

FURUNO

Installation Manual
MULTI-COLOR LCD RADAR

Model FR-8045/FR-8065/FR-8125/FR8255

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SAFETY INSTRUCTIONS

Read these safety instructions before you operate the equipment.

 WARNING	Indicates a condition that can cause death or serious injury if not avoided.
 CAUTION	Indicates a condition that can cause minor or moderate injury if not avoided.

 Warning, Caution	 Prohibitive Action	 Mandatory Action
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WARNING


 **Do not open the equipment unless totally familiar with electrical circuits and service manual.**
Only qualified personnel should work inside the equipment.

 **Wear a safety belt and hard hat when working on the antenna unit.**
Serious injury or death can result if someone falls from the radar mast.


Construct a suitable service platform from which to install the antenna unit.
Serious injury or death can result if someone falls from the radar mast.

Turn off the power at the mains switchboard before beginning the installation.
Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.

CAUTION

 Ground the equipment to prevent electrical shock and mutual interference.

WARNING

 **Radio Frequency Radiation Hazard**

The radar antenna emits electromagnetic radio frequency (RF) energy which can be harmful, particularly to your eyes. Never look directly into the antenna aperture from a close distance while the radar is in operation or expose yourself to the transmitting antenna at a close distance.

Distances at which RF radiation levels of 100 W/m² and 10 W/m² exist are given in the table below.

Note: If the antenna unit is installed at a close distance in front of the wheel house, your administration may require halt of transmission within a certain sector of antenna revolution. This is possible - Ask your FURUNO representative or dealer to provide this feature.

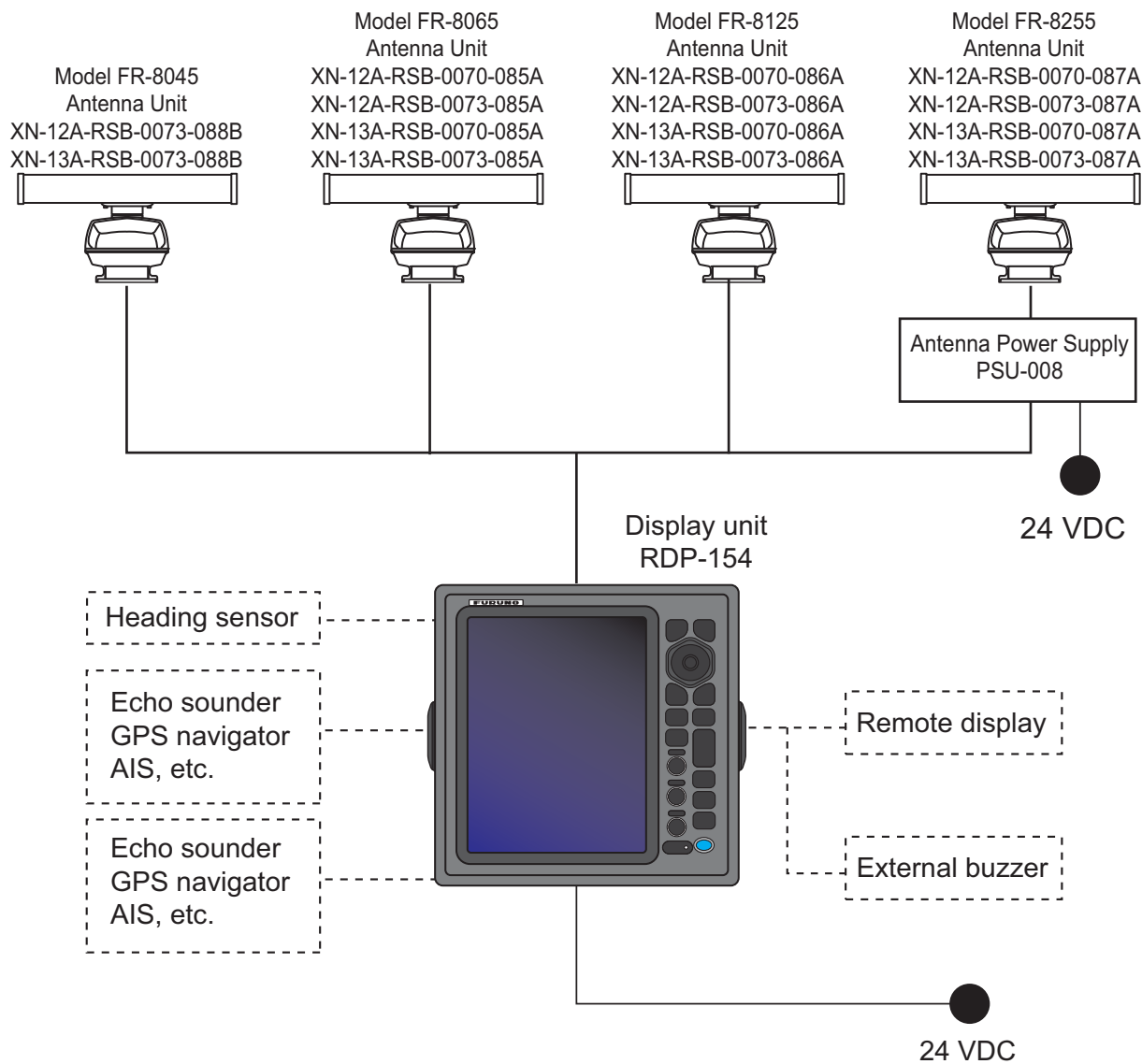
Model	100W/m ²	10W/m ²	
FR-8045	XN-12A	N/A	1.1m
	XN-13A	N/A	1.0m
FR-8065	XN-12A	N/A	1.9m
	XN-13A	N/A	1.7m
FR-8125	XN-12A	N/A	2.1m
	XN-13A	N/A	1.9m
FR-8255	XN-12A	0.6m	4.6m
	XN-13A	0.4m	3.1m

CAUTION

Observe the following compass safe distances to prevent deviation of a magnetic compass.

Model	Standard	Steering	
Display Unit RDP-154	1.00m	0.65m	
FR-8045 Antenna	0.95m	0.60m	
FR-8065 Antenna	RSB-0070	1.95m	1.25m
	RSB-0073	1.90m	1.20m
FR-8125 Antenna	RSB-0070	1.00m	0.60m
	RSB-0073	1.10m	0.70m
FR-8255 Antenna	RSB-0070	1.85m	1.25m
	RSB-0073	1.80m	1.15m
PSU-008	0.80m	0.50m	

SYSTEM CONFIGURATION



————— : Basic configuration

----- : Optional

Note 1: 12 VDC cannot be used with this equipment.

Note 2: When replacing the antenna, make sure the correct SPU board is used, referring to the table below.

Model	SPU Board
FR-8045	03P9586B
FR-8065/FR-8125/FR-8255	03P9586A

EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Comments	
Display Unit	RDP-154	—	1		
Antenna Unit	RSB-0070/0073-085A	—	1	Radiator: XN-12A or XN-13A	
	RSB-0070/0073-086A	—			
	RSB-0070/0073-087A	—			
	RSB-0073-088B	—			
Power Unit	PSU-008	—	1	5m Cable	For FR-8255
Installation Materials	CP03-30700	000-090-471	1	10m Cable	For FR-8065/ or FR-8125
	CP03-30710	000-090-472		15m Cable	
	CP03-30720	000-090-473		20m Cable	
	CP03-30730	000-090-474		30m Cable	
	CP03-30500	000-083-620	1	10m Cable	For FR-8255
	CP03-30510	000-083-621		15m Cable	
	CP03-30520	000-083-622		20m Cable	
	CP03-30530	000-083-623		30m Cable	
	CP03-35600	000-024-717	1	For Display Unit (Screws, Code: 000-162-608-10, 5×20 SUS304)	
	CP03-33000	000-014-604	1	5m Cable	For FR-8045
	CP03-33010	000-014-605		10m Cable	
	CP03-33020	000-014-606		15m Cable	
	CP03-33030	000-014-607		20m Cable	
	CP03-33040	000-014-608		30m Cable	
	CP03-33801	001-141-670	1	For Antenna Unit: FR-8065/FR-8125/FR-8255	
	CP03-18401	008-503-360	1	For Antenna Unit: FR-8045	
	CP03-22901	008-219-760	1	For Radiator	
CP03-30600	000-084-769	1	For PSU-008		
Spare Parts	SP03-17701	001-258-000	1	For Display Unit: Fuse (Code: 000-155-826-10, FGBO 125V 10A PBF)	
	SP03-14501	008-444-420	1	For PSU-008	
Accessories	FP03-12301	001-258-020	1	LCD Cleaning Cloth (Code: 100-360-672-10, 19-028-3125-2)	

