

FURUNO

INSTALLATION HANDBOOK OF FURUNO DEEP SEA EQUIPMENTS



FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

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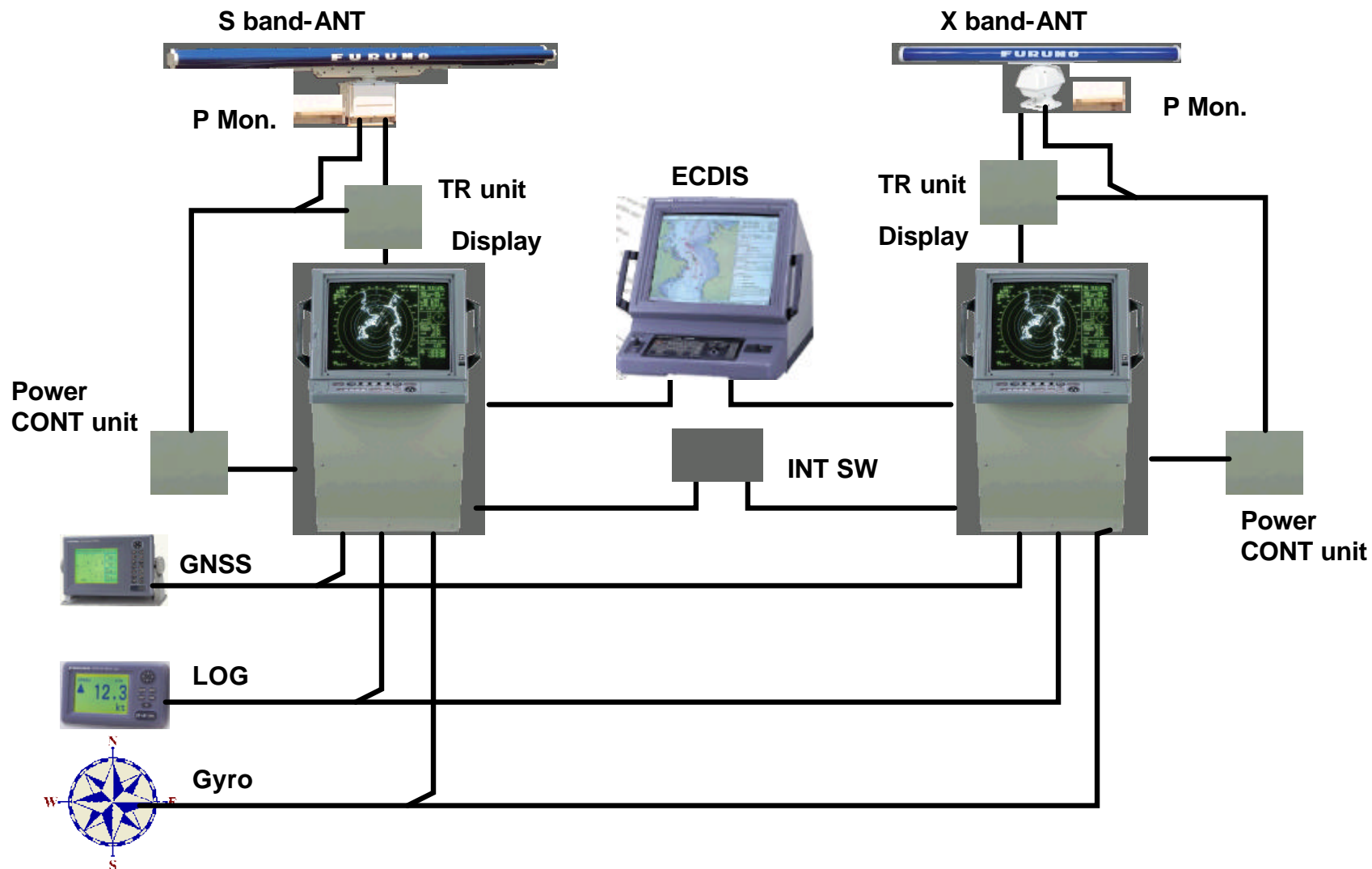
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FAR-2835SW-7AF

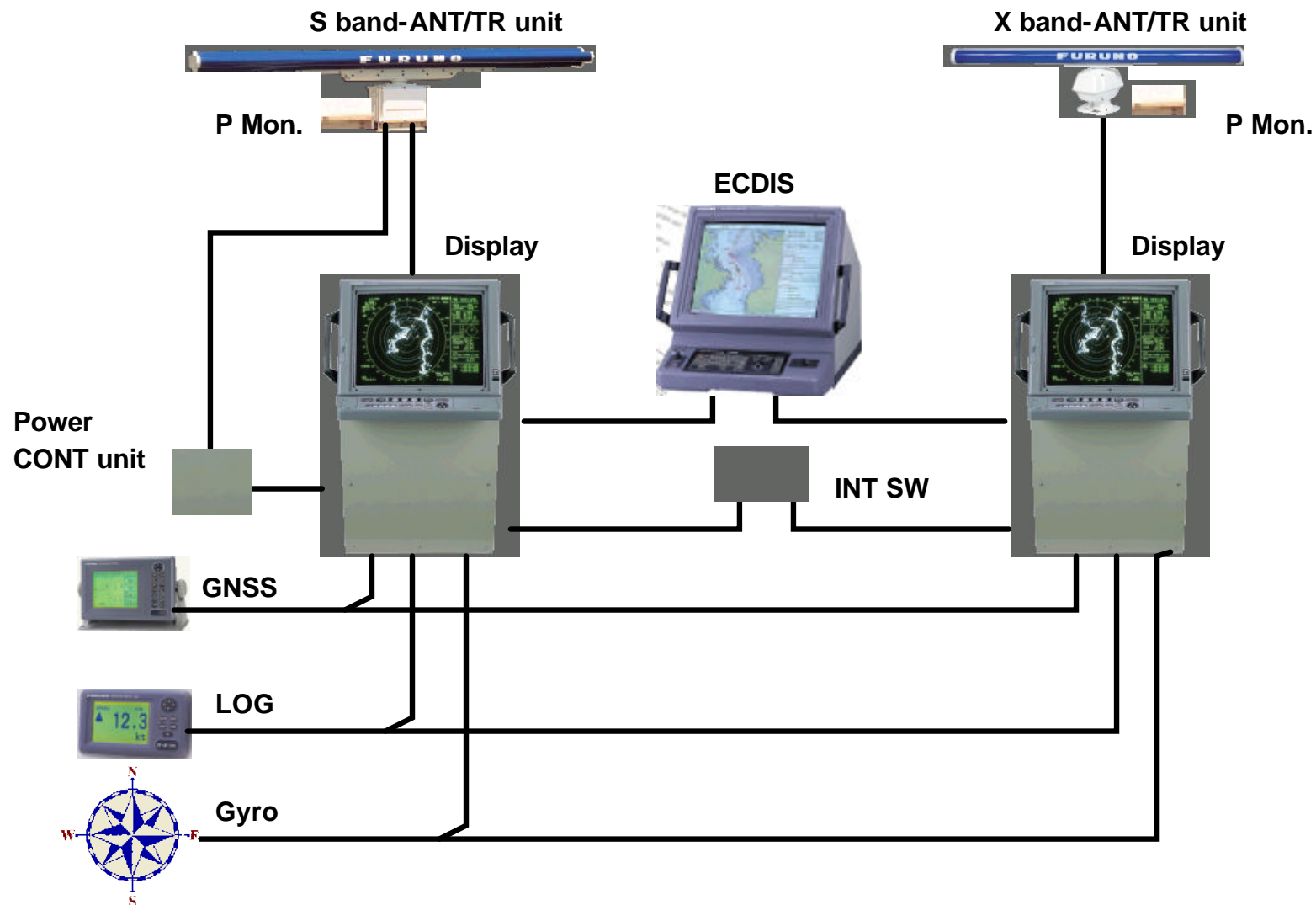
The TR unit installed in W/H.

FAR-2825W-4A



FAR-2835S-7AF

FAR-2825-4A



ANTENNA

Incoming IND.
DIS. Button for TEL
DIS. Button for TLX

TEL

B-FAX

GNSS

Junction BOX

Gyro

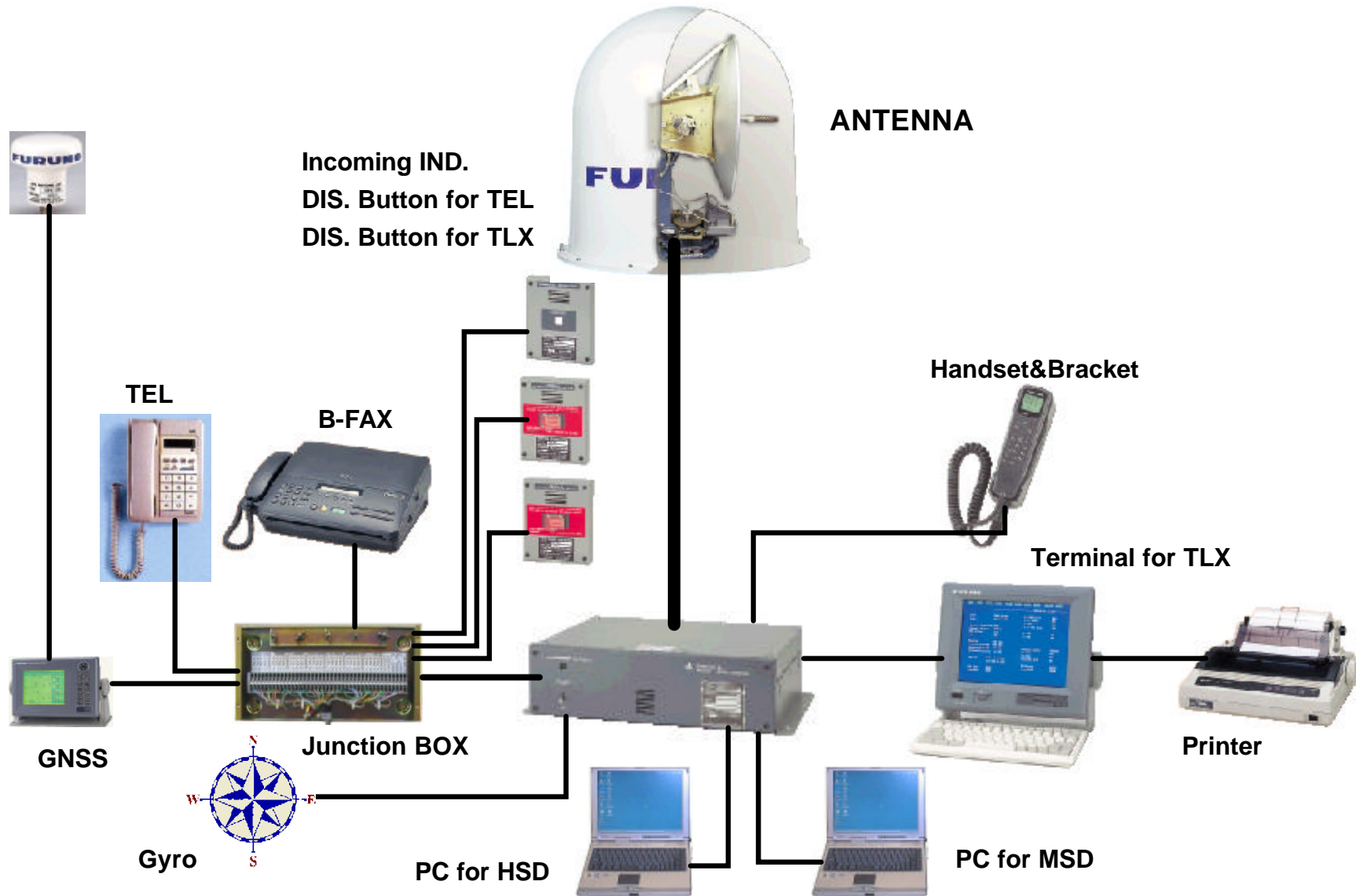
Handset & Bracket

Terminal for TLX

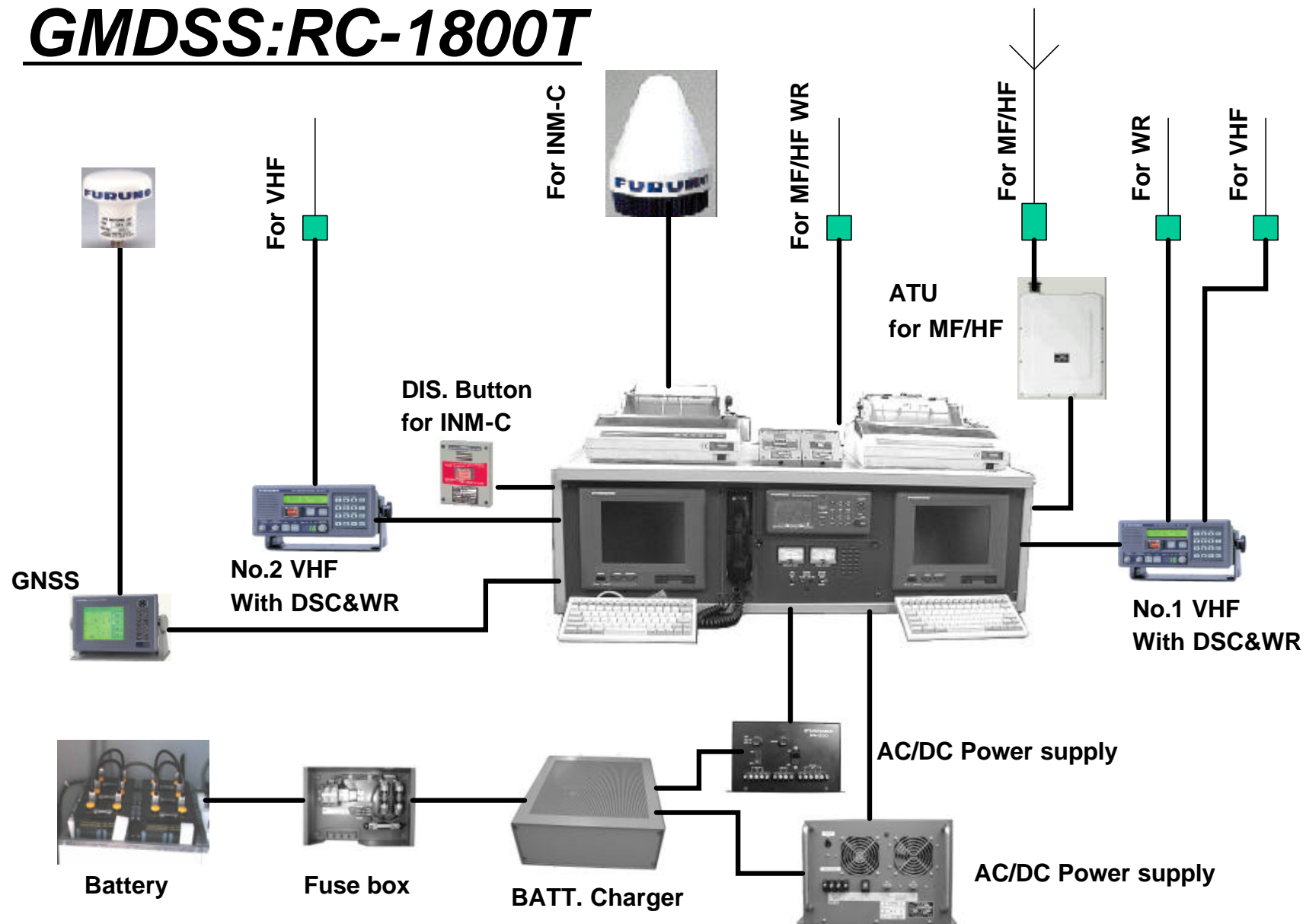
PC for HSD

PC for MSD

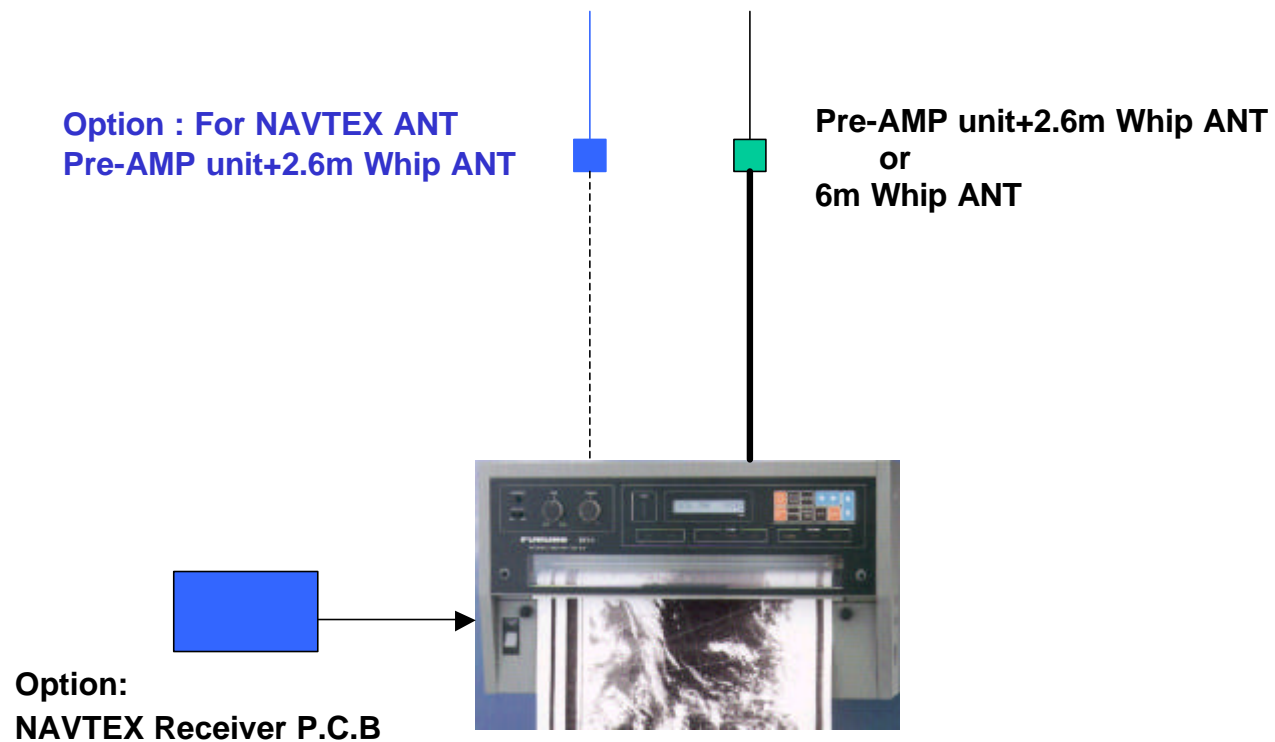
Printer



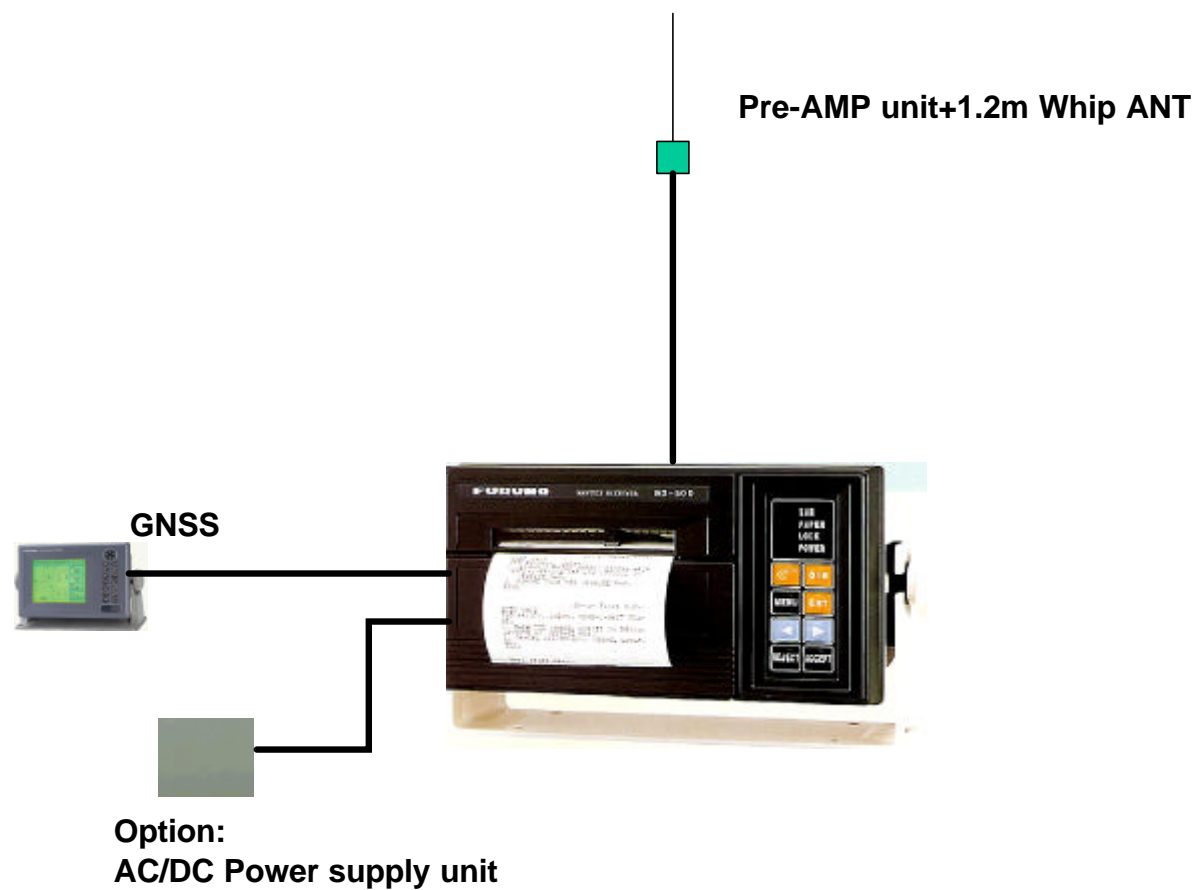
GMDSS:RC-1800T



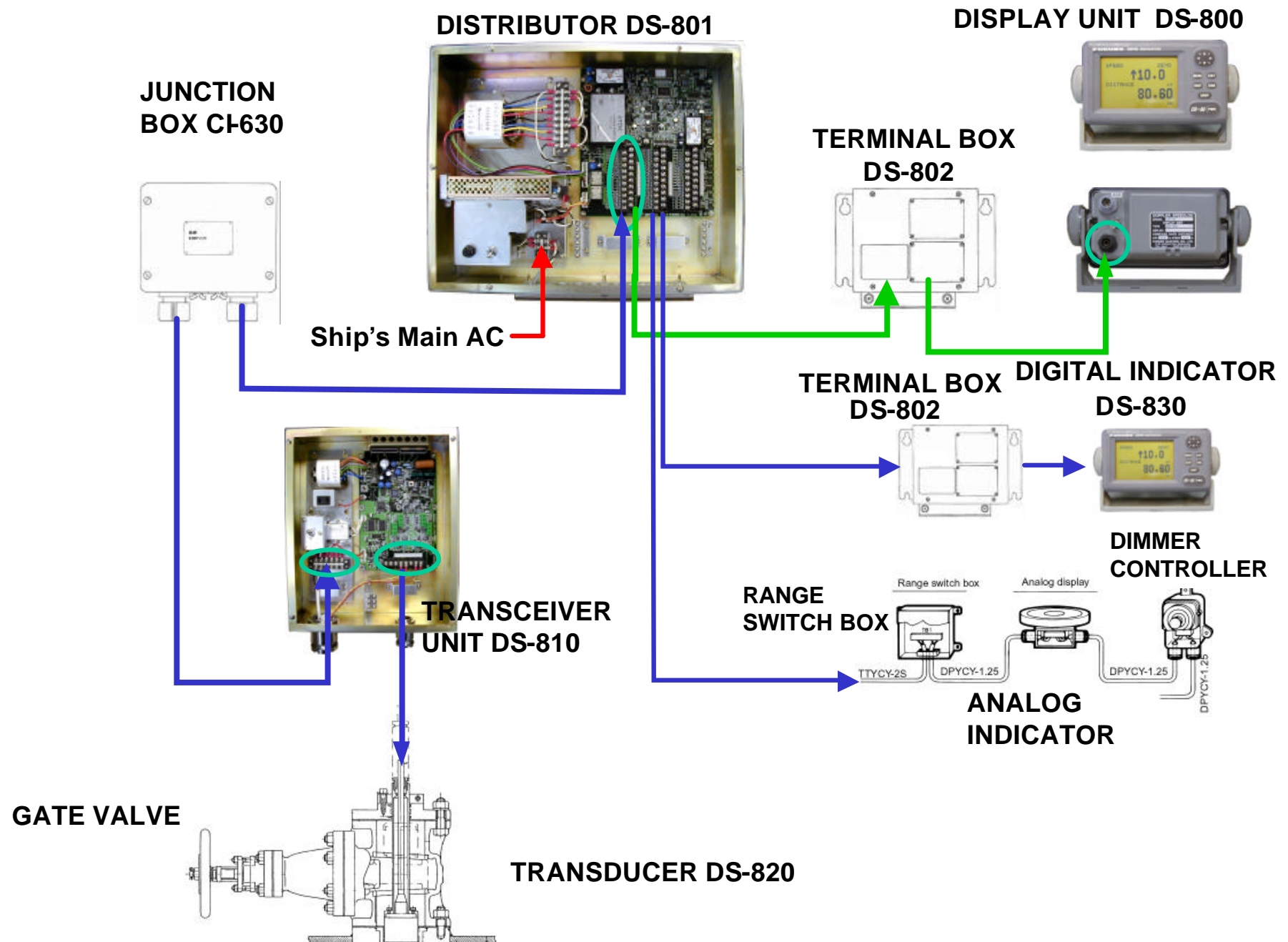
Weather FAX: FAX210/214/215



NAVTEX Receiver: NX-500

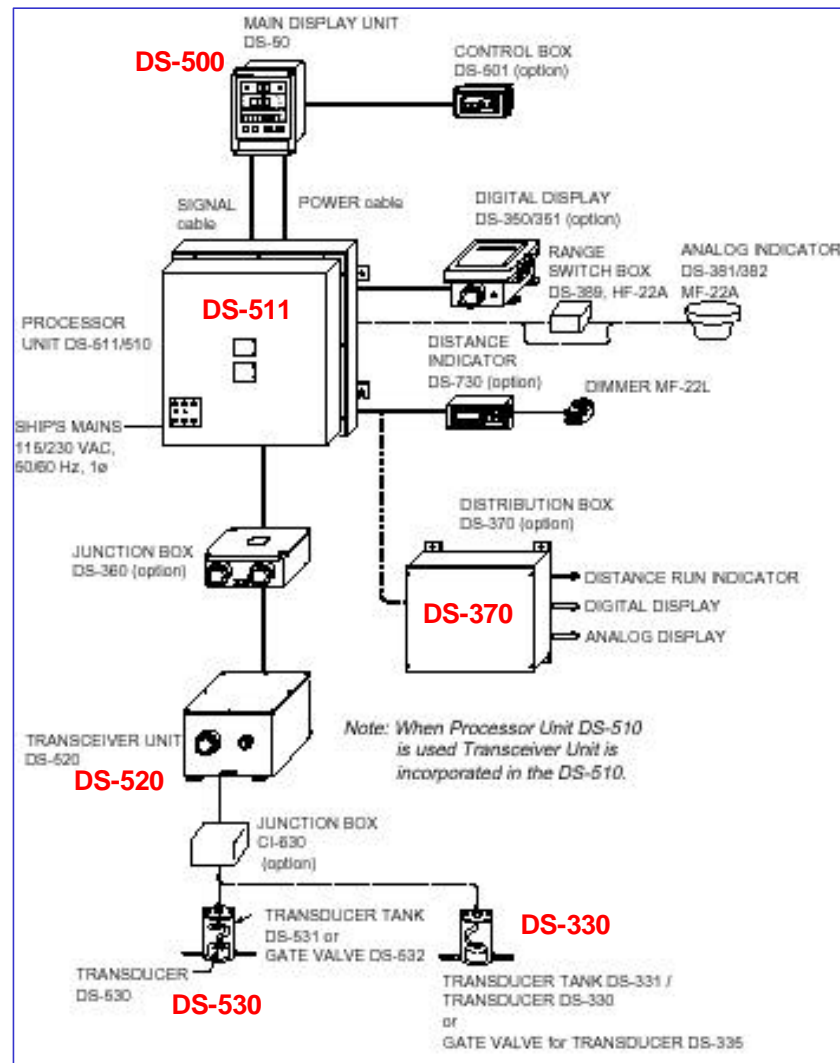


DOPPLER SPEEDLOG: DS-80

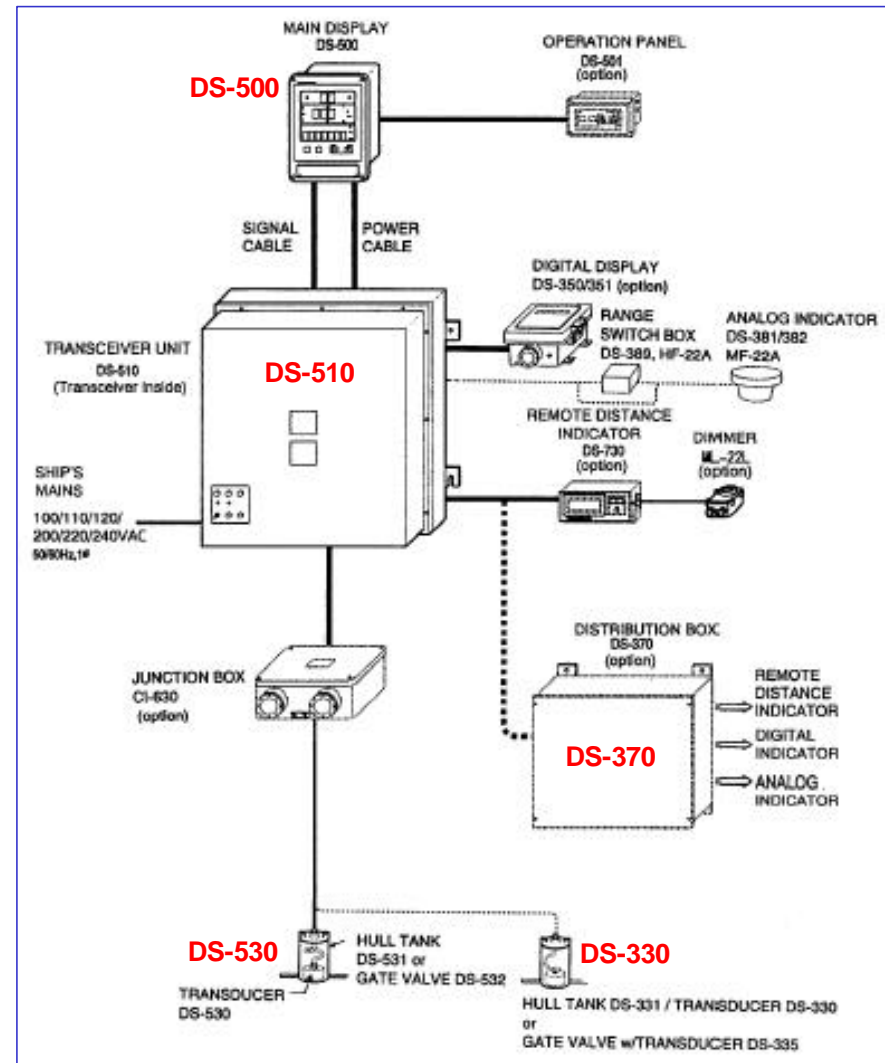


DOPPLER SPEEDLOG: DS-50

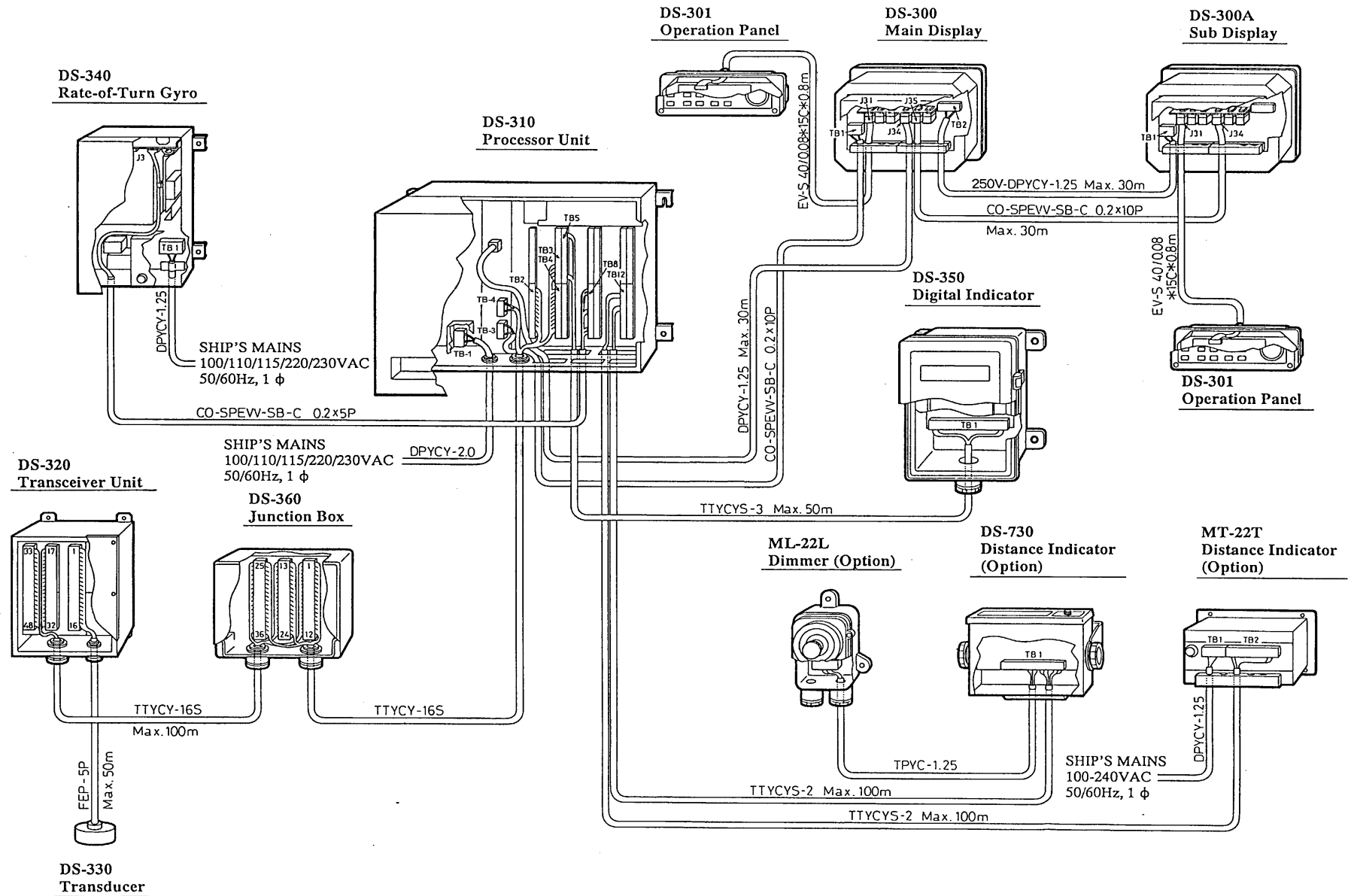
Processor and Transceiver Units Separate Type.



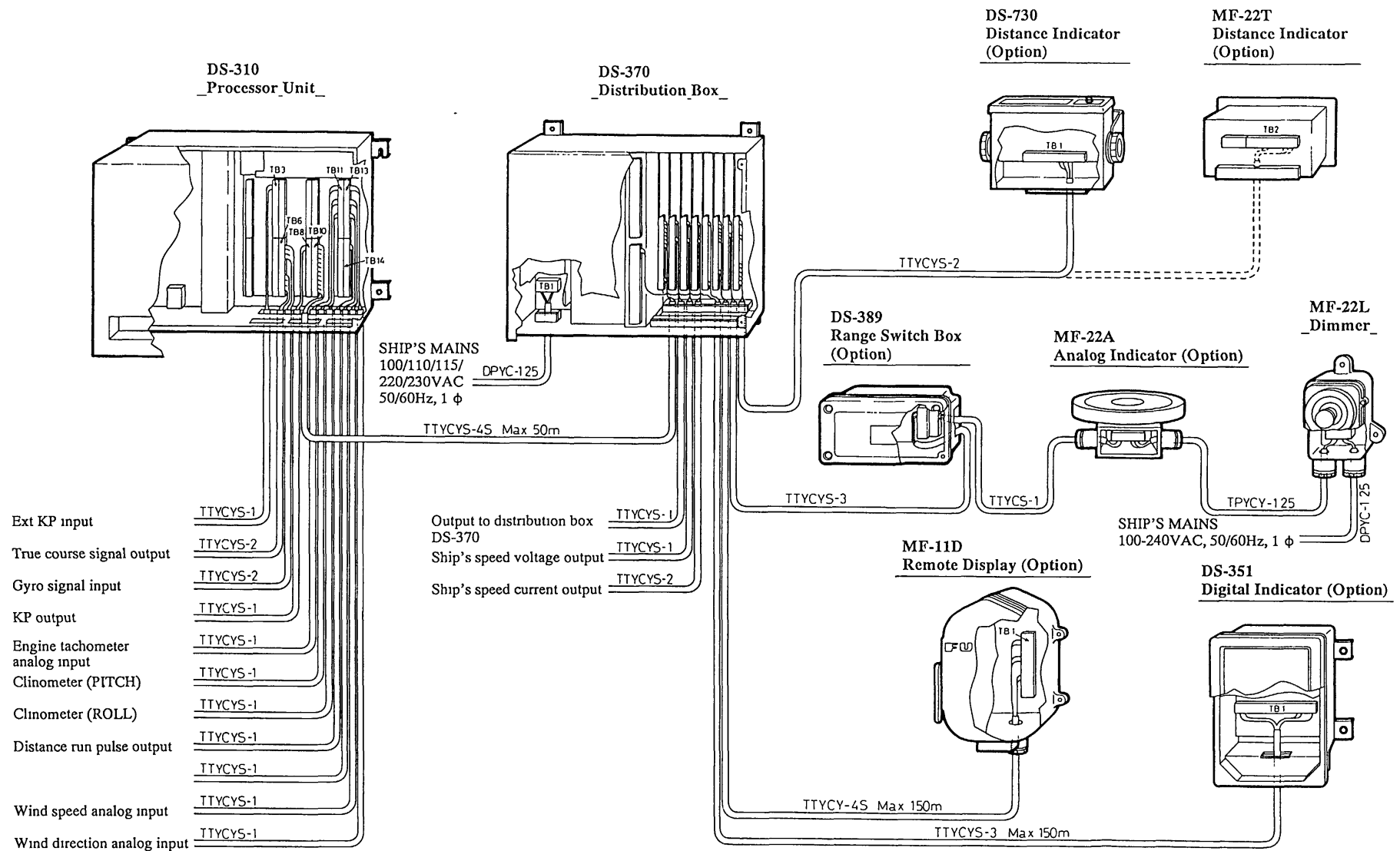
Processor and Transceiver Units Combination Type.



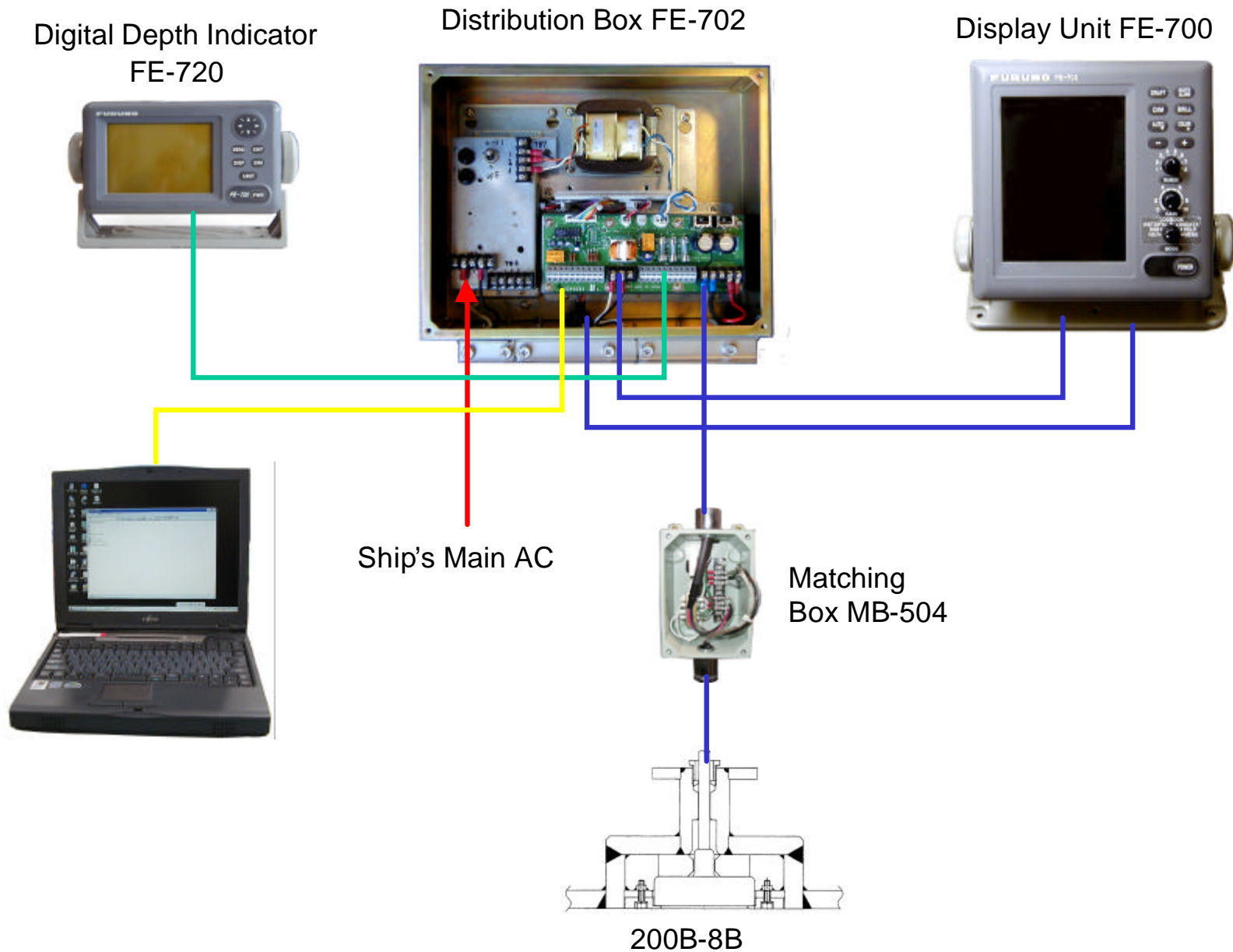
DOPPLER SPEEDLOG: DS-30



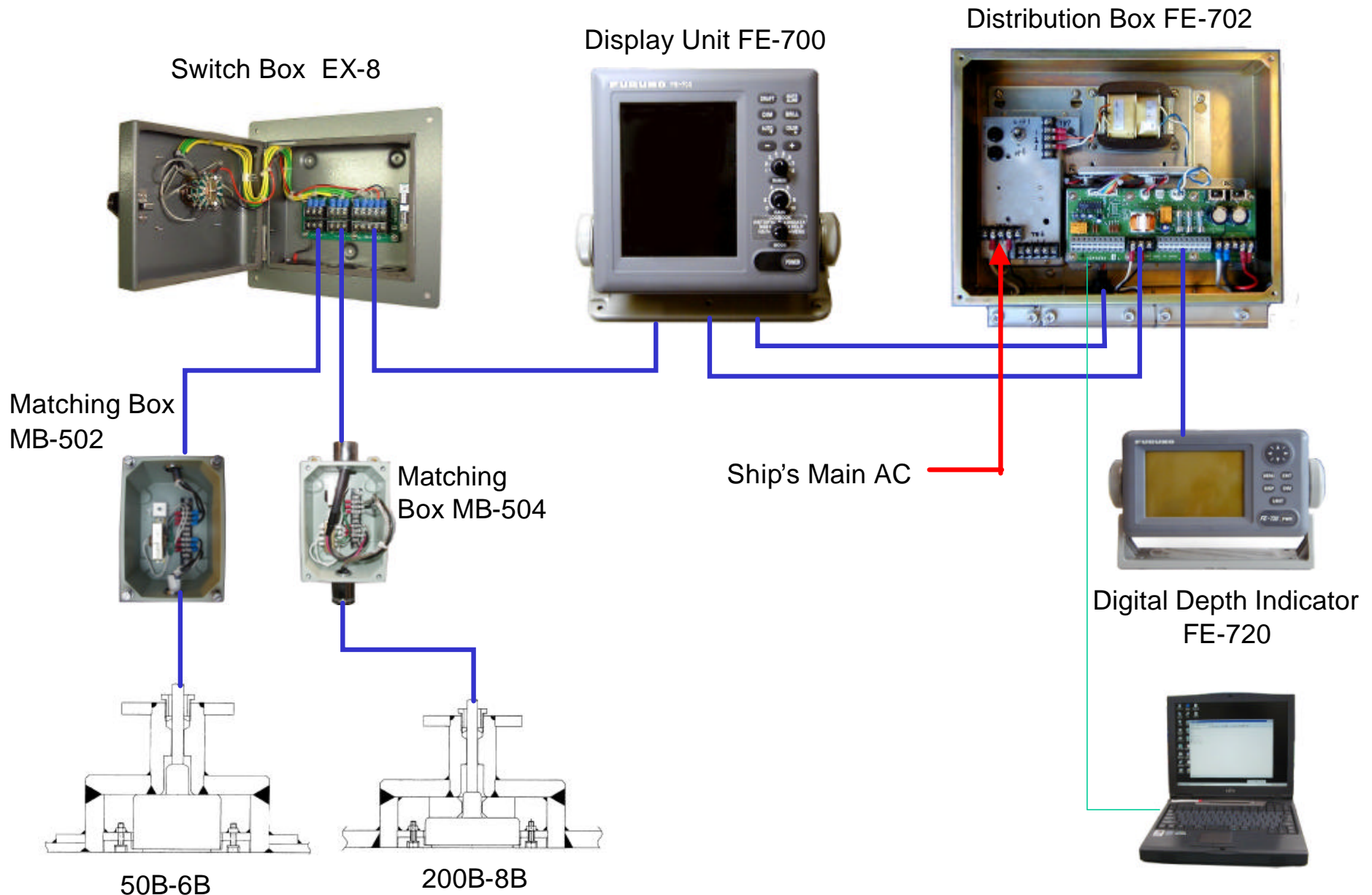
DOPPLER SPEEDLOG: DS-30



NAVIGATIONAL ECHO SOUNDER: FE-700



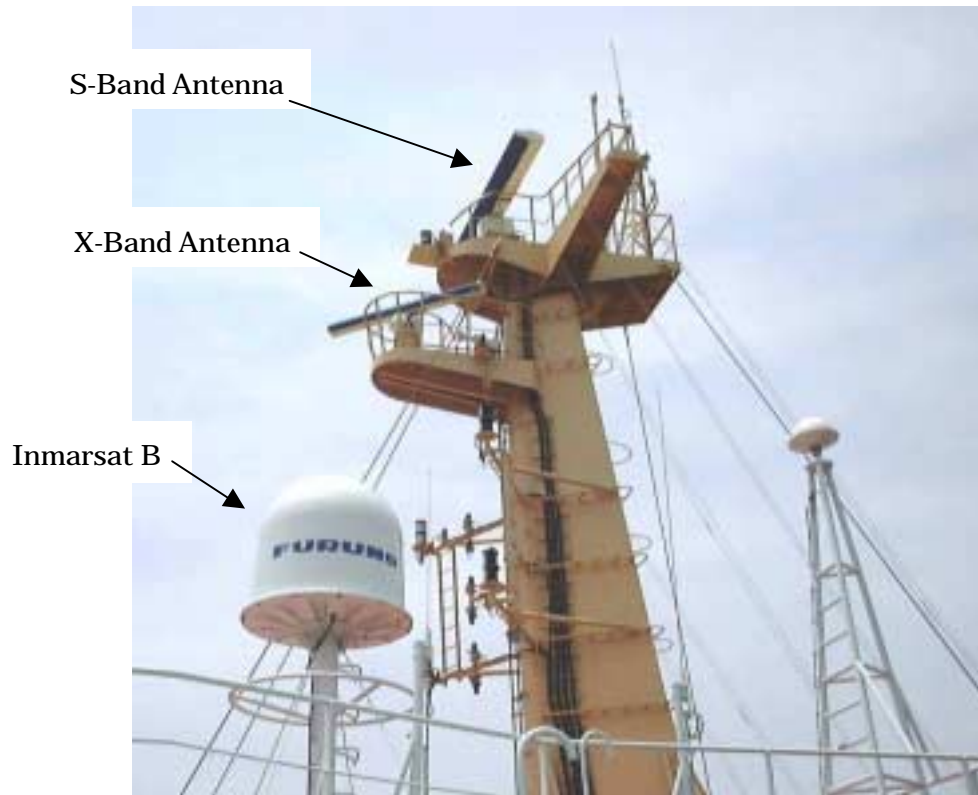
NAVIGATIONAL ECHO SOUNDER: FE-700



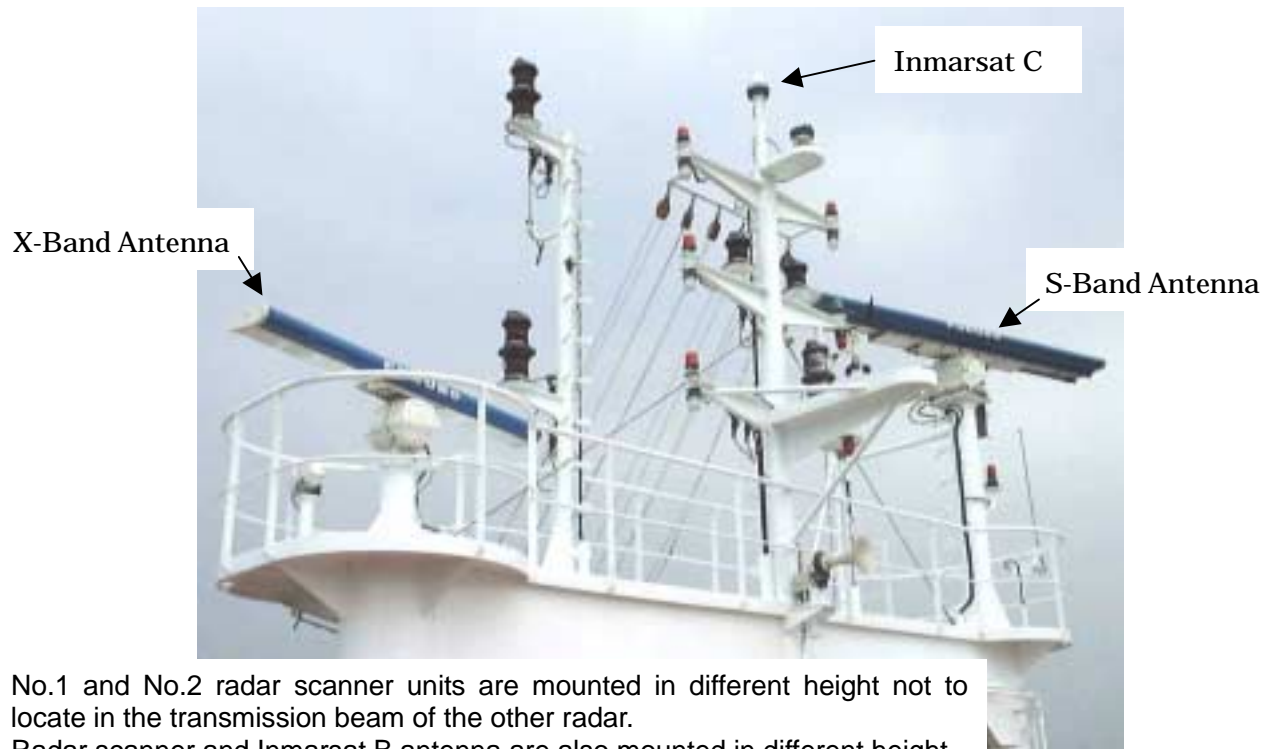
Chapter 1. Radar scanner unit

1.1 Radar scanner mast

Example of a radar scanner mast



Example of a radar scanner mast, enlarged



- 1) No.1 and No.2 radar scanner units are mounted in different height not to locate in the transmission beam of the other radar.
- 2) Radar scanner and Inmarsat B antenna are also mounted in different height.

