



INSTRUCTION MANUAL



MARINE RADAR

MXR-5000R

(Radome type)

MXR-5000T

(Open array type)

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

FOREWORD

Thank you for purchasing Icom's MXR-5000R/T MARINE RADAR.

The radar is designed for use with the Icom Marine-Commander™ system through the supplied connection cable.

It has powerful transmission power, and many other advanced features can be used with the Icom Marine-Commander™ system.

IMPORTANT

READ THIS INSTRUCTION MANUAL CAREFULLY before attempting to operate the radar.

SAVE THIS INSTRUCTION MANUAL. This manual contains important safety and operating instructions for the MXR-5000R/T.

SYSTEM COMPONENTS

MODEL NAME	UNIT	SCANNER UNIT
MXR-5000R (Radar)	Radar unit	EX-2714 (Radome type)
MXR-5000T (Radar)	Radar unit	EX-2780 (Open array type)

EXPLICIT DEFINITIONS

WORD	DEFINITION
⚠ DANGER!	Personal death, serious injury or an explosion may occur.
⚠ WARNING!	Personal injury, fire hazard or electric shock may occur.
CAUTION	Equipment damage may occur.
NOTE	If disregarded, inconvenience only. No risk of personal injury, fire or electric shock.

The MXR-5000R/T are supplemental aids to navigation and are not intended to be a substitute for accurate and current nautical charts.

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SUPPLIED ACCESSORIES

	Qty.
• DC power cable	1
• Connection cable	1
• Spring washers (M5)	8
• Flat washers (M5)	8
• Nuts (M5)	4
• Bolts (M5×30 mm)	4
• Fuse (FGB 5 A for 24 V power source)	1
• Spare fuse (FGB 10 A for 12 V power source)	1
• Scanner unit	1 set
EX-2714 (Radome type) for MXR-5000R	
- System cable (OPC-1188A: 15 m)	1
- Bolts (M10×50 mm)	4
- Bolts (M10×25 mm)	4
- Nuts (M10)	4
- Flat washers (M10)	4
- Spring washers (M10)	4
EX-2780 (Open array type) for MXR-5000T	
- System cable (OPC-1189A: 20 m)	1
- Bolts (M10×40 mm)	4
- Nuts (M10)	4
- Flat washers (M10)	4
- Spring washers (M10)	4
- Allen wrench	1
- Cap bolts (M8×18 mm)	4
- Belleville washers (M8)	4
- Sealing washers (T)	4
- Flat washers (M8)	4
- Grounding terminal (R5.5-10)	1
- Ferrite EMI filter	1

FCC INFORMATION

• FOR CLASS A UNINTENTIONAL RADIATORS:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

PRECAUTIONS

For radar unit:

⚠ **WARNING! NEVER** let metal, wire or other objects touch any internal part or terminals of the radar unit. This may result in an electric shock.

⚠ **WARNING! NEVER** apply AC voltage to the DC input terminals of the radar unit. This may pose a fire hazard, result in an electric shock or damage the radar unit.

⚠ **WARNING! NEVER** apply more than 32 V DC to the DC input terminal of the radar unit. This may pose a fire hazard or damage the radar unit.

⚠ **WARNING! NEVER** touch the radar unit with wet hands. This may result in an electric shock or damage the radar unit.

⚠ **WARNING! NEVER** open the bottom cover of the radar unit. There are no user adjustment points. This may result in an electric shock and incorrect reassembly may cause a fire hazard.

CAUTION: NEVER connect the radar unit to a DC power source using reverse polarity. This will damage the radar unit.

CAUTION: NEVER remove the fuse holder from the DC power cable. This will damage the radar unit.

DO NOT place the radar unit in excessively dusty environments.

DO NOT place the radar unit near heating equipment or in direct sunlight or where hot or cold air blows directly onto it.

DO NOT use or place the radar unit in areas with temperature below -20°C (-4°F) or above $+60^{\circ}\text{C}$ ($+140^{\circ}\text{F}$).

DO NOT use chemical agents such as benzine or alcohol when cleaning the radar unit, as they can damage the radar unit's surfaces.

DO NOT place the radar unit in areas that will block air passage or put anything around the radar unit. This will obstruct heat dissipation.

KEEP the radar unit out of the reach of children.

KEEP the radar unit away from heavy rain, and never immerse it in the water.

The radar unit meets IPX4 requirements for splash resistance when the supplied connection cable, scanner unit are connected.

However, if it is dropped, splash resistance cannot be guaranteed because of possible damage to the case or the waterproof seals.

For Scanner unit:

⚠ **DANGER: HIGH VOLTAGE! NEVER** open the scanner unit. The scanner unit contains high voltage that could be fatal. And there are no user adjustment points. All repairs and adjustments **MUST** be made by a qualified electronics technician at your Marine Navigation Dealer.

For qualified electronics technician only:

⚠ **DANGER: HIGH VOLTAGE!** High voltages of up to 3,500 volts are used in the scanner unit. Although prudent measures for safety have been adopted, sufficient care must be taken in the operation, maintenance and adjustment of the scanner unit.

Electric shock of 1,000 volts or more may cause electrocution and death; even an electric shock of only 100 volts may be fatal.

⚠ **DANGER: HIGH VOLTAGE!** To prevent an electric shock, turn the radar's power is OFF*¹ and do not reach inside the scanner unit until you have:

- discharged the capacitors by disconnecting the system cable from the radar unit for 5 min.
- checked that no electric charges remain inside the device.

