ICOM

INSTRUCTION MANUAL

MarineCommander

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.

Icom Inc.

FOREWORD

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

The radar is designed for use with the Icom MarineCommander™ system through the supplied connection cable.
It has powerful transmission power, and many other advanced features can be used with the Icom MarineCommander™ 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.

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 bead 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˚C (+140˚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˚C (+158˚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 waveguide 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.

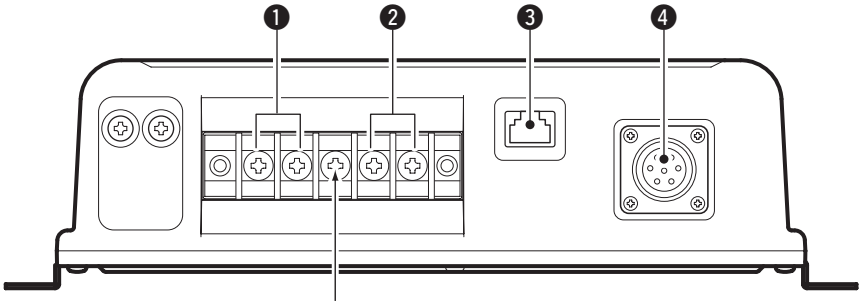
Do not transmit with radar and antenna when persons are within the MPE radius of the antenna, unless such persons (such as driver or radar operator) are shielded from antenna field by a grounded metallic barrier. The MPE Radius is the minimum distance from the antenna axis that person should maintain 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.

TABLE OF CONTENTS

■ 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.

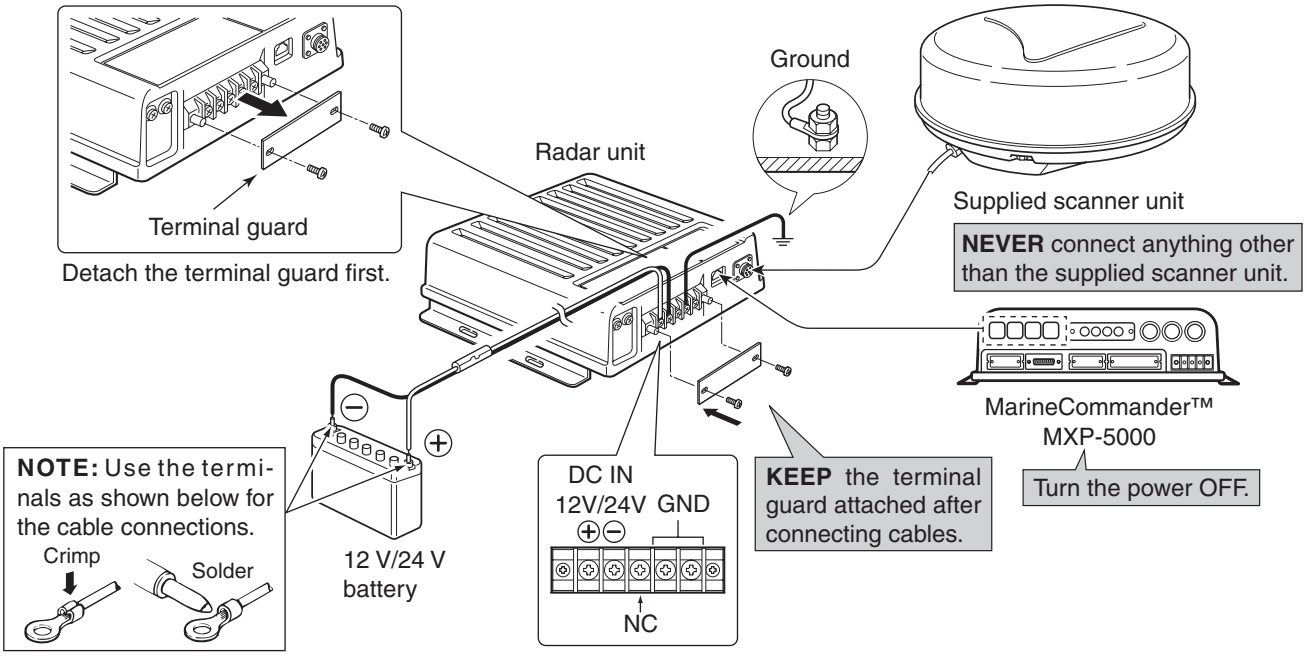
❸ MarineCommander™ CONNECTOR
Connect this connector to the Icom MarineCommander™.

❹ SCANNER UNIT CONNECTOR
Connect this connector to the supplied scanner unit.

2 INSTALLATION AND CONNECTIONS

■ 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

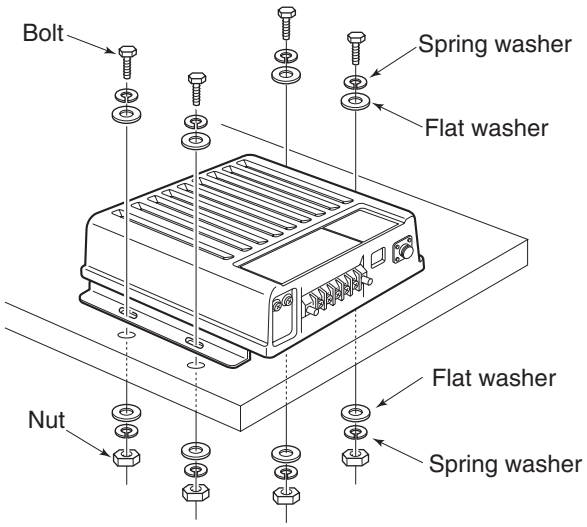
■ Ground connection

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 (7/32–1/4") 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.

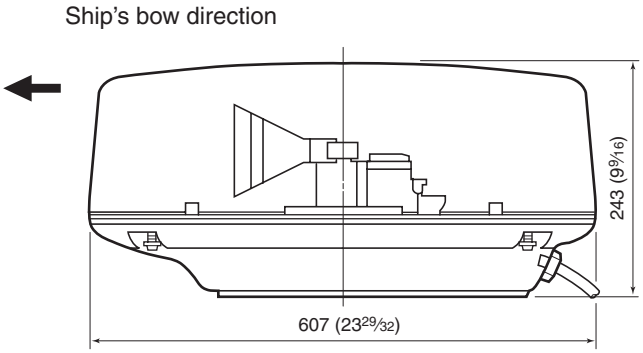
The scanner unit is designed for high-pressure water jet resistance (except for the cable connectors). Select a place for installation which meets the following important conditions.

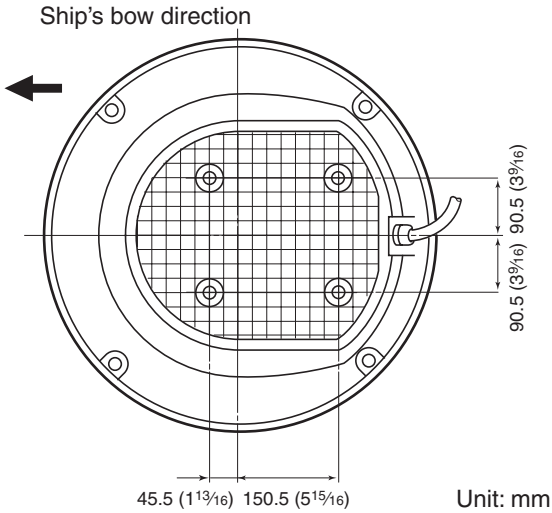
① The scanner unit must be near the boat's center line and have a good view in every direction. Be sure there are no objects in the surrounding area which will intercept the scanning beam.
② Keep the scanner unit away from any smoke-stacks. Smoke can damage the unit.
③ When the boat is equipped with 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 (½ 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.





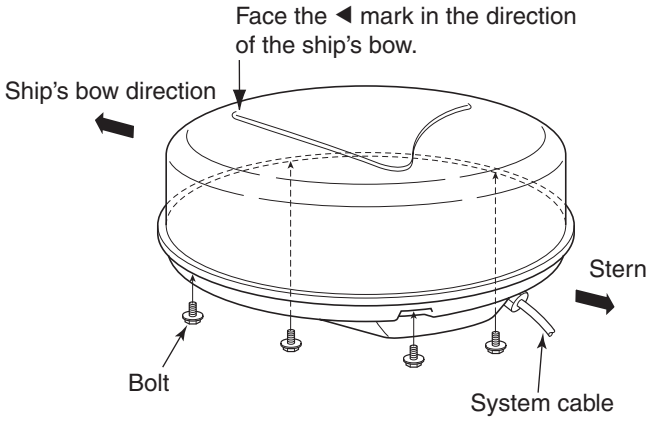
Unit: mm (in)

■ Wiring the EX-2714 system cable

CAUTION: NEVER cut the supplied system cable.