Fig. 1-2 Radar scanner mast, enlarged

1.1.1 Mounting X-band radar antenna unit

The scanner unit must be placed on the corrosion proof rubber mat supplied.

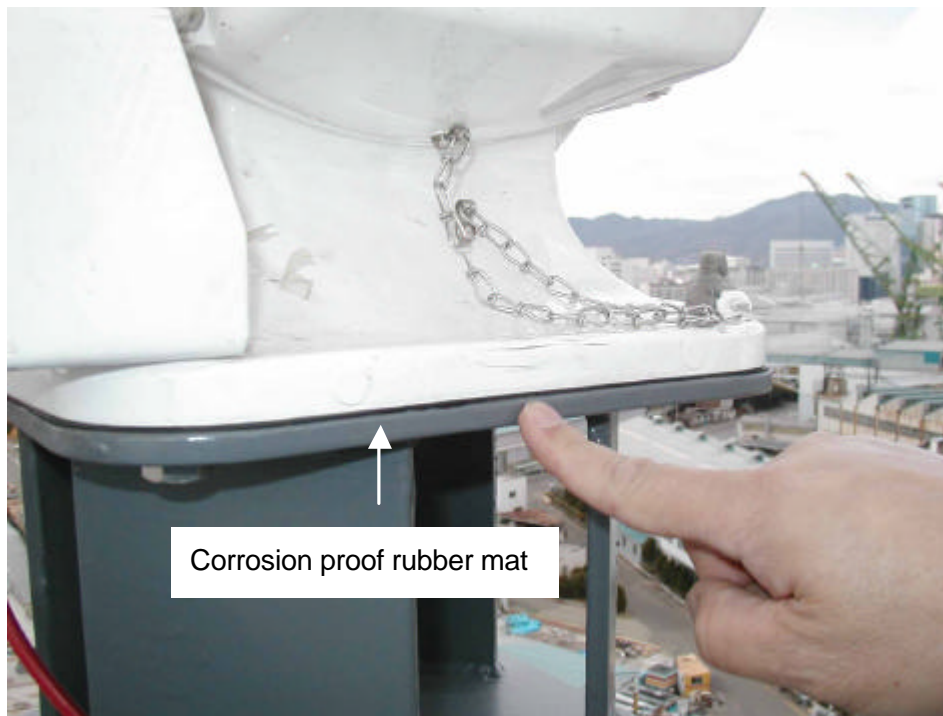


Fig. 1-3 Corrosion proof rubber mat

Bolts and nuts must be coated with anticorrosive silicone sealant.



Fig. 1-4 Applying silicone sealant

1.1.2 X-band radar (TR-UP Type)

Apply silicone sealant on to grounding points and terminals.



Fig. 1-5 Applying silicone sealant



Fig. 1-6 Cable entry of scanner base

1.1.3 Terminal board in X-band scanner unit

Antenna cable is connected to the terminal board in the scanner unit. The connection is made by referring to the interconnection diagram in the installation manual. Bind cables with cable ties for a better appearance.

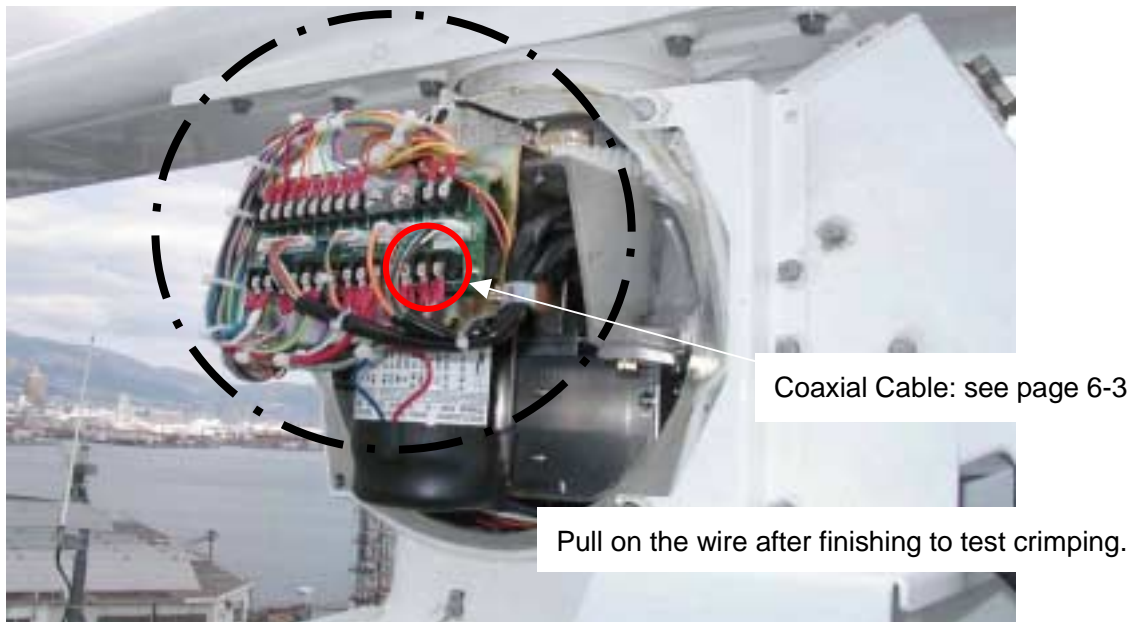


Fig. 1-7 Terminal board in X-band scanner unit

1.1.4 Performance monitor on X-band scanner unit

Figure below shows the performance monitor fitted on the scanner unit.



Fig. 1-8 Performance monitor on X-band scanner unit

1.1.5 S-band scanner unit

Ground the scanner unit securely. Apply silicone sealant over grounding point and terminal.



Fig. 1-9 Grounding scanner unit

Tighten the cable gland securely. Use pate for waterproofing.

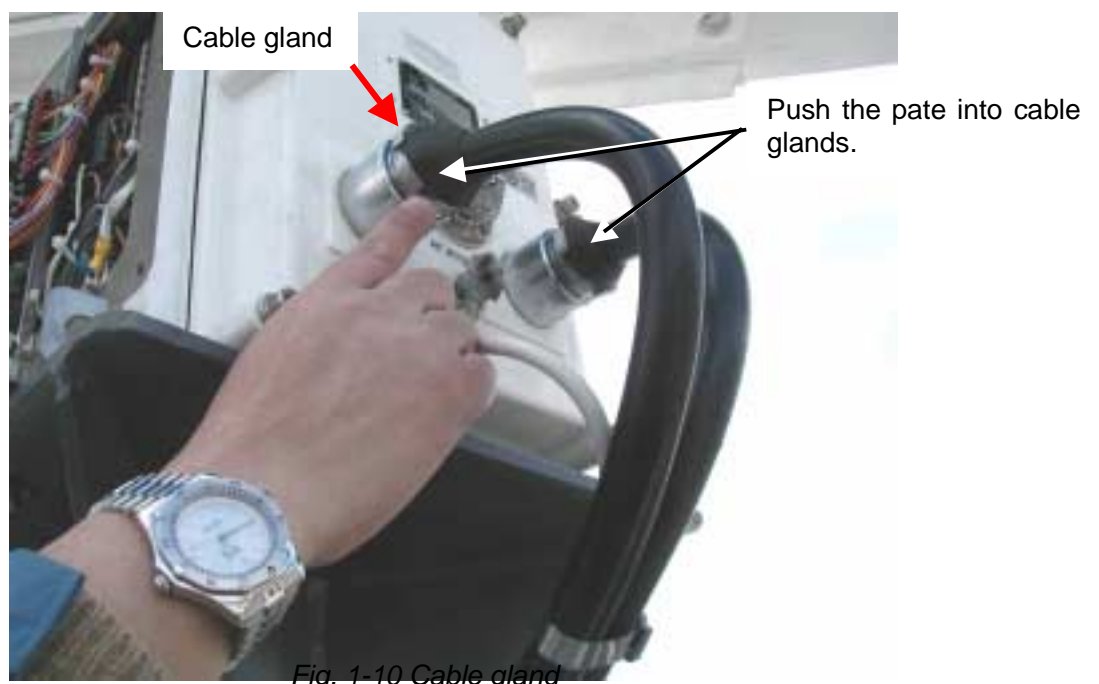


Fig. 1-10 Cable gland

1.1.6 S-band scanner unit

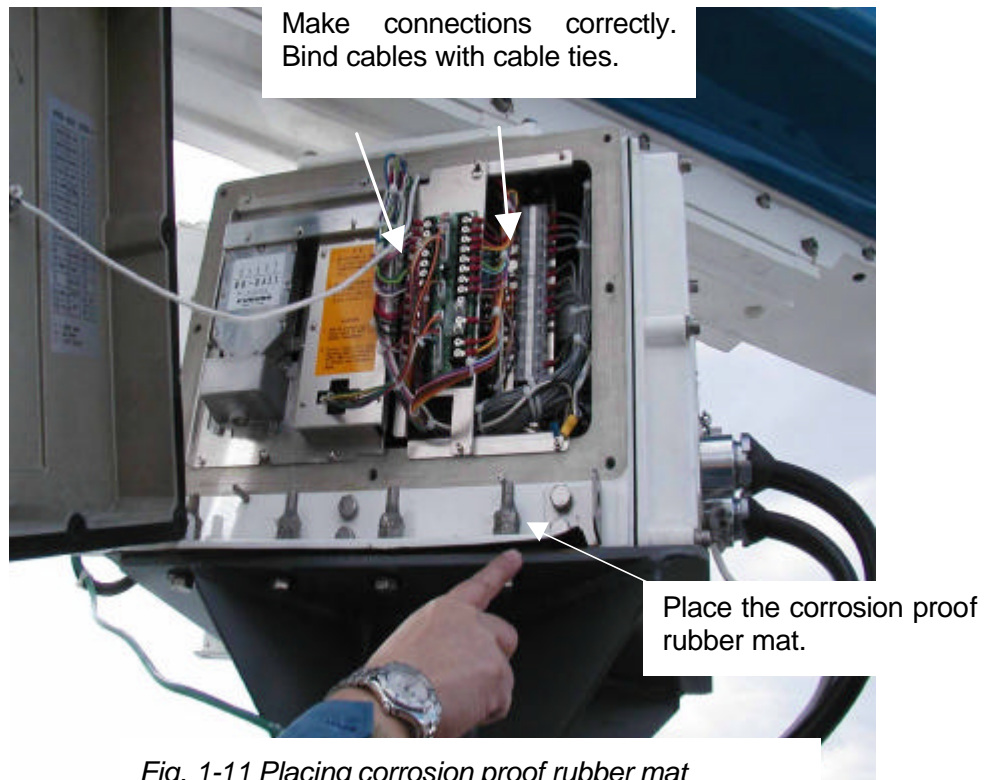


Fig. 1-11 Placing corrosion proof rubber mat

After the connection, tighten screws by following arrows in the figure below.

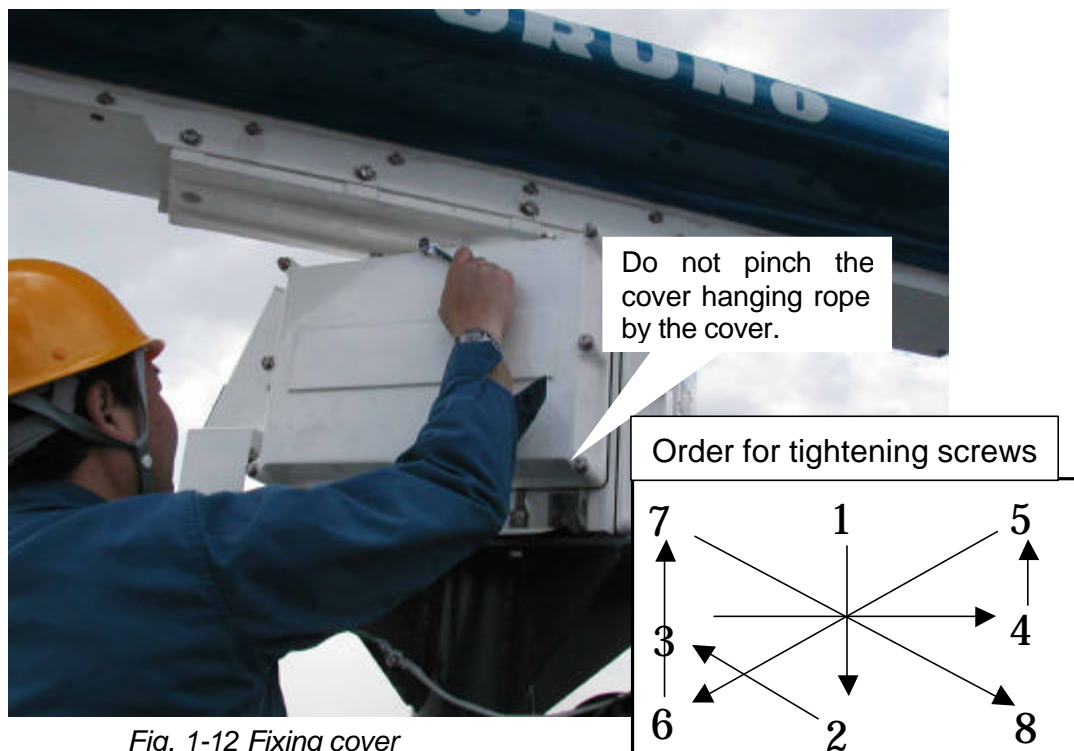


Fig. 1-12 Fixing cover

1.1.7 S-band scanner unit

The performance monitor is fixed as below.



Fig. 1-13 S-band scanner unit with performance monitor fitted.

1.2 How to work on X-band waveguide

Necessary tools

If necessary, order these tools to FURUNO. See xx for FURUNO code number.



Fig. 1-14 Tools needed

No	Item	Type	No	Item	Type
1	FR-90 power tool	03S9199	8	File	L-150
2	Brush		9	Heavy duty snips	No.150
3	Gauge (Square)	03-009-0534-0	10	Edge gauge	03-009-0530-0
4	Wrench	For M4	11	Tapes	Vinyl and waterproofing tapes
5	Knife	DK-N	12	Silicone rubber	1211
6	Hack saw	HFJ-12	13	Wooden hammer	
7	Saw	250x24	14	Tool box	# 2207

Flexible waveguide flange - Antenna side

The connector of the antenna side has been factory-fitted.

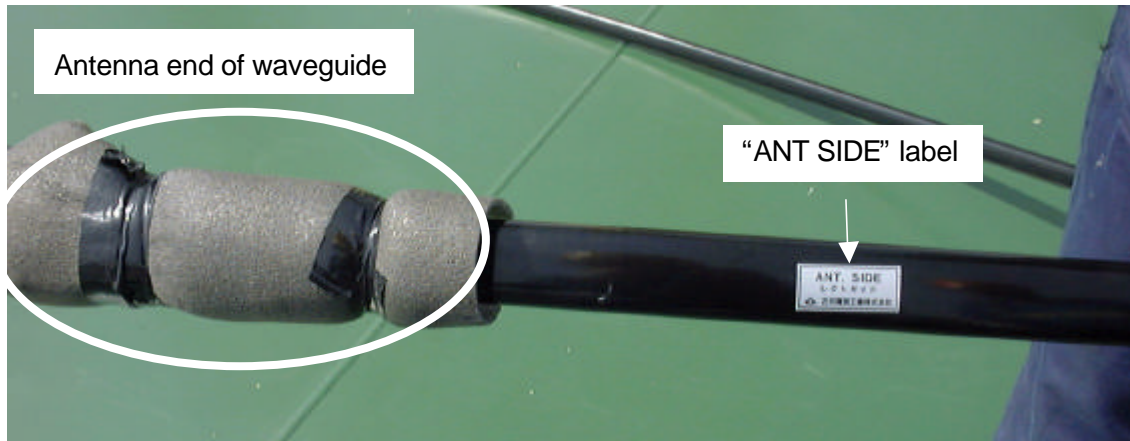


Fig. 1-15 Flexible waveguide, antenna side

Flexible waveguide flange - Transceiver side

Cut the waveguide to length at this end.

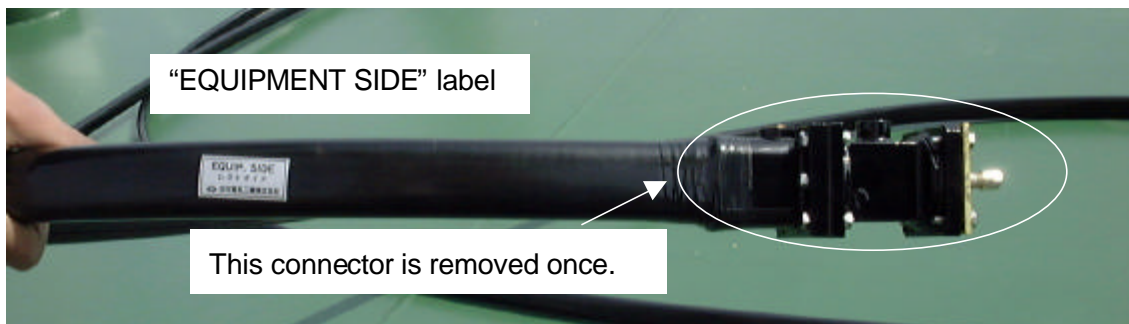


Fig. 1-16 Flexible waveguide, transceiver side

Lying waveguide

Following bending radius must be taking into account to prevent the waveguide from being damaged.

Minimum bending radius

E plane bend: 200 mm

H plane bend: 400 mm



Fig. 1-17 Lying waveguide

Cutting waveguide

Cut the waveguide at the height of the TR unit.



Fig. 1-18 Cutting waveguide

Waveguide Termination

Connect the connector referring to the chapter 7.

Cut off the jacket (sheath) 40 mm.



Fig. 1-19 Waveguide termination

When fix the connector, use standard tool.



Fig. 1-20 Widening waveguide opening

Good and bad examples of waveguide flange fitting

Good example) Appropriate tool is used.

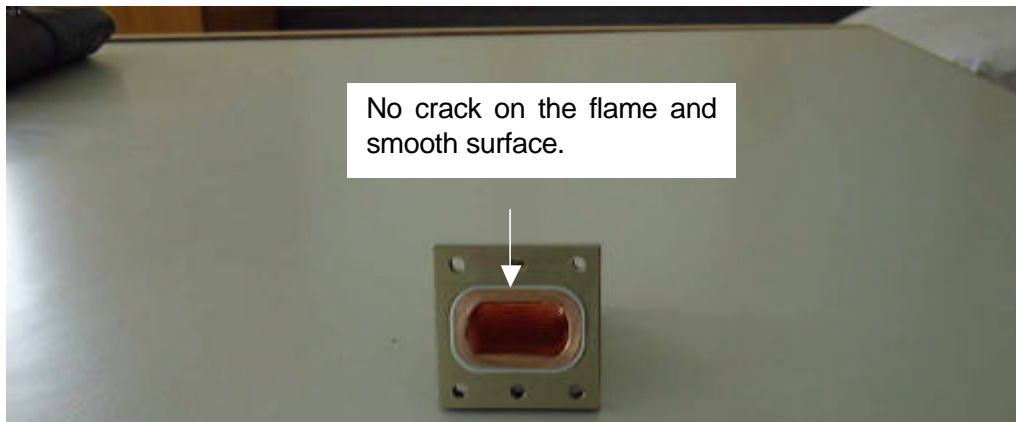


Fig. 1-21 Good example

Bad example) Appropriate tool is not used.



Fig. 1-22 Bad example

Radar performance degrades if the flange is fitted inadequately.

After fitting the connector, apply the silicone rubber from filling opening, then tape the waterproofing tape. Then, tape vinyl tape over the waterproofing tape.

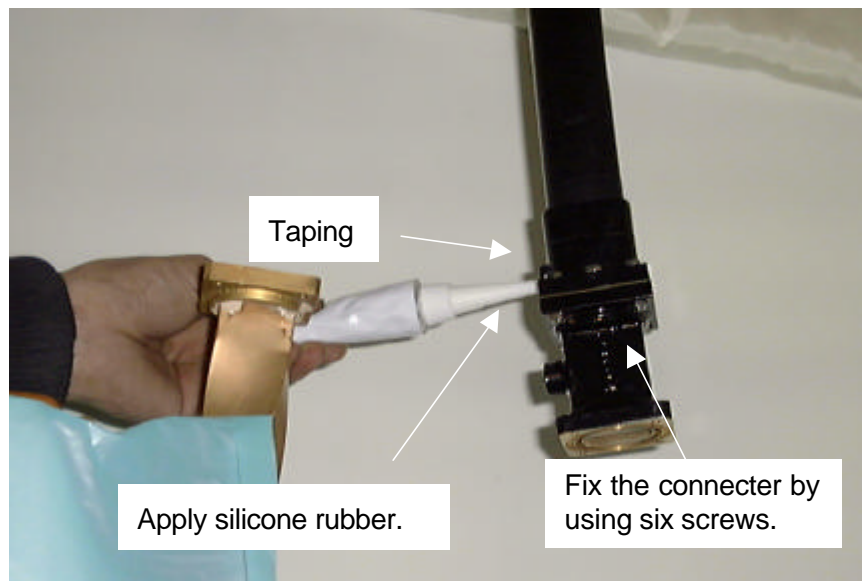


Fig. 1-23 Fitting guide connector

Connect the waveguide to the TR unit.

If necessary, use E-bend, H-bend and/or twist bend.

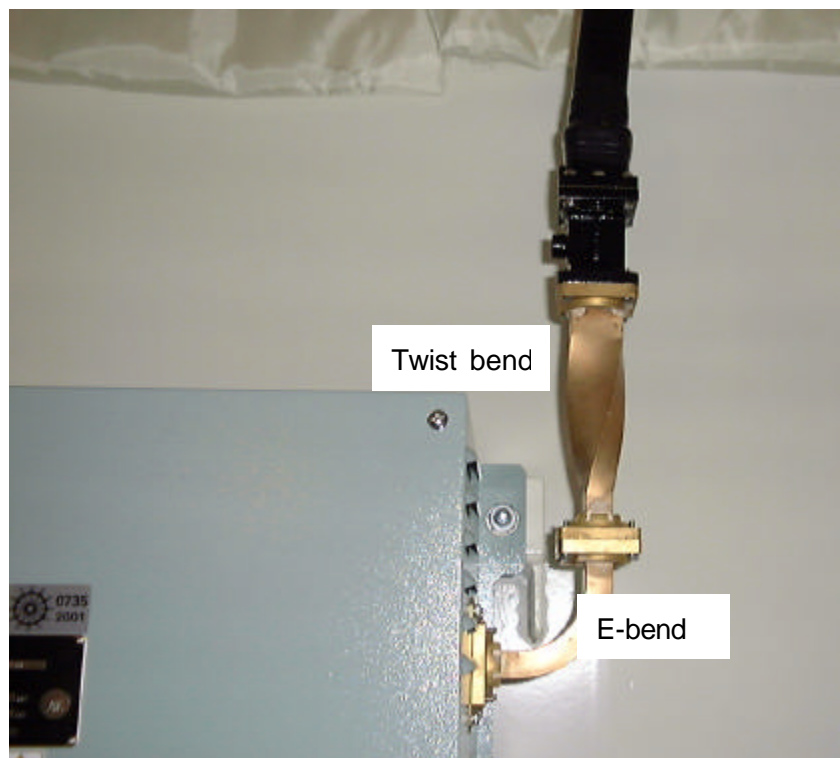


Fig. 1-24 Connecting waveguide to transceiver

1.3 Display unit

1.3.1 FAR-2805 Radar

The example below shows two radar display units side by side.



Fig. 1-25 Display units

Enlarged picture of the white circle in Fig1-25.

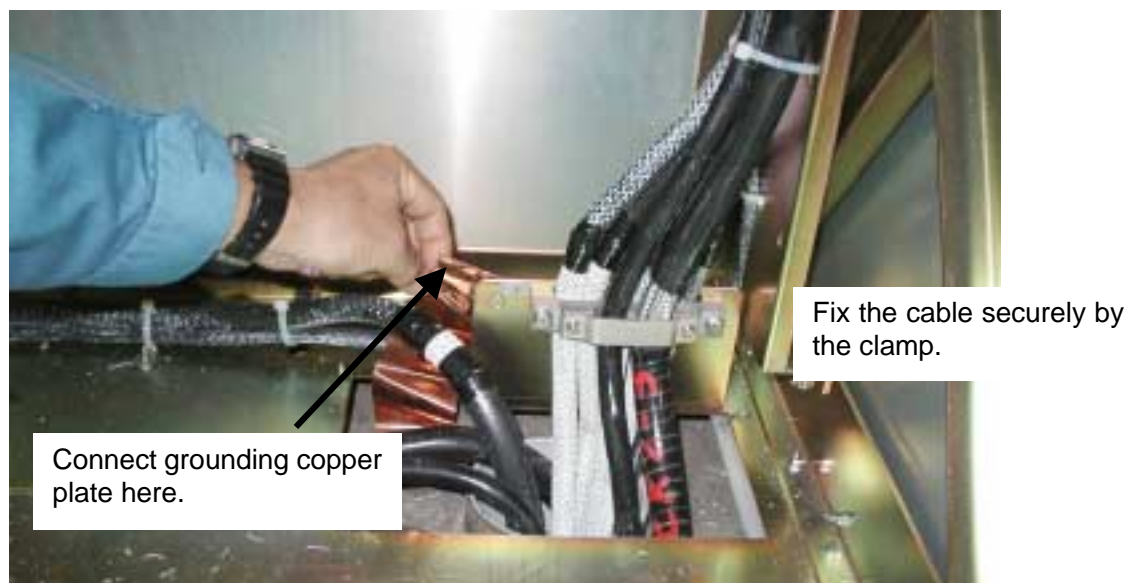


Fig. 1-26 Grounding chassis

Fix cables to the cable guide with cable ties.

Make connections correctly. Bind cables with cable ties.

Fix the cable securely by the clamp.

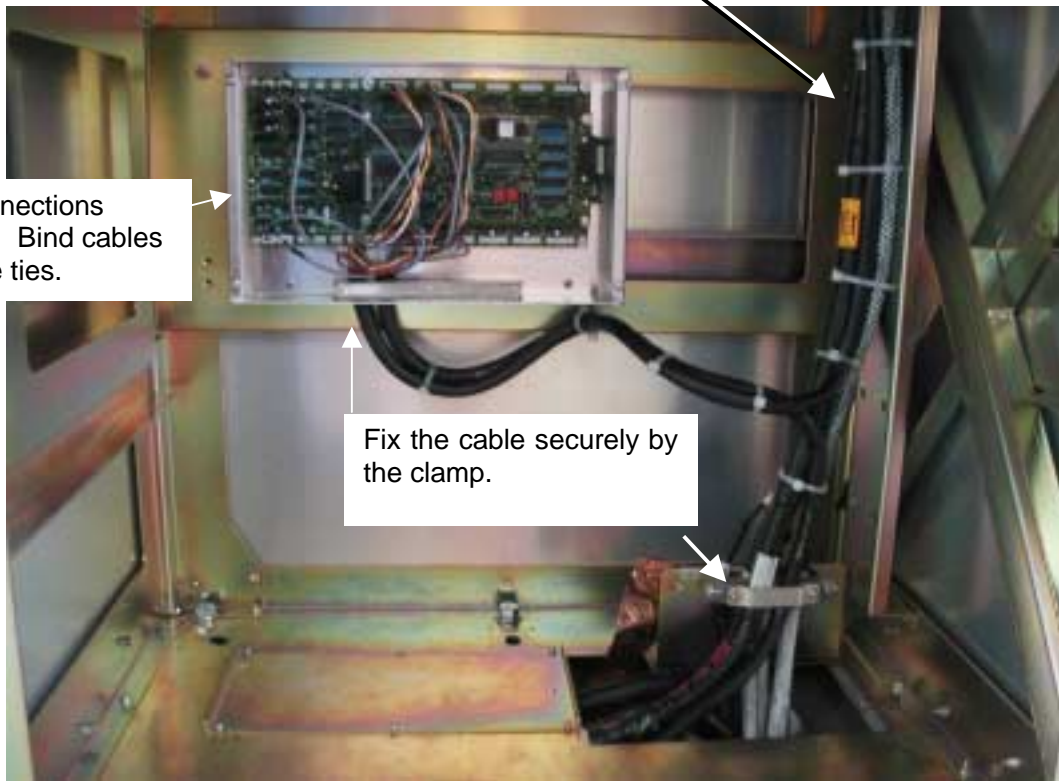


Fig. 1-27 Fixing cables

The example below shows the power control unit fitted in the console.

Make connections correctly. Bind cables with cable ties.

Power control unit

Cable run must be tidy.

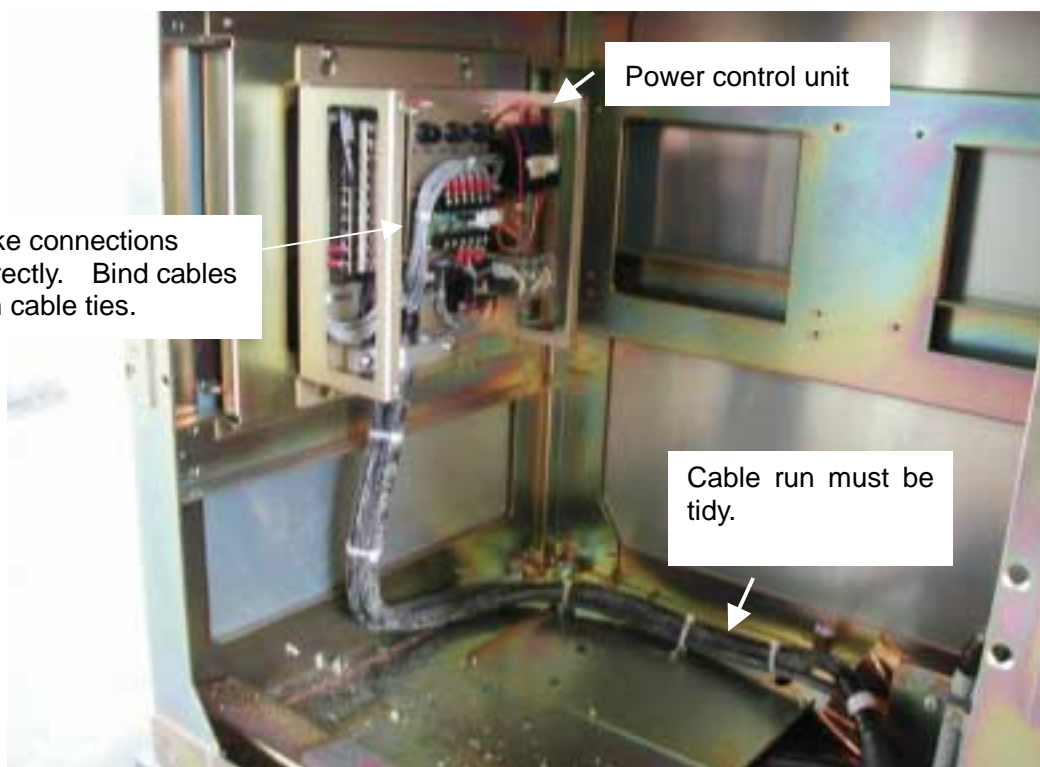


Fig. 1-28 Power control unit

Fix cables coming in the display unit by the clamp.

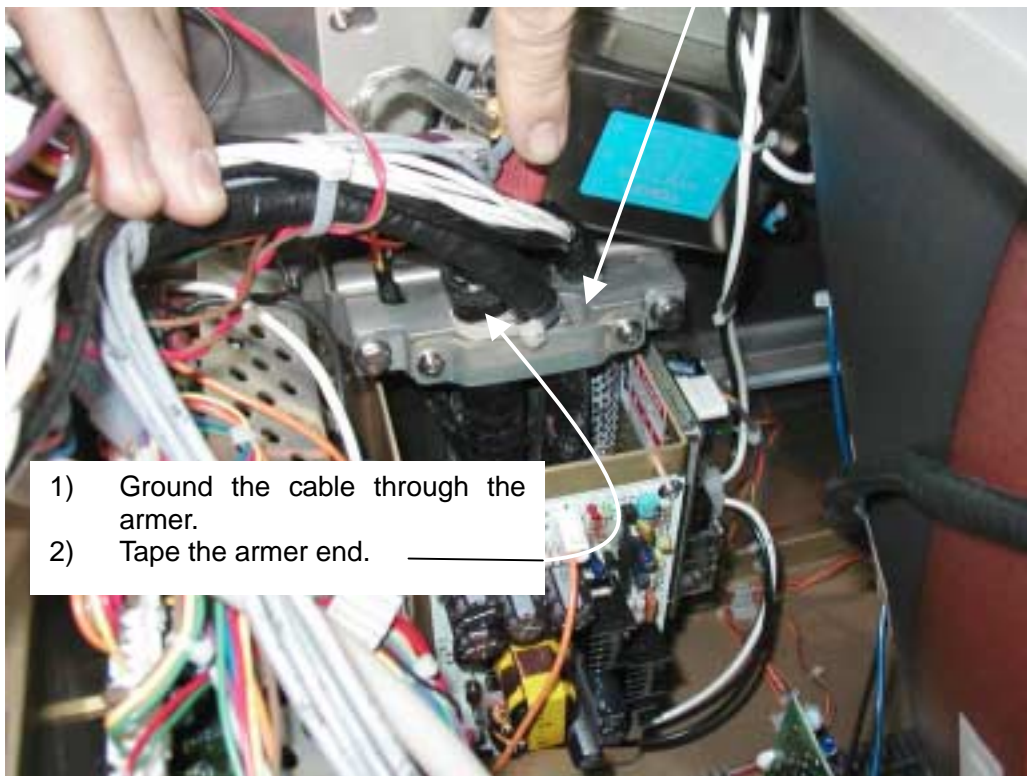


Fig. 1-29 Grounding cables

Use protective caps supplied after the connection.

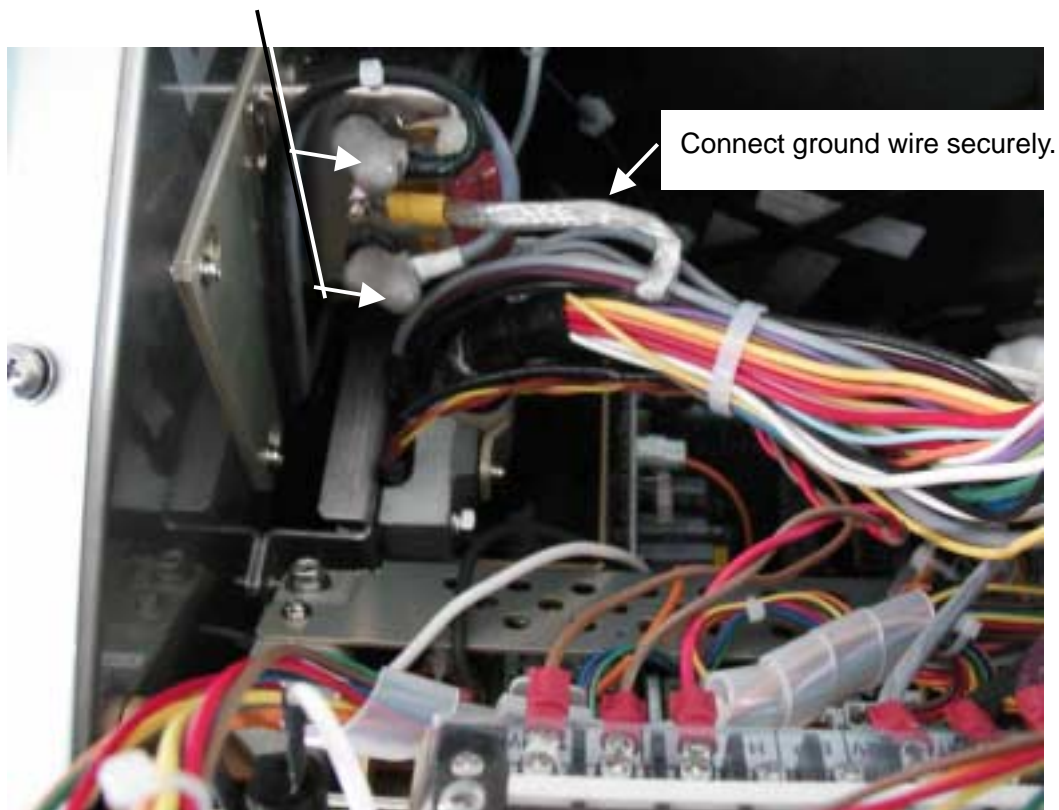


Fig. 1-30 Using protective caps

2.1 Inmarsat B

2.1.1 Antenna unit

- ◇ Installation site: Select the location where it will have a good view of the sky in all directions.
- ◇ Refer to the installation manual for the drawing of the mounting base.
- ◇ Never put the rubber mat between the mounting base and the antenna base.
- ◇ Do not cover the drain hole.

