

# FURUNO

# INSTALLATION MANUAL

MARINE RADAR/ARPA

MODEL FAR/FR-2815/2825



**FURUNO ELECTRIC CO., LTD.**  
NISHINOMIYA, JAPAN

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\* IME34040J00 \*

# SAFETY INSTRUCTIONS

"**DANGER**", "**WARNING**" and "**CAUTION**" notices appear throughout this manual. It is the responsibility of the installer of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.

 **DANGER**

This notice indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.

 **WARNING**

This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

 **CAUTION**

This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

# DANGER



**Hazardous voltage.**  
Can shock, burn, or cause death.

Only qualified personnel should work in the units of a radar system.

**Turn off the power at the ship's mains switchboard before beginning the installation. Post a warning sign near the switchboard to ensure the power will not be applied while the radar system is being installed.**

Electrical shock, fire, serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.

# WARNING



**Turn off the radar power switch before working on the antenna unit. Post a warning sign near the switch to ensure it will not be turned on while the antenna unit is being installed.**

Serious injury or death can result if the radiator starts rotating and strikes someone near the scanner unit.



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

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

# WARNING



**Microwave radiation can be harmful to the human body, particularly the eyes.**

Do not look into a transmitting antenna from a distance of less than 2.0 meter (7 feet).

# WARNING

**The neck of the scanner unit becomes VERY HOT when the de-icer is working.**

Before beginning any work on the scanner unit, turn off the breaker for the de-icer line at the main switchboard to remove the power (100VAC, 1Ø) to the de-icer. (Turning off the power to the display unit has no effect.)

# CAUTION



**Ground both the display unit and the antenna unit.**

Ungrounded equipment can cause mutual interference or electrical shock.

**Confirm that the power supply voltage is compatible with the voltage rating of the equipment.**

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the display unit.

**Use only the supplied power cable.**

Use of other power cables (particularly cables whose diameter is smaller than the supplied cable) can cause fire or short circuit.

**Use the correct fuse.**

Use of a wrong fuse can cause fire or equipment damage.

# TABLE OF CONTENTS

---

EQUIPMENT LISTS .....	iii
-----------------------	-----

## 1. MOUNTING

---

1.1 Scanner Unit .....	1-1
1.2 Mounting the Display Unit .....	1-5
1.3 Mounting the Separate Type Control Panel .....	1-6

## 2. CONNECTIONS

---

2.1 Scanner Unit .....	2-1
2.2 Display Unit Connections .....	2-6
2.3 Changing Power Specifications .....	2-13

## 3. INITIALIZATION AND ADJUSTMENT

---

3.1 Menus for Initialization and Adjustment .....	3-1
3.2 Heading Alignment .....	3-2
3.3 Adjusting Sweep Timing .....	3-2
3.4 Adjusting Video Signal Level .....	3-3
3.5 Suppressing Main Bang .....	3-4
3.6 Confirming Tuning .....	3-4
3.7 Confirming Magnetron Heater Voltage .....	3-5
3.8 Initial Settings Menus .....	3-6
3.9 Setting the Function Keys .....	3-8
3.10 Default of Initial Setting Menus .....	3-11
3.11 How to adjust ARP board .....	3-12
3.12 Installation Check List .....	3-14

## 4. INSTALLATION OF GYRO CONVERTER GC-8 (option)

---

4.1 General Procedure for Installing and Setting up the GYRO CONVERTER Board .....	4-1
4.2 Connection of External Power Supply .....	4-3
4.3 Confirming Gyrocompass Specifications .....	4-3
4.4 Changing Settings on the GYRO CONVERTER Board .....	4-4
4.5 Setting the Bearing on the Radar Display .....	4-8

# SCHEMATIC DIAGRAMS AND OUTLINE DRAWINGS

---

## SCHEMATIC DIAGRAMS

Interconnection Diagram .....	S-1
Display Unit General Schematic .....	S-2
Scanner Unit Schematic Diagram .....	S-3
INT-Board INT-9170 (1/2) .....	S-4
INT-Board INT-9170 (2/2) .....	S-5

## OUTLINE DRAWINGS

Display Unit (tabletop) .....	D-1
Display Unit (tabletop type, separate control panel) .....	D-2
Control Unit .....	D-3
Display Unit (console type) .....	D-4
Radar Scanner Unit .....	D-5
Radar Scanner Unit .....	D-6

LIST OF INSTALLATION MATERIALS, ACCESSORIES AND SPARE PARTS .....	L-1
---	-----

# EQUIPMENT LISTS

## Complete set

No.	Name	Type	Qty	Remarks
1	Scanner unit		1	
2	Display unit	RDP-115	1	Pedestal mount type
				Tabletop type
3	Accessories	FP03-05710	1 set	For built-in control unit, FP03-05701 FP03-05704 FP03-05705 03-133-184
		FP03-05730		For separate control unit, FP03-05701 FP03-05703 FP03-05704 FP03-05705 03-133-1811
4	Installation materials	CP03-19104	1 set	For scanner unit
		CP03-14602	1 set	For display unit
5	Signal cable	RW-4873 *15m*	1	no armor
		RW-4873 *20m*		
		RW-4873 *30m*		
		RW-6895 *15m*		w/armor
		RW-6895 *20m*		
		RW-6895 *30m*		
		RW-6895 *50m*		
6	Spare parts	SP03-08902	1 set	For scanner unit
		SP03-11301	1 set	For display unit

## Optional equipment

No.	Name	Type	Code No.	Remarks
1	Hand grips	OP03-70	008-423-420	For display unit
2	M card fixing plate	OP03-133	008-452-400	
3	Hood	FP03-0574	008-459-810	
4	Display unit cover	OP03-126	008-459-820	Tabletop w/built-in control unit
		OP03-127	008-459-760	Tabletop w/separate control unit
		OP03-128	008-459-890	Pedestal mount
5	Display unit conversion kit	OP03-129-1	008-459-830	Converts from tabletop type/built-in control unit to pedestal mount
		OP03-129-2	008-452-410	
		OP03-130-1	008-459-900	Converts from tabletop type/separate control unit to pedestal mount
		OP03-130-2	008-452-430	
		OP03-131	008-459-910	Converts from pedestal mount to tabletop type/built-in control unit
		OP03-132-1	008-459-920	Converts from pedestal mount to tabletop type/separate control unit
OP03-132-2	008-452-450			
6	Control panel fixing plate	OP03-134	008-461-340	For fastening separate type control unit to a tabletop
7	Video plotter/ Radar map	RP-25		Mandatory for IMO radar
8	Gyro converter	GC-8-2	008-446-520	With installation materials
9	Interswitch	RJ-7		
10	External buzzer	OP03-21	000-030-097	1 m, with connector
11	Performance monitor	PM-30		Mandatory for IMO radar
12	Range unit conversion kit	OP03-110-1	008-446-610	To km
13	Range unit conversion kit	OP03-110-2	008-452-200	To sm
14	Color display unit	CD-141		
15	Slave display unit	FMD-8000		
16	Transformer unit	RU-1758	000-030-416	Converts 220 VAC to 100 VAC
17	Transformer unit	RU-1803	000-030-420	Converts 440 VAC to 100 VAC
18	Interswitch	RJ-8		
19	Interface unit	IF-2300		Mandatory for IMO radar

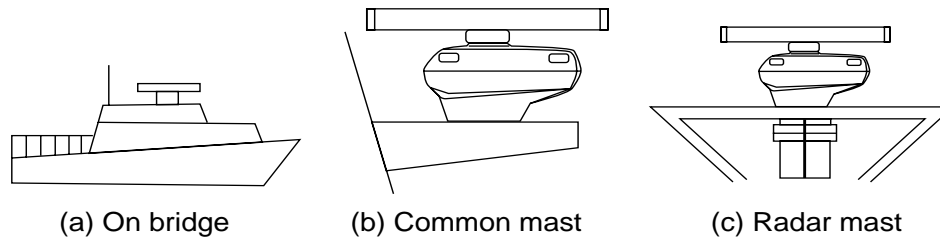


# 1. MOUNTING

## 1.1 Scanner Unit

### Mounting considerations

- 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.



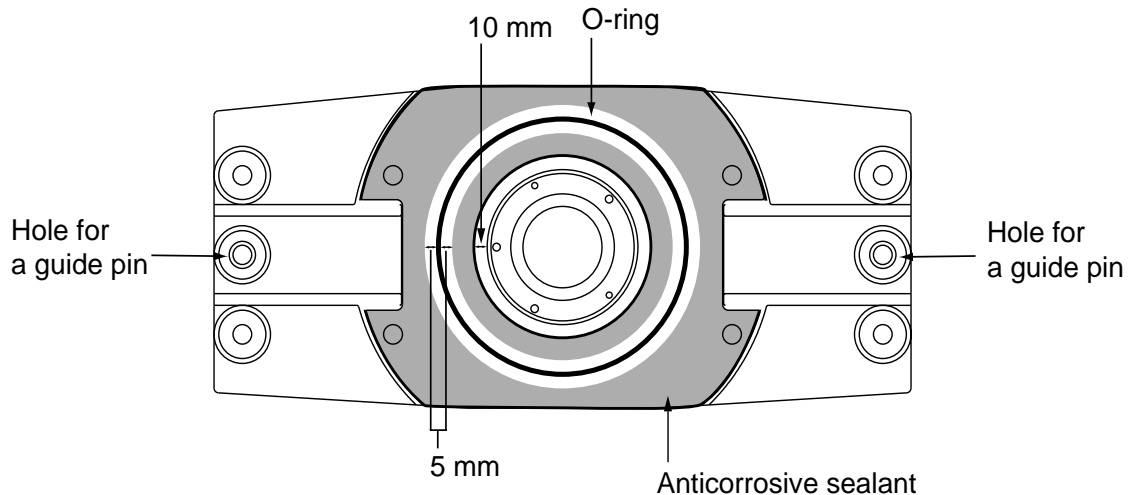
*Figure 1-1 Mounting methods*

- No funnel, mast or derrick should be within the vertical beamwidth of the scanner in the bow direction, especially zero degrees  $\pm 5^\circ$ , to prevent blind sectors and false echoes on the radar picture.
- 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.
- Locate the antenna of a direction finder 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, 1.70 m (FR-2815), 2.10 m (FR-2825), Steering compass, 1.90 m (FR-2815), 1.20 m (FR-2825).
- Do not paint the radiator aperture, to ensure proper emission of the radar waves.
- The signal cable run between the scanner and the display is available in lengths of 15 m (standard), 20 m, and 30 m. Whatever length is used it must be unbroken; namely, no splicing allowed.
- The scanner base is made of cast aluminum. To prevent electrolytic corrosion of the scanner base, use the seal washers and corrosion-proof rubber mat and ground the unit with the ground wire (supplied).
- 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  $70^\circ\text{C}$ .
- Leave sufficient space around the unit for maintenance and servicing. See the scanner unit outline drawing for recommended maintenance space.

## Assembling the scanner unit


The scanner unit consists of the scanner radiator and the scanner unit chassis, and they are packed separately. Fasten the scanner radiator to the scanner unit chassis as follows:

- 1) For the XN20AF, XN24AF, attach two guide pins to the underside of the scanner radiator.
- 2) Remove the waveguide cap from the radiator bracket. The cap may be discarded.
- 3) Coat the waveguide flange with anticorrosive sealant as shown in Figure 1-2.



*Figure 1-2 Coating the waveguide flange with anticorrosive sealant*

- 4) Coat fixing holes for the scanner radiator with anticorrosive sealant.
- 5) Grease the O-ring and set it to the O-ring groove of the radiator flange.
- 6) Set the scanner radiator to the radiator bracket.
- 7) For the XN20AF, XN24AF, coat hex bolts (M8 x 40, slotted washer head, 8pcs.) with anticorrosive sealant and use them to loosely fasten the scanner radiator to the scanner unit chassis. For the XN12AF, coat hex bolts, flat washers and spring washers with anticorrosive sealant and use them to loosely fasten the scanner radiator to the scanner unit chassis.
- 8) Remove two guide pins (inserted at step 1), and then tighten fixing bolts.

 <b>CAUTION</b>
<b>Be sure to remove the guide pins.</b>
Injury may result if the guide pins loosen and fall.

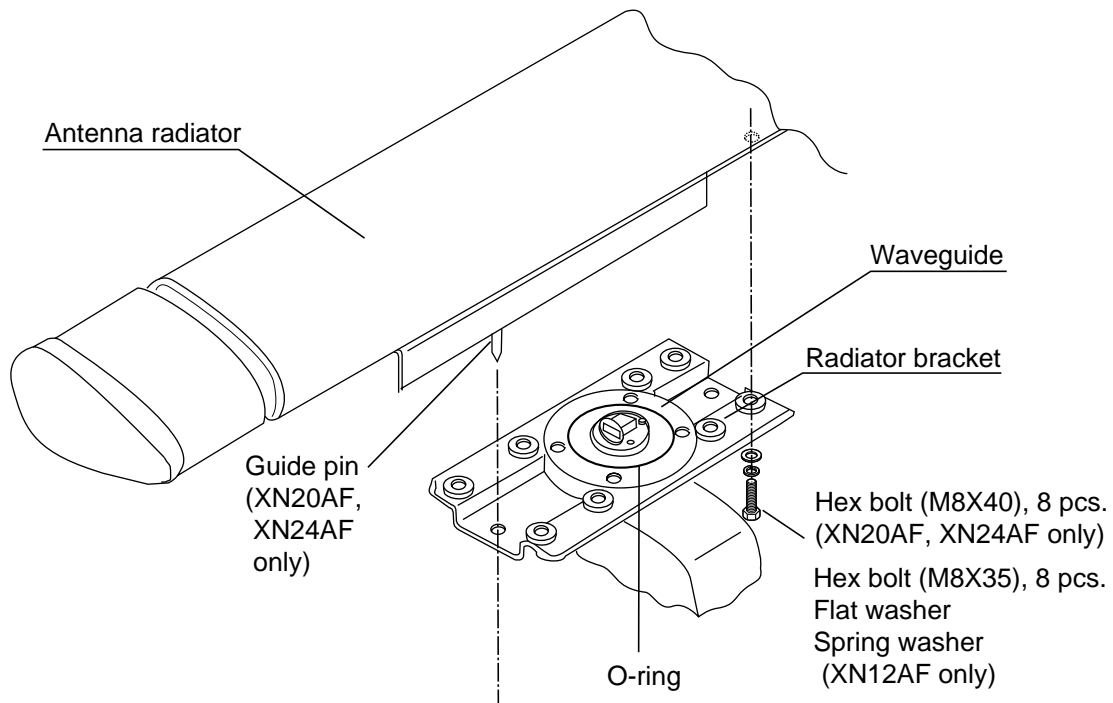
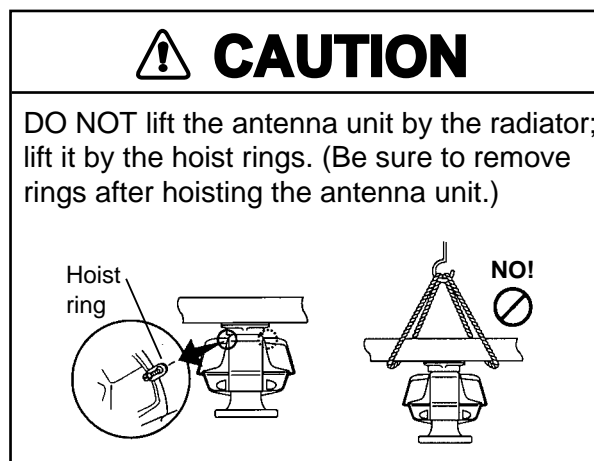


Figure 1-3 Fastening the radiator to the radiator bracket

## Fastening the scanner unit to the mounting platform

The scanner unit may be assembled before hoisting it to the mounting platform. However, do not lift the scanner unit by the radiator. Always hold the unit by its housing. When using a crane or hoist, lift the unit by the hoist rings which should be fastened to the bolt fixing covers of the scanner housing.



- 1) Construct a suitable mounting platform referring to the outline drawing at the back of the manual.
- 2) Drill four mounting holes of 15 mm diameter and one cable entry hole of about 50 mm diameter in the mounting platform.
- 3) Lay the rubber mat (supplied) on the mounting platform.

- 4) Place the scanner unit on the rubber mat orienting the unit so the bow mark on its base is facing the ship's bow.

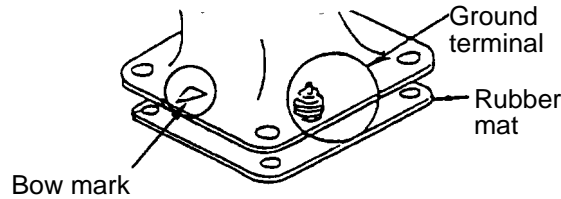


Figure 1-4 Scanner unit, front view

- 5) Fasten the scanner unit to the mounting platform with M12x60 hex bolts, nuts, flat washers and seal washers.
- 6) Using hex bolt (M6x25), nut (M6) and flat washer (M6) establish the ground system on the mounting platform as shown in Figure 1-5. The location should be within 370 mm of the ground terminal on the scanner unit. Connect the ground wire (RW-4747, 370 mm, supplied) between the grounding point and ground terminal on the scanner unit. Coat the entire ground system with silicone sealant (supplied).

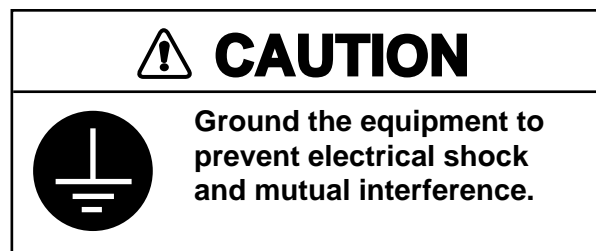
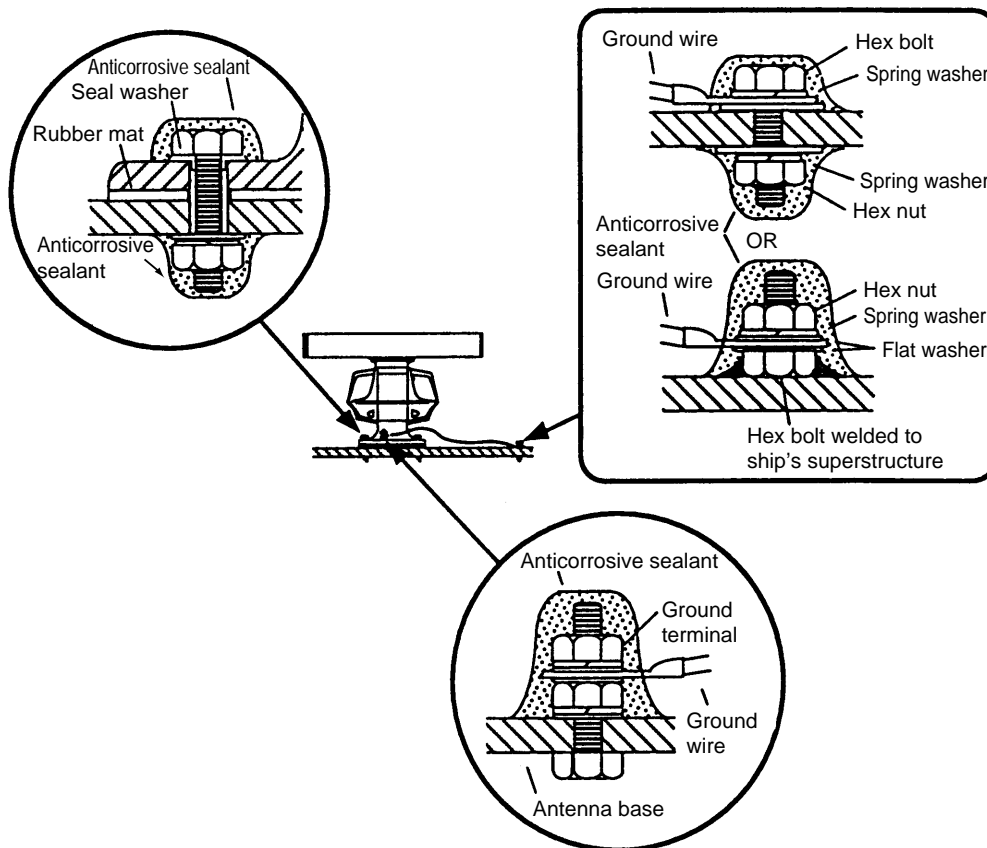


Figure 1-5 Fastening the antenna unit to the mounting location

## 1.2 Mounting the Display Unit



The display unit is designed to be mounted on a tabletop or on a pedestal (option).

### Before mounting the display unit

If Gyro Converter GC-8 (option) is to be used, install and setup the GYRO PROCESSOR Board before mounting the display unit, because of the difficulty involved if done after the unit is mounted. Instructions for installation and setup are in Chapter 4.

### Siting considerations

Locate the display unit on the bridge in a place where it can be viewed and operated conveniently. In addition, consider the points noted in the figure which follows.

<b>CAUTION</b>	
	<p>A magnetic compass will be affected if placed too close to the display unit. The minimum compass safe distances for magnetic compasses are</p> <p>standard compass: 1.6 m steering compass: 1.2 m</p>
	<p>Consider the points mentioned below when selecting a mounting location for the display unit.</p> <ul style="list-style-type: none"><li>• The orientation of the display unit should be so the operator views the screen while facing the bow. This makes determination of position much easier.</li><li>• The location should be free of water spray.</li><li>• The daylight bright type radar display provides excellent visibility even in direct sunlight. However, locate the unit out of direct sunlight and away from heat sources because of heat that can build up inside the cabinet.</li><li>• The mounting location should be determined considering the length of the signal cable between the antenna unit and the display unit. (The signal cable comes in lengths of 15, 20 or 30 meters; maximum 100 meters.)</li><li>• Leave sufficient space around the unit for maintenance and servicing. See the display unit outline drawing for recommended maintenance space.</li></ul>

## Mounting procedure

### Tabletop

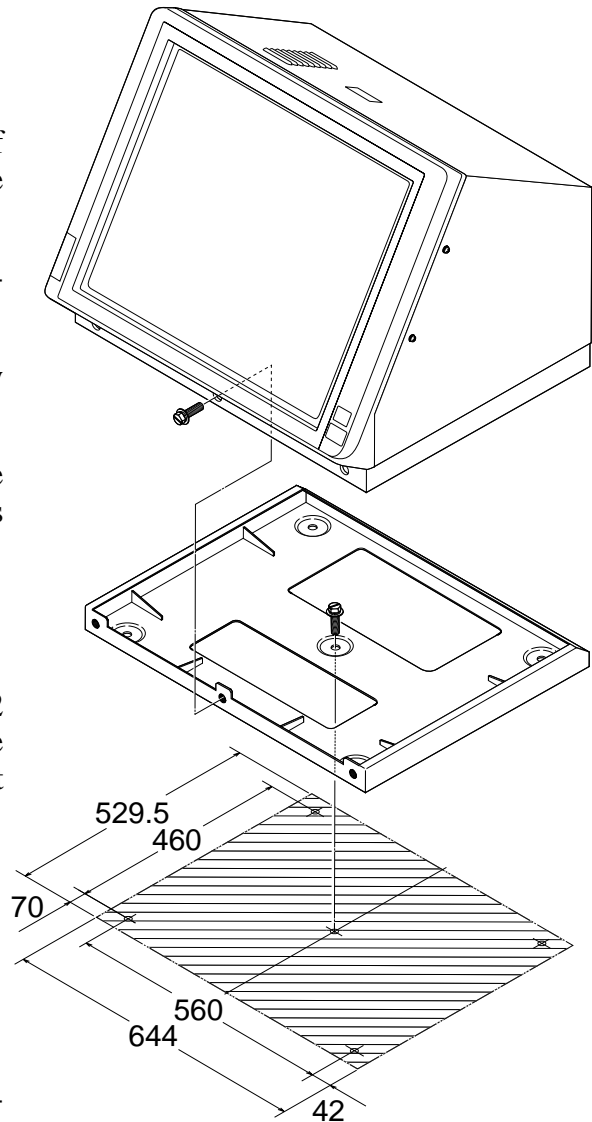
- 1) Unfasten the three M10 bolts at the front of the display unit and separate the mounting base from the display unit.
- 2) Drill five holes of 12mm diameter in the tabletop.
- 3) Secure the mounting base to the tabletop by using M10 nuts, bolts and flat washers.
- 4) Place the display unit on the mounting base and fasten it to the mounting base with the bolts removed in step 1.