Also, it is safest to wear dry insulated rubber gloves. **NEVER** use both hands simultaneously; keep one hand in your pocket.

⚠ **WARNING: RADIATION HAZARD!**

Radiation emitted from the scanner unit can be harmful, particularly to the eyes. To avoid harmful radiation, turn the radar's power is OFF*¹ before beginning work on the scanner unit.

DO NOT use or place the scanner unit in areas with temperature below -25°C (-13°F) or above $+70^{\circ}\text{C}$ ($+158^{\circ}\text{F}$).

NEVER immerse the scanner unit in the water.

The scanner units meet IPX6*² requirements for high-pressure water jet resistance.

However, if these items are dropped, high-pressure water jet resistance cannot be guaranteed because of possible damage to the cases or the waterproof seals.

*¹ The radar's power automatically turns OFF approx. 30 sec. after the display units' power are turned OFF.

*² Except for the cable connectors. They meet IPX4 requirements while connecting to the radar unit.

For U.S.A. only

CAUTION: Changes or modifications to this radar, not expressly approved by Icom Inc., could void your authority to operate this device under FCC regulations.

RADAR OPERATOR WARNING



Icom requires the radar operator to meet the FCC Requirements for Radio Frequency Exposure. A slotted wave-guide array antenna with gain not greater than 27 dBi must be mounted a minimum of 5.5 meters (measured from the lowest point of the antenna) vertically above the main deck and all possible personnel. This is the minimum safe separation distance estimated to meet all RF exposure compliance requirements. This 5.5 meter distance is based on the FCC Safe Maximum Permissible Exposure (MPE) distance of 3.5 meters added to the height of an adult (2 meters) and is appropriate for all vessels.

For watercraft without suitable structures, the antenna must be mounted so as to maintain a minimum of 1 meter vertically between the antenna, (measured from the lowest point of the antenna), to the heads of all persons AND all persons must stay outside of the 3.5 meter MPE radius.

Do not transmit with radar and antenna when persons are within the MPE radius of the antenna, unless such persons (such as driver or radar operator) are shielded from antenna field by a grounded metallic barrier. The MPE Radius is the minimum distance from the antenna axis that person should maintain in order to avoid RF exposure higher than the allowable MPE level set by FCC.

FAILURE TO OBSERVE THESE LIMITS MAY ALLOW THOSE WITHIN THE MPE RADIUS TO EXPERIENCE RF RADIATION ABSORPTION WHICH EXCEEDS THE FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMIT.

IT IS THE RESPONSIBILITY OF THE RADAR OPERATOR TO ENSURE THAT THE MAXIMUM PERMISSIBLE EXPOSURE LIMITS ARE OBSERVED AT ALL TIMES DURING RADAR TRANSMISSION. THE RADAR OPERATOR IS TO ENSURE THAT NO BYSTANDERS COME WITHIN THE RADIUS OF THE MAXIMUM PERMISSIBLE EXPOSURE LIMITS.

Determining MPE Radius

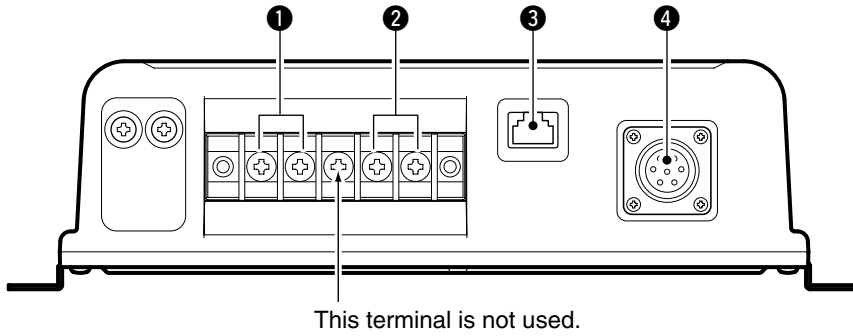
THE MAXIMUM PERMISSIBLE EXPOSURE (MPE) RADIUS HAS BEEN ESTIMATED TO BE A RADIUS OF ABOUT 3.5 M PER OET BULLETIN 65 OF THE FCC.

THIS ESTIMATE IS MADE ASSUMING THE MAXIMUM POWER OF THE RADAR AND ANTENNAS WITH A MAXIMUM GAIN OF 27 dBi ARE USED FOR A SHIP MOUNTED SYSTEM.

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■ MXR-5000 (Radar unit)



❶ DC POWER INPUT TERMINALS

Connect the 12 V/24 V DC power supply through the supplied DC power cable.

❷ GROUND TERMINALS

Connect these terminals to ground to prevent electrical shocks.