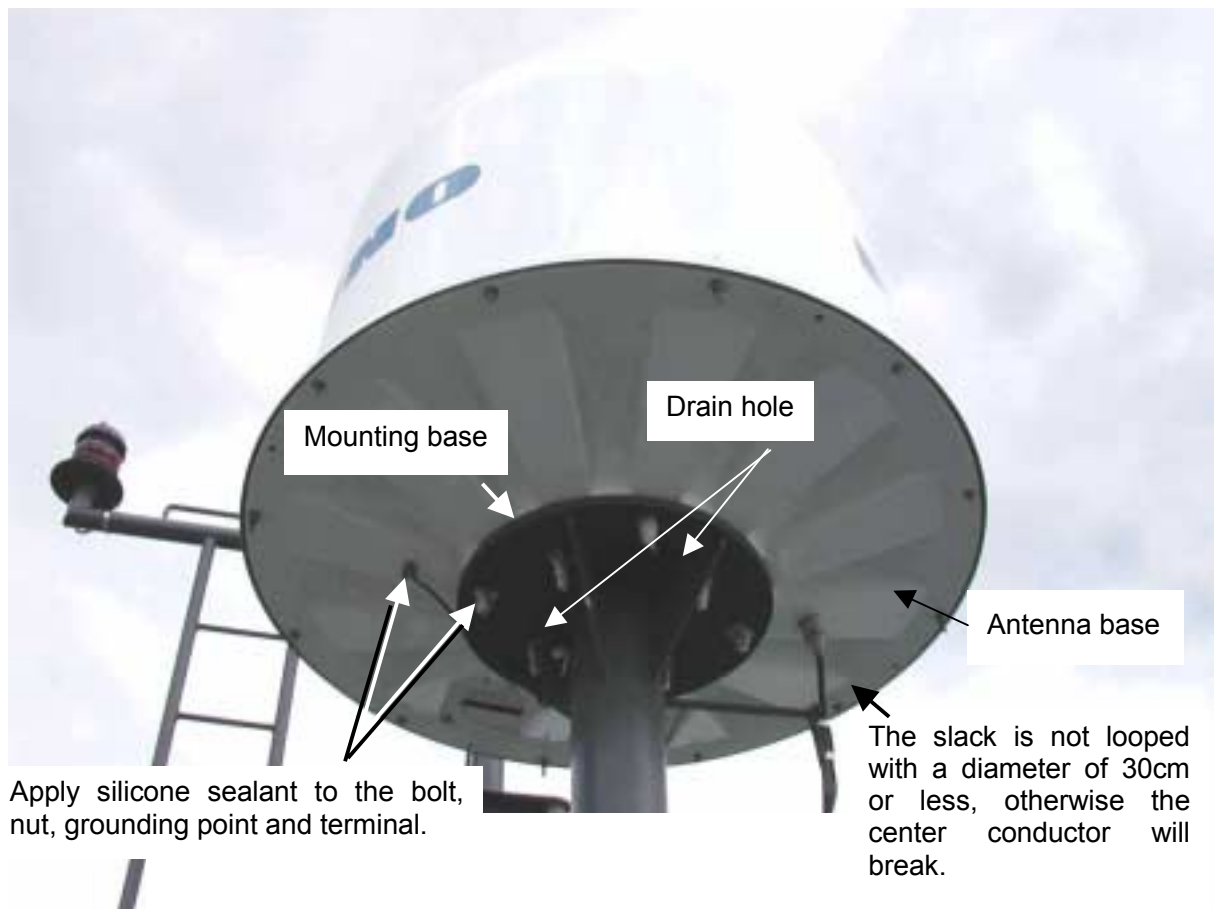


Fig. 2-1 Inmarsat B antenna unit

2.1.2 Connecting coaxial cable in radome (FELCOM 82)

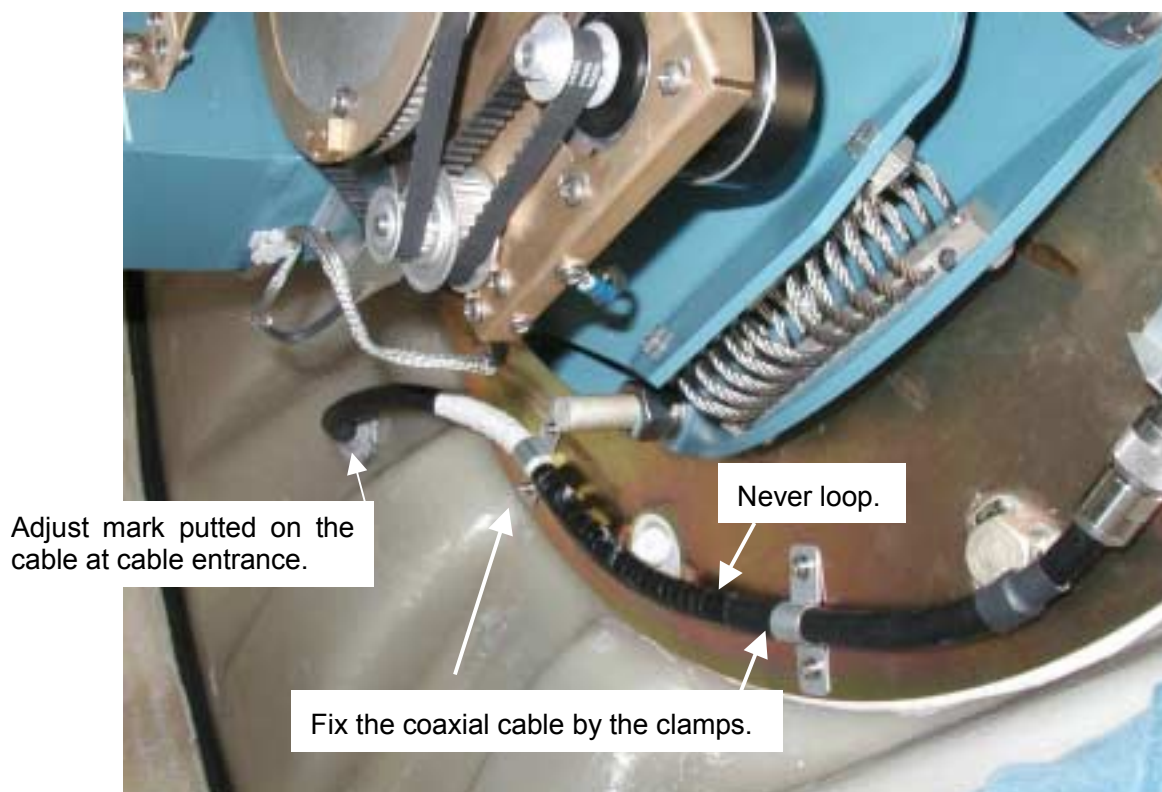


Fig. 2-2 Connecting cable in radome

2.1.3 Installation of transceiver unit and junction box



Fig. 2-3 Cable slack for servicing

2.1.4 FELCOM 82 handset

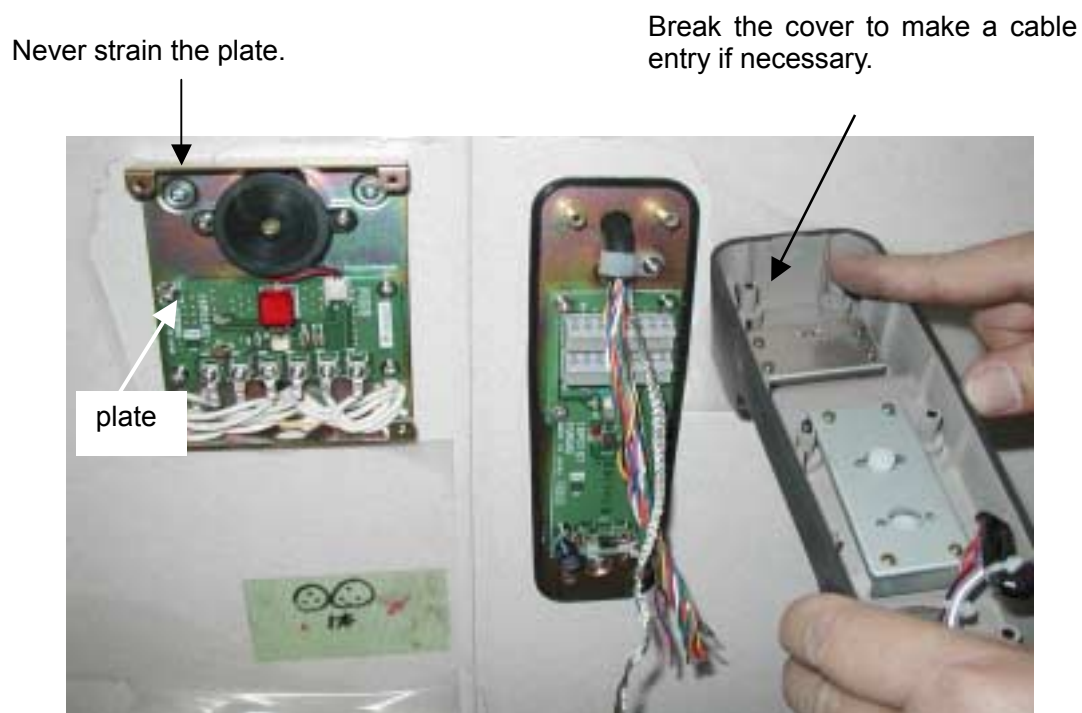


Fig. 2-4 FELCOM 82 Handset

2.1.5 Inmarsat B radio frequency radiation hazard label

The supplied label must be adhered to the mast at the visible place so that one can notice RF radiation hazard. Put label keeping distance (6m) from antenna.



Fig. 2-5 Radio frequency radiation hazard label

2.2 Inmarsat C

2.2.1 Antenna unit

- ◇ Installation site: Select the location where it will have a good view of the sky in all directions.
- ◇ Weld the antenna mounting pipe directly to the antenna pole. Mounting it with clamps is not recommended. (Fig. 2-6)
- ◇ Apply silicone sealant to the bolt, not, grounding point and terminal.
- ◇ The diameter of the service (drip) loop must be 30 cm or more.

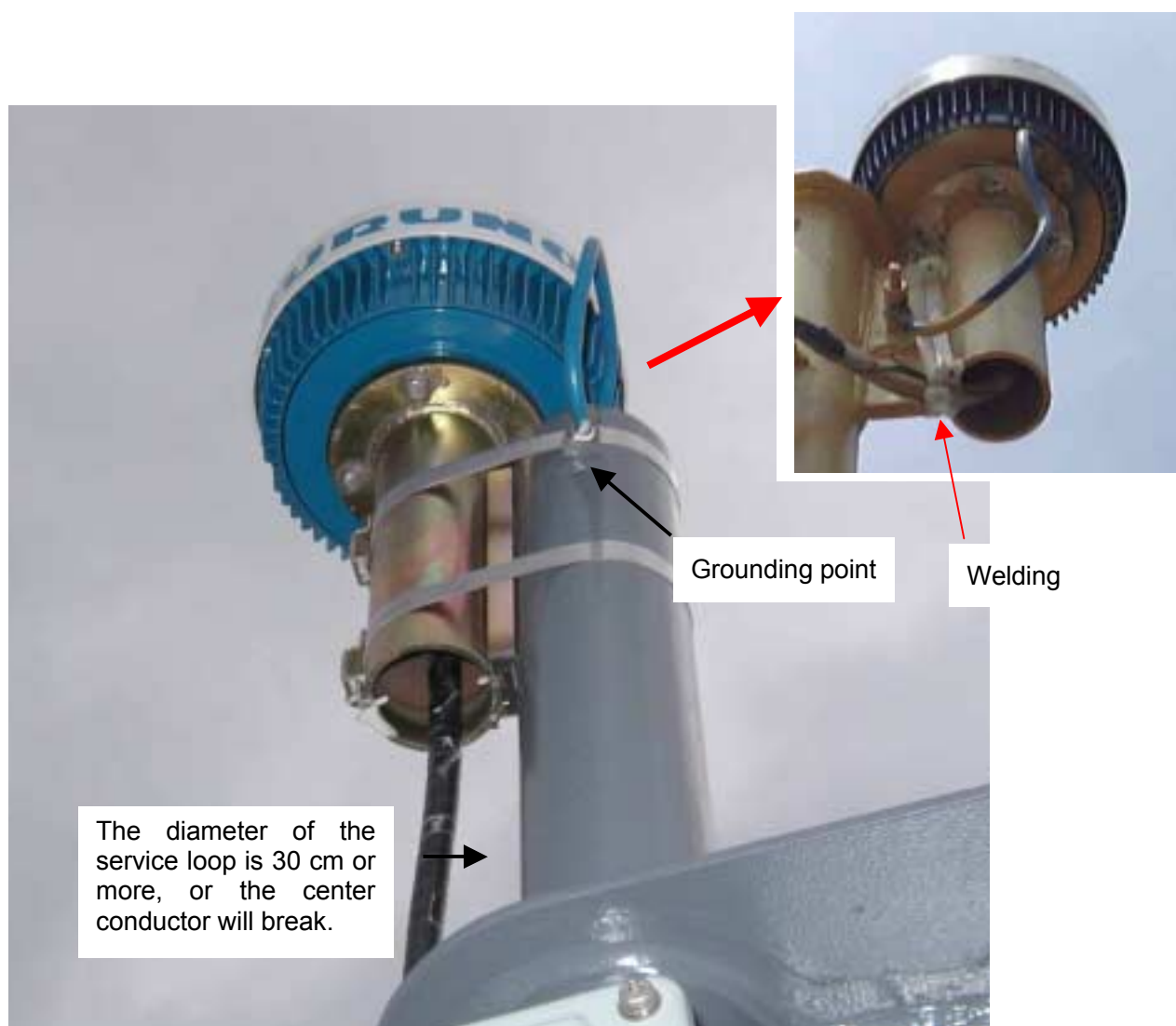


Fig. 2-6 Inmarsat C antenna unit

Chapter 3. Communications

3.1 MF/HF antenna

3.1.1 General

In the shipyard, put red clothes to the antenna wire for calling the crane operator's attention.



Fig. 3-1 Measure of safety

3.1.2 Feeder of 10 m antenna

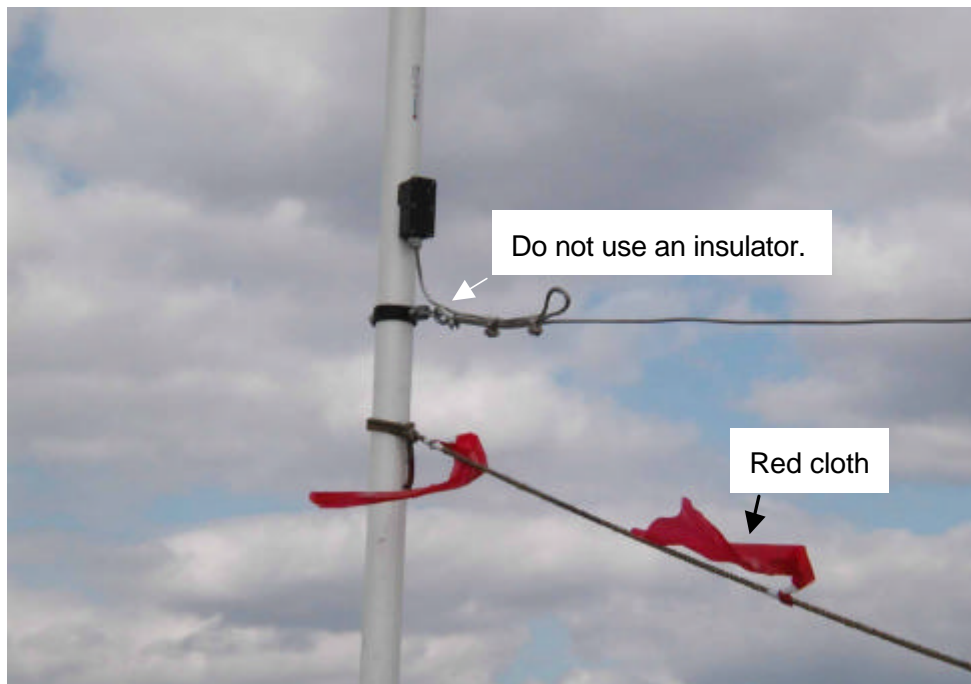


Fig. 3-2 10 m antenna

3.1.3 Antenna feeder

Use a support wire to reinforce the feeder.

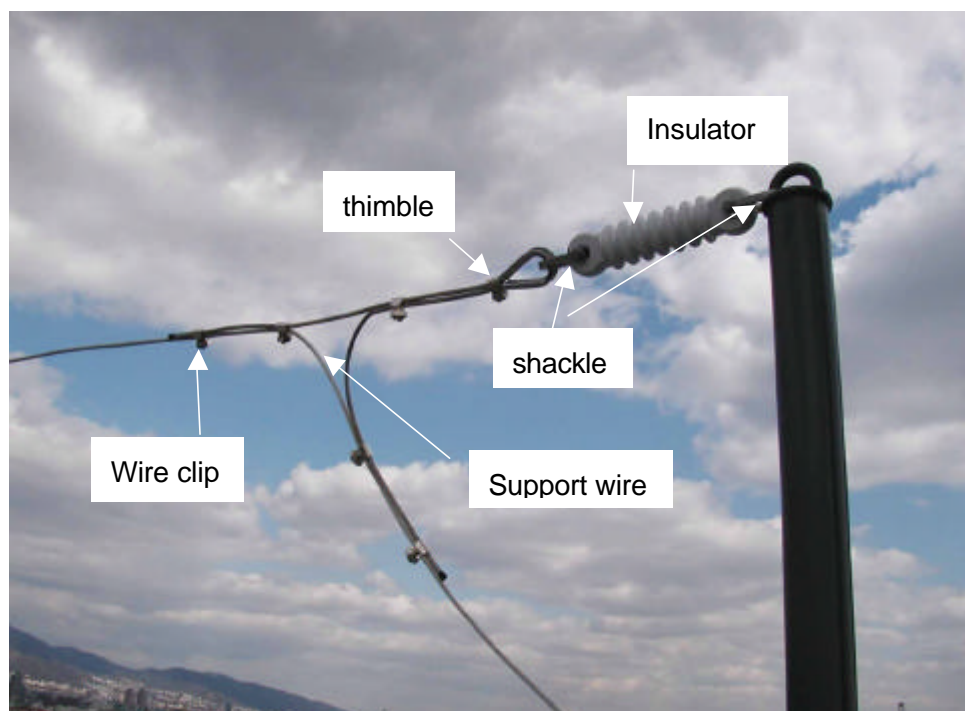


Fig. 3-3 Antenna feeder

Fix the feeder with an insulator.

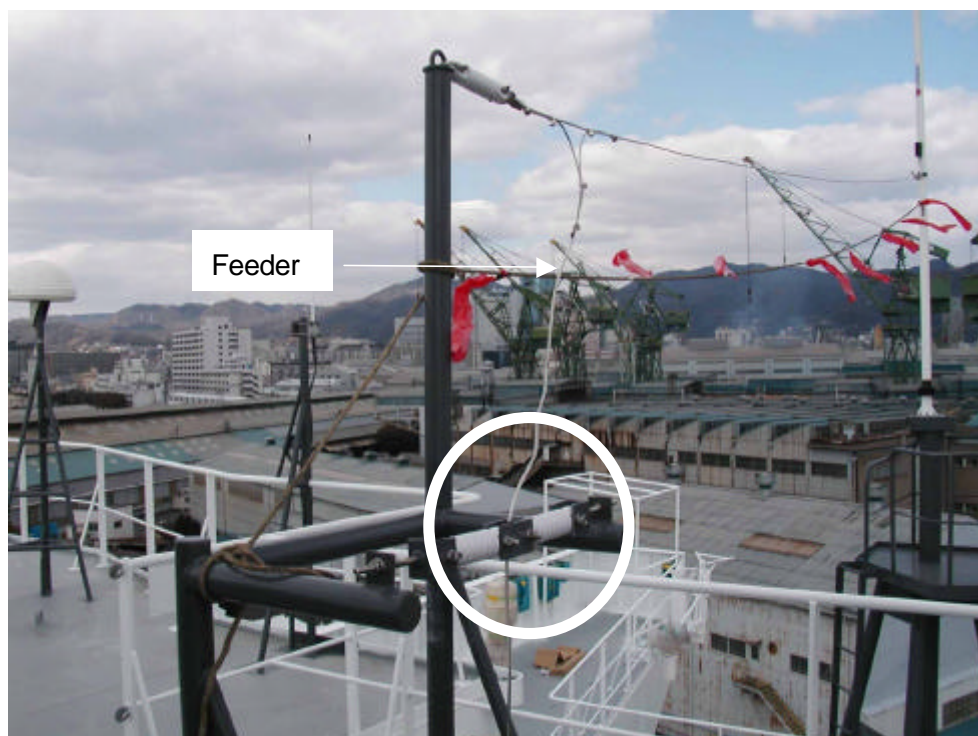


Fig. 3-4 Fixing feeder

Use lead-in insulator to lead the feeder into the radio room.



Fig. 3-5 Antenna lead-in insulator

Tighten the antenna wire firmly.

For example, by using the extra antenna wire, thicken the insert diameter.



Fig. 3-6 Fixing antenna wire

3.1.4 For safety

Arrange the safety fence to separate the antenna feeder from humankind and put the danger sign at the entry.

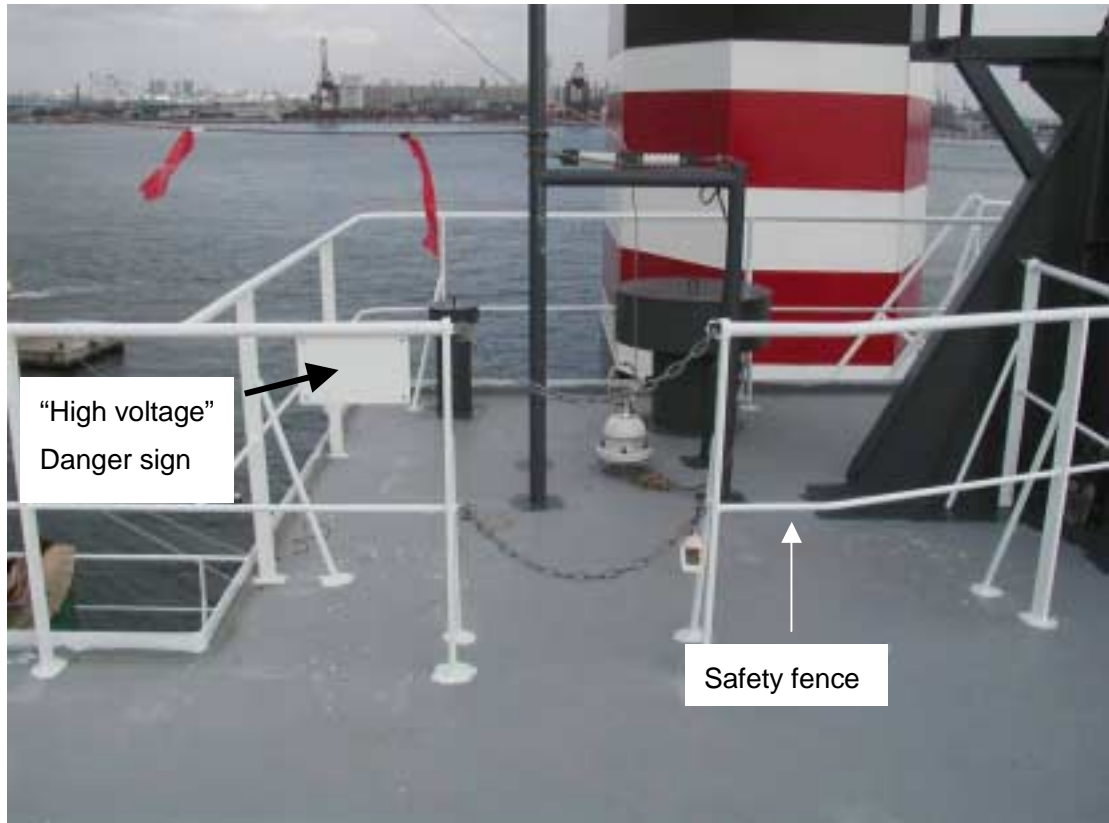


Fig. 3-7 Arrange safety fence

Note: When install safety fence, keep enough distance from antenna feeder so as to prevent touching antenna feeder.

3.1.5 Indoor feed line

Connect the lead-in insulator to the antenna changeover by a copper pipe. The pipe is fixed using stand insulators.

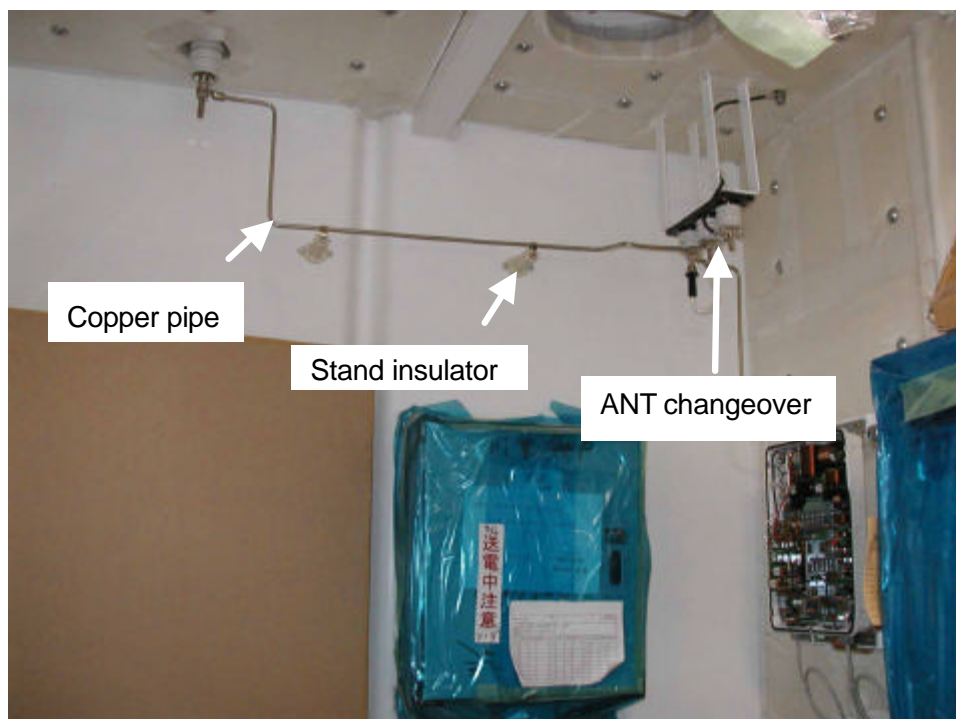


Fig. 3-8 Indoor feed line

The antenna changeover is installed for lightning protection.

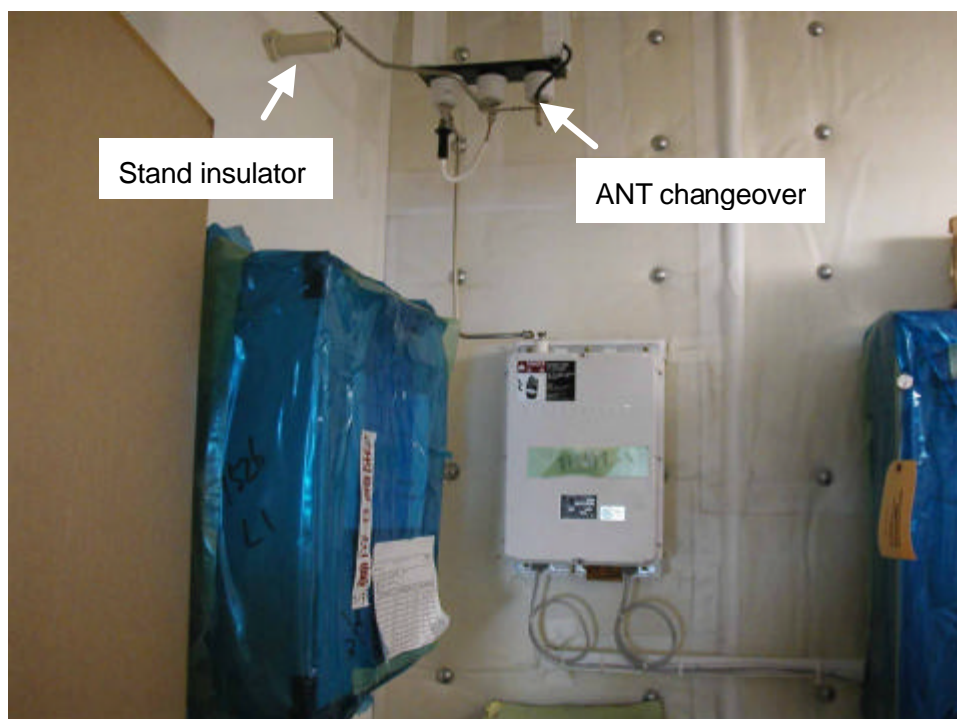


Fig. 3-9 Antenna changeover

3.1.6 Grounding of antenna coupler

Ground the antenna coupler by the copper plate securely.



Fig. 3-10 Grounding antenna coupler

Use wing nuts to connect the copper plate to the antenna coupler.
Hold the braid of the coaxial cable for clamping.

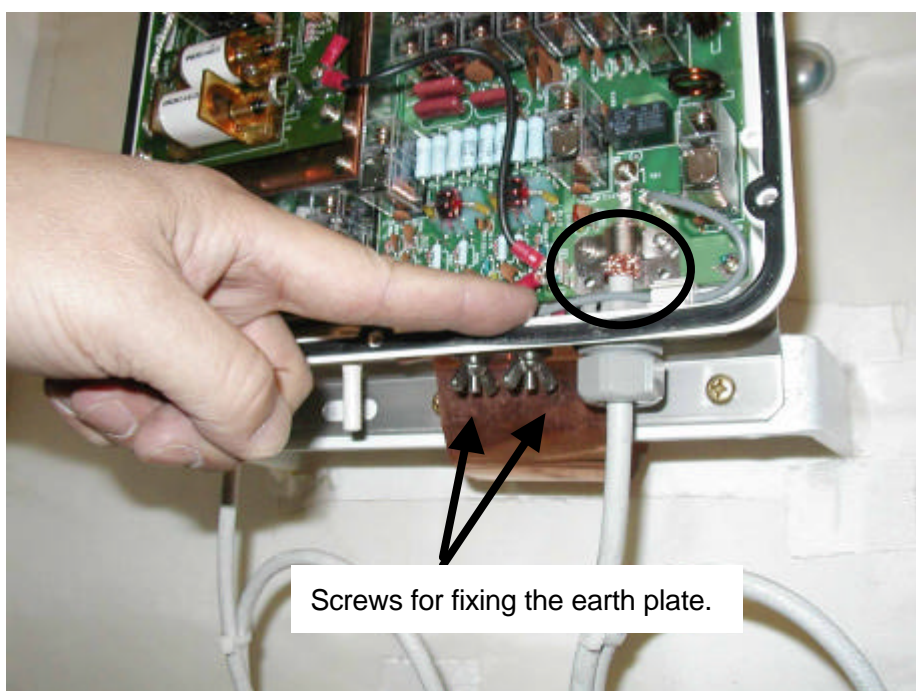
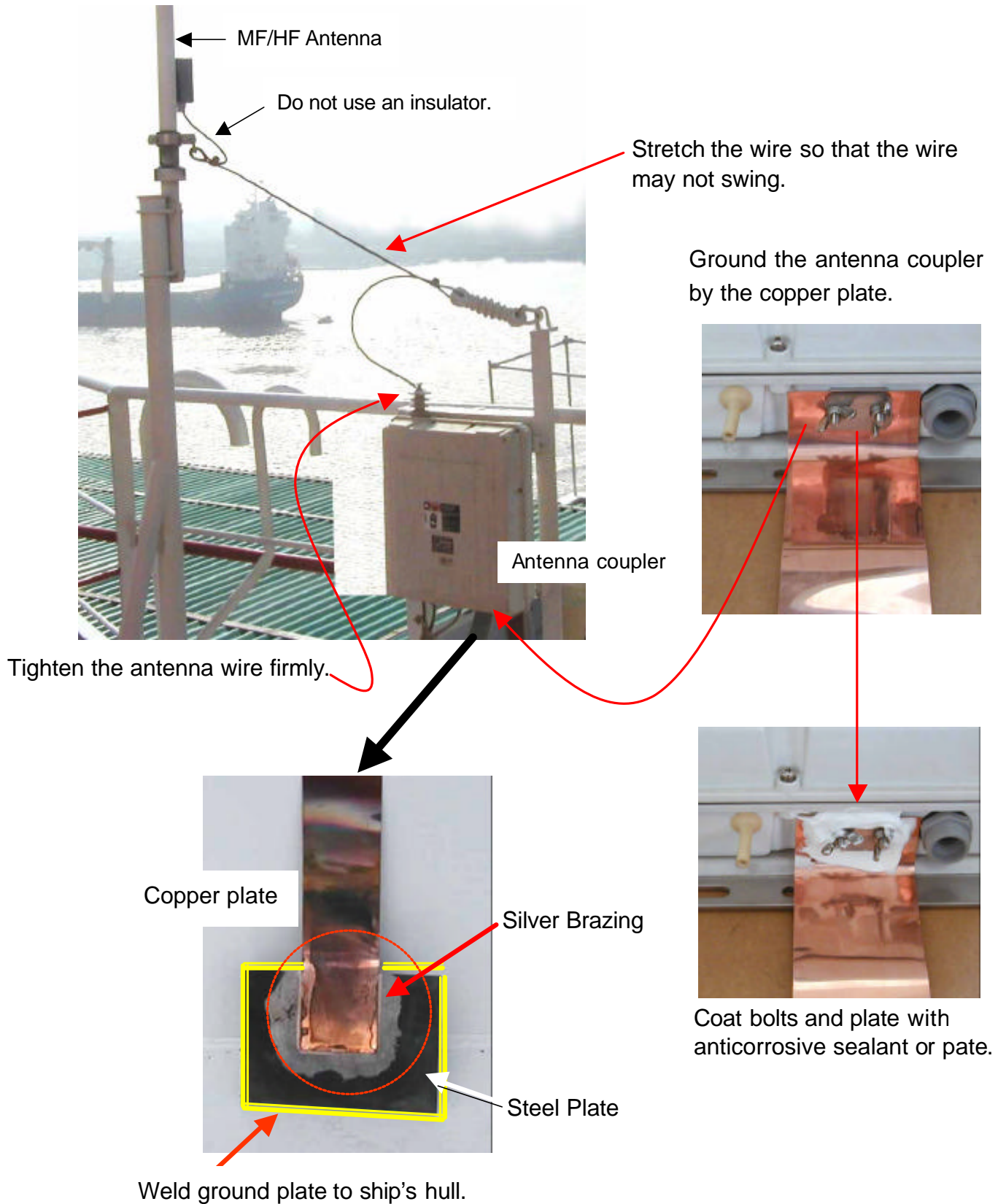


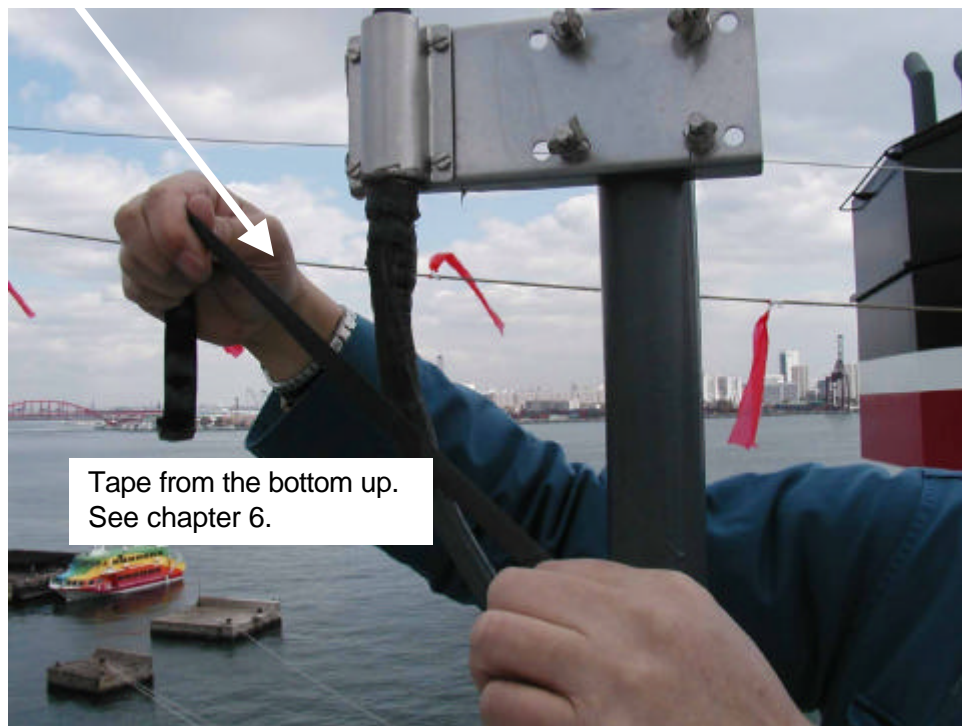
Fig. 3-11 Connecting copper plate to antenna coupler

3.1.7 MF/HF Antenna installation, when antenna coupler is installed in the open.



3.2 VHF antenna

Antenna connector must be waterproofed by the waterproofing and vinyl tapes.



Tape from the bottom up.
See chapter 6.

Fig. 3-12 Waterproofing of antenna connector

The service (drip) loop of the antenna cable is not smaller than 30 cm in diameter. If not, the center conductor of the cable will break.

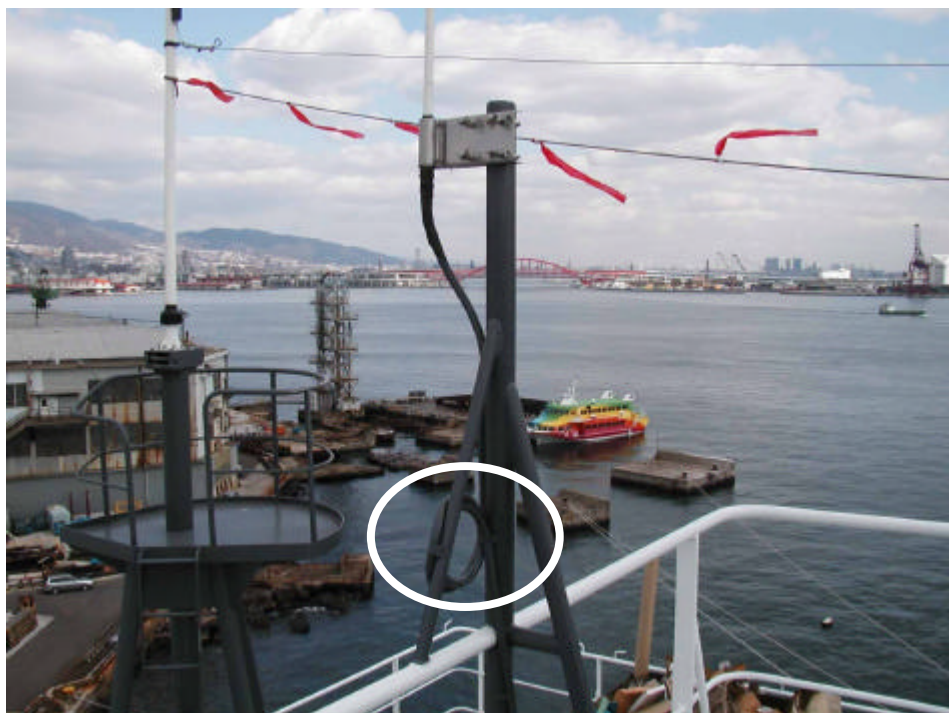


Fig. 3-13 Antenna cable

3.3 NAVTEX/FAX antenna coupler

? Fix the coupler onto the antenna pole by using hose clamps supplied.

? Grounding wire must be 8 sq or above.

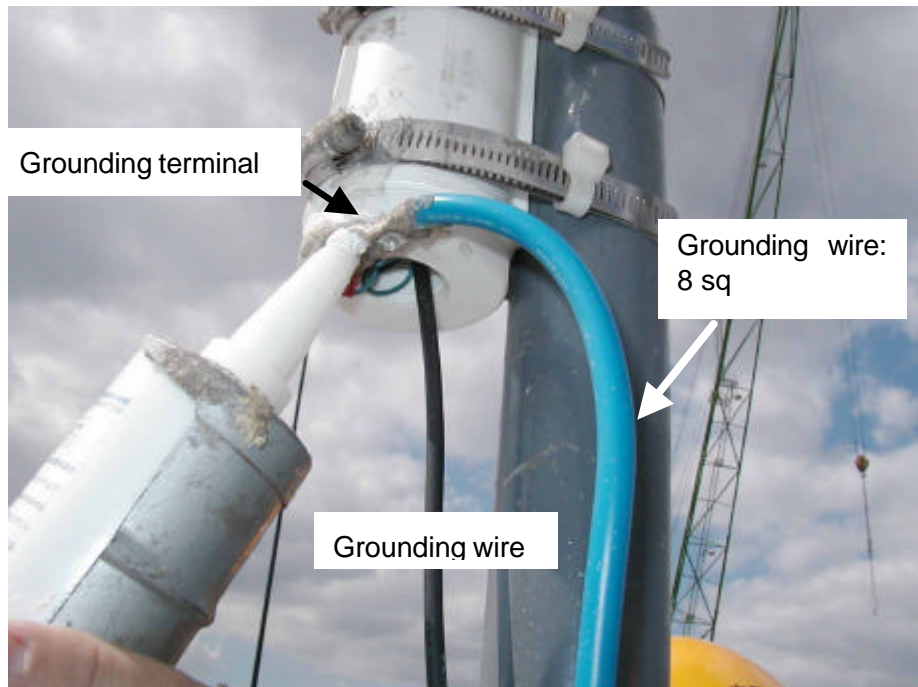


Fig. 3-14 Grounding antenna coupler

Fix internal grounding wire and external grounding wire together at the grounding terminal.

Apply anticorrosive silicone sealant to grounding points and terminals.

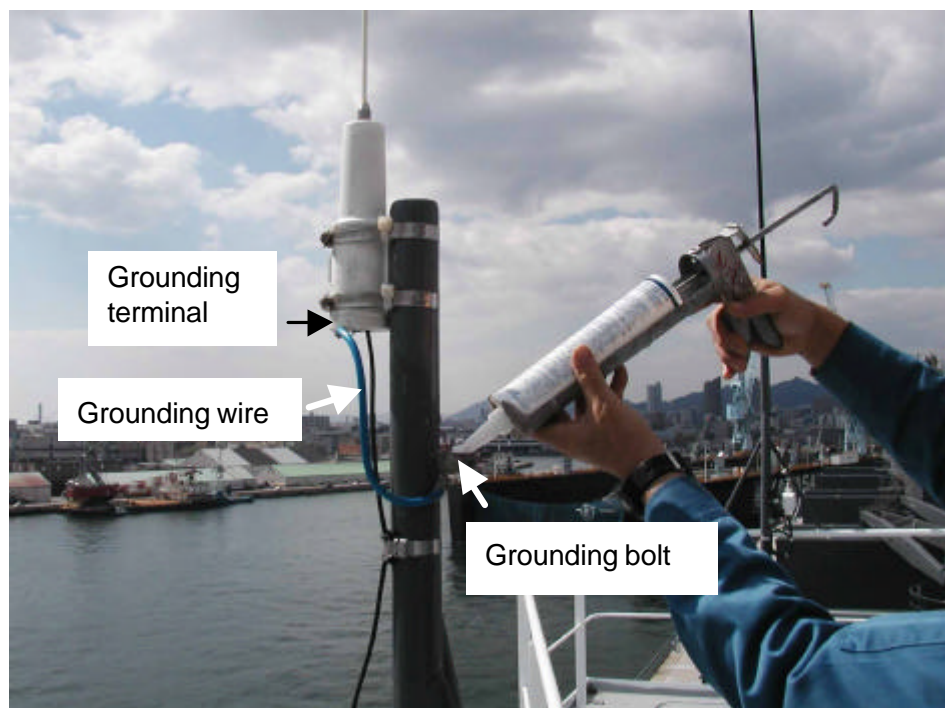


Fig. 3-15 Protecting grounding terminal

Apply anticorrosive silicone sealant around the base of the whip antenna.



Fig. 3-16 Waterproofing of whip antenna base

3.4 Antenna junction box

? All connection must be tight.

? Apply anticorrosive silicone sealant to bolts, nuts, grounding points and terminals.

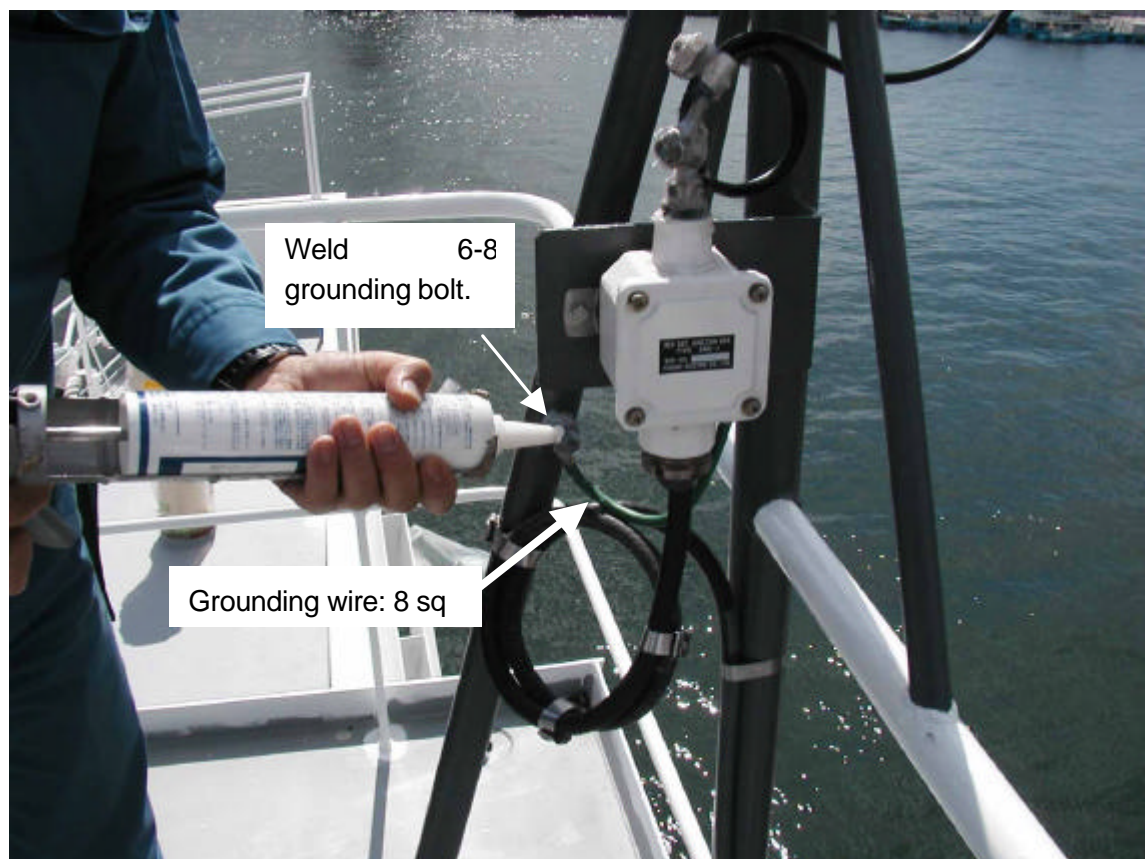


Fig. 3-17 Grounding antenna junction box

3.5 Radio console

3.5.1 RC-1800F

Put a protective cardboard on the table not to scratch it. Cover the console with a vinyl sheet to keep dust away when not working.