Optional supply

Name	Type	Code No.	Qty	Comments
Auto Plotter	ARP-11	008-523-050	1	
External Alarm Buzzer	OP03-21	000-030-097	1	
Signal Cable Assembly	MJ-B24LPF0010-100+R	000-147-880-12	1	For Remote Display Unit
	MJ-B24LPF0010-200+R	000-147-881-12		
	MJ-B24LPF0010-300+R	000-147-882-12		
	MJ-A7SPF0007-050C	000-154-028-10	1	For NMEA1/2
	MJ-A6SPF0007-100C	000-159-695-10	1	For Heading Sensor
	MJ-A10SPFW0001+R	001-074-600-10	1	For Remote Display Unit/ External Display splitter cable
Flush Mount Kit	OP03-228	001-258-030	1	

1. HOW TO INSTALL THE SYSTEM

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to plastic parts or equipment coating.

These items contain products that can damage plastic parts and equipment coating.

1.1 Display Unit

Select a location for the display unit by following the information shown below.

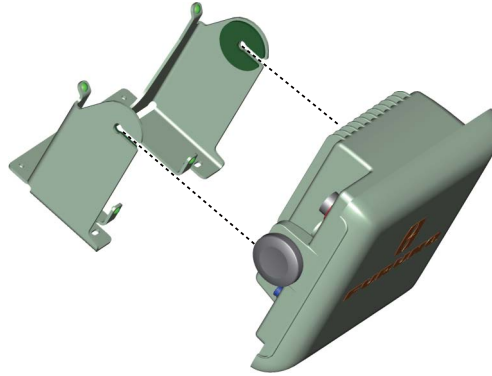
- The unit is waterproof, but FURUNO recommends that you install the display unit in a cabinet.
- Keep the unit away from direct sunlight.
- The temperature and humidity must meet the requirements shown in the equipment specifications.
- Set the unit away from the exhaust pipes and vents.
- The installation location must have enough cool air.
- Install the unit where shock and vibration meet the requirements shown in the equipment specifications. If there is heavy vibration, vertically install the display unit on the hanger.
- Keep the unit away from equipment that creates an electromagnetic field, for example, motors and generators.
- For maintenance and checking, leave enough space at the sides and rear of the unit, referring to the outline drawing and provide some additional length in cables.
- Follow the recommended compass safe distances shown on page i to prevent the interference to a magnetic compass.

1.1.1 How to install the display unit

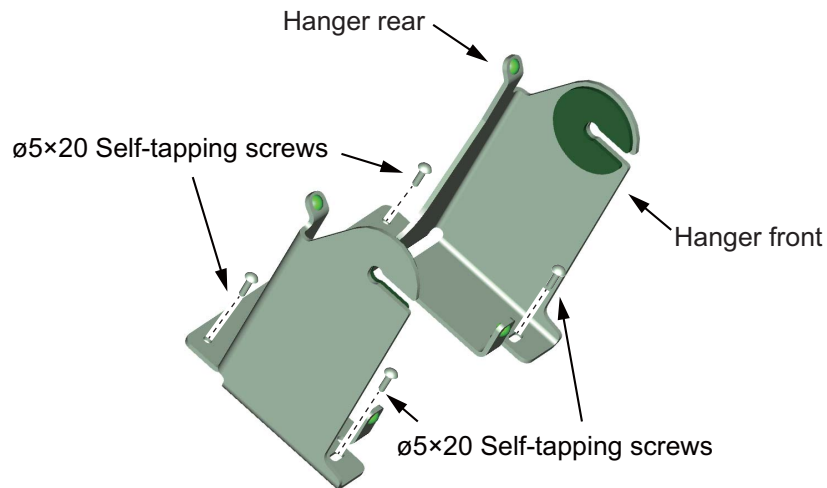
How to install the display unit on a desktop or overhead

Follow the procedure shown below to install the display unit on a desktop or overhead.

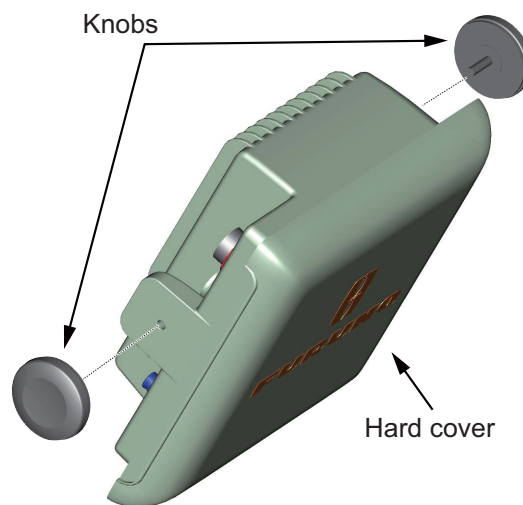
1. Unfasten the knob bolts and remove the display unit from the hanger.



2. Fasten the hanger with four self-tapping screws.



3. Screw the knob bolts into the display unit, leaving them slightly loose.



4. Connect all necessary cabling.
5. Set the display unit in the hanger, then fasten the knob bolts.

Note: For overhead installation, make sure the location is strong enough to hold the unit. If necessary, fasten the hanger with the bolts, nuts and washers (local supply).

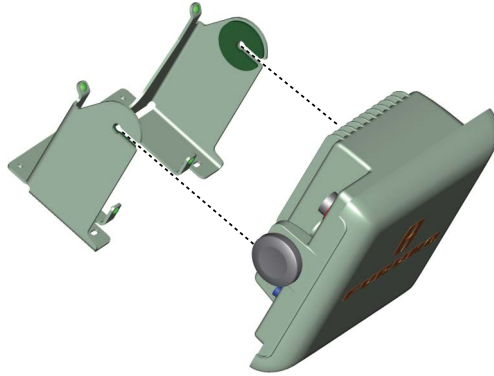
1. HOW TO INSTALL THE SYSTEM

How to install the display unit in a console

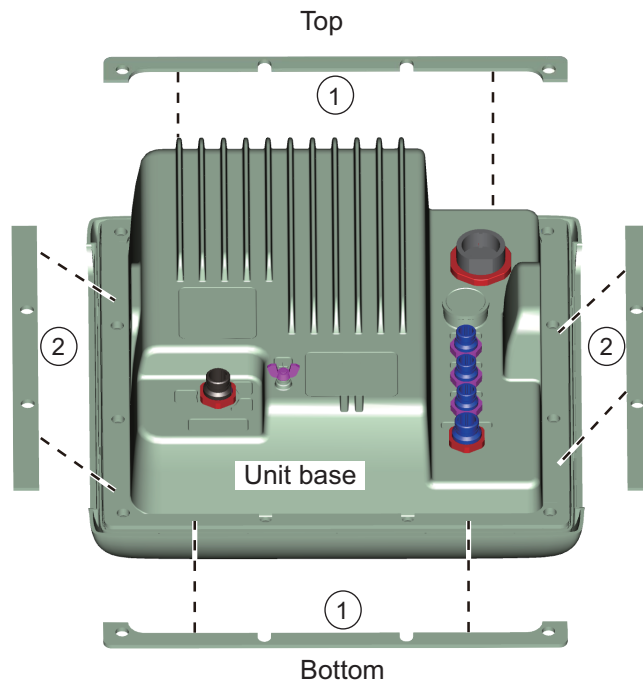
Note: The unit must be installed in a flat area of the console. Ensure there is ample room behind the unit once installed to allow access for maintenance.

