

FURUNO

Installation Manual **COLOR SECTOR SCANNING SONAR**

Model CH-37BB

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SAFETY INSTRUCTIONS


Read these safety instructions before you operate the equipment.


 WARNING	Indicates a condition that can cause death or serious injury if not avoided.
 CAUTION	Indicates a condition that can cause minor or moderate injury if not avoided.


 Warning, Caution	 Prohibitive Action	 Mandatory Action
--	--	--


 **WARNING**


 **ELECTRICAL SHOCK HAZARD**
Do not open the equipment unless totally familiar with electrical circuits and service manual.
Only qualified personnel should work inside the equipment.


 **Turn off the power at the switchboard before beginning the installation.**
Fire or electrical shock can result if the power is left on.


 **Do not install the equipment where it may get wet from rain or water splash.**
Water in the equipment can result in fire, electrical shock or equipment damage.



 **Be sure no water leaks in at the transducer installation site.**
Water leakage can sink the vessel. Also confirm that the transducer will not loosen by ship's vibration. The installer of the equipment is solely responsible for the proper installation of the equipment. FURUNO will assume no responsibility for any damage associated with improper installation.

 **WARNING**

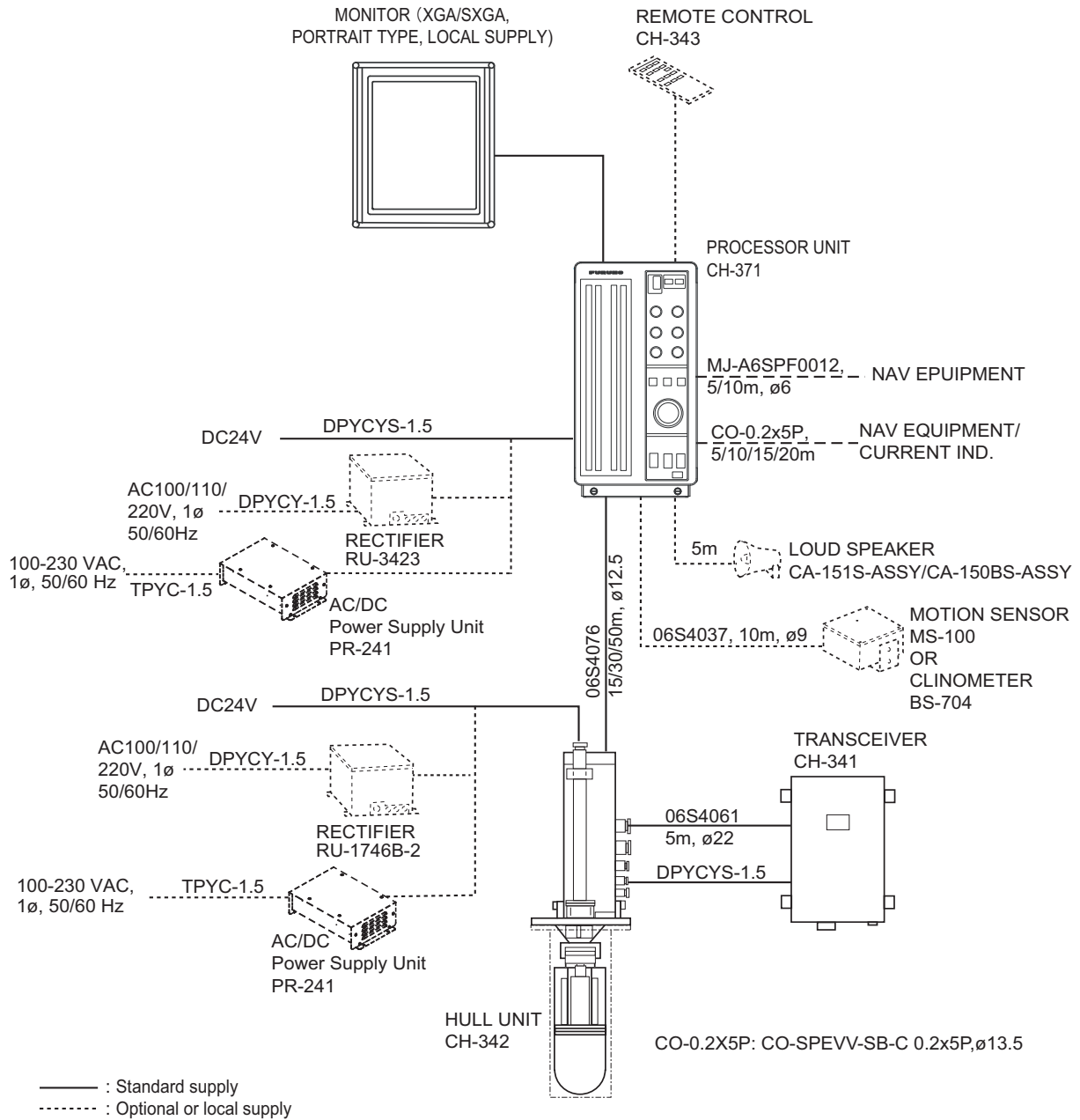
 **Install the specified transducer tank in accordance with the installation instructions. If a different tank is to be installed the shipyard is solely responsible for its installation, and it should be installed so the hull will not be damaged if the tank strikes an object.**
The tank or hull may be damaged if the tank strikes an object.

 **If a steel tank is installed on a wooden or FRP vessel, take appropriate measures to prevent electrolytic corrosion.**
Electrolytic corrosion can damage the hull.

 **Be sure that the power supply is compatible with the voltage rating of the equipment.**
Connection of an incorrect power supply can cause fire or equipment damage. The voltage rating of the equipment appears on the label above the power connector.

 CAUTION		
	<p>Ground the equipment to prevent electrical shock and mutual interference.</p>	
<p>Observe the following compass safe distances to prevent deviation of a magnetic compass:</p>		
	Standard compass	Steering compass
Transceiver unit	1.50 m	0.95 m
<p>WORKING WITH THE SONAR OIL</p> <p>Precautions</p> <ul style="list-style-type: none"> - Keep oil away from eyes. Wear protective gloves when working with the oil. The oil can cause inflammation of the eyes. - Do not touch the oil. Wear protective gloves when working with the oil. The oil can cause inflammation of the skin. - Do not ingest the oil. Diarrhea or vomiting can result. - Keep the oil out of reach of children. <p>Emergency</p> <ul style="list-style-type: none"> - If the oil enters eyes, flush with clean water about 15 min. Consult a physician. - If the oil contacts skin, wash with soap and water. - If the oil is ingested, see a physician immediately. <p>Disposal of oil and its container</p> <p>Dispose of oil and its container in accordance with local regulations. For further details, contact place of purchase.</p> <p>Storage</p> <p>Seal container to keep out foreign material. Store in dark place.</p>		

SYSTEM CONFIGURATION



EQUIPMENT LISTS

Standard Supply

Name	Type	Code No.	Qty	Remarks
Control unit	CH-371	-	1	
Transceiver unit	CH-341	-	1	60/113/162 kHz, select one
Hull Unit	CH-342	-	1	60/113/162 kHz, 24 VDC, Shaft length 1.17/2.2/3.8 m
Installation materials	CP06-01100	000-068-457	Select one	Cable length: 15 m (standard supply)
	CP06-01110	000-068-458		Cable length: 30 m
	CP06-01120	000-068-459		Cable length: 50 m
	CP06-01102	006-563-250	1 set	For control unit
Spare parts	SP06-01501	001-166-030	1	

Optional Supply

Name	Type	Code No.	Remarks
Remote control	CH-343	-	
Motion sensor	MS-100	-	
Clinometer	BS-704	-	
Rectifier	RU-1746B-2	000-030-439	100/110/220 VAC
Rectifier	RU-3423	000-030-443	100/110/220 VAC
AC/DC Power Supply Unit	PR-241	-	
Ferrite Core	OP86-11	001-594-450	For PR-241
Loudspeaker	CA-151S-ASSY	001-466-200	8Ω
	CA-150BS-ASSY	000-190-183	
Fairing	06-021-4502	001-159-790	For an FRP ship
Cable assembly	MJ-A6SPF0012-050C	000-154-053	64S4071-2, 5 m, 6 pin-6 pin
	MJ-A6SPF0012-100C	000-154-037	64S4071-2, 10 m, 6 pin-6 pin
	MJ-A6SPF0011-050C	000-159-690	03S9202-2, 5 m, 6 pin-4 pin
	MJ-A6SPF0011-100C	000-159-691	03S9202-2, 10 m, 6 pin-4 pin
5-pair twisted cable	CO-SPEVV-SB-C 0.2 x 5P	000-560-451	5 m
		000-560-452	10 m
		000-560-417	15 m
		000-103-868	20 m
48-core cable	06S4056	000-126-160	For extension of cable between hull unit and transceiver unit, specify length
Multi-core cable (12P+12P)	XES-SB 60/0.08×24P	001-255-400	
Replacement kit A	OP06-23-1	001-367-000	
Replacement kit B	OP06-23-2	001-367-020	

Hull Unit

Name	Type	Code No.	Remarks
Steel retraction tank	06-007-1570-2	600-715-702	1.0 m
	SHJ-0001-2	661-000-012	1.8 m
	06-007-1571-2	600-715-712	3.5 m
FRP retraction tank	06-021-4024	001-352-280	1 m
	06-007-1573-0	600-715-730	1.8 m
Aluminum retraction tank	OP10-5	000-019-283	1 m, with inst. materials
Raise/lower driving unit	CH-3422-60-2	006-547-010	60 kHz
	CH-3422-113/115-2	006-547-050	113 kHz
	CH-3422-162-2	006-547-070	162 kHz
Shaft	06-007-1591	001-261-030	3 m
Soundome	CH-3422-60-11	006-547-090	2.7 m cable (standard)
	CH-3422-113/115-11	006-547-150	
	CH-3422-162-11	006-547-180	
	CH-3422-60-22	006-547-100	3.7 m cable (option)
	CH-3422-113/115-22	006-547-160	
	CH-3422-162-22	006-547-190	
	CH-3422-60-38	006-547-110	5.3 m cable (option)
	CH-3422-113/115-38	006-547-170	
CH-3422-162-38	006-547-200		

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1. MOUNTING

NOTICE

Do not apply paint, anti-corrosive sealant or contact spray to coating or plastic parts of the equipment.

Those items contain organic solvents that can damage coating and plastic parts, especially plastic connectors.

1.1 Hull Unit

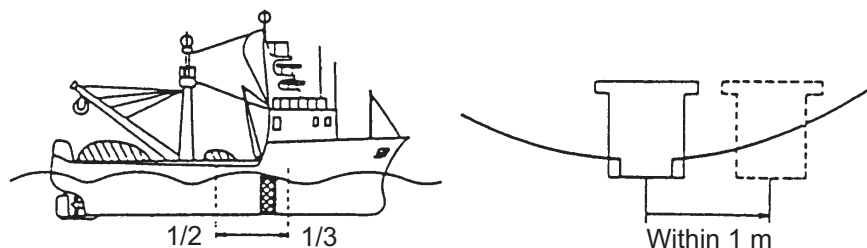
General mounting considerations

- Noise and air bubbles will affect performance.
- Keep the transducer away from oil. Oil can corrode the cable.
- Do not expose the transducer to hot water. Hot water can damage the transducer.
- Do not turn on the equipment with the transducer exposed to air. Exposing the transducer to air may damage it.

Installation position considerations

Discussion and agreement are required with the dockyard and ship owner in deciding the location for the hull unit. When deciding the location, take into account the following points:

- Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are minimal. Generally, the point at $1/3$ to $1/2$ of the ship's length from the bow or near the keel is the best. On-the-keel installation is advantageous for minimizing oil consumption in comparison with off-the-keel. If the hull unit cannot be installed on the keel, the center of the retraction tank should be within 1 meter of the keel to prevent a rolling effect.



- Select a place where interference from the transducers of other sounding equipment is minimal. The hull unit should be at least 2.5 meters away from the transducers of other sounding equipment.
- An obstacle in the fore direction not only causes a shadow zone but also aerated water, resulting in poor sonar performance. Be sure to locate the transducer well away from any obstacle in the fore direction.

Mounting method

A typical mounting method is shown in the outline drawing at the back of this manual. Consult ship's owner, dockyard and user to determine appropriate mounting method. Pay attention to safety (strength, watertightness) first, followed by ease of maintenance and inspection.

Tank length

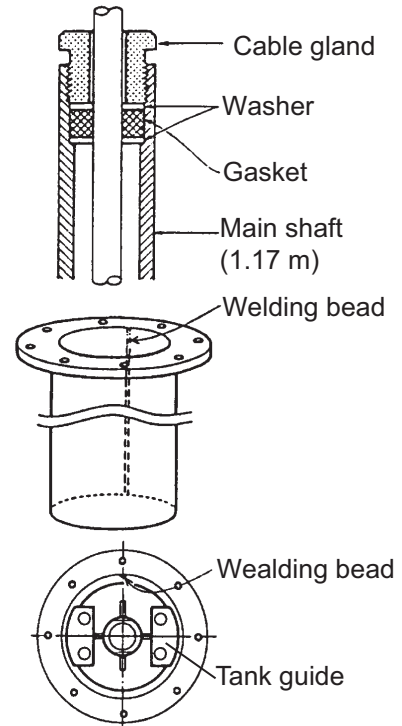
Shorten the transducer tank so the transducer is lowered into water as deep as possible.

Pay particular attention to the tank length (Lt). Determine the length of the main shaft as described in the paragraph.

Note 1: Do not shorten the 1 meter retraction tank. Shortening it may also necessitate shortening of the top part of the main shaft, thereby destroying the watertight construction of the 1.17 meter shaft.

Note 2: When the retraction tank is constructed locally, finish it so that welding beads do not protrude on the inner surface of the tank. The tank guide will hit the bead, burning out the raise/lower motor. Also, do not position the welding bead in the ship's fore-aft line.

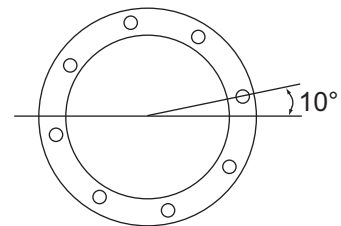
Note 3: Use of other manufacturer's tank is permitted. However, the dimensions should be the same as those in the transducer tank outline drawing.



Mounting of transducer tank

Install the transducer tank referring to the hull unit outline drawings at the back of this manual.

Note: Locate one of the bolt holes 10° to port to minimize mechanical shock at the raise/lower block during pitching and rolling.



Assembling and mounting of hull unit

The hull unit is shipped disassembled as the parts. Assemble the hull unit as shown in the procedure below.

Necessary tools

Name	Specification	Remarks
Wrench	For M10 (Hex. size 17 mm)	
Wrench	For M20 (Hex. size 20 mm)	
Pipe Wrench	55 mm	
Ball Wrench	Hex size 4 mm	Supplied with hull unit kit

1. Unscrew ten pieces of socket head cap screws with the ball wrench (supplied) to detach the soundome.

NOTE

Do not unfasten two nuts painted in red.
Unfastening the nuts may allow water to leak inside, which can damage the soundome.

Socket head cap screw (10 pcs. M5x30)

Spring washer

O-ring

Remove

Rotate 3 or 4 turns by hand to make sure that turning mechanisms are functioning properly.

Kinoruster*: Anti-crevice corrosion sealant (supplied)

NOTE

Do not fasten the M5x10 screws strongly. Oil may leak into the soundome.

Apply Kinoruster*

Screw 6 pcs. M5x10

Soundome

Protective sponge

2. Fill the soundome with sonar oil 6 cm below the top of the dome. (Use only the specified sonar oil. Use of other sonar oils may affect performance.) Reattach the soundome.

Ball wrench



Sonar oil

5 cm

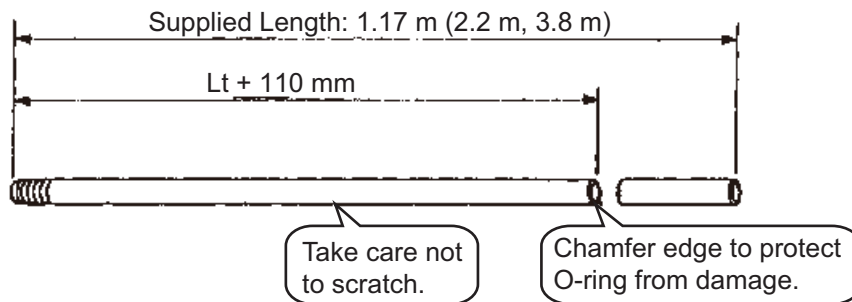
Use packing material to support soundome.

	Frequency (kHz)		
	60	113	162
Sonar oil 4L (000-824-033)	No	Yes	Yes
Super sonar oil 4L (000-177-561-10)	Yes	No	No

1. MOUNTING

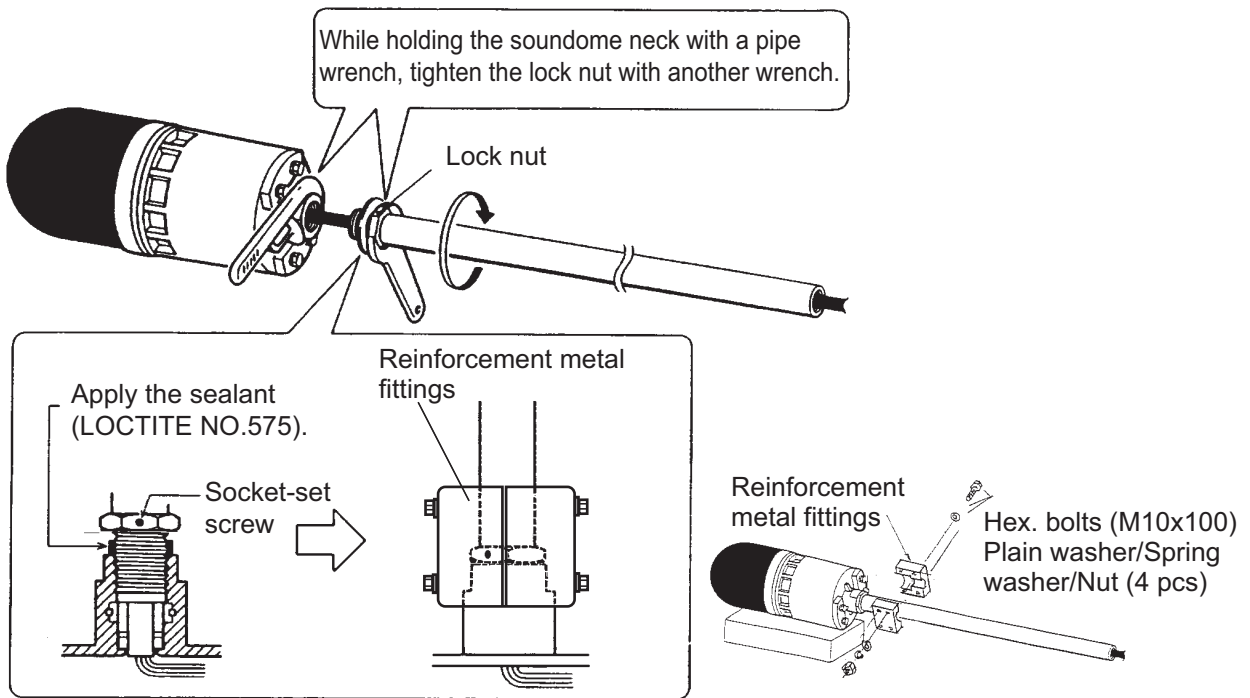
 CAUTION	
 WORKING WITH THE SONAR OIL <u>Precautions</u> <ul style="list-style-type: none">· Keep oil away from eyes. Wear protective glass when working with the oil. The oil can cause inflammation of the eyes.· Do not touch the oil. Wear protective gloves when working with the oil. The oil can cause inflammation of the skin.· Do not ingest the oil. Diarrhea or vomiting can result.· Keep the oil out of reach of children.	<u>Emergency</u> <ul style="list-style-type: none">· If the oil enters eyes, flush with clean water about 15 minutes. Consult a physician.· If the oil contacts skin, wash with soap and water.· If the oil is ingested, see a physician immediately. <u>Disposal of oil and its container</u> <ul style="list-style-type: none">· Dispose of oil and its container in accordance with local regulations. For further details, contact place of purchase. <u>Storage</u> <ul style="list-style-type: none">· Seal container to keep out foreign material. Store in dark place.

3. Shorten the main shaft by the length of $L_t + 110$ mm, where L_t is the length of the retraction tank. When the retraction tank length is 1 meter do not shorten the 1.17 meter main shaft.

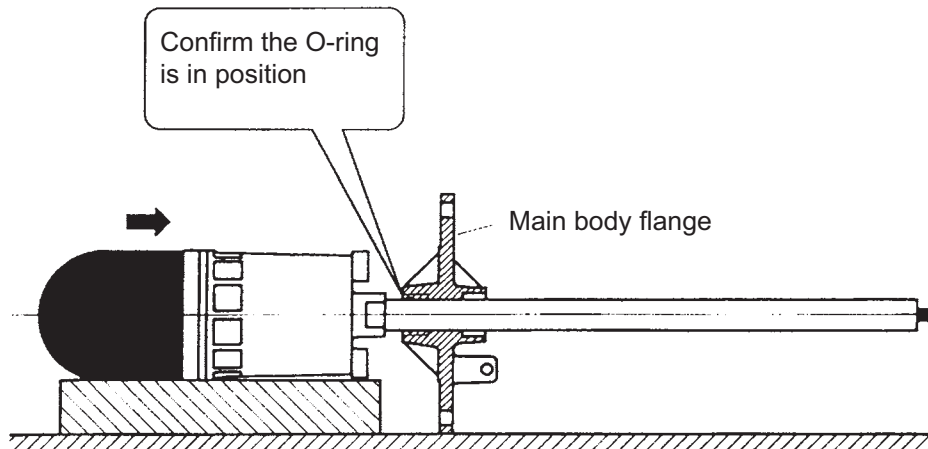


4. Fasten the main shaft to the soundome assembly as follows;
 - a) Screw the lock nut onto the main shaft.
 - b) Pass the transducer cable through the main shaft.
 - c) After fully screwing the main shaft into the soundome neck, unscrew it by four turns and apply the supplied sealant (LOCTITE NO.575) to the threads.
 - d) Screw in the main shaft completely, then tighten the lock nut with a wrench.
 - e) Remove any excess sealant with a waste cloth. The sealant does not harden when exposed to air.
 - f) Tighten the socket-set screw on the lock nut.

- g) Fasten two reinforce metal fittings to connect the main shaft and the soundome assembly securely (not using the stopper washer).