Fig. 3-18 Radio console

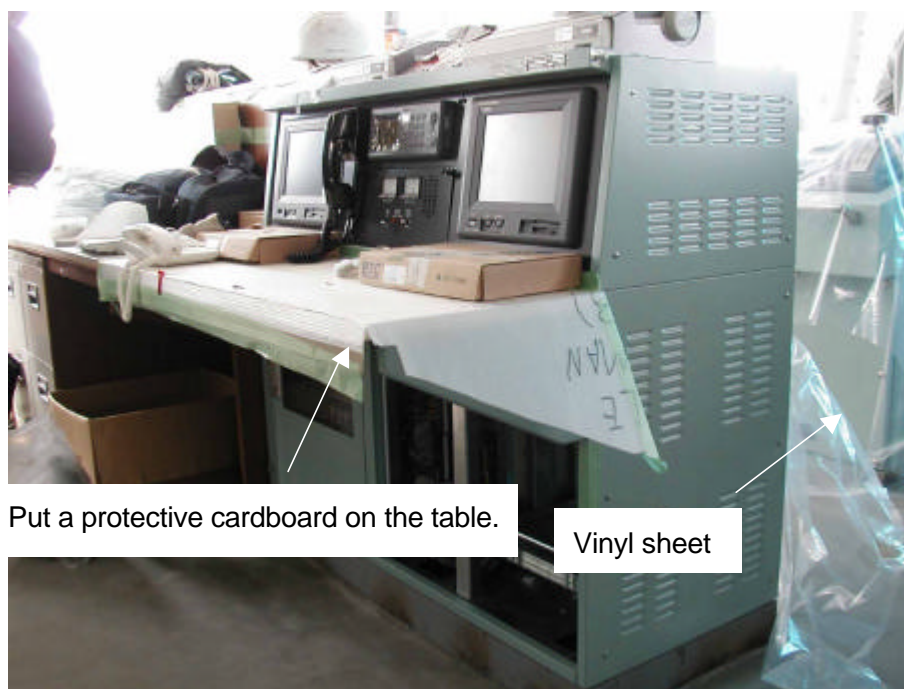


Fig. 3-19 Radio console with protective cardboard

3.5.2 RC-1800F grounding and leading-in cables

The cable coaming locates at appropriate position so that no stress is on any cable.

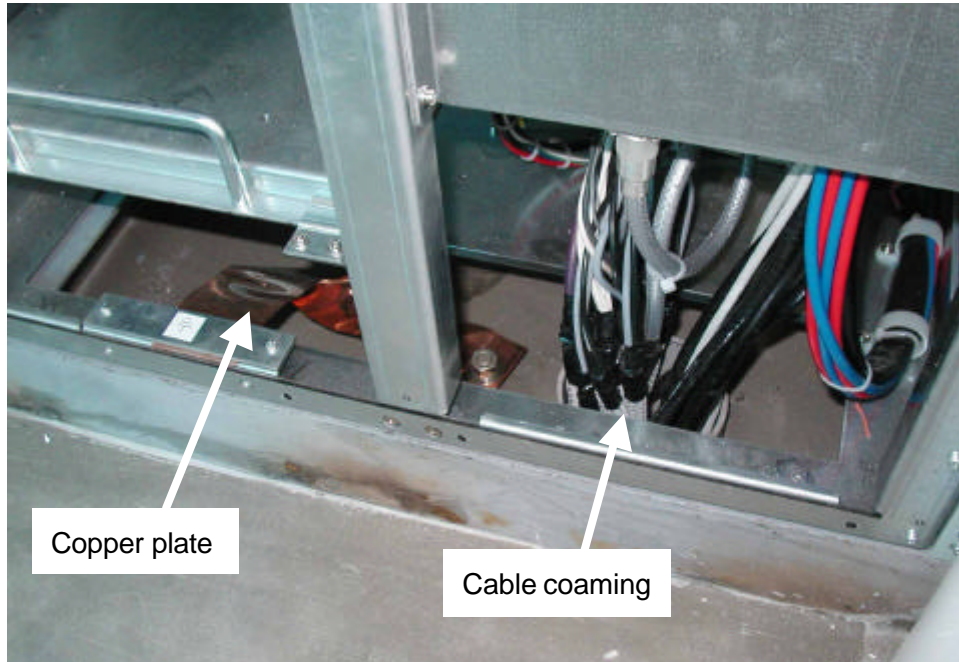


Fig. 3-20 Cable entry

Connect the grounding copper plate as below.

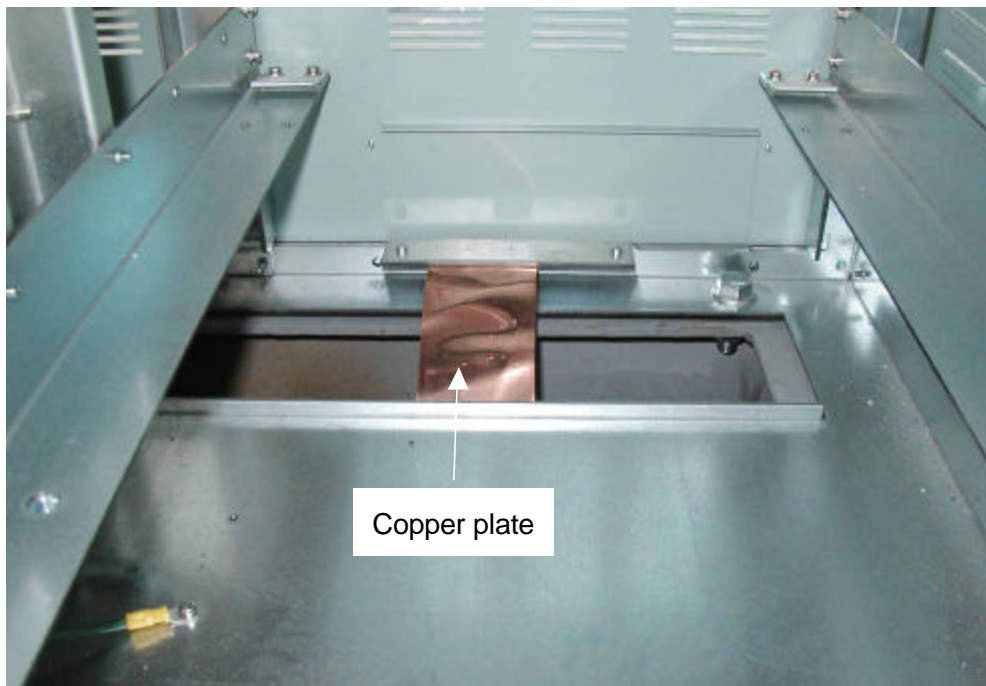


Fig. 3-21 Grounding console chassis

3.5.3 RC-1800F routing cables

Connection must be tight. Bind cables for a better appearance.



Fig. 3-22 RC-1800F with front panel removed

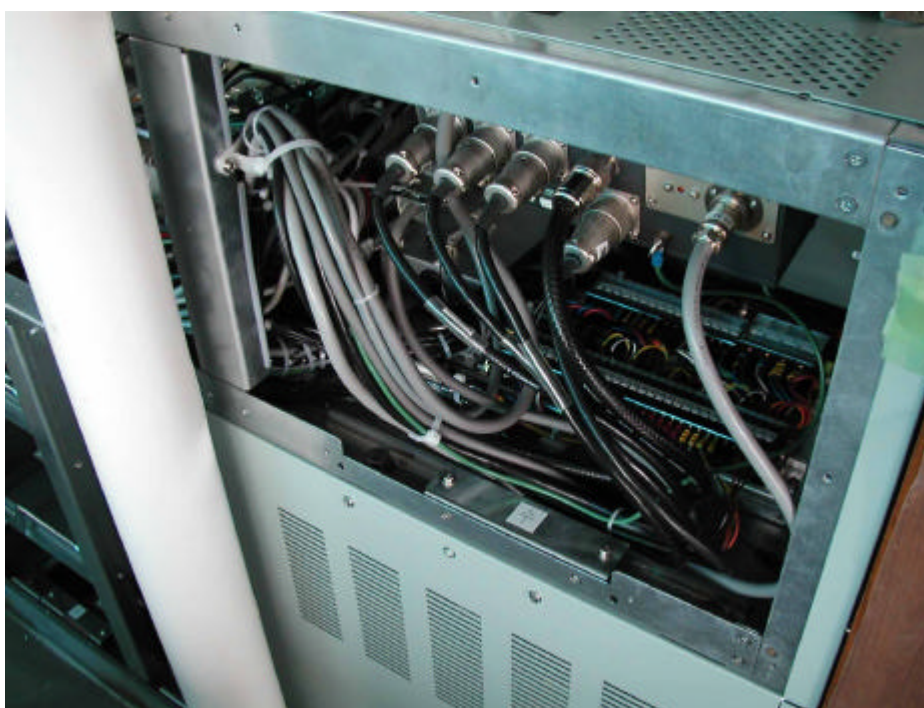


Fig. 3-23 RC-1800F with rear panel removed

The length of coaxial cable between MH/HF antenna coupler and PA must be as short as possible. A slack for servicing is needed.

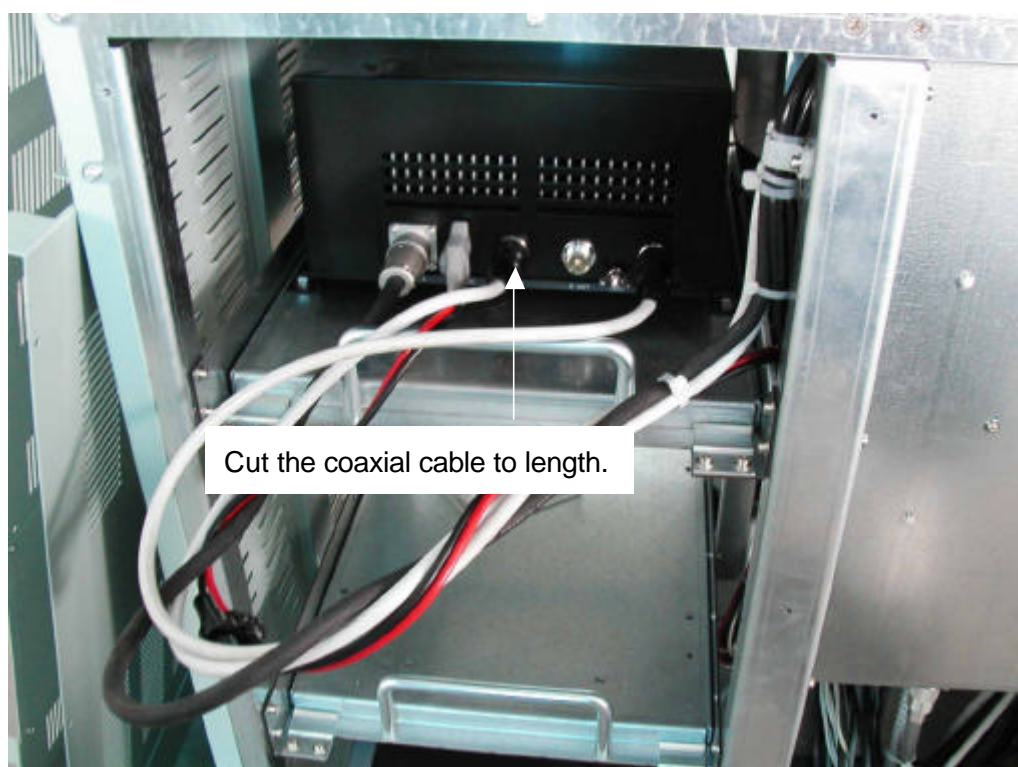


Fig. 3-24 cable length for servicing

Be sure to follow carefully the instruction on the later page to fit Inmarsat C antenna connector.

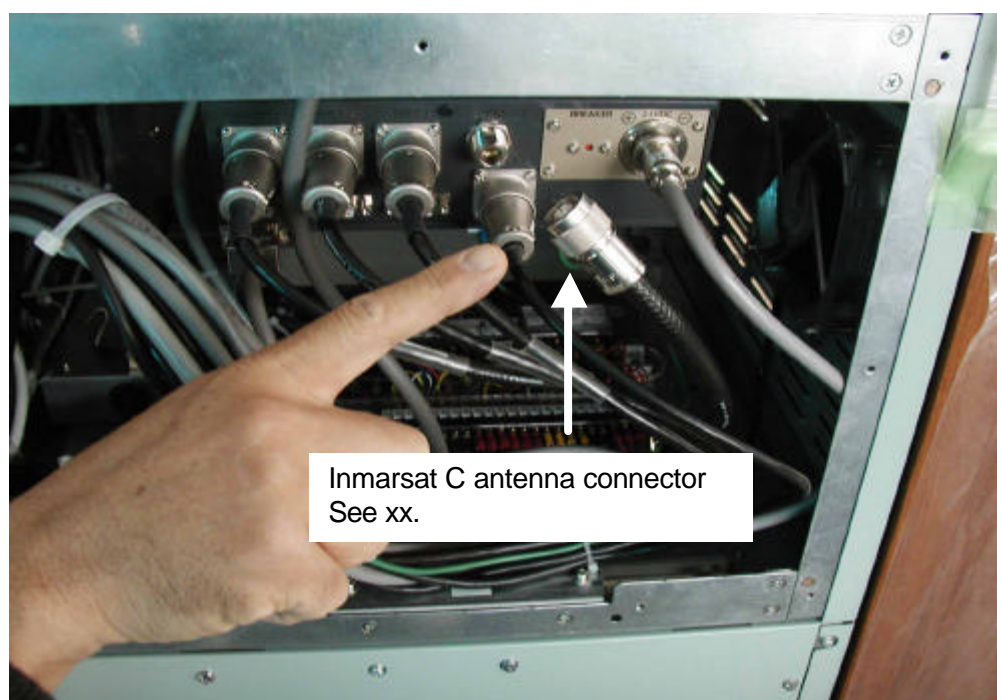


Fig. 3-25 Inmarsat C antenna connector

3.6 VHF radio

3.6.1 Wiring in VHF console

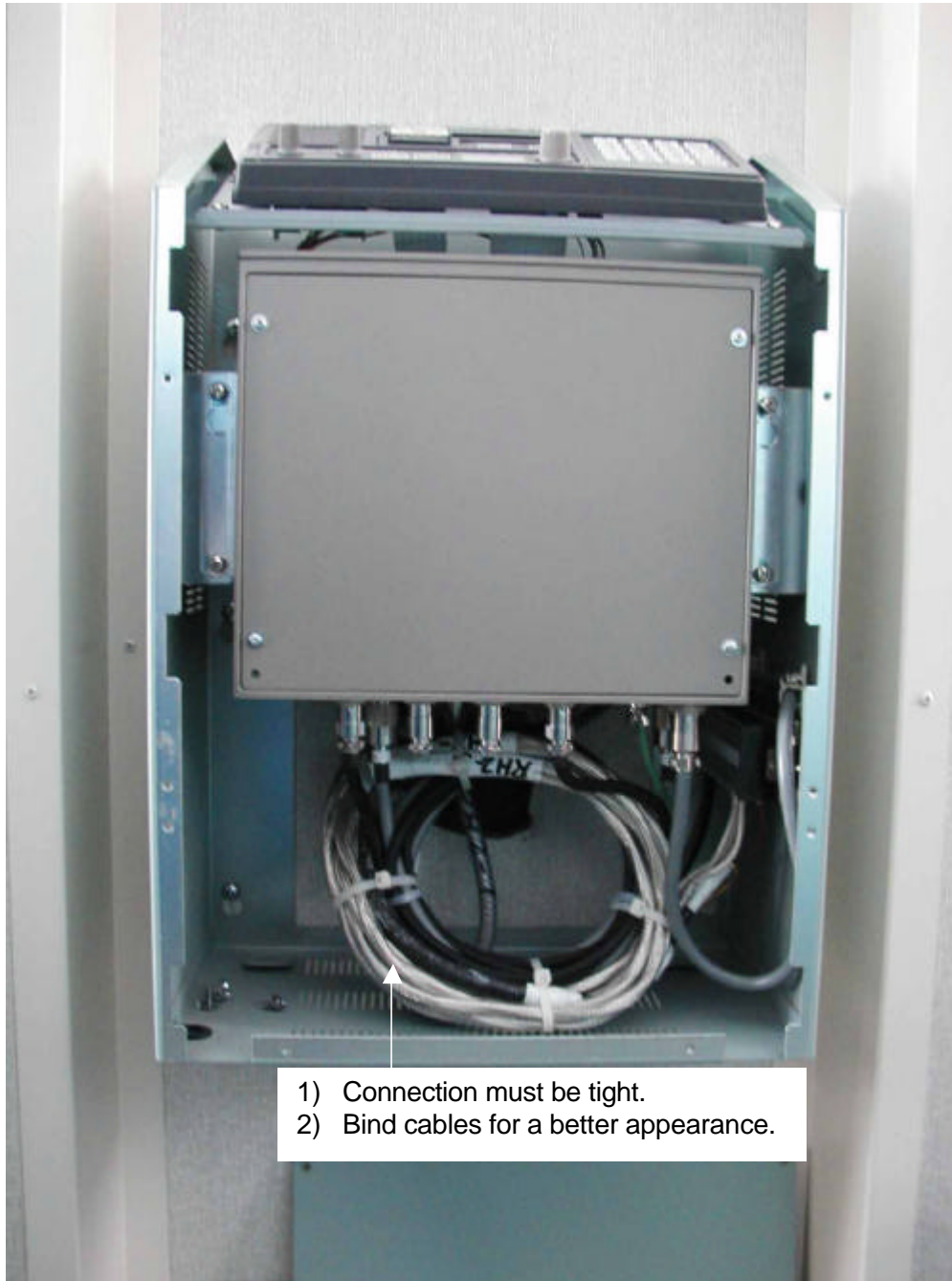


Fig. 3-26 Cables in VHF console

3.6.2 Junction box for VHF radio wing handset

The handset is installed in a watertight box to prevent it from corroding.

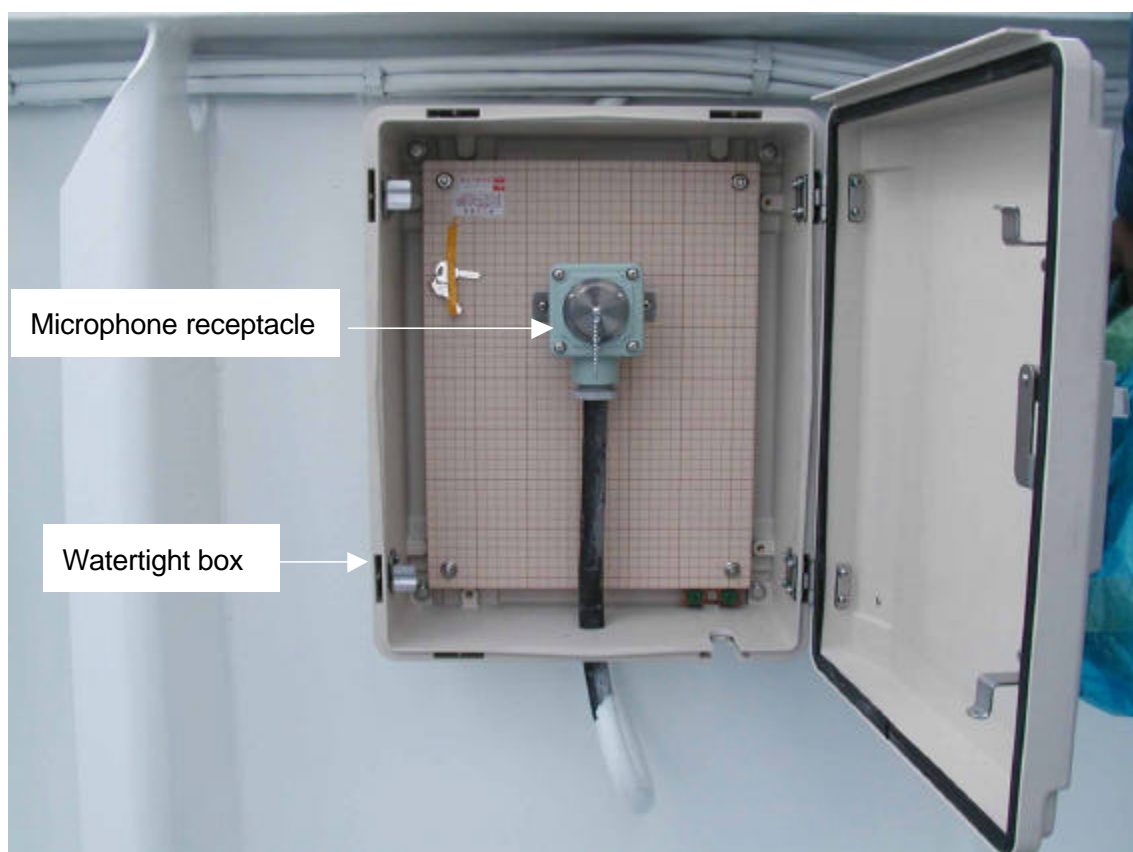


Fig. 3-27 Microphone receptacle in watertight box

3.7 Weather FAX receiver

Grounding must be secure and connections tight.

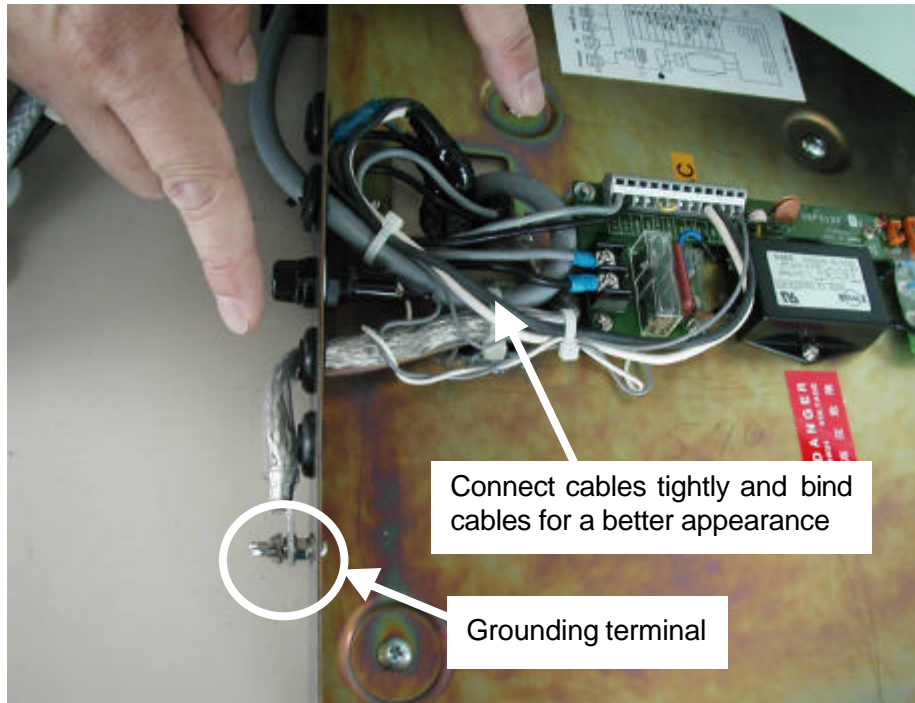


Fig. 3-28 Grounding and wiring in FAX receiver unit

3.8 NAVTEX receiver

Grounding must be secure and connections tight.

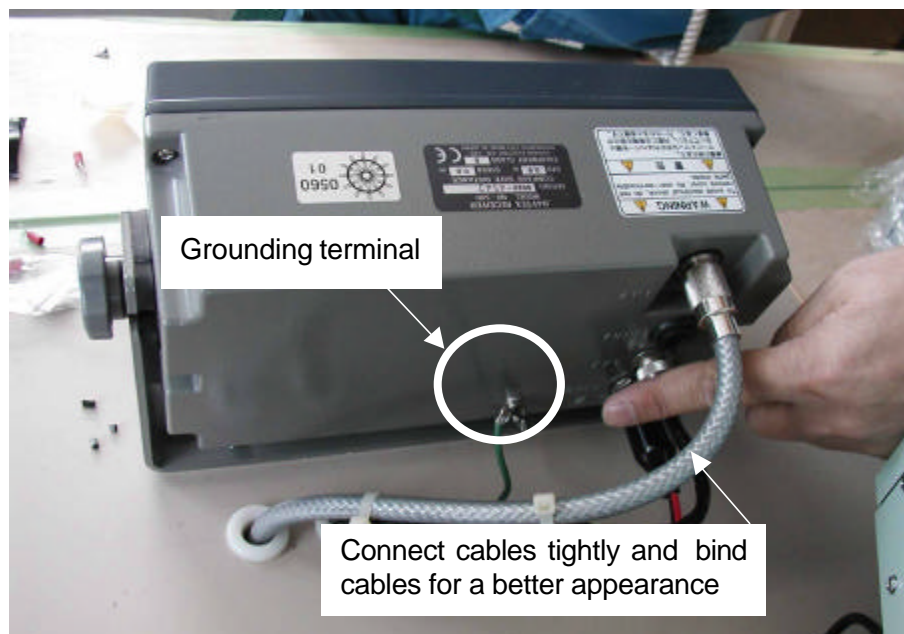


Fig. 3-29 Connections on NAVTEX

3.9 Reserve source (Battery)

Battery cables must have sufficient dimensions to prevent voltage reduction. Connections must be tight. Apply grease or vaseline to battery terminals.

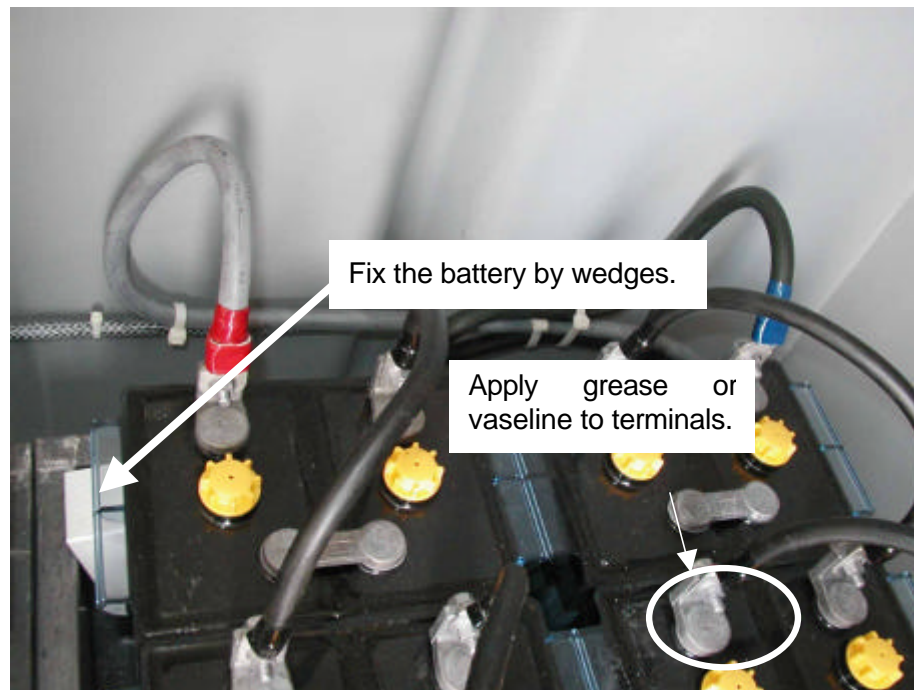


Fig. 3-30 Reserve source

Board up the inside of the box with copper plates for corrosion-proof. Spare parts must include the distilled water, specific gravity meter, voltmeter.

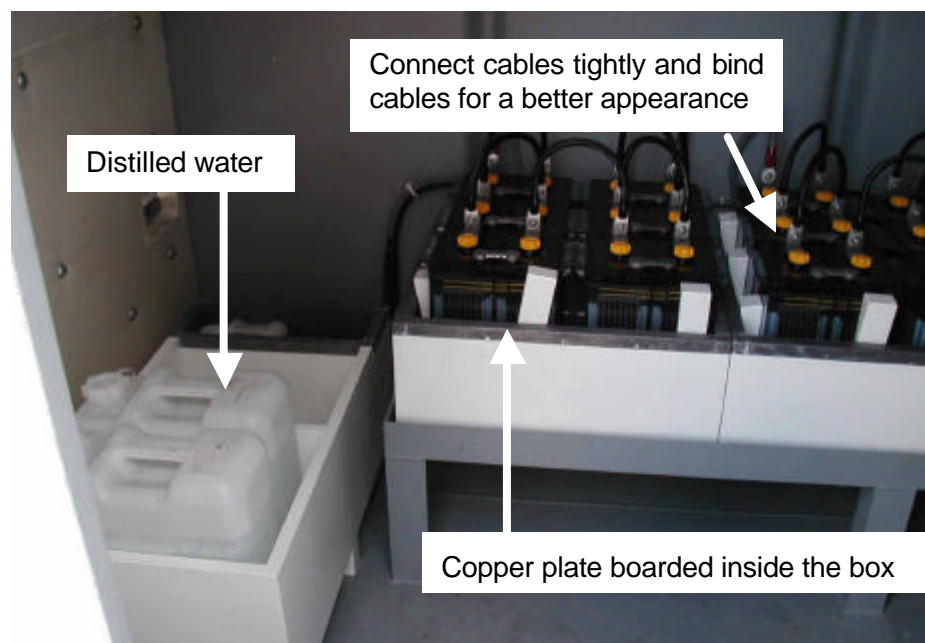


Fig. 3-31 Reserve source

3.10 SART

3.10.1 Installation site

Typically the SART is installed near the door either port or starboard side on the bridge.

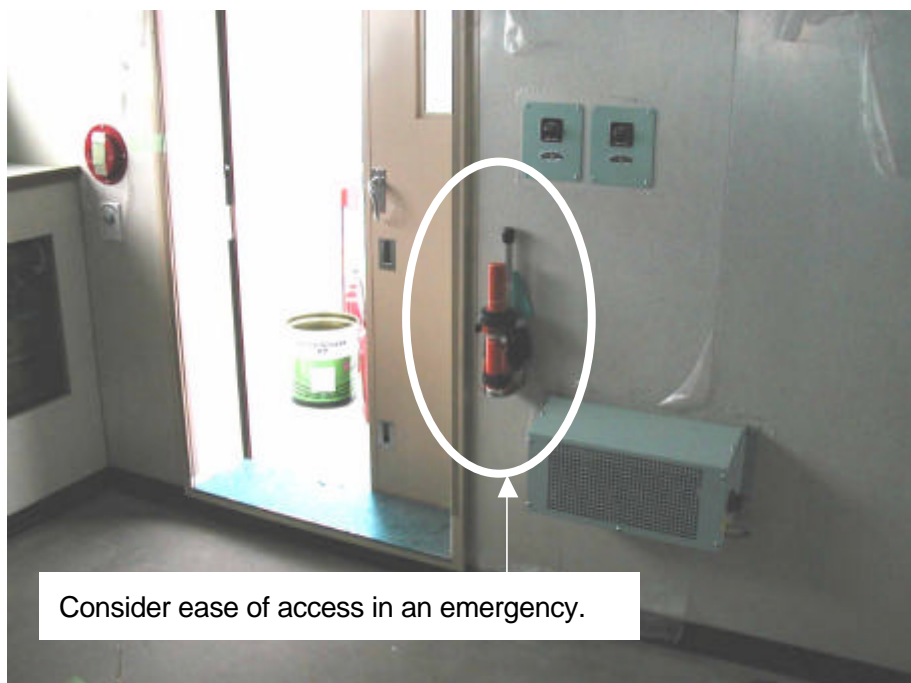


Fig. 3-32 Installing SART

3.10.2 Fitting SART mounting bracket

Fit the SART mounting bracket onto the lifeboat.

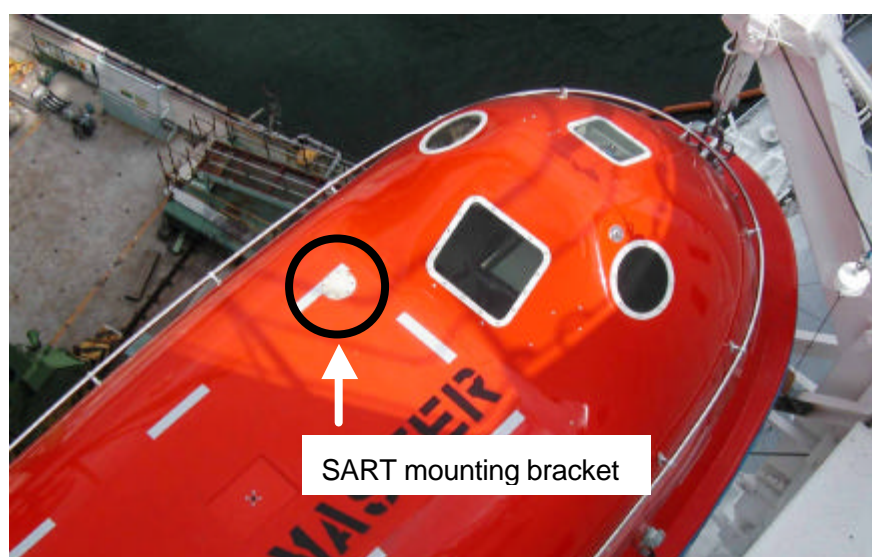


Fig. 3-33 SART mounting bracket

3.11 Two-Way Radio

Set the switch to either 110 V or 220 V according to ship's main, and change the fuse accordingly.



Fig. 3-34 Two-Way Radio charger

Place primary batteries (BP-1208) beside the charger.



Fig. 3-35 Primary batteries

3.12 EPIRB

3.12.1 Mounting base for KANNAD406WH

Mount the EPIRB at the position with sufficient space for lid ejection and maintenance.

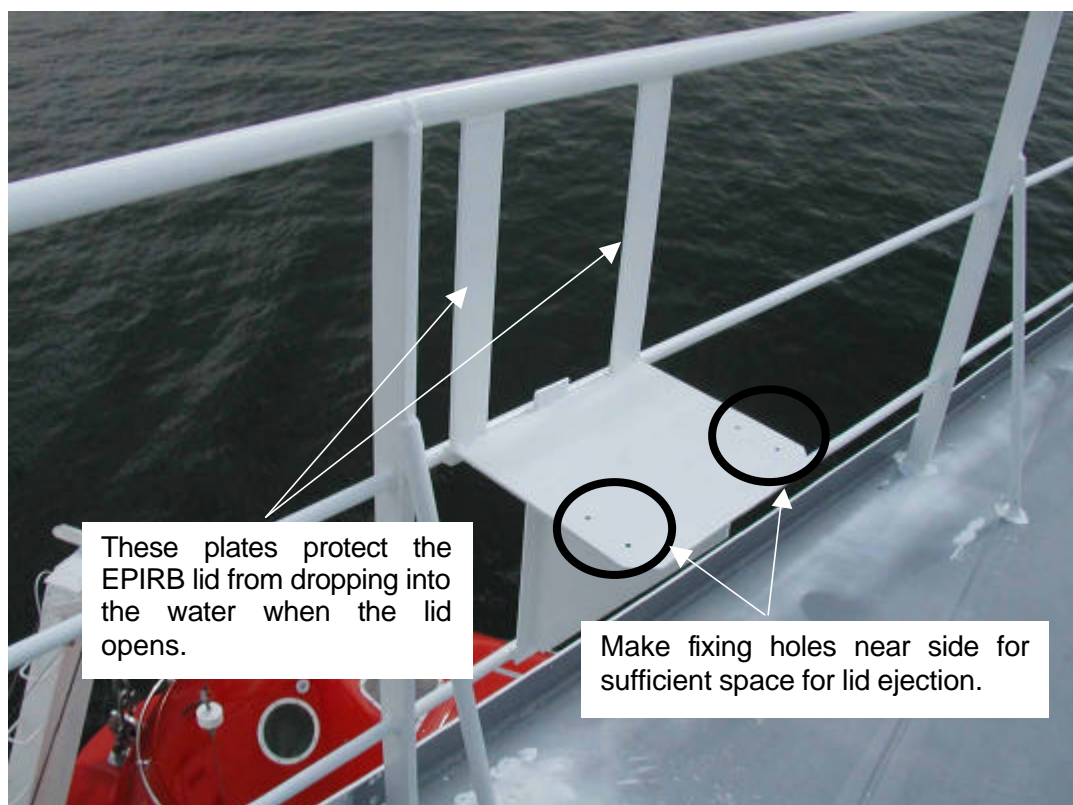


Fig. 3-36 EPIRB mounting base



Chapter 4. GPS receiver

4.1 GPS antenna

- Use the antenna fixture supplied when fixing the GPS antenna.
- Waterproof the cable joint with waterproofing and vinyl tapes.
- The diameter of the service loop is 30 cm or more, or the center conductor will break.

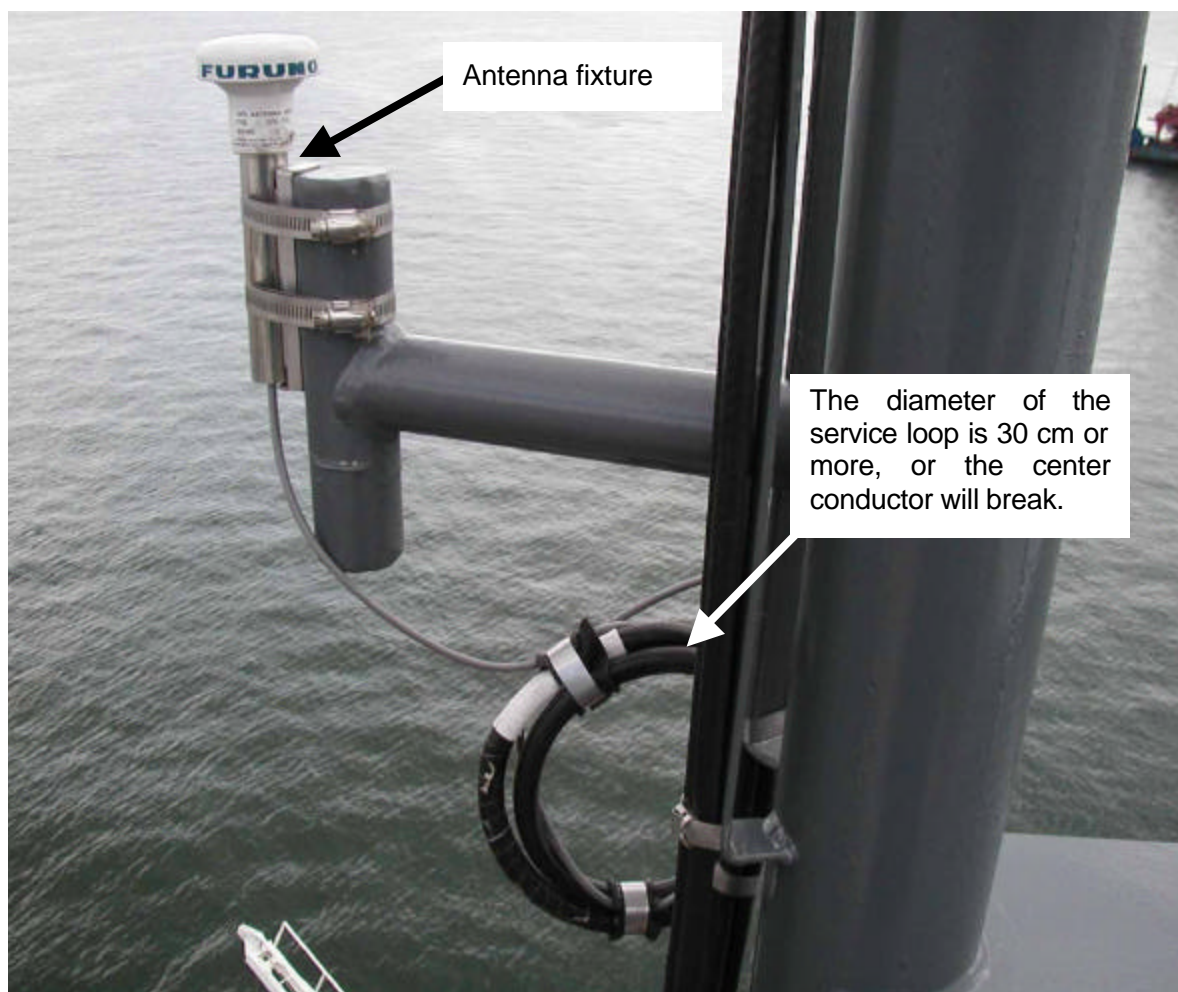


Fig. 4-1 Installing GPS antenna

4.2 GPS signal distribution box

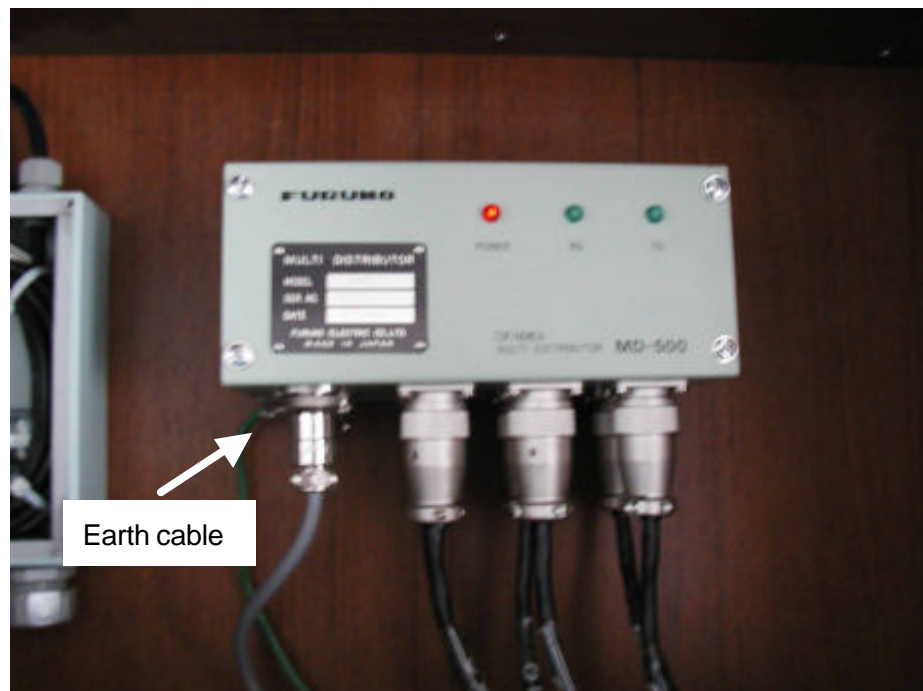


Fig. 4-2 Distribution MD-500

SRC connector

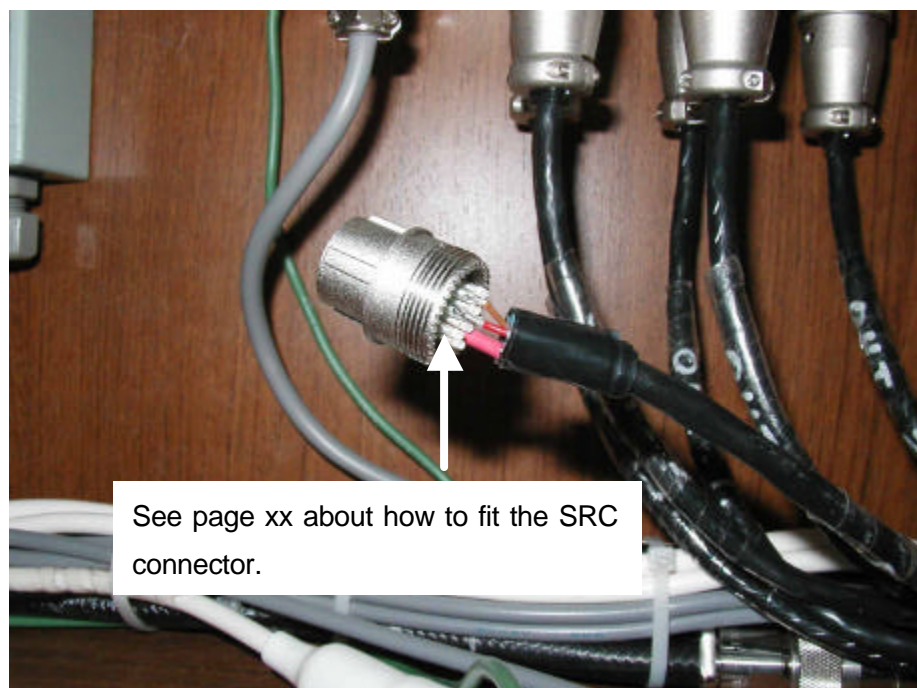


Fig. 4-3 Fitting SRC connector

Chapter 5. Acoustic equipment

5.1 Transducer position (DS-30/50/80, FE-700)

5.1.1 Best location

Select following locations for the transducer of acoustic equipment such as a doppler sonar and echosounder,

1. Location where is least affected by bubbles.
2. Location where is least affected by propeller and side thruster noises.

The most important is to avoid bubbles.

Flow of air bubbles created at ship's bow varies from hull to hull and according to ship's speed. Typically, bubbles flow along the hull as shown in Fig. 5-1.

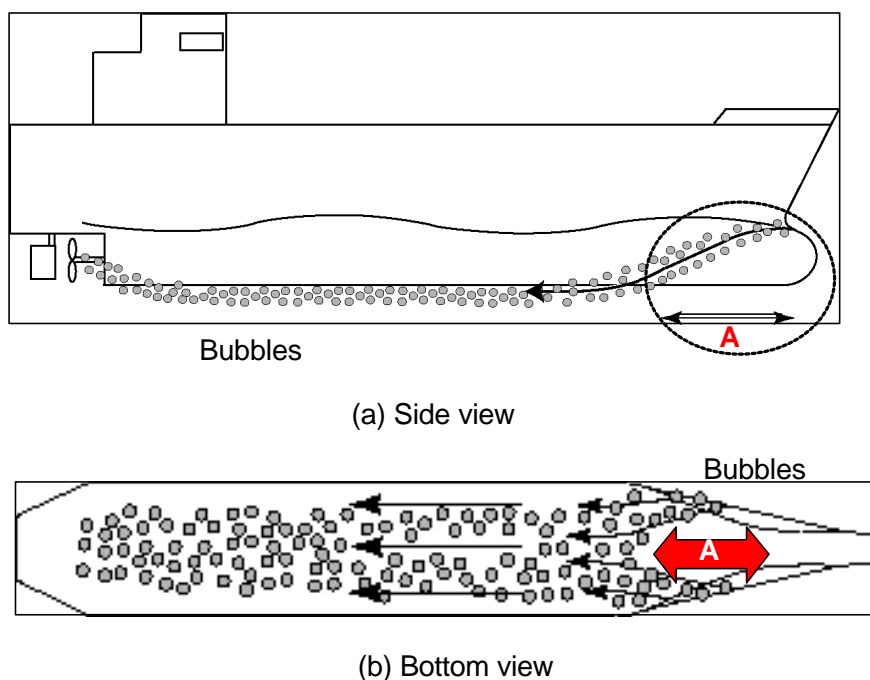


Fig.5-1 Flow of bubbles

Arrow A in Fig. 5-1 shows the best location for the transducer.

