SAFETY INSTRUCTIONS

WARNING

Radio Frequency Radiation Hazard

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

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

**Note:** If the scanner 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 scanner revolution. This is possible Ask your FURUNO representative or dealer to provide this feature.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Radiator type</th>
<th>Distance to 100 W/m² point</th>
<th>Distance to 10 W/m² point</th>
</tr>
</thead>
<tbody>
<tr>
<td>1932 MK-2</td>
<td>XN10A</td>
<td>Worst case 0.2 m</td>
<td>Worst case 3.0 m</td>
</tr>
<tr>
<td>1942 MK-2</td>
<td>XN12A</td>
<td>Nil</td>
<td>Worst case 2.5 m</td>
</tr>
</tbody>
</table>
WARNING

Do not open the equipment unless totally familiar with electrical circuits and service manual.

Only qualified personnel should work inside the equipment.

ELECTRICAL SHOCK HAZARD

Wear a safety belt and hard hat when working on the scanner unit.

Serious injury or death can result if someone falls from the radar scanner mast.

Construct a suitable service platform from which to install the scanner unit.

Serious injury or death can result if someone falls from the radar scanner 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.

Do not install the display unit where it may get wet from rain or water splash.

Water in the display unit can result in fire, electrical shock or equipment damage.

WARNING

Be sure that the power supply is compatible with the voltage rating of the equipment.

Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

Use only the specified power cable.

Fire or equipment damage can result if a different cable is used.

CAUTION

Ground the equipment to prevent electrical shock and mutual interference.

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

<table>
<thead>
<tr>
<th></th>
<th>Standard compass</th>
<th>Steering compass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display unit</td>
<td>0.75 m</td>
<td>0.60 m</td>
</tr>
<tr>
<td>Scanner unit</td>
<td>1.00 m</td>
<td>0.80 m</td>
</tr>
</tbody>
</table>

HIGH TENSION WARNING

DANGER

Electrical shock hazard. Do not touch parts inside this cover.

危険

感電の恐れあり。カバーの内部には絶対に触れないで下さい。

Name: Danger Label
Type: 14-055-4202-0
Code No.: 100-245-220
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**SYSTEM CONFIGURATION**

**Scanner Unit**

**Display Unit**

**Auto Plotter**

**ARP-10** (24 rpm only)

**RDP-118**

**Navigation device**

IEC 61162* (In/Out)

**Video Sounder**

IEC 61162* (In/Out)

**Gyro-compass**

Gyro Converter

AD-100

Integrated Heading Sensor PG-1000

**Rectifier**

RU-3423

115/230 VAC

**External Alarm Buzzer**

OP03-21

**Remote Display**

FMD-811/1800

**Radar Plotter**

RP-110

**External Alarm**

Buzzer OP03-21

**Note:** Even though the display unit meets waterproof standard IPX-5, the connection of external buzzer, radar plotter and/or remote display can affect waterproofness. Watertight integrity cannot be guaranteed. When these modification has been done, the display unit should not be mounted where exposed.

**Input data**

Own ship’s position: GGA>RMC>RMA>GLL (GLL is available Ver.1.5 only)

Speed: RMC>RMA>VTG>VHW

Heading (True): HDT>HDG *1>HDM *1>VHW>VHW *1

Heading (Magnetic): HDM>HDG *1>HDT *1>VHW>VHW *1

Course (True): RMC>RMA>VTG

Course (Magnetic): VTG>RMC>RMA

Waypoint (Range, Bearing): RMB>BWC>BWR

Loran time difference: RMA>GLC>GTD

Water depth: DPT>DBT>DBK>DBS

Water temperature: MTW>MDA

Time: ZDA

XTE: RMB>XTE>APB

*1: calculate by magnetic drift.

