FURUNO

INSTALLATION MANUAL

MARINE RADAR/ARPA

MODEL FR/FAR-2855

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FIRST EDITION : DEC. 2000
D : JUL. 18, 2000

PUB. No. IME-34190-D
FAR/FR-2855

(TATA)

00080726600

⚠ 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

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

Distances at which radiation level of 100 and 10 W/m^2 exist are;

Model	Radiation level	XN3A	XN4A	XN5A
FR-2855 (X-band, 50kW)	100W/m^2	Nil	Nil	Nil
	10W/m^2	2.0 m	1.9 m	1.8 m

⚠ 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 radiatior 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

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 give off or receive interference or cause 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 a 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.

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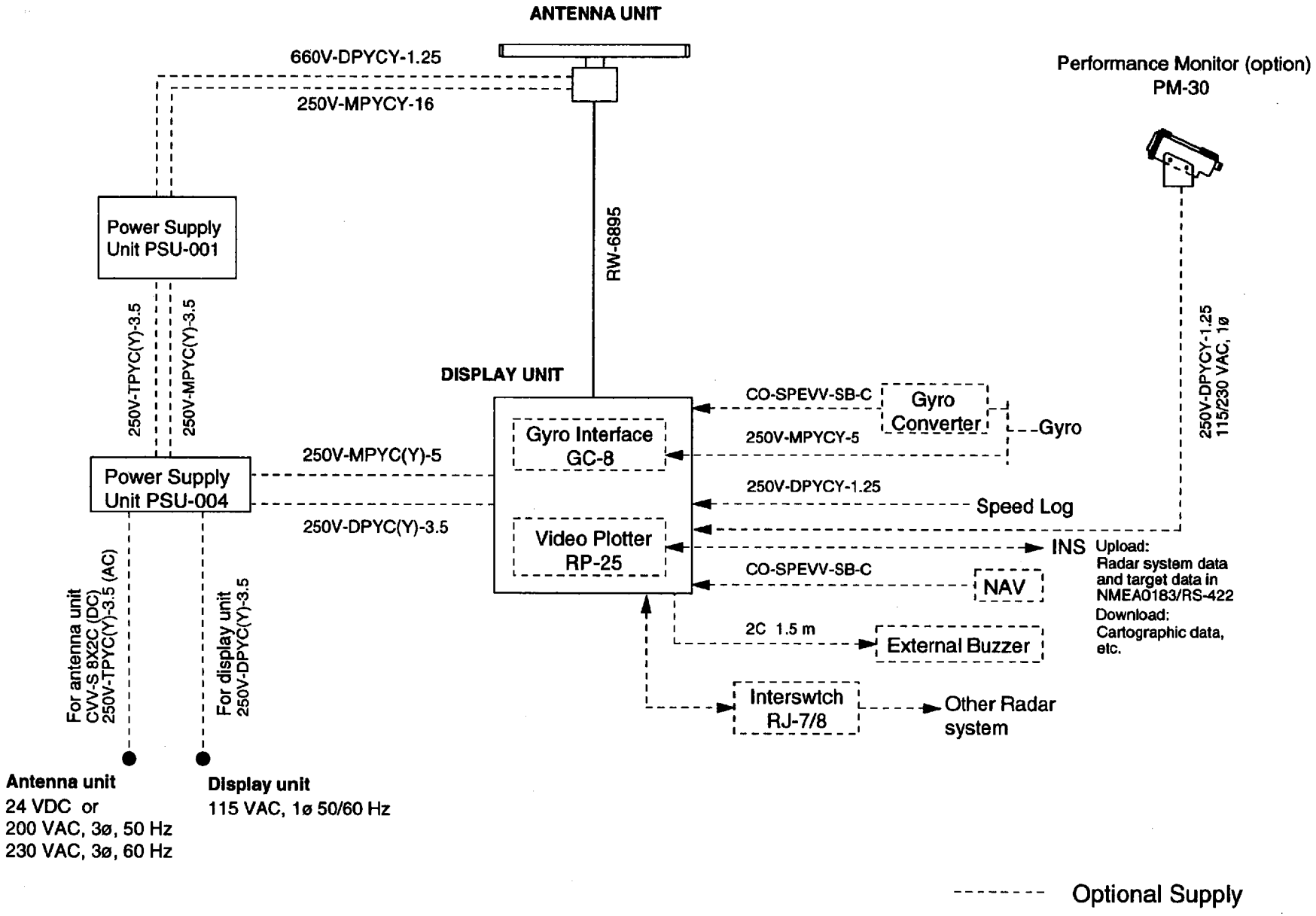

1. MOUNTING

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1.1 Assembling the Scanner Unit

The antenna unit consists of the antenna radiator and the antenna unit chassis. They are packed separately to prevent damage during shipment. Assemble them as shown in the procedure which follows.

Radiator XN3A (200 cm)/XN4A (240 cm)/XN5A (300 cm)

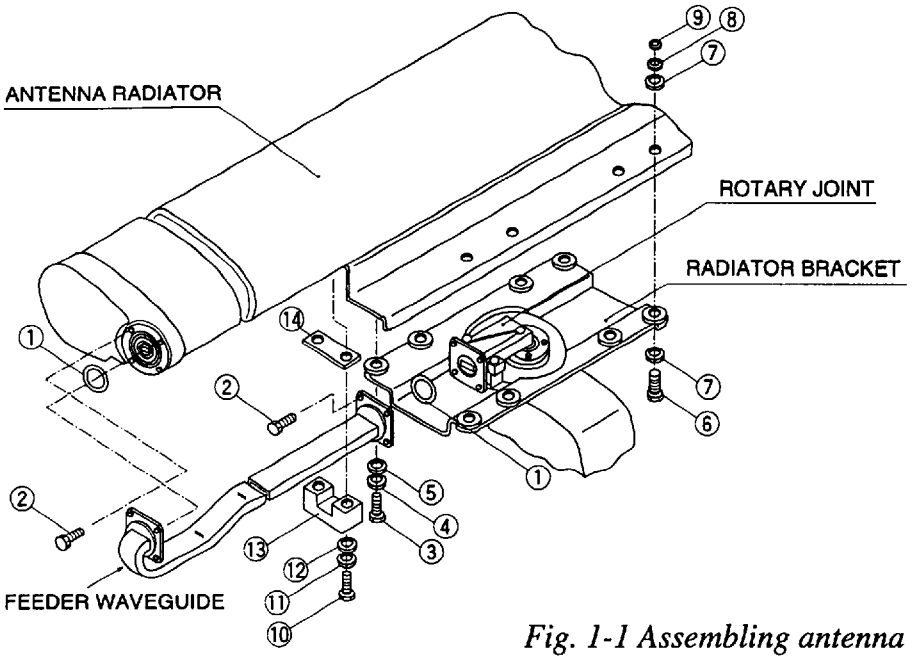


Fig. 1-1 Assembling antenna radiator XN3A/XN4A/XN5A

Table 1-1 XN3A/XN4A/XN5A antenna assembly materials

No.	Name	Specification	Qty
1	O-ring	AS568-125	2
2	Washerhead Hex. Bolt (B)	M4 x 16(SUS304)	8
3	Hex. Bolt (B)	M8 x 35(SUS304)	4
4	Spring Washer	M8(SUS304)	4
5	Flat Washer	M8(SUS304)	4
6	Hex. Bolt	M8 x 30(SUS304)	4
7	Flat Washer	M8(SUS304)	8
8	Spring Washer	M8(SUS304)	4
9	Hex. Nut	M8(SUS304)	4
10	Hex. Bolt	M4 x 30(SUS304)	2
11	Spring Washer	M4(SUS304)	2
12	Flat Washer	M4(SUS304)	2
13	W/G Clamp	RSB-2006-1	1
14	W/G Gasket	03-003-4003-1	1

Procedure

1) Remove the radiator joint flange cap. The cap may be discarded.
2) Wipe the feeder waveguide and radiator joint with a clean cloth.
3) Coat the waveguide flange with silicone sealant as shown in the figure below.

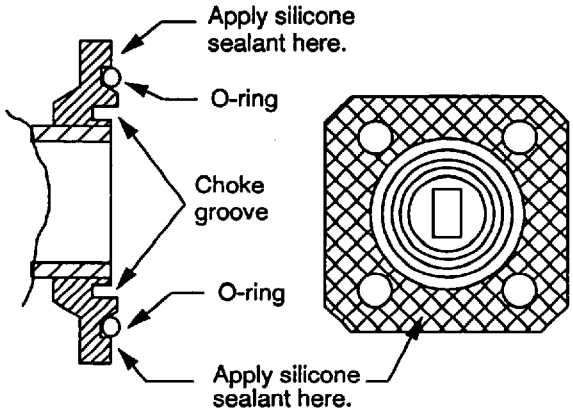


Fig. 1-2 Coating the waveguide flange with silicone sealant

4) Insert the O-ring (1) into the O-ring groove of the radiator flange of the rotary joint. Fix the feeder waveguide with hex. bolts (2).
5) Loosely fasten the antenna radiator to the radiator bracket with hex. bolts (3) and (6), flat washers (5) and (7), spring washers (4) and (8), and hex. nuts (9).
6) Insert the O-ring (1) into the O-ring groove of the flange section of the feeder waveguide. Fix the feeder waveguide with hex. bolts (2).
7) Fix the feeder waveguide at the bottom of the antenna radiator with the W/G clamp (13), W/G gasket (14), hex. bolts (10), flat washers (12), and spring washers (11).
8) Securely fasten the antenna radiator to the radiator bracket.

1.2 Mounting the Scanner Unit on the Mounting Platform

General considerations

- The antenna radiator may be fastened to the rotating bracket before mounting the antenna unit. However, DO NOT lift the antenna 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 the covers of the antenna housing.
- The antenna unit is constructed of aluminum and therefore subject to galvanic corrosion if improperly fastened to steel structures. To prevent galvanic corrosion, fasten the unit to the mounting platform using the rubber mat and washers (supplied).
- Do not paint the radiator. Performance will be affected.

Siting considerations

- A magnetic compass will be affected if placed too close to the antenna unit. Below are the minimum compass safe distances for magnetic compasses.

Radar model	Standard compass	Steering compass
FR/FAR-2855	4.2 m	3.2 m

- No funnel, mast or derrick should be within the vertical beamwidth of the antenna (XN3A/XN4A/XN5A, 20°) in the bow direction, especially zero degrees ±5°, to prevent blind sectors and false echoes on the radar picture.
- Fumes from the funnel or other exhaust vent can adversely affect performance and hot gas can distort the radiator. The antenna unit must not be mounted in a place where the temperature may exceed 70°C.
- Leave sufficient space around the unit for maintenance and servicing. See the antenna unit outline drawing for recommended maintenance space.
- Locate the unit well away from the aerial of a radiotelephone or navigation receiver to prevent interference. Separation of more than two meters is recommended.

How to change orientation

The scanner unit is normally mounted with the cable gland (cable entry side) facing the ship's stern. If this is not practical, the direction can be changed in multiples of 90°. In this case, the synchronous gear magnet, which produces the heading signal, should be remounted. Fix the magnet according to scanner unit attitude.

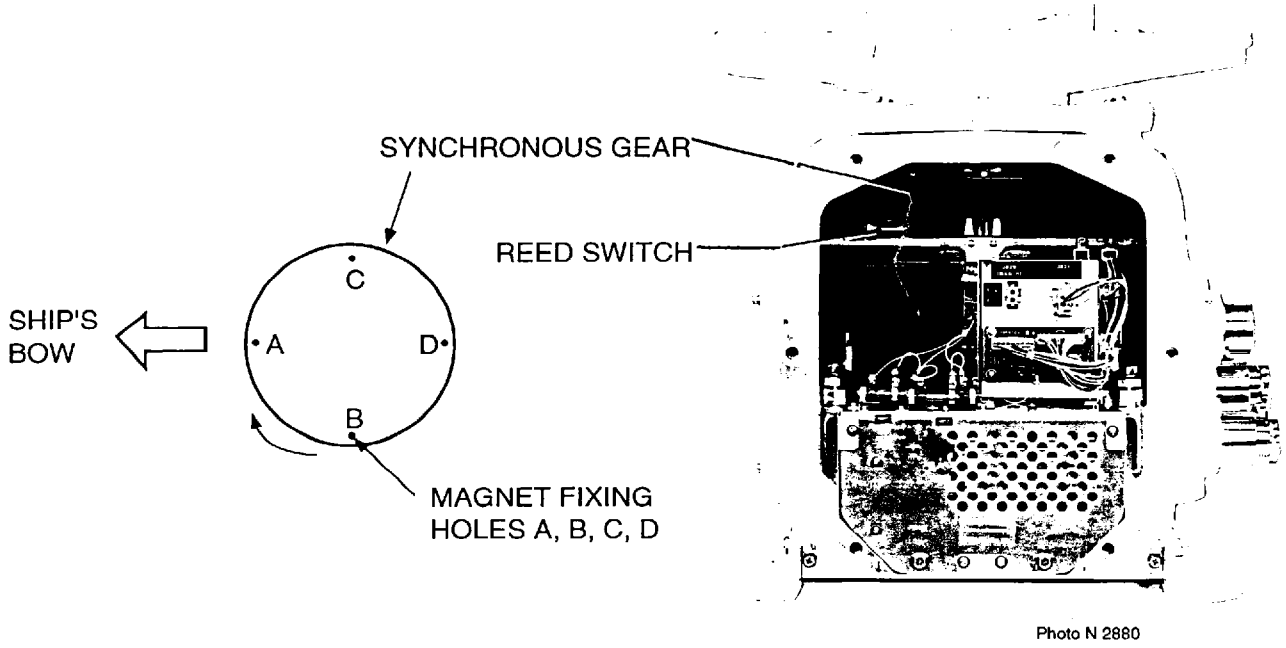


Fig. 1-3 Remounting the synchronous gear magnet

Mounting procedure

1) Drill four mounting holes of 15mm diameter in the mounting platform.
2) Lay the rubber mat (supplied) on the mounting platform.

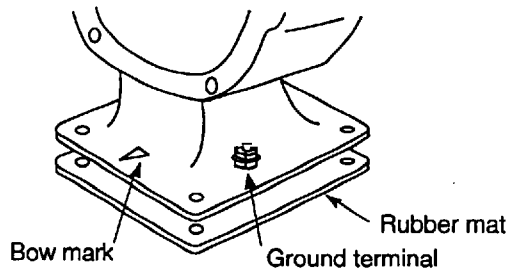


Fig. 1-4 Antenna unit, front view

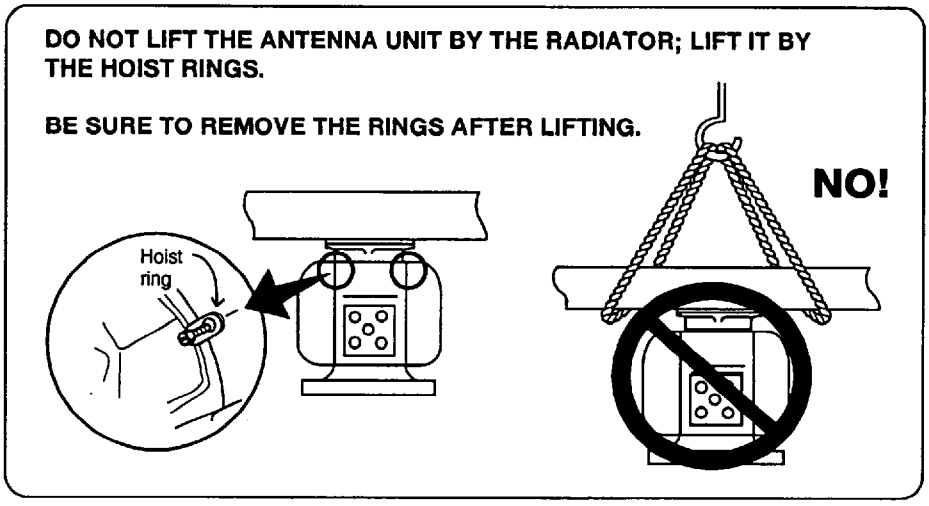


Fig. 1-5 How to lift the antenna unit

3) Place the antenna unit on the rubber mat and orient the unit so the bow mark on its base is facing the ship's bow.
4) Fasten the antenna unit to the mounting platform with M12 x 60 bolts, nuts, flat washers and seal washers.
5) Establish the ground on the mounting platform as shown in Figure 1-6. The location must be within 300mm of the ground terminal on the antenna unit. Use hex bolt (M6 x 25), M6 nut and M6 flat washer.
6) Connect the ground wire (RW-4747, 320 mm) between the ground point and the ground terminal on the antenna unit.
7) Coat the ground point and the ground terminal with silicone sealant (supplied) as shown in Figure 1-6 to prevent corrosion.

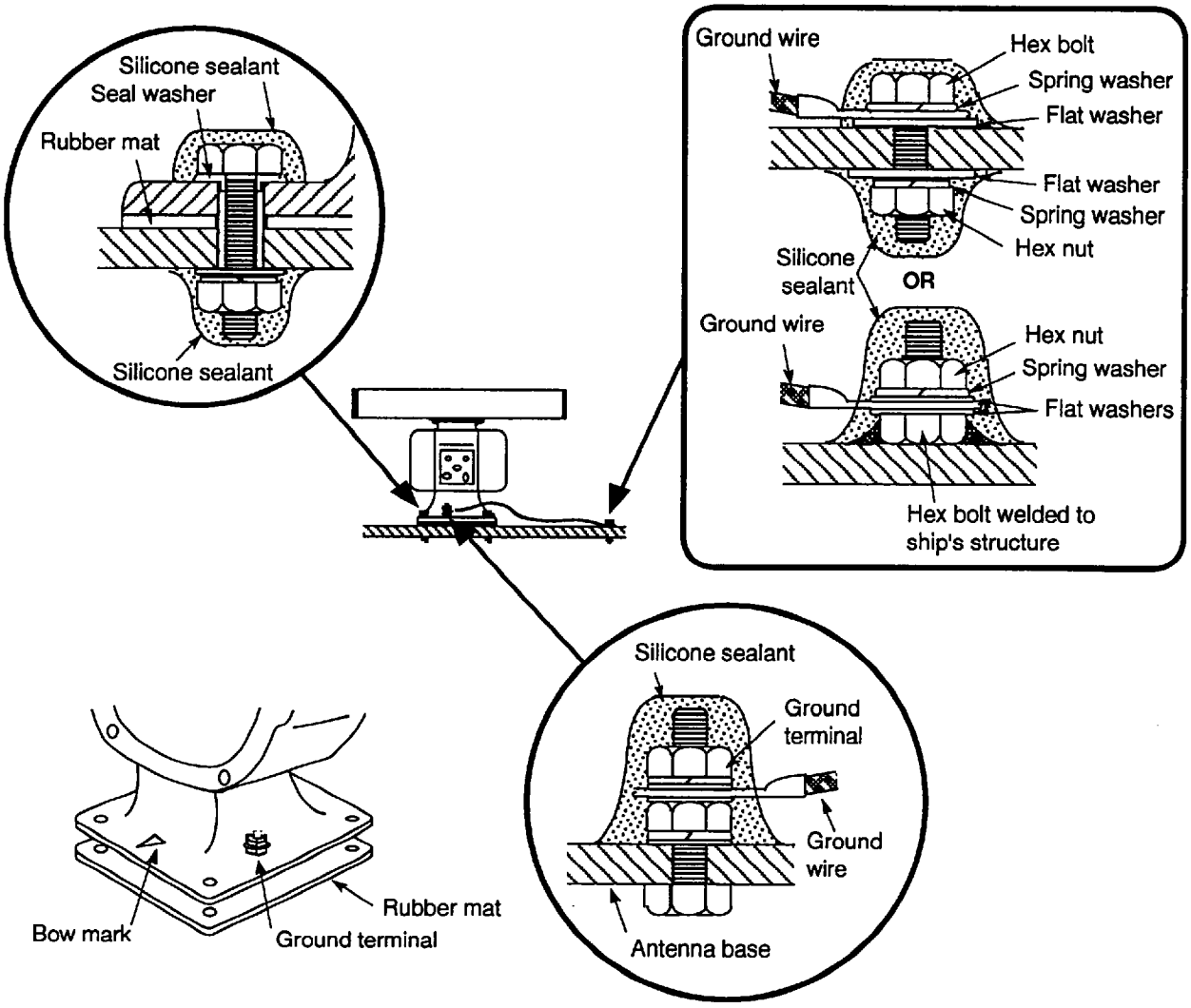


Fig. 1-6 Fastening the antenna unit to the mounting location

⚠ CAUTION

Ground the antenna unit to prevent electrical shock and mutual interference.

1.3 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 which follow.

- A magnetic compass will be affected if placed too close to the display unit. The minimum compass safe distances for magnetic compasses are

  standard compass: 1.6 m
  steering compass: 1.2 m

- 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.
- The location should be free of water spray.
- 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.
- 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 length of 15, 30 or 50 meters; maximum 100 meters.)
- Leave sufficient space around the unit for maintenance and servicing. See the display unit outline drawing for recommended maintenance space.

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.)

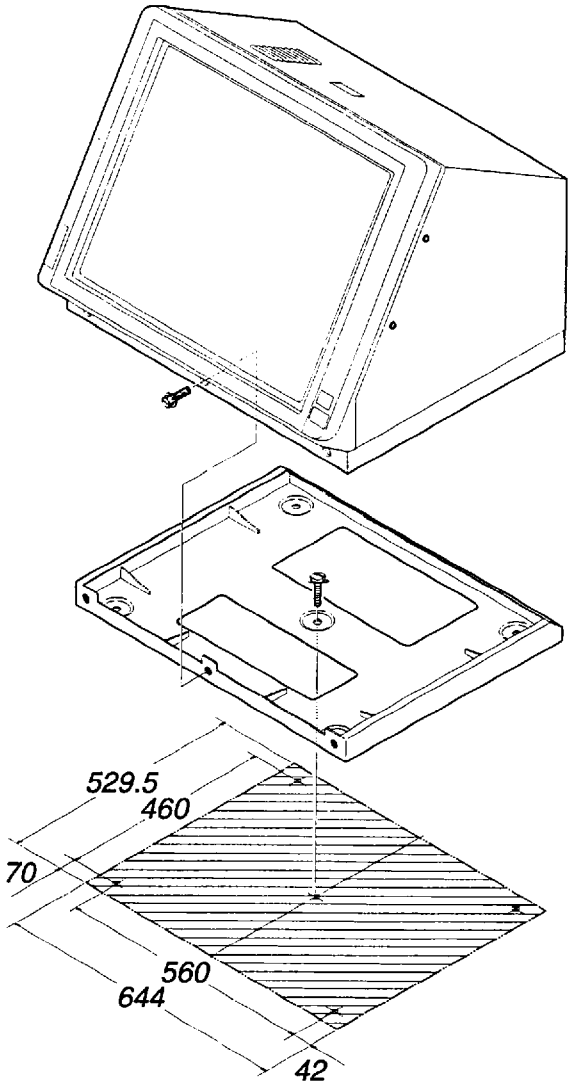


Fig. 1-7 Mounting dimensions for tabletop mount display unit

1.4 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).

1.5 Power Supply Unit

The power supply unit can be installed almost anywhere provided the location is dry and well-ventilated, the compass safe distances are observed, and sufficient maintenance space is provided. The compass safe distances are;

Power unit	Standard compass	Steering compass
PSU-001	1.2 m	0.9 m
PSU-004	0.7 m	0.5 m

The unit may be installed inside the display unit console type.

2. CONNECTIONS

2.1 Antenna Unit Connections

Two cables are connected to the antenna unit: signal cable and power cable.

Signal cable RW-6895

1) Shorten the cable to a suitable length, extending the length actually required by 800mm. Strip off about 800mm of the anti-corrosive vinyl sheath, and 790mm of the armor and the inner vinyl sheath.

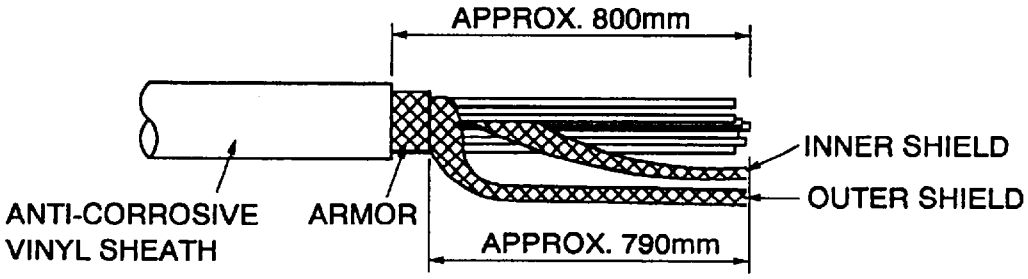


Fig. 2-1 Fabricating the signal cable RW-6895

2) Untwine the outer braided shield with a screwdriver or the like to expose the cores under the outer shield.