❸ MarineCommander™ CONNECTOR

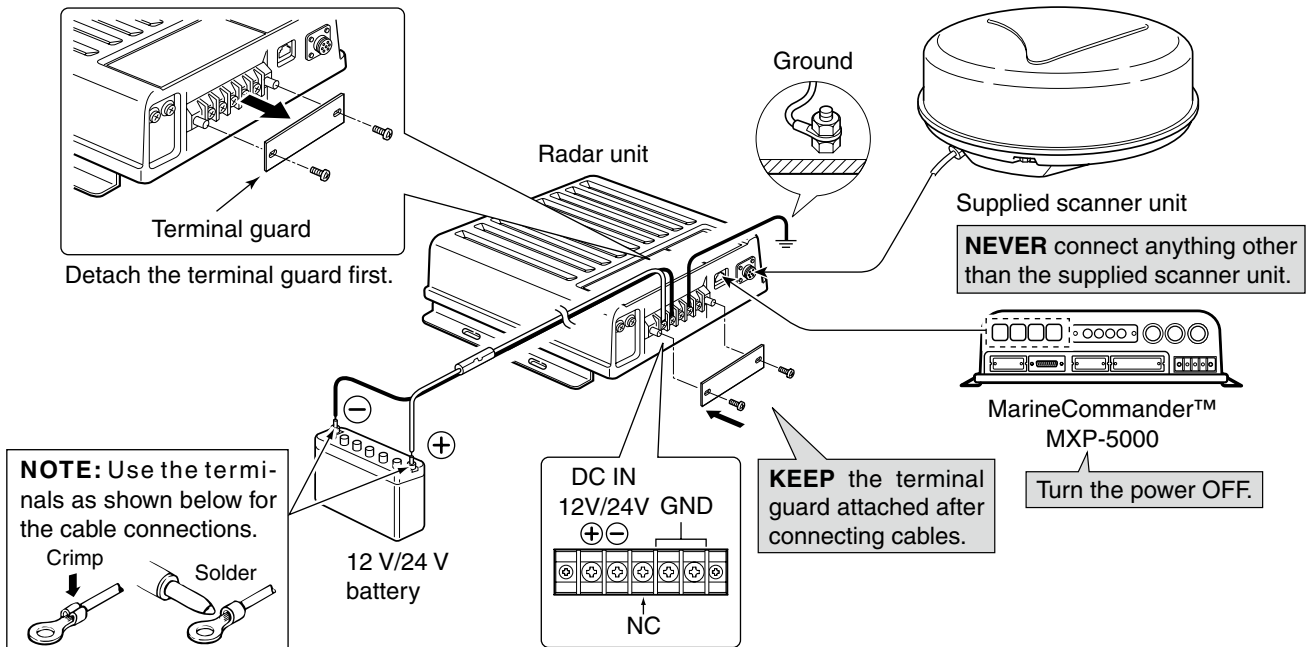
Connect this connector to the Icom MarineCommander™.

❹ SCANNER UNIT CONNECTOR

Connect this connector to the supplied scanner unit.

■ Connection

CAUTION: Before connecting, make sure disconnecting the radar unit's DC power cable from the battery.



■ Power source requirement

CAUTION: Before connecting the DC power cable, check the following important items. Make sure:

- Output voltage of the power source is 12 V/24 V DC.
- DC power cable polarity is correct.
 - Red : Positive ⊕ terminal
 - Black : Negative ⊖ terminal
- Fuse rating of the DC power cable is correct. (The 10 A fuse is pre-installed.)
 - 5 A : For 24 V power source
 - 10 A : For 12 V power source

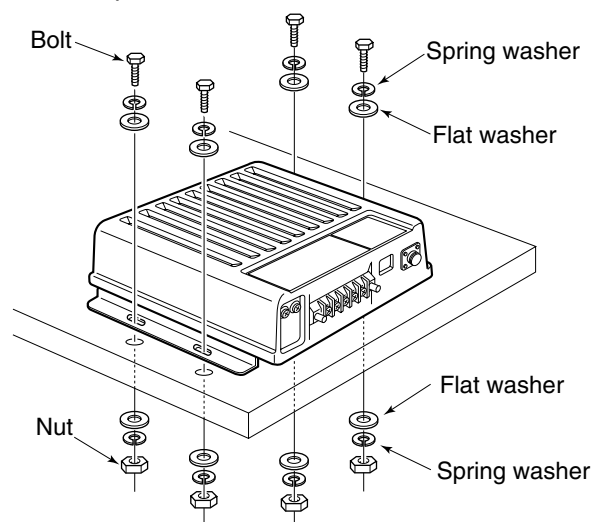
■ Ground connection

To prevent electrical shocks and other problems, ground the radar unit through the [GND] terminal. For best results, connect a heavy gauge wire or strap to the nearest grounding point on the boat. The distance between the [GND] terminal and the ground point should be as short as possible.

■ Mounting

First, drill four Ø5.5–6 mm (0.22–0.24 in) holes to mount the radar unit using the units base as a pattern. Mount the radar unit securely with the four supplied bolts (M5×30 mm) to a flat surface which supports more than approx. 5 kg (11 lb).

CAUTION: KEEP the radar unit at least 1.8 meter (5.9 ft) away from your vessel's magnetic navigation compass.



■ Mounting the EX-2714 scanner unit

◇ Location

⚠ WARNING! BE SURE the radar's power is **OFF*** whenever you are working with the scanner unit.

*The radar's power automatically turns OFF approx. 30 sec. after the display unit's power is turned OFF.

When 2 display units are connected to the MarineCommander™, all units' power must be turned OFF.