**Output data**

NMEA0183 (Ver.1.5/2.0), RS-422

TLL(target data) and RSD
### Standard Supply

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code No.</th>
<th>Qty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scanner Unit</td>
<td>XN10A-RSB-0070-064</td>
<td>—</td>
<td>Select one</td>
<td>For 1932M2, 24 rpm</td>
</tr>
<tr>
<td></td>
<td>XN10A-RSB-0073-064</td>
<td>—</td>
<td>Select one</td>
<td>For 1932M2, 48 rpm</td>
</tr>
<tr>
<td></td>
<td>XN12A-RSB-0070-059</td>
<td>—</td>
<td>Select one</td>
<td>For 1942M2, 24 rpm</td>
</tr>
<tr>
<td></td>
<td>XN12A-RSB-0073-059</td>
<td>—</td>
<td>Select one</td>
<td>For 1942M2, 48 rpm</td>
</tr>
<tr>
<td>Display Unit</td>
<td>RDP-118</td>
<td>—</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Installation Materials</td>
<td>CP03-19300</td>
<td>000-086-914</td>
<td>Select one</td>
<td>CP03-18401, power cable, 10 m signal cable</td>
</tr>
<tr>
<td></td>
<td>CP03-19310</td>
<td>000-086-915</td>
<td>Select one</td>
<td>CP03-18401, power cable, 15 m signal cable</td>
</tr>
<tr>
<td></td>
<td>CP03-19320</td>
<td>000-086-916</td>
<td>Select one</td>
<td>CP03-18401, power cable, 20 m signal cable</td>
</tr>
<tr>
<td></td>
<td>CP03-19330</td>
<td>000-086-917</td>
<td>Select one</td>
<td>CP03-18401, power cable, 30 m signal cable</td>
</tr>
<tr>
<td>Accessories</td>
<td>FP03-06400</td>
<td>000-086-872</td>
<td>1 set</td>
<td>FP03-06410, FP03-04810</td>
</tr>
<tr>
<td>Spare Parts</td>
<td>SP03-12200</td>
<td>000-086-965</td>
<td>1 set</td>
<td></td>
</tr>
</tbody>
</table>

### Optional Supply

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Code No.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Buzzer *</td>
<td>OP03-21</td>
<td>000-030-097</td>
<td></td>
</tr>
<tr>
<td>Rectifier</td>
<td>RU-3423</td>
<td>000-030-443</td>
<td></td>
</tr>
<tr>
<td>Cable Assy.</td>
<td>MJ-A6SPF0007-100</td>
<td>000-125-237</td>
<td>For heading sensor, 10 m w/6P connector at both ends, straight</td>
</tr>
<tr>
<td></td>
<td>MJ-A6SPF00012-050</td>
<td>000-134-424</td>
<td>For navaid, video sounder, 5 m w/6P connector at both ends, cross</td>
</tr>
<tr>
<td></td>
<td>MJ-A6SPF00012-100</td>
<td>000-133-817</td>
<td>For navaid, video sounder, 10 m w/6P connector at both ends, cross</td>
</tr>
<tr>
<td></td>
<td>MJ-A6SPF0009-100</td>
<td>000-125-236</td>
<td>For navaid, video sounder, heading sensor, 10 m w/6P connector at one side</td>
</tr>
<tr>
<td>Signal Cable</td>
<td>MJ-A6SPF0003-050</td>
<td>000-117-603</td>
<td>5 m, w/6P connector at one end</td>
</tr>
<tr>
<td>Flush Mount Kit</td>
<td>OP03-145</td>
<td>008-476-060</td>
<td>For display unit</td>
</tr>
<tr>
<td>Auto Plotter</td>
<td>ARP-10</td>
<td>000-086-852</td>
<td>Available with 24 rpm scanner.</td>
</tr>
<tr>
<td>Radar Plotter *</td>
<td>RP-110</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Cable Assy.</td>
<td>MJ-B24LPF0006-005</td>
<td>000-140-438</td>
<td>Cable converter connector</td>
</tr>
</tbody>
</table>

