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FURUNO

INSTALLATION MANUAL

COLOR SEARCHLIGHT SONAR

MODEL CH-18

FURUNO ELECTRIC CO., LTD.
NISHINOMIYA, JAPAN

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·Your Local Agent/Dealer

FIRST EDITION : AUG 1988
G : FEB. 2, 1998

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PUB. No. IME-12710-G
(TATA) CH-18

000806596 00

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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.

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⚠ WARNING



Only qualified personnel should work inside the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death.

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

Serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.

⚠ CAUTION

Ground the equipment.

Ungrounded equipment can give off or receive electro-magnetic interference or cause electrical shock.

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

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

⚠ CAUTION

Keep oil away from eyes. Wear protective goggles when working with the oil. The oil cause inflammation of the eyes.
Do not touch the oil. The oil can cause inflammation of the skin. Wear protective gloves when working with the oil.
Do not ingest the oil. Diarrhea or vomiting can result.
Keep the oil out of reach of children.

EMERGENCY
If the oil enters the eyes, flush with clean water about 15 minutes. Consult a physician.
If oil contacts skin, wash with soap and water.
If the oil is ingested, see a physician immediately.

DISPOSAL OF OIL AND ITS CONTAINER
Dispose of oil and its container in accordance with local regulations. For further informaton, contact place of purchase.

STORAGE
Seal container to keep out foreign material.
Store in dark place

Do not exceed speed 15 knots when operating the equipment or during lowering or raising of the transducer.

The transducer may become damaged.

The zinc block attached near the transducer must be replaced yearly.

The junction between the transducer and main shaft may corrode, which can result in loss of the tansducer or water leakage inside the ship.

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SPECIFICATIONS
* * * * * * * * *

1. Display System: PPI and vertical display on 8-inch color CRT

2. Picture Color: 8 colors depending on signal strength

3. Display Mode:
   - Sonar mode
     PPI, Expanded PPI, PPI+historical displays are vailable
   - Vertical sounding (V/S) mode

4. Range, Pulselength (P/L), Train Speed, TX Interval

MODE	Range (m)	10	20	40	60	100	150	200	250	300	400	600
SONAR	Pulselength(ms)	0.2	0.2	0.4	0.6	1.1	1.6	2.2	2.7	3.3	4.4	6.6
	Train Speed(S)	11	11	11	11	11	14	18	23	27	36	53
V/S	Pulselength(ms)	0.2	0.2	0.3	0.4	0.7	1.0	1.3	1.6	1.8	2.2	2.6
	TX Interval(ms)	100	100	200	200	400	400	500	500	600	700	830

Note 1. Unit for range scale can be changed to "foot" and "fathom".
2. Train speed can be changed to slower speed.
3. TX interval in sonar mode is every 6° transducer training.

5. Range Phasing: In steps of 1/5 of range in use for V/S mode

6. Audio: 2W, 1.0kHz with external loudspeaker

7. Transceiver:
   Frequency: 180kHz
   Output Power: 800Wrms
   Beamwidth: 6.5°(-3dB point)

8. Training:

Train Sector	6°(Stop), 36°, 60°, 96°, 120°, 156°, 180°, 360°
Train Center	Can be set in any direction in 6° steps
Train System	Continuous training or step-by-step training selectable

9. Tilt: +5° (above horizontal) to 90° (vertical) / 10 seconds

10. Transducer Raise/Lower: CH-181 (350mm travel): Raise/Lower time, 30 sec. approx.
    CH-184 (250mm travel): Raise/Lower time, 4 sec. approx.

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11. Allowable Ship's Speed:	15 knots	
12. Other Functions:	Motion Sensor: (Option)	Stabilizes sounding beam against rolling/pitching of up to ±20°
	Remote Control: (Option)	Capable of controlling raise/lower, range, tilt sector width, sector center direction and display picture.
13. Power Supply and Power Consumption:	12/24/32VDC, 100W (During raise/lower, 170W) 100/110/115/200/220/230VAC, 50/60Hz, 1o (Rectifier RU-1746B-2 is required)	
14. Environmental Condition:	Ambient temperature:	0°C to 45°C
	Humidity:	Less than 95%

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EQUIPMENT LIST

CH-180 + CH-181 (350mm Travel type)

No.	Unit Name	Name	Type	Code No.	Q'ty	Weight (Kg)	Remarks
1	Display Unit		CH-180-E1	000-065-226	1	6.5	For 12VDC
			CH-180-E2	000-065-227			For 24/32VDC
2	Hull Unit	R/L Drive Unit CH-1842	CH-1811-1	006-541-530	1		For 12VDC
			CH-1811-2	006-541-540			For 24/32VDC
		Main Shaft	06-008-1021, L=1.17m	100-028-500	1		
			SHJ-0006, L=2.2m	661-000-061			
			06-007-1572, L=3.8m	600-715-720			
		Soundome Assembly CH-1812	CH-1812-1-24, 2.4mcable	006-541-550	1		For 12VDC
			CH-1812-2-24, 2.4mcable	006-541-580			For 24/32VDC
			CH-1812-1-35, 3.5mcable	006-541-560			For 12VDC
			CH-1812-2-35, 3.5mcable	006-541-590			For 24/32VDC
			CH-1812-1-52, 5.2mcable	006-541-570			For 12VDC
			CH-1812-2-52, 5.2mcable	006-541-600			For 24/32VDC
		Retraction Tank	06-013-2501, Steel, 1m	100-099-190	1		For 1.17m main shaft.
			06-013-2511, FRP, 1m	100-099-200			
			06-013-2502, Steel, 1.8m	100-099-320			For 2.2m main shaft.
			06-013-2521, FRP, 1.8m	100-099-340			
			06-013-2503, Steel, 3.5m	100-100-330			For 3.8m main shaft.
		Assembly Kit	CH-1815-11	006-541-430	1		For 1.17m
			CH-1815-22	006-542-090			For 2.2m shaft.
3	Spare Parts		SP06-00500	000-065-238	1		For Display
			SP06-00510	000-065-239			For Hull Unit.
4	Accessories		FP06-00600	000-065-244	1		
5	Installation Materials		CP06-00400, 10mcable	000-065-240	1		10m cable is supplied unless otherwise specified.
			CP06-00410, 15mcable	000-065-241			
			CP06-00420, 20mcable	000-065-242			
			CP06-00430, 30mcable	000-065-243			
6	Remote Control	CH-143	CH-143-E	006-530-360	1	0.4	
7	Motion Sensor	MS-100	with 10m cable	000-069-256	1	2	
8	Rectifier	RU-1746-B	RU-1746-B-2, AC110V	000-030-439	1	17	
			RU-1746-B-2, AC220V	000-030-440			

Notes 1. See page 0-6 for Hull Unit Assembly Combination.
2. The units shaded by ⁞⁞⁞ are optional supply.

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EQUIPMENT LIST

CH-180 + CH-184 (250mm Travel type)

No.	Unit Name	Name	Type	Code No.	Q'ty	Weight (Kg)	Remarks
1	Display Unit		CH-180-E1	000-065-226	1	14	For 12VDC
			CH-280-E2	000-065-227			For 24/32VDC
2	Hull Unit	Control Box CH-1841	CH-1841-1	006-543-460	1	2.2	For 12VDC
			CH-1841-2	006-543-470			For 24/32VDC
		R/L Drive Unit CH-1842	CH-1842-1	006-543-480	1		For 12VDC
			CH-1842-2	006-543-490			For 24/32VDC
		Main Shaft	06-013-3211-0, L=48.5cm	100-151-380	1		
			SHJ-0006, L=2.2m	661-000-061			
		Soundome Assembly CH-1812	CH-1812-1-52, 5.2mcable	006-541-570	1		For 12VDC
			CH-1812-2-52, 5.2mcable	006-541-160			For 24/32VDC
			CH-1812-1-80, 8mcable	006-543-540			For 12VDC
			CH-1812-2-80, 8mcable	006-543-510			For 24/32VDC
		Retraction Tank	06-013-2501, Steel, 1m	100-099-190	1		For 1.17m main shaft.
			06-013-2511, FRP, 1m	100-099-200			
			06-013-2502, Steel, 1.8m	100-099-320			For 2.2m main shaft.
			06-013-2521, FRP, 1.8m	100-099-340			
			06-013-2503, Steel, 3.5m	100-100-330			For 3.8m main shaft.
		Cable Assembly CP06-00403	06S-4054, 5m	006-543-980	1set		
			Copper Strap	006-543-250			
		Assembly Kit CH-1845	CH-1845-11	006-543-520	1		For 1.17m shaft.
			CH-1845-22	006-543-530			For 2.2m shaft.
3	Spare Parts		SP06-00500	000-065-238	1		For Display Unit.
			SP06-00510	000-065-239			For Hull Unit.
4	Accessories		FP06-00600	000-065-244	1		
5	Installation Materials		CP06-00400, 10mcable	000-065-240	1		10m cable is supplied unless otherwise specified.
			CP06-00410, 15mcable	000-065-241			
			CP06-00420, 20mcable	000-065-242			
			CP06-00430, 30mcable	000-065-243			
6	Remote Control	CH-143	CH-143-E	000-065-030	1	0.38	
7	Motion Sensor	MS-100	With 10m cable	000-069-256	1	2	
8	Rectifier	RU-1746-B	RU-1746-B-2, AC110V	000-030-439	1	17	
			RU-1746-B-2, AC220V	000-030-440			

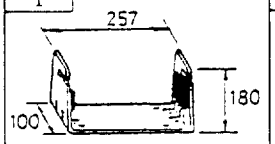
Notes 1. See page 0-7 for Hull Unit Assembly Combination.
2. The units shaded by ⬚ are optional supply.

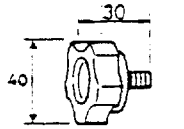
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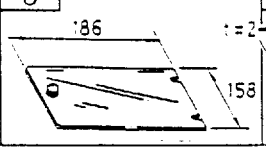
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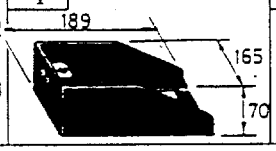
ACCESSORIES

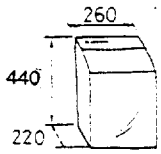
No.	Name	Type	Code No.	Q'ty	Out-Line	Remarks
1	Bracket	FP02-01410	001-373-880	1	1	
2	Knob Bolt	FP02-00250	001-336-840	2	2	
3	Non-glare Filter	FP02-01420	001-373-890	1	3	
4	Hood	02-043-1301	204-313-012	1	4	
5	Vinyl Cover	06-013-1501	000-801-700	1	5	
6	Loudspeaker	SC-05WR8	000-136-364	1	6	

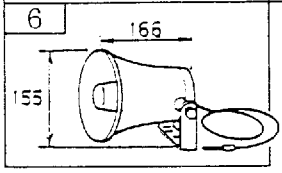
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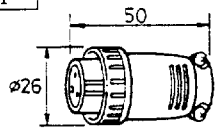
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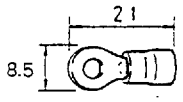
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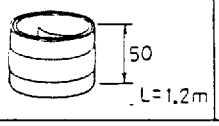
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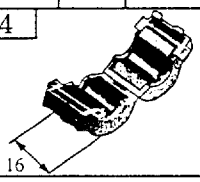
INSTALLATION MATERIALS

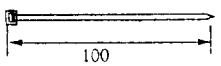
No.	Name	Type	Code No.	Q'ty	Out-Line	Remarks
1	Connector	NJC-203-PF	000-506-703	1	1	
2	Crimp-on Lug	FV2-3	000-108-424	3	2	
3	Copper Strap	WEA-1004-0	500-310-040	1	3	
4	Cable	06S4047-0 *10m*	000-114-959	1		See note.
5	EMI Core	044S-806402	000-137-942	1	4	
6	Cable-tie	CV-100	000-570-322	1	5	

1


2


3


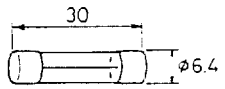
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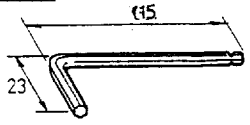
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Note : 15m, 20m or 30m cable is optionally available.

SPARE PARTS

No.	Name	Type	Code No.	Q'ty	Out-Line	Remarks
1	FUSE	JSO 10A, 125VAC	000-549-065	5	1	For 24/32VDC
2	FUSE	JSO 5A, 125VAC	000-549-064	5	1	For 21VDC
3	FUSE	JSO 7A, 125VAC	000-549-063	5	1	For 24/32VDC
4	FUSE	F7161 4A, 250VAC	000-547-028	5	1	For 12VDC
5	FUSE	JSO 3A, 125VAC	000-549-063	5	1	For 24/32VDC
6	FUSE	F7161 4A, 250VAC	000-547-028	5	1	For 12VDC
7	Ball Wrench	BW-2.5	000-830-108	1	2	

1


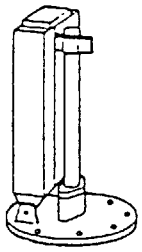
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HULL UNIT ASSEMBLY COMBINATION

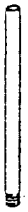
CH – 181 [350mm travel]

R/L DRIVE UNIT

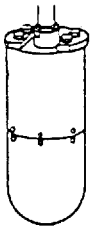
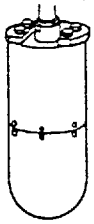
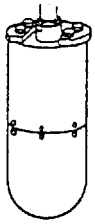


Type	Code No.	Remarks
CH-1811-1	006-541-530	DC12V
CH-1811-2	006-541-540	DC24/32V

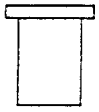
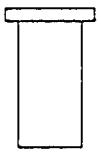
SHAFT

STANDARD		OPTION			
 1.17m		 2.2m		 3.8m	
Type	Code No.	Type	Code No.	Type	Code No.
06-008-1021	100-028-500	SHJ-0006	661-000-061	06-007-1572	600-715-720

SOUNDOME

2.4m Cable			3.5m Cable			5.2m Cable		
								
Type	Code No.	Remarks	Type	Code No.	Remarks	Type	Code No.	Remarks
CH-1812-1-24	006-541-550	DC12V	CH-1812-1-35	006-541-560	DC12V	CH-1812-1-52	006-541-570	DC12V
CH-1812-2-24	006-541-580	DC24/32V	CH-1812-2-35	006-541-590	DC24/32V	CH-1812-2-52	006-541-600	DC24/32V

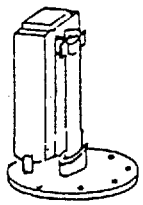
TANK

 1m			 1.8m			 3.5m		
	Type	Code No.		Type	Code No.		Type	Code No.
Steel	06-013-2501	100-099-190	Steel	06-013-2502	100-100-320	Steel	06-013-2503	100-100-330
FRP	06-013-2511	100-099-200	FRP	06-013-2521	100-100-340			

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CH – 184 [250mm travel]

R/L DRIVE UNIT



Type	Code No.	Remarks
CH-1842-1	006-543-480	DC12V
CH-1842-2	006-543-490	DC24/32V

STANDARD	OPTION

SHAFT



48.5cm

Type	Code No.
06-013-3211-0	100-151-380

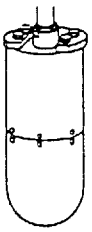


2.2m

Type	Code No.
SHJ-0006	661-000-061

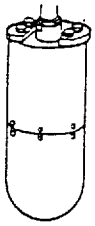
SOUNDOME

5.2m Cable



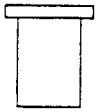
Type	Code No.	Remarks
CH-1812-1-52	006-541-570	DC12V
CH-1812-2-52	006-541-160	DC24/32V

8m Cable



Type	Code No.	Remarks
CH-1812-1-80	006-543-540	DC12V
CH-1812-2-80	006-543-510	DC24/32V

TANK



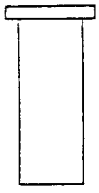
1m

	Type	Code No.
Steel	06-013-2501	100-099-190
FRP	06-013-2511	100-099-200



1.8m

	Type	Code No.
Steel	06-013-2502	100-099-320
FRP	06-013-2521	100-099-340



3.5m

	Type	Code No.
Steel	06-013-2503	100-100-330

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CHAPTER 1. MOUNTING

1-1. Display Unit

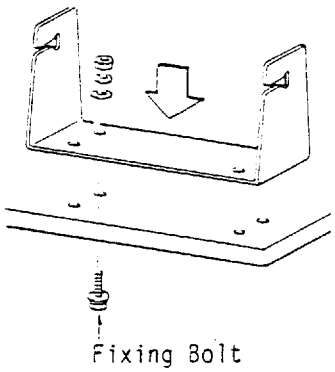
The display unit should be installed in a dry well-ventilated location which satisfies the following conditions:

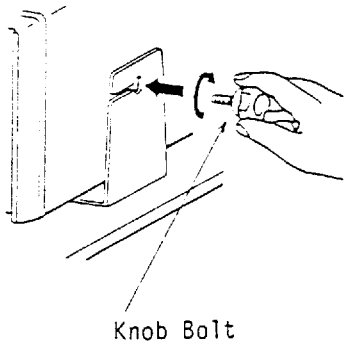
1) Place at least 1m away from magnetic components (high power transmitter, loudspeaker, etc.) and magnetic compass.

2) Place not exposed to direct sunlight, water splashes or hot air.

3) Place where maintenance and ventilation clearance shown in the outline drawing is secured.

Mounting Procedure





NOTE: OVERHEAD MOUNTING ALLOWED, BUT NO BULKHEAD MOUNTING.

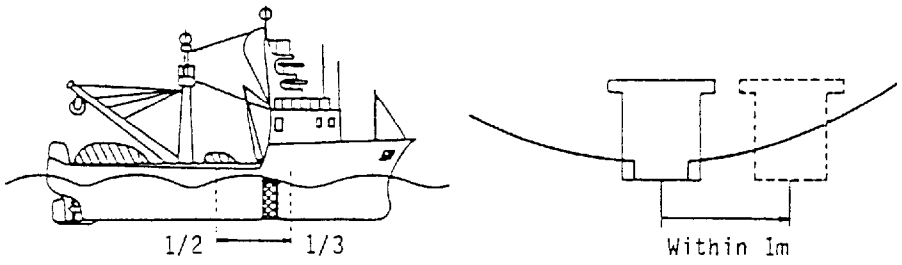
1-2. Hull Unit

Installation Position

The installation should be planned, keeping the following factors in mind.

1) Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are at a minimum. Generally the point at 1/3 to 1/2 of the ship's length from the bow on or near the keel is optimum. In case the on-keel installation is not possible, the center of the retraction tank should be within 1m of the keel so as to reduce rolling effect.

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Installation Position of Hull Unit

2) Select a place where the hull bottom is flat and draft is sufficiently deep.

3) Select a place where interference from other equipment is minimum. The hull unit should be at least 2.5m away from the transducer of other equipment.

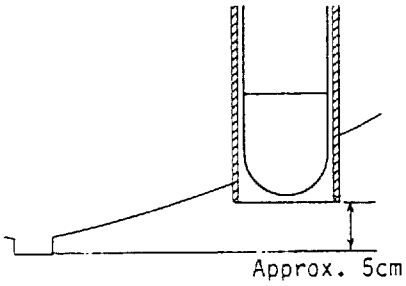
4) Select a place where service and maintenance space is secured. See the outline drawing on page 1-14 or 1-15.

Retraction Tank Mounting Procedure

1) Mounting Method

Typical mounting methods are shown on the following page. Careful attention should be paid to safety (strength, watertightness, etc.), and also the ease of maintenance and inspection.

In the off-keel installation, it is recommended that the retraction tank be protruded through the hull down to 5cm above the keel for minimizing effect of air bubbles.

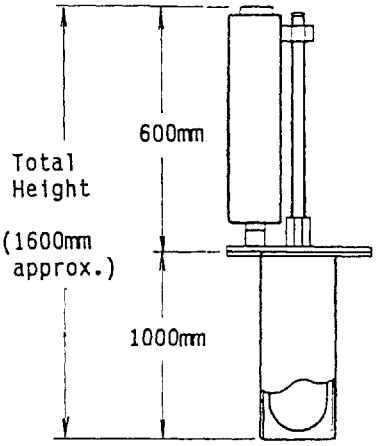
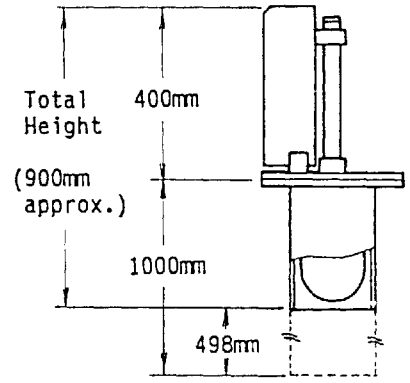


2) Determination of Tank Length [Lt] .

The mounting method will determine the necessary tank length [Lt] , so the excess portion should be cut off. In addition, this tank length [Lt] is necessary as the reference value for cutting the main shaft, so be sure to make a note of it.

There are two types of the hull unit; CH-181 for 350mm transducer travel and CH-184 for 250mm transducer travel. The CH-184 can give a very quick raise/lower operation with a compact body. The table below shows an outline of each hull unit installation.