3) Similar to step 2, expose the cores under the inner shield. Appropriately mark all cores for future identification.

4) Slide the clamping gland, washers and rubber packing onto the cable.

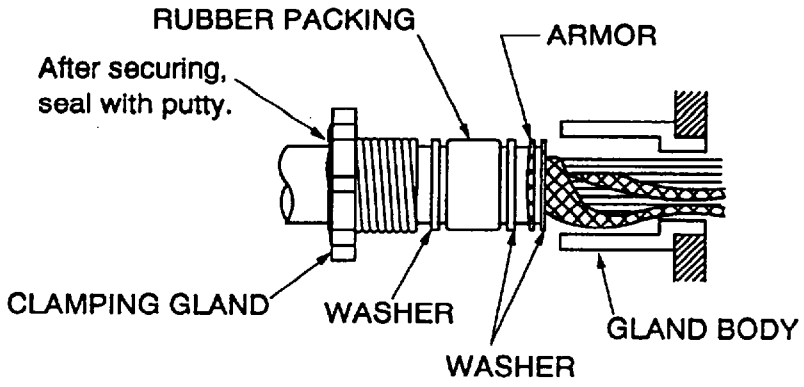


Fig. 2-2 Assembling the cable gland

5) Determine the length of each core considering their location on STB-1 in the antenna unit. Trim conductors as necessary.

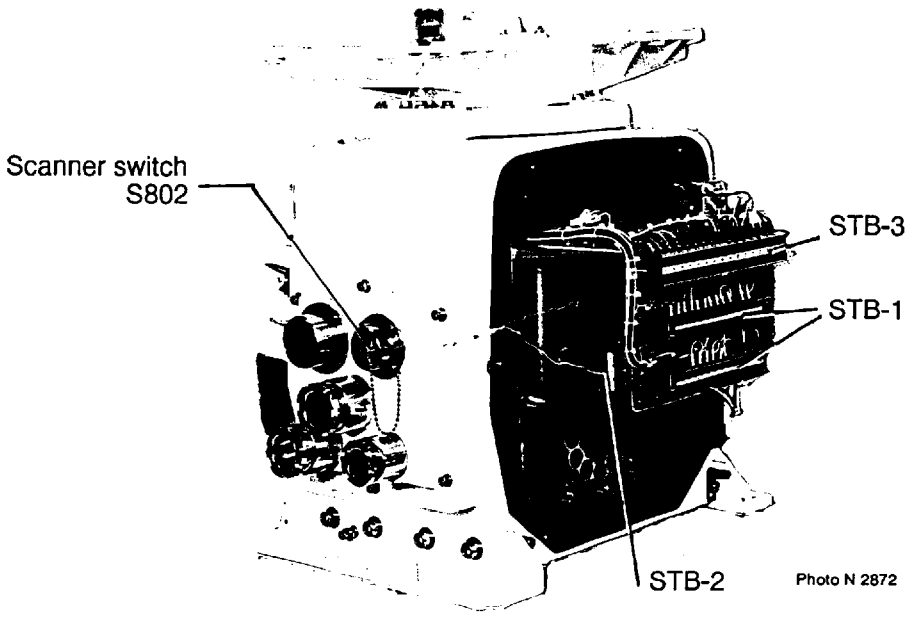


Fig. 2-3 Terminal boards inside scanner unit

6) Trim the shields considering their location on the earth terminal inside the scanner unit. Fasten crimp-on lugs (yellow, FV5.5-4) to each shield, then connect them to the ground terminal in the antenna unit.

7) Remove the outer sheath of the coaxial cable (2C-2V) by 75mm. Remove the shield of each core by 6mm and fold back each conductor as illustrated below. Fasten crimp-on lugs to each conductor and shield.

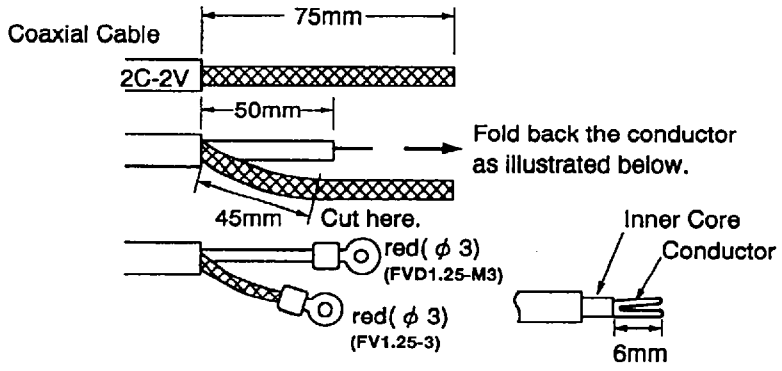


Fig. 2-4 Processing the cores of the coaxial cables

8) Slip the cable gland over the cable and tighten the cable gland nut. Ground the armor through the two washers. Seal the cable gland nut with putty to maintain watertightness.

9) Connect the conductors to terminal STB-1 according to the interconnection diagram.

Power supply cable MPYCY-16

Note that connections are different according to type of antenna motor.

1) Loosen the clamping gland of the upper cable gland, and remove the rubber packing and flat washers from the scanner unit.

2) Shorten the cable to a suitable length. Remove the vinyl sheath by 600mm. Cut off the armor by 590mm.

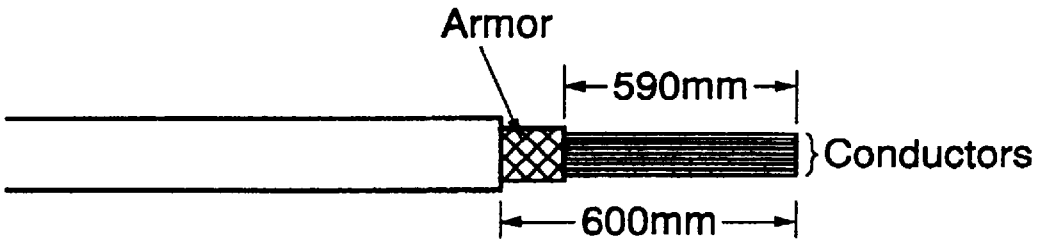


Fig. 2-5

3) Slide the clamping gland, washers and rubber gasket over the cable. Fold back the armor by 5mm, then put it between washer and cable gland body.

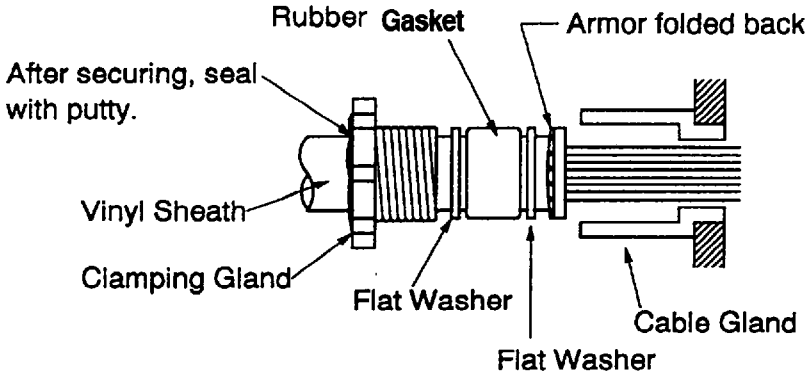


Fig. 2-6

4) Determine the length of the cores considering their location on STB-3. Trim conductors as necessary.

5) Remove the sheath of each core by 6mm. Fix crimp-on lugs (blue, FV1.25-4) to each conductor. Make sure each connection is secure both electrically and mechanically.

6) Secure the clamping gland to the body; then seal with putty.

7) Connect the conductors to STB-3, referring to the interconnection diagram.

Power supply cable 660V-DPYCY-1.25

This cable is fabricated the same as the MPYCY-16. Pass the cable into the right side cable gland. Fasten crimp-on lugs (blue, FV1.25-4) to the cores and connect them to STB-2.

Final preparations inside the scanner unit

After all wiring has been completed, check for loose screws and poor contact on crimp-on lugs. Apply grease to scanner cover fixing screws and packing; then replace the scanner cover.

Fixing the scanner cover

Fasten the scanner cover tightly to maintain watertightness. Apply grease to the fixing bolts and tapped holes.

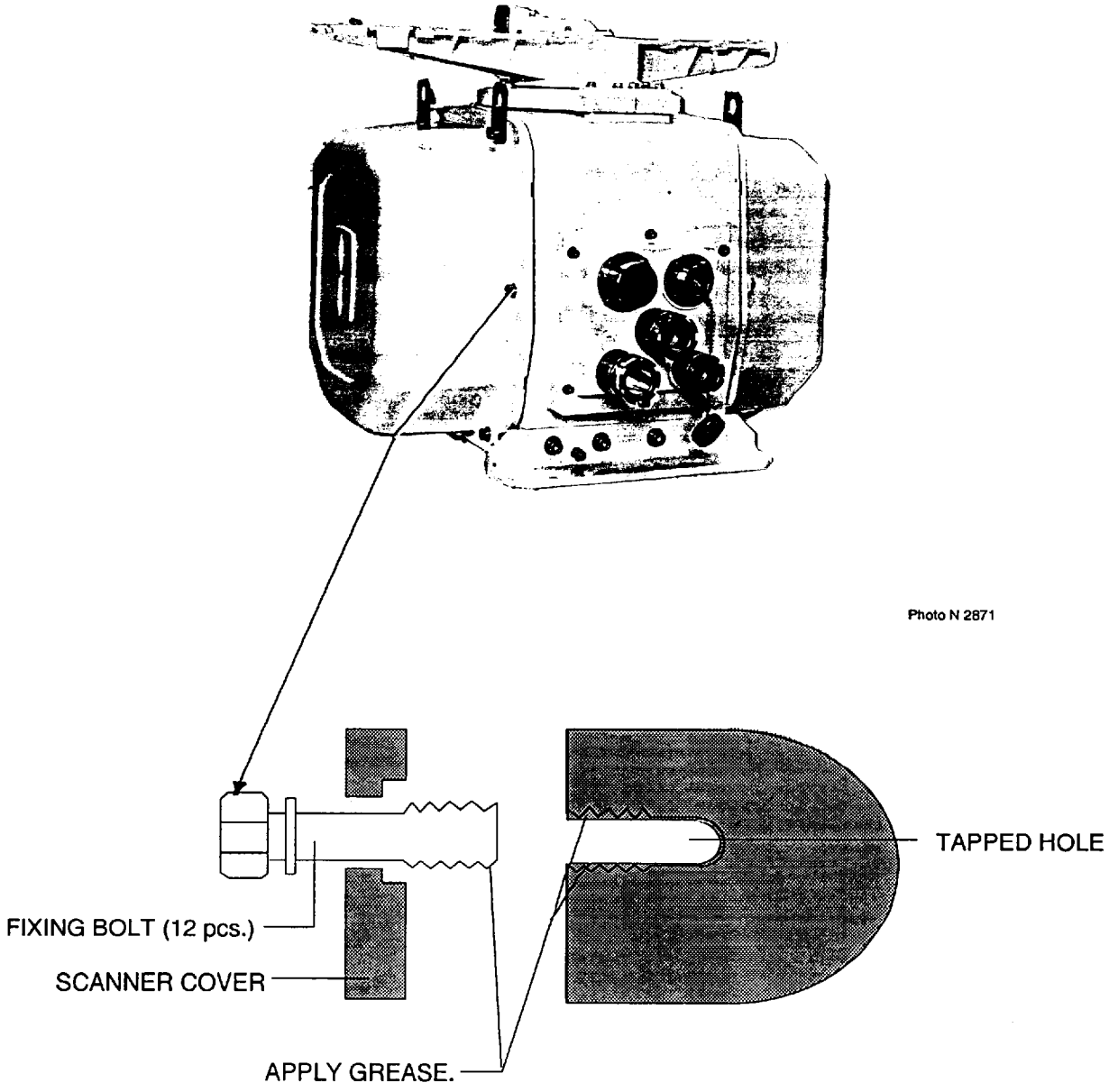


Fig. 2-7

2.2 Power Supply Unit PSU-001

Location of terminal boards

The figure below shows the location of the terminal boards inside the PSU-001.

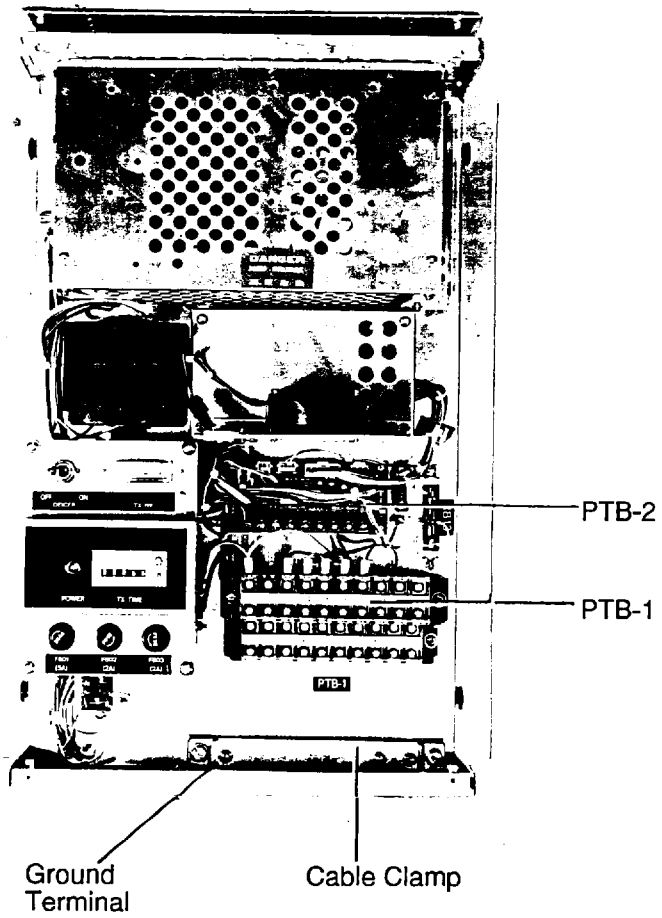


Photo N 2914

Fig. 2-8 Power supply unit (PSU-001), cover removed

Changing power supply voltage

The PSU-001 is factory-set for ship's mains of 100VAC, 1ø, 100VAC. For other supply voltage and frequency, follow the instructions shown below.

1) Set voltage by transformer T804.

2) Set frequency (50Hz or 60Hz) by slide switch behind the hour meter HM801.

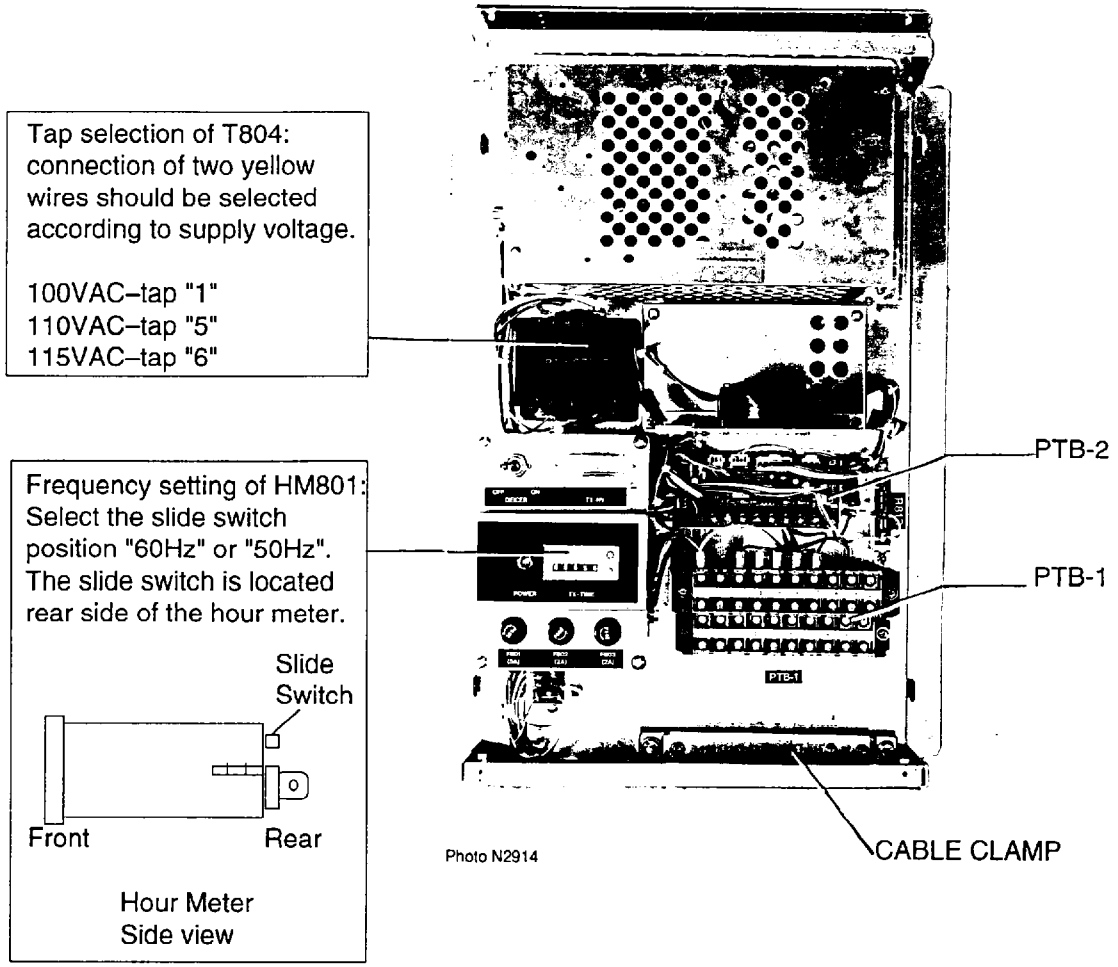


Fig. 2-9 Power supply unit (PSU-001)

2.3 Power Supply Unit PSU-004

Location of terminal boards

The figure below shows the location of the terminal boards inside the PSU-004.

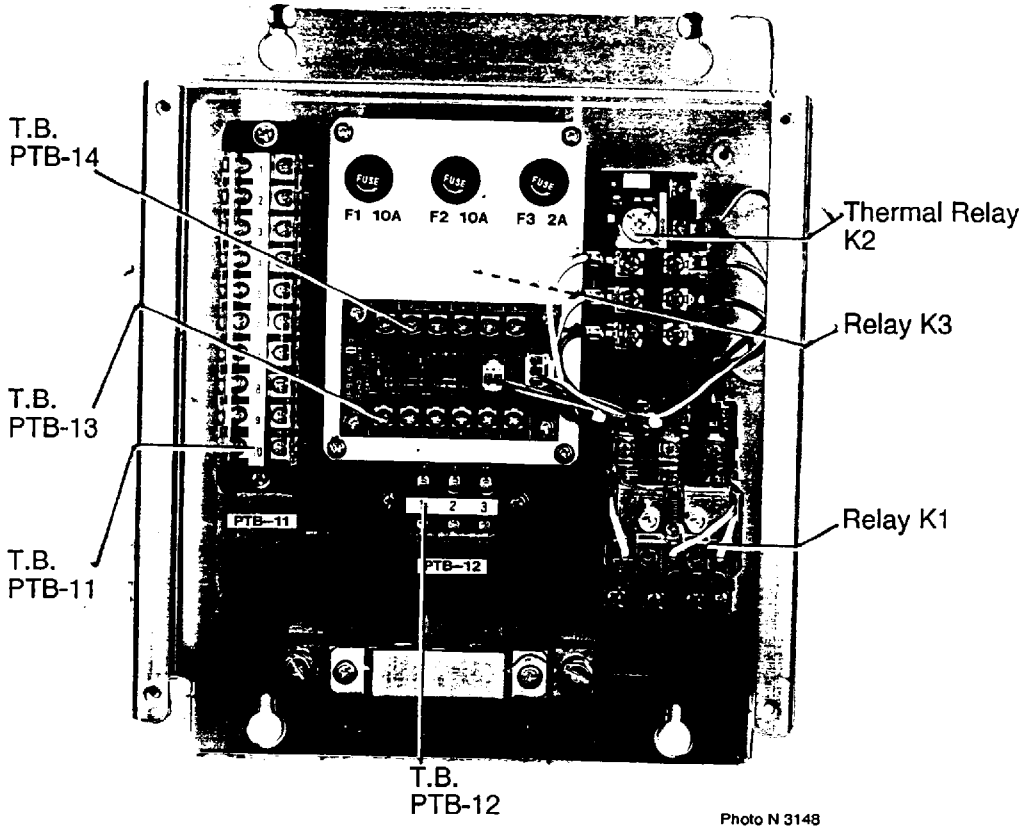


Fig. 2-10 Power supply unit (PSU-004), cover removed

Changing supply voltage

The table below lists the terminal relays used in the PSU-004. The type of the relay and its presetting differs according to ship's mains.

Ship's Mains	Scanner Unit	Thermal Relay (K2)	
		Type	Presetting
200/220VAC, 3ø	RSB-0049	T20A-Q1A	0.8A
24VDC	RSB-0050	RAC101505D	5A

Refer to Fig. 2-11 for the fabrication of the TPYCY (DPYCY) cables. The maximum cable length between the cable clamp and the terminal board is 350mm.

2.4 Display Unit Connection

Two cables are terminated at the display unit: the signal cable RW-6895 and the power cable DPCY-3.5. 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 10mm.
4) Slip the terminal cap onto the core.
5) Remove insulation of cores by about 10mm.
6) Fix crimp-on lugs to the cores.
7) Cover the braided shield with vinyl tape, leaving the portion which will lie inside the cable clamp untaped.

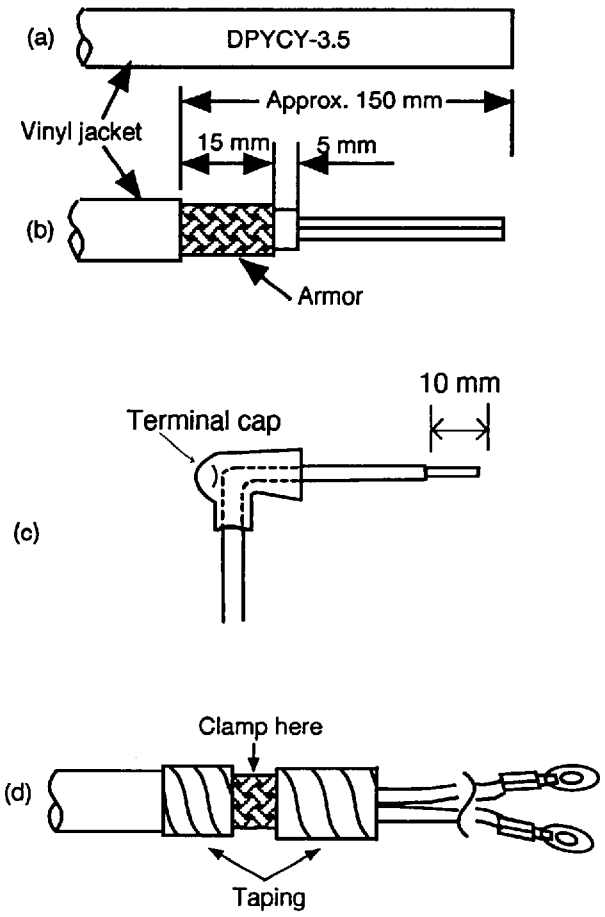


Fig. 2-11 How to fabricate power cable DPYCY-3.5

Leading in cables to the display unit

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

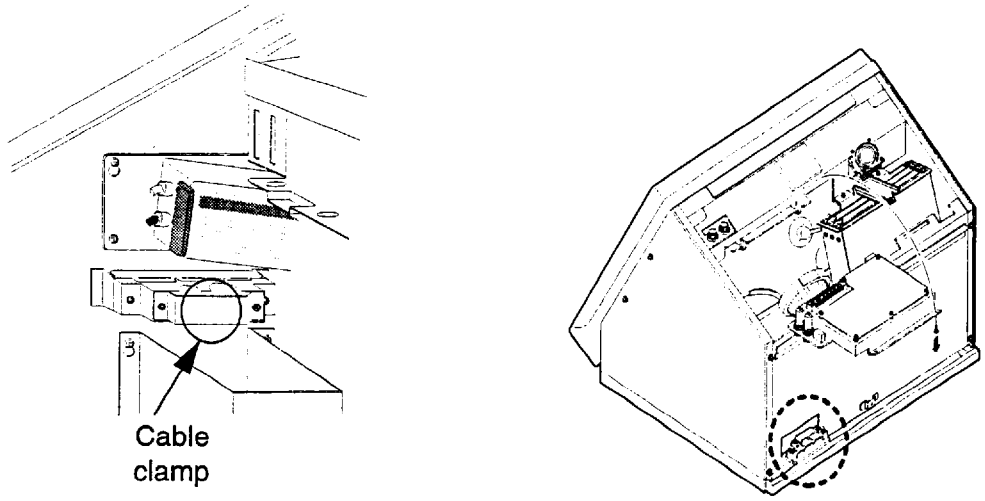


Figure 2-12 Location of cable clamp inside the display unit

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 2-13. Finally, pass cables through the cable clamp at the right side of the display unit and then tighten the cable clamp.