*: Even though the display unit meets waterproof standard IPX-5, the connection of external buzzer, radar plotter and/or remote display can affect waterproofness. Watertight integrity cannot be guaranteed. When these modification has been done, the display unit should not be mounted where exposed.
1. MOUNTING

1.1 Mounting Methods for Scanner Unit

- The scanner unit is generally installed either on top of the wheelhouse or on the radar mast on a suitable platform. Locate the scanner unit where there is a good all-round view. Any obstruction will cause shadow and blind sectors. A mast for instance, with a diameter considerably less than the width of the radiator, will cause only a small blind sector, but a horizontal spreader or crosstrees in the same horizontal plane as the scanner unit would be a much more serious obstruction; you would need to place the scanner unit well above or below it.

- It is rarely possible to place the scanner unit where a completely clear view in all directions is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting.

- If you have a radio direction finder on your boat, locate its antenna clear of the scanner unit to prevent interference to the direction finder. A separation of more than two meters is recommended.

- To lessen 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.

- A magnetic compass will be affected if placed too close to the scanner unit. Observe the following compass safe distances to prevent deviation of a magnetic compass: Standard compass, 1.00 m, Steering compass, 0.75 m.

- Do not paint the radiator aperture, to ensure proper emission of the radar waves.

- When this radar is to be installed on larger vessels, consider the following points:
  - The signal cable run between the scanner and the display comes in lengths of 10 m (standard), 15 m, 20 m and 30 m. Whatever length is used it must be unbroken; namely, no splicing allowed.
  - Deposits and fumes from a funnel or other exhaust vent can adversely affect the aerial performance and hot gases may distort the radiator portion. The scanner unit must not be mounted where the temperature is more than 70 C.

As shown in the figure below, the scanner unit may be installed on the bridge, on a common mast or on the radar mast.

![Scanner unit mounting methods](image)

1.2 Fixing Holes in Mounting Platform

Referring to the outline drawing on page D-1, drill five holes in the mounting platform: four holes of 15 mm diameter for fixing the scanner unit and one hole of 25-30 mm diameter for the signal cable.
1.3 Fastening the Radiator to the Radiator Bracket

For your reference, scanner installation materials list appears in the packing lists at the back of this manual.

1. Remove the radiator cap from the radiator bracket.

2. Coat contacting surface between scanner radiator and radiator bracket with anticorrosive sealant as shown in Figure 1-2 (scanner unit XN10A) or Figure 1-3 (scanner unit XN12A).

3. Coat threaded holes on the scanner radiator with anticorrosive sealant.

4. Grease the O-ring and set it to the radiator bracket.

5. Lay the scanner radiator on the radiator bracket.

6. Coat the radiator fixing bolts (4 pcs.) with anticorrosive sealant. Fasten the scanner radiator to the radiator bracket with the radiator fixing bolts, flat washers and spring washers.

1.4 Mounting the Scanner Unit

The scanner unit can be mounted using the fixing holes on the outside (240 x 240 nm) or inside (140 x 150 nm) the scanner unit.

Outside fixing holes

Use the hex head bolt (supplied) to mount the scanner unit as below.

1. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.
2. Lay the scanner unit on the mounting platform, orienting it as shown in Figure 1-6.

3. Insert four hex bolts and seal washers from the top of the scanner housing. Insert the seal washers with the larger diameter next to the bolt heads. Be sure the seal washer, not other washers, is next to bolt head.

4. Pass flat washers, spring washers and nuts onto hex bolts. Fasten by tightening nuts. Do not fasten by tightening the hex bolts; seal washers may be damaged.

5. Coat flat washers, spring washers, nuts and exposed parts of bolts with anticorrosive sealant.

6. Prepare ground point in mounting platform (within 300 mm of ground terminal on scanner unit) using M6 x 25 bolt, nut and flat washer.