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	Outline of Installation	
CH-181 350mm travel	Main Shaft: 1.17m Tank : 1m 	The standard combination as left doesn't need to cut the main shaft and tank. When you wish to position the tank top above the water line, use the optional 2.2 or 3.8m long main shaft. In this case, determine the shaft length (Ls) and tank length (Lt) as follows. Ls = Lt + 170mm
CH-184 250mm travel	Main Shaft: 485mm Tank : 1m 	The standard combination as left needs to cut 498mm of the supplied tank. The total height of the hull unit is 900mm approximately. When you wish to position the tank top above the water line, use the optional 2.2m long main shaft. In this case, determine the shaft length (Ls) and tank length (Lt) as follows. Ls = Lt - 17mm

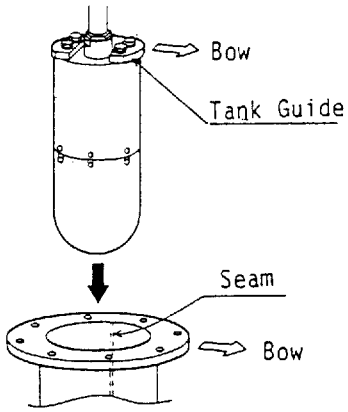
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3) Installing Retraction Tank

Install the retraction tank referring to the drawings on pages 1-18 thru 1-21.

Note: 1. The seam of tank should be positioned either at the port or starboard side, otherwise the tank guide on the soundome will hit the welded portion of the retraction tank and may not go through the tank smoothly.

2. When the retraction tank is locally made, it is recommended that the seamless pipe STPG38-S-C (carbon steel pipe for pressure service) be used.

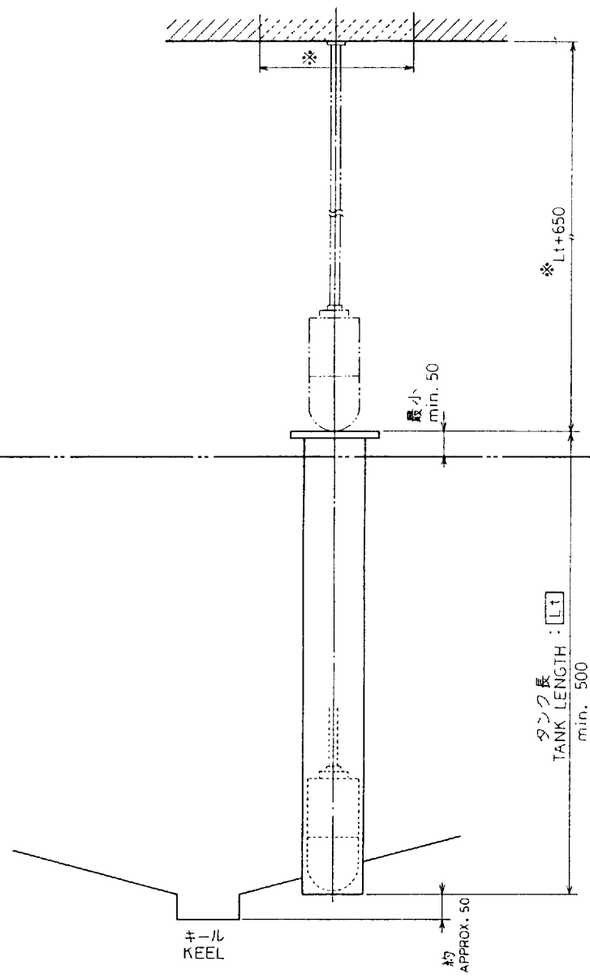


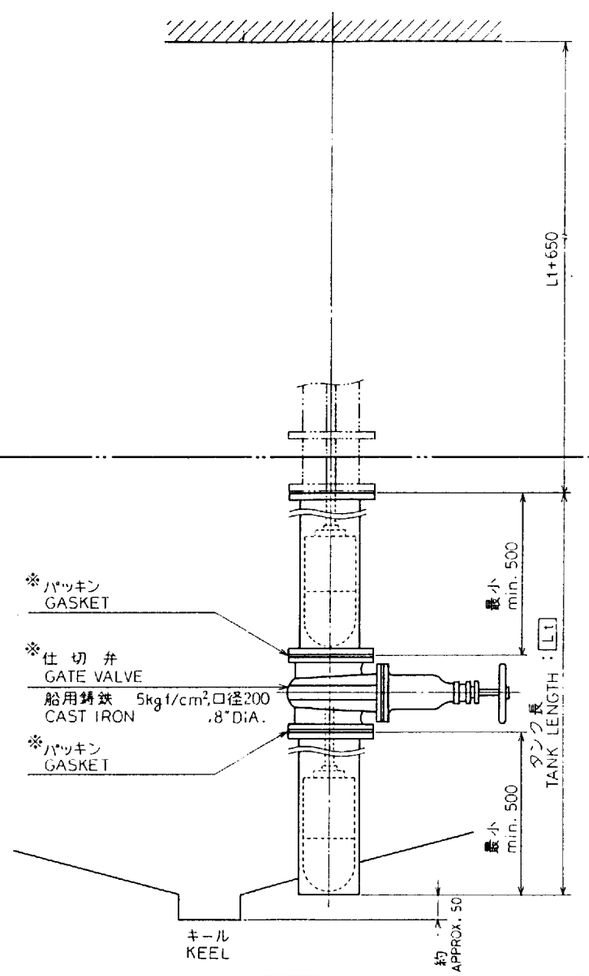
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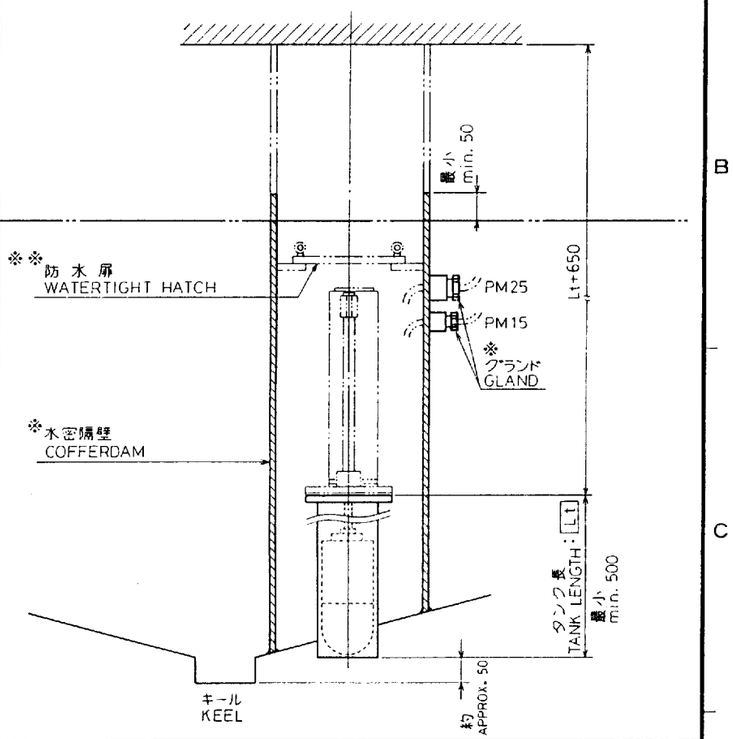
FURUNO

条件 CONDITION	A	タンク長を満載時の吃水線の上までとれる場合。 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外しておく場合。 THIS METHOD ALLOWS TO EASILY REMOVE THE SOUNDOME DURING A PERIOD OF NON-OPERATION OR SERVICING. 2. タンク長を吃水線の上まで取れない場合。 WHEN THE LONGER TANK IS NOT USED DUE TO LIMITED CLEARANCE.
		タンク長を吃水線までとれない場合で、仕切り弁を使用しない時。 WHEN THE LONGER TANK OR A GATE VALVE CAN NOT BE USED.

装備法 METHOD







1. この装備法を標準として推奨する。
   THIS METHOD IS RECOMMENDED AS STANDARD INSTALLATION.
2. ※；上下装置の上部に“Lt+650”のサービス空間が取れない場合は、天井に“300×300”の穴を明けておくこと。
   ※；IF OVERHEAD CLEARANCE “Lt+650” IS NOT ALLOWED, MAKE A HOLE OF 300×300mm ON CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.

条件（1）の目的でこの装備法を行う場合には、左図（A）と同様に、吃水線の上までタンク長をとる方が望ましい。
LIKE THE INSTALLATION METHOD [A], THE TANK FLANGE POSITION IS DESIRED TO BE ABOVE WATER LINE.

1. 水密隔壁は船級協会規則を参照し、造船所で製作下さい。その際サービススペースも考慮して下さい。
   FABRICATE THE COEFERDAM BY SHIPYARD IN ACCORDANCE WITH CONCERNED REGULATIONS. ALSO ALLOW ENOUGH MAINTENANCE SPACE.
2. ※※；水密隔壁の上限を吃水線の上までとれない場合には、上下装置取り外しの為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.

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

注 1. 装備法の決定に際しては、安全性（強度、水密性等）を重視し、それに合わせて保守・点検の容易さも配慮のこと。
DECIDE AN INSTALLATION METHOD CONSIDERING SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE SHIP'S HULL. ALSO PROVIDE ENOUGH MAINTENANCE SPACE.
2. ※※※：造船所手配
SHIPYARD SUPPLY.
3. 単位：mm
UNIT

CH-18/28

承認 APPROVED	AUG. 5. '88 T. NAKANO	三角法 THIRD ANGLE PROJECTION	名称 TITLE 格納タンクの装備例 RETRACTION TANK INSTALLATION METHOD
検図 CHECKED	AUG. 4. '88 T. KODA	尺度 SCALE	
製図 DRAWN	AUG. 3. '88 M. USUDA	重量 WEIGHT kg	図番 DWG.NO. C1271-002-C

FURUNO ELECTRIC CO., LTD.

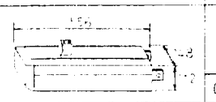
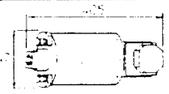
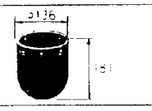
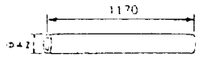
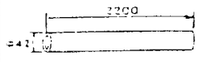
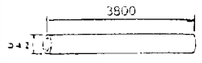
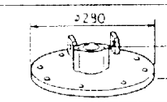
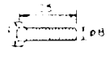
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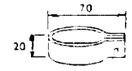
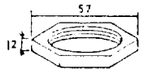
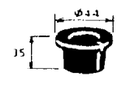
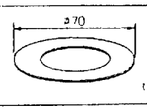
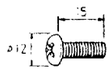
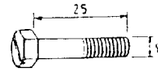
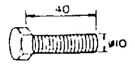
Assembling and Mounting of Hull Unit

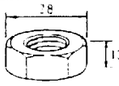
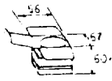
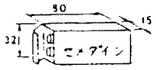
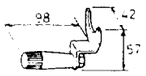
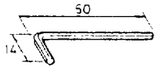
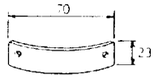
The hull unit is delivered in blocks and should be assembled at installation. After checking packing items referring to the list on page 1-7 or 1-8 assemble and mount the unit following the procedure on pages 1-9, 1-10 and 1-11.

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HULL UNIT ASSEMBLY KIT (For CH-181)

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY
1	上下動部 RAISE/LOWER DRIVE ASSEMBLY		CODE No.	1
2	旋回部 SOUNDOME ASSEMBLY		CODE No.	1
3	ドーム（D）組品 SOUNDOME (D) ASSEMBLY		CH-1813 CODE No. 006-541-410	1
4	上下シャフト MAIN SHAFT		06-008-1021 CODE No. 100-028-500	1
	〃		SHJ-0006-1 CODE No. 661-000-061	
	〃		06-007-1572-0 CODE No. 600-715-720	
5	架台載台組品 MAIN BODY FLANGE ASSEMBLY		06-013-2300 CODE No.	1
6	フランジパッキン GASKET		06-013-2303-1 CODE No. 100-098-711	(1)
7	O－リング O-RING		JIS B2401-1A-P42 CODE No. 000-851-142	(1)
8	グリスコットン GREASE COTTON		9.5 カク ※0.6M※ CODE No. 000-859-103	(1)
9	グリスコットン押え台 GREASE COTTON RETAINER		SHJ-0003-1 CODE No. 661-000-031	(1)
10	トラニオンピン TRUNNION PIN		06-013-2302 0 CODE No. 100-098-700	(1)
11	割りピン SPLIT PIN		3×25 SUS304 CODE No. 000-866-263	(2)
12	ミガキ平座金 PLAT WASHER		M10 SUS304 CODE No. 000-864-131	(2)
13	六角ボルト SLOTTED HEX BOLT		M8×25 SUS304 CODE No. 000-801-701	(2)

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY
14	ミガキ平座金 FLAT WASHER		M8 SUS304 CODE No. 000-864-130	(2)
15	グランド組品 GLAND ASSEMBLY		CH-1423-11 CODE No. 006-532-560	1
16	止め金具 STOPPER		SHN-0003-2 CODE No. 661-400-032	1
17	止めナット LOCK NUT		06-013-2401-0 CODE No. 100-098-730	1
18	六角穴付止めネジ SOCKET SET SCREW		M4×5 SUS CODE No. 000-801-527	1
19	パイプキャップ PIPE CAP		SHN-0011 CODE No. 661-400-110	1
20	回り止め用座金 STOPPER WASHER		06-013-2402-0 CODE No. 100-098-740	1
21	＋トラ小ネジ SELF-LOCK SCREW		M5×12 SUS304 CODE No. 000-801-704	10
22	スリ割り六角ボルト SLOTTED HEX. BOLT		M8×25 SUS304 CODE No. 000-862-149	1
23	六角ボルト HEX. BOLT		M10×40 SUS304 CODE No. 000-862-184	2
24	バネ座金 SPRING WASHER		M8×SUS304 CODE No. 000-864-262	1
25	バネ座金 SPRING WASHER		M10 SUS304 CODE No. 000-864-261	2
26	六角ナット HEX. NUT		M8 SUS304 CODE No. 000-863-110	1
27	U ナット U-NUT		M10 SUS304 CODE No. 000-863-930	2
28	六角ボルト HEX. BOLT		M16×75 SUS304 CODE No. 000-801-703	8

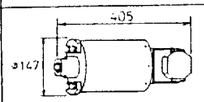
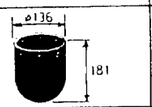
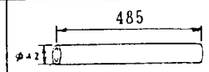
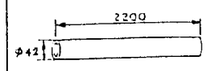
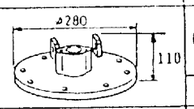
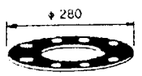
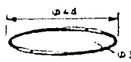
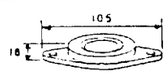
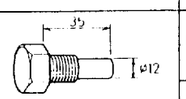
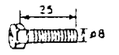
番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY
29	ミガキ平座金 FLAT WASHER		M16 SUS304 CODE No. 000-864-134	16
30	バネ座金 SPRING WASHER		M16 SUS304 CODE No. 000-864-265	8
31	六角ナット HEX. NUT		M16 SUS304 CODE No. 000-863-114	16
32	金属すきま腐触防止剤 ANTI-CREVICE CORROSION SEALANT		KNORUSTER 855 130G CODE No. 000-801-025	1
33	セメダイン ADHESIVE		6G セット SET CODE No. 000-856-520	1
34	高圧絶縁油 HIGH VOLTAGE INSULATION OIL		4 ℓ CODE No. 000-824-033	1
35	手動ハンドル組品 HAND CRANK ASSEMBLY		CH-1815 CODE No. 006-541-700	1
36	六角レンチ SOCKET SET SCREW WRENCH		対辺 HEX. Size 2mm CODE No. 000-830-108	1
37	ドーム抜き用当て板 ATTACHMENT PLATE		06-013-2701-0 CODE No. 100-099-170	2

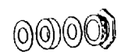
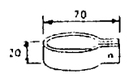
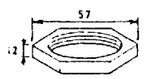
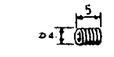
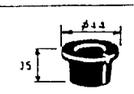
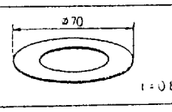
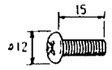
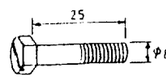
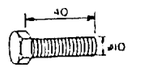
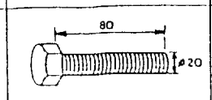
注
NOTE: 1. 6～14は 5に装着済。
ITEMS 6 THRU 14 HAVE BEEN FACTORY-FITTED ON ITEM 5.

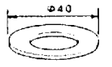
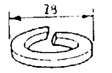
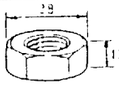
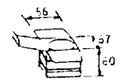
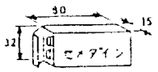
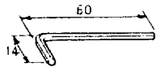
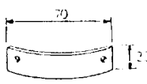
2. 14は1.17m 上下シャフトの場合のみ支給。
ITEM 14 IS SUPPLIED ONLY WHEN MAIN SHAFT OF 1.17m IS USED.

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HULL UNIT ASSEMBLY KIT (For CH-184)

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY
1	上下動部 RAISE/LOWER DRIVE ASSEMBLY		CODE No.	1
2	旋回部 SOUNDOME ASSEMBLY		CODE No.	1
3	ドーム（D）組品 SOUNDOME (D) ASSEMBLY		CH-1813 CODE No. 006-541-410	1
4	上下シャフト MAIN SHAFT		06-013-3211-0 CODE No.	1
	〃		SHJ-0006-1 CODE No. 661-000-061	
5	架台載台組品 MAIN BODY FLANGE ASSEMBLY		06-013-3201 CODE No. 100-143-891	1
6	フランジパッキン GASKET		06-013-2303-1 CODE No. 100-098-711	(1)
7	O－リング O-RING		JIS B2401-1A-P42 CODE No. 000-851-142	(1)
8	グリスコットン GREASE COTTON		9.5カク ※0.6M※ CODE No. 000-859-103	(1)
9	グリスコットン押え台 GREASE COTTON RETAINER		SHJ-0003-1 CODE No. 661-000-031	(1)
10	トラニオンボルト TRUNNION BOLT		06-013-3203-2 CODE No. 100-143-912	(2)
11	バネ座金 SPRING WASHER		M16 SUS304 CODE No. 000-864-265	(2)
12	六角ボルト SLOTTED HEX BOLT		M8×25 SUS304 CODE No. 000-801-701	(2)
13	ミガキ平座金 FLAT WASHER		M8 SUS304 CODE No. 000-864-130	(2)

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY
14	グランド組品 GLAND ASSEMBLY		CH-1423-11 CODE No. 006-532-560	1
15	止め金具 STOPPER		SHN-0003-2 CODE No. 661-400-032	1
16	止めナット LOCK NUT		06-013-2401-0 CODE No. 100-098-730	1
17	六角穴付止めネジ SOCKET SET SCREW		M4×5 SUS CODE No. 000-801-527	1
18	パイプキャップ PIPE CAP		SHN-0011 CODE No. 661-400-110	1
19	回り止め用座金 STOPPER WASHER		06-013-2402-0 CODE No. 100-098-740	1
20	＋トラ小ネジ SELF-LOCK SCREW		M5×12 SUS304 CODE No. 000-801-704	10
21	入り割り六角ボルト SLOTTED HEX. BOLT		M8×25 SUS304 CODE No. 000-862-149	1
22	六角ボルト HEX. BOLT		M10×40 SUS304 CODE No. 000-862-184	2
23	バネ座金 SPRING WASHER		M8×SUS304 CODE No. 000-864-262	1
24	バネ座金 SPRING WASHER		M10 SUS304 CODE No. 000-864-261	2
25	六角ナット HEX. NUT		M8 SUS304 CODE No. 000-863-110	1
26	Uナット U-NUT		M10 SUS304 CODE No. 000-863-930	2
27	六角ボルト HEX. BOLT		M16×75 SUS304 CODE No. 000-801-703	6

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY
29	ミガキ平座金 FLAT WASHER		M16 SUS304 CODE No. 000-864-134	14
30	バネ座金 SPRING WASHER		M16 SUS304 CODE No. 000-864-265	8
31	六角ナット HEX. NUT		M16 SUS304 CODE No. 000-863-114	16
32	金属すきま腐触防止剤 ANTI-CREVICE CORROSION SEALANT		KNORUSTER 855 130G CODE No. 000-801-025	1
33	セメダイン ADHESIVE		6G セット SET CODE No. 000-856-520	1
34	高圧絶縁油 HIGH VOLTAGE INSULATION OIL		4 ℓ CODE No. 000-824-033	1
35	六角レンチ SOCKET SET SCREW WRENCH		対辺 2mm HEX. Size CODE No. 000-830-108	1
36	ドーム抜き用当て板 ATTACHMENT PLATE		06-013-2701-0 CODE No. 100-099-170	2

注
NOTE: 1. 6～13は 5に装着済。
ITEMS 6 THRU 13 HAVE BEEN FACTORY-FITTED ON ITEM 5.

2. 14は0.485m上下シャフトの場合のみ支給。
ITEM 14 IS SUPPLIED ONLY WHEN MAIN SHAFT OF 0.485m IS USED.

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SOUNDOME ASSEMBLING

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⚠ CAUTION

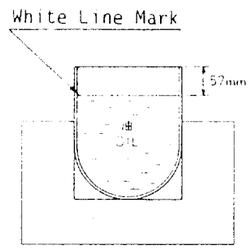
Keep oil away from eyes. Wear protective goggles when working with the oil. The oil cause inflammation of the eyes.
Do not touch the oil. The oil can cause inflammation of the skin. Wear protective gloves when working with the oil.
Do not ingest the oil. Diarrhea or vomiting can result.
Keep the oil out of reach of children.

EMERGENCY
If the oil enters the eyes, flush with clean water about 15 minutes. Consult a physician.
If oil contacts skin, wash with soap and water.
If the oil is ingested, see a physician immediately.

DISPOSAL OF OIL AND ITS CONTAINER
Dispose of oil and its container in accordance with local regulations. For further infomaton, contact place of purchase.

STORAGE
Seal container to keep out foreign material.
Store in dark place.