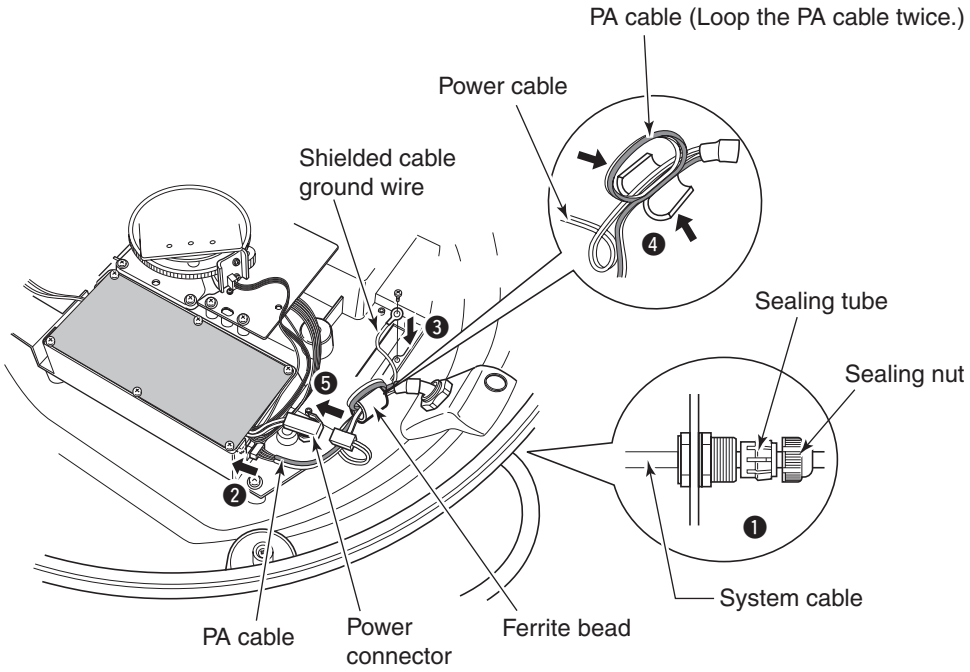
① Using a hex head wrench*, loosen the four bolts on the bottom of the scanner unit, and open the unit.
* Phillips head or flathead screwdriver is also usable.
② Loosen the sealing nut on the scanner unit and pass the system cable through the sealing nut and tube. (❶)
③ Insert the black and white PA cable connector into the PA unit connector J1. (❷)
④ Connect the shielded cable ground wire to the ground plate with the screw. (❸)
⑤ Clamp the system cable with the ferrite bead attached near the sealing connector.
Be sure to clamp it tightly. (❹)
⑥ Connect the power cable (black and red) to the power connector. (❺)
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)



Scanner unit assembly

• 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.

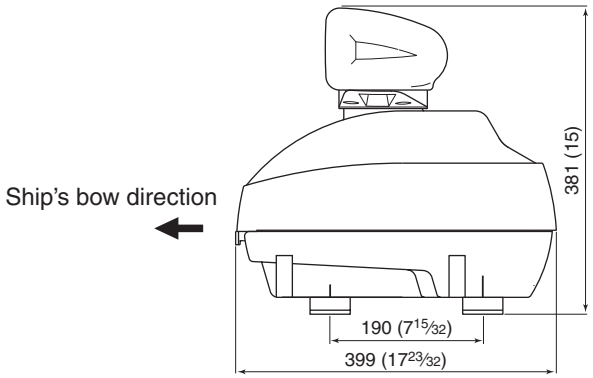
The scanner unit is designed for high-pressure water jet resistance (except for the cable connectors). Select a place for installation which meets the following important conditions.

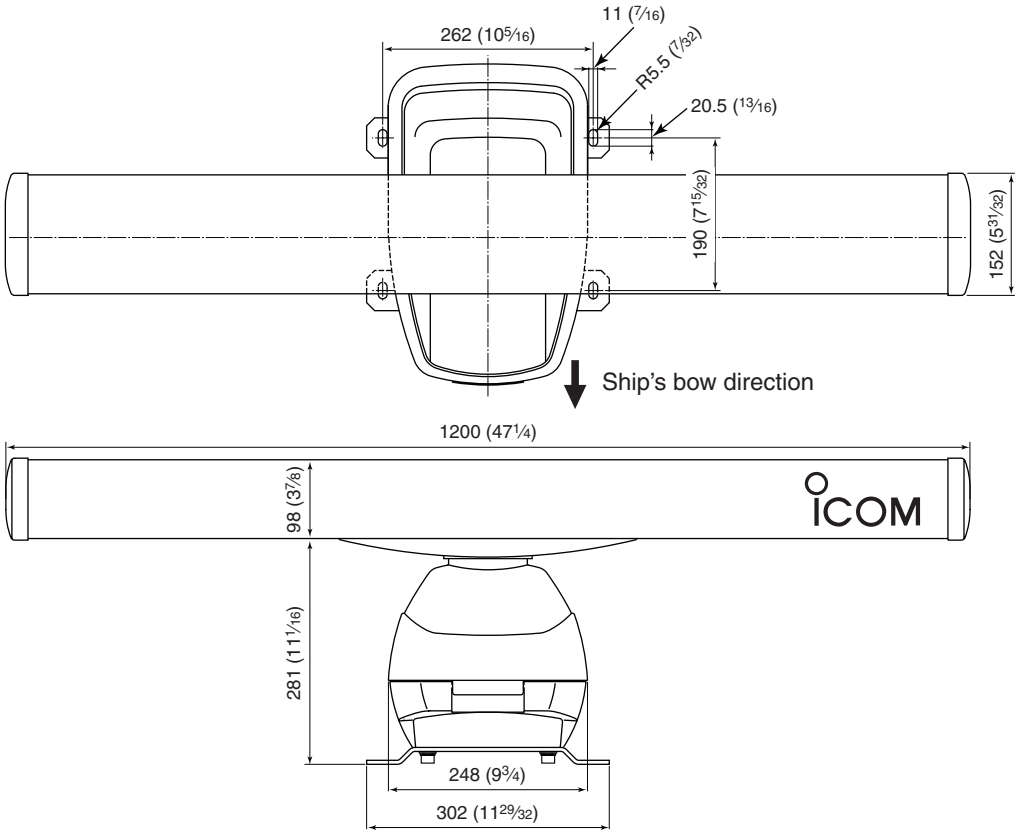
① The scanner unit must be near the boat's center line and have a good view in every direction. Be sure there are no objects in the surrounding area which will intercept the scanning beam.
② Keep the scanner unit away from any smoke-stacks. Smoke can damage the unit.
③ When the boat is equipped with 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

①Drill four holes of 12 mm (½ in) in diameter using the supplied template.
②If the mounting surface or platform is metal, apply sealing compound around the holes to prevent corrosion and to waterproof the unit.
③Attach the scanner unit to the selected position with the supplied bolts (M10×40 mm), flat and spring washers.

CAUTION: SECURE the four bolts firmly.





■ Wiring the EX-2780 system cable

CAUTION: NEVER cut the supplied system cable.

①Loosen the four bolts on the bottom of the scanner body using the supplied allen wrench (❶), and open the top cover (❷).
②Loosen the nut on the scanner unit and pass the system cable through the nut and sealing tube. (❸)
③Connect the power cable (black and red) connector to the power unit connector through the looped cable tie. (❹)
④Insert the PA cable (black and white) connector into the PA unit connector. Be sure to follow the diagram below carefully. (❺)
• Secure the looped PA cable with the looped cable tie (❻).
⑤Connect the shielded cable ground wire to the chassis with the screw as shown in the diagram. (❼)
⑥Clamp the system cable with the cable clamp metal fitting using a screw near the sealing connector. (❽)
Be sure to clamp it tightly.
⑦Clamp the system cable with the ferrite bead attached near the sealing connector. (❾)
Be sure to clamp it tightly.
Secure the ferrite bead with cable tie.
⑧Tighten the sealing-nut, then close the top cover.
DO NOT stretch the system cable too much, otherwise miss contact of the connector may occur.
⑨Tighten 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.)

