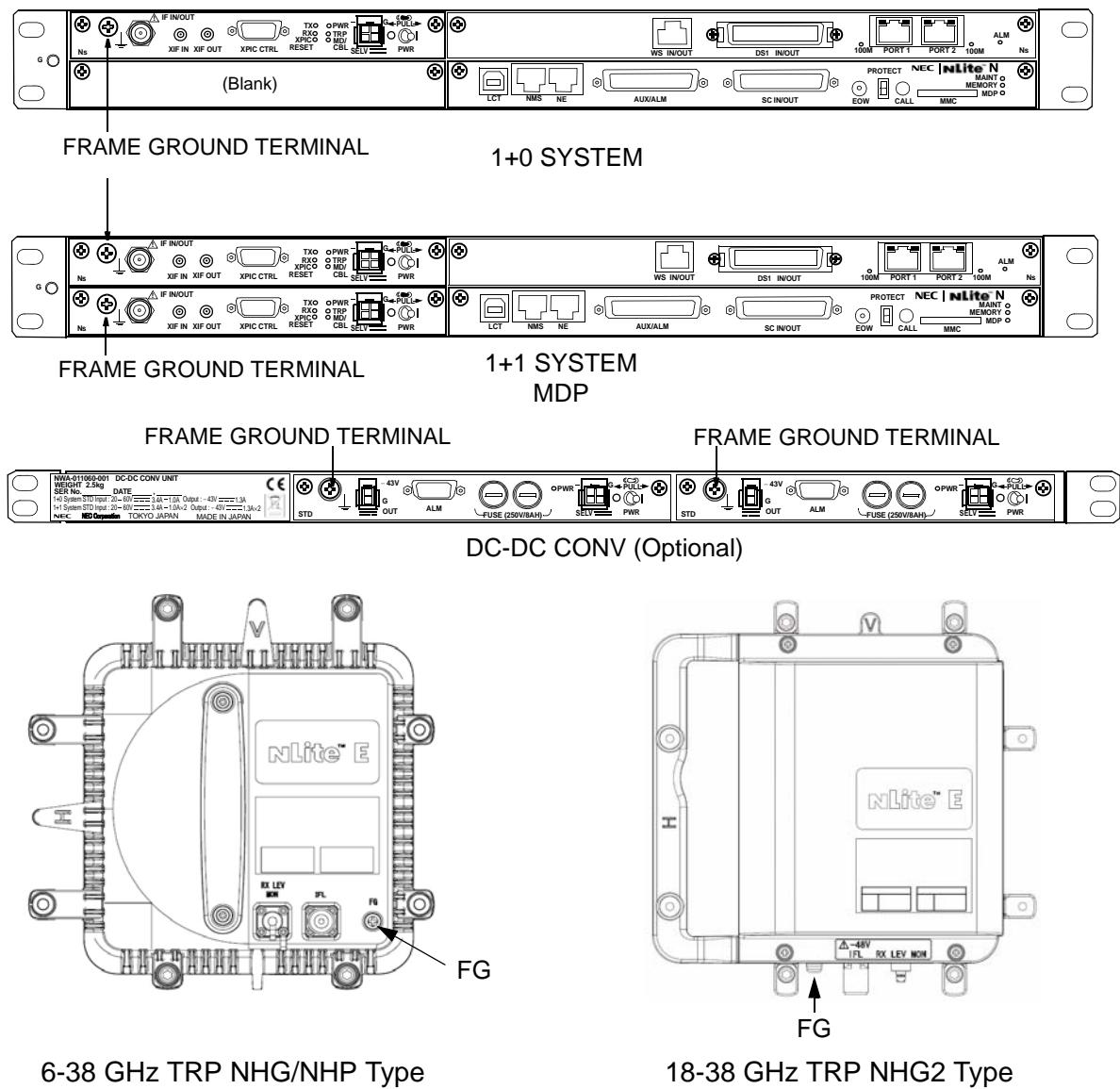
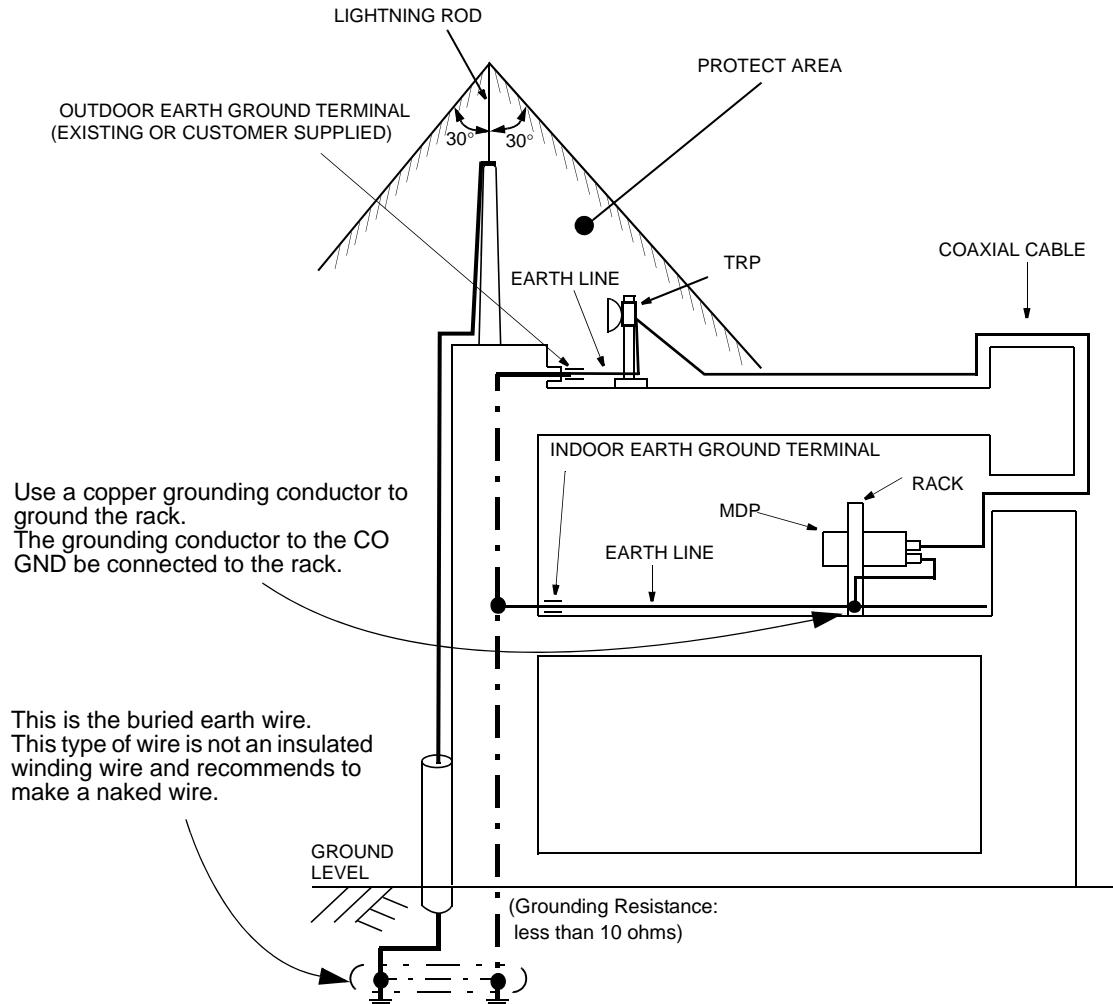


Fig. 2-10 Location of Frame Ground

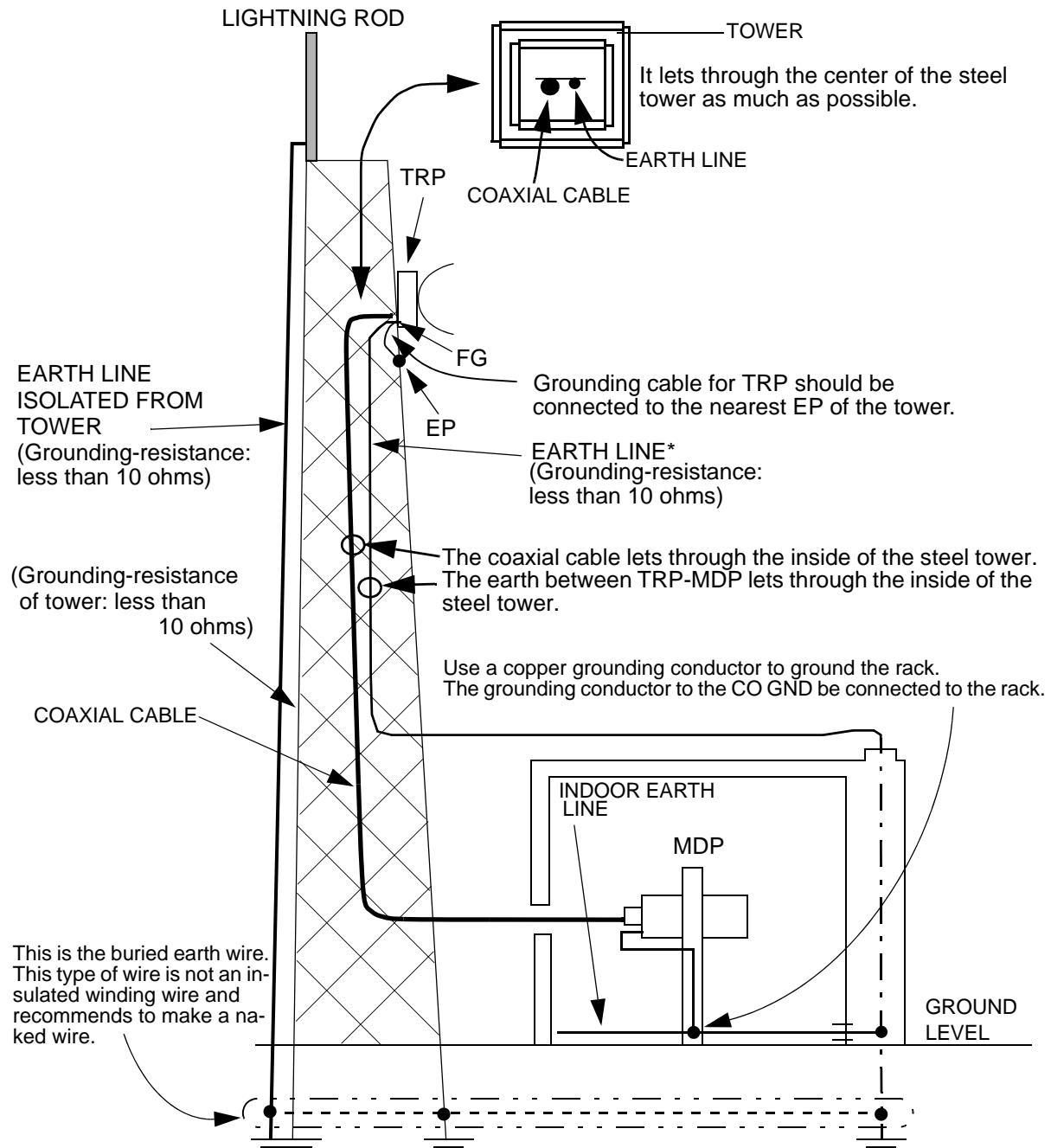


- Cautions:**
1. Install the TRP within the area protected by lightning rod.
  2. To avoid surge currents caused by lightning circulating in the equipment earth system, connect the equipment earth system (frame ground) to ground of the lightning rod at ground level.

*Note: Frame Ground terminal of the MDP (5 mm square cable (means more than 2.5 mm diameter cable (AWG #10) is recommended to apply for the earth grounding. The proper press fix terminal tool shall be used.)*

*This connection is an example.*

**Fig. 2-11 Connection for Frame Grounding (1/2)**



*Notes: \* NEC recommends that frame ground of TRP should be connected to earth line as NEC's standard installation.*

*EP: Earth Ground Point of tower*

*FG: Frame Ground terminal of the MDP (5 mm square cable (means more than 2.5 mm diameter cable (AWG #10) is recommended to apply for the earth grounding. The proper press fit terminal tool shall be used.)*

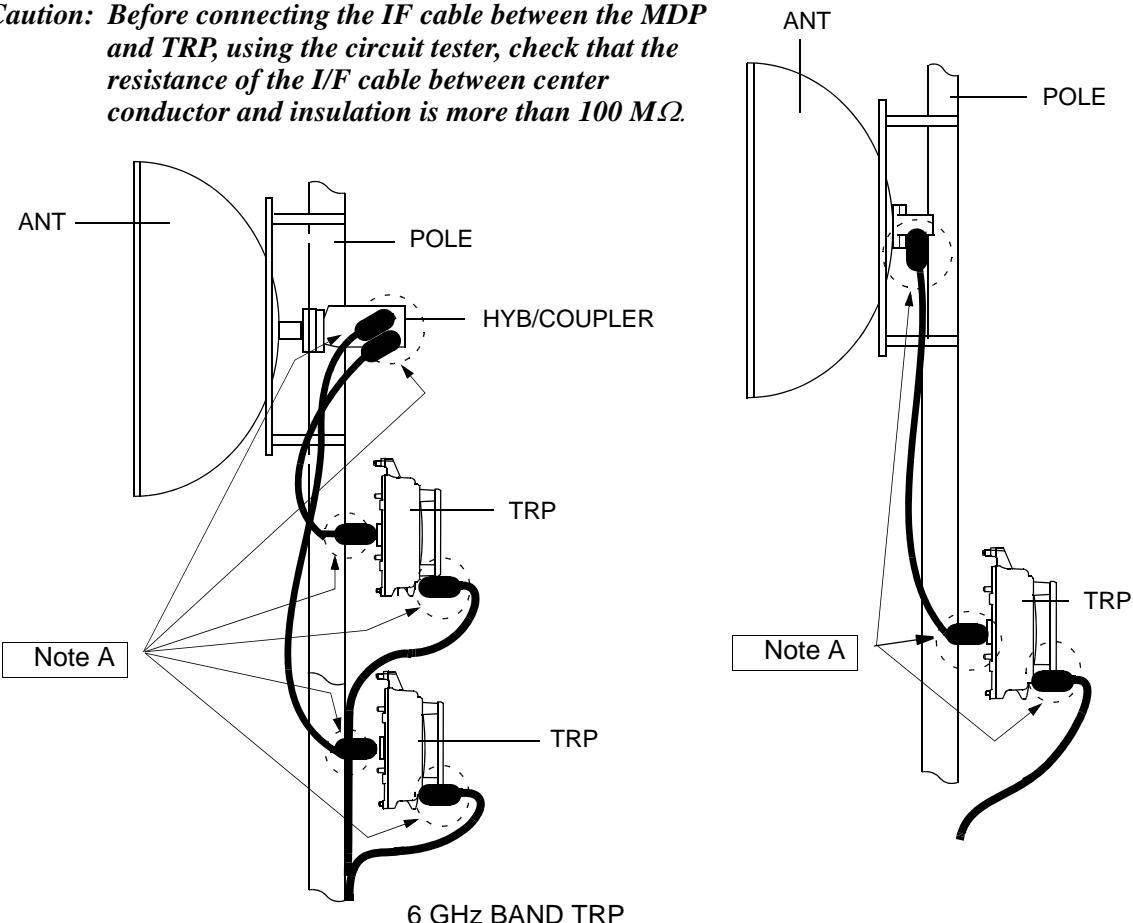
*This connection is an example.*

**Fig. 2-11 Connection for Frame Grounding (2/2)**

## 2.10 Waterproof Protection

After cable connection, the following parts should be wrapped by self-bonding tape for waterproof (see Fig. 2-10).

**Caution:** Before connecting the IF cable between the MDP and TRP, using the circuit tester, check that the resistance of the I/F cable between center conductor and insulation is more than  $100\text{ M}\Omega$ .



Note A

These parts should be wrapped the self-bonding tape tightly, twice or more around the IF cable connector and IF IN/OUT connector of the TRP for waterproof.