### Pedestal

Fix the pedestal to the mounting location with M12 nuts, bolts and washers. (The cable gland is at the bottom of the pedestal.) See the outline drawing at the back of this manual.

## 1.3 Mounting the Separate Type Control Panel

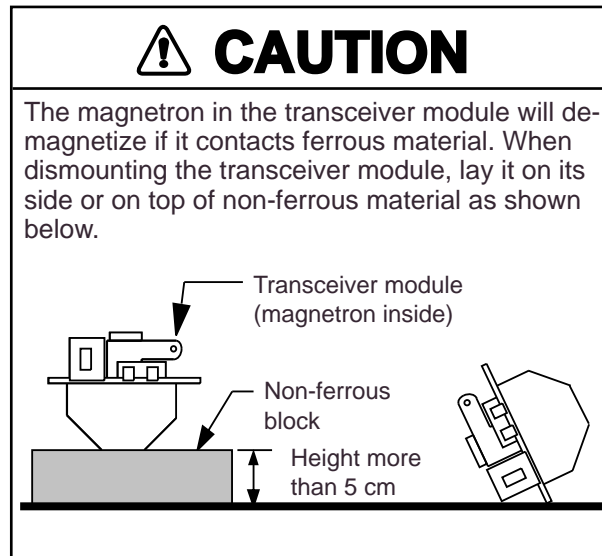
The separate type control panel connects to the display unit with a connection cable. Non-slip rubber feet (supplied) can be attached to the bottom of the control panel. The panel can be permanently fixed to a tabletop with the control panel fixing plate kit (option).



*Figure 1-6 Mounting dimensions for tabletop mount display unit*

## 2. CONNECTIONS

### 2.1 Scanner Unit



- 1) Open the scanner unit cover.
- 2) Disconnect plugs P611, P801 and P821.
- 3) Unfasten the transceiver module (two bolts). Remove the transceiver module.

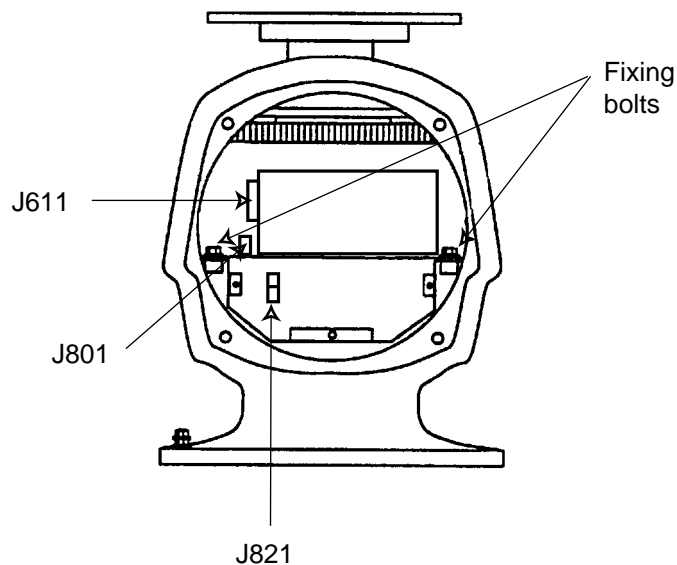
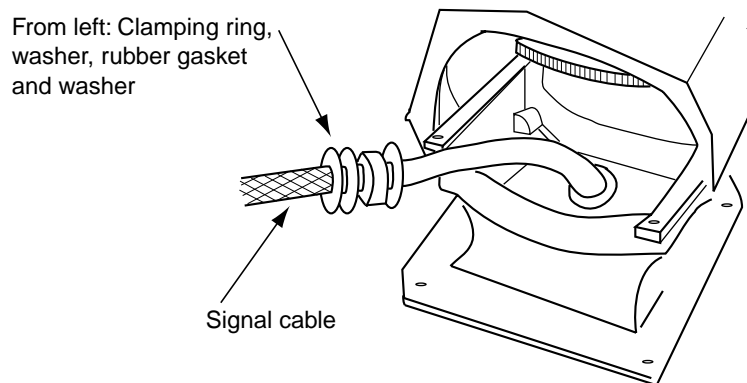


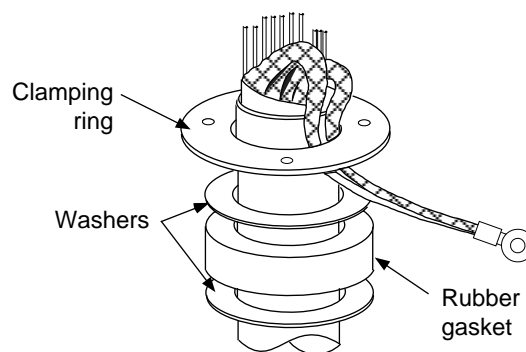
Figure 2-1 Scanner unit, front view

- 4) Unfasten the four fixing bolts on the cable gland at the base of the scanner unit. Remove clamping ring, rubber gasket and washers.



*Figure 2-2 Scanner unit, front view, cover removed*

- 5) Pass the signal cable through the cable entry hole in the scanner unit mounting platform. Trim the cable so about 80 cm of it protrudes past the cable gland.
- 6) Slide the clamping ring, washer, rubber gasket and washer onto the cable in that order.
- 7) Fabricate the signal cable as shown on page 2-4 (signal cable RW-4873), or page 2-5 (signal cable RW-6875).
- 8) Referring to Figure 2-3, pass the outer and inner shields between the signal cable and the clamping ring. Fasten the cable gland.



*Figure 2-3 Passing cable shields between cable and clamping ring*

- 9) Connect the signal cable to the terminal board RTB801 by referring to the interconnection diagram. Leave “slack” in the coaxial wire to prevent breakage.
- 10) Bind cores of cables with cable ties.
- 11) Mount the transceiver module. Connect plugs P611, P801 and P821. Fasten the shield to the ground terminal on the transceiver module.



- 12) If the scanner is mounted 2° or more left of ship's bow, adjust the position of S901 so it becomes "on" (contact between #1 and #2 on pcb MP-3795). To access S901, open the bow side cover; S901 is above the drive gear.

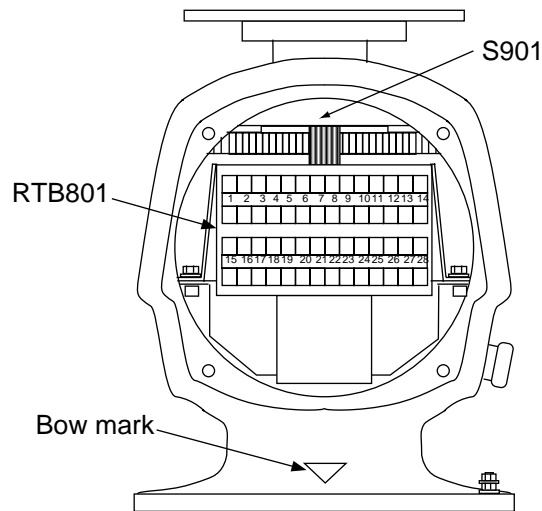


Figure 2-4 Scanner unit, front view

- 13) Confirm that all screws are tightened and all wiring is properly made. Coat waterproofing gasket, bolts and tapping holes of scanner unit with silicone grease. Check that the waterproofing gasket is seated as shown in Figure 2-5. Close the scanner unit cover.

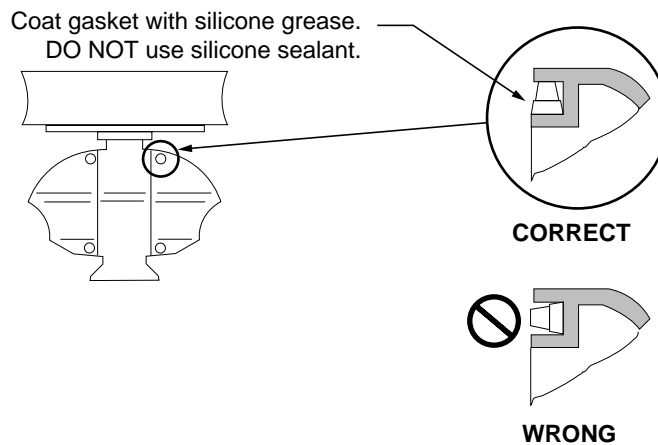


Figure 2-5 Correct seating of waterproofing gasket

## Fabricating signal cable RW-4873

- 1) Remove the vinyl sheath by 450 mm.
  - 2) Slide the clamping ring, washer, rubber gasket and washer onto the signal cable in that order.
  - 3) Unravel the outer shield to expose the cores in the outer layer. Then, unravel the inner shield to expose the cores in the inner layer. Label all inner cores to aid in identification.
  - 4) Attach EMI cores to all inner cores and all outer cores, and tie them with cable ties, etc..
- Note:** There are two types of the EMI core, thick and thin.
- 5) Trim each core (except coaxial wire) considering its location on the terminal board.
  - 6) Trim the inner and outer shields leaving 500 mm each. Twist shields together and attach crimp-on lug FV5.5-4 (blue,  $\phi 4$ ).
  - 7) Remove insulation of each core by about 6 mm. Fix crimp-on lug FV1.25-M3 (red,  $\phi 3$ ) to each core.
  - 8) Fabricate the coaxial cable. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD1.25-3 (red,  $\phi 3$ ) to coaxial cable.

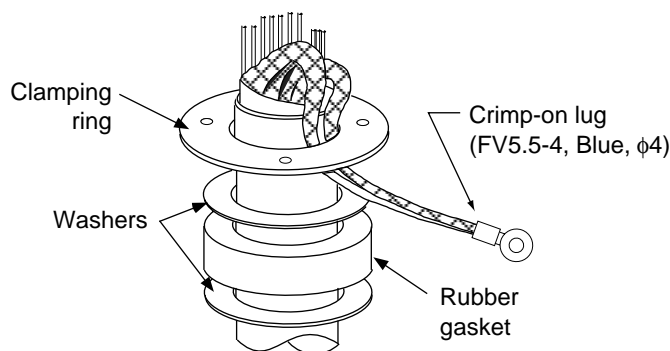


Figure 2-7 How to ground signal cable RW-4873

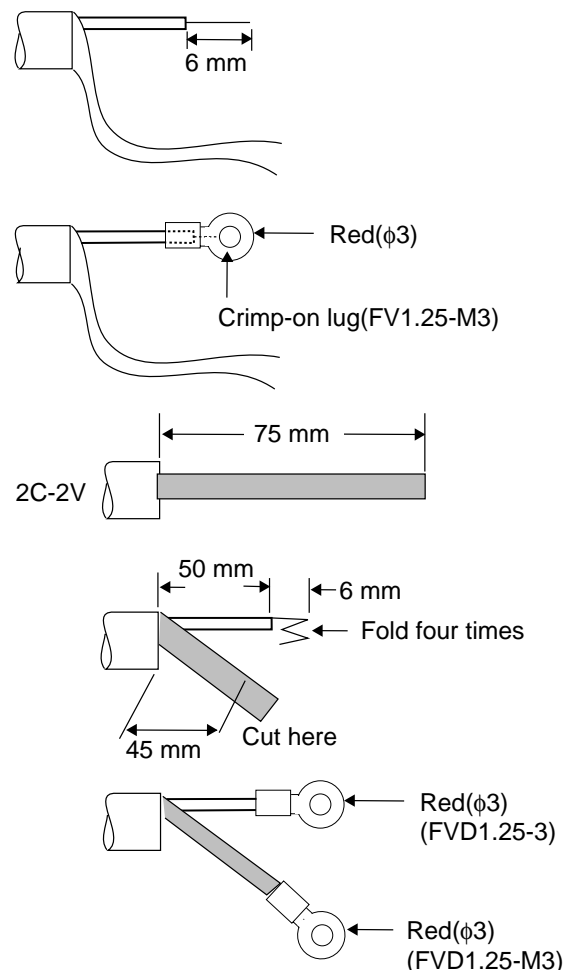
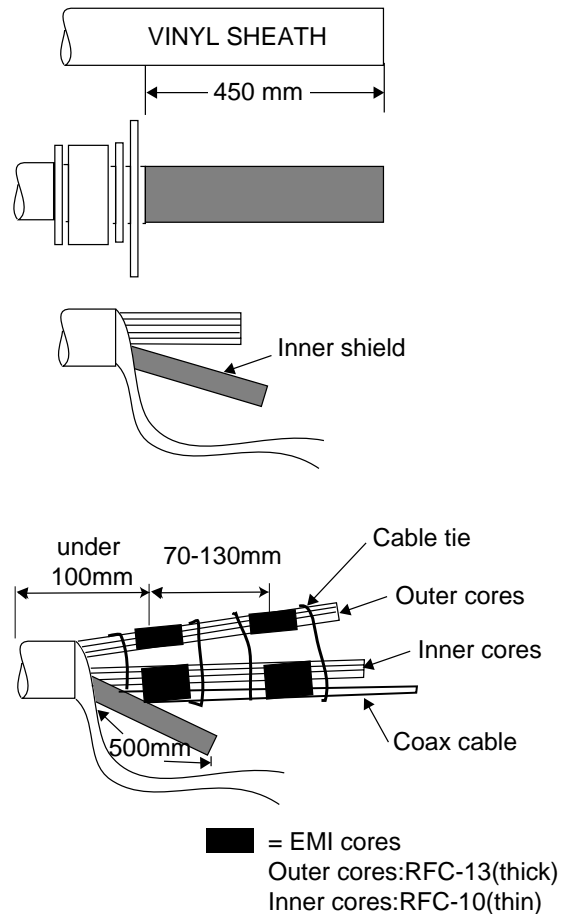


Figure 2-6 How to fabricate signal cable RW-4873

## Fabricating signal cable RW-6895

- 1) Remove the anti-corrosive sheath by 500 mm. Remove the armor and vinyl sheath leaving 50 mm each approximately.
- 2) Fold back the armor and trim to suitable length. Then, slide the washer, rubber gasket, washer and clamping ring onto the cable in that order.
- 3) Unravel the outer shield to expose the cores in the outer layer. Then, unravel the inner shield to expose the cores in the inner layer. Label all inner cores for later identification.
- 4) Attach EMI cores to all inner cores and outer cores, and tie them with cable ties, etc..

**Note:** There are two types of EMI core, thick and thin.

- 5) Trim each core (except coaxial core) considering its location on the terminal board.
- 6) Trim the inner and outer shields leaving 50 cm each. Twist shields together and attach crimp-on lug FV5.5-4 (blue,  $\phi 4$ ).
- 7) Remove insulation of each core by 6 mm approximately. Attach crimp-on lug FV1.25-M3 (red,  $\phi 3$ ) to each core.
- 8) Fabricate the coaxial cable. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD1.25-3 (red,  $\phi 3$ ) to coaxial cable.

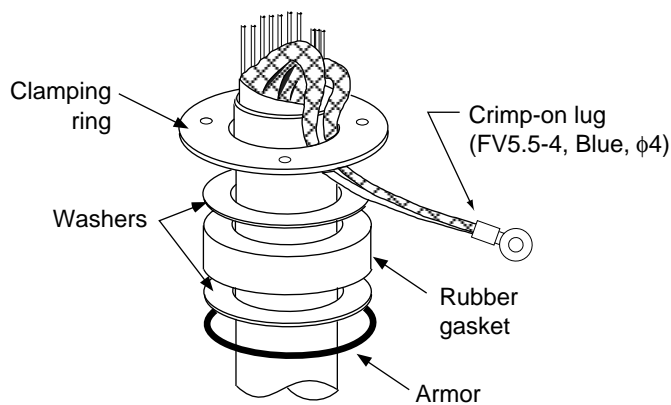


Figure 2-9 How to ground signal cable RW-6895

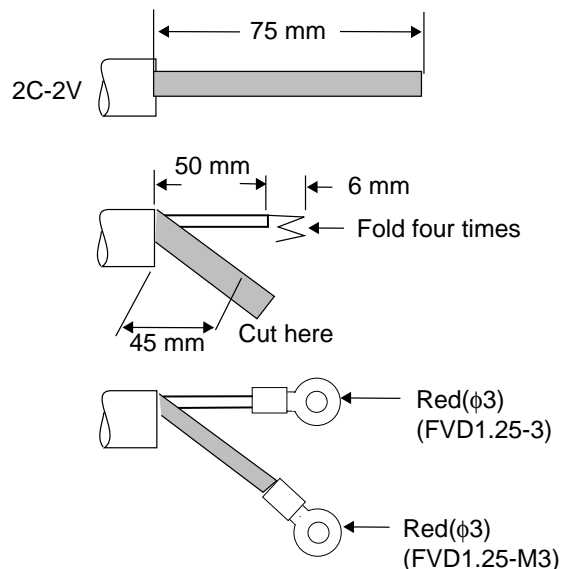
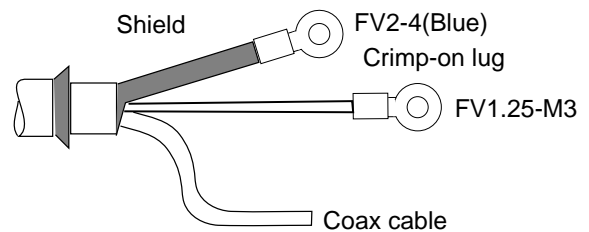
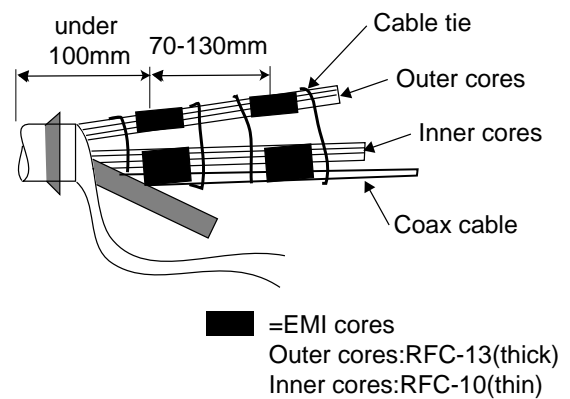
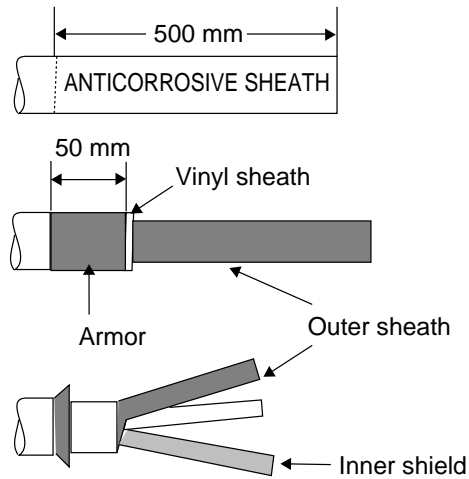


Figure 2-8 How to fabricate signal cable RW-6895

## 2.2 Display Unit Connections

Two cables are terminated at the display unit: the signal cable RW-4873 or RW-6895 and the power cable. The signal cable, available in lengths of 15m, 20m or 30m, comes with a connector preattached to it for connection to the display unit.

### Fabricating power cable DPYCY-3.5

- 1) Remove the vinyl jacket by 150mm.
- 2) Cut off jute tape wrapped around the braided shield.
- 3) Unravel the braided shield to expose the cores by about 120mm.
- 4) Slip the terminal cap onto the core.
- 5) Remove insulation of cores by about 10mm. Fix crimp-on lugs FV5.5-4 to the cores and braided shield.
- 6) Cover the braided shield with vinyl tape, leaving the portion which will lie inside the cable clamp untaped.

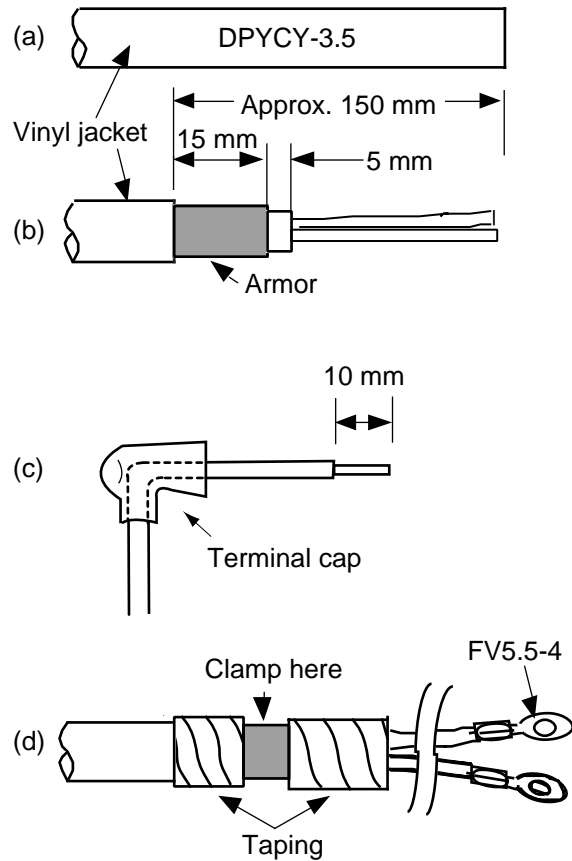
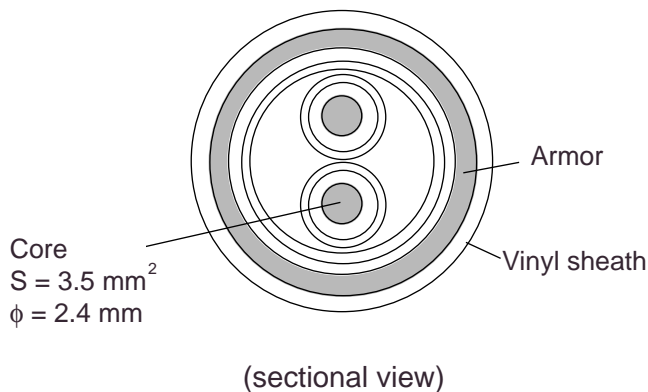
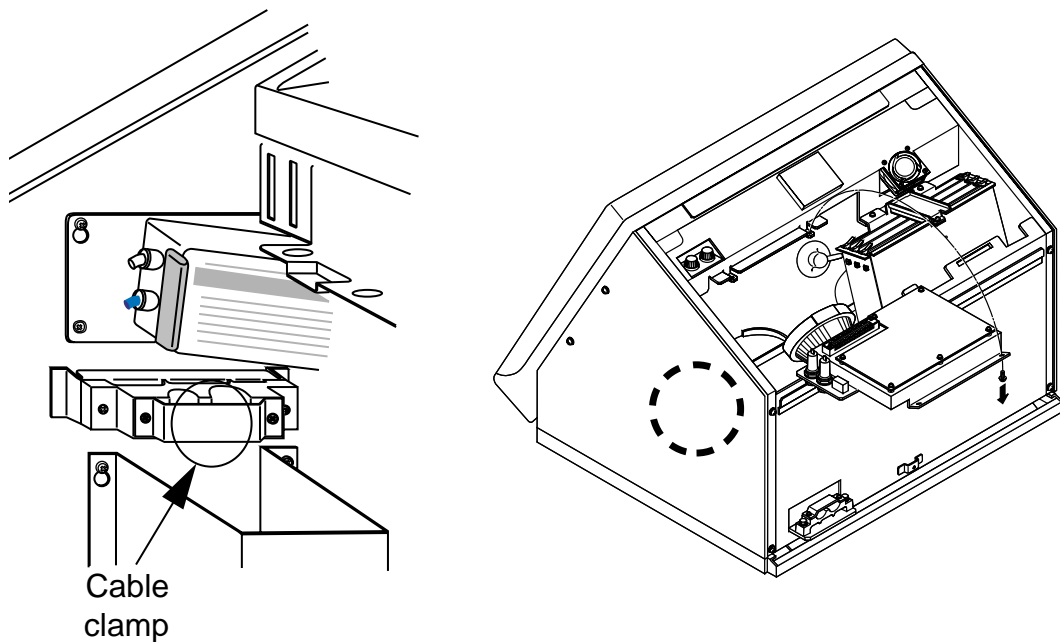


Figure 2-10 How to fabricate power cable DPYCY-3.5

## Leading in cables to the display unit

To lead in cables easily, unfasten the cable clamp at the right side of the display unit.



