FURUNO OPERATOR'S MANUAL

ECHO SOUNDER

MODEL FE-808



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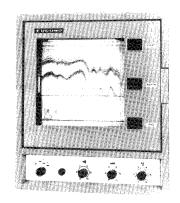


FEATURES OF FE-808 * * * * * * * * * *

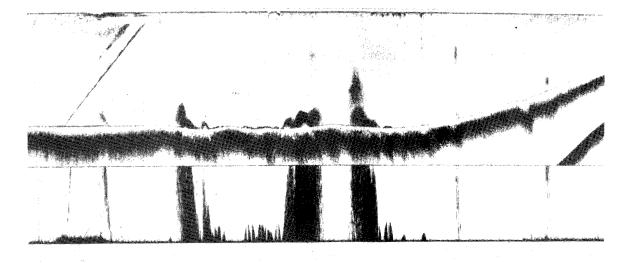
The FE-808, with FURUNO's years of experience in commercial echo sounders, adds many advantageous features to conventional echo sounders.

Thanks to new electronic devices and advanced digital signal processing technique, it provides fine and distinct recording of underwater objects. Aside its high quality recording, remarkable features of FE-808 are as follows.

- * Shaded recording by light-gray, gray and black gradation facilitates to know fish concentration and seabed nature.
- * Two-step expanded bottom-lock recording, which is extremely useful in bottom trawling or in shell fish finding, is available together with normal recording.
- * A bright digital display provides seabed depth at a glance together with start and end depth.
- * Extremely effective noise limiter without any effect on wanted echoes.
- * Three kinds of mount types, i.e. flush mount, bulkhead mount and table-top mount, are selectable.



F Photo No.1307 PC

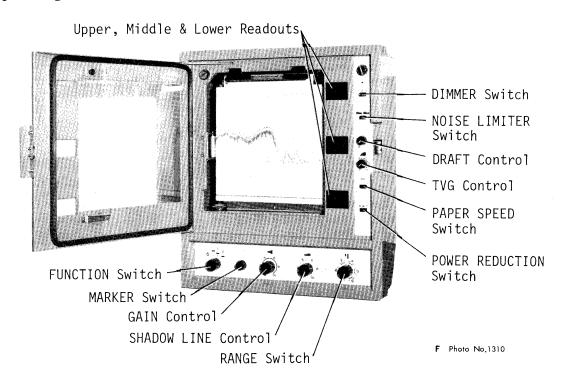


We hope you will read the following instructions and make best use of your $\mbox{FE-808.}$

(By adding slight modification, signals detected by the FE-808 can be displayed on FURUNO'S FCV-120/200 Color Video Sounder and even recorded into MT-11/12 Picture Recorder. Refer to "VI-1100A Installation Manual".)

OPERATION

1. Operating Controls and Switches



[FRONT PANEL CONTROLS]

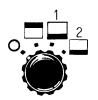
FUNCTION Switch

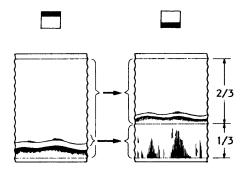
This switch has two functions: power on-off and selection of recording modes.

The position "O" shuts off the power of the set. Use this position to stop recording or to load new paper.

Turning this switch to "□" (normal) provides normal recording over the full paper width.

Turning this to "\(\frac{1}{2}\)" or "\(\frac{2}{2}\)" (bottom-lock) provides compressed normal recording on the upper 2/3 of paper width and an expanded bottom-lock recording on the rest. The SHADOW LINE control must be adjusted stable bottom-lock properly to ensure The bottom-lock range is 5m recording. (7.5ft or 2.5fam/braza/passi) or 10m (15ft or at "1" 2.5fam/braza/passi) respectively.





MARKER Switch



Press this button, and a straight line appears across the paper. It is used to examine the condition of the recording stylus or belt, and also to mark an event position.

GAIN Control



Turning this clockwise increases the sensitivity of the receiver. Use higher gain for deep sea operations, and lower gain in shallow waters.

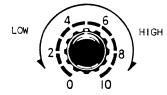
The table at right gives general guidelines for gain settings on range chosen and frequency of operation.







GAIN optimum



RANGE		GAIN							
KANGE	28kHz			50kHz			200kHz		
11	1	to	3	2	to	3	2	to	4
2	2	to	4	3	to	4	3	to	5
3	3	to	5	4	to	5	4	to	6
4-6				5	to	10)		



GAIN too high

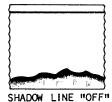
SHADOW LINE Control

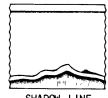


This control is used for discriminating fish or other targets just above the seabed. (This function is also known as "whiteline" or "grayline" in other machines.)