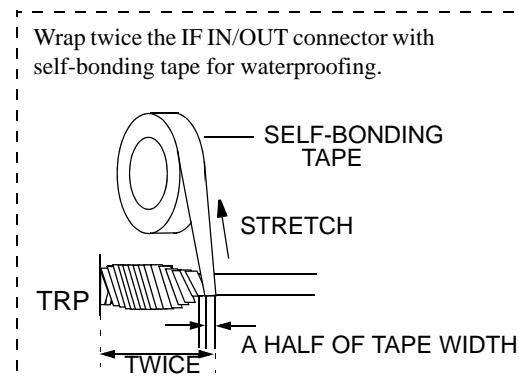
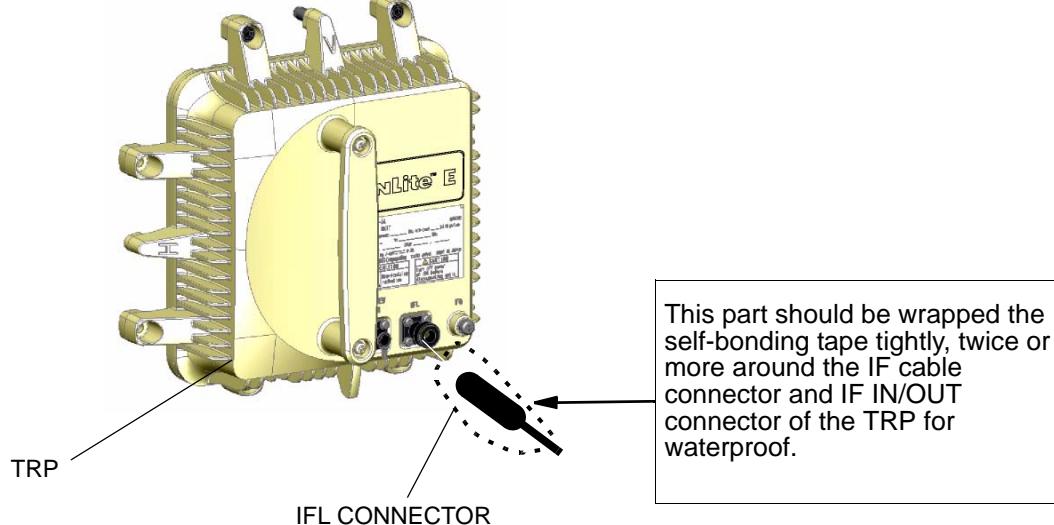
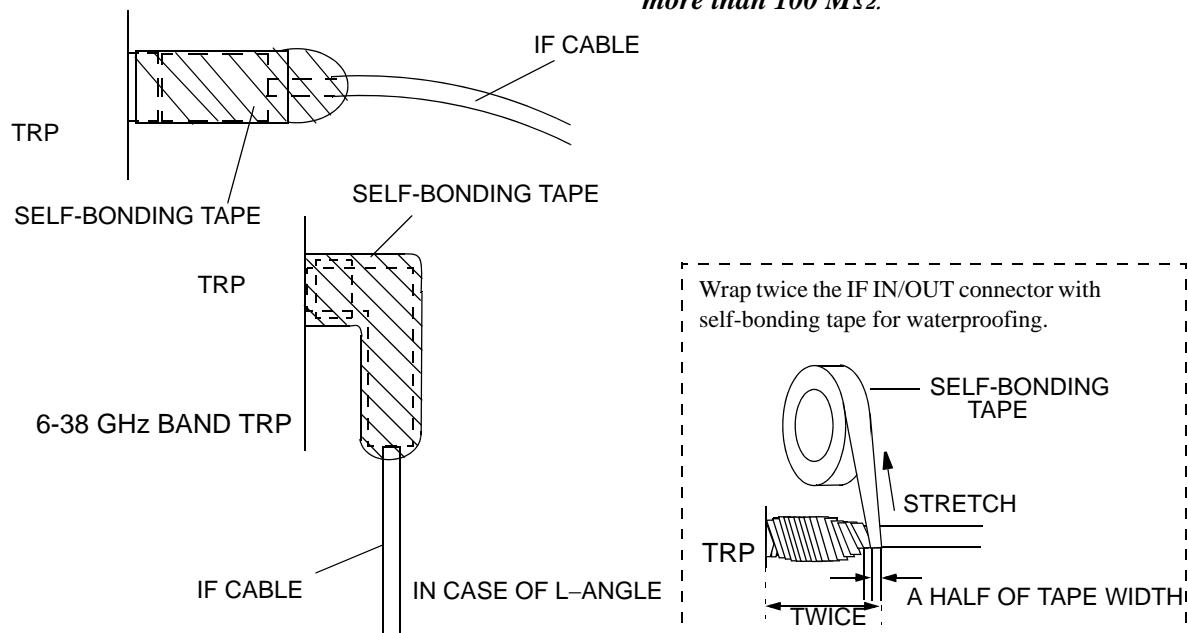


Fig. 2-12 Location of Connector for Waterproof (1/2)

For NHG Type TRP



**Caution:** Before connecting the IF cable between the MDP and TRP, using the circuit tester, check that the resistance of the I/F cable between center conductor and insulation is more than  $100\text{ M}\Omega$ .



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

**Fig. 2-12 Location of Connector for Waterproof (2/2)**

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### **3. INITIAL LINE UP**

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This section explains instructions for the initial lineup of the equipment. Included is information on start-up, shut-down, MDP and TRP equipment setting, antenna orientation and lineup test between two stations.

When the PASOLINK Monitor is used for RX LEV monitoring, connect the X0818 PASOLINK Monitor to the TRP. The PASOLINK Monitor operates on a dry battery (6F22/9 V).

- Notes:*
- 1. Insert the battery with correct polarity.*
  - 2. When the PASOLINK Monitor will not be used for extended periods of time, remove the battery to avoid damage from battery leakage and corrosion.*
  - 3. When the PASOLINK Monitor will be connected to the TRP, control corresponding TRP to Antenna Alignment mode using LCT in Maintenance ON.*

### 3.1 Start-up

The procedure for starting the equipment is shown in Chart 3-1.

- Warnings:**
1. *The -48 V DC is superimposed on the centre conductor of the IF coaxial cable between the MODEM and the TRP. Connecting test equipment directly to this terminal may damage it and touching the coaxial cable core may cause electrical shock.*
  2. *Do not disconnect the IF cable between the MODEM and the TRP in operating condition, to avoid damaging the NLite N, turn the MDP power OFF before connecting/disconnecting the IF cable.*
  3. *Do not allow open or short circuit of TRP TX output with the TX power on conditions. Perform the TX Mute control in the Maintenance mode or turn the PWR switch off at the MDP before disconnecting cable or feeder from the TRP TX output.*
  4. *After turning ON the equipment, wait at least 1 minute before turning it OFF again. Repeatedly turning the power ON and OFF within a short interval may cause the NLite N to fail.*

- Cautions:**
1. *Be careful top surface above MODEM of the MDP and the TRP are hot in operation.*
  2. *When replacing the MODEM, 2P LAN INTFC or DC-DC CONV (optional) turn off the PWR switch and disconnect all cables connected to the module which is to be replaced.*
  3. *When dismounting the ( ) INTFC, turn off the PWR switch on the MODEM and disconnect all cables connected to the ( ) INTFC.*

---

**Chart 3-1 Start-up**

---

- Cautions:**
1. *Do not apply a voltage to the equipment that varies sharply. The equipment may operate improperly.*
  2. *Do not remove/connect the IF cable with the MDP power ON. Turn the MDP power OFF before connecting/disconnecting the IF cable, or equipment may be damaged.*

Apparatus:

Suitable Screwdriver  
Digital Multimeter

---

<b>Step</b>	<b>Procedure</b>
-------------	------------------

---

- Notes:**
1. *The TRP power is supplied from the MDP*
  2. *Refer to the DC Power Connection-2 for Start-up procedure when the NLite N+ TRP is connected to the NLite N TRP.*

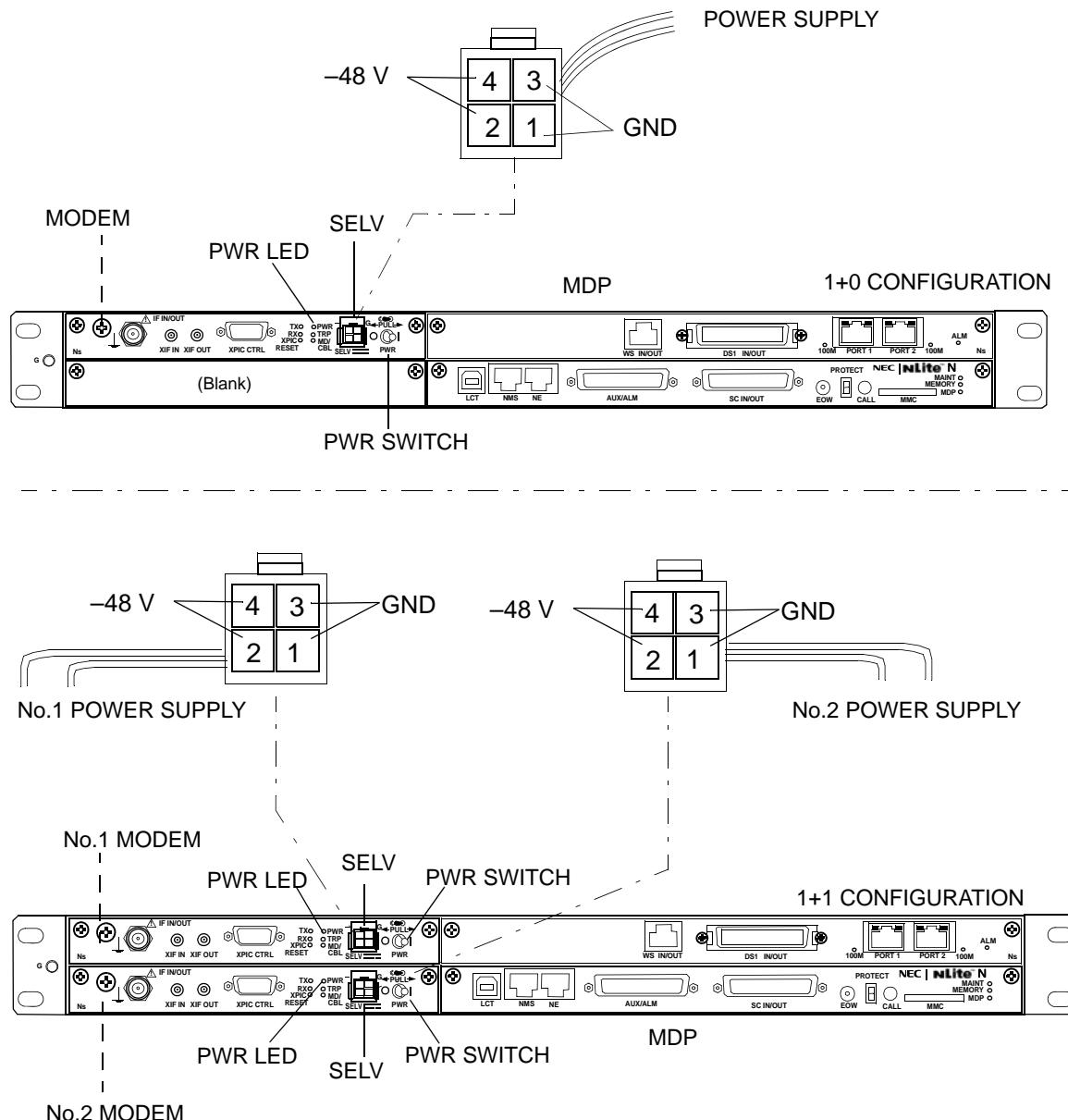
#### **DC Power Connection-1**

##### **1+0 SYSTEM**

- 1 Check that the IF cable between the MODEM and the TRP is firmly connected,
- 2 Before connecting the power cable connector to the MODEM, check that the SELV input voltage is -48V (allowable range; within -40.5 to -57 V) with the digital multimeter, (see Fig. 3-1),
- 3 Pull out the PWR switch lever and turn on,
- 4 Confirm that the PWR indicator on the MODEM is ON.

##### **1+1 SYSTEM**

- 1 Check that the IF cable between the No.1 MODEM and the No. 1 TRP is connected,
- 2 Before connecting the power cable connector to the No.1 MODEM, check that the SELV input voltage is -48V (allowable range, within -40.5 to -57 V) with the digital multimeter, (see Fig. 3-1),
- 3 Pull out the PWR switch lever and turn on, (see Fig. 3-1),
- 4 Confirm that the PWR indicator on the No.1 MODEM is ON.
- 5 Repeat steps 1 to 3 for No.2 MODEM,
- 6 Confirm that PWR indicator on the No.2 MODEM is ON.



**Caution:** The NLite N operates only negative voltage (-48 V). Therefore, the power supply system for the existing equipment which is used floating power supply (-20 to -60 V/+20 to +60 V) must not be connected to the NLite N.

When the MDP NLite N is used with another type TRP (e.g. NLite L TRP), optional DC-DC CONV module must be installed to the MDP NLite N. The TRP will be shorten it's life or may be damaged if not used optional DC-DC CONV module.

Fig. 3-1 DC Power cable Connection and Power ON/OFF (1/2)

**Chart 3-1 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
<p><i>Notes:</i> 1 The TRP power is supplied from the MDP.            2 Refer to the DC Power Connection-1 for Start-up procedure when the NLite N TRP is connected to the NLite N TRP.</p>	
<b>DC Power Connection-2 (DC-DC CONV)</b>	
<b>1+0 SYSTEM</b>	
1	Check that the IF cable between the MODEM and the TRP is connected,
2	Connect the power cable to -43 V/OUT of the DC-DC CONV and SELV of the MODEM as shown in Fig. 3-1 (2/2),
3	Before connecting the power cable connector to the SELV of the DC-DC CONV, check that the rated input voltage is -24V/-48V (allowable range; within -20 to -60 V) or +24V/+48V (allowable range; within +20 to +60 V) with the digital multimeter, (see Fig. 3-1),
4	Pull out the PWR switch lever of the DC-DC CONV and turn on,
5	Confirm that the PWR indicator on the DC-DC CONV is ON,
6	Pull out the PWR switch lever of the MODEM and turn on,
7	Confirm that the PWR indicator on the MODEM is ON.
<b>1+1 SYSTEM</b>	
1	Check that the IF cable between the No.1 MODEM and the No. 1 TRP, is connected,
2	Connect the power cable to -43 V/OUT of the No.1 DC-DC CONV and SELV of the No.1 MODEM as shown in Fig. 3-1 (2/2),
3	Before connecting the power cable connector to the SELV of the DC-DC CONV, check that the rated input voltage is -24V/-48V (allowable range; within -20 to -60 V) or +24V/+48V (allowable range; within +20 to +60 V) with the digital multimeter, (see Fig. 3-1),
4	Pull out the PWR switch lever of the No.1 DC-DC CONV and turn on,
5	Confirm that the PWR indicator on the No.1 DC-DC CONV is ON,

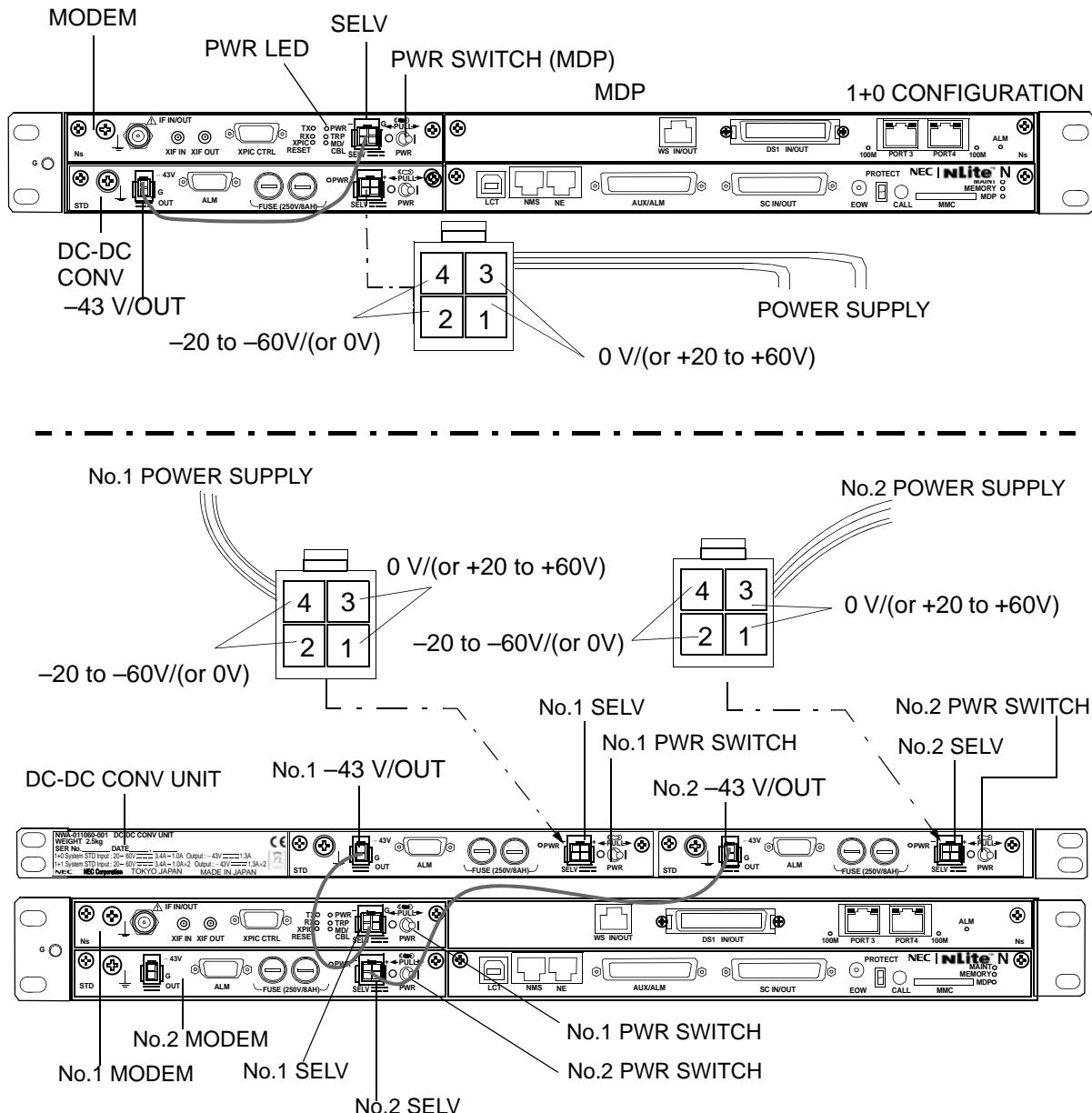
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**Chart 3-1 (Cont'd)**

---

<b>Step</b>	<b>Procedure</b>
6	Pull out the PWR switch lever of the No.1 MODEM and turn on,
7	Confirm that the PWR indicator on the No.1 MODEM is ON,
8	Repeat steps 1 to 7 for No.2 MODEM,
9	Confirm that PWR indicator on the No.2 MODEM is ON.