7. Run the ground wire (RW-4747, 370 mm) between the ground terminal and ground point.

8. Coat ground terminal and ground point with silicone sealant as shown in Figure 1-9.
Fixing holes inside scanner unit

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

1. Loose four scanner bolts to open the scanner unit. Refer to Figure 11 for location.

   ![Figure 10 Scanner unit chassis, upper chassis separated](image)

2. Unplug connector connected between upper and lower chassis.
3. Separate upper chassis from lower chassis by removing two hex head bolts.
4. Remove cover by unfastening four pan head screws.
5. Remove connector from RF unit.
6. Remove RF unit by unfastening four hex head bolts.
7. Lay the corrosion-proof rubber mat (supplied) on the mounting platform.
8. 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 anticorrosive sealant. Cut a slit in rubber bushing and insert bolt into bushing. Do not use seal washers.
9. Reassemble RF unit, cover and upper chassis.
10. Set four knob caps (supplied) into outside fixing holes.
11. Do steps 6-8 in “Outside fixing holes”.

1.5 Display Unit Mounting

Mounting considerations

When selecting a mounting location for the display unit keep in mind the following points:

- Provide adequate space behind and around the unit to permit circulation of air and to provide convenient access to the rear connection.
- Even though the picture is quite legible even in bright sunlight, keep the display unit out of direct sunlight or at least shaded because of heat that can build up inside the cabinet.
- Locate the display unit in a position where you can view and operate it conveniently but where there is no danger of salt or fresh water spray or immersion.
- The orientation of the display unit should be so the radar screen is viewed while the operator is facing in the direction of the bow. This makes determination of your position much easier.
- Make sure you allow enough clearance both to get to the connectors behind the unit and to allow you to get your hands in on both sides to loosen or tighten the mounting knobs. Make sure you leave at least a foot or so of “service loop” of cables behind the unit so it can be pulled forward for servicing or easy removal of the connectors.
- The compass safe distance of 0.75 meters (standard compass) and 0.6 meters (steering compass) should be observed to prevent deviation of the magnetic compass.
- Even though the display unit meets waterproof standard IPX-5, the connection of external buzzer, radar plotter and/or remote display can affect waterproofness. Watertight integrity cannot be guaranteed. When these modification has been done, the display unit should not be mounted where exposed.

Mounting

The display unit is designed to be mounted on a tabletop or bulkhead.

1. Using the hanger as a template, mark screw locations in the mounting location.
2. Fix the hanger to the mounting location with five M6 tapping screws (supplied).
3. Fit the knob bolts to the display unit. Install the display unit in the hanger. Tighten the knob bolts securely.
2. CONNECTIONS

2.1 Connecting the Signal Cable

Only the signal cable runs from the display unit to the scanner 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.

1. Open the scanner cover by loosening two screws, and then fix the stay.

2. Fabricate the signal cable as shown below.

3. Unfasten the cable gland assembly (plate, gasket, flat washer).

4. Pass the signal cable w/connector through the bottom of the scanner unit chassis. Pass the cable through the gland assembly as shown below.

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

6. Position the signal cable so that no more than 4 cm of the sheath is exposed as shown in the figure below. Tighten fixing bolts on the cable gland assembly.

---

Figure 2-1 Scanner unit chassis, cover opened

Figure 2-2 Fabrication of signal cable

Figure 2-3 Passing the signal cable through the cable gland assembly

Figure 2-4 How to fix signal cable in cable gland
7. Unfasten four screws shown in the figure below.

![Figure 2-5 Scanner unit chassis, cover opened](image)

8. Pass the signal cable through the cable protector.

![Figure 2-6 Scanner unit chassis, cover opened](image)

9. Connect the signal cable to the RTB Board (03P9249), referring to the interconnection diagram and the figure below. Note that connector VH2P is not used.

![Figure 2-7 Scanner unit chassis, cover opened](image)

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

![Figure 2-7 Scanner unit chassis, cover opened](image)

11. Fix the signal cable with the cable clamp.

12. Release the stay and close the cover. Loosely fasten the cover fixing screws; you will have to make some adjustments inside after completion of wiring.