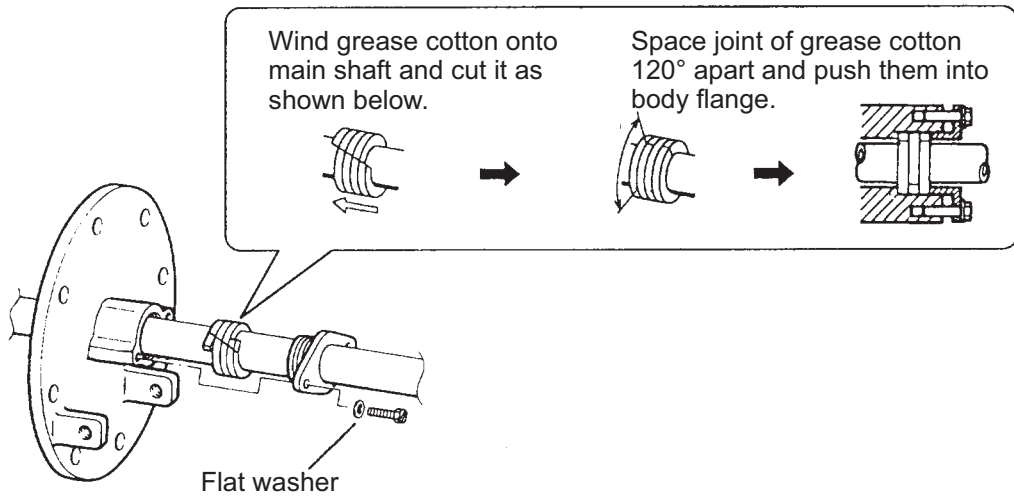


5. Clean the main shaft and pass it through the main body flange.

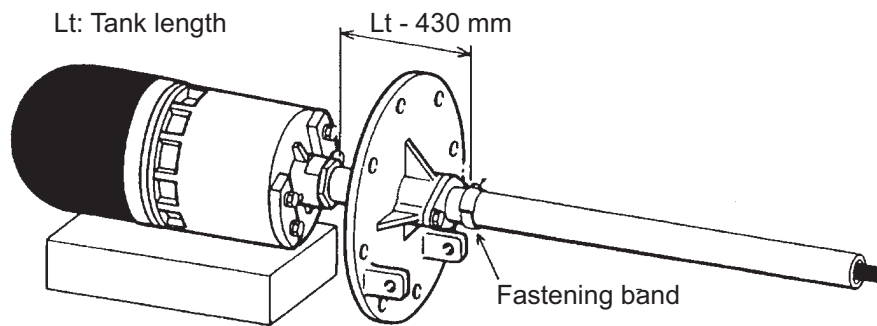


1. MOUNTING

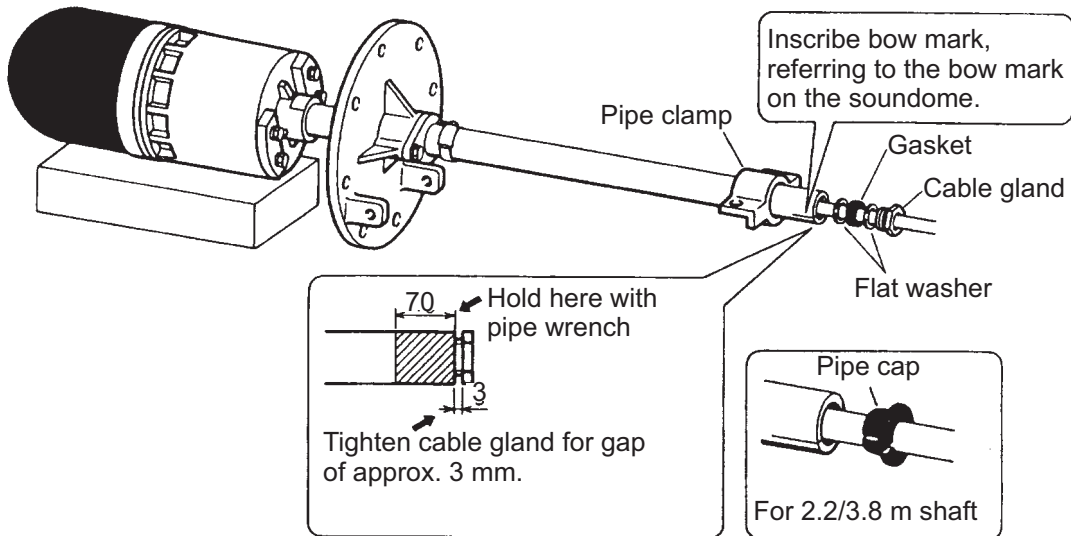
6. Set the grease cotton to the main body flange and tighten the grease cotton re-tainer temporarily.



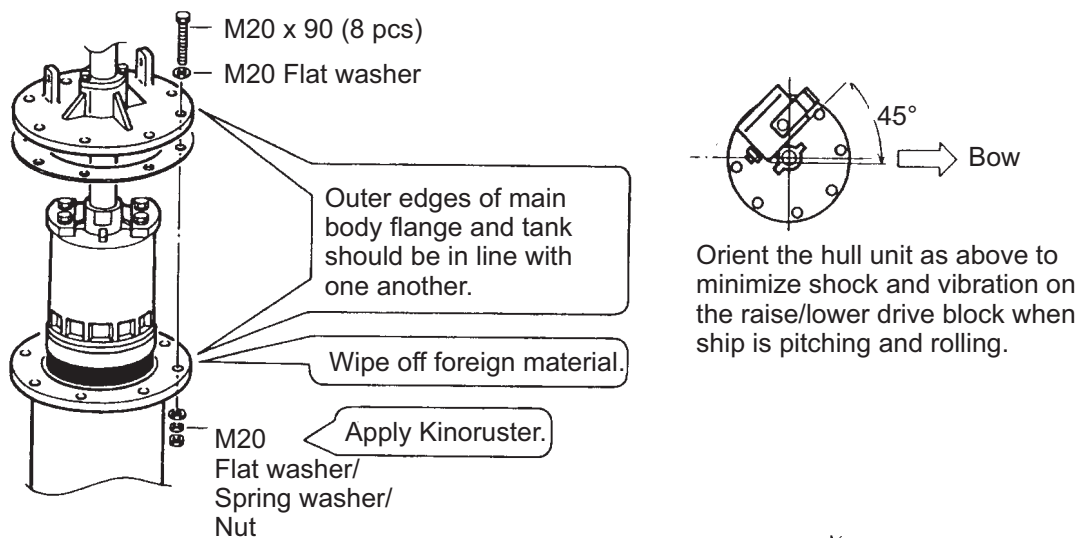
7. Temporarily fasten the fastening band onto the main shaft at the location shown below.



8. Inscribe bow mark at the top of the main shaft. Pass pipe clamp through the main shaft and install washer, gasket and cable gland.

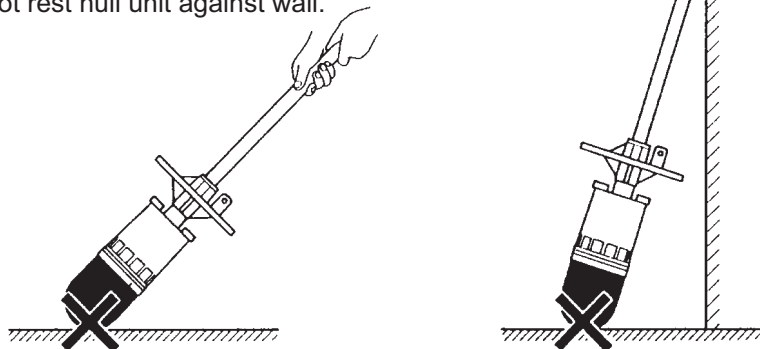


9. Fasten the hull unit to the transducer tank, orienting it so the ship's fore-aft line crosses the front panel of the raise/lower drive block at an angle of approximately 45 degrees.



CAUTION:

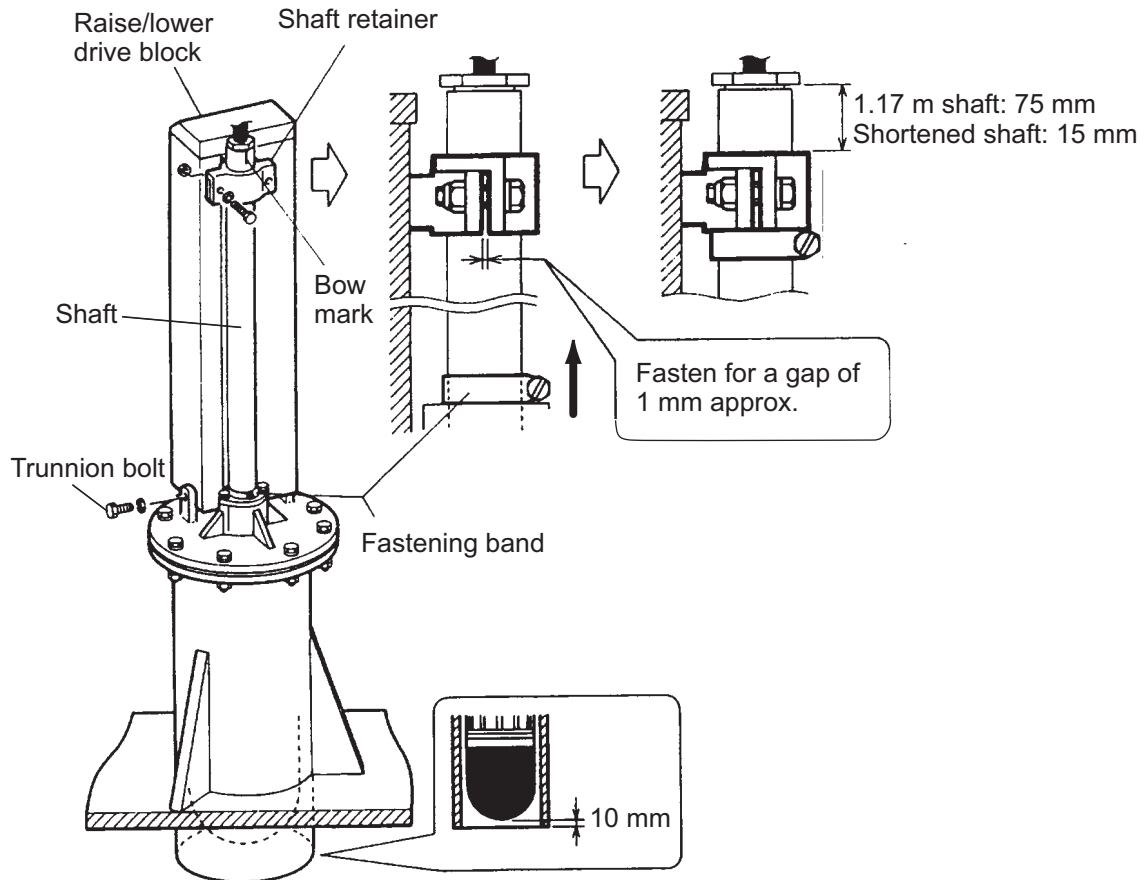
1. Do not drag hull unit on floor.
2. Do not rest hull unit against wall.



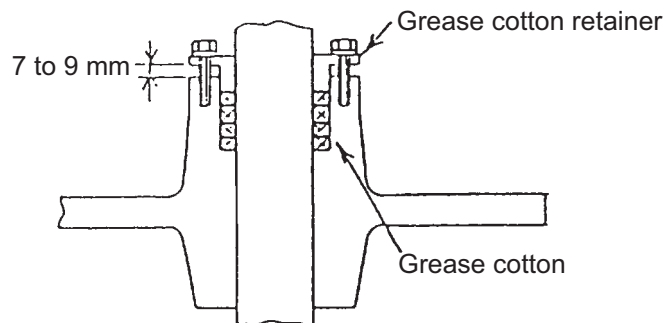
10. Install the raise/lower drive block as follows;
- a) Rotate the main shaft so the bow mark faces ship's bow.
 - b) Install the raise/lower drive block onto the main body flange.
 - c) Fix the main shaft with the shaft retainer.
 - d) Loosen the fastening band, slide it up to the shaft retainer and fasten it.
 - e) Check that the distance from the top of the main shaft to the top of the shaft retainer is as follows:
 - 1.17 m main shaft: 75 mm
 - Main shaft cut at Lt + 110 mm: 15 mm

1. MOUNTING

If not as shown above, loosen shaft retainer and fastening band to adjust the distance. This will place the bottom of the soundome 10 mm above the bottom of the retraction tank when the soundome is retracted.



11. Tighten the grease cotton retainer for a gap of 7 to 9 mm.

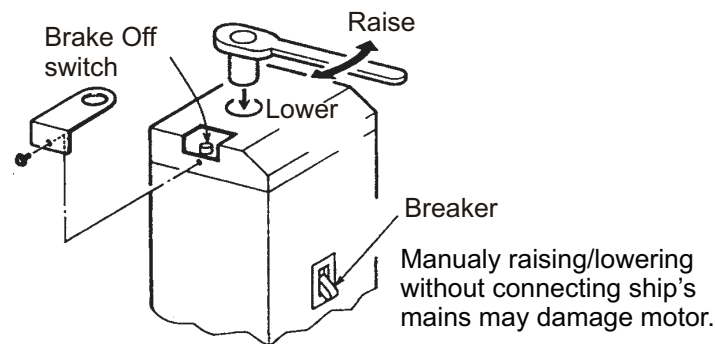


Checking manual raise/lower of transducer with hand crank

Perform this check after all wiring has been completed. Ship's mains power must be applied to the hull unit, otherwise the magnetic brake of the raise/lower motor activates, disabling the manual raise/lower gears.

1. turn off the breaker on the hull unit.
2. Detach the brake-off switch cover.
3. Set hand crank to the shaft gear and turn it while pressing the brake-off switch.

- The transducer should raise/lower smoothly with even force in upper to lower limits. If not, the centers of the main body flange and the retraction tank are not aligned. Adjust the hull mounting position if necessary.



1.2 Transceiver Unit

Mounting considerations

- The mounting location should be well ventilated and dry.
- The unit can be mounted on a bulkhead or the deck. The unit weights 8.5 kg so reinforce the mounting location if necessary.

To install the unit, refer to outline drawing D-2. Secure the maintenance space shown in the outline drawing for ease of maintenance and service.

1.3 Processor unit

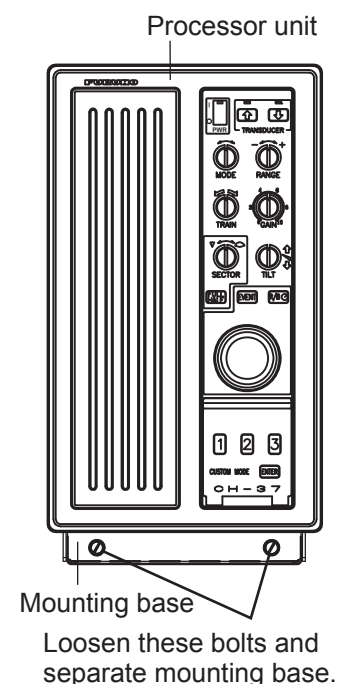
Mounting considerations

Select the mounting location considering the following conditions:

- Select a location where the processor unit can easily be operated while observing the fishing ground or area surrounding the vessel.
- Locate the unit at least 1 meter away from equipment which contains magnets (radar magnetron, loud-speaker).

Mounting Procedure

- Loosen two bolts at front of processor unit and remove the chassis from mounting base.
- Fix the mounting base with six tapping screws $\phi 6 \times 20$.
- Put the chassis onto the mounting base.
- Push the chassis toward the mounting base end.



1. MOUNTING

5. Fasten the chassis to mount base with two bolts removed at step 1.

1.4 Monitor

The portrait type monitor MU-151C or a commercial monitor can be used. The MU-151C is designed to be flush mount in a console.

When a commercial monitor is used, it should meet the following specifications;

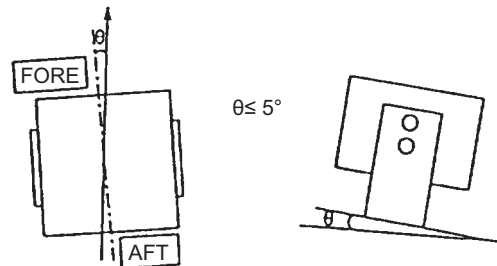
- Input signal: Analog RGB separated
- Resolution: XGA (1024 x 768) or SXGA (1280 x 1024), 60 Hz
- Signal level: 0.7 Vp-p, analog positive, Synchronization: TTL level
- Impedance: Video signal: 75 ohm, Horizontal 47 ohm, Vertical 47 ohm

1.5 Motion Sensor

The Motion Sensor MS-100 (option) measures ship's pitching and rolling angles. It is free from error caused by ship's vertical and horizontal motion. Therefore, it can be installed at any convenient location. However, ship's semi-permanent inclination due to loading imbalance cannot be detected. Compensate for this as described in Chapter 3.

Mounting considerations

- Vibration in the mounting area should be minimal.
- Locate the unit away from areas subject to water splash.
- The ambient temperature should not exceed 50°C (122°F).



Mounting procedure

Orient the FORE mark on the unit toward the ship's bow and mount the unit level to within 5 degree in all directions.

1.6 Clinometer

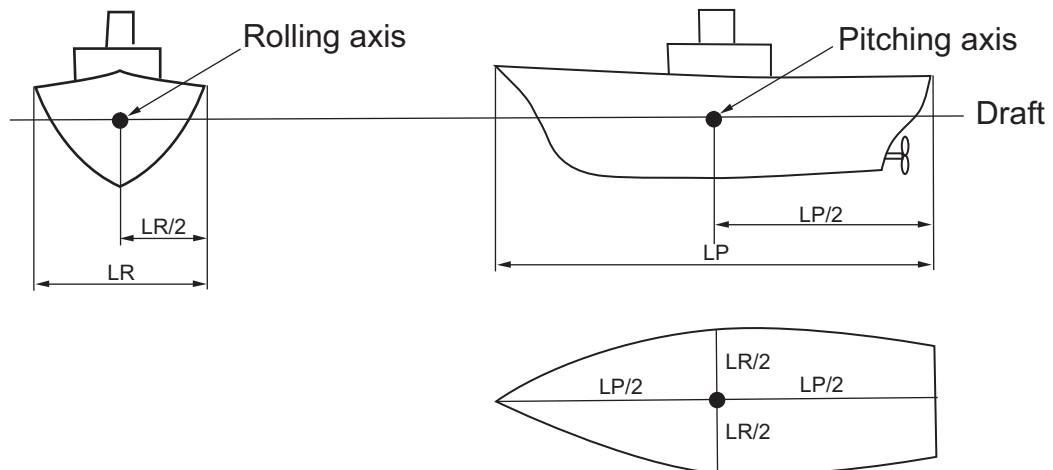
The clinometer BS-704 (option) detects ship's inclination caused by ship's rolling and pitching. Its output is used to stabilize the sonar beam against rolling and pitching.

The clinometer measures the inclination of the ship by sensing the direction of gravity acted on it, therefore when installed on a ship, it should be placed on or near the rotation axes of the ship's rolling and pitching. If it is placed away, upward from the axes, the measured value becomes larger than the correct value. On the contrary, if it is placed below the axes, the measured value becomes smaller. The same can be said when it is placed far to the left or right from the axes.

The rotation axes of pitching and rolling are theoretically considered to be located on the level of the ship's draft and in the center of ship. In other words, it can be said as follows;

- 1) Vertical position of the pitching and rolling axes is on the draft level of the ship.
- 2) Horizontal position of the rolling axes is in the center of ship's port-stbd line.
- 3) Horizontal position of the pitching axes is in the center of ship's fore-aft line.

From 1), 2) and 3) above, the crossing point of the two axes is indicated by the black dots in below. The clinometer should be mounted as close as possible to this point.



Note 1: The vicinity of the hull unit (on the ship's bottom) is too low and should be avoided, since the polarity of the measured value is reversed.

Note 2: When it is impossible to install the clinometer on the intersecting point of both rolling and pitching rotational axes, a special effort should be made to install it at place where the vertical distance to the intersecting point is minimum.

Note 3: The clinometer should be installed on the horizontal plane.

Note 4: Install the clinometer with the bow mark pointing in toward the ship's bow.

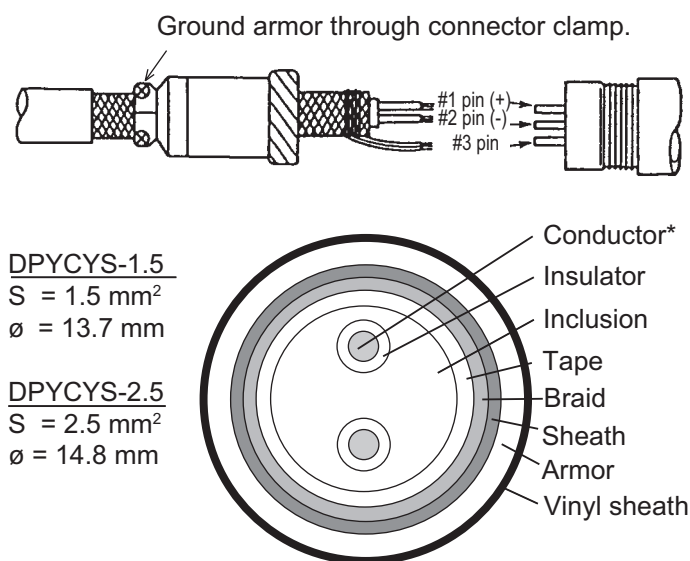
1. MOUNTING

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2. WIRING

2.1 Wiring Among Units

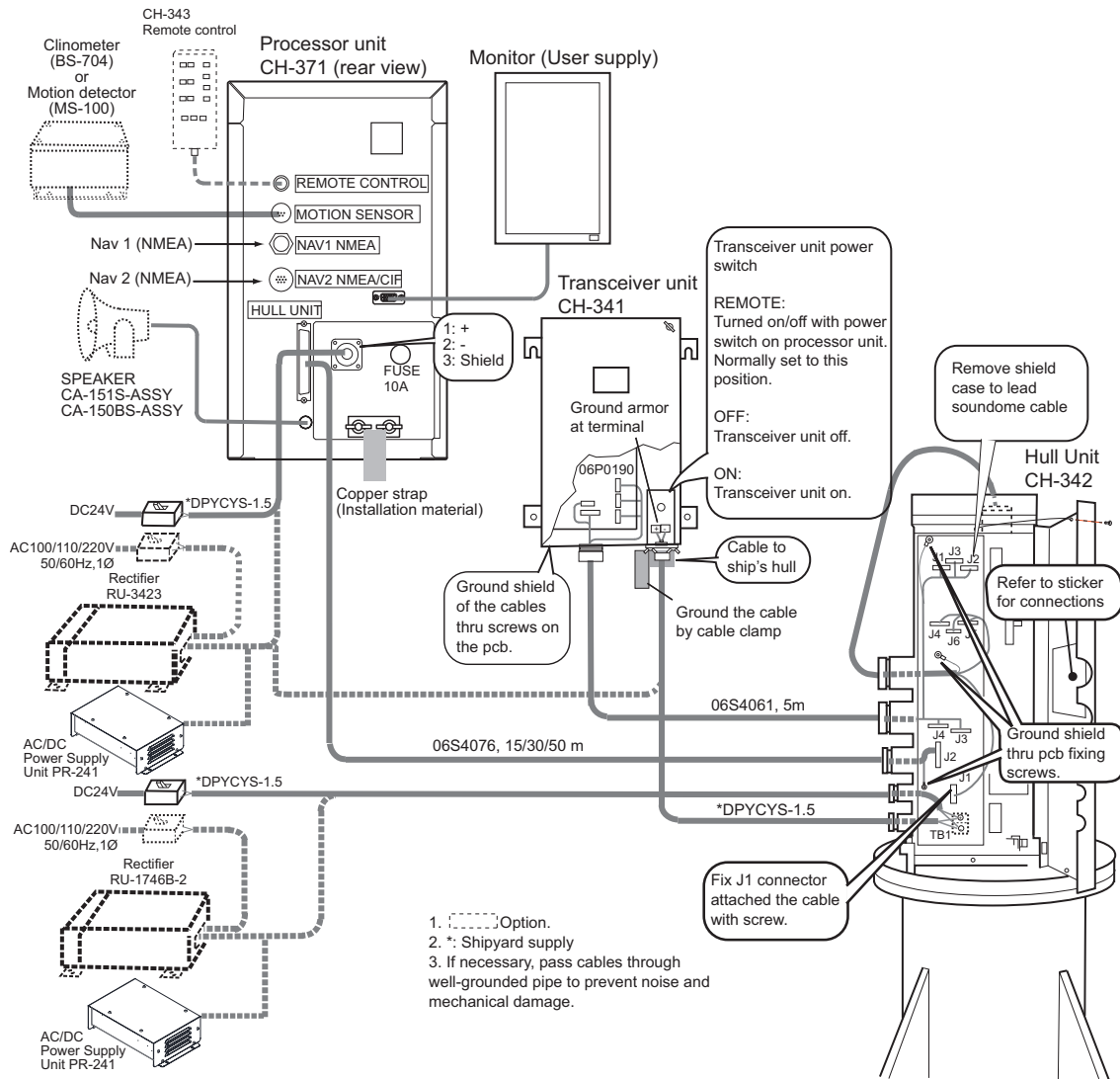
- The figure on the next page shows wiring among units.
- The signal cables are fitted with connectors. Connect the cables to the display, transceiver and hull units referring to the interconnection diagram and the drawing on page S-1.
- The power cable should be arranged locally. Use power cable type DPYCYS-2.5 and DPYCYS-1.5 (both Japan Industrial Standard cables) or equivalent cables. Attach supplied power connector as shown below.