Fig.5-2 is the example of an installation.

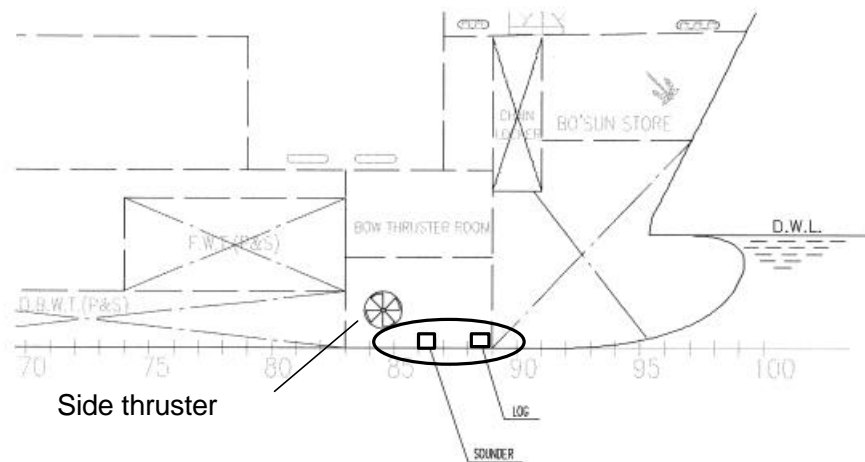


Fig.5-2 Location of transducer

The performance of the doppler sonar is easily degraded by bubbles so the transducer must be placed at the location "A" as shown in Fig. 5-1.

Transversely, the transducer is mounted on the keel or as near to the keel as possible.

?When side thruster is installed

The transducer is mounted in front of the side thruster about 1 m.

Installation at bow bulb

If the bottom is not flat, the transducer tank must be welded as shown in Fig. 5-3 to make the transducer surface flat. The installation at an angle will cause a false reading of depth.

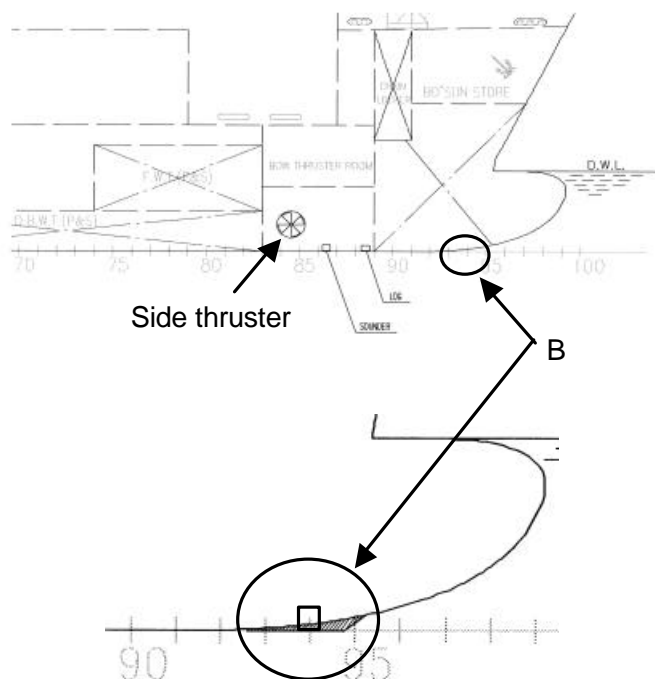


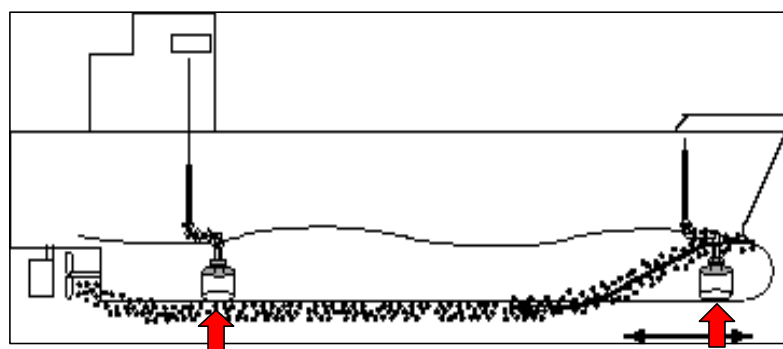
Fig.5-3 Installation at bow bulb

?Location for transducer of echosounder

The best position is the above-mentioned A. Installation at other areas may be affected by air bubbles and cause unstable depth indications.

Very important!

The lower the frequency, the more the air bubble interference. Use 200 kHz transducer where there is the possibility of air bubble interference.



200 kHz transducer

200 kHz or 50 kHz transducer

Fig.5-4 Location of echosounder transducer

5.1.2 Installation of echosounder and doppler sonar transducers

Decide location of doppler sonar transducer first.

When installing doppler sonar and echosounder transducers, decide the location for the doppler sonar transducer first. The echosounder transducer is placed behind the doppler sonar transducer about 2 m or more.

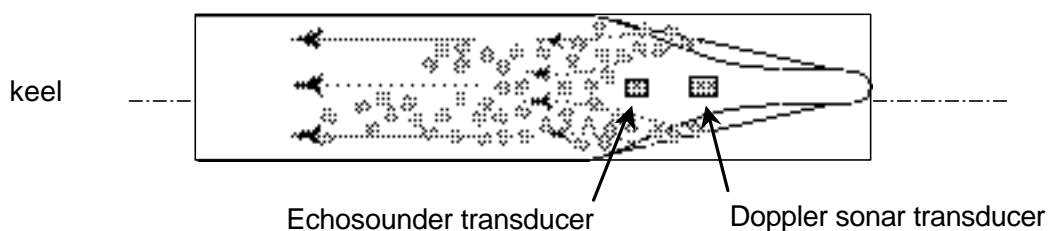


Fig.5-5 Echosounder and doppler sonar transducers

Fig. 5-6 shows the recommended area for echosounder transducer to be mounted.

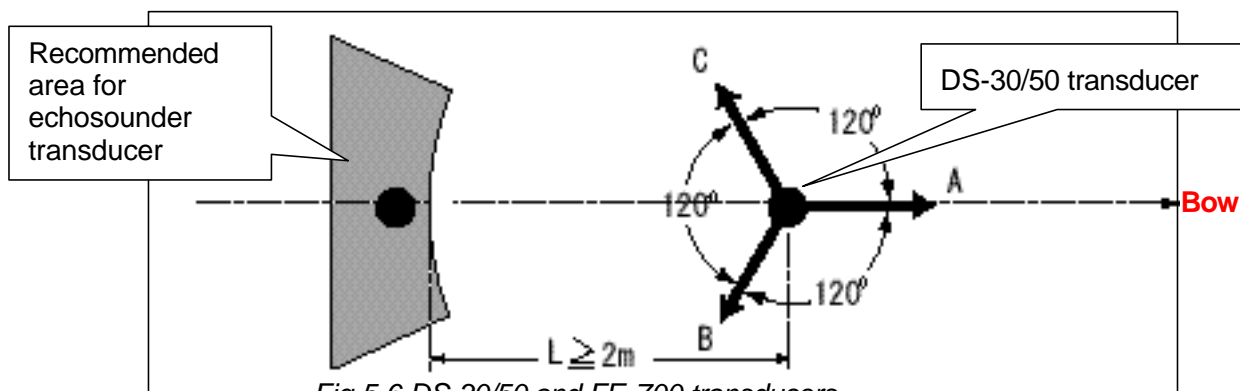


Fig.5-6 DS-30/50 and FE-700 transducers

Doppler sonar transmits three beams in directions A, B and C. Never place the echosounder transducer in the directions A, B and C.

? DS-80 and FE-700

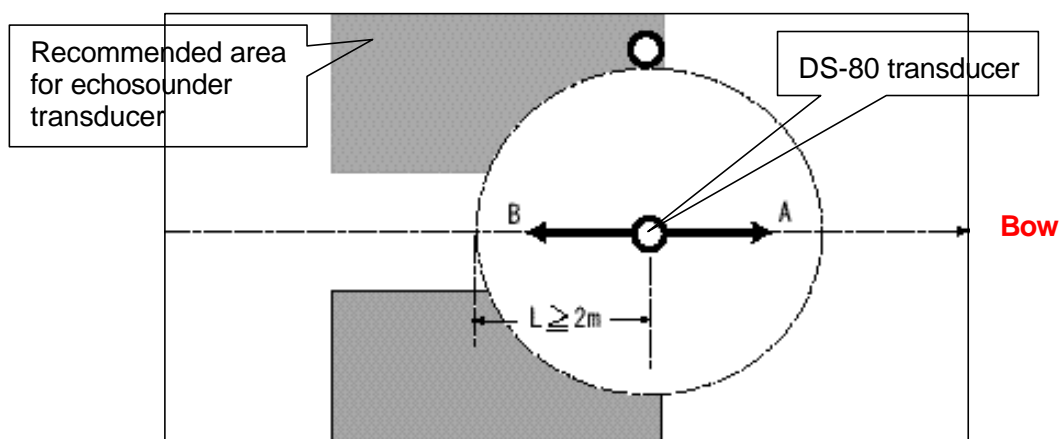


Fig.5-7 DS-80 and FE-700 transducers

5.1.3 Installation on ship with protruded keel

When the transducer is mounted in the keel, take followings into account to prevent the adverse affect from bubbles.

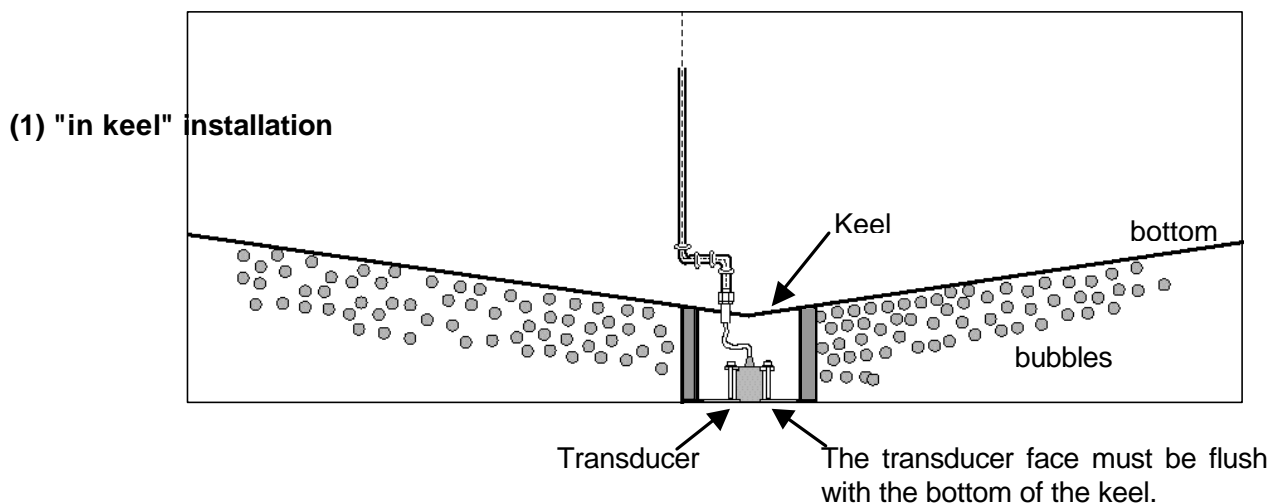


Fig.5-8 "In keel" Installation

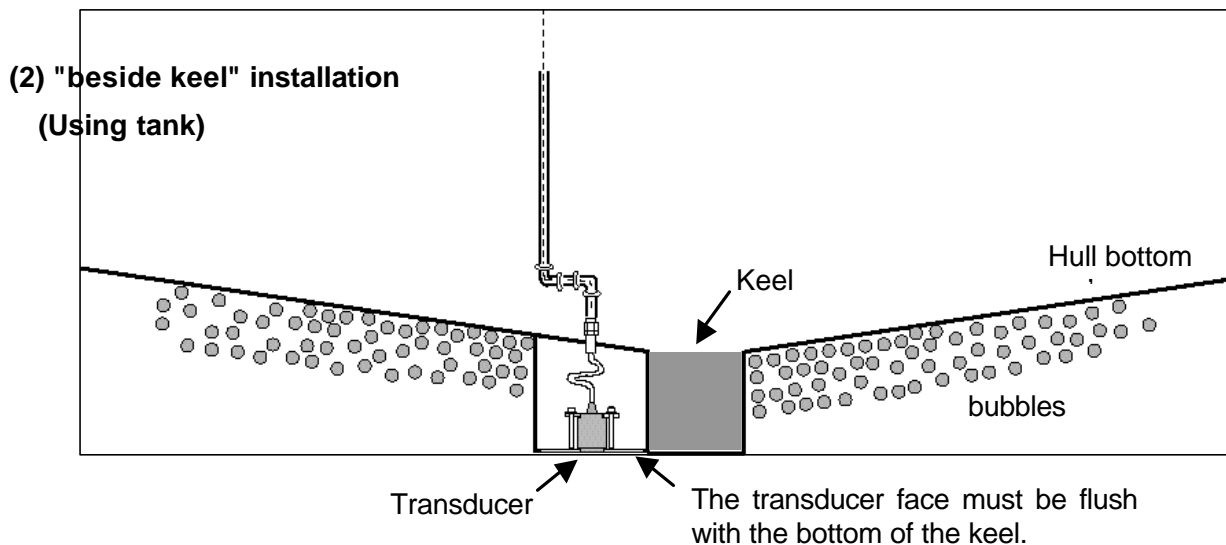


Fig.5-9 "Beside keel" installation

(3) "parallel to keel" installation (Using tank)

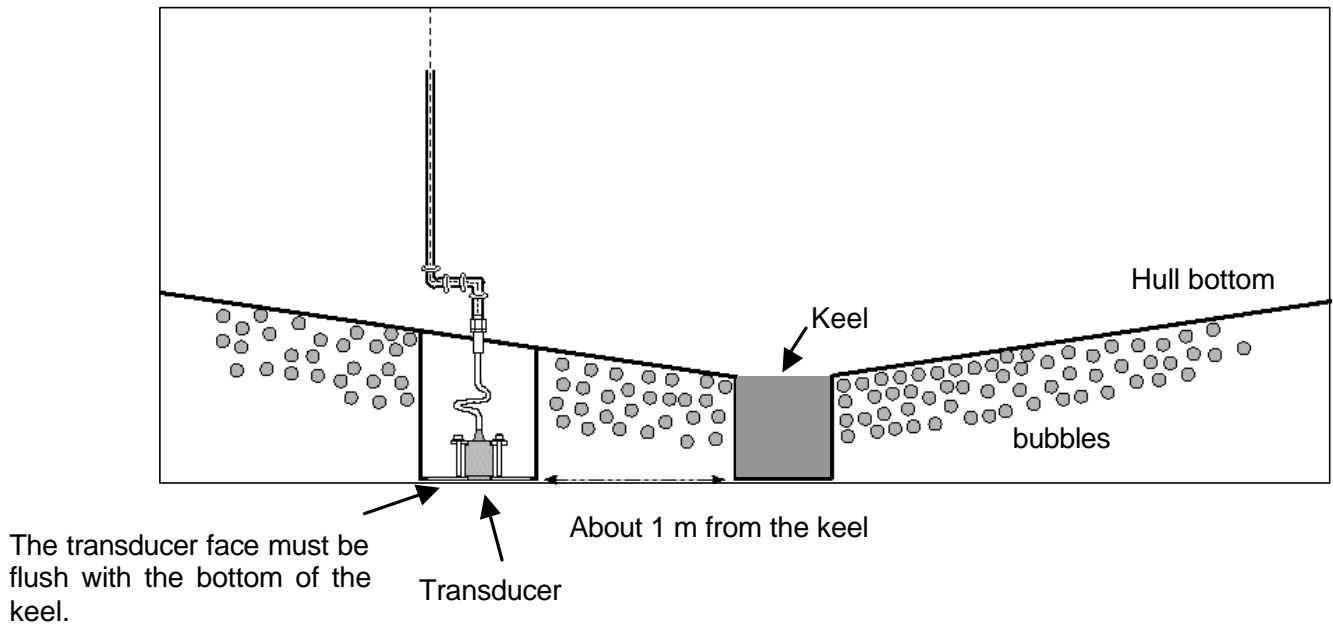


Fig.5-10 "Parallel to keel" installation

5.2 Installing DS-30 transducer

- 1) Align the transducer tank so that the bow mark is in fore direction.
(The tank supplied by FURUNO carries "bow mark".)

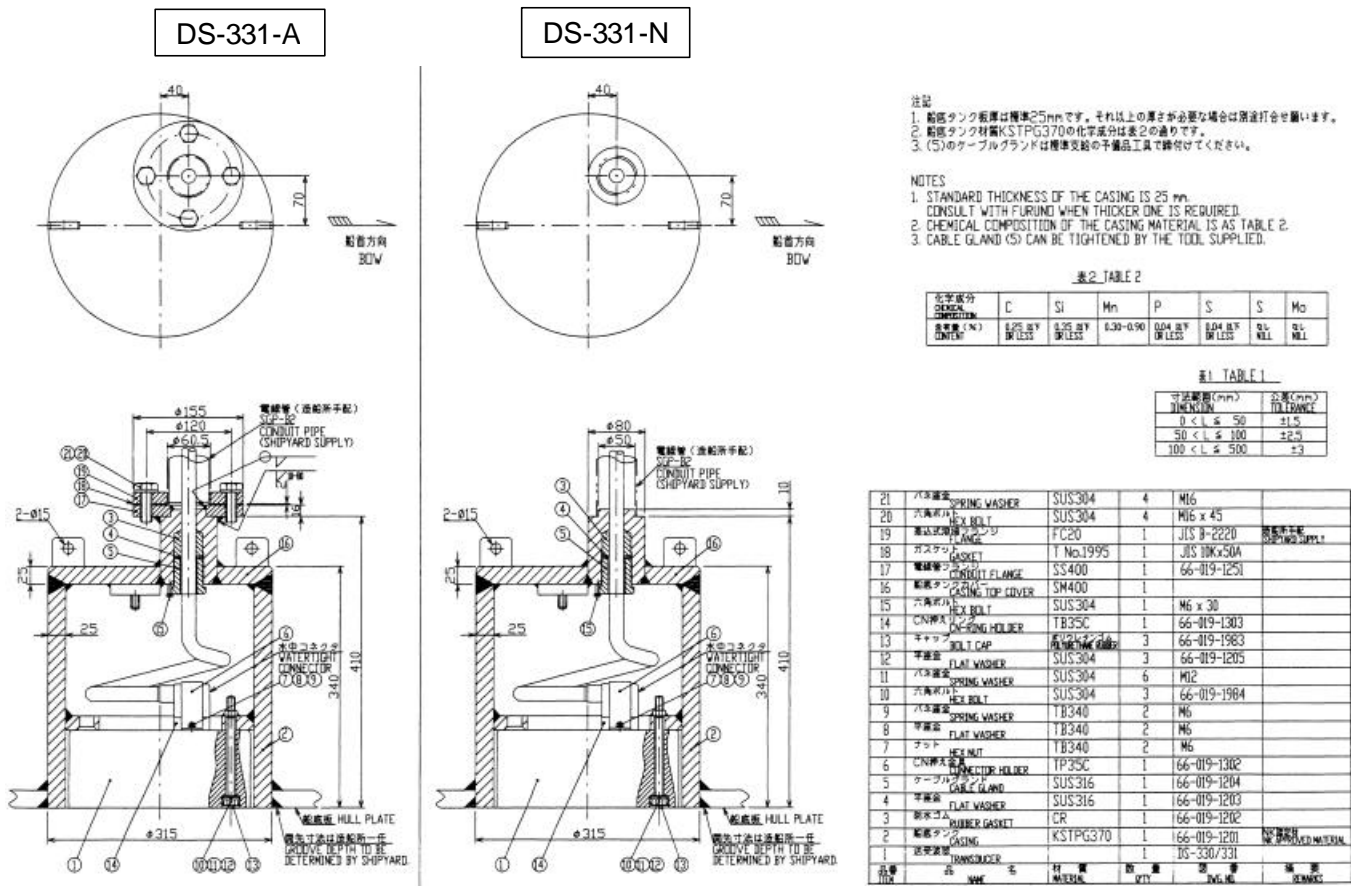


Fig.5-11 DS-331A/331N tank

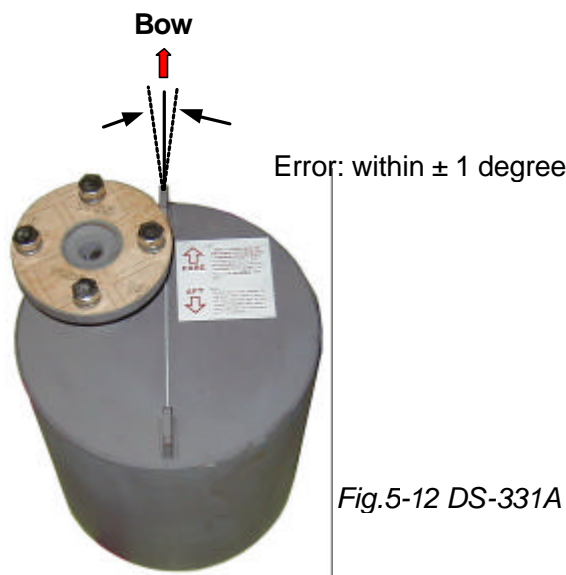


Fig.5-12 DS-331A tank

- 2) Install the tank parallel to draft line longitudinally and transversely.

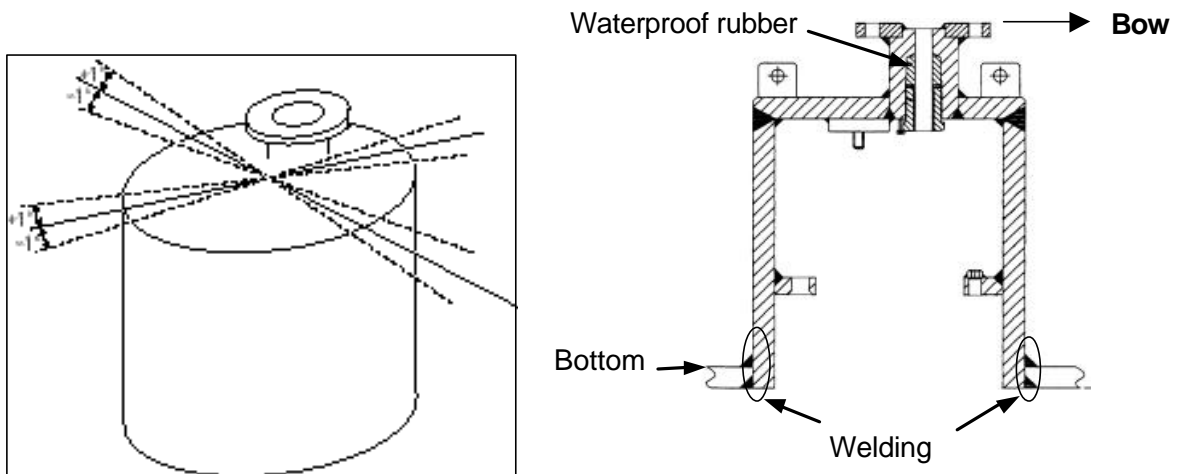


Fig.5-13 DS-331A tank

When welding the tank, remove the waterproof rubber of the transducer to prevent the damage from the heat.

- 3) Leave a slack of the transducer cable in the tank for servicing.

Procedure

1. Let the cable gland, flat washer and waterproof rubber through the transducer cable in order.
2. Put the cable through the cable gland from the bottom. The length between the connector and the cable gland is 700 to 900 mm. A slack is required for servicing.
3. Hand-tighten the cable gland.
4. Tighten the gland securely using the wrench supplied.
5. Fix the hex. bolt to prevent the gland from loosening.

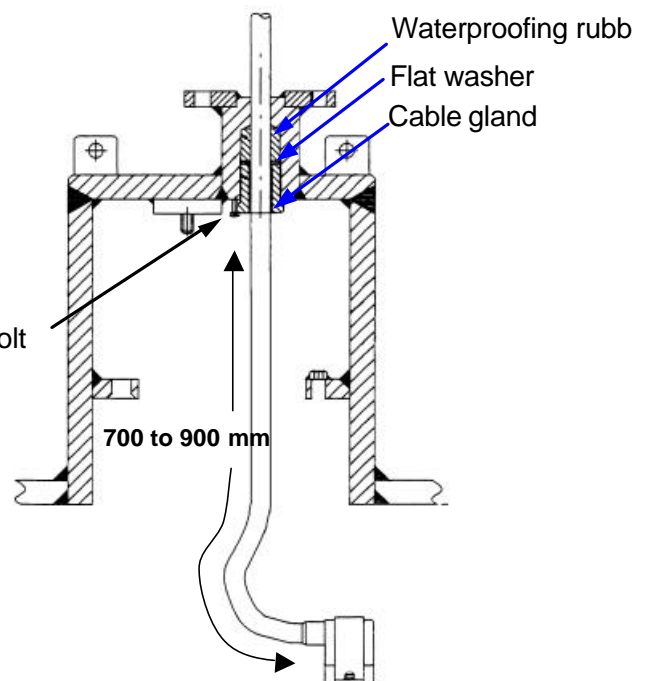


Fig.5-14 Installing transducer cable

4) Connecting waterproof transducer connector



Fig.5-15 Transducer, DS-330

1. Apply silicone grease (supplied in installation materials) on the connector face. (Whole area) Excess grease will isolate pin contacts.



Fig.5-16 Waterproof connector

2. Plug the connector while holding up the connector ring.

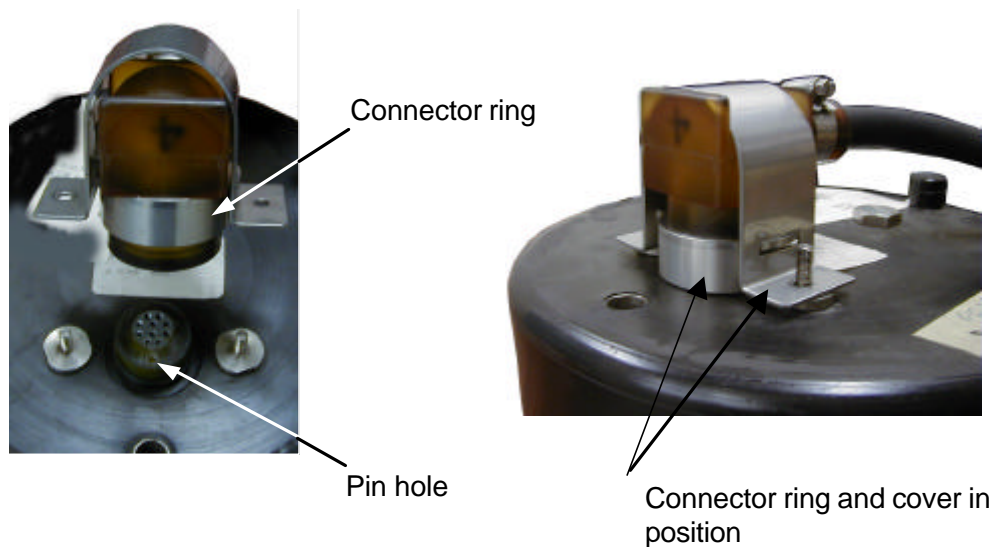


Fig.5-17 Installing waterproof connector

3. Place the connector ring in position and fix the connector cover using the supplied flat washer, spring washer and nut.

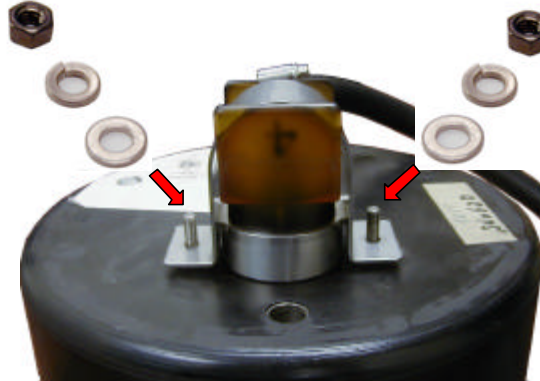


Fig.5-18 Fixing waterproof connector

Use the titanium nuts and washers or equivalents to fix the connector cover. If not, corrosion will result.

- 5) Place the transducer with a correct alignment.

The protuberance on the DS-30 transducer should be in stern direction. Fix the transducer with three bolts supplied.

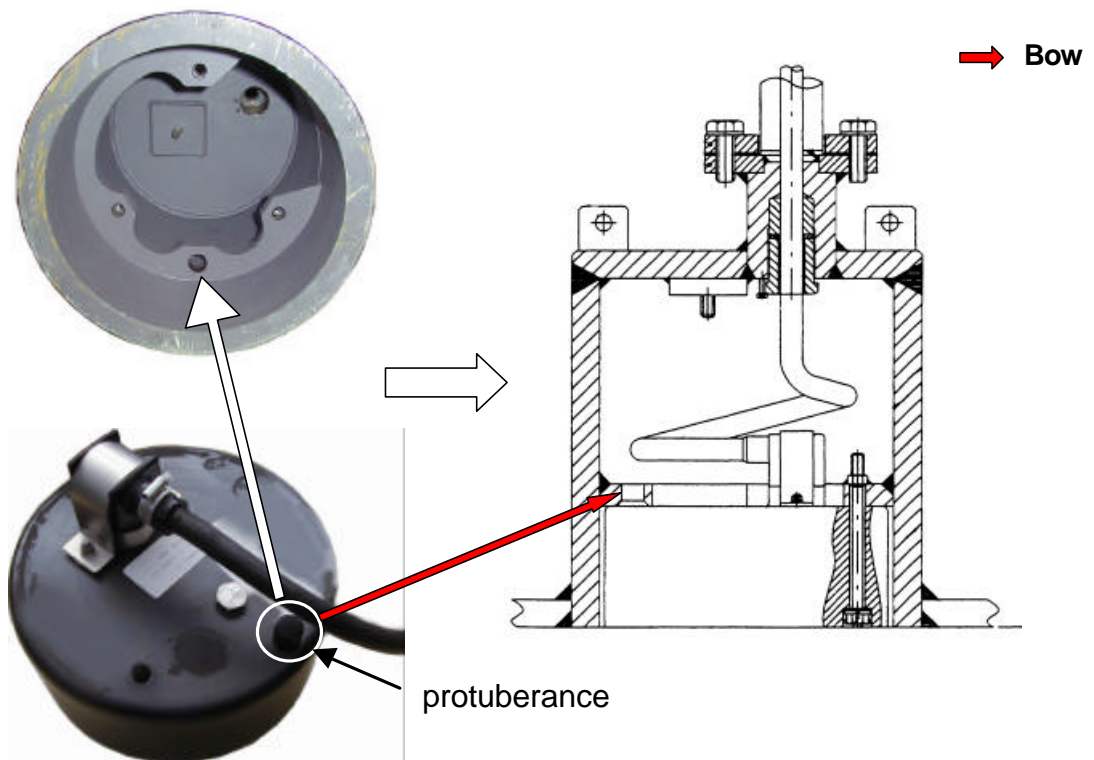


Fig.5-19 Mounting transducer

- 6) After fixing the transducer, apply supplied silicone sealant on the head of three bolts.

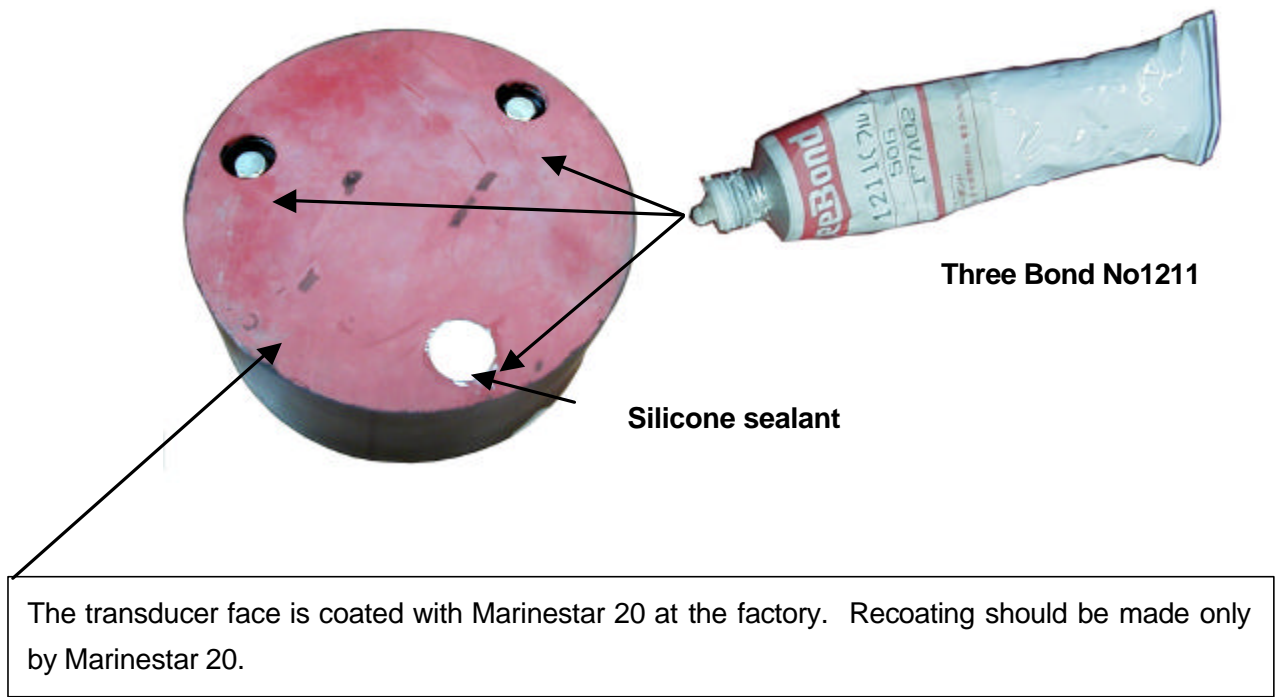


Fig.5-20 Applying silicone sealant

5.3 Installing DS-50 transducer

5.3.1 Hull tank

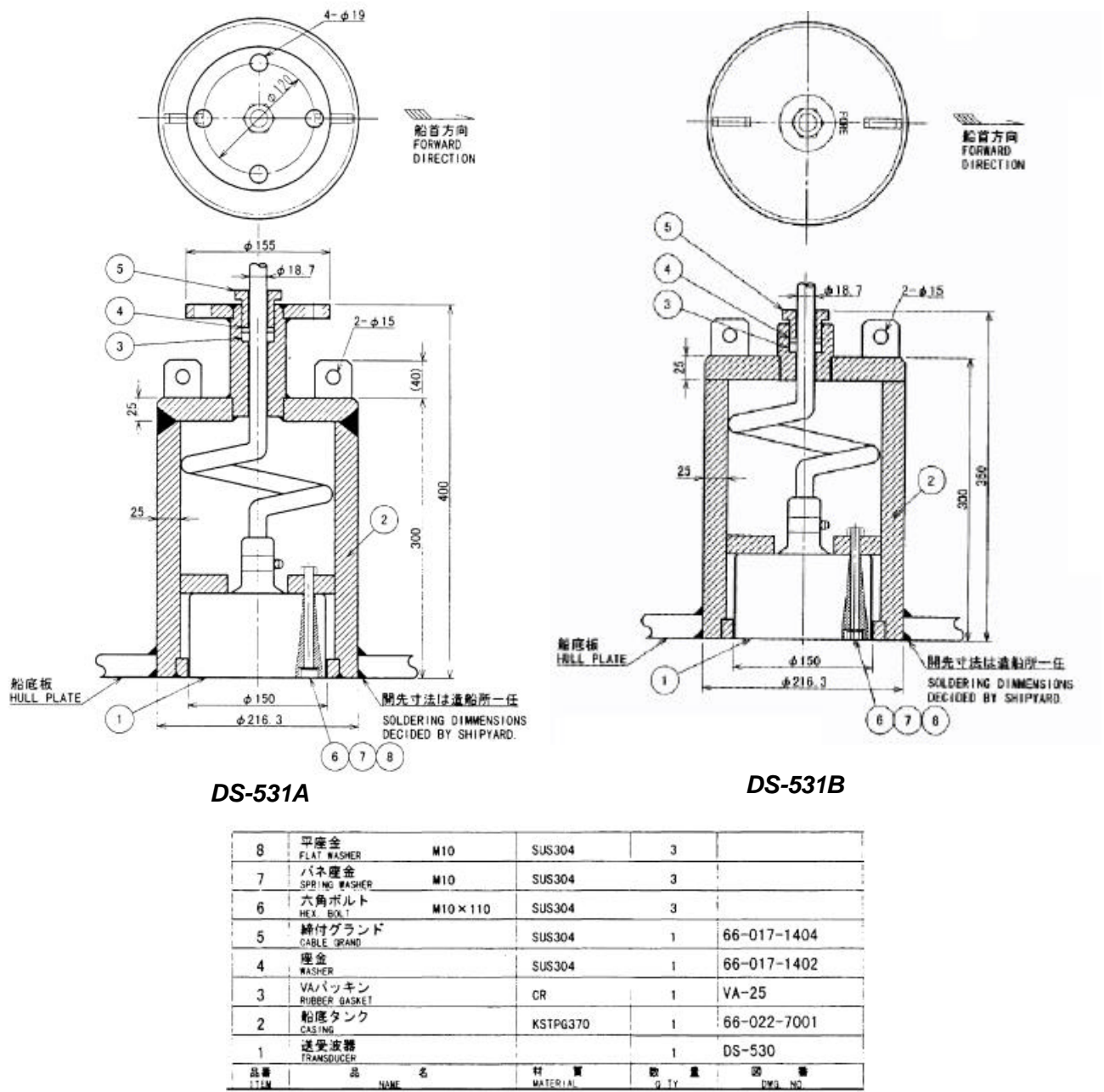


Fig.5-21 DS-50 Hull tank DS-531A/531B

"Bow mark"

The mark on the tank points toward the FORE direction.

Alignment error is within 1 degree. The tank is mounted at the right angles to the draft line.

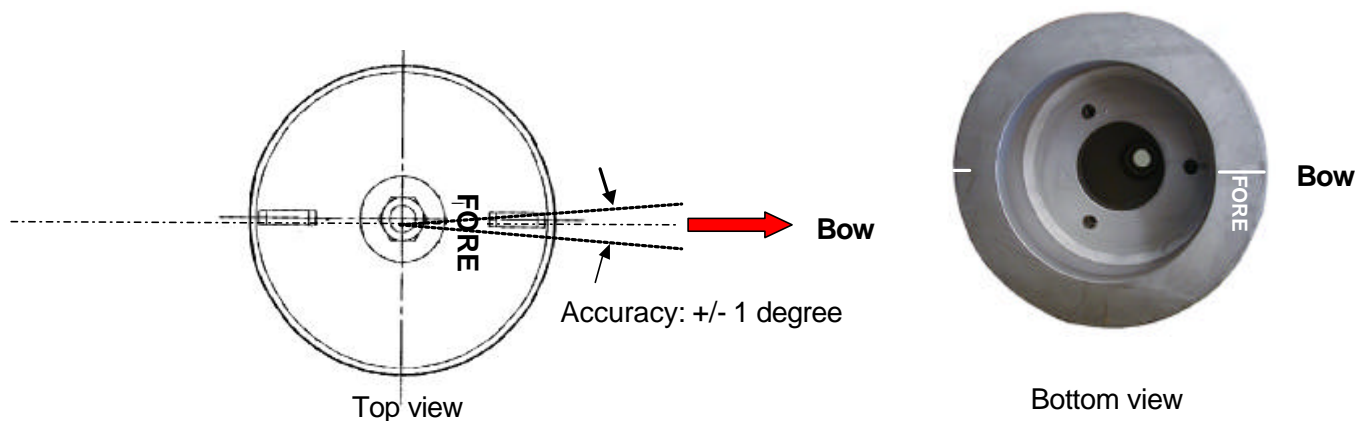


Fig.5-22 DS-50 Hull tank

Mounting transducer

Transducer is also mounted with correct alignment.

The fixing hole which is closest to the edge locates in the fore direction. If the transducer is inserted into the tank in wrong direction, it cannot be fixed. See Fig.5-23.

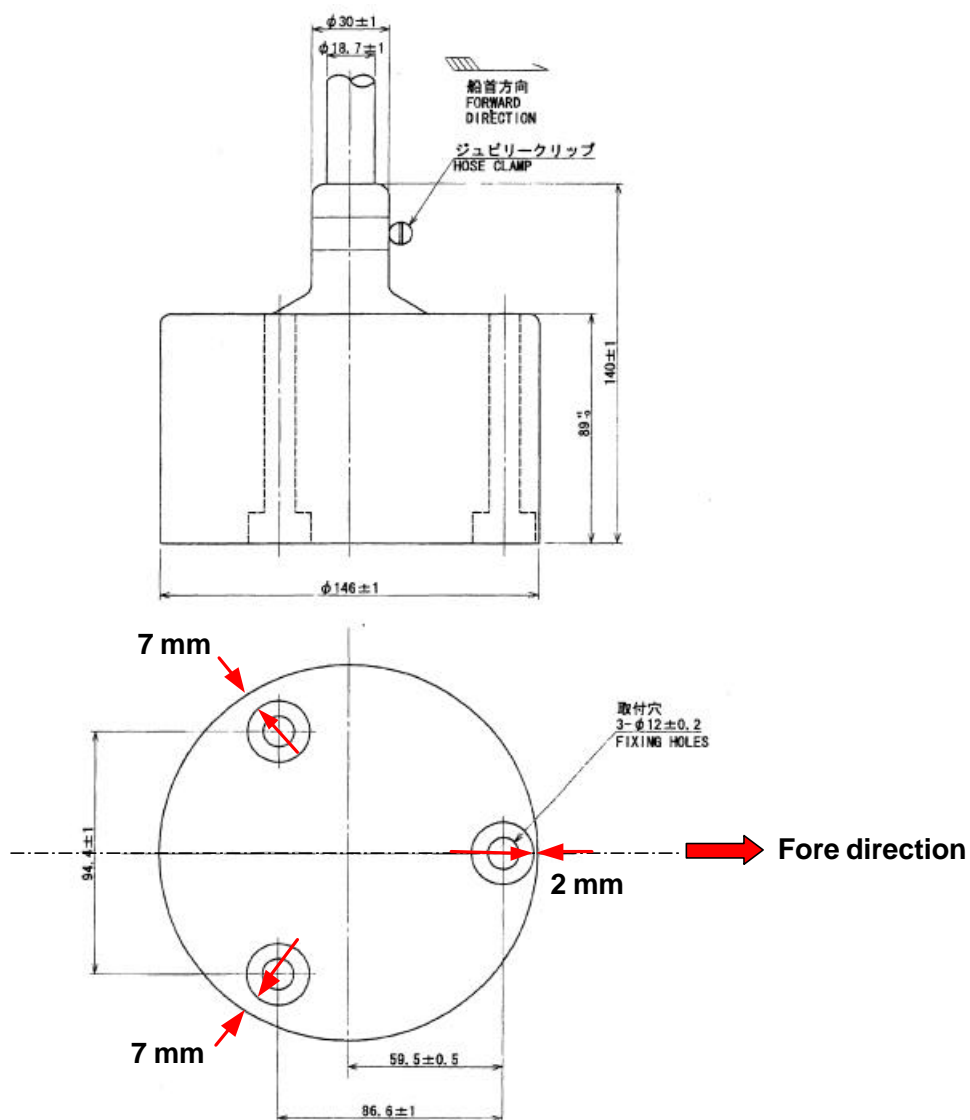
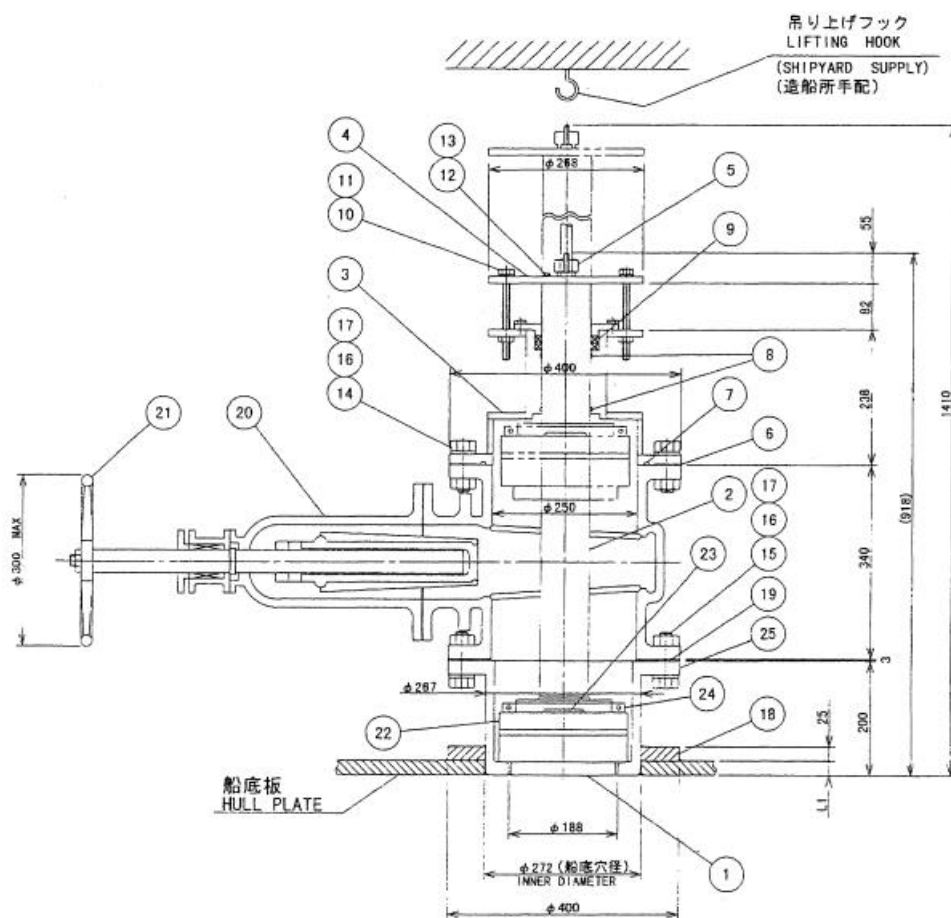


Fig.5-23 DS-50 transducer: DS-530

After mounting the transducer, apply supplied silicone sealant on the head of three bolts.