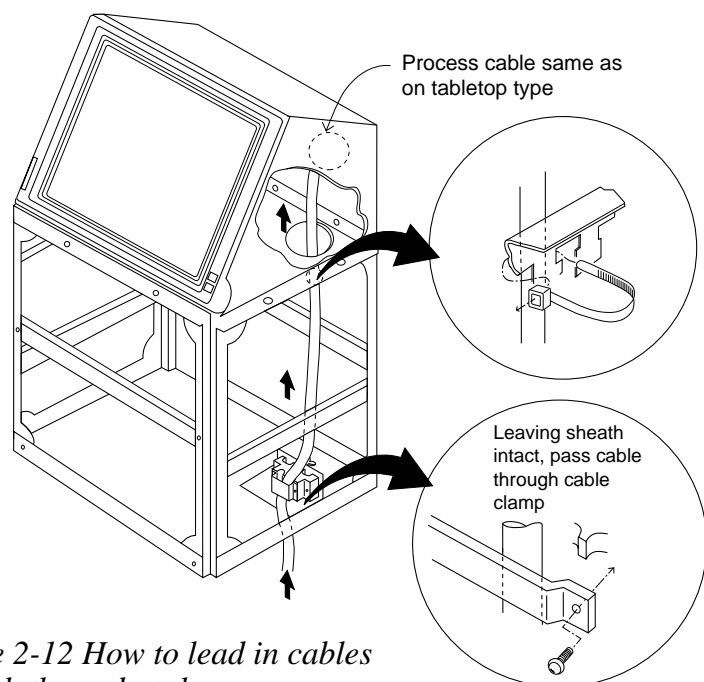
*Figure 2-11 Location of cable clamp inside the display unit*

### Tabletop

Cables can be led in through the cable gland at the rear or underside of the unit.

### Pedestal

Lead in cables through the cable gland at the bottom right-hand side of the pedestal. Pass cables through the cable clamp and tighten the cable clamp. Fix cables to the pedestal frame with cable ties as shown in Figure 2-12. Finally, pass cables through the cable clamp at the right side of the display unit and then tighten the cable clamp.

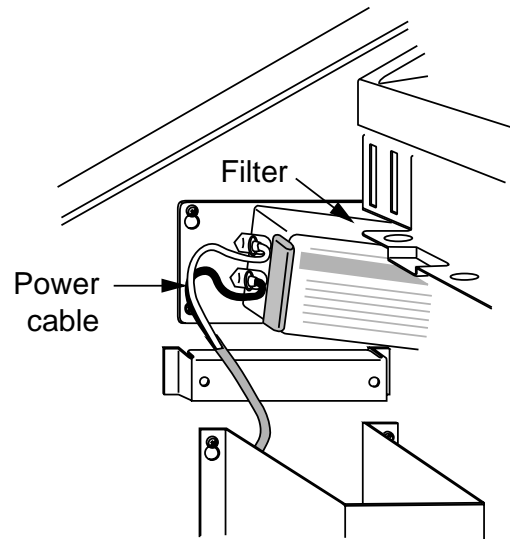


*Figure 2-12 How to lead in cables through the pedestal*

## Connections

### Power cable

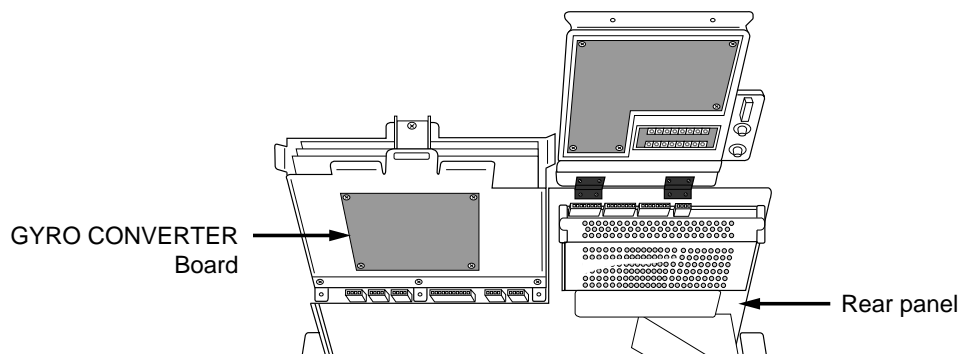
Connect the power cable to the filter at the right hand side of the display unit. Cover the filter terminals with the terminal caps (supplied) to insulate the terminals.



*Figure 2-13 Location of filter inside the display unit*

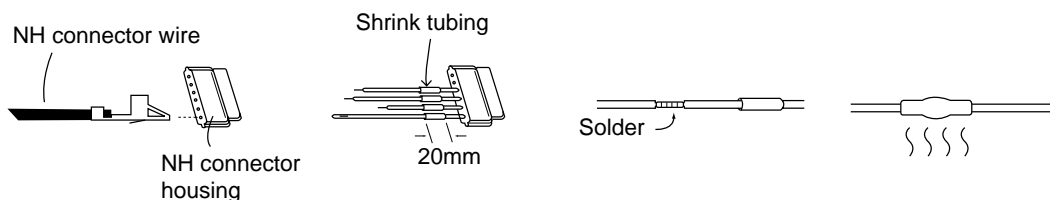
### Gyro signal

Solder the 5 pin and 3 pin VH connectors (supplied) to the gyrocompass cable. Plug in the connectors on the GYRO CONVERTER Board. For further details, see page 4-2.



*Figure 2-14 Location of GYRO CONVERTER Board*

#### **HOW TO ATTACH NH CONNECTOR TO SIGNAL CABLE**



① Insert NH connector wire into NH connector housing.


② Cut shrink tubing in 20 mm lengths and slip onto each wire.

③ Solder connector to signal cable.

④ Heat shrink tubing with soldering iron.

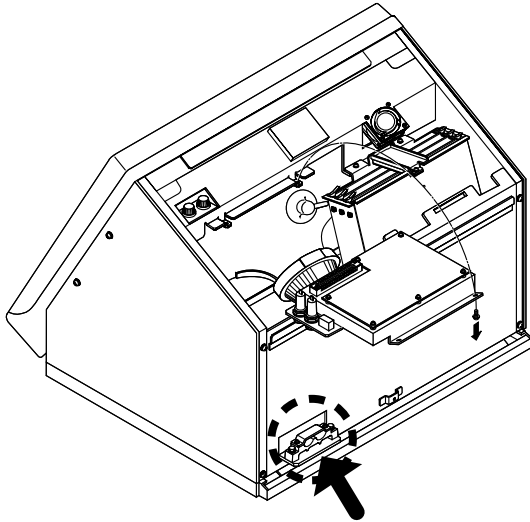
## Grounding

The display unit must be grounded from a grounding stud having a wing nut located at the point shown in Figure 2-15.

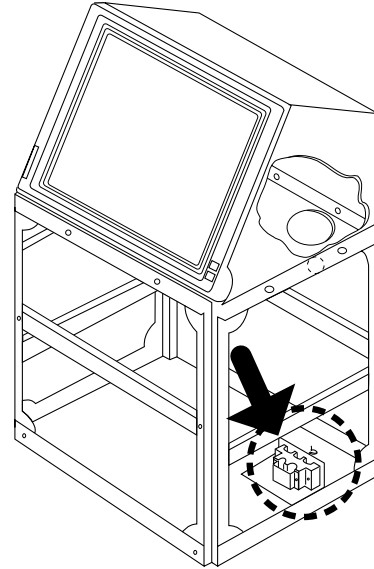


# CAUTION

An ungrounded unit can cause electrical shock when its metallic parts are touched and give off or receive electromagnetic interference.



Tabletop type



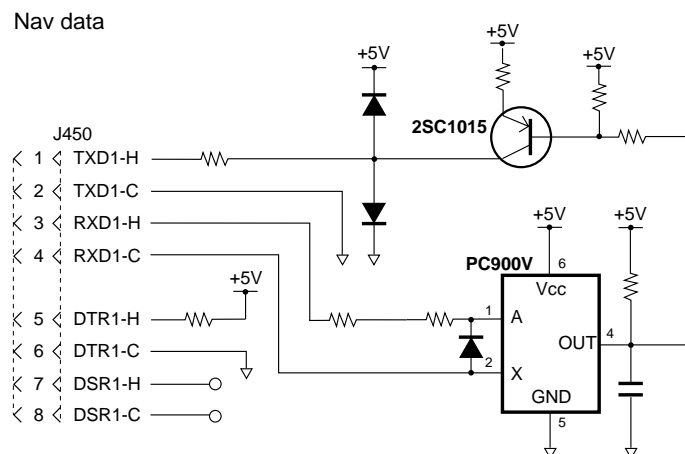
Pedestal type

*Figure 2-15 Grounding the display unit*

## Radar buoy

Solder the radar buoy signal line to the "BUOY" connector on the VDA Board. Connect the trigger line to the corresponding connector on the INT Board.

## Signal input/output circuit (INT Board INT-9170)



*Figure 2-16 INT Board circuit*

For other input/output circuits, see the circuit diagram of the INT Board at the back of this manual.

*Table 2-1 Input and output signals on the INT Board*

Signal name	Name on pcb	Connector no.	Connector type	Applicable equipment	Remarks
<b>Input Signal</b>					
Gyro signal		J4* J5*	VH, 5 pin VH, 3 pin		*: On pcb A64P1106 (option)
Speed log signal	LOG	J448	NH, 3 pin		200 pulses/nm, etc.
Current indicator signal (tide)	NAV COURSE	J459	NH, 4 pin		Not used
Current indicator signal (speed)	NAV SPEED	J460	NH, 3 pin		Not used
Radar buoy signal	RADAR BUOY	J445	NH, 4 pin		
Remote display signal	EXT-RADAR or RJ-7	J458	NH, 8 pin		
Rudder angle signal	ROT RUDDER	J464	NH, 7 pin		
<b>Output Signal</b>					
External ARPA signal	EXT-ARPA	J444	NH, 8 pin	FA-2805	heading, bearing, Tx trigger
Slave display signal	SLAVE	J442 J443	NH, 8 pin	CD-140, CD-141, GD-500, FMD-800, FMD-8000 *1  *1: Display unit for FR-2800 series radar can be used as slave display unit.	heading, bearing, video, Tx trigger
Buzzer signal	EXT-BUZ	J451	NH, 3 pin	OP03-21-3	buzzer drive signal
Buzzer signal (AC)	EXT-BUZ (AC)	J452	NH, 2 pin	Speaker w/amp	speaker signal
Monitor signal		J449	NH, 10 pin		VER synchronous, HOR synchronous, video (NTSC format)
RJ-8	RJ-8	J456	NH, 4 pin		
<b>Input/Output Signal</b>					
INS data	INS. DATA	J455	NH, 5 pin		
RJ-7	RJ-7	J457	NH, 15 pin NH, 8 pin		
Nav data	N AV DATA	J450	NH, 8 pin		
ARPA data	ARPA DATA	J454	NH, 5 pin		



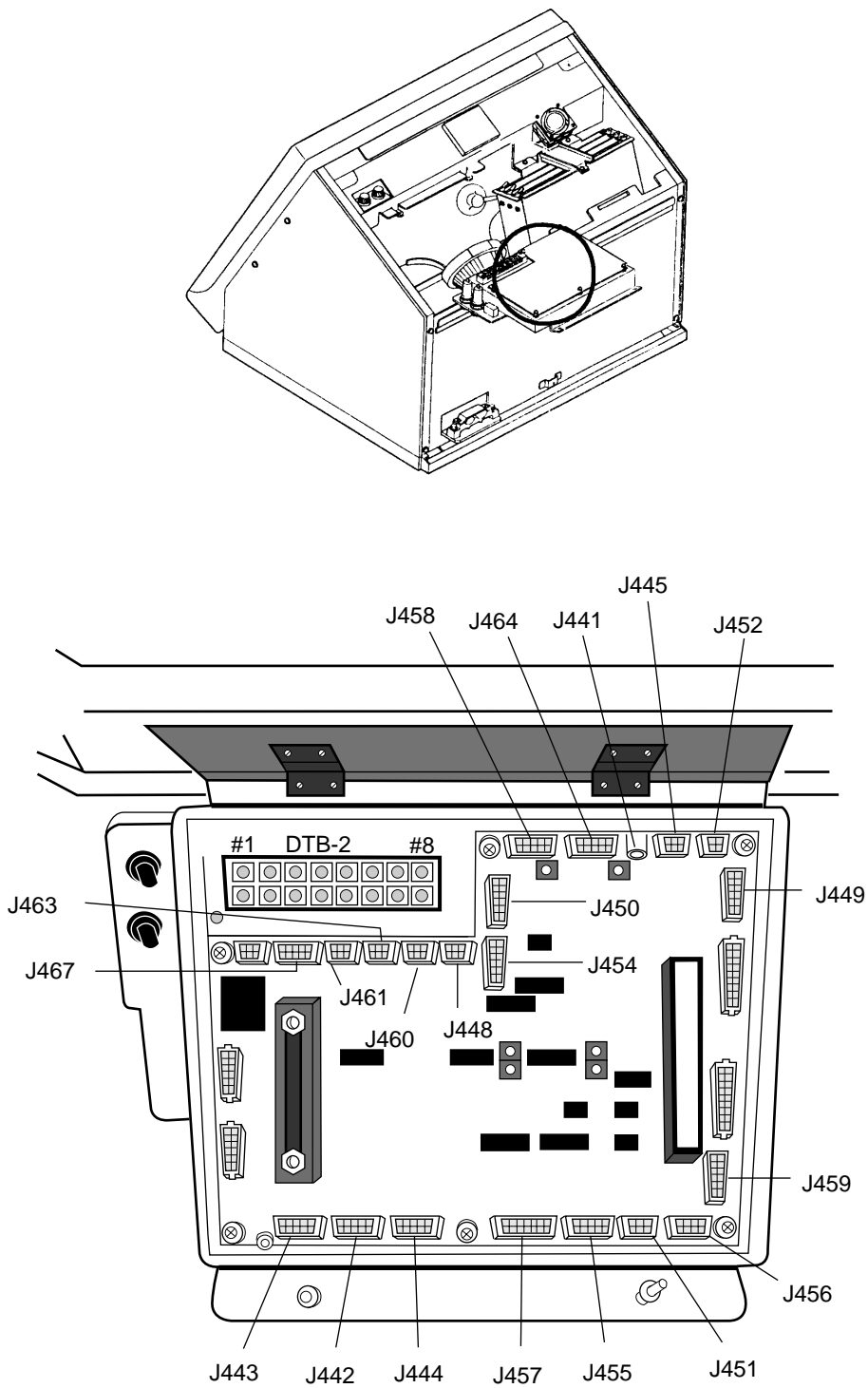
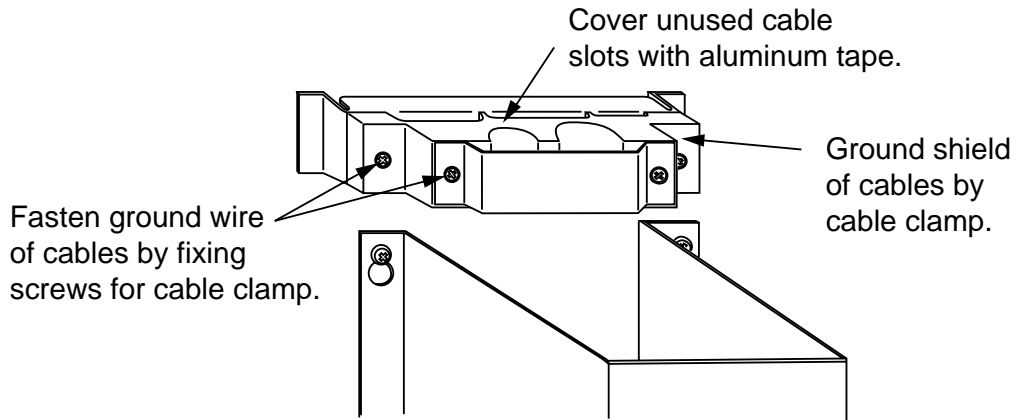


Figure 2-17 Location of connectors on the INT Board

## Grounding cables and covering unused cable slots in the cable clamp



*Figure 2-18 Cable clamp*



### **CAUTION**

- 1) The display unit must be grounded. Failure to ground the unit may cause electrical shock when its metallic parts are touched and give off or receive electromagnetic interference.
- 2) Cover unused cable slots in the cable clamp with aluminum tape to prevent foreign objects from falling into the display unit through the cable slots.

## 2.3 Changing Power Specifications

This radar can be powered by 100V AC or 220V AC, and is set at the factory for connection to a 100V power supply. To power the unit by 220V AC, remove jumper JP13 on the POWER Board as shown in the procedure below.

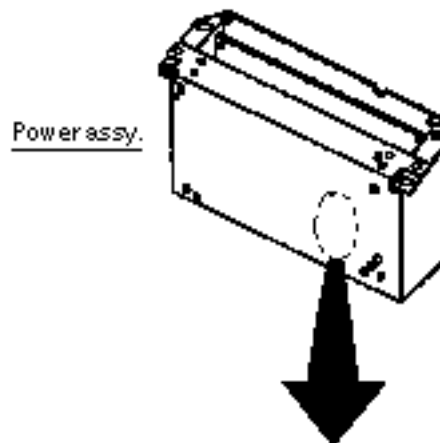
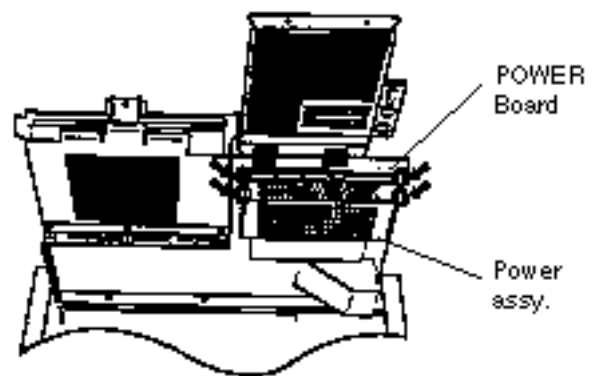


# CAUTION

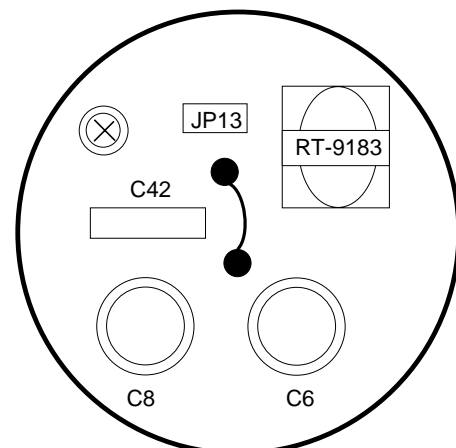
Turn off the power before executing the procedure shown below.

### Procedure

- 1) Turn off the power.
- 2) Unfasten the four screws circled in the illustration at right.
- 3) Remove the power assembly.
- 4) Remove the power assembly cover.
- 5) For 220V power supply, remove jumper wire JP13 on the POWER Board.
- 6) Mount the power assembly.



Power	Jumper wire JP13
100 VAC	Short
220 VAC	Remove



# 3. INITIALIZATION AND ADJUSTMENT

## 3.1 Menus for Initialization and Adjustment

### Accessing the menus

The menus for initialization and adjustment of this radar are locked to prevent adjustment by the user. To access them;

- 1) Turn off the power.
- 2) Turn on the #4 segment of DIP Switch S1 on the SPU Board.

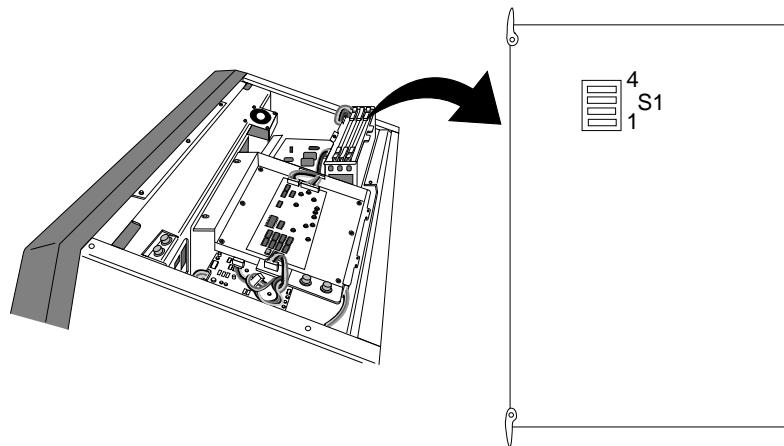


Figure 3-1 Display unit (top view, cover removed) and SPU Board

### Menu operation

- 1) Press the [RADAR MENU] key.
- 2) Press appropriate numeric key to select menu desired.
- 3) Press numeric key to select item.
- 4) Press same numeric key pressed in step 3 to select option.
- 5) Press [ENTER] to register selection.

### Menu description and menu tree

See pages 3-6 and 3-11, respectively.

### Restoring default settings

- 1) Press [RADAR MENU] [0] [0] [2] [0] [0] [0] [0] to select FACTORY DEFAULT on the INITIAL SETTING 4 menu.
- 2) Press [ENTER] key.
- 3) Wait for 10 seconds.
- 4) Turn power off, and on again.

- 5) Press [RADAR MENU] [0] [0] [2] [0] [0] [0] to open the INITIAL SETTING 4 menu.
- 6) Confirm that FR-2815, 2825 is selected at MODEL.

## 3.2 Heading Alignment

Antenna unit mounted error (heading reed switch timing error) can be compensated at the display unit.

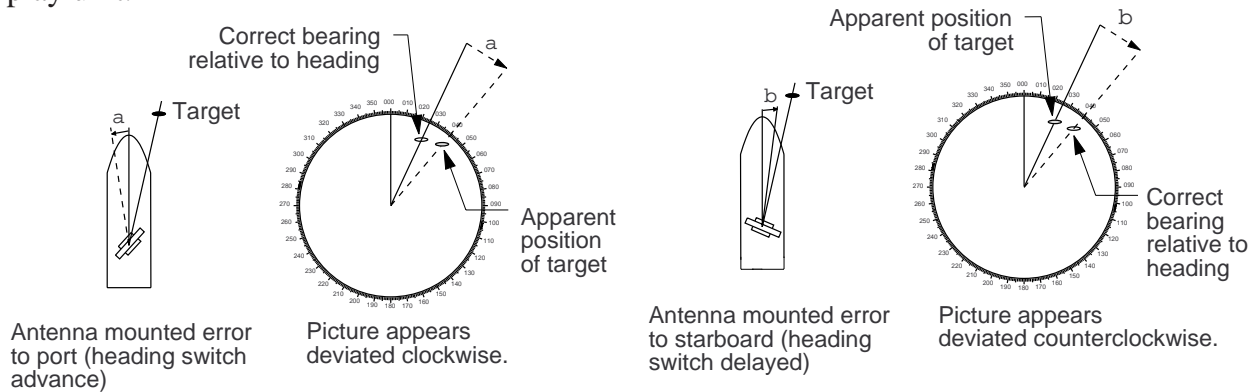


Figure 3-2 Heading alignment error

### Procedure

- 1) Turn on the power. Press [RADAR MENU] [0] [0] [2] [2] to select HD ALIGN on the INITIAL SETTING 1 menu.
- 2) Select a target echo (by gyrocompass, for example) at a range between 0.125 and 0.25nm, preferably near the heading mark.
- 3) Operate the EBL control to bisect the target echo. (The value shown on the display is antenna position in relation to ship's bow.)
- 4) Press [ENTER] to finish.