---



**Caution:** The NLite N operates only negative voltage (-48 V). Therefore, the power supply system for the existing equipment (not NLite N) which is used floating power supply (-20 to -60 V/+20 to +60 V) must not be connected to the NLite N.

**In case of the MDP NLite N is used with the existing TRP (e.g. NLite L TRP), optional DC-DC CONV module must be used. If the optional DC-DC converter is not used the NLite L TRP lifetime or the TRP may be damaged.**

Fig. 3-1 DC Power cable Connection and Power ON/OFF (2/2)

### 3.2 Shut-down

The shut-down procedures for the equipment is shown in Chart 3-2.

**Warning:** After turning ON the equipment, wait at least 1 minute before turning it OFF again. Repeatedly turning the power ON and OFF with in a short interval may cause the MDP/TRP to fail.

---

**Chart 3-2 Shut-down**

---

Step	Procedure
<b>1+0 SYSTEM</b>	
1	Pull out the PWR switch lever on the MODEM and turn off the PWR switch (see Fig. 3-1),
2	Confirm that all LED indicators on the MDP are OFF.
<b>1+1 SYSTEM</b>	
<i>Note: When turn OFF the MDP and TRP in 1+1 configuration, turn OFF power for standby side first, then working side.</i>	
<i>When turn OFF the MDP and TRP in working channel only, switchover the working to standby channel with TX and RX SW using LCT. (see Chart 3-7)</i>	
1	Pull out the PWR switch lever on the corresponding MODEM is to be shut down, then turn off (see Fig. 3-1).
2	Confirm that the PWR indicator on the MODEM is OFF.
3	Pull out the PWR switch lever on the other MODEM, then turn off the PWR switch. (see Fig. 3-1).
4	Confirm that all LED indicators on the MDP are OFF.

---

### 3.3 Initial Setting

The initial setup of the MDP/TRP is performed using the PC according to Table 3-1.

For the details operation of the PC setup for connecting LCT, refer to the NLite N LCT Operation Manual in Section IV Appendix.

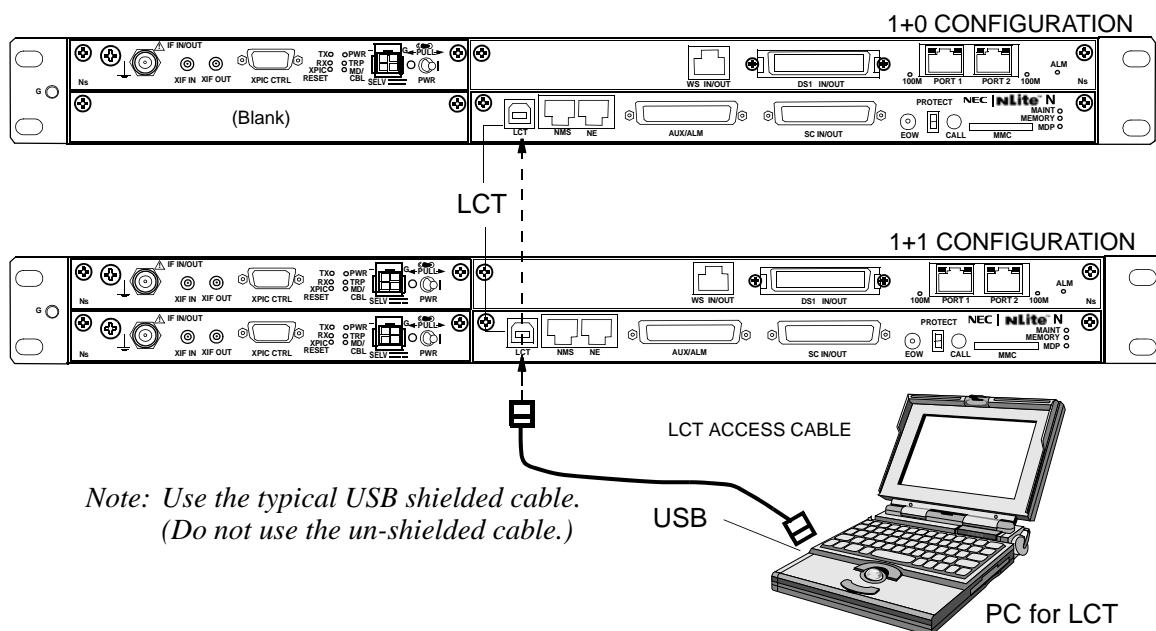
**Table 3-1 Initial Setup Items**

Setup Order	Setup Item	LCT
1.	Equipment Setup	Chapter 3
2.	Date and Time	Chapter 6.3
3.	Provisioning	Chapter 7
4.	Relay/House Keeping	Chapter 7

*Note: The “Equipment Setup” must be set properly every items before “Provisioning” setup.*

*The “Provisioning” setup must be performed based on the “Equipment Setup”.*

*When setting or changing Equipment Setup, check the setting values of all the Provisioning items.*



**Fig. 3-2 LCT Connection**

### 3.3.1 Equipment Setup

In initial lineup, the “Equipment Setup” must be performed using LCT.

---

#### Chart 3-3 Equipment Setup

---

Refer to the NLite N LCT Operation Manual in Section IV Appendix. for the details of “3. EQUIPMENT SETUP”.

- Redundancy Setting
- INTFC Main (WORK)
- INTFC Sub (PROT)
- XPIC Usage \*3
- APS Function \*3
- Modulation Scheme
- Transmission Capacity
- TX RF Frequency [MHz]
- RX RF Frequency [MHz] \*2
- Frame ID
- TX Power Control
- TRP Type \*3
- TX SW Type \*3
- LAN Port Usage \*1
- LAN Capacity1 \*1
- LAN Capacity2 \*1
- TX Start Frequency [MHz]
- TX Stop Frequency [MHz]
- RX Start Frequency [MHz]
- RX Stop Frequency [MHz]
- Frequency Step [MHz]
- Shift Frequency [MHz]
- Upper/Lower
- Sub Band

*Notes:* \*1 For LAN transmission only.

\*2 There is two types TRP for the RX RF Frequency setup mode.

\*3 Indicate only item name, not setting anything.

Type 1. When the transmitting frequency is set, the receiving frequency is automatically assigned.

Type 2. When the transmitting frequency is set, the receiving frequency is automatically assigned and assignment of it in manual is also available.

### 3.3.2 Provisioning

In initial lineup, the “Provisioning” Setup must be performed using LCT.

---

#### Chart 3-4 Provisioning

---

Refer to the NLite N LCT Operation Manual in Section IV Appendix. for details of the “7. PROVISIONING”.

The Provisioning Setup items are as follows:

- Provisioning
- DS1 Setting
  - WS Setting
  - BER Threshold Setting
  - SC Assignment
  - LAN Port Setting \*1
  - TX Power Control \*2
  - Relay Setting
  - TCN Threshold (15min)
  - TCN Threshold (1day)
  - PMON Select
  - In-band Loopback Setting
  - Others \*3

*Notes: \*1:For LAN transmission only.*

*\*2:Set to required TX power level in MTPC mode when it is going to perform the Antenna Orientation.*

*\*3:Optional items*

*When setting or changing Equipment Setup, check the setting values of all the Provisioning items.*

### 3.4 Antenna Orientation

After the initial setup has been completed, an antenna orientation will be performed between two stations according to the procedures in Chart 3-5.

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**Chart 3-5 Antenna Orientation**

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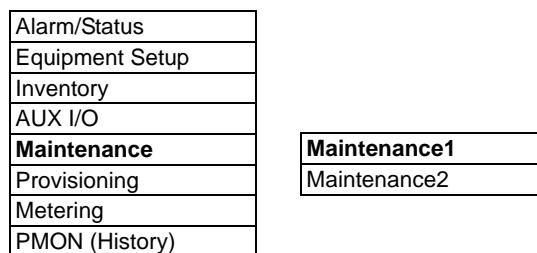
Apparatus:

Digital Multimeter with test leads  
Wrench  
Headset

---

Step	Procedure
1	Connect the PC to the LCT port on the NLite N MDP using USB cable, (see Fig. 3-2)
2	At each station, set “Maintenance1” from Maintenance in LCT Menu,

**LCT MENU**



*Note: In Maintenance “On” condition, every external Alarm outputs, excluding Maintenance/PS/CPU (MDP) ALM, are masked and remote control can not be performed.*

- 3 Click and select for the following control items in “Maintenance1”,

*Notes: 1. Retain the present status for other control items.*

- 2. When the TX power control mode is set to ATPC, set it to MTPC and required level for the NLite N link on the “Equipment Setup” and “Provisioning”.*

**Chart 3-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
• TX SW Manual Control:	Fix No.1 or No.2 (in 1+1 configuration)
• RX SW Manual Control:	Fix No.1 or No.2 (which is the same side fixed by TX SW in 1+1 configuration)
• TX Power Control: (at opposite site)	MTPC in Equipment Setup Required level in Provisioning
• CW Control: (at opposite site)	When the Antenna Alignment Mode is not selected, set manually to On.
• Antenna Alignment Mode:	Select On (in 1+0 configuration) (Set No.1 or No.2 which is the same side fixed by TX SW and RX SW in 1+1 configuration)

--- Maintenance 1 ---

Item	Value	Setting	
Maintenance	On	<input type="radio"/> Off <input checked="" type="radio"/> On	Set
TX SW Manual Control	No.1	<input type="radio"/> Auto <input checked="" type="radio"/> No.1 <input type="radio"/> No.2	Set
RX SW Manual Control	No.1	<input type="radio"/> Auto <input checked="" type="radio"/> No.1 <input type="radio"/> No.2	Set
RX SW Maintenance Mode	Manual		
TX Mute Control(No.1)	Off	<input checked="" type="radio"/> Off <input type="radio"/> On	Set
TX Mute Control(No.2)	Off	<input checked="" type="radio"/> Off <input type="radio"/> On	Set
CW Control(No.1)	Off	<input checked="" type="radio"/> Off <input type="radio"/> On	Set
CW Control(No.2)	Off	<input checked="" type="radio"/> Off <input type="radio"/> On	Set
IF Loopback (No.1)	Off	<input checked="" type="radio"/> Off <input type="radio"/> On	Set
IF Loopback (No.2)	Off	<input checked="" type="radio"/> Off <input type="radio"/> On	Set
Main CH Loopback (Near End)	Off		Select
Main CH Loopback (Far End)	Off		Select
LAN Device Reset	...	INTFC (1) - Port1	▼ Set

--- Offline Maintenance ---

DADE Adjust	...	<input checked="" type="radio"/> DADE <input type="radio"/> Offset DADE <input type="radio"/> DADE Off	Set
RF Sub Band Select (No.1)	...	A	▼ Set
RF Sub Band Select (No.2)	...	A	▼ Set
Antenna Alignment Mode(No.1)	On	<input type="radio"/> Off <input checked="" type="radio"/> On	Set
Antenna Alignment Mode(No.2)	On	<input type="radio"/> Off <input checked="" type="radio"/> On	Set

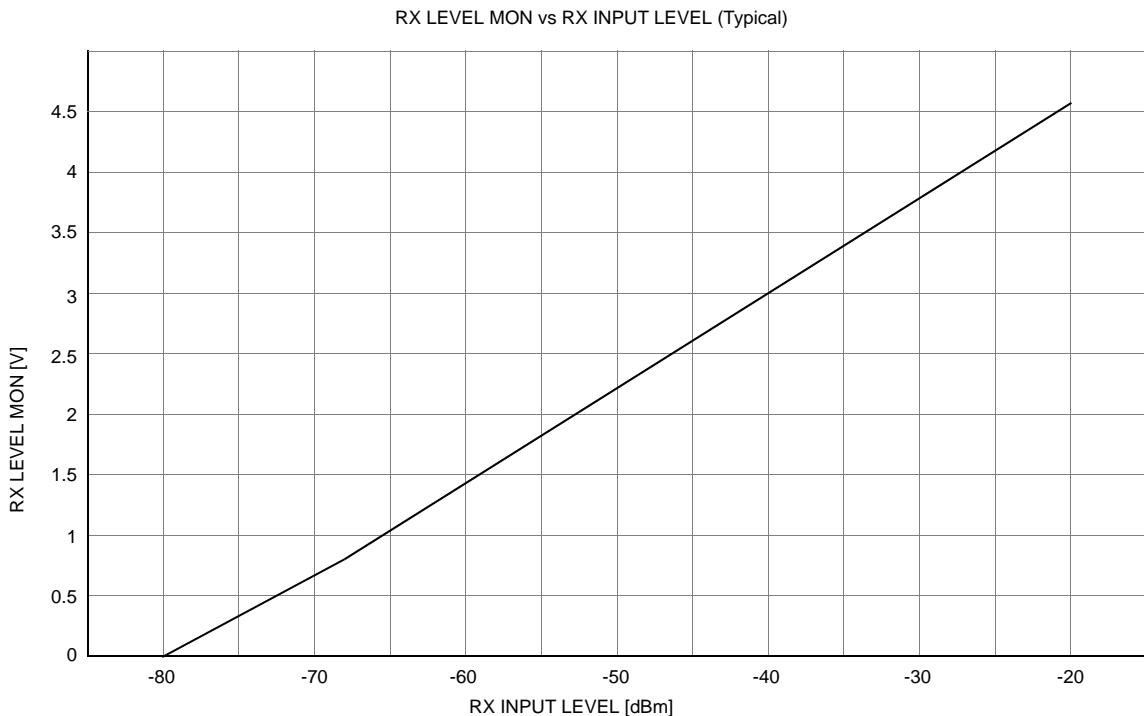
*Note: In Antenna Alignment Mode “On” condition, controls between MDP and TRP are restricted.*

**Chart 3-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
4	At receiving station, remove a cap from the RX LEV MON jack,
5	At each station connect the digital multimeter,
6	At each station, adjust the azimuth and elevation angle of the antenna alternately so that the measured voltage becomes maximum,

*Note: In order to measure exact performance of AGC V, it is mandatory required to set Antenna Alignment Mode to ON. The AGC voltage indication is not guaranteed outside Antenna Alignment Mode.*

*Note: The relation of the RX INPUT LEVEL versus RX LEVEL MON(V) is shown below.*

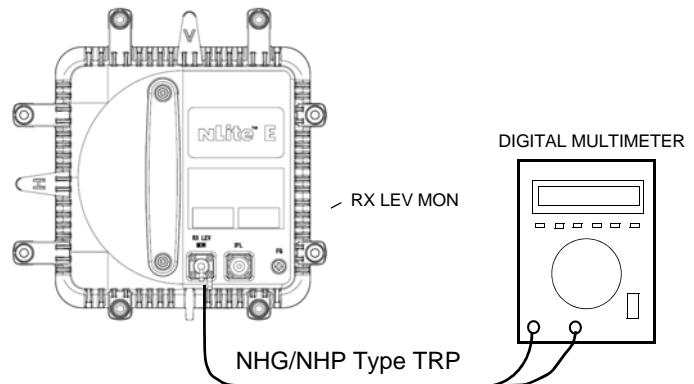


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**Chart 3-5 (Cont'd)**

---

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



*Notes 1: The RX LEV MON terminal on the TRP (conformed to IEC61169-24).*

*2: The RX LEV MON terminal must be capped for waterproof.*

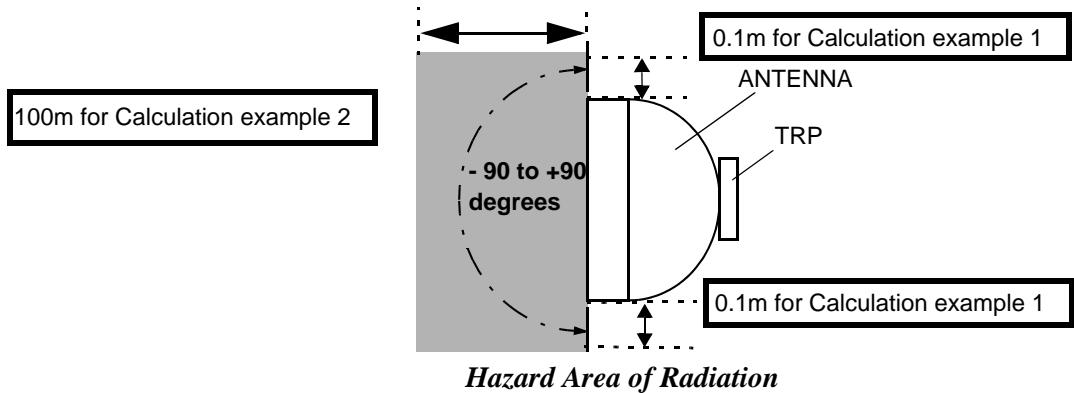
**Fig. 3-3 Antenna Orientation Test Setup**

*Note: The fixed bolts and nuts to be used for the antenna orientation differ with antenna bracket types, refer to antenna bracket shown in Fig. 3-4 (1/4) to (4/4).*

### **Safety Guideline for Microwave Radiation Hazard**

The Microwave and Millimetre-wave that NLite N series are treating is very small radiation level and never been reported to effect human health. But advanced countries about health hazard have started to regulate the radiation levels. In case of EU country, it is specified by EN50385. In order to keep the regulation, the operator shouldn't work at near parabolic antenna during transmitter activating. Especially the area in side to front of antenna shows higher radiation level. (please see below figure and calculation sample 1).