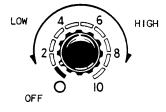
After the GAIN control has been adjusted (with the SHADOW LINE off) for a good bottom recording, turn the SHADOW LINE control slowly clockwise to give a gray "shadow" just under the top of the seabed echo. Now fish will show distinctly above the seabed even if they close to the bottom.

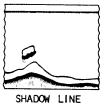
Too far a clockwise setting of this control can blank fish echoes, and the correct depth reading or bottom-lock operation may be affected.





SHADOW LINE optimum



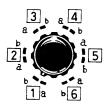


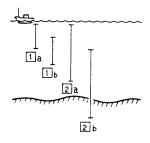
SHADOW LINE too high

RANGE Switch

This selects the depth range to be recorded on the paper. The basic range is doubled step-by-step by turning it from 1 to 6. The "b" position on each range is a 50%-phased range with respect to the basic "a" range. Refer to table below.

BASIC		1	1	2	3	3	L	1	ĺ	5	6	
PHASED	a	b	a	Ь	a	b	a	b	a	Ь	a	b
Meters	0 20	10 30	0 40	20 60	0 80	40 120	0 100	100 300	0 400	200 	0 	400 1200
Feet	0 30	15 	0 	30 90	0 120	60 180	0 300	150 450	0 	300 900	0 1200	600 1800
Fathoms Brazas Passis	0 10	5 15	0 20	10 30	0 40	20 	0 100	50 150	0 200	100 300	0 	200 600





Upper, Middle & Lower Readouts

With the SHADOW LINE control at "O" (off) position, the upper and lower readouts show the start and end depths of the recording range selected by the RANGE switch. The middle readout shows nothing.

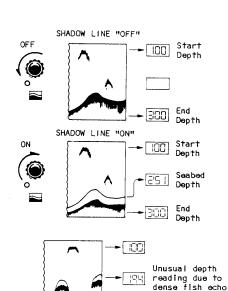
With the SHADOW LINE control turned clockwise, the middle readout shows the seabed depth. The upper and lower readouts show the depth range as before.

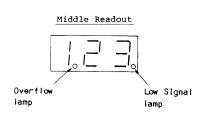
However, if there is strong interference from other echo sounders nearby or if a very dense fish school is encountered, the seabed depth reading may become unstable momentarily. This condition may mean that exessive Shadow Line/Gain is used.

Two decimal points on the middle readout are used as alarm indicator.

The one on the left is an "overflow" indicator that lights when the reading has gone over "999". This may happen in deep water operation.

Note: This indicator may light when power is applied with the SHADOW LINE "off". If so, turn it on and off once.





Ex. "1.23" ---- 1123(feet)

Ex. "123." ---- Reading not reliable.



The one on the right is a "low signal" indicator that flickers when the signal is too weak to allow proper shadow line operation. This is to alert that the seabed depth shown on the middle readout may not be reliable.

Note: When the SHADOW LINE control is set at off, the indicator flickers.

When the RANGE switch is set to 6b(meter), 6a(feet) or 6b(feet), the lower readout shows as $\exists \Box (1200m, 1200ft)$ or $\exists \Box (1800ft)$ respectively.

[SUB-PANEL CONTROLS] - inside the front door -

DIMMER Switch



This switch has three positions, i.e. dim (1), medium (2) and bright (3) to control the illumination of the recording paper and control panel as well as brightness of LED displays.

NOISE LIMITER Switch



With this switch turned to "\[\]", random interference or noise can be minimized. As it may reduce sensitivity for small targets, it is recommended to turn it off if noise is not perceivable.

DRAFT Control



This adjusts the position of zero line on the paper. The primary purpose of this control is to read the true depth from sea surface, taking the ship's draft into account.

This may also be used to shift the recording area downward to use the paper twice or more times. However, the following points should be noted.

- a. This method does not work on the phased ("b") ranges.
- Multiple recording may be confusing to read.

TVG Control



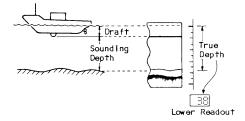
The TVG control is used to compensate for the effect of propagation loss of sound energy in water, suppressed gain just after transmission and increasing gain as time (range) elapses. Too far a clockwise setting will miss weak targets in shallow/mid water.

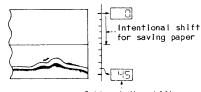


4

from echo sounder on other boat

Noise from motor, generator, etc.





Subtract the shift to read seabed depth.







No TVG effect

TVG optimum

TVG too high (shallow fish missing)



PAPER SPEED Switch



This selects the paper sending speed. Select the optimum speed, taking depth range and ship's speed into account. A guideline for paper speed setting is shown at right. Refer to specifications on page AP1-1 for actual paper speed.