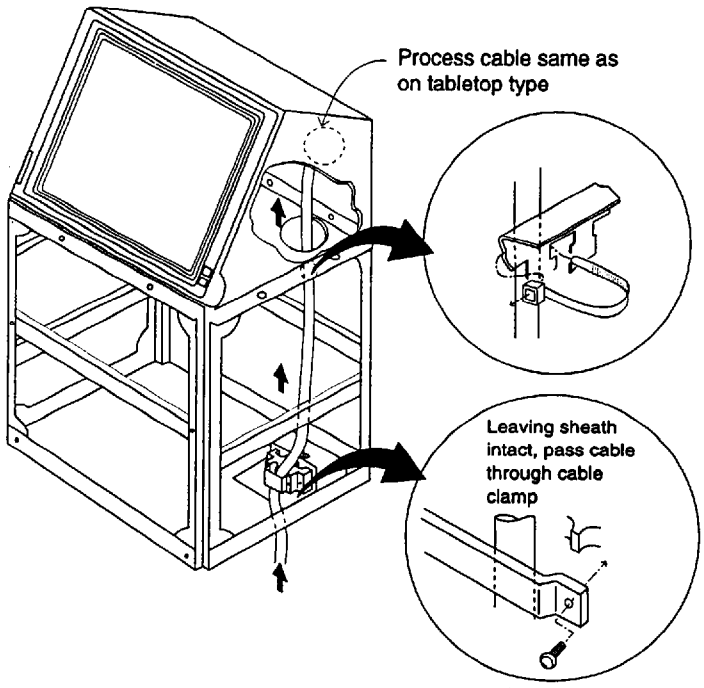


Figure 2-13 How to lead in cables through the pedestal

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.

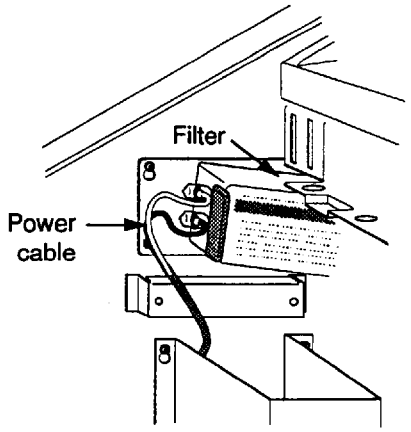


Fig. 2-14 Location of filter inside the display unit

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.

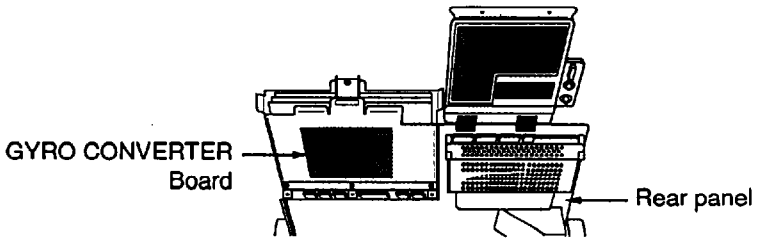
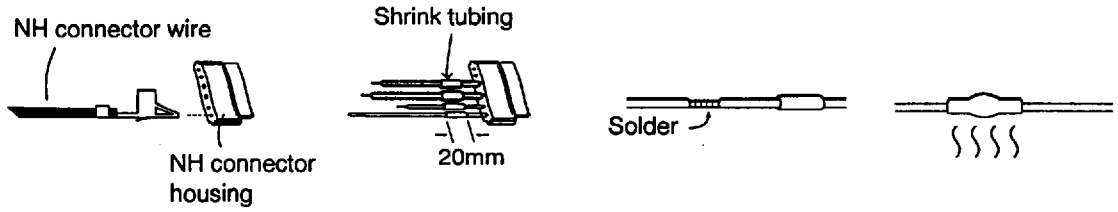


Fig. 2-15 Location of GYRO CONVERTER Board

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.

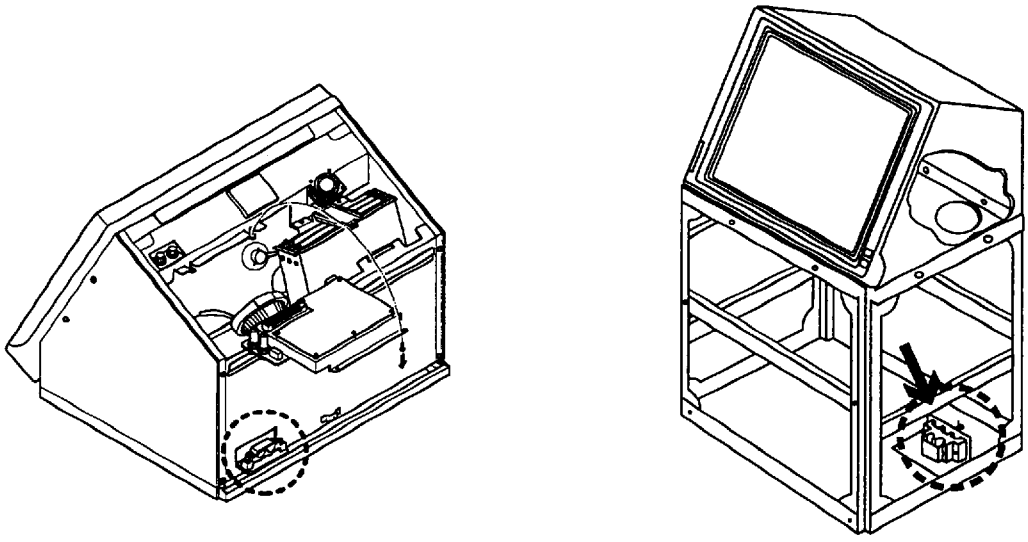
④ Heat shrink tubing with soldering iron.

Grounding

The display unit must be grounded at the point circled shown in Fig. 2-16.

⚠ CAUTION

Ground the display unit to prevent electrical shock and mutual interference.



Tabletop type Pedestal type

Fig. 2-16 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)

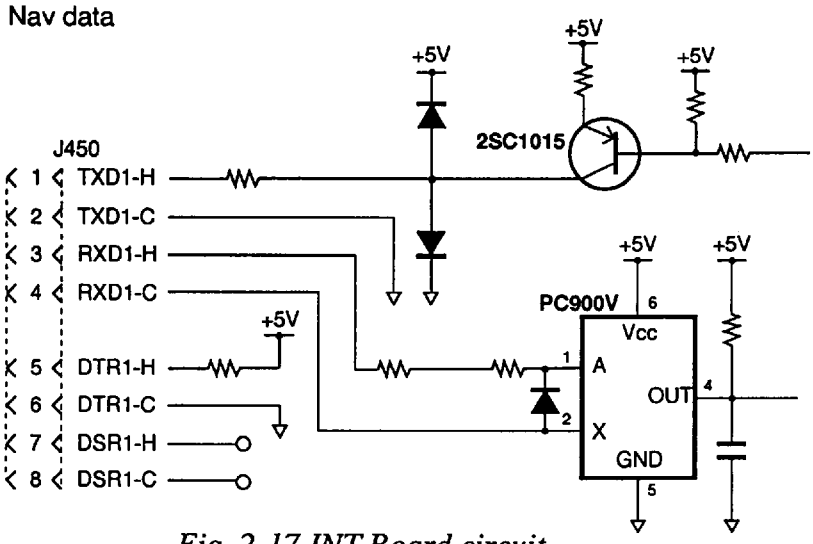


Fig. 2-17 INT Board circuit

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
Input Signal					
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		
Output Signal					
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, FR-2800 series	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)
RJ-8	RJ-8	J456	NH, 4 pin		
PM-30	PM-30	J105	VH, 2pin		
Input/Output Signal					
INS data	INS. DATA	J455	NH, 5 pin		
RJ-7	RJ-7	J457	NH, 15 pin		
		J458	NH, 8 pin		
Nav data	N AV DATA	J450	NH, 8 pin		
ARPA data	ARPA DATA	J454	NH, 5 pin		

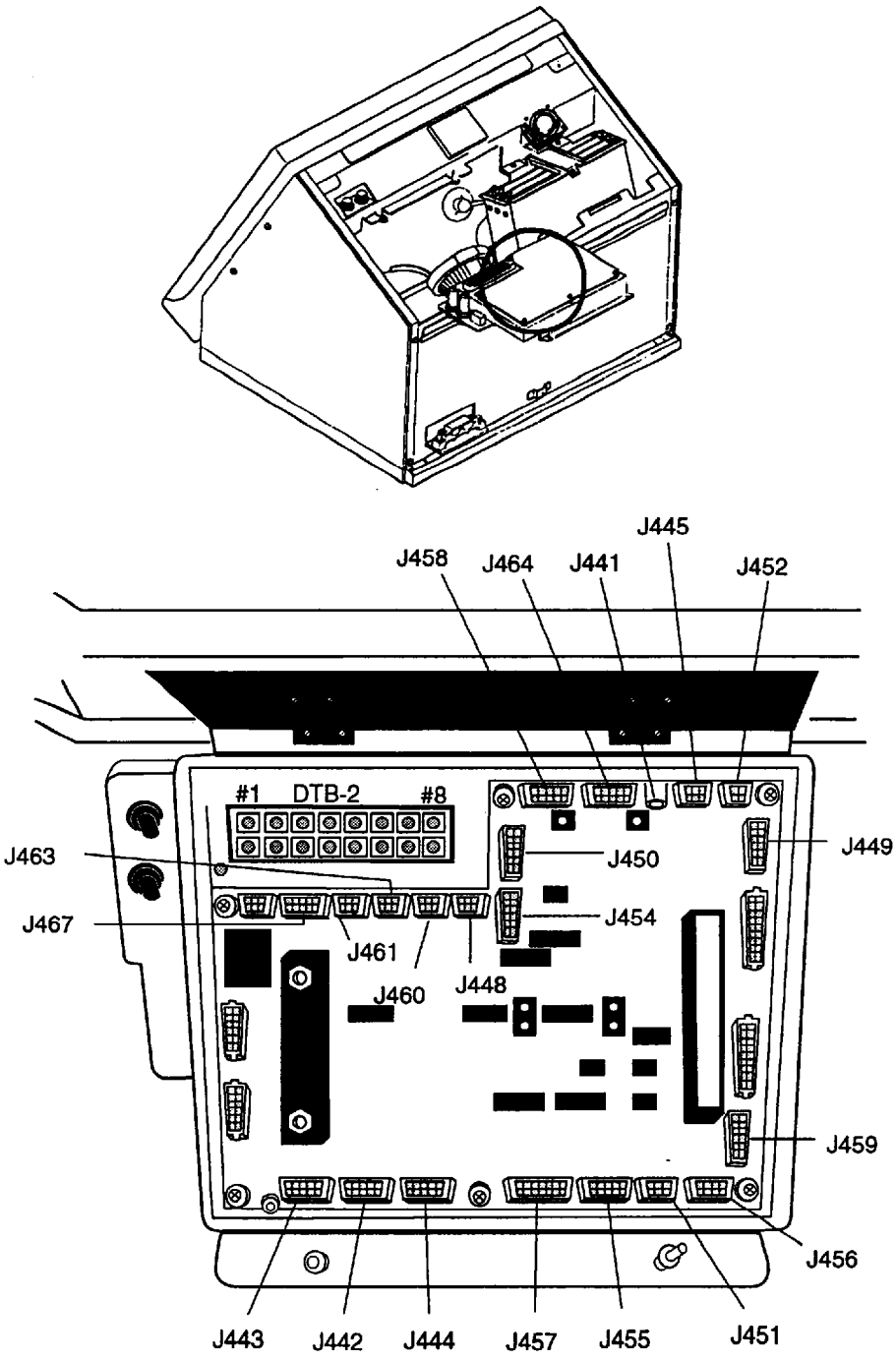


Fig. 2-18 Location of connectors on the INT Board

Grounding cables

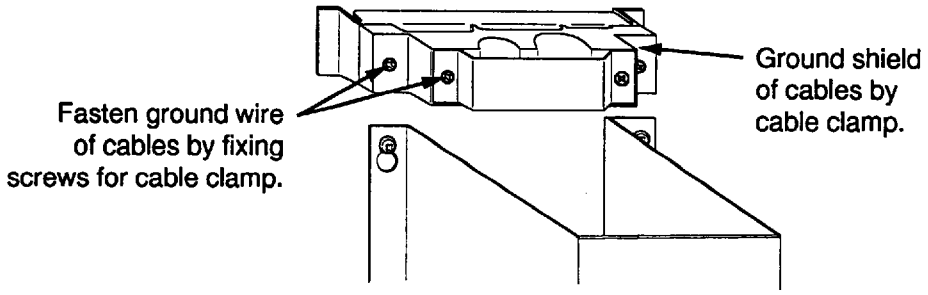
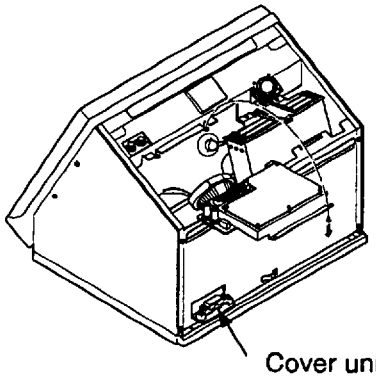


Fig. 2-19 Cable clamp

Covering unused cable slots in the cable clamp



3. INITIALIZATION AND ADJUSTMENT

3.1 Preparation 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.

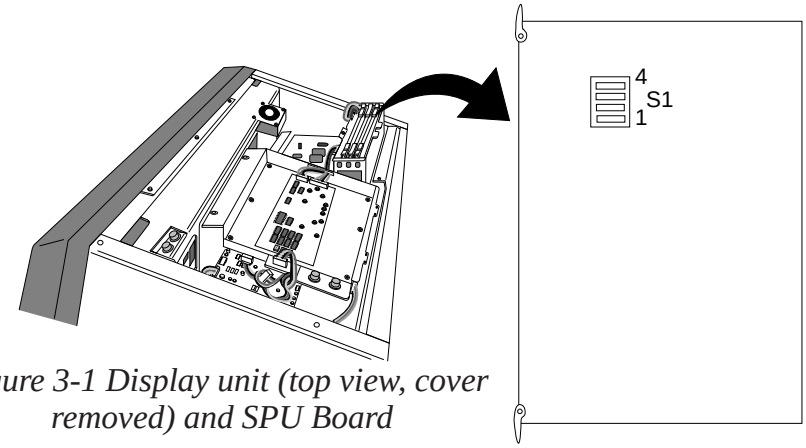


Figure 3-1 Display unit (top view, cover removed) and SPU Board

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 3-9 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 the [ENTER] key.
3) Wait for 10 seconds.
4) Turn power off, and on again.
5) Press [RADAR MENU] [0] [0] [2] [0] [0] [0] [2] to select MODEL on the INITIAL SETTING 4 menu.
6) Press the [2] key to select OTHER X-BAND.
7) Press the [ENTER] key.

3.2 Heading Alignment

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

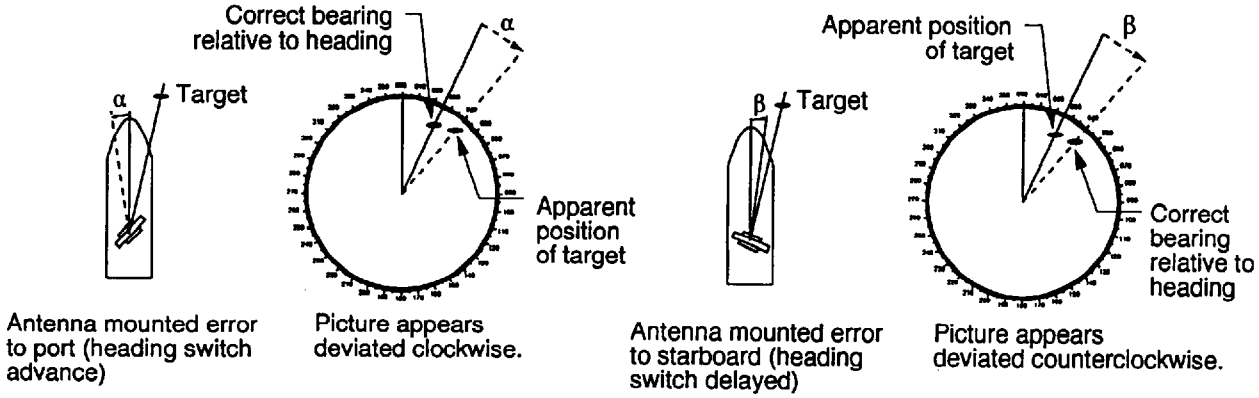


Fig. 3-2 Heading alignment error

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 with the EBL. (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.

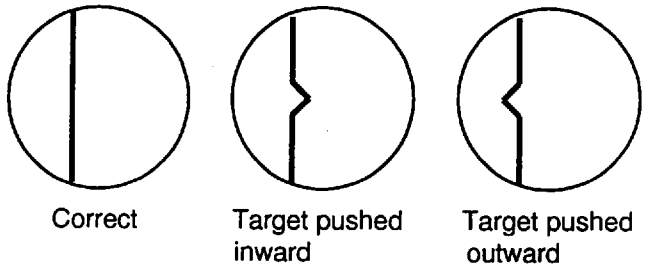


Fig. 3-3 Examples of correct and incorrect sweep timings

Procedure

1) Turn on the power. Press [RADAR MENU] [0] [0] [2] [3] to select TIMING ADJ on the INITIAL SETTING 1 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). Take trigger at TP10 on the same board.
2) Transmit on the 12nm range.
3) Adjust VR1 on the INT Board so the value of TP3 is 4Vpp. (For slave display, adjust VR2 on the INT Board so the value of TP3 is 4Vpp.)

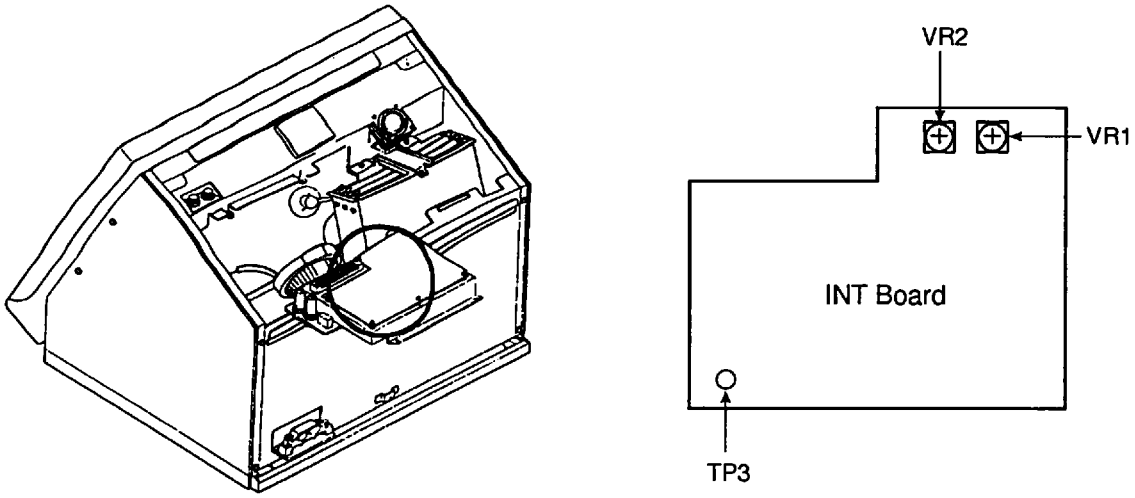


Fig. 3-4 Location of INT Board

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.**

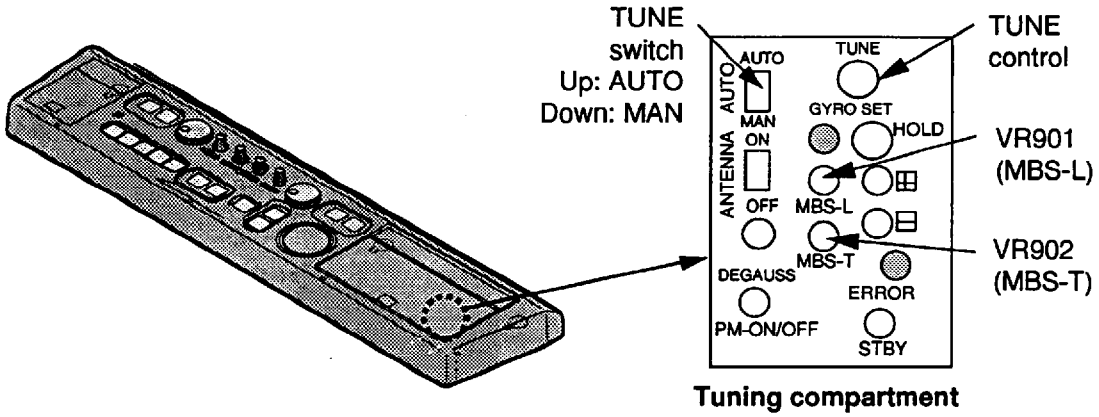


Fig. 3-5 Control unit, location of tuning compartment

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 Adjustment

Magnetron heater voltage

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

Procedure

1. Press [RADAR MENU] [0] [0] [2] [0] [5] to set "SCANNER STOPPED" to "TX".
2. Set the radar to stand-by, 0.25nm range, CRT brilliance control fully ccw, and the ANTENNA switch to OFF position.
3. Remove the fuse F801(5 A) on the power supply unit.
4. Connect a multimeter, set to 10 VDC range, between #1(+) and #2(-) of J829.
5. Adjust the position of the sliding contact of R812 for a multimeter reading between 7.0 and 7.5V.
6. Transmit the radar on the 48 nm range.
7. Adjust R811 for a multimeter reading between 4.5 and 5.0V.

NOTE: If the length of multicore cable (MPYCY-16) between the scanner unit and power supply unit exceeds 60m, the magnetron heater voltage may not reach the lower limit due to voltage drop. In that case, increase the voltage by R813 (various resistor in the power supply unit, coarse adjustment) and readjust the R811/R813 in the scanner unit.

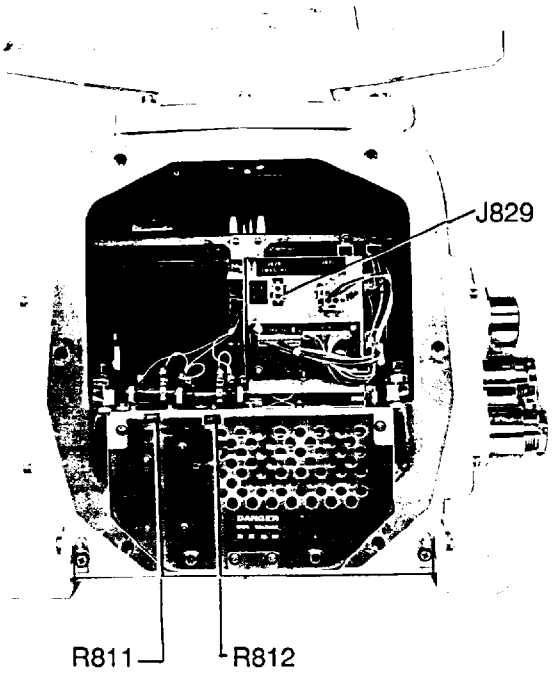


Photo N2914

Fig. 3-6 Scanner unit

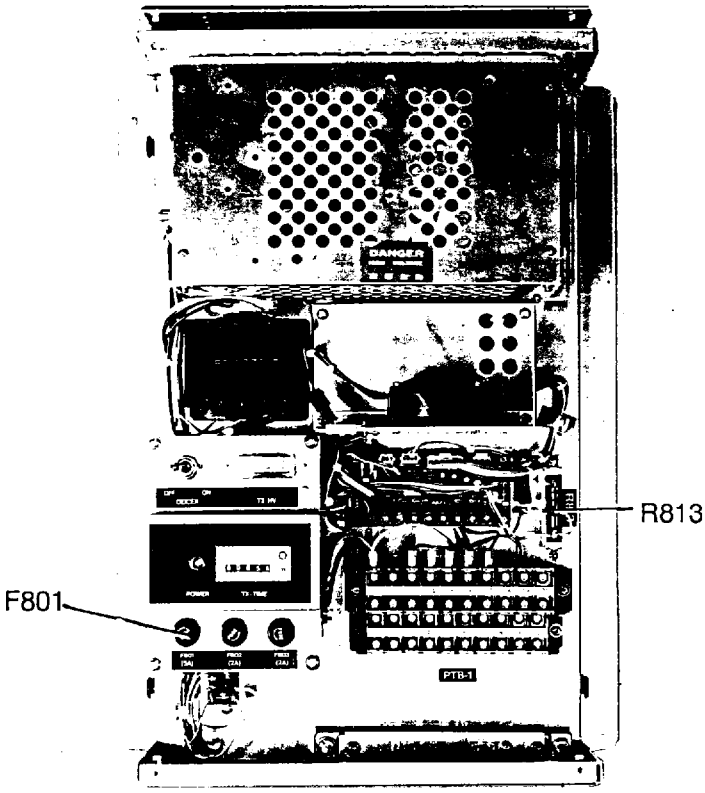


Photo N 2880

Fig. 3-7 Power supply unit

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.