DPYCYS-1.5, DPYCYS-2.5

- Install the main switch for the sonar where it can be easily accessed. Turn off this switch when the sonar is not being used, to reduce power consumptions and to keep the transducer from slipping by vibration.
- For AC mains, use rectifiers RU-3423 or AC/DC power supply unit PR-241 for the processor unit and transceiver units, and RU-1746B-2 or AC/DC power supply unit PR-241 for the hull unit.

2. WIRING



Use below rectifiers or AC/DC power supply unit for AC mains.

RU-3423: for processor unit

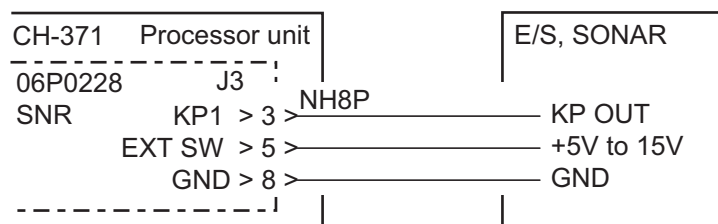
RU-1746B-2: for transceiver and hull unit

PR-241: For processor, transceiver and hull unit

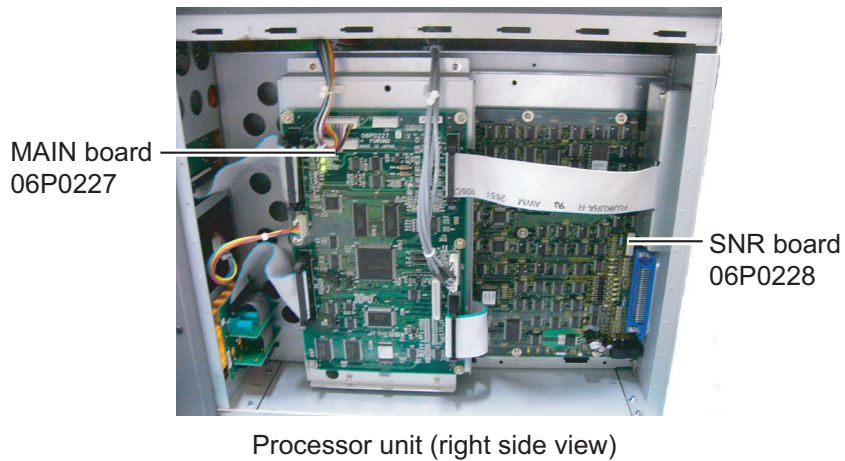
2.2 Synchronizing Transmission with Echo Sounder or Other Sonar

To synchronize transmission of the CH-37BB with an echo sounder or other type of sonar, connect it as shown below.

Connections for synchronizing Tx with other E/S, sonar



Positive KP 5 V to 15 V acceptable



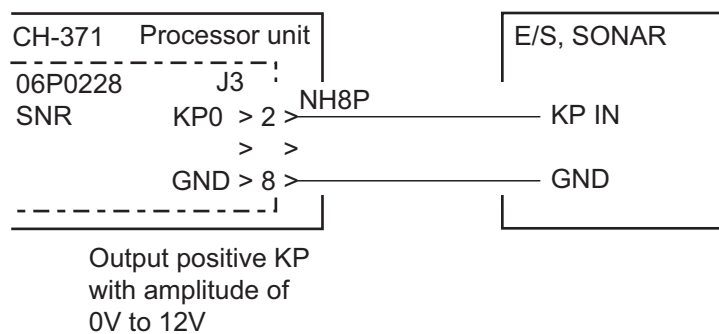
Menu setting

1. Press the MENU key.
2. Select SONAR at the top of the menu.

MENU:	SONAR	BOTTOM/3D	DUAL	E/S
TX RATE (MAX 10 :	10			
TX PULSE LENGTH :	LONG	SHORT		
TX OUTPUT POWER:	A	B	C (MAX)	
TX EXT SYNC :	OFF	ON		
IR :	OFF	ON		
STABILIZER :	OFF	ON		
COLOR :	16	8		
RES. COLOR :	LOG	LINEAR	SQUARE	
EXIT: PRESS MENU KEY				

3. Set TX EXT SYNC to ON.
4. Press the MENU key.

Note: Outputting KP of CH-37BB to other sonar or echo sounder

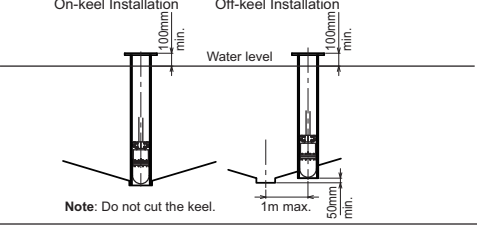
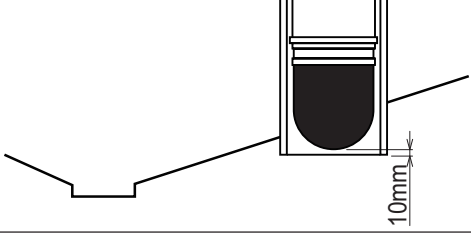
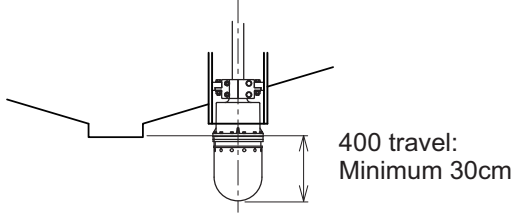
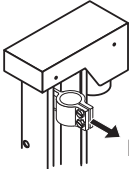


2. WIRING

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3. ADJUSTMENTS

3.1 General Checks

Check Item	Check Point, Rating
Retraction tank level	 <p>On-keel Installation Off-keel Installation</p> <p>100mm min. 100mm min.</p> <p>Water level</p> <p>Note: Do not cut the keel.</p> <p>1m max. 50mm min.</p>
Clearance between transducer and bottom of retraction tank when transducer is completely retracted by hand crank.	 <p>10mm</p>
Transducer travel (lowered by hand crank) Note: For maintenance, a clearance of approximately 1 meter is required under the bottom of the transducer.	 <p>400 travel: Minimum 30cm</p>
Manual raise/lower of transducer	Transducer can be raised/lowered smoothly with hand crank.
Transducer heading	 <p>Bow mark on the shaft sleeve should face ship's bow.</p> <p>BOW</p>
Wiring check	<ul style="list-style-type: none"> • All cables are correctly connected. • All lead wires are tightly fixed with contact pins or crimp-on lugs. • All screws are firmly fastened. • Cables are firmly secured. • Cable shields are properly grounded.
Rejecting source of noise and interference	<ul style="list-style-type: none"> • Noise generating machinery (motor, radiotelephone, TV set, etc.) are not placed nearby. • Magnetic devices are not placed in the vicinity of processor unit.
Ground	Each unit is grounded with a copper strap.
Ship's mains voltage	Ship's mains voltage is stable 24 VDC.
Watertightness	Water should not leak from the main body flange or along the main shaft.
Heading alignment	A target is displayed on the correct bearing.

3.2 Adjustment of Transceiver Unit

Selecting audio frequency

Select audio frequency of 1000 Hz or 900 Hz by jumper connector JP2 on pcb 06P0192 in the transceiver unit. The default setting is 1000 Hz. Refer to Figure 3-1 for the location of JP2.

Signal offset adjustment

When noise appears on the screen, adjust R61 (offset) on pcb 06P0192. Turning R61 clockwise removes low level signals in a similar way to the CLUTTER control on the processor unit. (While the CLUTTER control on the processor unit eliminates low level signals without changing signal level of strong signals, R61 shifts signal level of all signals.) When the offset adjustment is necessary, set R61 fully counterclockwise. Refer to Figure 3-1 for the location of R61.

Horizontal beamwidth

When the user wishes echoes to be displayed in high resolution, turn R40 on pcb 06P0192 clockwise to sharpen horizontal beamwidth. Do not turn it excessively clockwise, or an echo which should be displayed as a single solid mass may become hollow or split into smaller, fewer masses. Normally, set R40 at the midpoint of its travel.

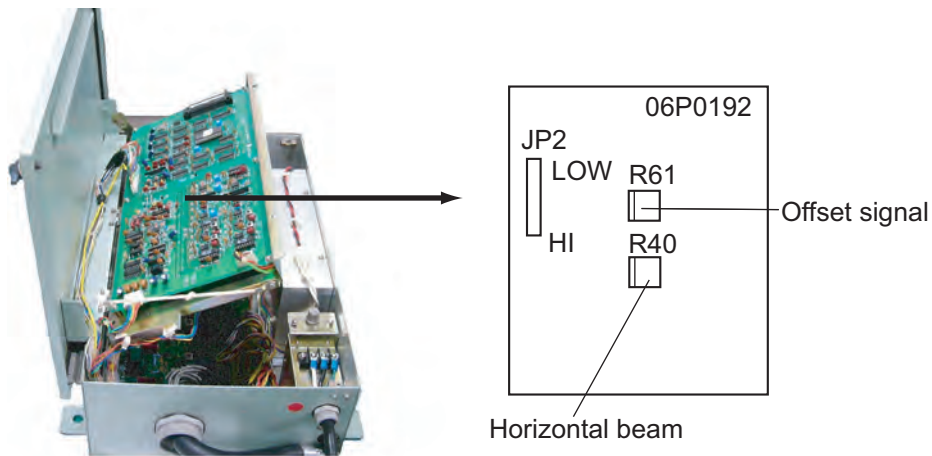
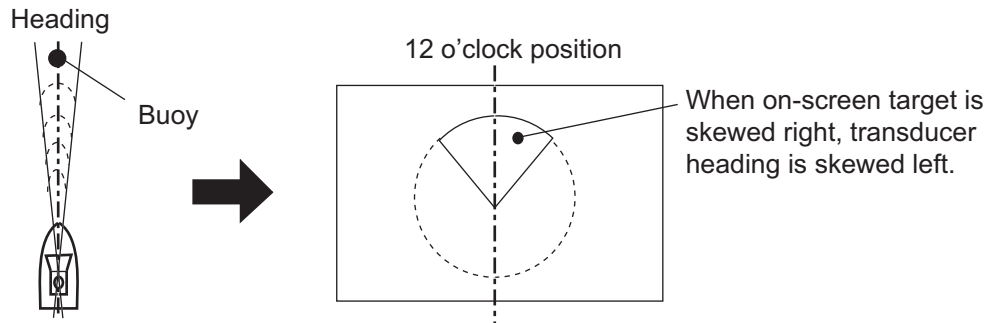


Figure 3-1 Transceiver unit, cover opened

3.3 Heading Alignment

1. Locate a target (buoy, etc.) in the bow direction and display it on the screen at close range. The heading alignment is correct when the target is displayed at 12 o'clock on the screen.

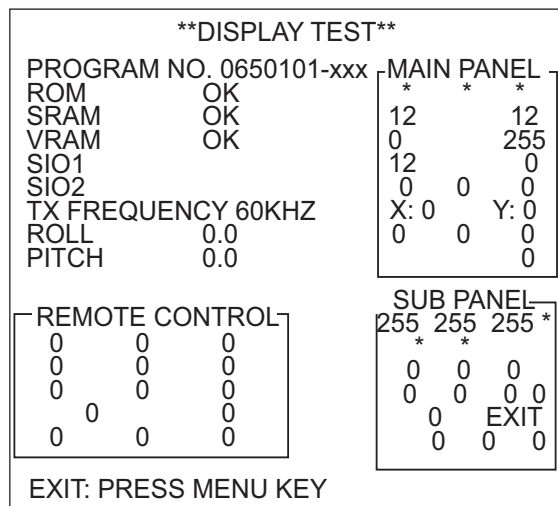


2. When the heading alignment is incorrect, loosen four bolts on the shaft retainer and then rotate the main shaft to align heading.
3. Tighten bolts.

3.4 Adjustment of Motion Sensor and Clinometer

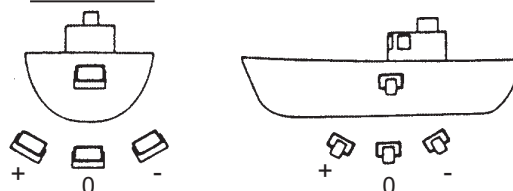
When the ship has a semi-permanent inclination, offset it as follows. Inclination of up to 10° can be corrected.

1. Turn on the power while pressing the **MENU** key. Release the **MENU** key when you hear a beep.
2. Select [DISPLAY TEST] then press the **MENU** key.



3. Read [ROLL/PITCH] angles from the display.
4. By using a clinometer or other means, measure ship's semi-permanent inclination angle. Take the polarity of the angle as follows;

Stern view



	+	-
ROLL	STBD UP	STBD DOWN
PITCH	Sterm UP	Sterm DOWN

3. ADJUSTMENTS

5. Adjust the potentiometers R35 (ROLL) and R36 (PITCH) on the MAIN board (06P0227) in the processor unit so the angle readout on the screen agrees with the angles measured at step 4.

3.5 LEDs Status

Processor unit

Range	Output power	Tilt	Tx Rate
400 m	C (max.)	0°	10

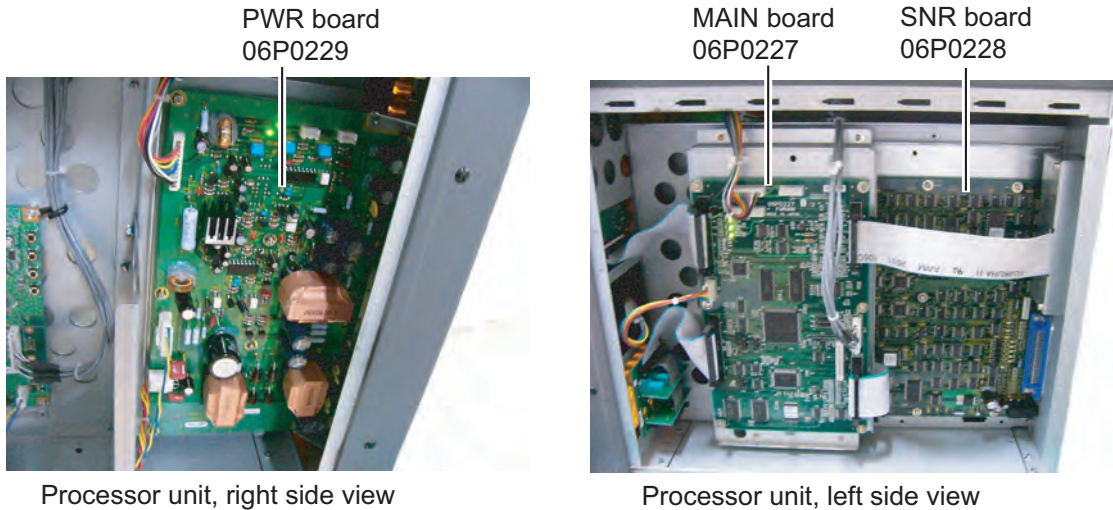


Table 3-2 LEDs in the processor unit

PCB	LED			Remarks
	No.	Signal	Status	
MAIN 06P0227	CR2	+5V	Lit	
	CR4	+12V	Lit	
	CR5	-12V	Lit	
SNR 06P0228	CR4	L CONT	Off	Off except when transducer is being lowered.
	CR7	TR CLK	Flickers	Flickers while transducer TILT lever is pressed; off while TILT lever is released.
	CR9	TI CLK	Flickers	Lights momentarily when the transducer is trained to 0° direction.
	CR12	TR 0°	Flickers	Lights momentarily when the transducer is trained to 180° direction.
	CR14	TR 180°	Flickers	Lights momentarily when the transducer tilt angle is +180°.
	CR16	TI +10°	Off	Lights momentarily when the transducer tilt angle is +10° or 90°.
	CR17	TI 190°	Off	Lights momentarily when the transducer tilt angle is +90° or 190°.
	CR20	HULL	Lit	Lights while ship's mains is supplied to the hull unit.
CR21	KP	Flickers	Flickers during KP transmission.	

PCB	LED			Remarks
	No.	Signal	Status	
PWR 06P0229	CR21	+5V	Lit	
	CR22	+12V	Lit	
	CR25	IN HL	Off	Lights when the over voltage protector operates.
	CR26	+115V	Lit	Power supply for color monitor
	CR27	-12V	Off	Lights momentarily when the over voltage protector for the -12V line operates.
	CR30	5V	Off	Lights momentarily when the over voltage protector for the 5V line operates.

Transceiver unit

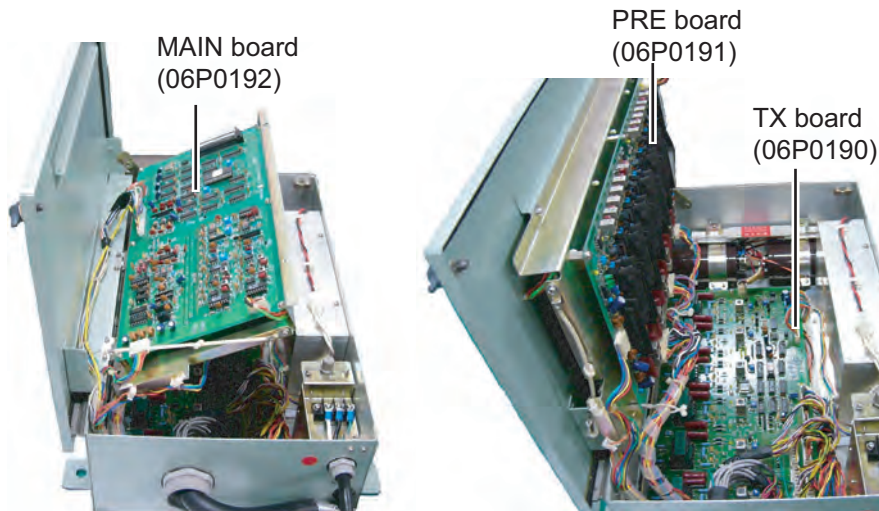


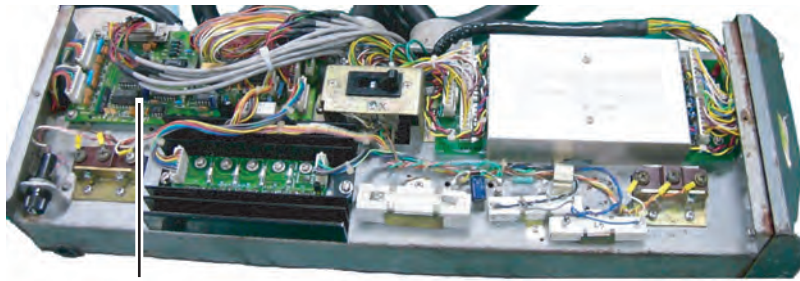
Table 3-3 LEDs in the transceiver unit

PCB	LED			Remarks
	No.	Signal	Status	
TX board 06P0190	CR11	+5V	Lit	
	CR12	+12V	Lit	
	CR13	+130V	Lit	
	CR39	TX1	Flickers	Flickers during transmission
	CR40	TX12	Flickers	
	CR41	TX11	Flickers	
	CR42	TX2	Flickers	
	CR43	TX3	Flickers	
	CR44	TX10	Flickers	
	CR45	TX9	Flickers	
	CR46	TX4	Flickers	
	CR47	TX5	Flickers	
	CR48	TX8	Flickers	
	CR49	TX7	Flickers	
CR50	TX6	Flickers		
PRE board 06P0191	CR1	+5V	Lit	
	CR2	+12V	Lit	
	CR3	-12V	Lit	

3. ADJUSTMENTS

PCB	LED			Remarks
	No.	Signal	Status	
MAIN board 06P0192	CR1	+5V	Lit	
	CR2	+12V	Lit	
	CR3	-12V	Lit	
	CR4	AUD	Flickers	Flickers against audio signal
	CR16	FS	Lit	FS signal
	CR17	TVG	Flickers	Digital TVG signal
	CR18	LCLK	Lit	TVG signal latch clock
PWR board 06P0172	CR9	-12V	Lit	
	CR10	+12V	Lit	
	CR11	+5V	Lit	
	CR12	+130V	Lit	

Hull unit



DRIVE board
(06P0193)

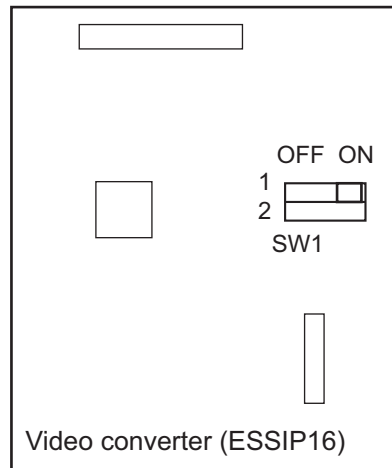
Table 3-4 LEDs in the hull unit

PCB	LED			Remarks
	No.	Signal	Status	
DRIVE board 06P0193	CR12	TR 0°	Flickers	Light momentarily when transducer is trained in 0° direction.
	CR13	TR 180°	Flickers	Lights momentarily when the transducer is trained in 180° direction.
	CR14	TI +10°	Off	Lights momentarily when the transducer is tilted to +10°C or 90°.
	CR15	TI 90°	Off	Lights momentarily when the transducer is tilted to 90°.
	CR16	+13V	Lit	
	CR18	TR CLK	Lit	Lights when the transducer is being trained.
	CR19	TI CLK	Off	Lights while the TILT lever is pressed, goes off when the TILT lever is released.
	CR20	+13V	Lit	

3.6 Monitor Size Setting

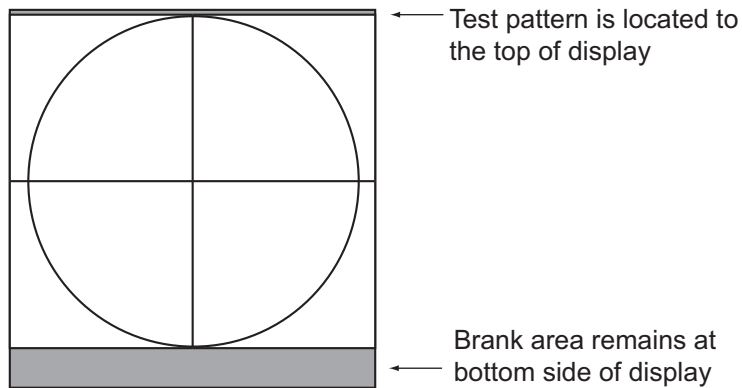
The CH-37BB is set at the factory for connection to a monitor of XGA resolution. For SXGA resolution, change the monitor resolution setting as shown below.