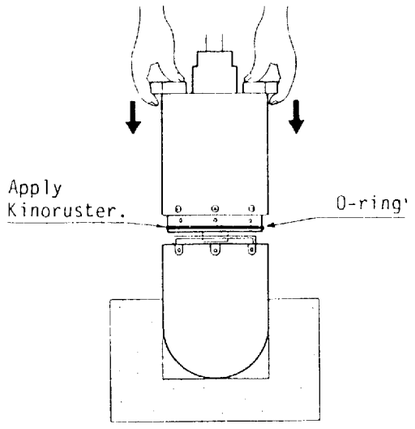
1 1. Place the soundome vertically and fill oil up to the white line (57mm below top) marked on the inner surface of the soundome.



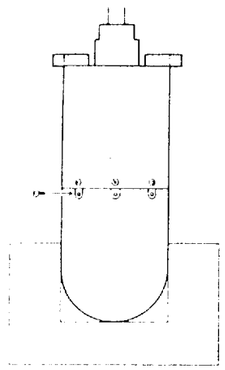
NOTE

Do not put excessive oil. It makes the job of step [2] difficult.

2 1. Make sure that the o- ring is placed in position on the upper dome assembly.
2. Apply a slight coat of sealant (Kinoruster) to the o-ring.
3. Fit the upper dome assembly into the soundome, being sure that the screw holes are aligned.



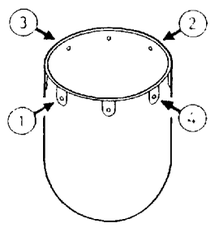
3 1. While pressing down the upper dome assembly, fit screws temporarily to the diagonally located two holes.



NOTE

Screws are self-locking type which requires no washers.

4 1. Fit other 8 screws.
2. Fasten the screws securely in diagonal order, especially for the first four screws.



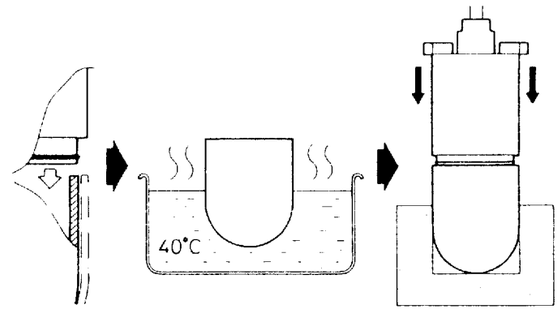
Caution

Make sure that the screws are secured evenly. Uneven fastening causes water penetration.

* * * NOTE * * *

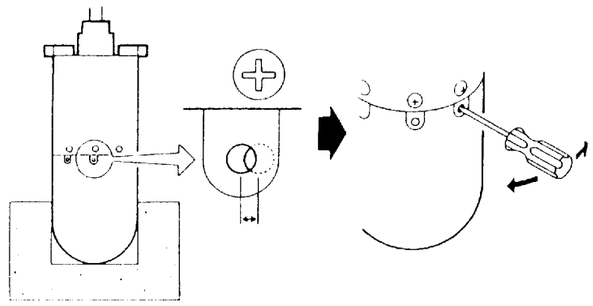
1. When the soundome is assembled in a low ambient temperature.

The soundome may shrink and become difficult to be fit to the upper dome assembly. Warm it in water of 40°C approximately or leave it in a room temperature of above 20°C for at least one hour to swell it.



2. When screw holes are not agreeing.

When screw holes of the soundome and the upper dome assembly are slightly out of alignment, insert a screw driver into a hole and pry it.



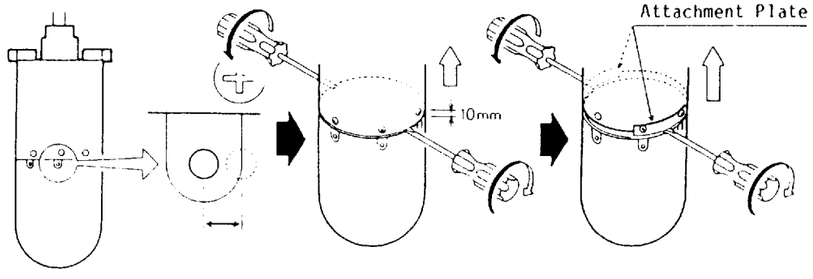
When the holes are totally out of alignment, detach the soundome once as below and refit it.

1) Place the soundome vertically.

2) Insert screwdrivers with blade width of 7 to 9mm to the slits on the soundome and rotate them in the opposite directions each other. The upper dome assembly will slide up by the width of the blade.

3) Fit two attachment plates to the upper dome assembly at the locations directly above the slits of the soundome.

4) Insert the screwdrivers between the plates and the slits of soundome and rotate them. The upper dome assembly is pushed up further and will become loose enough to be removed by hand.



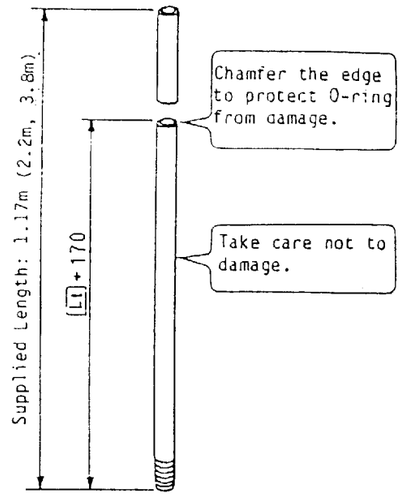
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HULL UNIT ASSEMBLING AND MOUNTING

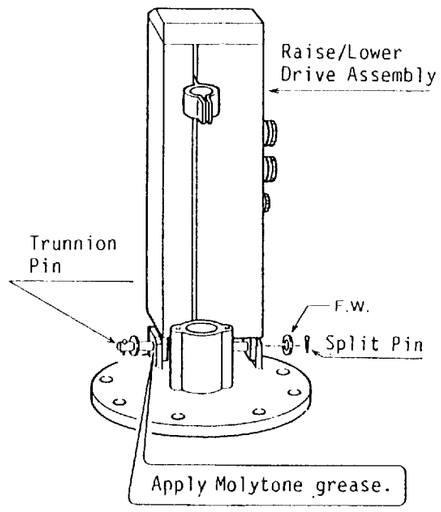
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(For CH-181, 350mm Travel Set)

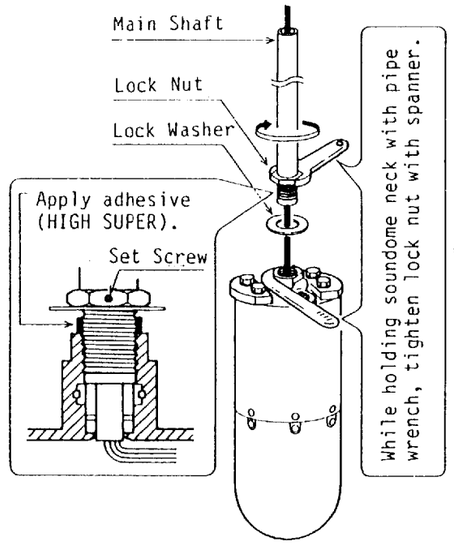
1 1. Calculate necessary length of main shaft and the length of retraction tank [Lt] and cut off the spare portion. When 1m tank is used, main shaft (1.17m) should be used without cutting off any portion.



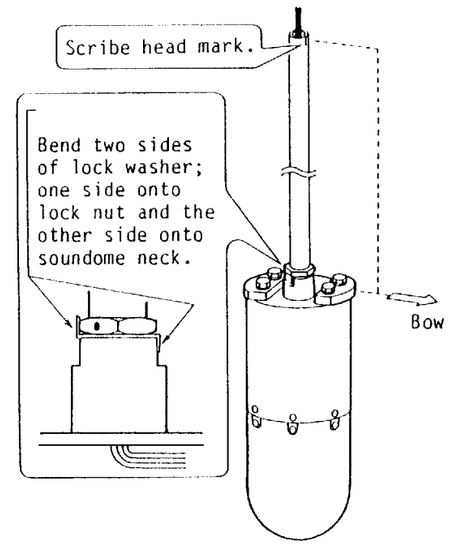
2 1. Mount raise/lower drive assembly on main body flange by using trunnion pins.



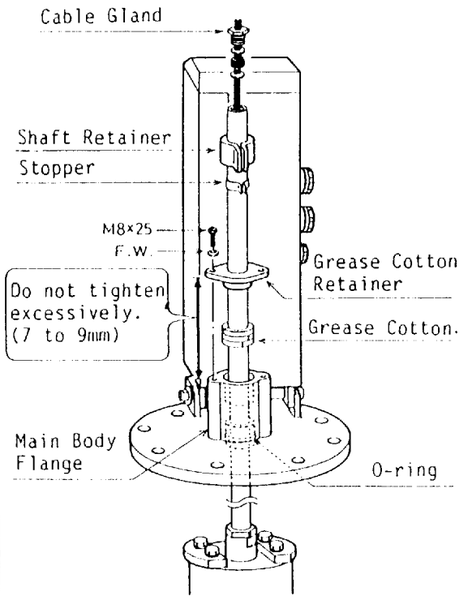
3 1. Slide lock nut and lock washer on to main shaft.
2. After screwing main shaft tightly into soundome neck, unscrew it by four turns and apply ADHESIVE (HIGH SUPER) to the threads.
3. Faster main shaft completely and tighten lock nut with spanner.



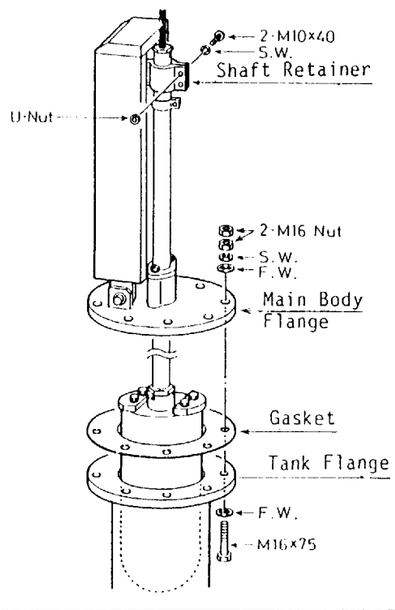
4 1. Tighten socket-set screw on lock nut.
2. Bend two sides of lock washer by using hammer; one side upward onto lock washer and the opposite side downward onto main shaft.
3. Scribe head mark on the main shaft.



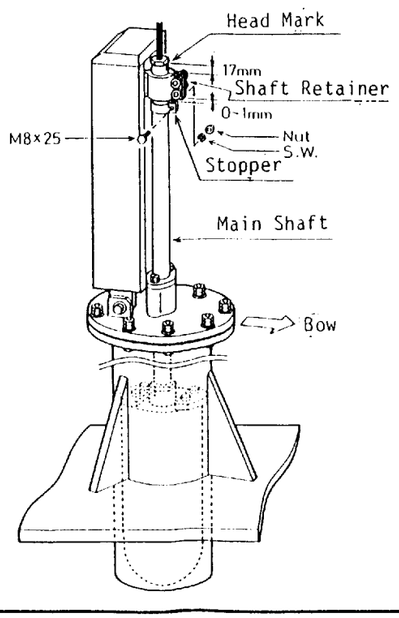
5 1. Make sure that O-ring is in position on main body flange.
2. Pass main shaft thru main body flange, grease cotton retainer, stopper and shaft retainer.
3. Insert 3 pieces of grease cotton so that joints of cottons are spaced at 120°.
4. Pass washers gasket and cable gland thru cable and secure them to main shaft. (For 2.2m and 3.8m long main shaft, screw up pipe cap on main shaft.)



6 1. Temporarily secure shaft retainer on main shaft with two bolts.
2. Place gasket and hull unit on the tank and themporarily fix them with bolts and nuts.
3. Using hand crank, manually raise/lower soundome and check that it moves smoothly without hitting tank. If not, adjust the position of hull unit by sliding it on the tank. See note 1.
4. Fasten bolts and nuts securely.



7 1. Set main shaft so that head mark is faced ship's bow.
2. Slide the main shaft until distance between tops of main shaft and shaft retainer becomes 17mm, and then secure the shaft retainer.
3. Fasten stopper.

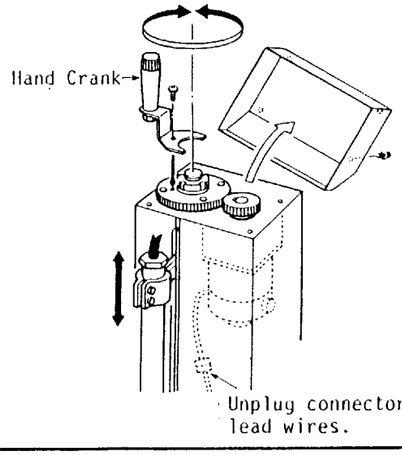


* * * NOTE * * *

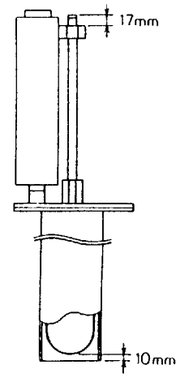
1. Manual raise/lower of transducer

Remove the top cover of the raise/lower control assembly and set the hand crank as shown below.

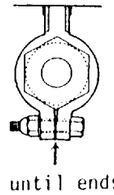
Turn off power switch and unplug the connector on motor lead wires in hull unit before using the hand crank, and the soundome can be easily raised/lowered because the motor which works as a gnenerator is isolated from load.



2. Bottom of soundome is placed 10mm above the bottom of retrac-tion tank when the shaft retainer is fastened at 17mm below the top of main shaft.



3. The shaft retainer should be fastened securely. It is recommended that the spanner with a length of approx. 300mm be used.



Fasten until ends touch.

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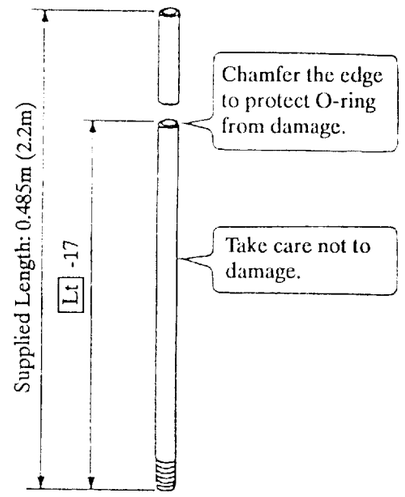
HULL UNIT ASSEMBLING AND MOUNTING

* * * * * * * * * * * * * * *

(For CH-184, 250mm Travel Set)

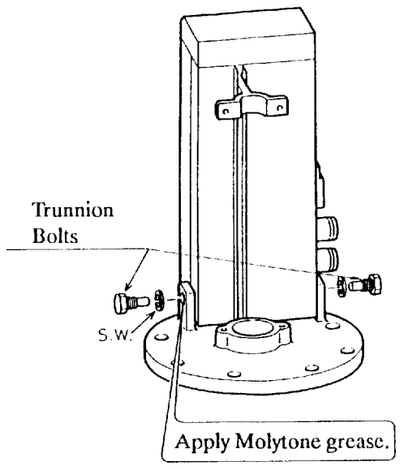
1

1. Calculate necessary length of main shaft and the length of retraction tank [Lt] and cut off the spare potion.



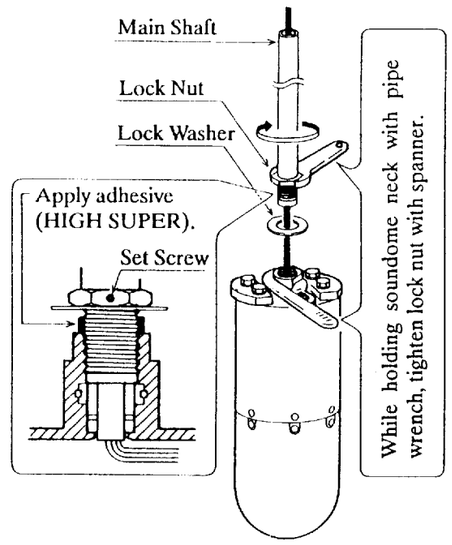
2

1. Mount raise/lower drive assembly on main body flange by using trunnion bolts.



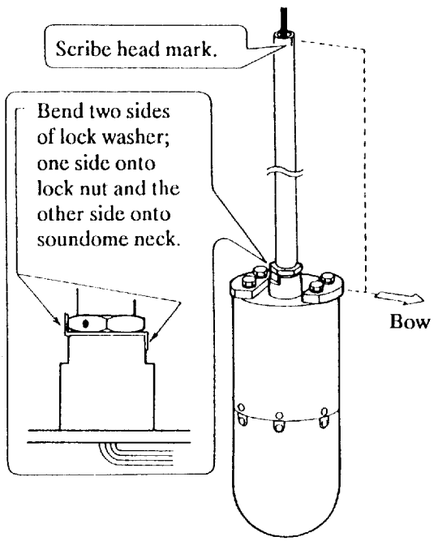
3

1. Slide lock nut and lock washer on to main shaft.
2. After screwing main shaft tightly into soundome neck, unscrew it by four turns and apply ADHESIVE (HIGH SUPER) to the threads.
3. Faster main shaft completely and tighten lock nut with spanner.



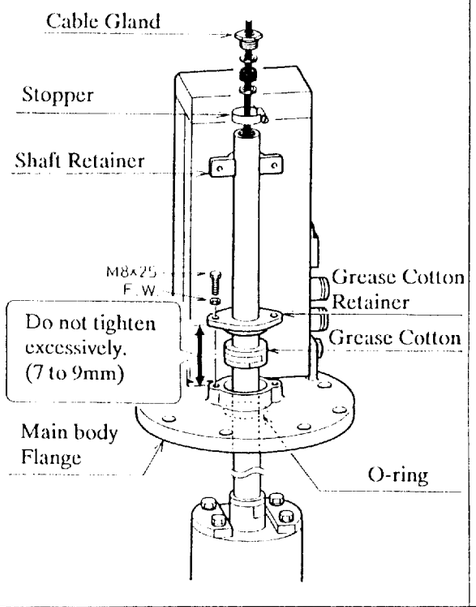
4

1. Tighten socket-set screw on lock nut.
2. Bend two sides of lock washer by using hammer; one side upward onto lock washer and the opposite side downward onto main shaft.
3. Scribe head mark on the main shaft.



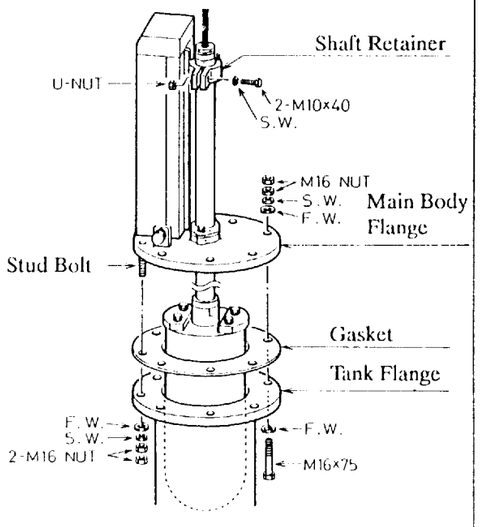
5

1. Make sure that O-ring is in position on main body flange.
2. Pass main shaft thru main body flange, grease cotton retainer and stopper.
3. Insert 3 pieces of grease cotton so that joints of cottons are spaced at 120°.
4. Pass washers gasket and cable gland thru cable and secure them to main shaft. (For 2.2m long main shaft, screw up pipe cap on main shaft.)



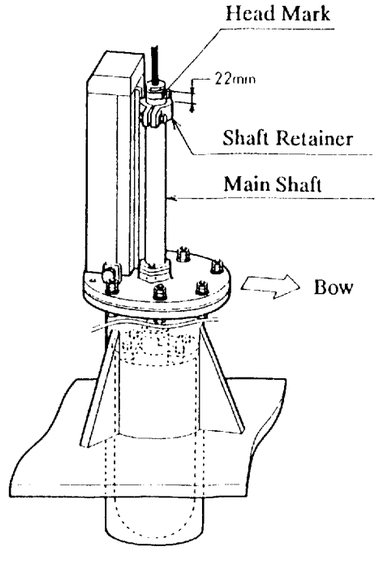
6

1. Temporarily secure shaft retainer on main shaft with two bolts.
2. Place gasket and hull unit on the tank and temporarily fix them with bolts and nuts.
3. Turning on the power (breaker) switch, raise/lower soundome and check that it moves smoothly without hitting tank. If not, adjust the position of hull unit by sliding it on the tank. See note 1.
4. Fasten bolts and nuts securely.



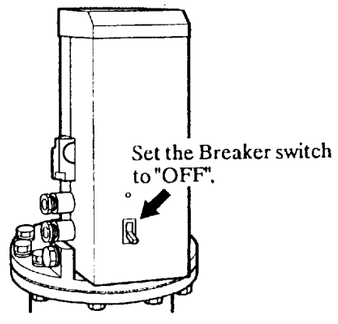
7

1. Set main shaft so that head mark is faced ship's bow.
2. Slide the main shaft until distance between tops of main shaft and shaft retainer becomes 22mm, and then secure the shaft retainer.
3. Fasten stopper.



* * * NOTE * * *

1. Set the Breaker switch to "OFF" firmly by packing tape before starting job at hull unit. If a Power switch turns on carelessly while at work, it is quite dangerous for the worker to be injured by shaft retainer or stopper.

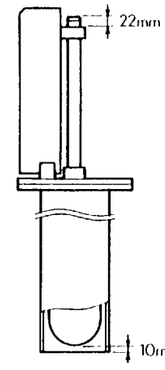


2. Manual raise/lower operation cannot be performed. This is because the motor brakes itself when the power is not applied.