OWN 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 changed 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).

SECTOR BLKG: 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.

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. Pulsewidth, 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 DEFAULT: 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
3	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 TARGETDATA/ CANCEL/

[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.

Fig. 3-8 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

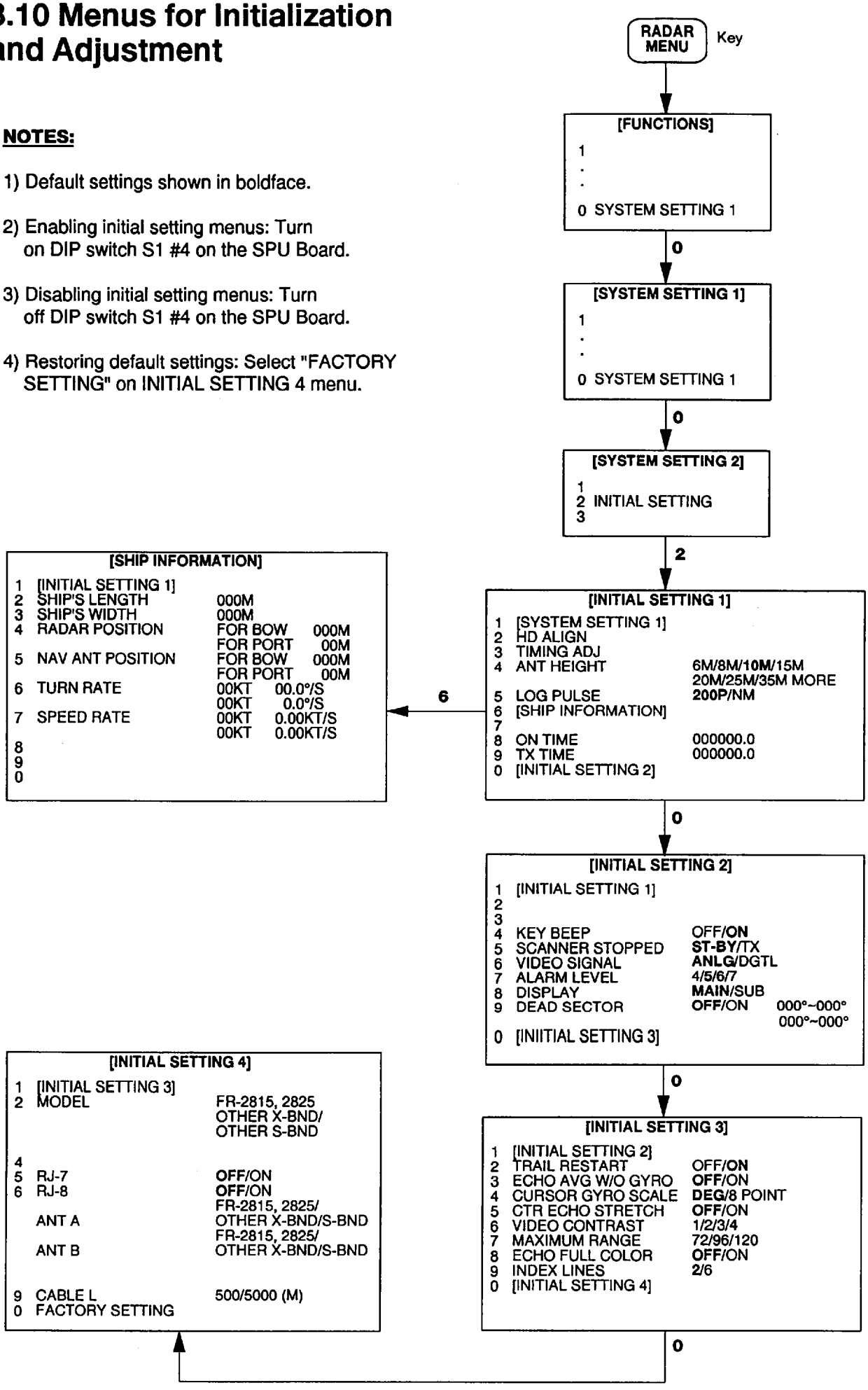
NOTES:

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 SETTING" on INITIAL SETTING 4 menu.



3.11 Adjusting the ARP Board

Procedure

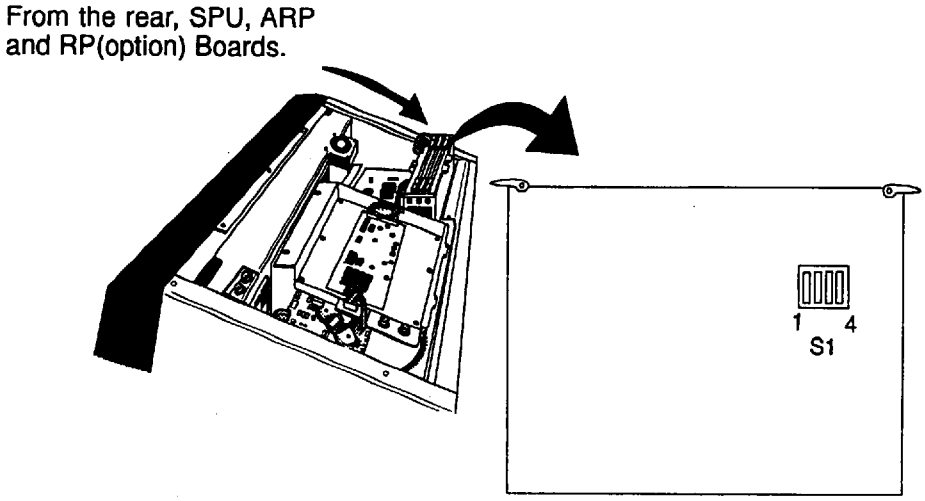
1) Take out the SPU Board SPU-9111 from the pcb compartment in the display unit.

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 6nm range.

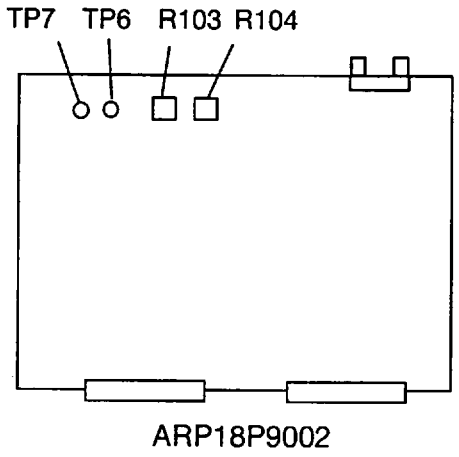
A/C SEA control:	fully CCW
A/C RAIN control:	fully CCW
GAIN control:	fully CCW



5) Connect a digital multimeter, set to DCV range, to the following points on the ARP Board.

+: TP7 (VS+)
- : TP6 (VS -)

6) Adjust potentiometer R104 ("OFFSET") on the ARP Board so that the multimeter reads +0.09 to 0.13V.



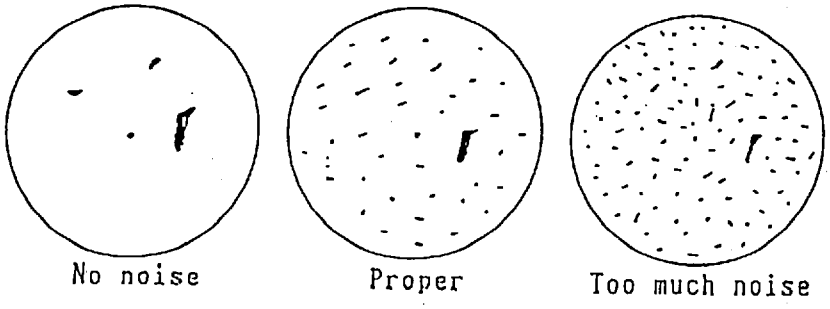
7) Set the controls and switches as follow.

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) Press the RADAR MENU key followed by 0, 0, 2, 0 and 6 to select "DGTL".

9) Press the ENTER key.

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



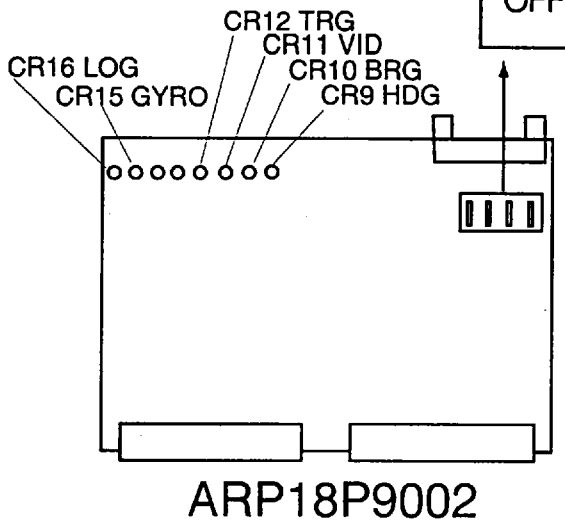
11) Repeat step 6 to select "ANLG", and press the ENTER key.

12) Turn off #4 of DIP switch S1.

Confirming proper operation

Connect speed log and gyro to radar. Transmit the radar. 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.

#4	#3	#2	#1
OFF	OFF	OFF	OFF



ARP18P9002

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 converts analog gyrocompass reading into digital coded bearing data for display on the radar display.

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

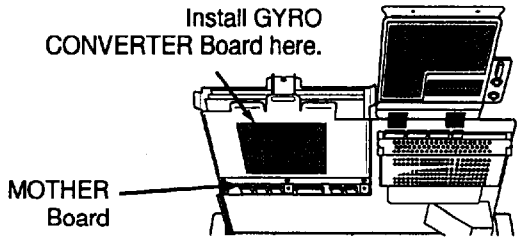


Fig. 4-1 Display unit, top view

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

3) Connect the GYRO CONVERTER Board to the MOTHER Board (cables supplied with GC-8) as follows:

GYRO CONV. Board		MOTHER Board
J1 (14P)	◄——►	J301 (6P)
J7 (5P)	◄——►	J307 (4P)

4) 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

5) Solder the gyrocompass cable to the VH connector assemblies (supplied).

6) Connect the VH connectors to the GYRO CONVERTER Board as shown in the table below.

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.

7) Attach instruction label (supplied) to the rear side of the top cover.

8) Close the panel.

9) Turn on and off the power to reset the CPU.

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.

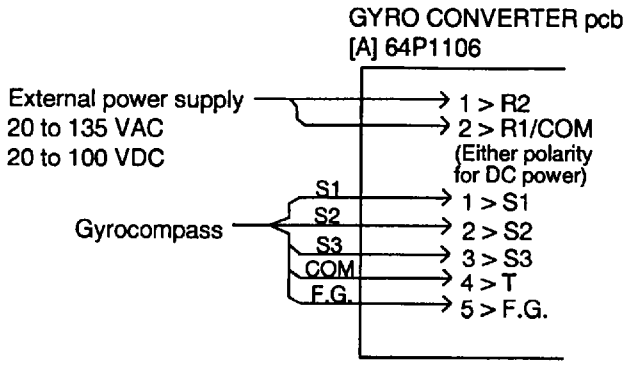


Fig. 4-2 Connection of external power supply to GYRO GYRO CONVERTER Board

4.3 Confirming Gyrocompass Specifications

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

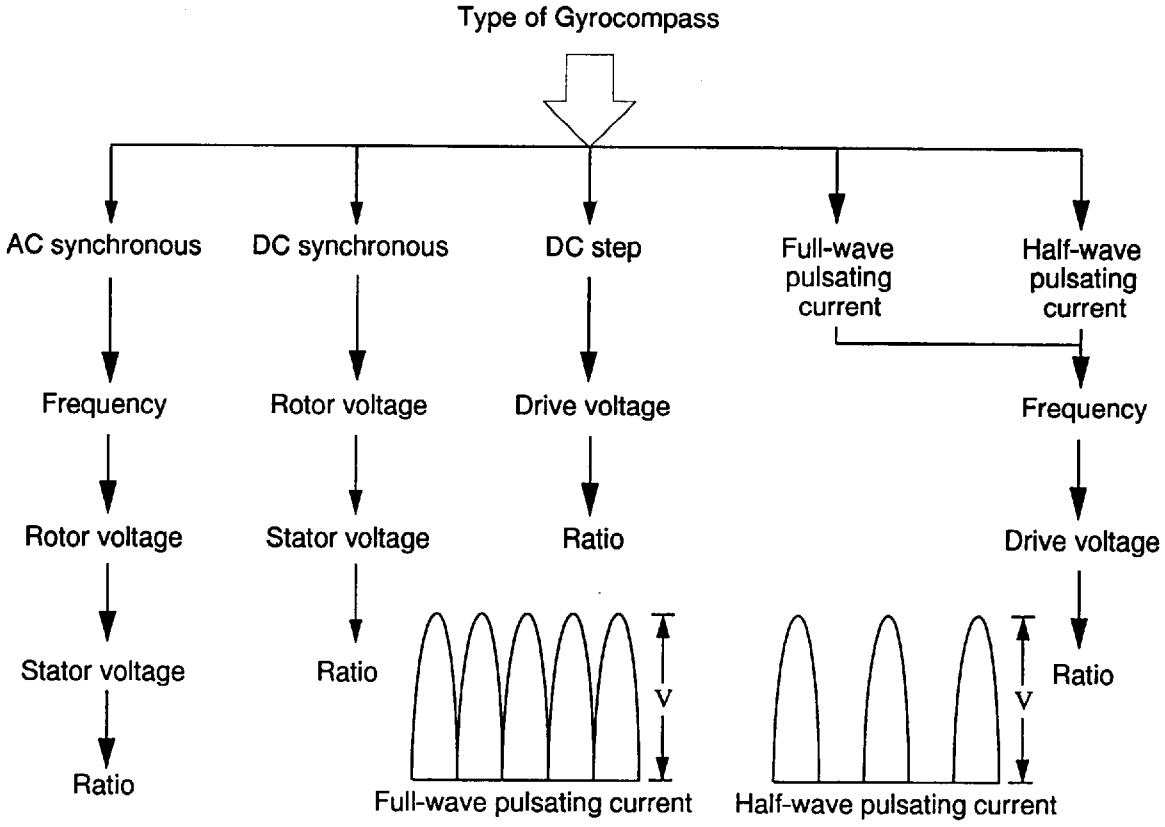


Fig. 4-3 Confirming gyrocompass specifications

4.4 Changing Settings on the GYRO CONVERTER Board

Default setting

In the default setting all DIP switches are off and all jumpers 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	OFF	#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	JP3
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	OFF	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	#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	#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.

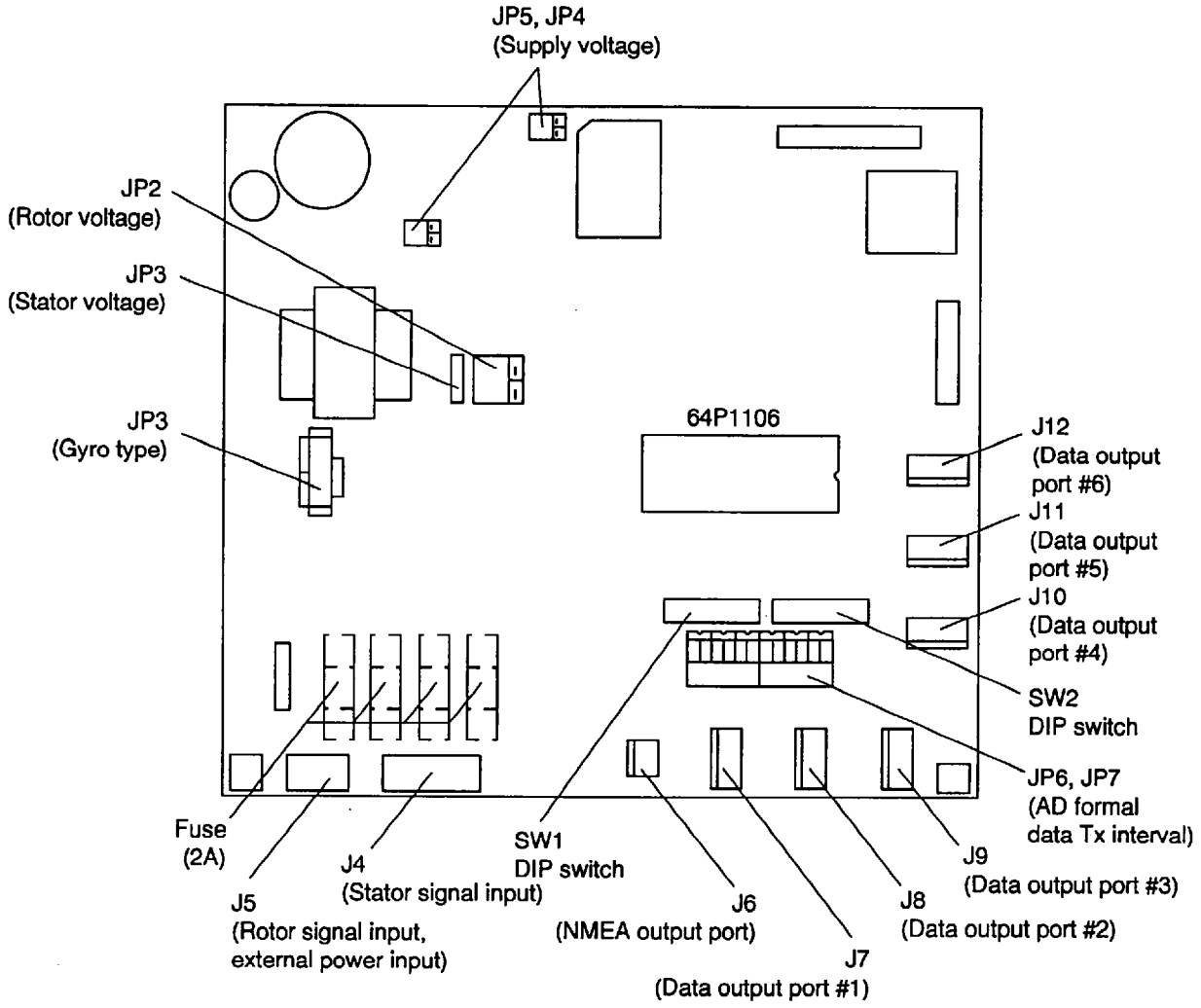


Fig. 4-4 Location of DIP switches and jumper wires on the GYRO CONVERTER Board

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.

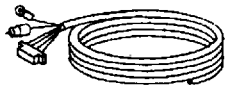
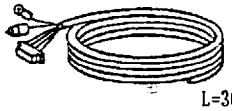
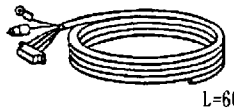
FURUNO

CODE NO.		03EU-X-9412
TYPE		

工事材料表
INSTALLATION MATERIALS

FR-2855
FAR-2855

レーダー
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	信号ケーブル組品・ SIGNAL CABLE ASSY.	 L=15m	S03-58-15 RW-6895-0 *15M*	1	選択 TO BE SELECTED
			CODE NO. 008-461-710		
2	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=20m	S03-58-20 RW-6895-0 *20M*	1	
			CODE NO. 008-461-720		
3	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30m	S03-58-30 RW-6895-0 *30M*	1	
			CODE NO. 008-461-730		
4	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=60m	S03-58-60 RW-6895-0 *60M*	1	
			CODE NO. 008-461-740		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

(1/1)

図番 DWG. NO. C3419-M01-A

FURUNO

CODE NO.	008-461-760	03EU-X-9403 -2
TYPE	CP03-14602	1/2

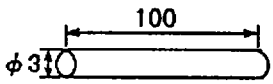
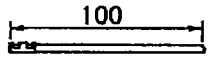
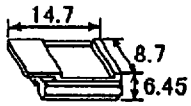
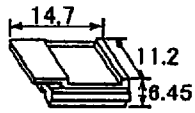
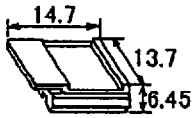
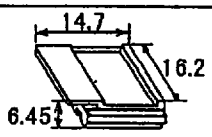
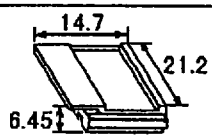
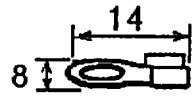
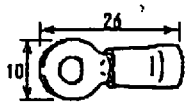
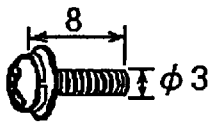
工事材料表

INSTALLATION MATERIALS

FR/FAR-2815/2825
2835S/2855/2855W
FA-2805

舶用レーダー

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	ｽﾐﾁｭｰﾌﾞ F(Z) HEAT-SHRINK TUBE		3X0.25 ｸﾛ *0.10M* CODE NO. 000-105-874	2	外部機器接続用 FOR EXTERNAL EQUIPMENT
2	NHｺﾈｸﾀ *ｾﾝｻﾞｲ* NH CONNECTOR ASSY.		AWG24 *0.1M* CODE NO. 000-132-342	20	外部機器接続用 FOR EXTERNAL EQUIPMENT
3	NHｺﾈｸﾀﾊｳｼﾞﾝｸﾞ NH CONNECTOR HOUSING		H2P-SHF-AA CODE NO. 000-505-595	1	警報音信号(AC) EXT-BUZZER (AC)
4	NHｺﾈｸﾀﾊｳｼﾞﾝｸﾞ NH CONNECTOR HOUSING		H3P-SHF-AA CODE NO. 000-505-596	2	ｼﾞｬｲﾛ信号用 GYRO DATA ﾛｸﾞ信号用 SPEED LOG
5	NHｺﾈｸﾀﾊｳｼﾞﾝｸﾞ NH CONNECTOR HOUSING		H4P-SHF-AA CODE NO. 000-505-597	3	RJ-8用 ﾚｰﾀﾞﾌﾞｲ用 潮流計信号用
6	NHｺﾈｸﾀﾊｳｼﾞﾝｸﾞ NH CONNECTOR HOUSING		H5P-SHF-AA CODE NO. 000-505-598	2	ｼﾞｬｲﾛ信号用 GYRO DATA ﾛｸﾞ信号用 INSﾃﾞｰﾀ用 INS DATA
7	NHｺﾈｸﾀﾊｳｼﾞﾝｸﾞ NH CONNECTOR HOUSING		H7P-SHF-AA CODE NO. 000-505-600	1	舵角信号用 FOR PORT RUDDER
8	特殊ﾗｸﾞ LUG		ｱﾅｹｲ4 ｽｽﾞ CODE NO. 000-536-100	2	
9	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	
10	ﾜｰﾅﾍﾞﾋﾞｽｽﾈｼﾞ B WASHER HEAD SCREW		M3X8 C2700 MBNI2 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

CODE NO.	008-461-760	03EU-X-9403 -2
TYPE	CP03-14602	2/2

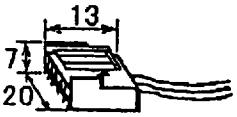
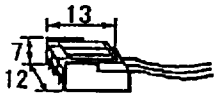
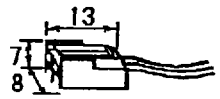
工事材料表

INSTALLATION MATERIALS

FR/FAR-2815/2825
2835S/2855/2855W
FA-2805

舶用レーダー

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
11	VHコネクタ組品 NH CONNECTOR ASSY.		03-1737(5P) CODE NO. 008-454-380	1	ジャイロコンバータ FOR GYRO CONVERTER
12	VHコネクタ組品 NH CONNECTOR ASSY.		03-1738(3P) CODE NO. 008-454-390	1	ジャイロコンバータ FOR GYRO CONVERTER
13	VHコネクタ組品 NH CONNECTOR ASSY.		03-1778(2P) CODE NO. 008-460-050	1	パフォーマンスモニター PM-30/50用 FOR PERFORMANCE MONITOR