1. Confirm that the main switch of processor unit is turned off.
2. Unfasten the screws at the left side of the processor unit to remove the left side cover.
3. Set the DIP switch SW1-#1 on the Video Converter board (ESSIP-16) according to the monitor connected, referring to the figure below.

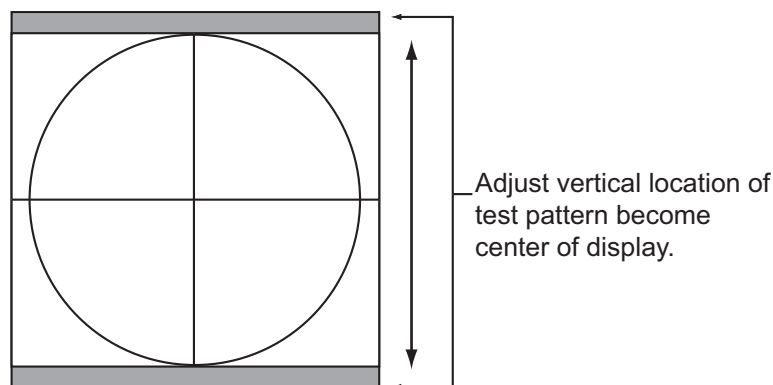


SW No.	XGA	SXGA
#1	OFF	ON
#2	OFF	OFF

4. Fasten the cover.
5. Press the **POWER** key while pressing the **MENU** key



6. Press ↓ to select [TEST PATTERN], then press the **MENU** key.



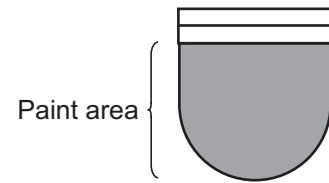
7. Turn the power off pressing the **POWER** key.

3.7 Soundome Painting

When the soundome is painted to keep marine life off the transducer, observe the following precautions:

Use only anti-fouling paint type SEATENDAR 20 (Manufacturer: Chugoku Marine Paint Co., Ltd., Japan).

Paint only the plastic portion of the dome. Painting the metal parts causes corrosion.



4. SYSTEM MENU

System menu should be customized for user's convenience.

1. Turn on the power while pressing the [MENU] key.
2. Select SYSTEM SETTING and press [MENU] key.

** SYSTEM SETTING **			
3D DISPLAY	:	<input type="checkbox"/> OFF	ON
SHIP'S POSITION	:	<input type="checkbox"/> OFF	L/L LOP
CURRENT DATA	:	<input type="checkbox"/> OFF	FLOW FROM FLOW TO
DEPTH DATA	:	<input type="checkbox"/> OFF	ON
HEADING INDICATION	:	<input type="checkbox"/> OFF	TRUE AZ
NORTH MARK	:	<input type="checkbox"/> OFF	ON
TRACK	:	<input type="text" value="10R"/>	20R
HDG/SPD DATA	:	<input type="text" value="NAV"/>	CI
NAV DATA	:	<input type="text" value="GPS"/>	LORAN C LORAN A
		<input type="text" value="DR"/>	DECCA OTHERS
DATA FORMAT FOR NAV2	:	<input type="text" value="NMEA"/>	CIF
CIF BAUD RATE	:	<input type="text" value="1200"/>	2400 <input type="text" value="4800"/>
TVG CORRECTION	:	<input type="checkbox"/> OFF	1/2 1
UNIT	:	<input type="text" value="m"/>	ft fa HIRO
V-MODE MANUAL TRAIN	:	<input type="text" value="HALF"/>	FULL
DEGAUSSING INTERVAL	:	<input type="text" value="30"/> SEC	
FACTORY SETTING	:	<input type="text" value="NO"/>	YES
EXIT : PRESS MENU KEY			

3. Select items and options with the arrow keys.
4. To return to normal operation, restart the unit.

Table 4-1 System setting menu description

Item	Description
3D display	Turns 3D mode on/off
SHIP'S POSITION	Turns position indication on/off and selects position format, latitude and longitude or Loran LOP
CURRENT DATA	Turns current (tide) data on/off
DEPTH DATA	Turns depth indication on/off
HEADING DISPLAY	Turns heading indication on/off and selects its format; true bearing or azimuth (16 azimuth bearing)
NORTH MARK	Turns north marker on/off
TRACK	Select length of course line plotting; 10R (ten times the range in use) or 20R (twenty times the range in use)
HDG/SPD DATA	Select source of data to be used to plot course line; NAV (Navigator), CI (Current Indicator)
NAV DATA	Selects source of data; GPS, Loran C, Loran A, DR, Decca, others
DATA FORMAT FOR NAV2	Selects data format for nav data; CIF (FURUNO) or NMEA
CIF BAUD RATE	Select baud rate of CIF data; 1200, 2400, 4800 bps

4. SYSTEM MENU

Item	Description
TVG CORRECTION	Changes TVG curve to compensate for absorption attenuation of ultrasonic wave in water. OFF, Standard TVG curve, 1/2, 1/2 of theoretical absorption value added to TVG curve, 1, Full theoretical absorption value added to TVG curve
UNIT	Select unit of depth measurement. m, meters; ft, feet; fm, fathom; HR, Hiro
V-MODE MANUAL TRAIN	Selects manual training sector width for the vertical fan mode. Half, half circle; Full, full circle
DEGAUSSING INTERVAL	Enter interval at which to have the screen degaussed. OFF degausses the screen at the maximum interval
FACTORY SETTING	Yes restores default system menu settings

APPENDIX 1 JIS CABLE GUIDE

Cables listed in the manual are usually shown as Japanese Industrial Standard (JIS). Use the following guide to locate an equivalent cable locally.

JIS cable names may have up to 6 alphabetical characters, followed by a dash and a numerical value (example: DPYC-2.5). For core types D and T, the numerical designation indicates the *cross-sectional Area (mm²)* of the core wire(s) in the cable. For core types M and TT, the numerical designation indicates the *number of core wires* in the cable.

1. Core Type 2. Insulation Type 3. Sheath Type

D Double core power line **P** Ethylene Propylene Rubber **Y** PVC (Vinyl)

T Triple core power line

M Multi core

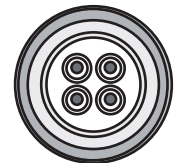
TT Twisted pair communications (1Q=quad cable)



DPYCY



TPYCY



MPYC-4



TTYCSLA-4

4. Armor Type 5. Sheath Type 6. Shielding Type

C Steel

Y Anticorrosive vinyl sheath

SLA All cores in one shield, plastic tape w/aluminum tape

-SLA Individually shielded cores, plastic tape w/aluminum tape

EX: ^{1 2 3 4 5 6} DPYCYSLA - 1.5 ^{1 2 3 4} MPYC - 4
 Designation type Core Area (mm²) Designation type # of cores

The following reference table lists gives the measurements of JIS cables commonly used with Furuno products:




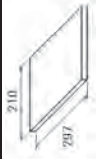
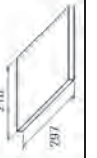
Type	Core		Cable Diameter	Type	Core		Cable Diameter
	Area	Diameter			Area	Diameter	
DPYC-1.5	1.5mm ²	1.56mm	11.7mm	TPYCY-1.5	1.5mm ²	1.56mm	14.5mm
DPYC-2.5	2.5mm ²	2.01mm	12.8mm	TPYCY-2.5	2.5mm ²	2.01mm	15.5mm
DPYC-4	4.0mm ²	2.55mm	13.9mm	TPYCY-4	4.0mm ²	2.55mm	16.9mm
DPYC-6	6.0mm ²	3.12mm	15.2mm	TPYCYSLA-1.5	1.5mm ²	1.56mm	13.9mm
DPYC-10	10.0mm ²	4.05mm	17.1mm	TTYC-7SLA	0.75mm ²	1.11mm	20.8mm
DPYC-16	16.0mm ²	5.10mm	19.4mm	TTYCSLA-1	0.75mm ²	1.11mm	9.4mm
DPYCY-1.5	1.5mm ²	1.56mm	13.7mm	TTYCSLA-1Q	0.75mm ²	1.11mm	10.8mm
DPYCY-2.5	2.5mm ²	2.01mm	14.8mm	TTYCSLA-4	0.75mm ²	1.11mm	15.7mm
DPYCY-4	4.0mm ²	2.55mm	15.9mm	TTYCY-4SLA	0.75mm ²	1.11mm	19.5mm
DPYCYSLA-1.5	1.5mm ²	1.56mm	11.9mm	TTYCYSLA-1	0.75mm ²	1.11mm	11.2mm
DPYCYSLA-2.5	2.5mm ²	2.01mm	13.0mm	TTYCYSLA-4	0.75mm ²	1.11mm	17.9mm
MPYC-2	1.0mm ²	1.29mm	10.0mm				
MPYC-4	1.0mm ²	1.29mm	11.2mm				
MPYC-7	1.0mm ²	1.29mm	13.2mm				
MPYCY-12	1.0mm ²	1.29mm	19.0mm				
MPYCY-19	1.0mm ²	1.29mm	22.0mm				

PACKING LIST

CH-371

06AX-X-9851 -1 1/1

A-1

NAME	OUTLINE	DESCRIPTION/CODE No.	QTY
ユニット			
操作制御部 PROCESSOR UNIT		CH-371-J/E 000-020-444-00 **	1
予備品			
予備品 SPARE PARTS		SP06-01501 001-166-030-00	1
工事材料			
工事材料 INSTALLATION MATERIALS		CP06-01102 006-563-250-00	1
図書			
取扱説明書 OPERATOR'S MANUAL		000-13370-* 000-171-778-1* **	1
装備要領書 INSTALLATION MANUAL		1000-13370-* 000-171-810-1* **	1

コート番号末尾の[**]は、選択品の代表コードを表します。
CODE NUMBER ENDING WITH "**" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

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

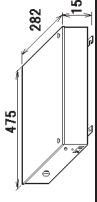


C1337-Z01-B

PACKING LIST

CH-341-60/81/113/162

06AR-X-9852 -0 1/1

A-2

NAME	OUTLINE	DESCRIPTION/CODE	QTY
ユニット			
送受信装置 TRANSCIEVER UNIT		CH-341-60/81/113/162 000-068-717-00 SP06-01002	1
予備品			
予備品 SPARE PARTS		SP06-01002 006-563-260-00	1
工事材料			
工事材料 INSTALLATION MATERIALS		CP06-01103 006-563-300-00	1

コート番号末尾の[**]は、選択品の代表コードを表します。
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TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT QUALITY IS THE SAME.

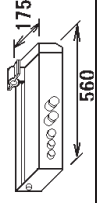


(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1303-Z02-A

PACKING LIST

CH-3421-37*

06AR-X-9853 -0 1/1
A-3

NAME	UNIT	OUTLINE	DESCRIPTION/CODE	Q'TY
ユニット				
上下動部 RAISE/LOWER DRIVE UNIT			CH-3421-37* 006-565-640-00 **	1
予備品				
予備品 SPARE PARTS			SP06-01003 006-563-320-00	1
工事材料				
工事材料 INSTALLATION MATERIALS			CP06-01104 006-563-340-00	1

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型式/ユニット番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

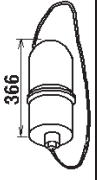
(略図の寸法は、参考値です。DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

C1303-Z03-A

PACKING LIST

CH-3422-113*/115*

06AR-X-9854 -0 1/1
A-4

NAME	UNIT	OUTLINE	DESCRIPTION/CODE	Q'TY
ユニット				
旋回俯仰部 COMPLETE SOUNDOME ASSEMBLY			CH-3422-113*/115* 006-547-150-00 **	1

ユニット番号末尾の「*」は、選択品の代表コードを表します。
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型式/ユニット番号が2段の場合、下段より上段に代わる過渡期品であり、どちらが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

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

C1303-Z04-A

PACKING LIST

CH-3424-11-60/CH-3424-22-60

06AR-X-9855 -2 1/1

A-5

NAME	OUTLINE	DESCRIPTION/CODE No.	Q'TY
ユニット フラグ			
MAIN BODY FLANGE ASSEMBLY		CH-3423 006-547-210-00	1
現地組立キット			
HULL UNIT ASSEMBLY PARTS		CH-3424-11/22 006-546-130-00 **	1
スーパ-ソナーオイル		4リットル缶 001-247-260-00	1
SUPER SONAR OIL			

コード番号末尾の「**」は、選択品の代表コードを表します。
CODE NUMBER ENDING WITH " **" INDICATES THE CODE NUMBER OF REPRESENTATIVE MATERIAL.

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TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

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

C1303-Z05-C

FURUNO

A-6

CODE NO. TYPE		06AR-X-9402-2 1/1		
COLOR SECTOR SCANNING SONAR CH-37, CH-37BB				
工事材料表				
INSTALLATION MATERIALS				
番号	名称	略図	型名/規格	
NO.	NAME	OUTLINE	DESCRIPTIONS	
			数量	
			Q'TY	
1	ケーブル(組品) CABLE ASSEMBLY		06S4061-0-45M* 000-126-159-10	1
2	ケーブル(組品) CABLE ASSEMBLY		81-546-0089-001*15M* 001-109-390-10	1
3	ケーブル(組品) CABLE ASSEMBLY		81-546-0089-002 001-110-000-10	1
4	ケーブル(組品) CABLE ASSEMBLY		81-546-0089-003*50M* 001-110-010-10	1

型式/コード番号が2段の場合、下段より上段に代わる過渡期品であり、どちらかが入っています。なお、品質は変わりません。
TWO TYPES AND CODES MAY BE LISTED FOR AN ITEM. THE LOWER PRODUCT MAY BE SHIPPED IN PLACE OF THE UPPER PRODUCT. QUALITY IS THE SAME.

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

FURUNO ELECTRIC CO., LTD.


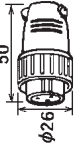
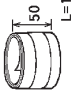
C1303-IM2-C

FURUNO

CODE NO.	006-563-250-00	06AR-X-9405-5
TYPE	CP06-01102	1/1

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	圧着端子 CRIMP-ON LUG		FVZ-4 BLU K CODE NO. 000-157-247-11	4	
2	コネクタ (NJC) CONNECTOR (NJC)		NJC-203-PF #R0163* CODE NO. 000-160-165-11	1	
3	7-ス板 COPPER STRAP		MEA-1004-0 R0HS CODE NO. 500-310-040-10	2	

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


FURUNO ELECTRIC CO., LTD.

FURUNO

CODE NO.	006-563-340-00	06AR-X-9403-2
TYPE	CP06-01104	1/1

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	圧着端子 CRIMP-ON LUG		FVZ-4 BLU K CODE NO. 000-157-247-11	6	

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

FURUNO ELECTRIC CO., LTD.

1 2 3 4 5 6

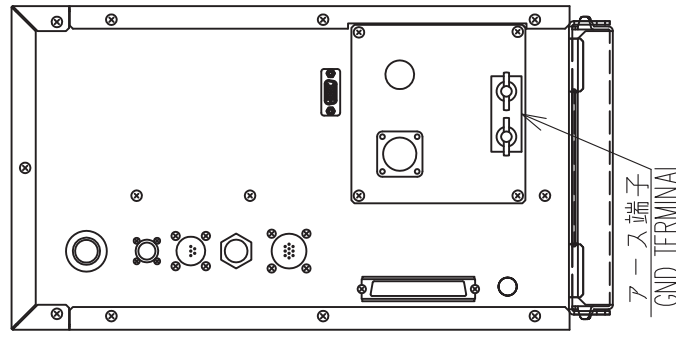
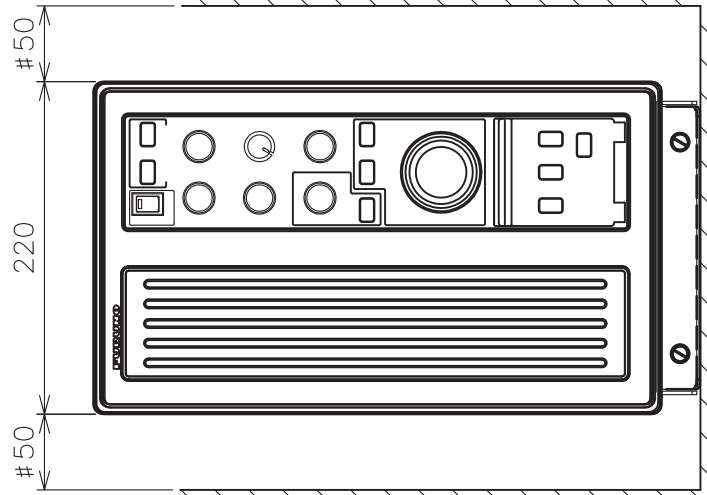
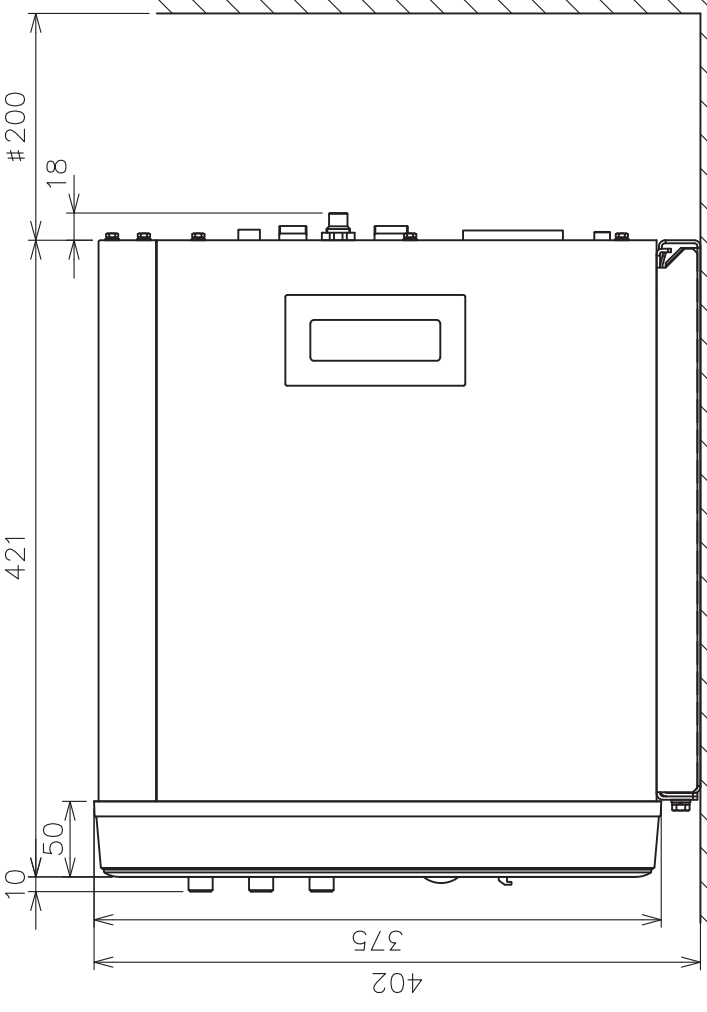
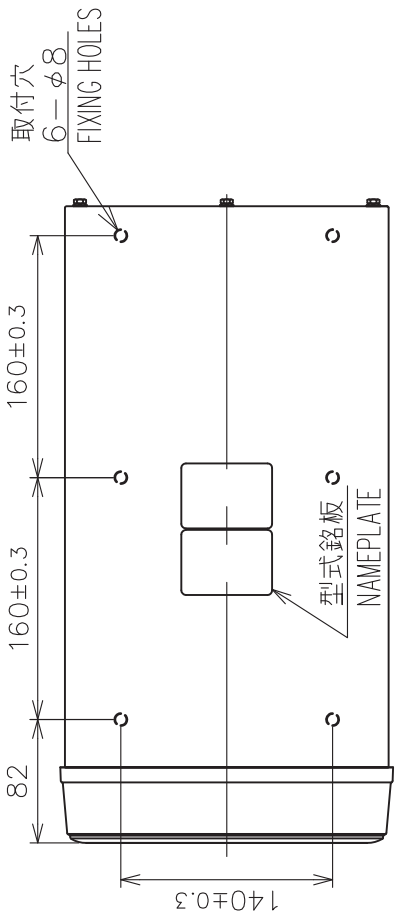
- 注記
- 1) 指定なき寸法公差は表1による。
 - 2) # : 最小サービス空間寸法。
 - 3) 取付用ネジはM6ボルトを使用のこと。

NOTE

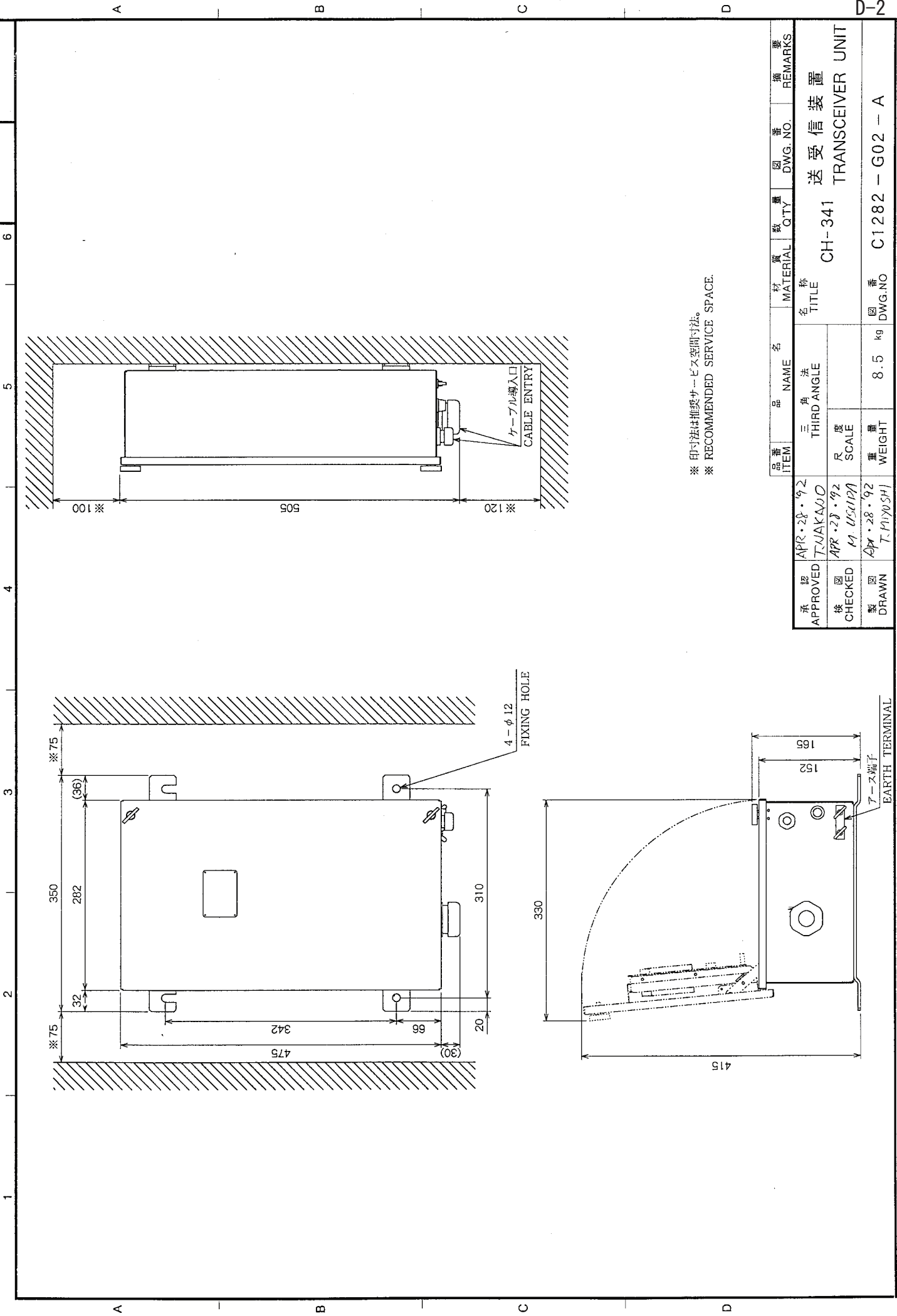
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. # : MINIMUM SERVICE CLEARANCE.
3. USE M6 BOLTS FOR FIXING THE UNIT.