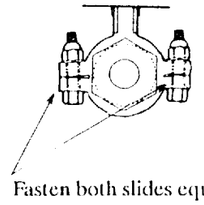
   Check raise/lower operation by turning on the Power (breaker) switch.

   * Confirm that no obstacles exists on the travel of the main shaft. Fast raise/lower speed cannot stop the operation even if you notice obstacle on the way.

3. Bottom of soundome is placed 10mm above the bottom of retraction tank when the shaft retainer is fastened at 22mm below the top of main shaft.



4. The shaft retainer should be fastened securely. It is recommended that the spanner with a length of approx. 300mm be used.



Fasten both slides equally.

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1-3. Control Box CH-1841 (For 250mm travel hull unit)

The control box should be installed in a location close to the hull unit. The connection cable between the control box and the soundome assembly is 5.2 or 8m long. See pages 1-22, 2-2 and 2-5 for installation.

1-4. Motion Sensor MS-100 (Option)

The MS-100 measures ship's rolling and pitching angles with sensors using the principles of the gyroscope. Following in the footsteps of its predecessor model BS-704, the MS-100 is free from errors caused by ship's vertical and horizontal motions and can be installed at any convenient location.

However ship's semi-permanent inclination due to loading imbalance, etc. can not be detected and should be compensated at installation as described on page 3-5.

REMARKS ON INSTALLATION

Installation Site

Basically, the unit can be installed at any location, provided that the following places are avoided. Especially pay attention to vibration, which may be the main cause of erroneous reading. The recommended place is on the floor in the bridge.

1) Place subjected to intense vibration; engine room, thin bulkhead, ceiling etc.

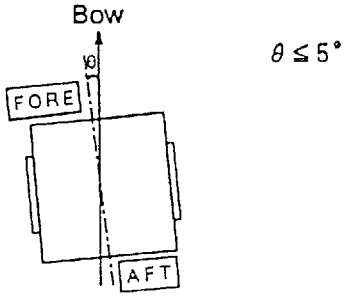
2) Place exposed to rain and splash

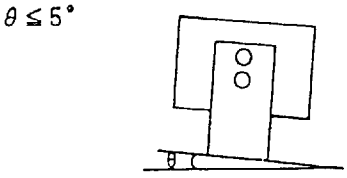
3) Place with high temperature (50°C or more)

Further, do not mount it on the hull unit, where intense vibration is expected.

Installation

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



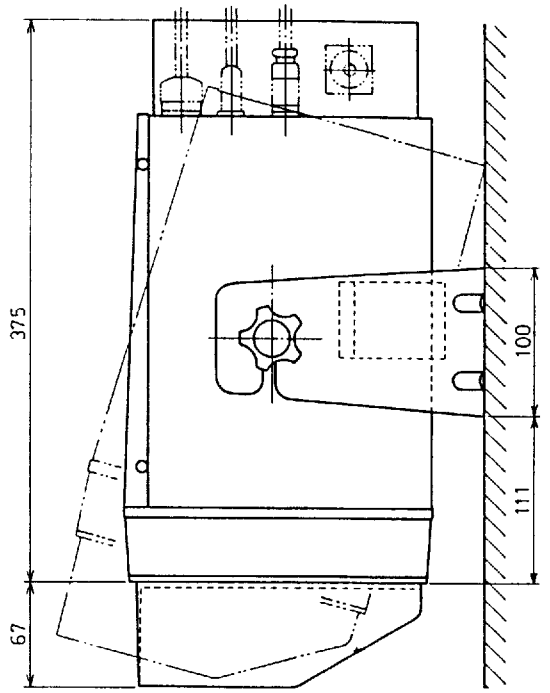


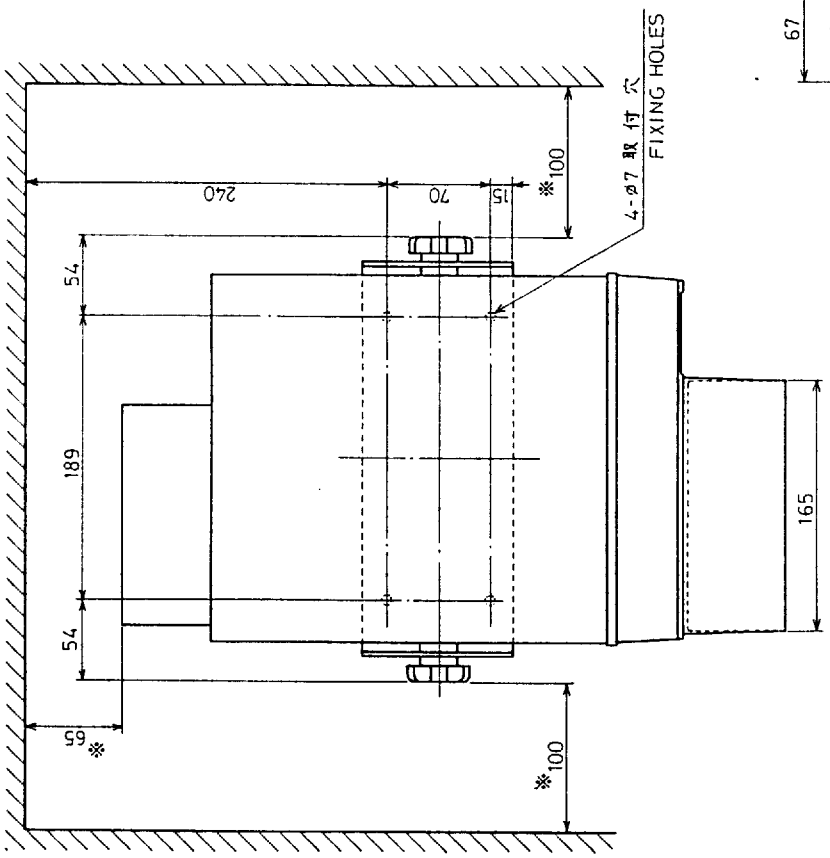
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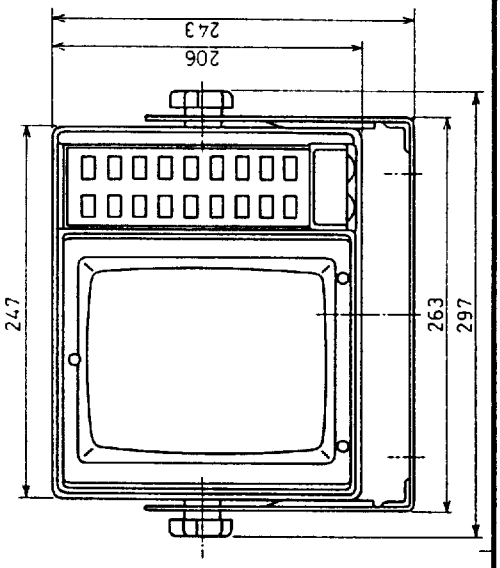
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1-13

壁取付不可
NO BULKHEAD MOUNTING ALLOWED
※:推奨サービス空間
RECOMMENDED SERVICE SPACE.





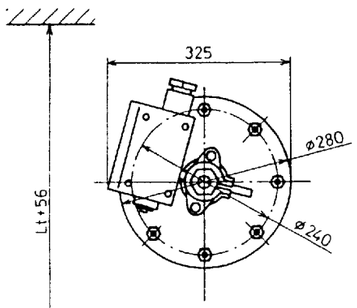


品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

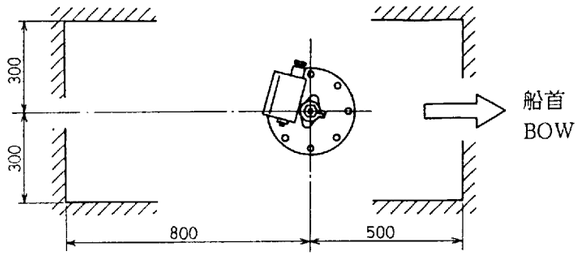
承認 APPROVED	SEP.6.'88 T.NAKAJO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	指示器 CH-180 DISPLAY UNIT
検図 CHECKED	Sep.6.'88 T.K...	尺度 SCALE	1/5		
製図 DRAWN	AUG.30.'88 M.USUDA	重量 WEIGHT	8 内ハンガーブラケット 1.4 kg BRACKET	図番 DWG.NO.	C1271-007-A

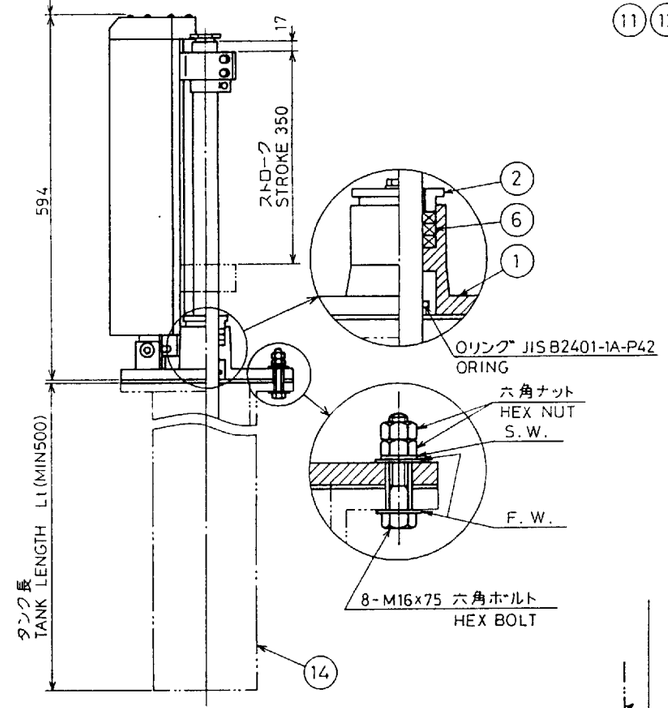
www.reelschematic.com

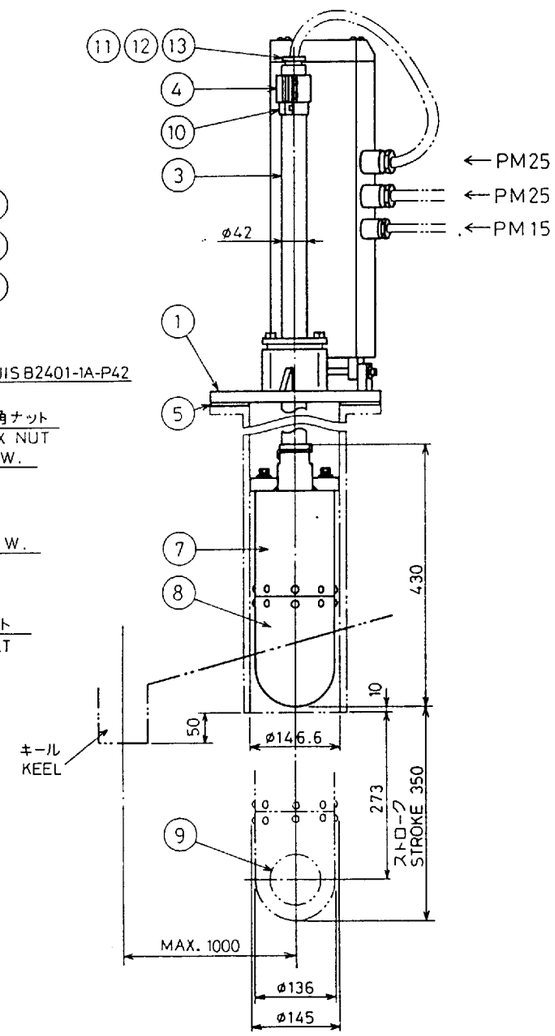
FURUNO



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、格納タンクの長さ（Lt）に、170mmを加えた値で切断すること。
   Ls＝Lt＋170（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+170 (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.

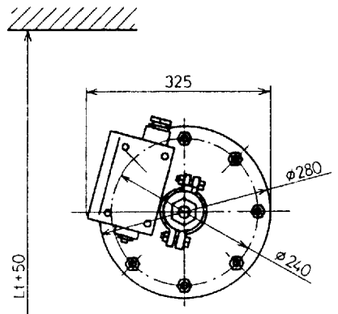
ITEM	NAME	MATERIAL	Q'TY	DWG.NO.	REMARKS
14	格納タンク RETRACTION TANK		(1)		オプション OPTION
13	ガスケット GASKET		1		
12	座　金 WASHER		2		
11	締付グランド GLAND		1		
10	抜止め金具 STOPPER		1		
9	送受波器 TRANSDUCER		1		
8	ドーム(D) SOUNDOME (D)		1		
7	ドーム(U) TOP HOUSING(U)		1		
6	グリスコットン GREASE COTTON		3		
5	フランジパッキン GASKET		1		
4	パイプ取付金具 SHAFT RETAINER		1		
3	上下シャフト(1) MAIN SHAFT (1)		1		
2	グリスコットン押え台 GREASE COTTON RETAINER		1		
1	架台鍛台 MAIN BODY FLANGE		1		

承認 APPROVED	SEP・6・'88 T.NAKAUC	三角法 THIRD ANGLE PROJECTION		名称 TITLE	上下装置
検図 CHECKED	Sep.6.'88 T.KOYA	R度 SCALE	1/10	CH-181	HULL UNIT
製図 DRAWN	AUG・30・'88 M.USUDA	重量 WEIGHT	37 kg	図番 DWG.NO.	C1271-008-B

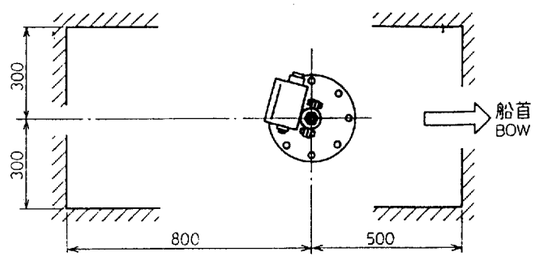
FURUNO ELECTRIC CO., LTD.

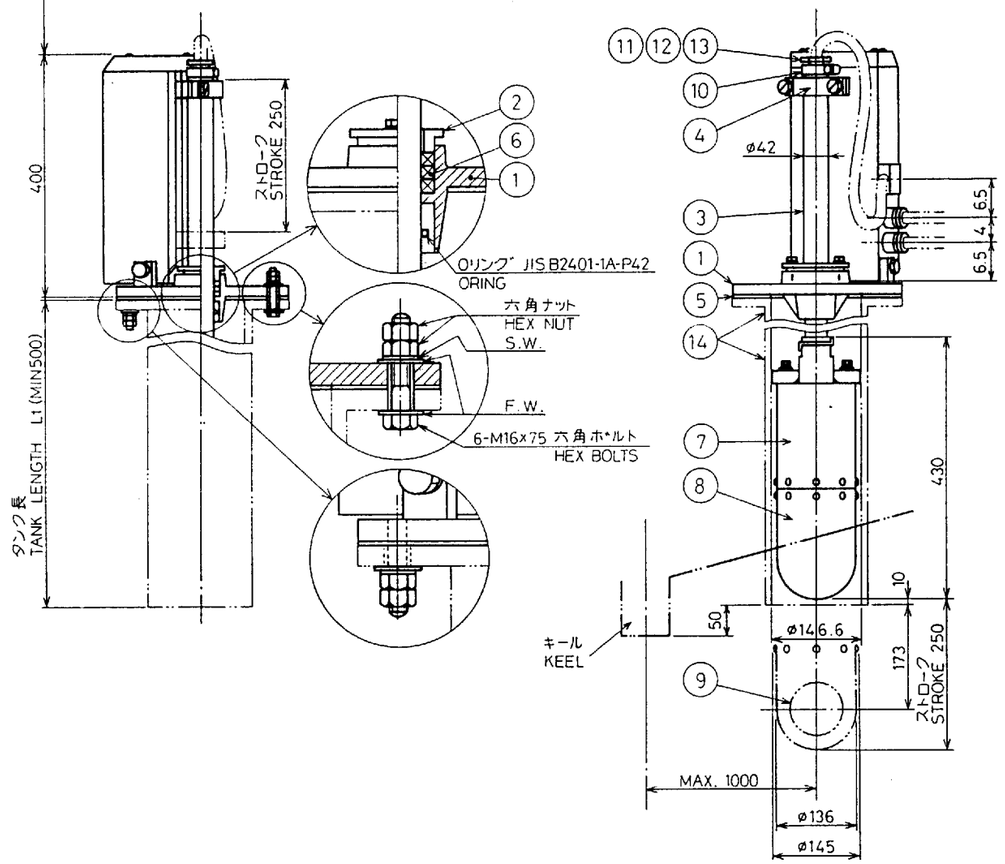
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推奨保守点検用スペース（尺度 1/20）
RECOMMENDED SERVICE SPACE (SCALE 1/20)





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、格納タンクの長さ（Lt）に、17mmを引いた値で切断すること。
   Ls=Lt−17 （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−17 (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.

ITEM	NAME	MATERIAL	Q'TY	DWG.NO.	REMARKS
14	格納タンク RETRACTION TANK		(1)		オプション OPTION
13	ガスケット GASKET		1		
12	座金 WASHER		2		
11	締付グランド GLAND		1		
10	板止め金具 STOPPER		1		
9	送受波器 TRANSDUCER		1		
8	ドーム(D) SOUNDOME (D)		1		
7	ドーム(U) TOP HOUSING(U)		1		
6	グリスコットン GREASE COTTON		3		
5	フランジパッキン GASKET		1		
4	パイプ取付金具 SHAFT RETAINER		1		
3	上下シャフト(1) MAIN SHAFT (1)		1		
2	グリスコットン押え台 GREASE COTTON RETAINER		1		
1	架台載台 MAIN BODY FLANGE		1		

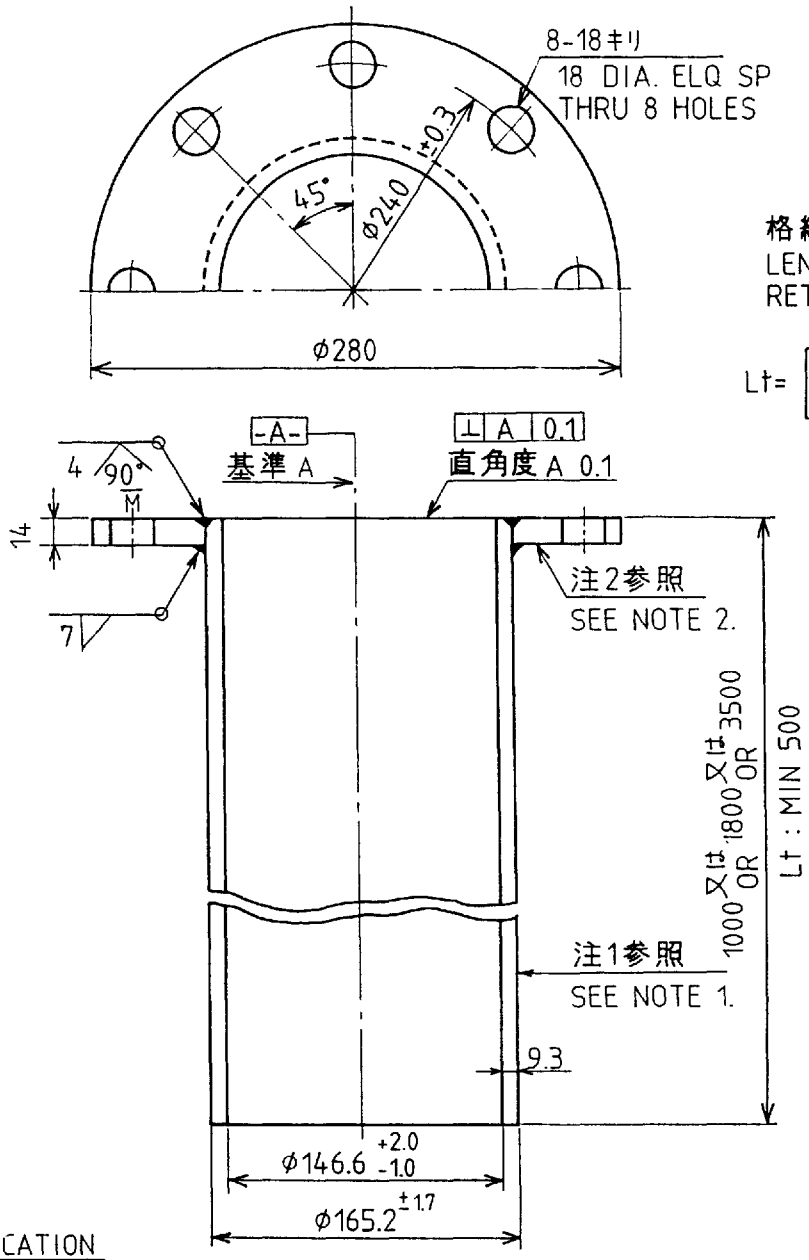
承認 APPROVED	JAN・19・'91 T.NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	上下装置
検図 CHECKED	JAN・19・'91 M. USUDA	尺度 SCALE	1/10	CH-184	HULL UNIT
製図 DRAWN	JAN・18・'91 T. MIYOSHI	重量 WEIGHT	35 kg	図番 DWG.NO.	C1280−G05−A