Follow the procedure shown below to install the display unit in a console.

1. Prepare a hole in the installation location referring to the outline drawing at the back of this manual.
2. Unfasten the knob bolts and remove the display unit from the hanger.



3. Fit the backing sponges, referring to the diagram below.

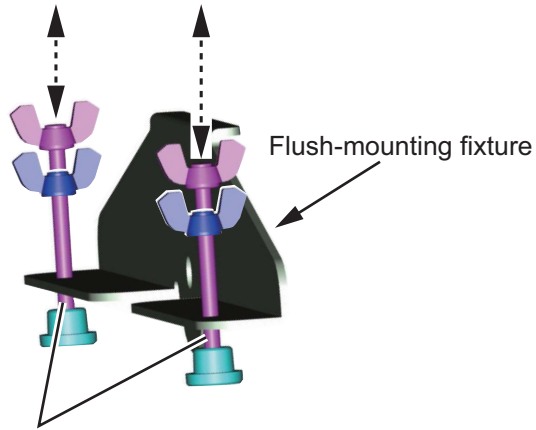


Note 1: Ensure the backing sponges are used correctly. 1 - Horizontal, 2 - Vertical.

Note 2: Take care to place the backing sponges around screw holes and ensure there are no gaps between the sponges at their joining points.

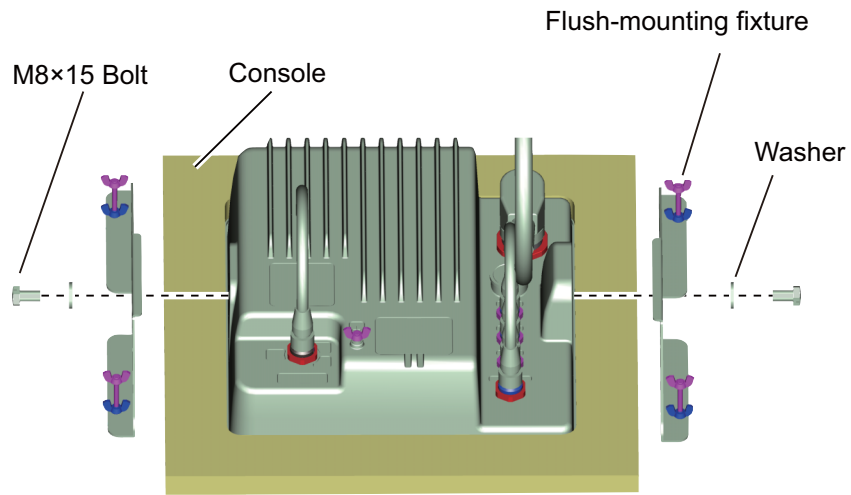
4. Connect all necessary cables to the unit, making sure to leave enough slack for maintenance and service.
5. Insert the unit into the console, making sure that all cabling attached to the unit is not damaged. Ensure the unit is secure before proceeding to the next step.

- Adjust the flush-mounting fixture by loosening the wingnuts and wingscrews to allow the bolt free movement. Use the figure below for reference.

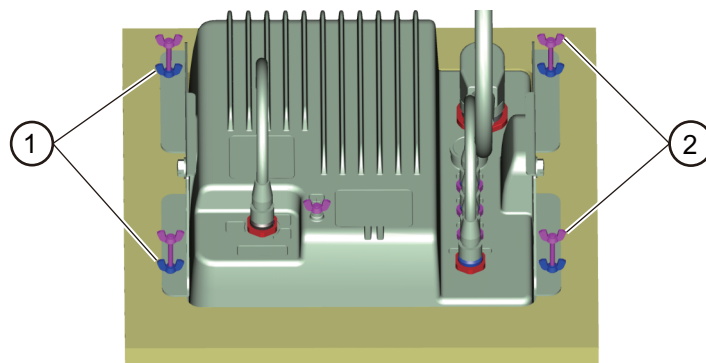


Minimal distance between protector and clamp.

- Attach the flush-mounting fixture to the unit referring to the diagram below.



- Fasten the four wingscrews until the footing is flush against the mounting area. See No. 2 in the figure below for reference.

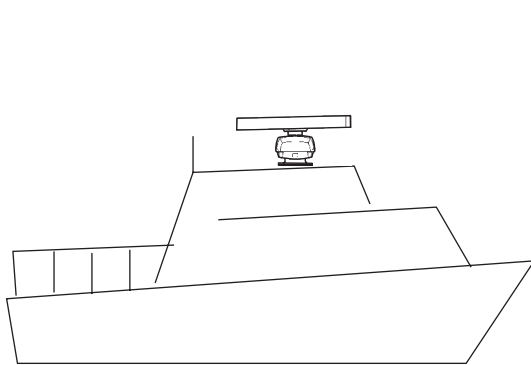


- Tighten the four wingnuts until the unit is firmly secured. See No. 1 in the figure above for reference.

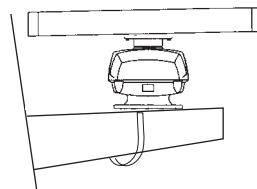
1.2 Antenna Unit Installation

How to select the location for the antenna unit

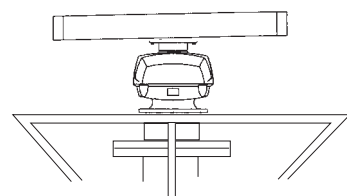
- The antenna unit is installed either on top of the wheelhouse or a platform on the radar mast. Install the antenna unit where there is a good complete view. Any obstruction causes blind sectors. For example, a mast with a diameter smaller than the horizontal beamwidth of the radiator causes only a small blind sector. A horizontal spreader or crosstrees in the same horizontal plane creates a large obstruction. Install the antenna unit above, or below a horizontal spreader or crosstrees.
- You cannot put the antenna unit where there is a completely clear view in all directions. Make sure you check for blind sectors on the radar screen after you have installed the radar.
- To reduce the electrical interference, do not run the signal cable near other electrical equipment. Also do not run the cable in parallel to power cables.
- A magnetic compass gives error if the antenna unit is installed near the magnetic compass. See SAFETY INSTRUCTIONS for the compass safe distances to prevent the interference to a magnetic compass.
- Do not apply paint to the radiator aperture. The radar wave cannot be transmitted if there is paint on the radiator.
- If this radar is installed on a large vessel, follow the points shown below:
 - The length of the signal cable between the antenna unit and the display unit is max. 30 m.
 - The output from a funnel or exhaust vent decreases aerial performance and hot gases can damage the radiator. The antenna unit must not be installed where the temperature is more than 55°C.
- The antenna unit can be installed on the bridge, a common mast, or the radar mast.



(a) On bridge



(b) Common mast



(c) Radar mast

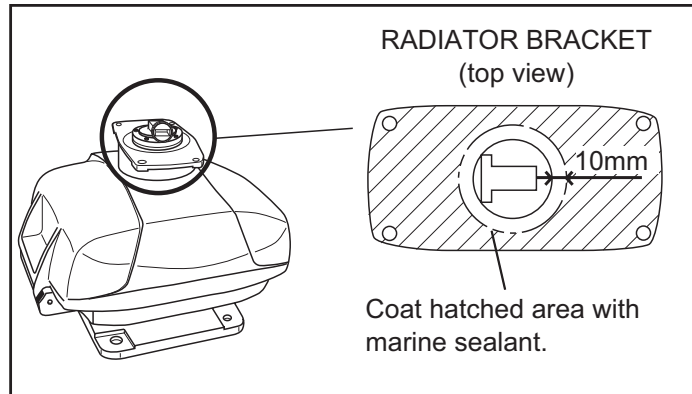
1.2.1 Installation procedure

Refer to the outline drawing at the back of this manual for the dimensions. Make five holes in the platform. Four holes to fasten the antenna unit and one hole for the signal cable.

