FURUNO

INSTALLATION MANUAL

MARINE RADAR/ARPA

MODEL FR/FAR-2825W/2855W

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FIRST EDITION : FEB. 1996
G : AUG. 8, 2001

PUB. No. IME-34050-G
FAR/FR-2825/2855W

(YOSH)

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⚠ SAFETY INSTRUCTIONS

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

⚠ **DANGER**	This notice indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or property damage.

⚠ DANGER

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

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

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

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

⚠ WARNING

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

Serious injury or death can result if the 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

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

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

⚠ WARNING

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

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

⚠ CAUTION

Ground both the display unit and the antenna unit.

Ungrounded equipment can cause mutual interference or electrical shock.

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

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

Use only the supplied power cable.

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

Use the correct fuse.

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

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EQUIPMENT LISTS

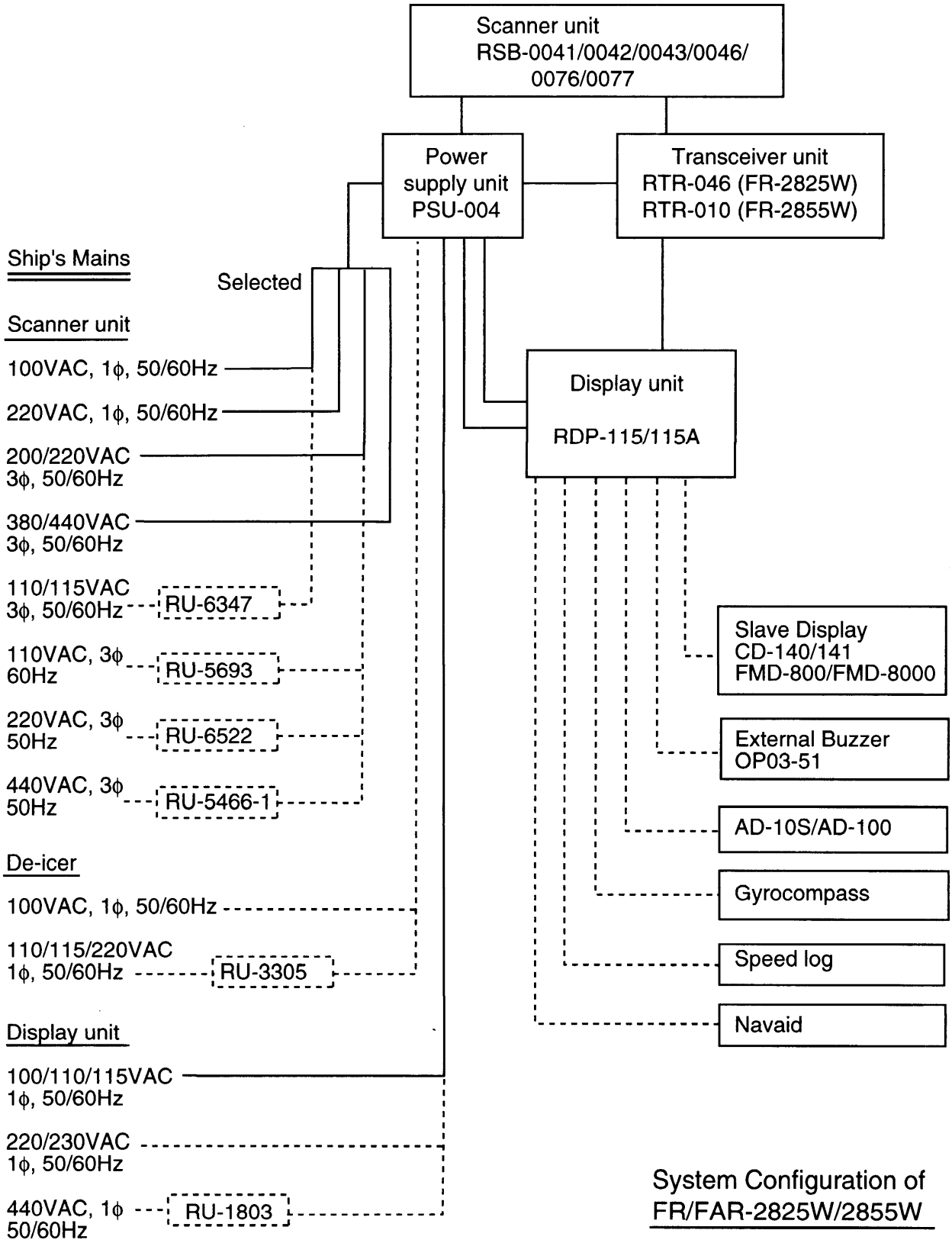
Complete set

No.	Name	Type	Qty	Remarks
1	Scanner unit		1	
2	Display unit	RDP-115	1	Pedestal mount type
				Tabletop type
3	Accessories	FP03-05710	1 set	For built-in control unit
		FP03-05730		For separate control unit
		FP03-05704		Hood
		FP03-05705		Hand grips
4	Installation materials	CP03-14401	1 set	For scanner unit
		CP03-14602	1 set	For display unit
5	Signal cable	RW-4873 *15m*	1	no armor
		RW-4873 *20m*		
		RW-4873 *30m*		
		RW-6875 *15m*		w/armor
		RW-6875 *20m*		
		RW-6875 *30m*		
6	Spare parts	SP03-08902	1 set	For scanner unit
		SP03-11301	1 set	For display unit

Optional equipment

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

SYSTEM CONFIGURATION



System Configuration of
FR/FAR-2825W/2855W

1.1 Assembling the Scanner Unit

FR/FAR-2825W: XN20AF (206 cm), XN24AF (220 cm)

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

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

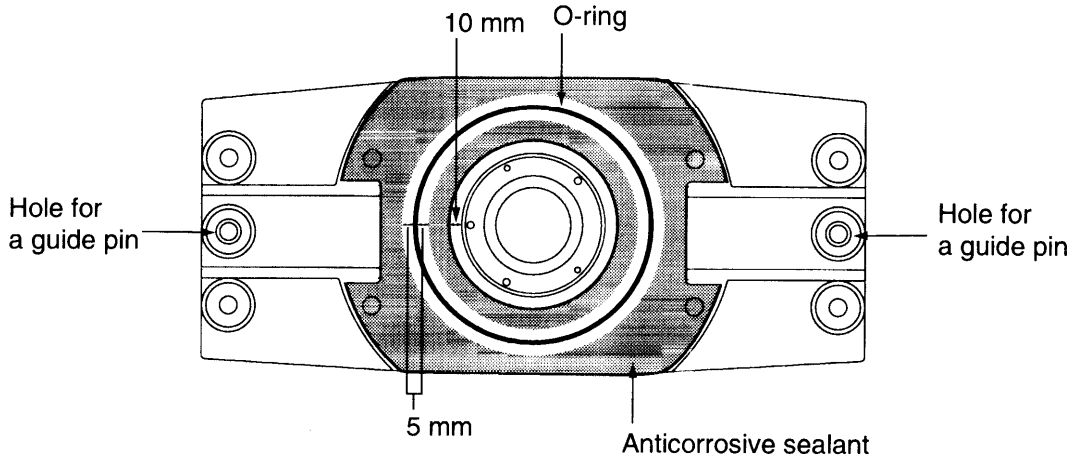


Figure 1-1 Coating the waveguide flange with anticorrosive sealant

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

⚠ CAUTION

Be sure to remove the guide pins.

Injury may result if the guide pins loosen and fall.

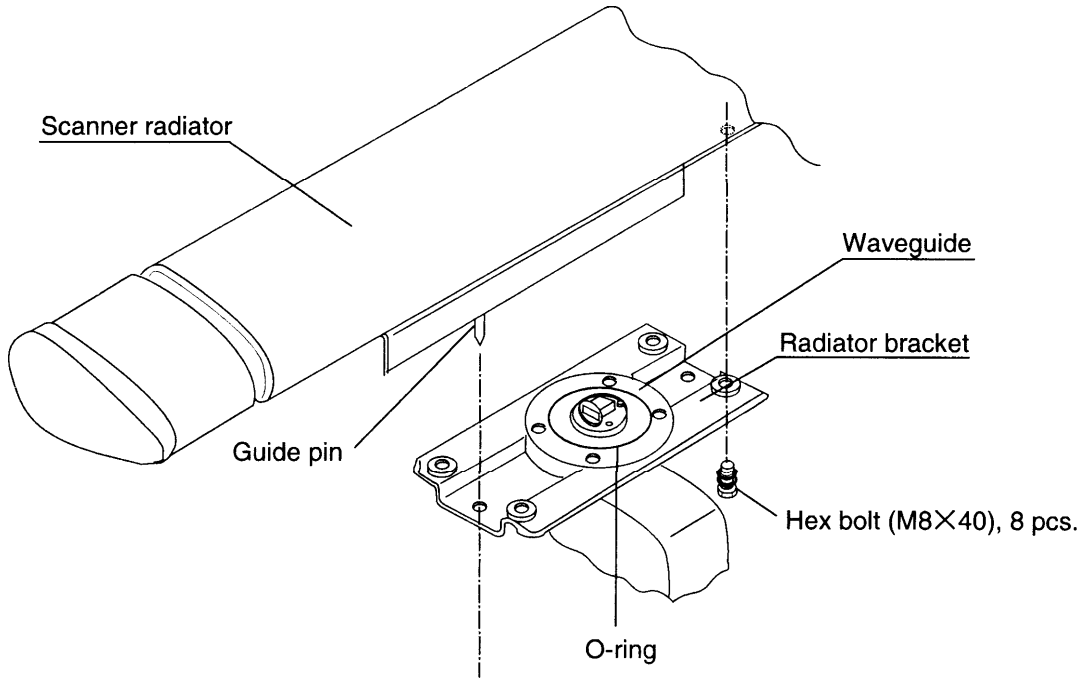


Figure 1-2 Fastening the radiator to the radiator bracket

FR/FAR-2855W: Radiator XN3A (200 cm)/XN4A (240 cm)

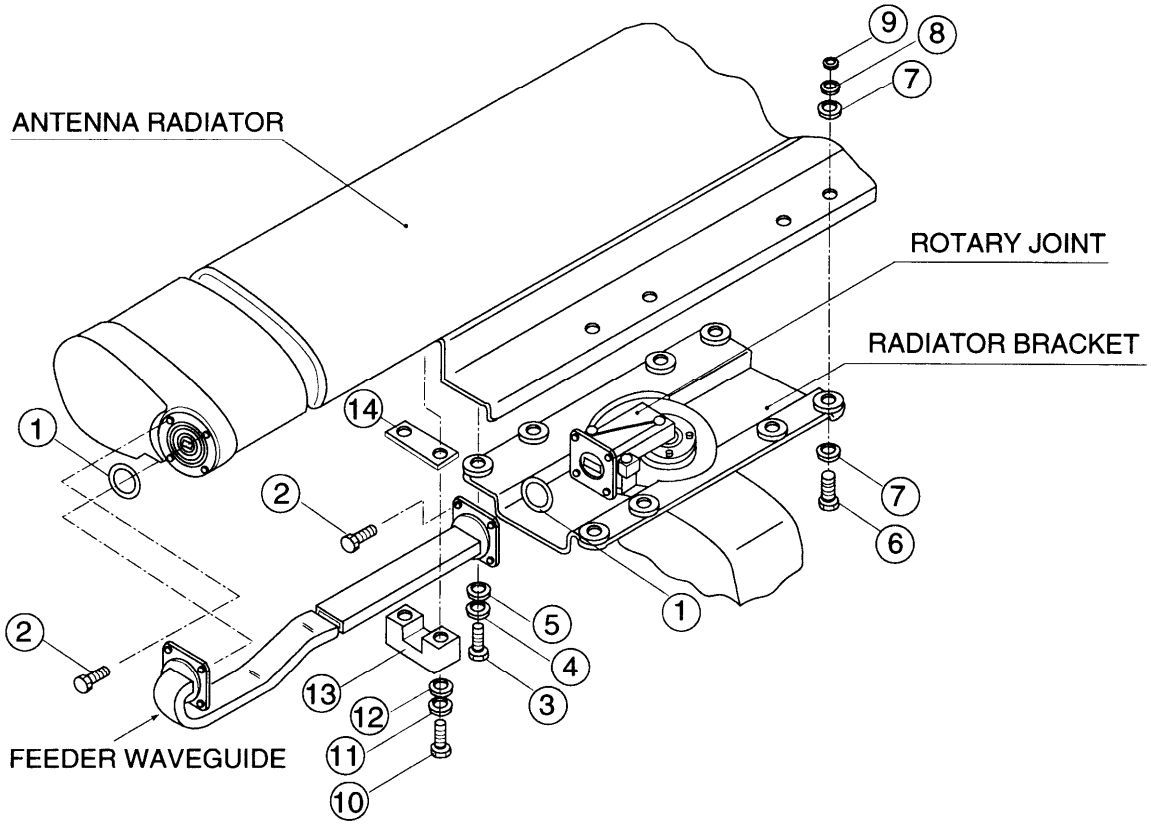


Figure 1-3 Assembling antenna radiator XN3A/XN4A

Procedure

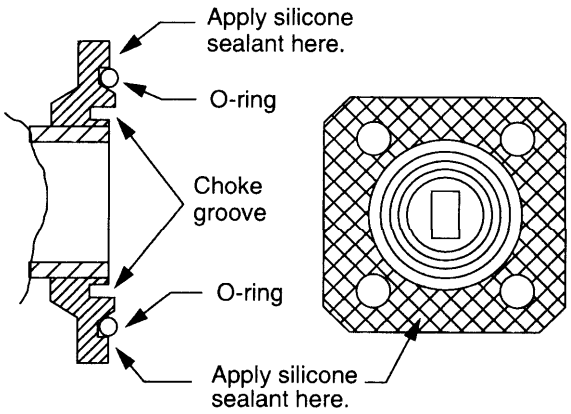
1) Remove the radiator joint flange cap. The cap may be discarded.
2) Wipe the feeder waveguide and radiator joint with a clean cloth.
3) Coat the waveguide flange with silicone sealant as shown on the next page.
4) Insert the O-ring (1) into the O-ring groove of the radiator flange of the rotary joint. Fix the feeder waveguide with hex. bolts (2).

Table 1-1 XN3A/XN4A 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

Coating the waveguide flange with silicone sealant

1. Do not coat the O-ring with silicone sealant; use grease.
2. Clean the surface of the waveguide flange, if necessary. Evenly coat the waveguide flange with silicone sealant as shown in the illustration below.



Evenly coat the waveguide flange with silicone sealant. Apply sealant sparingly; it leaks out slightly when the fixing bolts are tightened. Be sure no sealant contacts the choke groove and waveguide.

Figure 1-4 Coating the waveguide flange with silicone sealant

1.2 Mounting the Antenna Unit on the Mounting Platform

⚠ CAUTION

1) Work at high places is dangerous. Always wear a hard hat and safety belt when working on the scanner unit mast.
2) Both a service platform and steps to the service platform must be mounted to provide safe access for service personnel. Improperly installed platforms present a hazard to service personnel.

Siting considerations

CAUTION

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

Radar model	Standard compass	Steering compass
FR/FAR-2825W	1.20m	0.75m
FR/FAR-2855W	2.0m	1.5m

Consider the following points when selecting a mounting location for the antenna unit.

- No funnel, mast or derrick should be within the vertical beamwidth of the antenna (XN3A/XN4A, 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.

The scanner unit is normally mounted with the waveguide outlet facing the ship's stern however the waveguide outlet can be faced toward port or starboard as well. In this case, the synchronous gear magnet (See below), which produces the heading single, should be remounted. Fix the magnet according to waveguide outlet attitude.

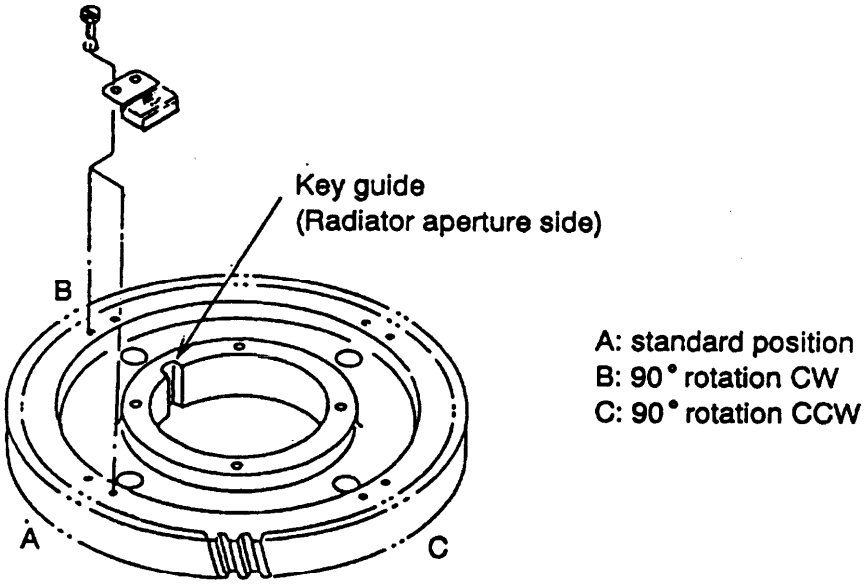


Fig1-5 Remounting the Synchronous Gear Magnet

Mounting procedure

CAUTION

1) The antenna radiator may be fastened to the rotating bracket before mounting the antenna unit. However, DO NOT lift the antenna unit by the radiator. Always hold the unit by its housing. When using a crane or hoist, lift the unit by the hoist rings which should be fastened to the bolt fixing the covers of the antenna housing.
2) 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).
3) DO NOT paint the radiator. Performance will be affected.

1) Drill four mounting holes (15mm diameter) and one cable entry hole (50mm diameter approximately) in the mounting platform.

2) Lay the rubber mat (supplied) on the mounting platform.

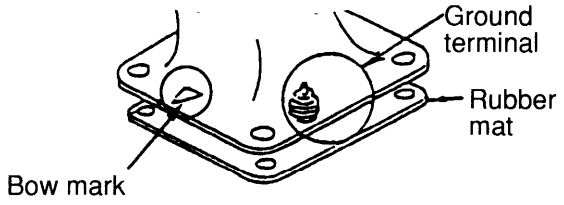


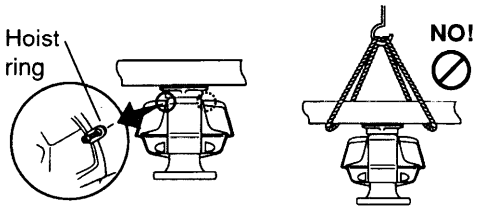
Figure 1-6 Antenna unit, front view

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.

⚠ CAUTION

DO NOT lift the antenna unit by the radiator; lift it by the hoist rings. (Be sure to remove rings after hoisting the antenna unit.)



5) Using hex bolt (M6x25), nut (M6) and flat washer (M6) establish the ground system on the mounting platform as shown in Figure 1-7.

6) Connect the ground wire (RW-4747, 340 mm) between the grounding 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 1-5 to prevent corrosion.

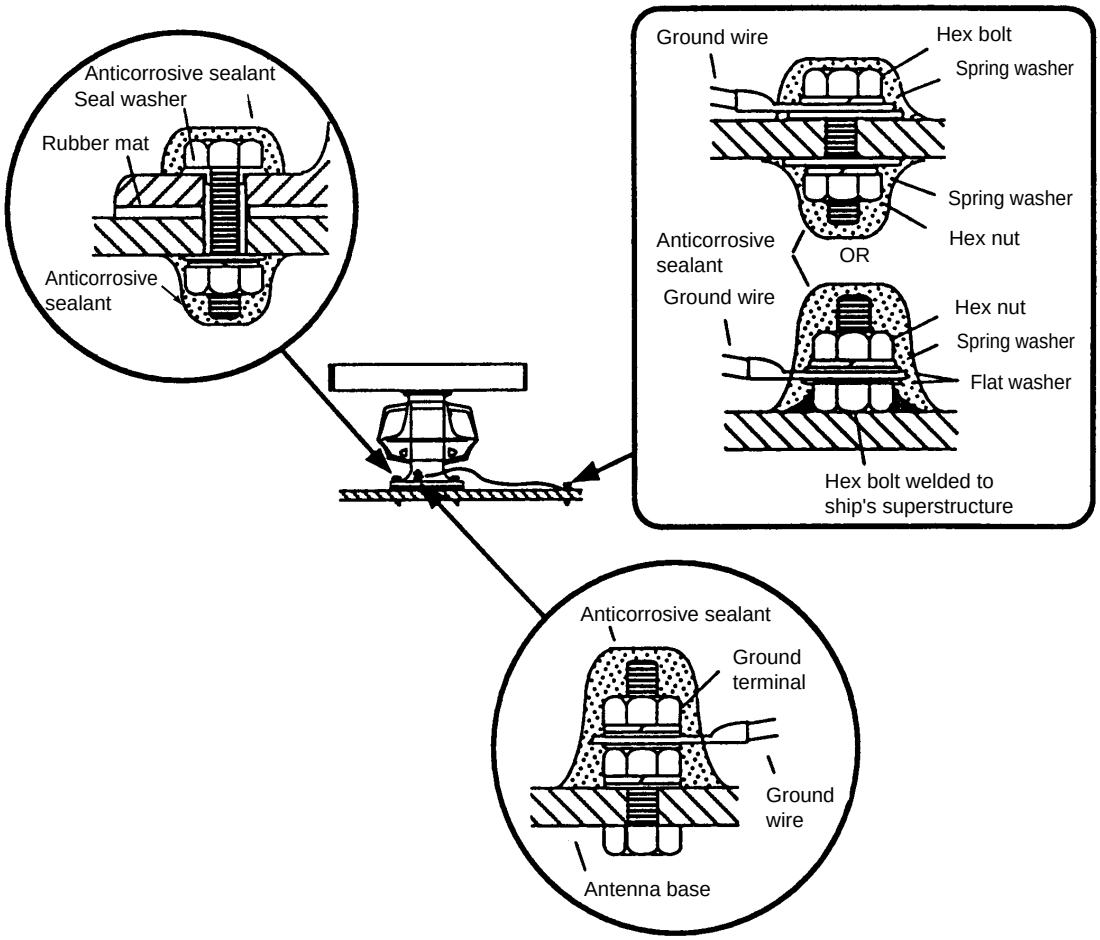


Figure 1-7 Fastening the antenna unit to the mounting location

CAUTION

The antenna unit must be grounded. Failure to ground the unit may cause electrical shock when its metallic parts are touched and give off or receive electro-magnetic 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 noted in the figure which follows.

CAUTION

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

Consider the points mentioned below when selecting a mounting location for the display unit.

- 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 transceiver unit and the display unit. (The signal cable comes in lengths 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.)

1.4 Mounting the Separate Type Control Panel

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

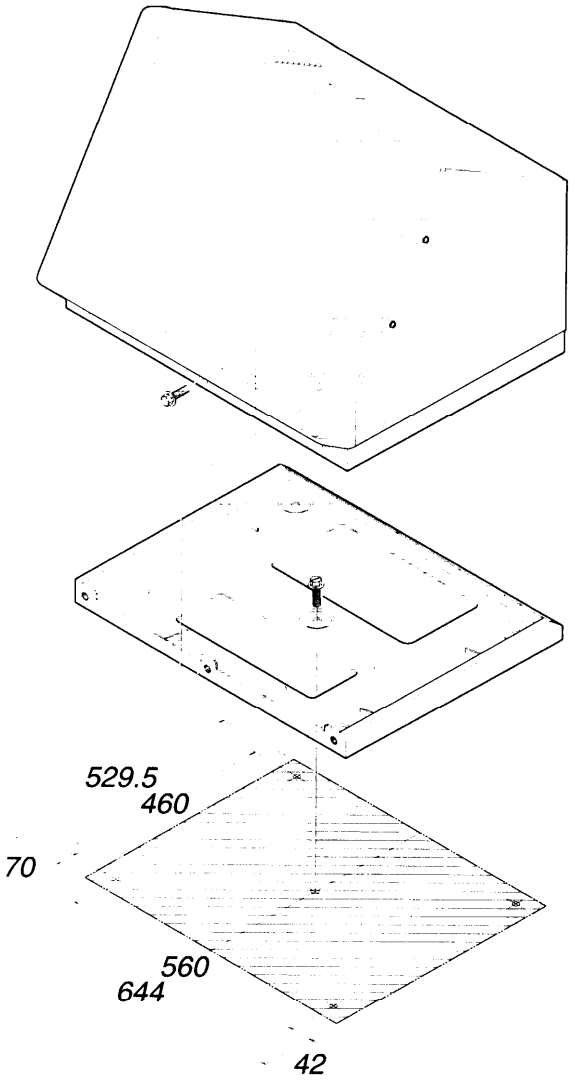


Figure 1-8 Mounting dimensions for tabletop mount display unit

1.5 Transceiver Unit

The transceiver unit is designed for bulkhead mounting, and may be mounted in any dry, well-ventilated place. Ensure the mounting location is strong enough to support the weight of the unit under the continued shock and vibration normally encountered onboard. The transceiver must not be installed in close proximity of a magnetic compass; observe the compass safe distances.

Fix the unit to the bulkhead with four bolts (FR/FAR-2825W: M10, FR/FAR-2855W: M12). Run a ground wire (8mm^2) between the ship's body and the transceiver unit, using the lug supplied to make the connection at the earth stud on the transceiver unit. Keep the length of the ground wire as short as possible.

1.6 Power Supply Unit

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

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

CAUTION

A magnetic compass will be affected if placed to close to the transceiver/power supply units.
The minimum compass safe distances for magnetic compasses are

Unit	Standard compass	Steering compass
Transceiver Unit 25W 55W	4.3 m 2.5 m	3.2 m 2.0 m
Power Supply Unit	0.7 m	0.5 m

2.1 Antenna Unit Connections

1. Remove the scanner cover with the wrench supplied.
2. Unscrew the cable gland and take out the washers and rubber packing.
3. Cut the cable to a suitable length, extending the length actually required by 600mm. Strip off about 600mm of the inner vinyl sheath. Wrap vinyl tape around the areas indicated below.

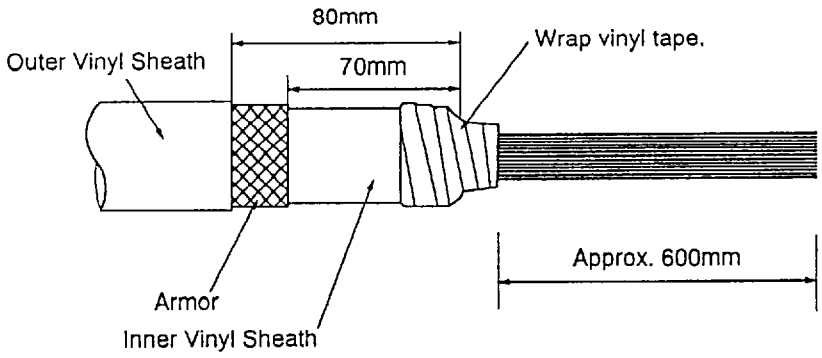


Fig. 2-1

4. Slide the clamping gland, washers and rubber packing on to the cable as shown below.

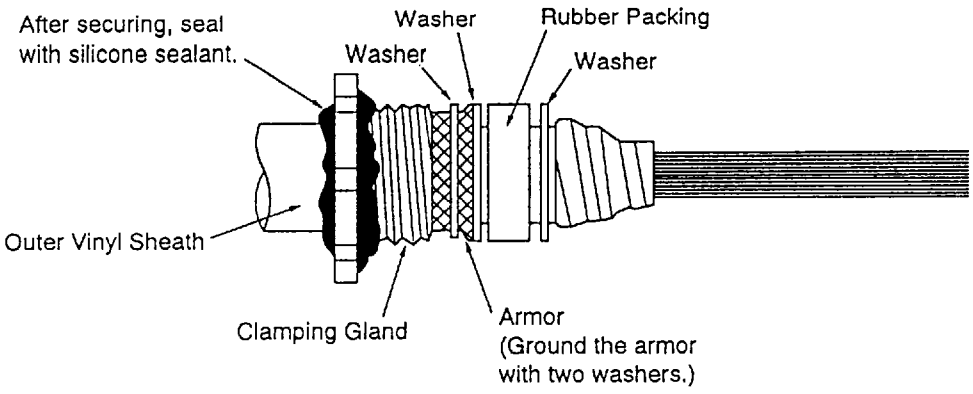


Fig. 2-2

5. Fix cable cores with cable ties (see below). Trim cores considering their location on STB1/2/3, fit a crimp-on lug (STB1/STB3 .... FV1.25-3, STB2 .... FV2-4) to each core. Connect lugs to terminal boards. Tape spare wires.