On the other hand, in case of front side of antenna, the power density becomes high level along antenna beam. Therefore the user of this system should pay attention not to radiate the beam against humans any time. (Please refer below calculation sample 2)



In addition, the Power density and Field strength level is calculated by equation below.

$$\text{Power density } S \text{ (mW/cm}^2\text{)} = \frac{10^{\left(\frac{P+G-30}{10}\right)} \times K}{40 \times \pi \times R^2}$$

Where:

- P = Output power of TRP (dBm),
- G = Antenna Gain (dBi),  
(in consideration of the angle from antenna)
- K = Reflection factor = 2.56 (given),
- R = Distance between Human and Antenna (m)

Calculation example 1, (90 degree side of antenna)

NLite N = 18 GHz/+23 dBm,  
Antenna diameter = 0.6 m,  
0 degree antenna gain = 39 dBi,  
90 degrees side antenna gain = -24 dBi, (90 degrees attenuation = -63 dB),  
Distance = 0.1 m

$$\text{Power density } S \text{ (mW/cm}^2\text{)} = 0.0016 \leq 0.01 \text{ (European safety guideline)}$$

Calculation example 2, (0 degree, front side of antenna)

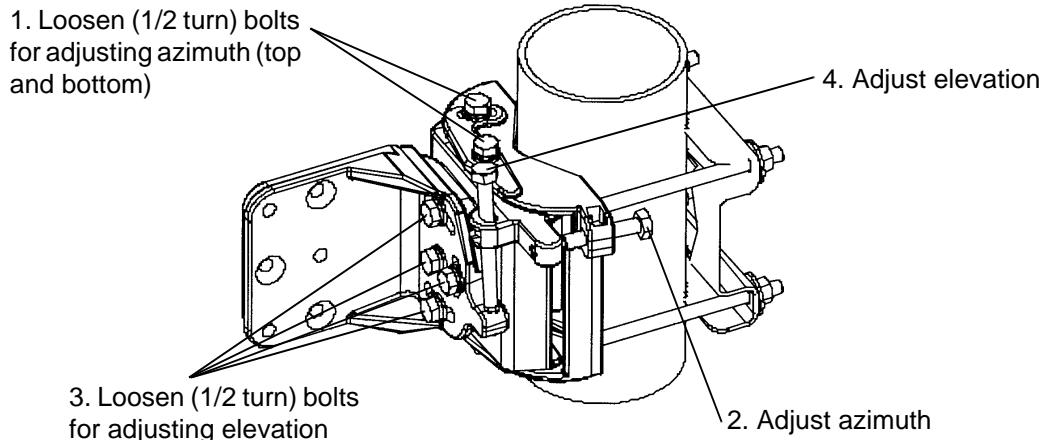
NLite N = 7 GHz/+27 dBm,  
Antenna diameter = 1.8 m,  
0 degree antenna gain = 40 dBi,  
Distance = 100 m

$$\text{Power density } S \text{ (mW/cm}^2\text{)} = 0.01 \Rightarrow \text{Equal to European safety guideline}$$

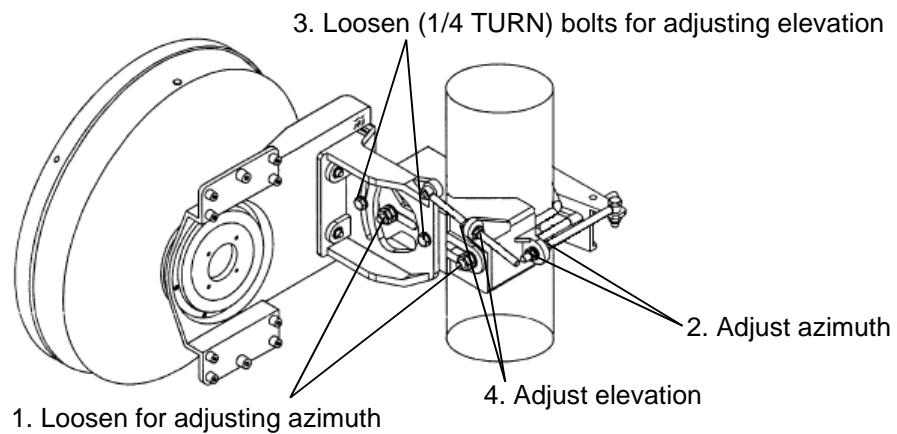
<b>Chart 3-5 (Cont'd)</b>	
<b>Step</b>	<b>Procedure</b>
<b>ANTENNA DIRECTO MOUNTING TYPE</b>	
<b>A. USING ANDREW VHLP TYPE BRACKET</b>	
	<b><u>Azimuth Angle Adjustment</u></b>
6-1	Loosen bolts (1 in Fig. 3-4 (1/4) A),
6-2	Adjust the azimuth angle by adjusting bolt (2 in Fig. 3-4 (1/4) A),
6-3	Secure bolts loosened in step 6-1,
	<b>Elevation Angle Adjustment</b>
6-4	Loosen bolts (3 in Fig. 3-4 (1/4) A),
6-5	Adjust the elevation angle by adjusting bolt (4 in Fig. 3-4 (1/4) A)
6-6	Secure bolts loosened in step 6-4,
<b>B. USING RFS SB1 TYPE BRACKET</b>	
	<b><u>Azimuth Angle Adjustment</u></b>
6-7	Loosen nuts (1 in Fig. 3-4-B),
6-8	Adjust the azimuth angle by adjusting the nuts (2 in Fig. 3-4 (1/4) B),
6-9	Secure nuts loosened in step 6-7,
	<b><u>Elevation Angle Adjustment</u></b>
6-10	Loosen bolt(s) (3 in Fig. 3-4 (1/4) B),
6-11	Adjust the elevation angle by adjusting the nuts (4 in Fig. 3-4 (1/4) B),
6-12	Secure nut loosened in step 6-7,
6-13	Secure nuts loosened in step 6-10.

<b>Chart 3-5 (Cont'd)</b>	
<b>Step</b>	<b>Procedure</b>
<b>C. USING RFS C-Mount TYPE BRACKET</b>	
<b><u>Azimuth Angle Adjustment</u></b>	
6-14	Loosen 3 bolts (1 in Fig. 3-4 (2/4)),
6-15	Adjust azimuth angle by adjusting bolt (2 in Fig. 3-4 (2/4)),
6-16	Secure nuts loosened in step 6-14,
<b><u>Elevation Angle Adjustment</u></b>	
6-17	Loosen 4 bolts (3 in Fig. 3-4 (2/4)),
6-18	Adjust elevation angle by adjusting bolt (4 in Fig. 3-4 (2/4)),
6-19	Secure bolts loosened in step 6-17,
7	At each station, restore the “Antenna Alignment Mode” to “off” using the LCT,
8	At each station, reset control items to original using LCT,
9	At each station, restore the “MAINT Mode” to “off” position using the LCT,
10	At each station, disconnect the digital multimeter Monitor from the RX LEV MON connector,
11	At each station, reconnect the cap removed in step 4,
<i>Note: The RX LEV MON connector must be capped for waterproof.</i>	

<b>Chart 3-5 (Cont'd)</b>	
<b>Step</b>	<b>Procedure</b>
<b>XPD Adjustment (For Antenna Direct Mounting Type)</b>	
	<p><i>Note: The XPD adjustment using cross-polarization signal should be done more carefully than using co-polarization signal because XPD changes sharply in the axial direction.</i></p> <ol style="list-style-type: none"> <li>1' Loosen three screws (SCREW1, 2 and 3 in Fig. 3-4 (3/4)) and rotate antenna (connected OMT/TRP) so that the RX LEVEL MON indicates the maximum value at the TRP of the Main Master and Sub Master channels,</li> <li>2' At opposite station, turns the TRP of the Sub Master channel power OFF (for both No.1 and No.2 Sub Master channels in 1+1 system),</li> <li>3' In this conditions, check the RX LEVEL MON indication value for XPD at the TRP of the Sub Master channel,</li> <li>4' Confirm that the XPD is more than 25 dB, if not, repeat Azimuth Angle, Elevation Angle and XPD Adjustment,</li> <li>5' At opposite station, turns the TRP of the Sub Master channel power ON,</li> </ol>



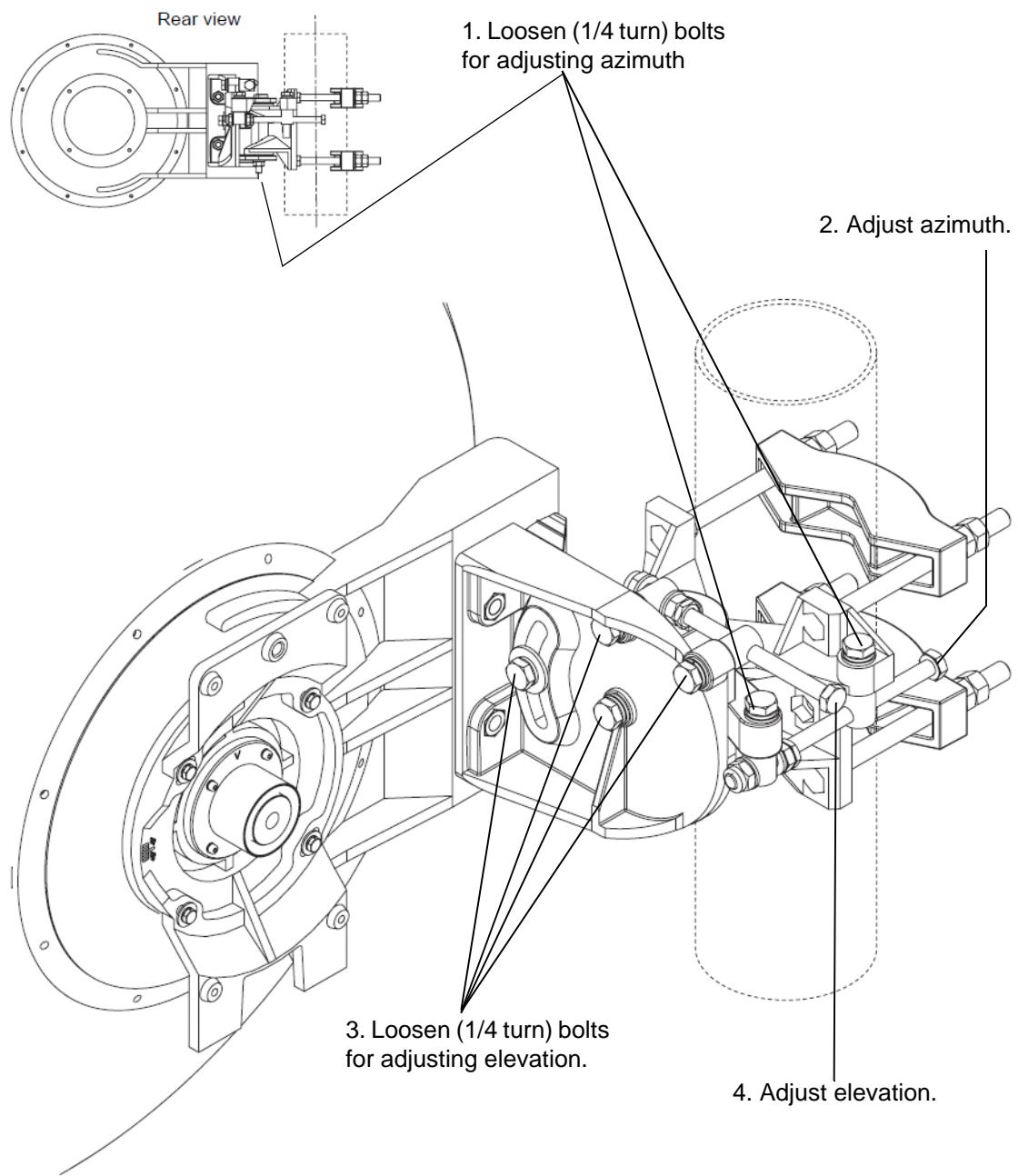
A. ANDREW VHLP TYPE BRACKET



0.3 φ m Antenna

B. RFS SB1 TYPE BRACKET

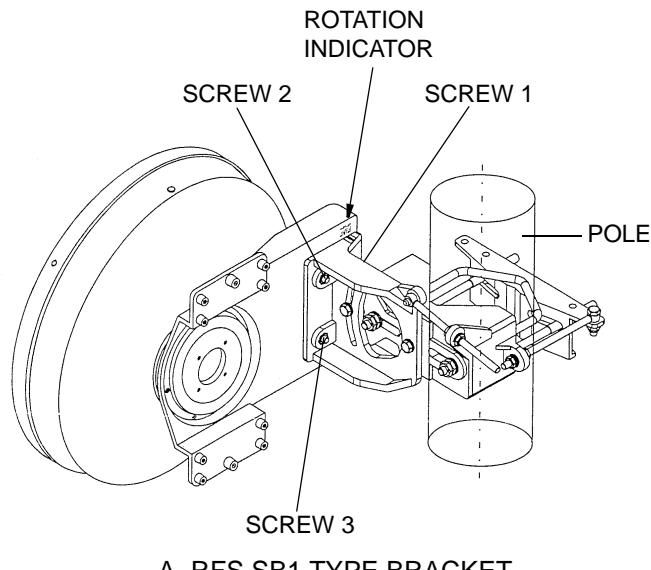
Fig. 3-4 Location of Adjusting Nuts and Bolts (1/4)



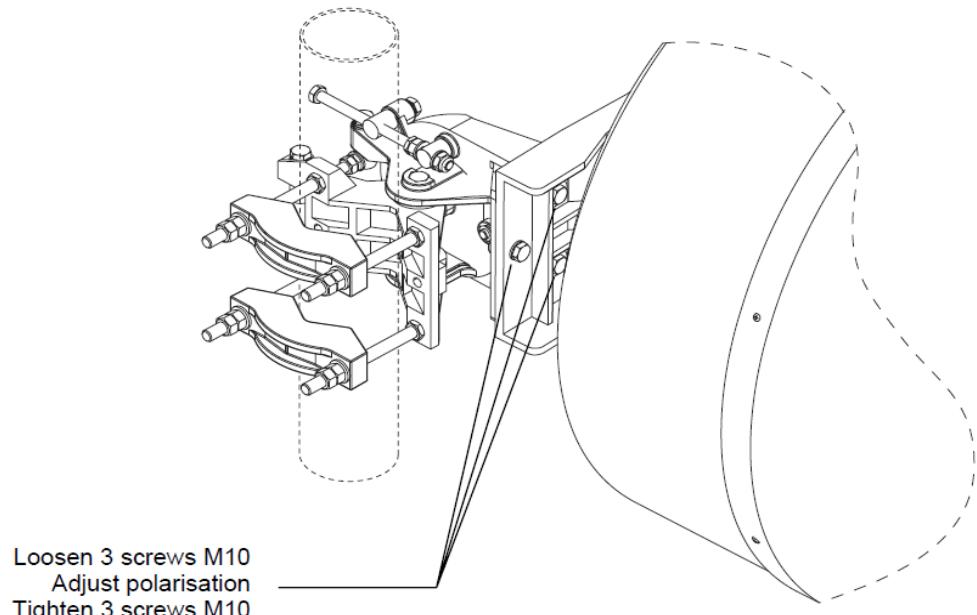
0.6 φ m Antenna

C. RFS C-Mount TYPE BRACKET

**Fig. 3-4 Location of Adjusting Nuts and Bolts (2/4)**



A. RFS SB1 TYPE BRACKET



B. RFS C-Mount TYPE BRACKET

**Fig. 3-4 Location of Adjusting Nuts and Bolts (3/4)**

<b>Chart 3-5 (Cont'd)</b>	
<b>Step</b>	<b>Procedure</b>

### **WAVEGUIDE CONNECTION TYPE**

#### **Azimuth Angle Adjustment (Waveguide Connection Type)**

*Note: Take care that the flexible waveguide is not forcedly twisted by rotating the antenna.*