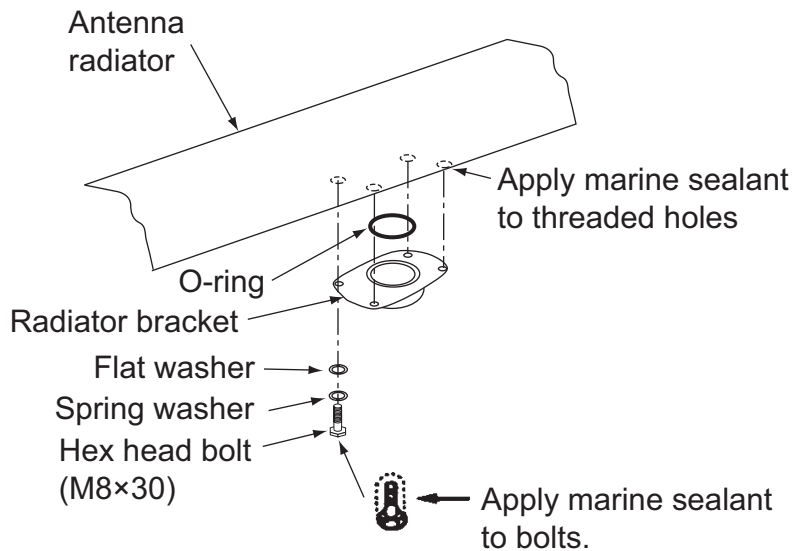
How to fasten the radiator to the chassis

See the packing list at the back of this manual for the installation materials.

1. Remove the radiator cap from the radiator bracket.
2. Apply marine sealant to the surface of the antenna radiator and the radiator bracket. See the figure shown below for the location.



3. Apply the marine sealant to the threads in the four holes on the antenna radiator.
4. Apply the grease to the O-ring and set the O-ring to the radiator bracket.
5. Set the antenna radiator on the radiator bracket.
6. Apply the marine sealant to the radiator bolts (4 pieces). Fasten the antenna radiator to the radiator bracket with the radiator bolts, flat washers and spring washers.



1. HOW TO INSTALL THE SYSTEM

1.2.2 How to install the antenna unit

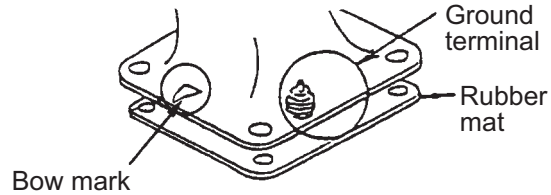
You can install the antenna unit by one of the two methods shown below.

- Use the outside holes
- Use the inside holes

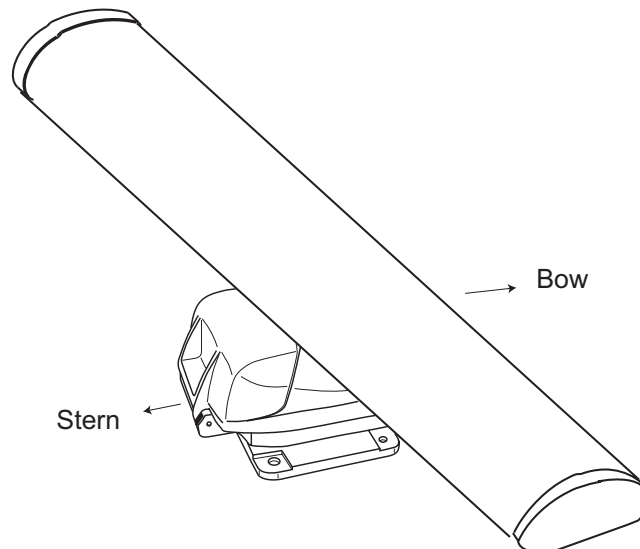
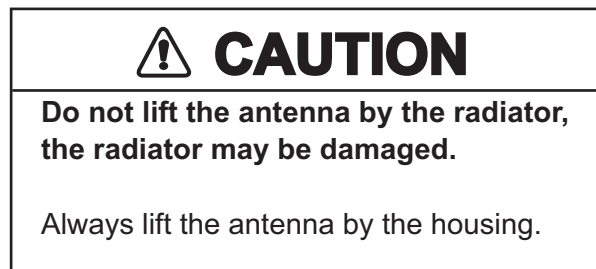
How to use outside holes of the antenna housing

Use the hex head bolts (supplied) to install the antenna unit as shown in the illustration below.

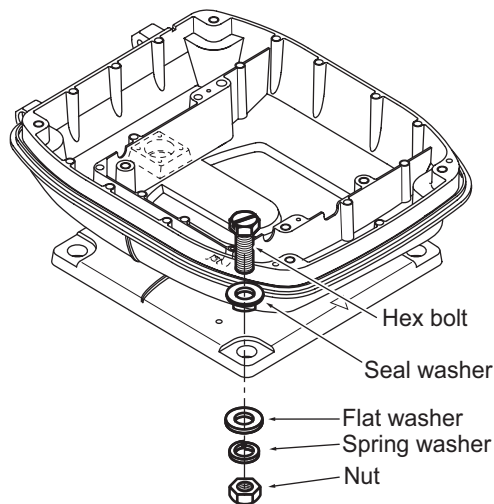
1. Put the rubber mat (supplied) on the platform.



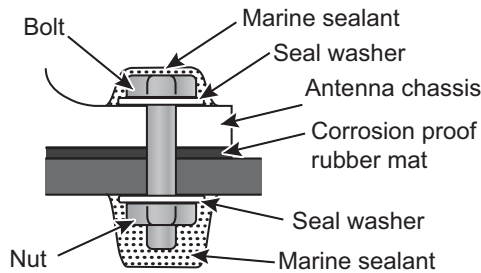
2. Put the antenna unit on the rubber mat. Align the position of the antenna unit as shown in the illustration below.



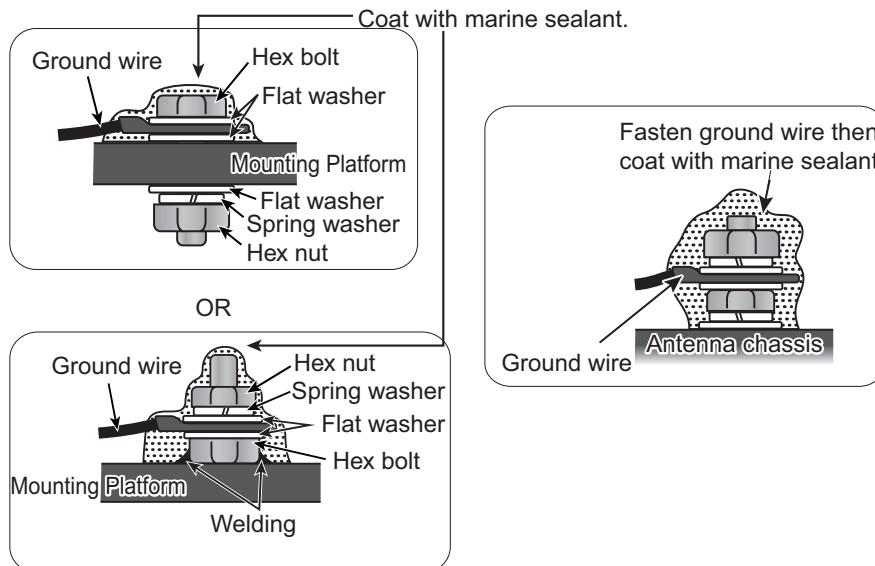
- Set four hex head bolts (M12×60, supplied) and seal washers (supplied) from the top of the antenna housing, as shown below.



- Set the flat washers (M12, supplied), spring washers (supplied) and nuts (supplied) to the hex head bolts. Tighten by turning the nuts. Do not tighten by turning the hex head bolts, to prevent damage to the seal washers.