The transducer face is coated with MarineStar 20 at the factory. Coating is not necessary at installation. For maintenance, use MarineStar 20 only.

5.3.2 Installing tank with gatevalve



ITEM	品名	NAME	材質	数量	図番	備	備
24	クランプ	CLAMP BAND	SUS304	2			
23	クランプピン	CLAMP PIN	SUS304	2			
22	防蝕亜鉛	ANTI-CORROSIVE ZINC	ZAP	2			
21	ハンドル	HANDLE	FC20	1			造船所手配
20	ゲートバルブ	GATE VALVE 9.8 x 10 ⁵ Pa	SC46	1	JIS F7366-2508		造船所手配
19	ガスケット	GASKET	アスベスト複合シート	1	t=3 mm		造船所手配
18	船底補強板	DOUBLING PLATE	KA	1			
17	ナット	NUT M22	SUS304	12			
16	バネ座金	SPRING WASHER M22	SUS304	12			
15	六角ボルト	BOLT M22 x 80	SUS304	12			
14	六角ボルト	BOLT M22 x 85	SUS304	12			
13	バネ座金	SPRING WASHER M6	SUS304	12			
12	六角ボルト	BOLT M6 x 12	SUS304	12			
11	バネ座金	SPRING WASHER M12	SUS304	12			
10	六角ボルト	BOLT M12 x 150	SUS304	12			
9	グリース綿	GREASE COTTON					
8	O-リング	O-RING	NBR	2			
7	O-リング	O-RING	NBR	1			
6	ガスケット	GASKET	CR	1	t=2 mm		
5	取付金具	FIXING GRAB	SUS304	1			
4	覆き板	UPPER PLATE	SS400	1			
3	蓋	SEACHEST CAP	SS400	1			
2	シャフト	SHAFT	SUS304	1			
1	圧受液機	TRANSDUCER		1			
ITEM	品名	NAME	MATERIAL	Q. TY	FIG. NO.	備	REMARKS

Fig.5-24 Transducer tank with gatevalve: DS-532

Bow mark on the flange must locate in fore direction.

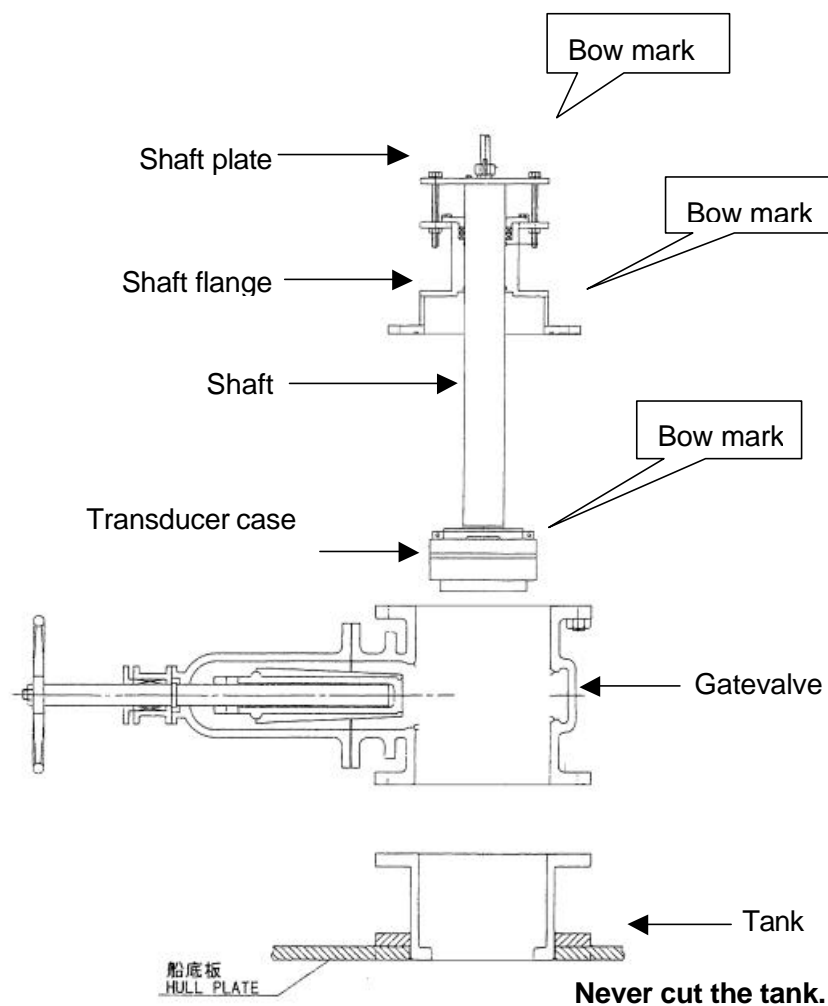


Fig.5-25 Transducer tank with gate valve, exploded

Installing tank

The center line between the fixing holes is the fore-aft line.

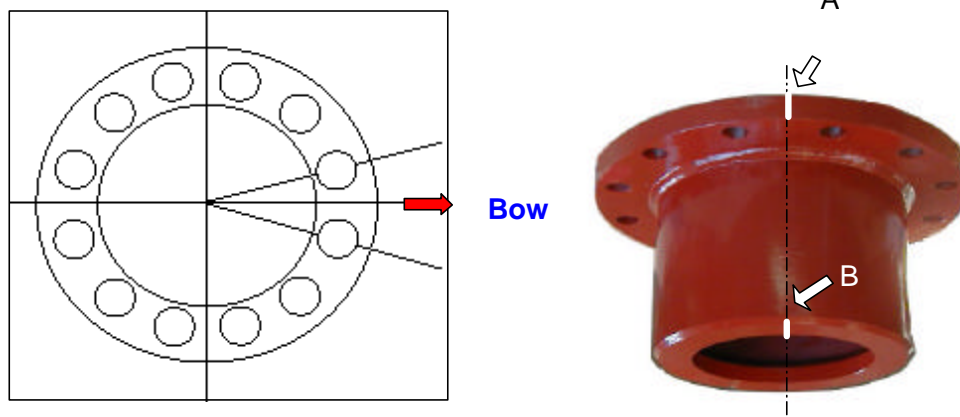


Fig.5-26 Bow direction of tank

Before mounting tank

Put bow marks A and B on the tank as shown in the Fig.5-26. (Accuracy: within 1 degree) The tank is mounted at right angles to the draft line.

Installing transducer

Insert the transducer into the case. The transducer fixing hole which is closest to the edge matches to the fore mark on the case. The transducer is fixed with three bolts supplied.

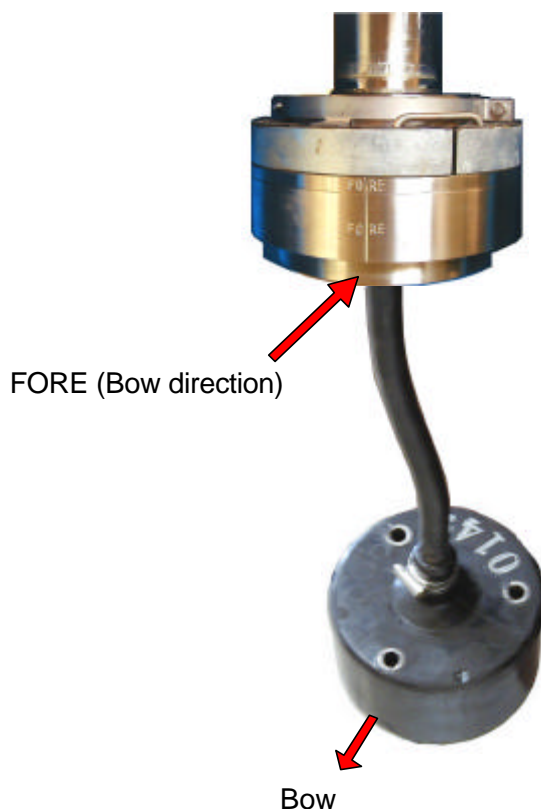


Fig.5-27 Mounting transducer

Caution on mounting shaft / transducer assembly to gatevalve

"FORE" marks must be in bow direction.

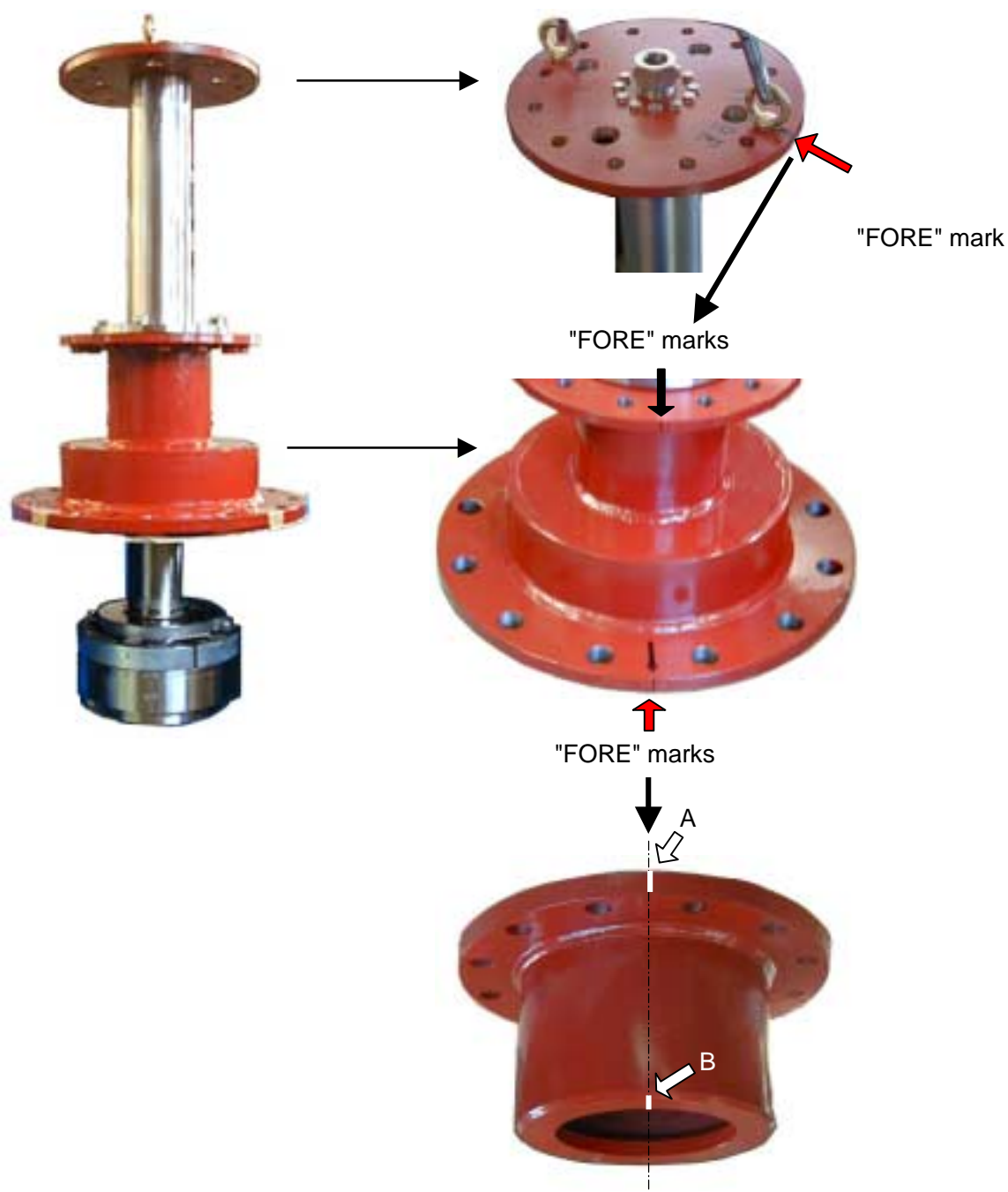


Fig.5-28 Orienting "FORE" marks

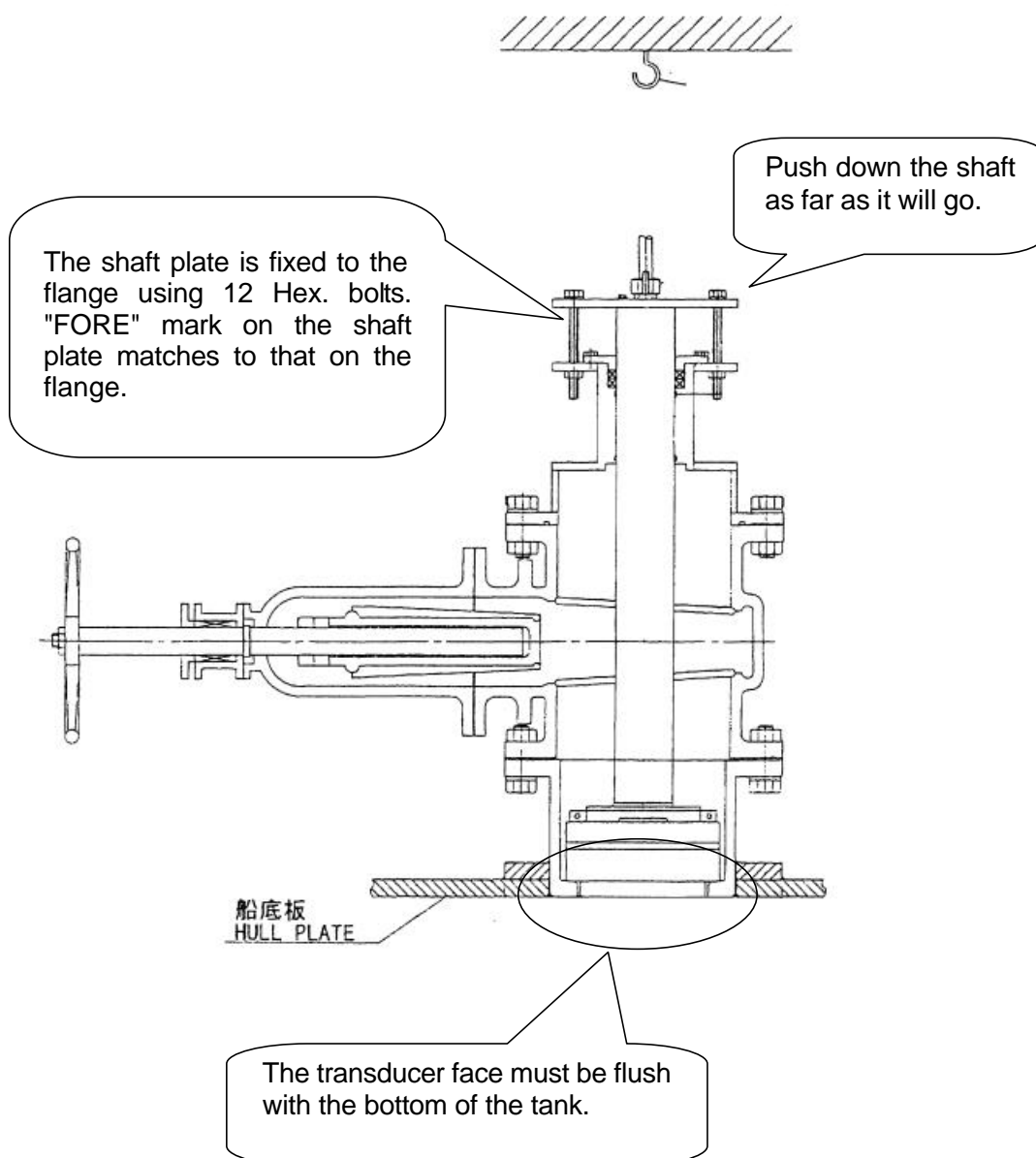
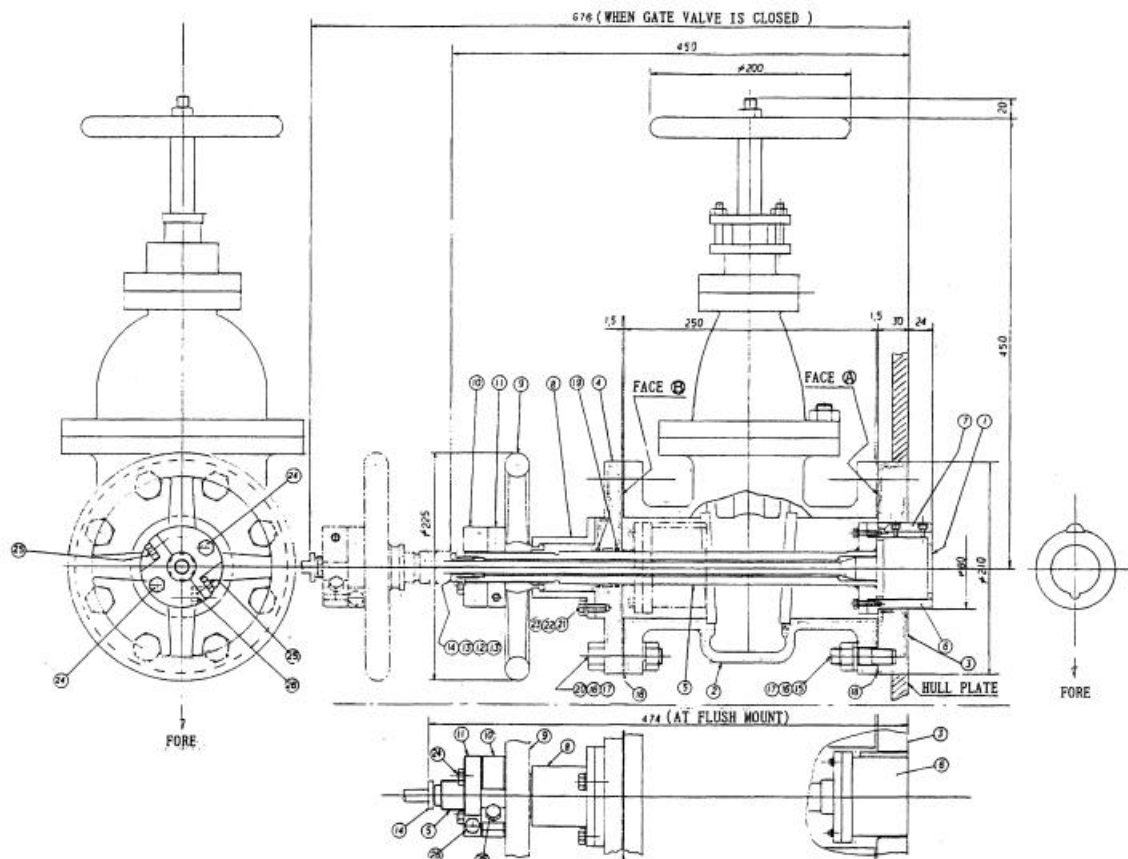


Fig.5-29 Mounting transducer

5.4 Installation of DS-80 transducer

5.4.1 Gatevalve tank

Type: DS-782



No.	NAME	Q'TY	No.	NAME	Q'TY
1	TRANSDUCER	1	14	CABLE GLAND	1
2	GATEVALVE	1	15	STUD BOLT	8
3	HULL FLANGE	1	16	SPRING WASHER	16
4	UPPER FLANGE	1	17	HEX. NUT	16
5	RETRACTION SHAFT	1	18	GASKET	2
6	TRANSDUCER CASE	1	19	O-RING	2
7	TURNING STOPPER	1	20	HEX. BOLT	8
8	LOCK RING	2	21	FLAT WASHER	4
9	HANDLE	1	22	SPRING WASHER	4
10	SPACER	2	23	BOX. BOLT	4
11	LOCK RING	1	24	HEX. BOLT	2
12	GASKET	1	25	HEX. BOLT	2
13	SECURE RING	2	26	HEX. BOLT	1

Fig.5-30 DS-80 gatevalve tank: DS-782

(1) Weld the hull flange (3) to the hull bottom with the FORE mark pointing toward the bow direction and reference marks on the side of the hull flange aligned with the fore-aft line.

- Fore-aft alignment is accurate within ± 1 degree.
- The flange must be parallel to the draft line within ± 1 degree.
- Grind the welding area outside the hull bottom to accomplish flatness.

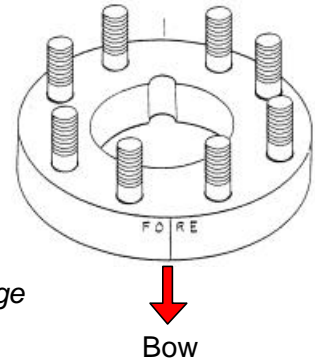
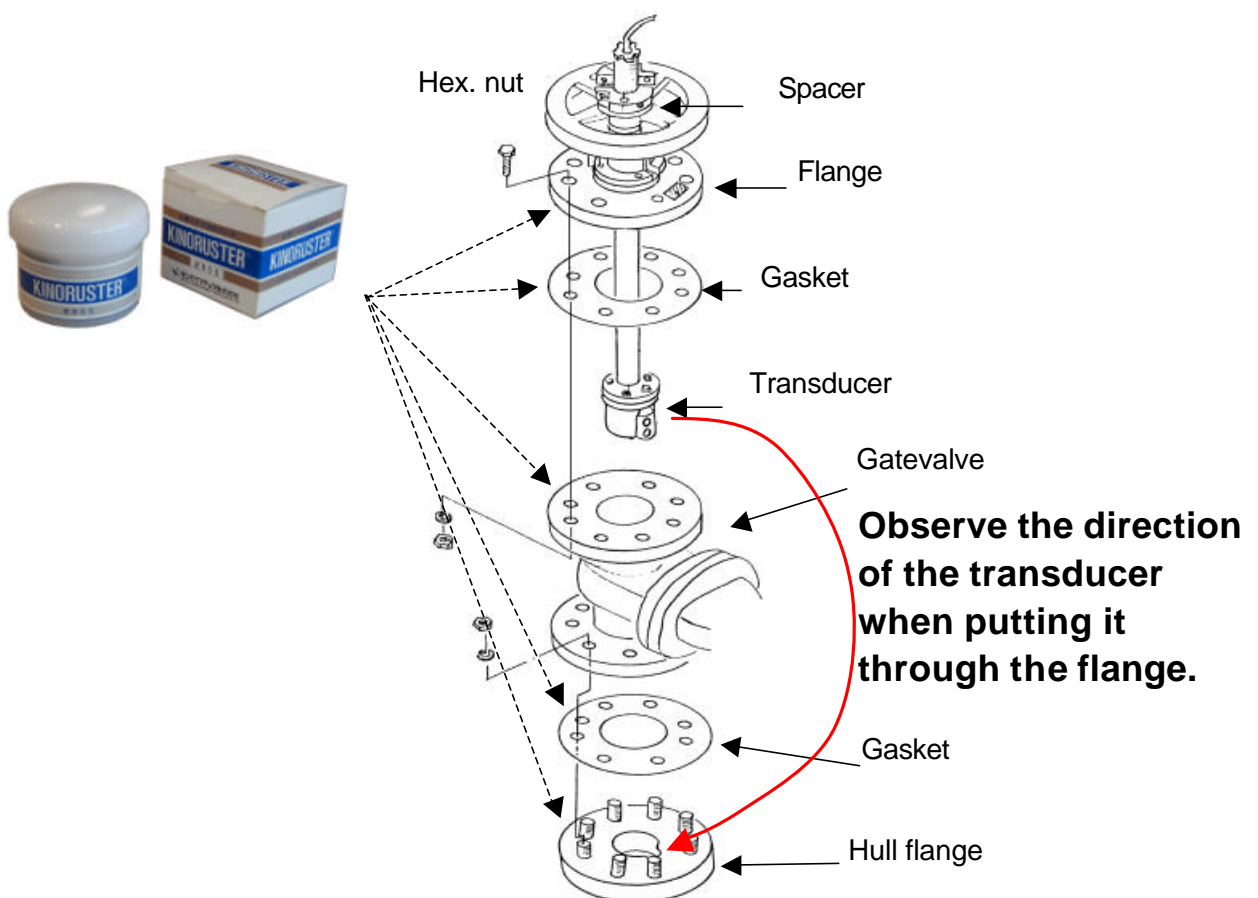


Fig.5-31 Bottom flange

(2) Apply KINORUSTER or alternative anticorrosive sealant to the flanges and the gasket as shown in Fig. 5-32. Use the sealant for both side of the gasket.



(3) Mounting transducer

Insert the transducer into the head cap so that the protuberance of the transducer engages to location mark. Then, fix the transducer to the head cap with the Hex. bolts.



The protuberance of the transducer points toward fore direction.

Fig.5-33 Transducer (DS-820)

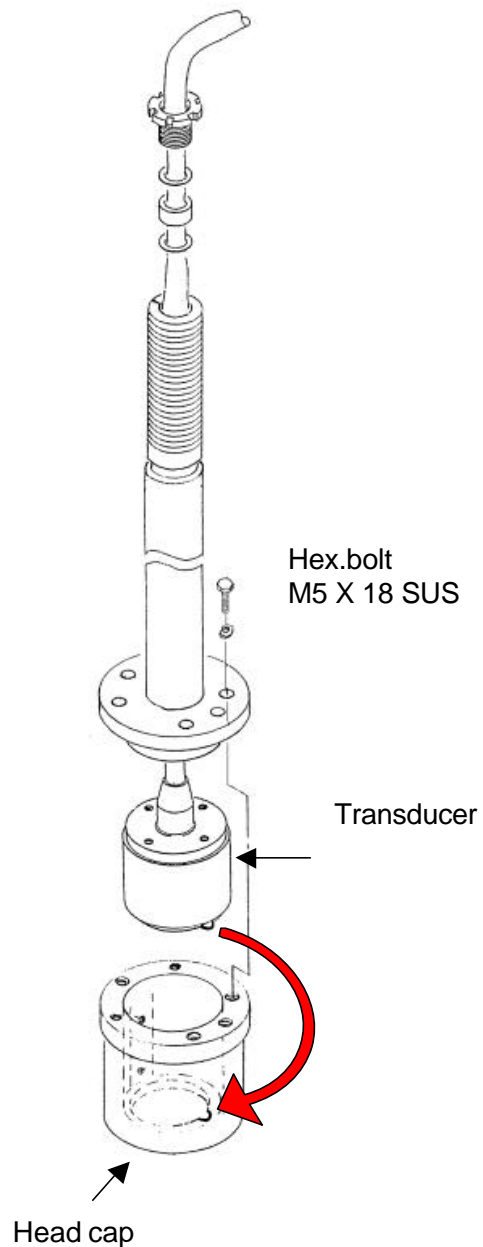
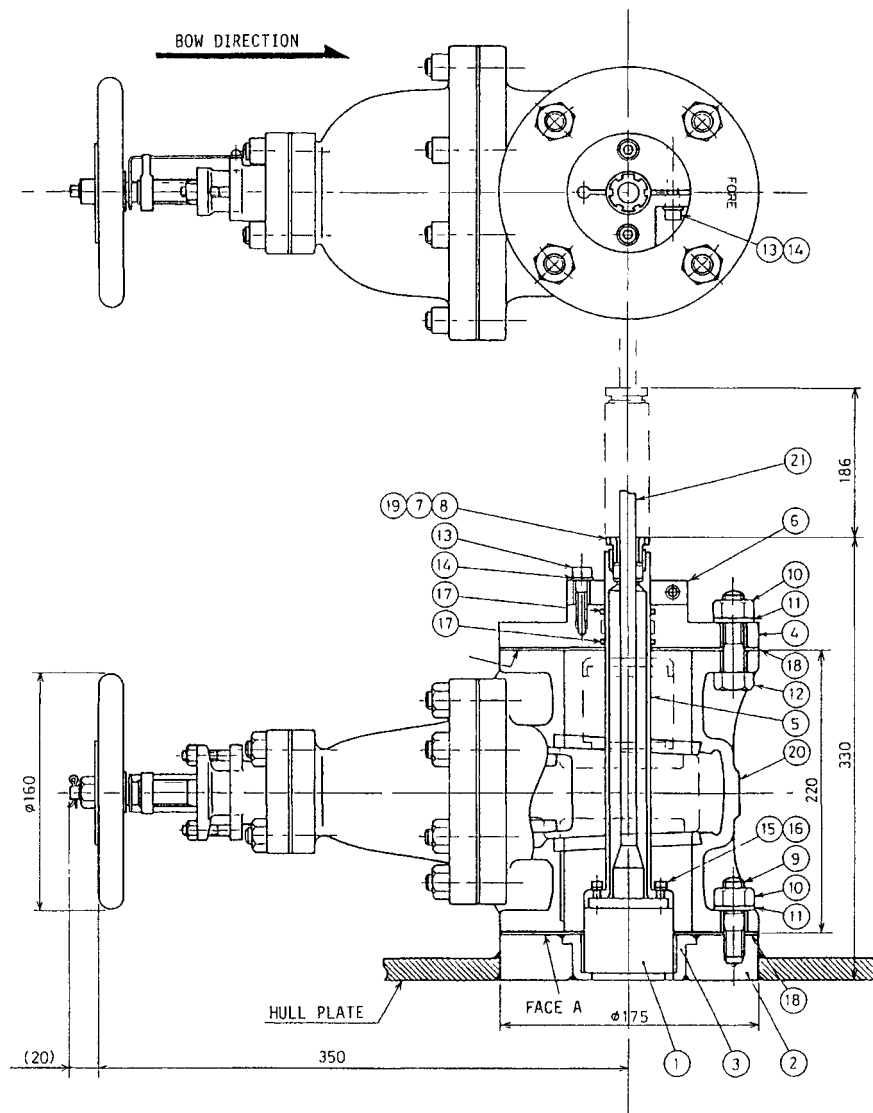


Fig.5-34 Mounting transducer

Fig.5-32 Gatevalve DS-782, enlarged

Type: DS-786



No.		Q'TY	No.		Q'TY
1	TRANSDUCER		12	HEX.BOLT	
2	HULL FLANGE		13	HEX. SOCKET HEAD BOLT	
3	BUSHING		14	SPRING WASHER	
4	4FLANGE		15	HEX. SOCKET HEAD BOLT	
5	SHAFT		16	SEAL WASHER	
6	6 LOCKRING		17	O RING	
7	GASKET		18	GASKET	
8	WASHER		19	FIXING GLAND	
9	TAP-END STUD BOLT		20	GATE VALVE	
10	HEX. NUT		21	CONNECTION CABLE	
11	SPRING WASHER				

Fig.5-35 DS-80 gatevalve hull tank: DS-786

Mounting transducer

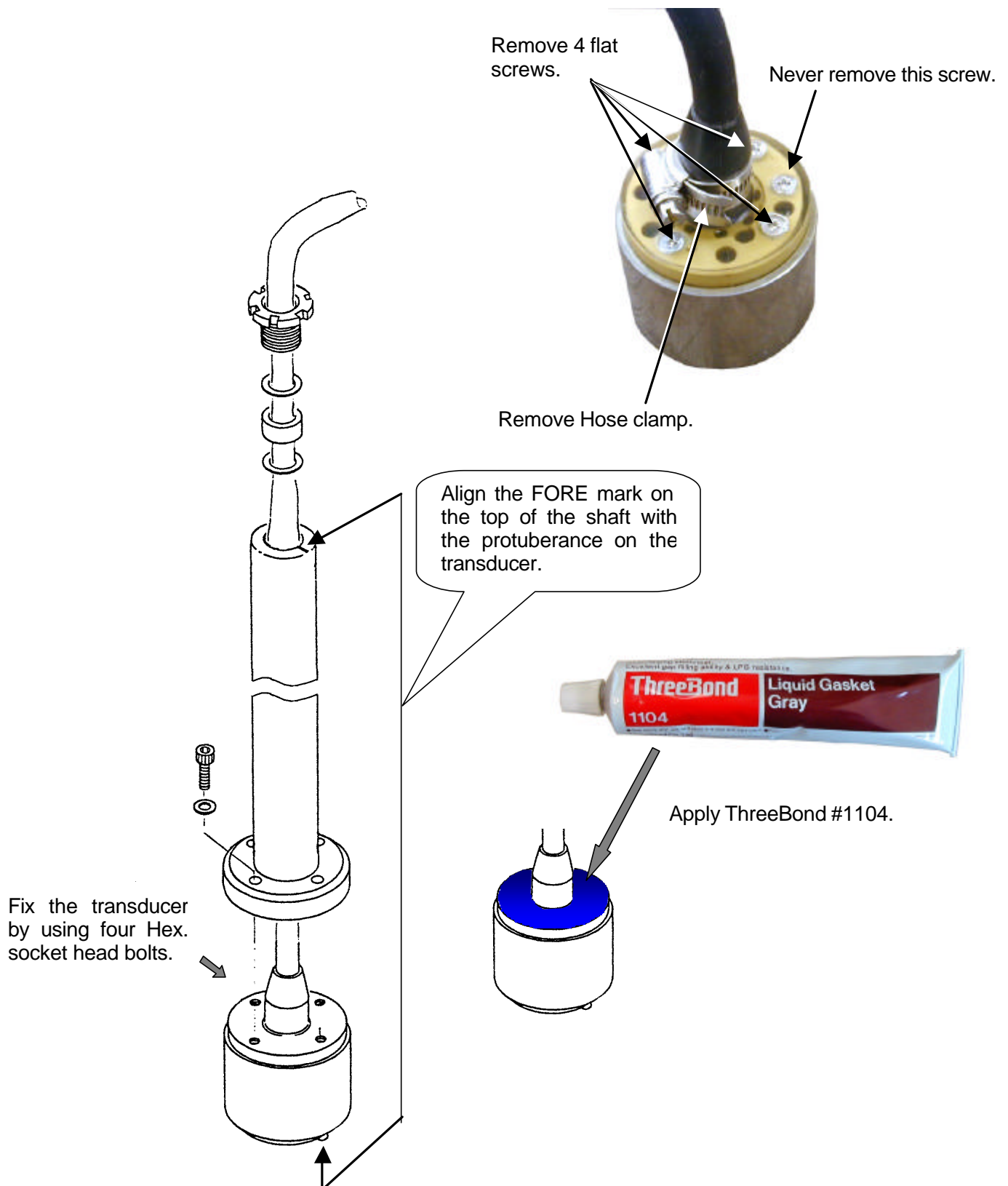


Fig.5-36 Mounting DS-80 transducer

Weld the hull flange with FORE mark aligned to the bow direction and the reference marks to the fore-aft line.

- Fore-aft alignment is accurate within ± 1 degree.
- The flange must be parallel to the draft line within ± 1 degree.
- Grind the welding area outside the hull bottom to accomplish flatness.

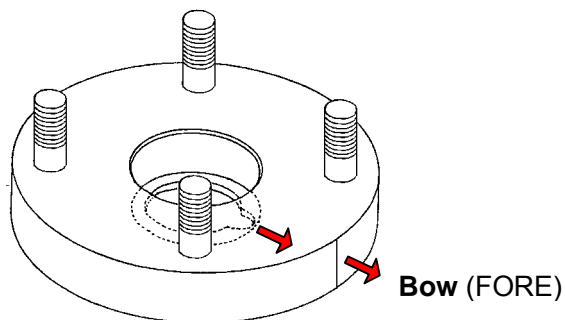


Fig.5-37 Mounting bottom flange

Apply KINORUSTER or alternative anticorrosive sealant to the flanges and the gasket as shown in Fig. 5-32. Use the sealant for both side of the gasket.



Align FORE mark on the flange with that on the bottom flange.

Align FORE mark on the top of the shaft with that on the flange.

Confirm that the transducer face flushes with the bottom hull.

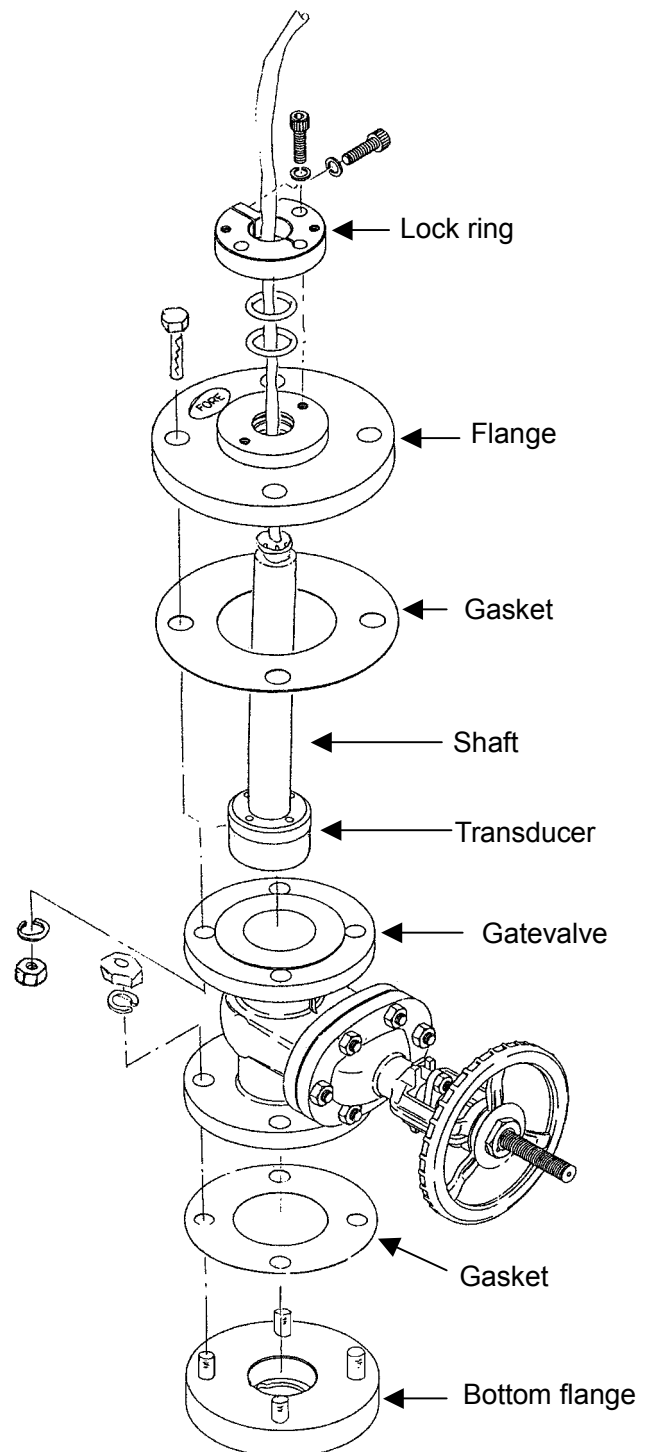
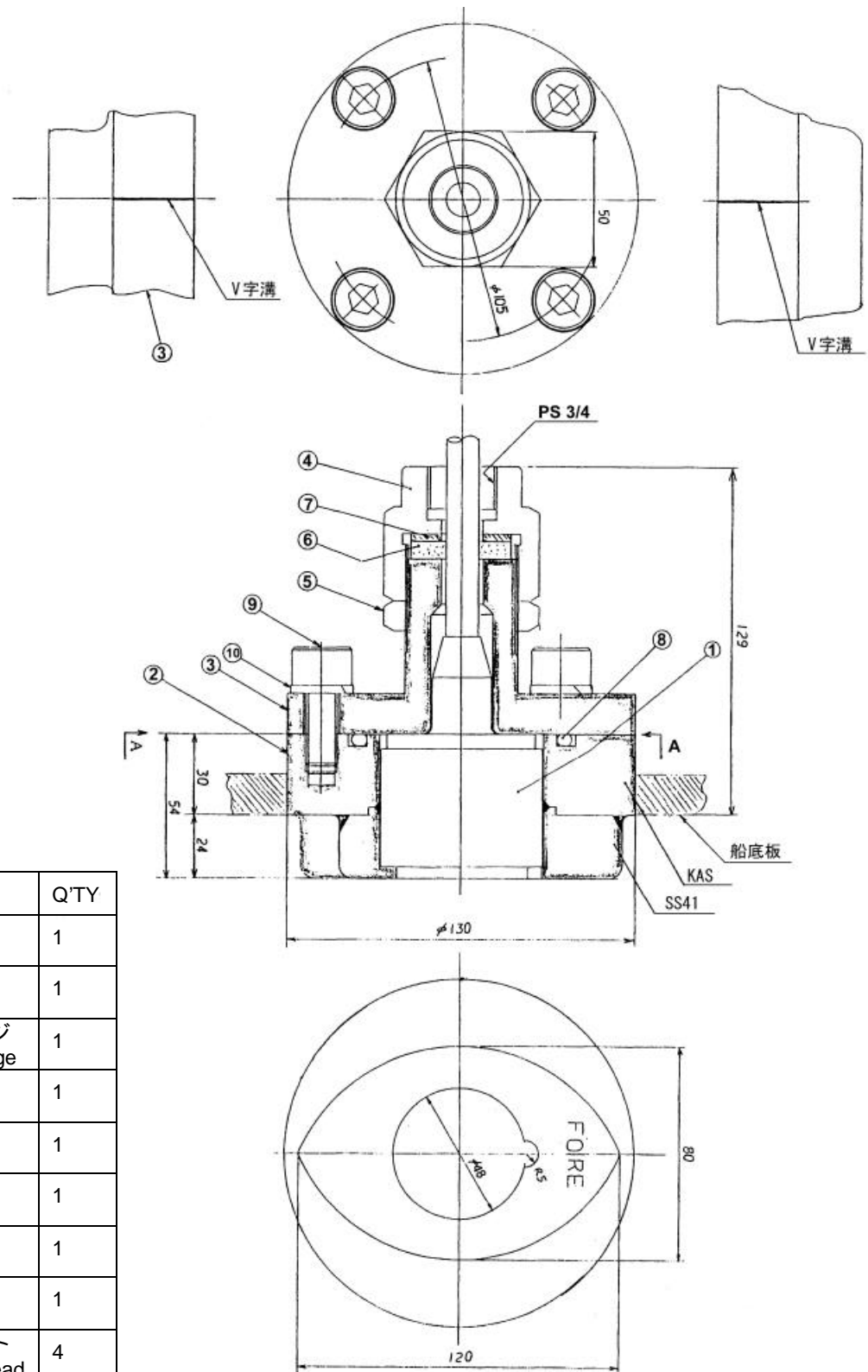


Fig.5-38 DS-786 enlarged

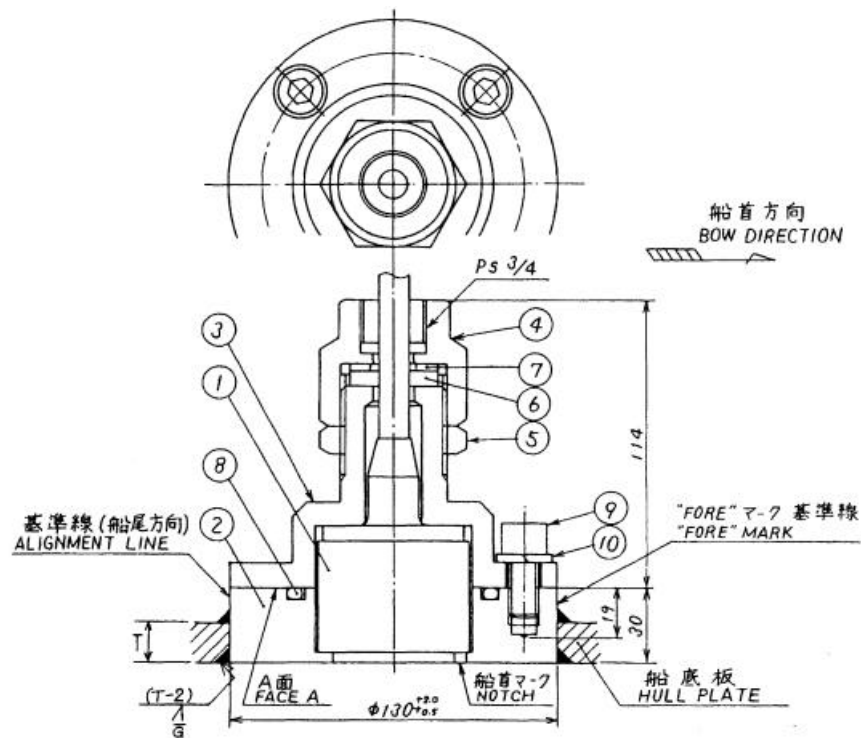
5.4.2 Hull tank DS-783



No.	NAME	Q'TY
	送受波器 Transducer	1
	船底フランジ Flange	1
	送受波器フランジ Transducer Flange	1
	キャップナット CAP NUT	1
	トメナット Nut	1
	ガスケット Gasket	1
	平座金 Flat Washer	1
	O リング O-Ring	1
	六角穴付きボルト Hex. Socket Head bolt	4
	バネ座金 Spring Washer	4

Fig.5-39 Hull tank: DS-783

DS-784



ITEM	NAME	Q'TY
	送受波器 Transducer	1
	船底フランジ Flange	1
	送受波器フランジ Transducer Flange	1
	キャップナット CAP NUT	1
	トメナット Nut	1
	ガスケット Gasket	1
	平座金 FlatWasher	1
	O リング O-Ring	1
	六角穴付きボルト Hex. Socket Head bolt	4
	バネ座金 Spring Washer	4

Fig.5-40 Hull tank: DS-784

Before welding the hull flange, remove the o-ring, transducer and transducer flange.

Apply KINORUSTER or alternative anticorrosive sealant to the o-ring groove, o-ring, transducer flange and Hex. nut.



Engage the protuberance of the transducer to the slot of the hull flange.

FORE mark on the bottom points toward the fore direction. Weld the flange with reference marks aligned to the fore-aft line. (Accuracy: within 1 degree)

The flange must be parallel to the draft line within ± 1 degree. Grind the welding area outside the hull bottom to accomplish flatness.