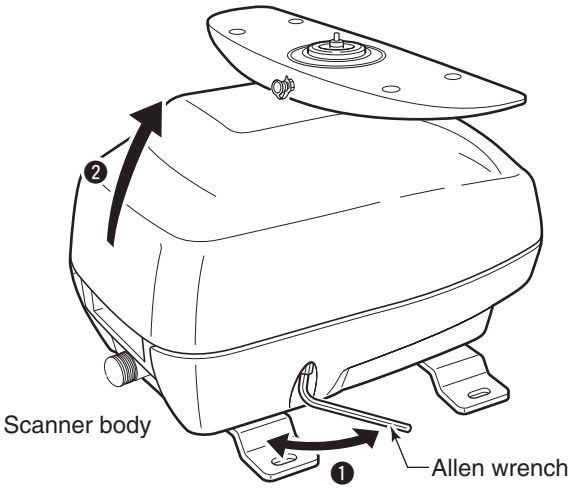


Fig.1

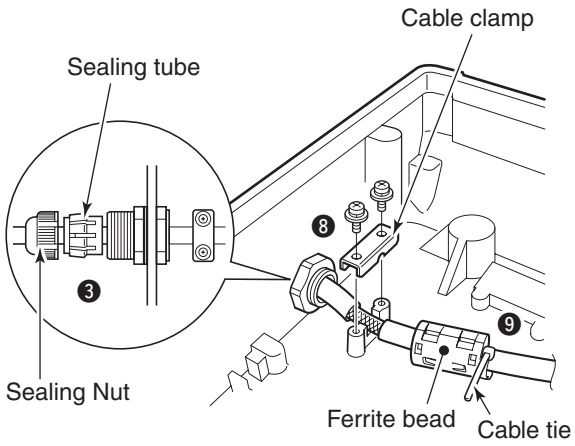


Fig.2

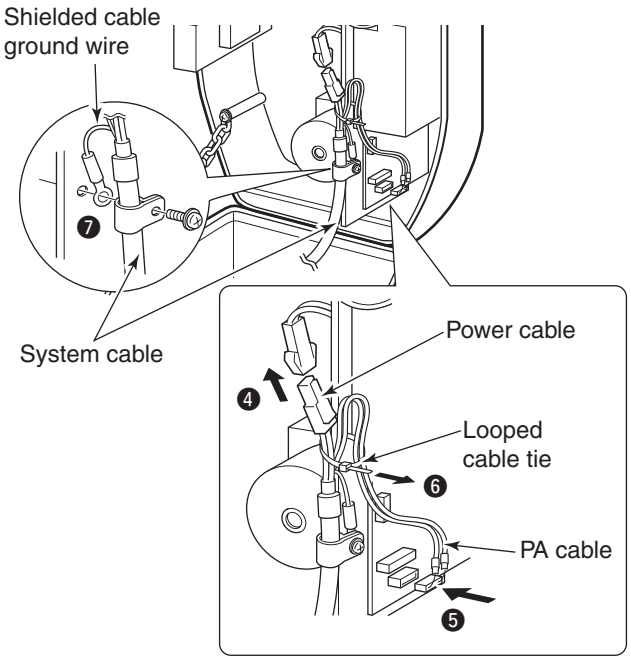


Fig.3

■ Attaching the EX-2780 scanner unit

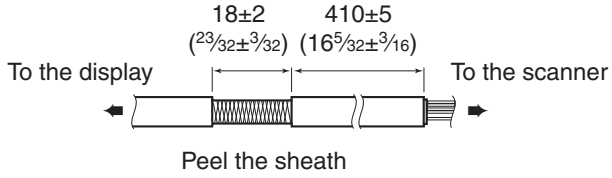
① Put the scanner unit on the stay, then attach the antenna rotor with the supplied bolts (M8×18 mm), flat and belleville washers and a sealing washer.
Be sure to install the belleville washer in the direction as shown below. (Fig. 1)

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.



Unit: mm (inch)

2

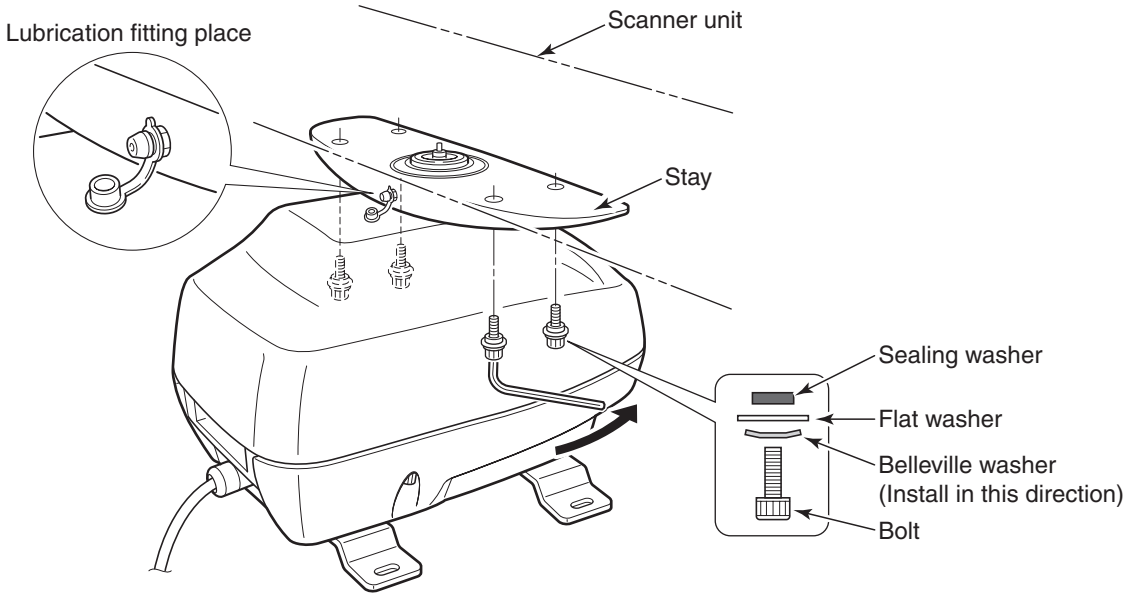


Fig.1

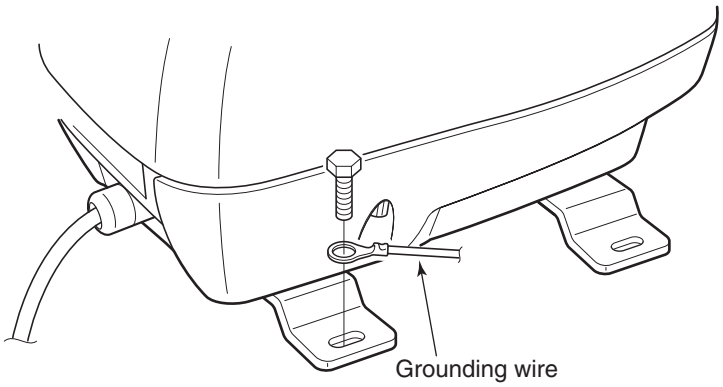


Fig.2

3 MAINTENANCE AND OPTIONS

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.

⚠ **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.

■ 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

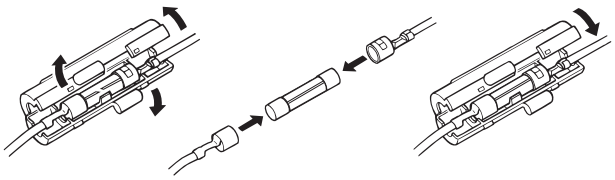
◇ **Cleaning**
① Wipe the surface of the scanner unit with a clean soft cloth.
  • **DO NOT** use harsh solvents such as benzene or alcohol.
② Check that there is no dirt or caked-on salt.
  • A heavy deposit of dirt or caked-on salt on the painted surface of the upper scanner unit will cause a considerable 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.



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; $9\frac{27}{32}$(W)×$2\frac{5}{8}$(H)×$7\frac{7}{8}$(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 (Ø)*×243 (H) mm; $23\frac{29}{32}$ (Ø)*×$9\frac{9}{16}$ (H) in *"Ø" 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.

MEMO

MEMO

Count on us!