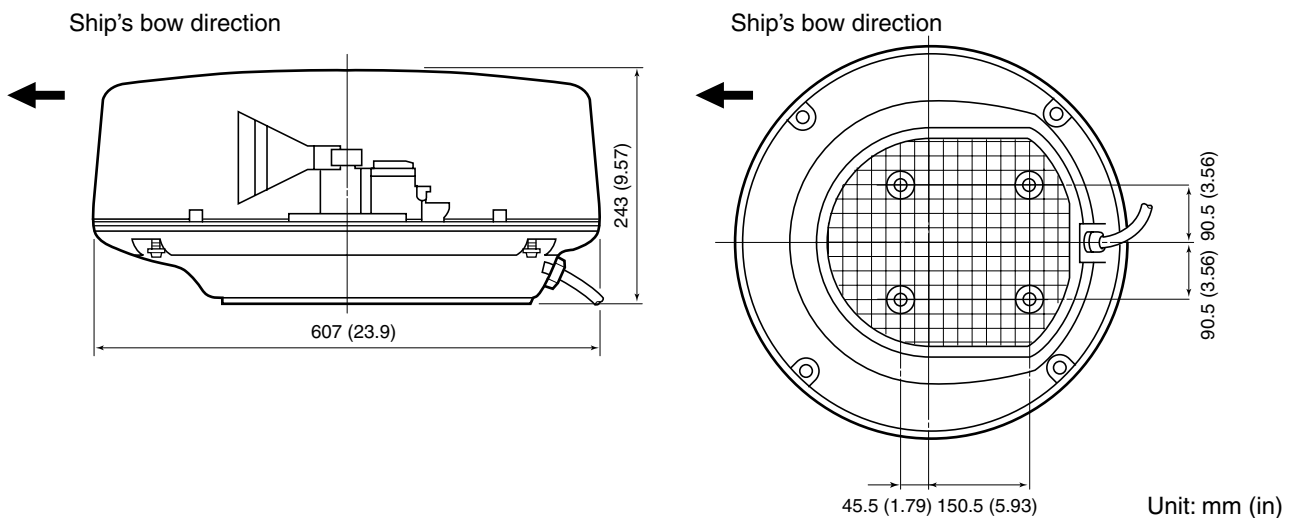
The scanner unit is designed for high-pressure water jet resistance (except for the cable connectors). Select a place for installation which meets the following important conditions.

- ① The scanner unit must be near the boat's center line and have a good view in every direction. Be sure there are no objects in the surrounding area which will intercept the scanning beam.
- ② Keep the scanner unit away from any smoke-stacks. Smoke can damage the unit.
- ③ When the boat is equipped with a Radio Directional Finder (RDF) system, keep the scanner unit at least 2 m (6.6 ft) away from any RDF antenna.
 - Radiation from the scanner unit can affect the measurement data of RDF equipment.
- ④ The unit should be placed as high as possible on the boat to obtain best performance with maximum range.
- ⑤ If you install two or more radar in one boat, install one above, and one below.
- ⑥ The mounting surface must be parallel with the boat's waterline.
- ⑦ If the height is insufficient to install the scanner unit, build a special frame for installation.

◇ Mounting

- ① Drill four holes of 12 mm (0.47 in) in diameter using the supplied template.
- ② If the mounting surface or platform is metal, apply sealing compound around the holes to prevent corrosion and to waterproof the unit.
- ③ Attach the scanner unit to the selected position with the supplied bolts (M10×50 mm or M10×25 mm; depending on your installation needs), flat and spring washers.

⚡ **CAUTION: SECURE** the four bolts firmly.

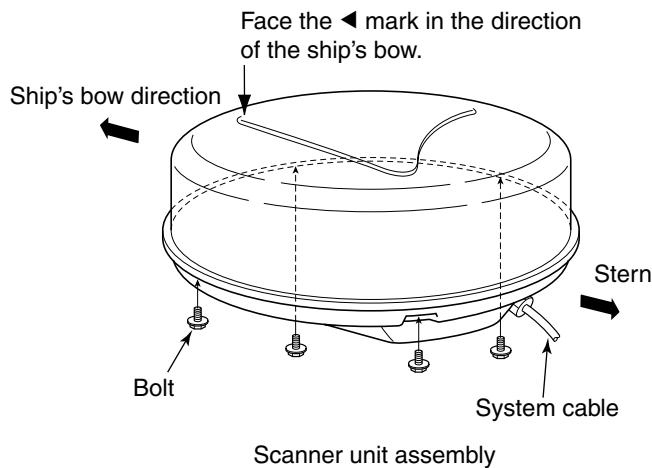


■ Wiring the EX-2714 system cable

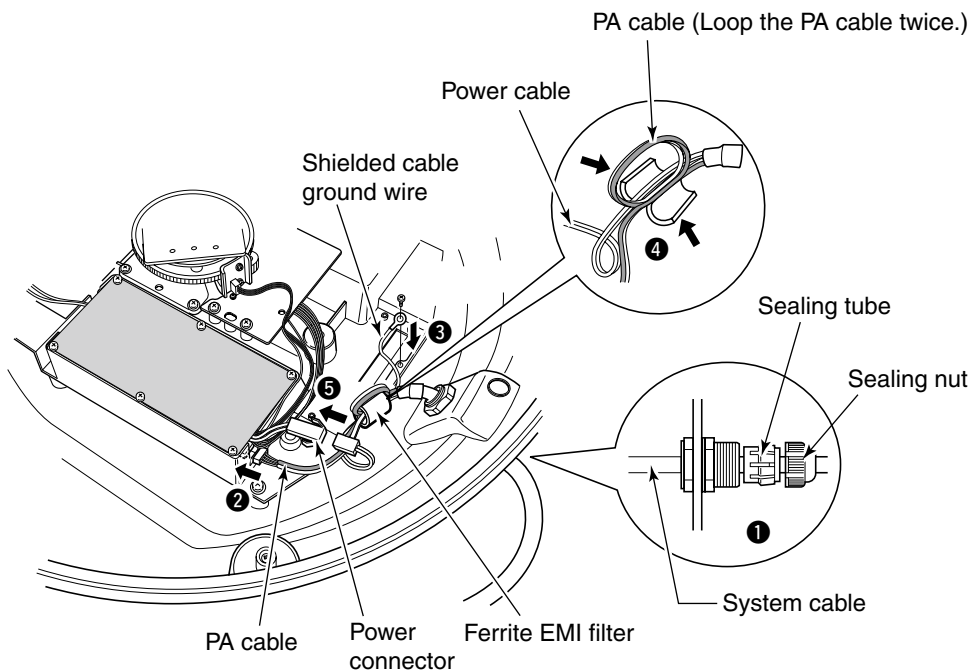
CAUTION: NEVER cut the supplied system cable.