CH-18
CH-28

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製作時の注意
NOTE FOR FABRICATION

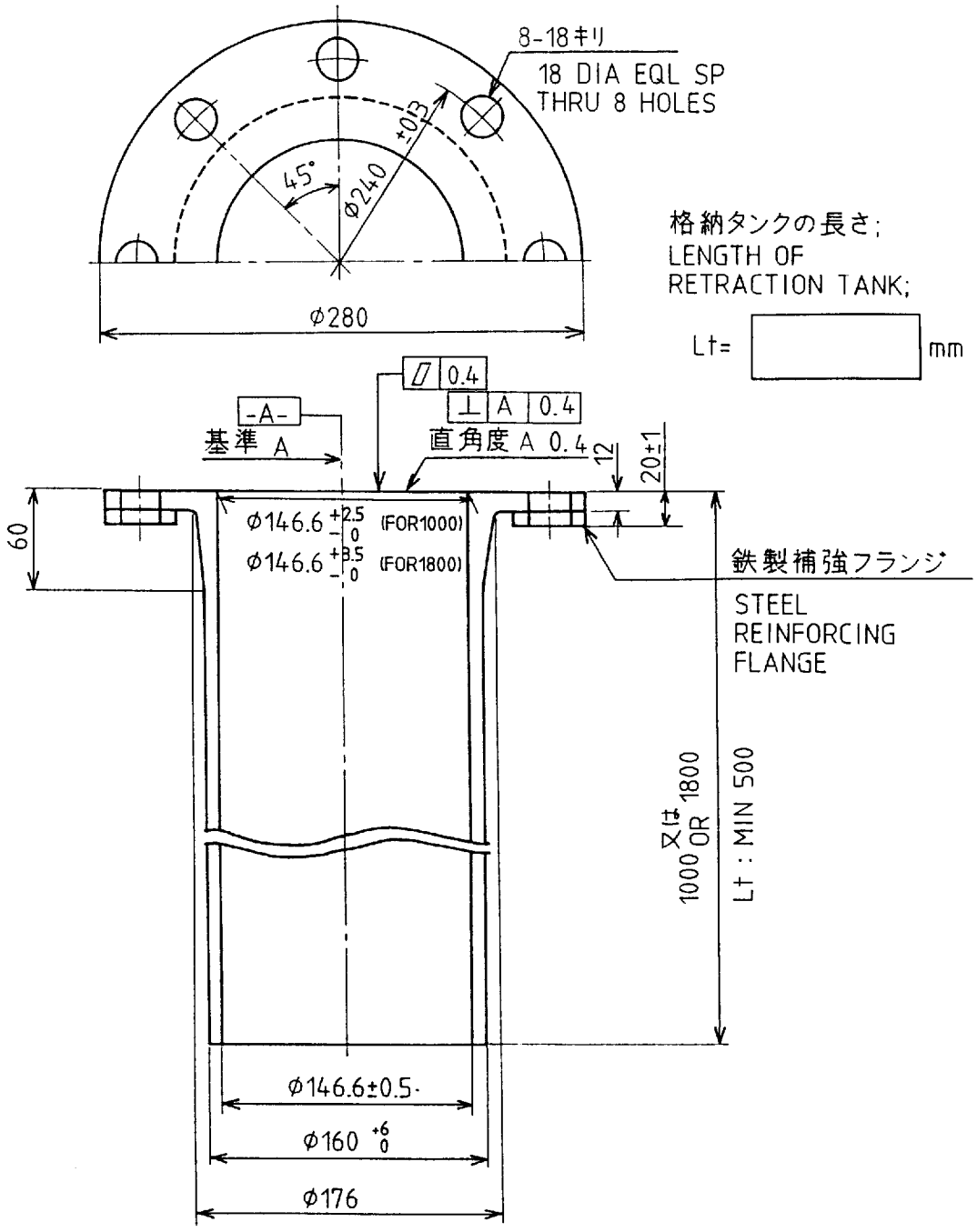
1. 材料はSTPG38-E-C(圧力配管用炭素鋼鋼管冷間仕上電気抵抗溶接鋼管)の150A×Sch60 (外径φ165.2,厚さ9.3)で内径がφ146.6 $^{+2.0}_{-1.0}$ のものを使用のこと。
2. 材料はSS41Pを使用のこと。
3. タンク側面は大日本ペイント速乾プライマー(ブラウン)を1回塗布のこと。
4. タンク内面はビニールAF(中国塗料)を2回塗布のこと。
5. タンク上面は塗装しないこと。
1. USE STPG-38-E-C (CARBON STEEL PIPE FOR PRESSURE SERVICE) WITH OUTER DIAMETER φ165.2, INNER DIAMETER φ146.6 $^{+2.0}_{-1.0}$ AND THICKNESS 9.3.
2. USE SS41P (JIS G3101, ROLLED STEEL FOR GENERAL STRUCTURE).
3. GIVE ONE COAT OF FAST-DRYING RED LEAD PAINT ON OUTSIDE OF TANK.
4. GIVE TWO COATS OF VINYL PAINT "AF" OR ANTI-FOULING PAINT ON INSIDE OF TANK.
5. DO NOT PAINT SURFACE OF FLANGE.

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

承認 APPROVED		三角法 THIRD ANGLE PROJECTION		名称 TITLE	鉄製格納タンク外観図 STEEL RETRACTION TANK OUTLINE DRAWING
検図 CHECKED		尺度 SCALE	1/4		
製図 DRAWN	AUG. 30. '88 M. USUDA	重量 WEIGHT	1000mm : 46 1800mm : 69 kg 3500mm : 130	図番 DWG.NO.	C1271-003-A

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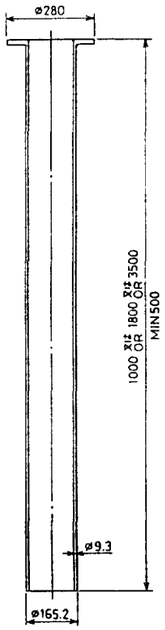


品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

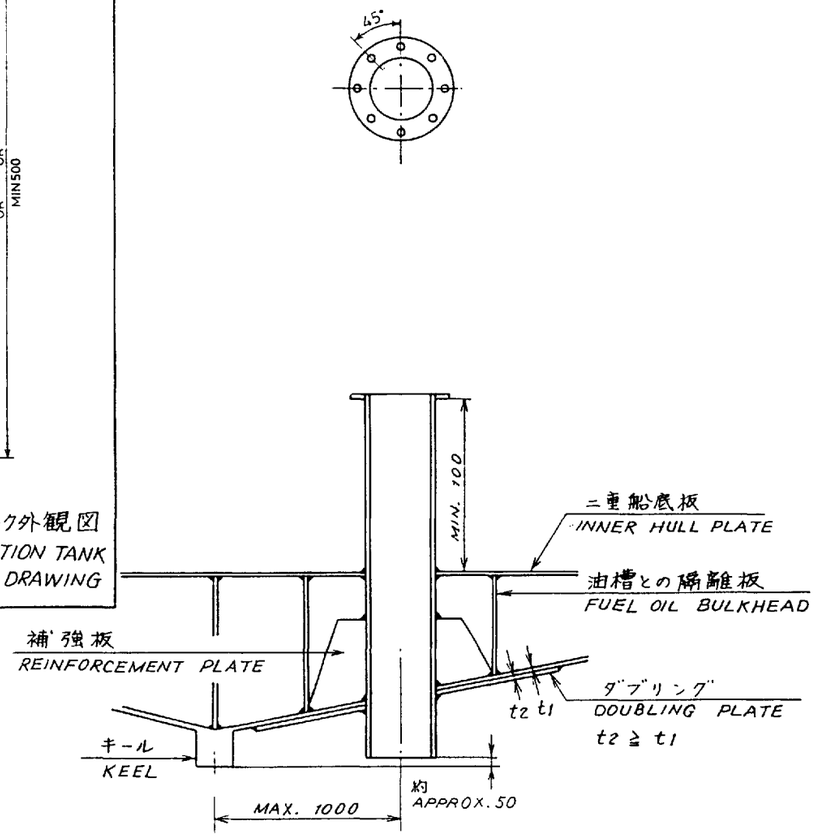
承認 APPROVED	SEP・6・'88 T.NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	FRP製格納タンク外観図 FRP RETRACTION TANK OUTLINE DRAWING
検図 CHECKED	Sep.・6・'88 T.[illegible]	尺度 SCALE	1/4		
製図 DRAWN	AUG・30・'88 M. USUDA	重量 WEIGHT	1000mm : 10 1800mm : 16 kg	図番 DWG.NO.	C1271-004-A

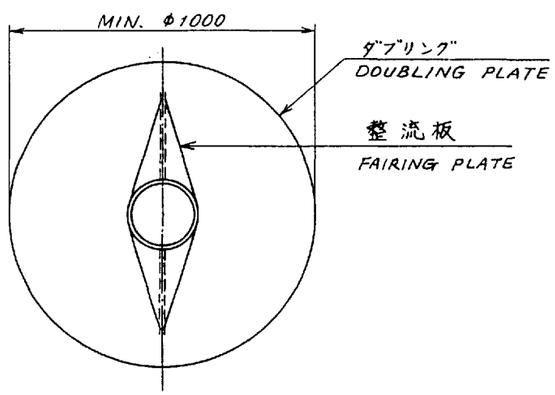
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格納タンク外観図
RETRACTION TANK
OUTLINE DRAWING





単位 UNIT: mm

1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) 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。
   4) タンクの先端はキールの先端より約50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。
2. 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。
3. 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。
4. 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。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW ON FORE-AFT LINE.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.
2. DOUBLING PLATE OF ABOUT 1000 mm IN DIA. SHOULD BE INSTALLED BY THE SHIPYARD.
3. FAIRING PLATE (NET PROTECTOR) SHOULD BE INSTALLED AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM BY THE SHIPYARD.
4. 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.

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

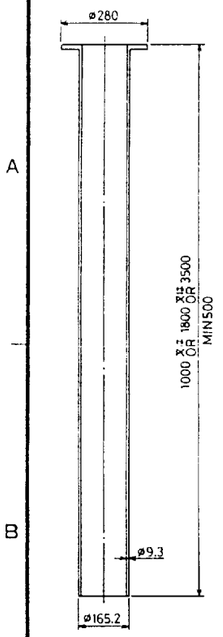
承認 APPROVED	SEP. 6, '88 T. NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク船底装備図（鋼船） RETRACTION TANK INSTALLATION ON STEEL HULL
検図 CHECKED	Sep. 6, '88 T. IWODA	尺度 SCALE	1/20		
製図 DRAWN	AUG. 30 '88 M. USUDA	重量 WEIGHT	kg	図番 DWG.NO.	C1271-009-B

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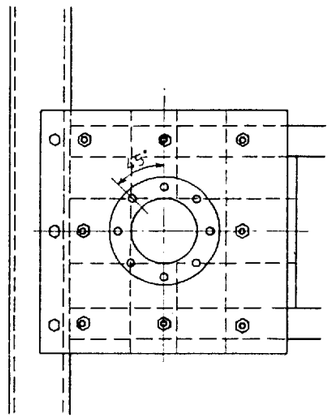
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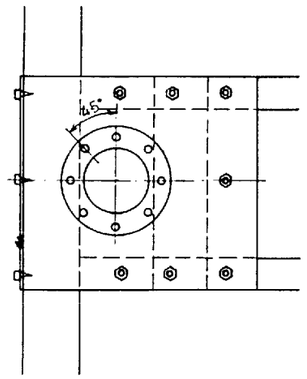
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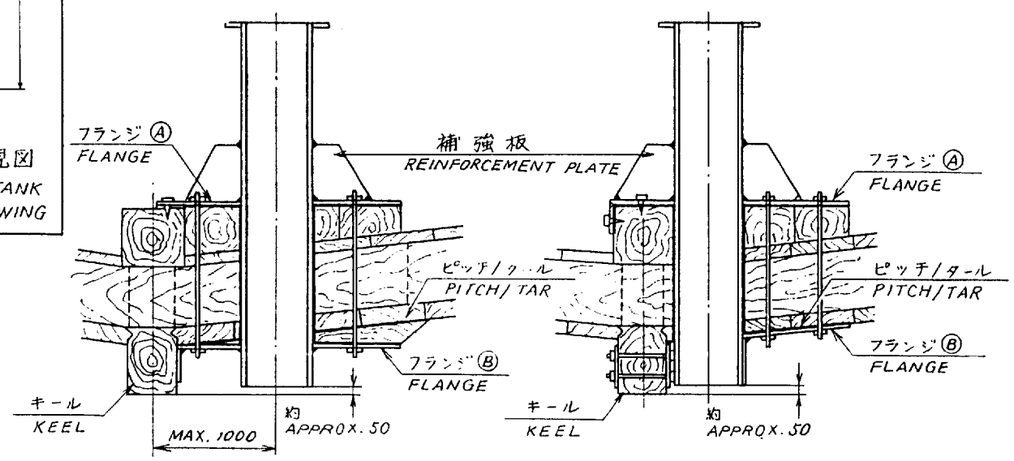
FURUNO

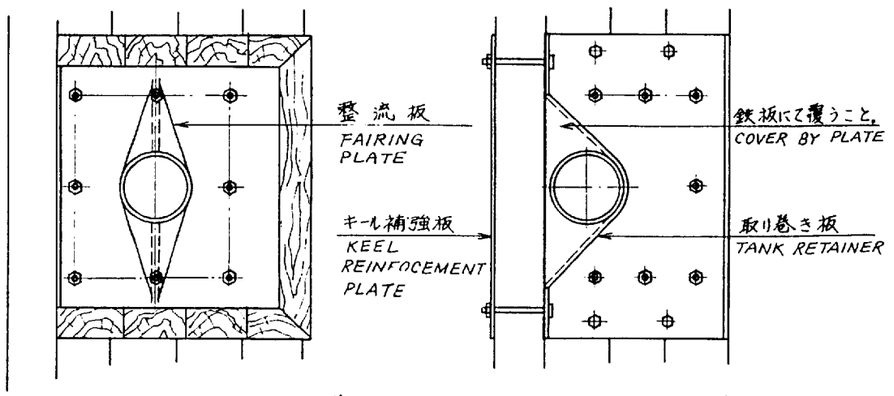


格納タンク外観図
RETRACTION TANK OUTLINE DRAWING









キールから離して装備
INSTALLATION OFF KEEL

キール脇に装備
INSTALLATION BESIDE KEEL

1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) 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。
   4) タンクの底部はキールの下端より約50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの装備は次の要領を参考にして行うこと。
   1) 木のブロック等を使用して船骨間の船底を充分補強する。補強された面は標準走航時水平になる様にする。
   2) タンクが通る穴を開ける。
   3) 必要個所に水密のためのピッチ等を充てん塗布した後、フランジ Ⓐ 及び Ⓑ をボルトナットで締めつけて固定する。
   4) タンクを貫通させ、タンクの底部がキール下端より約50mm上になる様にフランジ Ⓐ 及び Ⓑ に溶接し、固定する。キール肋装備の場合は取り巻き板もタンクに溶接し、キールに固定する。
   5) 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。
   6) 必要に応じてタンクの周囲3,4ヶ所でフランジ Ⓐ 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。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW ON FORE-AFT LINE.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
   1) REINFORCE THE HULL PLATE BETWEEN FRAMES WITH WOODEN BLOCKS OR SO. THE WOODEN BLOCKS SHOULD BE INSTALLED SO THAT THE FLANGE Ⓐ IS LEVELED WHEN THE SHIP IS NORMALLY TRIMMED AS IN THE DRAWING.
   2) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL BOTTOM, WOODEN BLOCKS AND FLANGES Ⓐ & Ⓑ.
   3) APPLY PITCH, TAR, ETC BETWEEN FLANGES Ⓐ & Ⓑ AND WOODEN BLOCKS OR HULL PALTE FOR SUFFICIENT WATERTIGHTNESS. THEN SETTLE THE FLANGES Ⓐ AND Ⓑ IN POSITION WITH BOLTS AND NUTS.
   4) WELD THE TANK TO THE FLANGES Ⓐ AND Ⓑ. WHEN THE TANK IS INSTALLED BESIDE THE KEEL, WELD THE TANK RETAINER TO THE FLANGE Ⓑ AND THE TANK. THEN FIX THE RETAINER TO THE KEEL WITH BOLTS AND NUTS.
   5) FAIRING PLATE (NET PROTECTOR) SHOULD BE INSTALLED AROUND THE PARTS OF THE TANK PROTRUDING FROM THE BOTTOM BY THE SHIPYARD.
   6) IF REQUIRED, 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.

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

承認 APPROVED	SEP. 6, 88 T.NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク船底装備図（木船） RETRACTION TANK INSTALLATION ON WOODEN HULL
検図 CHECKED	Sep 6.'88 T.KODA	尺度 SCALE	1/20		
製図 DRAWN	AUG.30 '88 M.USUDA	重量 WEIGHT	kg	図番 DWG.NO.	C1271-010-B

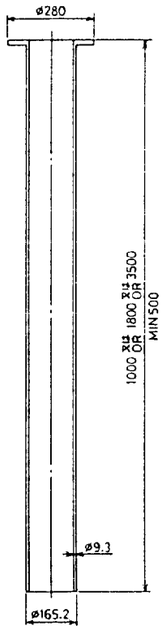
単位 UNIT: mm

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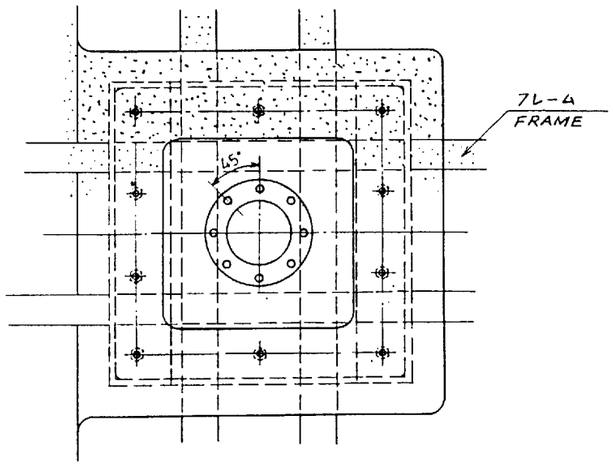
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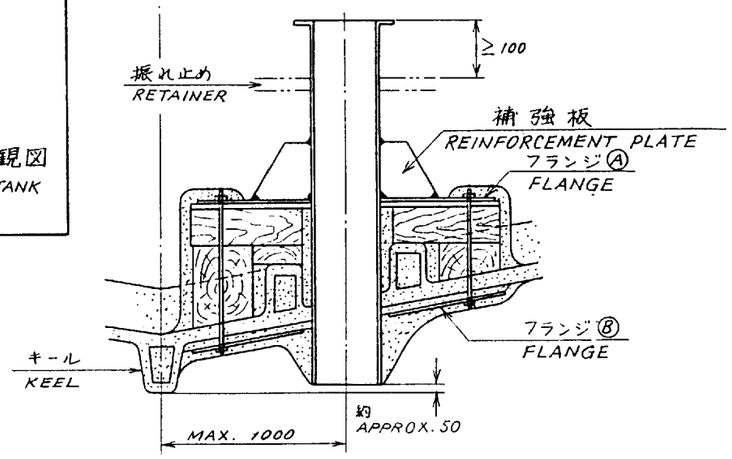
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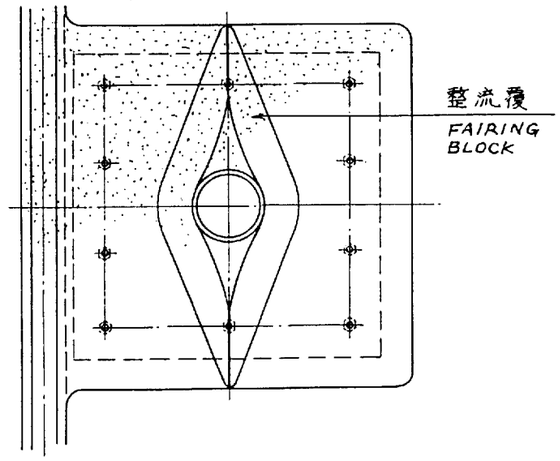
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鉄製格納タンク外観図
STEEL RETRACTION TANK
OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から 1/3 (小型船の場合は 1/2) 程度。
   2) キールより 1 m 以内。
   3) 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 100 mm 以上のスペースがあること。
   4) タンクの先端はキールの先端より約50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの装備は、次の要領を参考にして行うこと。
   1) フレーム間の船底にタンクが通る穴をあける。
   2) 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。
   3) 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。
   4) FRP 硬化後タンクあるいは中子を抜き取る。
   5) フランジ (A) をタンクに溶接する。
   6) 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。
   7) 浸水を防ぐため充分に FRP で必要個所を塗り固める。時にタンク回りは 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。
   8) 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 ヶ所で 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。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
   1) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL PLATE.
   2) 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).
   3) 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).
   4) AFTER FRP IS STIFFENED, DRAW OUT THE TANK OR THE CORE FROM THE MOUNTING BED.
   5) WELD THE FLANGE (A) TO THE TANK.
   6) 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.
   7) 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
   8) 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.