表1 TABLE 1

寸法範囲 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3



DRAWN	4/Jul/2012 T.YAMASAKI	TITLE	CH-371
CHECKED	4/Jul/2012 H.MAKI	名称	操作制御部
APPROVED	6/Jul/2012 Y.NISHIYAMA	外寸図	PROCESSOR UNIT
SCALE	1/5 MASS 18 ±0.04 kg	NAME	OUTLINE DRAWING
DWG.No.	C1337-G01-B	REF.No.	06-026-100G-1



※ 印寸法は推奨サービス空間寸法。
 ※ RECOMMENDED SERVICE SPACE.

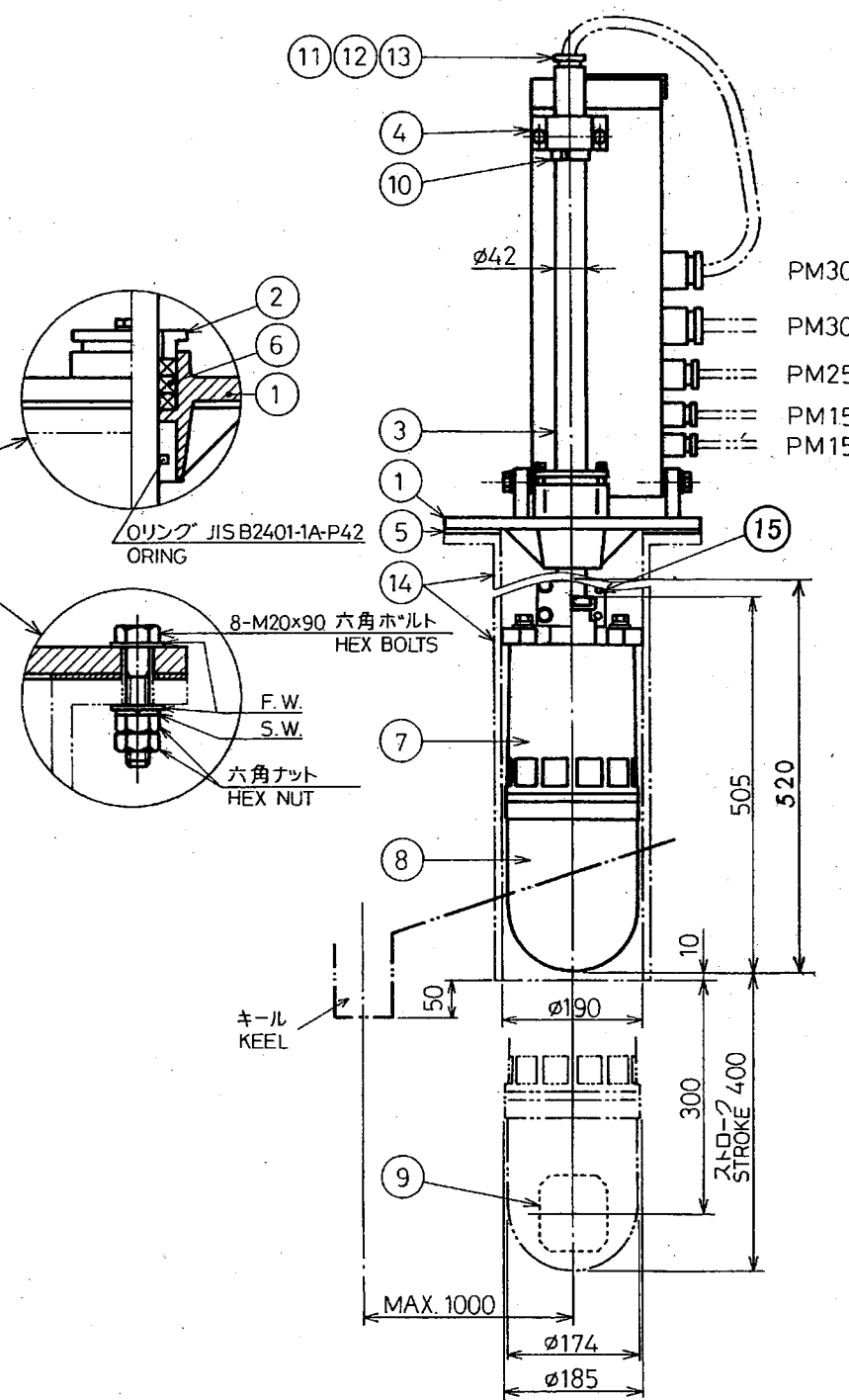
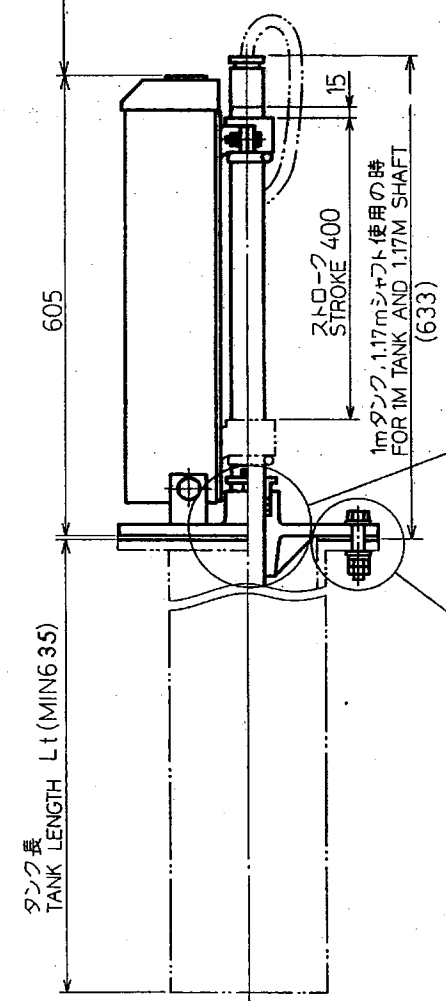
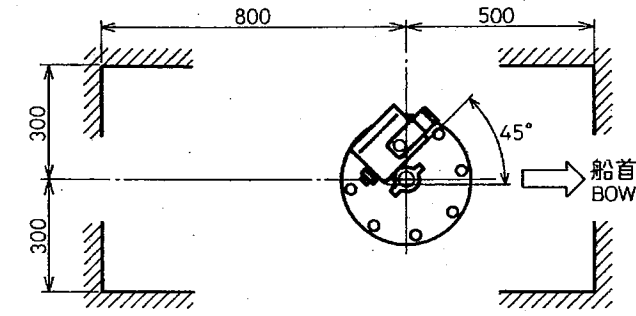
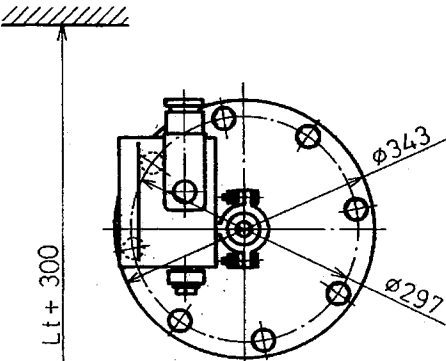
承認 APPROVED	品番 ITEM	品名 NAME	材名 MATERIAL	数量 QTY	図番 DWG. NO.	摘要 REMARKS
APR・28・92 T. YAKANO		三角法 THIRD ANGLE				
検図 CHECKED	APR・28・92 M. USUI	R SCALE			CH-341	送受信装置 TRANSCIVER UNIT
製図 DRAWN	APR・28・92 T. MIYOSHII	重量 WEIGHT			8.5 kg	国番 DWG. NO. C1282 - G02 - A

推奨保守点検用スペース (尺度 1/20)
RECOMMENDED SERVICE SPACE SCALE(1/20)

注
NOTES:

- 1) 装備位置は船首から 1/3 (小型船では 1/2) 程度でキールから 1m 以内とする。
- 2) 上下シャフトの長さ (Ls) は、次の式の値で切断すること。
(Lt: 格納タンクの長さ)
 $Ls = Lt + 110 \text{ (mm)}$
- 3) 上下装置の船首方向は左図の矢印 (⇒) で示す。
- 4) ドーム内部保守点検のため、上下装置上部には図示のスペースを設けるか、障害となる天井等に 300mm × 300mm 程度の角穴を明ける。

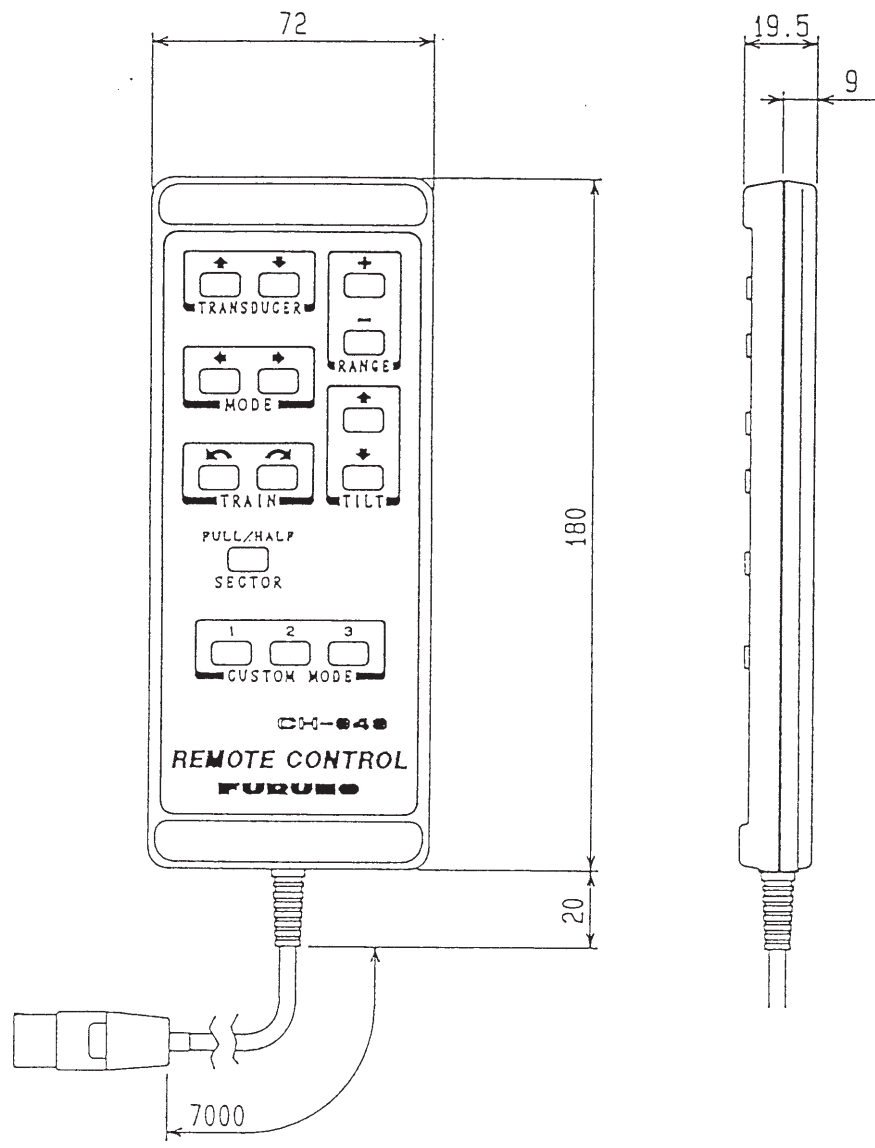
- 1) THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND BESIDE THE KEEL LINE (LESS THAN 1000mm FROM KEEL LINE).
- 2) THE MAIN SHAFT SHOULD BE CUT TO A LENGTH (Ls) GIVEN BY THE FOLLOWING EQUATION.
 $Ls = Lt + 110 \text{ (mm)}$ Lt: TANK LENGTH
- 3) ⇒ (ARROW) SHOWS FORE FOR HULL UNIT AND TANK.
- 4) IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING IS NOT OBTAINED, MAKE A HOLE OF 300mm × 300mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.



15	シャフト保護金具 SHAFT RETAINER		1		
14	格納タンク RETRACTION TANK				
13	ガスケット GASKET		1		
12	座金 WASHER		2		
11	締付グラウンド CABLE GLAND		1		
10	ジュビリークリップ FASTENING BAND		1		
9	送受波器 TRANSDUCER		1		
8	ドーム (D) SOUNDOME (D)		1		
7	ドーム (U) SOUNDOME (U)		1		
6	グリスコットン GREASE COTTON		1		
5	フランジパッキン GASKET		1		
4	パイプクランプ PIPE CLAMP		1		
3	上下シャフト MAIN SHAFT		1		
2	グリスコットン押え台 GREASE COTTON RETAINER		1		
1	フランジ MAIN BODY FLANGE		1		
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

DRAWN 14/04/11 T. YAMASAKI	TYPE CH-342
CHECKED 14/04/11 T. Yamasaki	名称 上下装置
APPROVED 14/04/11 T. Yamasaki	外寸図
SCALE MASS	MODEL CH-34/37
Dwg No. C1282-G03- D	BLOCK No. NAME HULL UNIT
	REF. No. OUTLINE DRAWING

A
B
C
D

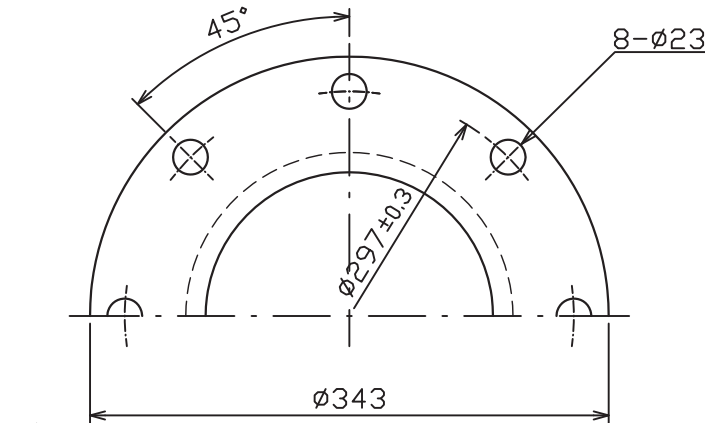


品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	備考 REMARKS
承認 APPROVED	三角法 THIRD ANGLE	名稱 TITLE	CH-343	リモートコントロール REMOTE CONTROL	
検図 CHECKED	尺度 SCALE	1 / 2			
製図 DRAWN	重量 WEIGHT	0.38 kg	図番 DWG. NO	C1282 - G04 - A	

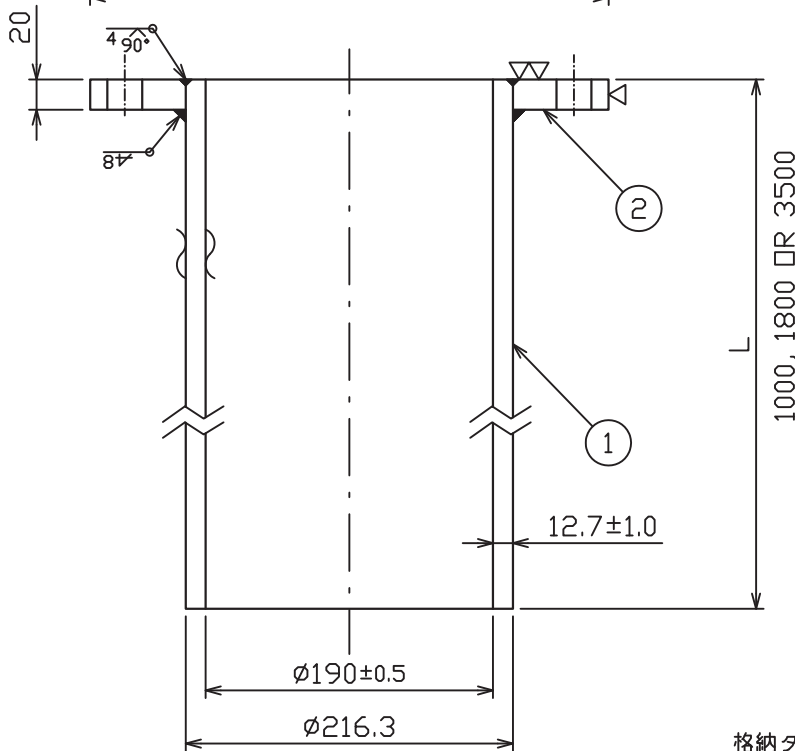
表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3
500 < L ≤ 1000	±4
1000 < L ≤ 2000	±5
2000 < L ≤ 4000	±7

A



B



C

注記

- 1) 指定なき寸法公差は表1による。
- 2) フランジ面は塗装しないこと。
- 3) タンク側面はエピコンジクリッチプライマ(中国塗料製)を塗布すること。
- 4) タンク内面はビニル防汚塗料を二重に塗布すること。

格納タンクの長さ : Lt
 LENGTH OF RETRACTION TANK: Lt
 Lt = mm

NOTE

1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
2. DO NOT PAINT ON SURFACE OF FLANGE.
3. APPLY ZINC RICH PRIMER ON OUTSIDE OF TANK.
4. APPLY VINYL ANTI-FOULING PAINT TWICE ON INSIDE OF TANK.

長さ L (mm) LENGTH (mm)	質量(kg±10%) MASS
1000	73
1800	123
3500	231

D

品番 ITEM	品名 NAME	材質 MATERIAL	数量 QTY	図番 DWG. No.	摘要 REMARKS
2	フランジ FLANGE	SS41P	1	JIS G3101	ROLLED STEEL FOR GENERAL STRUCTURE
1	本体 BODY	STPG-38-E-C	1	200A, 8" SCHEDULE 80	

DRAWN 7/May/2013 T.YAMASAKI		TITLE 06-007-1570
CHECKED 7/May/2013 H.MAKI		名称 格納タンク(鋼製)
APPROVED 8/May/2013 H.MAKI		外寸図
SCALE 1/5	MASS 表2参照 SEE TABLE 2	NAME RETRACTION TANK (STEEL HULL)
DWG. No. C1229-006-H	REF. No. 06-007-1570-2	OUTLINE DRAWING

A

B

C

D

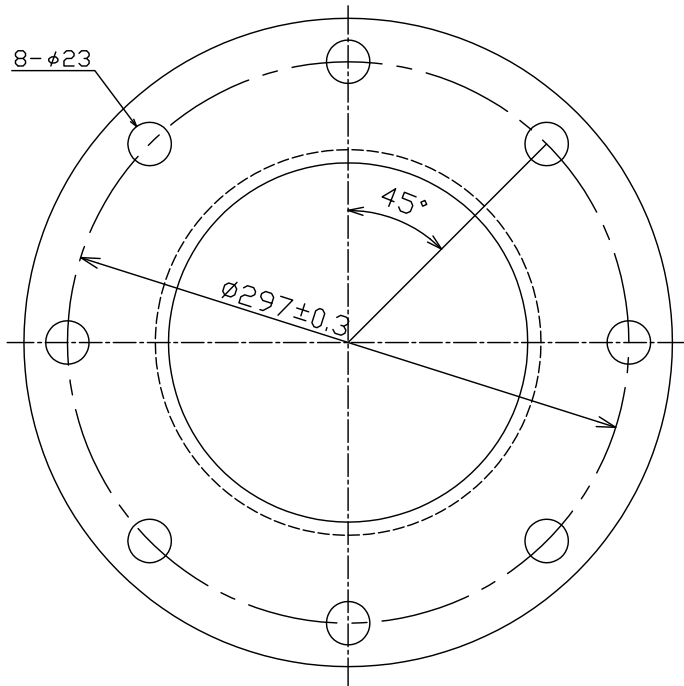
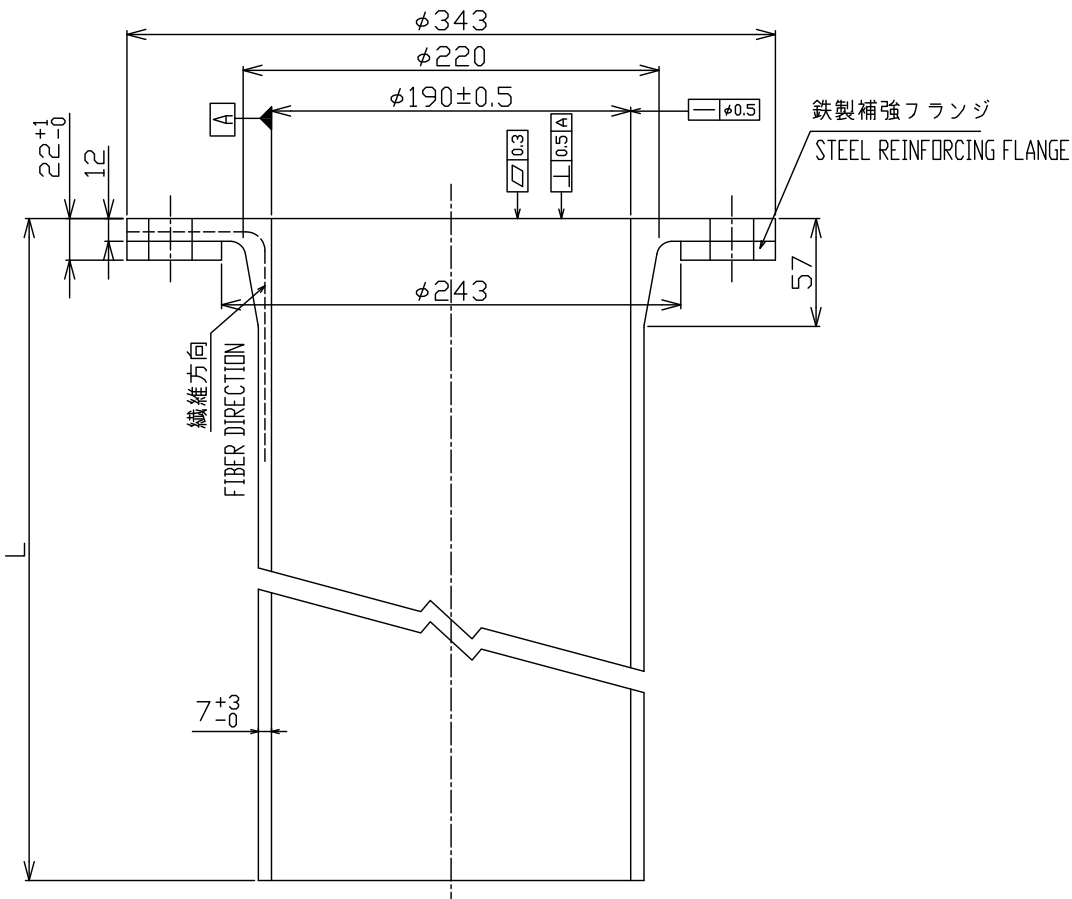