- ① Using a hex head wrench*, loosen the four bolts on the bottom of the scanner unit, and open the unit.
* Phillips head or flathead screwdriver is also usable.
- ② Loosen the sealing nut on the scanner unit and pass the system cable through the sealing nut and tube. (①)
- ③ Insert the black and white PA cable connector into the PA unit connector J1. (②)
- ④ Connect the shielded cable ground wire to the ground plate with the screw. (③)
- ⑤ Clamp the system cable with the ferrite EMI filter attached near the sealing connector.
Be sure to clamp it tightly. (④)
- ⑥ Connect the power cable (black and red) to the power connector. (⑤)
- ⑦ Tighten the sealing nut, then replace the radome cover over the scanner unit.
DO NOT stretch the system cable too much, otherwise miss contact of the connector may occur.
- ⑧ Tighten the four bolts on the bottom of the scanner unit. (Use a torque wrench until the scale on the wrench reads torque to 5.0 N•m; 3.69 lbf•ft.)
• The four projections around the circumference of the radome cover show the positions of the bolt receptacles.

• Scanner unit assembly (cover removed)



• Connect the system cable



■ Mounting the EX-2780 scanner unit

◇ Location

⚠ WARNING! BE SURE the radar's power is **OFF*** whenever you are working with the scanner unit.

*The radar's power automatically turns OFF approx. 30 sec. after the display unit's power is turned OFF.

When 2 display units are connected to the MarineCommander™, all units' power must be turned OFF.

The scanner unit is designed for high-pressure water jet resistance (except for the cable connectors). Select a place for installation which meets the following important conditions.

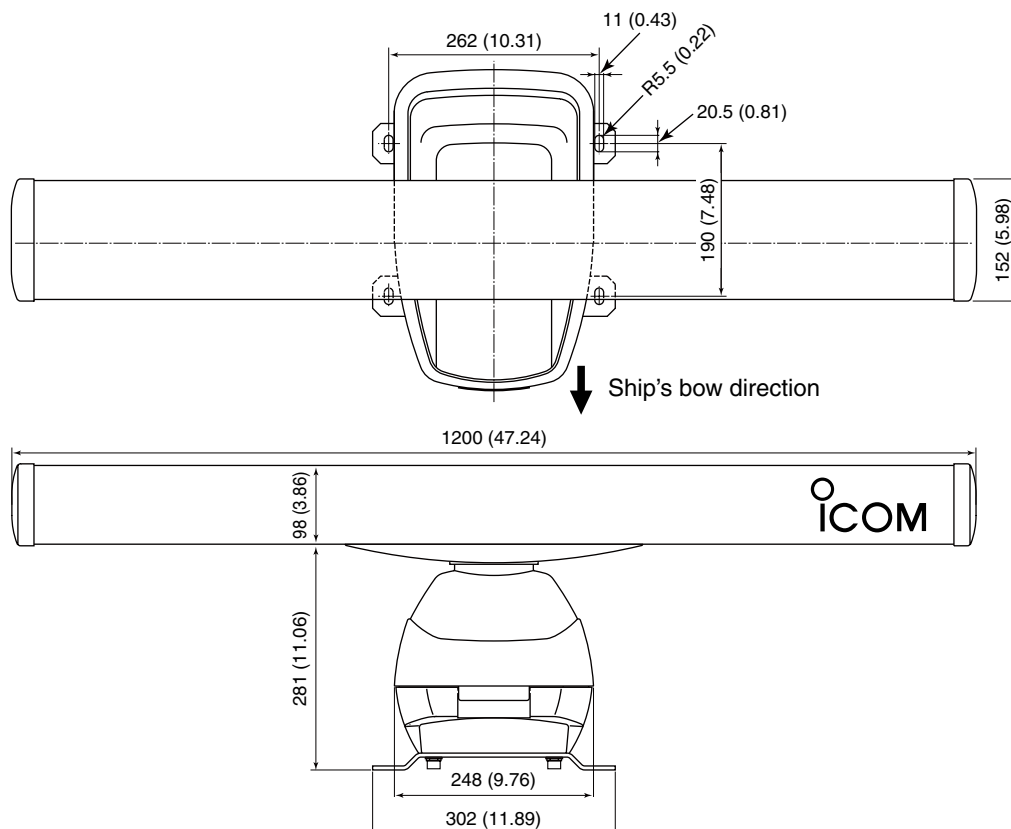
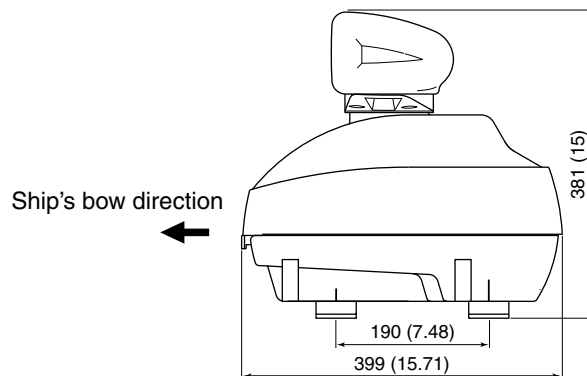
- ① The scanner unit must be near the boat's center line and have a good view in every direction. Be sure there are no objects in the surrounding area which will intercept the scanning beam.
- ② Keep the scanner unit away from any smoke-stacks. Smoke can damage the unit.
- ③ When the boat is equipped with a Radio Directional Finder (RDF) system, keep the scanner unit at least 2 m (6.6 ft) away from any RDF antenna.
 - Radiation from the scanner unit can affect the measurement data of RDF equipment.
- ④ The unit should be placed as high as possible on the boat to obtain best performance with maximum range.
- ⑤ If you install two or more radar in one boat, install one above, and one below.