A-6752H-1EX-②
Printed in Japan

Icom Inc.
1-1-32 Kamiminami, Hirano-ku, Osaka 547-0003, Japan

ICOM

INSTRUCTION MANUAL

MarineCommander

MARINE PLOTTER

MXP-5000

DISPLAY UNIT

MXD-5000

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Icom Inc.

PRECAUTIONS

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

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

⚠ **WARNING! NEVER** apply more than 32 V DC to the DC input terminals of the Main unit or use reverse polarity. This may pose a fire hazard or damage the Main unit.

⚠ **WARNING! NEVER** cut the DC power cable between the DC plug and fuse holder. If an incorrect connection is made after cutting, the Main unit may be damaged.

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

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

DO NOT place the Main unit in excessively dusty environments.

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

DO NOT use or place the Main unit in areas with temperature below –20˚C (–4˚F) or above +60˚C (+140˚F).

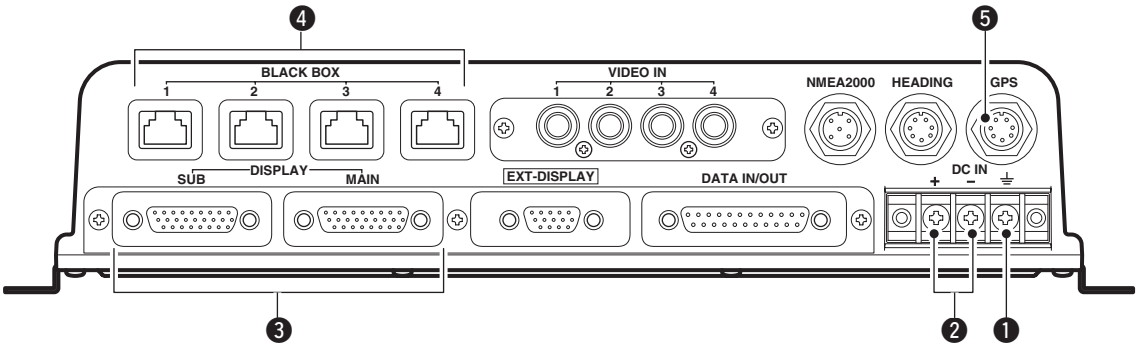
DO NOT place the Main unit in areas that will block air passage or put anything around the Main unit. This will obstruct heat dissipation.

DO NOT use harsh solvent such as benzine or alcohol to clean the Main unit, as they will damage the Main unit's surfaces.

KEEP the Main unit out of the reach of children.

KEEP the Main unit away from heavy rain, and never immerse it in the water.
The Main unit meets IPX4 requirements for splash resistance when the supplied connection cables are connected, and the connector cap is installed on the other connector.
However, if it is dropped, splash resistance cannot be guaranteed because of possible damage to the case or the waterproof seals.

■ MXP-5000 (Main unit)



❶ GROUND TERMINAL
Connect this terminal to ground to prevent electrical shocks.

❷ DC POWER INPUT TERMINALS
Connect the 12 V/24 V DC power supply through the supplied DC power cable.

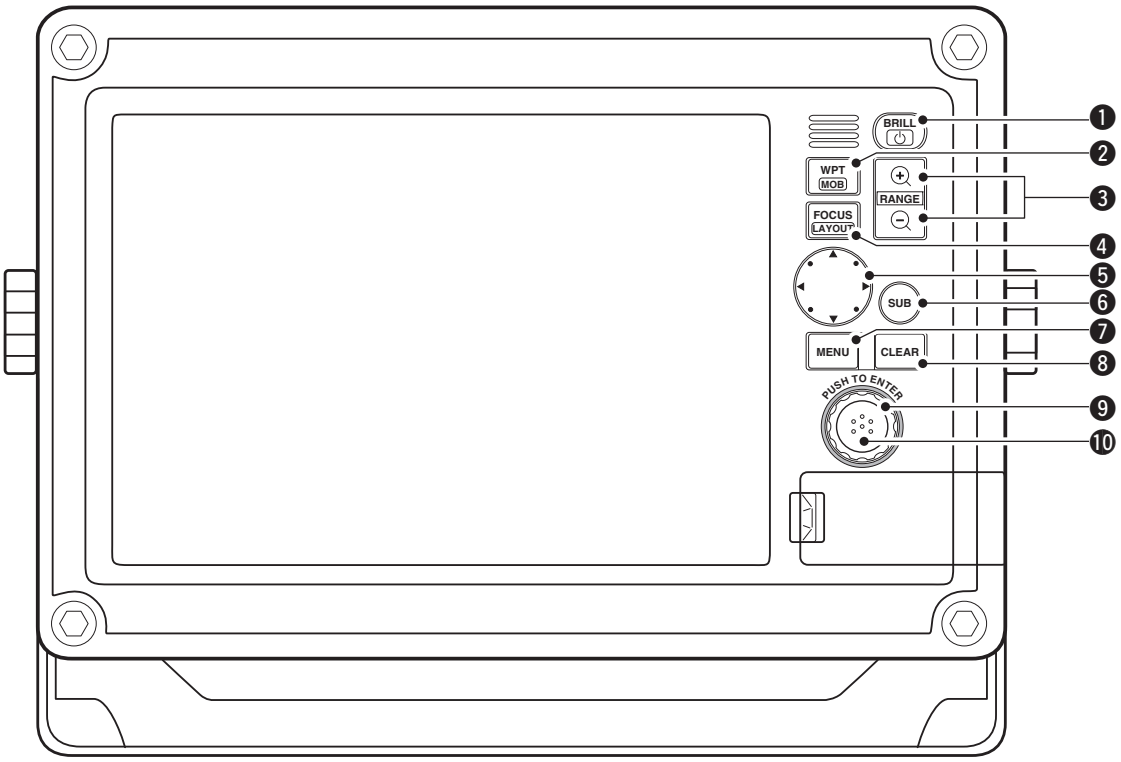
❸ DISPLAY UNIT CONNECTOR
Connect this connector to the Display unit (MXD-5000). Two Display units can be connected.

❹ BLACK BOX CONNECTOR
- **1 to 3 connectors**
  Connect this connector to a black box unit such as Radar unit (MXR-5000), Fish finder unit (MXF-5000).
- **4 connector**
  Connect an other Main unit (MXP-5000).

❺ GPS UNIT CONNECTOR
Connect this connector to the GPS unit (MXG-5000).

1 PANEL DESCRIPTION

■ MXD-5000 (Display unit)



❶ POWER/DISPLAY BLLIANCE SWITCH [⏻/BRILL]

- ***While the MarineCommander's power is OFF***

  Push to turn ON the MarineCommander's power.

- ***While the MarineCommander's power is ON***

  ➥ Push to turn the Radar second menu.
  - Display Brilliance, Radar TX setting, Panel Brilliant and Color Palette are available.
  - Push two or more times to increase or decrease the display brilliance.

  ➥ Hold down for 3 seconds to turn OFF the MarineCommander's power.

❷ WAYPOINT/MAN OVERBOARD SWITCH [WPT/MOB]

➥ Push to enter the Waypoint screen.
- Waypoint window appears.

➥ Hold down for 3 seconds to mark the man overboard point on the screen. When a crew member falls overboard.
- MOB readout shows the bearing and distance to the MOB point.
- Push [MOB] for 3 seconds to cancel the function.
- Position and bearing data are necessary.

❸ RANGE UP/ DOWN SWITCHES [+]/[–]

Push [+] or [–] to set a suitable screen range.

❹ FOCUS/DISPLAY LAYOUT SWITCH [FOCUS/LAYOUT]

➥ Push to change the selected screen.
- Orange box indicates the selected screen.

➥ Hold down for 3 seconds to enter the display selection screen.

❺ UP, DOWN, LEFT, RIGHT KEYS [▲ ▼ ◀ ▶]

Set the alarm area, ATA target, etc. according to the menu act.

Use the [▲] [▼] to select menu item.

Pushing center of the [▲ ◀]/[▲ ▶] or [▼ ◀]/[▼ ▶] allows you to move the cross line cursor to the upper (or lower) left or right.

❻ SUB MENU SWITCH [SUB]

While entering the Menu screen, push to enter the Sub menu.

❼ MENU SWITCH [MENU]

Push to enter the Menu screen.

❽ CLEAR SWITCH [CLEAR]

Push to clear the current function.

While entering the Menu screen, push to clear and return to the upper menu or clear the Menu screen.