表1 TABLE 1

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

表2 TABLE 2

タンク長(L) (mm) TANK LENGTH	質量 (kg±10%) MASS	タンク型式 TANK TYPE
1000	12	06-021-4024
1800	18	06-007-1573



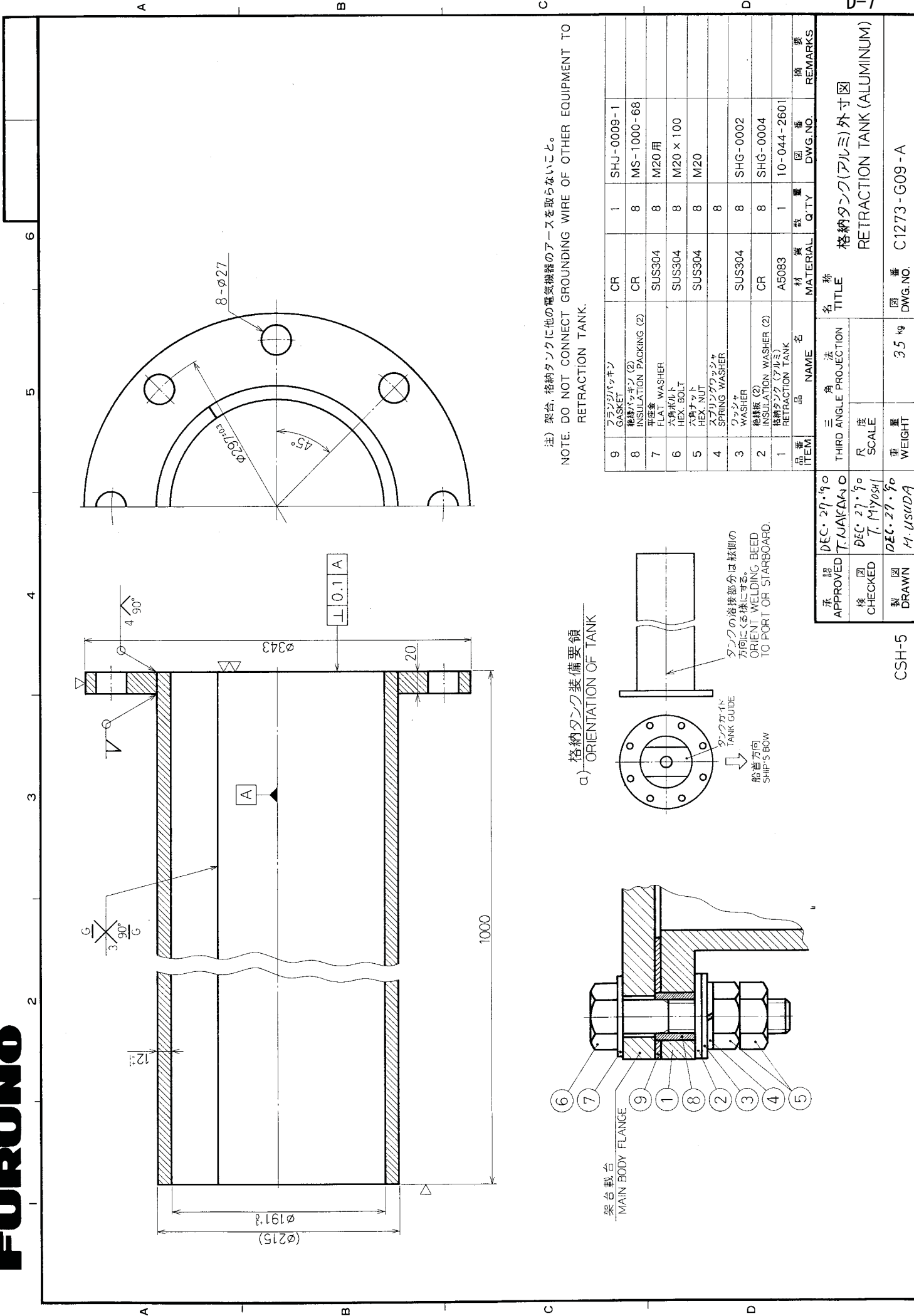
注記

1) 指定外の寸法公差は表1による。

NOTE

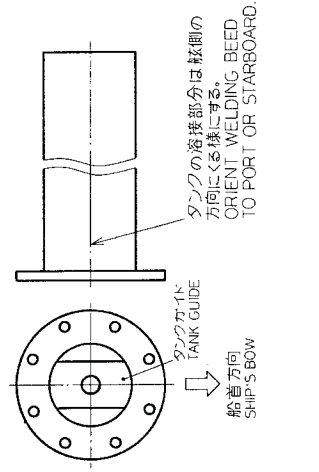
1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN 13/Dec/2018 T. YAMASAKI		TITLE 06-021-4024/06-007-1573
CHECKED 13/Dec/2018 H. MAKI	CH-37(BB), etc.	名称 FRP格納タンク
APPROVED 13/Dec/2018 H. MAKI	CH-500/600 CH-250/300	外寸図
SCALE 1/4	MASS 表2参照 SEE TABLE 2	NAME RETRACTION TANK (FOR FRP HULL)
DWG. No. C1315-G14-D	REF. No. 06-021-4024-0	OUTLINE DRAWING



注) 架台, 格納タンクに他の電気機器のアースを取らないこと。
 NOTE: DO NOT CONNECT GROUNDING WIRE OF OTHER EQUIPMENT TO RETRACTION TANK.

格納タンク装備要領
 a) ORIENTATION OF TANK



品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q.TY	図番 DWG.NO.	備考 REMARKS
9	フランジパッキン GASKET	CR	1	SHJ-0009-1	
8	絶縁パッキン(2) INSULATION PACKING (2)	CR	8	MS-1000-68	
7	平垫金 FLAT WASHER	SUS304	8	M20用	
6	六角ボルト HEX BOLT	SUS304	8	M20 x 100	
5	六角ナット HEX NUT	SUS304	8	M20	
4	スプリングワッシャー SPRING WASHER		8		
3	ワッシャー WASHER	SUS304	8	SHG-0002	
2	絶縁板(2) INSULATION WASHER (2)	CR	8	SHG-0004	
1	格納タンク(アルミ) RETRACTION TANK	A5083	1	10-044-2601	

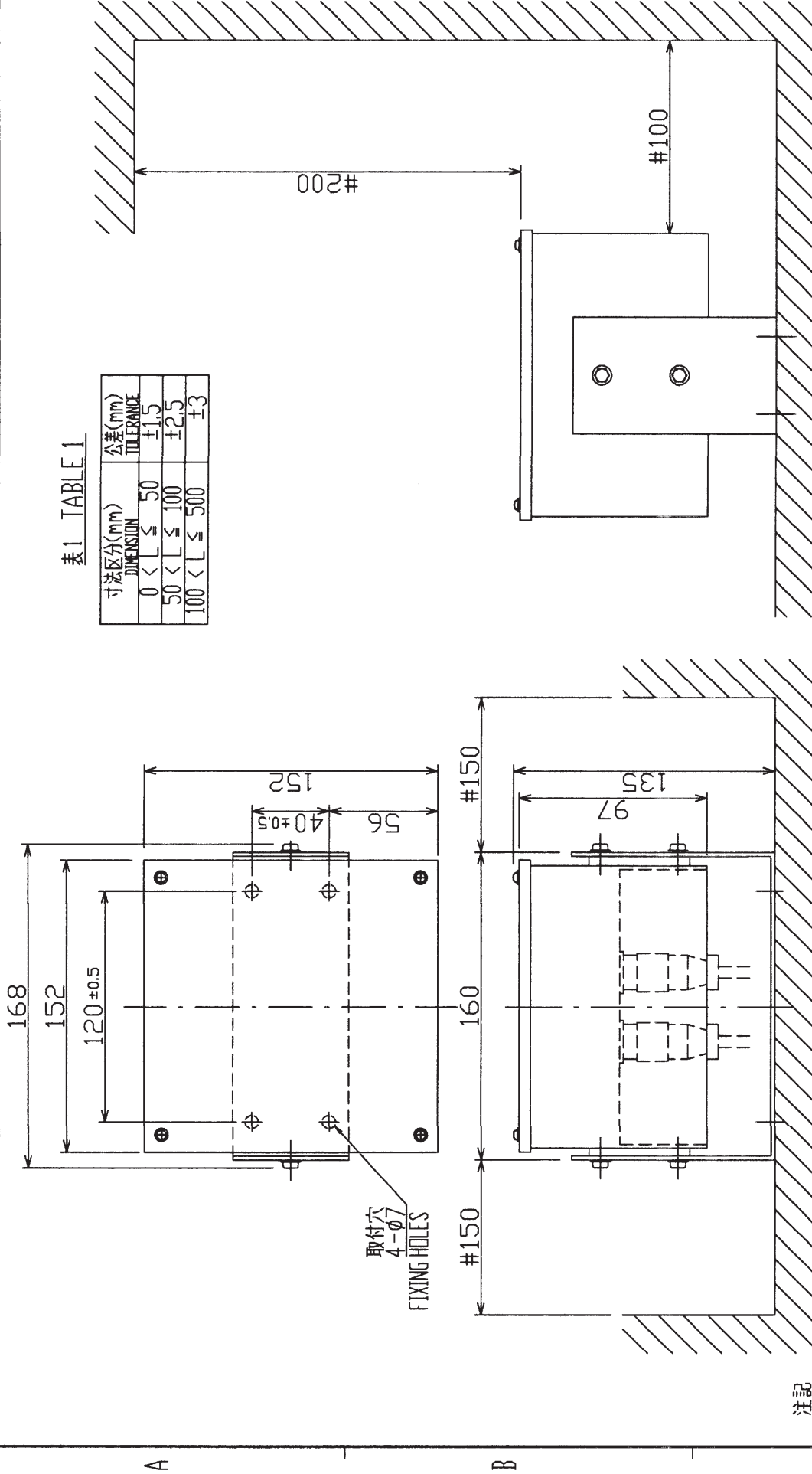
承認 APPROVED	DEC. 27. '90 T. JAKAKI	第三角法 THIRD ANGLE PROJECTION	名称 TITLE	格納タンク(アルミ)外寸図 RETRACTION TANK (ALUMINUM)
検図 CHECKED	DEC. 27. '90 T. Miyoshi	R 度 SCALE	重量 WEIGHT	3.5 kg
製図 DRAWN	DEC. 27. '90 M. Usuda	重量 WEIGHT	図番 DWG.NO.	C1273-G09-A

CSH-5

4

3

2



DRAWN NOV. 6 '01 J. YAMASAKI	TITLE MS-100
CHECKED M. Y. K.	名称 動揺検出器
APPROVED M. Y. K.	外寸図
SCALE 1/3 MASS ±10% 1.1 kg	NAME MOTION SENSOR
DWG. No. C1278-G01-B	OUTLINE DRAWING

注記
 1) 指定なき寸法公差は表1による。
 2) # : 推奨する最小サービス空間寸法。
 3) 船首マーク(FORE)を船首方向に向けて、きょう体を水平に取り付けること。

NOTE
 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.
 2. # RECOMMENDED SERVICE CLEARANCE.
 3. ORIENT THE 'FORE' MARK ON THE UNIT TOWARD SHIP'S BOW AND MOUNT THE UNIT LEVEL IN PARALLEL WITH SURFACE.

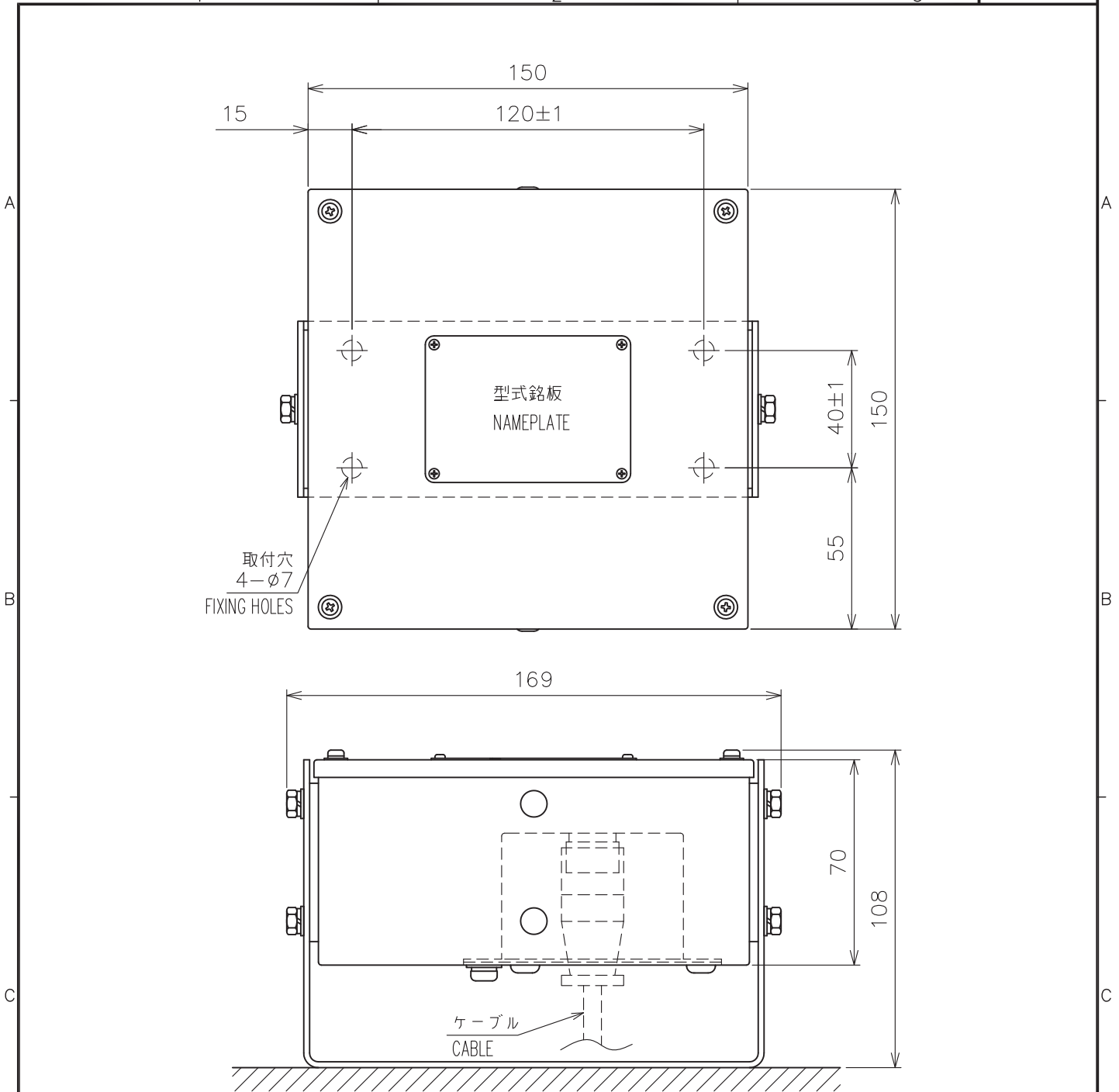


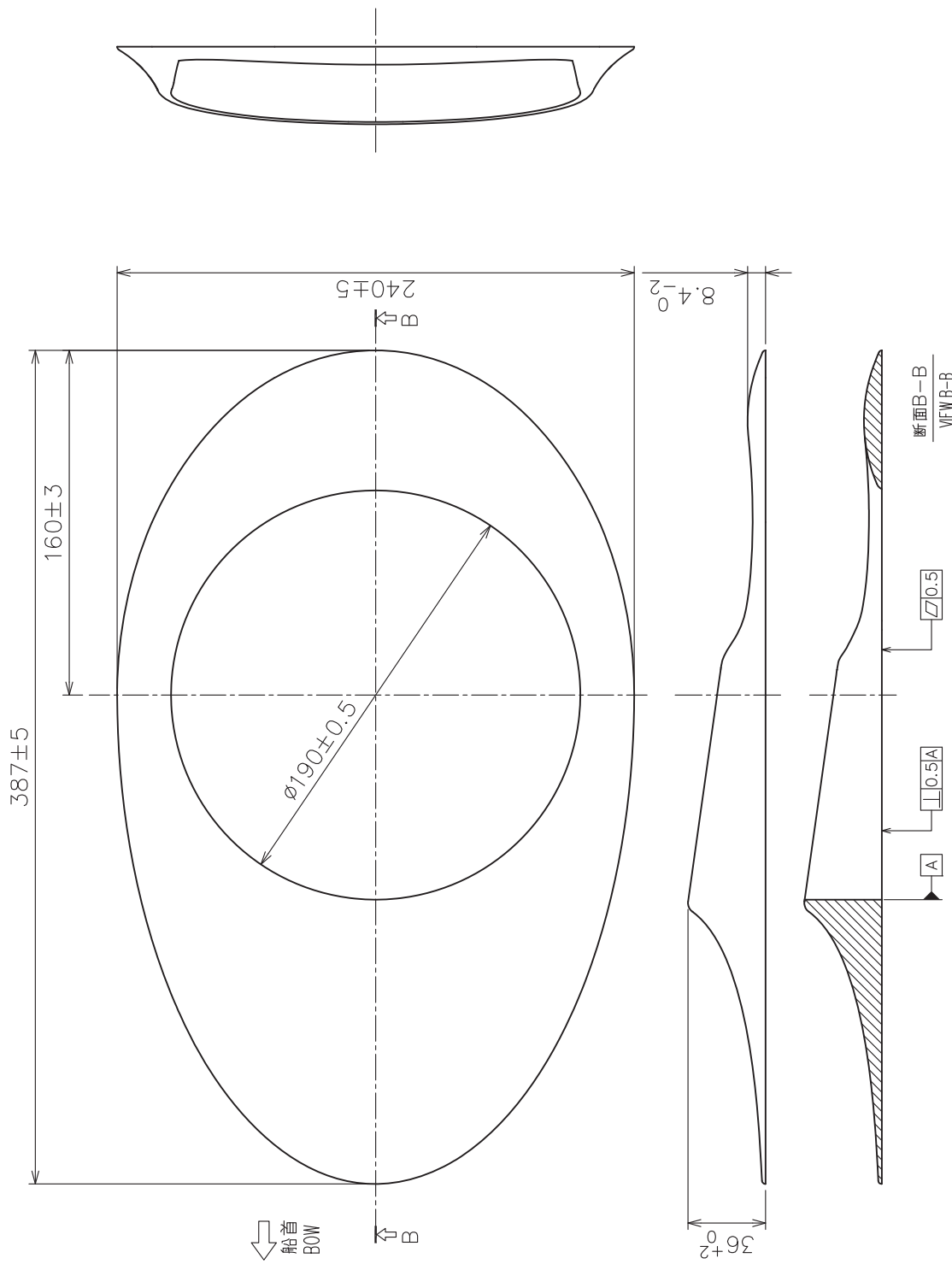
表1 TABLE 1

- 注 記 1) 指定外の寸法公差は表 1 による。
 2) 取付用ネジは、M5 ボルトを使用のこと。
 3) 船体の回転軸と水平に取り付けること。

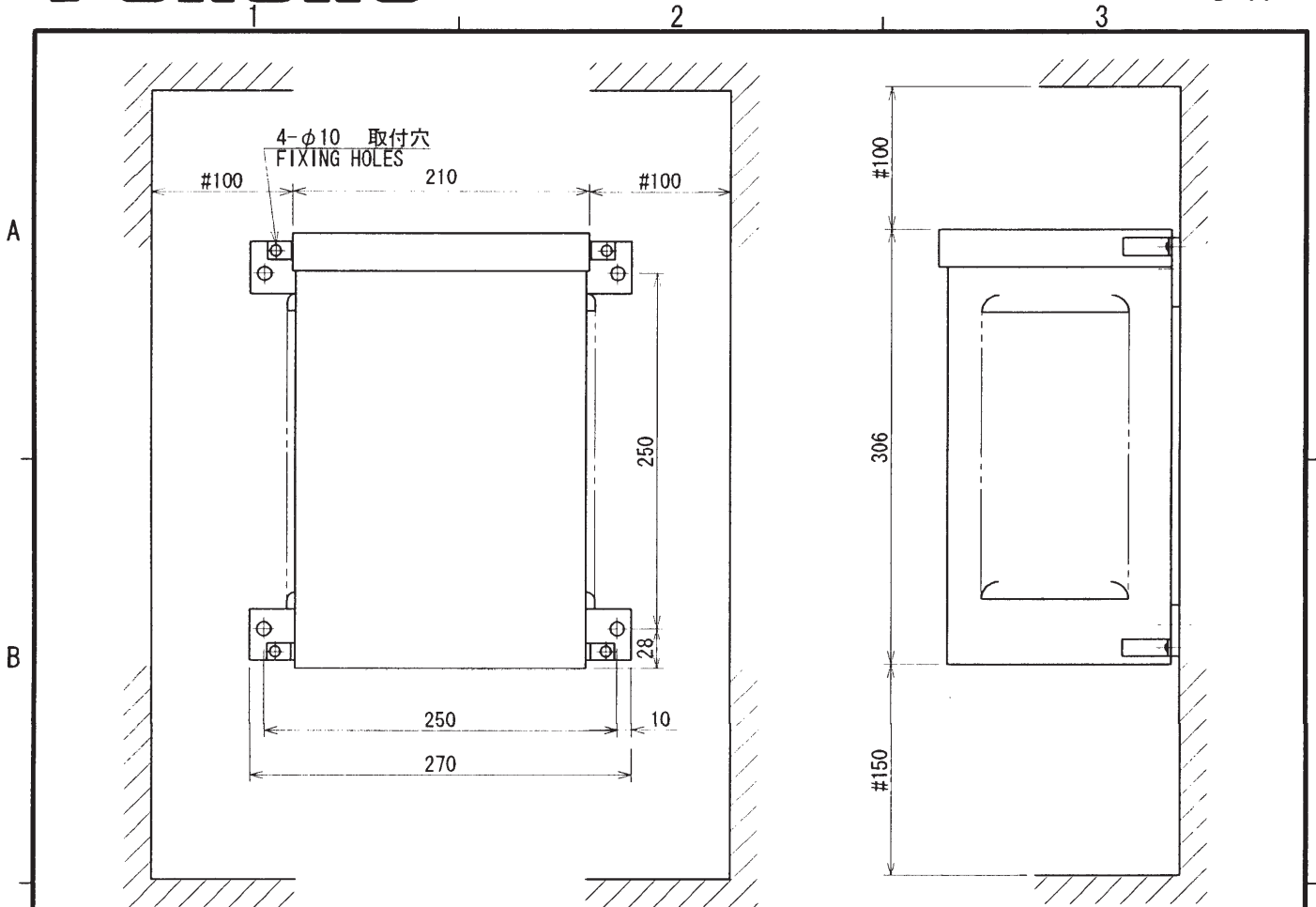
寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	± 1.5
$50 < L \leq 100$	± 2.5
$100 < L \leq 500$	± 3

- NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
 2. USE M5 BOLTS FOR FIXING THE UNIT.
 3. INSTALL THE UNIT HORIZONTALLY ON THE ROTATION AXIS OF SHIP'S ROLLING AND PITCHING.