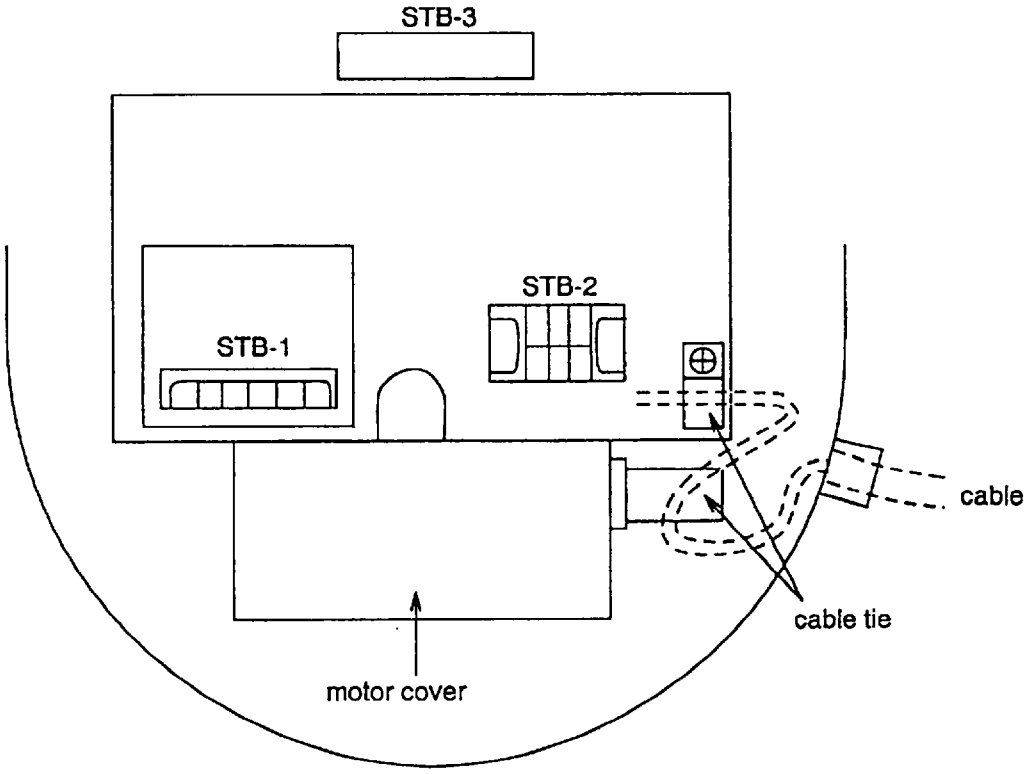


Fig. 2-3 Location of Cable Ties in Antenna Unit

WHEN THE DE-ICER IS INSTALLED

1) 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, 1ϕ) to the de-icer. (turning off the power to the display unit has no effect.)

2) The neck of the scanner unit becomes ***VERY HOT*** when the de-icer is working. (The de-icer turns on when ambient temperature is below 0℃.)

2.2 Transceiver Unit Connections

25 kW Transceiver Unit Fabrication of Signal cable (RW-6895)

1) Remove the anti-corrosive sheath by 500mm. Remove the armor and vinyl sheath leaving 50mm each approximately.

2) Unravel the outer shield to expose the cores in the outer layer. Then, unravel the inner shield to expose the cores in the inner layer. Label all inner cores for later identification.

3) Trim each core (except coaxial core) considering its location on the terminal board.

4) Trim the inner and outer shields leaving 50cm each. Attach crimp-on lug FV5.5-4 (blue, ø4) to the shields.

5) Remove insulation of each core by 6 mm approximately. Attach crimp-on lug FV1.25-M3 (red, ø3) to each core.

6) Fabricate the coaxial wire. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD1.25-3 (red, ø3) to coaxial wire.

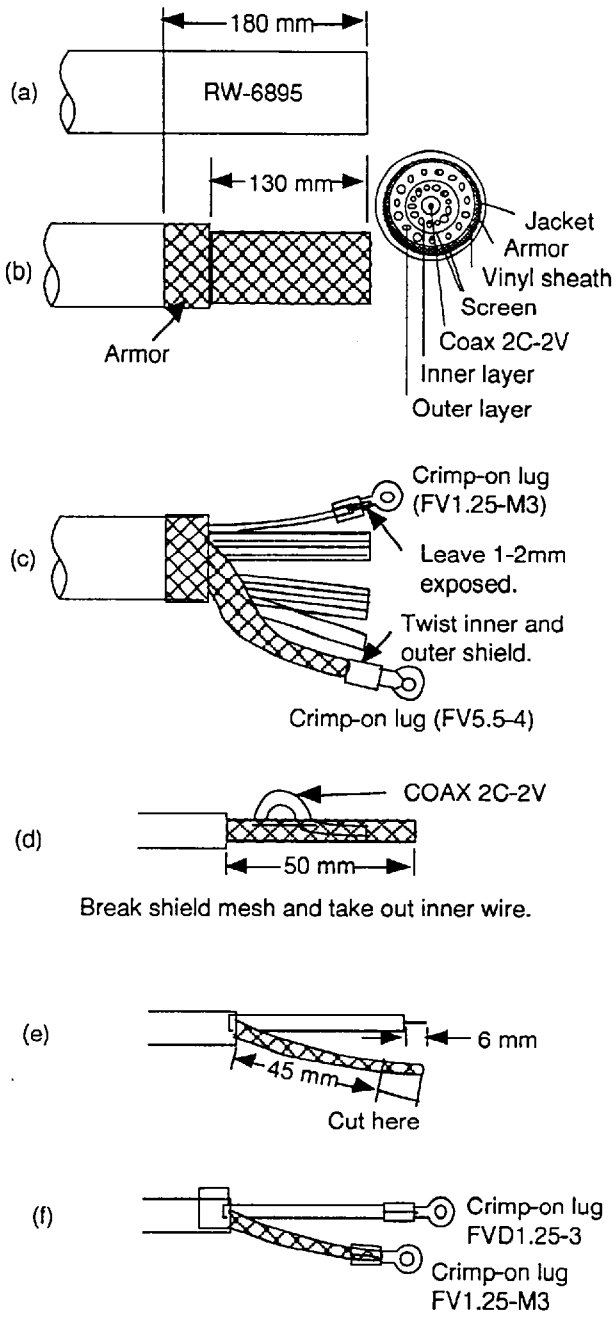


Figure 2-4 How to fabricate signal cable RW-6895

Connection

1. Remove transceiver cover.
2. Pass the signal cable through the cable entrance. Lay the cable in the clamp with the exposed armor inside the clamp; and then tighten the cable clamp. Use either of the cable entrances located at bottom rear chassises.
3. Connect wires to RTB1 and FL801.
4. Cover the filter terminals with the terminal caps (supplied) to inside the terminals.
5. Connect the shield to the chassis.
6. Run a ground wire (shipyard supply) between the ground terminal on the transceiver unit and the ship's body.

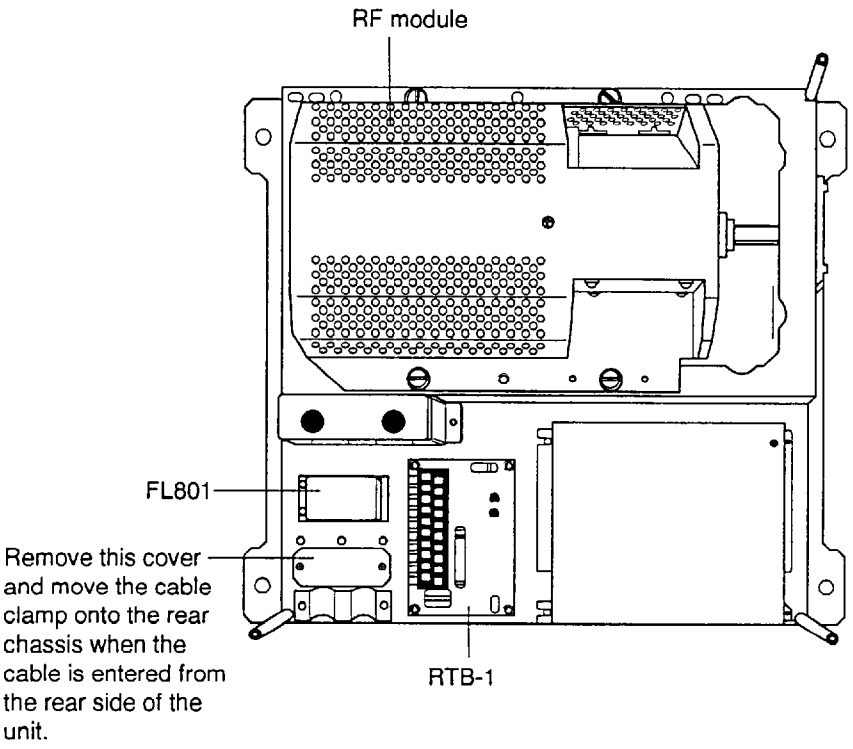


Fig. 2-5 Transceiver Unit (25kW)

CAUTION

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

Fabrication of Signal Cable RW-5093

1. Remove the vinyl sheath by 1200mm.
2. Expose 50mm of the armor.
3. Expose 5mm of the inner vinyl sheath, and cover exposed part with tape.
4. Separate the outer layer wires with a small screwdriver.
5. Separate the outer layer wires in the same way as above. Mark each core for future identification.
6. Cut each core to a suitable length considering its location on the terminal board.
7. Cut the inner and outer shields to a suitable length considering the distance to the ground terminal. Attach crimp-on lug FV5.5-4.
8. Expose the conductor of each core by 6mm. Fit a crimp-on lug to each conductor.
9. Spare wires: Bundle and cover with vinyl tubing.
10. Fabricate the coaxial wire. Make the length 10 mm longer than the shield to prevent wire strain. Attach crimp-on lug FVD 1.25-3 (red, ϕ3) to coaxial wire.

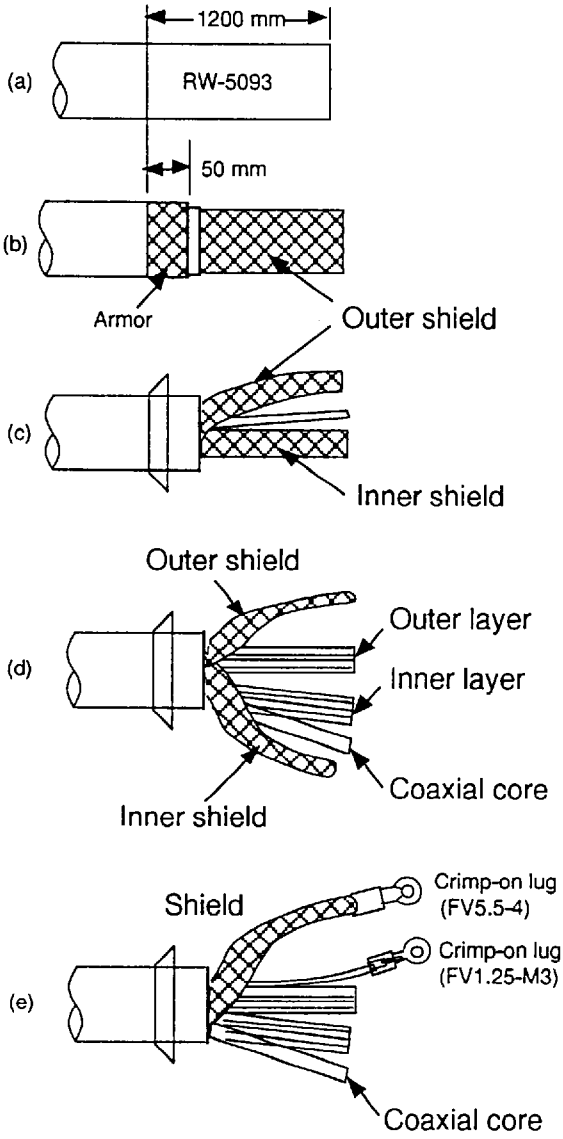


Fig. 2-6 Fabrication the Signal Cable

Fit the BNC connector to the coaxial cable as;

a) Remove the vinyl sheath by 10 mm.

b) Slip the washer, packing and gland onto the coaxial cable.

c) Comb out braid and fold back as illustrated.

d) Trim braid so that its edge justtouches the outer part of the clamp.

e) Remove the dielectric by 3 mm.

f) Slip male conductor in place; but against dielectric and solder.

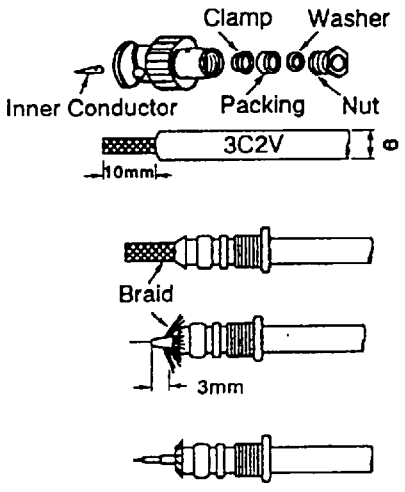


Fig. 2-7 Fitting the BNC Connector

g) Push assembly into body as far as it will go. Slide nut into body and screw in place with wrench until tight.For this operation, hold cable and shell rigidly and rotate nut.

Connections

1. Loosen the six bolts securing the transceiver cover.
2. Pass the signal cable through one of the two cable entrances. Lay the cable in the cable clamp with the exposed armor under the clamp; and then tighten cable clamp.
3. Connect conductors to their proper location on RTB1 and FL801.
4. Connect the coacial cable to BNC connector J651 on the IF Ampler.
5. Connect the shield to the ground terminal.
6. Run a cable wire (shipyard Supply) between the ground terminal on the transceiver unit and the ship's body.

NOTE: To prevent magnetron demagnetization, do not bring metallic objects such as screwdrivers near the magnetron.

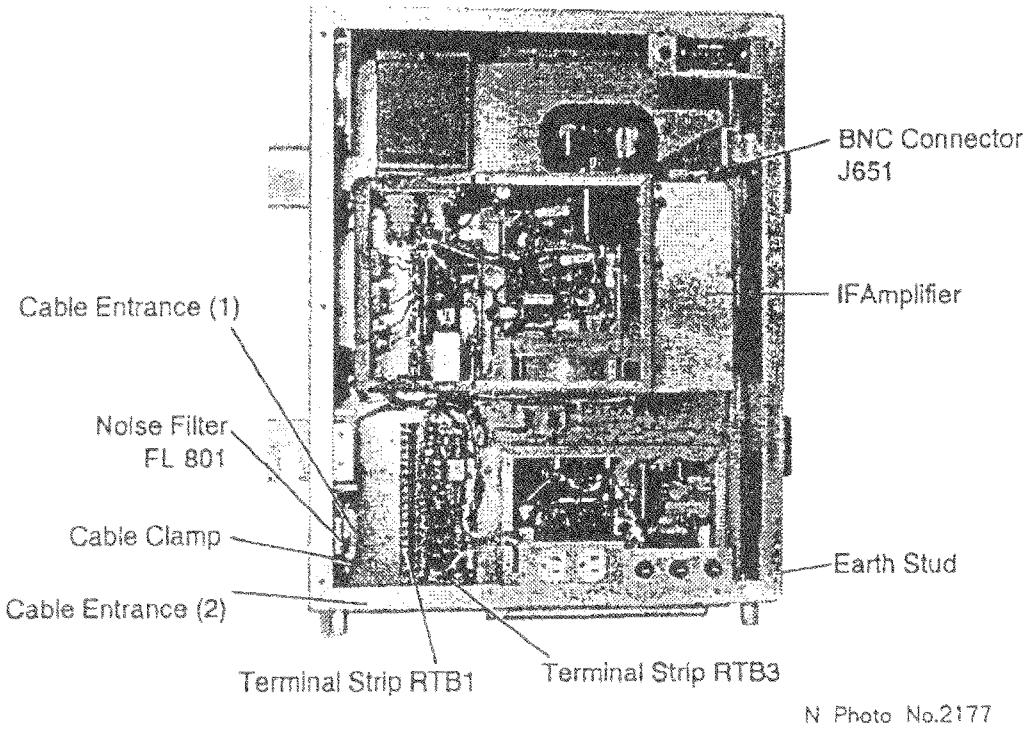


Fig. 2-8 Transceiver Unit (50 kW)

2.3 Installing the Rectanguler Waveguide (WRJ-9)

The RF interconnection between the scanner unit and the transceiver can be made with a rectangular waveguide (WRJ-9) or flexible waveguide (WELF-A-10). If the rectangular waveguide is used, observe the following installation guidelines.

1) Correctly installed waveguide runs ensure the most efficient transmission of electrical energy at high frequencies. Electrical losses, however, occur in the waveguide runs. To minimize them the following factors are of great importance: minimum length, airtightness and electrical continuity.

2) Another consideration required is that of frequency disturbance. The transmitting valve, a magnetron, is the primary oscillator in the radar.

   This is different from the oscillation system at lower frequencies in which conventional radio valves are used. In the latter case, the primary oscillator is always protected from the effects of load impedance by a buffer stage so that frequency and waveform are left unobstructed. With a waveguide and magnetron, however, mismatch of impedance causes "frequency pulling." For this reason, the number of possible mismatches in a waveguide run, i.e., joins and bends, must be kept minimum.

3) Each pair of flanges should be coupled with one O-ring, four bolts and spring washers and the choke flange must be in the upper position. The bolts and O-ring must be greased before insertion to facilitate removal if required at a later date.

4) The transceiver unit output flange is a plain type and the scanner unit output flange is a choke type, and it is important to maintain this relationship throughout the waveguide run.

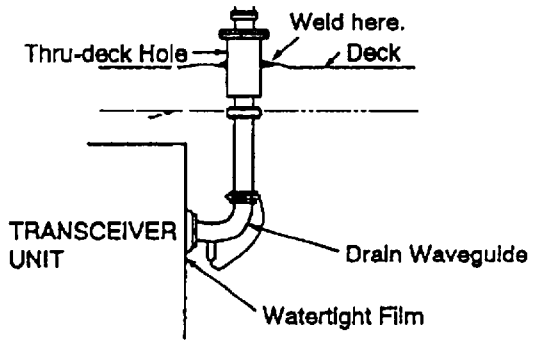


Fig. 2-9 Flange connection

5) After installation of the waveguide is completed, the coupling portions must be sealed by using the adhesive supplied.

6) In a very short time the surface of the waveguide becomes green with verdigris. Therefore, paint both the surface of the waveguide and flanges to avoid corrosion and water penetration. Paint must not be allowed to reach the inner surface of the waveguide or the mating surface of any flange.

2.4 Aligning the Circulator with the Output Waveguide (FR-2855W only)

Realignment of the circulator with the output waveguide is required whenever the RF module is swung out for magnetron replacement, etc.

After tightening the six bolts fixing the RF module, follow one of the steps shown below to make alignment.

A) When the port of the output waveguide is visible.

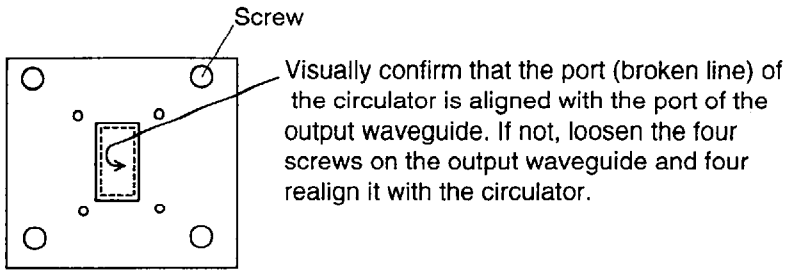


Fig.2-10 Output xaveguide

B) When the above condition cannot be met.

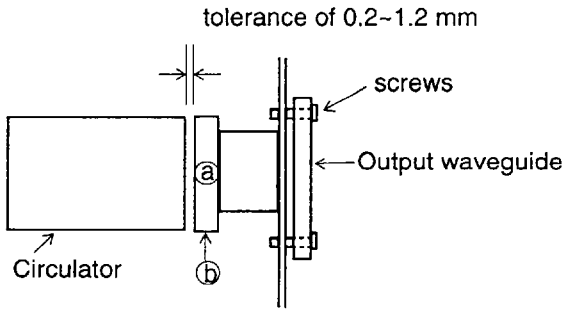
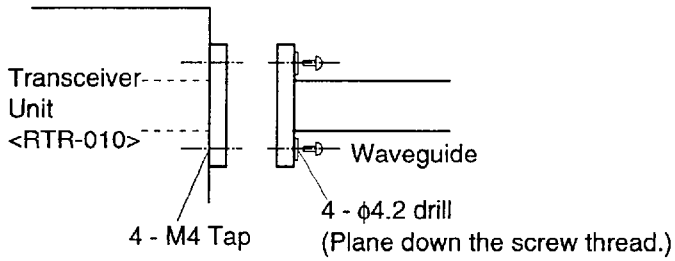


Fig.2-11 Output waveguide alignment 2

Confirm that the vertical (A) and horizontal (B) faces of the output waveguide are aligned with the front face of the circulator. If not, loosen the four screws on the output waveguide and realign it with the circulator. Alternatively, check that the distance between the circulator and the output waveguide is between 0.2 mm. If not, loosen the circulator and readjust it to obtain the avobe mentioned tolerance.

When the drain waveguide is not used

When the drain waveguide is not used, drill the four tapped holes on the flange of the waveguide to plane down the screw thread.



2.5 Display Unit Connection

Two cable are terminated at the display unit: the signal cable RW-5093 or RW-6895 and the power cable. The signal cable, available in lengths of 15m, 20m, or 30m, comes with a connector preattached to it for connection to the display unit.

Fabricating power cable DPYCY-3.5

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

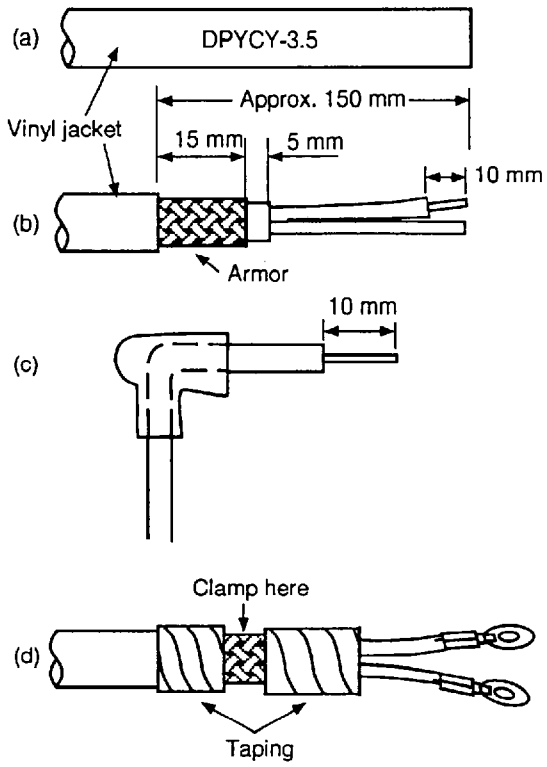


Fig. 2-12 How to fabricate power cable DPYCY-3.5

Leading in cables to the display unit

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

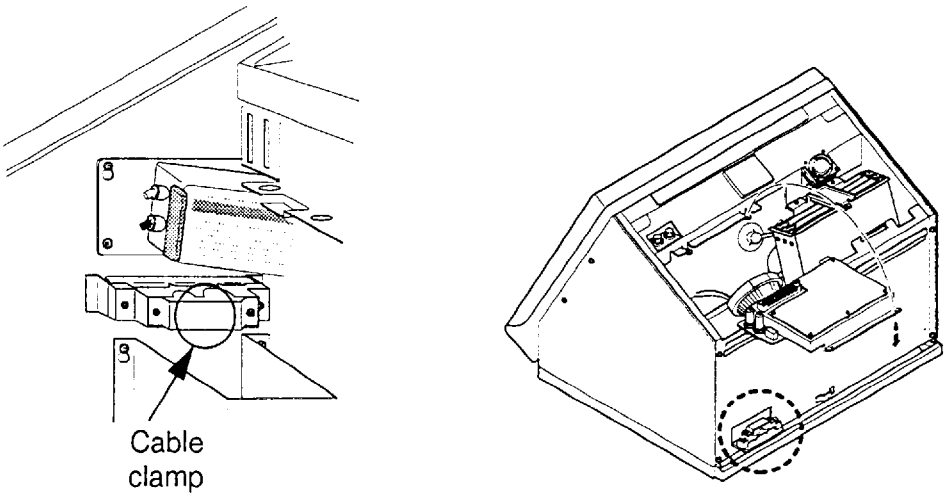


Figure 2-13 Location of cable clamp inside the display unit

Tabletop

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

Pedestal

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

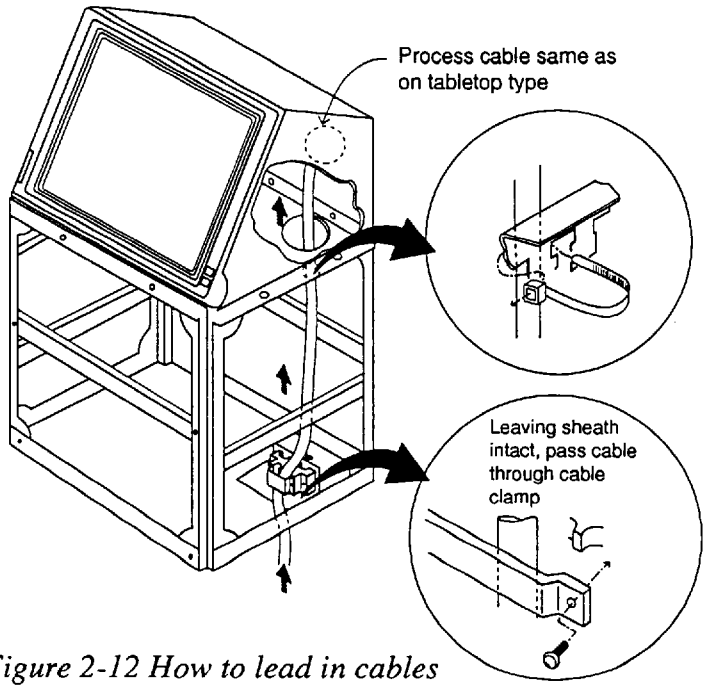


Figure 2-12 How to lead in cables through the pedestal

Connections

Power cable

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

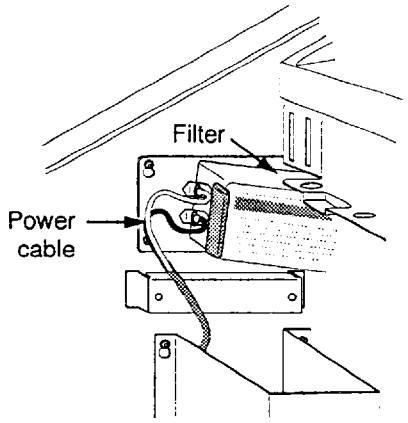


Figure 2-13 Location of filter inside the display unit

Gyro signal

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

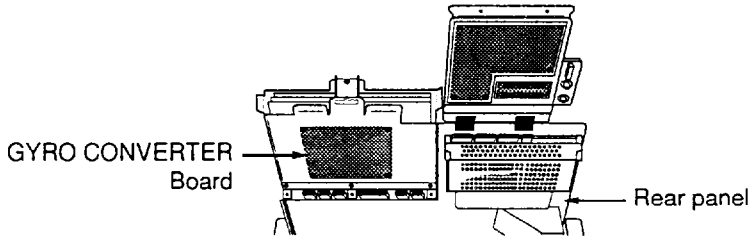
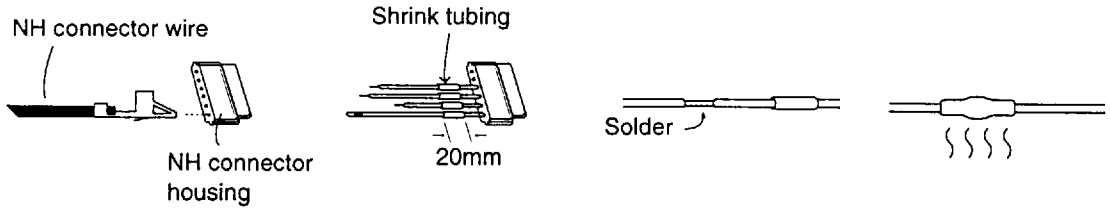


Figure 2-14 Location of GYRO CONVERTER Board

HOW TO ATTACH NH CONNECTOR TO SIGNAL CABLE



① Insert NH connector wire into NH connector housing.

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

③ Solder connector to signal cable.