❾ SELECTION DIAL [DIAL]

➥ While entering Menu screen, rotate to select the Menu groups, items or options.

➥ Rotate to set the function level, such as Gain, SEA or Rain level.

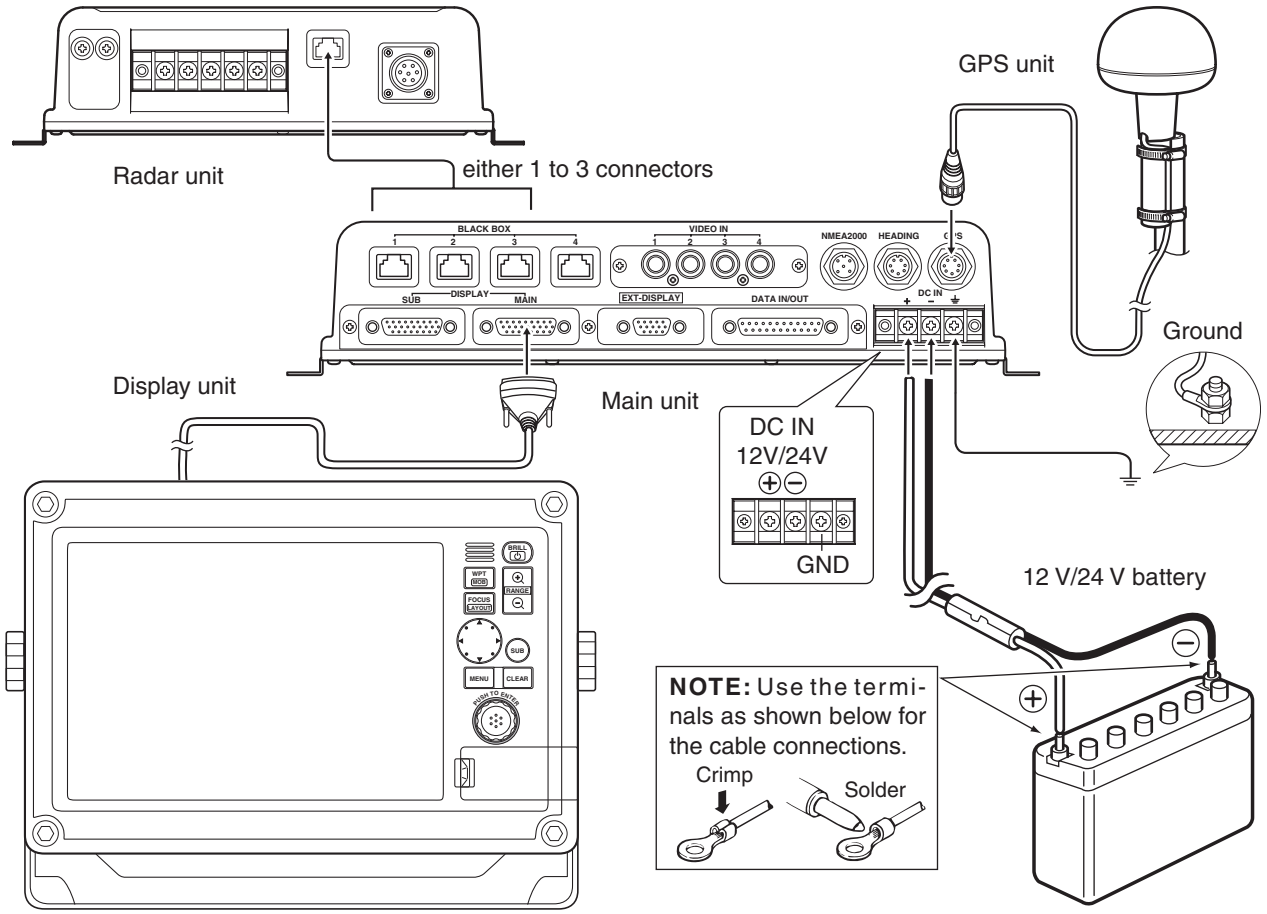
❿ ENTER SWITCH

➥ Push enter the Radar 1st menu.
- Radar 1st menu includes the Gain control, Sea, Rain, Radar TX menu and Heading line OFF function.

➥ While entering Menu screen, push enter the selected menu or function.

■ Connection

CAUTION: Before connecting, make sure disconnecting the DC power cable from the battery.



3 BASIC OPERATION

■ Turning power ON/OFF

① Push [⏻] to turn the power ON.
- The initial screen and WARNING screens appear.

② Push [ENTER] to start operation.
- The warming up screen appears.
- The magnetron inside the scanner unit warms up for 90 seconds.

③ When the warming up is complete, the operating screen appears to start operation.

> ❶ If any other than Radar screen appears, hold down [LAYOUT](FOCUS) for 2 seconds to enter the screen selection mode.
> ❷ Rotate [DIAL] to select Radar, then push [ENTER].

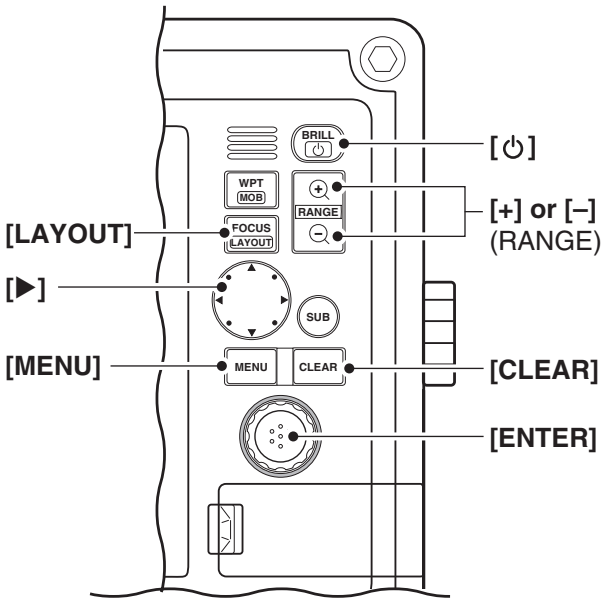
④ Push [BRILL], and then [▶], to select the Radar TX menu.

⑤ Rotate [DIAL] to select “TX,” then push [ENTER] to start scanning.
- Targets and heading marker appear.
- The screen appears approximately 2 seconds after pushing [ENTER], when “Auto” is selected in the “TUNE” of the “Gain” menu.

Repeat step ④ and ⑤, and select “STBY,” then push [ENTER] to return to the stand-by mode of the Scanner transmission.

⑥ Hold down [⏻] for 3 seconds to turn the power OFF.

■ Basic operation



① Turn the power ON.
② Turn the Radar TX ON.
• See "Turning power ON/OFF" on page at left.
③ Push [+] or [–] one or more times to select the display range.
• The screen range readout shows the maximum range of the screen.
④ Push [ENTER] to enter the Radar setting menu, then rotate [DIAL] to set the gain level on the Gain menu.
• Clockwise rotation increases the gain.
• Increased gain may increase screen noise.

◇ Heading marker

The heading marker is a line that shows your ship's bow direction. (This marker will appear in the center of the screen when the Head-up screen H UP is selected.) The heading marker can be hidden when the desired target is located under the heading marker.

• Push [ENTER] to enter the Radar menu, then push [▶] four times to select the Heading marker menu. Hold down [ENTER] to hide the heading marker. Release [ENTER] to return.

◇ Fixed range rings

The fixed range rings can be used for rough distance measurement.

➥ Push [MENU], then rotate [DIAL] until the "Presentation" menu becomes highlighted.
➥ Push [ENTER], then rotate [DIAL] until the "Ring" menu becomes highlighted.
➥ Push [ENTER], then rotate [DIAL] to select one of Ring-OFF; OFF or any other three Ring levels; Low, Mid, High.
➥ Push [ENTER], and then [CLEAR] twice, to exit the menu screen.

⑤ Push [ENTER], and then [▶] once to select the Sea menu, to set the sensitivity time control, rotate [DIAL] counterclockwise to set the SEA to minimum.

CAUTION: When setting of the SEA to a fully clockwise position, close targets are blanked.

You can automatically set SEA control.
➥ Push [MENU], then rotate [DIAL] until the "Gain" menu becomes highlighted.
➥ Push [MENU], then rotate [DIAL] until the "Auto Sea" menu becomes highlighted.
➥ Push [ENTER], then rotate [DIAL] to select "ON."
➥ Push [ENTER], and then [CLEAR] twice, to exit the menu screen.