- ⑥ The mounting surface must be parallel with the boat's waterline.
- ⑦ If the height is insufficient to install the scanner unit, build a special frame for installation.

◇ Mounting

- ① Drill four holes of 12 mm (0.47 in) in diameter using the supplied template.
- ② If the mounting surface or platform is metal, apply sealing compound around the holes to prevent corrosion and to waterproof the unit.
- ③ Attach the scanner unit to the selected position with the supplied bolts (M10×40 mm), flat and spring washers.

⚡ **CAUTION: SECURE** the four bolts firmly.



Unit: mm (in)

■ Wiring the EX-2780 system cable

CAUTION: NEVER cut the supplied system cable.

- ① Loosen the four bolts on the bottom of the scanner body using the supplied allen wrench (①), and open the top cover (②).
- ② Loosen the nut on the scanner unit and pass the system cable through the nut and sealing tube. (③)
- ③ Connect the power cable (black and red) connector to the power unit connector through the looped cable tie. (④)
- ④ Insert the PA cable (black and white) connector into the PA unit connector. Be sure to follow the diagram below carefully. (⑤)
 - Secure the looped PA cable with the looped cable tie (⑥).
- ⑤ Connect the shielded cable ground wire to the chassis with the screw as shown in the diagram. (⑦)
- ⑥ Clamp the system cable with the cable clamp metal fitting using a screw near the sealing connector. (⑧)
- Be sure to clamp it tightly.
- ⑦ Clamp the system cable with the ferrite EMI filter attached near the sealing connector. (⑨)
 - Be sure to clamp it tightly.
 - Secure the ferrite EMI filter with cable tie.
- ⑧ Tighten the sealing-nut, then close the top cover. **DO NOT** stretch the system cable too much, otherwise miss contact of the connector may occur.
- ⑨ Tighten the four bolts on the bottom of the scanner body. (Use a torque wrench until the scale on the wrench reads torque to 9.8 N•m; 7.23 lbf•ft.)