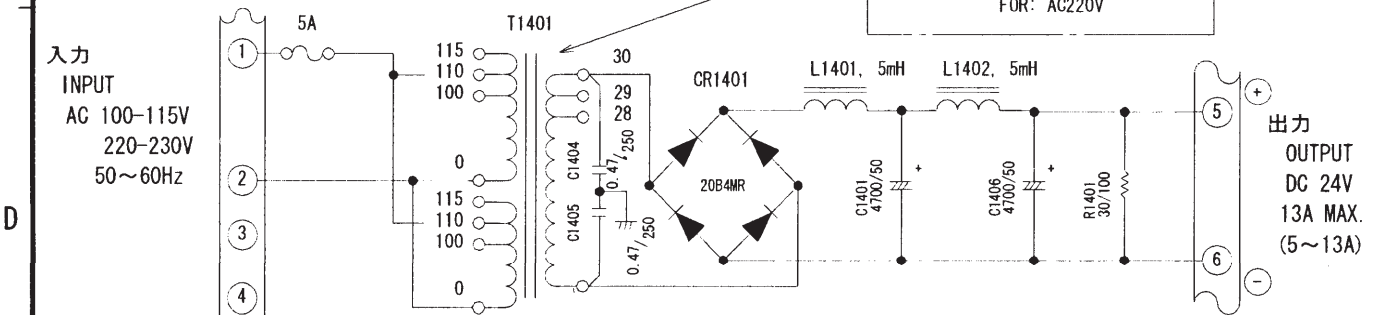
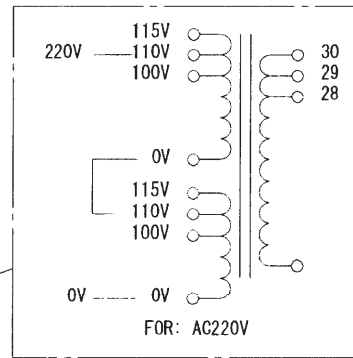
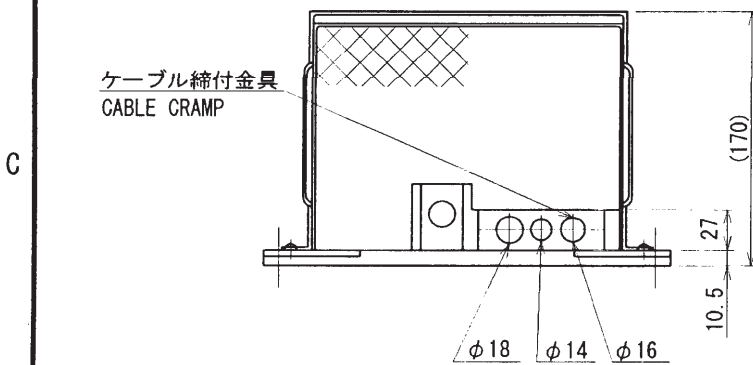
DRAWN 16/Sep/2014 T.YAMASAKI	TITLE BS-704
CHECKED 16/Sep/2014 H.MAKI	名称 傾斜角検出器 (卓上装備)
APPROVED 17/Sep/2014 H.MAKI	外寸図
SCALE 1/2	MASS 1.3 $\pm 10\%$ kg 質量はケーブルを含まず。 MASS DOES NOT INCLUDE CABLE.
DWG. No. C1259-009-D	REF. No. 06-008-201G-0
NAME CLINOMETER (TABLETOP MOUNT)	
OUTLINE DRAWING	



DRAWN	22/Jun/2011	I. YAMASAKI	TITLE	06-021-4502
CHECKED	22/Jun/2011	H. MAKI	名称	フェアリング
APPROVED	24/Jun/2011	Y. NISHIYAMA	外寸図	
SCALE	1/3	MASS	NAME	FAIRING
DWG.No.	C1316-G13-A	REF.No.	06-021-4502-0	OUTLINE DRAWING



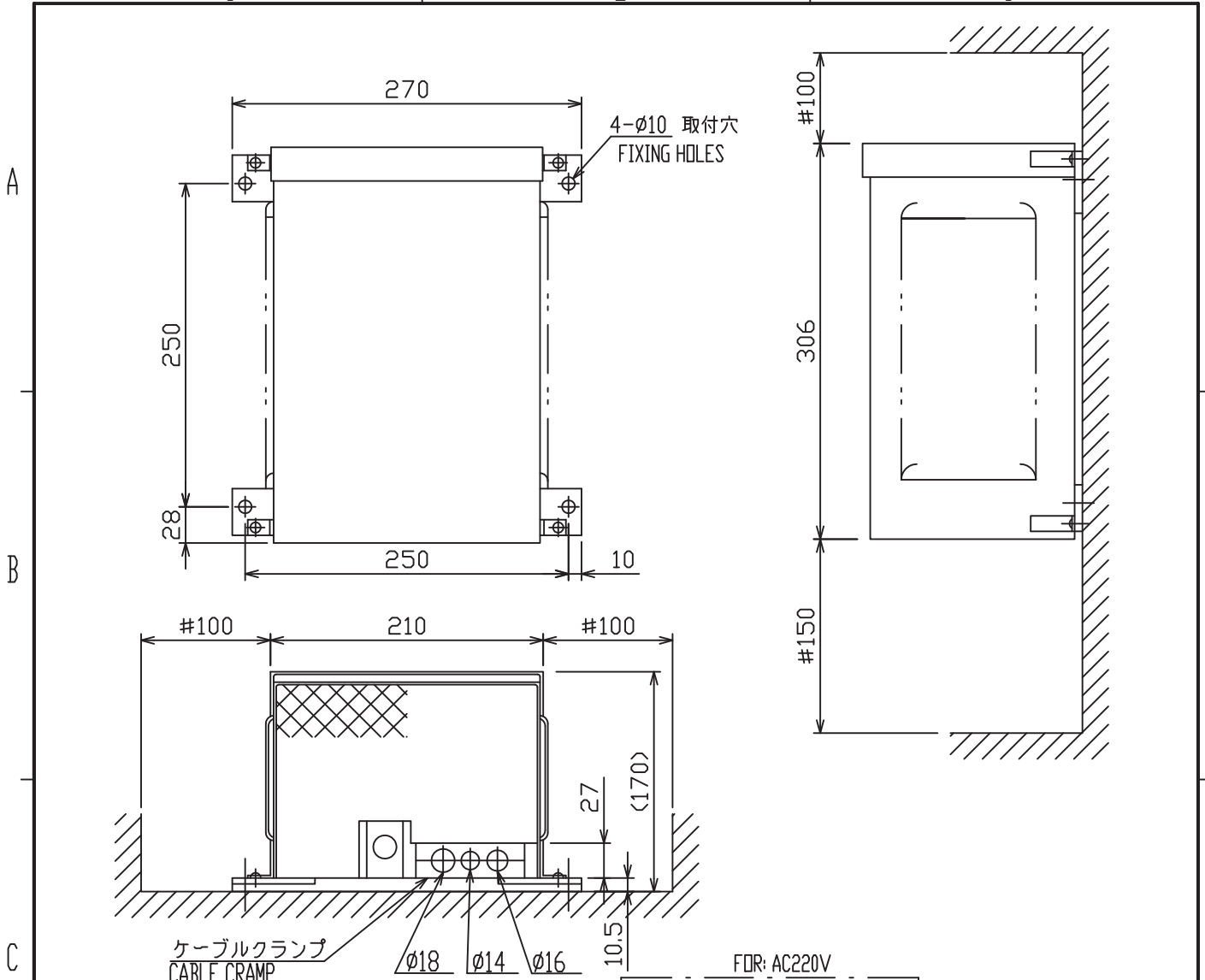
NOTE 1. # : 推奨サービス空間
RECOMMENDED SERVICE CLEARANCE.



注記 AC220V入力に対しては T1401の一次巻線を直列に接続する。
NOTE FOR 220V AC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

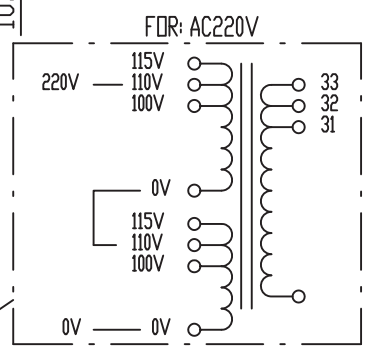
DRAWN Aug 16 '00 T.YAMASAKI
CHECKED Aug 17 '00 Y.Kim
APPROVED Aug 17 '00 Y.Kim
SCALE 1/5 MASS ±10%
17 kg
DWG. No. C3002-002- N

TITLE RU-1746B-2
名称 整流器
外寸図
NAME RECTIFIER UNIT
OUTLINE DRAWING

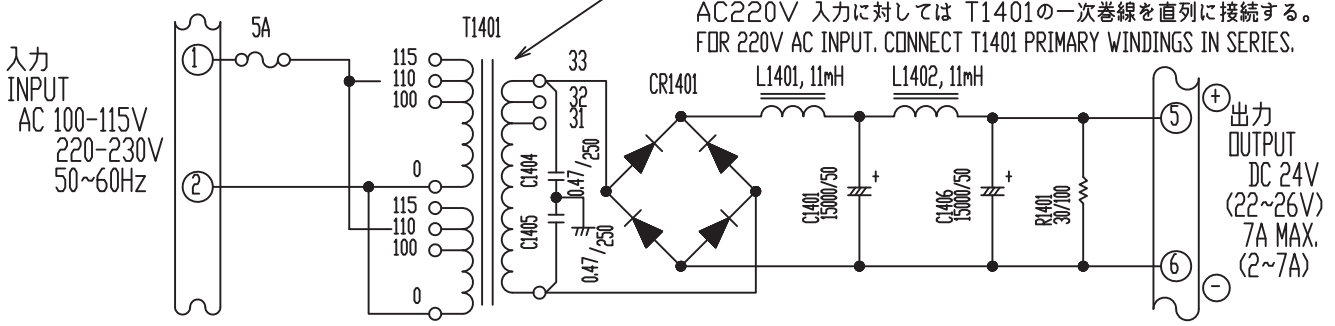


注記
 1) # : 最小サービス空間寸法。
 2) 取付ネジはM8ボルトを使用のこと。

NOTE
 1. # : MINIMUM SERVICE CLEARANCE.
 2. USE M8 BOLTS FOR FIXING THE UNIT.



AC220V 入力に対しては T1401の一次巻線を直列に接続する。
 FOR 220V AC INPUT. CONNECT T1401 PRIMARY WINDINGS IN SERIES.



入力 INPUT
 AC 100-115V
 220-230V
 50~60Hz

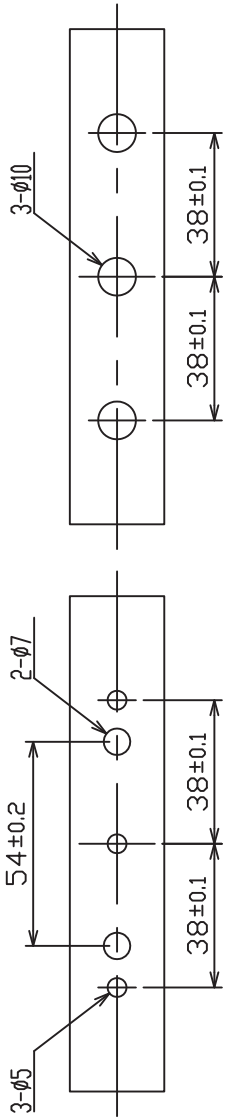
出力 OUTPUT
 DC 24V
 (22~26V)
 7A MAX.
 (2~7A)

DRAWN	8/Jul/2014 T.YAMASAKI	TITLE	RU-3423
CHECKED	8/Jul/2014 H.MAKI	名称	整流器
APPROVED	8/Jul/2014 H.MAKI		外寸図
SCALE	1/5 MASS 16.5 ±10% kg	NAME	RECTIFIER UNIT
DWG. No.	C.3002-005- M	REF. No.	OUTLINE DRAWING

4

3

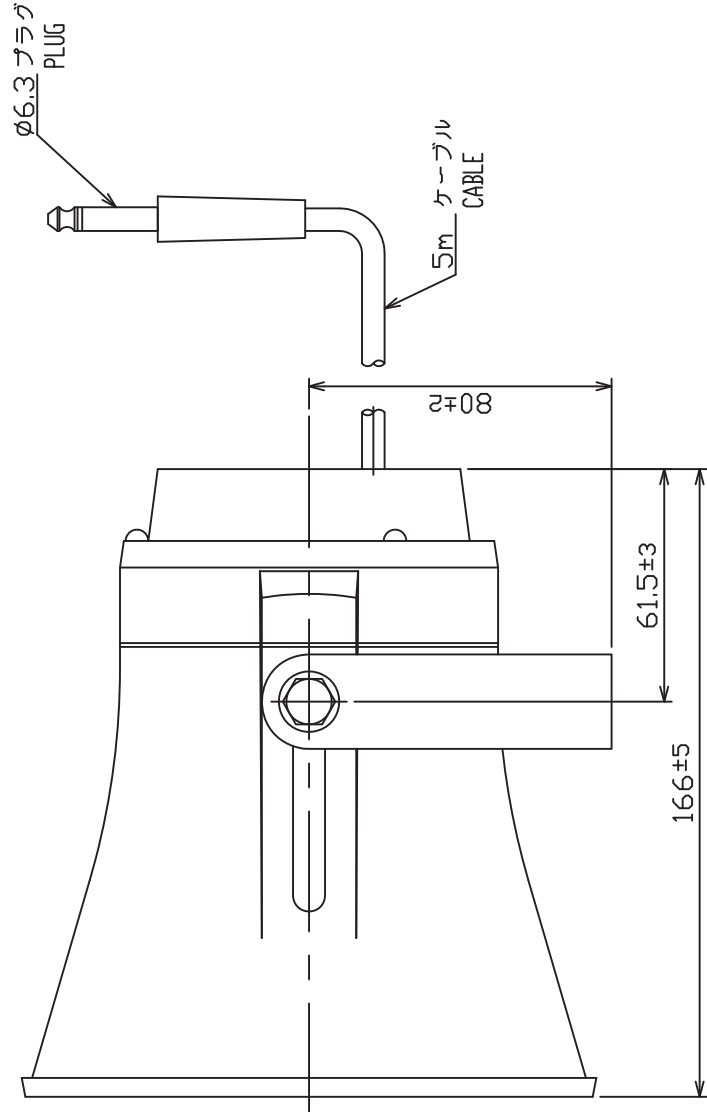
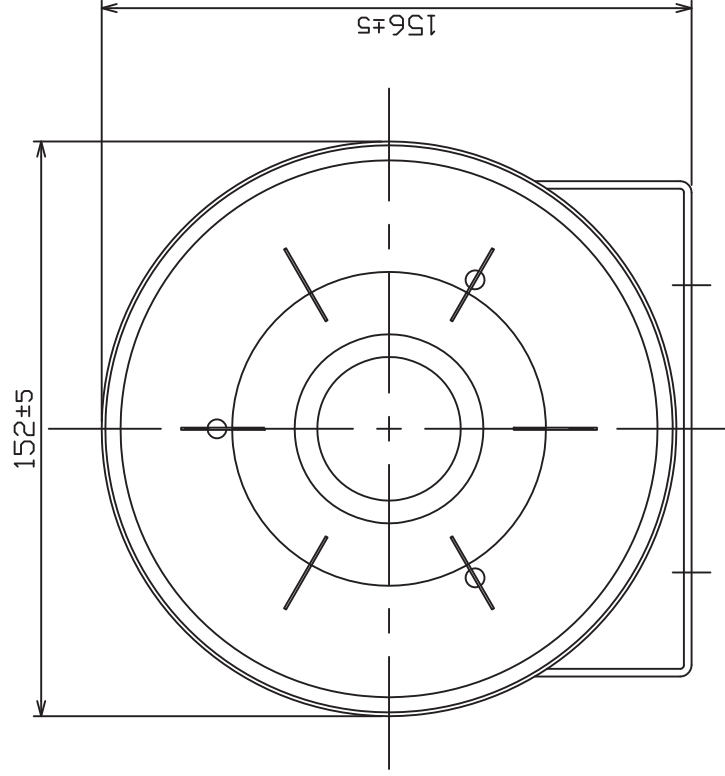
2



取付寸法
FIXING DIMENSIONS

CA-150

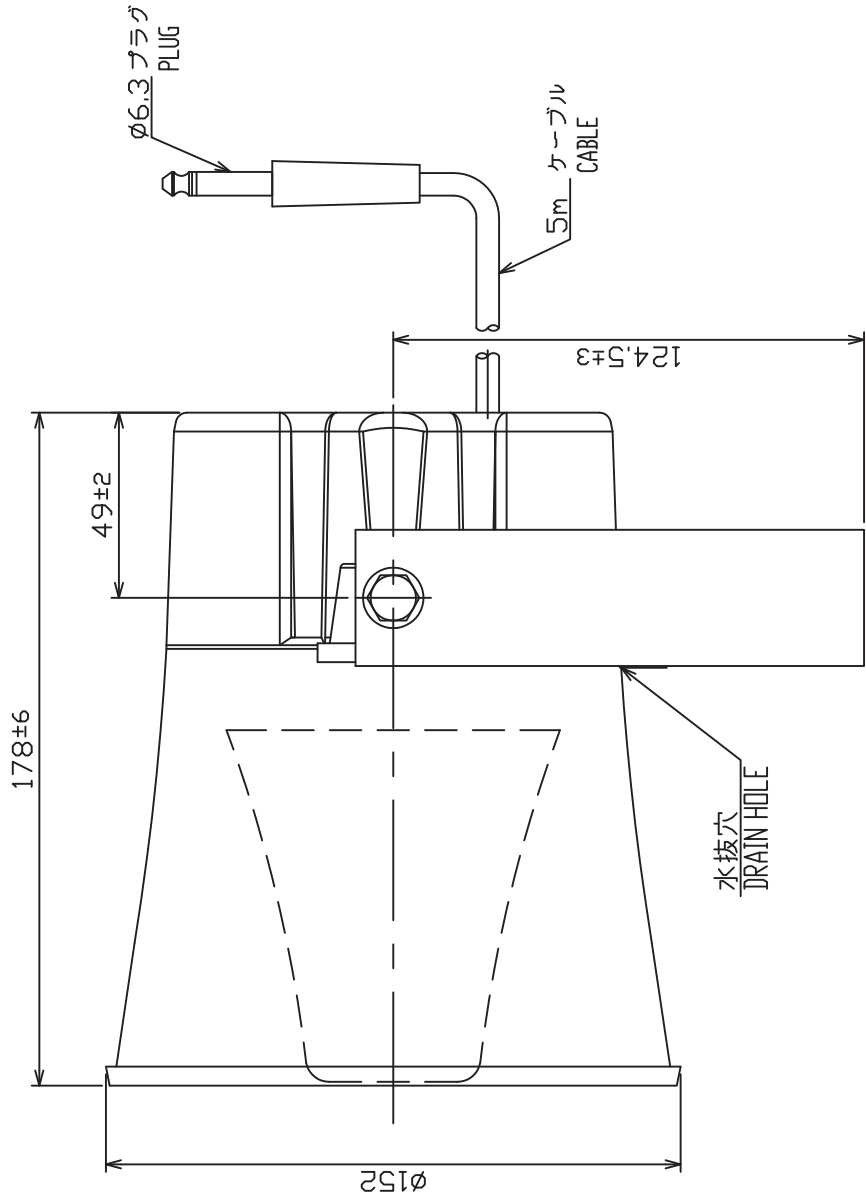
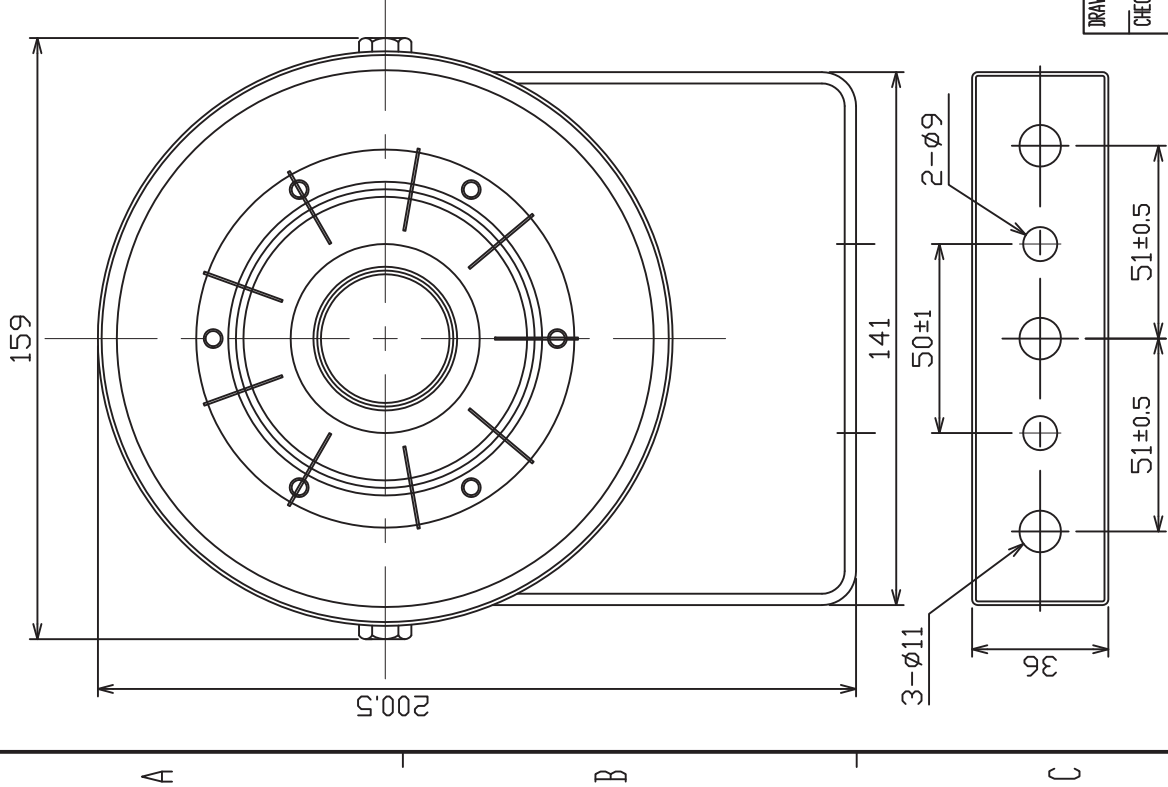
SC-05WR



DRAWN	9/Oct/08	I. YAMASAKI	TITLE	SC-05WR, CA-150
CHECKED	9/Oct/08	T. TAKENO	名称	5Wトランペットスピーカ
APPROVED	23/Oct/08	R. Esumi	外寸図	
SCALE	1/2	MASS 1.2 ±10% kg	NAME	TRUMPET SPEAKER
DWG.No.	C5016-101-E	質量はケーブルを含まず。 MASS W/O CABLE.	OUTLINE DRAWING	
		REF.No.		