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

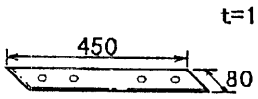
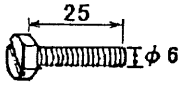
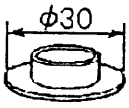
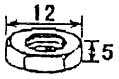
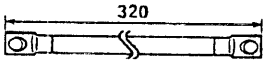
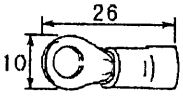
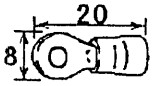
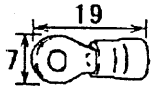
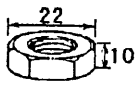
CODE NO.	008-461-750	03EU-X-9406 -5
TYPE	CP03-14601	1/2

工事材料表

INSTALLATION MATERIALS

FR/FAR-2855/2150 レーダー
FR-2160DS/2155
FR-2165DS

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	防蝕ゴム CORROSION-PROOF RUBBER MAT		03-029-0301-2 CODE NO. 100-091-112	2	
2	六角ボルト HEX. BOLT		M6X25 SUS304 CODE NO. 000-862-180	1	
3	シールワッシャ SEAL WASHER		03-001-3002-0 CODE NO. 300-130-020	4	
4	バネ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-864-260	1	
5	六角ナット 1種 HEX. NUT		M6 SUS304 CODE NO. 000-863-109	1	
6	アース線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO. 000-566-000	1	
7	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	2	
8	圧着端子 CRIMP-ON LUG		FV1.25-4 CODE NO. 000-538-114	18	
9	圧着端子 CRIMP-ON LUG		FV1.25-M3 7カ CODE NO. 000-538-110	26	
10	六角ナット 1種 HEX. NUT		M12 SUS304 CODE NO. 000-863-112	4	

DWG NO.
C3407-M01- C

FURUNO ELECTRIC CO., LTD

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

FURUNO

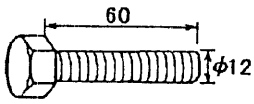
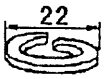
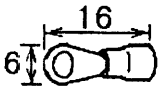
CODE NO.	008-461-750	03EU-X-9406 -5
TYPE	CP03-14601	2/2

工事材料表

INSTALLATION MATERIALS

FR/FAR-2855/2150 レーダー
FR-2160DS/2155
FR-2165DS

RADAR

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	六角ボルト（全ネジ） HEX. BOLT		M12X60 SUS304 CODE NO. 000-862-191	4	
12	バネ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-864-263	4	
13	ミガキ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-864-132	4	
14	圧着端子 CRIMP-ON LUG		FVD1.25-3 CODE NO. 000-116-634	1	
15	ミガキ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-864-129	3	

DWG NO.
C3407-M02- C

FURUNO ELECTRIC CO., LTD

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

FURUNO

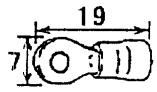
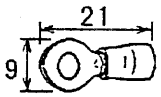
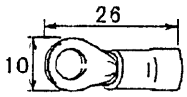
CODE NO.	008-452-790	03EP-X-9409 -3
TYPE	CP03-13916	1/1

工事材料表

INSTALLATION MATERIALS

FR-2155/2155-B　船舶用レーダ
FR-2165DS
FR/FAR-2855

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	圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ CODE NO. 000-538-110	9	
2	圧着端子 CRIMP-ON LUG		FV2-4A アオ CODE NO. 000-538-118	11	
3	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	5	

DWG NO.
C3390-M03- D

FURUNO ELECTRIC CO., LTD

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

FURUNO

CODE NO.	008-452-540	03EP-X-9405 -4
TYPE	CP03-13907	1/1

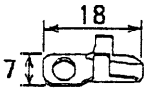
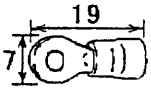
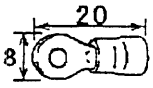
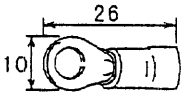
工事材料表

INSTALLATION MATERIALS

FR/FAR-2125W
FR-2135S/-B
FR-2135SW/-MSA
FR-2155/-B/2165DS
FR/FAR-2825W
FR/FAR-2835S/SW
FR/FAR-2855/W
FR/FAR-2865SW

船舶用ﾚｰﾀﾞｰ

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	特殊ﾗｸﾞ LUG		ｱﾅｹｲ4 ｽｽﾞ CODE NO. 000-536-100	2	
2	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO. 000-538-110	16	
3	圧着端子 CRIMP-ON LUG		FV1.25-4 CODE NO. 000-538-114	11	
4	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	19	

DWG NO.
C3387-M01- E

FURUNO ELECTRIC CO., LTD

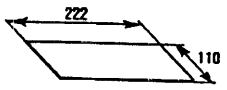
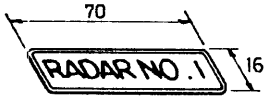
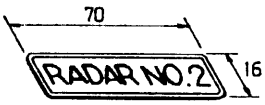
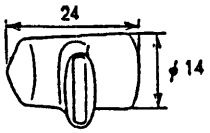
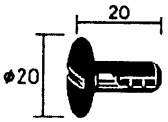
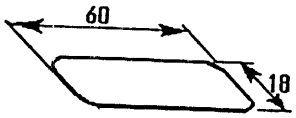
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-459-790	03EU-X-9502-4
TYPE	FP03-05701	

付属品表
ACCESSORIES

FR/FAR-2815/2825/2835S /2855/2855W /2865SW/2825W/2835SW MARINE RADAR 船用レーダー
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	ユーザーキーSWシート(E) KEY LABEL(E)		03-133-1802-1 CODE NO. 100-233-420	1	
2	システム銘板NO.1 NAME PLATE NO.1		03-009-0343-0 CODE NO. 300-903-430	2	
3	システム銘板NO.2 NAME PLATE NO.2		03-009-0344-0 CODE NO. 300-903-440	2	
4	端子板カバー PANEL BOARD COVER		ZM-47A CODE NO. 000-532-491	2	
5	ホールプラグ HOLE PLUG		NO. 4567 CODE NO. 000-800-729	4	
6	RPブラインドフィルム RP BRIND FILM		03-133-1636-0 CODE NO. 100-244-490	1	
			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。）

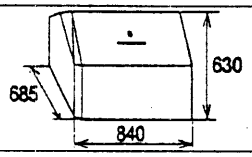
図番 DWG. NO. C3418-F02-F (1/1)

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 /2865SW/2825W/2835SW MARINE RADAR
FA-2805
舶用レーダー

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.		
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			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

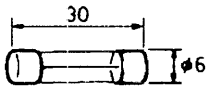
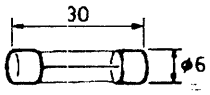
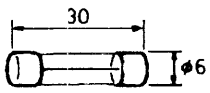
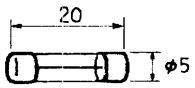
（略図の寸法は参考値です。）

図番 (1/1)
DWG. NO. C3418-F04-E

FURUNO

CODE NO.	008-459-740	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 レーダー FR-2150W/2160SW RADAR		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES.	QUANTITY SPARE	REMARKS/CODE NO.
1	管入りヒューズ GLASS TUBE FUSE		FGBO 0.5A AC250V	3		6	TCT9106 F3 000-549-018
2	管入りヒューズ GLASS TUBE FUSE		FGBO 5A AC250V	3		6	F1/F2/F3 (230V) 000-549-022
3	管入りヒューズ GLASS TUBE FUSE		FGBO 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.	008-424-380	03DZ-X-9303 -6
TYPE	SP03-09203	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-1430DS/1460DS 船舶用ﾚｰﾀﾞｰ FR-1760DS FR-2155/2155-B FR/FAR-2855 MARINE RADAR		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ｶｰﾎﾞﾝﾌﾞﾗｼ CARBON BRUSH		T-A012978	4		4	000-115-023

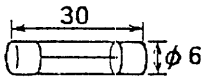
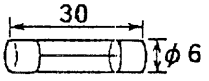
MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3357-P03- H	1/1

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

FURUNO

CODE NO.	008-424-370	03DZ-X-9302 -8
TYPE	SP03-09202	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-1460DS/1760DS 船舶用ﾚｰﾀﾞｰ FR-2155/2155-B FR-2165DS FR/FAR-2855 MARINE RADAR		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ﾋｭｰｽﾞ FUSE		FGBO-A 2A AC125V	2		4	000-549-062
2	ﾋｭｰｽﾞ FUSE		FGBO-A 5A AC125V	1		2	000-549-064

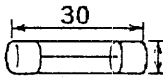
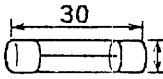
MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3357-P02- J	1/1

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

FURUNO

CODE NO.	008-452-700	03EP-X-9301 -3
TYPE	SP03-10320	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR-2155/2155-B 船舶用レーダー FR-2125W/2165DS FR-2135S/2135SW FR-2135S-B/2825W FR-2855/2855W MARINE RADAR FR-2865SW FR-2835S/2835SW	電源制御部用 FOR POWER CONTROL UNIT	

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES	QUANTITY SPARE	REMARKS/CODE NO.
1	ヒューズ FUSE		FGBO-A 2A AC125V	1		2	000-549-062
2	ヒューズ FUSE		FGBO 10A AC125V	2		4	000-549-065

MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3387-P01- D	1/1

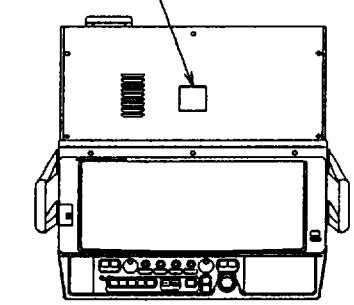
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

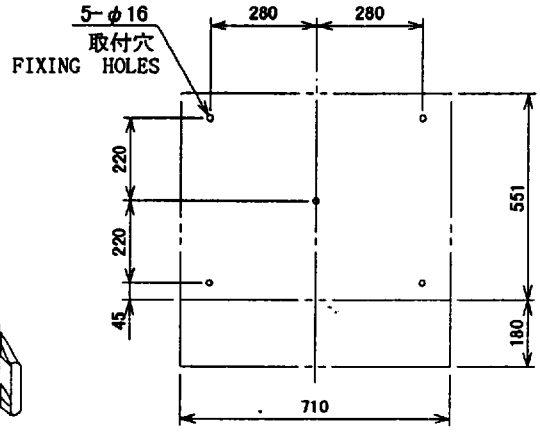
注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

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 φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICING CLEARANCE.

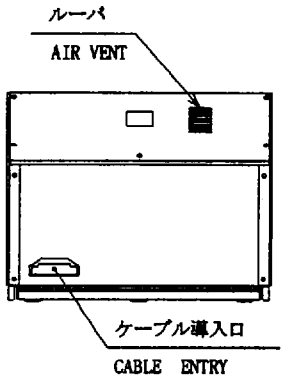
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０<L≦１００	±２mm
１００<L≦５００	±３mm
５００<L≦１０００	±４mm
１０００<L≦２０００	±５mm
２０００<L≦４０００	±７mm
４０００<L≦８０００	±１０mm
８０００<L	±１５mm

表 1
TABLE 1

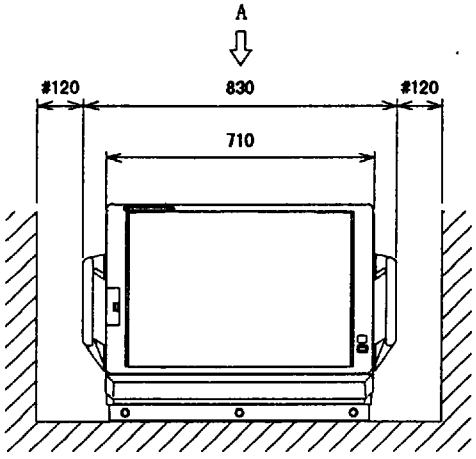


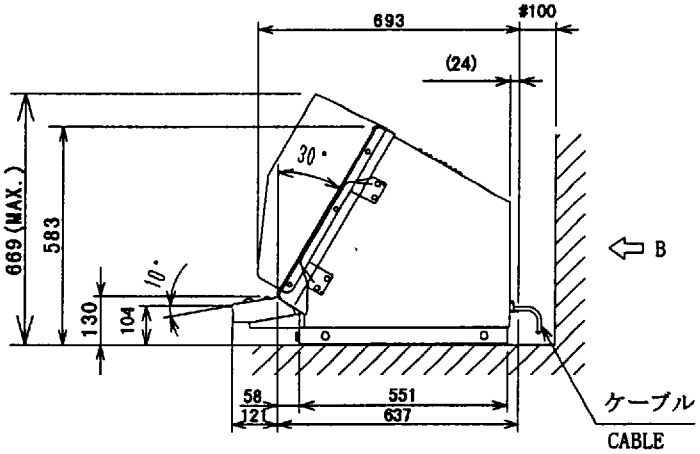


取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)



矢視 B
VIEWING B





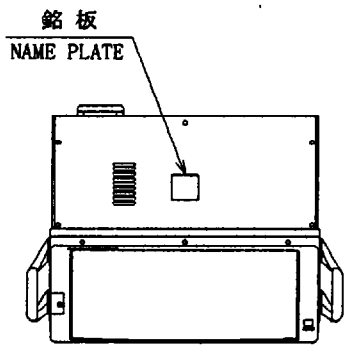
DRAWN Oct. 7 '97 T. YAMASAKI			TITLE RDP-115
CHECKED Oct 7'97 K.Kusunoki			名称 指示器（卓上型）
APPROVED Oct 7'97 K.Kusunoki		FR/FAR-2805 SER.	外寸図
SCALE 1/20	MASS 85 kg		NAME DIAPLAY UNIT (TABLETOP)
DWG. No. C3418-G02-C		03-133-1000-G2	OUTLINE DRAWING

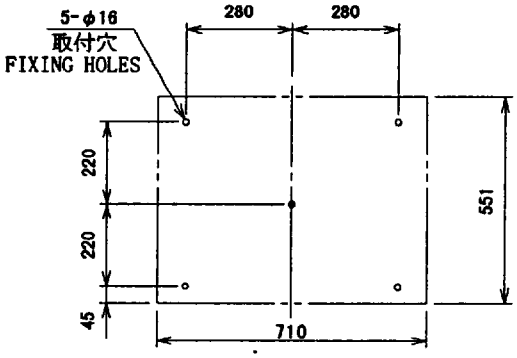
注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

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 φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICING CLEARANCE.

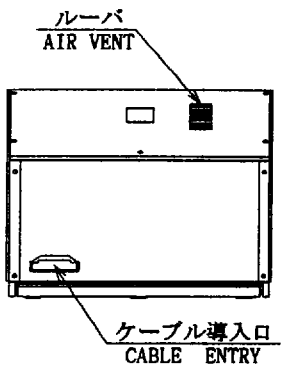
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０<L≦１００	±２mm
１００<L≦５００	±３mm
５００<L≦１０００	±４mm
１０００<L≦２０００	±５mm
２０００<L≦４０００	±７mm
４０００<L≦８０００	±１０mm
８０００<L	±１５mm

表 1
TABLE 1



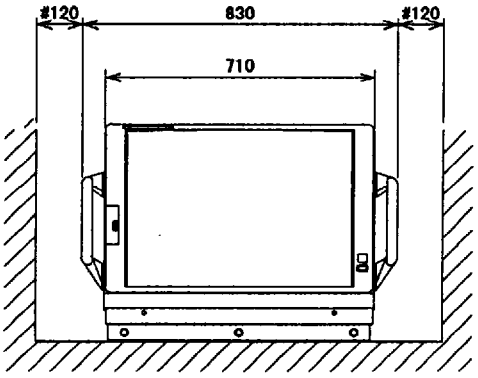


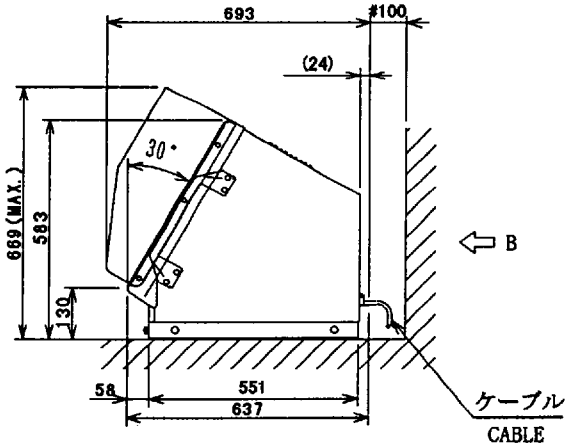
取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)



矢視 B
VIEWING B

A





DRAWN Oct.2'97 T.YAMASAKI			TITLE RDP-115
CHECKED Oct 7'97 K.Kusunoki			名称 指示器（卓上・パネル分離型）
APPROVED Oct 7'97 K.Kusunoki		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

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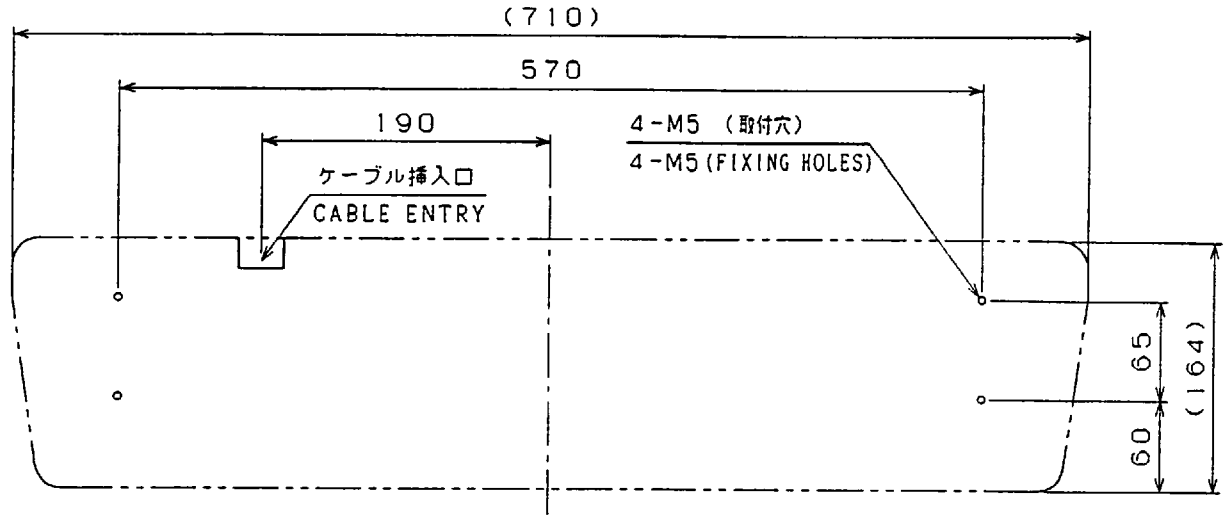
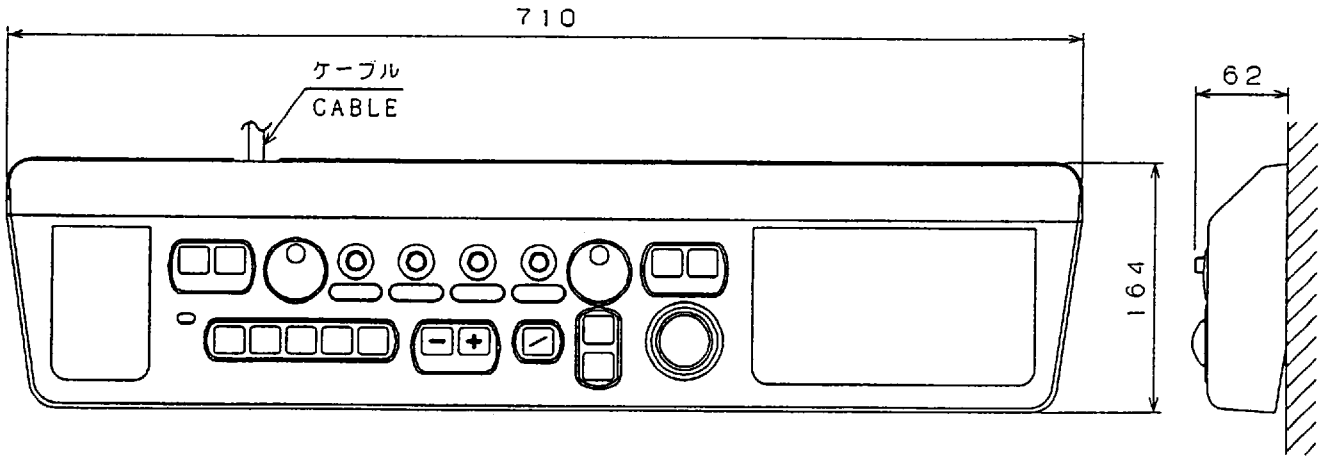
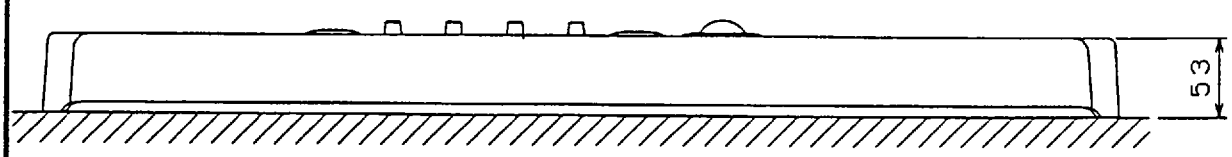


取付寸法図（矢視A）
FLAT MOUNTING DIMENSION (VIEWING A)



A



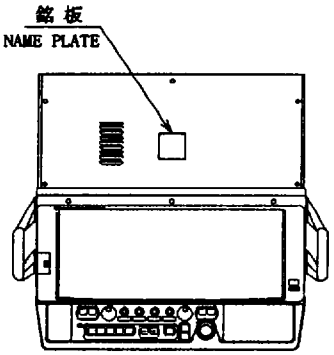
DRAWN July 6, 1995 Morimoto			TYPE RDP-115
CHECKED July 6, '95 Joe Nakai	FR2805SER FAR2805SE FA2805		名称 操作部外寸図
APPROVED July 6, '95 K.Okamoto			NAME CONTROL UNIT
SCALE 1/5 / MASS 3 kg	APPLICABLE TO: (MODEL)	BLOCK NO.	DWG NO. C3418-G04- A / 03-133-1600- 00

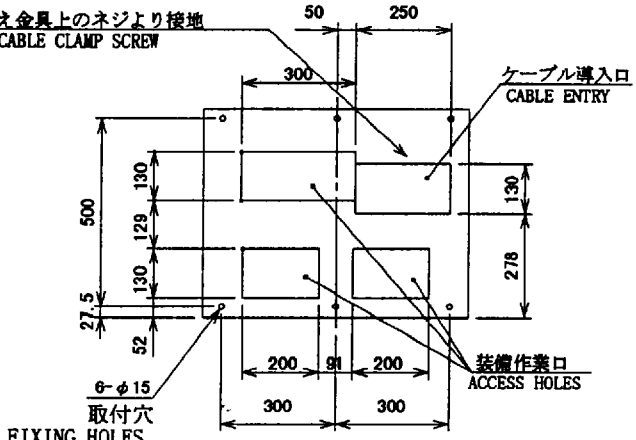
注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

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 φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICING CLEARANCE.