*When the HS/SD system is configured, alternately switchover the transmitter to the other channel (No.1 or No.2) at the opposite station and repeat adjustment of elevation and azimuth to obtain satisfactory results in both No.1 and No.2 CH. (Refer to Chart 3-7 for TX SW/RX SW Manual Switchover Operation).*

- 1' Loosen all strut attachment hardware,
- 2' Loosen bolts indicated by arrows in Fig. 3-4 (4/4)-A,
- 3' Loosen jam nuts and rotate turnbuckle-1 in Fig. 3-4 (4/4)-A so that the RX LEVEL MON voltage obtains the maximum value,
- 4' Carefully, tighten turnbuckle-1 jam nuts and bolts indicated by arrows in Fig. 3-4 (4/4)-A to hold the adjustment,

#### **Elevation Angle Adjustment (Waveguide Connection Type)**

- 5' Make sure that all strut attachment hardware is loosened,
- 6' Loosen bolts indicated by arrows in Fig. 3-4 (4/4)-B,
- 7' Loosen jam nuts and rotate turnbuckle-2 in Fig. 3-4 (4/4)-B so that the RX LEVEL MON voltage obtains the maximum value,
- 8' Carefully, tighten turnbuckle-2 jam nuts and bolts indicated by arrows in Fig. 3-4 (4/4)-B,

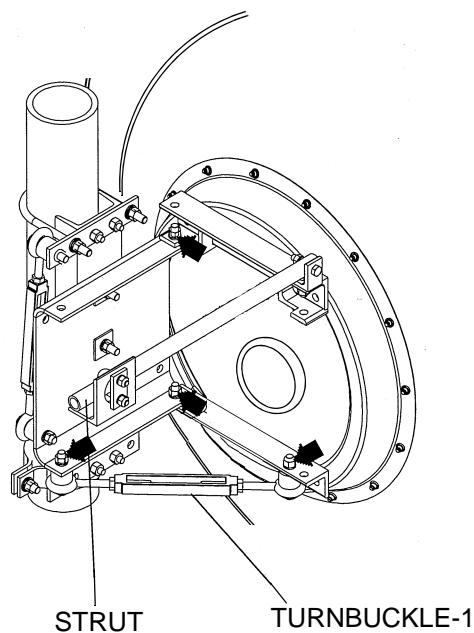
#### **XPD Adjustment (Waveguide Connection Type)**

*Note: This XPD adjustment using cross-polarization signal should be done more carefully than using co-polarization signal because XPD changes sharply in the axial direction.*

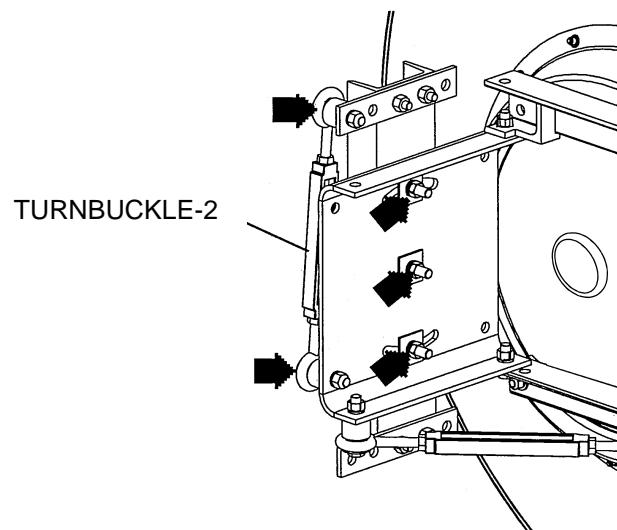
- 9' At opposite station, turns the TRP of the Sub Master channel power OFF (for both No.1 and No.2 Sub Master channels in 1+1 system),
- 10' In this conditions, check the RX LEVEL MON indication value for XPD at the TRP of the Sub Master channel,

**Chart 3-5 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
11'	Confirm that the XPD is more than 25 dB, if it is not obtained, repeat Azimuth Angle, Elevation Angle for the XPD Adjustment,
12'	Tighten all strut attachment hardware, turnbuckle jam nuts and bolts indicated by arrows in Fig. 3-4 (4/4) A and Fig. 3-4 (4/4) B,
13'	At opposite station, turns the TRP of the Sub Master channel power ON (for both No.1 and No.2 slave channels in 1+1 system),
12	At each station, disconnect the digital multimeter from the RX LEV MON connector,
13	At each station, reconnect the cap removed in step 4, <i>Note: The RX LEV MON connector must be capped for waterproof.</i>
14	At each station, restore the “Antenna Alignment Mode” to “off” position using the LCT,
15	At the Main Master station, when the TX power control is operated in ATPC, restore the TX Power Control item of System Configuration changed in step 1 to “ATPC” using the LCT,
16	At the Main Master, when the TX power control is operated in MTPC, restore MTPC TX PWR item of “Provisioning Data” changed in step 2 to original setting value using the LCT.
17	At each station, reset Maintenance to “OFF”.



A. Azimuth Adjustment



B. Elevation Adjustment

ANDREW VHLP4 TYPE BRACKET

**Fig. 3-4 Location of Adjusting Nuts and Bolts (4/4)**

### 3.5 Lineup Test

Line up test items for between two stations are listed in Table 3-2.

**Table 3-2 Lineup Test Items**

Item	Chart No.
Orderwire Test	Chart 3-6
TX/RX SW Switchover Operation	Chart 3-7 *1
DADE Adjust	Chart 3-8 *2
Meter Reading	Chart 3-9
PMON Clear	Chart 3-13 *3

*Note: \*1 Chart 3-7 is described about Manual Switchover Operation.*

*\*2 Chart 3-8 is needed only when INTFC is Out-phase in 1+1 configuration.*

*\*3 After the initial lineup has been finished, clear PMON and RMON data for the start of service operation.*

#### **Chart 3-6 Orderwire Test**

Step	Procedure
1	Connect headset to the EOW jack on the MDP,
2	Press the CALL button on the MDP, Requirement: At the opposite station, the buzzer on the MDP sounds,
3	Check that the orderwire can be used between two stations with headsets,
4	Disconnect headset from EOW jack on the MDP at each station.

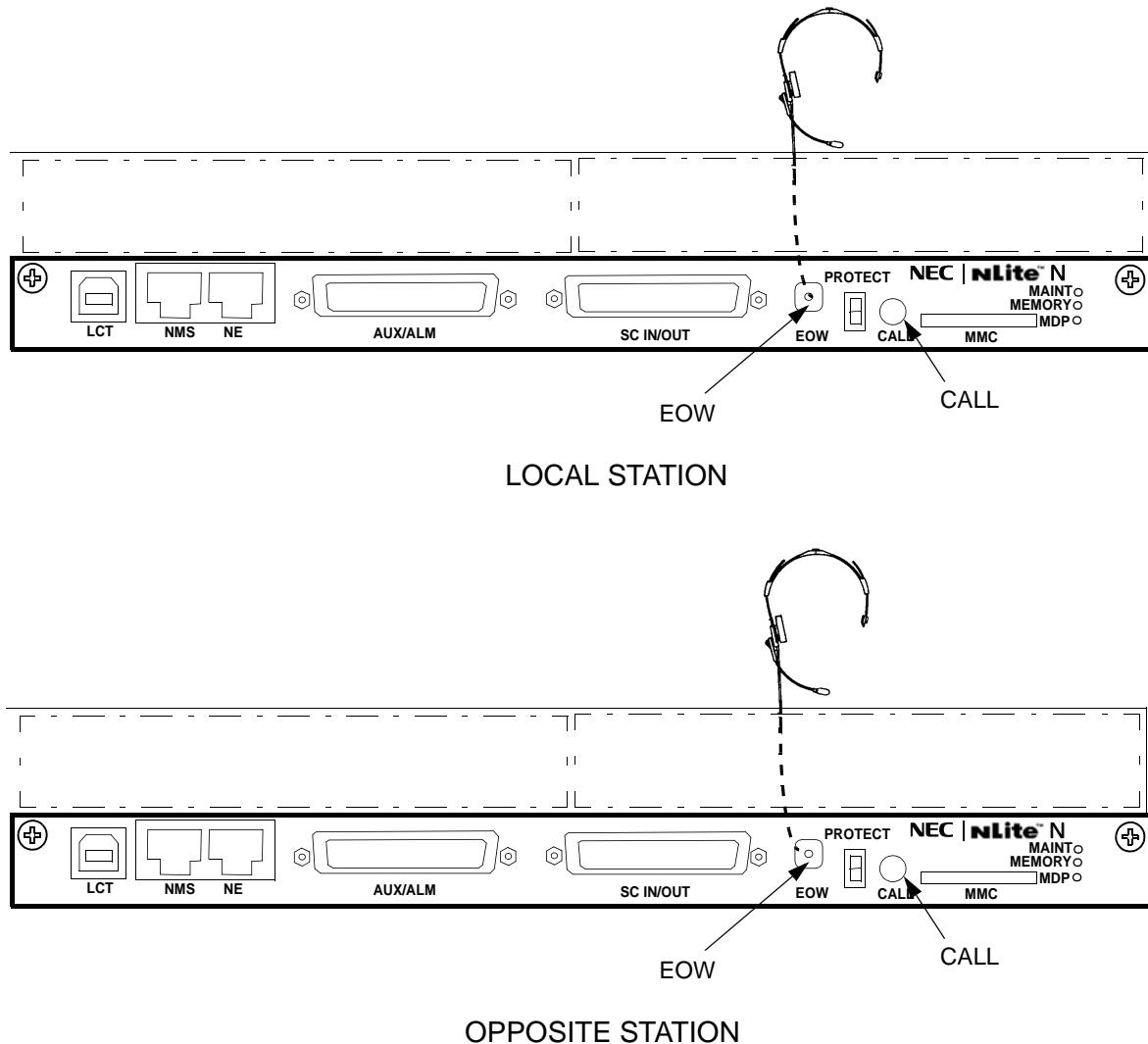


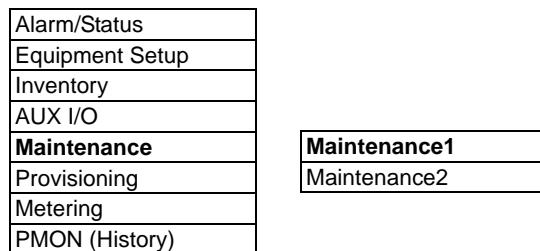
Fig. 3-5 OW Test Setup for MDP

---

**Chart 3-7 TX/RX SW Switchover Operation**


---

<b>Step</b>	<b>Procedure</b>
<i>The TX/RX SW switchover operation is performed only in 1+1 configuration.</i>	
1	Connect the PC to the LCT port on the NLite N MDP using USB cable, (see Fig. 3-2)
2	Enter Login name “Admin”, enter Admin password and press the “Login” button,
3	LCT Open window will be displayed, then click “Maintenance” button in the LCT MENU, select “Maintenance1” on background menu,

**LCT MENU**

- 4 Select “On” of the Maintenance setting button and click on “Set” button,
- 5 Select “No.1” or “No.2” of the TX SW setting button and click on “Set” button,
- 6 Select “No.1” or “No.2” of the RX SW setting button and click on “Set” button,

**--- Maintenance 1 ---**

Item	Value	Setting	
Maintenance	On	<input type="radio"/> Off <input checked="" type="radio"/> On	Set
TX SW Manual Control	No.1	<input type="radio"/> Auto <input checked="" type="radio"/> No.1 <input type="radio"/> No.2	Set
RX SW Manual Control	No.1	<input type="radio"/> Auto <input checked="" type="radio"/> No.1 <input type="radio"/> No.2	Set

- 7 Check that the “Value” box for each item turned to the required status.
-

---

**Chart 3-8 DADE Adjustment**

---

<b>Step</b>	<b>Procedure</b>
<i>Note: The DADE control applies in 1+1 configuration to adjust delay time for RX hitless switching when the INTFC status is indicated Outphase.</i>	
1	Connect the USB cable to the USB port of PC and the LCT port of the MDP (see Fig. 3-2),
2	Login to LCT using Internet Explorer,
3	Enter Login name “Admin”, enter Admin password and press the “Login” button,
4	LCT Open window will be displayed, then click “Maintenance” button in the LCT Menu area, select “Maintenance1” on background menu,
5	Select “DADE Adjust” on the “Maintenance1” table,
6	Click on setting button “DADE”, “Off set DADE” or “DADE Off” and click on “Set” button,

**--Maintenance1--**

Item	Value	Setting	
Maintenance	On	<input type="radio"/> Off <input checked="" type="radio"/> On	Set
DADE Adjust	---	<input checked="" type="radio"/> DADE <input type="radio"/> Offset DADE <input type="radio"/> DADE Off	Set

*Note: The DADE adjustment is needed in initial lineup or when the IF CABLE is replaced. It is not needed readjustment when the INTFC status is indicated In-phase. The setting conditions are as follows:*

**DADE:** *Automatically adjust delay time based on either No.1 signal or No.2 signal which it is selected by RX SW under the Outphase condition of the INTFC status. The DADE control is processed assuring no interruption of traffic.*

**Offset DADE:** *Automatically adjust delay time based on either No.1 signal or No.2 signal which it is selected by RX SW under the Outphase condition of the INTFC status. Since the offset memory minimizes the latency delay, traffic interruption occurs at that moment. This Offset DADE controls the delay time difference to a minimum than DADE control.*

**DADE off:** *Set when DADE function is not used. For particularly, when low bit rate (10 to 20 MB) transmission is applied to the system, the DADE control is not required.*

---

**Chart 3-9 Meter Reading**

<b>Step</b>	<b>Procedure</b>
1	Connect the PC to the LCT port on the NLite N MDP using USB cable, (see Fig. 3-2)
2	Enter Login name “Admin”, enter Admin password and press the “Login” button,
3	Click “Metering” button in LCT Menu,

**LCT MENU**

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

4 Then, the values of Metering items are displayed as follows:  
1+1 Configuration

## ----Metering---

	No.1	No.2
TX Power [dBm]*1	+19	+19
RX Level [dBm]	-49.5	-49.7
Power Supply [V] *2	-45	-45
BER *3	0.0E-10	Calculating

1+0 Configuration

## ----Metering---

TX Power [dBm]*1	+19
RX Level [dBm]	-50
Power Supply [V] *2	-45
BER *3	1.10E-10

**Chart 3-9 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

*Notes:*\*1: TX POWER Level is indicated in 1 dB step.

The TX Power varies depending on the propagation condition within setup ATPC range in provisioning, therefore, TX Power may be displayed within limited values listed in Table 3-3. Add attenuation value for Max. and Min. level when additional attenuator is used.

\*2: Power supply voltage of the TRP input varies depending on the IF cable length.

\*3: During total number of erroneous bits and total number of correctly received bits are calculating, “Calculating” and \*E-\*\* are displayed.

**Table 3-3 TX Power Output Level**

Modulation Mode	Frequency Band (GHz)	5.8G (EHG)	L6G	U6G (EHG)	10.5G	11G	18G	23G	38G
QPSK	Output Power Max. (dBm) (at ATPC 0 dB)	+21	+29	+21	+25	+25	+24	+24	+18
	Output Power Min. (dBm)	-9	-1	-9	-5	-5	-6	-6	-7
	Additional attenuator (dB)				NA			NA	
16QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+21	+27	+21	+21.5	+21.5	+22	+22	+14.5
	Output Power Min. (dBm)	-3	+3	-3	-2.5	-2.5	-2	-2	-9.5
	Additional attenuator (dB)				NA			NA	
32QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+21	+25	+21	+21	+21	+19	+19	+14.5
	Output Power Min. (dBm)	-2	+2(-3)	-2(-7)	-2(-7)	-2(-7)	-4(-9)	-4(-9)	-8.5
	Additional attenuator (dB)				5			NA	
64QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+21	+25	+21	+21	+21	+19	+19	+14.5
	Output Power Min. (dBm)	+1(-4)	+5(0)	+1(-4)	+1(-4)	+1(-4)	-1(-6)	-1(-6)	-5.5
	Additional attenuator (dB)				5			NA	
128QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+21	+25	+21	+21	+21	+19	+19	+14.5
	Output Power Min. (dBm)	+1(-4)	+5(0)	+1(-4)	+1(-4)	+1(-4)	-1(6)	-1(6)	-5.5
	Additional attenuator (dB)				5			NA	
Tolerance	(dB)				±3 (except additional attenuator)				

*Note:* ( ) shows the values with additional attenuator.