---

**2.2 Display Unit Connections**

- **Power cable connector**
- **Signal cable connector** (DJ-1, waterproof)
- **External equipment connector**
  - (For Remote Display, External Alarm Buzzer OP03-21 and Radar Plotter, RP-110)
- **Ground terminal**

![Figure 2-8 Connection on the display unit](image)

---

CAUTION
Ground the equipment to prevent mutual interference.
Connection procedure

1. Connect the power cable to the power cable connector on the rear of the display unit.
2. Connect the signal cable to connector DJ-1 on the rear of the display unit.
3. Run a ground wire (local supply) between the ground terminal on the rear of the display unit and the ship’s superstructure.

2.3 Connection of External Equipment

Navigation aid, video sounder connection

If your navigation aid can output data in IEC 61162 (NMEA 0183) format, your vessel’s position in latitude and longitude, the range and bearing to waypoint, speed and course may be input to this radar, and be seen on the screen.

Further if your video sounder can output depth data in IEC61162 (NMEA 0183) format, depth can be displayed on the radar screen.

You will need an NMEA cable. The following cables are optionally available.

<table>
<thead>
<tr>
<th>Type</th>
<th>Code no.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJ-A6SPF0007-100</td>
<td>000-125-237</td>
<td>6P-6P (10m)</td>
</tr>
<tr>
<td>MJ-A6SPF0009-100</td>
<td>000-125-236</td>
<td>w/connector (10m)</td>
</tr>
</tbody>
</table>

This radar can output NAV data received from a navaid to an echosounder.

Heading sensor connection

Heading signal can be connected to the “HDG” connector. You will need a heading sensor cable. The following cables are optionally available.

<table>
<thead>
<tr>
<th>Type</th>
<th>Code no.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJ-A6SPF0007-100</td>
<td>000-125-237</td>
<td>6P-6P (10m)</td>
</tr>
<tr>
<td>MJ-A6SPF0009-100</td>
<td>000-125-236</td>
<td>w/connector (10m)</td>
</tr>
<tr>
<td>MJ-A6SPF0003-050</td>
<td>000-117-603</td>
<td>w/connector (5m)</td>
</tr>
</tbody>
</table>

Input/Output Data List

<table>
<thead>
<tr>
<th>Model</th>
<th>Connector</th>
<th>Data</th>
<th>Pin</th>
<th>In/Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCV561M2</td>
<td>J1</td>
<td>183 (1.5)</td>
<td>4</td>
<td>In/Out</td>
</tr>
<tr>
<td>FCV581L</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>FCV582L</td>
<td>NMEA</td>
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<td>6</td>
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<td>FCV291</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
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<td>In/Out</td>
</tr>
<tr>
<td>FCV292</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
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<td>In/Out</td>
</tr>
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<td>FCV668</td>
<td>NMEA</td>
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<td>In/Out</td>
</tr>
<tr>
<td>FCV600L</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP1810</td>
<td>IN/OUT</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP3100M2</td>
<td>IN/OUT</td>
<td>183 (1.5)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP8000M2</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
<td>4</td>
<td>In/Out</td>
</tr>
<tr>
<td>PS8000M2</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
<td>4</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP80</td>
<td>DATA1</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP80</td>
<td>DATA2</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP1610C</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
<tr>
<td>GP1610CF</td>
<td>NMEA</td>
<td>183 (1.5/2.0)</td>
<td>6</td>
<td>In/Out</td>
</tr>
</tbody>
</table>

Note: All plotters listed in the table above can receive TLL data (radar target position).
2.4 Exchange of Fuse for 24/32V Power Supply

The power cable comes with a 10A fuse in its holder. This fuse is for use with a 12V DC power supply. For 24V/32V DC power supply, replace the fuse with the 5A fuse (supplied) and attach 5A label (supplied) to fuse holder.

⚠️ **CAUTION**

*Use the proper fuse.*

Use of an improper fuse can damage the equipment and void the warranty.