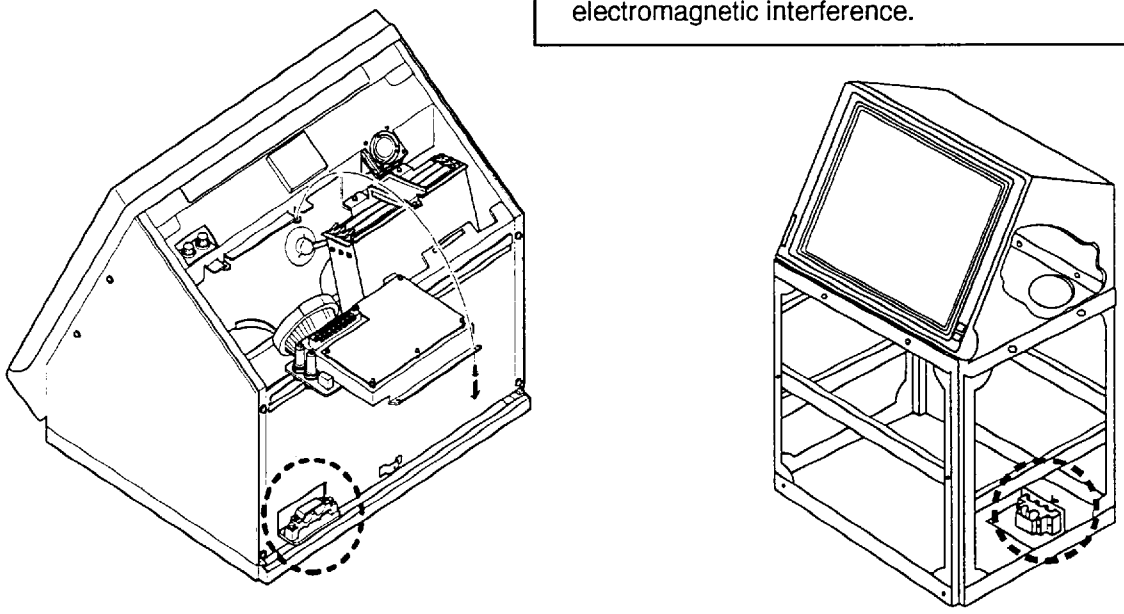
④ Heat shrink tubing with soldering iron.

Grounding

The display unit must be grounded at the point shown in Figure 2-15.

⚠ CAUTION

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



Tabletop type

Pedestal type

Figure 2-15 Grounding the display unit

Radar buoy

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

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

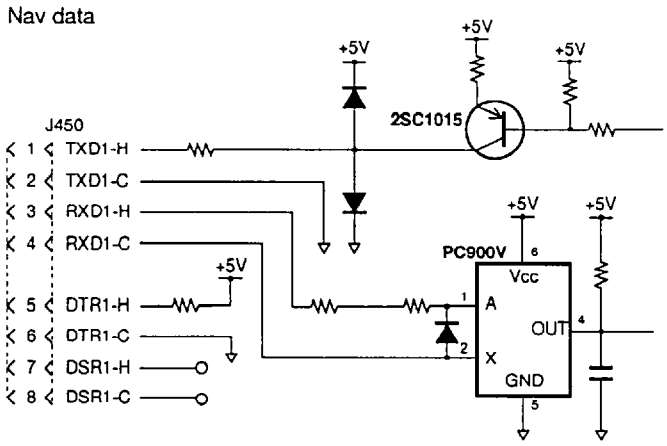


Figure 2-16 INT Board circuit

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

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

Signal name	Name on pcb	Connector no.	Connector type	Applicable equipment	Remarks
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, 4 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 *1 *1: Display unit for FR-2800 series radar can be used as slave display unit.	heading, bearing, video, Tx trigger
Buzzer signal	EXT-BUZ	J451	NH, 3 pin	OP03-21-3	buzzer drive signal
Buzzer signal (AC)	EXT-BUZ (AC)	J452	NH, 2 pin	Speaker w/amp	speaker signal
Monitor signal		J449	NH, 10 pin		VER synchronous, HOR synchronous, video (NTSC format)
RJ-8	RJ-8	J456	NH, 4 pin		
Input/Output Signal					
INS data	INS. DATA	J455	NH, 5 pin		
RJ-7	RJ-7	J457	NH, 15 pin NH, 8 pin		
Nav data	N AV DATA	J450	NH, 8 pin		
ARPA data	ARPA DATA	J454	NH, 5 pin		

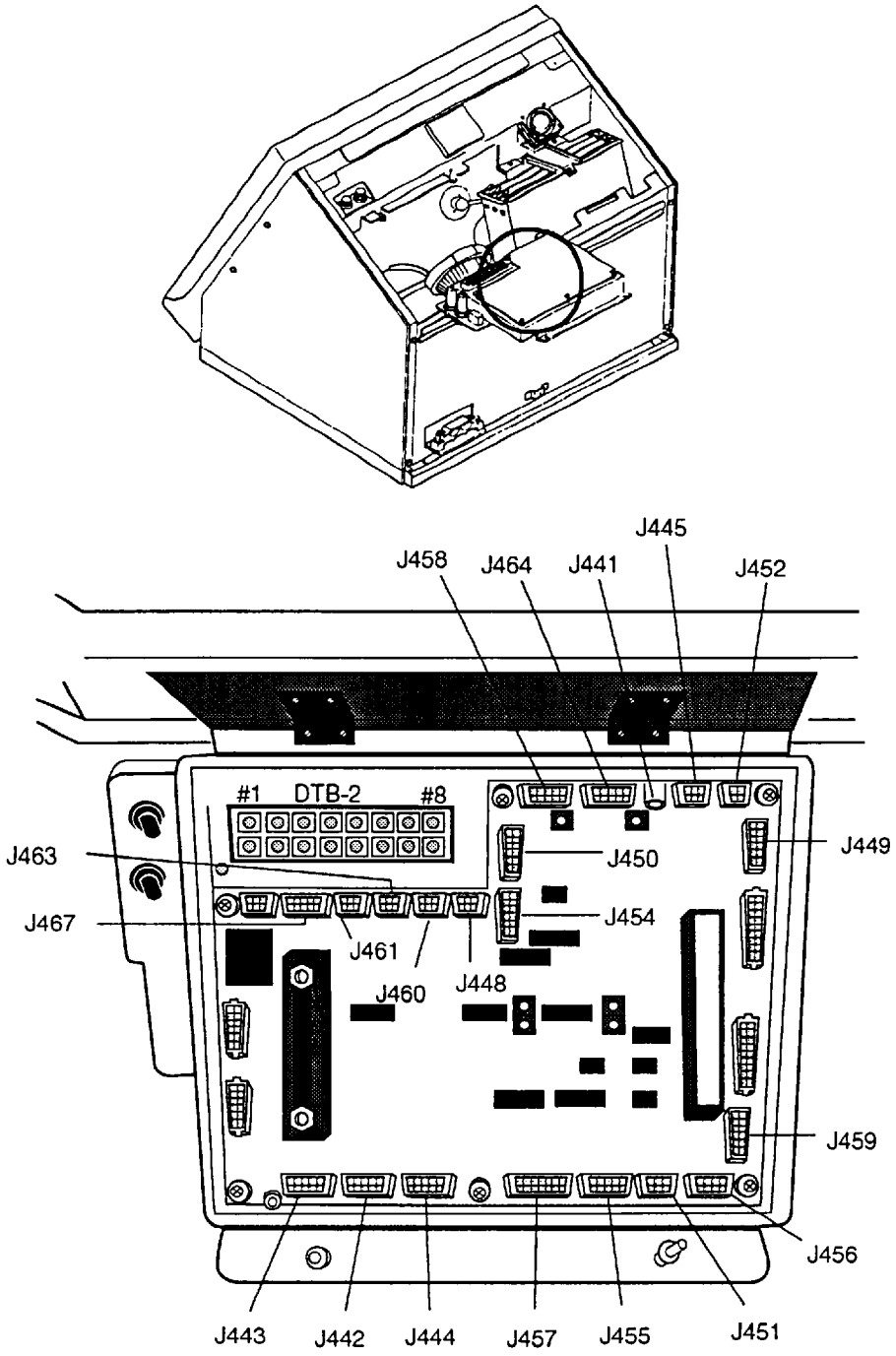


Figure 2-17 Location of connectors on the INT Board

Grounding cables and covering unused cable slots in the cable clamp

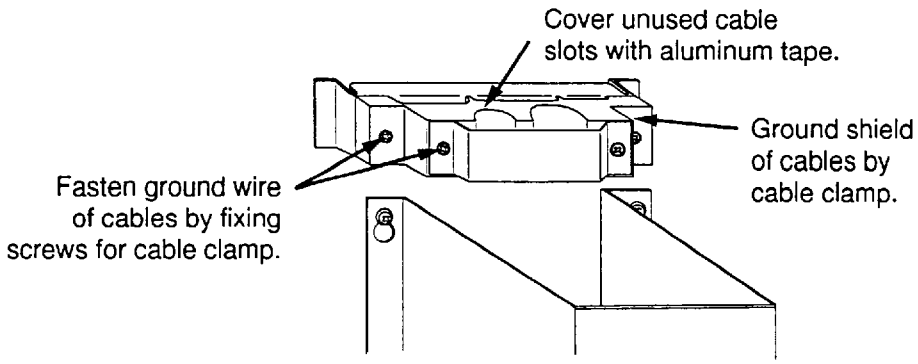


Figure 2-18 Cable clamp

⚠ CAUTION

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

2.6 Power Supply Unit

PSU-004

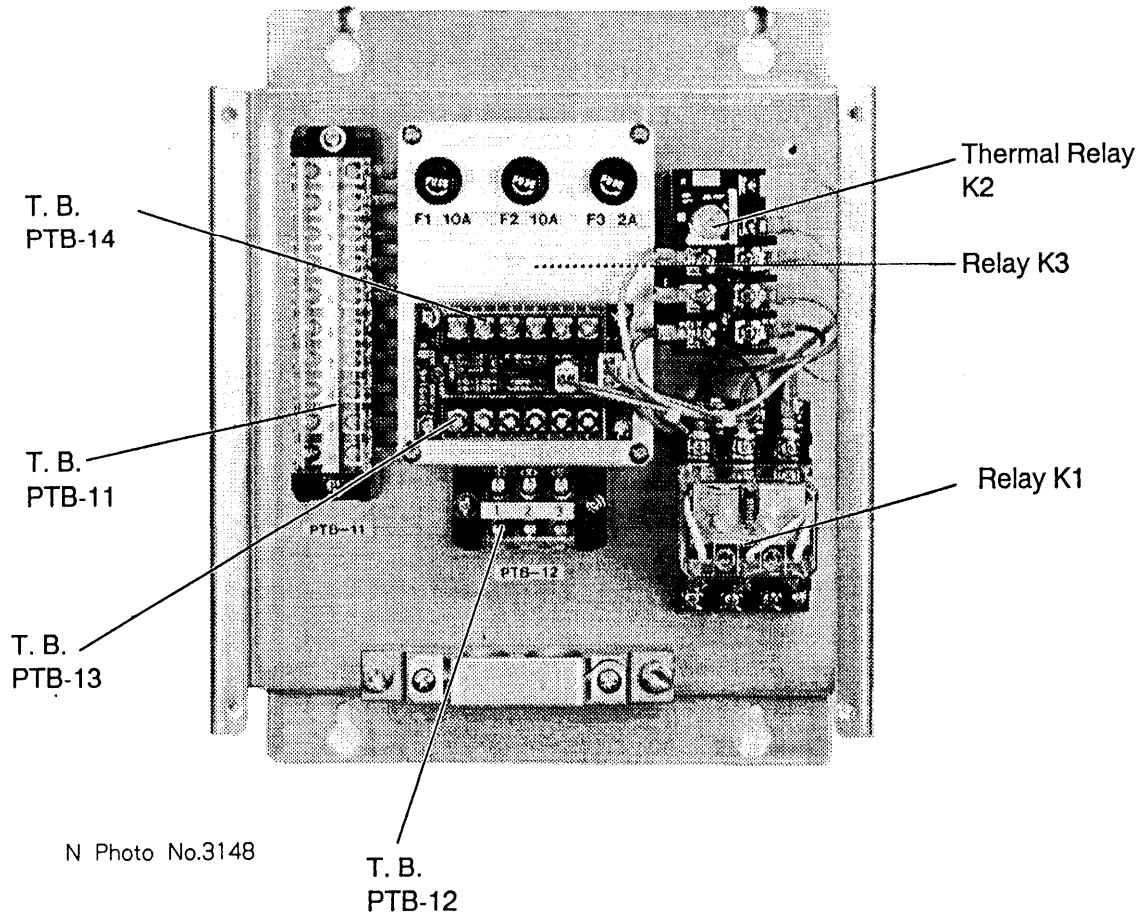


Fig. 2-19 Power Supply Unit (PSU-004) with Cover Removed

The table below lists the thermal relays to be used in the Power Supply Unit (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, 3ϕ	RSB-0041/0076	TR-ONH/3 0.8A	0.8A
380/440VAC, 3ϕ	RSB-0042/0077	TR-ONH/3 0.36A	0.4A
100VAC, 1ϕ	RSB-0043	BMK9-04-8K	3.0A
220VAC, 1ϕ	RSB-0046	BMK9-04-8K	1.8A

3. INITIALIZATION AND ADJUSTMENT

3.1 Setting Operating Voltage of Fan Motor

The operating voltage of the fan motor inside the transceiver unit must be the same as thet of ship's mains.

The primary of the transformer inside the transceiver unit is factory-wired to the #1 of RTB-3 for 100 VAC power supply. Change the connection is ship's mains is not 100 VAC.

100 VAC: #1, 110 VAC: #2, 115VAC: #3

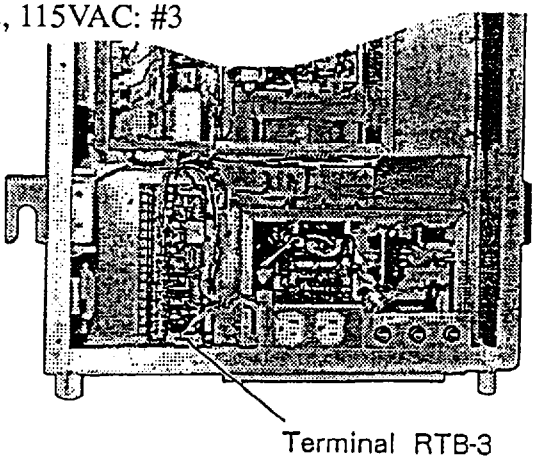


Figure 3-1 Transceiver Unit (50 kW)

3.2 Menus for Initialization and Adjustment

Accessing the menus

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

1) Turn off the power.

2) Turn on the #4 segment of DIP Switch S1 on the SPU Board.

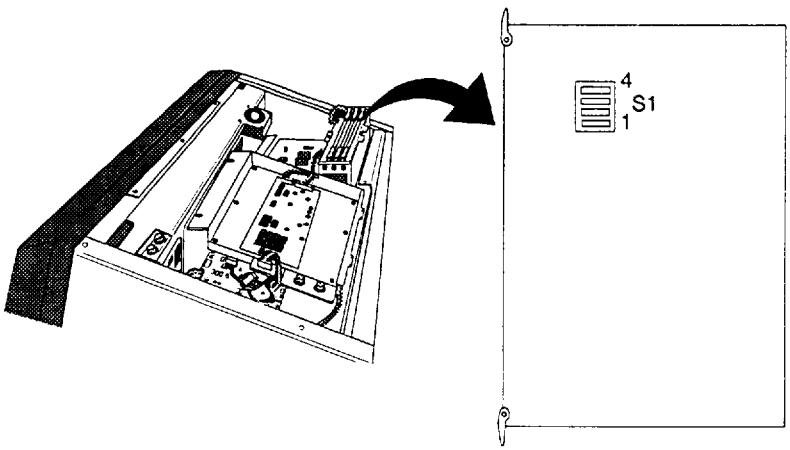


Figure 3-2 Display unit (top view, cover removed) and SPU Board

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 3-8 and 3-13, 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 several times to select OTHER X-BAND.
7) Press the [ENTER] key.

3.3 Heading Alignment

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

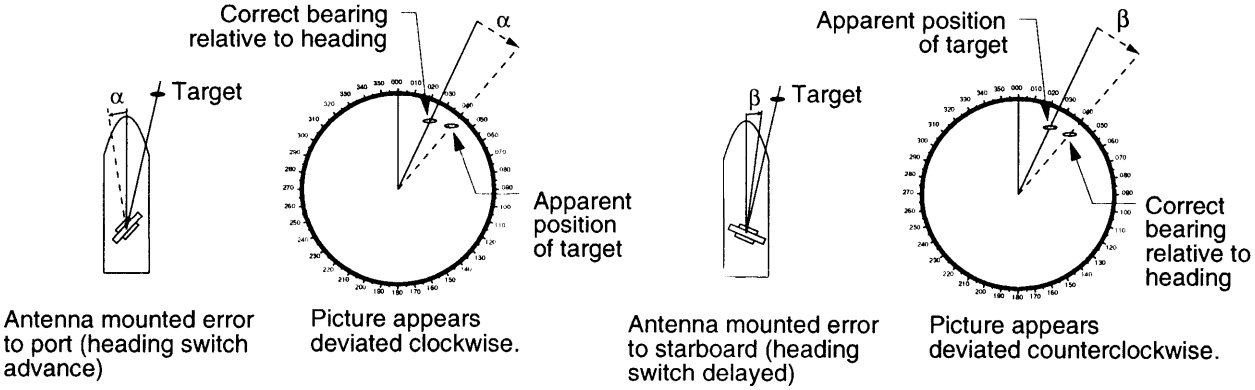


Figure 3-3 Heading alignment error

Procedure

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

3.4 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 3-4.
- The range of target echoes will also be incorrectly shown.

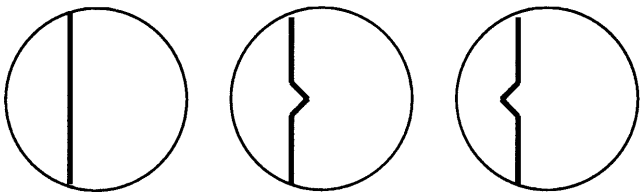


Figure 3-4 Examples of correct and incorrect sweep timings

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.

3.5 Adjusting Video Signal Level

When the signal cable is very long, the video signal 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 the trigger at TP10 on the INT Board.
2) Transmit on the 12nm range.
3) Adjust VR1 on the INT Board so the value of TP3 is 4Vpp. (For secondary display, adjust VR2 for same level.)

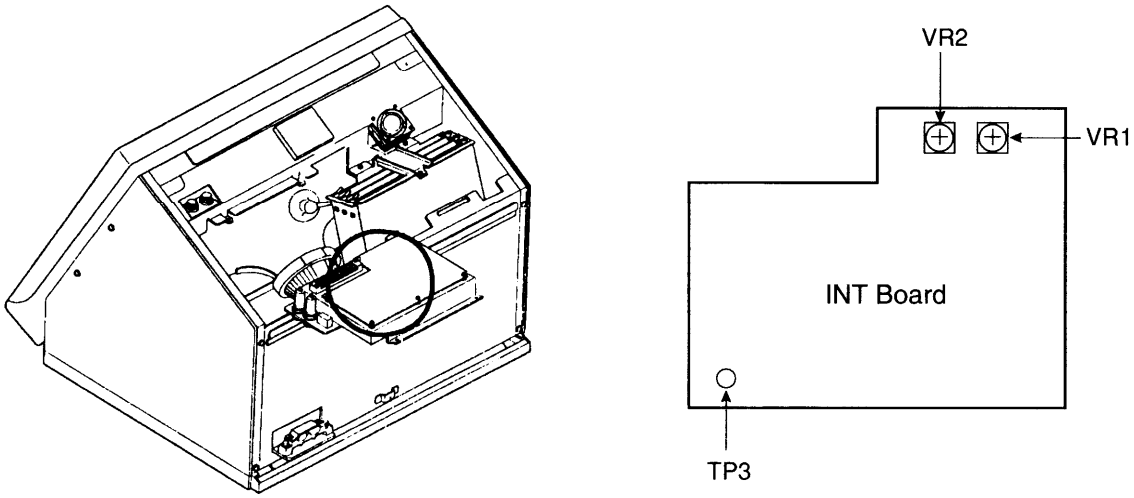


Figure 3-5 Location of INT Board

3.6 Suppressing Main Bang

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

Procedure

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

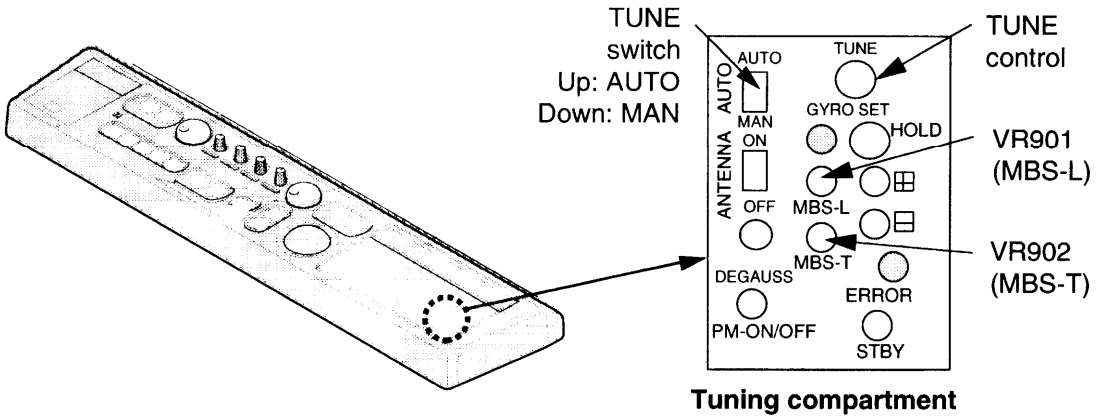


Figure 3-6 Control unit, location of tuning compartment

3.7 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.

3.8 Confirming Magnetron Heater Voltage

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

Table 3-1 Magnetron heater voltage rating

Measuring conditions	FAR/FR-2825W (25kW)	FAR/FR-2855W (50kW)	Tuning point
ST-BY, 0.25nm	8.2 V to 8.4 V	7.0 V to 7.6 V	VR801 on the TRIGGER Board (RFC-9008)
Tx on 48nm range	6.5 V to 7.5 V	4.5 V to 5.1 V	

25 kW Transceiver

1. Set the item "SCANNER STOPPED" on the INITIAL SETTING menu to "TX" so that the radar can transmit with the scanner rotation suspended.
2. Set the SCAN switch on the keyboard panel to "Off".
3. Remove TX fuse (F801) on the transceiver unit.
4. Set a multimeter to 10 VDC range and connect it between #4 (+) and #6(-) of connector P9 on the 03P9189 Board.
5. With the radar set to 0.25 nm range, adjust sliding contact VR801 for multimeter reading of 8.2 to 8.4 VDC.
6. With the radar set to 48 nm range, confirm that a multimater reading is 6.5 to 7.5 VDC.

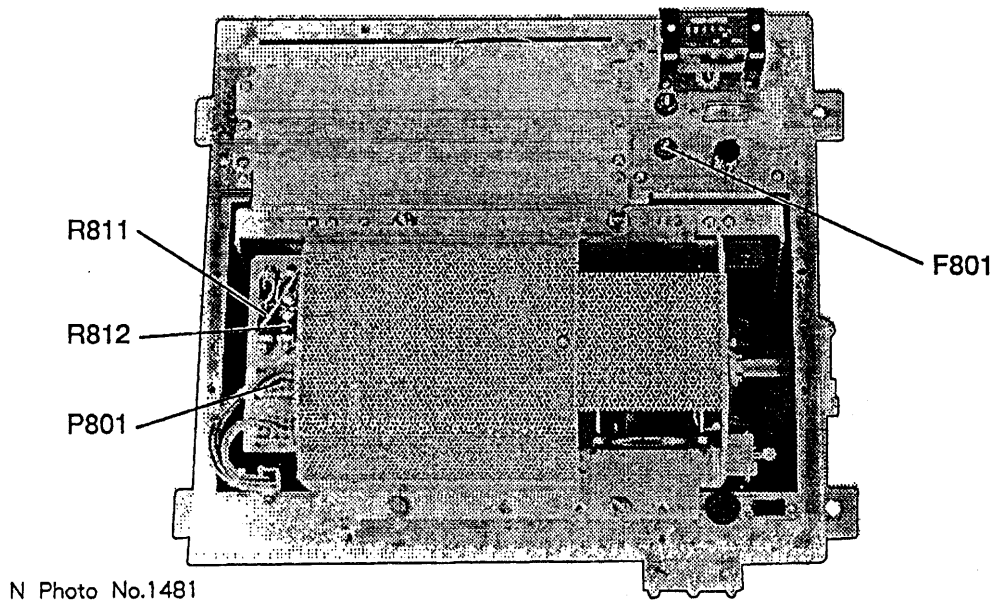


Fig. 3-7 Transceiver Unit (25 kW)

50 kw Transceiver

1. Set the item 2 "SCANNER STOPED" on the INITIAL SETTING menu to "TX" so that the radar can transmit with the scanner rotation suspended.
2. Set the SCAN switch on the top right-hand panel to "Off".
3. Pull on the door switch (S802) to
4. Set a multimeter to 10VDC range and connect it between #1(+) and (-) of P805 on the board 03P6666.
5. With the radar set to the 0.25 mile range, adjust sliding contact R812 for a multimeter reading of 7.0-7.6 VDC.
6. With the 48mile range, adjust sliding contact R811 for a multimeter reading of .5-5.1 VDC.
7. Replace the transmission fuse, transmit the radar, and check that magnetron current, shown on the check meter, is normal (6-9.5) on the 48 mile range.

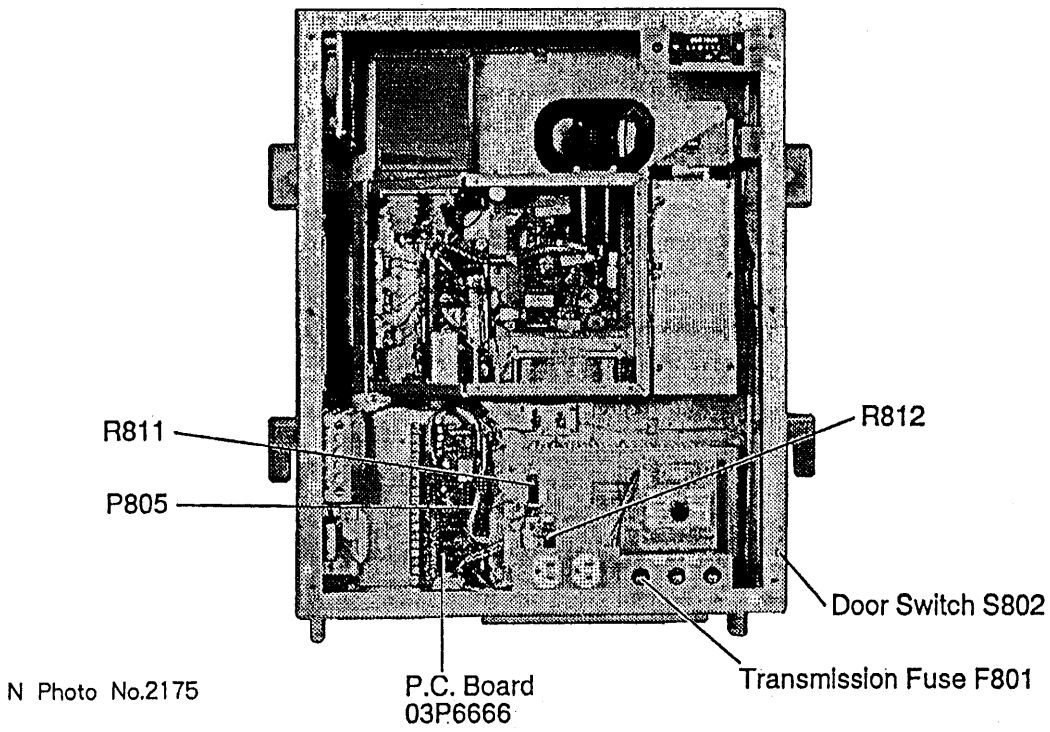


Fig. 3-8 Transceiver Unit (50 kW)

3.9 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 change to monitor magnetron usage, etc.

INITIAL SETTING 2 menu

KEY BEEP: Turns key response beep on or off.

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

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

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

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

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(Center) 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.

3.10 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

[FUNC1 PULSE WD] *3

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

[FUNCTION KEY 4]

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

Notes

*1: Available on "R" specification radar.
*2: Same menu appears for function key #3.
*3: Same menu appears for function keys #1, #2 & #3.

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

Figure 3-9 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.