**Table 3-4 ALL INOOR TR Unit Tx Power Output Level**

Modulation Mode	Frequency Band (GHz) (TX Power at TR Unit Out)	L6G		U6G		11G
		High Power	STD Power	High Power	STD Power	High Power
32QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+32.5	+29.5	+32.5	+29.5	+30
	Output Power Min. (dBm)	+12.5	+9.5	+12.5	+9.5	+10
	Additional attenuator (dB)			5		
64QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+32.5	+29.5	+32.5	+29.5	+30
	Output Power Min. (dBm)	+12.5	+9.5	+12.5	+9.5	+10
	Additional attenuator (dB)			5		
128QAM	Output Power Max. (dBm) (at ATPC 0 dB)	+32.5	+29.5	+32.5	+29.5	
	Output Power Min. (dBm)	+12.5	+9.5	+12.5	+9.5	
	Additional attenuator (dB)			5		
Tolerance	(dB)	±3 (except additional attenuator)				

### 3.6 TRP Mounting/Demounting (ALL INDOOR TRP)

*Install the equipment in the place where it is not restricted access location regulated with UL60950-1.*

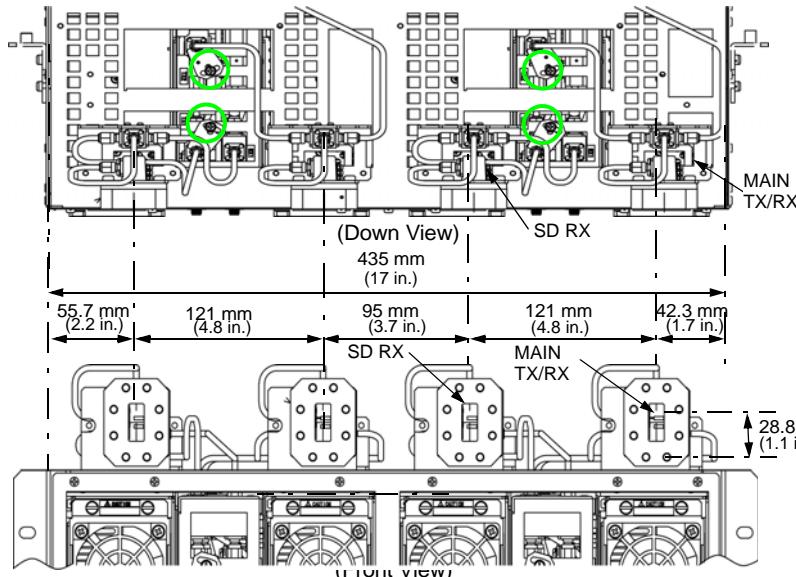
The installation procedure for TRP is shown in Chart 3-10. The TRP should be installed in the radio station indoor.

---

**Chart 3-10 Mounting Method for TRP (ALL INDOOR TRP)**

---

Step	Procedure
1	Be careful and mount TRP onto the rack using two persons.  <i>Note: When the change of the connecting direction of the transducer for the waveguide is necessary, that is possible using the same SJ cables. Refer to the following procedure.</i>
2	When the waveguide will be connected from the left side of the equipment, different SJ cables. provide for the transducer connection.



Note: : SJ cable connector-lock metal and screw bolt.

#### Waveguide Connection in Up Direction

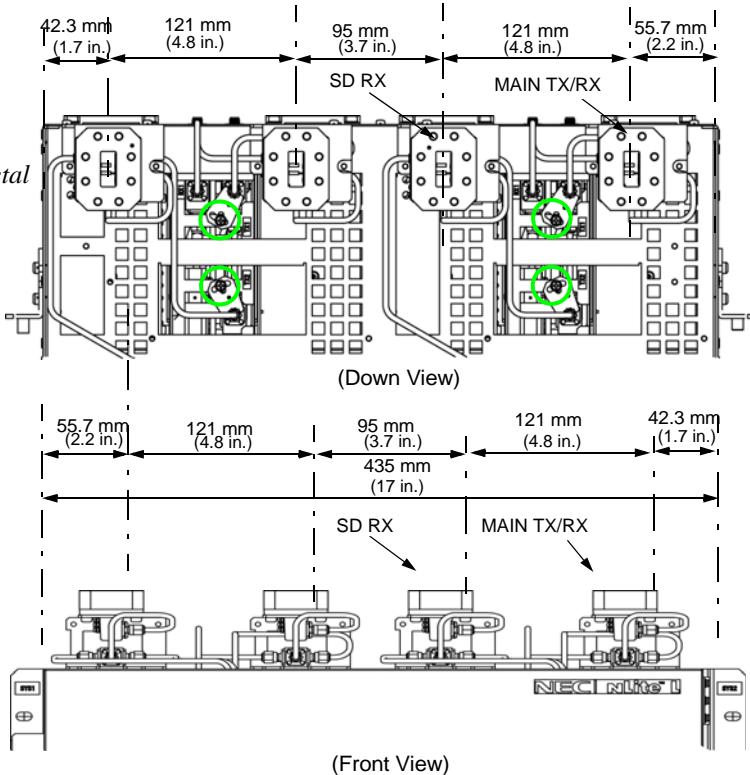
Note: : SJ cable connector-lock metal and screw bolt.

- (5) Tighten two screw bolts to fix the transducer to the shelf,
- (6) Connect the SJ cable to the transducer and tighten the SJ cable connectors with the torque wrench,

Note: Being careful, tighten alternately and gradually either end connectors of the SJ cable.

Tightening torque: 0.6 N·m.

- (1) Using torque wrench, loosen connectors of the SJ cable(s) connected between the BR CKT and transducer.  
(The same SJ-cable(s) are reused.)
- (2) Disconnect the SJ cable from transducer side only.
- (3) Loosen two screw bolts holding the transducer and remove the transducer.
- (4) Turn the transducer and fit the through-hole to the holding screw hole.



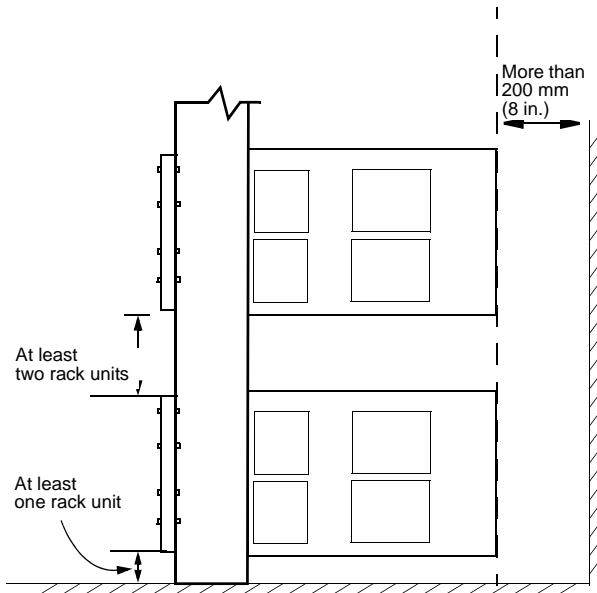
#### Waveguide Connection in Rear Direction

**Chart 3-10 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 3 Align the TRP to the mounting position on the 19-inch rack.

*Note: To mount the TRP in a 19-inch rack above other equipment, leave space for two rack units at the bottom to allow heat from the NLite N to radiate.*

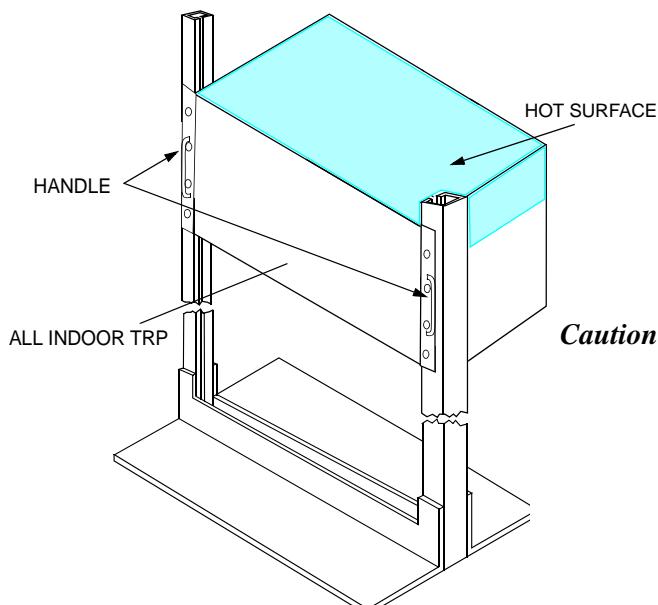
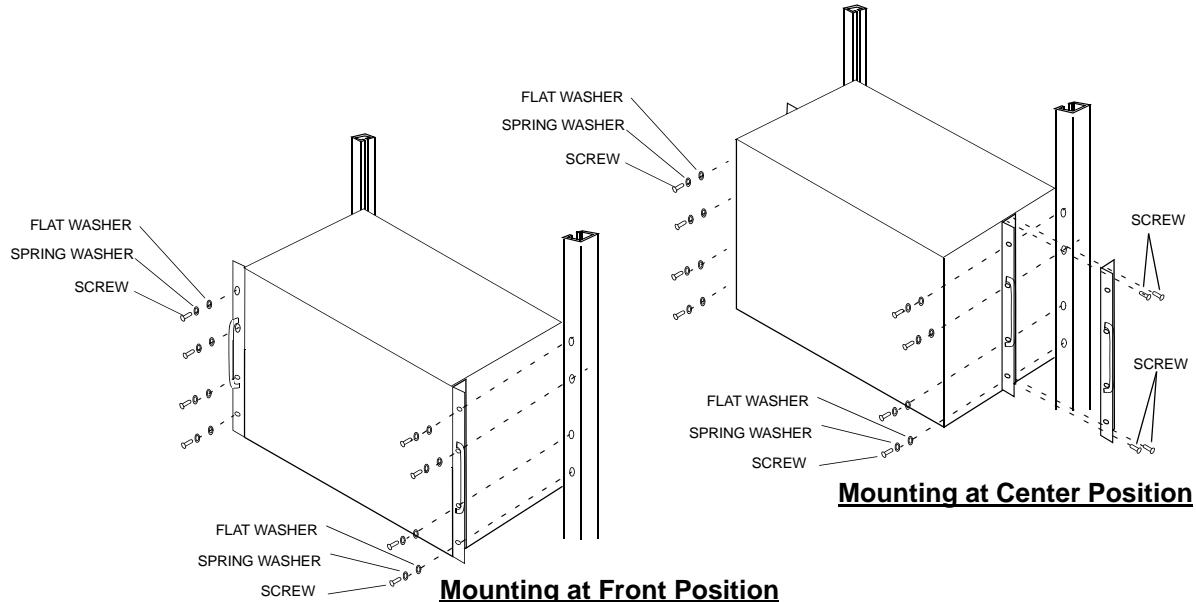


- 4 Holding both handles and bottom of the TRP using two persons, mount it into the rack,
- 5 Using a screw driver, tighten four screw bolts to fix the TRP at left and right sides,

**Chart 3-10 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
-------------	------------------

- 6 When the TRP is close to the wall (within 200 mm (8 in.)), move two fixture brackets to center position on both sides of the equipment. (four screws are used for each side)



**Caution:** *Install the equipment in the place that is a restricted access location in compliance with UL60950-1.*

*When the TRP is installed in a place of unrestricted access, open space above TRP is more than two rack unit (approximately 90 mm). Also, keep the environment temperature lower than +104°F (+40°C).*

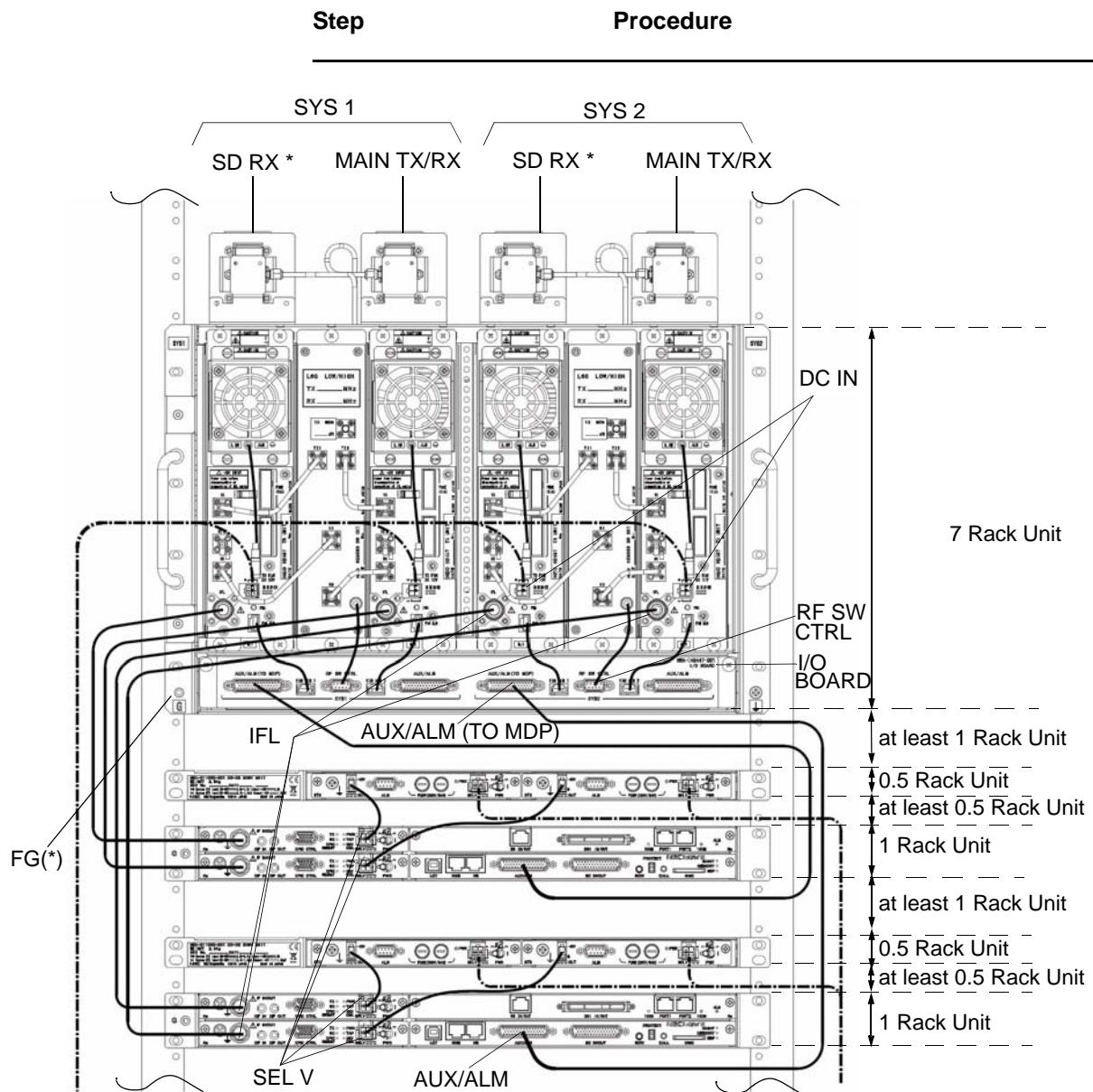
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**Chart 3-10 (Cont'd)**