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

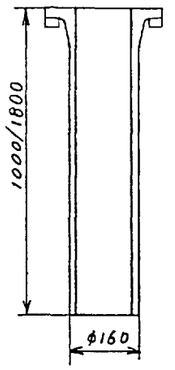
承認 APPROVED	Sep. 6, '88 T.WAKAUO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	鉄製格納タンク船底装備図(FRP船) STEEL RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	Sep. 6, '88 T. KODA	尺度 SCALE	1/20		
製図 DRAWN	AUG. 30 '88 M. USUDA	重量 WEIGHT	kg	図番 DWG.NO.	C1271-011-B

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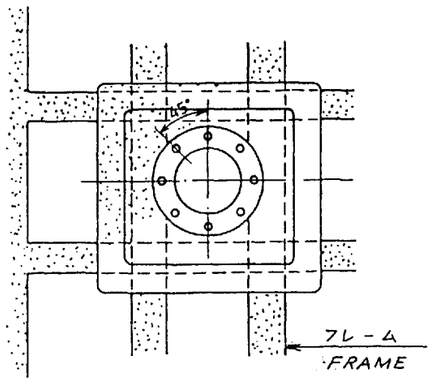
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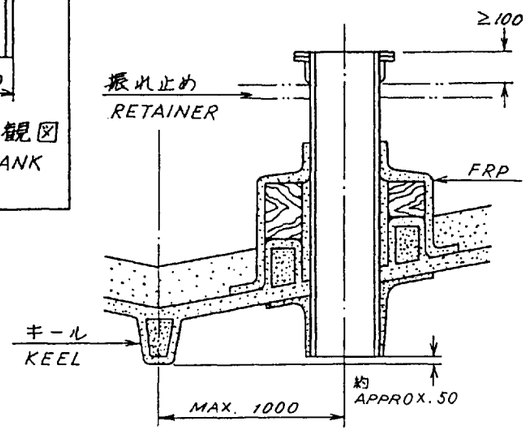
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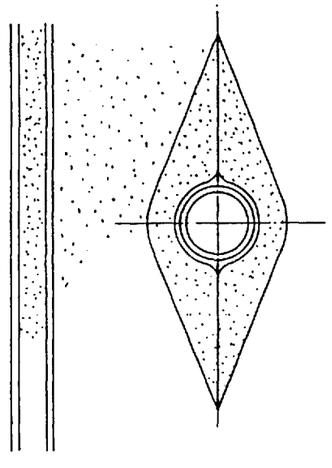
FURUNO



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







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) 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。
   4) タンクの先端はキールの先端より約50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 浸水を防ぐため充分にFRPで必要個所を塗り固める。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。
3. 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。

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。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. 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.
3. 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.

CH-18

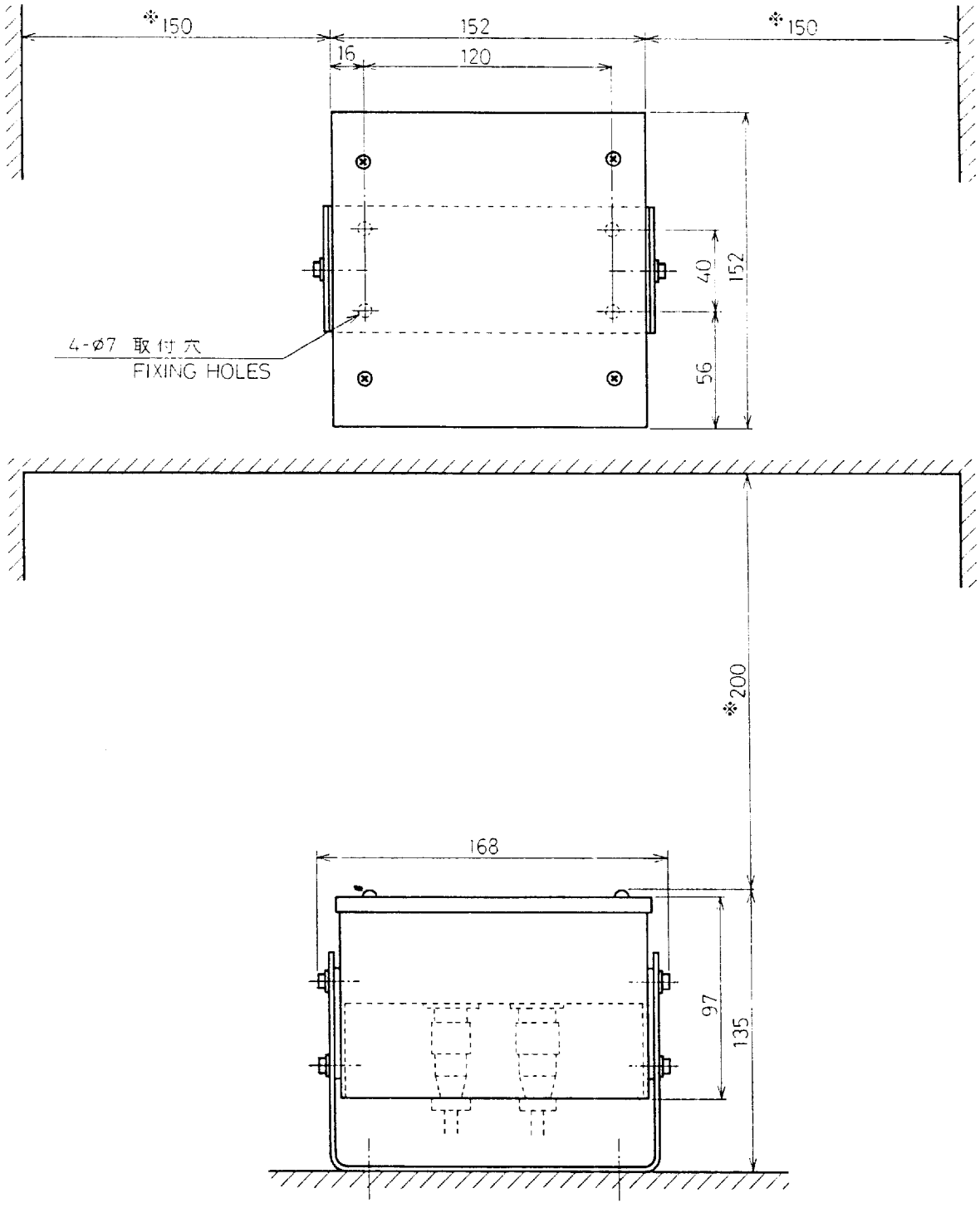
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	SEP. 6. '88 T. NAKADA	三角法 THIRD ANGLE PROJECTION	名称 TITLE FRP製格納タンク船底装備図(FRP船) FRP RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	Sep. 6, '88 T. KODA	尺度 SCALE 1/	
製図 DRAWN	AUG. 30. 1988 M. USUDA	重量 WEIGHT kg	図番 DWG.NO. C1271-012-B

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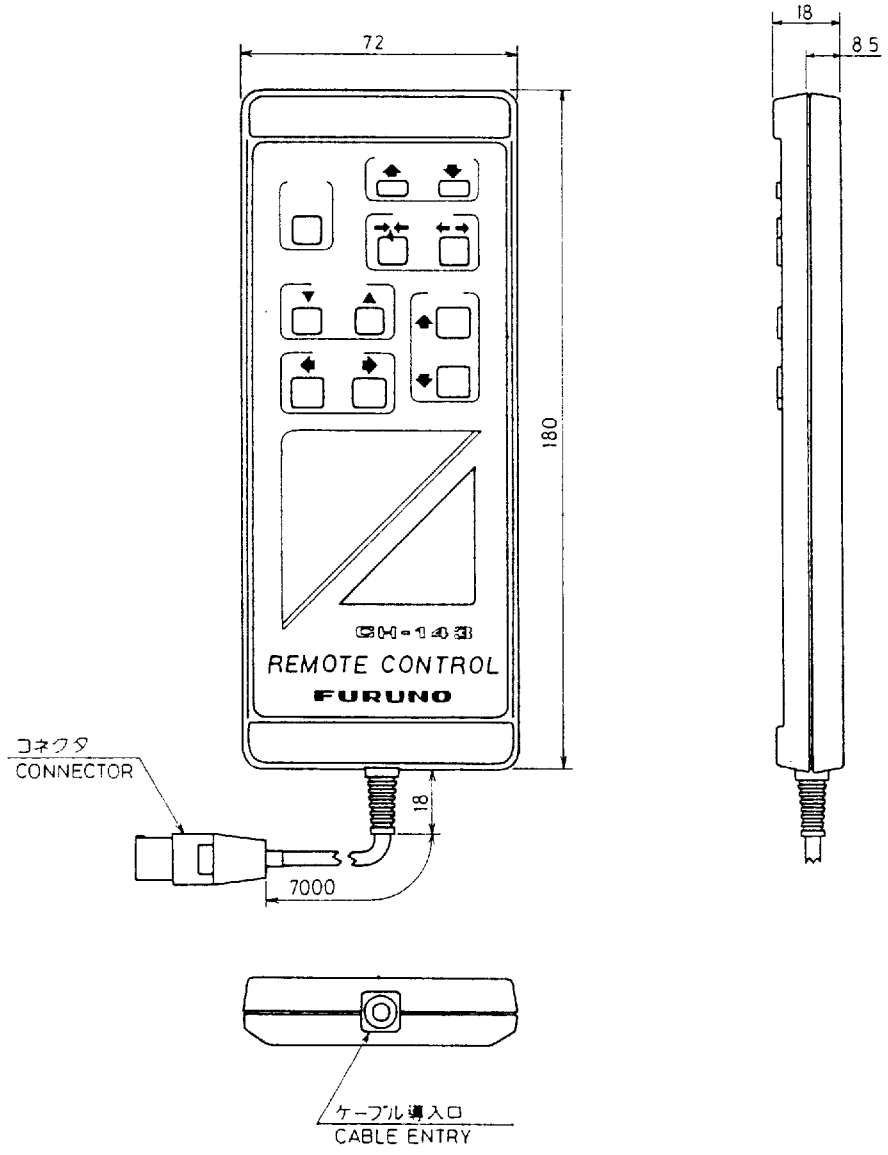
NOTE 1. 保守点検及び放熱用として、※印のスペースをとること。
DIMENSIONS MARKED "※" SHOW RECOMMENDED MAINTENANCE AND VENTILATION SPACE.
2. 船首マーク FORE を船首方向に向けて、筐体が水平になるように取り付けること。
ORIENT THE FORE MARK ON THE UNIT TOWARD SHIP'S BOW AND MOUNT THE UNIT LEVEL.

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

承認 APPROVED	JUL・20・'90 T.NAKAUCHI	三角法 THIRD ANGLE PROJECTION		名称 TITLE	動揺検出器
検図 CHECKED	Jul・20・'90 T.KOJIMA	尺度 SCALE	1/3	MS-100	MOTION SENSOR
製図 DRAWN	JUL・20・'90 M.MIZUNO	重量 WEIGHT	2 kg	図番 DWG.NO.	C1278-G01-A

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FURUNO

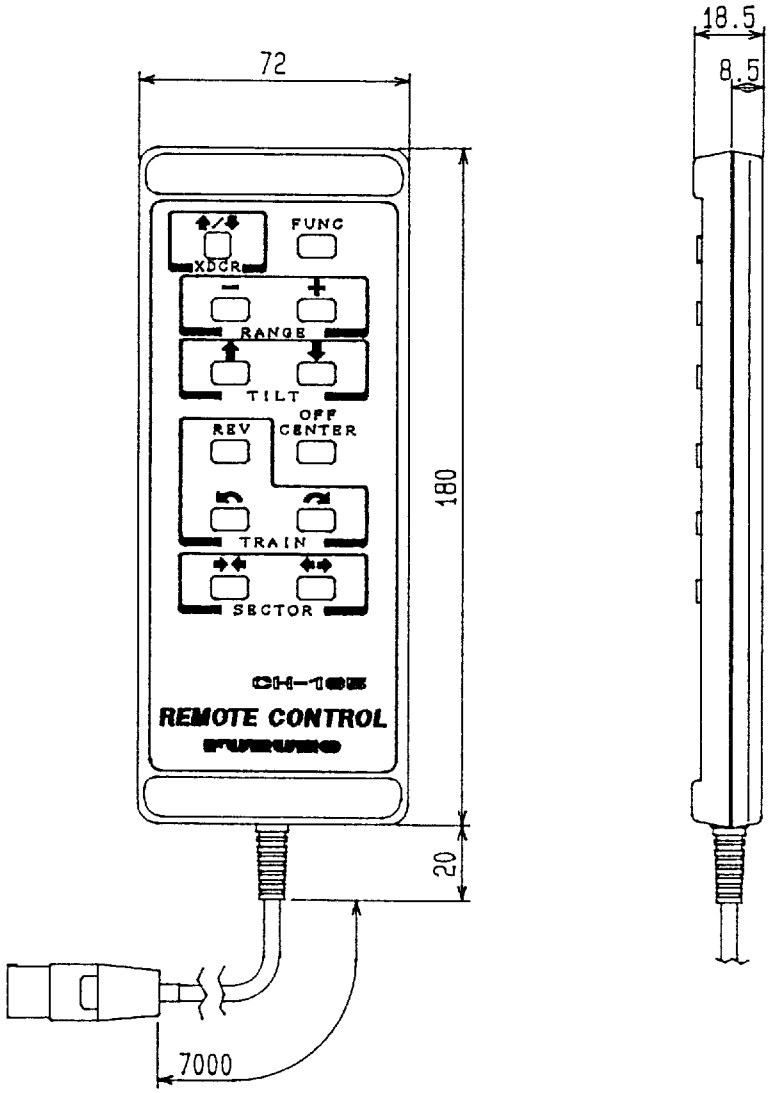


品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	SEP・18・'86 T. NAKANO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	リモートコントロール CH-143 REMOTE CONTROL
検図 CHECKED	Sep・18・86 T. KODA	尺度 SCALE	1/2		
製図 DRAWN	[illegible]	重量 WEIGHT	0.4kg	図番 DWG.NO.	C1261-004-A

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FURUNO



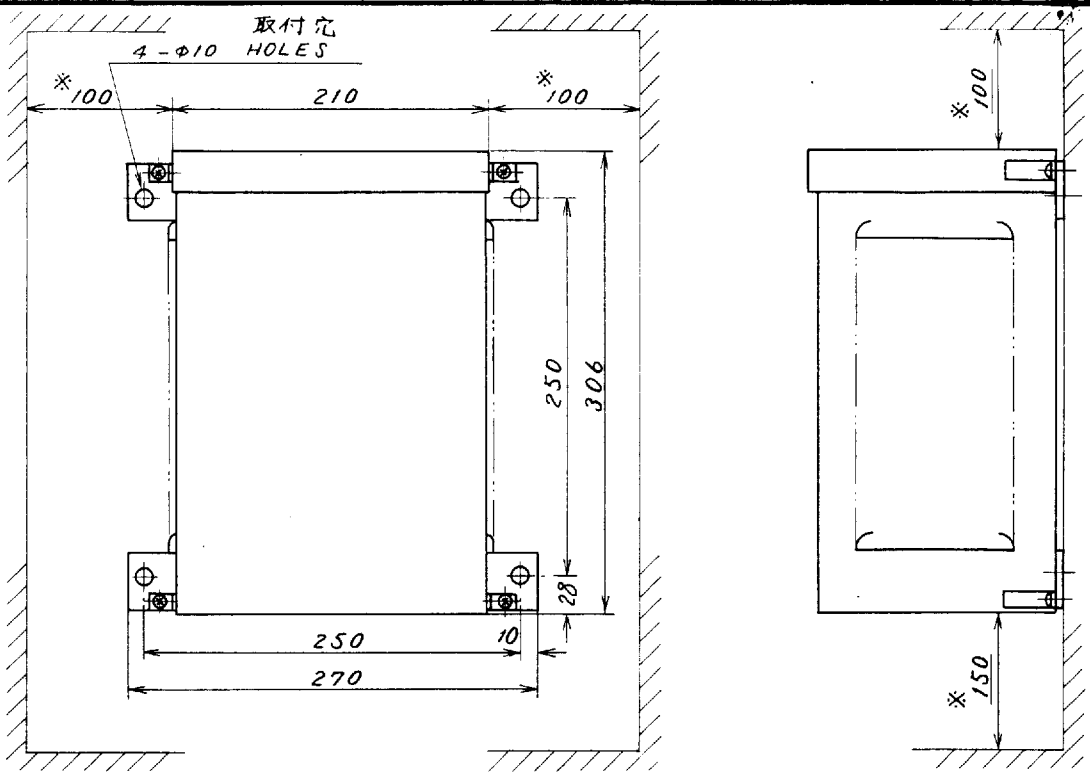
FOR CH-28

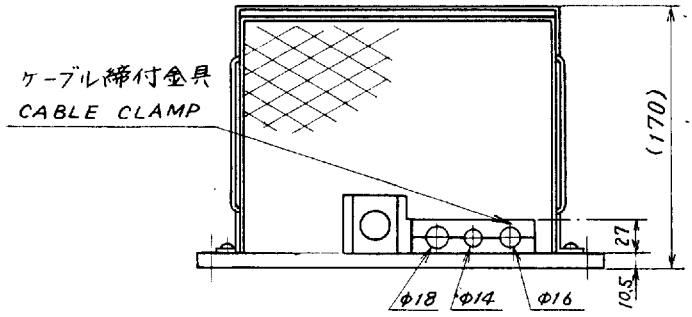
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	JAN・19・'91 T.NAKA	三角法 THIRD ANGLE PROJECTION		名称 TITLE	CH-185 REMOTE CONTROL
検図 CHECKED	JAN・19・'91 M.[illegible]	尺度 SCALE	1/2		
製図 DRAWN	JAN・18・'91 T.MINOWA	重量 WEIGHT	0.38 kg	図番 DWG.NO.	E1280-G04-A

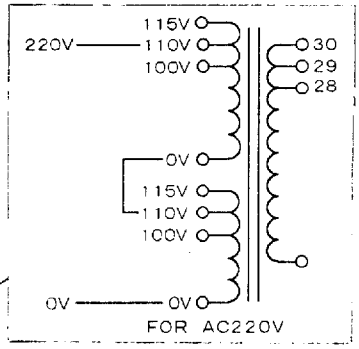
www.reelschematic.com

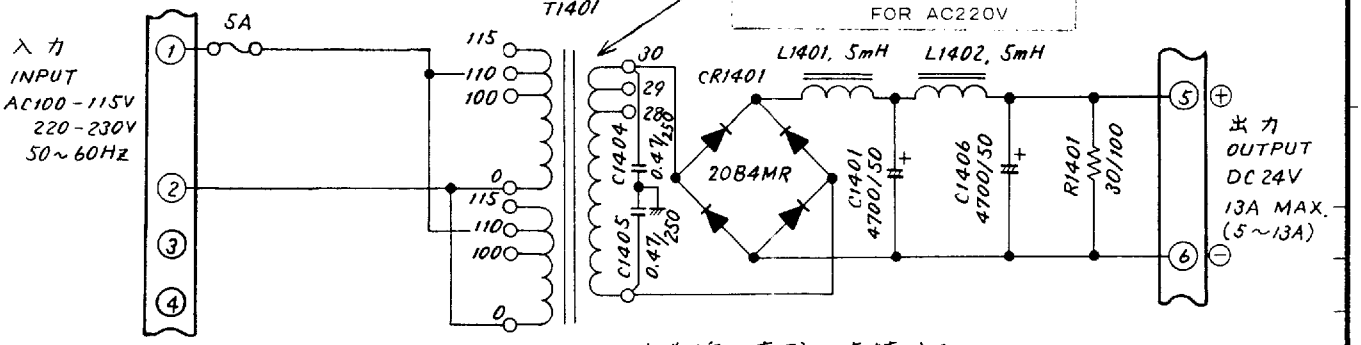
FURUNO





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





注 AC220V 入力に対しては T1401 の一次巻線を直列に接続する.

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

DRAWN Apr. 11 '97 T.YAMAZAKI			TYPE RU-1746B-2
CHECKED APR. 15 '97 K.KUSUNOKI			名称 整流器
APPROVED			外寸図
SCALE 1/5	MASS 17 kg	APPLICABLE TO; (MODEL)	BLOCK NO.	NAME RECTIFIER UNIT
DWG NO. C3002-002- M				OUTLINE DRAWING

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CHAPTER 2. WIRING

The signal cables are fitted with connectors at the factory. Plug into the receptacles on the display and hull unit referring to the interconnection diagram on page 2-2 or 2-3.

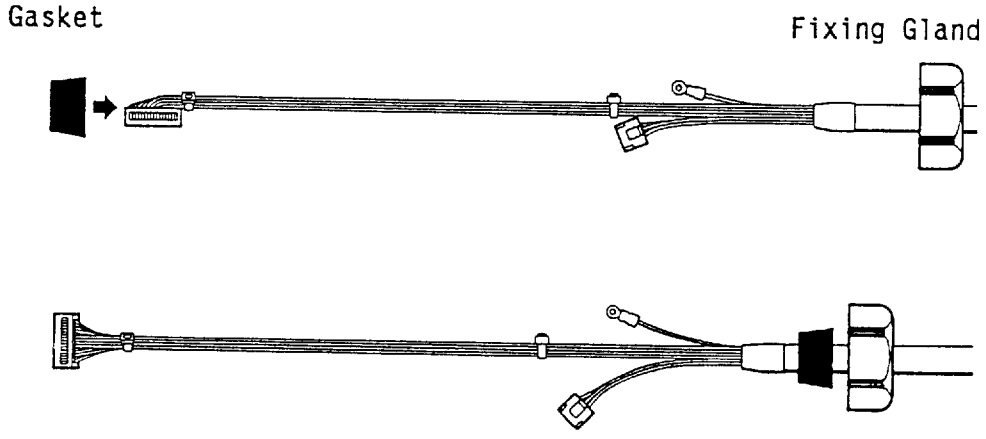
The power cable should be arranged locally and crimp-on lugs should be fitted.

⚠ CAUTION

Ground the equipment.

Ungrounded equipment can give off or receive electro-magnetic interference or cause electrical shock.