3.11 Default of Initial Setting Menus

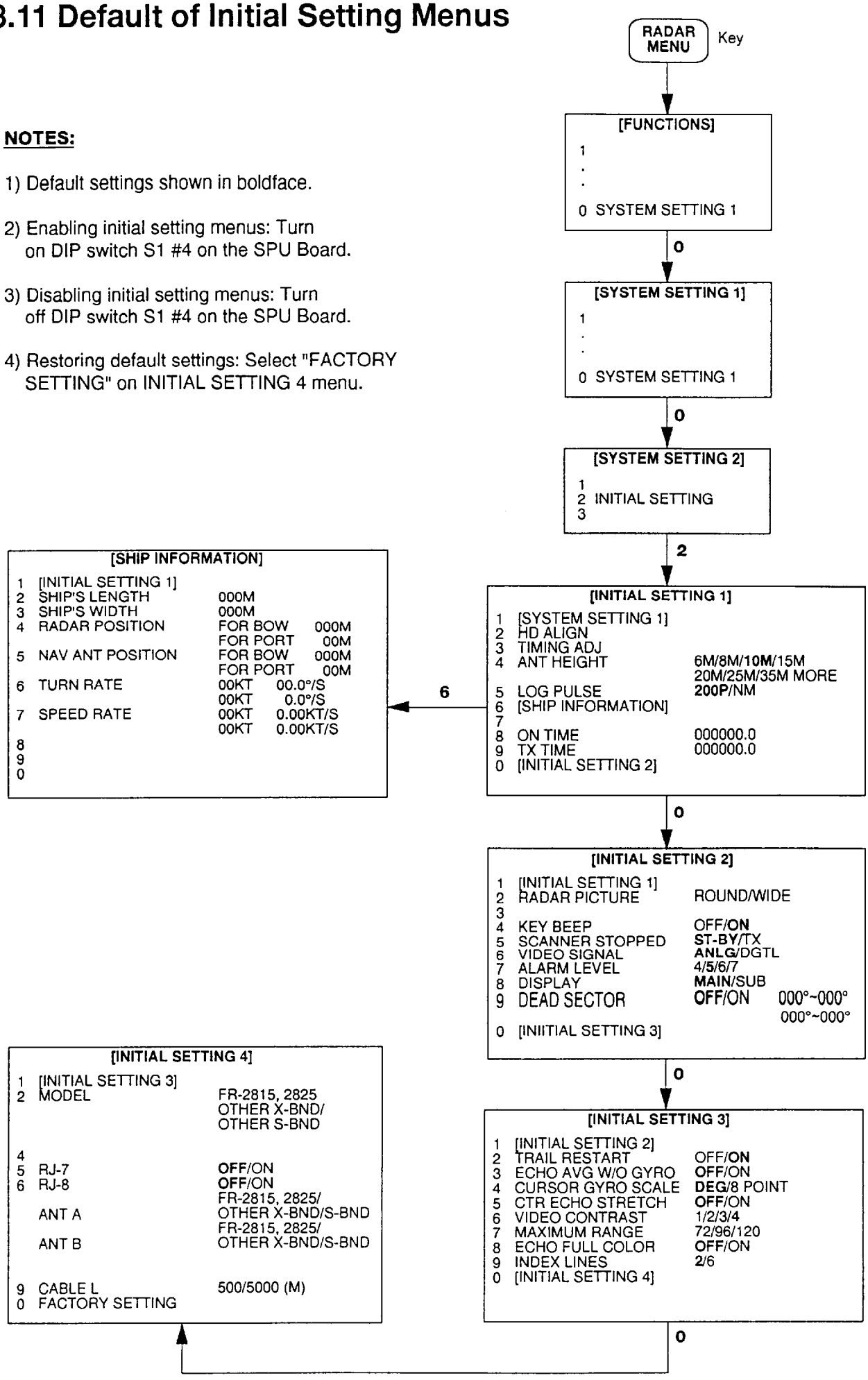
NOTES:

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.



3.12 Adjusting ARP Board

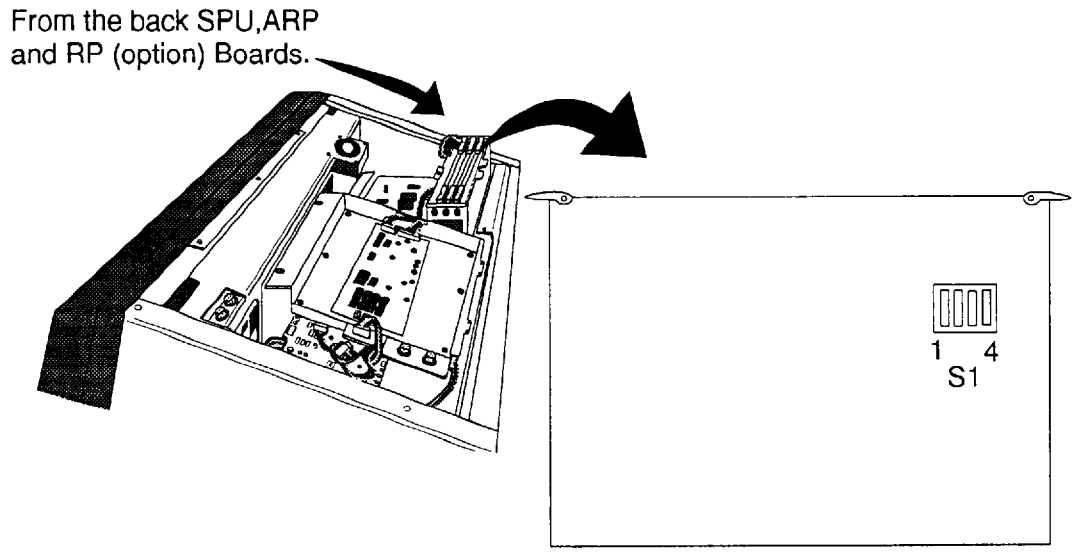
Procedure

1) Take out the SPU Board SPU-911 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 rader as follows and transmit on 6 nm range.
   A/C SEA control: Fully CCW
   A/C SEA control: Fully CCW
   A/C SEA control: Fully CCW

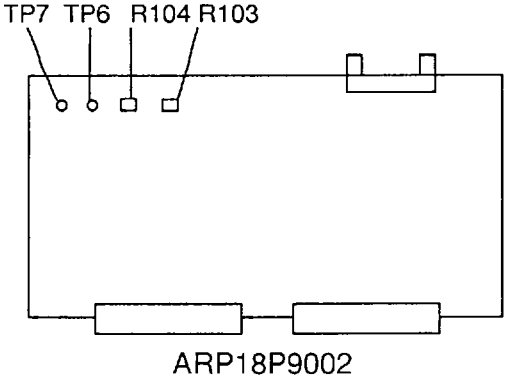


5) Connect the digital multimeter, set to DCV range, to the folllowing points on the ARP Board.

   +: TP7 (VS+)

   +: TP6 (VS-)

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



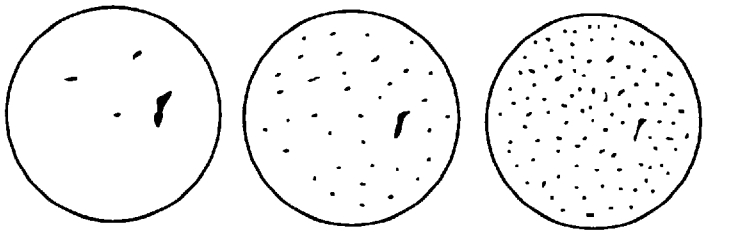
7) Set the controls and switches as follow.

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

8) Press the RARAR 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 gaintly appears.



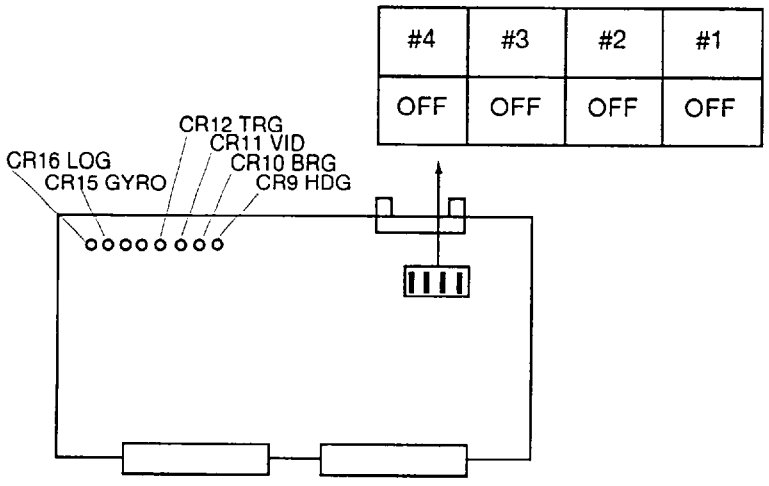
11) Repeat step 6 to select "ANLG", and press the ENTER key.

12) Turn off #4 of DIP switch S1.

Confirmation after Installation

Transmit the radar after connection with speed log and gyrocompass.

Confirm that all red LEDs, CR9, 10, 11, 12, 15 and 16 are off, provided that the ship's speed is not zero. If any signal is notapplied, the corresponding LED lights.



ARP18P9002

3.13 Installation Check List

Tick box to indicate completion.

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

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

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

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

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

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

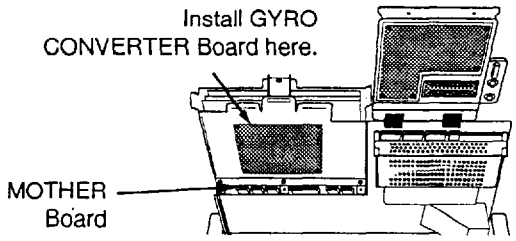


Figure 4-1 Display unit, top view

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

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

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

5) Confirm gyrocompass specifications and set up the DIP switches and jumper wires on the GYRO CONVERTER Board according to gyrocompass connected;

- Confirming gyrocompass specifications: see next page
- Setting jumper wires and DIP switches by gyrocompass specifications: page 4-4
- Setting jumper wires and DIP switches by make and model of gyrocompass: page 4-6
- Location of jumper wires and DIP switches: page 4-7

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

7) Connect the VH connectors to the GYRO CONVERTER Board as shown in the table at right.

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

9) Close the panel.

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

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

4.2 Connection of External Power Supply

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

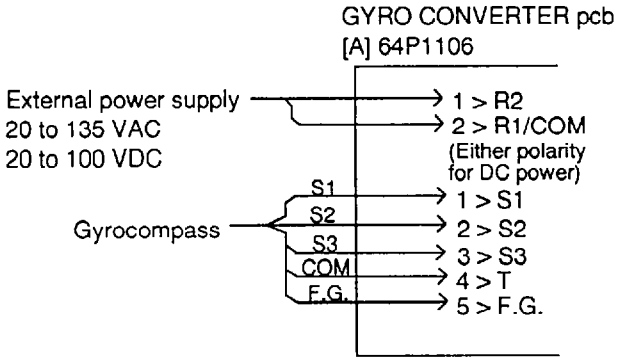


Figure 4-2 Connection of external power supply to GYRO GYRO CONVERTER Board

4.3 Confirming Gyrocompass Specifications

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

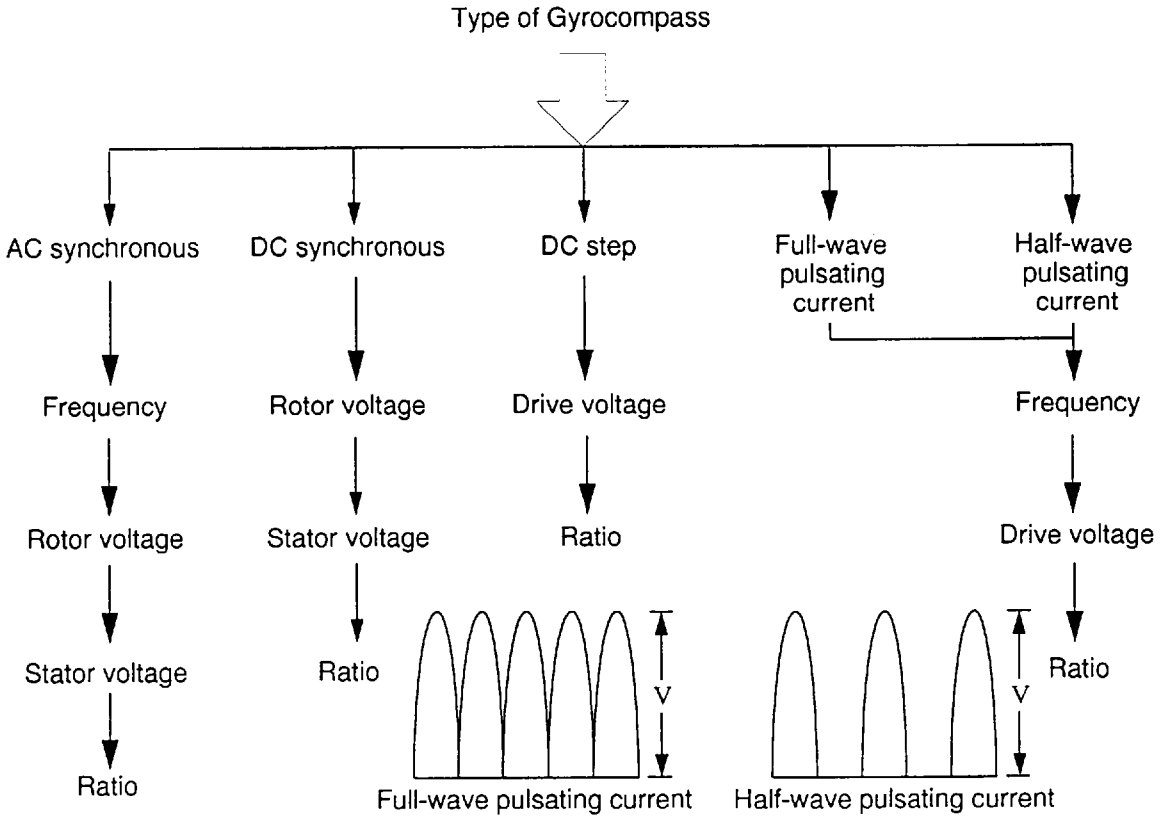


Figure 4-3 Confirming gyrocompass specifications

4.4 Changing Settings on the GYRO CONVERTER Board

Default setting

In the default setting all DIP switches are off and all 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.

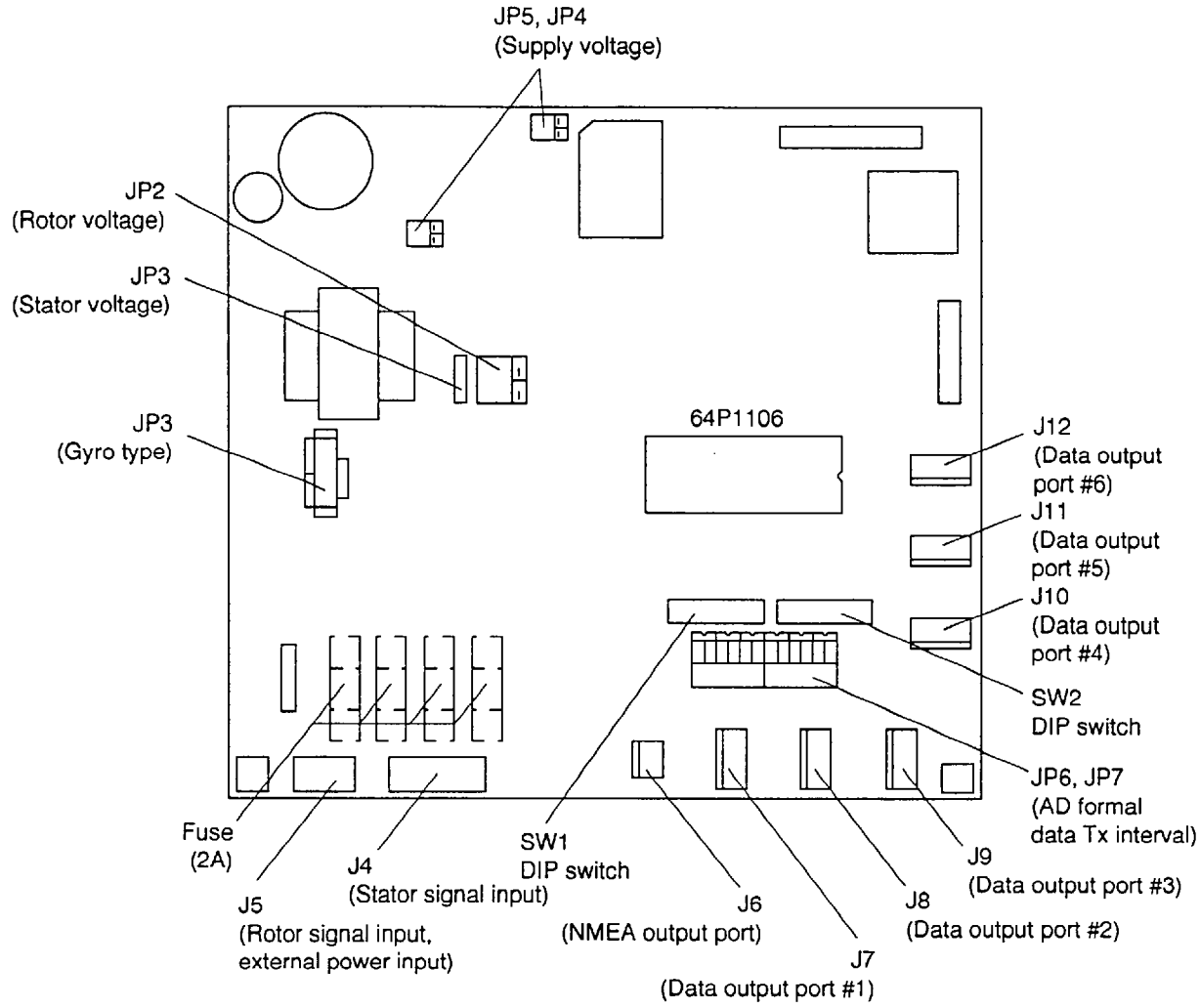


Figure 4-5 Location of DIP switches and jumper wires on the GYRO CONVERTER Board

4.5 Setting the Bearing on the Radar Display

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

1) Open the tuning compartment on the control panel. Press the HOLD switch to disengage the computing circuit from the gyrocompass. The "HOLD" LED lights.

2) Press [+] or [–] switch to duplicate the gyrocompass reading at the top of the radar display. (Each press of those switches changes the readout by 0.1 degrees. A switch may be pressed and held down more than two seconds to change the readout by one degree.)

3) Press the HOLD switch when the gyrocompass reading on the radar matches the gyrocompass reading. The "HOLD" LED goes off.

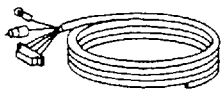
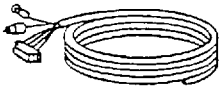
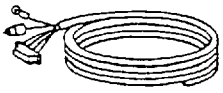
Note: In some cases, the gyrocompass rotation may be the opposite of the displayed bearing, in spite of correct connections. In this case try exchanging two connections among S1, S2 and S3 on the GYRO SWITCH Board.

FURUNO

CODE NO.		03EU-X-9414-0
TYPE		

工事材料表
INSTALLATION MATERIALS

FR/FAR-2825W/2835SW
レーダー
RADAR
(信号ケーブル SIGNAL CABLE)

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 ASSEMBLY	 L=15m	S03-63-15 (RW-6895 *15M*) CODE NO. 008-465-230	1	選択 TO BE SELECTED
2	信号ケーブル組品 SIGNAL CABLE ASSEMBLY	 L=30m	S03-63-30 (RW-6895 *30M*) CODE NO. 008-465-240	1	
3	信号ケーブル組品 SIGNAL CABLE ASSEMBLY	 L=50m	S03-63-50 (RW-6895 *50M*) CODE NO. 008-465-250	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

(略図の寸法は参考値です。)

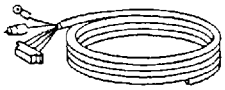
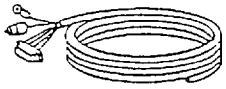
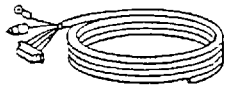
図番 DWG. NO. C3411-M01-A (1/1)

FURUNO

CODE NO.		03EU-X-9413
TYPE		

工事材料表
INSTALLATION MATERIALS

FR-2855W/2865SW　　レーダー
FAR-2855W/2865SW　　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	S03-57-15 RW-5093 *15M* CODE NO. 008-461-810	1	選択 TO BE SELECTED
2	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=30m	S03-57-30 RW-5093 *30M* CODE NO. 008-461-820	1	
3	信号ケーブル組品 SIGNAL CABLE ASSY.	 L=50m	S03-57-50 RW-5093 *50M* CODE NO. 008-461-830	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

(1/1)

図番
DWG. NO. C3406-M02-A

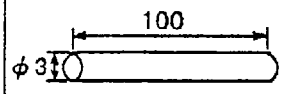
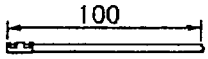
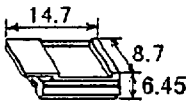
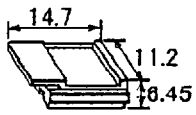
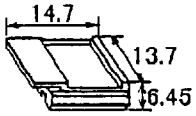
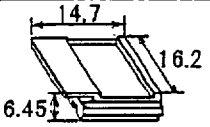
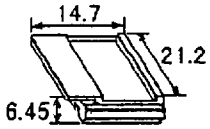
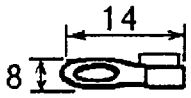
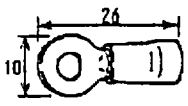
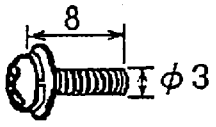
FURUNO

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	ﾅｰﾅﾍﾞｾﾑｽｽﾞﾐﾂﾞ B WASHER HEAD SCREW		M3X8 C2700 MBN12 CODE NO. 000-881-404	2	

C3418-M03-D

FURUNO ELECTRIC CO., LTD

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

FURUNO

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

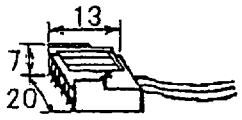
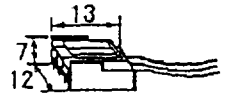
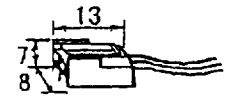
工事材料表

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

C3418-M04-C

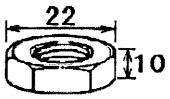
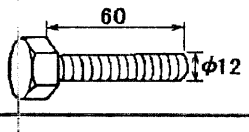
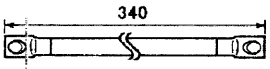
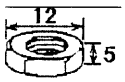
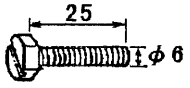
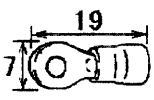
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-452-510	03EP-X-9402 -4
TYPE	CP03-13904	1/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	六角ﾅｯﾄ 1種 HEX. NUT		M12 SUS304 CODE NO. 000-863-112	4	
2	ﾐｶﾞｷ平座金 FLAT WASHER		M12 SUS304 CODE NO. 000-864-132	4	
3	ﾊﾞﾈ座金 SPRING WASHER		M12 SUS304 CODE NO. 000-864-263	4	
4	六角ﾎﾞﾙﾄ（全ﾈｼﾞ） HEX. BOLT		M12X60 SUS304 CODE NO. 000-862-191	4	
5	ｱｰｽ線 GROUNDING WIRE		RW-4747-1 03S4747 CODE NO. 000-566-000	1	
6	六角ﾅｯﾄ 1種 HEX. NUT		M6 SUS304 CODE NO. 000-863-109	1	ｱｰｽ線取付用 FOR GROUNDING WIRE
7	ﾐｶﾞｷ平座金 FLAT WASHER		M6 SUS304 CODE NO. 000-864-129	3	ｱｰｽ線取付用 FOR GROUNDING WIRE
8	ﾊﾞﾈ座金 SPRING WASHER		M6 SUS304 CODE NO. 000-864-260	1	ｱｰｽ線取付用 FOR GROUNDING WIRE
9	六角ﾎﾞﾙﾄ HEX. BOLT		M6X25 SUS304 CODE NO. 000-862-180	1	ｱｰｽ線取付用 FOR GROUNDING WIRE
10	圧着端子 CRIMP-ON LUG		FV1.25-M3 ｱｶ CODE NO. 000-538-110	9	ｽｷｬﾅ端子台用 FOR TERMINAL BOARD CONNECT

DWG NO.
C3385-M02- E

FURUNO ELECTRIC CO., LTD.

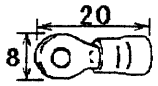
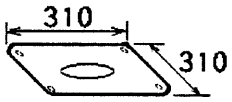
（略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.）

FURUNO

CODE NO.	008-452-510	03EP-X-9402 -4
TYPE	CP03-13904	2/2

工事材料表

INSTALLATION MATERIALS

番号 NO.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	圧着端子 CRIMP-ON LUG		FV1.25-4 CODE NO. 000-538-114	3	ｽｷｬﾅ端子台用 FOR TERMINAL BOARD CONNECT
12	防蝕ゴム.1. CORROSION-PROOF RUBBER MAT		03-001-3001-0 CODE NO. 300-130-010	1	電蝕防止用 FOR PREVENSION OF CORROSION
13	ｼｰﾙﾜｯｼｬ SEAL WASHER		03-001-3002-0 CODE NO. 300-130-020	4	電蝕防止用 FOR PREVENSION OF CORROSION

DWG NO.
C3385-M03- E

FURUNO ELECTRIC CO., LTD.

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

FURUNO

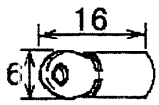
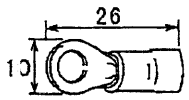
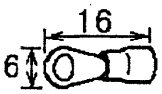
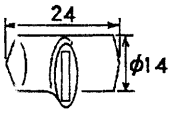
CODE NO.	008-465-220	03EU-X-9416 -3
TYPE	CP03-15801	1/1

工事材料表

INSTALLATION MATERIALS

FR/FAR-2825W/2835W　船用レーダー
FR-2125W
FR-2135SW/-MSA

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		FV1.25-3 アカ CODE NO. 000-538-113	16	
2	圧着端子 CRIMP-ON LUG		FV5.5-4 CODE NO. 000-538-123	4	
3	圧着端子 CRIMP-ON LUG		FVD1.25-3 CODE NO. 000-116-634	1	
4	端子板カバー PANEL BOARD COVER		ZM-47A CODE NO. 000-532-491	2	

DWG NO.
C3411-M02- 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.	008-461-850	03EU-X-9410 -4
TYPE	CP03-14802	1/1

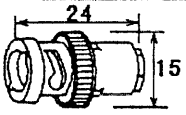
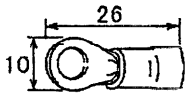
工事材料表

INSTALLATION MATERIALS

FR-2150W
FR-2855W/2865SW
FAR-2855W/2865SW

船舶用レーダー

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	コネクタ CONNECTOR		BNC-P-3		1	
			CODE NO.	000-500-396		
2	圧着端子 CRIMP-ON LUG		FV1.25-M3 アカ		16	
			CODE NO.	000-538-110		
3	圧着端子 CRIMP-ON LUG		FV5.5-4		4	
			CODE NO.	000-538-123		

DWG NO.
C3406-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.	008-452-540	03EP-X-9405 -4
TYPE	CP03-13907	1/1

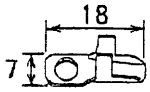
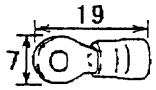
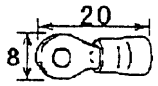
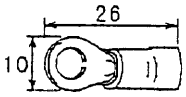
工事材料表

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	特殊ラグ LUG		アナケイ4 スズ 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

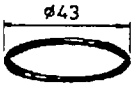
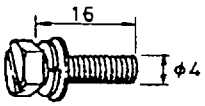
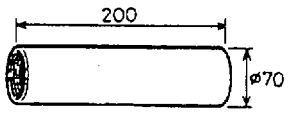
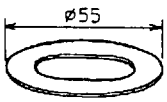
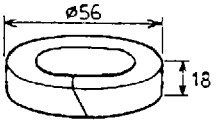
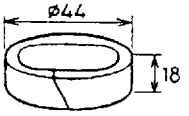
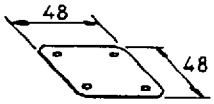
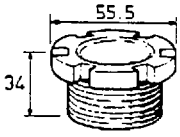
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

FURUNO

CODE NO.	008-470-020	03CQ-X-9420-
TYPE	CP03-16411	

工事材料表
INSTALLATION MATERIALS

レーダー RADAR　レクトガイド(FR-9)工事用 FOR FR-9 RECTGUIDE (FLEXIBLE WAVEGUIDE)

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	Oリング O-RING		AS568-128 1115-70 CODE NO. 000-851-842	3	
2	六角セムスBスリ割付 HEX.BOLT(SLOTTED WASHER HEAD)		M4X16 SUS304 CODE NO. 000-882-042	4	
3	グランド本体 THRU-DECK CABLE GLAND		03-009-0521-1 CODE NO. 100-207-551	1	
4	座金 WASHER		03-009-0522-0 CODE NO. 100-207-560	2	
5	パッキン (1) RUBBER PACKING (1)		03-009-0523-0 CODE NO. 100-207-570	2	
6	パッキン (2) RUBBER PACKING (2)		03-009-0524-0 CODE NO. 100-207-580	2	
7	防水フィルム WATERTIGHT FILM		03-009-0368-0 CODE NO. 300-903-680	1	
8	締付グランド GLAND		JIS F8801 A45 CODE NO. 000-806-094	1	
			CODE NO.		
			CODE NO.		