2.5 Checking the Installation

After completing the installation, it is a good idea to recheck it to be sure all steps were correctly done. Use the table below to check the installation.

- The signal cable is securely retained against the mast or mounting platform and is free of interference from running rigging.
- The cable gland or entry on the deck, if provided, is waterproofed.
- The power connections to the battery are of correct polarity.
- The plugs at the rear of the display unit are tightly fastened.
- The fuse in the power cable is 10A (12V) or 5A (24V/32V DC).
This section covers adjustment of the radar after installation. You will need to
• adjust tune/video amplifier level
• enter antenna height
• align heading
• adjust sweep timing
• adjust main bang suppression
• select STC curve
• set a dead sector, and
• confirm magnetron heater voltage.

These adjustments are done through the installation setup menu.

3.1 Preparation

Most adjustments and initial settings may be completed on the Installation Setup menu, and you can display this menu as follows:

1. Turn off the radar. While pressing and holding down the [GAIN] control (at least three seconds), press the [POWER] key.
2. Press the [MENU] key, select "OTHERS" by using the omnipad, and press [ACQ/ENTER] key.
3. Select "24. Installation Setup".
4. Press the [ACQ/ENTER] key to open the Installation Setup menu.

3.2 Adjusting Tuning/Video

Do the following to automatically adjust tuning and video amplifier level input.

1. Press the [STBY/TX] key to transmit.

[WARNING]

Before transmitting the radar make sure no one is near the scanner unit, to prevent the potential risk of being struck by the rotating scanner and exposure to RF radiation hazard.

3. The unit automatically adjusts tuning and video, displaying the following message.

"[Tune/Video Auto Adjustment]
Now under correction."

4. When adjustment is completed, the message disappears.

3.3 Entering Antenna Height

The STC curve changes with respect to antenna height above the waterline. Enter antenna height above the waterline to optimize the STC curve.

2. Operate the omnipad to select antenna height above the waterline; Low (3 m or less), Mid (3 to 6 m) or High (6 to 10 m).
3. Press the [ACQ/ENTER] key.
3.4 Aligning Heading  
(Adjustment sector: 0~359.90)

You have mounted the scanner unit facing straight ahead in the direction of the bow. Therefore, a small but conspicuous target dead ahead visually should appear on the heading marker (zero degrees).

In practice, you will probably observe some small bearing error on the display because of the difficulty in achieving accurate initial positioning of the scanner unit. The following adjustment will compensate for this error.

1. Identify a suitable target (for example, ship or buoy) at a range between 0.125 to 0.25 nautical miles, preferably near the heading marker. To lessen error, keep echoes in the outer half of the picture by changing the range. Also, be sure the zoom and off center functions are off.

2. Select “9. Heading Alignment” from the Installation Setup menu and press the [ACQ/ENTER] key. The following message appears:

   [Heading Alignment]  
   Set EBL1 to center of target dead ahead and press ENTER.  
   Correction 0.0°  
   <Press MENU for inst setup>

   Figure 3-3 Heading alignment message

3. Operate the omnipad to bisect target selected at step 1 with the heading marker.

4. Press the [ACQ/ENTER] key.

5. As a final test, move the boat towards a small buoy and confirm that the buoy shows up dead ahead on the radar when it is visually dead ahead.

3.5 Adjusting Sweep Timing  
(Adjustment range: 0.000~4.266 nm)

This adjustment ensures proper radar performance, especially on short ranges. The radar measures the time required for a transmitted echo to travel to the target and return to the source. The received echo appears on the display based on this time. Thus, at the instant the transmitter is fired, the sweep should start from the center of the display (sometimes called sweep origin).

A trigger pulse generated in the display unit goes to the scanner unit through the signal cable to trigger the transmitter (magnetron). The time taken by the signal to travel up to the scanner unit varies, depending largely on the length of the signal cable. During this period the display unit should wait before starting the sweep. When the display unit is not adjusted correctly, the echoes from a straight local object (for example, a harbor wall or straight pier) will not appear with straight edges – they will be seen as “pushed out” or “pulled in” near the picture center. The range of objects will also be incorrectly shown.