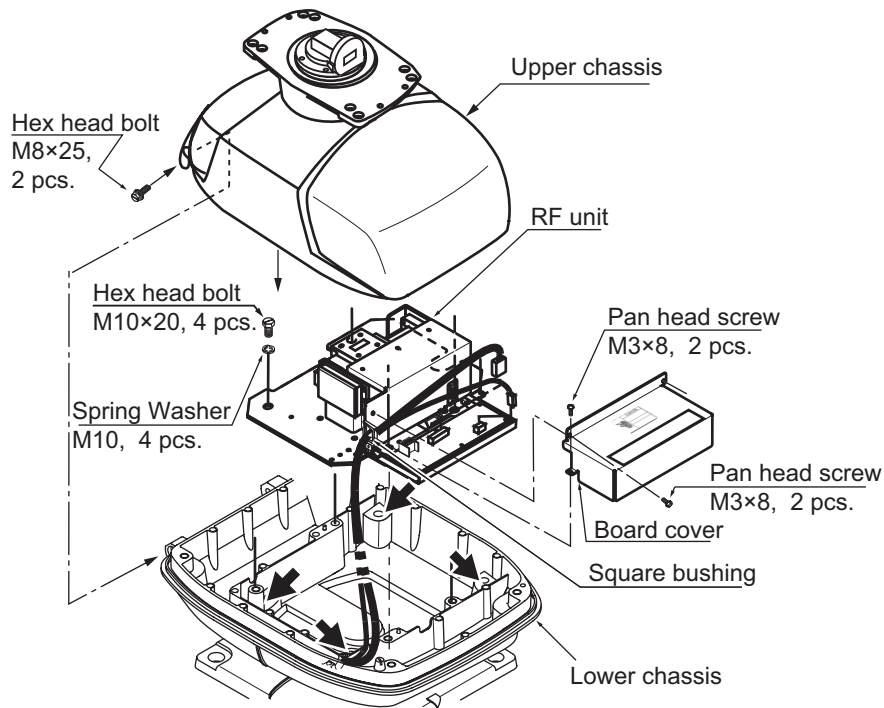
- Apply anti-corrosive sealant to the flat washers, spring washers, nuts and visible parts of bolts.
- Prepare the ground point on the platform. Use an M6×25 bolt, nut and flat washer (supplied). The ground point must be within 300 mm from the ground terminal on the antenna unit.
- Run the ground wire (RW-4747, 340 mm, supplied) between the ground terminal and the ground point.
- Apply marine sealant to the ground terminal and ground point as shown below.



1. HOW TO INSTALL THE SYSTEM

1.2.3 How to use the inside holes of the antenna housing (FR-8045)

This method requires removal of the RF unit from the antenna unit to access the inside fixing holes. Use four hex head bolts, flat washers, spring washers and nuts (local supply) to install the antenna unit. Check the length of the bolts before you install.



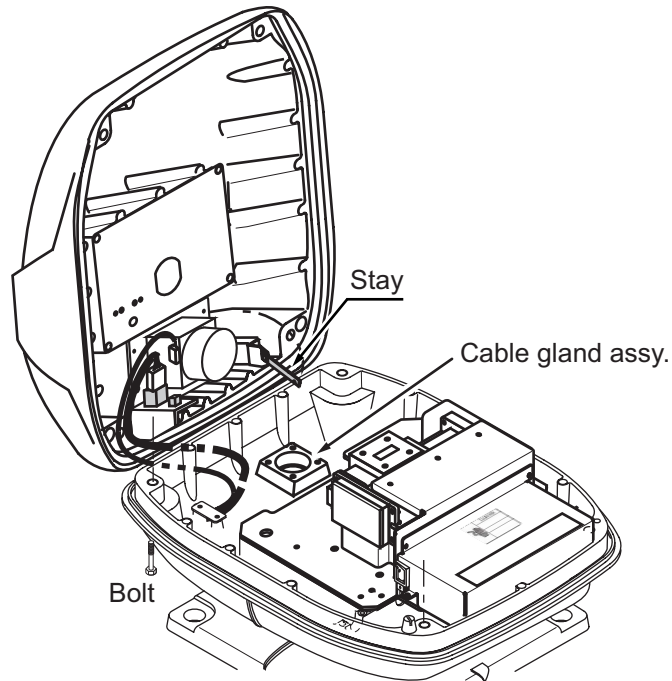
Antenna unit chassis, upper chassis separated

1. Unfasten four bolts on the cover to open the antenna unit.
2. Disconnect the connectors connected between the upper chassis and the lower chassis.
3. Remove two hex head bolts (M8×25) to separate the upper chassis from the lower chassis.
4. Loosen four pan head screws to remove the cover from the pc board.
5. Remove the connector from the RF unit.
6. Loosen four hex head bolts to remove the RF unit.
7. Set the corrosion-proof rubber mat (supplied) to the support platform.
8. Cut the rubber bushings in the fixing holes and put four bolts from the inside of the lower chassis. Fasten the lower chassis to the support platform with the spring washers, flat washers and nuts (local supply). Apply marine sealant to the flat washers, nuts and visible parts of bolts.
9. Assemble the RF unit, cover and chassis.
10. Set four caps (supplied) into the outside fixing holes.
11. Prepare the ground point on the platform. Use an M6×25 bolt, nut and flat washer (supplied). The ground point must be within 300 mm from the ground terminal on the antenna unit.
12. Run the ground wire (RW-4747, 340 mm, supplied) between the ground terminal and the ground point.
13. Apply the marine sealant to the ground terminal and ground point. See the illustration on page 8 for instructions.

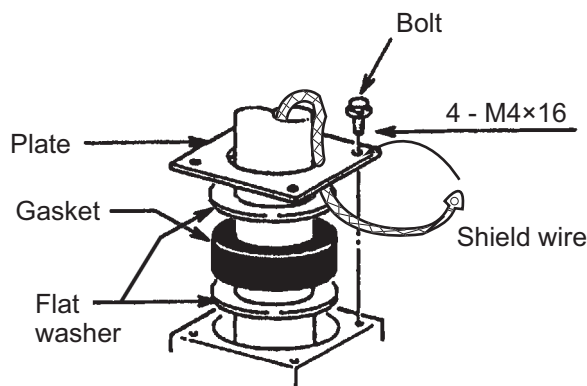
1.2.4 How to connect the signal cable (FR-8045)

The signal cable runs from the display unit to the antenna unit. To reduce the electrical interference, do not run the signal cable near other electrical equipment. Also do not run the cable in parallel to power cables. Put the cable through the hole and apply sealing compound around the hole for waterproofing.

1. Loosen four bolts, open the antenna cover, and set the stay.



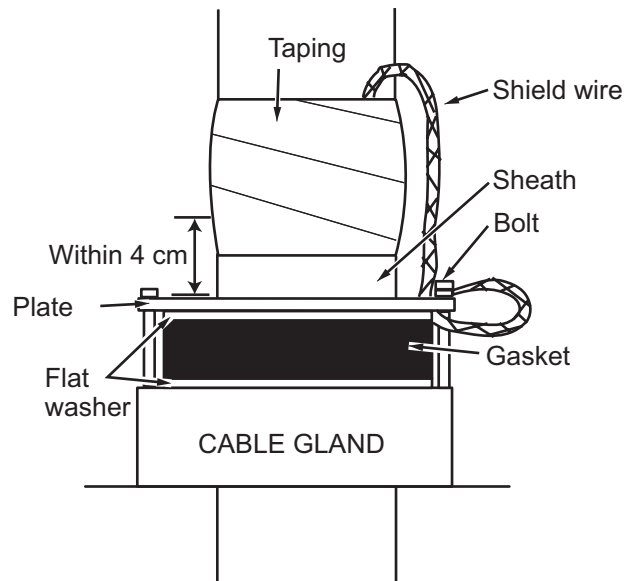
2. Loosen the cable gland assembly (plate, gasket, flat washer).
3. Put the signal cable with the connector through the bottom of the antenna unit chassis. Put the cable through the gland assembly as shown below.