(略図の寸法は、参考値です。)

図番 DWG. NO. C3006-M01-D (1/1)

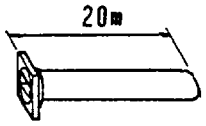
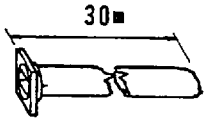
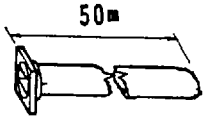
FURUNO

CODE NO.	
TYPE	

03CQ-X-9414-

工事材料表
INSTALLATION MATERIALS

レーダ-レクトガイド(FR-9)
RADAR RECTGUIDE

番号 No.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	FR-9レクトガイド RECTGUIDE		FR-9-20 *20M* CODE NO. 000-805-738	1	選択 TO BE SELECTED
1	FR-9レクトガイド RECTGUIDE		FR-9-30 *30M* CODE NO. 000-805-739	1	
1	FR-9レクトガイド RECTGUIDE		FR-9-50 *50M* CODE NO. 000-805-740	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

*1 別梱包
*1 PACKED SEPARATELY

(略図の寸法は、参考値です。)

図番 DWG. NO. C3006-M03-B (1/1)

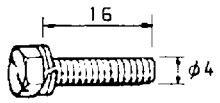
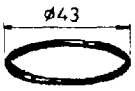
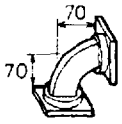
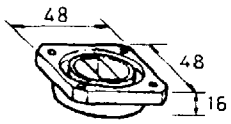
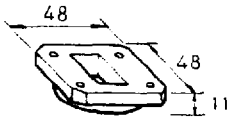
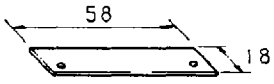
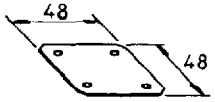
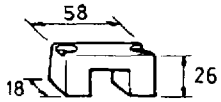
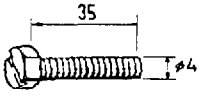
FURUNO

CODE NO.	000-086-743	03EP-X-9405-
TYPE	CP03-16400	

工事材料表
INSTALLATION MATERIALS

WRJ-9

レーダー方形導波管工事用
FOR RADAR RECTANGULAR WAVEGUIDE INSTALLATION

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	六角セムスAスリ割付 HEX.BOLT(SLOTTED WASHERHEAD)		M4X16 SUS304 CODE NO. 000-881-912	80	
2	Oリング O-RING		AS568-128 1115-70 CODE NO. 000-851-842	20	
3	コウジヨウWG.Hベント WAVEGUIDE H-BEND		RWA-1040 B-108 CODE NO. 310-100-160	2	
4	チョークフランジ WAVEGUIDE FLANGE (CHOKE)		WRJ-9 BRASS CODE NO. 000-879-242	7	
5	カバーフランジ WAVEGUIDE FLANGE (PLAIN)		WRJ-9 BRASS CODE NO. 000-879-262	7	
6	導波管保護ゴム RUBBER CUSHION		RWA-1011-0 CODE NO. 310-110-110	15	
7	防水フィルム WATERTIGHT FILM		03-009-0368-0 CODE NO. 300-903-680	1	
8	導波管押え(3)E型 WAVEGUIDE CLAMP (3) E-TYPE		RSB-2007-0 CODE NO. 360-220-070	15	
9	六角ボルトスリ割付 HEX. BOLT (SLOTTED HEAD)		M4X35 SUS304 CODE NO. 000-862-118	35	
10	ミガキ平座金 FLAT WASHER		M4 SUS304 CODE NO. 000-864-126	65	

008-470-010 CP03-16401 (NO. 1~NO. 12)

FR-1222X/1622X/2020X
FR-2822X/FAR-2822X
FR-2120W/2150W
FR-2825W/FAR-2825W
FR-2855W/FAR-2855W

(略図の寸法は、参考値です。)

図番 (1/2)
DWG. NO. C3006-M06-D

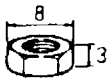
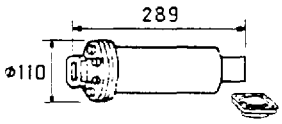
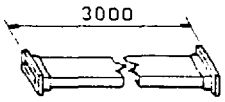
FURUNO

CODE NO.	000-086-743	03EP-X-9406-2
TYPE	CP03-16400	

工事材料表
INSTALLATION MATERIALS

WRJ-9

レーダー方形導波管工事用
FOR RADAR RECTANGULAR WAVEGUIDE INSTALLATION

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
11	ﾊﾞﾈ座金 SPRING WASHER		M4 SUS304 CODE NO. 000-864-256	35	
12	六角ﾅｯﾄ HEX. NUT		M4 SUS304 CODE NO. 000-863-106	35	
13	WG貫通金物組立 THRU-DECK WAVEGUIDE		RWG-1000-0 CODE NO. 310-710-000	1	
14	導波管*1 WAVEGUIDE STRAIGHT		RWA-1020 A-107A CODE NO. 310-100-420	4	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

*1別梱包 PACKED SEPARATELY.
FR-1222X/1622X/2020X
FR-2822X/FAR-2822X
FR-2120W/2150W
FR-2825W/FAR2825W
FR-2855W/FAR-2855W
(略図の寸法は、参考値です。)

図番 (2/2)
DWG. NO. C3006-M07-D

FURUNO

CODE NO.	008-254-170	03CQ-X-9501 -6
TYPE	FP03-02710	1/1

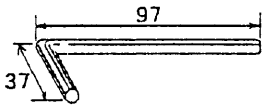
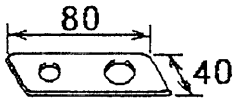
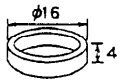
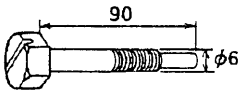
付属品表

ACCESSORIES

FR-2135S/2135SW
FR-2135S-B
FR/FAR-2835S
FR/FAR-2835SW
FR/FAR-2865SW
FR-2135SW-MSA

船舶用レーダー

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	六角レンチ HEX. WRENCH		対辺6 CODE NO. 000-830-134	1	
2	つり上げ金具 LIFTING FIXTURE		03-015-3233-0 CODE NO. 100-090-720	2	
3	取付用カラー COLLAR FOR LIFTING FIXTURE		03-015-3234-0 CODE NO. 100-090-730	2	
4	ボルト BOLT		03-029-0403-0 CODE NO. 100-091-140	1	

DWG NO. C3407-F01- F

FURUNO ELECTRIC CO., LTD

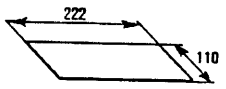
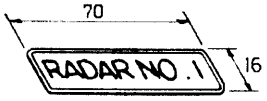
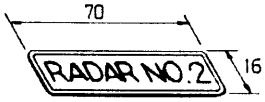
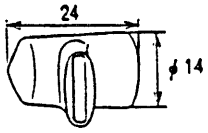
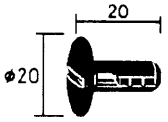
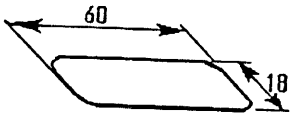
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

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
FA-2805
船用レーダー

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	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ブライントフィルム 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

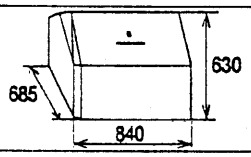
（略図の寸法は、参考値です。）

図番 (1/1)
DWG. NO. C3418-F02-F

FURUNO

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

付属品表 ACCESSORIES	FR/FAR-2815/2825/2835S /2855/2855W /2865SW/2825W/2835SW 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	ダストカバー DUST COVER		03-133-1811 CODE NO. 000-807-203	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

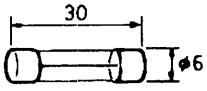
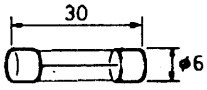
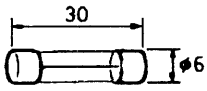
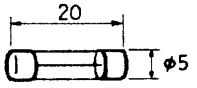
（略図の寸法は参考値です。）

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/2130SW レーダー FR-2150W/2160SW RADAR	指示部予備品 SPARE PARTS FOR DISPLAY UNIT	

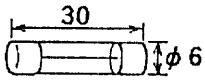
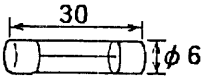
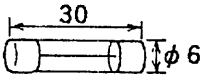
ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES.	QUANTITY SPARE	REMARKS/CODE NO.
1	管入りヒューズ GLASS TUBE FUSE		FGBO 0.5A AC250V	3		6	TCT9106 F3 000-549-018
2	管入りヒューズ GLASS TUBE FUSE		FGBO 5A AC250V	3		6	F1/F2/F3 (230V) 000-549-022
3	管入りヒューズ GLASS TUBE 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.	008-464-880	03EU-X-9302 -2
TYPE	SP03-11701	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	FR/FAR-2800シリーズ　レーダー FR-2100シリーズ RADAR	送受信部予備品 SPARE PARTS FOR TRANSCEIVER 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 0.5A AC125V	2		2	000-549-060
2	ヒューズ FUSE		FGBO-A 5A AC125V	1		2	000-549-064
3	ヒューズ FUSE		FGBO-A 2A AC125V	*		2	*25/30KW用1個　50/60KW用2個 000-549-062

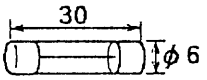
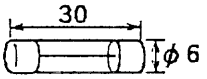
MFR'S NAME	FURUNO ELECTRIC CO.,LTD	DWG NO.	C3412-P01- D	1/1

（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

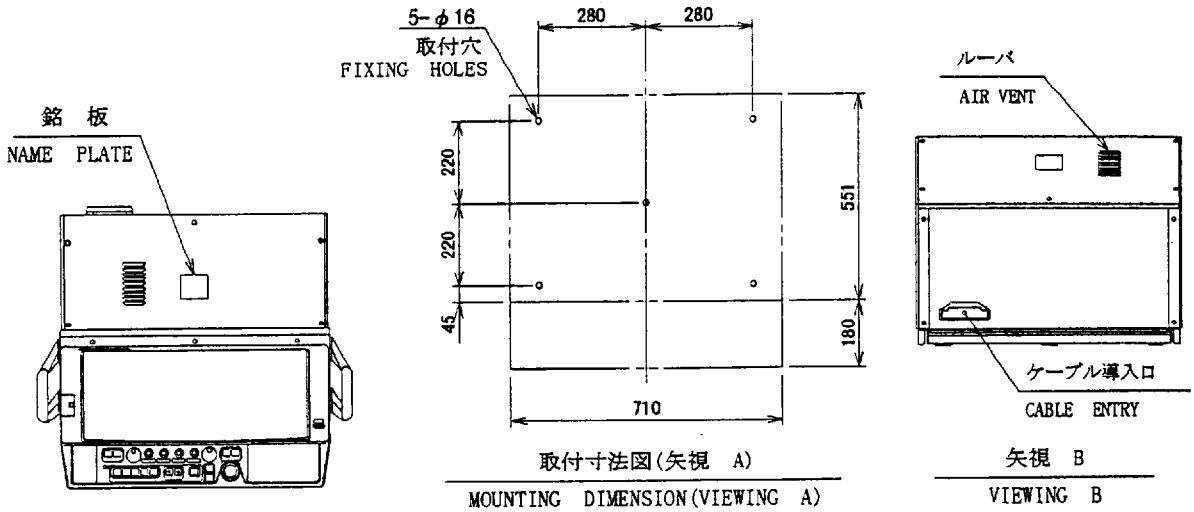
(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

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.

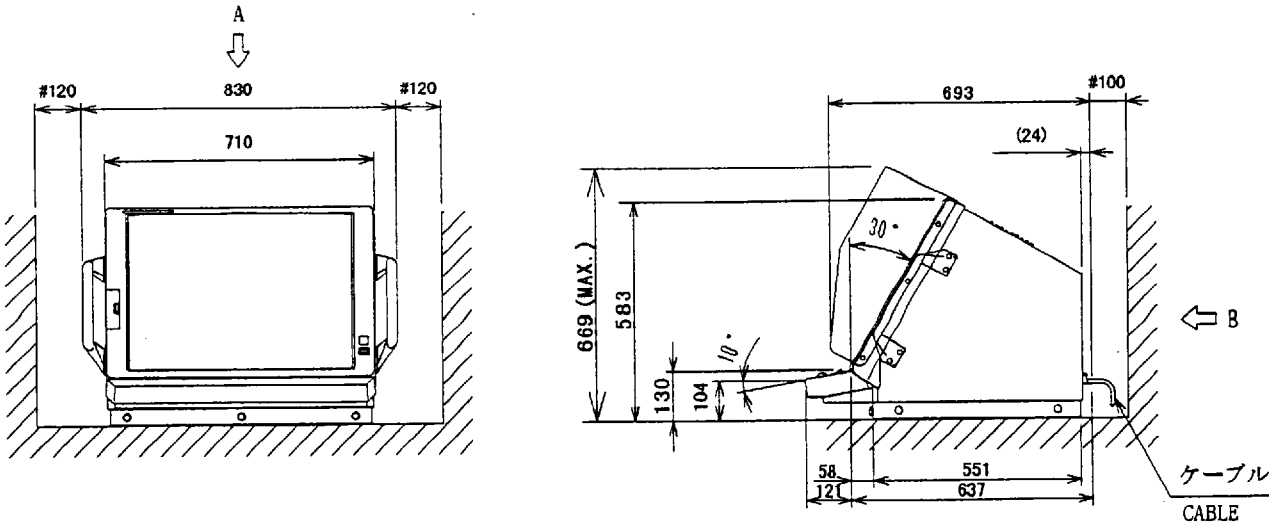
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０<L≦１００	±２mm
１００<L≦５００	±３mm
５００<L≦１０００	±４mm
１０００<L≦２０００	±５mm
２０００<L≦４０００	±７mm
４０００<L≦８０００	±１０mm
８０００<L	±１５mm

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 H. Hasunuma			名称 指示器（卓上型）
APPROVED Oct 7 '97 H. Hasunuma	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

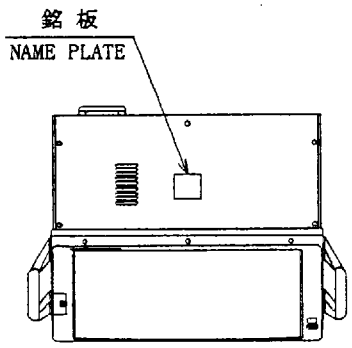
FURUNO ELECTRIC CO., LTD.

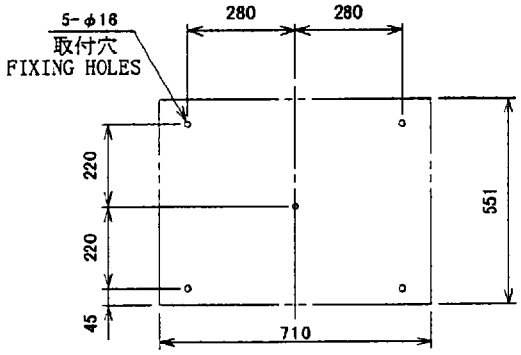
注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

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.

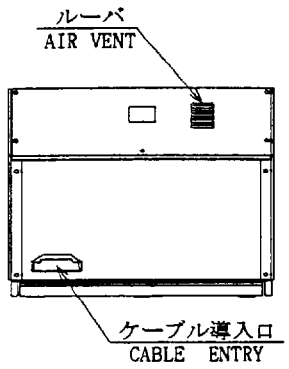
範　囲 DIMENSION	公差 TOL.
L≦５０	±１mm
５０<L≦１００	±２mm
１００<L≦５００	±３mm
５００<L≦１０００	±４mm
１０００<L≦２０００	±５mm
２０００<L≦４０００	±７mm
４０００<L≦８０００	±１０mm
８０００<L	±１５mm

表 1
TABLE 1



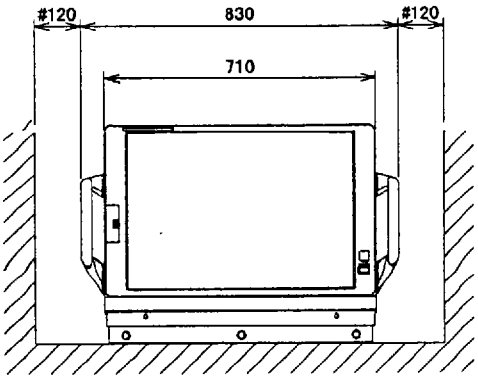


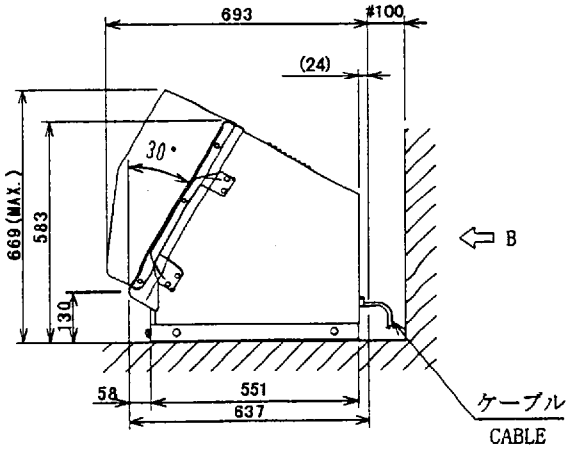
取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)



矢視 B
VIEWING B

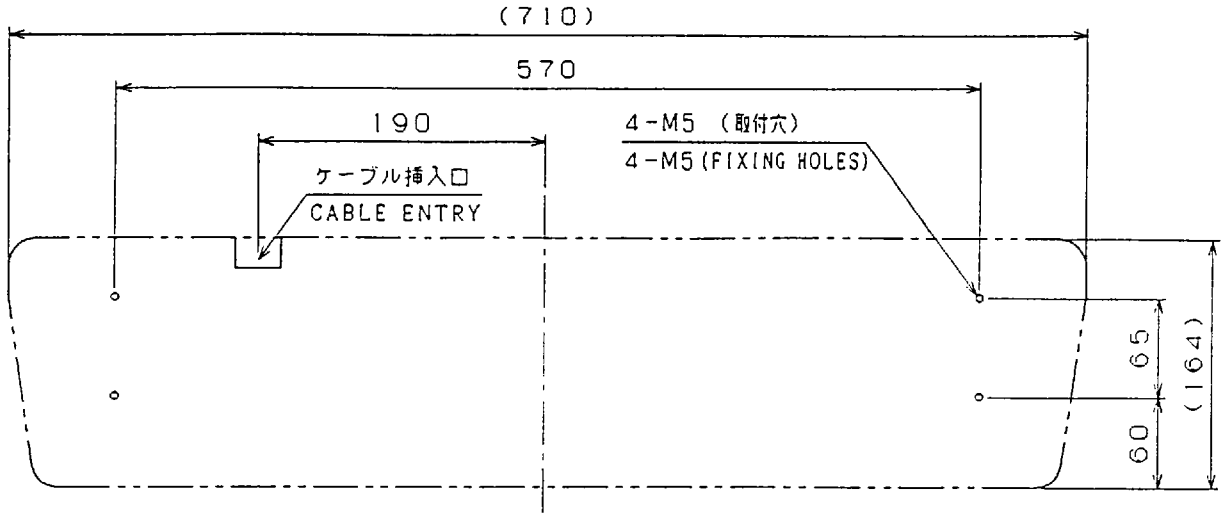
A



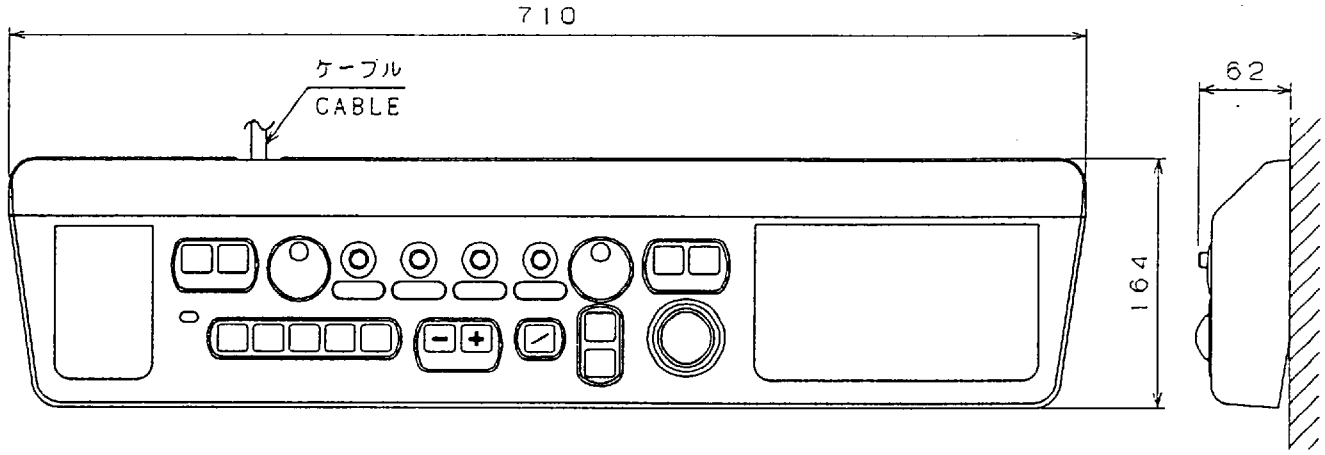


DRAWN Oct.7'97 T.YAMASAKI			TITLE RDP-115
CHECKED Oct.7'97 K.Kusunoki			名称 指示器（卓上・パネル分離型）
APPROVED Oct.7'97 K.Kusunoki	FR/FAR-2805 SER.		外寸図
SCALE 1/20	MASS 82 kg		NAME DIAPLAY UNIT (TABLETOP W/O KEYBOARD)
DWG. No. C3418-G01- C	03-133-1100-G2		OUTLINE DRAWING

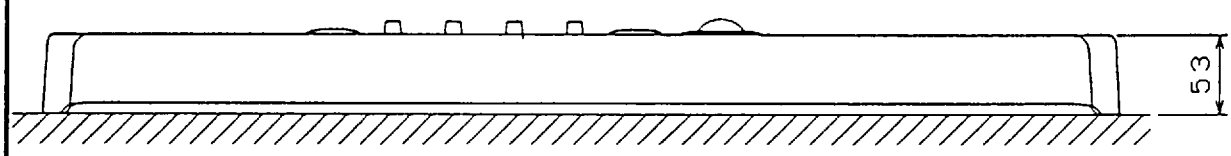
FURUNO ELECTRIC CO., LTD.



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



A



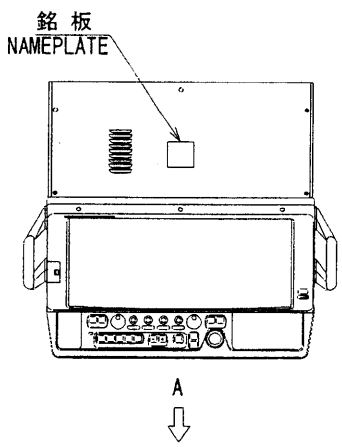
DRAWN July 6, 1995 Morimoto			TYPE RDP-115	
CHECKED July 6, '95 Tsutsumi	FR2805SER		名称 操作部外寸図	
APPROVED July 6, '95 K.Okamoto	FAR2805SE FA2805		NAME CONTROL UNIT	
SCALE 1/5	MASS 3 kg	APPLICABLE TO; (MODEL)	BLOCK NO.	DWG NO. C3418-G04- A	03-133-1600- G0

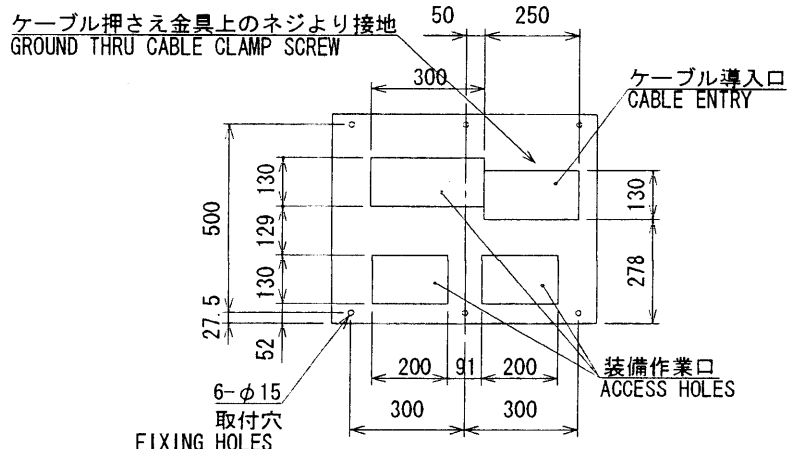
注　記 1) 装備ケーブルはサービス時、指示部を前方に十分引き出せるよう
余裕を持たせること。
2) 取付用ネジはM10ボルト又は コーチボルト呼び径９を使用のこと。
3) ＃印寸法は最小サービス空間寸法とする。

NOTE 1) SUFFICIENT EXTRA CABLINGS SHOULD BE ALLOWED
AT THE BACK OF THE UNIT SO THAT THE UNIT
CAN BE DRAWN OUT WITH THE CABLES CONNECTED
FOR MAINTENANCE.
2) USE M10 BOLTS OR φ9 COACH SCREWS FOR FIXING THE UNIT.
3) #:RECOMMENDED SERVICE CLEARANCE.