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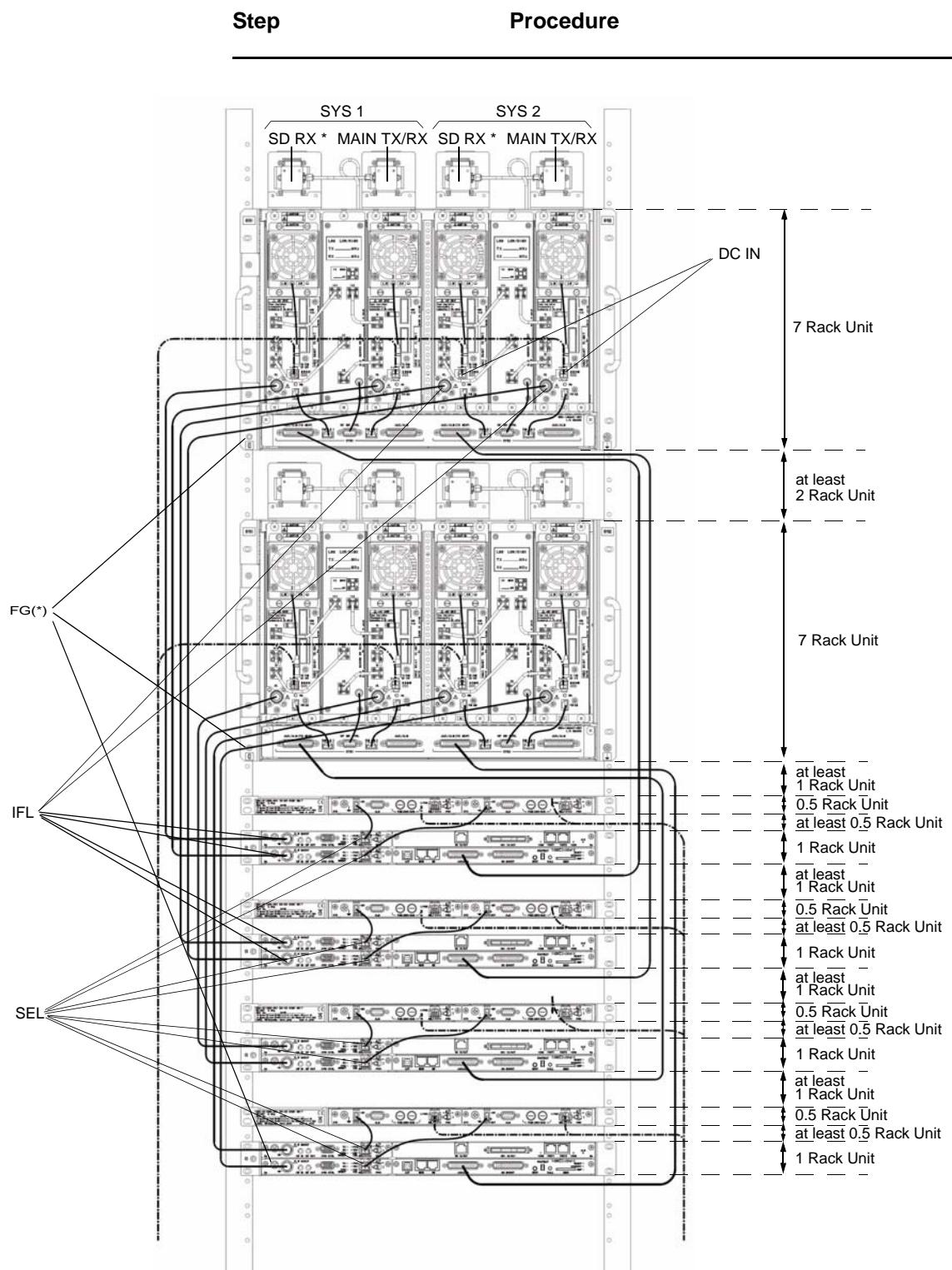
<b>Step</b>	<b>Procedure</b>
7	Connect the frame ground cable (*) to the "FG" terminals on the TR UNIT and the MDP,
8	Connect to between the RF SW CTRL connectors on the I/O BOARD (TRP) and the CTRL UNIT (MDP) using an exclusive cable,
9	Connect to between the CLUSTER ALM/AUX connectors on the I/O BOARD (TRP) and the CTRL UNIT (MDP) using an exclusive cable,
10	Connect an IFL cable to between IFL connectors on the TR UNIT and MDP,
11	Connect signal cables to the appropriate connector on the I/O BOARD and the CTRL UNIT using,
12	Connect the power supply cable to the DC IN connector on the TR UNIT.
13	Connect the power supply cable to the SEL V connector on the MDP,

Chart 3-10 (Cont'd)



Note: (\*)5 mm square cable (more than 2.5 mm diameter cable) (AWG#10 cable) is recommended for frame ground. The proper press fix terminal tool shall be used.

Chart 3-10 (Cont'd)



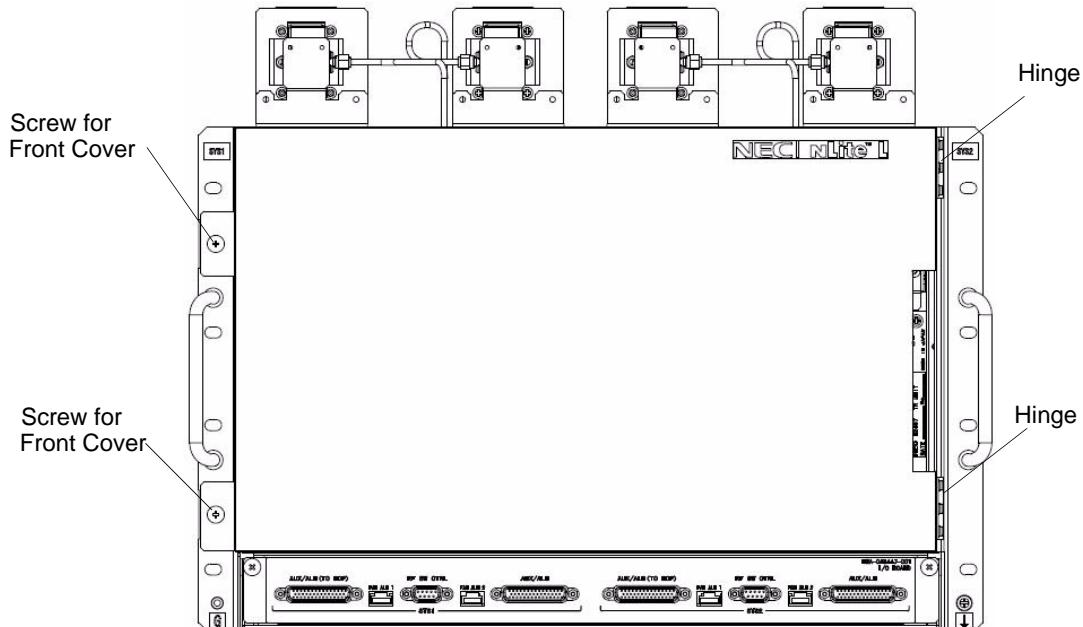
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**Chart 3-10 (Cont'd)**

---

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

- 14 Attach the front cover to the equipment with two hinges and tighten two screws.



### 3.6.1 TRP Demounting (ALL INDOOR TRP)

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

---

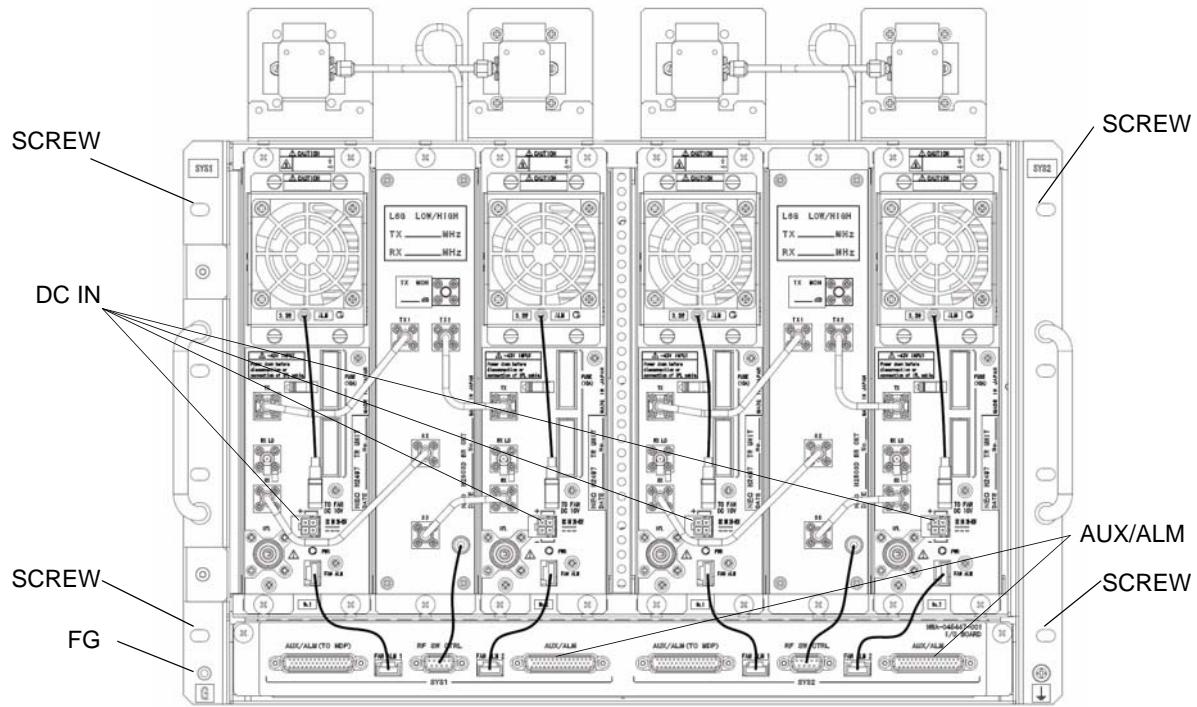
**Chart 3-11 TRP Demounting**

---

<b>Step</b>	<b>Procedure</b>
1	Remove front cover from the TRP,
2	Turn off the power switch of the MDP No.1 and No.2.,
3	Turn off the DC power to the TRP and disconnect power supply cables from the DC IN jack on the TR UNIT No.1 and No.2,
4	Disconnect IFL cables from the TR UNIT No.1 and No.2,
5	Disconnect a cable from the RF SW CTRL connector on the I/O BOARD,
6	Disconnect a cable from the CLUSTER ALM/AUX connector on the I/O BOARD,
7	Disconnect waveguide feeder from the transducer,
8	Disconnect ground cables from “FG” terminal on the TRP,
9	Remove the four (or eight) holding bolts from both sides of the TRP,
10	Remove the TRP from the rack.

## INITIAL LINE UP

ROI-S07045



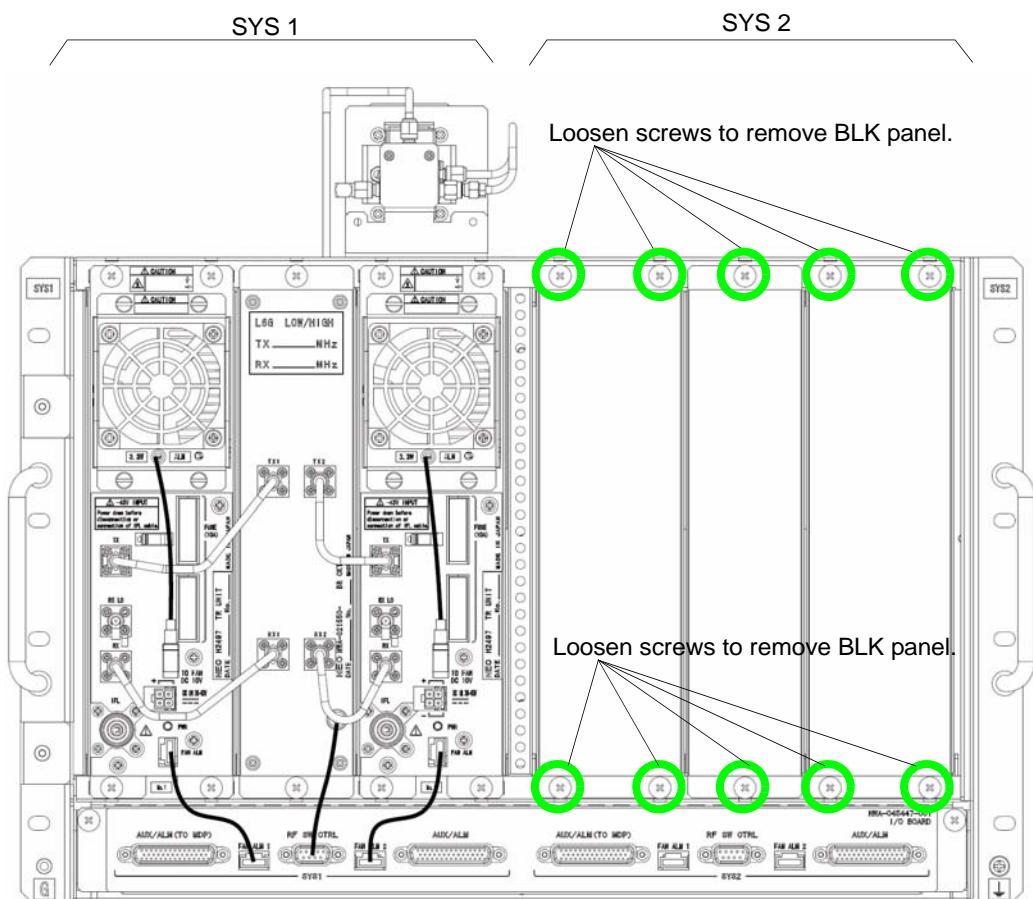
*Note: Before demounting the TRP equipment from the 19 inch rack, wait for a while until cool down the TRP.*

### 3.7 System Expansion (ALL INDOOR TRP)

The expansion procedure for the TRP is explained in Chart 3-12. The TRP may be expanded in the SYS2.

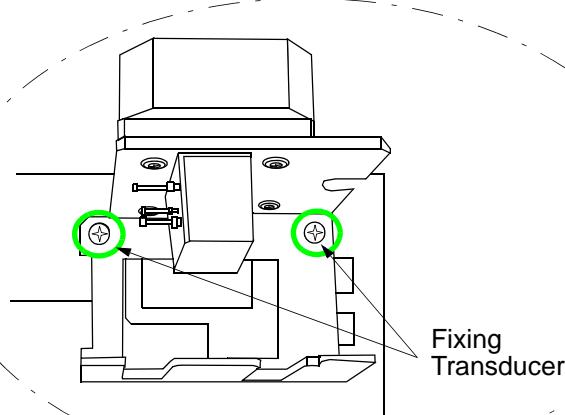
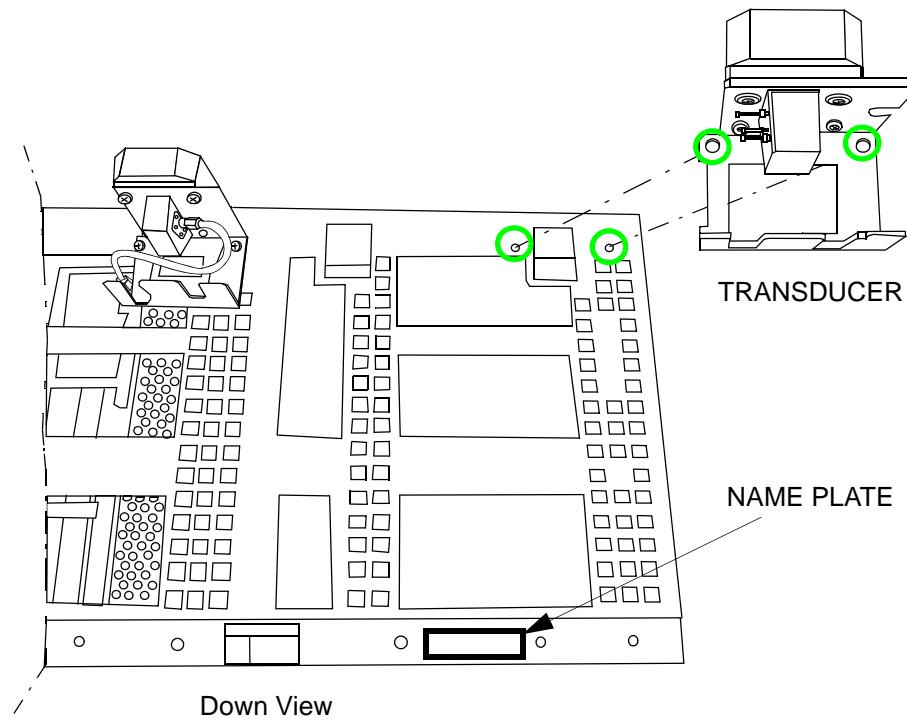
**Chart 3-12 Expansion Method for TRP (ALL INDOOR TRP)**

Step	Procedure
1	Loosen screws of the blank panels of the SYS2 of the TRP to be expanded,



**Chart 3-12 (Cont'd)**

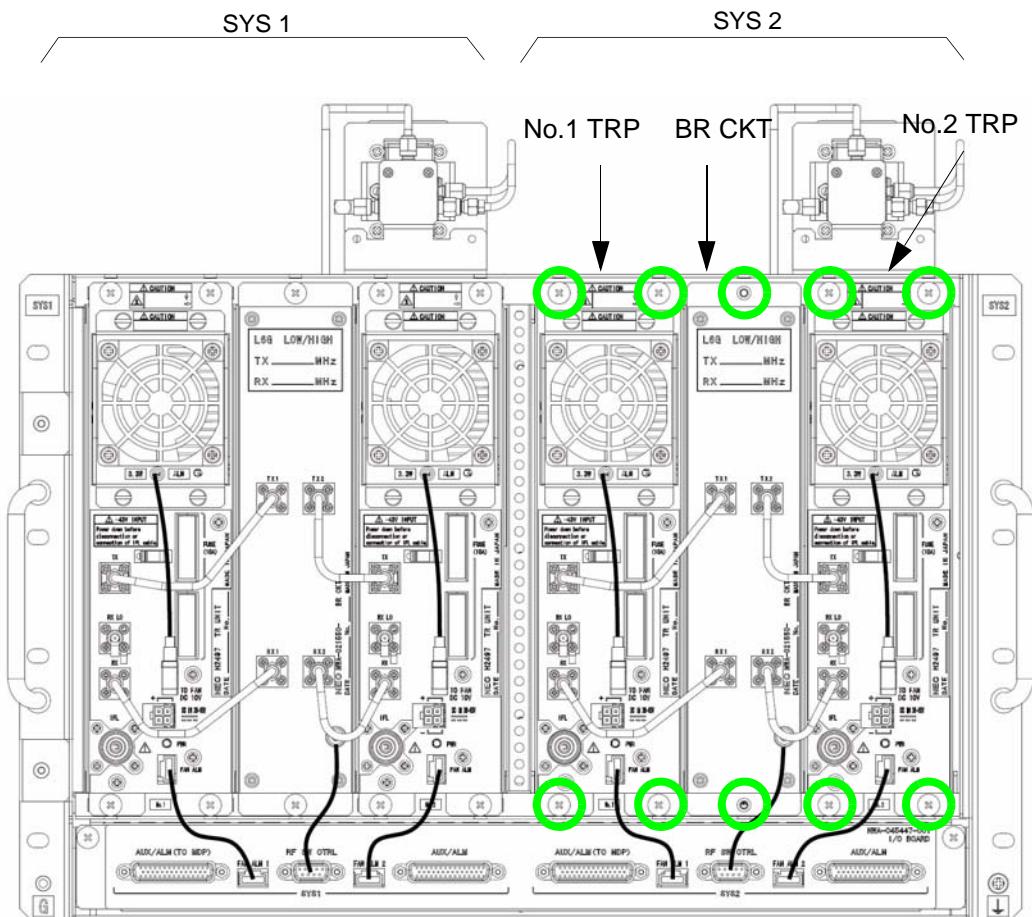
<b>Step</b>	<b>Procedure</b>
2	Using a screw driver, tighten two screws to fix the transducer for SYS2 at the rear side of the shelf,
3	Put the name plate on the shelf as shown in figure below,



○ : Tighten screws, using screw driver.