1. Transmit on the shortest range and confirm that the [GAIN] and [A/C SEA] controls are properly adjusted.

2. Visually select a target which forms a straight line (for example, harbor wall, straight pier).

3. Select “10. Sweep Timing Adjustment” from the Installation Setup menu and press the [ACQ/ENTER] key. The following message appears:

   (1) Correct  (2) Target pushed inward  (3) Target pushed outward

   Figure 3-4 Examples of improper and correct sweep timing

1. Transmit on the shortest range and confirm that the [GAIN] and [A/C SEA] controls are properly adjusted.

2. Visually select a target which forms a straight line (for example, harbor wall, straight pier).

3. Select “10. Sweep Timing Adjustment” from the Installation Setup menu and press the [ACQ/ENTER] key. The following message appears:
[Sweep Timing Adjustment]
Use omnipad to straighten target and press ENTER key.

Correction 0.000 nm

<PRESS MENU for inst setup>

Figure 3-5 Sweep timing adjustment message

4. Operate the trackball to straighten the target selected at step 2, and then press the [ACQ/ENTER] key.

3.6 Adjusting MBS
(Adjustment range: 0.00~0.25)

Main bang, a large filled circle which appears at the display center on short ranges, can be suppressed as follows:

1. Transmit on long range about 10 minutes.
2. Adjust the gain to show a small amount of noise on the display.
3. Change to the 0.125 nautical mile range and adjust the [A/C SEA] control.
4. Select “11. MBS Adjustment” from the Installation Setup menu and press the [ACQ/ENTER] key. The following message appears:

[MBS Adjustment]
Set value by T-ball and press ENTER key.

Correction 000

<PRESS MENU for inst setup>

Figure 3-6 MBS adjustment message

5. Operate the trackball to suppress main bang (adjustment range: 000 to 025).

3.7 Selecting STC Curve

The STC curve changes with respect to the antenna height above the waterline. The default STC curve can be maintained in most cases. If necessary the STC curve can be changed as follows:

2. Select STC curve desired;
   - **Sharp**: The effective range of the [A/C SEA] control is relatively short.
   - **Std**: Between Sharp and Gentle.
   - **Gntl (Gentle)**: The effective range of the [A/C SEA] control is relatively long.
3. Press the [ACQ/ENTER] key.

3.8 Setting a Dead Sector

When the scanner is installed at a close distance in front of the wheelhouse, the radar should be set not to transmit within that area, to prevent microwave hazard. The dead sector area graphic can be turned on/off on the OTHERS menu.

2. Operate the omnipad to enter starting point of sector (in figures).
3. Press the [ACQ/ENTER] key.
4. Operate the omnipad to enter ending point of sector (in figures, Max: 270°).
5. Press the [ACQ/ENTER] key.

**Note**: This setting should be done after other adjustment are finished.

Dead sector

Figure 3-7 Dead sector
3.9 Checking Magnetron Heater Voltage

Magnetron heater voltage is formed on the MD Board of the scanner unit, and is preadjusted at the factory for use with any length of signal cable. Therefore no adjustment is required. However, check magnetron heater voltage as follows:

1. Turn on the radar and leave it in standby.
2. Open the scanner cover.
3. Unfasten two screws to remove the RF section cover.

**DANGER**

**ELECTRICAL SHOCK HAZARD**

This check is done with the power on — **DO NOT** touch the magnetron.

4. Connect a multimeter, set to 10 VDC range, between test point J825#4 and J825#6 (GND) on the RTB Board (03P9249).

5. Confirm that the meter reads 7.5 V ± 0.1 V.
6. Close the scanner cover and tighten the cover fixing screws.
4. INSTALLATION OF ARP-10 (OPTION)

NOTICE
This option is not available with 48 rpm scanner unit.