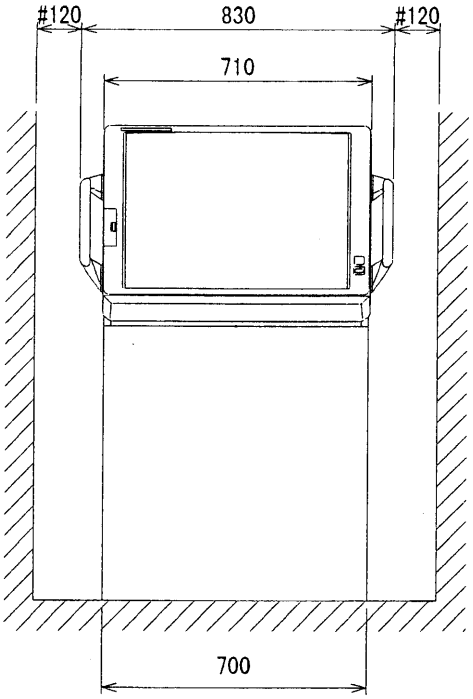
寸法範囲 (mm) DIMENSION	公差 (mm) TOLERANCE
0＜L≦50	±1．5
50＜L≦100	±2．5
100＜L≦500	±3
500＜L≦1000	±4
1000＜L≦2000	±5

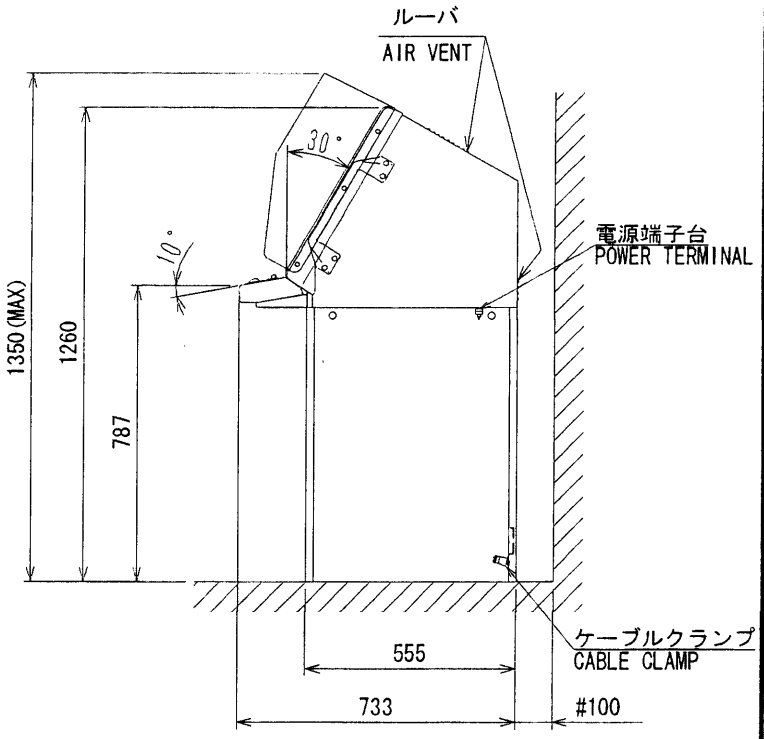
表 1
TABLE 1



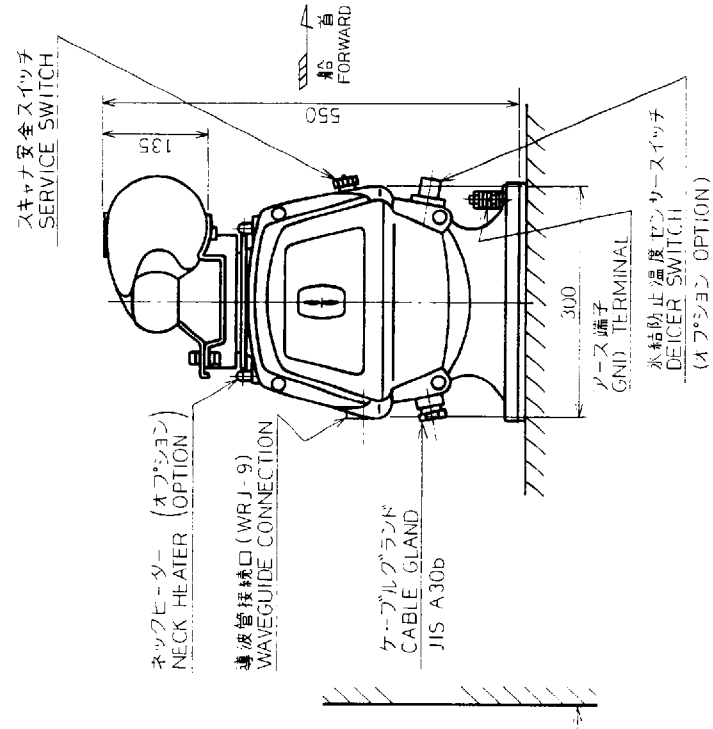


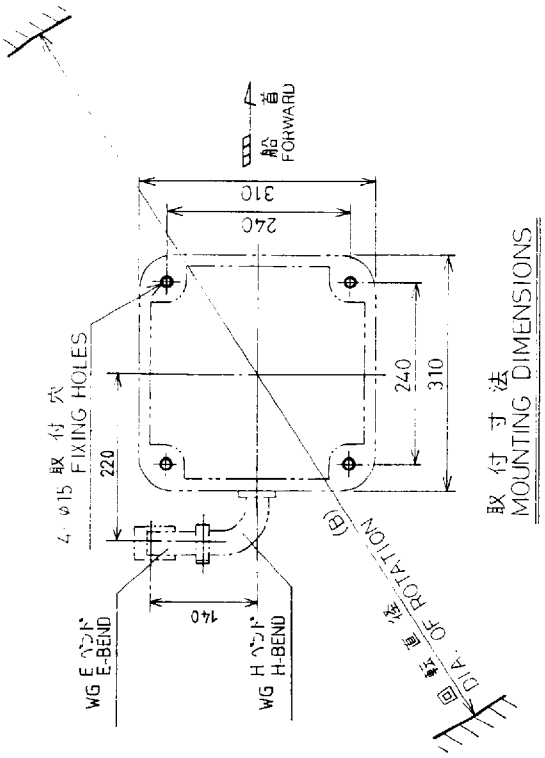
取付寸法図(矢視 A)
MOUNTING DIMENSION(VIEWING A)



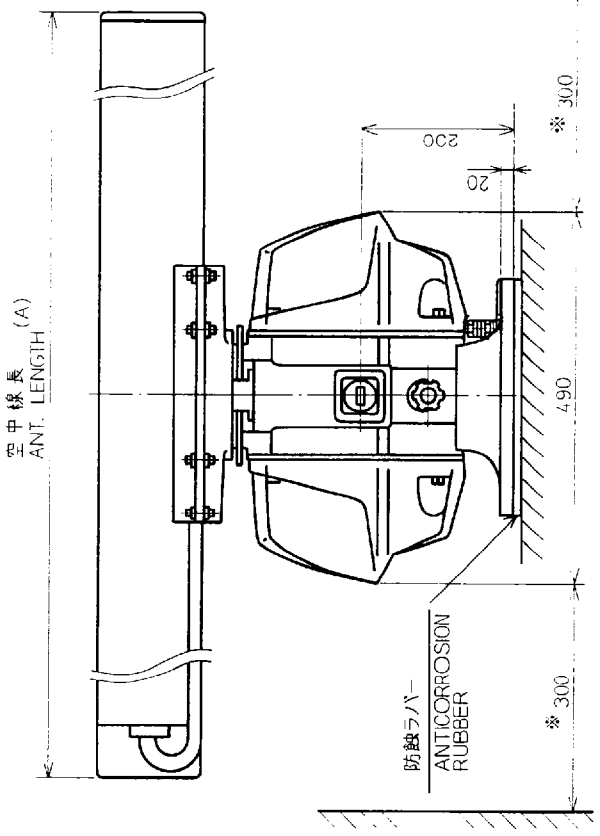


DRAWN July 27'00 T.YAMASAKI		TITLE	RDP-115
CHECKED July 27'00 T.KIM		名称	指示器（コンソール型）
APPROVED July 27'00 T.KIM	FR/FAR-2805 SERIES		外寸図
SCALE 1/20	MASS ±10% 120 kg	NAME	DIAPLAY UNIT (CONSOLE)
DWG. No. C3418-G03- H	03-133-1200-G1		OUTLINE DRAWING





取付寸法
MOUNTING DIMENSIONS



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

NOTE 2.

種類※※ ANT. TYPE	200cm 型 TYPE (XN-3A)	240cm 型 TYPE (XN-4A)	300cm 型 TYPE (XN-5A)
空中線長 (A) ANT. LENGTH	2070mm	2570mm	3210mm
回転直径 (B) DIA. OF ROTATION	2200mm	2700mm	3340mm
質量 MASS	39.5kg	42kg	44.5kg

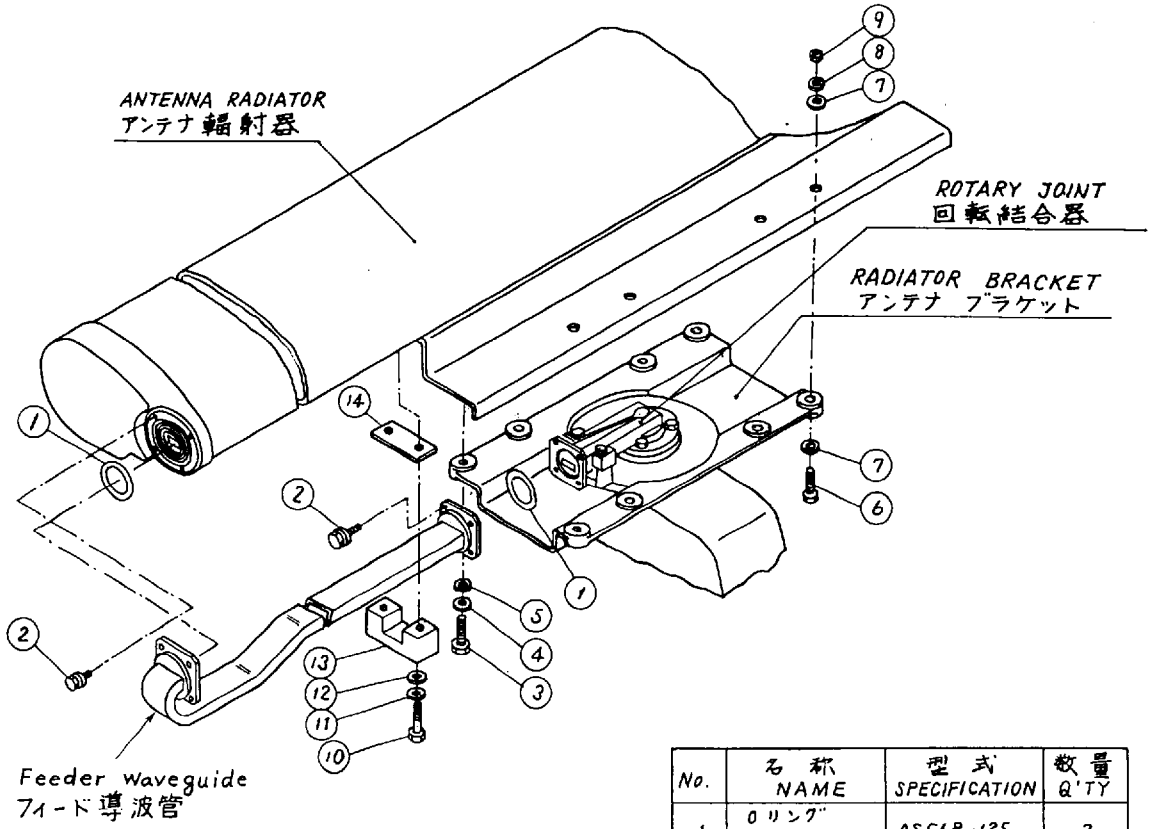
※※選択可能な空中線部種類はレーダー型式により異なる。各仕様を参照のこと。
SELECTABLE ANTENNA TYPE DEPENDS ON RADAR MODEL. SEE INDIVIDUAL SPECIFICATIONS.

NOTE 3. 取付台の平面度は±1mm以内のこと。
THE SURFACE OF PLATFORM SHOULD BE EVEN WITHIN ±1mm.

REMARKS XN3A/4A/5A	FR2852X FR2822X FAR2852X FAR2822X	TYPE	RSB0041/RSB0042/RSB0043/RSB0046
DRAWN M.IKEDA Feb 9. '94		名称	空中線部
		NAME	RADAR SCANNER UNIT
SCALE 1/10 MASS kg	APPLICABLE TO: (MODEL) BLOCK NO.	DWG NO.	C3332-G01- K

FURUNO

D - 6



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)	M4×16 (SUS304)	8
3	六角ボルト HEX. BOLT	M8×35(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	M8×30 (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	M4×30(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

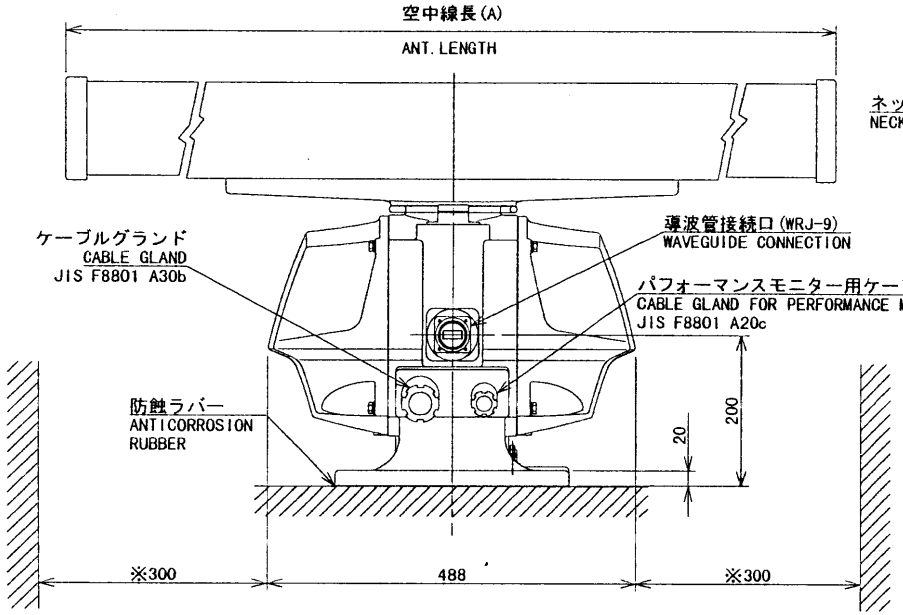
注意:
1. 電蝕防止のため、組立時にボルト、ナット、ワッシャ及びフランジ面のOリング溝外側の部分に支給のシリコンシール剤(無酸性)を塗布する。Oリング及びOリングの溝には塗布しないこと。
2. Oリングに傷をつけたり、ゴミを付着させないように注意のこと。
3. Oリング及びスキャナーカバーのパッキンにはグリースを使用すること。シリコンシール剤は使用不可。

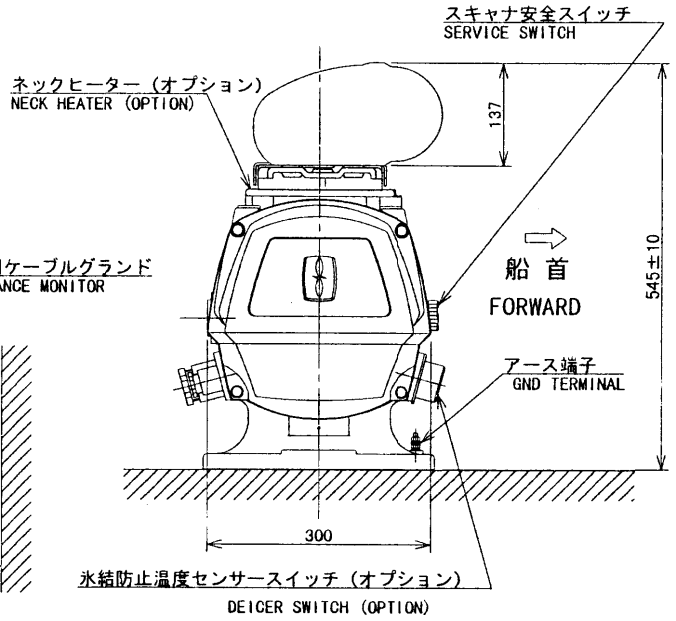
NOTE:
1. APPLY SILICONE SEALANT (SUPPLIED, NON-ACID TYPE) ON BOLTS, NUTS, WASHER AND WAVEGUIDE FLANGE OUTSIDE O-RING GROOVE TO AVOID ELECTRICAL CORROSION. (DO NOT APPLY SEALANT TO O-RINGS AND O-RING GROOVES.)
2. DO NOT PINCH O-RING AND KEEP IT CLEAN.
3. FOR PACKINGS OF SCANNER COVERS AND O-RINGS, DO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

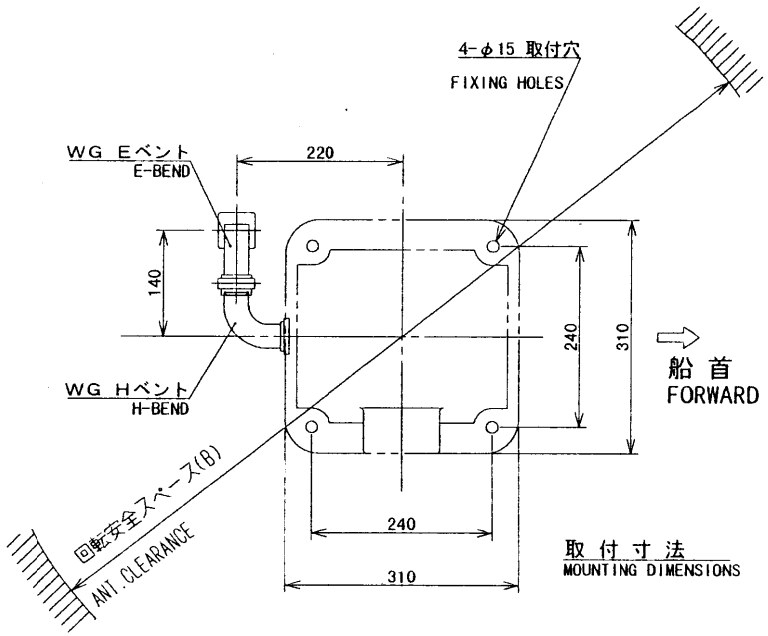
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

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

FURUNO







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

NOTE 2.

種類 ** ANT. TYPE	200cm型TYPE (XN20AF)	240cm型TYPE (XN24AF)
空中線長 (A) ANT. LENGTH	2,040±10 mm	2,550±10 mm
回転安全スペース(B) ANT. CLEARANCE	2,200 mm	2,700 mm
質量 MASS	39.5 kg	42 kg

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

NOTE 3. 取付台の平面度は±1mm以内のこと。
THE SURFACE OF PLATFORM SHOULD BE EVEN WITHIN ±1 mm.

NOTE 4. 指定外の寸法公差は表1による
REFER DIMENSION TOLERANCE TO TABLE 1.

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

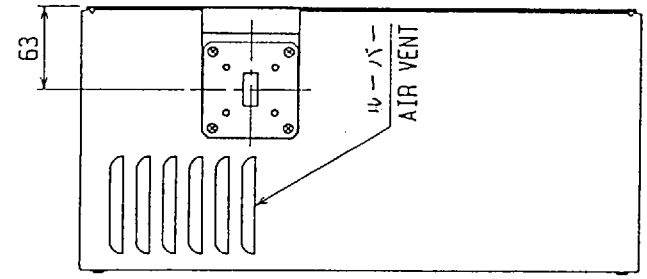
表 1 TABLE 1

DRAWN Aug 20 '99 T.YAMASAKI		TITLE	RSB-0076/0077/0078
CHECKED Aug 20 '99 K.Kasuya		名称	空中線部
APPROVED Aug 20 '99 K.Kasuya	FR-2125W		外寸図
SCALE 1/10	MASS kg	NAME	ANTENNA UNIT
DWG. No. C3466-G01- B	03-145-3200-G1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

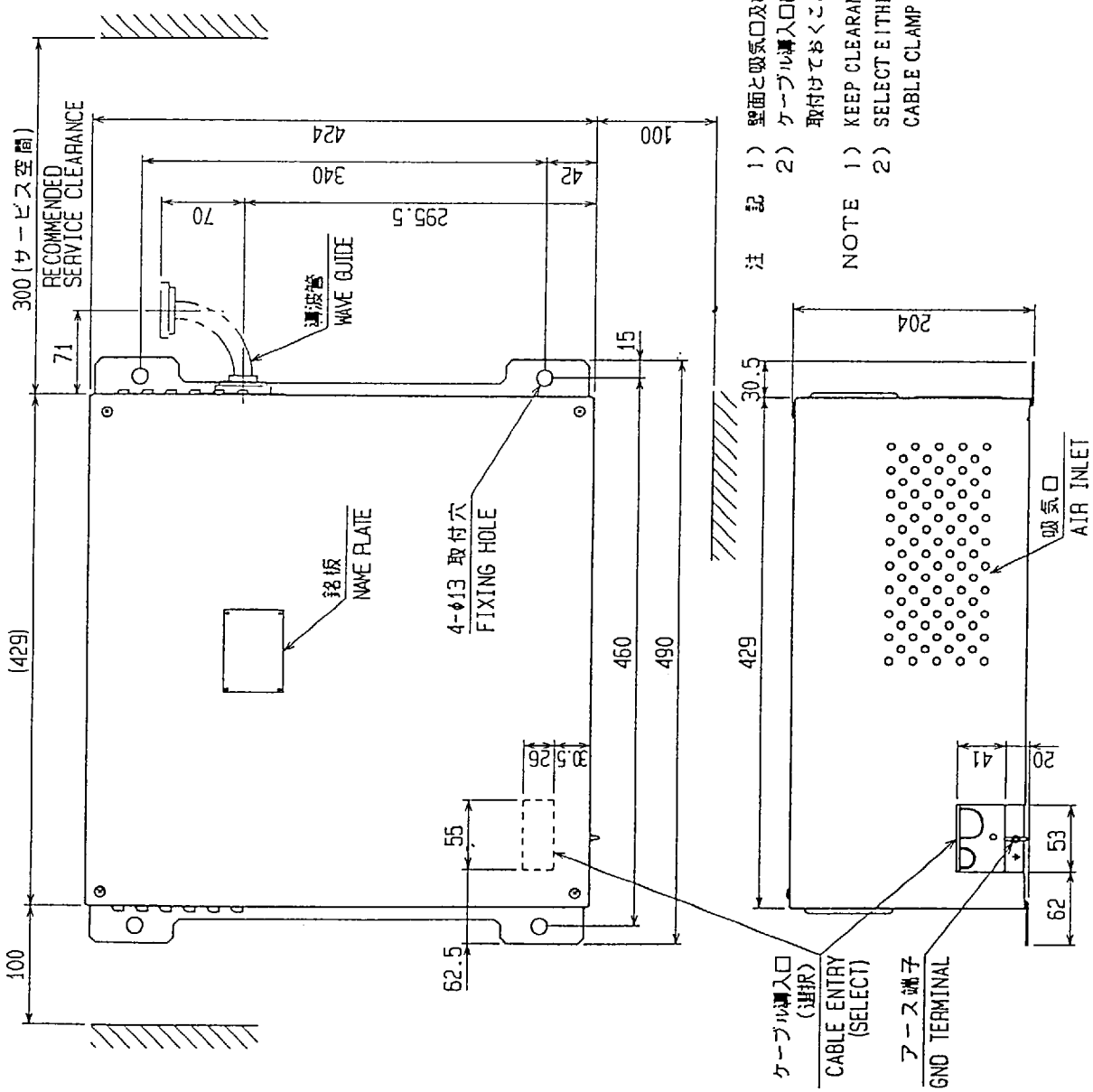
D-6A

FURUNO



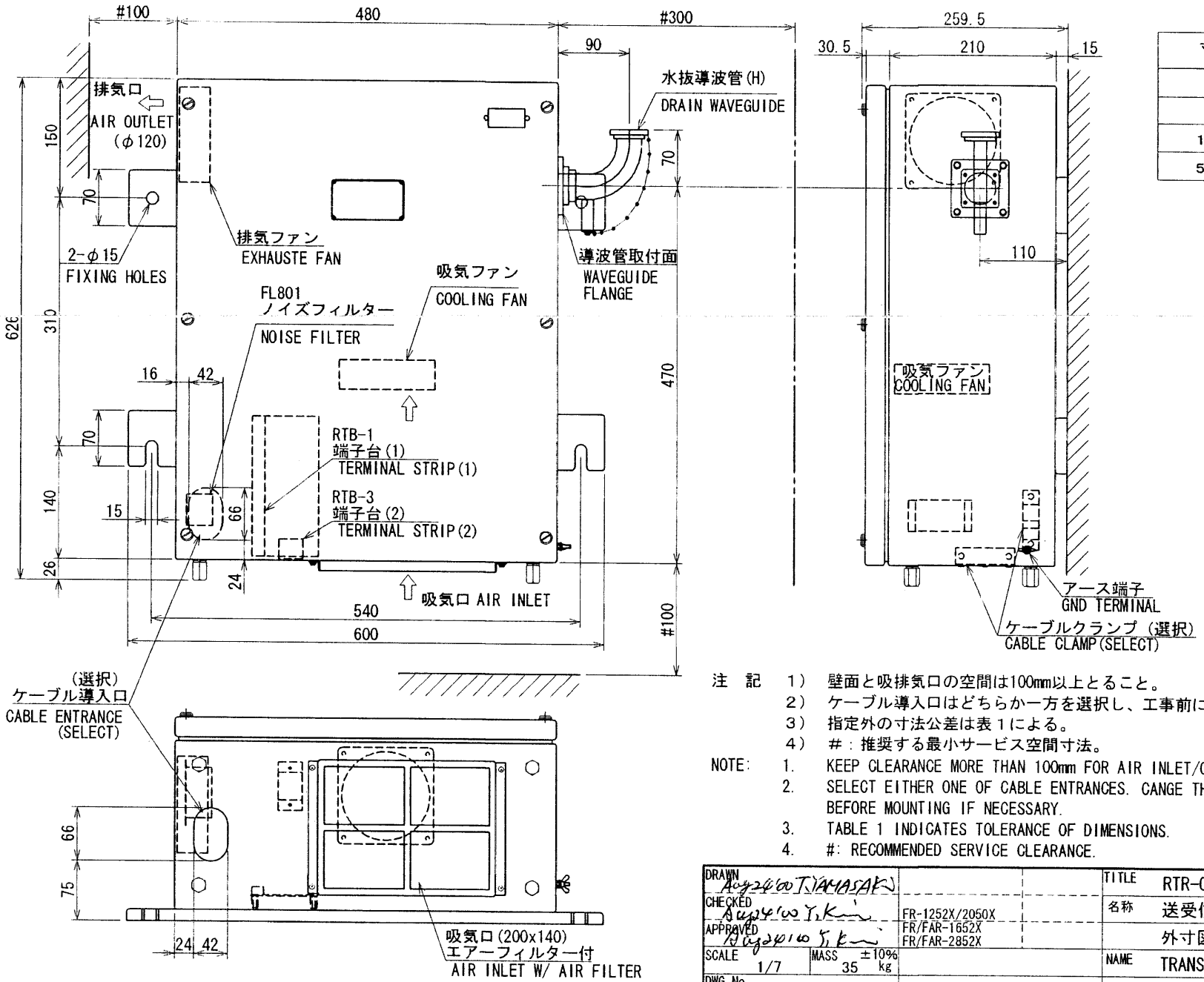
注記
1) 壁面と吸気口及びルーバーの空間は100mm以上とること。
2) ケーブル導入口はどちらか一方を選択し、工事前に必要な方に取付けておくこと。

NOTE
1) KEEP CLEARANCE MORE THAN 100 mm FOR AIR INLET/VENT.
2) SELECT EITHER OF THE CABLE ENTRANCES. CHANGE THE CABLE CLAMP IN POSITION BEFORE MOUNTING IF NECESSARY.



DRAWN Nov.22'95 T.NISHINO				TYPE RTR-046
CHECKED Nov.22'95 K Okamoto				名称
APPROVED Nov.22'95 K Okamoto		FAR-2825W FR-2825W		外寸図
SCALE ∝	MASS 13.5 kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME
DWG NO. C3405-G03- A		03-130-5000- G0		OUTLINE DRAWING

FURUNO



寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
0<L≦50	±1.5
50<L≦100	±2.5
100<L≦500	±3
500<L≦1000	±4

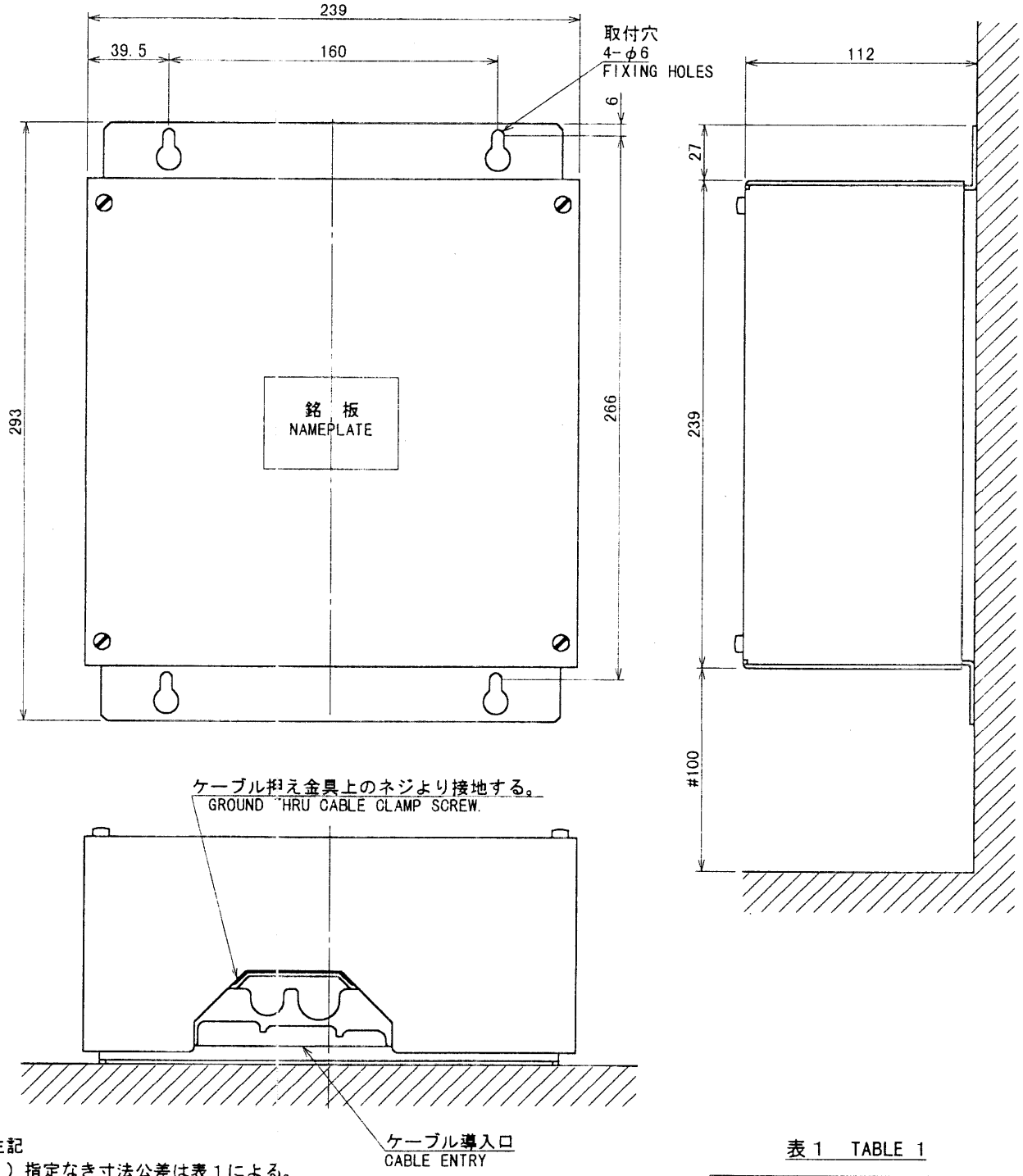
表 1 TABLE 1

注 記
1) 壁面と吸排気口の空間は100mm以上とること。
2) ケーブル導入口はどちらか一方を選択し、工事前にケーブルクランプを取付けておく。
3) 指定外の寸法公差は表1による。
4) #：推奨する最小サービス空間寸法。

NOTE:
1. KEEP CLEARANCE MORE THAN 100mm FOR AIR INLET/OUTLET.
2. SELECT EITHER ONE OF CABLE ENTRANCES. CANGE THE CABLE CLAMP IN POSITION BEFORE MOUNTING IF NECESSARY.
3. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
4. #: RECOMMENDED SERVICE CLEARANCE.