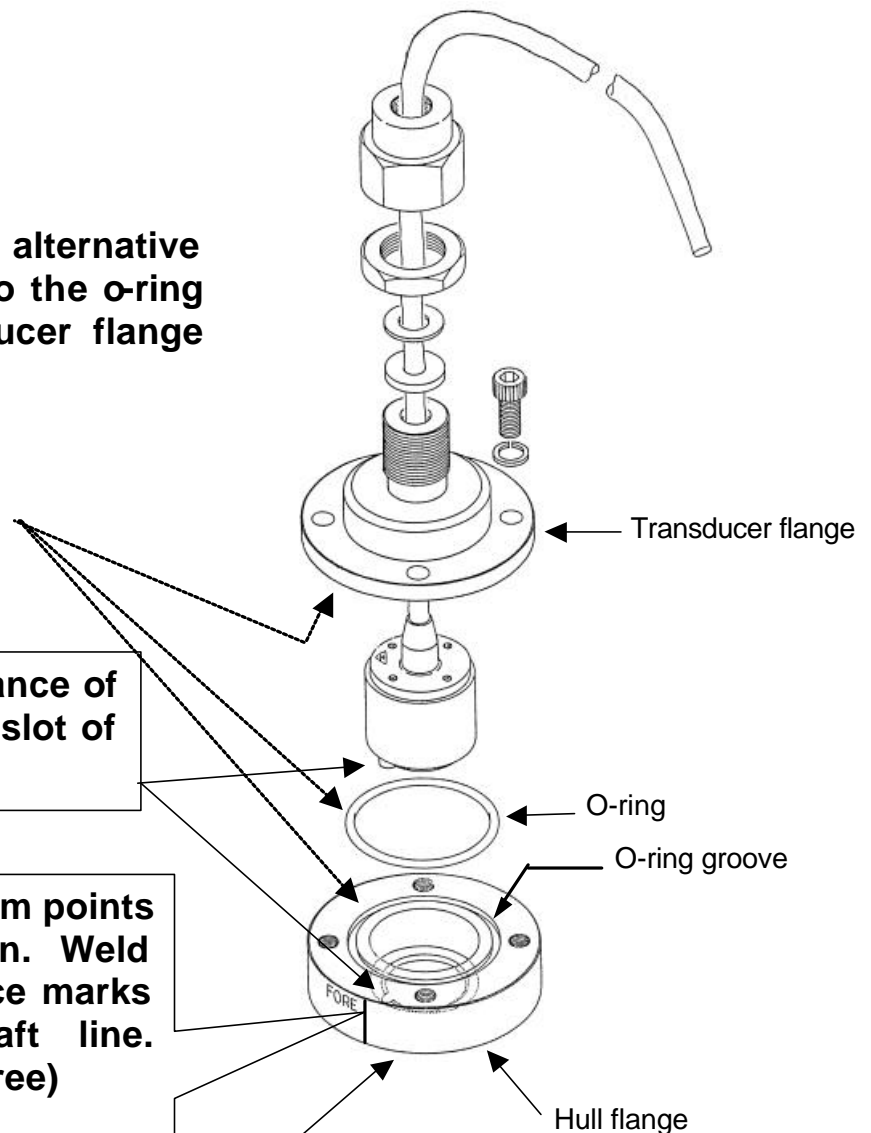


Fig.5-41 DS-784 enlarged

5.4.3 Protruded hull tank

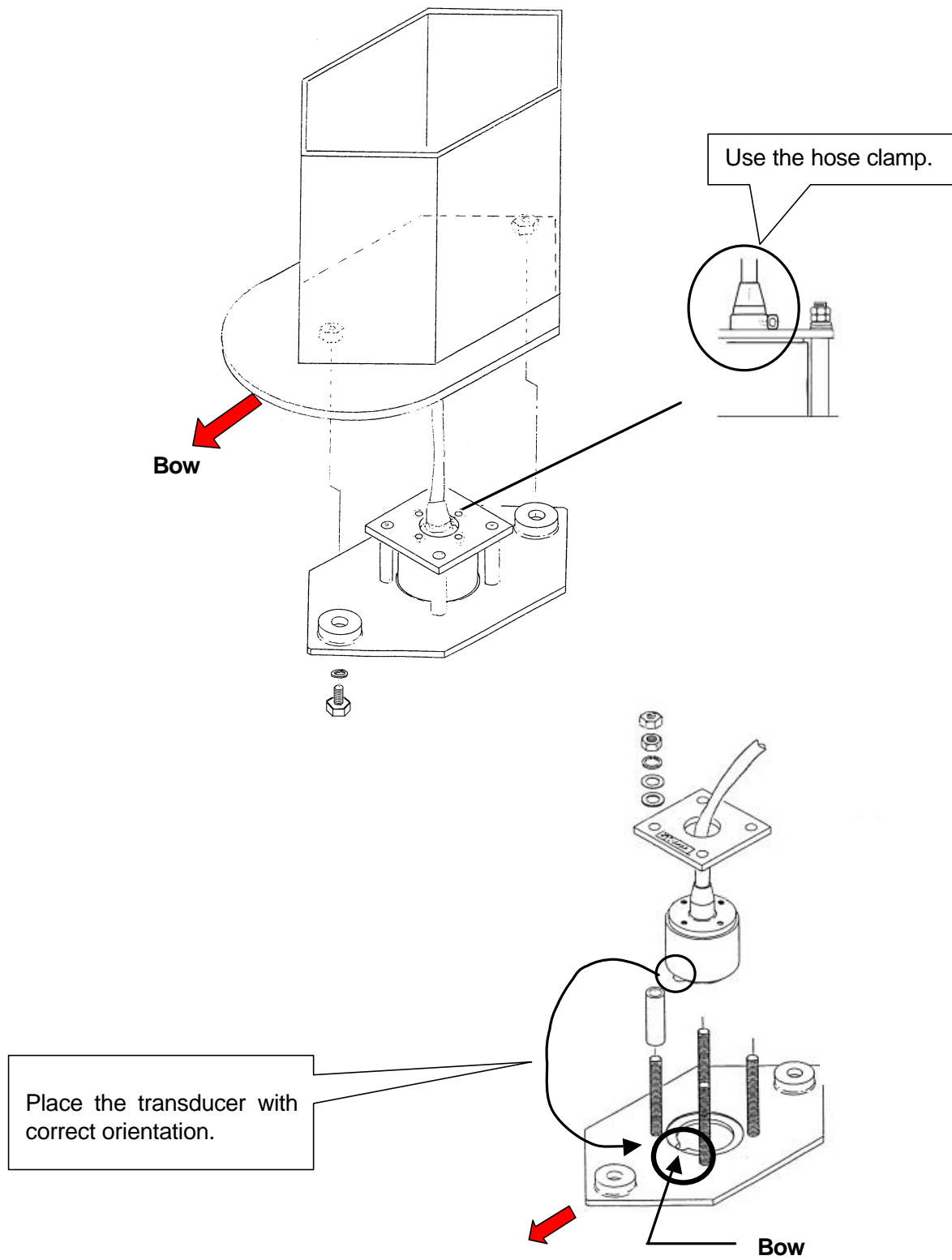


Fig.5-42 Mounting DS-781

5.5 Installing FE-700 echosounder

Figure below shows an example of the installation of FE-700 on the switch board.



Fig.5-43 Installation of FE-700 echosounder

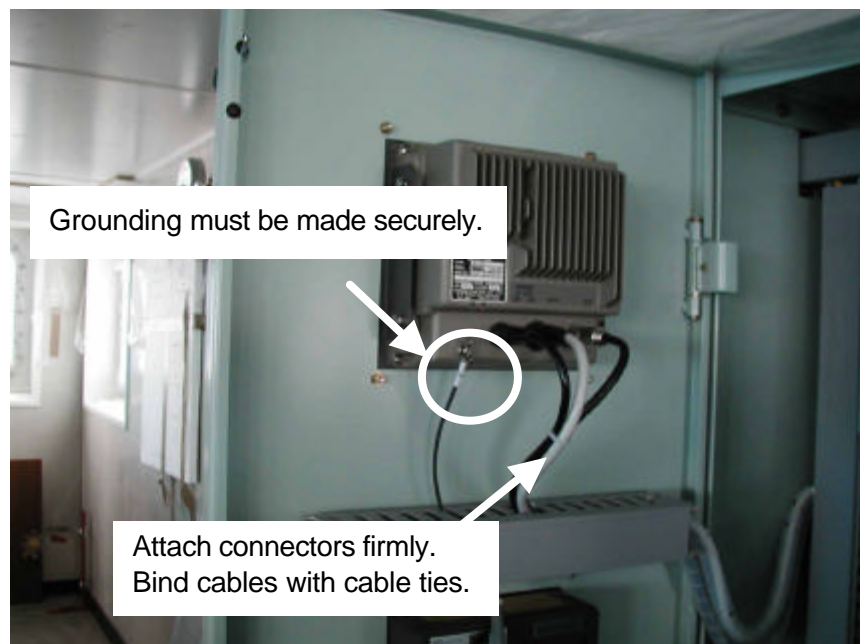


Fig.5-44 Rear side view of FE-700 echosounder

The processor unit is mounted inside the switch box.

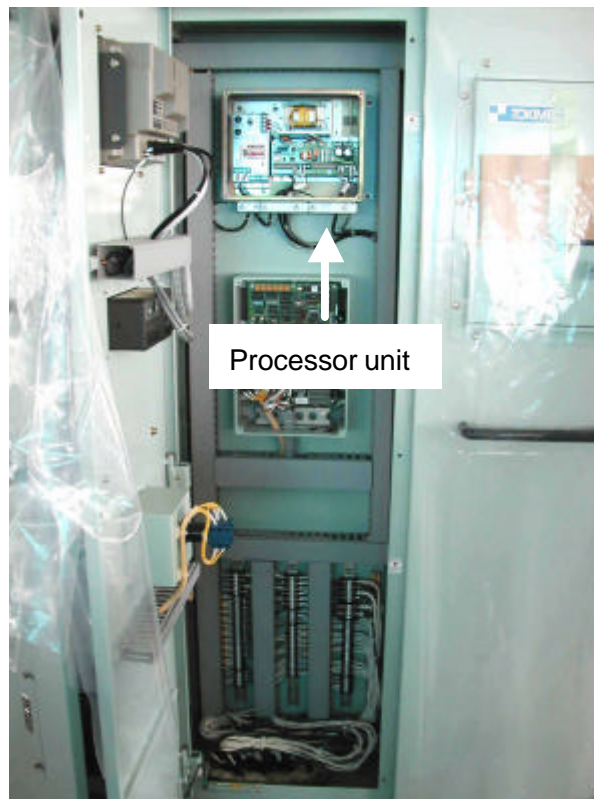


Fig.5-45 Installation of FE-700 processor unit

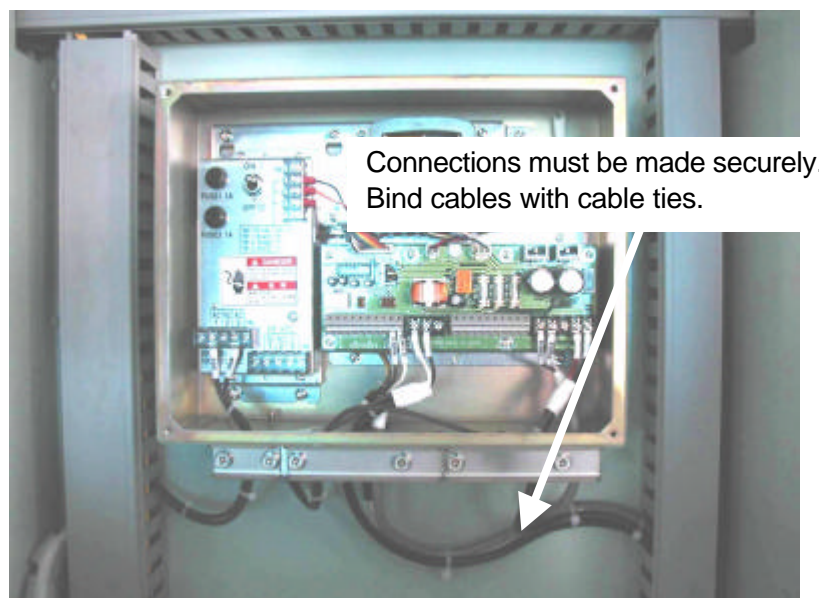


Fig.5-46 FE-700 processor unit, enlarged

Matching box

Typically, the matching box is installed in the engine room. Connect the cables correctly. Cut the transducer cable to length.

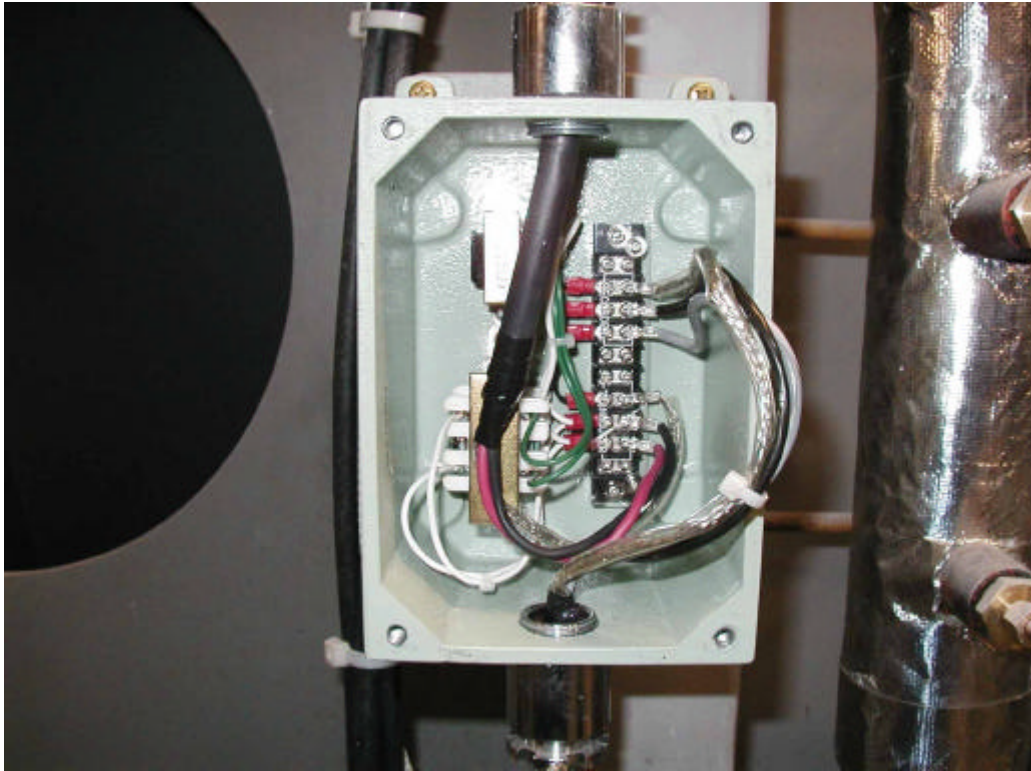


Fig.5-47 Installation of FE-700 matching box

Transducer cable

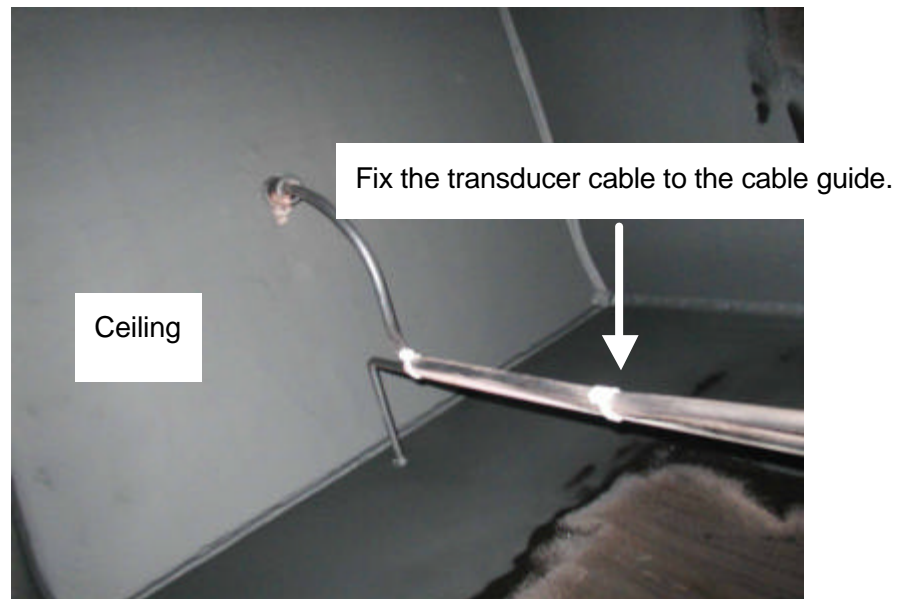


Fig.5-48 Transducer cable

Transducer flange

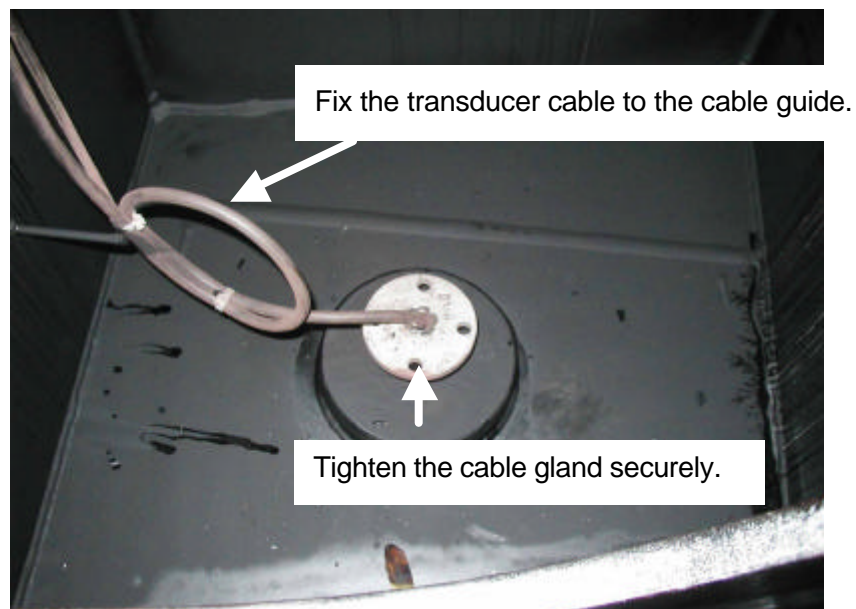


Fig.5-49 Transducer flange

5.6 Piping transducer cable

Pipe the cable from the transducer flange to the transducer or matching box.

Note: The transducer cable of doppler sonar must be piped.

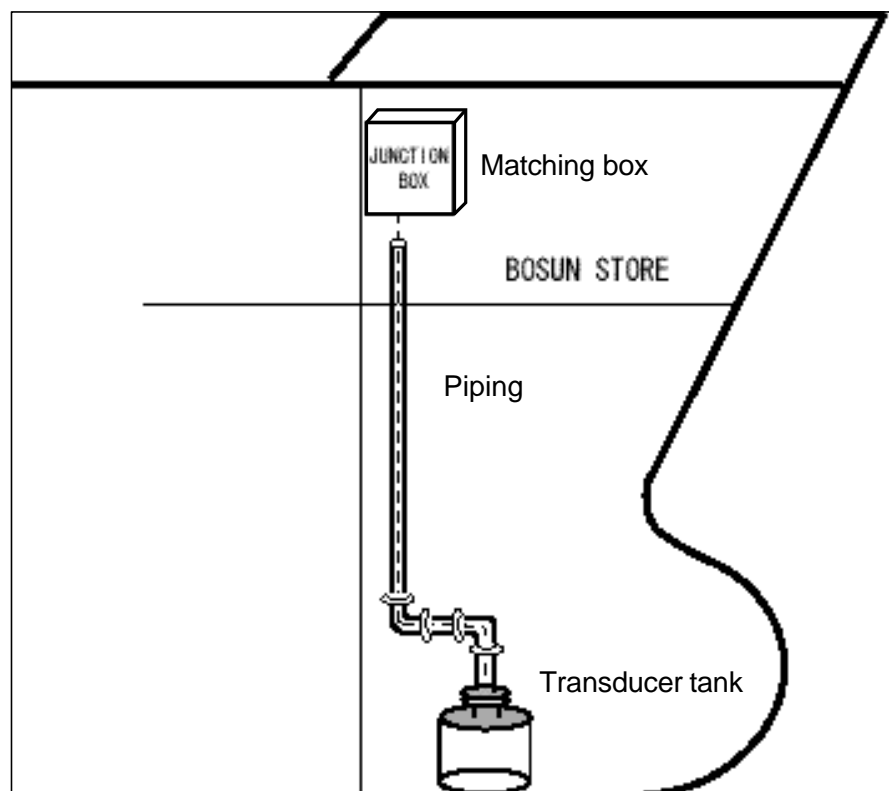


Fig.5-50 Piping transducer cable

5.7 Connecting grounding wire

Grounding must be made by using the copper plate or wire specified in the installation manual and/or drawing.

Example

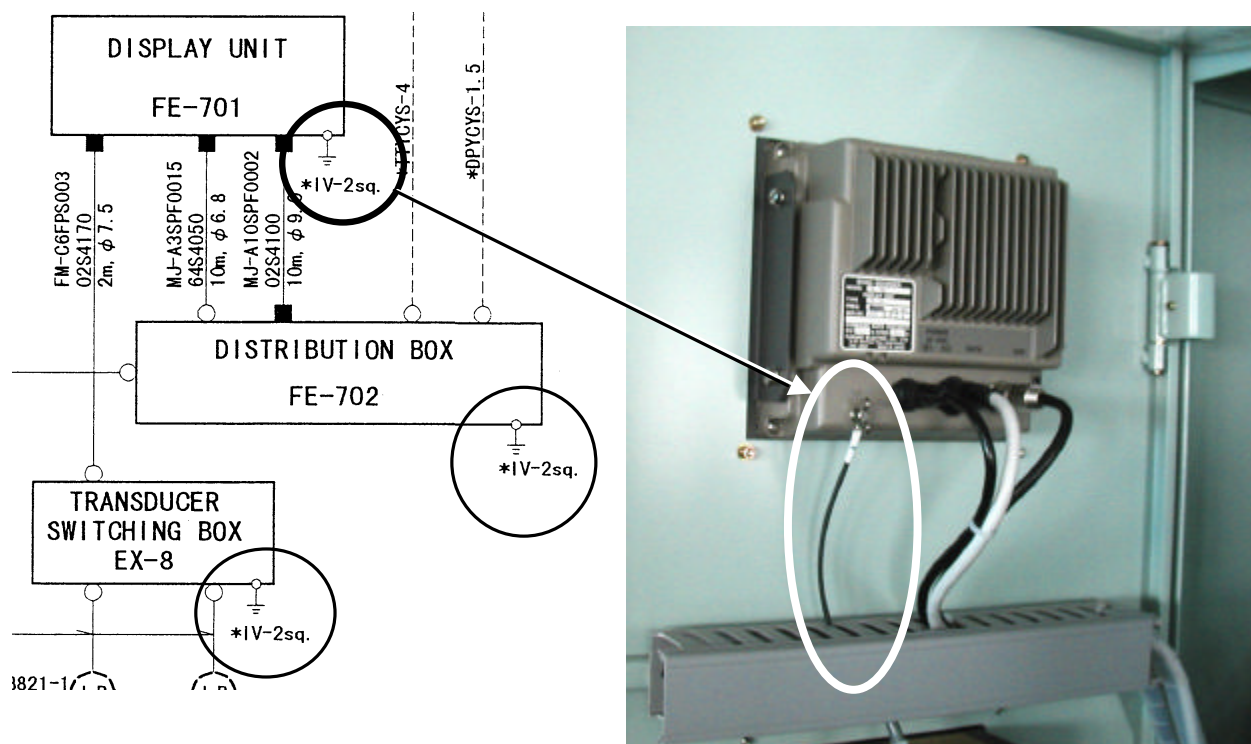


Fig.5-51 Connecting grounding wire to FE-700

Chapter 6. Basic installation knowledge

6.1 Cable termination

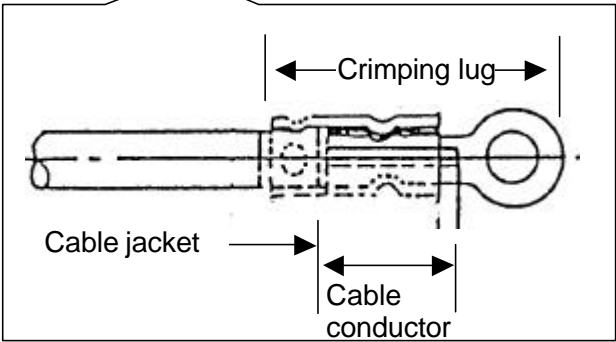
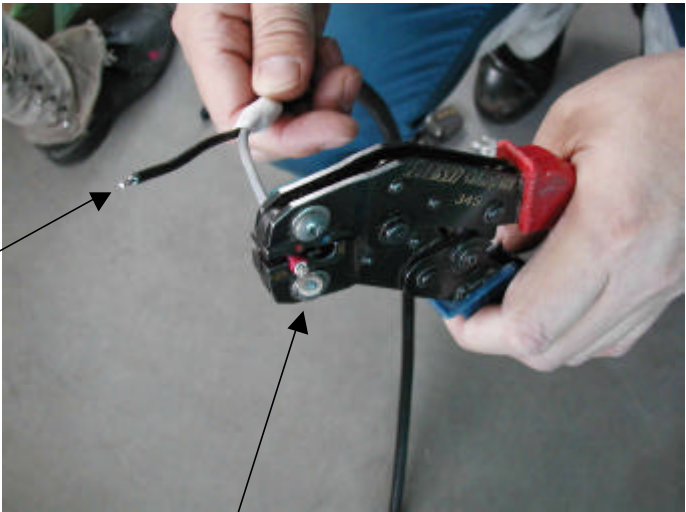
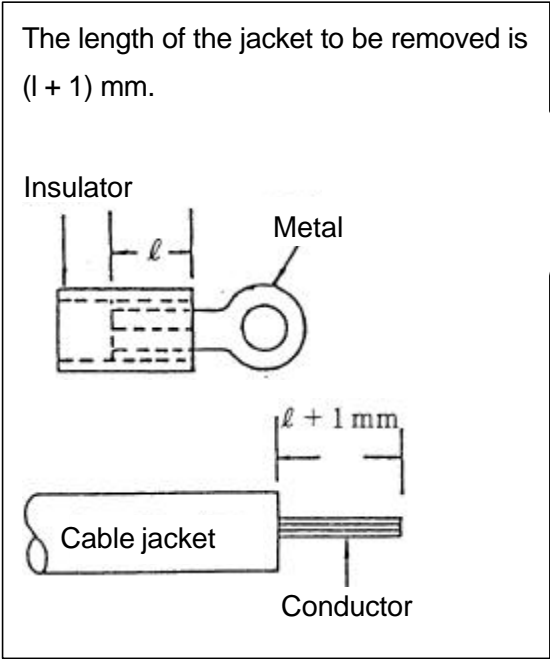
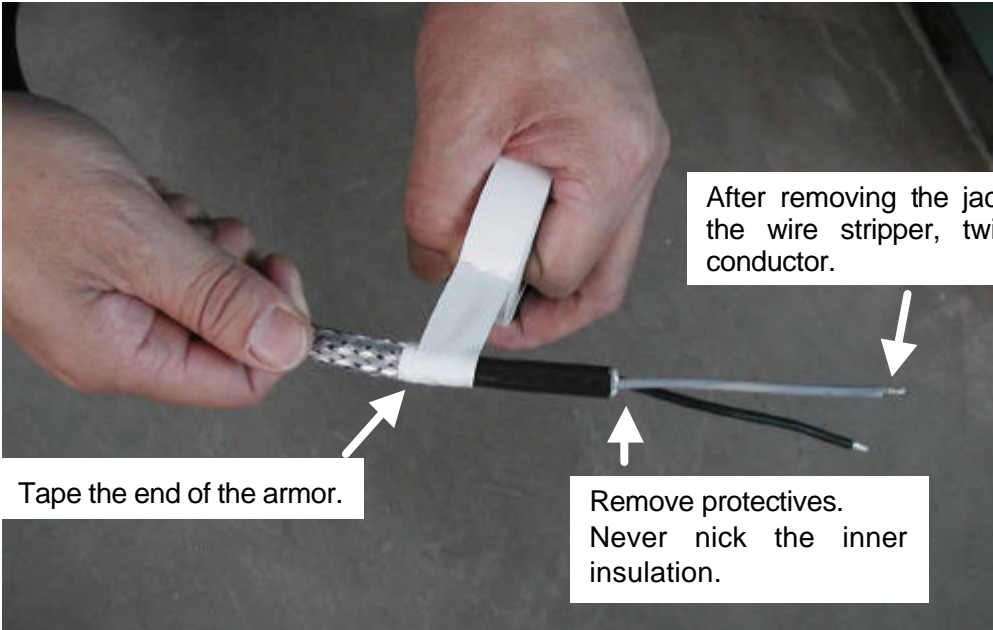
6.1.1 Fixing crimp-on lug

- 1) Use a crimper for correct gauge.
- 2) Use the proper size terminal for the wire.

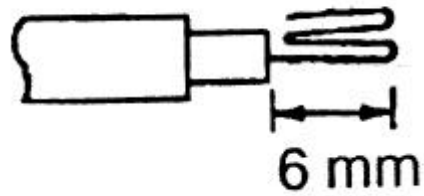
Tools (Example)

Tool	Model	Manufacturer	Photo
Insulated terminal crimper	MH-112	Minoru Kogyo	1
Insulated terminal crimper	CR1MPCX 34S	Izumi	2
Noninsulated terminal crimper	P-75	Hozan	3





When crimping a lug on the coaxial cable, fold the conductor.

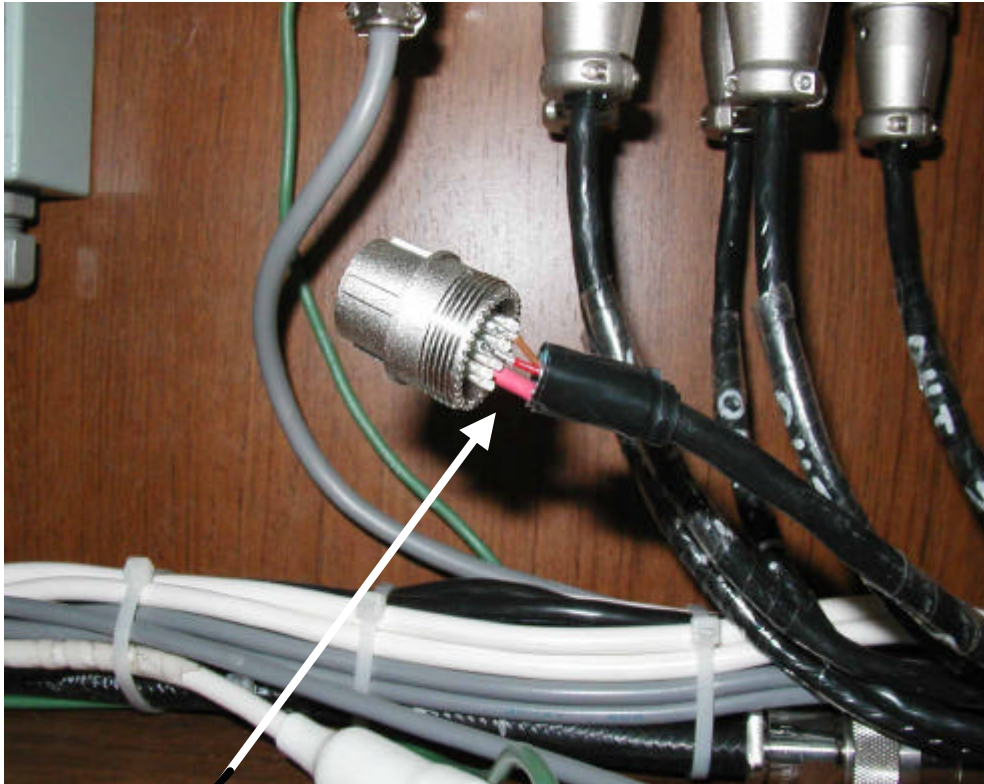


Finishing



Pull on the wire after finishing crimping to test your crimp.

6.1.2 SRCN connector

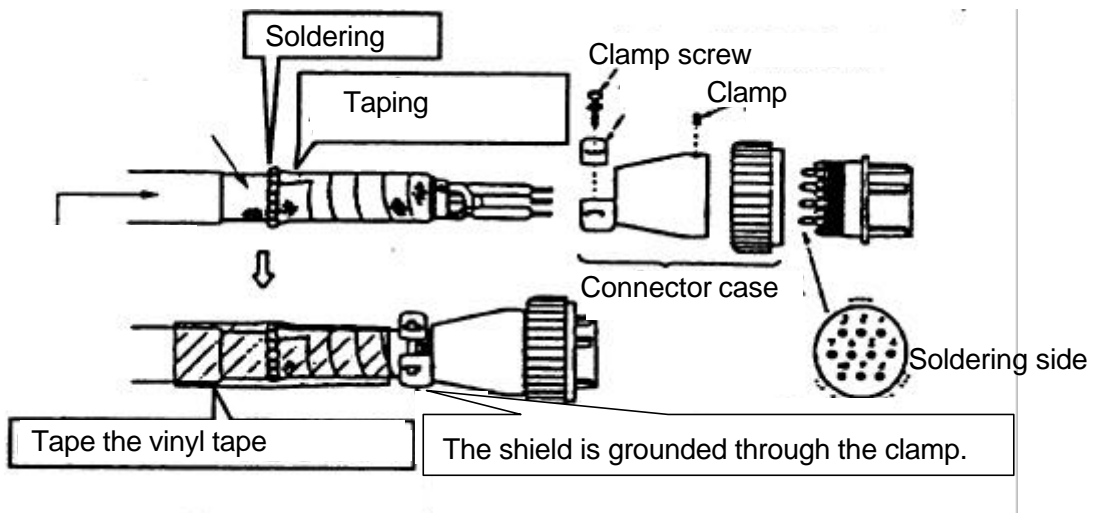


Wires must be soldered to pins properly.
Never burn the insulator by the soldering iron.

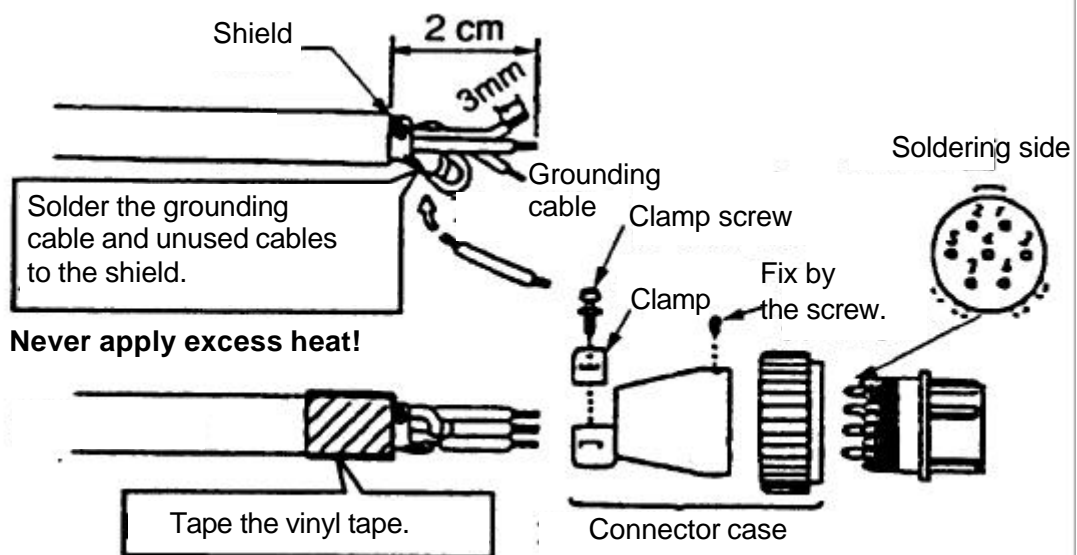
It is recommended to use heat shrink tubes, 7 mm in length to prevent pins from being short-circuited to the case.

SRCN connector

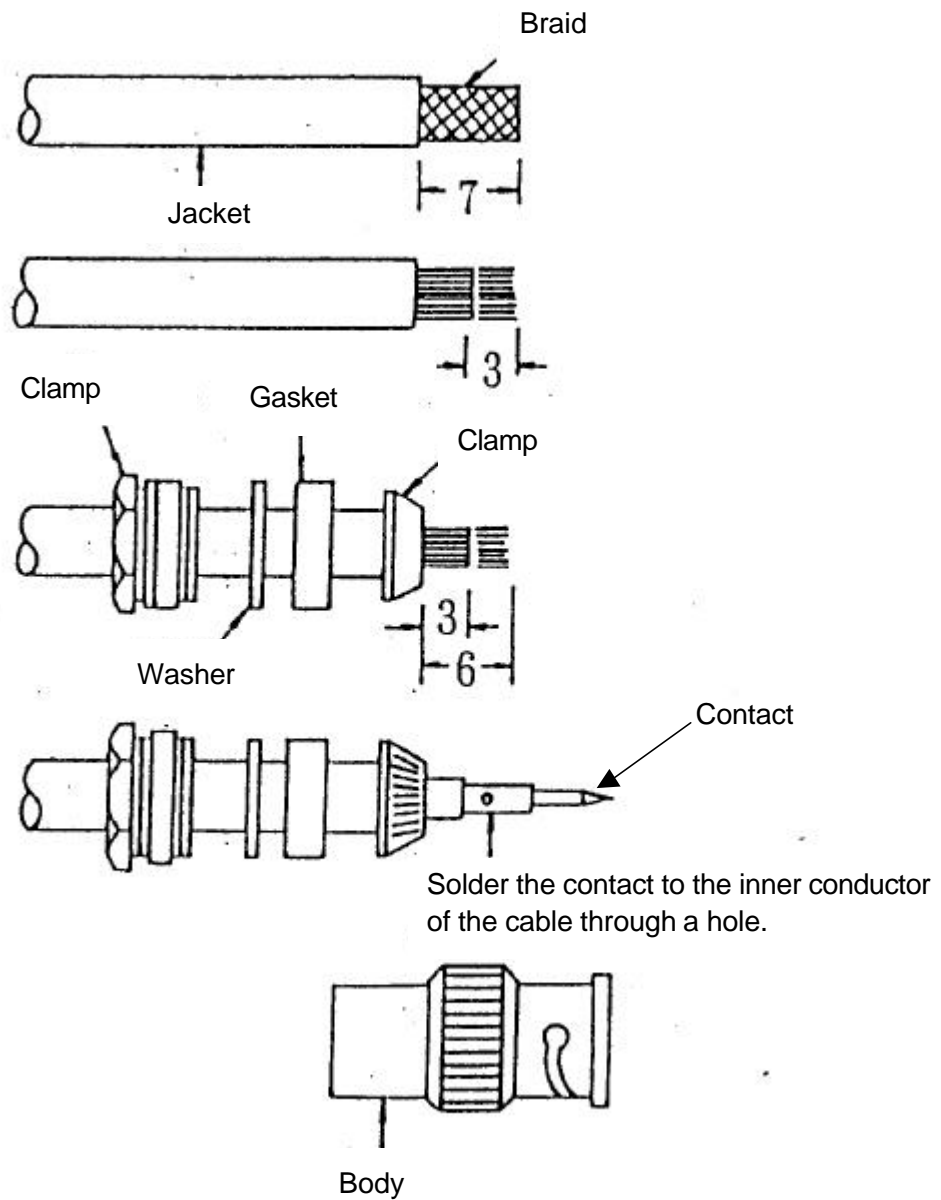
When grounding the grounding cable



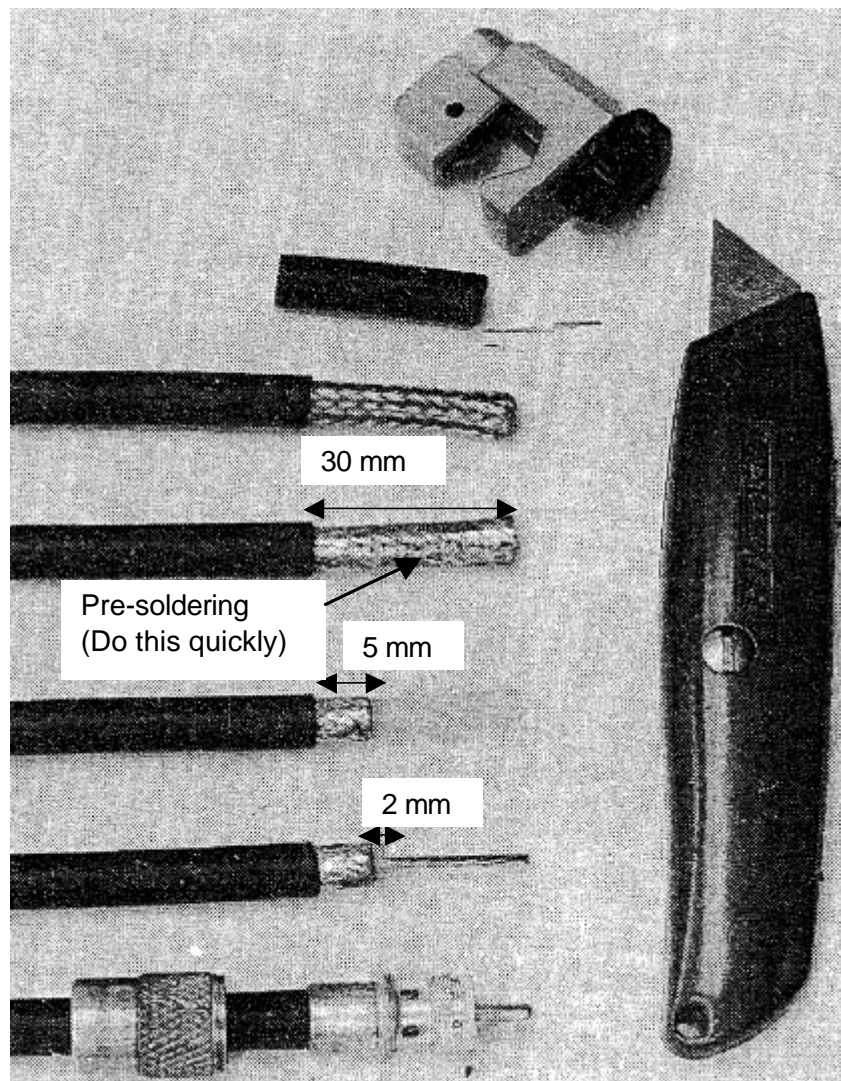
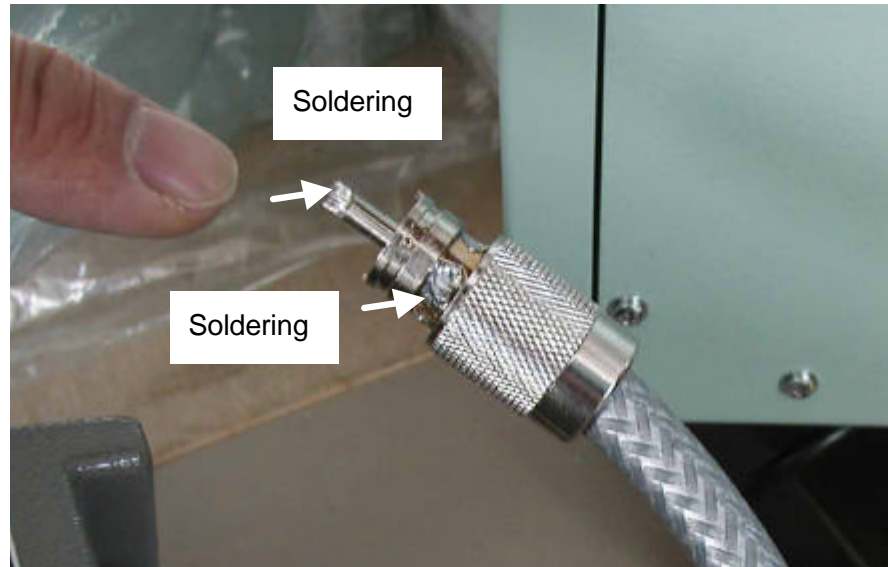
When not grounding the grounding cable



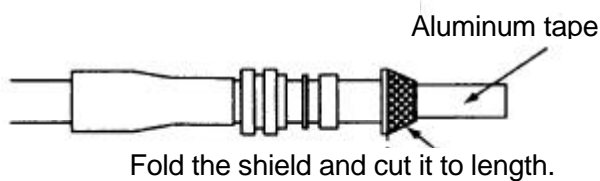
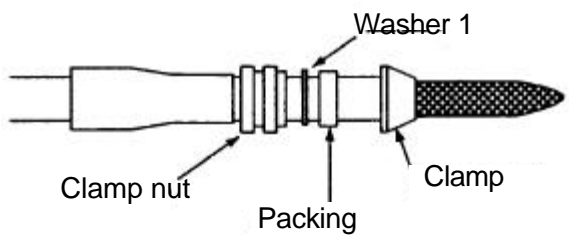
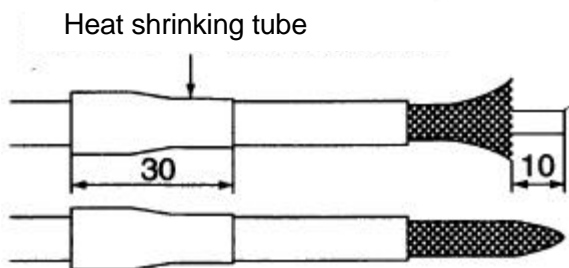
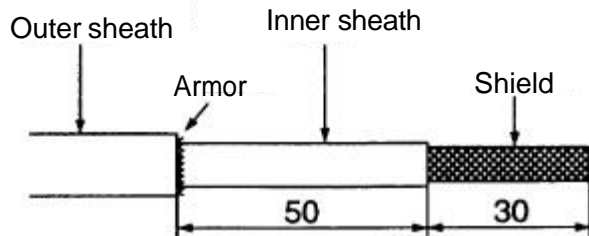
6.1.3 Fitting BNC coaxial connector



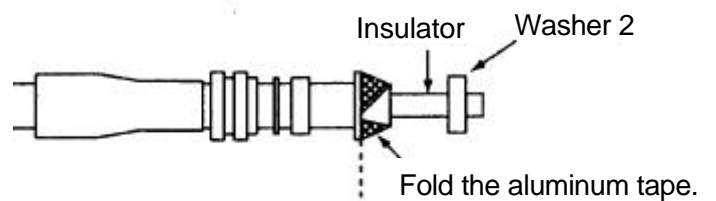
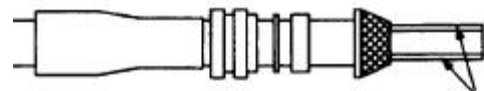
6.1.4 Fitting M-type coaxial connector



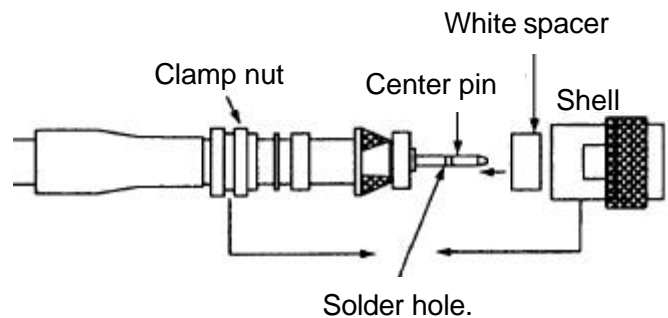
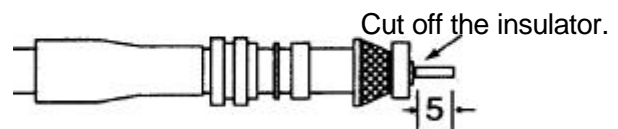
6.1.5 N-type coaxial connector (N-P-8DFB)



Cut a break to the aluminum tape every 90 degrees.