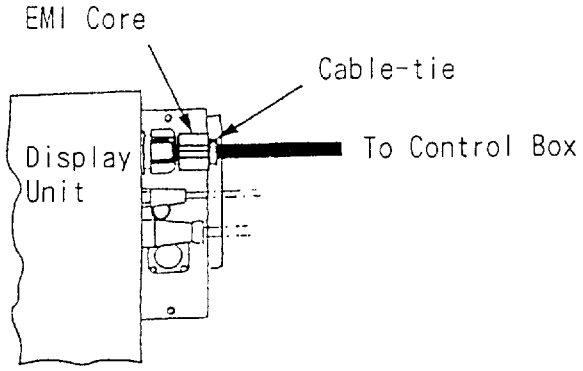
NOTE: How to pass cable through cable gland in display unit



As gasket hole is small, pay attention not to damage the connector assembly.

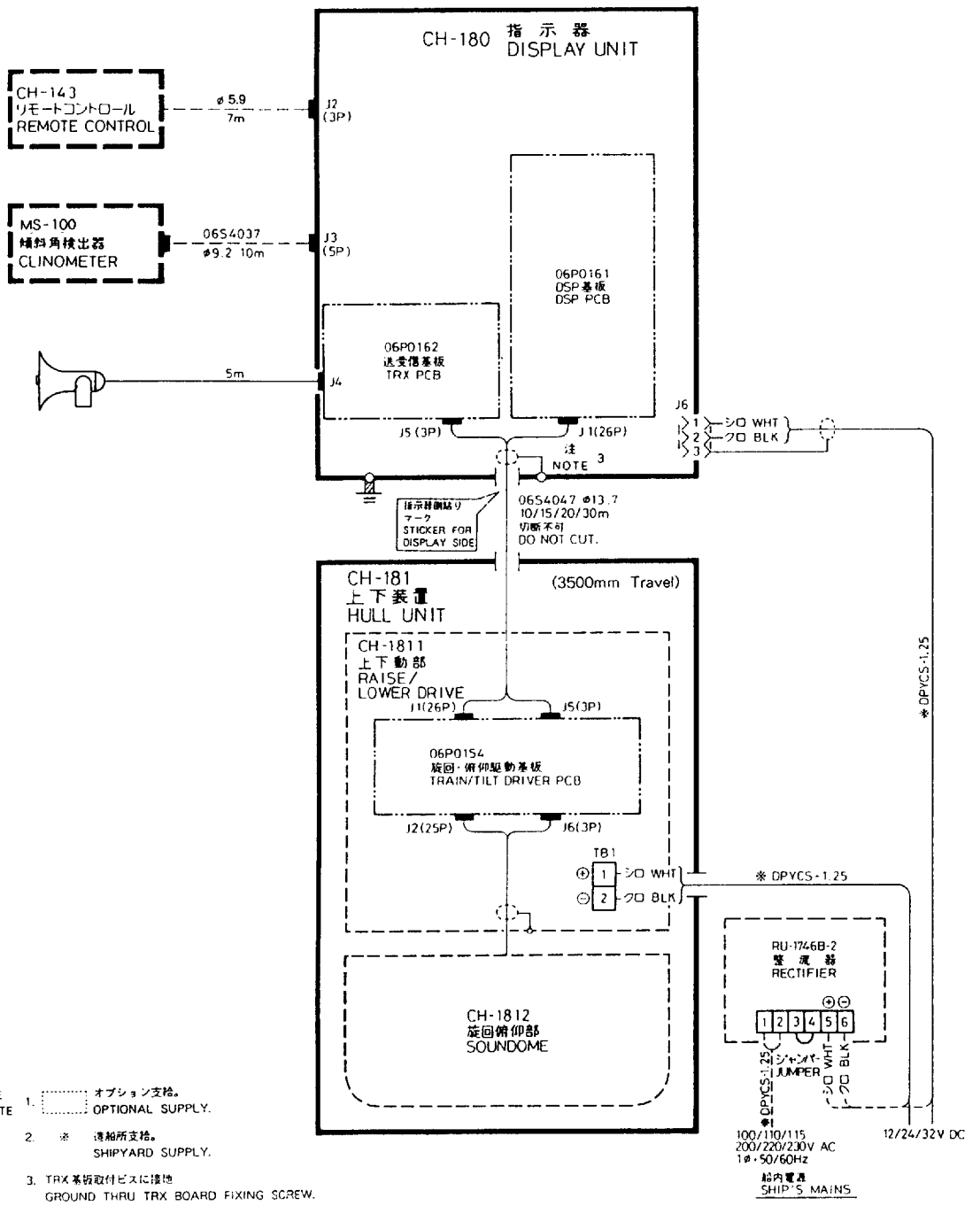
www.reelschematic.com

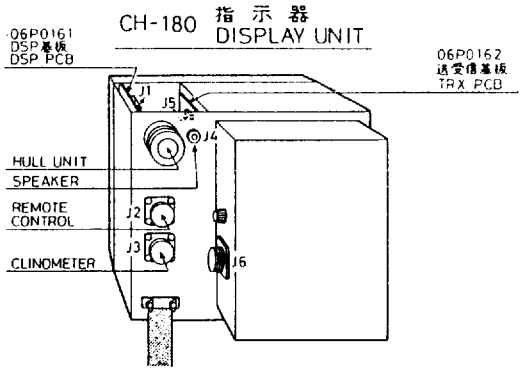
After connecting the cable between display unit and control box, attach EMI core (supplied) to the cable close at the display unit and secure it by cable tie.

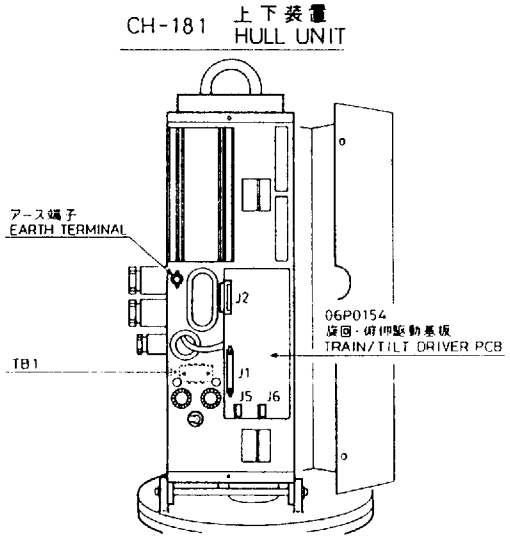


Display unit, right side view

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注 NOTE
1. ..... オプション支給。 OPTIONAL SUPPLY.
2. ※ 造船所支給。 SHIPYARD SUPPLY.
3. TRX基板取付ビスに接地 GROUND THRU TRX BOARD FIXING SCREW.

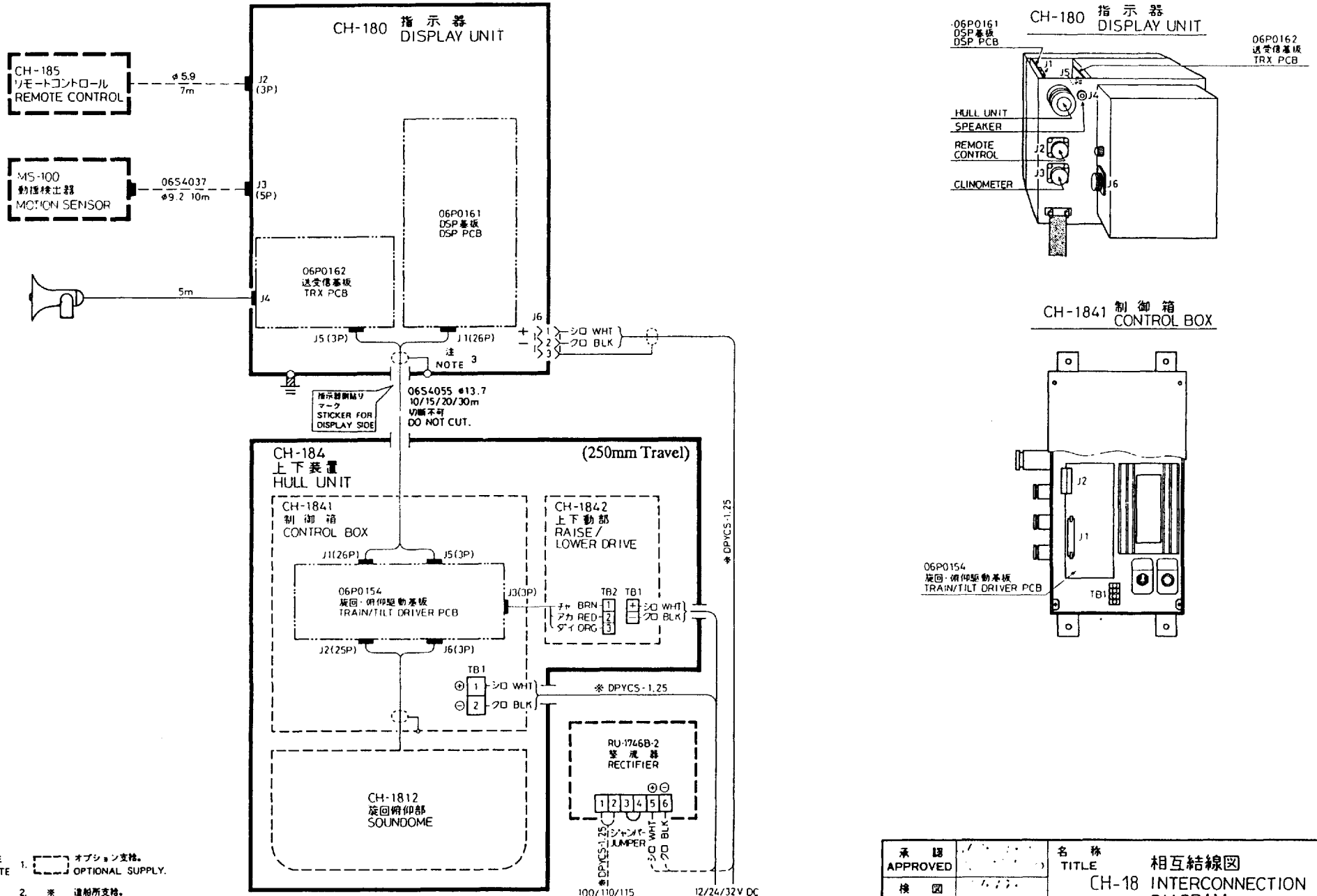
承認 APPROVED	AUG・12・'88 T. NAKANO	名称 TITLE	相互結線図 INTERCONNECTION DIAGRAM
検図 CHECKED	Aug・9・'88 T. IKEDA	CH-18	
製図 DRAWN	Aug・9・'88 M. USUDA	図番 DWG.NO.	C1271-006-D

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2-3

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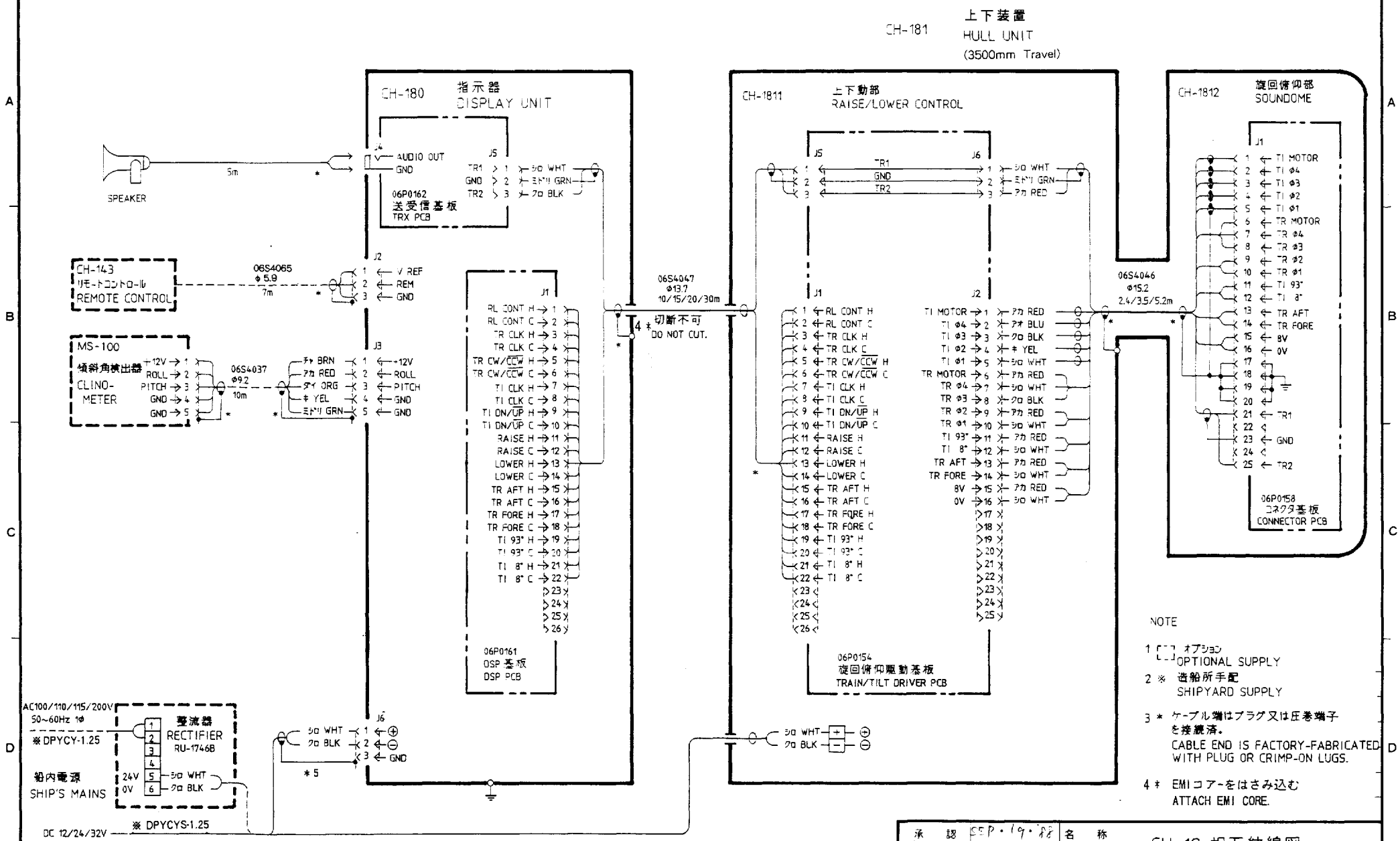
注 NOTE
1. [ ] オプション支給。 OPTIONAL SUPPLY.
2. ※ 造船所支給。 SHIPYARD SUPPLY.
3. TRX基板取付ビスに接地 GROUND THRU TRX BOARD FIXING SCREW.

CH-180+CH-184 For oversea market.

承認 APPROVED		名称 TITLE	相互結線図 CH-18 INTERCONNECTION DIAGRAM
検図 CHECKED			
製図 DRAWN		図番 DWG.NO.	C1271-C03-B

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FURUNO



NOTE

1 [ ] オプション
[ ] OPTIONAL SUPPLY

2 ※ 造船所手配
SHIPYARD SUPPLY

3 * ケーブル端はプラグ又は圧着端子を接続済。
CABLE END IS FACTORY-FABRICATED WITH PLUG OR CRIMP-ON LUGS.

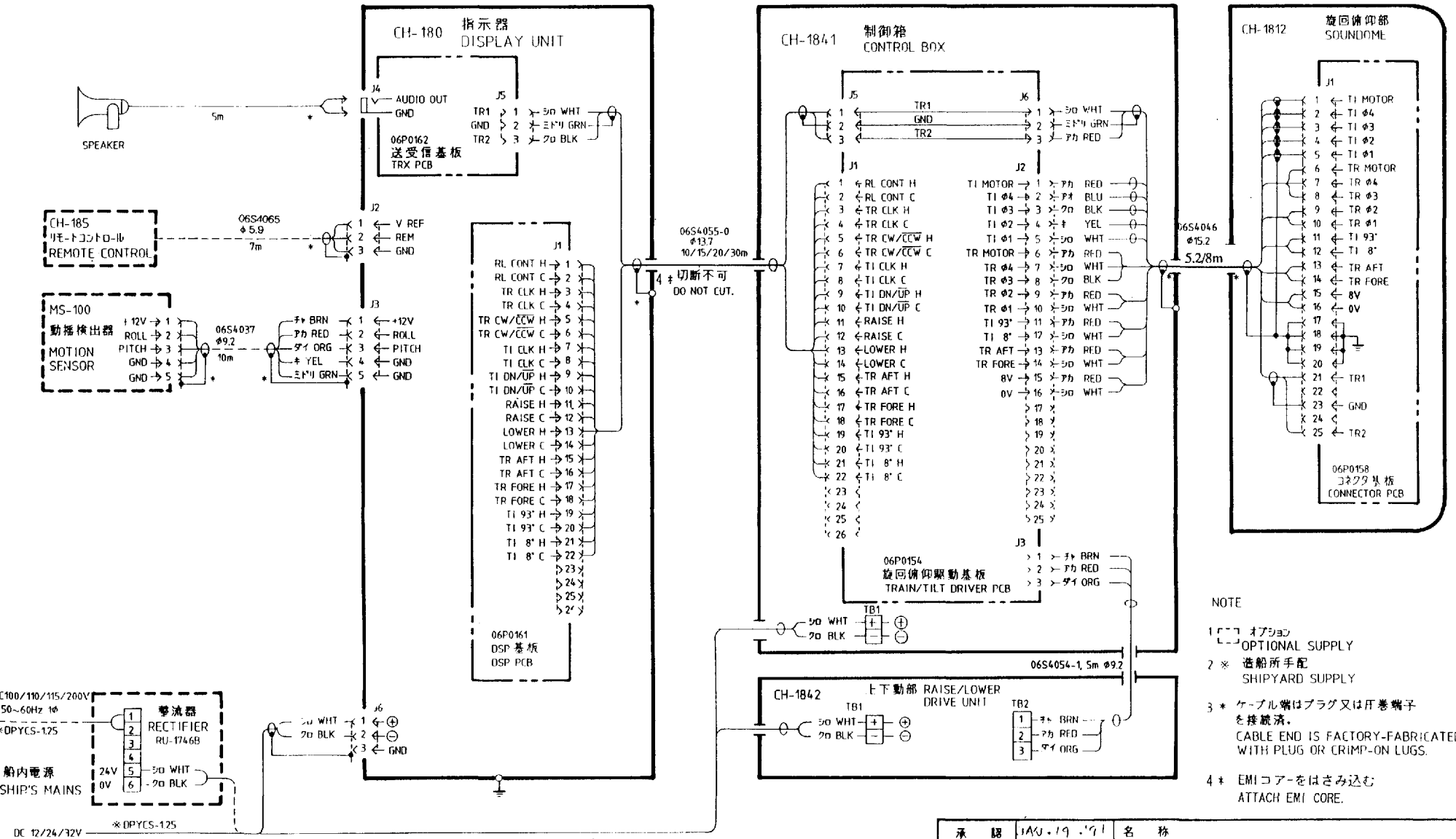
4 * EMIコアーをはさみ込む
ATTACH EMI CORE.

承認 APPROVED	SEP・19・'96 T.YAKAJO	名称 TITLE	CH-18 相互結線図 INTERCONNECTION DIAGRAM
検図 CHECKED			
製図 DRAWN	AUG・30・'96	図番 DWG. NO.	C1271-013-E

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CH-184 上下装置 HULL UNIT
(250mm Travel)



NOTE

1 [ ] オプション
OPTIONAL SUPPLY

2 ※ 造船所手配
SHIPYARD SUPPLY

3 ※ ケーブル端はプラグ又は圧着端子を接続済。
CABLE END IS FACTORY-FABRICATED WITH PLUG OR CRIMP-ON LUGS.

4 ※ EMIコアーをはさみ込む
ATTACH EMI CORE.

承認 APPROVED	JAN.19.'91 T.NAKAGO	名称 TITLE	CH-18 相互結線図 INTERCONNECTION DIAGRAM
検図 CHECKED	JAN.19.'91		
製図 DRAWN	JAN.18.'91 T.MIYOSHI	図番 DWG.NO.	C1271-C02-C

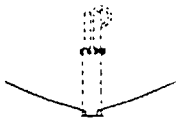
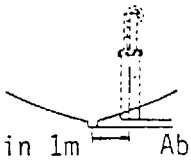
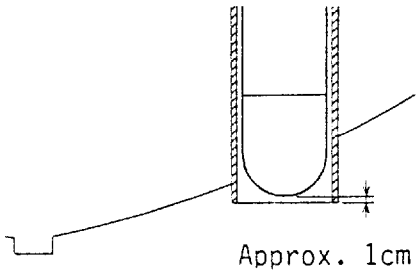
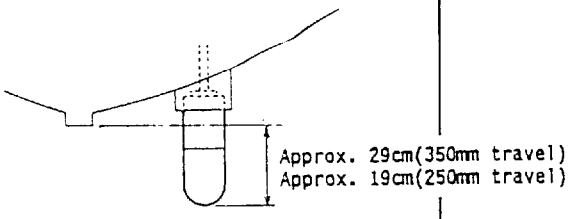
CH-180 + CH-184
For oversea market

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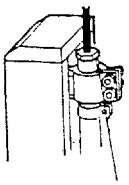
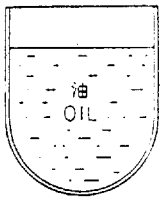
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CHAPTER 3. AFTER-INSTALLATION CHECK

3-1. Check on Dry Dock or Slipway

No.	Check Item	Ratings	Refer to page	Result
1	Retraction tank level	On-keel Installation  flush with keel Off-keel Installation  Within 1m Above keel	1-1 1-2	
2	Clearance between bottoms of soundome and retraction tank when the transducer is completely retracted.	 Approx. 1cm	1-10 1-11 1-14 1-15	
3	Transducer protrusion Before lowering, make sure that there is no obstruction below the tank.	 Approx. 29cm(350mm travel) Approx. 19cm(250mm travel) Transducer should be protruded beyond the keel.		