## 3.3 Adjusting Sweep Timing

Sweep timing differs with respect to the length of the signal cable between the antenna unit and the display unit. Adjust sweep timing at installation to prevent the following symptoms:

- The echo of a "straight" target (for example, pier), on the 0.25nm range, will appear on the display as being pulled inward or pushed outward. See Figure 3-3.
- The range of target echoes will also be incorrectly shown.

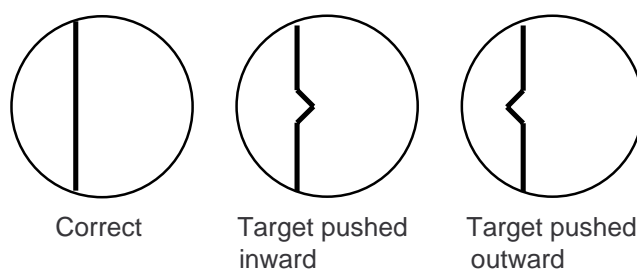


Figure 3-3 Examples of correct and incorrect sweep timings

## Procedure

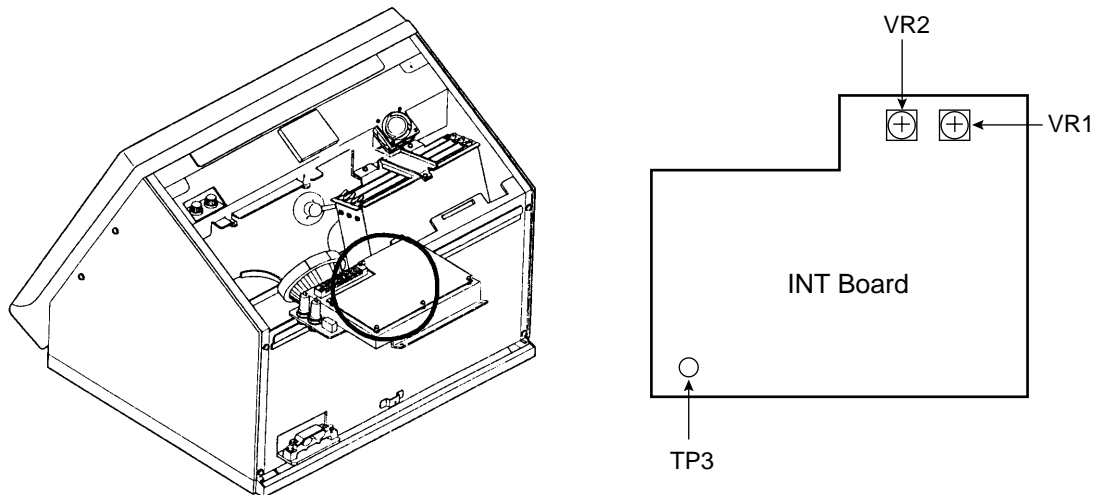
- 1) Turn on the power. Press [RADAR MENU] [0] [0] [2] [3] to select TIMING ADJ on the INITIAL SETTING 4 menu.
- 2) Transmit on the 0.25nm range.
- 3) Adjust radar picture controls to display picture properly.
- 4) Select a target echo which should be displayed straightly.
- 5) Adjust the VRM control to straighten the target echo.
- 6) Press the [ENTER] key.

## 3.4 Adjusting Video Signal Level

When the signal cable is very long, the video amplifier input level decreases, shrinking target echoes. To prevent this, confirm (and adjust if necessary) video amplifier input level.

### Procedure

- 1) Connect an oscilloscope to TP3 on the INT Board (INT-9170).
- 2) Transmit on the 12nm range. Take trigger at TP10 on the same board.
- 3) Adjust VR1 on the INT Board so the value of TP3 is 4Vpp. (For secondary display, adjust VR2 for same level.)



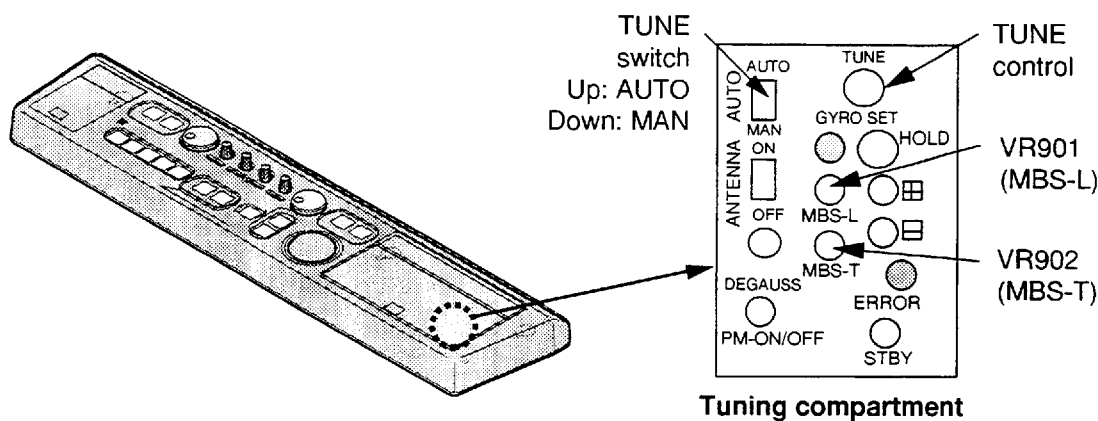
*Figure 3-4 Location of INT Board*

## 3.5 Suppressing Main Bang

If main bang appears at the screen center, suppress it as follows.

### Procedure

- 1) Turn on the power. Transmit on a long range and then wait ten minutes.
- 2) Adjust [GAIN] control to show a slight amount of noise on the display.
- 3) Select the 0.25nm range. Adjust the [A/C SEA] control to suppress sea clutter.
- 4) Open the tuning compartment on the control unit.
- 5) Set VR901(MBS-L) at two o'clock and then slowly turn VR902 (MBS-T) clockwise to suppress main bang.
- 6) If main bang still exists, turn VR901 clockwise slightly, and then slowly turn VR902 clockwise. **Note that excessive main bang erases targets in close range.**



*Figure 3-5 Control unit, location of tuning compartment*

## 3.6 Confirming Tuning

The radar receiver can be tuned both automatically and manually. Confirm that the radar can be tuned both automatically and manually.

### Procedure

- 1) Turn on the power. Set the TUNE switch in the top right hand panel to MANU.
- 2) Transmit on the 48nm range.
- 3) Adjust sensitivity and picture brilliance. Turn the [A/C SEA] and [A/C RAIN] controls fully counterclockwise (off).
- 4) While observing the picture, turn the [TUNE] control in the tuning compartment slowly counterclockwise (clockwise) more than twice to get best (worst) tuning point.

- 5) Turn the [TUNE] control slowly clockwise (counterclockwise) to display the longest tuning bar.
- 6) Set the TUNE switch to AUTO and wait about 10 seconds (about four rotations of the antenna).
- 7) Confirm that the radar found best tuning point. Peak tuning is obtained when about 80% of the tuning indicator lights.

### 3.7 Confirming Magnetron Heater Voltage

Magnetron heater voltage is adjusted at the factory. However, confirm that it is within the prescribed rating.

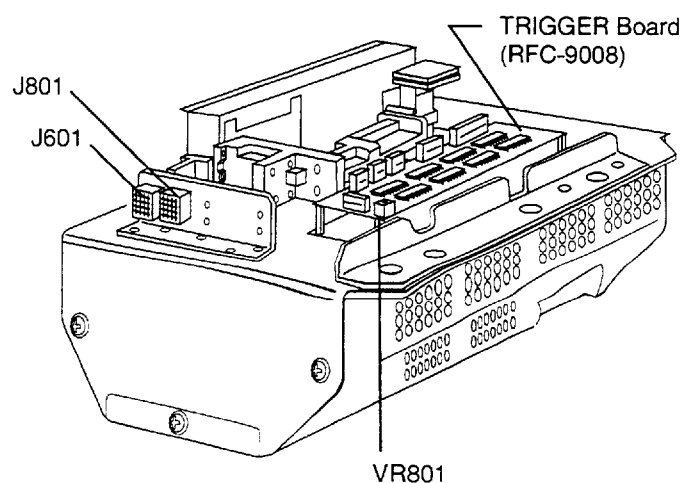
*Table 3-1 Magnetron heater voltage rating*

Measuring conditions	FR-2815 (10kW)	FR-2825 (25kW)	Tuning point
ST-BY, 0.125nm	7.4V to 7.6V	8.2V to 8.4V	VR801 on the TRIGGER Board (RFC-9008)
Tx on 120nm range	measurement not necessary	6.5V to 7.5V	

#### FR-2825, FR-2815

##### Procedure

- 1) Turn on the power. Press [RADAR MENU] [0] [0] [2] [0] [5] to set "SCANNER STOPPED" for "TX."
- 2) Remove the fuse (F3, 0.5A) at the rear of the display unit.
- 3) Turn off the ANTENNA switch in the tuning compartment.
- 4) Turn off display brilliance.
- 5) Measure voltage between pins #12(+) and #11(-) on connector P801 in the antenna unit.
- 6) If the voltage is not within the rating shown in Table 3-1, adjust potentiometer VR801 on the TRIGGER Board (RFC-9008).
- 7) Referring to step 1, set "SCANNER STOPPED" for "ST-BY."
- 8) Insert the fuse and turn on the ANTENNA switch.



*Figure 3-6 Transceiver module*



## 3.8 Initial Setting Menus

The INITIAL SETTING menus (four menus) setup the radar according to expected usage, authorities specification, ship's characteristics, operator's preference, etc. Set items on each menu accordingly.

### INITIAL SETTING 1 menu

HD ALIGN: Compensates for heading error in bow direction.

TIMING ADJ: Adjusts sweep timing, which varies according to signal cable length.

ANT HEIGHT: Enter height of antenna above water.

LOG PULSE: Enter speed log's pulse rate.

SHIP INFORMATION: Enter ship's characteristics; length, width, radar position, nav antenna position, turn rate, and speed rate. Those data will be used for the anchor watch alarm, docking, etc.

ON TIME, TX TIME: Shows number of hours the radar has been turned on and transmitted, respectively. Value can be change to monitor magnetron usage, etc.

### INITIAL SETTING 2 menu

KEY BEEP: Turns key response beep on or off.

SCANNER STOPPED: Set to ST-BY in normal use. TX enables transmission state without antenna rotation.

VIDEO SIGNAL: Set to ANLG (analog) for normal use. Set for DGTL to adjust QV (Quantized Video).

ALARM LEVEL: Sets echo strength which triggers guard alarm. "7" is strongest echo; "4" is medium strength echo.

DISPLAY: Select radar display function; main or sub (slave).

DEAD SECTOR: Sets area (up to 2) where no radar pulses will be transmitted. For example, set the area where an interfering object at the rear of the antenna would produce a dead sector (area where no echoes appear) on the display. To enter an area, select ON and enter relative bearing range of the area.

### INITIAL SETTING 3 menu

TRAIL RESTART: Selects whether to restart or discontinue echo trailing when changing the range. ON restarts trailing on newly selected range; OFF discontinues trailing.

ECHO AVG W/O GYRO: Echo averaging can be turned on without gyrocompass connection.

CURSOR GYRO SCALE: Bearing scale may be shown in degrees or compass points.

CTR ECHO STRETCH: Turn on to enlarge echoes in the range up to the first range ring.

VIDEO CONTRAST: For factory use. Do not change setting.

MAXIMUM RANGE: For factory use. Do not change setting.

ECHO FULL COLOR: Echoes may be displayed in single or multi-color.

INDEX LINES: Selects the number of index lines to display; 2 or 6.

## **INITIAL SETTING 4 menu**

MODEL: Select radar model. Pulswidth, pulse repetition rate and STC curve change according to selection.

RJ-5, RJ-7 and RJ-8: Selects which Interswitch unit to use.

ANT A: Select model of antenna A.

ANT B: Select model of antenna B.

CABLE L: Set for "500."

FACTORY SETTING: Restores all menus' default settings.

## **After entering initial settings**

Turn off the #4 segment of DIP Switch S1 on the SPU Board to disable the menus for initialization and adjustment.

### 3.9 Setting the Function Keys

This radar has four function keys which automatically set up the radar according to the conditions ascribed to them. Confer with ship owner and radar operator to determine suitable program for each key.

Assign task to each function key;

Function key #1: picture setup

Function key #2 and #3: picture setup or specific operation

Function keys #4: specific or watch function

The table below and menu on the next page show the programs available.

Table 3-2 Operation setup conditions

Picture setup	Function
RIVER	River navigation
BUOY	Detecting navigation buoys, small vessels and other small surface objects
SHIP	Detecting vessels
SHORT	Short range detection using a range of 3 nm or less on calm seas.
LONG	Long range detection using a range of 6 nm or larger
CRUISING	Cruising using a range of 1.5 nm or larger
HARBOR	Short range navigation in a harbor using range of 1.5 nm or less
COAST	Coastal navigation using range of 12 nm or less
OCEAN	Transoceanic voyage using range of 12 nm or larger
ROUGH SEA	Optimum setting for rough weather or heavy rain

[FUNCTION KEY 1]		
1	[SYSTEM SETTING 1]	
2	FUNCTION	FUNC1/RIVER/BUOY/ SHIP/SHORT/LONG/ CRUISING/HARBOR/ COAST/OCEAN/ ROUGH SEA (FLOAT/BIRD) *1
3	INT REJECT	OFF/1/2/3
4	ECHO STRETCH	OFF/1/2
5	ECHO AVERAGE	OFF/1/2/3
6	A/C AUTO	OFF/ON
7	[FUNC1 PULSE WD]	(see menu below)
8	NOISE REJ	OFF/ON

[FUNCTION KEY 2] *2		
1	[SYSTEM SETTING 1]	
2	FUNC KEY2	PICTURE/OPERATION HU/HU TB/CU/NU/ TM/TRAIL/CU, TM RESET/OFF CENTER/ ECHO STRETCH1/ ECHO STRETCH2/ PLS WD1/PLS WD2/ ECHO AVG1/ECHO AVG2/ ECHO AVG3/ECHO COLOR/TRAIL BRILL/ PANEL BRILL/CHAR BRILL/NOISE REJ
3	OPERATION	

[FUNC1 PULSE WD] *3			
1	[FUNCTION KEY 1]		
2	0.5	NM	S1/S2
3	0.75	NM	S1/S2
4	1.5	NM	S1/S2/M1
5	3	NM	S2/M1/M2
6	6	NM	M1/M2/L
7	12-24	NM	M2/L

[FUNCTION KEY 4]		
1	[SYSTEM SETTING 1]	
2	FUNC KEY4	OPERATION/WATCH ALARM
3	WATCH ALARM INTERVAL	6/10/12/15/20 MIN

#### Notes

\*1: Available on "R" specification radar.

\*2: Same menu appears for function key #3.

\*3: Same menu appears for function keys #1, #2 & #3.

Shaded items are set at the factory; do not change their settings. See note on next page.

Figure 3-7 Function key menus

## Procedure for setting function keys

### Function key #1

- 1) Press [RADAR MENU].
- 2) Press [0].
- 3) Press [3] to select FUNCTION KEY 1.
- 4) Press [2] to select picture setup condition desired.
- 5) Press [8]. (See the note on the next page.)

### Function key #2 & #3

- 1) Press [RADAR MENU].
- 2) Press [0].
- 3) Press [4] to select FUNCTION KEY 2.
- 4) Press [2] to select PICTURE or OPERATION.

- 5) Press [3] to select picture setup condition (or specific operation) desired.
- 6) Press [9]. (See the note below.)

#### **Function key #4**

- 1) Press [RADAR MENU].
- 2) Press [0].
- 3) Press [5] (FUNCTION KEY 3) or [6] (FUNCTION KEY 4).
- 4) Press [2] to select OPERATION or WATCH ALARM.
- 5) Press [3] to select picture setup condition (or watch alarm interval).
- 6) Press [9]. (See the note which follows.)

**Note:** Each picture setup condition is programmed with optimal settings for interference rejection, echo stretch, echo averaging, automatic clutter removal, pulsewidth, and noise rejection. Therefore, the settings for those items on the function key menus should not be changed; any adjustment may adversely affect the target detection ability of the radar. If change is absolutely necessary, consult with nearest FURUNO representative or dealer.

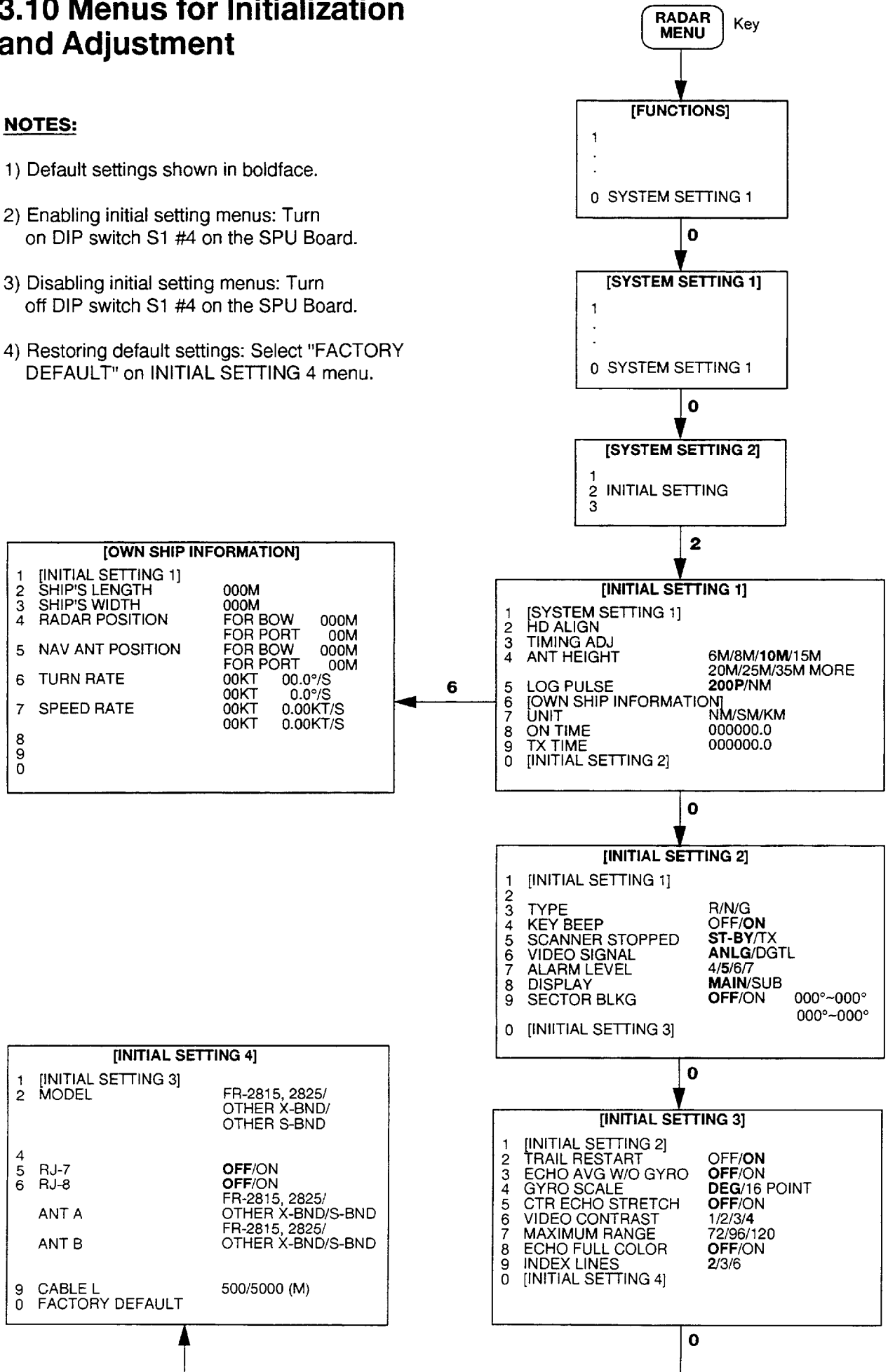
#### **Attach label to function keys**

After setting the function keys, attach appropriate label (supplied) to them.

### 3.10 Menus for Initialization and Adjustment

**NOTES:**

- 1) Default settings shown in boldface.
- 2) Enabling initial setting menus: Turn on DIP switch S1 #4 on the SPU Board.
- 3) Disabling initial setting menus: Turn off DIP switch S1 #4 on the SPU Board.
- 4) Restoring default settings: Select "FACTORY DEFAULT" on INITIAL SETTING 4 menu.



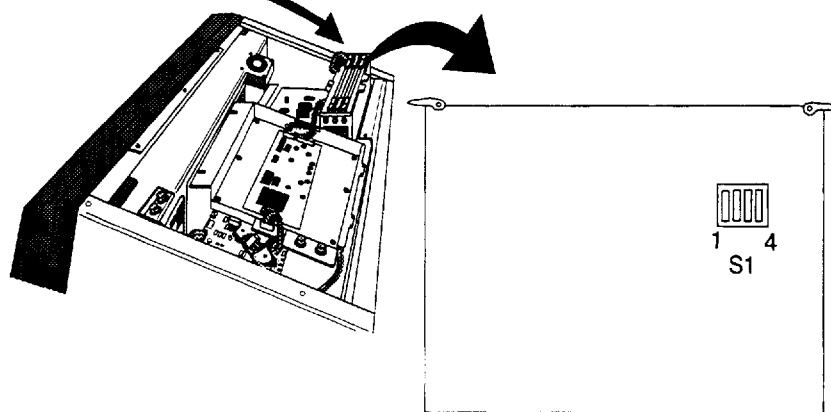
### 3. 11 How to adjust ARP board

#### Procedure

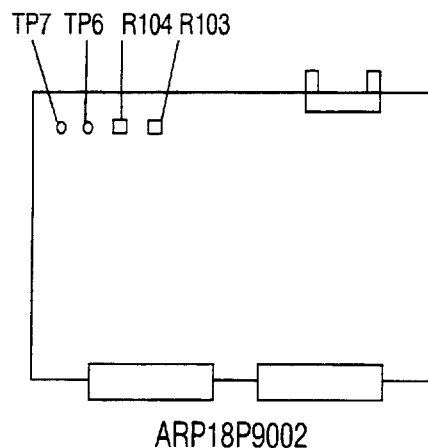
- 1) Take out the SPU Board SPU-9111 from the pcb compartment in the display unit.
- 2) Turn on #4 of DIP Switch S1.
- 3) Set the SPU Board in pcb compartment.
- 4) Set the radar as follows and transmit on 6 nm range.

A/C SEA control: fully CCW  
A/C RAIN control: fully CCW  
GAIN control: fully CCW

From the back SPU,ARP  
and RP(option) Boards.



- 5) Set the digital multimeter to DCV range, and connect to the following points on the ARP Board.  
+: TP7 (VS+)  
- : TP6 (VS-)
- 6) Adjust potentiometer R104 ("OFFSET") on the ARP Board for the multimeter reading of +0.09 to 0.13V.



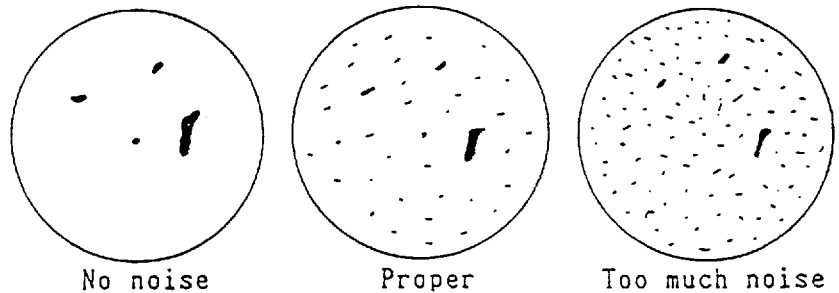
7) Set the controls and switches as follow.