DRAWN Aug.24'00 T.YAMASAKI		TITLE	RTR-010
CHECKED Aug.24'00 T.K	FR-1252X/2050X	名称	送受信部
APPROVED Aug.24'00 T.K	FR/FAR-1652X FR/FAR-2852X		外寸図
SCALE 1/7 MASS 35 ±10% kg		NAME	TRANSCEIVER UNIT
DWG.No. C3300-002- E	03-017-5006- 1		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



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。

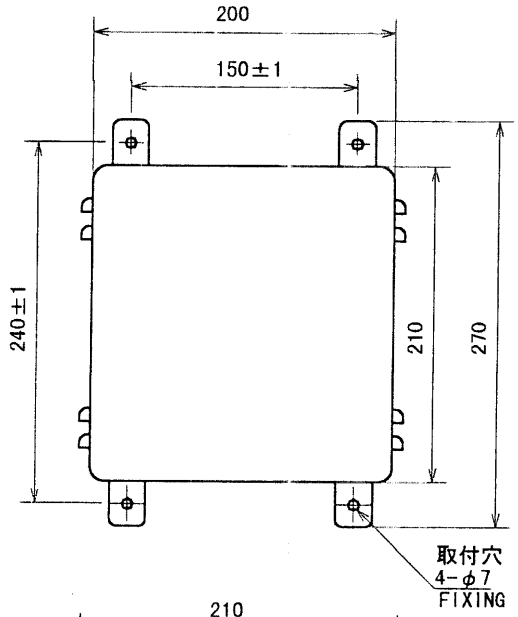
NOTE

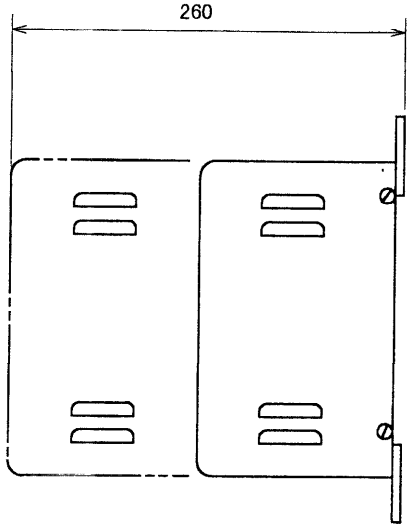
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
2. #: RECOMMENDED SERVICE CLEARANCE.
3. USE TAPPING SCREWS 5x20 FOR FIXING THE UNIT.

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.Kimura	名称	電源制御部
APPROVED June 27 '00 Y.Kimura		外寸図
SCALE 1/4 / MASS 2.3 kg ±10%	NAME	POWER SUPPLY UNIT
DWG. No. C3385-G02- D		OUTLINE DRAWING





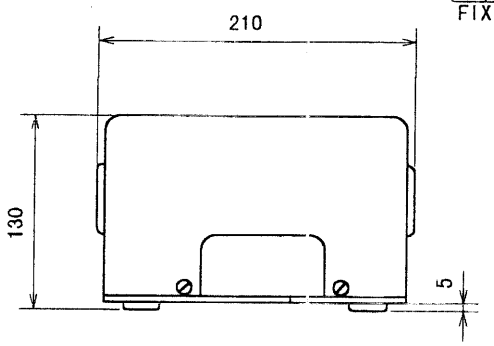
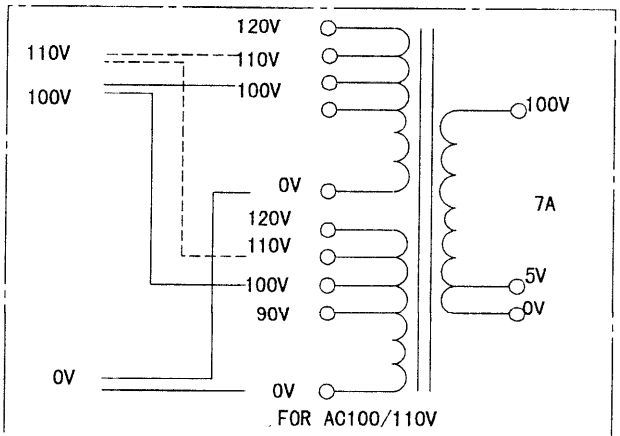
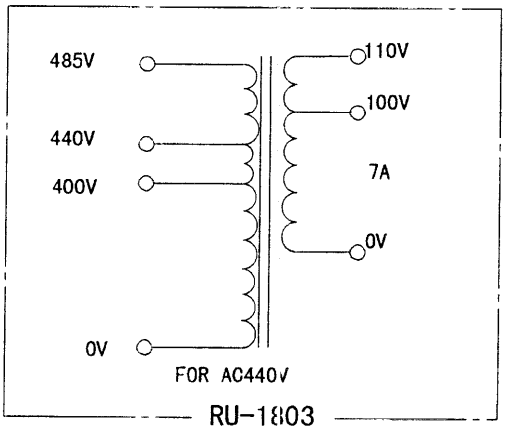
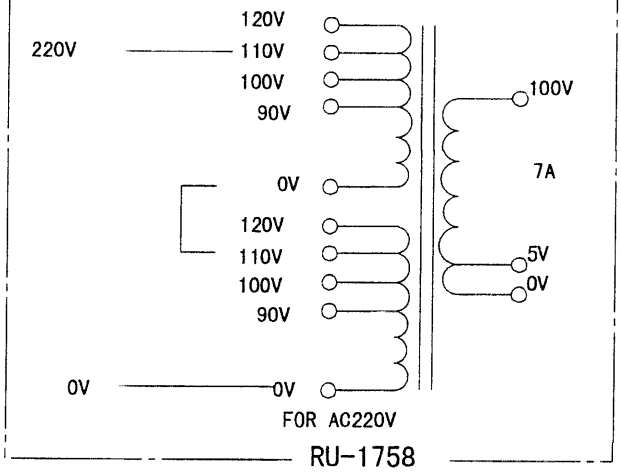


表１　TABLE 1

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

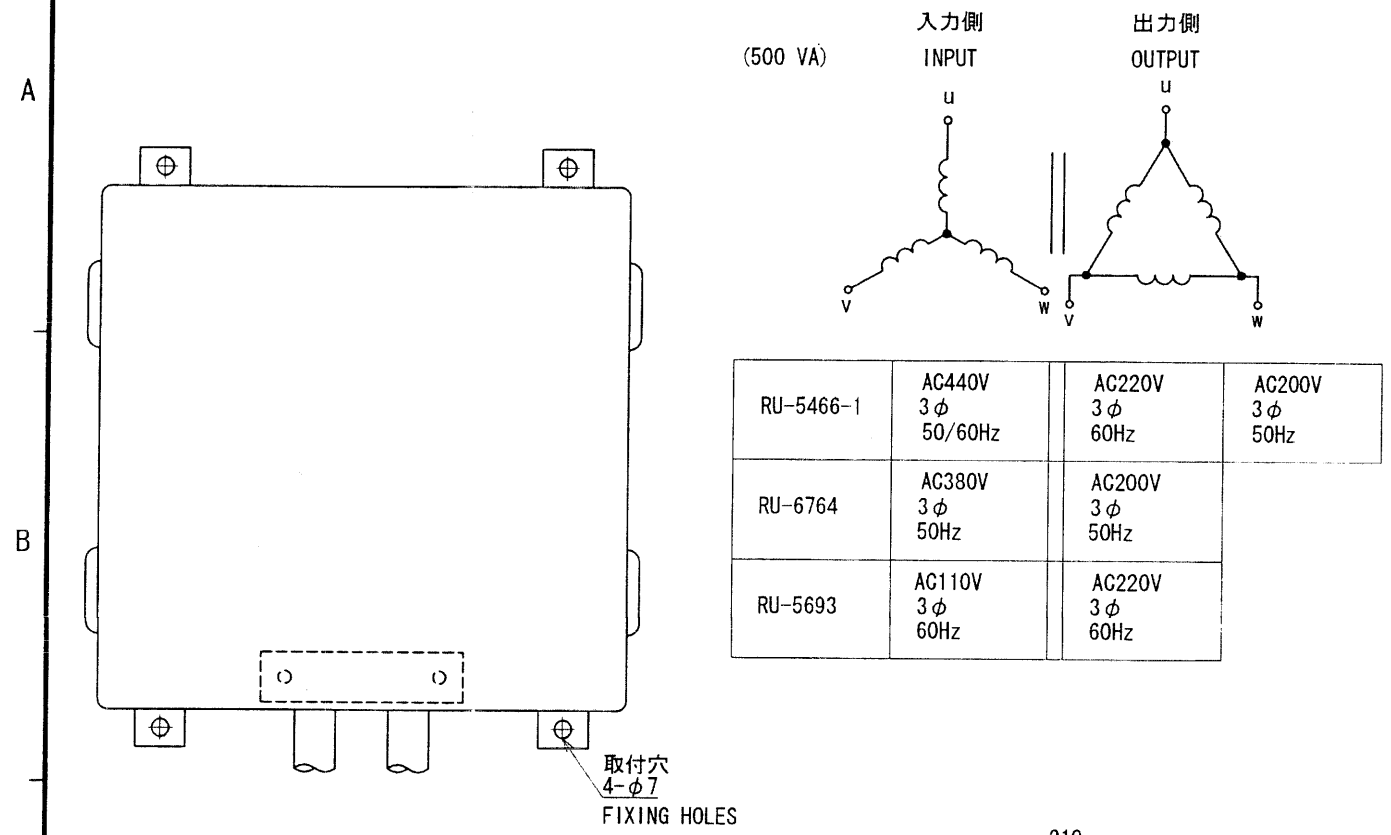




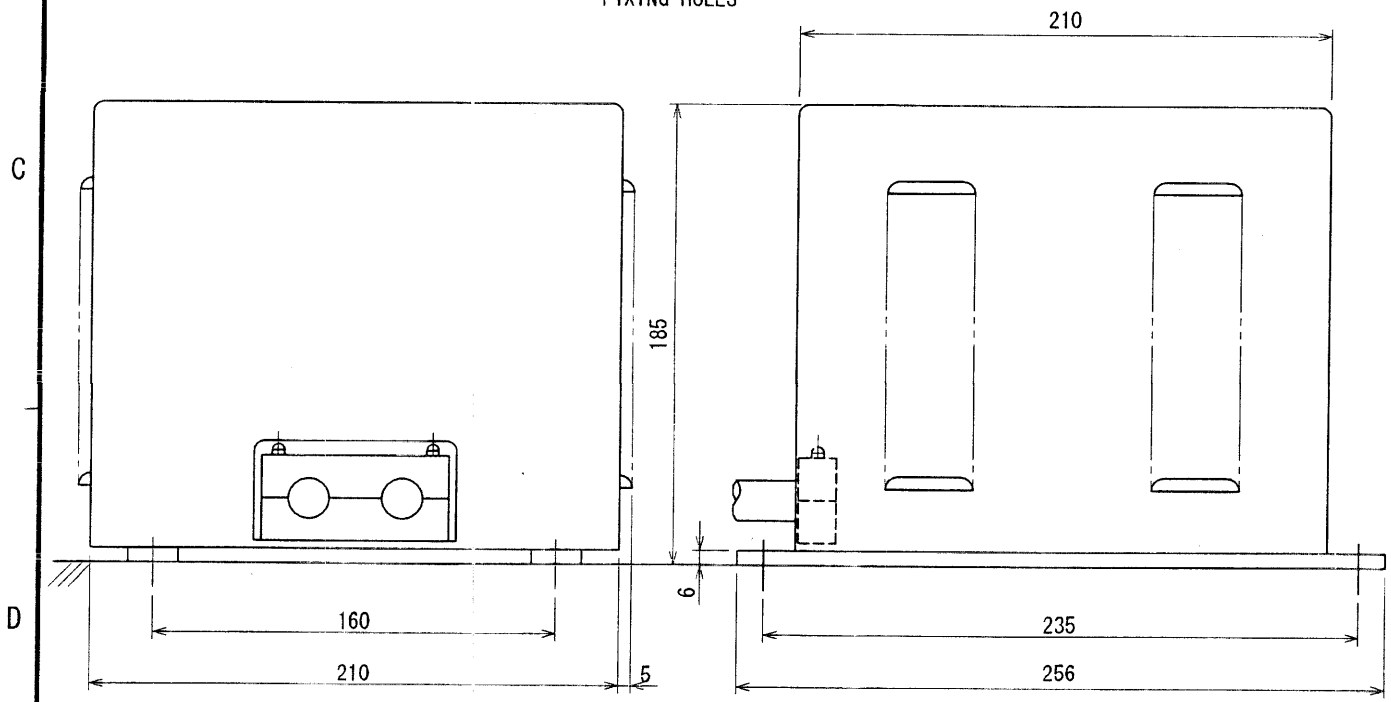


注記
１）指定なき寸法公差は表１による。
NOTE
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN June 28'00 T.YAMASAKI		TITLE RU-1758/1803
CHECKED June 28 '00 Y.K		名称 トランスユニット
APPROVED June 28 '00 Y.K		外寸図
SCALE 1/5 MASS 12 kg ±10%		NAME TRANSFORMER UNIT
DWG. No. C3003-001- E		OUTLINE DRAWING

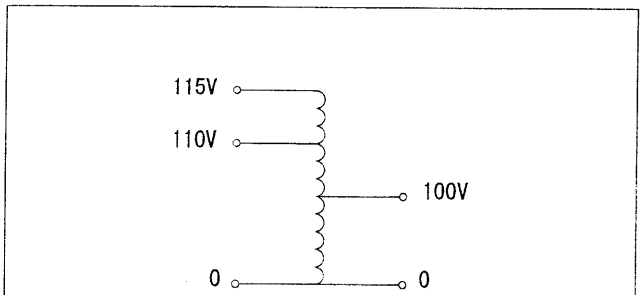


RU-5466-1	AC440V 3φ 50/60Hz	AC220V 3φ 60Hz	AC200V 3φ 50Hz
RU-6764	AC380V 3φ 50Hz	AC200V 3φ 50Hz	
RU-5693	AC110V 3φ 60Hz	AC220V 3φ 60Hz	



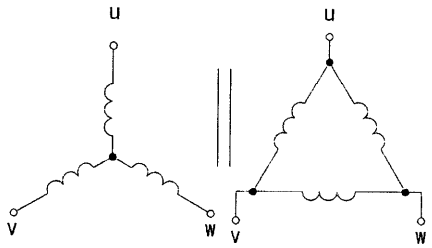
DRAWN Aug 16'00 T.YAMASAKI		TITLE RU-5466-1, RU-6764/5693
CHECKED Aug 17'00 Y.K		名称 トランスユニット
APPROVED Aug 17'00 Y.K		外寸図
SCALE 1/3 MASS 12 kg ±10%		NAME TRANSFORMER UNIT
DWG. No. C3003-006- F		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.

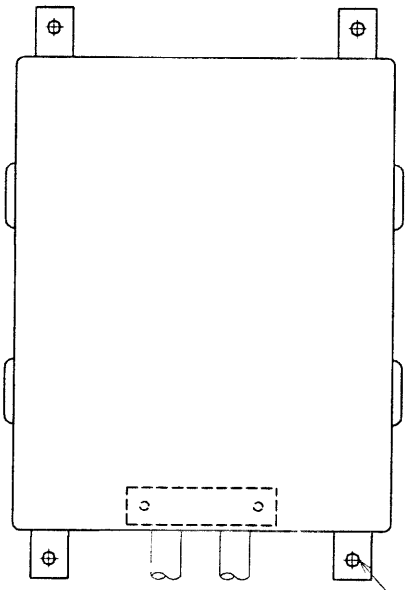


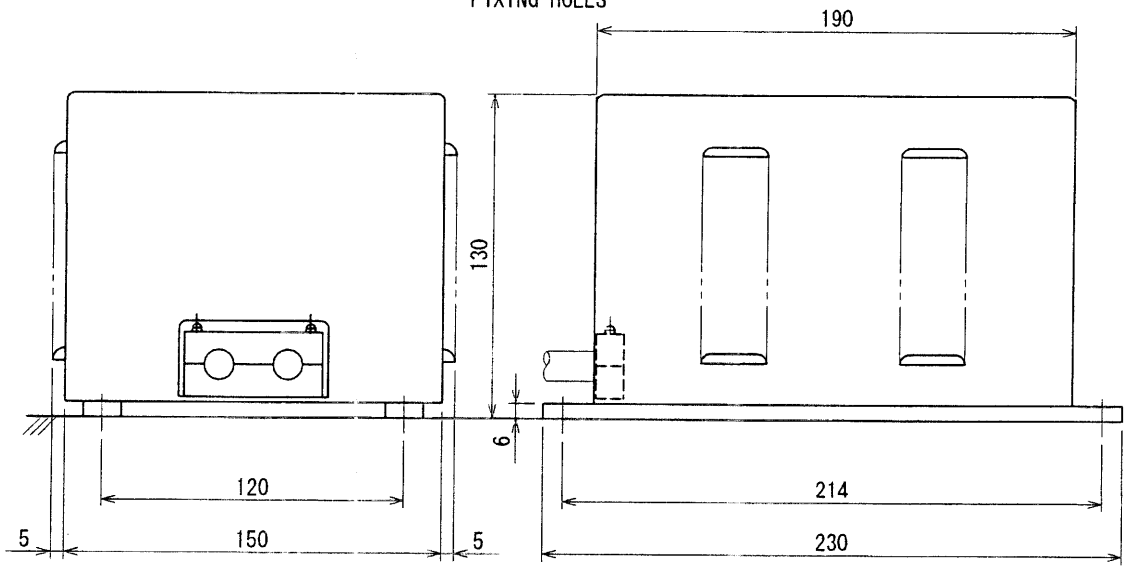
RU-6347	AC110/115V 1φ 50/60Hz	AC100V 1φ 50/60Hz

入力側 INPUT　　出力側 OUTPUT



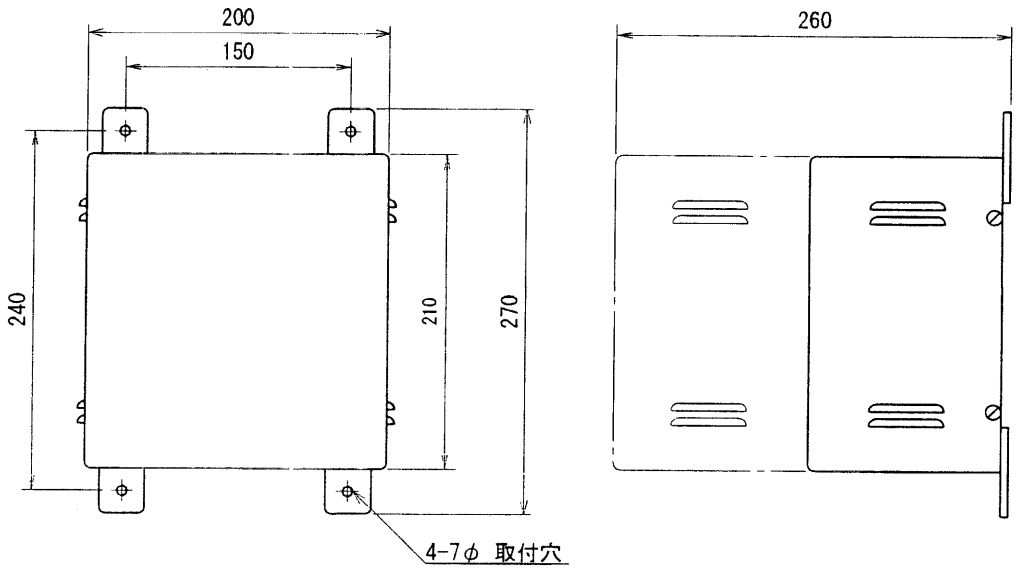
RU-6522	AC220V 3φ 50Hz	AC200V 3φ 50Hz

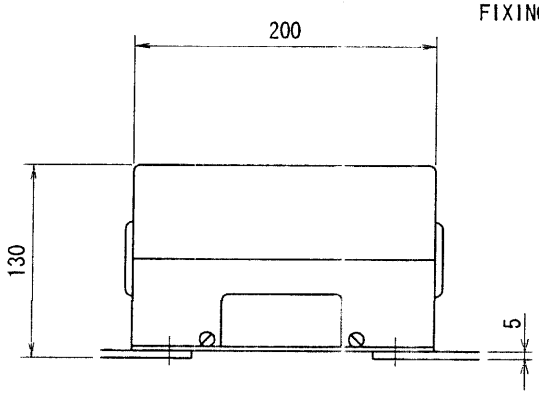


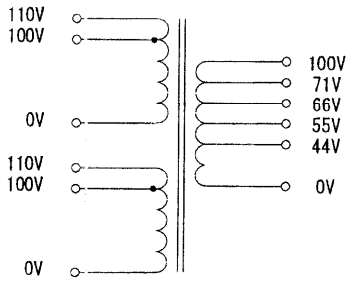


DRAWN Aug 16'02 T.YAMASAKI		TITLE RU-6347/6522
CHECKED Aug19'02 Y.K		名称 トランスユニット
APPROVED Aug/7'02 Y.K		外寸図
SCALE 1/3	MASS ±10% 12 kg	NAME TRANSFORMER UNIT
DWG. No. C3003-007- C		OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.





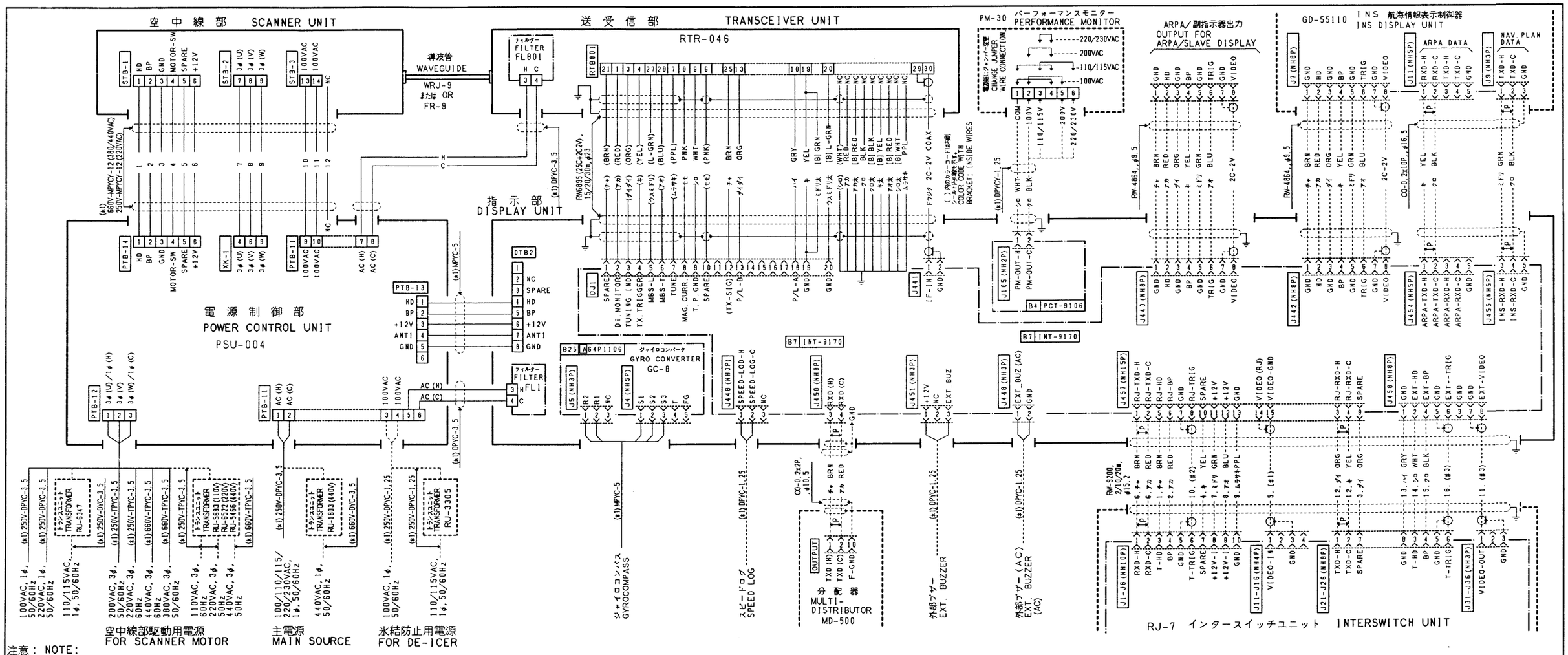


コンパス安全距離 COMPASS SAFE DISTANCE

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

DRAWN Aug/6'00 T.YAMASAKI		TITLE	RU-3305
CHECKED Aug/7'00 T.K		名称	トランスユニット
APPROVED Aug/7'00 T.K			外寸図
SCALE 1/5	MASS ±10% 12.2 kg	NAME	TRAMSUFORMER UNIT
DWG. No. C3003-004- D			OUTLINE DRAWING

FURUNO ELECTRIC CO., LTD.



注意： NOTE:

- コネクタ CONNECTOR
- 99 : 端子台 TERMINAL BOARD
- P : ツイストペア線 TWISTED-PAIR
- : 銅板にて接地 GROUNDING COPPER STRAP
- : IV-8sq. 或いは同等品にて接地 GROUNDING WIRE IV-8sq.
- ---: オプション支給 OPTIONAL SUPPLY

＊1 : 造船所殿手配 SHIPYARD SUPPLY

＊2 : 工場にて取付済 FITTED AT FACTORY.

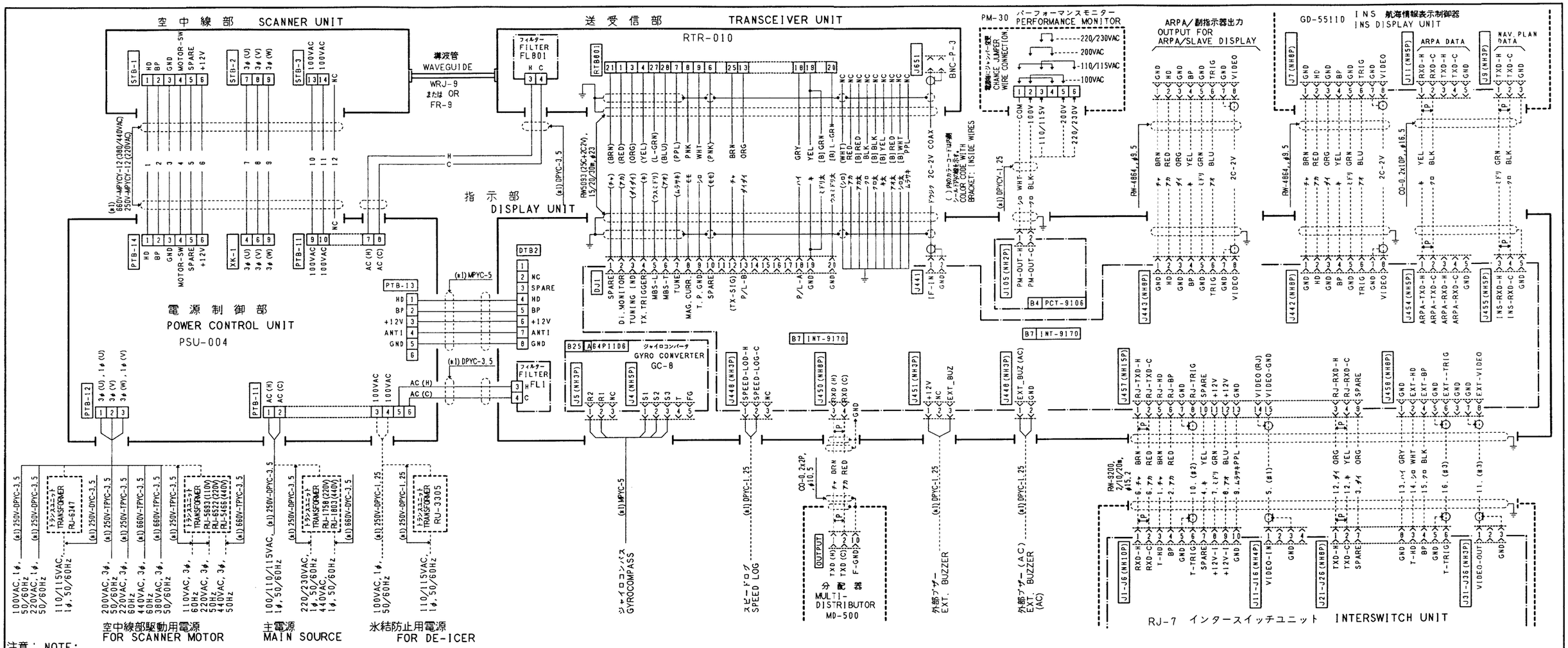
＊3 : コネクターのクランプでアースに落とす。 GROUND THROUGH CONNECTOR CLAMP.

＊4 : [太] は太線を示す。 [B] REPRESENTS THICKER WIRES.