4.1 Necessary Parts

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<tr>
<th>Name</th>
<th>Type</th>
<th>Code No.</th>
<th>Qty</th>
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<td>Spacer</td>
<td>SQ-20</td>
<td>000-801-650</td>
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<tr>
<td>Spring Washer</td>
<td>M3 C5191W</td>
<td>000-864-204</td>
<td>4</td>
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<td>Pan Head Screw</td>
<td>M3x8 C2700W</td>
<td>000-881-404</td>
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<td>Pan Head Screw w/washer*</td>
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</table>

*Not used.

4.2 Mounting

1. Turn off the power. Remove the cover from the display unit as follows:
   ① Unfasten four binding screws (M4 x 10).
   ② Unfasten six binding screws (M3 x 10).
   ③ Remove three rubber covers to unfasten three hex nuts.
   ④ Loosen two hex nuts.

2. Fasten the ARP-10 Board to the right-hand chassis of the display unit, using the pan head spacers, screws, and washers (supplied) as follows.
   (1) Attach three spacers.
   (2) Attach the P107 connector from the ARP-10 Board to J107 connector on the SPU Board.

4.3 Adjustments

Input signal

1. Connect the gyrocompass. Turn on the radar and transmit.
2. Press the [MENU] key and select the OTHERS menu
3. Select “23. Self Test” and press the [ACQ/ENTER] key. Confirm that the ARP-10 test results show OK for SPEED, COURSE, TRIGGER< BP and HP.

Video signal

Confirm the following on the ARP-10 test display:

- Video is “OK.”
- Adjust the GAIN, A/C and A/C RAIN controls so FE-DATA1 and FE-DATA2 indications on the ARP-10 TEST show less than 1,000. Also, raise/lower the gain while watching the FE-DATA1 and FE-DATA2 indications. Confirm that the FE-DATA1 and FE-DATA2 indications rise/lower according to GAIN control adjustment.
### 工事材料表

#### INSTALLATION MATERIALS

<table>
<thead>
<tr>
<th>番号</th>
<th>名称</th>
<th>時図</th>
<th>型名／規格</th>
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(dimensions in drawing for reference only.)
# 工事材料表

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（略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）
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**XN10A, XN12A**

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(DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

19AK-X-9856
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MODEL 1831/1832:1832
MODEL 1833:1832:
MODEL 1841/1842:1842:

MARINE RADAR

(尺寸の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)
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**MFR'S NAME**: FURUNO ELECTRIC CO., LTD.  **DWG NO.**: C3441-P02-B

(図面の寸法は、参考値です。Dimensions in drawing for reference only.)
1) #印寸法は最小サービス期間寸法とする。
2) 指定外の寸法公差は表1による。
3) 取付用ネジはトラススタンピングネジ呼び径6 x 20を使用のこと。

NOTE
1. #: RECOMMENDED SERVICE CLEARANCE.
2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
3. USE TAPPING SCREWS 6x20 FOR FIXING THE UNIT.
注記
1) 取付はM12ボルトを使用のこと。
2) 指定寸法公差は表2による。
3) 本機取付台にφ25-30のケーブル貫通穴を開ける。

NOTE
1. USE M12 BOLTS FOR FIXING THE UNIT.
2. TABLE 2 INDICATES TOLERANCE OF DIMENSIONS.
3. MAKE A HOLE φ25-30 ON MOUNTING MAST FOR CABLE PASS.

表1

<table>
<thead>
<tr>
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<th>TYPE</th>
<th>XN10A</th>
<th>XN12A</th>
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<td>回転安全空間 (B) CLEANSANCE (mm)</td>
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<tr>
<td>質量 (kg) MASS (±10%)</td>
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表2

<table>
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<tr>
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<th>公差 (mm) TOLERANCE</th>
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<td>± 1.5</td>
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<td>50 &lt; L ≤ 100</td>
<td>± 2.5</td>
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<td>100 &lt; L ≤ 500</td>
<td>± 3</td>
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<td>1000 &lt; L ≤ 2000</td>
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