A/C SEA control: fully CCW (same as step 4)  
 A/C RAIN control: fully CCW (same as step 4)  
 GAIN control: fully CW  
 INT REJECT key: OFF  
 RANGE: 24 nm  
 Echo Stretch (in menu): OFF

8) Select Video signal level to "DGTL" on the INITIAL SETTING 2 menu.  
 (Keystrokes; RADAR MENU, 0, 0, 2, 0, 0, 6 and 6.)

9) Press the ENTER key.

10) Adjust potentiometer R103 ("LEVEL") on the ARP Board so that random noise faintly appears.

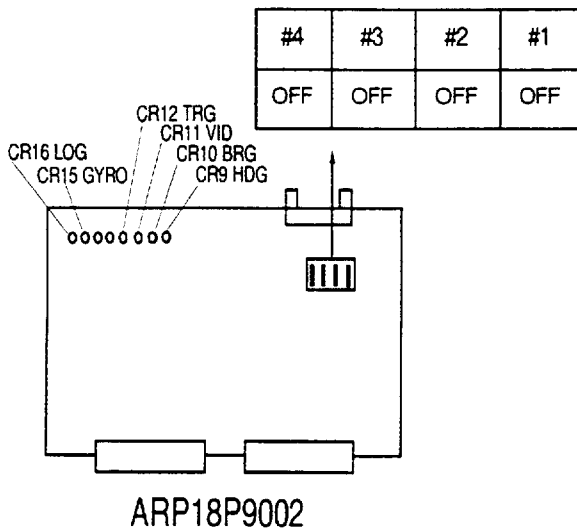


11) Select video level to "ANLG", and press the ENTER key.

12) Turn off #4 of DIP switch S1.

## Confirmation after installation

Transmit the radar after connection with speed log and gyrocompass. Confirm that all red LEDs, CR9, 10, 11, 12, 15 and 16, are off, provided that the ship's speed is not zero. If any signal is not applied, the corresponding LED lights.





## 3.12 Installation Check List

Tick box to indicate completion.

- Hoist rings removed?
- Rubber mat placed between antenna unit and mounting platform?
- Waterproofing gasket on antenna unit oriented correctly?
- Heading aligned?
- Sweep timing adjusted?
- Main bang suppressed?
- Tuning checked?
- Magnetron heater voltage checked?
- Antenna height entered?
- Log pulse selected?
- GYRO CONVERTER Board set up?
- DIP Switch S1 #4 turned off?
- Function keys set and function key labels attached?
- Unused cable slots in cable clamp covered with aluminum tape?

# 4. INSTALLATION OF GYRO CONVERTER GC-8 (option)

The Gyro Converter GC-8, incorporated inside the radar display unit, converts analog gyro-compass reading into digital coded bearing data for display on the radar display.

This section explains how to install and setup the GC-8 (mainly consisting of the GYRO CONVERTER Board) and set it up according to gyrocompass connected.

## 4.1 General Procedure for Installing and Setting up the GYRO CONVERTER Board

- 1) Turn off the power.
- 2) Remove the top cover.
- 3) Connect the GYRO CONVERTER Board to the MOTHER Board (cables supplied with the GC-8) as follows:



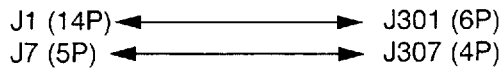
*Table 4-1 Contents of GC-8 installation kit*

Name	Type	Code No.	Qty
GYRO CONVERTER Board	64P1106	004-412-200	1
Spacer	SQ-10	000-801-678	4
Washerhead Screw	M3 x 8	008-456-404	4
PH-XH Connector	03-1761 (14P-6P)	008-456-130	1
NH-XH Connector	03-1762 (5P-5P)	008-456-140	1
Label	64-014-2021-1	100-132-701	1
VH Connector Assy.	03-1763 (5P)	008-456-150	1
VH Connector Assy.	03-1764 (3P)	008-456-160	1
Spare Fuses	FGMB 2A 250V	000-122-000	4

*Figure 4-1 Display unit, top view*

- 4) Connect the GYRO CONVERTER Board to the MOTHER Board (c ables supplied with GC-8) as follows:

**GYRO CONV. Board      MOTHER Board**



- 5) Confirm gyrocompass specifications and set up the DIP switches and jumper wires on the GYRO CONVERTER Board according to gyrocompass connected;
- Confirming gyrocompass specifications: see next page
  - Setting jumper wires and DIP switches by gyrocompass specifications: page 4-4
  - Setting jumper wires and DIP switches by make and model of gyrocompass: page 4-6
  - Location of jumper wires and DIP switches: page 4-7
- 6) Solder the gyrocompass cable to the VH connector assemblies (supplied).
- 7) Connect the VH connectors to the GYRO CONVERTER Board as shown in the table at right.
- 8) Attach instruction label (supplied) to the rear side of the top cover.
- 9) Close the panel.
- 10) Turn on and off the power to reset the CPU.

Connector		Gyrocompass	
		Step type	Synchro type
J4	#1	S1	S1
	#2	S2	S2
	#3	S3	S3
	#4		
	#5	F. G.	F. G.
J5	#1	—	R2
	#2	COM	R1
	#3	F. G.	F. G.

## 4.2 Connection of External Power Supply

Connect an external power supply when the repeater signal is step-by-step type and the step voltage is below 20V or output voltage is less than 5W.

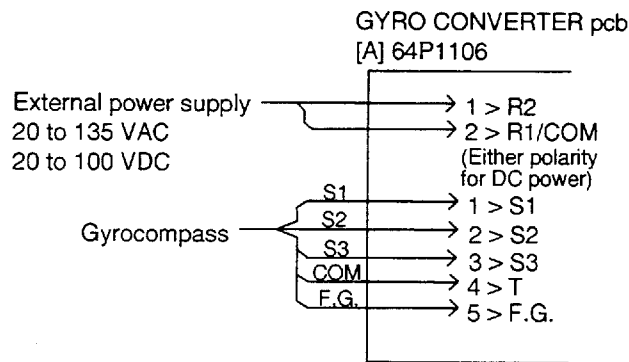


Figure 4-2 Connection of external power supply to GYRO GYRO CONVERTER Board

## 4.3 Confirming Gyrocompass Specifications

Follow the flow chart in the figure below to confirm gyrocompass specifications.

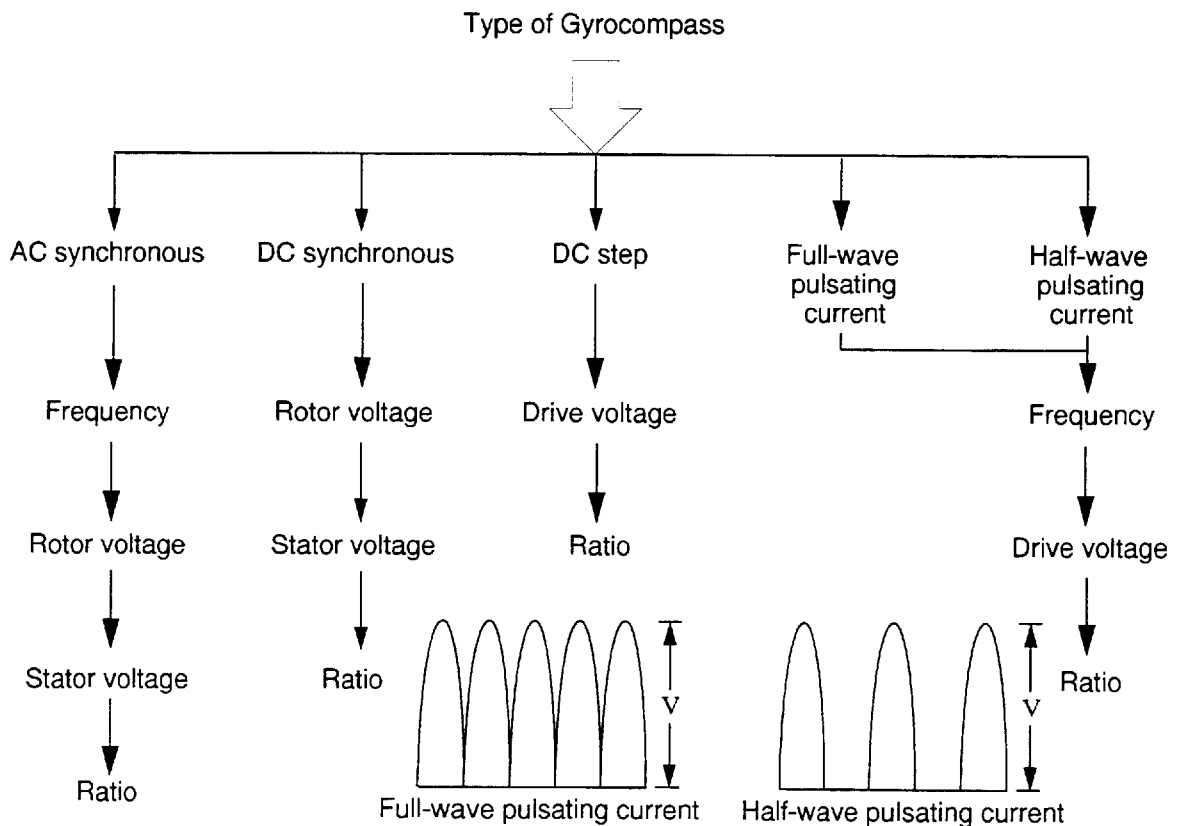


Figure 4-3 Confirming gyrocompass specifications

## 4.4 Changing Settings on the GYRO CONVERTER Board

### Default setting

In the default setting all DIP switches are off and all jumper wires are set to "#1." (Note that jumper wire JP1's setting is #1, #2, and #3.) In those settings the gyrocompass having the following specifications can be directly connected; modification of the GYRO CONVERTER Board is not necessary.

AC synchronous signal: 50/60Hz

Rotor voltage: 60V to 135V AC

Stator voltage: 60V to 135V AC

Gear ratio: 360x

Supply voltage: 30V to 135V AC

If the specifications of the gyrocompass differ from those mentioned above, change jumper wire and DIP switches settings on the GYRO CONVERTER Board. Settings may be changed according to gyrocompass specifications or make and model of gyrocompass (see page 4-6). For the location of DIP switches and jumper wires, see page 4-7.

### Setting method 1: by gyrocompass specifications

#### 1) Gyrocompass type

Gyrocompass type	SW 1-4	SW 1-5	SW 1-6	JP1
AC synchronous	OFF	OFF	OFF	#1, #2, #3
DC synchronous	OFF	OFF	OFF	#2, #3, #4
DC step	ON	OFF	OFF	#4, #5, #6
Full-wave pulsating current	OFF	ON	OFF	#4, #5, #6
Half-wave pulsating current	ON	ON	OFF	#4, #5, #6

#### 2) Frequency

Frequency	SW 1-7	SW 1-8	Remarks
50/60Hz	OFF	OFF	AC synchronous pulsating current
400Hz	ON	OFF	AC synchronous pulsating current
500Hz	OFF	ON	AC synchronous pulsating current
DC	ON	ON	DC synchronous DC step

#### 3) Rotor voltage (between R1 & R2)

Rotor voltage	SW 2-1	JP3
20V to 45V AC	ON	#2
30V to 70V AC	OFF	#2
40V to 90V AC	ON	#1
60V to 135V AC	OFF	#1

#### 4) Stator voltage (between S1 and S2)

Stator voltage	SW 2-2	SW 2-3	JP2
20V to 45V AC, or 20V to 60V DC	ON	OFF	#2
20V to 45V AC, or 20V to 60V DC	OFF	OFF	#2
40V to 90V AC	ON	OFF	#1
60V to 135V AC	OFF	OFF	#1

### 5) Ratio

Ratio	SW1-1	SW 1-2	SW1-3
360x	OFF	OFF	OFF
180x	ON	OFF	OFF
90X	OFF	ON	OFF
36X	ON	ON	OFF

### 6) Supply voltage

Supply voltage	JP4	JP5
20V to 45V AC, or 20V to 60V DC	#2	#2
30V to 135V AC, or 40V to 100V DC	#1	#1

### 7) AD-10 format data Tx interval

Select data transmitting interval for ports 1 to 6 by jumper wires JP6 and JP7.

**Note:** The Tx interval is available in 25 msec or 200 msec. 25 msec is for radar; 200 msec is for all other equipment.

### 8) NMEA-0183 Tx interval

Tx interval	SW2-4
2 seconds	ON
1 second	OFF

## Setting method 2: by make and model of gyrocompass

Table 4-2 Setting GYRO CONVERTER Board by make and model of gyrocompass

Maker	Models	Specification	SW 1-1	SW 1-2	SW 1-3	SW 1-4	SW 1-5	SW 1-6	SW 1-7	SW 1-8	SW 2-1	SW 2-2	SW 2-3	JP1	JP2	JP3	JP4	JP5	
FURUNO	GY-700	DC step 100V 180x 5-wire, open collector	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
Anschutz	Standard 2,3	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#1	
	Standard 4,6	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#1	#1	#1	
	Standard 20	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
Yokogawa Navtec (Plaith type)	C-1/1A/2/3 A-55, B-55	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 22V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	ON	OFF	#1, #2,#3	#2	#2	#1	#1	
	CMZ-250X/ 300X/500	DC synchronous 360x	OFF	OFF	OFF	OFF	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	*	*	
		DC step 35V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
	CMZ-100/200/ 300 C-1Jr,D-1Z/1/3 IPS-2/3	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
CMZ-50 Note	step 35V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	Remo- ve	#2	-	*	*		
Plaith	NAVGAT II/III	AC synchronous 50/60Hz Rotor voltage: 50/60V Stator voltage: 68V 360x	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#2	#2	#1	#1	
Tokimec (Sperry type)	ES-1/2/11 GLT-101/102/ 103/106K/107	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 36x	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1	
	ES-11A/110 TG-200 PR222R/2000 PR237L/H GM 21	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 22V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1	
	MK-14 MOD-1/2/T NK-EN,NK-EI	DC step 70V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
	SR-130/140	DC step 70V 180x 5-wire, open collector	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
	TG-100/5000 PR-357/130/ 140, ES-17 GLT-201/202 /203	DC step 70V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
	TG-6000	DC step 24V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
	GM-11	AC synchronous 50/60Hz Rotor voltage: 100V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1
	SR-120,ES-16 MK-10/20/30	DC step 35V 180x	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	
Kawasaki	GX-81	AC synchronous 50/60Hz Rotor voltage: 100/110V Stator voltage: 90V 90x	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	#1, #2,#3	#1	#1	#1	#1	
Armabrown	MK-10,MKL-1 SERIES1351, MOD-4	DC step 50V 180x COM(+), 3-wire(-)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	OFF	OFF	#4, #5,#6	#2	-	#1	#1	
Robertson	SKR-80	DC step 35V 180x COM(-), 3-wire(+)	ON	OFF	OFF	ON	OFF	OFF	ON	ON	-	ON	OFF	#4, #5,#6	#2	-	#2	#2	

## After changing settings

Turn on and off the power to reset the CPU.

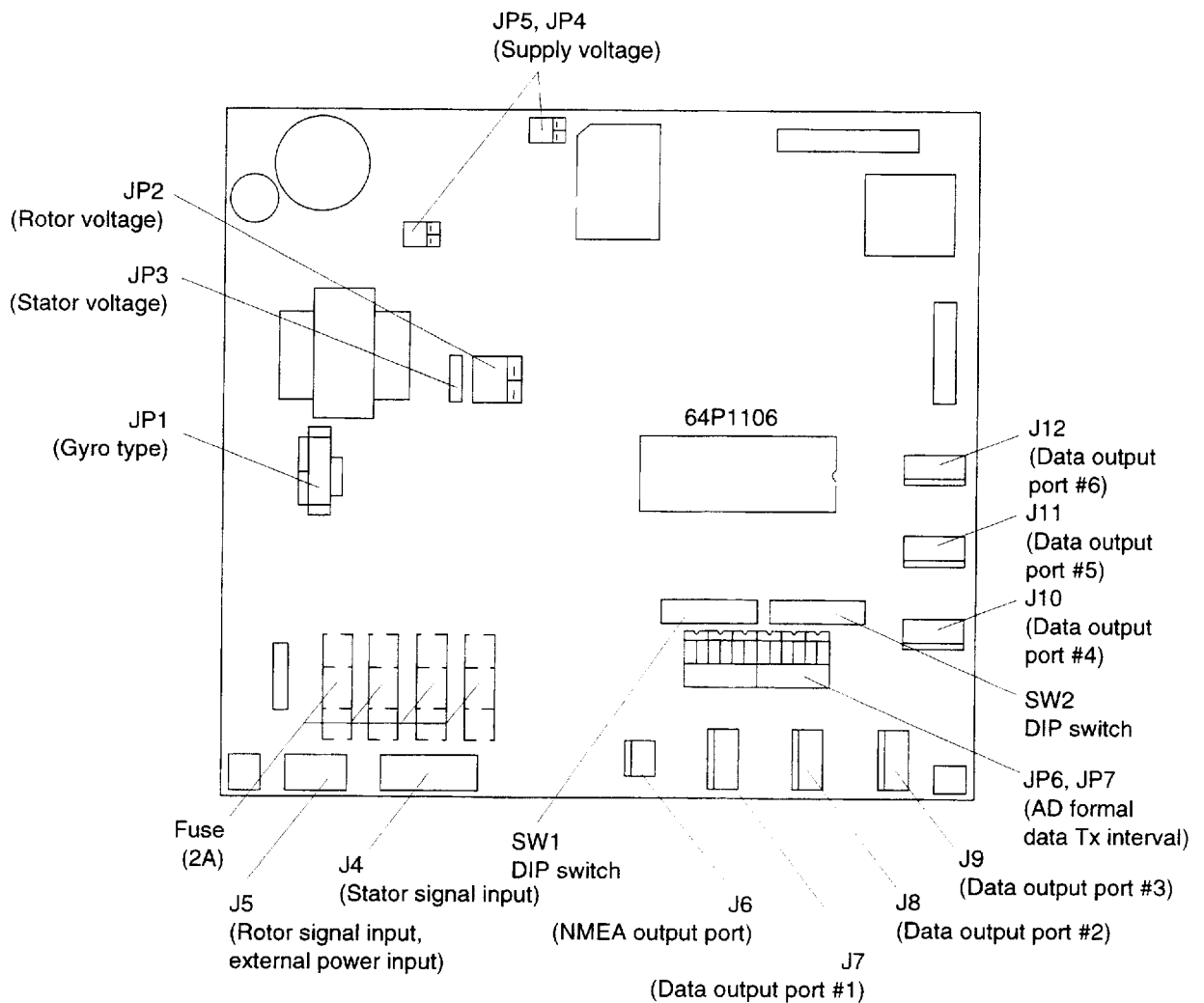


Figure 4-5 Location of DIP switches and jumper wires on the GYRO CONVERTER Board



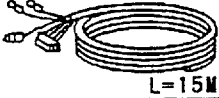






## 4.5 Setting the Bearing on the Radar Display

Confirm that the gyrocompass is giving reliable readings. Then, set bearing on the radar display as shown in the procedure below.

- 1) Open the tuning compartment on the control panel. Press the HOLD switch to disengage the computing circuit from the gyrocompass. The "HOLD" LED lights.
- 2) Press [+] or [-] switch to duplicate the gyrocompass reading at the top of the radar display. (Each press of those switches changes the readout by 0.1 degrees. A switch may be pressed and held down more than two seconds to change the readout by one degree.)
- 3) Press the HOLD switch when the gyrocompass reading on the radar matches the gyrocompass reading. The "HOLD" LED goes off.

**Note:** In some cases, the gyrocompass rotation may be the opposite of the displayed bearing, in spite of correct connections. In this case try exchanging two connections among S1, S2 and S3 on the GYRO SWITCH Board.

**FURUNO**

工事材料表 INSTALLATION MATERIALS		FR-2825/FAR-2825 船舶用レーダー MARINE RADAR		CODE NO.	03EU-X-9405 -3
				TYPE	1/1
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=15M	S03-62-15 RW-4873 *15M*	1	選択 TO BE SELECTED
			CODE NO.		
2	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20M	S03-62-20 RW-4873 *20M*	1	選択 TO BE SELECTED
			CODE NO.		
3	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30M	S03-62-30 RW-4873 *30M*	1	選択 TO BE SELECTED
			CODE NO.		
4	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=15M	S03-56-15 RW-6895-0 *15M*	1	選択 TO BE SELECTED
			CODE NO.		
5	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20M	S03-56-20 RW-6895-0 *20M*	1	選択 TO BE SELECTED
			CODE NO.		
6	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30M	S03-56-30 RW-6895-0 *30M*	1	選択 TO BE SELECTED
			CODE NO.		
7	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=50M	S03-56-50 RW-6895-0 *50M*	1	選択 TO BE SELECTED
			CODE NO.		

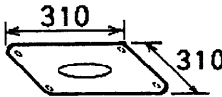
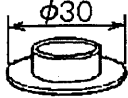

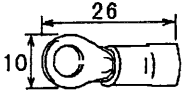
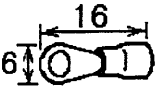
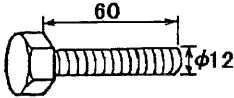
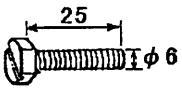
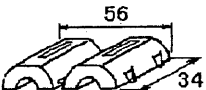

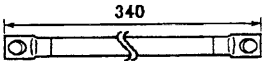
DWG NO.

C3418-M05- C  
FURUNO ELECTRIC CO., LTD

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

**FURUNO**

CODE NO.	008-493-160	03FS-X-9404 -7 1/2
TYPE	CP03-19104	

工事材料表 INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	防蝕ゴム. 1. CORROSION-PROOF RUBBER MAT		03-001-3001-0 CODE NO. 300-130-010	1	空中線部用 FOR ANTENNA UNIT
	2	シールワッシャー SEAL WASHER			
3		圧着端子 CRIMP-ON LUG		FV1.25-M3 7カ CODE NO. 000-538-110	26
	4	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	
5		圧着端子 CRIMP-ON LUG		FVD1.25-3 CODE NO. 000-116-634	1
	6	六角ボルト (全ネジ) HEX. BOLT		M12X60 SUS304 CODE NO. 000-862-191	
7		六角ボルト HEX. BOLT		M6X25 SUS304 CODE NO. 000-862-180	1
	8	EMIコア EMI CORE		RFC-10 CODE NO. 000-141-085	
9		EMIコア EMI CORE		RFC-13 CODE NO. 000-141-084	2
	10	アース線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO. 000-566-000	

DWG NO.

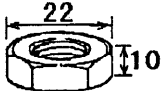
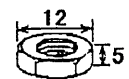
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FURUNO ELECTRIC CO., LTD.