Cut the aluminum tape even.



6.2 How to solder

Use a suitable soldering iron!

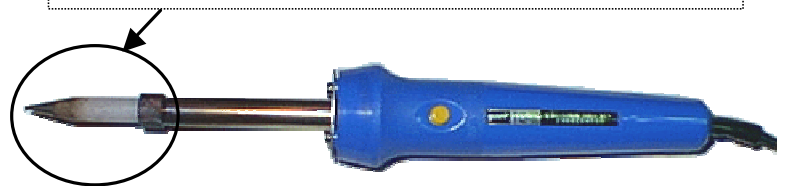
Use 30 to 80 W soldering iron for indoor, 100 W or more for outdoor. Using the soldering iron of lower wattage results in bad soldering.

Use a good quality multicore solder (rosin-core solder); a standard 60 % tin, 40 % lead alloy solder with cores of non-corrosive flux.



Example Tin: Lead = 6: 4

The shape of the tip is important.
This type of the tip is ideal for soldering wires.

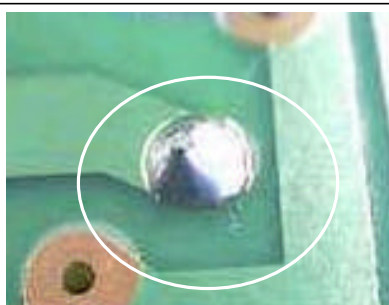


Example 15 to 150 W adjustable soldering iron

Procedure

1. Apply a thin layer of solder to the part to be soldered.
2. Heat both parts of the joint by soldering iron.
3. In a couple of seconds, the two parts to be jointed will reach the solder's melting temperature. Now apply the solder to the point where parts of the joint and the soldering iron are all touching one another.
4. Remove the iron from the joint. Make sure that no parts of the joint move after the soldering iron is removed until the solder is completely hard.

Good and bad examples of the soldering



Good example



Bad example: Not enough temperature



Bad example:
Excess solder (causing
vibration problem)



Bad example:
Little solder (Half finished
appearance)



Bad example:
Bridge to other contact

Soldering connector plug

Multi-pin connector

1. Strip the jacket.



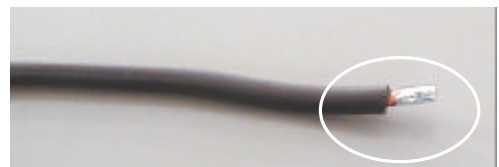
2. Twist conductors.



3. Apply a thin coating of the solder.



4. Cut the conductor to length.



5. Apply a thin layer of solder to the tap.



6. Put the heat shrinking tube over the sheath.



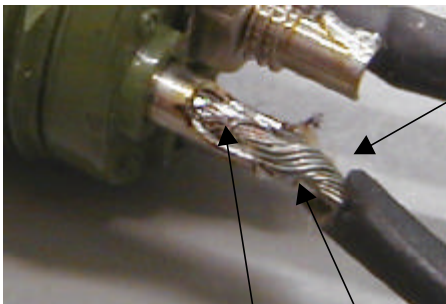
7. Place the tinned wire on the tap and heat them. When the solder starts melting, apply the end of the solder.



8. Use the right amount of solder. Do not move parts until the solder has cooled.



Bad example



Conductors are not thoroughly covered by solder because of low temperature.

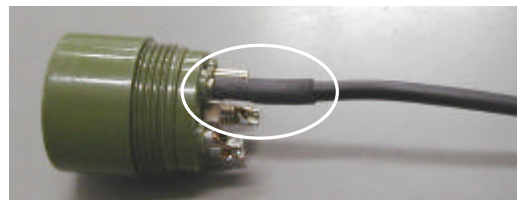
Jacket is removed too long.

Too little of solder

9. Place the heat shrinking tube in place.



10. Heat the tube by the soldering iron.



Example: Connecting M-P connector

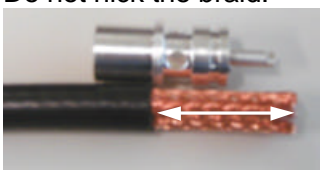
1. M-P connector



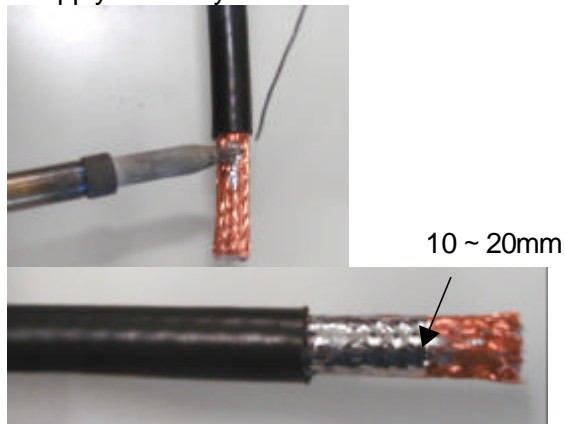
2. Slide the coupler over the cable.



3. Strip the cable 300 to 400 mm.
Do not nick the braid.



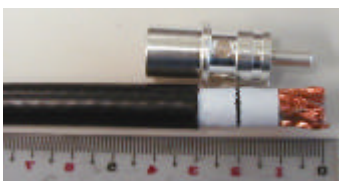
4. Apply a thin layer of solder.



5. Tape the soldered area.



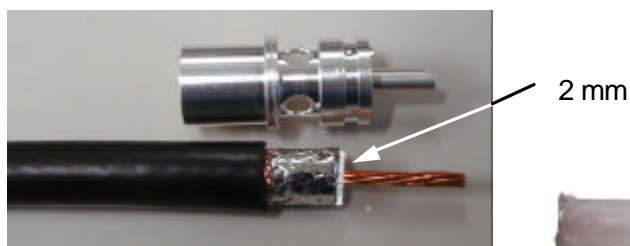
6. Mark 10 mm from the end.



7. Remove the shield from the mark.



8. Remove the insulator leaving it 2 mm from the shield end.



Never nick the center conductor.

10. Tin the end of the center conductor.



11. Insert the cable in the M-P connector as far as it will go.



12. Solder the connector and shield through holes.



13. Solder the center conductor.



Do not apply excess solder.

14. Trim the center connector.



15. Be sure that the solder covers holes entirely with a smooth shiny appearance.

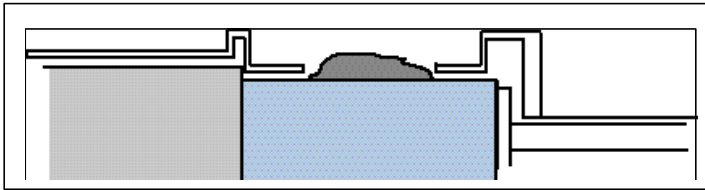


Appearance of good soldering

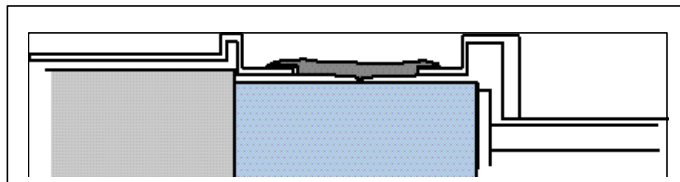


Bad example

Solder shortage



Solder shortage (No solder between the shield and connector)



Solder shortage



6.3 Waterproofing by taping

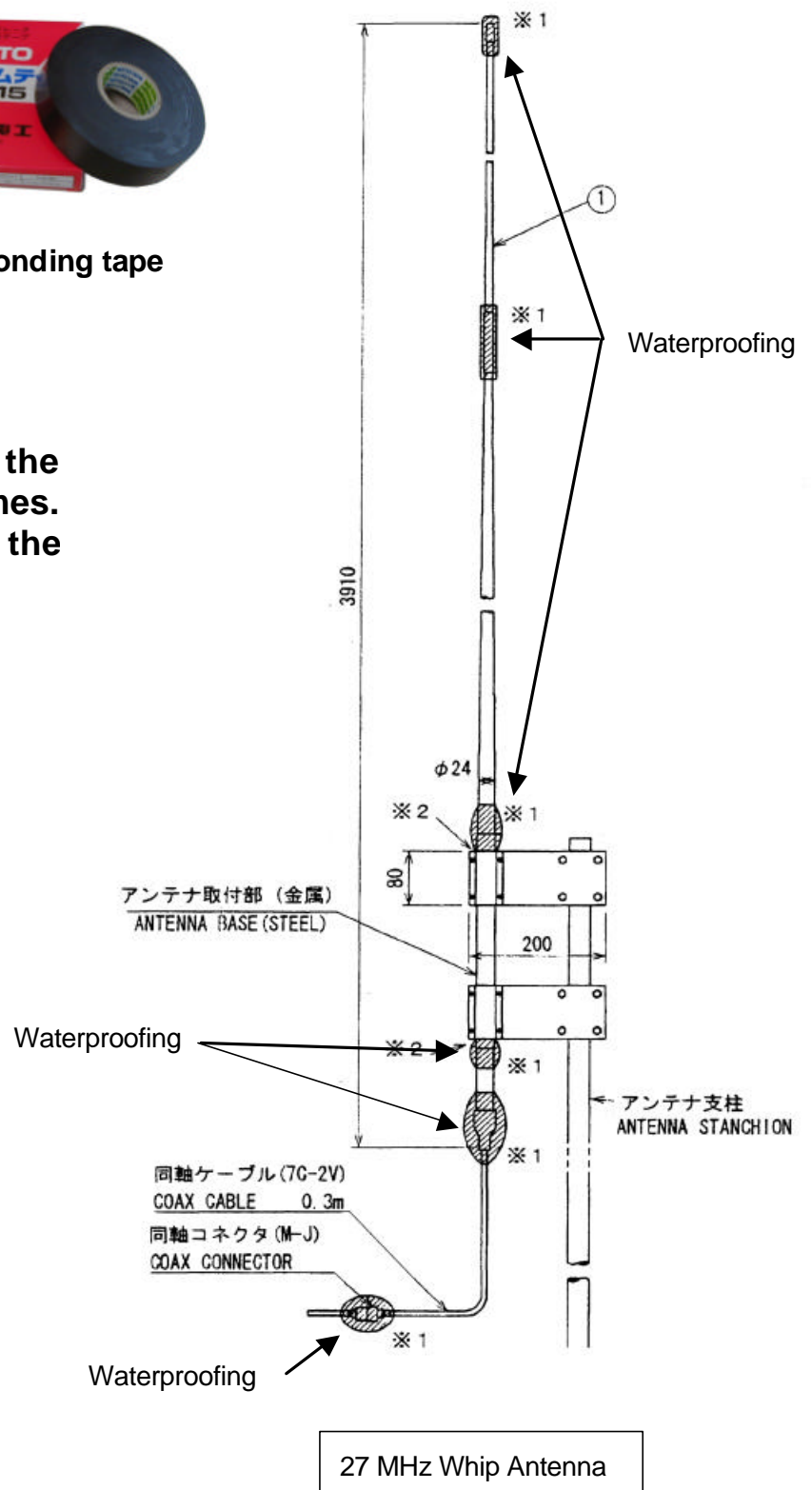


Vinyl tape

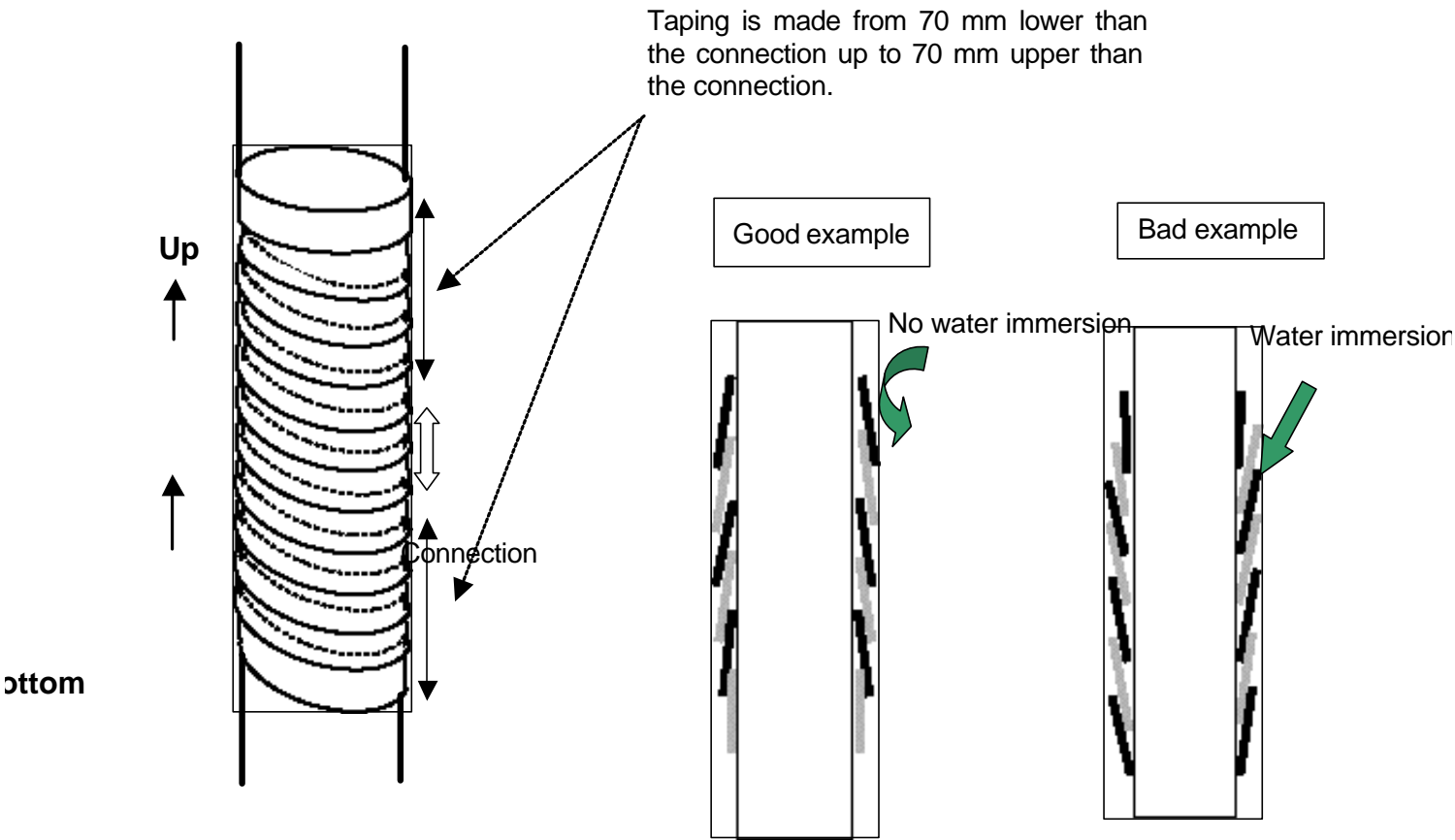


Self-bonding tape

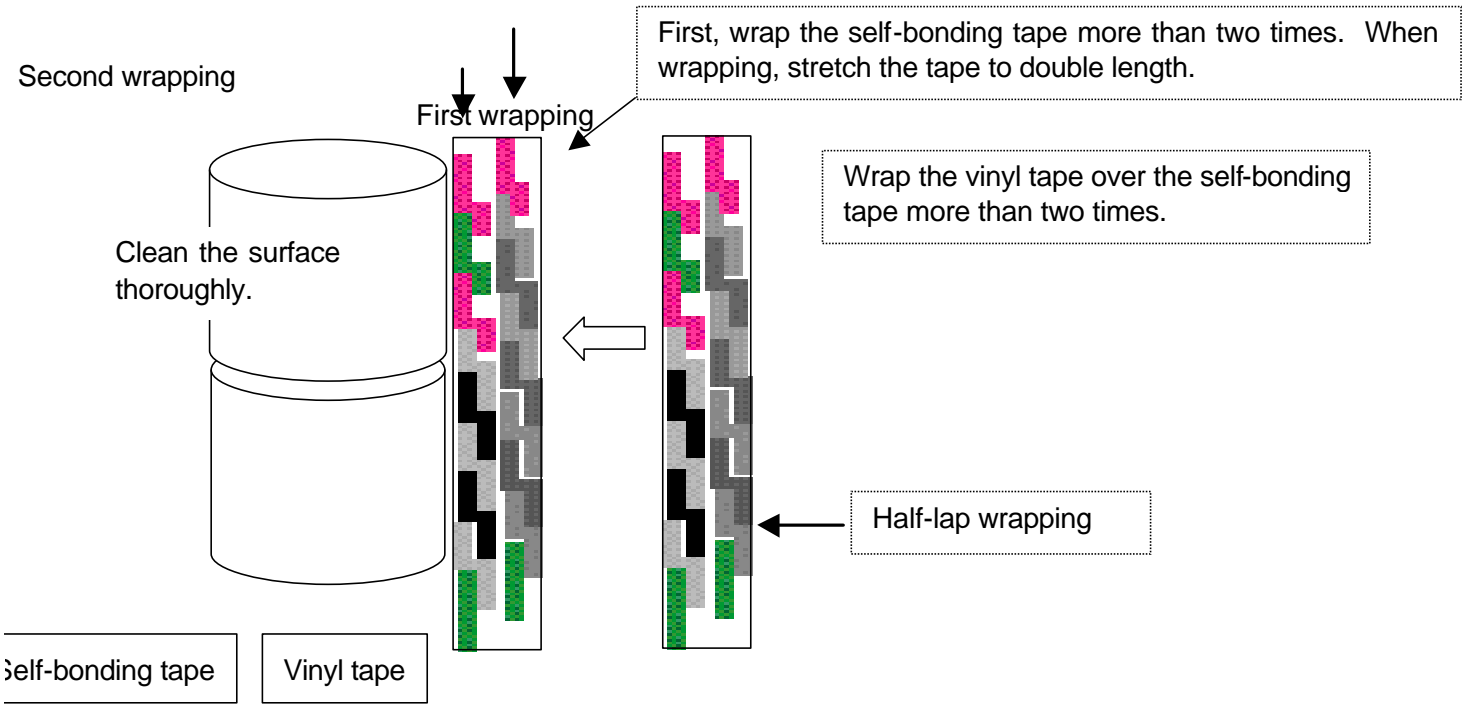
For waterproofing, wrap the self-bonding tape three times. Then, wrap vinyl tape over the self-bonding tape.



How to tape



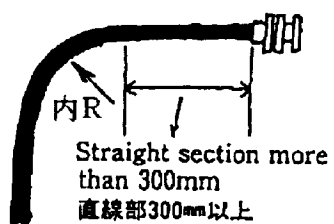
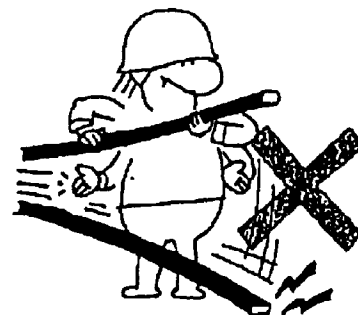
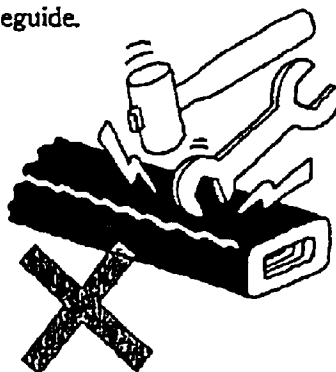
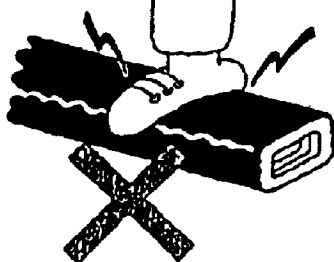
ape from the bottom up.



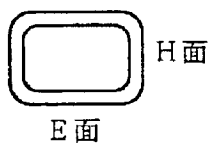
Chapter 7. Radar waveguide

(1) Caution on handling waveguide

Be careful not to deform the waveguide.
衝撃を与えないよう注意して下さい。



Minimum bending radius



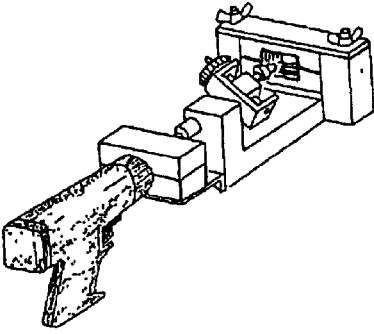
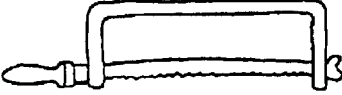


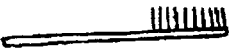








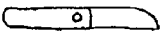

E bend $R_{min} = 200mm$
H bend $R_{min} = 400mm$

7.1 Waveguide for X-band radar

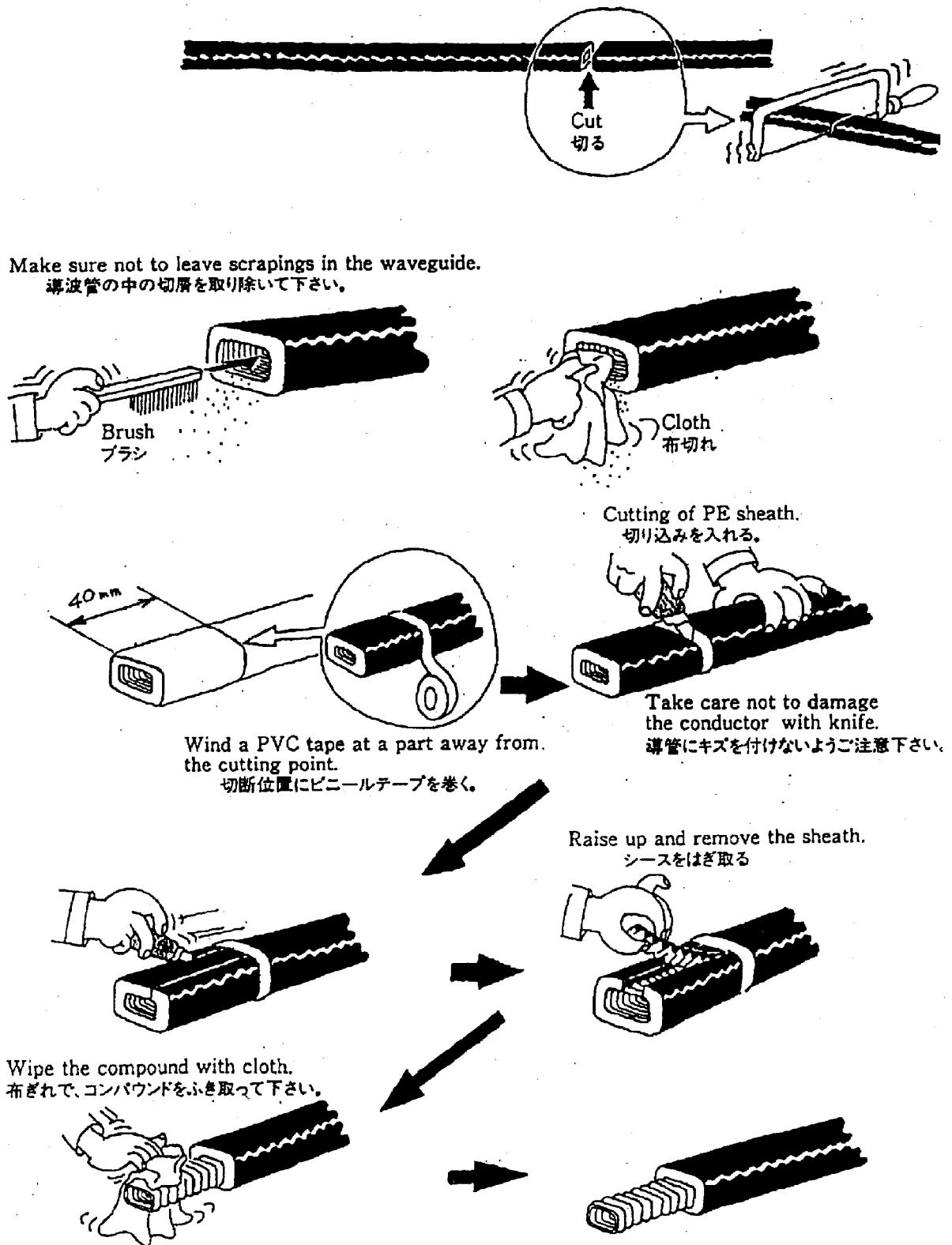
(2) Necessary tools

○: Needs separate order

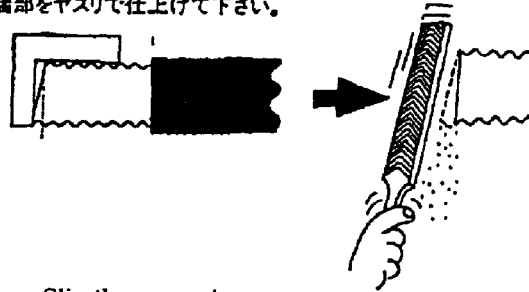
*: Supplied with waveguide

<p>○FR-90 power tool(03S9199) Code : 000-805-737</p> 	<p>○ Hack saw (HFJ-12) Code : 000-805-850</p>  <p>○ Saw (250x24) Code : 000-805-851</p> <p>6 saws</p>  <p>○ File (L150) Code: 000-805-852 Fine file Code: 000-805-853</p>  <p>2 files a set</p>
<p>○ Brush Code : 000-805-848</p> 	<p>○ TONE heavy duty snips (No.150) Code : 000-805-855</p> 
<p>○ Gauge (Square) (03-009-0534-0) Code : 100-207-540</p> 	<p>○ Edge gauge (03-009-0530-0) Code : 100-207-500</p> 
<p>○ Wrench (For M4) Code : 000-805-849</p> 	<p>※ PVC tape and tape</p> 
<p>Cloth</p> 	<p>※ Silicone compound</p> 
	<p>Hammer</p> 
<p>○ Knife (DK-N) Code : 000-805-854</p> 	<p>○ TONE tool box (# 2207) Code: 000-805-847</p> 

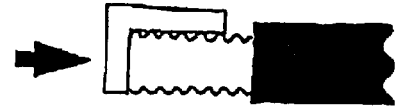
(3) How to terminate



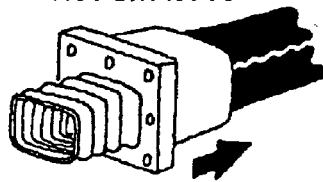
Finish the edge of the conductor with a file.
導体端部をヤスリで仕上げて下さい。



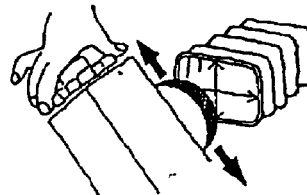
Check the angle
直角であるかチェックして下さい。



Slip the connector
コネクタを挿入します。

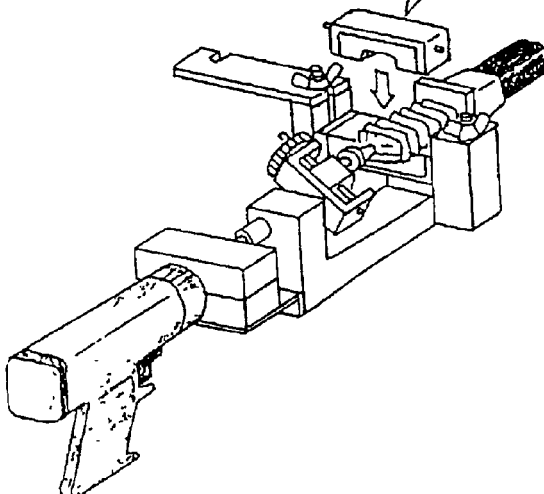
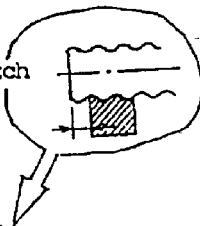


Turn the feed gear counterclockwise and
bring flare roller to the center of the holder.
送りギヤを反時計方向に回して導波管固定用ホルダー
の中央に持ってきます。

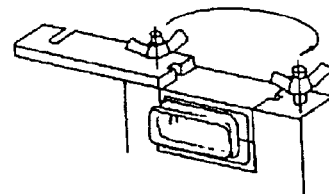


Put forth the conductor one pitch
from the end of attachment.

アタッチメント端面から、導体を
1山分出してセッティングします。



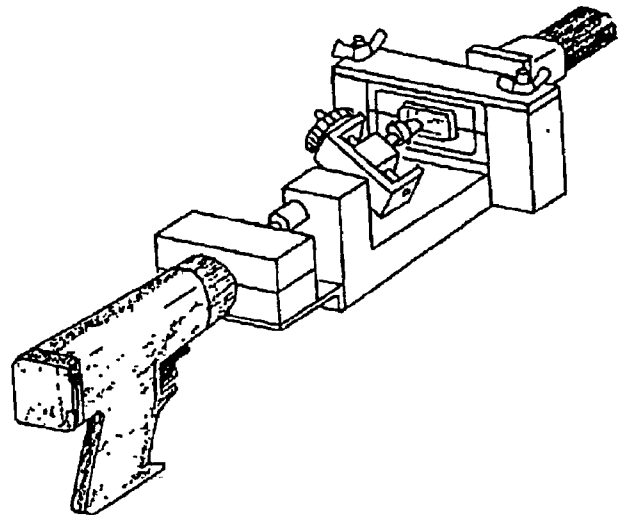
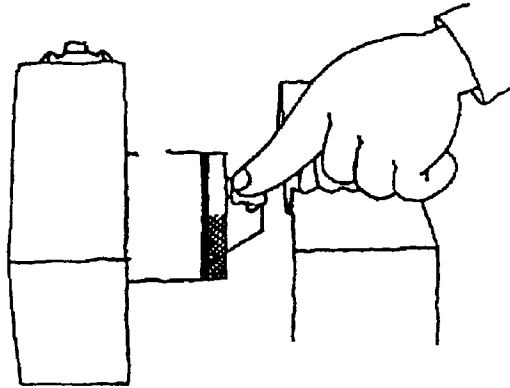
Avoid accidental starting.
Don't carry tool with finger on switch.



After upper attachment put on the
conductor, fix it by metal fittings.

上側のアタッチメントを乗せた後、
押さえ金具で固定して下さい。

Apply silicone grease to the end of the flare roller.
シリコングリスを塗ります。



Change the switch to flaring mode(R).

モーター部の取っ手にある回転方向
切替スイッチをR方向にしてください。

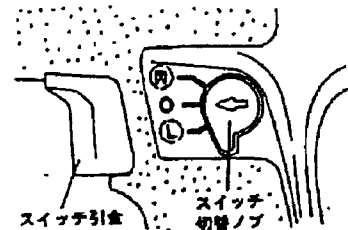


スイッチ切替ノブ

R: flaring mode
L: reverse mode
O: neutral mode

R: フレア加工をする時
L: ロールを元に戻す時
O: ニュートラル

Do not touch movable parts or accessories unless the power source has been disconnected.



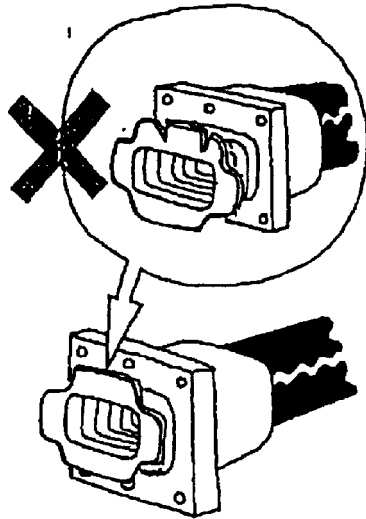
スイッチ引き金

スイッチ切替ノブ

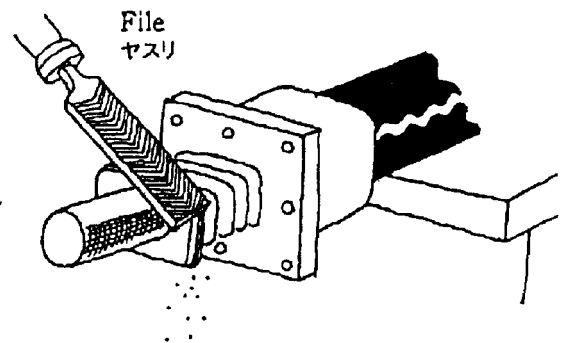
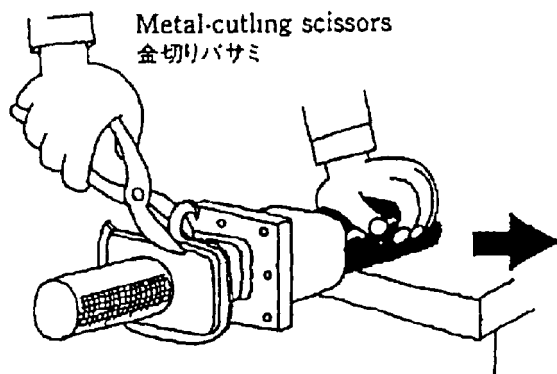
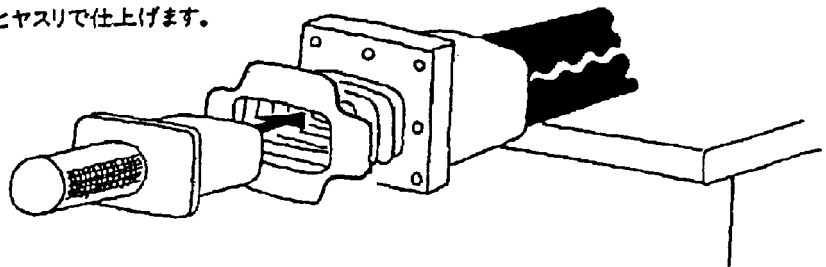
Push the switch, and flaring starts.

スイッチ引き金を押すと回転が始まります。

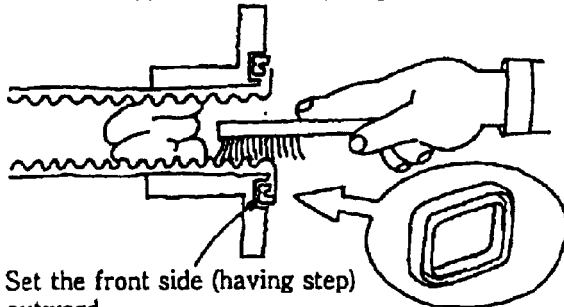
If give crack, once more /
もし、フレヤー部が割れた場合にはやり直して下さい。



Insert the "edge locating jig" into the waveguide
and finish with scissors and a file.
フチ切り治具を導波管に挿入し、
導体の端部が治具と一致するようにハサミとヤスリで仕上げます。

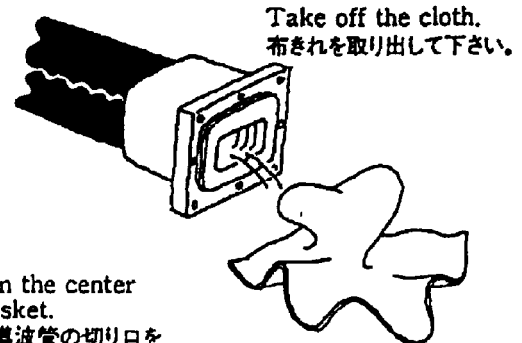


Cleanse well the inner surface of the conductor.
ブラシで内面をきれいにして下さい。

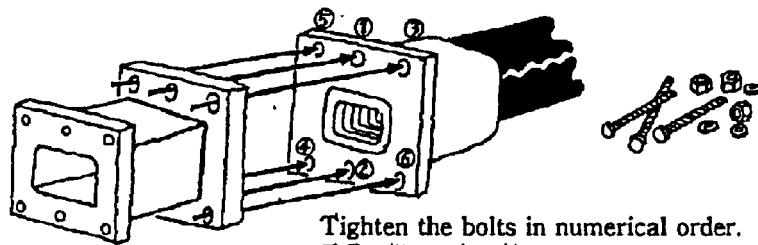


Set the front side (having step)
outward.
バックインに裏表があります、ご注意ください。

Set the conductor in the center
of groove of the gasket.
バックインの溝の中央に導波管の切り口を
合わせて下さい。

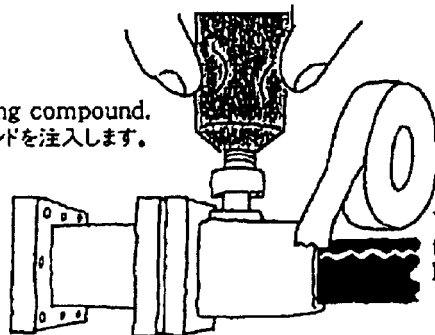


Take off the cloth.
布きれを取り出して下さい。



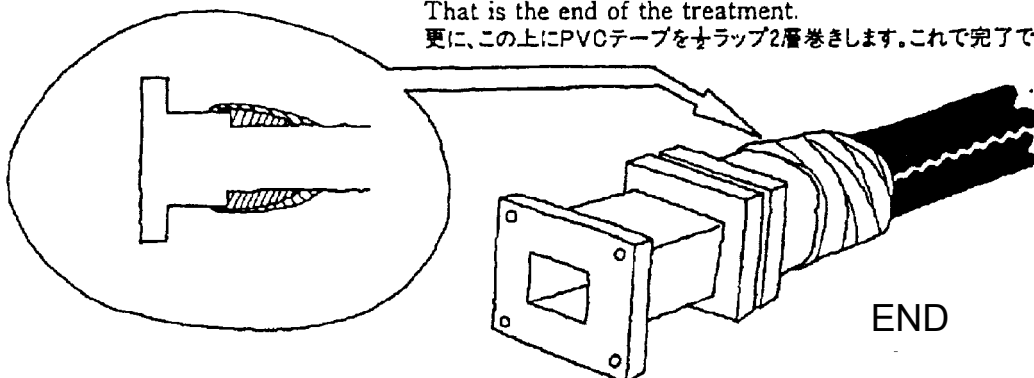
Tighten the bolts in numerical order.
番号に従ってボルト締めして下さい。

Pouring of sealing compound.
シーリングコンパウンドを注入します。



Wind the self-bonding tape (FCO tape) between
the ends of the connector and PE sheath,
half-lapped in two layers.
自己融着テープ(エフコテープ)で半ラップ2層巻きます。

Further, wind PVC tape half-lapped in two layers
That is the end of the treatment.
更に、この上にPVCテープを半ラップ2層巻きます。これで完了です。



END

7.2 Waveguide for S-band radar

High frequency Coaxial cable

The scanner unit is connected to the transceiver unit by a high frequency coaxial cable. It is necessary to install the connector at the transceiver side of the coaxial cable. The connector for the scanner unit side has been installed at the factory.

Installing coaxial cable

Use the cable band for fixing the cable supplied.



The cable band Fig. 7-1 (Type: 03-011-3228, Code: 100-049-62) is also available optionally.



Fig. 7-1 Cable band, optional

Necessary tools

No	Items	Amount	
1	Heavy duty saw	1	For cable cutting
2	Knife	1	For cable sheath cutting
3	File	1	For taking out inner conductor and removing burr
4	Cutter knife	1	For cutting insulator
5	Scale	1	For scaling
6	Wrench for M4 (S7)	1	For fixing the bolts
7	Gauge	1	For finishing the cable conductor edge

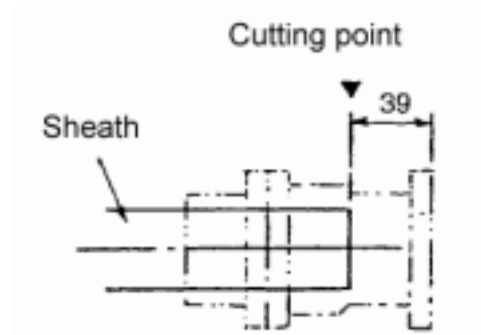
Installation Material



Note2: A minimum cable bending radius of 150 mm must be observed at the cable run. When bending the cable twice or more in close points, the bending radius should be more than 250 mm.

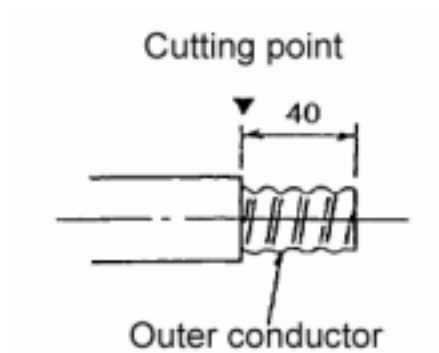
Procedure

1. Straighten the cable and cut it even using the hacksaw and scale (gauge).

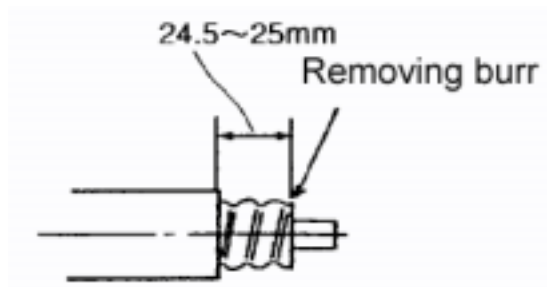


2. Remove the sheath 40 mm using the tubing cutter and scale.

Note: Be careful not to nick the outer conductor.

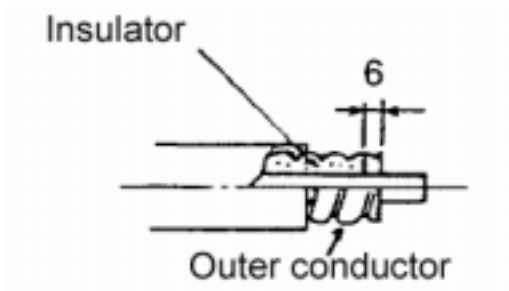


3. Remove the outer conductor and the insulator. (Tools: Hacksaw, scale)



4. Removing burr of the outer conductor with the file.

5. Remove the insulator in the outer conductor 6 mm.

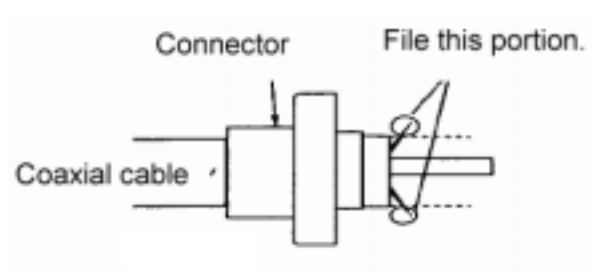
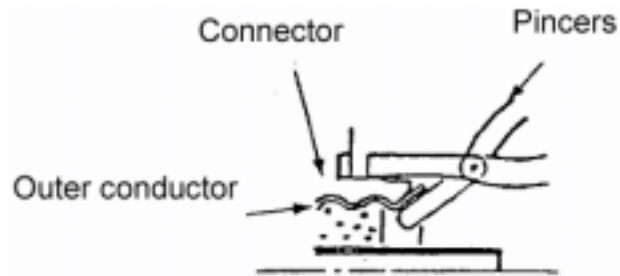


6. Connect the connector to the coaxial cable.

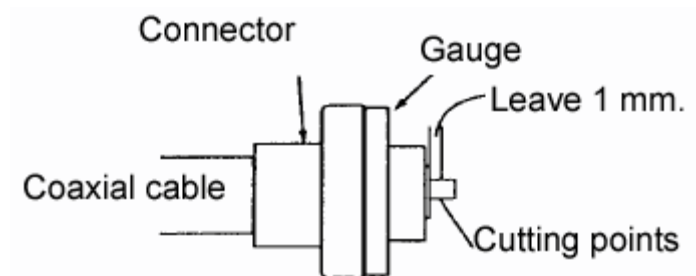
Screw connector onto the coaxial cable.



7. Flare the outer conductor along the connector by a pincers.
8. File the outer conductor beyond the diameter of the connector.



9. Insert the gauge through the connector. Fix the gauge by the bolts and then cut the inner conductor leaving 1 mm for finishing. (Tools: Gauge, M4 Wrench, Hacksaw)



10. Remove the gauge. Then, file the inner conductor to finish.



11. Assemble relay connector and relay conductor, and then connect it to the coaxial cable.



12. Tape the self-bonding tape twice or more on the cable and connector. And then tape the aluminum tape over the self-bonding tape by half-lap wrapping. Tape vinyl tape over the aluminum tape.