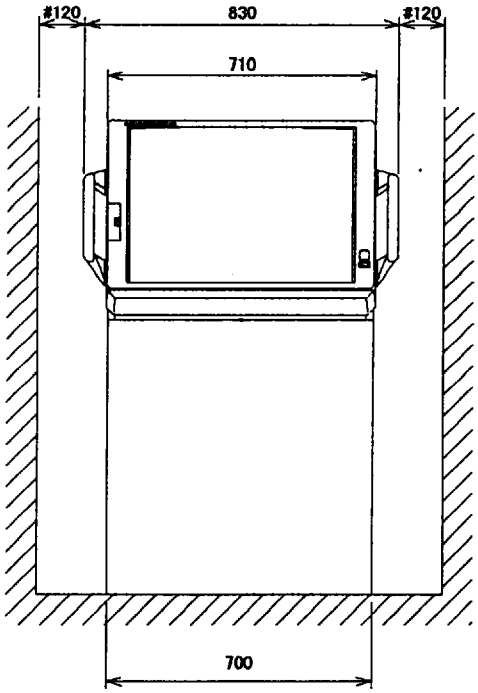
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０<L≦１００	±２mm
１００<L≦５００	±３mm
５００<L≦１０００	±４mm
１０００<L≦２０００	±５mm
２０００<L≦４０００	±７mm
４０００<L≦８０００	±１０mm
８０００<L	±１５mm

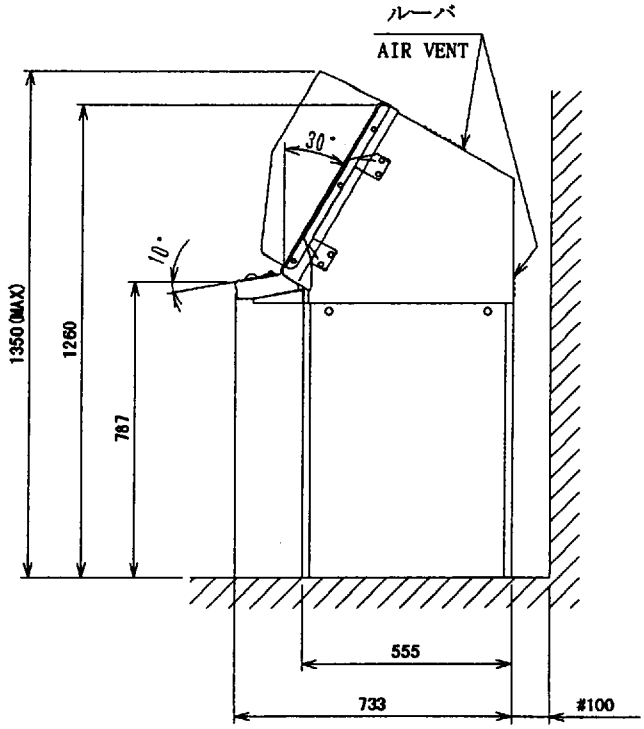
表 1
TABLE 1



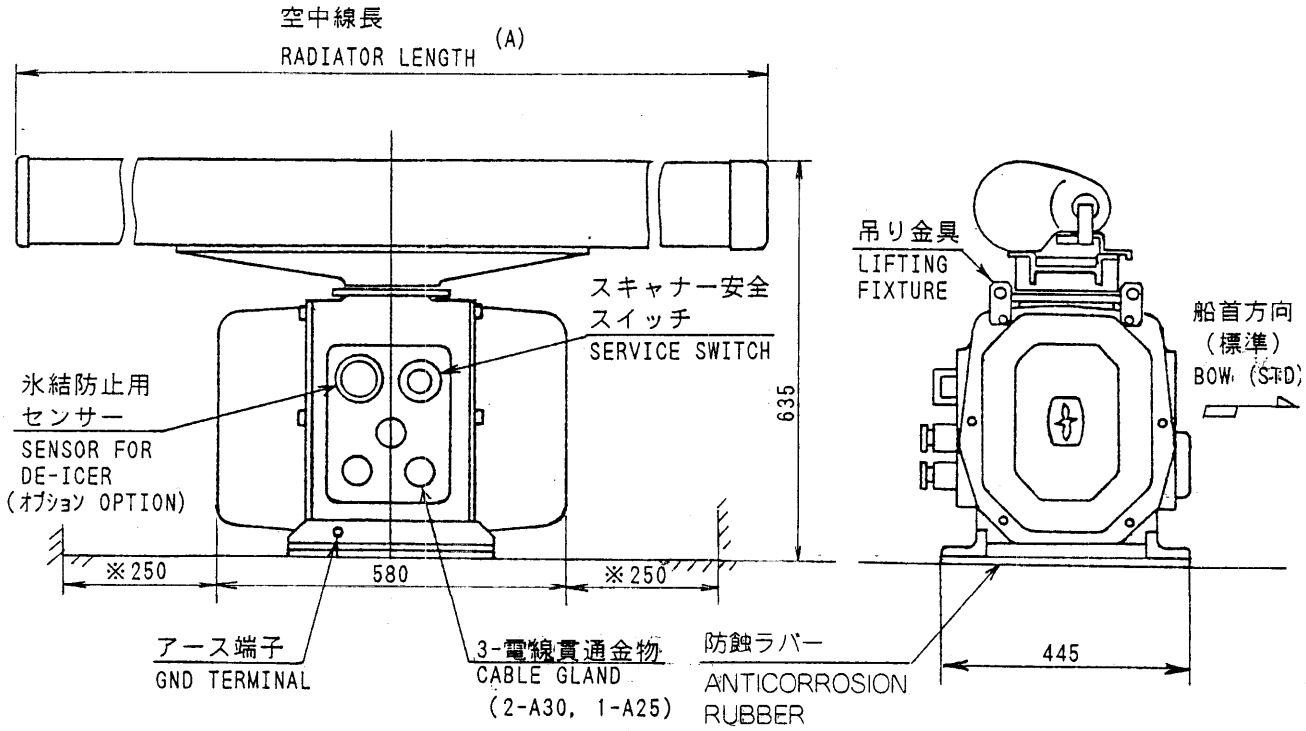


取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)

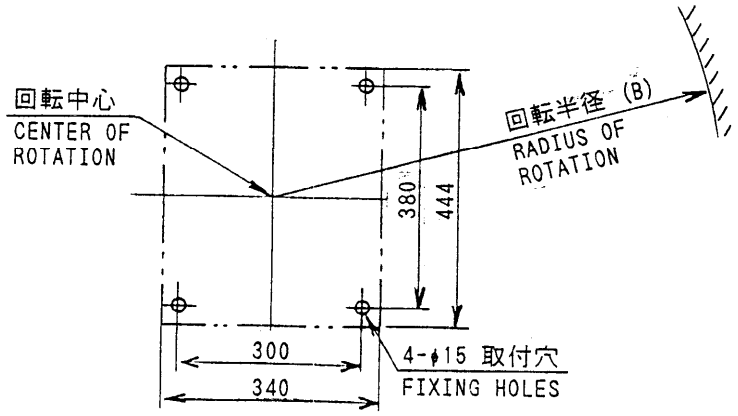




DRAWN Oct. 7 '97 T.YAMASAKI		TITLE	RDP-115
CHECKED Oct 7 '97 K.Kusunoki		名称	指示器（コンソール型）
APPROVED Oct 7 '97 K.Kusunoki	FR/FAR-2805 SER.		外寸図
SCALE 1/20 MASS 120 kg		NAME	DIAPLAY UNIT (CONSOLE)
DWG. No. C3418-G03-G	03-133-1200-G1		OUTLINE DRAWING



※サービス空間
RECOMMENDED SERVICE CLEARANCE



取付寸法
MOUNTING DIMENSIONS

アンテナ型名 ANTENNA TYPE	XN3A	XN4A	XN5A
空中線長 (A) ANT LENGTH (mm)	2070	2570	3210
回転半径 (B) RADIUS (mm)	1100	1350	1670
総質量 TOTAL MASS (kg)	71.5	74	77

DRAWN Sep.2'98 T.YAMASAKI	FR-2855 FR-2150 FAR-2852 FR-2852 FR-2050T		TYPE RSB-0049/0050
CHECKED Sep 2'98 K.Kusunoki			名称 空中線部
APPROVED Sep 2'98 K.Kusunoki			外寸図
SCALE 1/10 MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME SCANNER UNIT
DWG NO. C3353-G02- D			OUTLINE DRAWING

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FURUNO

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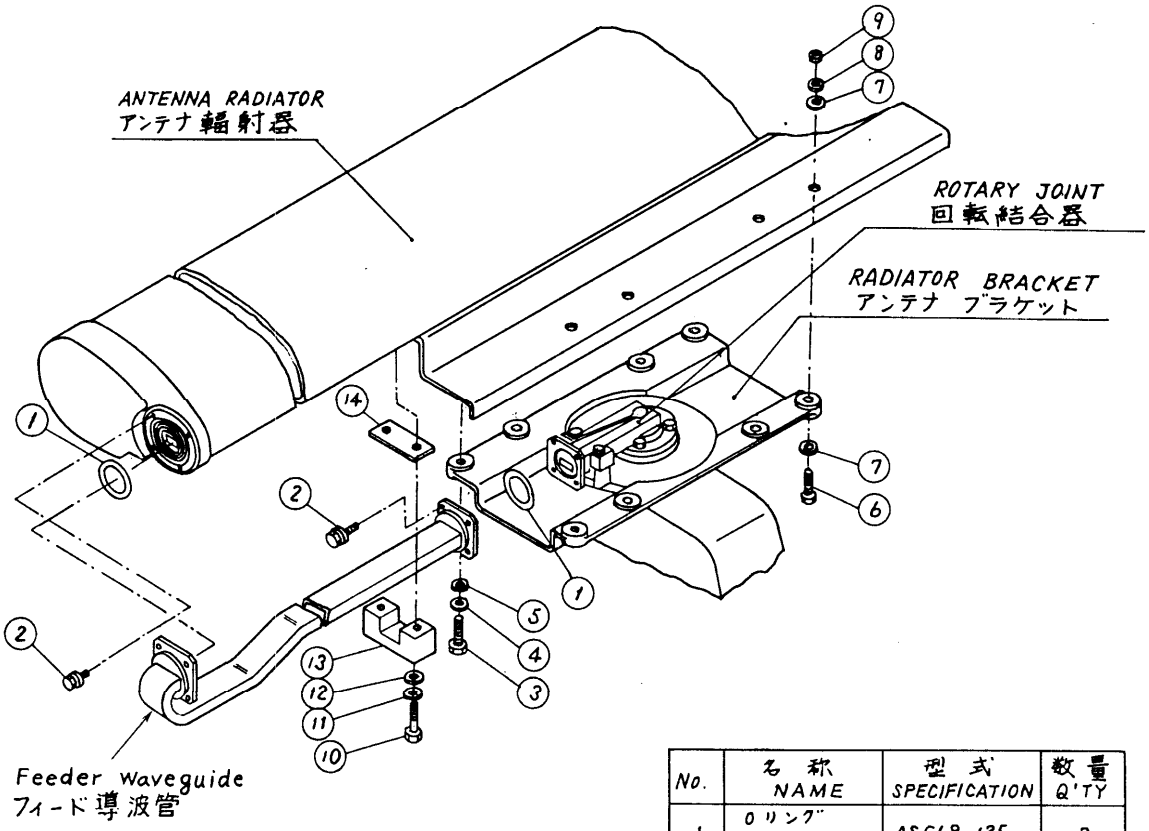

No.	名称 NAME	型式 SPECIFICATION	数量 Q'TY
1	Oリング O-RING	AS568-125	2
2	六角セムス(B) HEX. BOLT(B) (WASHER HEAD)	M4x16 (SUS304)	8
3	六角ボルト HEX. BOLT	M8x35(SUS304)	4
4	バネ座金 SPRING WASHER	FOR M8用(SUS304)	4
5	平座金 FLAT WASHER	FOR M8用(SUS304)	4
6	六角ボルト HEX. BOLT	M8x30 (SUS304)	4
7	平座金 FLAT WASHER	FOR M8用(SUS304)	8
8	バネ座金 SPRING WASHER	FOR M8用(SUS304)	4
9	六角ナット HEX. NUT	M8(SUS304)	4
10	六角ボルト HEX. BOLT	M4x30(SUS304)	2
11	バネ座金 SPRING WASHER	FOR M4用(SUS304)	2
12	平座金 FLAT WASHER	FOR M4用(SUS304)	2
13	導波管押え W/G CLAMP	RSB-2006-1	1
14	導波管間座 W/G PACKING	03-003-4003-0	1

注意:
1. 電蝕防止のため、組立時にボルト、ナット、ワッシャ及びフランジ面のOリング溝外側の部分に支給のシリコンシール剤(無酸性)を塗布する。Oリング及びOリングの溝には塗布しないこと。
2. Oリングに傷をつけたり、ゴミを付着させないように注意のこと。
3. Oリング及びスキャナーカバーのパッキンにはグリースを使用すること。シリコンシール剤は使用不可。

NOTE:
1. APPLY SILICONE SEALANT (SUPPLIED, NON-ACID TYPE) ON BOLTS, NUTS, WASHER AND WAVEGUIDE FLANGE OUTSIDE O-RING GROOVE TO AVOID ELECTRICAL CORROSION. (DO NOT APPLY SEALANT TO O-RINGS AND O-RING GROOVES.)
2. DO NOT PINCH O-RING AND KEEP IT CLEAN.
3. FOR PACKINGS OF SCANNER COVERS AND O-RINGS, DO NOT USE SILICONE SEALANT, BUT RATHER USE GREASE.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	MAY. 25. '79	三角法 THIRD ANGLE PROJECTION		名称 TITLE	空中線部組立図 SCANNER UNIT ASSEMBLING (XN3A/XN4A)
検図 CHECKED	MAY. 25. '79	尺度 SCALE	/		
製図 DRAWN	25. 5. 79	重量 WEIGHT	kg	図番 DWG.NO.	C3249-017-H

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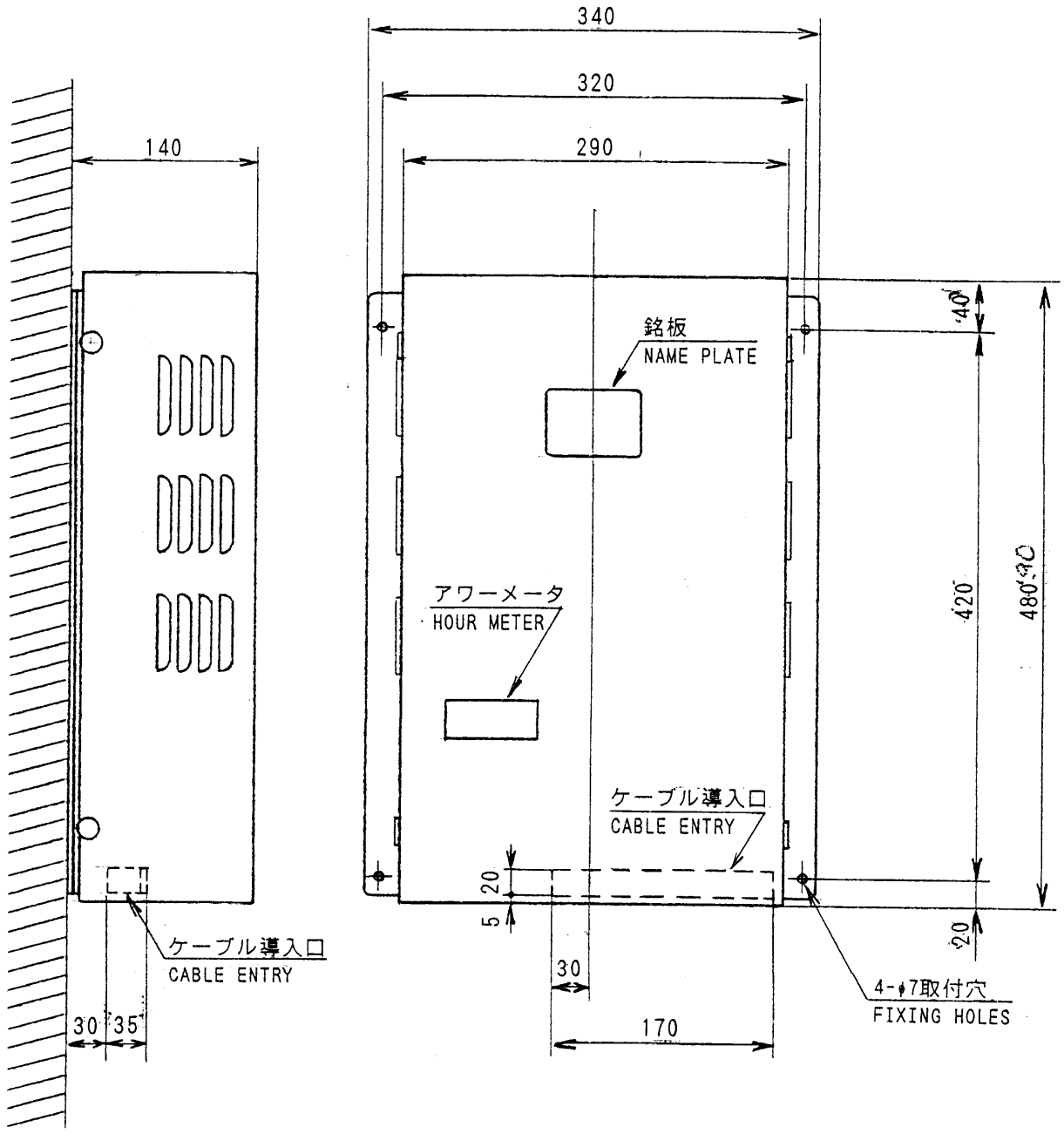
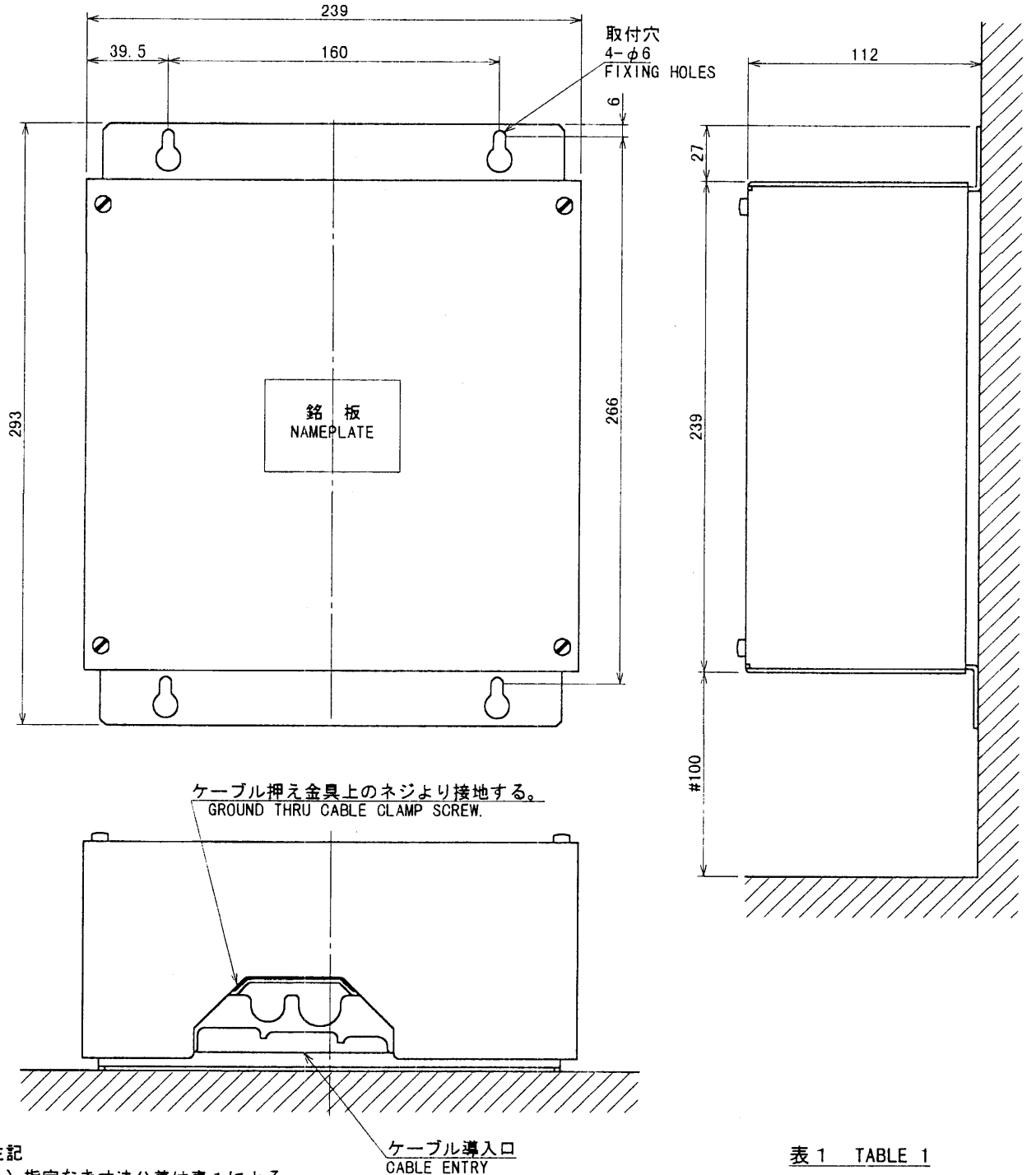


DRAWN Aug 28 '98 T.YAMASAKI				TYPE PSU-001/002
CHECKED Aug 28 '98 K.Kiwaki				名称 空中線電源部
APPROVED Aug 28 '98 K.Kiwaki				外寸図
SCALE 1/5	MASS 7 kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME POWER SUPPLY UNIT
DWG NO. C3353-G01- D				OUTLINE DRAWING



注記

1）指定なき寸法公差は表１による。

2）＃：推奨する最小サービス空間寸法。

3）取付ネジはトラスタッピンネジ呼び径５×20を使用のこと。

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.
3. USE TAPPING SCREWS 5x20 FOR FIXING THE UNIT.

表１ TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 ＜ L ≦ 50	±1.5
50 ＜ L ≦ 100	±2.5
100 ＜ L ≦ 500	±3

DRAWN June 27 '00 T.YAMASAKI		TITLE	PSU-004
CHECKED June 27 '00 Y.K		名称	電源制御部
APPROVED June 27 '00 Y.K			外寸図
SCALE 1/4	MASS 2.3 kg ±10%	NAME	POWER SUPPLY UNIT
DWG. No. C3385-G02- D			OUTLINE DRAWING

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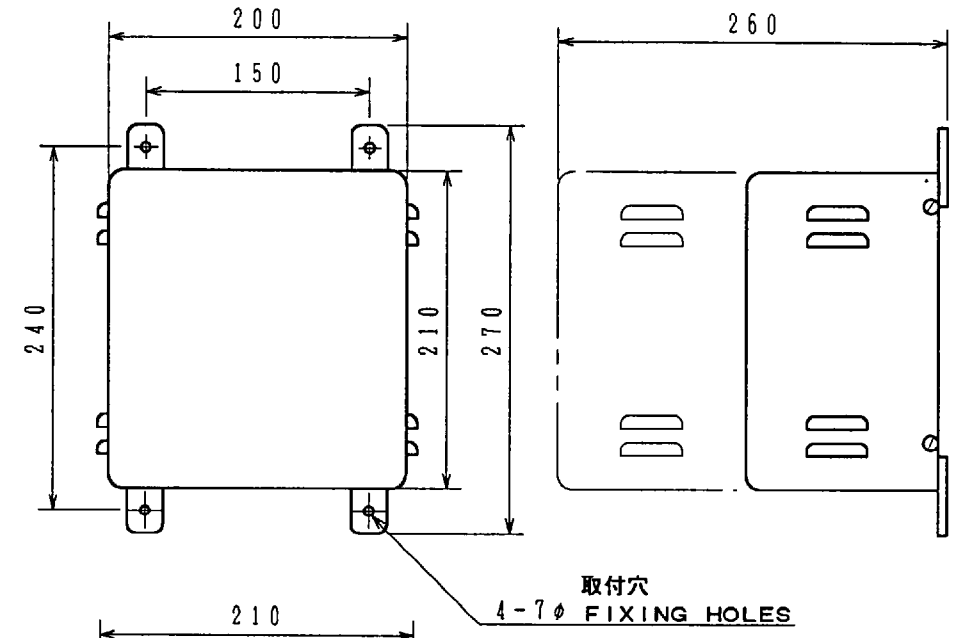