⑥ Push [ENTER], and then [▶] twice to select the Rain menu, to set the rain clutter control, then rotate [DIAL] counterclockwise to set RAIN to minimum.
⑦ Select Radar Display mode.
➥ Push [MENU], then rotate [DIAL] until the "Radar Display Mode" menu becomes highlighted.
➥ Push [ENTER], then rotate [DIAL] to select one of Head-up; H-UP, North-up; N-UP, Course-up; C-UP or True Motion; TM screens.
➥ Push [ENTER], and then [CLEAR] twice, to exit the menu screen.

NOTE: Manual adjustment can be used. (See below.)

◇ Manual tuning

The receiver tuning can be manually adjusted.

➥ Push [MENU], and then [ENTER], to enter the Gain menu. Then rotate [DIAL] until the "Tune" menu becomes highlighted.
➥ Push [ENTER], then rotate [DIAL] to select the "Manual..." menu and push [ENTER] to turn the manual tuning level indicator, then rotate [DIAL] to set the "Tune Level" meter to the maximum level.
➥ Push [ENTER] to exit the manual tuning screen.

◇ Brilliance adjustment

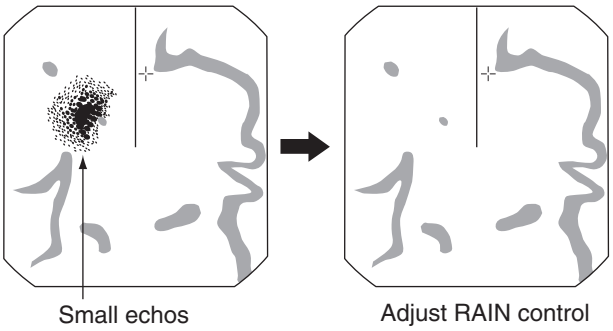
The intensity of the screen can be adjusted. When you require continuous operation, but not constant viewing, a lower setting can increase the life of the LCD display.

• Key illumination

The backlighting of the keys can be adjusted for convenient operation.
Push [BRILL], and then [▶] three times, to call up the "Panel Brill" menu. Then rotate [DIAL] to select the illumination level.

The following are typical basic operation examples, which may hinder radar reception (sea clutter, precipitation interference and echoes from other radar).

■ RAIN function (MENU ▷ Gain ▶ Rain...)

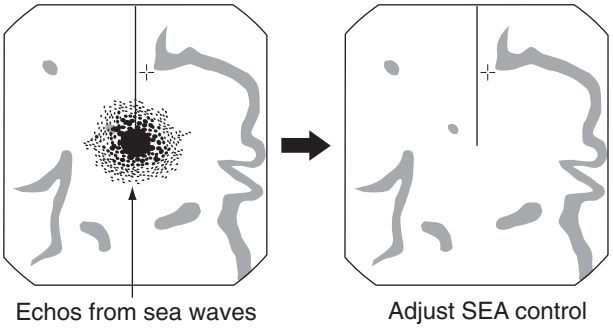


This function eliminates reflection echoes from rain, snow, fog etc.

① Push [MENU], and then [ENTER], to enter the Gain menu.
② Rotate [DIAL] until the “Rain...” menu becomes highlighted.
③ Push [ENTER] to turn the Rain level indicator.
④ Rotate [DIAL] to adjust the Rain level.
- **NOTE: DO NOT** reduce the reflection echoes too much, otherwise you may miss weaker targets.

⑤ Push [ENTER] to exit the Rain adjustment screen.

■ SEA function (MENU ▷ Gain ▶ Sea...)

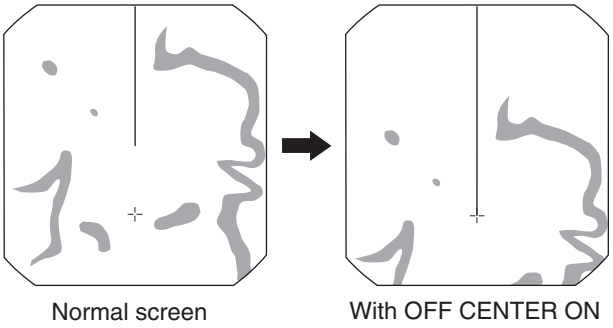


This function serves to eliminate echoes from waves at close range. Reduce the receiver gain for close objects within a radius of 8 miles to eliminate sea clutter.

① Push [MENU], and then [ENTER], to enter the Gain menu.
② Rotate [DIAL] until the “Sea...” menu becomes highlighted.
③ Push [ENTER] to turn the SEA level indicator.
④ Rotate [DIAL] to adjust SEA level.
⑤ Push [ENTER] to exit the SEA adjustment screen.

WARNING: The SEA function reduces the receiver sensitivity of objects within 8 miles. Therefore, caution and careful adjustment are necessary when using the SEA function.
Small objects may not be displayed on the screen when strong echoes from the rain or the island within 1 NM while automatic SEA function is activating.

■ CENTER SHIFT function MENU ▷ CenterShift



The scanning area can be shifted in a desired direction and can be enlarged partially. This is useful when the Head-up* is selected and you want to enlarge the bow direction display, or, the center of the screen shifts in the direction of the intersection.

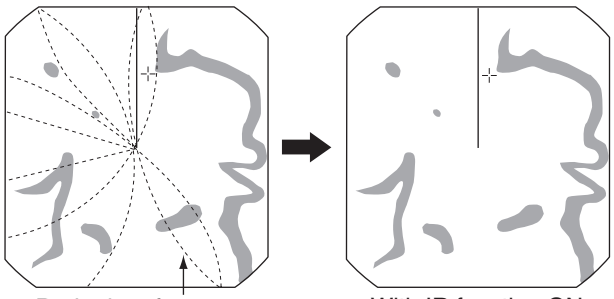
① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the “Center Shift” menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] to select the “ON...” option.
④ Push [ENTER] to activate the Center Shift function.
- The Cursor window appears in the upper right of the screen.
- This function is available for 24NM or shorter range selection.

*This function is not available in the TM screen.

⑤ Push [▲ ▼ ◀ ▶] to move the cursor where you want to shift the center of the screen.
- Max. offsetting is up to 75% of the screen.

⑥ Push [ENTER] to shift the screen.

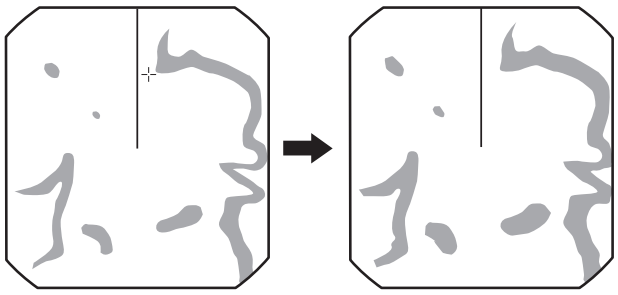
■ IR function (MENU ▷ Radar Setup ▶ Signal Process ▶ IR)



Radar interference may appear when another ship's radar is operating on the same frequency band in close proximity. The IR function can eliminate this type of interference.

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the "Radar Setup" menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the "Signal Process" menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] until the "IR" menu becomes highlighted.
⑤ Push [ENTER] then rotate [DIAL] to select the IR function, 1, 2 or OFF. Push [ENTER].
• "IR1" or "IR2" appears in the upper left of the screen, when the function is activated.

■ STRETCH function (MENU ▷ Radar Setup ▶ Signal Process ▶ Stretch)



The blips can be magnified electronically for easier viewing of small targets.

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the "Radar Setup" menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the "Signal Process" menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] until the "Stretch" menu becomes highlighted.
⑤ Push [ENTER] then rotate [DIAL] to turn the function ON. Push [ENTER].
• "ES" appears in the upper left of the screen, when the function is activated.

NOTE: Turn OFF this function during normal operation.

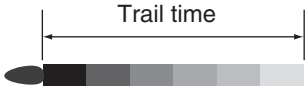
■ ZOOM function (MENU ▷ Zoom)

The ZOOM function expands the target to two times normal size.

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the "Zoom" menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] to select the "ON..." option.
④ Push [ENTER] to activate the Zoom function.
• The Zoom window appears in the lower left of the screen.
⑤ Push [▲ ▼ ◀ ▶] to move the dotted box to the desired target.
⑥ Push [ENTER] to set the zoom position.