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**FURUNO**

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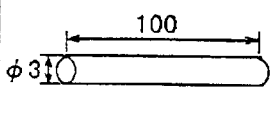
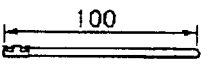
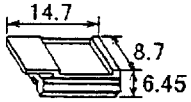
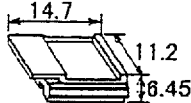
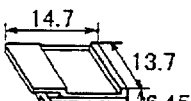
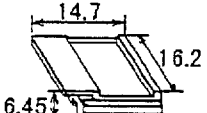
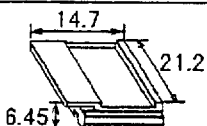
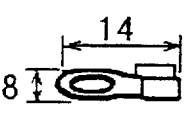
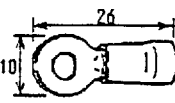
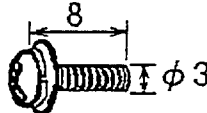
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11	六角ナット 1種 HEX. NUT		M12 SUS304		4	空中線部用 FOR ANTENNA UNIT
	CODE NO.		000-863-112			
12	ミガキ平座金 FLAT WASHER		M12 SUS304		4	空中線部用 FOR ANTENNA UNIT
	CODE NO.		000-864-132			
13	スプリング座金 SPRING WASHER		M12 SUS304		4	空中線部用 FOR ANTENNA UNIT
	CODE NO.		000-864-263			
14	六角ナット 1種 HEX. NUT		M6 SUS304		1	空中線部用 FOR ANTENNA UNIT
	CODE NO.		000-863-109			
15	ミガキ平座金 FLAT WASHER		M6 SUS304		3	空中線部用 FOR ANTENNA UNIT
	CODE NO.		000-864-129			
16	スプリング座金 SPRING WASHER		M6 SUS304		1	空中線部用 FOR ANTENNA UNIT
	CODE NO.		000-864-260			

DWG NO.  
C3464-M06- G

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

# FURUNO

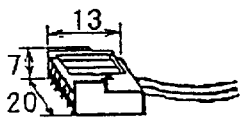
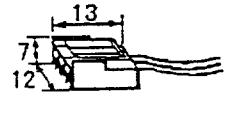
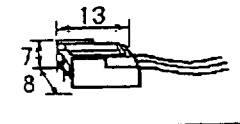
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1	スチューブ F(Z) HEAT-SHRINK TUBE		3X0.25 加 *0.10M* CODE NO. 000-105-874	2	外部機器 接続用 FOR EXTERNAL EQUIPMENT			
2	NHコネクタ *センサーイ* NH CONNECTOR ASSY.		AWG24 *0.1M* CODE NO. 000-132-342	20	外部機器 接続用 FOR EXTERNAL EQUIPMENT			
3	NHコネクタハウジング NH CONNECTOR HOUSING		H2P-SHF-AA CODE NO. 000-505-595	1	警報音信号 (AC) EXT-BUZZER (AC)			
4	NHコネクタハウジング NH CONNECTOR HOUSING		H3P-SHF-AA CODE NO. 000-505-596	2	gyro 信号用 GYRO DATA ログ 信号用 SPEED LOG			
5	NHコネクタハウジング NH CONNECTOR HOUSING		H4P-SHF-AA CODE NO. 000-505-597	3	RJ-8 用 レーダー用 潮流計信号用			
6	NHコネクタハウジング NH CONNECTOR HOUSING		H5P-SHF-AA CODE NO. 000-505-598	2	gyro 信号用 GYRO DATA ログ 信号用 INSデータ用 INS DATA			
7	NHコネクタハウジング NH CONNECTOR HOUSING		H7P-SHF-AA CODE NO. 000-505-600	1	舵角信号用 FOR PORT RUDDER			
8	特殊ラグ LUG		7x14 ス CODE NO. 000-536-100	2				
9	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2				
10	ワッシャーヘッドネジ B WASHER HEAD SCREW		M3X8 C2700 MBN12 CODE NO. 000-881-404	2				

C3418-M03-D

FURUNO ELECTRIC CO., LTD

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

**FURUNO**

工事材料表 INSTALLATION MATERIALS		FR/FAR-2815/2825 2835S/2855/2855W FA-2805		船用レーダー MARINE RADAR		CODE NO.	008-461-760	03EU-X-9403 -2
						TYPE	CP03-14602	2/2
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS		数量 Q'TY	用途/備考 REMARKS		
11	VHコネクタ組品 NH CONNECTOR ASSY.		03-1737(5P)		1	シャイロコンバータ FOR GYRO CONVERTER		
			CODE NO.	008-454-380				
12	VHコネクタ組品 NH CONNECTOR ASSY.		03-1738(3P)		1	シャイロコンバータ FOR GYRO CONVERTER		
			CODE NO.	008-454-390				
13	VHコネクタ組品 NH CONNECTOR ASSY.		03-1778(2P)		1	パフォーマンスモニター PM-30/50用 FOR PERFORMANCE MONITOR		
			CODE NO.	008-460-050				

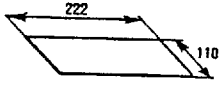
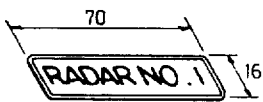
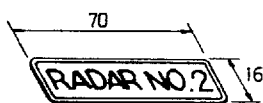
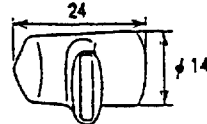
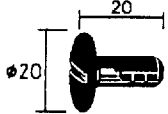
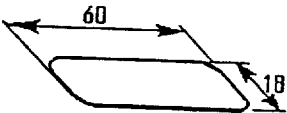
C3418-M04-C

FURUNO ELECTRIC CO., LTD

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

# FURUNO

CODE NO.	008-459-790	03EU-X-9502-
TYPE	FP03-05701	

付 属 品 表 ACCESSORIES		FR/FAR-2815/2825/2835S /2855/2855W 船用レーダー /2865SW/2825W/2835SW MARINE RADAR FA-2805			
番号 No	名 称 N A M E	略 図 OUTLINE	型 名 / 規 格 DESCRIPTIONS	数 量 Q'TY	用 途 / 備 考 REMARKS
1	キーシート(E) KEY LABEL(E)		03-133-1802-1	1	
			CODE NO. 100-233-420		
2	システム銘板NO.1 NAME PLATE NO.1		03-009-0343-0	2	
			CODE NO. 300-903-430		
3	システム銘板NO.2 NAME PLATE NO.2		03-009-0344-0	2	
			CODE NO. 300-903-440		
4	端子板カバー PANEL BOARD COVER		ZM-47A	2	
			CODE NO. 000-532-491		
5	ホールプラグ HOLE PLUG		NO. 4567	4	
			CODE NO. 000-800-729		
6	RPフライントフィルム RP BRIND FILM		03-133-1636-0	1	
			CODE NO. 100-244-490		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

英文 / 操作パネル一体型  
ENGLISH / PANEL FITTED

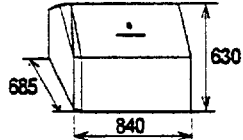
(略図の寸法は、参考値です。)

図 番 (1/1)  
DWG. NO. C3418-F02-F

# FURUNO

CODE NO	000-807-203	03EU-X-9504-2
TYPE	03-133-1811-0	

付属品表 ACCESSORIES	FR/FAR-2815/2825/2835S /2855/2855W 船用レーダー /2865SW/2825W/2835SW MARINE RADAR FA-2805
---------------------	--

番号 No	名称 NAME	略図 OUTLINE	型名 / 規格 DESCRIPTIONS	数量 Q'TY	用途 / 備考 REMARKS
1	ダストカバー DUST COVER		03-133-1811 CODE NO: 000-807-203	1	
			CODE NO:		
			CODE NO:		
			CODE NO:		
			CODE NO:		
			CODE NO:		
			CODE NO:		
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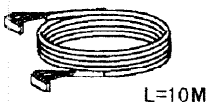
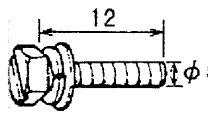
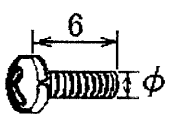
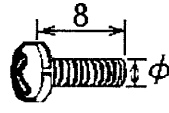
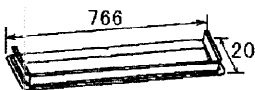
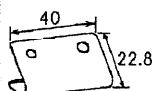
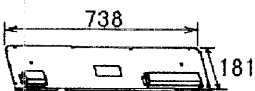
(略図の寸法は参考値です。)

図番 (1/1)  
 DWG. NO. C3418-F04-E



**FURUNO**

CODE NO.	008-459-930	03EU-X-9503 -3
TYPE	FP03-05703	

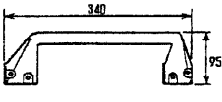
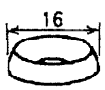
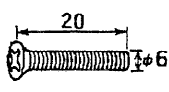

付属品表 ACCESSORIES		FR/FAR-2815/2825 2835S/2855/2855W FR-2865SW/2825W 2835SW/FA-2805	船用レーダー MARINE RADAR		
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	フラットケーブル組品 FLAT CABLE ASSY.		HIF6-50D-AA-1000	1	
			CODE NO.		
2	7°セットロックセムスB HEX. BOLT		M5X12 SUS304	4	
			CODE NO.		
3	ワッシャーセムスネジ A WASHER HEAD SCREW		M3X6 C2700W MBN12	6	
			CODE NO.		
4	ワッシャーセムスネジ A WASHER HEAD SCREW		M4X8 C2700W MBN12	8	
			CODE NO.		
5	操作部取付板 PANEL FIXING PLATE		03-133-1921-1	1	
			CODE NO.		
6	蓋保持板 SUPPORTING PLATE FOR LID		03-133-1613-4	3	
			CODE NO.		
7	底面板 BOTTOM PLATE		03-133-1922-1	1	
			CODE NO.		

C3418-F08- A  
FURUNO ELECTRIC CO., LTD

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

# FURUNO

CODE NO.	008-475-740	03EU-X-9510 -2 1/1
TYPE	FP03-05705	

付属品表 ACCESSORIES		FR/FAR-2815/2825 2835S/2855/2855W 2865SW/2825W/2835SW FA-2805 レダ - RADAR			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	取手 HANDLE		03-026-1203-2	2	
			CODE NO. 100-073-362		
2	ロゼット座金 ROSETTE WASHER		M6 C2700W ホリシール クロ	8	
			CODE NO. 000-864-910		
3	+丸皿小ネジ OVAL COUNTERSUNK HEAD SCREW		M6X20 C2700W ホリシール クロ	8	
			CODE NO. 000-861-475		
4	波座金 WAVE WASHER		WW-6 SUS	8	
			CODE NO. 000-864-350		

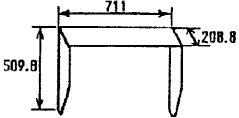
DWG NO. C3418-F06- B

FURUNO ELECTRIC CO., LTD.

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

# FURUNO

CODE NO.	008-459-810	03EU-X-9505 -2 1/1
TYPE	FP03-05704	

<b>付属品表</b> ACCESSORIES		FR/FAR-2815/2825 2835S/2855/2855W 2865SW/2825W/2835SW FA-2805		船用レーダー MARINE RADAR	
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	フード HOOD		03-133-1901-3 CODE NO. 100-233-443	1	

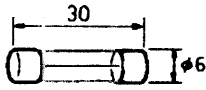
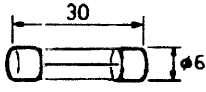
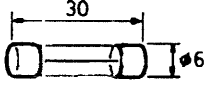
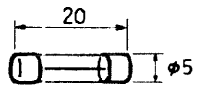
FURUNO ELECTRIC CO., LTD

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

C3418-F07-A


# FURUNO

CODE NO.	008-459-740	03EU-X-9301-3
TYPE	SP03-11301	BOX NO. P

SHIP NO.		SPARE PARTS LIST FOR		U S E			SETS PER VESSEL
		FR/FAR-2815/2825/2835S/ FA-2805/2855/2855W/2865SW FR-2120W/2130W      L-2"- FR-2150W/2160SW      RADAR					
ITEM NO.	NAME OF PART	O U T L I N E	DWG. NO. OR TYPE NO.	QUANTITY			REMARKS/CODE NO.
				WORKING		SPARE	
				PER SET	PER VES.		
1	管入りヒューズ GLASS TUBE FUSE		FGB0 0.5A AC250V	3		6	TCT9106 F3 000-549-018
2	管入りヒューズ GLASS TUBE FUSE		FGB0 5A AC250V	3		6	F1/F2/F3 (230V) 000-549-022
3	管入りヒューズ GLASS TUBE FUSE		FGB0 10A AC125V	2		4	F1/F2(100V) 000-549-065
4	ヒューズ FUSE		FGMB 2A AC250V	4		4	64P1106 000-122-000
MFR'S NAME		FURUNO ELECTRIC CO., LTD		DWG NO.		C3418-P01-C	1/1

# FURUNO

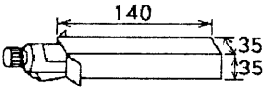
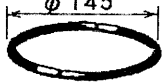


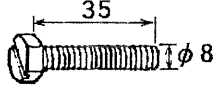
CODE NO.	008-418-920	03DX-X-9303 -6
TYPE	SP03-08902	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR		U S E			SETS PER VESSEL	
	FR-1400/2100 シリーズ FR-1700/1500 シリーズ FCR-1400 シリーズ FR/FAR-2825/2855	船舶用レーダ  MARINE RADAR	FOR ANTENNA UNIT				
ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY			REMARKS/CODE NO.
				WORKING		SPARE	
				PER SET	PER VES		
1	カーボンブラシ CARBON BRUSH		MG120-5X6X11 D8G	2		2	000-631-716
MFR'S NAME	FURUNO ELECTRIC CO., LTD		DWG NO.	C3352-P04- G		1/1	

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

**FURUNO**

CODE NO.	008-485-250	03FS-X-9409 -0 1/1
TYPE	CP03-24201	

工事材料表 INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	スリーボント SEALANT		1211 50G CODE NO. 000-854-118	1	
2	Oリング O-RING		JISB2401-P135 CODE NO. 000-808-309	1	
3	ミガキ平座金 FLAT WASHER		M8 SUS304 CODE NO. 000-864-130	8	
4	バネ座金 SPRING WASHER		M8 SUS304 CODE NO. 000-864-262	8	
5	六角ボルト スリ割り HEX. BOLT (SLOTTED HEAD)		M8X35 SUS304 CODE NO. 000-862-153	8	

DWG NO.

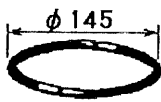
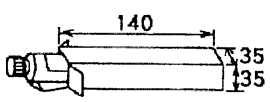
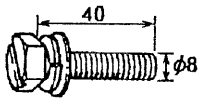
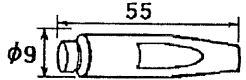
C3453-M04- A

FURUNO ELECTRIC CO., LTD.

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

# FURUNO

CODE NO.	008-487-130	03FS-X-9403 -2 1/1
TYPE	CP03-19101	

工事材料表 INSTALLATION MATERIALS		FR-2115/2125/2125W 船舶用レーダ MARINE RADAR			
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	O-RING		JISB2401-P135	1	
			CODE NO. 000-808-309		
2	ADHESIVE		1211 50G	1	
			CODE NO. 000-854-118		
3	六角ボルト (SLOTTED, WASHER HEAD)		M8X40 SUS304	8	
			CODE NO. 000-882-071		
4	ピン PIN		03-141-0301-2	2	
			CODE NO. 100-266-882		

DWG NO. C3464-M04-C

FURUNO ELECTRIC CO., LTD

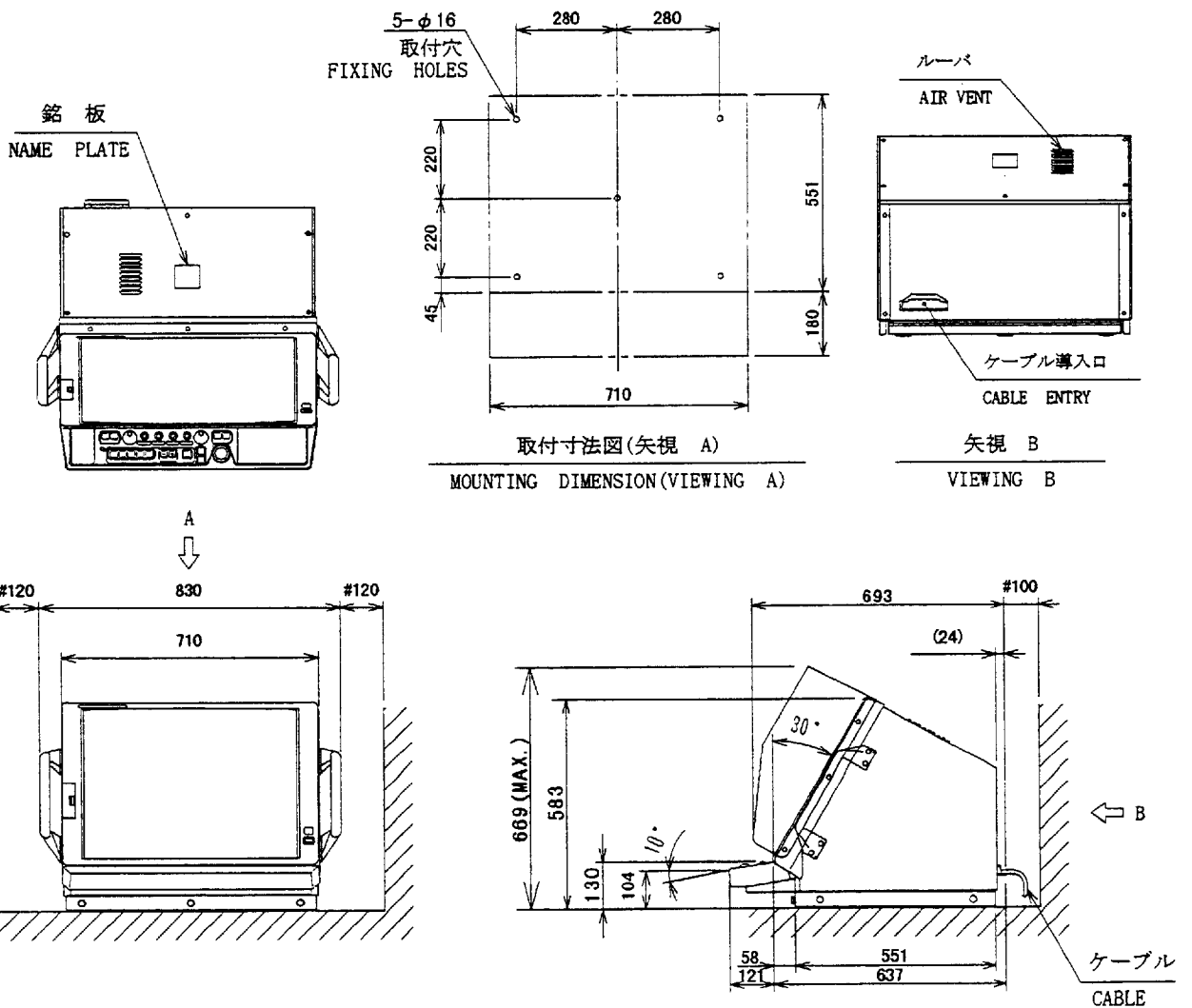
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

- 注 記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。  
 2) 取付用ネジはM10ボルト又は コーチボルト呼び径9を使用のこと。  
 3) #印寸法は最小サービス空間寸法とする。

- NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED AT THE BACK OF THE UNIT SO THAT THE UNIT CAN BE DRAWN OUT WITH THE CABLES CONNECTED FOR MAINTENANCE.  
 2) USE M10 BOLTS OR  $\phi 9$  COACH SCREWS FOR FIXING THE UNIT.  
 3) #:RECOMMENDED SERVICING CLEARANCE.

範囲 DIMENSION	公差 TOL.
$L \leq 50$	$\pm 1 \text{ mm}$
$50 < L \leq 100$	$\pm 2 \text{ mm}$
$100 < L \leq 500$	$\pm 3 \text{ mm}$
$500 < L \leq 1000$	$\pm 4 \text{ mm}$
$1000 < L \leq 2000$	$\pm 5 \text{ mm}$
$2000 < L \leq 4000$	$\pm 7 \text{ mm}$
$4000 < L \leq 8000$	$\pm 10 \text{ mm}$
$8000 < L$	$\pm 15 \text{ mm}$

表 1  
TABLE 1



DRAWN Oct. 7 1977 T. YAMASAKI		TITLE RDP-115
CHECKED Oct 7 1977 M. H. YAMASAKI		名 稱 指示器 (卓上型)
APPROVED Oct 7 1977 M. H. YAMASAKI	FR/FAR-2805 SER.	外 寸 図
SCALE 1/20	MASS 85 kg	NAME DIAPLAY UNIT (TABLETOP)
DWG. No. C3418-G02-C	03-133-1000-G2	OUTLINE DRAWING

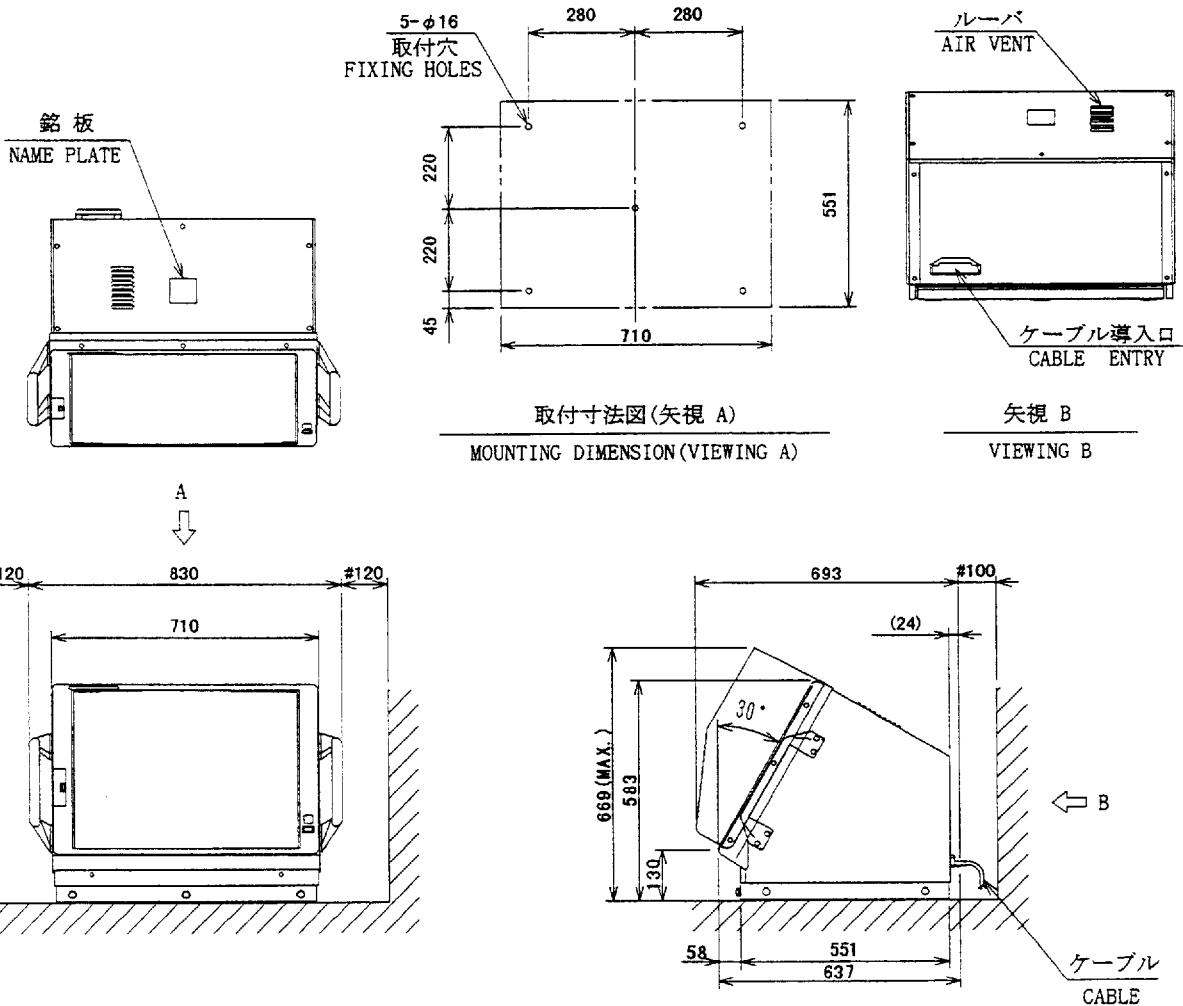


- 注 記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。  
 2) 取付用ネジはM10ボルト又は コーチボルト呼び径9を使用のこと。  
 3) #印寸法は最小サービス空間寸法とする。

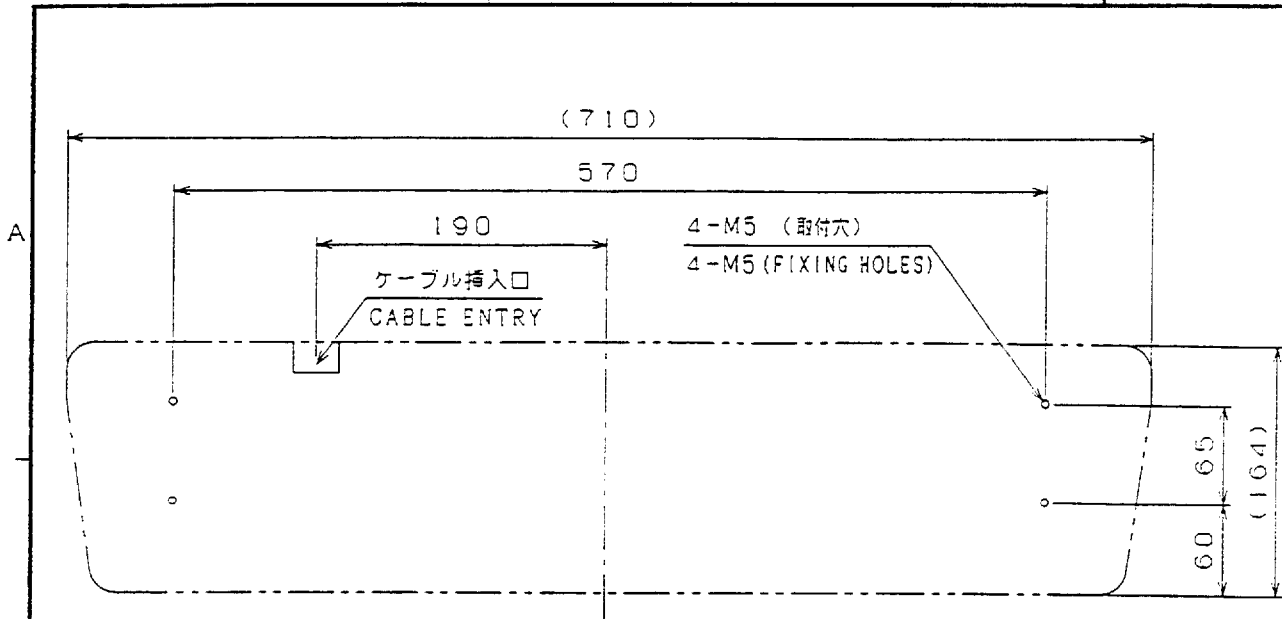
- NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED AT THE BACK OF THE UNIT SO THAT THE UNIT CAN BE DRAWN OUT WITH THE CABLES CONNECTED FOR MAINTENANCE.  
 2) USE M10 BOLTS OR  $\phi 9$  COACH SCREWS FOR FIXING THE UNIT.  
 3) #:RECOMMENDED SERVICING CLEARANCE.