**Chart 3-12 (Cont'd)**

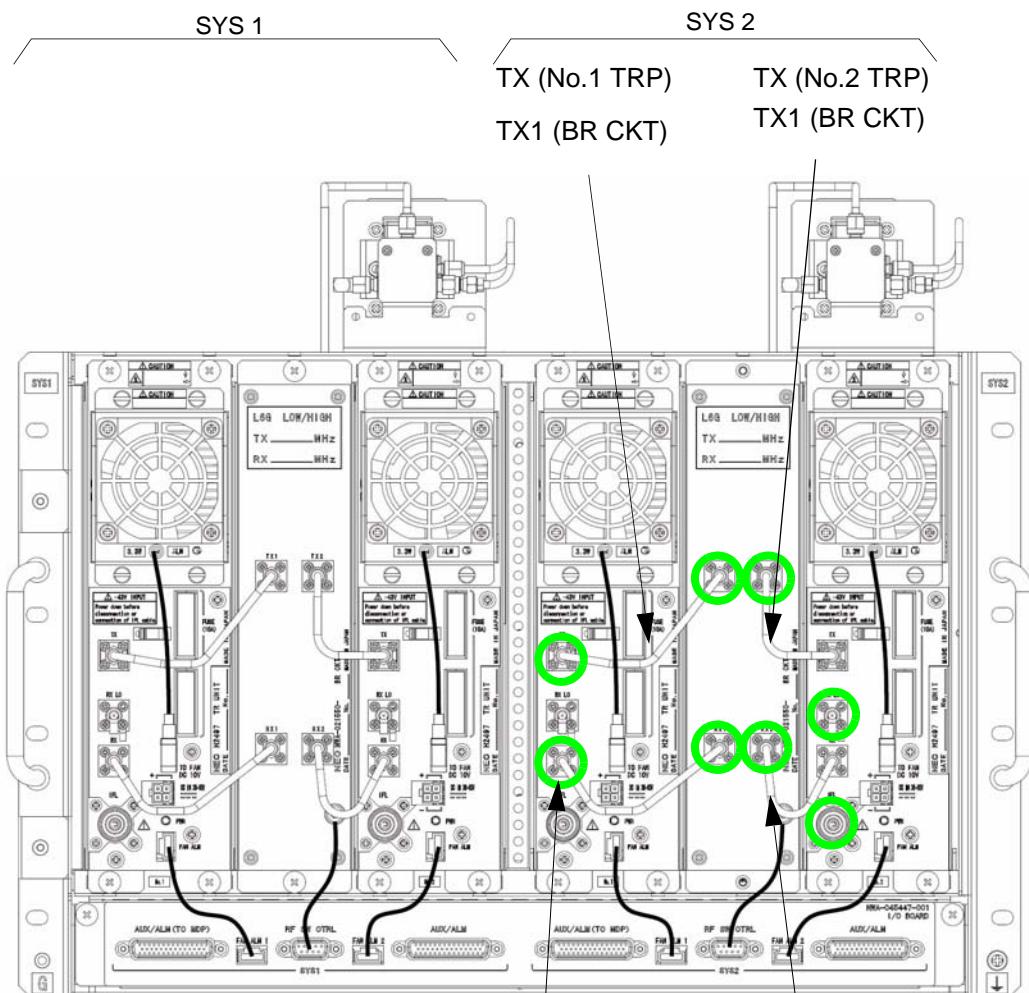
<b>Step</b>	<b>Procedure</b>
4	Align the TR unit and BR CKT to the mounting position in the SYS 2,
5	Using a screw driver, tighten screws at the upper position and lower position of the unit,



○ :Tighten screws, using screw driver.

Chart 3-12 (Cont'd)

Step	Procedure
6	Connect SJ cables between TR unit and BR CKT as shown in figure below,
7	Using torque wrench, tighten SJ cable connectors,

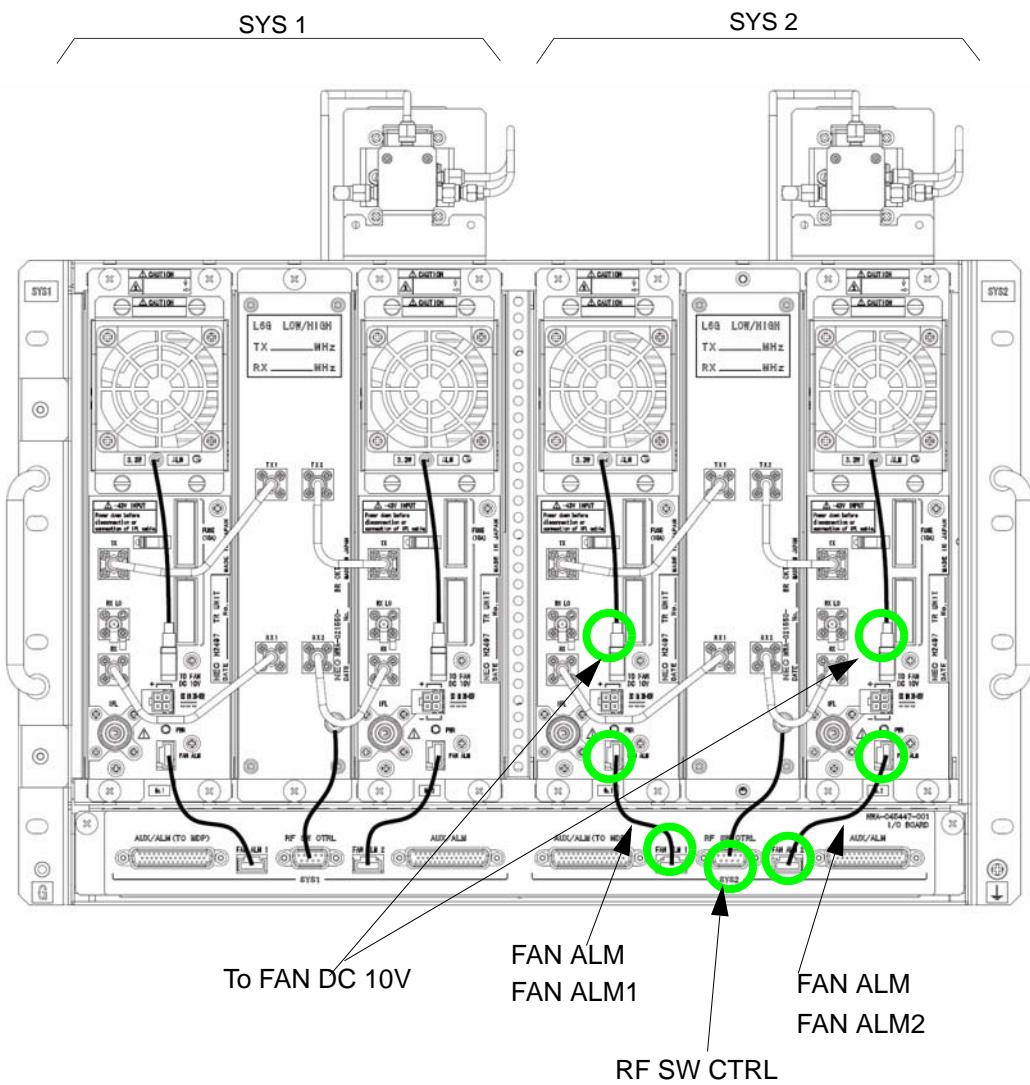


: Tighten screws, using screw driver.  
 Note: Being careful, tighten alternately and gradually either and connections of the SJ cable. Tightening torque: 0.6 N·m.

Chart 3-12 (Cont'd)

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

- 8 Connect FAN power supply cable, FAN ALM cable and RF SW CTRL cable to corresponding connector as shown in figure below,



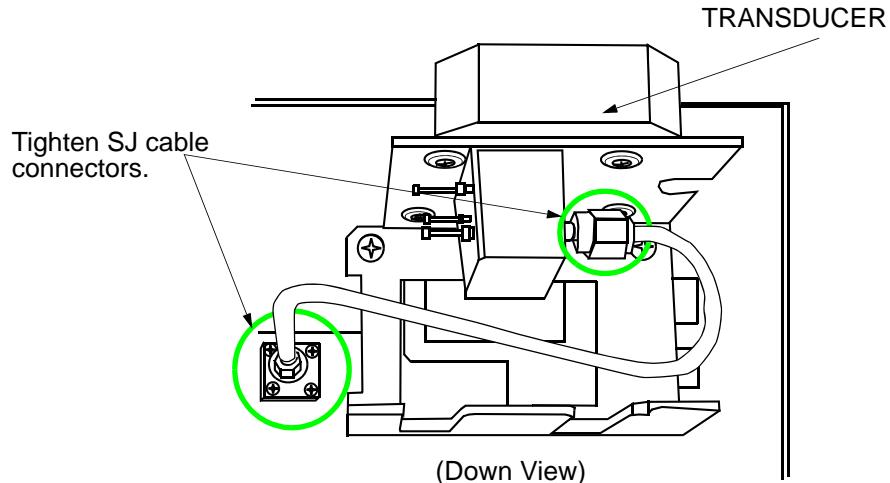
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Chart 3-12 (Cont'd)

---

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

- 9     Connect SJ cable between transducer and BR CKT,  
 10    Using torque wrench, tighten SJ cable connectors,

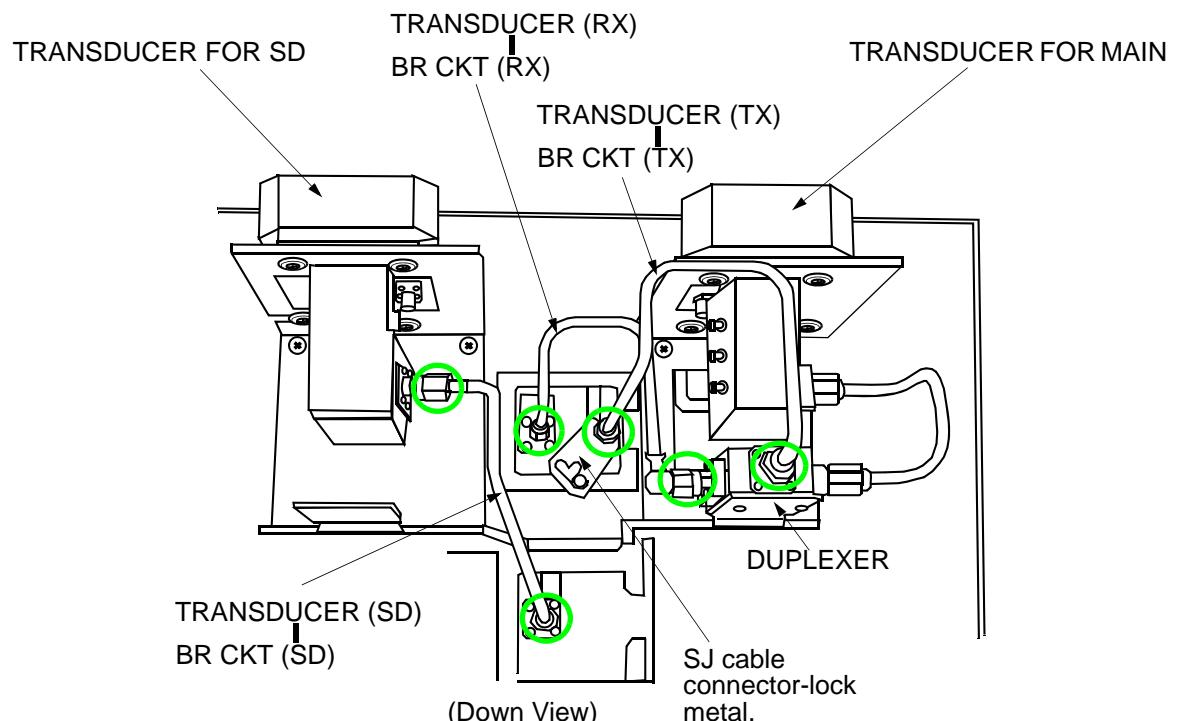


○ : Tighten connectors, using torque wrench.

*Note: Being careful, tighten alternately and gradually either end connectors of the SJ cable. Tightening torque: 0.6 N·m.*

When SYS2 w/o SD.

**Chart 3-12 (Cont'd)**

<b>Step</b>	<b>Procedure</b>
	<p>When the SD configuration applies to the system, connect SJ cables shown in figure below,</p> <p>When the EXP PORT applies to the system, the Duplexer and the SJ cable connector-lock metal are provided,</p>  <p>(Down View)</p>
	<p><i>Note: Being careful, tighten alternately and gradually either end connectors of the SJ cable. Tightening torque: 0.6 N·m.</i></p> <p> : Tighten connectors, using torque wrench.</p>

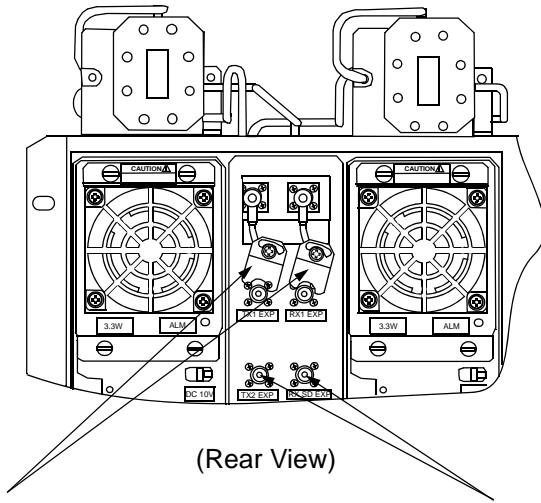
When SYS2 e/w optional SD and EXP PORT.

---

**Chart 3-12 (Cont'd)**

---

<b>Step</b>	<b>Procedure</b>
11	Connect 50-ohm terminator to the EXP PORT on the BR CKT which has EXP PORT, when the EXP PORT is not used,
12	Put on the SJ cable connector-lock metal when the BR CKT which has EXP PORT is provided.

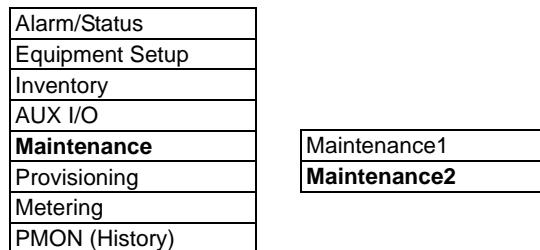


Put on the SJ cable connector-lock metal when the BR CKT which has EXP PORT is provided.

Terminate EXP PORT on the BR CKT which has EXP PORT is provided when the EXP PORT is not used.

**Chart 3-13 PMON Clearing**

<b>Step</b>	<b>Procedure</b>
1	Connect the PC to the LCT port on the NLite N MDP using USB cable, (see Fig. 3-2)
2	Enter Login name “Admin”, enter Admin password and press the “Login” button,
3	Click the “Maintenance” button in LCT Menu,
4	Click the Maintenance2 button,

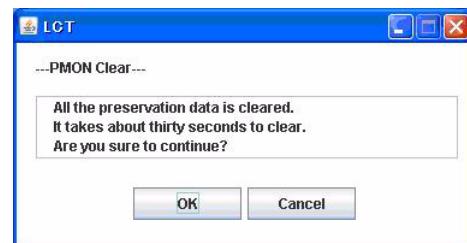
**LCT MENU**

- 5 Then, the “PMON Clear” button is displayed in the Main Area,

---PMON Clear---

PMON Clear

- 6 Click the PMON Clear button,  
7 Click on the “OK” button in the “WARNING” confirmation window,



- 8 Disconnect the LCT from the MDP after the PMON Clearing has been finished.

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