■ TRAILS function (MENU ▷ Trail)

The trails function memorizes echoes continuously or at constant intervals. This is useful for watching other ships' tracks, approx. relative speed, etc.



• Setting the trail interval time
(MENU ▷ Trail ▶ Trail Setup ▶ Trail Time)

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the "Trail" menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the "Trail Setup" menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] until the "Trail Time" menu becomes highlighted.
⑤ Push [ENTER] then rotate [DIAL] to select a desired trail interval time. Push [ENTER].
  • 6 seconds, 15 seconds, 30 seconds, 1 minute, 3 minutes, 6 minutes, 15 minutes, 30 minutes and ∞ (continuous) are selectable.
⑥ Push [CLEAR] three times to exit the menu screen.

• Setting the trail color
(MENU ▷ Trail ▶ Trail Setup ▶ Trail Color)

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the "Trail" menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the "Trail Setup" menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] until the "Trail Color" menu becomes highlighted.
⑤ Push [ENTER] then rotate [DIAL] to select a desired trail color. Push [ENTER].
  • Blue, Yellow, Green, Red, Orange, White and Multi (mixed color) are selectable.
⑥ Push [CLEAR] three times to exit the menu screen.

• Using the TRAILS function (MENU ▷ Trail ▶ Trail)

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the "Trail" menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the "Trail" menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] to select the trail function ON. Push [ENTER].
  • "TRAILS" and trail interval time appears in the upper left of the screen.
  • Trail interval counter starts to count up to the trail time.
⑤ All displayed echoes at the plotted time are memorized and displayed with a graduated intensity together with the current echoes.
  • Echoes are displayed with minimum intensity when "∞" is selected.
⑥ To cancel the trail function, repeat steps ① to ④ and select OFF.
  • "TRAILS" and trail interval time disappears.

■ Long pulse function (MENU ▷ Radar Setup ▶ Signal Process ▶ Pulse)

To magnify the blips for easier viewing of small targets, the long pulse and echo stretch functions are available. When the long pulse is used in the ¾ to 2 NM range, this function magnifies target echoes to the backward direction of the target.

• Pulse selection

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the “Radar Setup” menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the “Signal Process” menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] until the “Pulse” menu becomes highlighted.
⑤ Push [ENTER] then rotate [DIAL] to select a desired pulse type, “Short” or “Long.” Push [ENTER].
⑥ Push [CLEAR] three times to exit the menu screen.
• “SP” or “LP” appears in the upper left of the screen.

NOTE: Select “Short” this function during normal operation. This function reduces the target distance resolution.

■ PPI area selection

(MENU ▷ Presentation ▶ PPI Area)

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the “Presentation” menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the “PPI Area” menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] to select a desired area size, “Nar” or “Wide.” Push [ENTER].
⑤ Push [CLEAR] twice to exit the menu screen.

■ Echo Color selection

(MENU ▷ Presentation ▶ Echo Color)

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the “Presentation” menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the “Echo Color” menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] to select a desired echo color, “Yellow-Black,” “Green-Black,” “Red-Black,” “Multi-Black,” “Yellow-Dark Blue,” “Green-Dark Blue,” “Multi-Dark Blue,” “Green-White” or “Multi-White.” Push [ENTER].
⑤ Push [CLEAR] twice times to exit the menu screen.

4 DISTANCE AND DIRECTION MEASUREMENTS

■ Distance measurement

TYPE	DESCRIPTION
RING	Displays fixed rings. Suitable for rough estimations from your own ship to any target.
VRM1	Displays a variable range marker and activated by the [DIAL] for the range marker selector. Suitable for accurate measurements from your own ship to a target.
VRM2	Normally functions the same as VRM1. When the VRM1 and EBL1 selects a target, the center of VRM2 appears at the intersection point. Suitable for accurate measurements from target to target.

Two measurement procedures are available with this radar. Operating them separately or jointly is possible.

The Distance unit, nautical mile (nm), seemeile (sm) or kilometer (km) is selected in the “Initial Setting...” in the “General” menu of the “System setup” menu.

◇ Using the fixed rings

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the “Presentation” menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the “Ring” menu becomes highlighted.
④ Push [ENTER] then rotate [DIAL] to select the RING function ON, either “Low,” “Mid” or “High.” Push [ENTER] to display the fixed ring.
• The ring range is fixed depending on the screen range. (See below.)
⑤ Push [CLEAR] twice exit the menu screen.
⑥ To clear the fixed rings, select “OFF” in step ④ above.

Range (nm)	1/8	1/4	1/2	3/4	1	1.5	2	3	4	6	8	12	16	24	32	36	48*
Ring (nm)	1/16	1/8	1/8	1/4	1/4	1/2	1/2	1	1	2	2	3	4	6	8	12	12
	2	2	4	3	4	3	4	3	4	3	4	4	4	4	4	3	4

NOTE: When the screen is shifted, the number of rings may differ.
*Available for the MXR-5000T only.

◇ Using the variable range marker

① Push [MENU] to enter the Menu screen.
② Rotate [DIAL] until the “EBL/VRM” menu becomes highlighted.
③ Push [ENTER] then rotate [DIAL] until the “VRM1...” menu (or “EBL1...” menu) becomes highlighted.
④ Push [ENTER] then rotate [DIAL] to set the marker.
- The yellow dotted circle appears. (Or yellow dotted line appears.)
- The range between the ship and the target is displayed in the VRM1 readout. (Or the degree between the ship and target is displayed in the EBL1 readout.)

⑤ Push [ENTER].
- The yellow dotted circle becomes red dotted circle. (Or yellow dotted line becomes red dotted line.)

⑥ Rotate [DIAL] until the “VRM2...” menu (or “EBL2...” menu) becomes highlighted.
⑦ Push [ENTER] then rotate [DIAL] to set the marker.
- The yellow dotted circle appears. (Or yellow dotted line appears.)
- The range between the ship and the target is displayed in the VRM2 readout. (Or the degree between the ship and target is displayed in the EBL2 readout.)

⑧ Push [ENTER].
- The yellow dotted circle becomes red dotted circle.

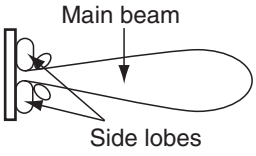
⑨ Push [CLEAR] twice exit the menu screen.

5 BASIC RADAR THEORY

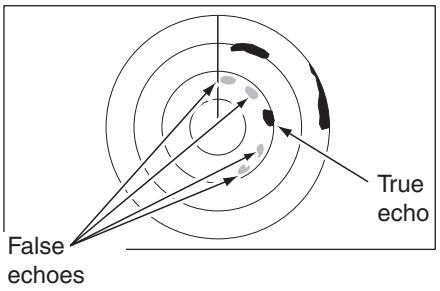
Radar uses a form of electromagnetic radiation, which like light, can be reflected. Because of this property, some objects may cause false echoes on the screen where in fact no targets actually exist.
These echoes may appear if a large vessel, bridge, or tank is in proximity. Operators should be familiar with the effects of these phenomena. In some cases, echoes can be reduced.

■ Side-lobe echoes

Radiation can escape on each side of the beam inside the lobes. If a target reflects this radiation, it will be displayed on the screen as an echo.

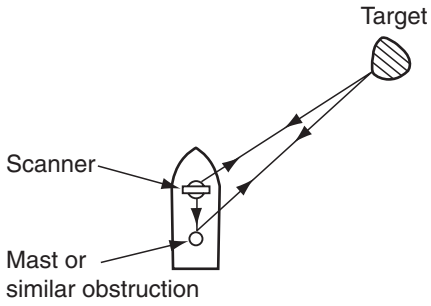


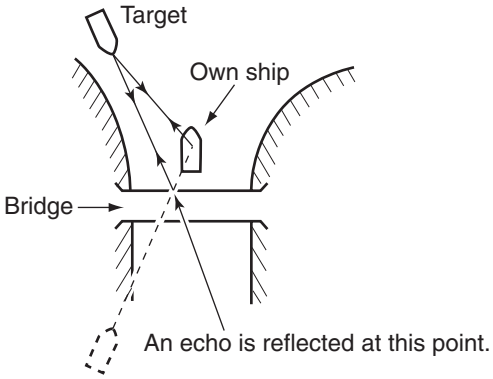
Side-lobe echoes usually occur at short ranges and as a result of large (strongly reflective) targets. They can be reduced with proper adjustment of the [SEA] control.