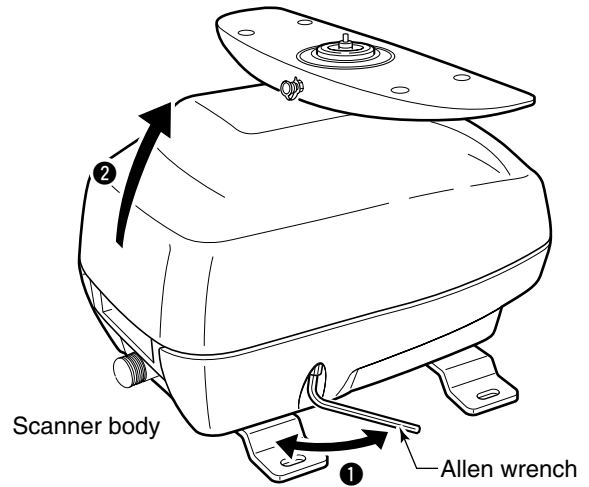


Fig.1

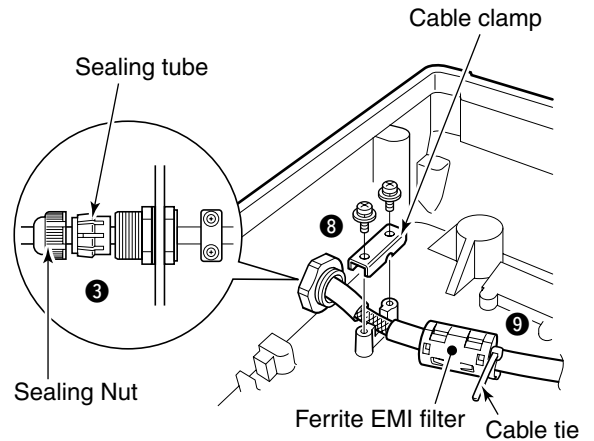


Fig.2

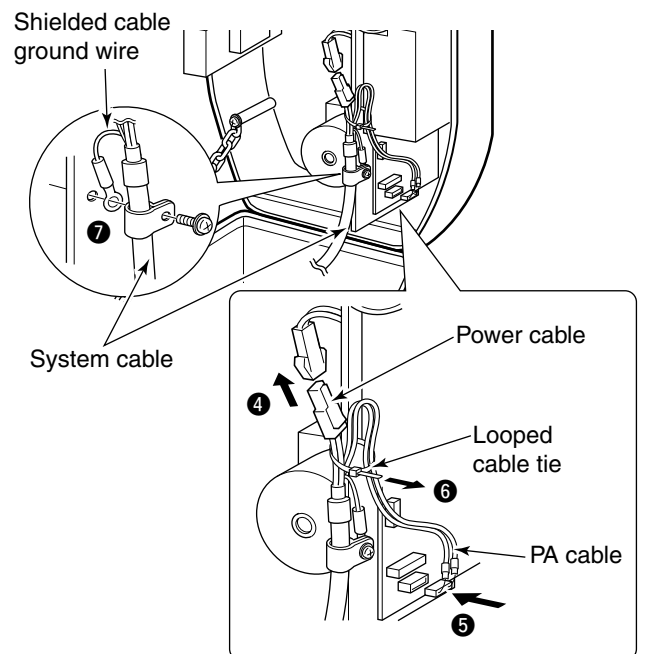


Fig.3

■ Attaching the EX-2780 scanner unit

- ① Put the scanner unit on the stay, then attach the antenna rotor with the supplied bolts (M8×18 mm), flat and belleville washers and a sealing washer. Be sure to install the belleville washer in the direction as shown below. (Fig. 1)
- ② Apply the lubricant specified below, or an equivalent one, to the motor bearing, if required.
 - Manufacture : ESSO
 - Type : BEACON 325
- ③ Connect the grounding wire (purchase locally) to the ground plate with the supplied terminal if required. (Fig. 2)

NOTE: When using the optional system cable. Peel the outer sheath of the system cable when using the optional system cable **OPC-1078**.

BE CAREFUL! DO NOT cut the inner shield wire when peeling the outer sheath.

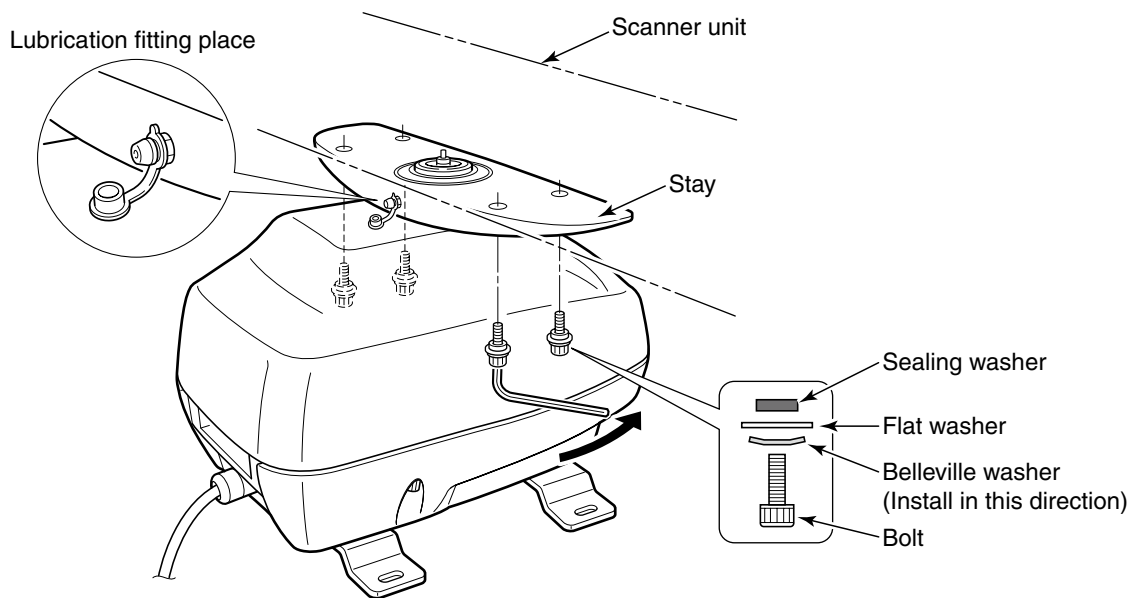
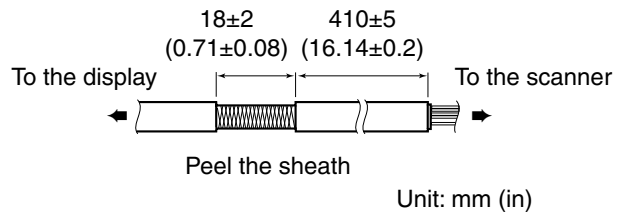


Fig.1

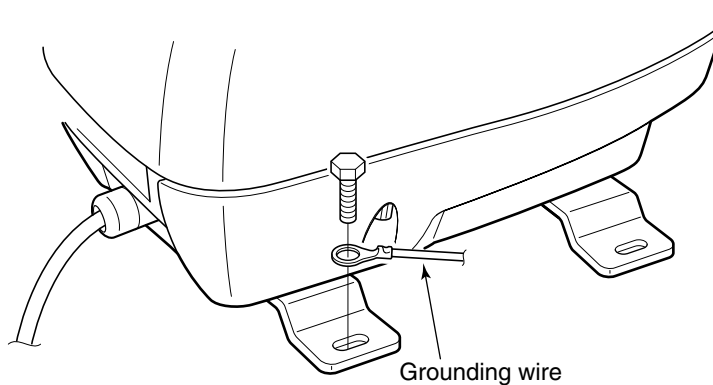


Fig.2

Continued, reliable operation of the radar depends on how you care for your equipment.

The simple maintenance tips that follow can help you save time and money, and avoid premature equipment failures.

■ Periodic maintenance

- ① Keep the equipment as clean as possible.
 - Use a soft cloth to remove dirt, dust and water.
- ② Check all hardware for loose screws, bolts, etc.
- ③ Check cables and terminal connections.