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No.	Check Item	Ratings	Refer to page	Result
4	Orientation of the hull unit	 Head Mark	1-10 or 1-11	
5	Insulation oil		1-9	

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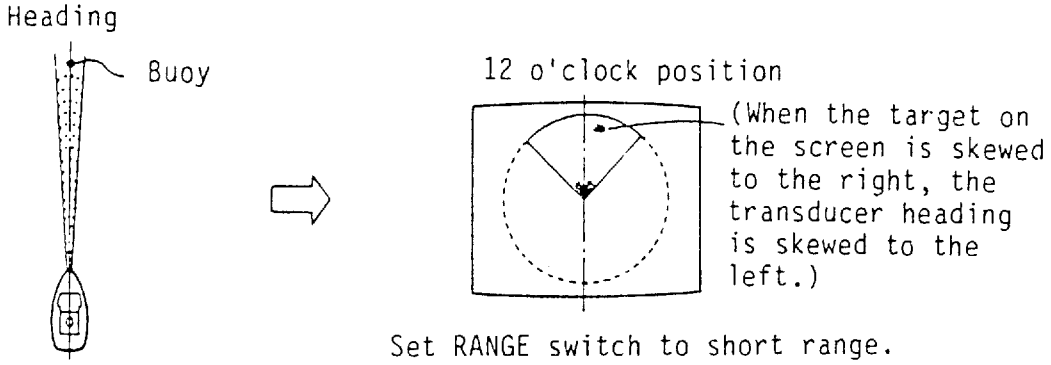
3-2. Final Check

No.	Check Item	Ratings	Refer to page	Result
1	Wiring Check	1. All the connectors are correctly connected. 2. All wires are tightly fixed to the terminal boards. 3. All screws are securely tightened. 4. Shields of cables are properly grounded.	2-2 2-3	
2	Rejection of interference and noise	1. Noise generating machines are not placed nearby, e.g., motor, radiotelephone transmitter unit, TV set, etc. 2. Magnetic devices are not placed in the vicinity of display unit.	1-1	
3	Grounding	Each unit is grounded with a copper strap.	2-2 2-3	
4	Ship's mains voltage	Input voltage is between 10.5V and 15V for 12VDC set and between 22V and 40V for 24/32VDC set.		
5	Watertightness	Water should not leak from the main body flange or along the main shaft.		
6	Heading Alignment	A target is displayed in the correct bearing.	3-4	

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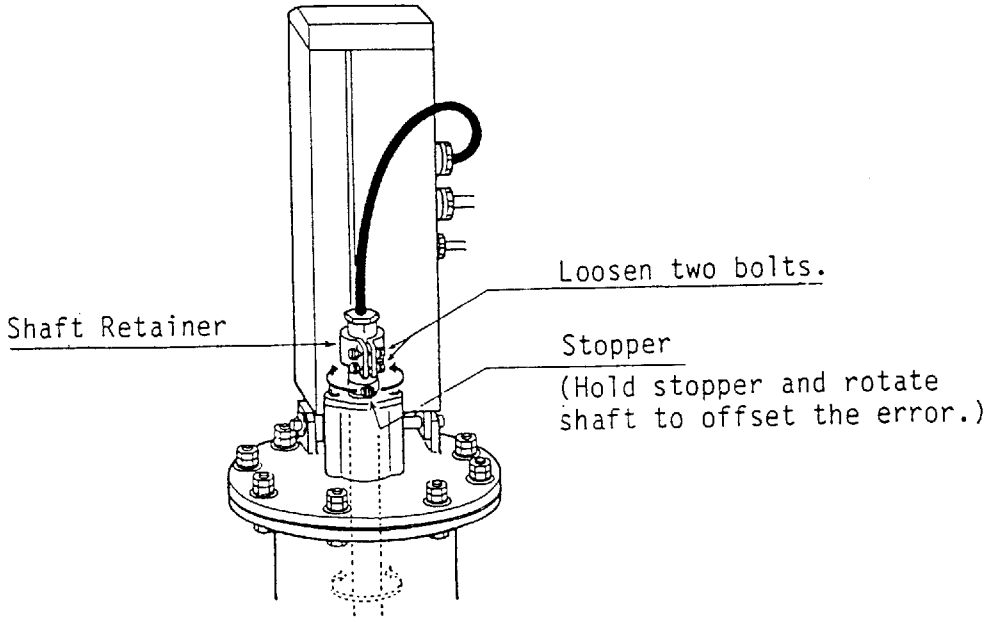
3-3. Heading Alignment

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



Set RANGE switch to short range.

2. When the heading alignment is incorrect, rotate the main shaft after loosening two bolts.



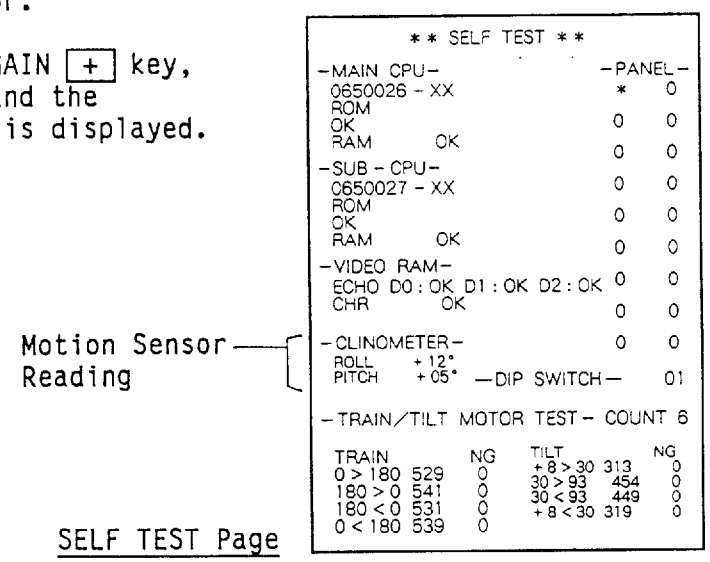
3. After the adjustment, do not fail to fasten the loosened two bolts.

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3-4. Motion Sensor Adjustment

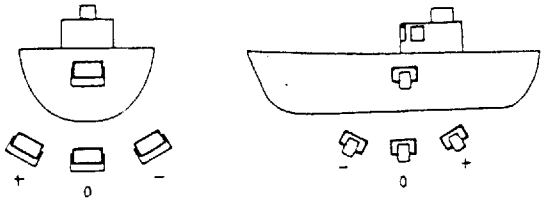
As stated in paragraph 1-3, the motion sensor can be installed at any convenient locations. However, when it is not installed horizontally, the following adjustment should be made in the display unit to compensate for the inclination error; error of up to approximately 10° can be compensated. It is necessary the adjustment be conducted with the ship stationary in the harbor.

1. While pressing the GAIN [+] key, turn on the power, and the "SELF TEST" picture is displayed.

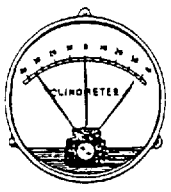


2. Note ROLL and PITCH values on the lower left of the screen. Polarity of the values represents ship's inclination as below.

	+	-
ROLL	Starboard up	Port up
PITCH	Stern up	Bow up

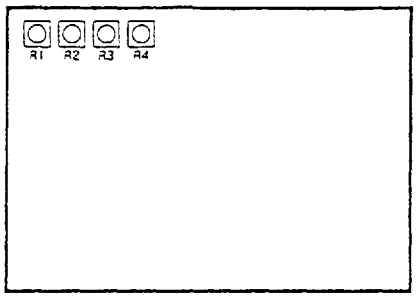


3. Measure the ship's semi-permanent inclination angle with other clinometer on the ship or by other means.



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4. Adjust potentiometer R3 for pitching angle and R4 for rolling angle so that the values on the screen agree with the ones measured at step #3.



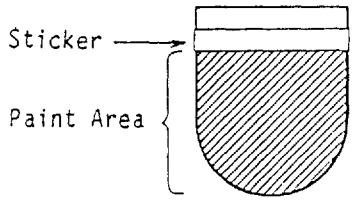
DSP Board

3-5. Soundome Painting

When the soundome is painted to prevent oysters and shells to grow on its surface, observe the following precautions.

1. Use anti-fouling paint type "Marine Star 20" manufactured in Japan by Chugoku Marine Co., Ltd. Other type should not be used.

2. Paint only the portion below the sticker. Painting the metal portion causes electrolytic corrosion.



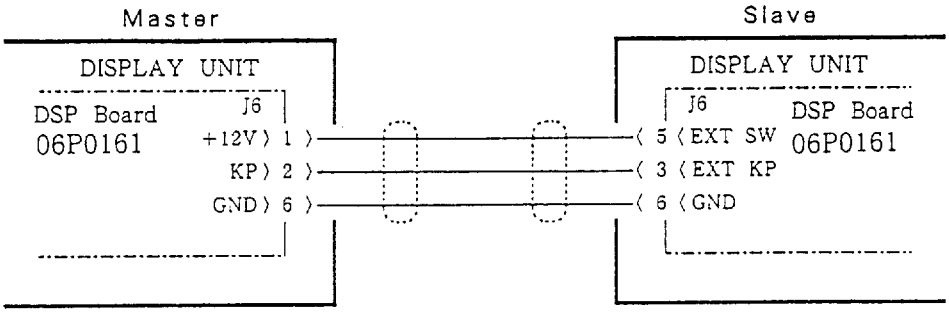
3-6. Synchronizing Transmission with Other Sonar

When two CH-18 sonars are fitted on one boat and their transmissions need be synchronized, make wiring as follows.

Note: 1. Use the master sonar in a range setting longer than that of the slave sonar.

2. The slave sonar operates independently while the master sonar is off.

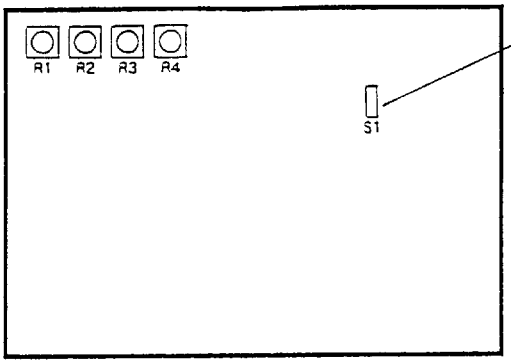
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The CH-18 can also be synchronized with different model of sonar or echo sounder by the above wiring. The CH-18 accepts the KP of an amplitude of 5V thru 15V in positive polarity.

3-7. DIP Switch Setting

Check the setting of DIP switch S1 on the DSP board after installation.



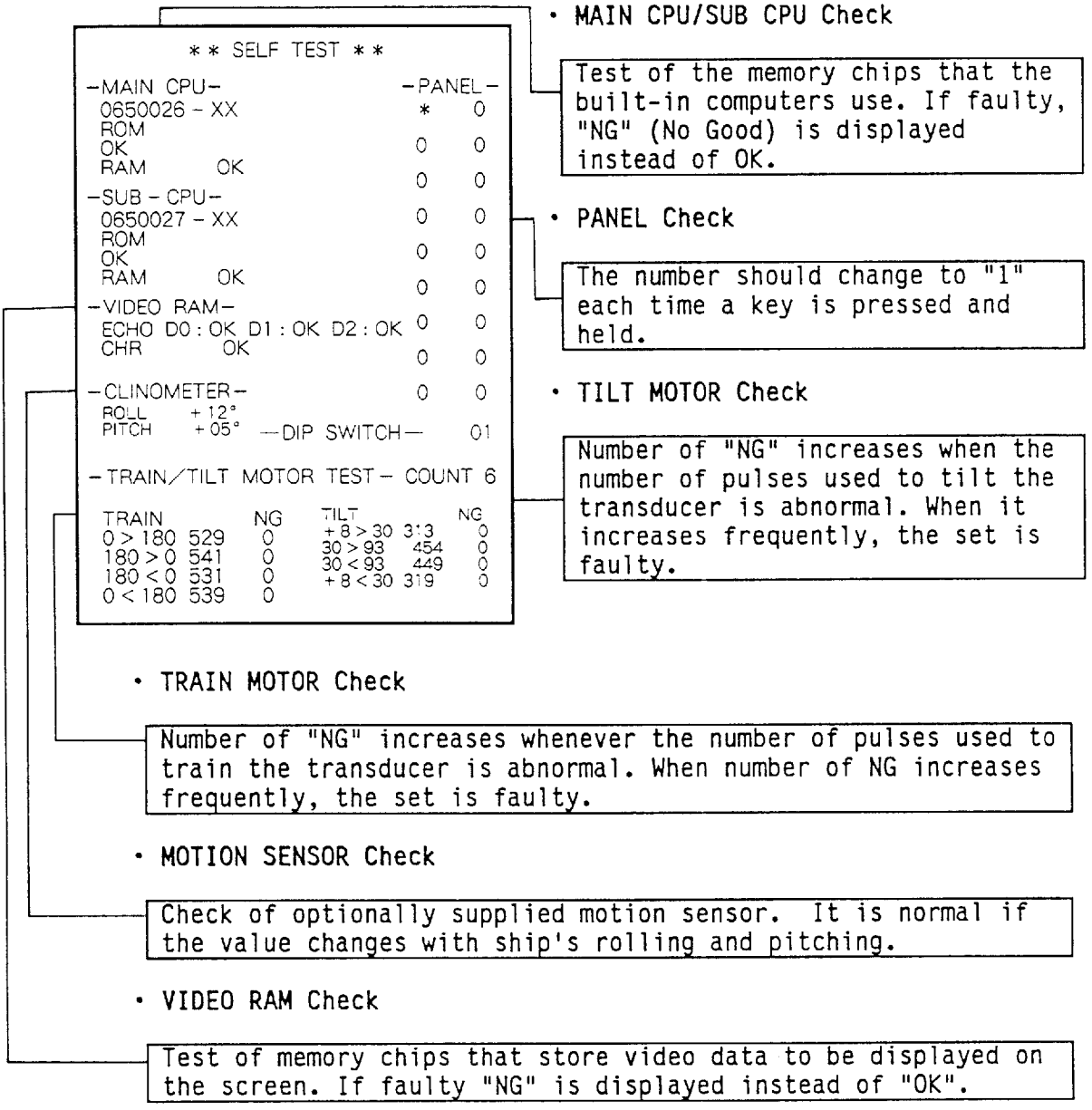
S1-#1 ON : Japanese language
OFF: English language
S1-#2 Set to "OFF" always.
The stabilizer function is turned on automatically if the MS-100 is connected. It is unnecessary to set the switch to "ON" when it is unconnected.

DSP Board 06P0161

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3-8. Diagnostic Self-Check

The major circuits of the set can be checked with the self-check facility. Execute it after installation by pressing PWR and GAIN [+] key simultaneously.

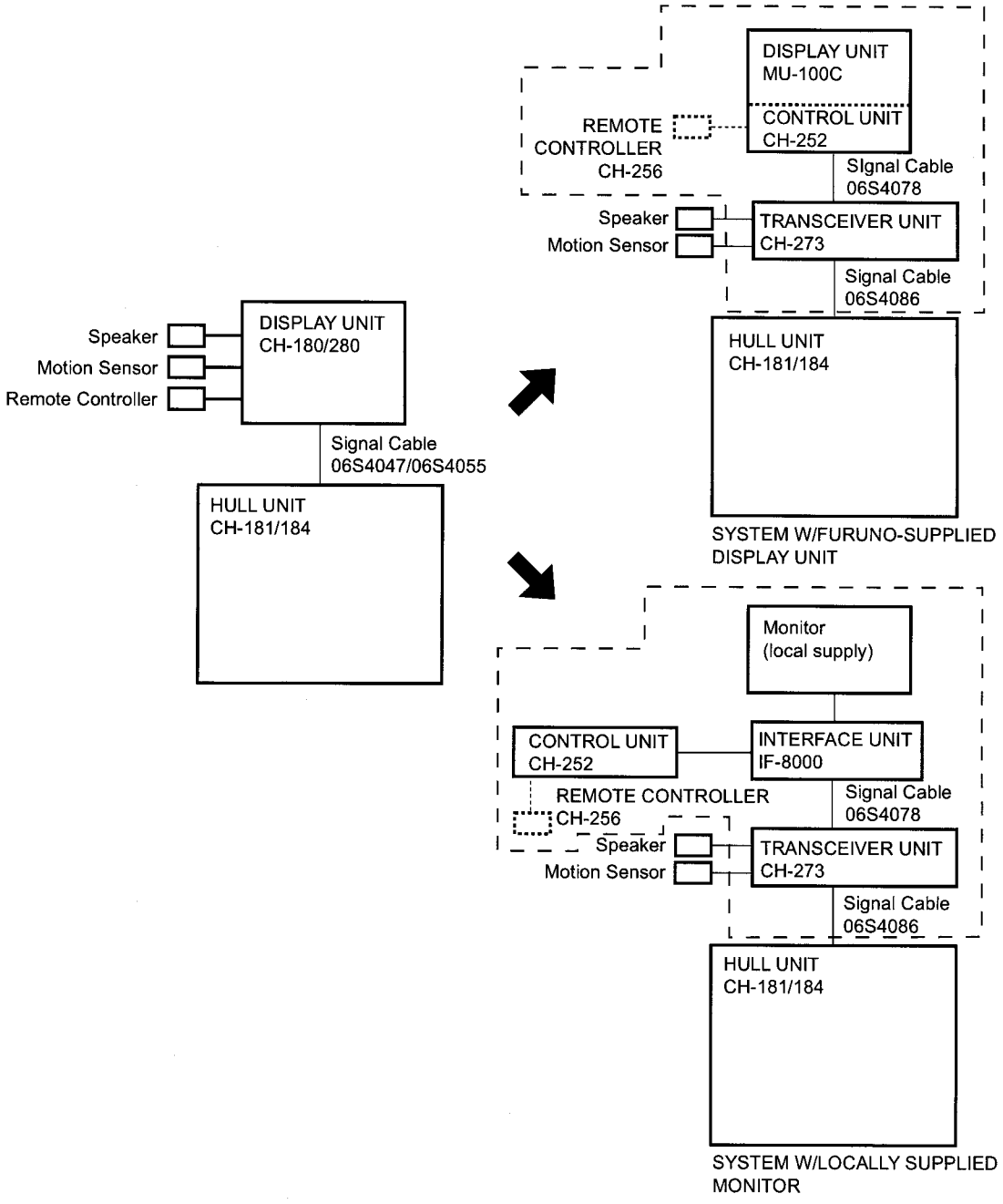


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APPENDIX
Retrofitting CH-18/CH-28

This retrofit uses the existing hull unit. A display unit (FURUNO supplied or locally supplied), control unit and transceiver unit are newly installed.

Note: The maximum allowable speed with the transducer descended is 15 knots. Please explain this to the owner of the equipment.



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Retrofit for system with FURUNO-supplied display unit

Previous Configuration	New Configuration
Display Unit CH-180/CH-280	Display Unit/Control Unit/Transceiver Unit MU-100C/CH-252/CH-273
Hull Unit↔Display Unit Signal Cable 06S4047/06S4055	Hull Unit↔Transceiver Unit Signal Cable 06S4086

Retrofit for system with locally supplied monitor

Previous Configuration	New Configuration
Display Unit CH-180/CH-280	Interface Unit/Control Unit/Transceiver Unit IF-8000/CH-252/CH-273
Hull Unit↔Display Unit Signal Cable 06S4047/06S4055	Hull Unit↔Transceiver Unit Signal Cable 06S4086

Notes

- Supply VGA monitor locally.
- The E/S Interface cannot be used.
- The existing speaker and motion sensor may be used, however Remote Controller CH-143/185 cannot be used. Use the optional Remote Controller CH-256.

Necessary parts for retrofitting

Integrated display unit, control unit

Name	Type	Code No.	Qty	Remarks
Transceiver Unit	CH-273	—	1	With SP06-01102
Control Unit/Display Unit	CH-252/MU-100C	—	1	With CP02-06600, FP02-05100, SP06-01101
Installation Materials	FV2-4, Blue	000-538-118	8	For transceiver unit
	06S4078*10 m*	000-142-900	1	For display unit, 10 m
	06S4078*5 m*	000-142-902		For display unit, 5 m
	06S4086*10 m*	000-146-974	1	For transceiver unit, 10 m
	06S4086*15 m*	000-146-975		For transceiver unit, 15 m
	06S4086*20 m*	000-146-976		For transceiver unit, 20 m
	06S4086*30 m*	000-146-977		For transceiver unit, 30 m

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Blackbox type

Name	Type	Code No.	Qty	Remarks
Transceiver Unit	CH-273	—	1	With SP06-01102
Interface Unit	IF-8000	—	1	With SP06-01111
Control Unit	CH-252-15	—	1	With CP02-06610 (1.5 m cable) and FP06-01120
	CH-252-50	—		With CP02-06620 (5 m cable) and FP06-01120
Installation Materials	FV2-4, Blue	000-538-118	8	For transceiver unit
	06S4078*10 m*	000-142-900	1	For monitor, 10 m
	06S4078*5 m*	000-142-902		For monitor, 5m
	06S4086*10m*	000-146-974	1	For transceiver unit, 10 m
	06S4086*15 m*	000-146-975		For transceiver unit, 15 m
	06S4086*20 m*	000-146-976		For transceiver unit, 20 m
	06S4086*30 m*	000-146-977		For transceiver unit, 30 m

Installation and wiring

Refer to chapters 1 and 2 to install and wire the display unit, control unit, interface unit and transceiver unit.

Installation check

Run the diagnosis test to confirm proper operation, referring to the operator's manual for the procedure.