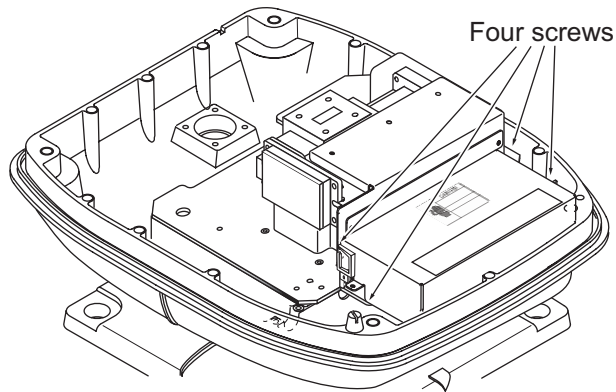
4. Fasten the crimp-on lug of the shield wire to one of the four fixing bolts of the cable gland assembly.

1. HOW TO INSTALL THE SYSTEM

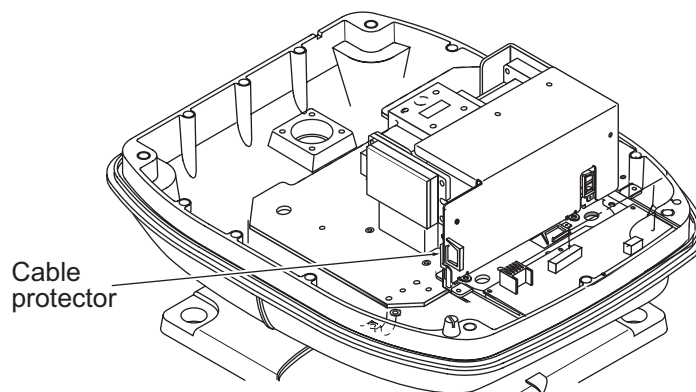
- Put the signal cable so that no more than 4 cm of the sheath is visible, as shown in the figure below. Tighten the fixing bolts.



- Loosen four screws in the figure shown below and open the cover.

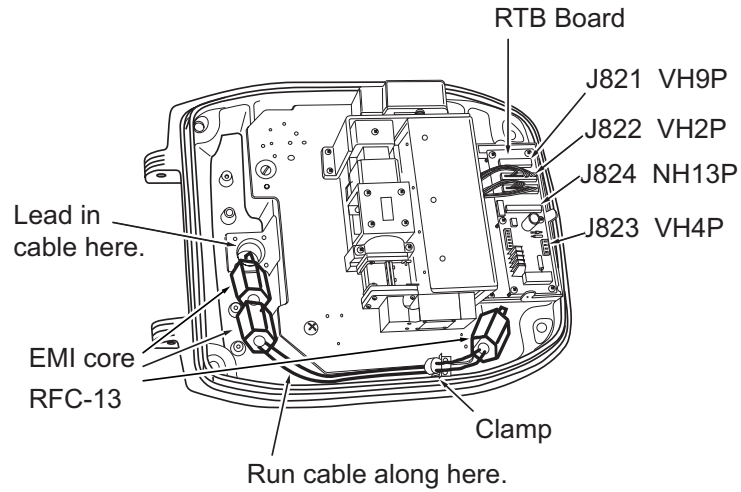


- Put the signal cable through the cable protector.



- Connect the signal cable to the RTB Board (03P9249). See the interconnection diagram and the figure shown on page 12.

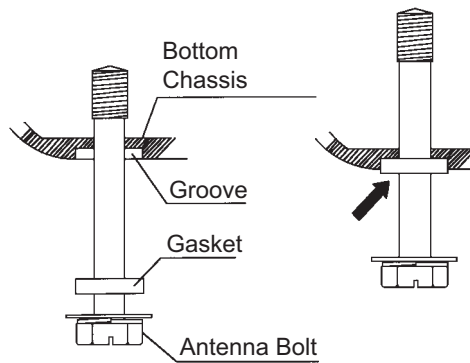
9. Attach three EMI cores to the signal cable as shown below.



10. Fasten the signal cable with the cable clamp.

11. Undo the stay and close the cover. Securely fasten the scanner bolts.

Note: When you close the cover, set the gaskets to the grooves in the bottom chassis, then tighten the bolts.



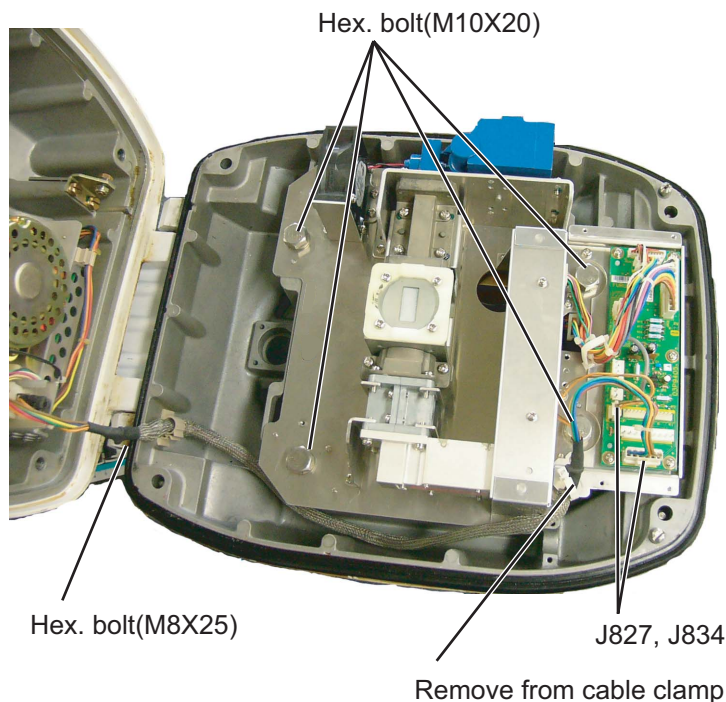
Torque : 9.8 ± 0.1 Nm

1. HOW TO INSTALL THE SYSTEM

1.2.5 How to use the inside holes of the antenna housing (FR-8065/FR-8125/FR-8255)

This method requires removal of the RF unit in the antenna unit to access inside fixing holes. Use hex head bolts, flat washers, spring washers and nuts (local supply) to mount the antenna unit, confirming length of bolts.

1. Unfasten four antenna bolts on the cover to open the antenna unit.
2. Unfasten four screws on the RTB cover to remove it.
3. Unplug connector J827 and J834 on the RTB board
4. Separate upper chassis from lower chassis by removing two hex head bolts (M8x25).
5. Remove RF unit by unfastening four hex head bolts.



Antenna unit, opened

6. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.
7. Fasten the lower chassis to the mounting platform with hex head bolts, spring washers, flat washers and nuts (local supply), and then coat flat washers, nuts and exposed parts of bolts with marine sealant. Cut a slit in the rubber bushing and insert bolt into the bushing. Do not use seal washers.
8. Reassemble RF unit, cover and chassis.
9. Set four knob caps (supplied) into outside fixing holes.
10. Do steps 6-8 in "Outside fixing holes" on page 8.

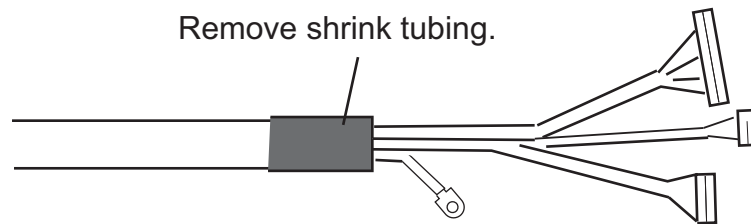
1.2.6 How to connect the signal cable (FR-8065/FR-8125/FR-8255)

Only the signal cable runs from the display unit (power supply unit in case of FR-8255) to the antenna unit. In order to minimize the chance of picking up electrical interference, avoid where possible routing the signal cable near other onboard electrical equipment. Also, avoid running the cable in parallel with power cables. Pass the cable through the hole and apply sealing compound around the hole for waterproofing.