■ Scanner unit maintenance

◇ Cleaning

- ① Wipe the surface of the scanner unit with a clean soft cloth.
 - **DO NOT** use harsh solvents such as benzene or alcohol.
- ② Check that there is no dirt or caked-on salt.
 - A heavy deposit of dirt or caked-on salt on the painted surface of the upper scanner unit will cause a considerable drop in radar performance.
- ③ Check for cracks or deterioration of the rubber packing and replace it, if necessary.

◇ Painting (MXR-5000T only)

To prevent the corrosion, paint the surface of the scanner body (except the scanner unit) once or twice a year.

◇ Mounting

Check the mounting bolts of the scanner unit and tighten, if necessary.

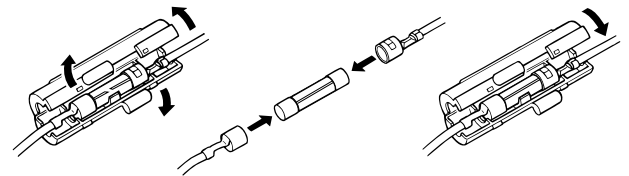
■ Fuse replacement

If the fuse blows or the radar stops functioning, find the source of the problem and have it repaired. Then, replace the blown fuse with a new, properly rated one as shown at right.

⚠ WARNING! BE SURE the radar's power is **OFF*** before performing any maintenance.

*The radar's power automatically turns OFF approx. 30 sec. after the display unit's power is turned OFF.

When 2 display units are connected to the MarineCommander™, all units' power must be turned OFF.



Fuse rating: 10 A for 12 V power source
5 A for 24 V power source

■ Options

• OPC-1895 CONNECTION CABLE

Allows you to connect the Icom MarineCommander™ system. (20 m: 65.6 ft)

• OPC-1077 SYSTEM CABLE

Allows you to install the radar unit and scanner unit up to 20 m (65.6 ft) apart. (For MXR-5000R only)

• OPC-1078 SYSTEM CABLE

Allows you to install the radar unit and scanner unit up to 30 m (98.4 ft) apart.

Approved Icom optional equipment is designed for optimal performance when used with an Icom transceiver. Icom is not responsible for the destruction or damage to an Icom transceiver in the event the Icom transceiver is used with equipment that is not manufactured or approved by Icom.

◆ Radar unit

- DC input voltage : 10.8 V to 31.2 V DC
- Power consumption : Less than 5.0 A at 12.0 V (MXR-5000R)
Less than 5.5 A at 12.0 V (MXR-5000T)
- Usable temperature range : -20°C to +60°C; -4°F to 140°F
- Dimensions (projections not included) : 250(W)×67(H)×200(D) mm; 9.84(W)×2.64(H)×7.87 (D) in
- Weight (approx.) : 2.1 kg; 4.62 lb

◆ Scanner unit

◆ EX-2714 (Radome)

- Type : 60 cm (2 ft.) Slotted Waveguide Array, enclosed in a radome.
- Rotation speed (typical) : 24 rpm, 36 rpm, 48 rpm
- Beam width (typical) : Horizontal beam 4°
Vertical beam 22°
- Side lobe (typical) : -18 dB
- Polarization : Horizontal
- Transmission frequency : 9410 MHz ±30 MHz P0N
- Peak output power : 4 kW
- Pulse width : 80 ns/2880 Hz, 80 ns/2160 Hz, 250 ns/2160 Hz,
350 ns/2160 Hz, 900 ns/720 Hz.
- Mixer and Local Oscillator : Microwave Integrated Circuit
- Transmitting Tube : Magnetron MAF1421B
- Modulator : FET switching
- Duplexer : Circulator
- Tuning system : Automatic/manual selectable
- Intermediate frequency : 60 MHz
- IF Band width : 10 MHz, 3 MHz
- Dimensions : 607 (∅)*×243 (H) mm; 23.9 (∅)*×9.57 (H) in
**"∅" means diameter.
- Usable temperature range : -25°C to +70°C; -13°F to 158°F
- Relative Humidity : Less than 95% at 35°C (+95°F)
- Weight (approx.) : 8 kg; 17.5 lb (without cable)

◆ EX-2780 (Open array)

- Type : 120 cm (4 ft.) Slotted Waveguide Array
- Rotation speed (typical) : 24 rpm, 36 rpm, 48 rpm
- Beam width (typical) : Horizontal beam 2°
Vertical beam 25°
- Side lobe (typical) : -24 dB
- Polarization : Horizontal
- Transmission frequency : 9410 MHz ±30 MHz P0N
- Peak output power : 4 kW
- Pulse width : 80 ns/2880Hz, 80 ns/2160 Hz, 250 ns/2160 Hz,
350 ns/2160 Hz, 900 ns/720 Hz
- Mixer and Local Oscillator : Microwave Integrated Circuit
- Transmitting Tube : Magnetron MAF1421B
- Modulator : FET switching
- Duplexer : Circulator
- Tuning system : Automatic/manual selectable
- Intermediate frequency : 60 MHz
- IF Band width : 10 MHz, 3 MHz
- Diameter of rotation/height : 1205/381 mm; 47.4/15 in
- Usable temperature range : -25°C to +70°C; -13°F to 158°F
- Relative Humidity : Less than 95% at 35°C (+95°F)
- Weight (approx.) : 17 kg; 37.4 lb (without cable)

All stated specifications are subject to change without notice or obligation.

Count on us!