範囲 DIMENSION	公差 TOL.
$L \leq 50$	$\pm 1 \text{ mm}$
$50 < L \leq 100$	$\pm 2 \text{ mm}$
$100 < L \leq 500$	$\pm 3 \text{ mm}$
$500 < L \leq 1000$	$\pm 4 \text{ mm}$
$1000 < L \leq 2000$	$\pm 5 \text{ mm}$
$2000 < L \leq 4000$	$\pm 7 \text{ mm}$
$4000 < L \leq 8000$	$\pm 10 \text{ mm}$
$8000 < L$	$\pm 15 \text{ mm}$

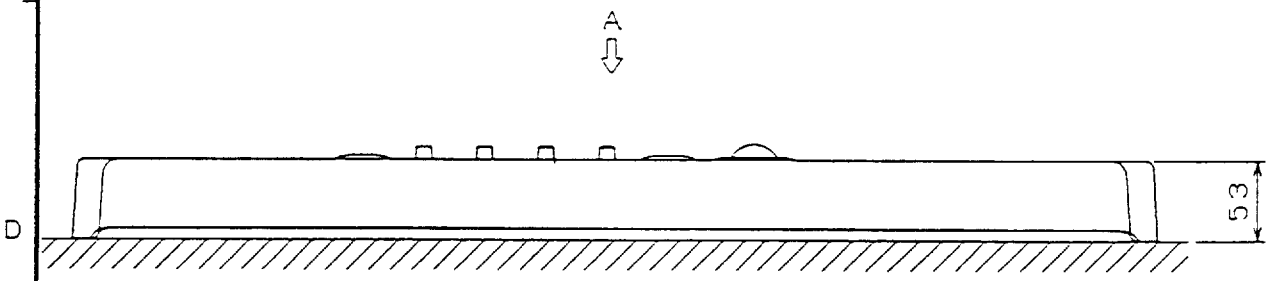
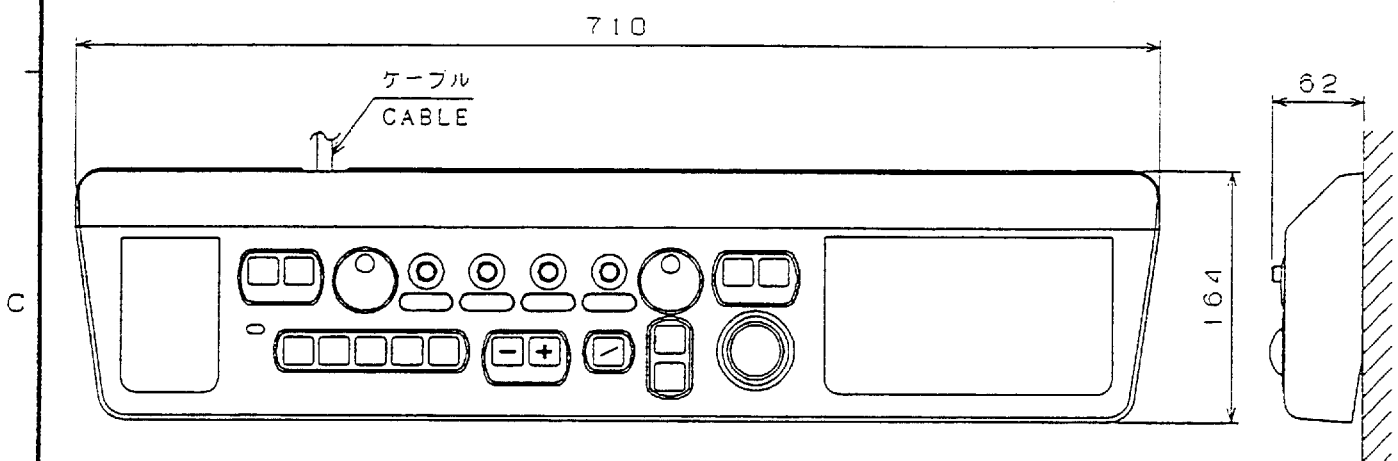
表 1  
TABLE 1



DRAWN Oct 7 '97 T.YAMASAKI		TITLE RDP-115
CHECKED Oct 7 '97 K.HIYOSHI		名称 指示器 (卓上・パネル分離型)
APPROVED Oct 7 '97 K.HIYOSHI	FR/FAR-2805 SER.	外寸図
SCALE 1/20	MASS 82 kg	NAME DIAPLAY UNIT (TABLETOP W/O KEYBOARD)
DWG. No. C3418-G01-C	03-133-1100-G2	OUTLINE DRAWING



取付寸法図 (矢視 A)  
 FLAT MOUNTING DIMENSION (VIEWING A)



DRAWN July 6, 1995 Morimoto				TYPE RDP-115	
CHECKED July 6, '95 T. Anake		FR2805SER		名称 操作部外寸図	
APPROVED July 6, '95 K. Okamoto		FAR2805SE		NAME CONTROL UNIT	
SCALE 1/5	MASS 3 kg	APPLICABLE TO: (MODEL)	BLOCK NO.	DWG NO. C3418-G04-A	03-133-1600-G0

- 注 記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。  
 2) 取付用ネジはM10ボルト又は コーチボルト呼び径9を使用のこと。  
 3) #印寸法は最小サービス空間寸法とする。

- NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED AT THE BACK OF THE UNIT SO THAT THE UNIT CAN BE DRAWN OUT WITH THE CABLES CONNECTED FOR MAINTENANCE.  
 2) USE M10 BOLTS OR  $\phi 9$  COACH SCREWS FOR FIXING THE UNIT.  
 3) #: RECOMMENDED SERVICE CLEARANCE.

寸法範囲 (mm) DIMENSION	公差 (mm) TOLERANCE
$0 < L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$
$500 < L \leq 1000$	$\pm 4$
$1000 < L \leq 2000$	$\pm 5$

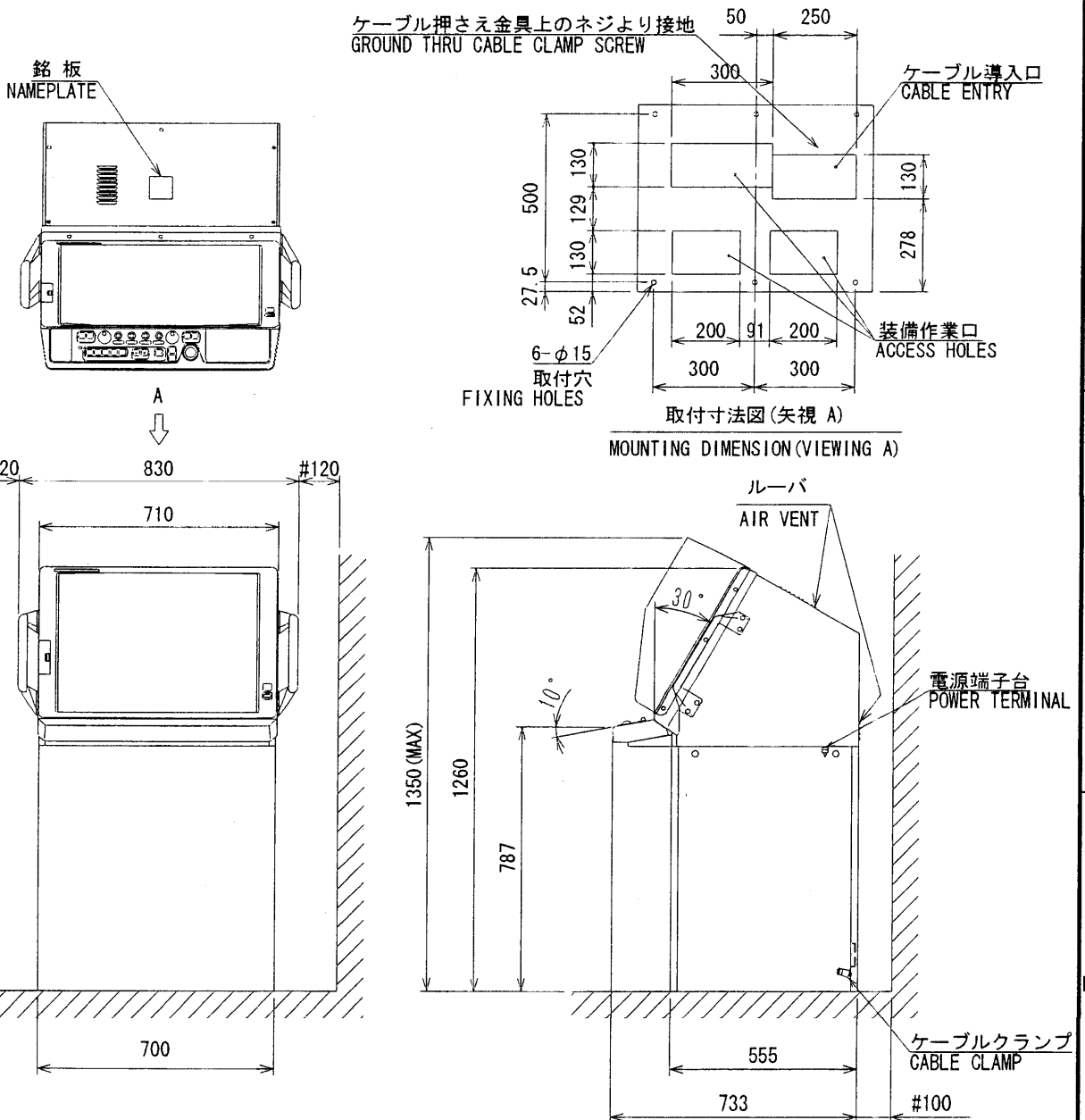
表 1  
TABLE 1

A

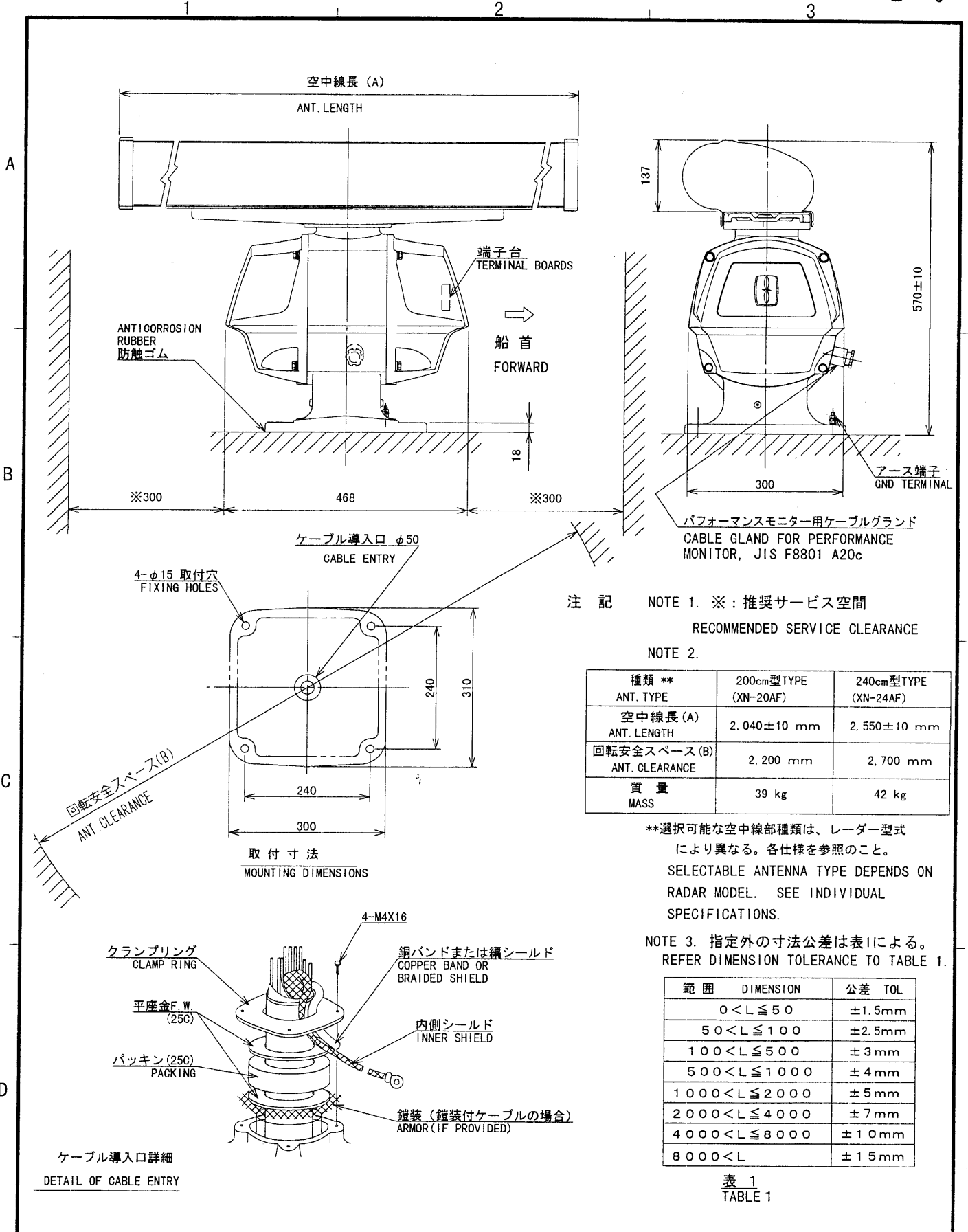
B

C

D



DRAWN July 27 '00 T. YAMASAKI		TITLE RDP-115
CHECKED July 27 '00 Y. Kim		名称 指示器 (コンソール型)
APPROVED July 29 '00 T. Kim	FR/FAR-2805 SERIES	外寸図
SCALE 1/20	MASS 120 $\pm 10\%$ kg	NAME DIAPLAY UNIT (CONSOLE)
DWG. No. C3418-G03-H	03-133-1200-G1	OUTLINE DRAWING



注記 NOTE 1. ※ : 推奨サービス空間  
RECOMMENDED SERVICE CLEARANCE

NOTE 2.

種類 ** ANT. TYPE	200cm型TYPE (XN-20AF)	240cm型TYPE (XN-24AF)
空中線長 (A) ANT. LENGTH	2,040±10 mm	2,550±10 mm
回転安全スペース (B) ANT. CLEARANCE	2,200 mm	2,700 mm
質量 MASS	39 kg	42 kg

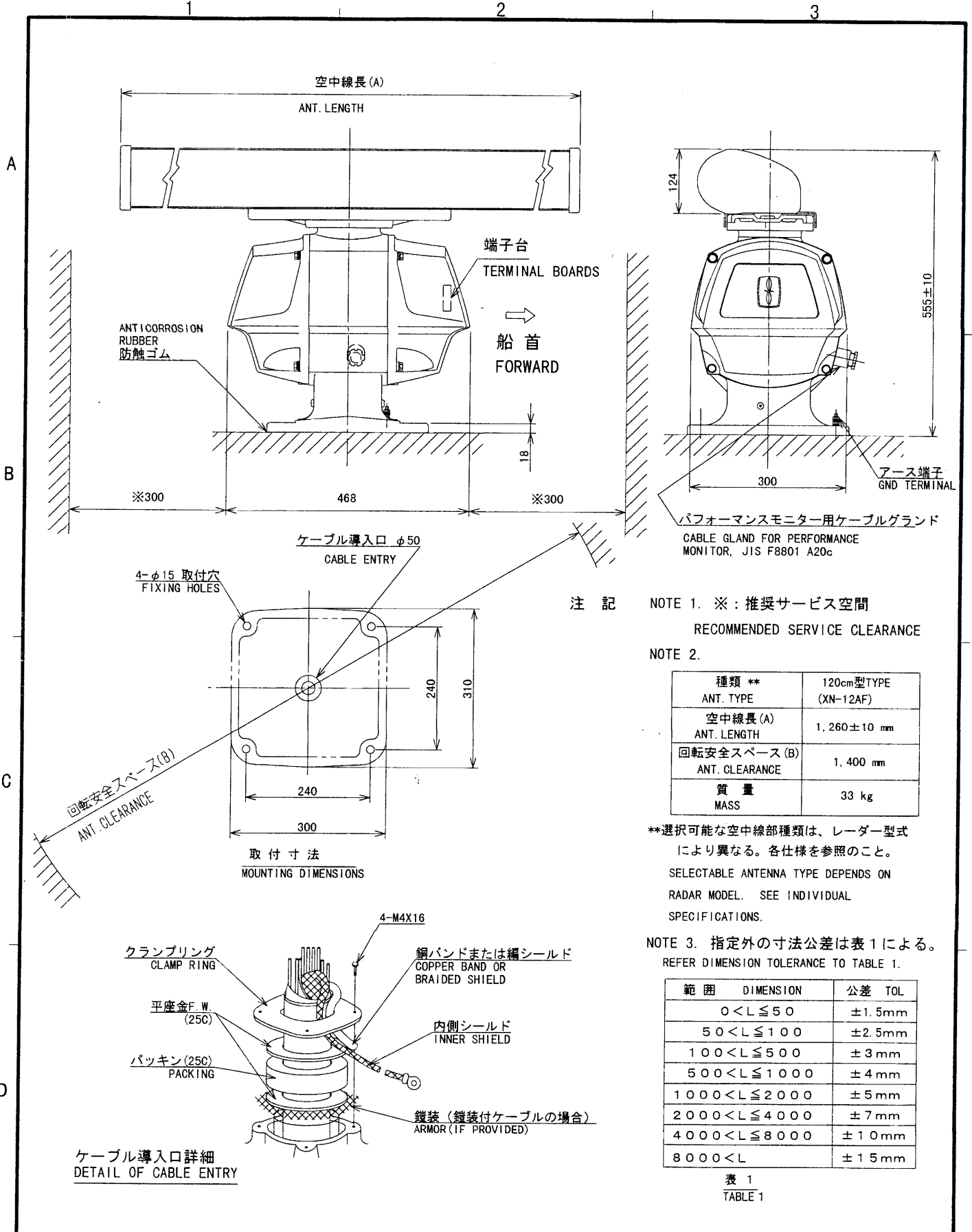
\*\*選択可能な空中線種類は、レーダー型式により異なる。各仕様を参照のこと。  
SELECTABLE ANTENNA TYPE DEPENDS ON RADAR MODEL. SEE INDIVIDUAL SPECIFICATIONS.

NOTE 3. 指定外の寸法公差は表1による。  
REFER DIMENSION TOLERANCE TO TABLE 1.

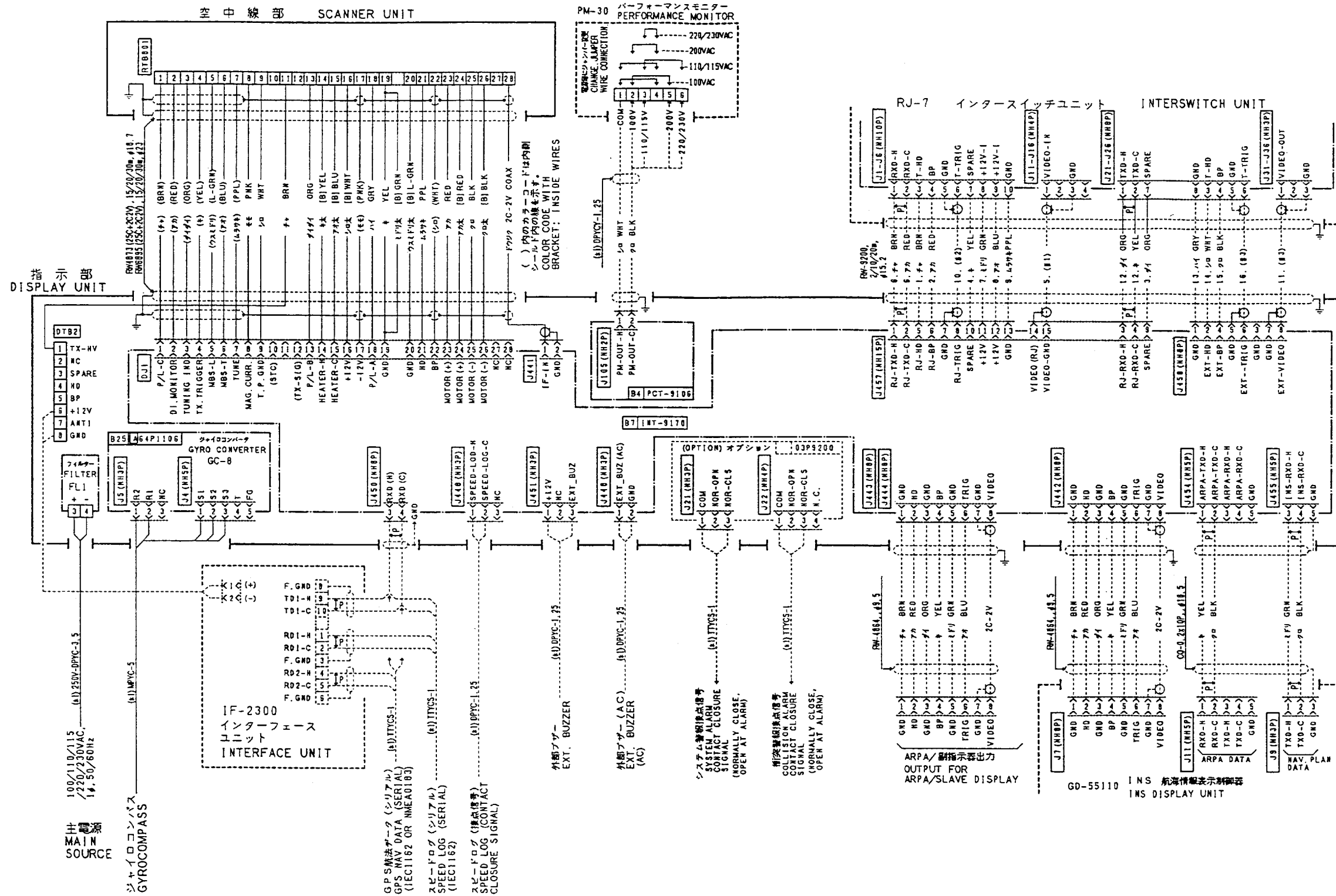
範囲	DIMENSION	公差 TOL
0 < L ≤ 50		±1.5mm
50 < L ≤ 100		±2.5mm
100 < L ≤ 500		±3mm
500 < L ≤ 1000		±4mm
1000 < L ≤ 2000		±5mm
2000 < L ≤ 4000		±7mm
4000 < L ≤ 8000		±10mm
8000 < L		±15mm

表 1  
TABLE 1

DRAWN Aug 20 '99 T. YAMASAKI		TITLE RSB-0074/0075-20/24AF
CHECKED Aug 20 '99 K. Kusumoto	OTHERS FR-1500 SER. FR-1700 SER. FR-2115/2125	名称 空中線部
APPROVED Aug 20 '99 K. Kusumoto		外寸図
SCALE 1/10	MASS kg	NAME ANTENNA UNIT
DWG. No. C3464-G02-D	03-143-3000-G2	OUTLINE DRAWING



DRAWN Aug 21 '89 T. YAMASAKI	TITLE RSB-0074/0075-12AF
CHECKED Aug 31 '89 K. Kusunoki	名称 空中線部
APPROVED Aug 31 '89 K. Kusunoki	外寸図
SCALE 1/10	NAME ANTENNA UNIT
MASS kg	
DWG. No. C3464-G04-E	03-144-3000-G2
	OUTLINE DRAWING



**注: NOTE:**

①: コネクタ  
CONNECTOR

②: ツイストペア線  
TWISTED-PAIR

③: 銅板にて接地  
GROUNDING COPPER STRAP

④: 1V-8sq. 或いは同等品にて接地  
GROUND THROUGH CONNECTOR CLAMP.  
GROUNDING WIRE 1V-8sq.