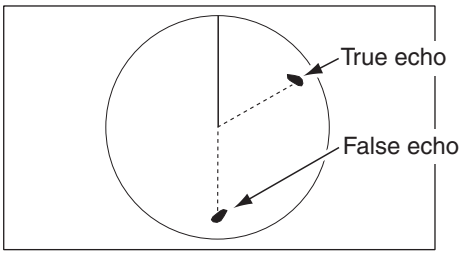
■ Indirect echoes

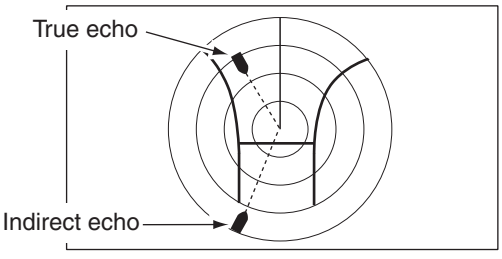
Indirect echoes may be returned from either a passing ship, or returned from a reflecting surface, such as a mast on your own ship.





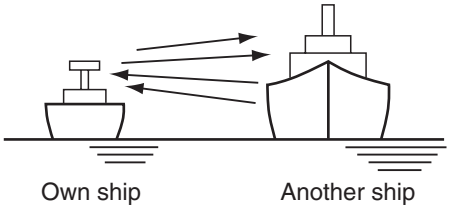
An indirect echo from a reflecting surface will appear on a different bearing from the direct (true) echo, but the distance will be approximately the same for both.



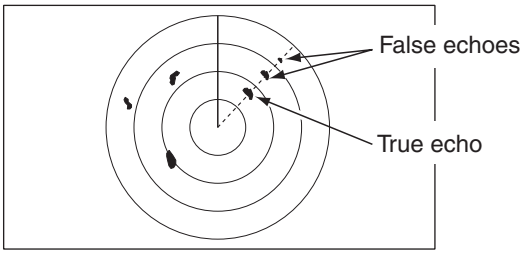


■ Multiple echoes

Multiple echoes may appear when a short-range and strong echo is received from a ship, bridge, or breakwater.



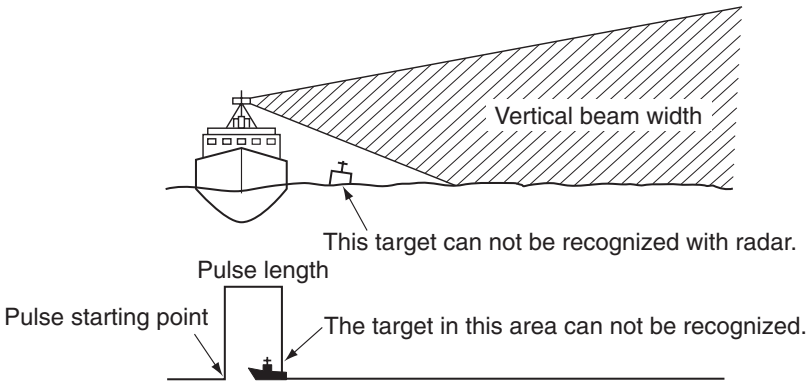
Multiple echoes will appear beyond the target's true echo point on the same bearing of a large target. They can be reduced with proper adjustment of the [SEA] control.



■ Minimum range

Detection at short range is very important. Minimum range is determined primarily by transmitter pulse length, vertical beam width and height of the scanner unit. The shorter the transmission time, the quicker the return echoes can be received and their distance measured.

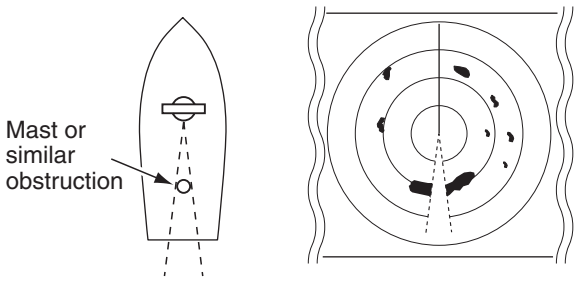
The ability to see targets very close to the ship is decreased if the scanner is mounted too high off the water, because the bottom of the vertical beam of the scanner cuts off nearby targets.



■ Blind and Shadow sectors

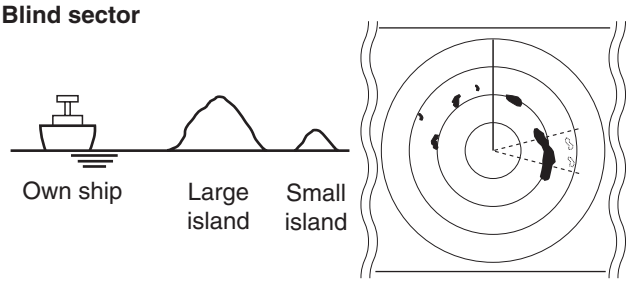
Blind or Shadow sectors may exist because of obstructions such as masts, derricks or stacks. An obstruction may throw either a complete or partial shadow as shown in the diagram below. If a target is in a shadow sector, target echoes may not appear on the screen.

Shadow sector



When tall and massive targets such as a large island are located at close range also shadowed without producing any echoes. This phenomenon is called blind sector. It is very important to know the bearings and widths of all shadow sectors caused by your own ship's obstructions.

Blind sector



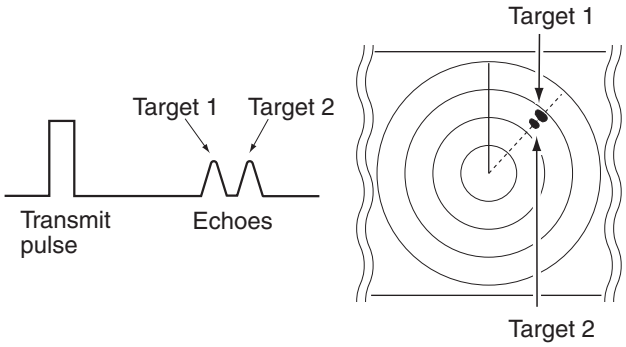
■ Target resolution

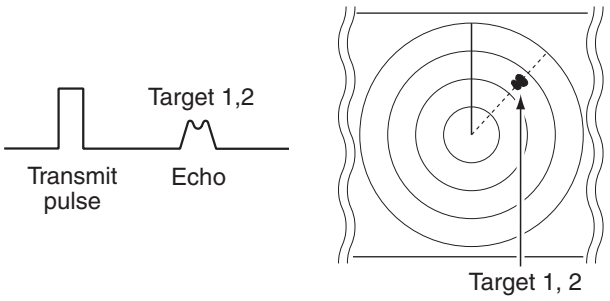
Target resolution is determined by the horizontal beam width and transmit pulse width. Sometimes it is difficult to detect two targets which are separated by short distances or which are in the same direction.

◇ Distance resolution

When two targets are separated by more than the pulse width, they appear as two echoes.

When two targets are not separated by more than the pulse width, they appear as 1 echo.

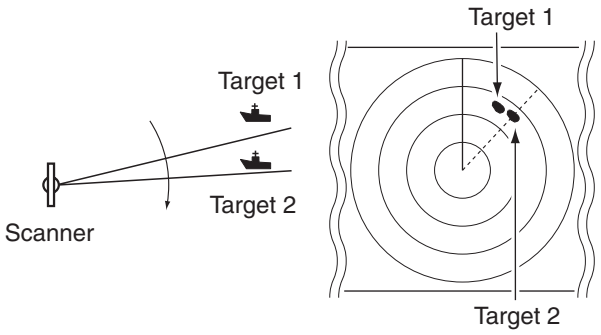


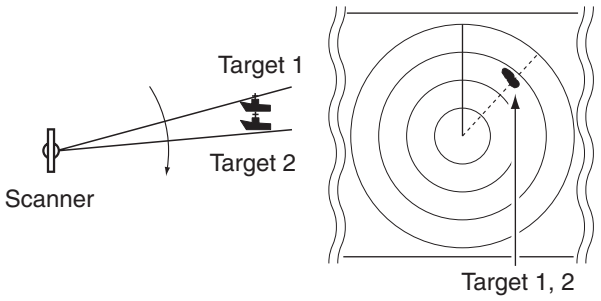


◇ Direction resolution

When two targets are separated by more than the horizontal beam width, they appear as two echoes.

When two targets are not separated by more than the horizontal beam width, they appear as one echo.





MEMO

Count on us!

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