CO-0.2x2P: CO-SPEVV-SB-C 0.2x2P, φ10.5
CO-0.2x5P: CO-SPEVV-SB-C 0.2x5P, φ13.5
CO-0.2x10P: CO-SPEVV-SB-C 0.2x10P, φ16.5

承認 APPROVED	Sept 5 '96 K.Ito	名称 TITLE	FR-2825W FAR-2825W 船舶用レーダー MARINE RADAR
検図 CHECKED	Sep 5 '96 K.Kawnoki		
製図 DRAWN	Sept. 5 '96 Y.Ebisu	図番 DWG. NO.	C3405C03B000

FURUNO



注意: NOTE:

- 99 : コネクタ CONNECTOR
- 99 : 端子台 TERMINAL BOARD
- : ツイストペア線 TWISTED-PAIR
- : 銅板にて接地 GROUNDING COPPER STRAP
- : IV-8sq. 或いは同等品にて接地 GROUNDING WIRE IV-8sq.
- ----: オプション支給 OPTIONAL SUPPLY

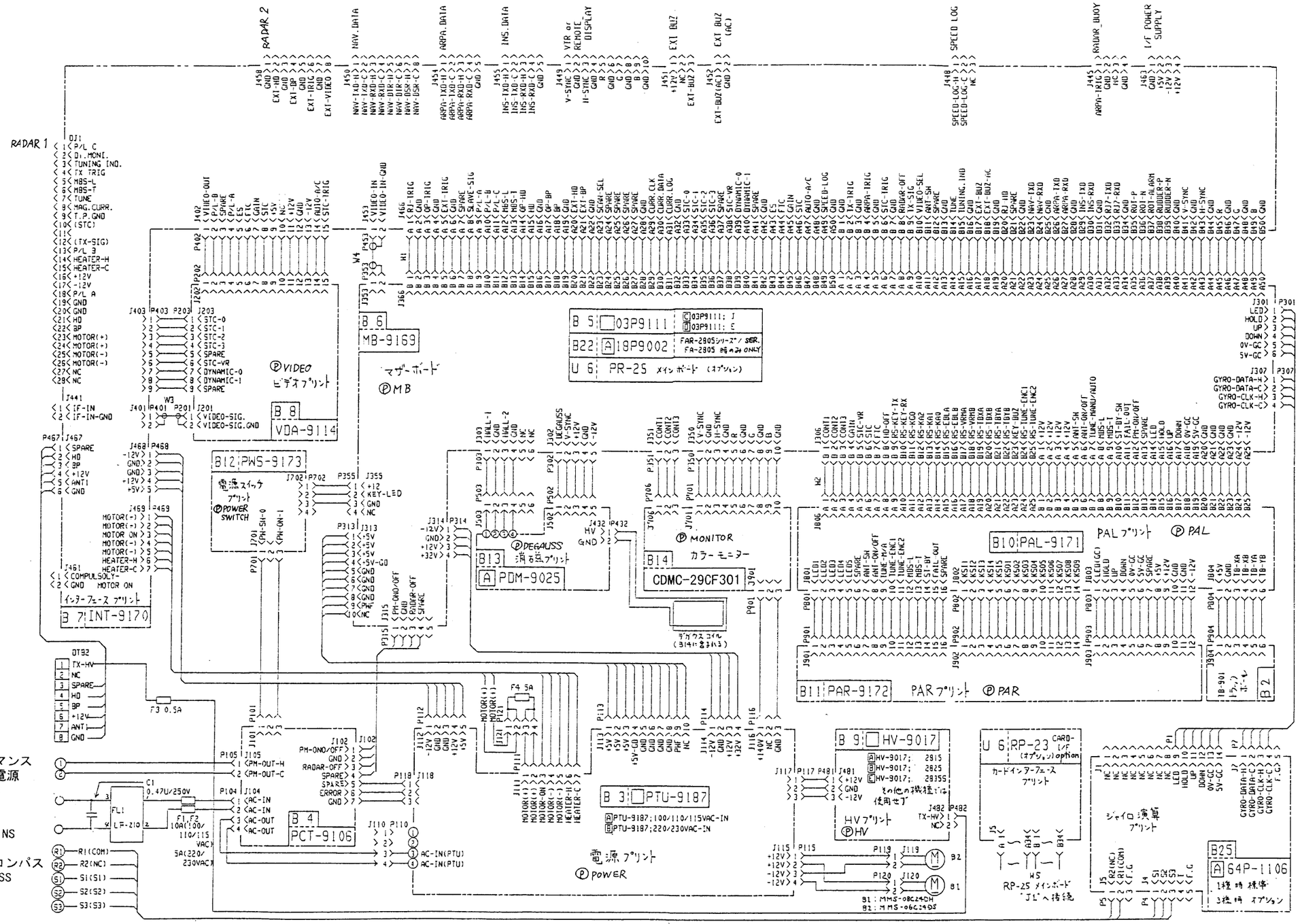
*1 : 造船所殿手配 SHIPYARD SUPPLY
*2 : 工場にて取付済 FITTED AT FACTORY.
*3 : コネクターのクランプでアースに落とす。 GROUND THROUGH CONNECTOR CLAMP.
*4 : [太] は太線を示す。 {B} REPRESENTS THICKER WIRES.

CO-0.2x2P: CO-SPEVV-SB-C 0.2x2P, φ10.5
CO-0.2x5P: CO-SPEVV-SB-C 0.2x5P, φ13.5
CO-0.2x10P: CO-SPEVV-SB-C 0.2x10P, φ16.5

承認 APPROVED	Sept 5 '96 K. Ito	名称 TITLE	FR-2855W FAR-2855W 船舶用レーダー MARINE RADAR
検図 CHECKED	Sep 5 '96 K.Kawaguchi		
製図 DRAWN	Sept 5 '96 T. Ishii	図番 DWG. NO.	C3406C02C000

FURUNO

S - 3



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

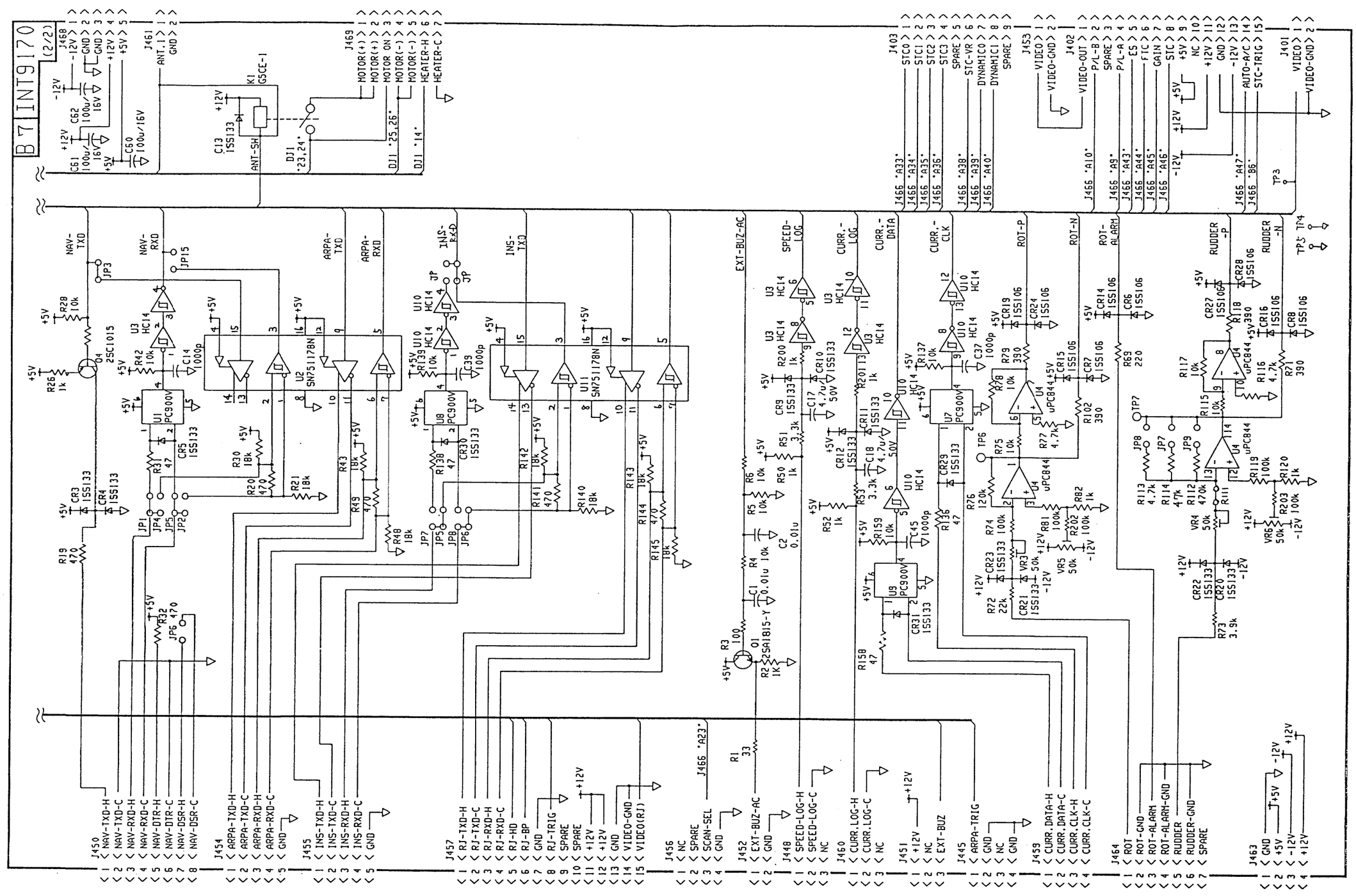
FURUNO ELECTRIC CO., LTD.

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		NAME INT BOARD (1/2)
SCALE /	MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO. 1B 7
			DWG NO. C3418-K01- A / 03-131-6004- 1

古野電気株式会社

B7 INT9170 (2/2)

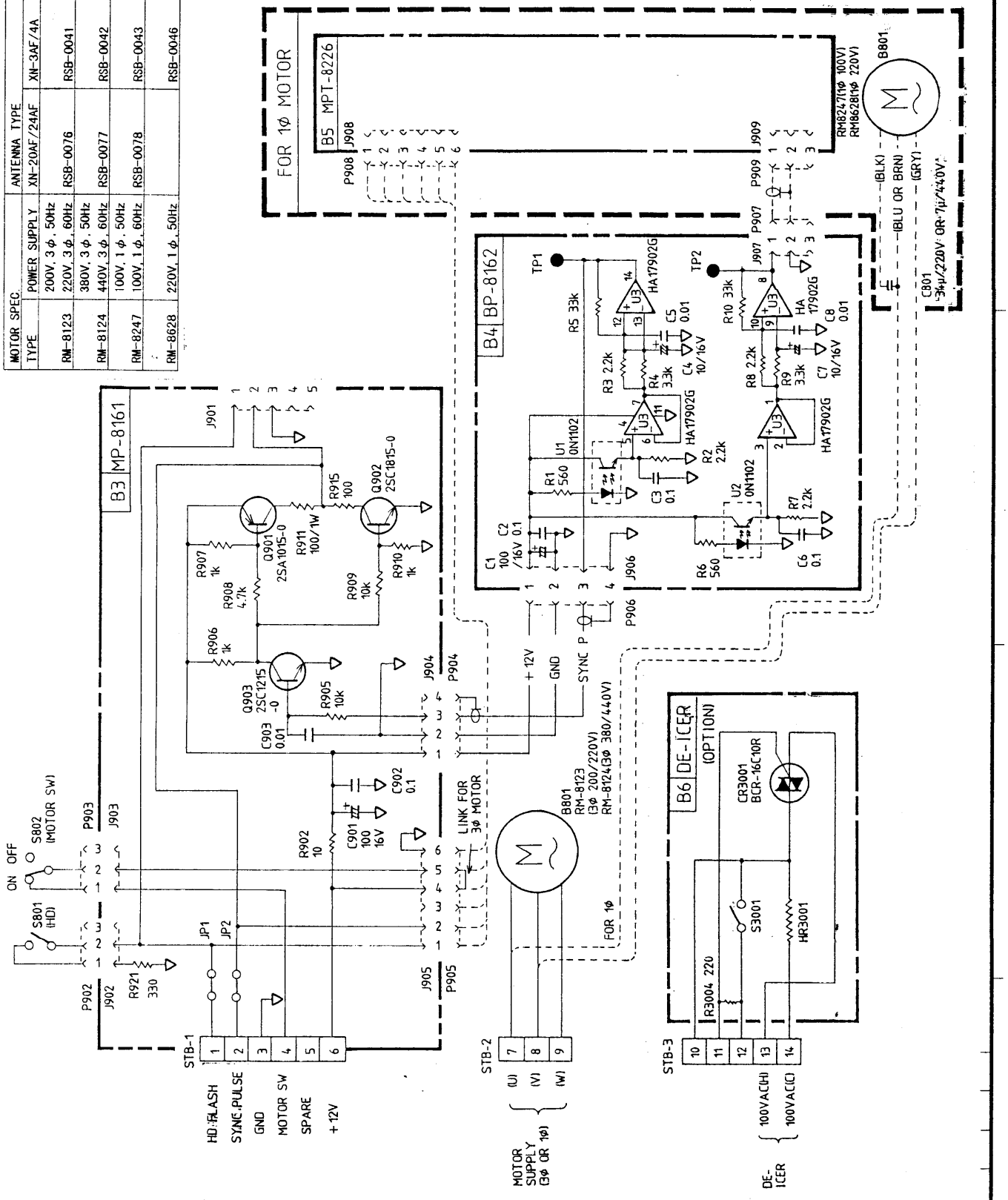


DRAWN July 18, 1995 Morimoto			TYPE	INT9170
CHECKED July 18, '95 Maki	FR2805SER FAR2805SE FA2805		名称	INT基板 (2/2)
APPROVED July 18 '95 okamoto		1B 7	NAME	INT BOARD (2/2)
SCALE / MASS kg	APPLICABLE TO: (MODEL)	BLOCK NO.	DWG NO.	C3418-K02- A 03-131-6004- 1

古野電気株式会社

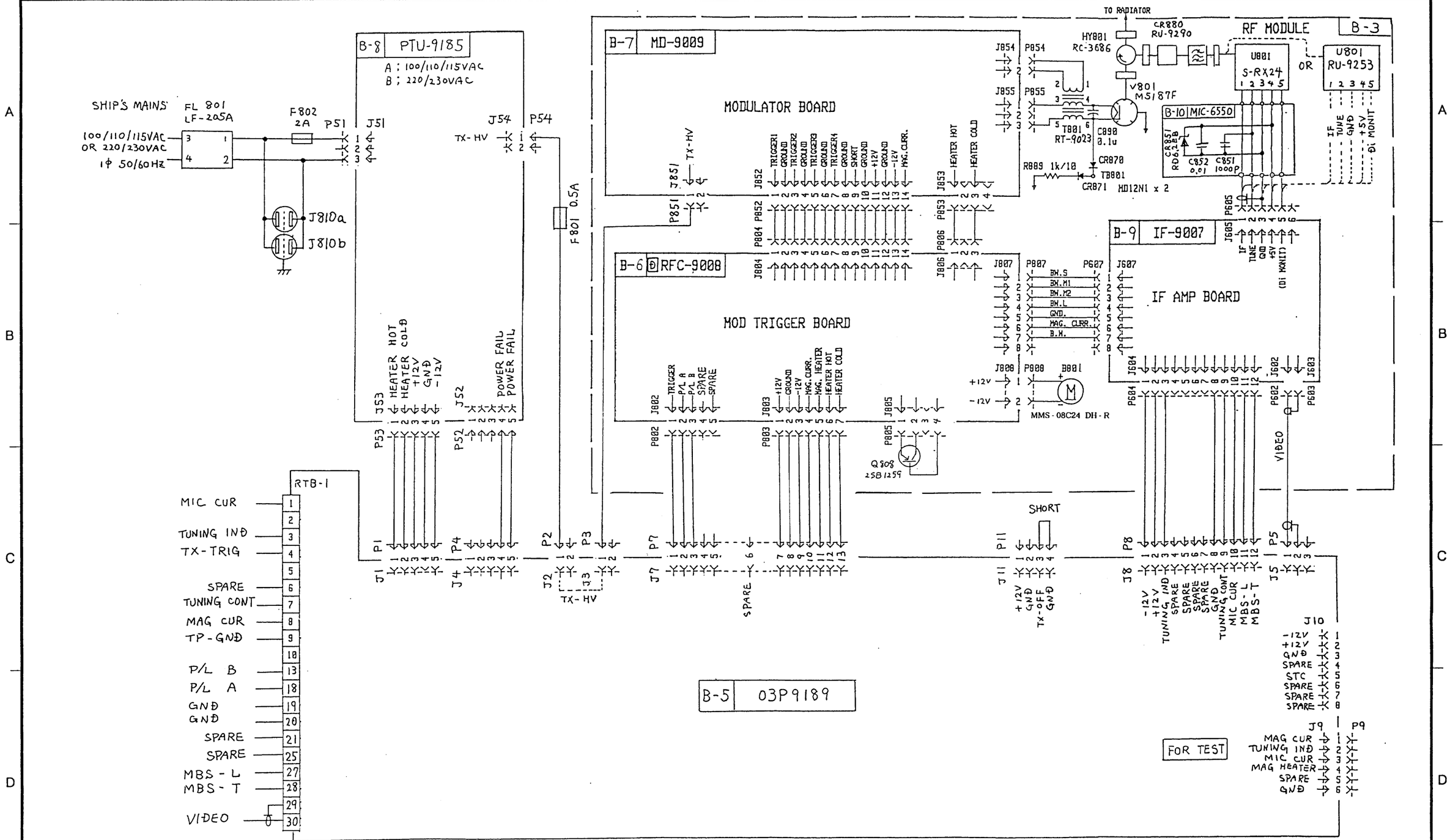
FURUNO

MOTOR SPEC.		ANTENNA TYPE	
TYPE	POWER SUPPLY	XN-20AF/24AF	XN-3AF/4A
RM-8123	200V, 3 φ, 50Hz 220V, 3 φ, 60Hz	RSB-0076	RSB-0041
RM-8124	380V, 3 φ, 50Hz 440V, 3 φ, 60Hz	RSB-0077	RSB-0042
RM-8247	100V, 1 φ, 50Hz 100V, 1 φ, 60Hz	RSB-0078	RSB-0043
RM-8628	220V, 1 φ, 50Hz		RSB-0046



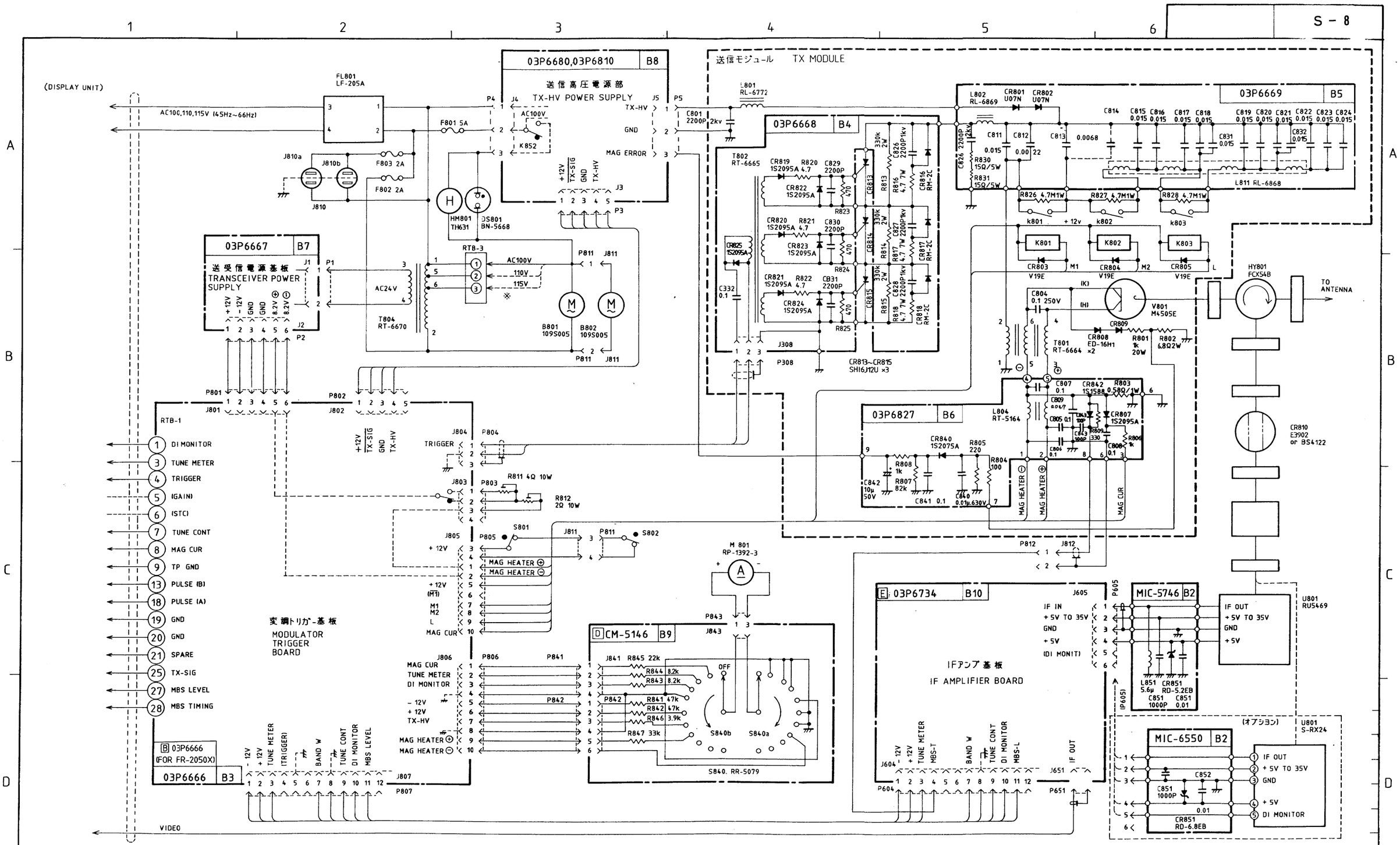
DRAWN Dec 8'98 T.YAMASAKI	FR2125W FR2855W		TYPE	RSB-0041/42/43/46/76/77/78
CHECKED Dec 8'98 K.Kusunoki	FR2825W FR2852X		名称	空中線部
APPROVED Dec 8'98 K.Kusunoki	FR2822X FR2022X			回路図
SCALE /	MASS kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME SCANNER UNIT
DWG NO. C3333-K01- E		03-318-8245- 3		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.



B-5 03P9189

DRAWN: NOV. 2 '95 E. KISHIMA			TYPE: RTR046
CHECKED: NOV. 2'95 T. SAITO			名称: 送受信部
APPROVED: NOV. 2 '95 K. OTA	FR-2825W FAR-2825W		回路図
SCALE: / MASS: kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME: TRANSCEIVER UNIT
DWG NO.: C3405-K01- B	03-130-6008- 0		SCHEMATIC DIAGRAM



NOTE 1. ※: 入力電源により100V,110V,115Vのいずれかのタップを使用。
: CHANGE TAP CONNECTION WITH SHIP'S MAINS VOLTAGE.

2. 特記なき抵抗の単位は全てΩ,1/4W 又 コンデンサはμF.
ALL RESISTANCE IN OHMS, 1/4W AND CAPACITANCE IN MICROFARADS UNLESS NOTED OTHERWISE.

構体部品番号 :2B1---
CHASSIS PARTS NO.

DRAWN APR.24.'96 E.KISHIMA	FAR2855W		TYPE RTR-010
CHECKED Apr.24'96 T.SAITO	FR2855W		名称 送受信部総合回路図
APPROVED APR.24.'96 K.ITA	FR2150W		回路図
SCALE / MASS kg	FR2050X FR2852X	BLOCK NO.	NAME TRANSCEIVER UNIT
DWG NO. C3300-005- N	APPLICABLE TO: (MODEL)		SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

FURUNO

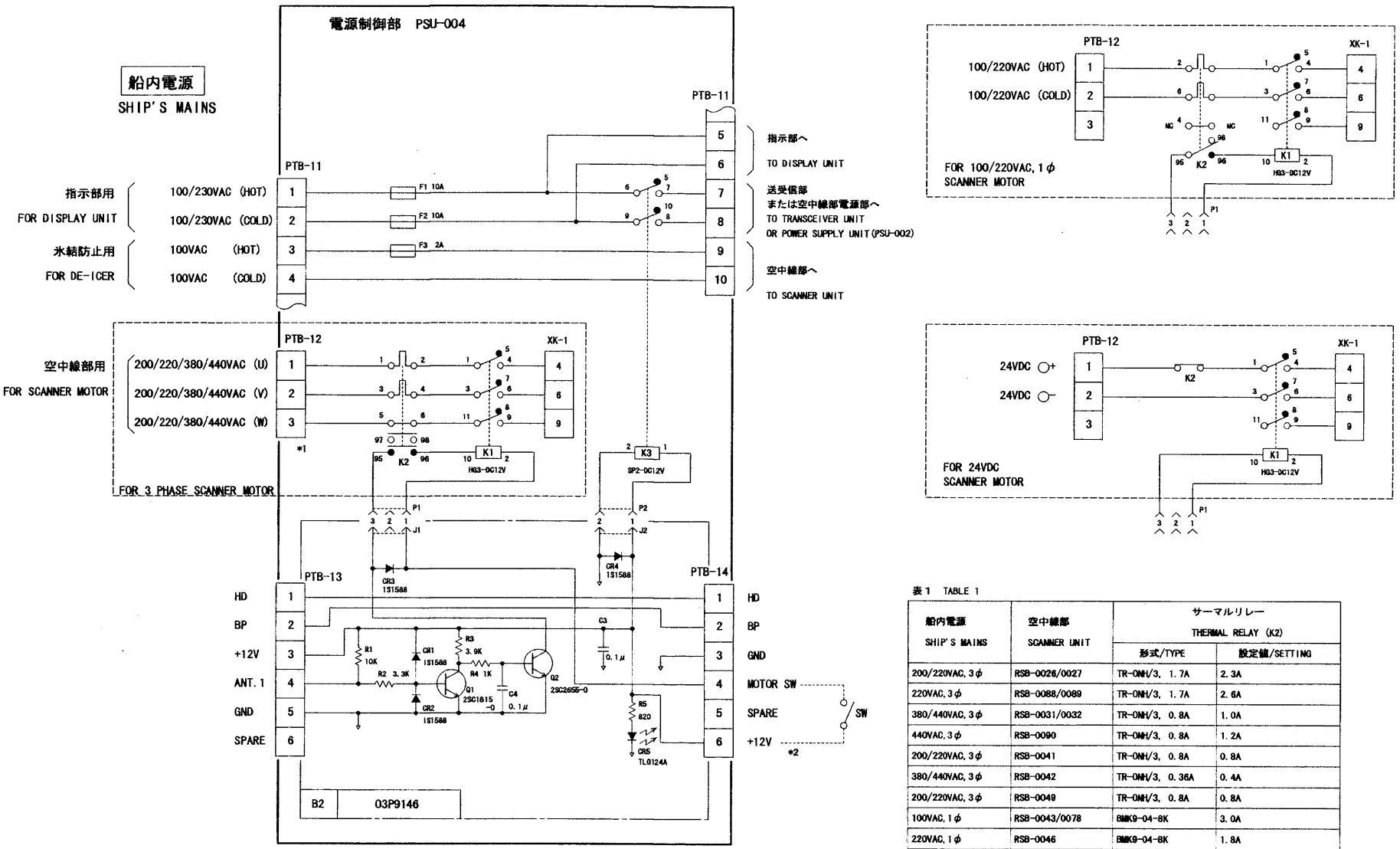


表1 TABLE 1

船内電源 SHIP'S MAINS	空中線部 SCANNER UNIT	サーマルリレー THERMAL RELAY (K2)	
		形式/TYPE	設定値/SETTING
200/220VAC, 3φ	RSB-0026/0027	TR-ONH/3, 1.7A	2.3A
220VAC, 3φ	RSB-0088/0089	TR-ONH/3, 1.7A	2.6A
380/440VAC, 3φ	RSB-0031/0032	TR-ONH/3, 0.8A	1.0A
440VAC, 3φ	RSB-0090	TR-ONH/3, 0.8A	1.2A
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-0043/0078	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)

注記
＊1）設定値は表1を参照。
＊2）FR-2160DSのときはPTB-14の#4と#6を現地で短絡すること

NOTE
*1. REFER TO TABLE 1 FOR THERMAL RELAY SETTINGS.
*2. FOR FR-2160DS, PUT A JUMPER BETWEEN #4 AND #6 OF PTB-14 AT INSTALLATION.

DRAWN Jun. 20 '01 T.YAMASAKI			TITLE PSU-004
CHECKED Yone 21'01 Y.Eino			名称 電源制御部
APPROVED Aug 21 '01 Y.Kan	FR-28**SERIES FR-21**SERIES		回路図
SCALE	MASS kg		NAME POWER SUPPLY UNIT
DWG No. C3385-K01- F			SCHEMATIC DIAGRAM

FURUNO ELECTRIC CO., LTD.

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