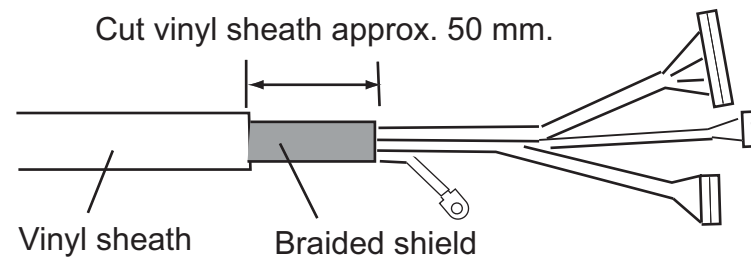
Fabricating the signal cable

This type of signal cable is used with other models of radar. For these models, the following fabrication is required.

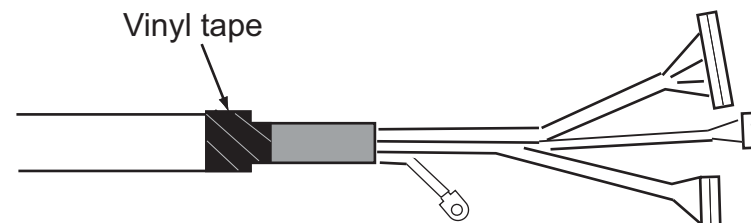
1. Remove shrink tubing from the signal cable.



2. Remove vinyl sheath approx. 50 mm.



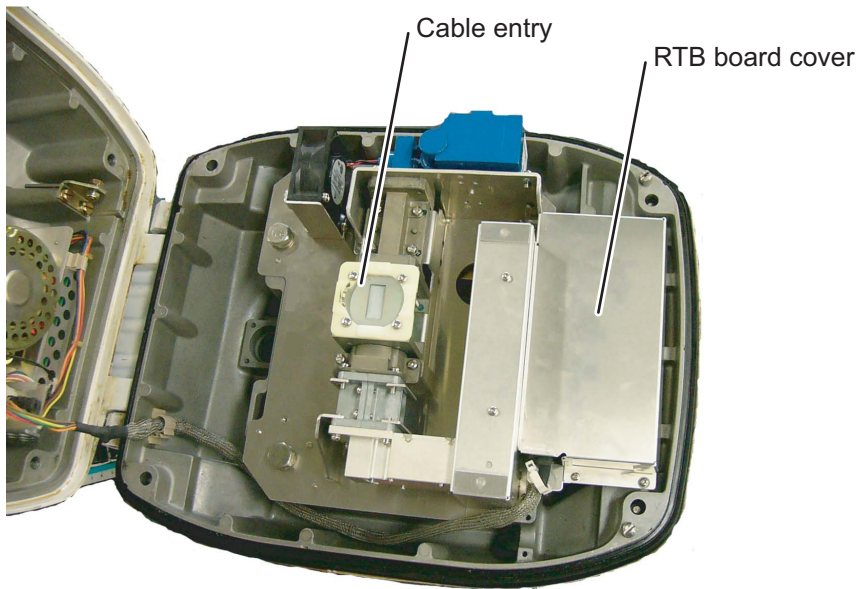
3. Wrap vinyl tape at the end of the vinyl sheath.



1. HOW TO INSTALL THE SYSTEM

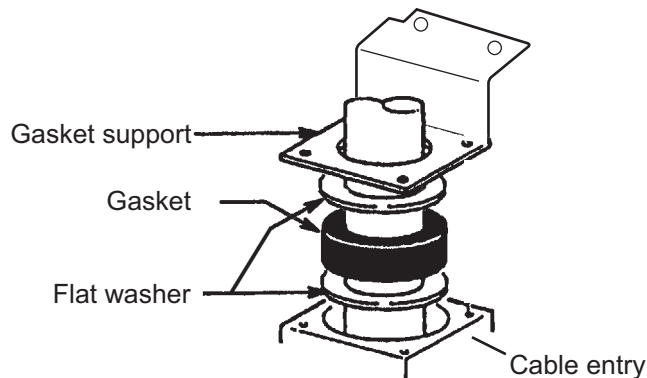
Connecting the signal cable

1. Open the antenna cover by loosening four bolts, and then fix the stay.



Antenna unit chassis, cover opened

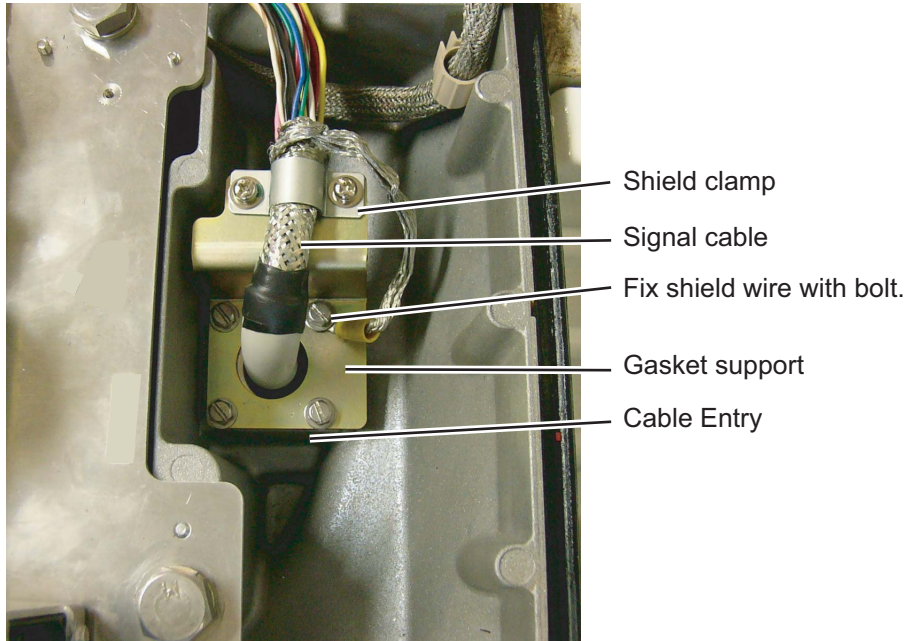
2. Unfasten the cable gland assembly (plate, gasket, flat washer). The plate may be discarded.
3. Pass the signal cable with connector through the bottom of the antenna unit chassis. Pass the cable through the gland assembly as shown below.