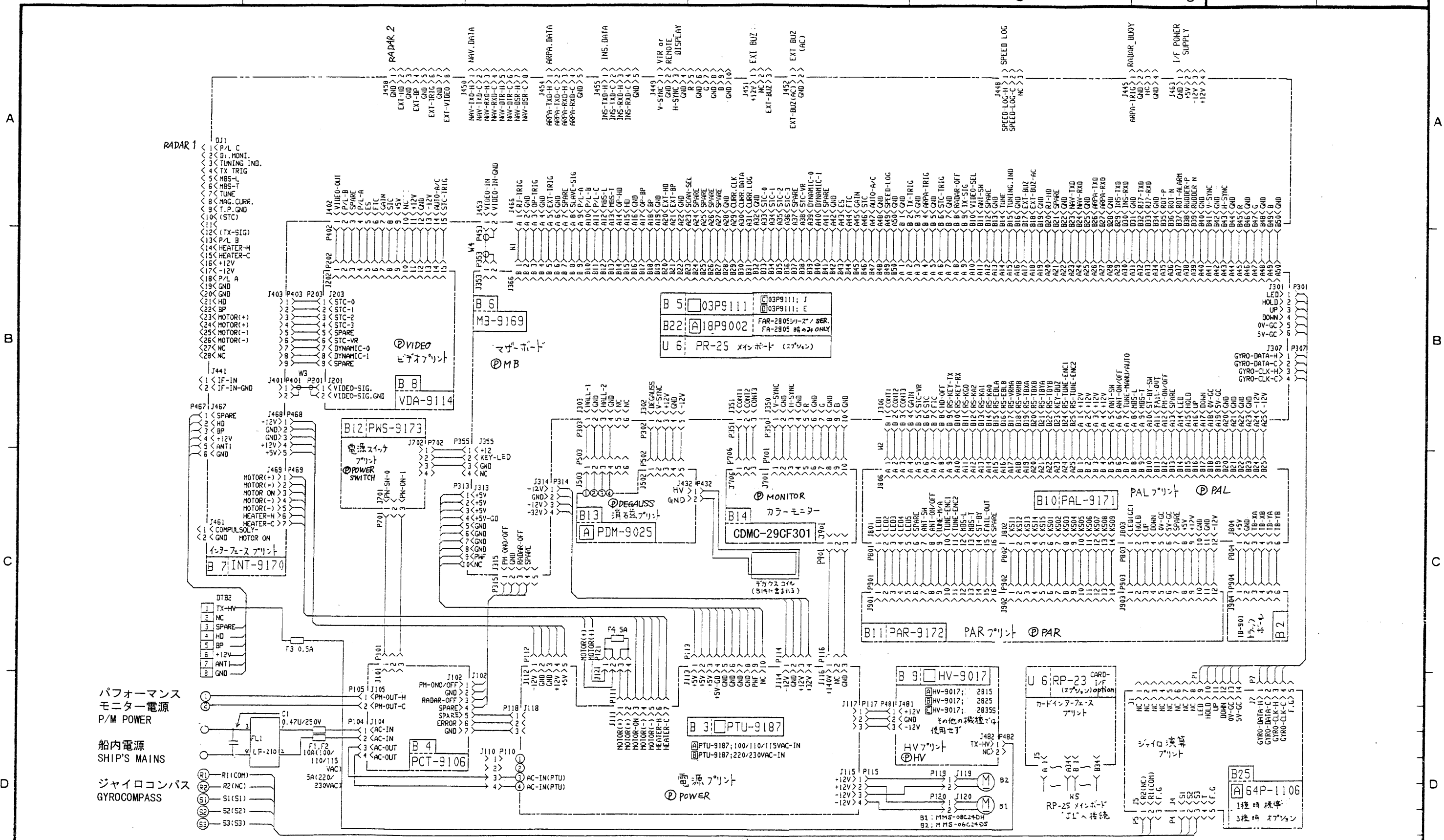
---: オプション支給  
OPTIONAL SUPPLY

- \*1: 造船所取付  
SHIPYARD SUPPLY
- \*2: 工場にて取付済  
FITTED AT FACTORY.
- \*3: コネクタのクランプでアースに落とす。  
GROUND THROUGH CONNECTOR CLAMP.
- \*4: [本] は太線を示す。  
[B] REPRESENTS THICKER WIRES.

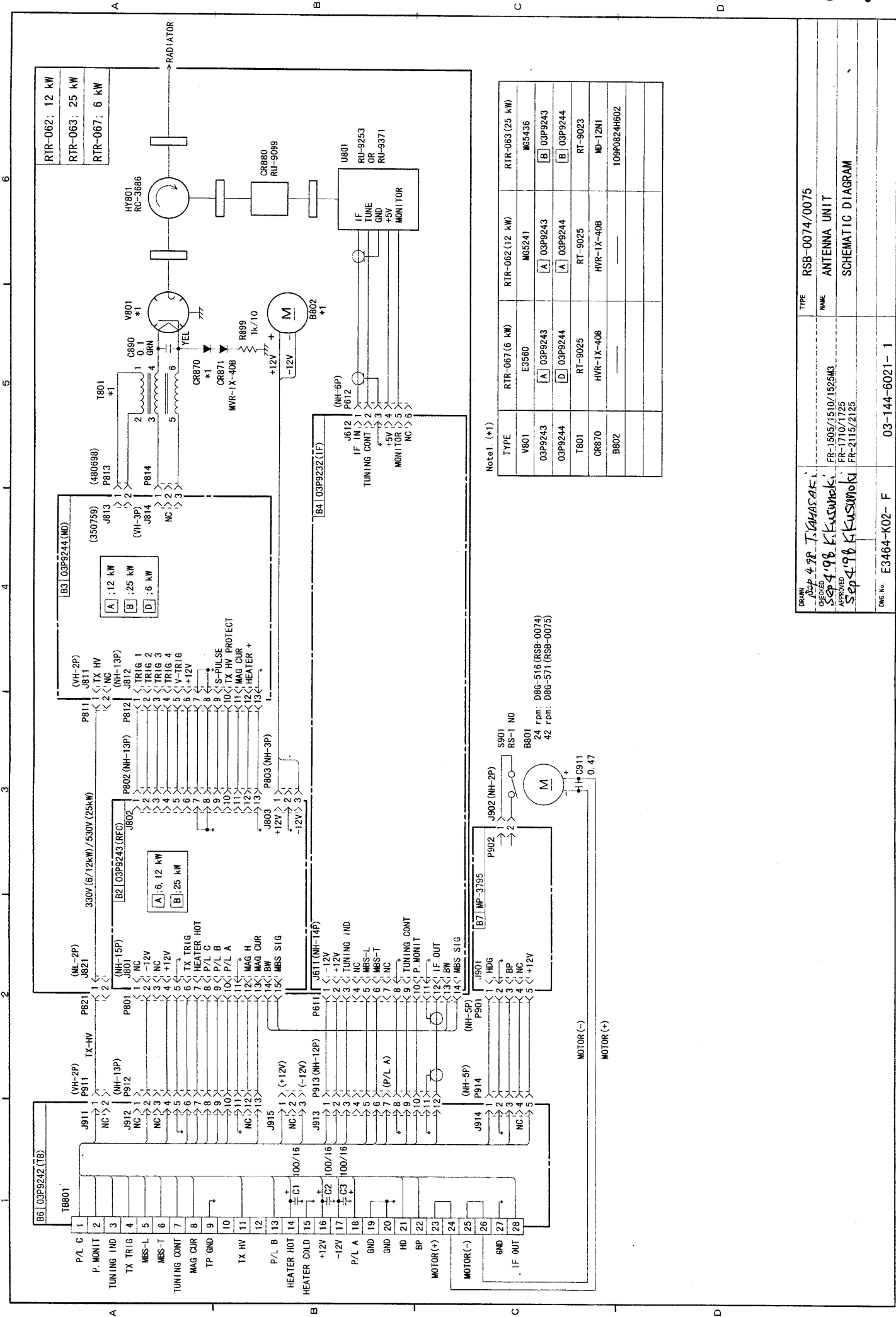
CO-0. 2x2P: CO-SPEVV-SB-C 0. 2x2P, #10. 5  
 CO-0. 2x5P: CO-SPEVV-SB-C 0. 2x5P, #13. 5  
 CO-0. 2x10P: CO-SPEVV-SB-C 0. 2x10P, #15. 5

DRAWN: Nov. 27 '91  
 CHECKED: Nov. 27 '91  
 APPROVED: Nov. 27 '91  
 SCALE: MASS

TITLE	FR-2025 FAR-2025
名称	船舶用レーダー/衝突予防補助レーダー
相互結線図	
NAME	MARINE RADAR / ARPA
INTERCONNECTION DIAGRAM	



DRAWN <i>Dec 1 '98 T. Yamasaki</i> CHECKED <i>Dec 1 '98 K. Kusunoki</i> APPROVED <i>Dec 1 '98 K. Kusunoki</i>	SERIES FR-28X5 FAR-28X5	TYPE RDP-115/A 名称 指示部総合 回路図 名称 DISPLAY UNIT
SCALE MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO. NAME DISPLAY UNIT
DWG NO. C3404-K01- C	03-131-6002- 2	SCHEMATIC DIAGRAM



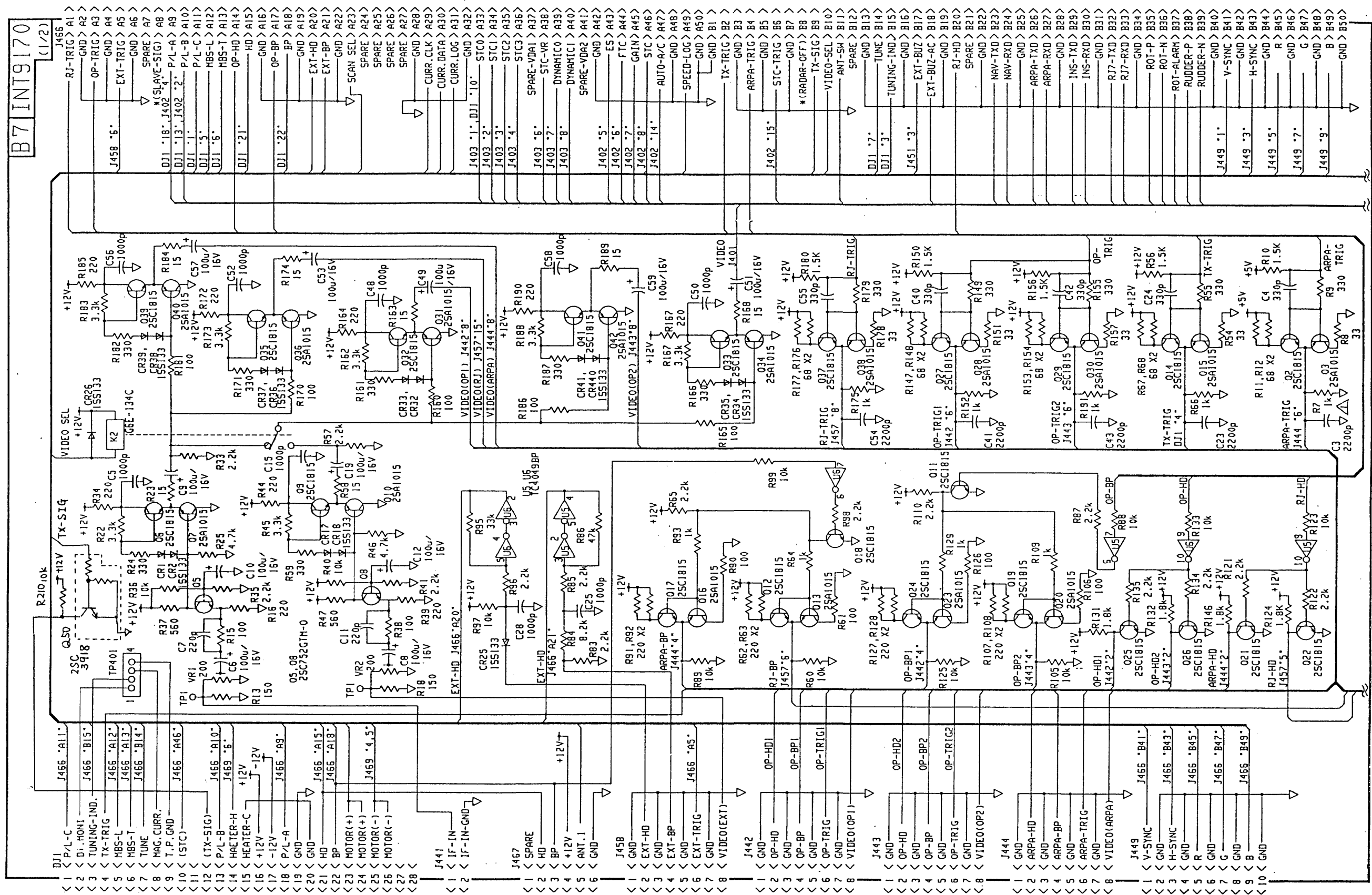
Note1. (\*1)

TYPE	RTR-067 (6 kW)	RTR-062 (12 kW)	RTR-063 (25 kW)
V801	E3560	M65241	M65436
03P9243	[A] 03P9243	[A] 03P9243	[B] 03P9243
03P9244	[D] 03P9244	[A] 03P9244	[B] 03P9244
T801	RT-9025	RT-9025	RT-9023
CR870	HVR-1X-40B	HVR-1X-40B	MD-12N1
B802			109P0824H602

DRAWN 4.98 DESIGNED 4.98 CHECKED 4.98 APPROVED 4.98	TYPE RSB-0074/0075
NAME FR-505/1510/1525MB FR-1710/1725 FR-2119/2125	NAME ANTENNA UNIT
NAME K. KAWAMOTO K. KAWAMOTO K. KAWAMOTO	SCHEMATIC DIAGRAM
DWG. No. E3464-K02-F	03-144-6021-1

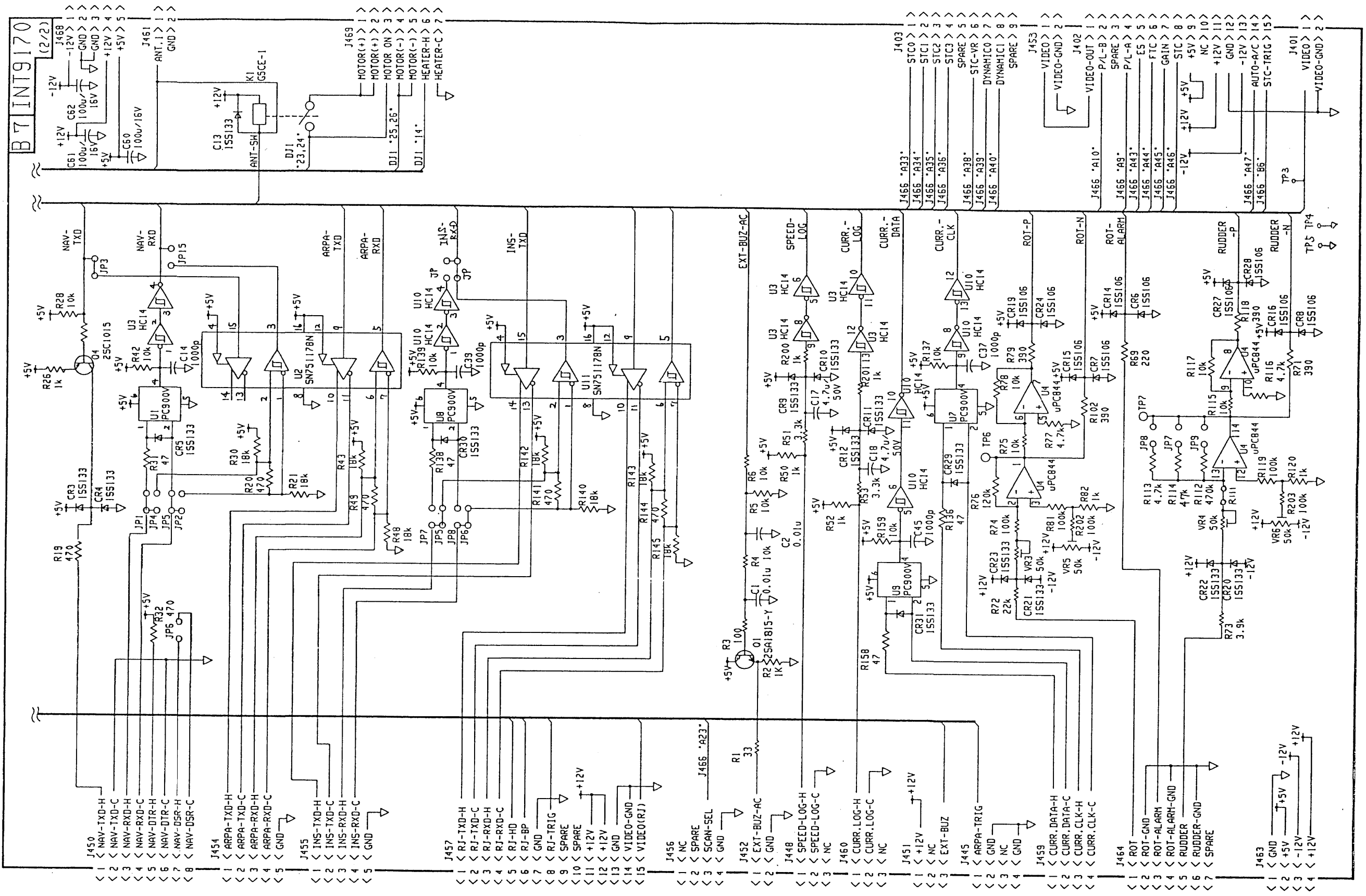


B7 INT9170 (1/2)



- J466 .A11. < 1 < P/L-C
- J466 .B15. < 2 < D1 .MONI
- J466 .A12. < 3 < TUNING-IND.
- J466 .A13. < 4 < TX-TRIG
- J466 .B14. < 5 < HBS-L
- J466 .A14. < 6 < HBS-T
- J466 .A15. < 7 < TUNE
- J466 .A16. < 8 < MAG.CURR.
- J466 .A17. < 9 < T.P.GND
- J466 .A18. < 10 < (STC)
- J466 .A19. < 11 < (TX-SIG)
- J466 .A20. < 12 < P/L-B
- J466 .A21. < 13 < HAETER-H
- J466 .A22. < 14 < HAETER-C
- J466 .A23. < 15 < +12V
- J466 .A24. < 16 < -12V
- J466 .A25. < 17 < P/L-A
- J466 .A26. < 18 < GND
- J466 .A27. < 19 < GND
- J466 .A28. < 20 < HD
- J466 .A29. < 21 < BP
- J466 .A30. < 22 < MOTOR(+)
- J466 .A31. < 23 < MOTOR(-)
- J466 .A32. < 24 < MOTOR(+)
- J466 .A33. < 25 < MOTOR(-)
- J466 .A34. < 26 < MOTOR(+)
- J466 .A35. < 27 < MOTOR(-)
- J466 .A36. < 28 < GND
- J441 < 1 < IF-IN
- J441 < 2 < IF-IN-GND
- J467 < 1 < SPARE
- J467 < 2 < HD
- J467 < 3 < BP
- J467 < 4 < +12V
- J467 < 5 < ANT.1
- J467 < 6 < GND
- J467 < 7 < GND
- J467 < 8 < VIDEO(EXT)
- J442 < 1 < GND
- J442 < 2 < EXT-HD
- J442 < 3 < GND
- J442 < 4 < EXT-BP
- J442 < 5 < GND
- J442 < 6 < EXT-TRIG
- J442 < 7 < GND
- J442 < 8 < VIDEO(OP1)
- J443 < 1 < GND
- J443 < 2 < OP-HD
- J443 < 3 < GND
- J443 < 4 < OP-BP
- J443 < 5 < GND
- J443 < 6 < OP-TRIG
- J443 < 7 < GND
- J443 < 8 < VIDEO(OP1)
- J444 < 1 < GND
- J444 < 2 < OP-HD
- J444 < 3 < GND
- J444 < 4 < OP-BP
- J444 < 5 < GND
- J444 < 6 < OP-TRIG
- J444 < 7 < GND
- J444 < 8 < VIDEO(OP2)
- J449 < 1 < V-SYNC
- J449 < 2 < GND
- J449 < 3 < H-SYNC
- J449 < 4 < GND
- J449 < 5 < R
- J449 < 6 < GND
- J449 < 7 < G
- J449 < 8 < GND
- J449 < 9 < B
- J449 < 10 < GND

DRAWN July 18, 1995 Morimoto		TYPE INT9170	
CHECKED July 18, '95 Maki		名称 INT基板 (1/2)	
APPROVED July 18, '95 Okamoto		NAME INT BOARD (1/2)	
SCALE	MASS kg	APPLICABLE TO: (MODEL)	DWG NO. C3418-K01-A 03-131-6004-1
		BLOCK NO. 1B 7	



B7INT9170  
(2/2)

A

B

C

2

3

4

A

B

C

DRAWN July 18, 1995 Morimoto	TYPE INT9170
CHECKED July 18, '95 Maki	名称 INT基板 (2/2)
APPROVED July 18 '95 Okamoto	NAME INT BOARD (2/2)
SCALE	DWG NO. C3418-K02-A 03-131-6004-1
MASS kg	APPLICABLE TO: (MODEL)
	BLOCK NO. 1B 7

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