FURUNO

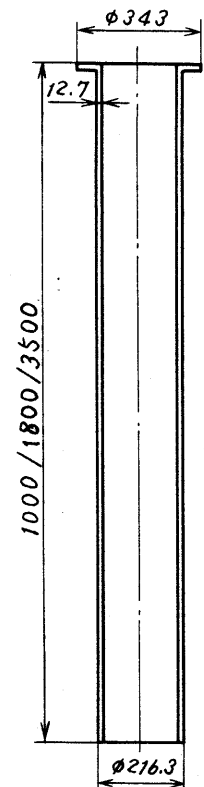
2 3 4



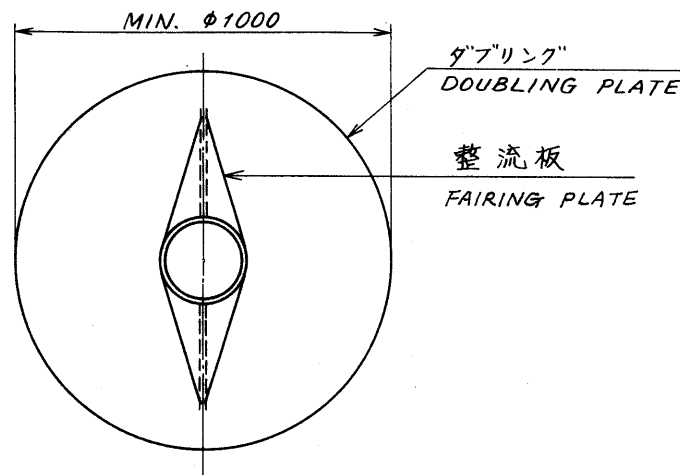
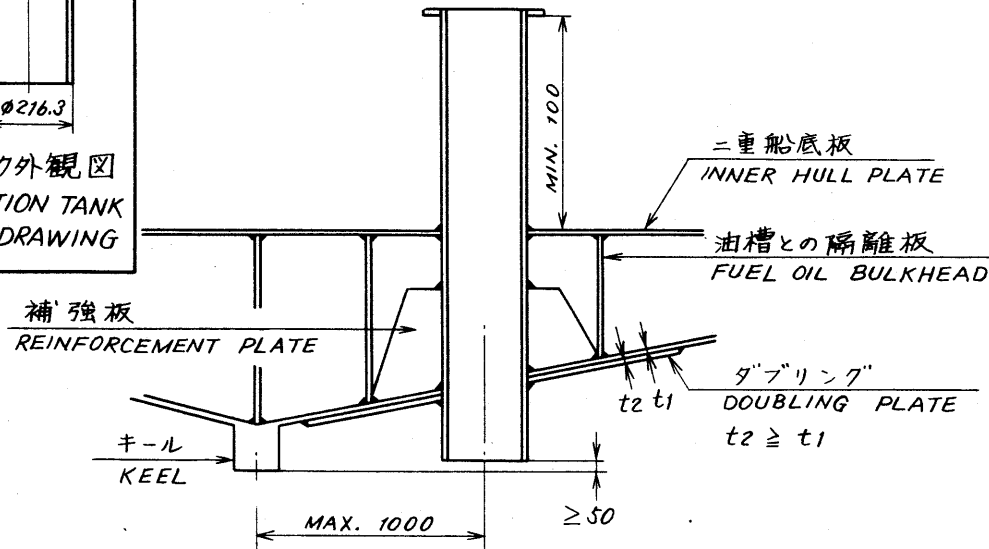
DRAWN	25/Jul/2016	I. YAMASAKI	TITLE	CA-151S-ASSY
CHECKED	25/Jul/2016	H. MAKI	名称	5Wトランペットスピーカ
APPROVED	25/Jul/2016	H. MAKI	外寸図	
SCALE	1/2	質量 1.4 kg	質量はケーブルを含む。 MASS INCLUDES CABLE.	TRUMPET SPEAKER
DWG. No.	C5016-G08-A	REF. No.		OUTLINE DRAWING

取付寸法
FIXING DIMENSIONS

FURUNO ELECTRIC CO., LTD.



格納タンク外観図
RETRACTION TANK
OUTLINE DRAWING



- 格納タンクの装備は次の条件を満たすこと。
 - 取付位置は船首から1/3 (小型船の場合は1/2) 程度。
 - キールより1m以内。
 - フランジのボルト締めのためフランジ下面と障害物 (二重船底等) との間に100mm以上のスペースがあること。
 - タンクの先端はキールの先端より50mm上であること。
 - タンクのフランジ面は標準走航時に水平であること。

- 格納タンクの周辺の船底板に径1000程度のダブリングを施すこと。
- 格納タンクの突出部分に網除けを兼ねた整流板を設けること。
- 必要に応じて格納タンク周辺に油槽との隔離板をめぐらせること。またタンク周囲、3,4ヶ所で船底板に向けて補強板を溶接すること。

注: 強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

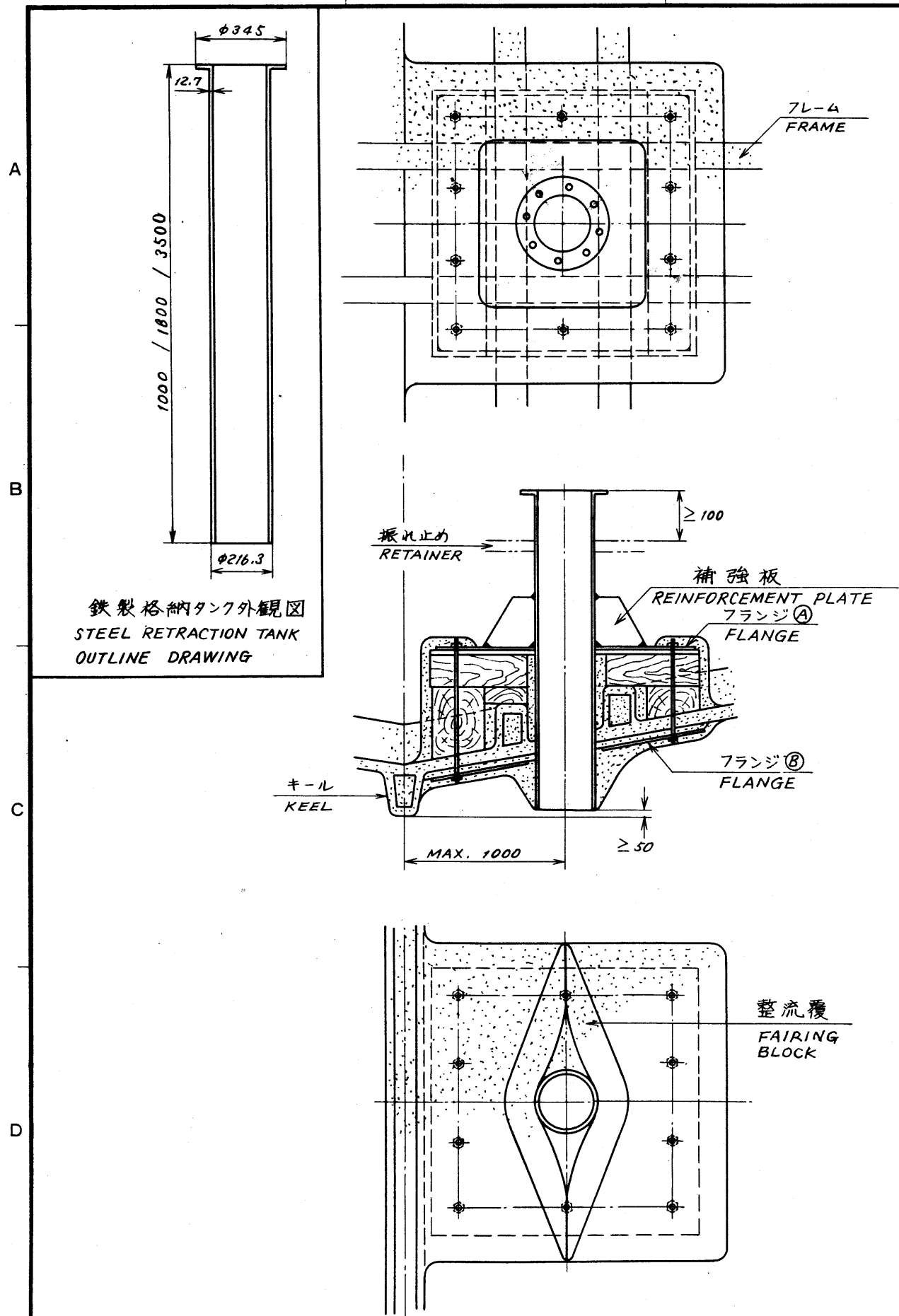
- SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
 - ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW ON FORE-AFT LINE.
 - WITHIN 1000 mm FROM KEEL LINE.
 - ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
 - KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
 - TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.
- DOUBLING PLATE OF ABOUT 1000 mm IN DIA. SHOULD BE INSTALLED BY THE SHIPYARD.
- FAIRING PLATE (NET PROTECTOR) SHOULD BE INSTALLED AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM BY THE SHIPYARD.
- IF REQUIRED, FUEL OIL BULKHEAD AND REINFORCEMENT PLATE SHOULD BE INSTALLED BY THE SHIPYARD.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

単位 UNIT: mm

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
承認 APPROVED	NOV. 9 '77	三角法 THIRD ANGLE PROJECTION			名称 格納タンク船底装備図 (鋼船) TITLE RETRACTION TANK INSTAL- LATION ON STEEL HULL
検図 CHECKED	NOV. 8 '77	尺度 SCALE	1/20		
製図 DRAWN	1977.11.7 M. Medy	重量 WEIGHT	kg	図番 DWG.NO.	C1243-017-F



鉄製格納タンク外観図
STEEL RETRACTION TANK
OUTLINE DRAWING

- 格納タンクの張備は次の条件を満たすこと。
 - 取付位置は船首から 1/3 (小型船の場合は 1/2) 程度。
 - キールより 1m 以内。
 - フランジのボルト締めのためフランジ下面と障害物 (二重船底等) との間に 100mm 以上のスペースがあること。
 - タンクの先端はキールの先端より 50mm 上であること。
 - タンクのフランジ面は標準走航時に水平であること。
- 格納タンクの張備は、次の要領を参考にして行うこと。
 - フレーム間の船底にタンクが通る穴をあける。
 - タンクあるいはタンクと同径の中子を貫通させ、その回りにフランジ(A)の乗せられる取付台を作り FRP でフレーム、船底間に固定する。
 - フランジ(A)の取付穴に合わせて取付台にボルトを立てておく。必要があればフランジ(B)を作りボルトを船底から貫通させる。
 - FRP 硬化後タンクあるいは中子を抜き取る。
 - フランジ(A)をタンクに溶接する。
 - フランジ(A)下面及びタンク外周に FRP-鉄接着剤を塗布した後タンクを取りつける。
 - 浸水を防ぐため充分に FRP で必要箇所を塗り固める。特にタンク回りは流線型に成型し水による抵抗及び気泡発生を最少限におさえる様努めること。
 - 必要に応じてタンクのフランジ面下部 100mm の位置より隔壁等に向けて振れ止めを設けること。またフランジ(A)溶接時、タンクの周囲 3, 4ヶ所をフランジ(A)に向けて補強板を溶接する。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

- SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
 - ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
 - WITHIN 1000 mm FROM KEEL LINE.
 - ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
 - KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
 - TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.
- INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
 - CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL PLATE.
 - PASS THE TANK OR A CORE HAVING THE SAME DIAMETER AS THE TANK THRU THE HULL PLATE. MAKE A MOUNTING BED WITH WOODEN BLOCK AND FRP AROUND THE TANK OR THE CORE. THIS BED IS USED TO MOUNT THE FLANGE (A).
 - WHEN FABRICATING THE MOUNTING BED, STAND THE BOLTS ON THE BED FOR FIXING THE FLANGE (A). IF NECESSARY, MAKE THE FLANGE (B) TO ENSURE FIXING OF THE FLANGE (A).
 - AFTER FRP IS STIFFENED, DRAW OUT THE TANK OR THE CORE FROM THE MOUNTING BED.
 - WELD THE FLANGE (A) TO THE TANK.
 - APPLY A STEEL-FRP ADHESIVE TO THE TANK AND THE FLANGE (A), AND INSTALL THE TANK WITH FLANGE (A) IN PLACE. SETTLE THE FLANGE (A) WITH BOLTS AND NUTS.
 - APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION.
 - IF REQUIRED, INSTALL A REINFORCEMENT PLATE WHEN THE FLANGE (A) IS WELDED TO THE TANK. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

単位 UNIT: mm

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

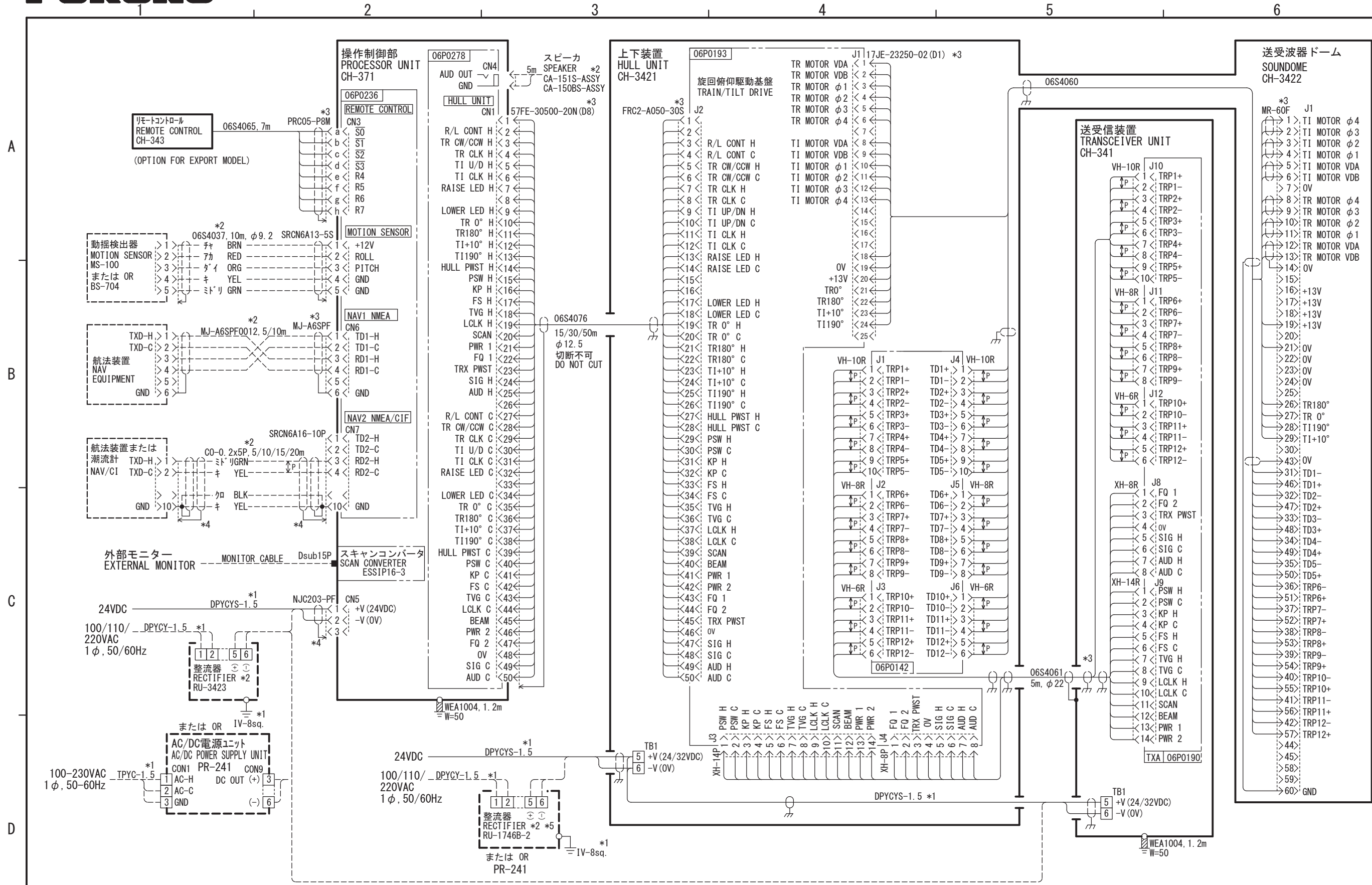
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS
承認 APPROVED	NOV. 9 '77 S	三角法 THIRD ANGLE PROJECTION			名称 TITLE 鉄製格納タンク船底張備図 (FRP船) STEEL RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	NOV. 8 '77 N	尺度 SCALE 1/20			
製図 DRAWN	1977.11.7 D. Deda	重量 WEIGHT	kg	図番 DWG.NO. C1243-019-F	

条件 CONDITION	A 満載時喫水線の上までタンク長が取れる場合。 WHEN THE LONGER TANK IS USED SO THAT ITS FLANGE POSITIONS ABOVE WATER LINE.	B 1. オフシーズンに上下装置を取りはずしておく場合。 WHEN THE OUT OF SEASON, HULL UNIT IS REMOUNTED FROM THE TANK. 2. 満載時喫水線の上までタンク長が取れない場合。 WHEN THE LONGER TANK IS NOT USED DUE TO LIMITED CLEARANCE.	C タンク長を喫水線まで取れない場合で、仕切弁を使用しないとき。 WHEN THE LONGER TANK OR A GATE VALVE CANNOT BE USED.
装備法 METHOD 満載時の喫水線 WATER LINE AT FULL LOAD			
注記 NOTE	<ol style="list-style-type: none"> この装備法を標準として推奨する。 THIS METHOD IS RECOMMENDED AS STANDARD INSTALLATION. 上下装置の上部に十分なサービス空間が取れない場合は、天井に300×300の穴をあけておくこと。 WHEN OVERHEAD CLEARANCE IS NOT ALLOWED, MAKE A HOLE OF 300x300 mm ON CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE. 隔壁の強度は船底外板と同等以上とする。 BULKHEAD SHOULD BE STRONG AS WELL AS HULL PLATE OR MORE. 	<ol style="list-style-type: none"> 上記(1)の目的でこの装備を行う場合は、左図(A)と同様に喫水線の上までタンク長を取る方が望ましい。 THE TANK FLANGE POSITION IS DESIRED TO BE ABOVE WATER LINE, AS LIKE THE INSTALLATION METHODE 'A'. 隔壁の強度は船底外板と同等以上とする。 BULKHEAD SHOULD BE STRONG AS WELL AS HULL PLATE OR MORE. 	<ol style="list-style-type: none"> 水密隔壁は、船級協会規則を参照し、造船所で製作してください。その際、サービス空間も考慮してください。 FABRICATE THE COFFERDAM BY SHIPYARD IN ACCORDANCE WITH CONCERNED REGULATIONS, ALSO PROVIDE ENOUGH SERVICE CLEARANCE. 水密隔壁の上限を喫水線の上までとれない場合にも、上下装置取り外しのための防水扉を設けること。 PROVIDE A WATERTIGHT HATCH FOR FUTURE MAINTENANCE IF A COFFERDAM IS NOT HIGH ABOVE WATER LEVEL.

注記
船底から甲板まで他の船室と区切られたソナールーム以外に船底タンクを装備するとき、上記基準を遵守すること。
装備法の決定に際しては、安全性（強度、水密性等）を重視し、保守・点検の容易さにも配慮すること。

NOTE
FOLLOW THE ABOVE INSTALLATION METHODS OTHERWISE INSTALLATION IN A SONAR ROOM PARTED FROM OTHER ROOMS WITH BULKHEAD BETWEEN HULL AND DECK.
DECIDE THE METHOD CONSIDERING SUFFICIENT REINFORCEMENT, WATERTIGHT OF THE SHIP'S HULL AND MAINTENANCE CLEARANCE AROUND THE UNIT ALSO.

DRAWN	17/Nov/2016 T.YAMASAKI	TITLE	TANK FOR CH SERIES
CHECKED	17/Nov/2016 H.MAKI	名称	格納タンク
APPROVED	18/Nov/2016 H.MAKI		送受波器装備図
SCALE	1/15 MASS - kg	NAME	RETRACTION TANK
DWG No.	C1316-T01- B		TRANSDUCER INSTALLATION



注記
 * 1) 造船所手配。
 * 2) オプション。
 * 3) 工場にて取付済み。
 * 4) コネクタのクランプを通し接地する。
 * 5) 出力タップを30Vに変更する。

NOTE
 *1. SHIPYARD SUPPLY.
 *2. OPTION.
 *3. FITTED AT FACTORY.
 *4. GROUNDING THRU CONNECTOR CLAMP.
 *5. CHANGE OUTPUT TAP TO 30V.

CO-0. 2x5P: CO-SPEVV-SB-C 0. 2x5P, φ 13.5

DRAWN	17/Feb/2021 T. YAMASAKI	TYPE	CH-37BB
CHECKED	17/Feb/2021 H. MAKI	名称	カラーセクタースキャニングソナー
APPROVED	19/Feb/2021 H. MAKI		相互結線図
SCALE	MASS	NAME	COLOR SECTOR SCANNING SONAR
DWG. No.	C1337-C01- H	REF. No.	06-026-0001-0
		INTERCONNECTION DIAGRAM	