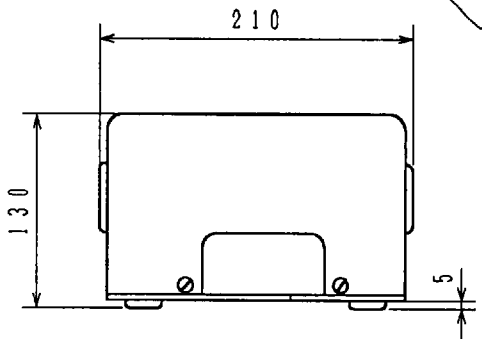

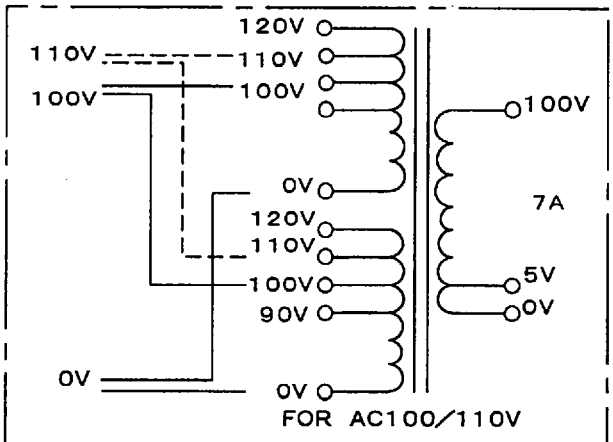

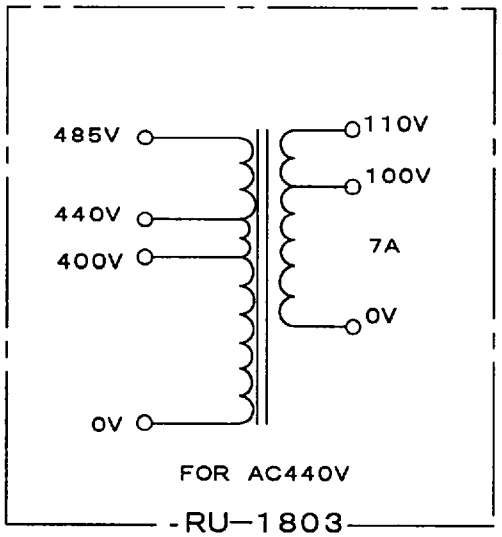

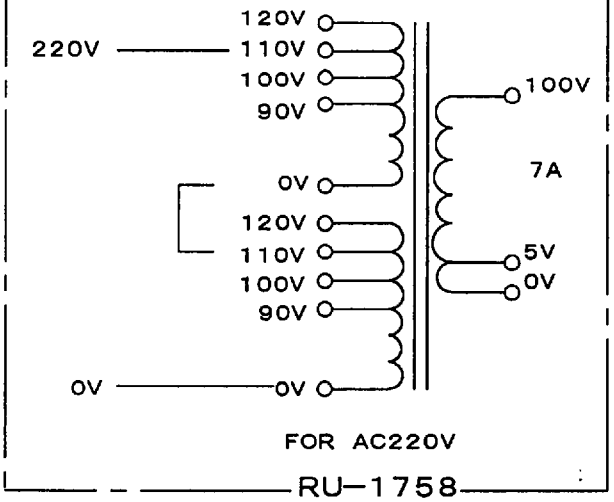

DRAWN June. 18 '96 Y. EBISU			TITLE RU-1758/1803
CHECKED June 18 '96 K. Kusunoki			名称 トランスユニット
APPROVED June 18 '96 K. UTA			外 寸 図
SCALE 1/5	MASS 12 kg		NAME TRANSFORMER UNIT
DWGNo. C3003-001-D			

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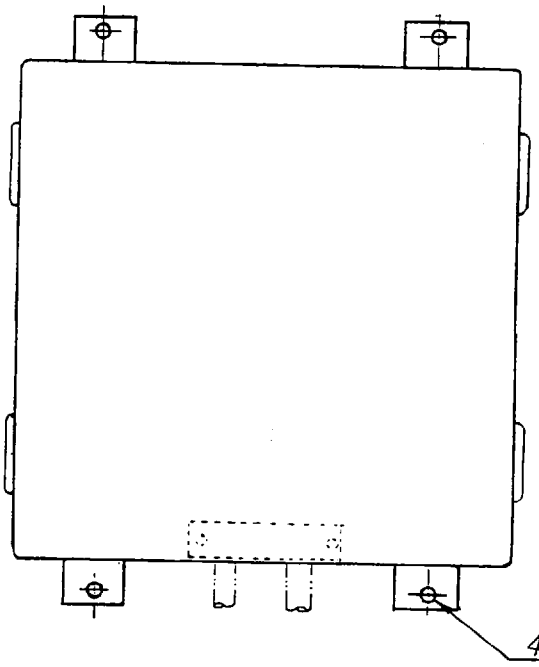
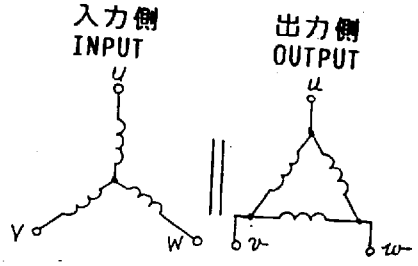
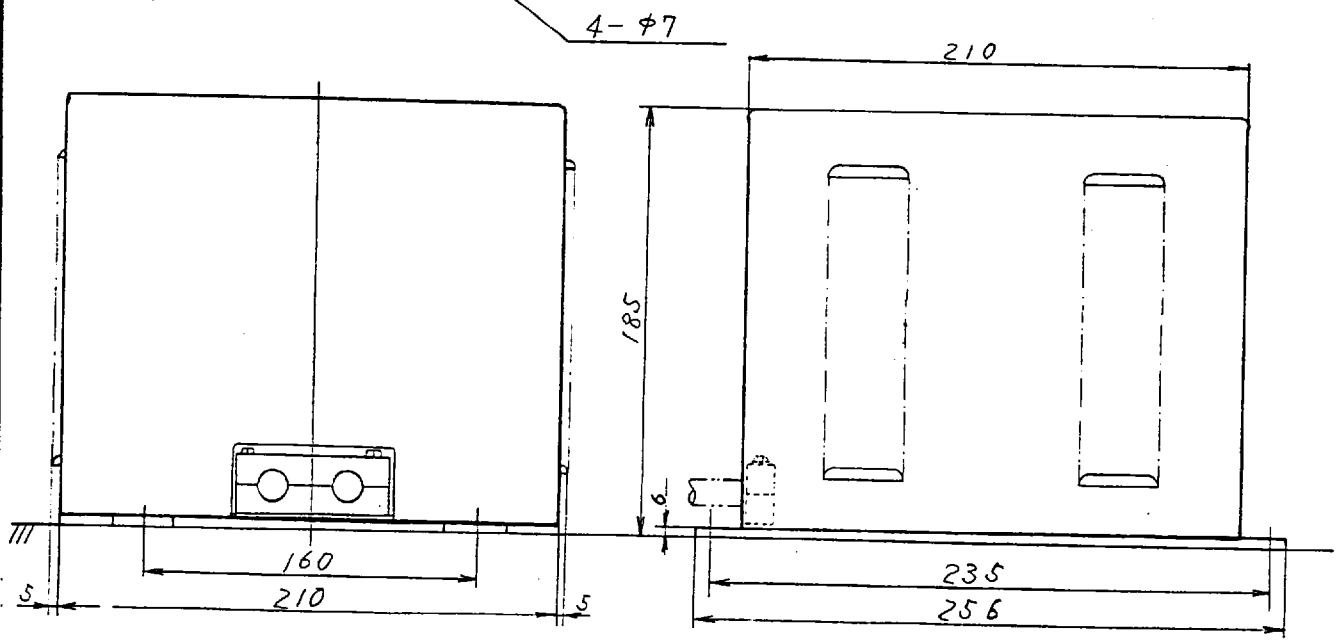




RU-5466-1	AC440V 3φ 50/60Hz	AC220V 3φ 60Hz	AC200V 3φ 50Hz
RU-6764	AC380V 3φ 50Hz	AC200V 3φ 50Hz	
RU-5693	AC110V 3φ 60Hz	AC220V 3φ 60Hz	



品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	58・7・15 池谷	三角法 THIRD ANGLE PROJECTION		名称 TITLE トランスユニット TRANSFORMER UNIT	RU-5466-1 RU-6764 RU-5693
検図 CHECKED	58・8・11 木矢	尺度 SCALE	∼		
製図 DRAWN	・・	重量 WEIGHT	約 12 kg	図番 DWG.NO.	C3003-006-E

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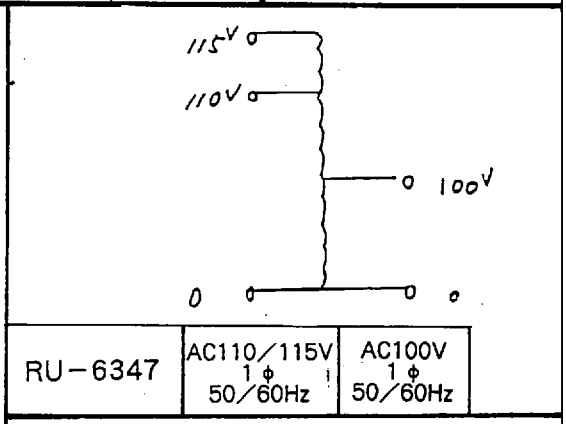
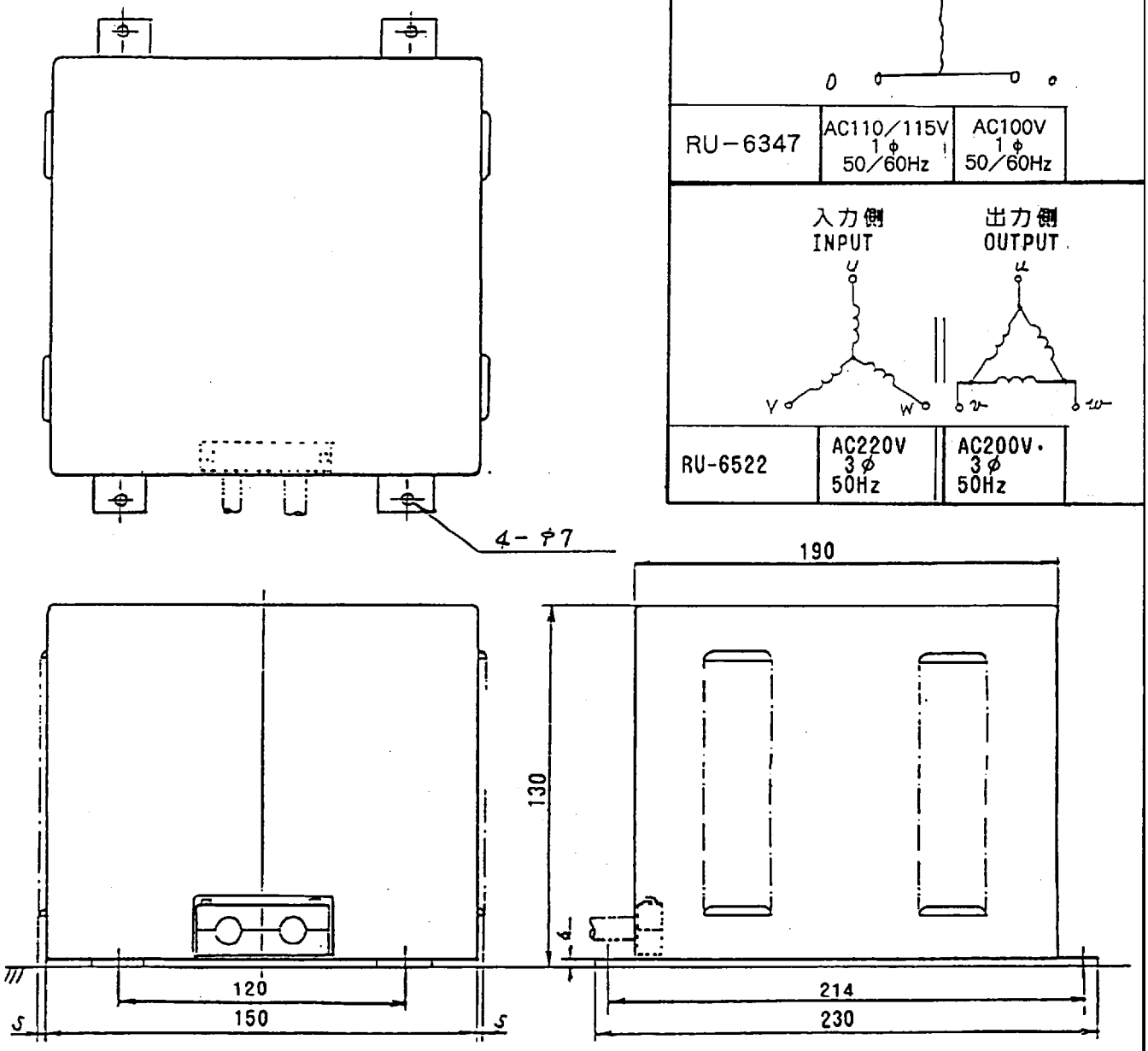
FURUNO

D-11



RU-6347	AC110/115V 1φ 50/60Hz	AC100V 1φ 50/60Hz

RU-6522	AC220V 3φ 50Hz	AC200V・ 3φ 50Hz

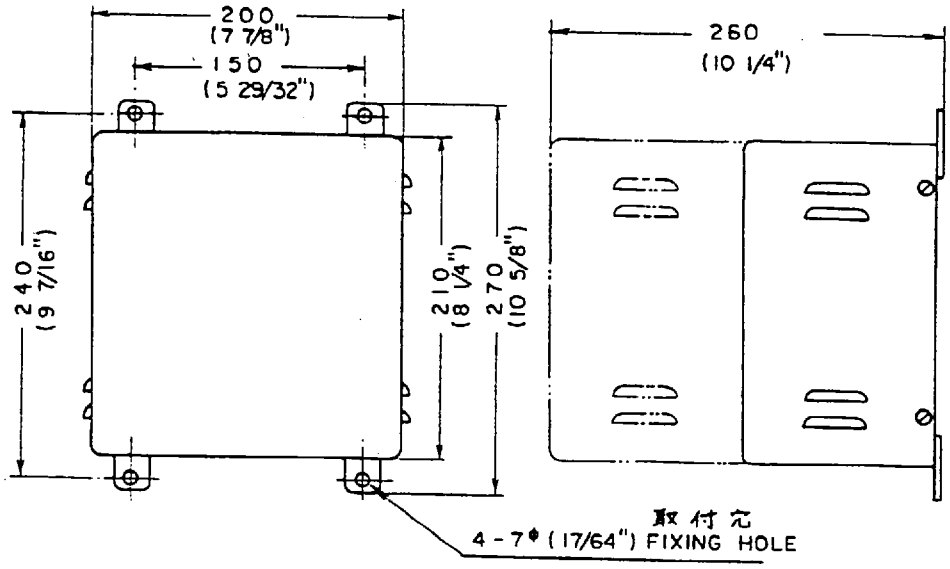


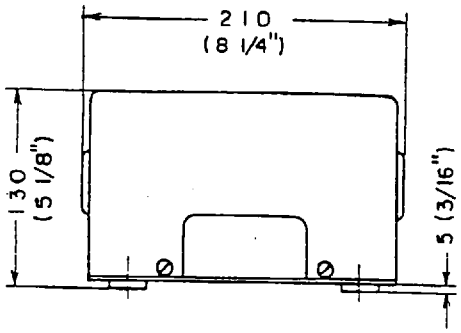
FR-1222/1222X/1622/1622X
FR-1252X/1652X
FAR-1622X/1652X

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

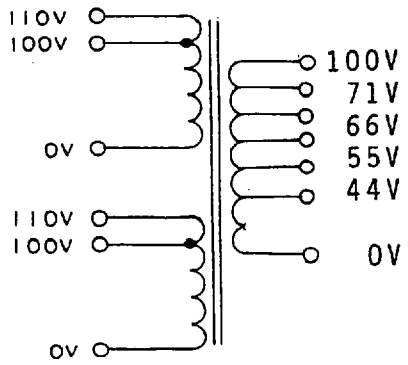
承認 APPROVED	JUNE 2 '87 T. UAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	RU-6347 RU-6522 トランスユニット TRANSFORMER UNIT
検図 CHECKED	June 2 '87 T. Amano	尺度 SCALE	≈		
製図 DRAWN		重量 WEIGHT	約12kg kg	図番 DWG.NO.	C3003-007-B

FURUNO ELECTRIC CO., LTD.





重量 WEIGHT: 12kg (27 lbs)
単位 UNIT: mm (inches)



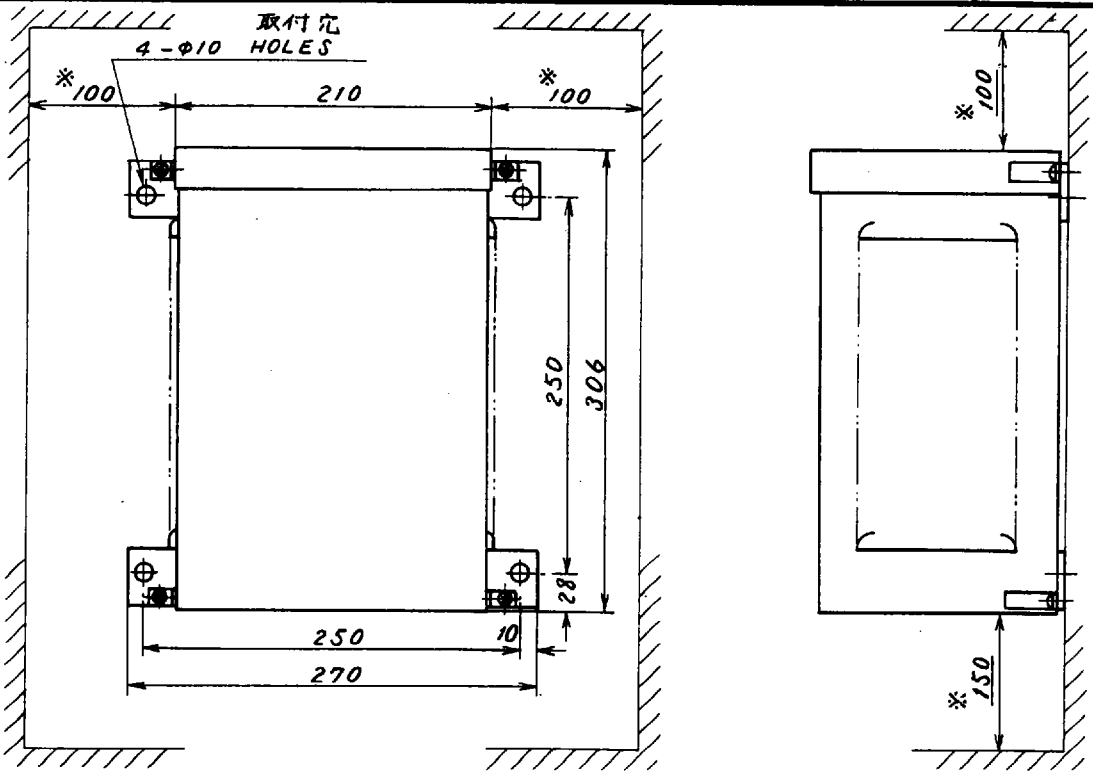
コンパス安全距離 COMPAS SAFE DISTANCE

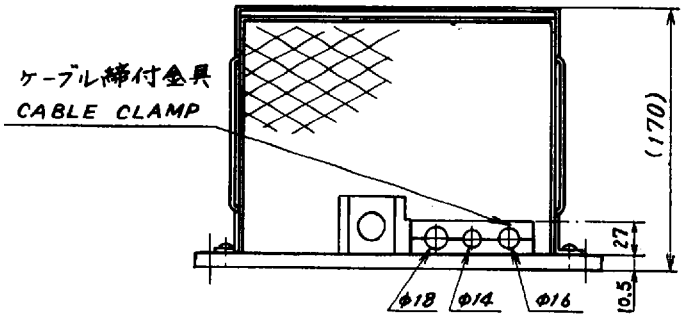
スタンダード STANDARD	2.1M
ステアリング STEERING	1.5M

氷結防止 DE-ICER

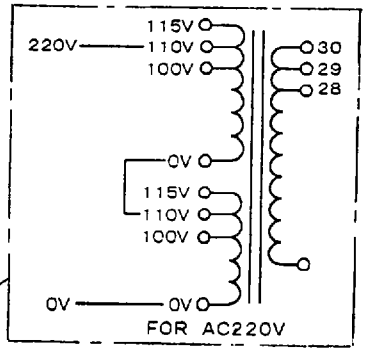
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

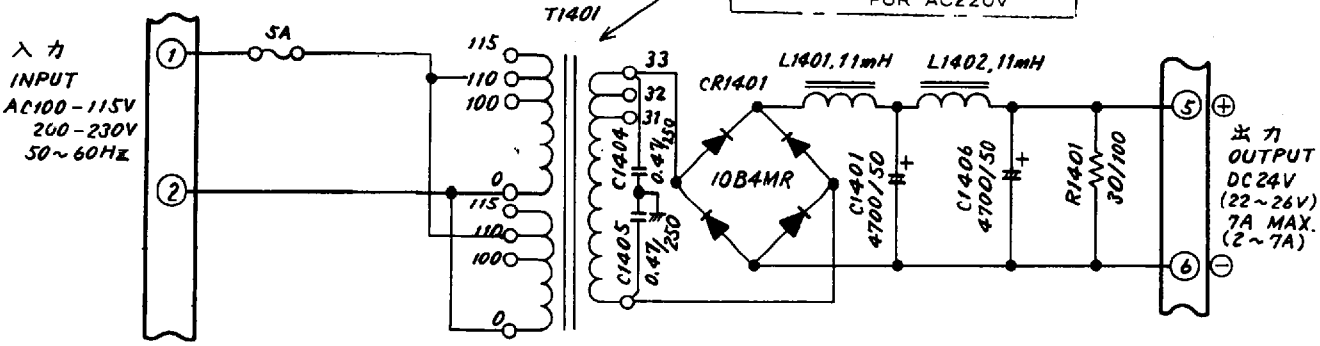
承認 APPROVED		三角法 THIRD ANGLE PROJECTION		名称 TITLE	トランス ユニット RU-3305 TRANSFORMER UNIT
検図 CHECKED	AUG.19.'83	尺度 SCALE	/		
製図 DRAWN	19.Aug.'83 K.K.	重量 WEIGHT	12.2 kg	図番 DWG.NO.	C3003-004-C





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





注 AC220V 入力に対しては T1401 の一次巻線を直列に接続する。

NOTE FOR 220VAC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

DRAWN	Apr. 11 '97 T. YAMASAKI			TYPE	RU-3423
CHECKED	APR. 15 '97 K. KUSUNOKI			名称	整流器
APPROVED					外寸図
SCALE	1/5	MASS	16.5 kg	APPLICABLE TO; (MODEL)	BLOCK NO.
DWG NO.	C3002-005- K			NAME	RECTIFIER UNIT
					OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

注）1. アンテナケーブル（RW-6895）のカラーコードで（ ）は内側シールド内の線を示す
2. シールドは両端で完全にアースすること
3. *印と※1～※5は造船所支給（現地手配）

NOTE 1. WIRE COLOR CODE OF ANT CABLE (RW-6895)
( ) : INSIDE WIRE, B : LARGE WIRE,
L : LIGHT COLOR

2. SHIELD SHOULD BE EFFECTIVELY GROUNDED AT BOTH ENDS.

3. *MARK& ※1-※4 : SHIPYARD SUPPLY (PREPARED LOCALLY)

電源部制御部
POWER
SUPPLY
UNIT
PSU-004

空中線電源部
POWER
SUPPLY UNIT
PSU-001

＊660V-DPYCY-1.25
PTB-1
11 送信高圧
12
13 アース
STB-2
1 TX-HV
2
3 GND

＊250V-HPYCY-16
PTB-2
03P9003
1 マグネトロンエラー — 1 — 1 — STB-3 1 MAG ERROR
2 送信信号 — 2 — 2 — 2 TX SIG
3 +12V — 3 — 3 — 3 +12V
4 -12V — 4 — 4 — 4 -12V
5 アース — 5 — 5 — 5 GND
6 アース — 6 — 6 — 6 GND
7 ヒータ (+) — 7 — 7 — 7 HEATER (+)
8 ヒータ (-) — 8 — 8 — 8 HEATER (-)
9 予備 — NC — 9 — 9 SPARE

XK-1 ※1 or ※3
3φ (U), 24V(+) 4
3φ (V), 24V(-) 6
3φ (W) 9
PTB-1 8 (U), (+) / 9 (V), (-) / 10 (W)

PTB-11 ※1
100/110/115 VAC 7
100/110/115 VAC 8
100 VAC (氷結防止) 9
100 VAC (Deicer) 10
※5
PTB-1 1 H / 2 C / 6 H / 7 C

PTB-1
14 100VAC (ファン用) — 9 — 10 — STB-3 10 100VAC (H)
15 100VAC (ファン用) — 10 — 11 — 11 100VAC (C)
16 100VAC (氷結防止用) — 11 — 12 — 12 100VAC (H)
17 100VAC (氷結防止用) — 12 — 13 — 13 100VAC (C)
18 +12V — 13.14 — 14 — 14 3φ (U), 24V(-)
19 — 15.16 — 15 — 15 3φ (V), 24V(-)
20 — NC — 16 — 16 3φ (W)
DC 3φ
スキャナーモーターにより選択
Choice depend on Scanner Motor

空中線部
SCANNER
UNIT

(指示部用)
For Display Unit
220/230VAC 1φ 50/60Hz ※1 RU-1758
440VAC 1φ 50/60Hz ※2 RU-1803
100/110/115VAC 1φ 50/60Hz ※1

(氷結防止)
For Deicer
100VAC 1φ 50/60Hz
110/115/220VAC 1φ 50/60Hz RU-3305
※250V-DPYC(Y)-1.25