Passing the signal cable through the cable gland assembly

4. Fasten the gasket support with four bolts. Using one of the four bolts, fasten the crimp-on lug to the shield wire.

5. Fasten the shielded part of the signal cable with shield clamp (installation material) as shown below.

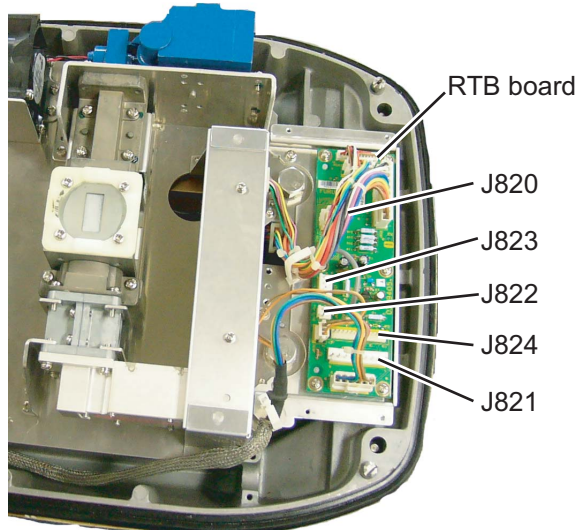


How to fix signal cable in cable gland

6. Unfasten four screws to remove the RTB board cover.
7. Connect the plugs of the signal cable to the RTB board.

FR-8065, FR8125 : J821, J823, J824, J822

FR-8255 : J821, J823, J824, J820

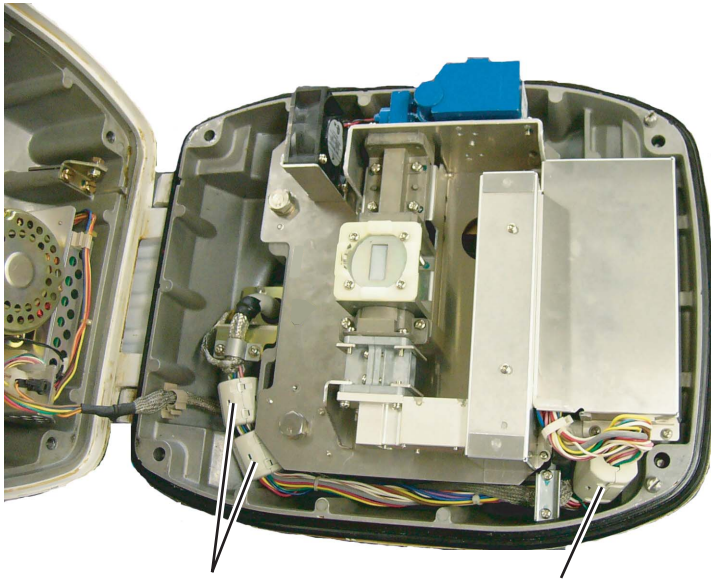


Connecting to the RTB board

8. Reattach the RTB board cover.

1. HOW TO INSTALL THE SYSTEM

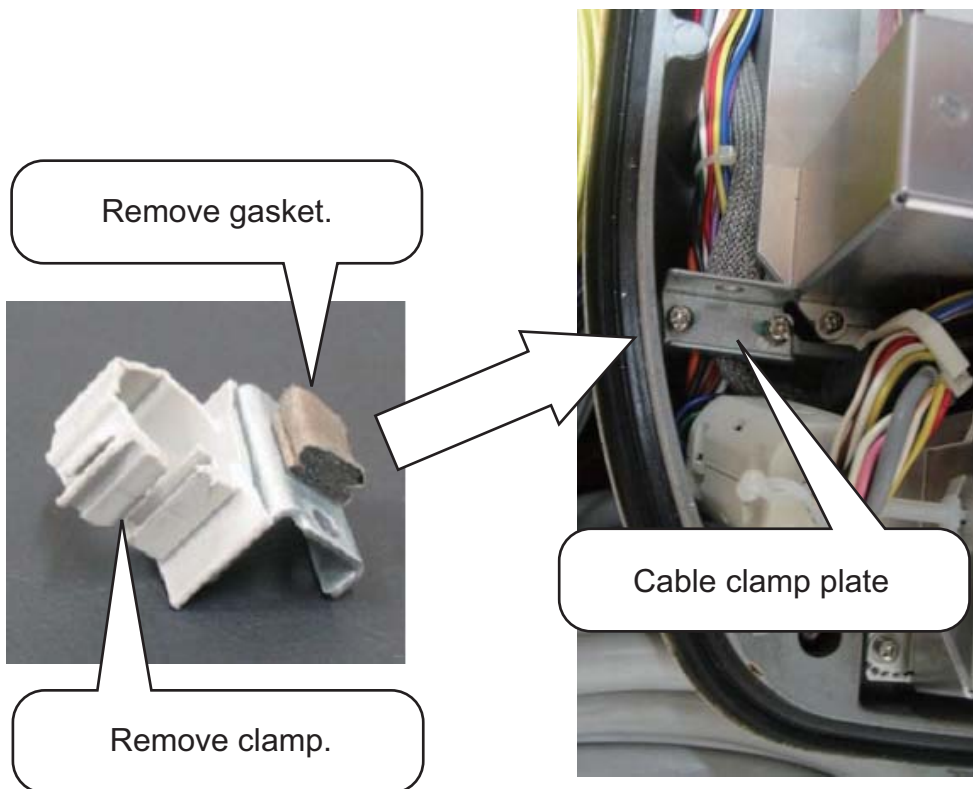
- 9. Attach three EMI cores to the signal cable as shown below.



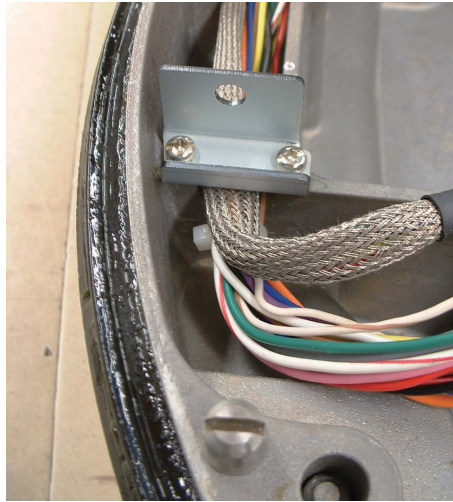
EMI Core RFC-13 (2 pcs) EMI Core RFC-H13 (1 pc)

Antenna unit chassis, cover opened

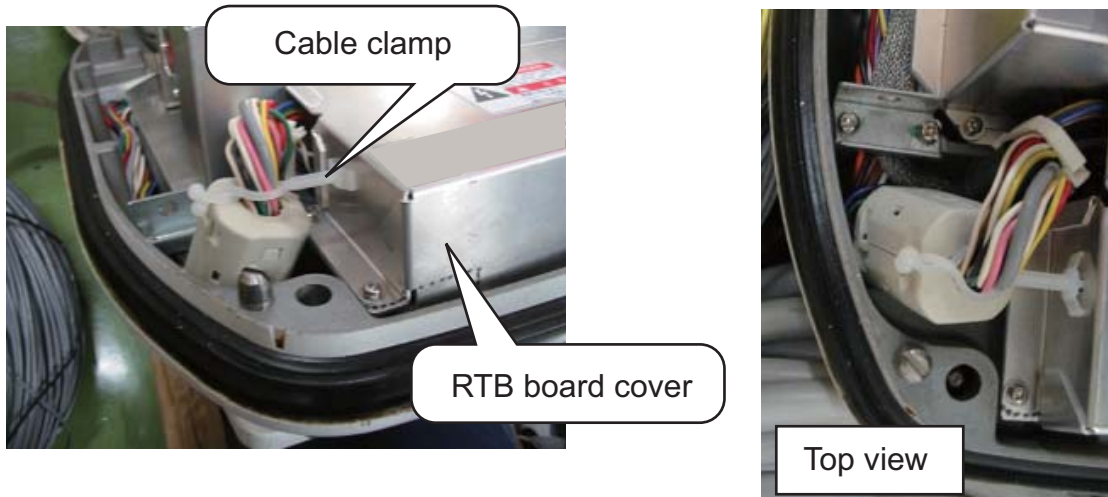
- 10. Fix the signal cable with the cable clamp as follows.
 - a) Dismount the cable clamp plate and remove clamp and gasket.



b) Run the signal cable as shown below.

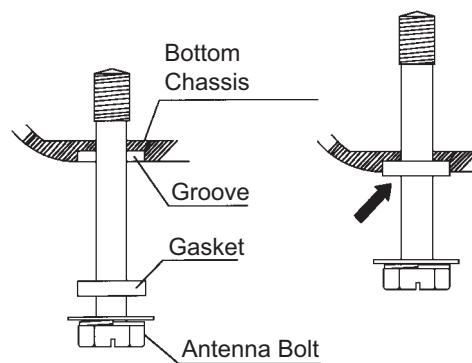


c) Fix the signal cable with cable clamp as shown below.



11. Release the stay and close the cover. Loosely fasten the antenna bolts; you will have to make some adjustments inside after completion of wiring.

Note: When you close the cover, set the gaskets to the grooves in the bottom chassis, then tighten the bolts.



Torque : 9.8 ± 0.1 Nm

1. HOW TO INSTALL THE SYSTEM

1.3 Power Supply Unit

A power supply unit is shipped with the FR-8255, because of its high power consumption.

The power supply unit can be installed almost anywhere provided the location is dry, well-ventilated, sufficient maintenance space is provided and is installed within 5 m (cable length) from the display unit. To fix the unit, use four self-tapping screws (5x20).

Note: Do not install the power supply unit on the overhead; install it on the deck or bulkhead.