PTB-11 1 2 3 4 5 6
※1
DTB 1 1 3
100/110/115 VAC IN

(空中線部用)
For Scanner Unit
200/220VAC 3φ 50/60Hz ※3
110VAC 3φ 60Hz ※3 RU-5693
220VAC 3φ 50Hz ※3 RU-6522
440VAC 3φ 50Hz ※4 RU-5466-1
24V DC ※1
100/110/115/220/230VAC 1φ 50/60Hz ※1 RU-3423
選択 Choice

PTB-12
1 3φ (U), 24V(+)
2 3φ (V), 24V(-)
3 3φ (W)

指示部
DISPLAY
UNIT

INT DP1 (DJ1) — RW-6895 (25C+2C2V) — STB-1
1 予備 — (チャ) — (BRN) — 1 SPARE
2 DIモニタ — (アカ) — (RED) — 2 MIC CURR.
3 同調メータ — (ダイ) — (ORG) — 3 TUNING IND.
4 送信トリガ — (キ) — (YEL) — 4 TX TRIGGER
5 MBS L — (ウスミドリ) — (L-GRN) — 5 MBS L
6 MBS T — (アオ) — (BLU) — 6 MBS T
7 同調 — (ムラサキ) — (PPL) — 7 TUNING CONT.
8 マグネトロン電流 — ピンク — PNK — 8 MAG CURR.
9 TP アース — シロ — WHT — 9 TP GND
10 予備 — (ピンク) — (PINK) — 10 SPARE
11 — — — — 11
12 送信信号 — チャ — BRN — 12 TX SIG
13 パルス巾切換B — ダイ — ORG — 13 P/L B
14 — — — — 14
15 — — — — 15
16 +12V — (シロ太) — (B-WHT) — 16 NC
17 — — — — 17
18 パルス巾切換A — ハイ — GRY — 18 P/L A
19 アース — キ・ミドリ太 — YEL,B-GRN — 19 GND
20 アース — ウスミドリ太 — B-L-GRN — 20 GND
21 船首線信号 — ムラサキ — PPL — 21 HEADING
22 方位信号 — (シロ) — (WHT) — 22 BEARING
23
26

黒太、黄太、青太 B-BLK, B-YEL, B-BLU — NC
アカ — RED — 23 GND
アカ太 — B-RED — 24 MOTOR SW
クロ — BLK — 25
26 +12V
27
INT J441 P441 — 映像信号 — 同軸線 — COAX — 28 IF OUT (VIDEO)
VIDEO SIGNAL

PTB-13
1
2
+12V 3 — ＊MPYC (Y)-5 3 — DTB-2 6 +12V
ANT.1 4 — 4 — 7 ANT 1
GND 5 — 5 — 8
SPARE 6

PTB-14
GND 3
MOTOR SW 4 — 1 — 2
SPARE 5 — 2 — 3
+12V 6

※1 250V-DPYC(Y)-3.5
※2 660V-DPYC(Y)-3.5
※3 250V-TPYC(Y)-3.5
※4 660V-TPYC(Y)-3.5
※5 250V-DPYC(Y)-1.25

INT J452
1 EXT BUZ (AC) — 外付ブザー EXT BUZZER
2 GND

INT J451 (NH3P)
1 +12V — 外付ブザー EXT BUZZER
2
3 ALM BZ

INT J450 (NH8P)
航法装置 (NMEA) NAV AID
TXD-H 1
TXD-C 2
RXD-H 3
RXD-C 4
DTR-H 5
DTR-C 6
DSR-H 7
DSR-C 8

INT J442 (NH8P)
1 GND
2 HD
3 GND
4 BP
5 GND
6 OP TRIG.
7 GND
8 VIDEO
RW-4864 副指示器 REMOTE DISPLAY

INT J448 (NH4P)
スピードログ ※5 SPEED LOG
LOG H 1
LOG C 2
3 NC

INT J443 (NH8P)
1 GND
2 HD
3 GND
4 BP
5 GND
6 OP TRIG.
7 GND
8 VIDEO
RW-4864 副指示器 REMOTE DISPLAY

( )内はステップ式の場合
( ) for step type
J5
R1(COM) 2
R2(NC) 1
J4 GC-8 64P1106
ジャイロコンパス GYROCOMPASS
S1(S1) 1
S2(S2) 2
S3(S3) 3
どちらか択一 EITHER ONE

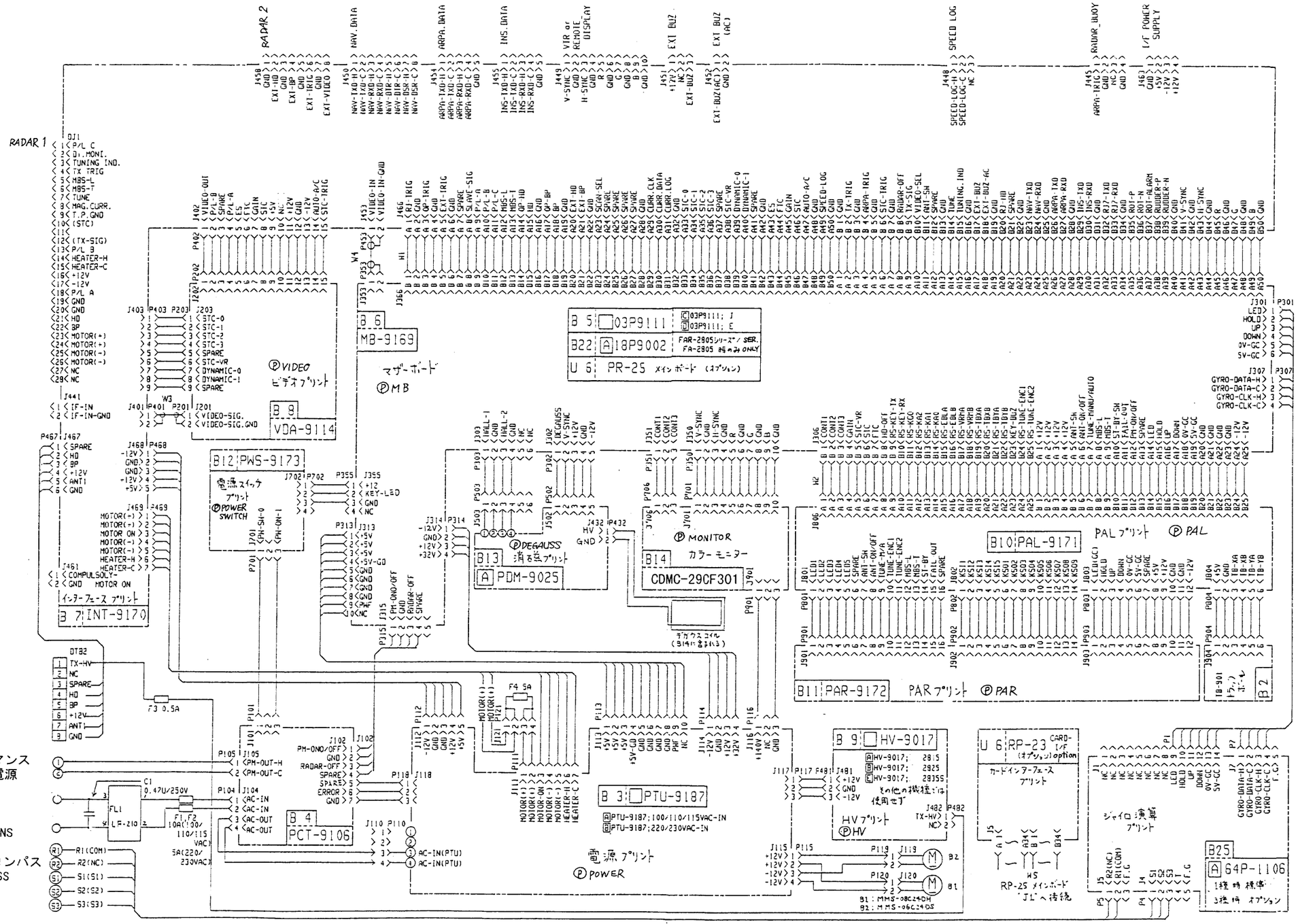
INT J444 (NH8P)
1 GND
2 HD
3 GND
4 BP
5 GND
6 ARP TRIG.
7 GND
8 VIDEO
外部アルパ EXT. ARPA

MB J307 (NH4P)
ADコンバータ GYRO CONVERTER AD-100
1 SIFT1-C
2 SIFT1-H
3 DATA1-C
4 DATA1-H
P P

DRAWN	Dec. 4, '95 H. Maki	TYPE	FR/FAR-2855
CHECKED	Dec. 4, '95 K. Okamoto	名称	相互結線図
APPROVED	Dec. 4, '95 K. Okamoto		
SCALE	/	NAME	INTERCONNECTION DIAGRAM
MASS	kg	APPLICABLE TO: (MODEL)	FR2855 FAR2855
DWG NO.	C3421-C01- A	BLOCK NO.	

FURUNO

S - 2



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

FURUNO ELECTRIC CO., LTD.

B7 INT9170 (1/2)

DRAWN July 18, 1995 Morimoto			TYPE INT9170
CHECKED July 18, '95 Maki	FR2805SER FAR2805SE FA2805		名称 INT基板 (1/2)
APPROVED July 18 '95 Okamoto		1B 7	NAME INT BOARD (1/2)
SCALE / MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	DWG NO. C3418-K01- A 03-131-6004- 1

B7 INT9170 (2/2)

DRAWN	July 18, 1995 Morimoto	
CHECKED	July 18, '95 Maki	FR2805SER FAR2805SE FA2805
APPROVED	July 18 '95 okamoto	1B 7
SCALE	/	MASS kg
APPLICABLE TO: (MODEL)		BLOCK NO.

TYPE	INT9170
名称	INT基板 (2/2)
NAME	INT BOARD (2/2)
DWG NO.	C3418-K02- A / 03-131-6004- 1

FURUNO

B1 筐体 CHASSIS

B3 RFシャーシ RTR-030 RF TRANSCEIVER MODULE

B5 03P6668 PFN.1.基板 PFN.1. PCB

B6 B 03P6669 PFN.2.基板 PFN.2. PCB

B9 03P9004 中継基板 INT PCB

B7 B 03P6827 MAG基板 MAG PCB

B8 C 03P6734 (IF AMP) IFアンプ基板 IF AMP PCB (ケース付 W/CASE)

B10 氷結防止 DE-ICER (オプション OPTION)

B11 MIC-6550 MIC基板 MIC PCB

B2 MP-3795 方位信号発生基板 BEARING SIG. GEN. PCB

B4 C 03P6666 RTB基板 RTB PCB

STB-2: TX-HV, GND

STB-3: MAG. ERROR, TX-SIG, +12V, −12V, GND, GND, HEATER⊕, HEATER⊖, SPARE, 100VAC (H), 100VAC (C), 100VAC (H), 100VAC (C), 220V U or 124V⊕, 220V V or 124V⊖, 220V W

STB-4: HR3001, HR3002, R3004 220, CR3001, BCR-16C10R, S3001 0℃

U B801 GOB-8222 又は OR RM-6585

S801 RS-1 NO

B802 MU1025S-11

B803 109-180

P815 J815

L801 RL-9029

C801 2200P 2kV

T802 RT-6665

T801 RT-9028

V801 9M31/M4505E

HY801 RC-3686

TO ANTENNA

CR810 BS4122/E3902

K801 M1, K802 M2, K803 L

VF-12HN ×3

SH16J12U ×3

U07N ×2

L802 RL-6869

L811 RL-6868

R826 R827 R828 4.7M/1W ×3

+12V

CR803 V19E, CR804 V19E, CR805 V19E

CR808 CR809 ED-16H1 ×2

R801 2k/10W, R802 6.8/2W

C804 0.1 250V

MAG CURR

HEATER⊕, HEATER⊖, + 12V, + 12V, M1, M2, L, MAG CURR

R811 4/10W, R812 2/10W

MAG HEATER⊕, MAG HEATER⊖

MAG. HEATER TEST POINT (S, M1 ---- 7.3V, M2, L ---- 4.8V)

STB-1: SPARE, DI MONIT., TUN METER, TX TRIG, MBS L, MBS T, TUN CONT, MAG CURR, TP GND, STC, TX-SIG, P/L "B", P/L "A", GND, GND, HP, BP, GND, MOTOR SW, SPARE, + 12V, GND, VIDEO

SERVICE SW. S802 ATK 21W

(RTB-1): DI MONIT, TUN METER, TX TRIG, STC, TUN CONT, MAG CURR, TP GND, P/L "B", P/L "A", GND, SPARE, TX-SIG, MBS L, MBS T

J807: −12V, +12V, TUN METER, TX TRIG, GND, STC, BAND W, GND, TUN CONT, DI MONIT, MBS L, MBS T

J805: HEATER⊕, HEATER⊖, + 12V, + 12V, M1, M2, L, MAG CURR

J802: + 12V, TX-SIG, GND

J801: + 12V, − 12V, GND, GND, HEATER⊕, HEATER⊖

J604: +12V, TUN METER, TX TRIG, GND, STC, BAND W, GND, TUN CONT, DI MONIT, MBS L, MBS T

J605: IF OUT, S~35V, GND, + 5V, DI MONIT

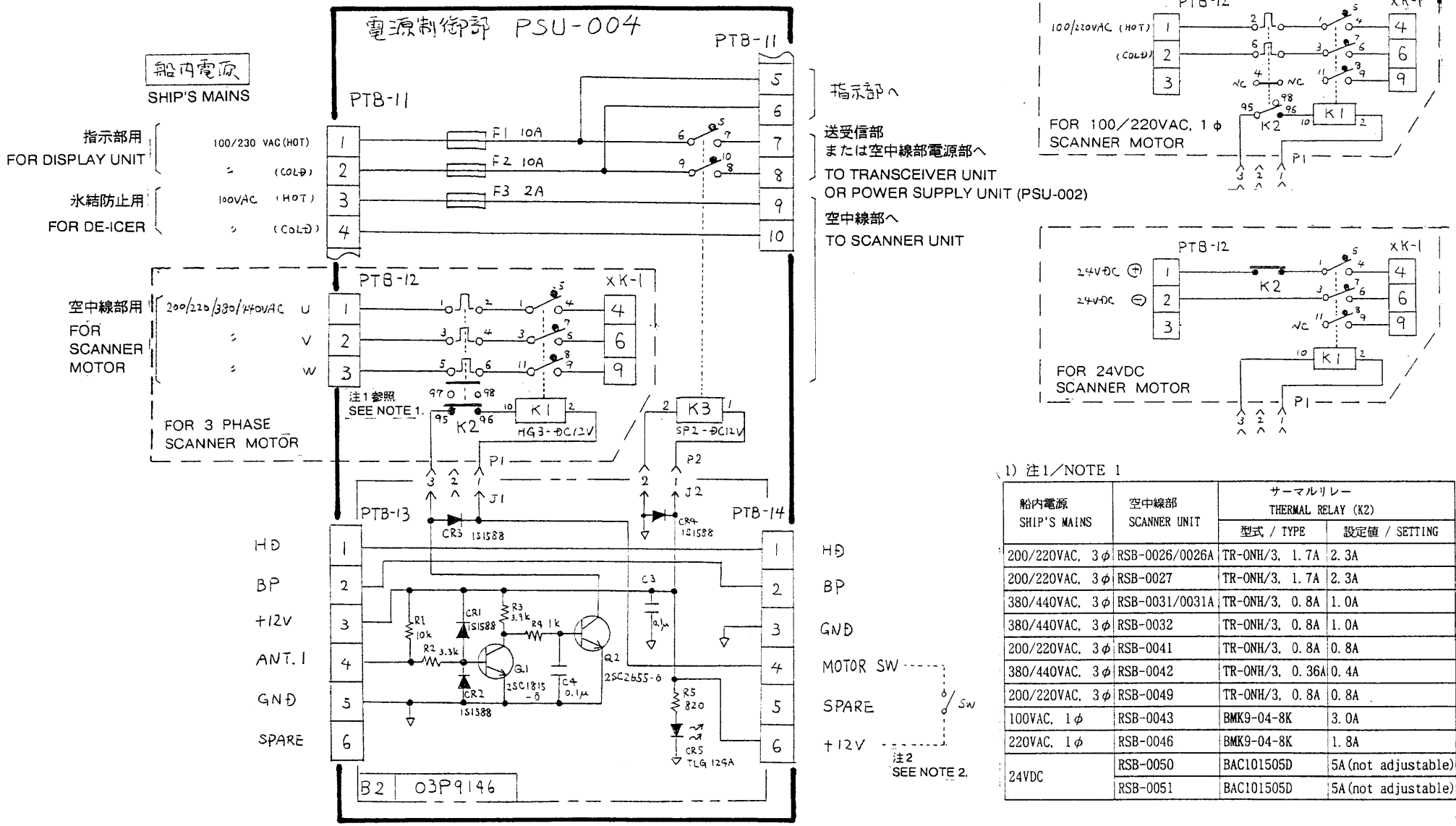
X-BAND MIC U801 S-RX24

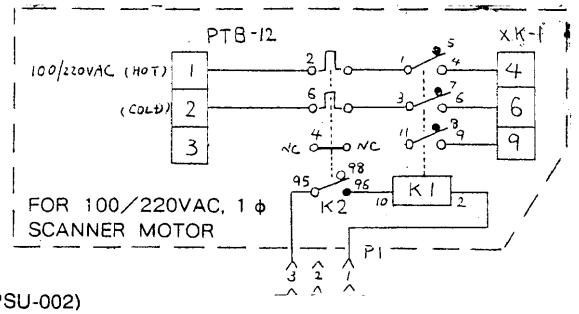
NOTE 1
特記なき抵抗の単位は全てΩ, 0.25W 又 コンデンサはμF.
ALL RESISTANCE IN OHMS, 0.25W, CAPACITANCE IN MICROFARADS UNLESS NOTED OTHERWISE.

DRAWN: APR 29 '96 E. KISHIMA			TYPE: RSB-0049/0050
CHECKED: APR 29 '96 T. SAITO	FAR2855 FR2855		名称: 空中線部総合回路図
APPROVED: APR 29 '96 K. OTA	FR2050T FR2852		回路図
SCALE: / MASS: kg	APPLICABLE TO: (MODEL)	BLOCK NO.	NAME: SCANNER UNIT
DWG NO. C3353-K03- D			SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO





1) 注1／NOTE 1

船内電源 SHIP'S MAINS	空中線部 SCANNER UNIT	サーマルリレー THERMAL RELAY (K2)	
		型式 / TYPE	設定値 / SETTING
200/220VAC, 3φ	RSB-0026/0026A	TR-ONH/3, 1.7A	2.3A
200/220VAC, 3φ	RSB-0027	TR-ONH/3, 1.7A	2.3A
380/440VAC, 3φ	RSB-0031/0031A	TR-ONH/3, 0.8A	1.0A
380/440VAC, 3φ	RSB-0032	TR-ONH/3, 0.8A	1.0A
200/220VAC, 3φ	RSB-0041	TR-ONH/3, 0.8A	0.8A
380/440VAC, 3φ	RSB-0042	TR-ONH/3, 0.36A	0.4A
200/220VAC, 3φ	RSB-0049	TR-ONH/3, 0.8A	0.8A
100VAC, 1φ	RSB-0043	BMK9-04-8K	3.0A
220VAC, 1φ	RSB-0046	BMK9-04-8K	1.8A
24VDC	RSB-0050	BAC101505D	5A (not adjustable)
	RSB-0051	BAC101505D	5A (not adjustable)

2) 注2／NOTE 2

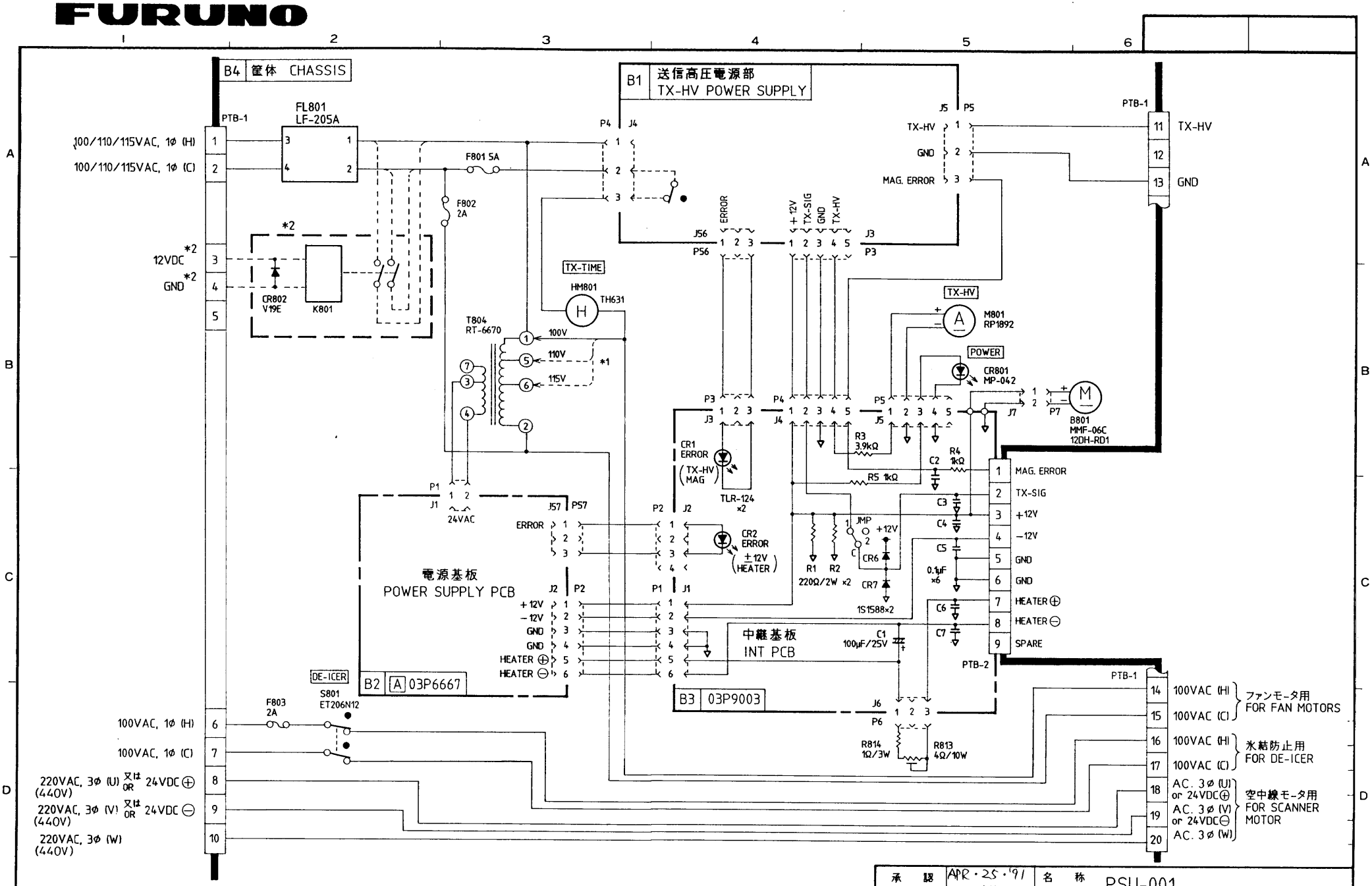
FR-2160DSのときはPTB-14の＃4と＃6を現地で短絡すること

FOR FR-2160DS, PUT A JUMPER BETWEEN #4 AND #6 OF PTB-14 AT INSTALLATION.

DRAWN July 28'98 T.YAMASAKI			TITLE PSU-004
CHECKED July 28'98 K.KUSUNOKI	FR-28**SERIES		名称 電源制御部
APPROVED July 28'98 K.KUSUNOKI	FR-21**SERIES		回路図
SCALE	MASS kg		NAME POWER SUPPLY UNIT
DWG No. C3385-K01-D			SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO



注
*1. 船内電源がAC110/115V時には，タップ変更必要。
*2. PSU-001 標準品には，K801は使用しない。

NOTE
*1. CHANGE CONNECTION FOR 110/115VAC SHIP'S MAINS.
*2. K801 IS NOT USED FOR STANDARD SET.

FR/FAR-2860S
FR/FAR-2852
FR-2050T

承認 APPROVED	APR・25・'91 T.NAKANO	名称 TITLE	PSU-001 空中線電源部 POWER SUPPLY UNIT
検図 CHECKED	APR・25・'91 J.AMANO		
製図 DRAWN	25TH APR・'91 H.ITAI	図番 DWG.NO.	C3353-K04-C

FURUNO ELECTRIC CO., LTD.

S-7