RANGE	SPEED				
1, 2, 3	3 (Fast)				
4, 5	2 (Medium)				
6	1 (Slow)				

POWER REDUCTION Switch

This selects the output power of the sounding pulse. Use high power at position "C" for normal use. Occasionally low power at "A" position is needed in extremely shallow water, or on congested fishing grounds to minimize interference to other boats.

2. Paper Loading

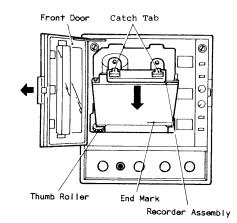
During operation, an end mark will eventually appear on the bottom of the paper. This is to warn that the paper is running out, and you will need a new roll of paper soon.

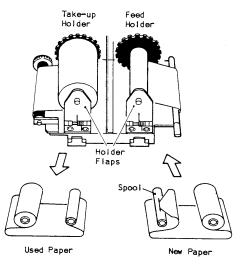
Change the paper roll, following the procedure below.

- 1. Turn the FUNCTION switch to "O" (off).
- 2. Open the front door.
- 3. Swing the recorder assembly down by holding the catch tabs after confirming that the recording stylus is behind the recording plate.
- 4. Pull down the paper holder flaps and remove the used paper and spools.
- 5. Put a new roll of paper into the feed holder and an empty spool into the take-up holder. Then pass the paper over the recording plate and insert the end into the spool slot, or tape the end squarely to the spool.

Roll the paper 3 to 4 turns so that it will not come loose.

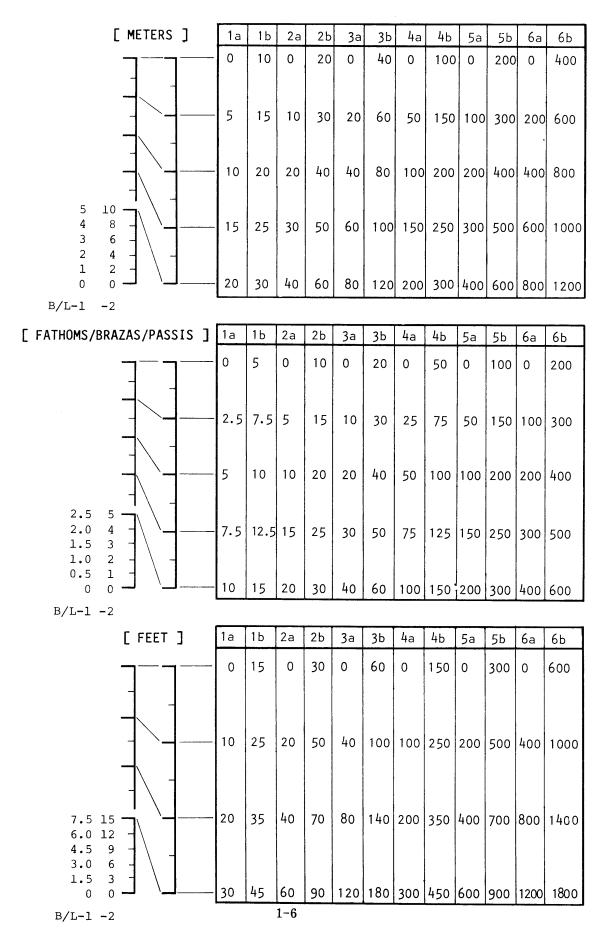
- 6. Carefully swing up and push the recorder assembly backwards until you feel a click at the catch tabs.
- 7. Turn the thumb roller to smooth out the paper over the recording plate.
- 8. Close the front door again.







SCALE PLATE CALIBRATIONS



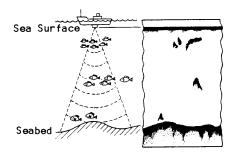


[What is provided on echogram]

Transmission Line

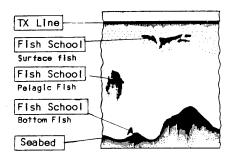
The transmission line is a trace of ultrasonic wave emitted into the water. We often call this line as "Zero Line", however, it indicates not the sea surface but the ship's hull bottom where the transducer is mounted. To know the depth of a target, the ship's draft must be added to the sounding depth. In small boats, this line may be taken as sea surface.

The transmission line can not be seen in a phased range.



Seabed

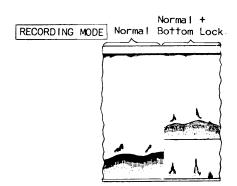
The seabed is recorded as comparatively dark trace with some width. Its intensity and width vary with the nature of seabed and characteristics of the echo sounder(frequency, pulselength and receiver characteristics).



Fish School

The fish school is recorded between the transmission line and seabed (the transmission line is invisible in phased ranges). The shape and size of the fish school trace largely depends on the characteristics of echo sounder and habits of fish species.

In the "bottom-lock" mode, echoes just above the seabed are expanded in the lower part of paper.





[Variety of echogram with echo sounder characteristics]

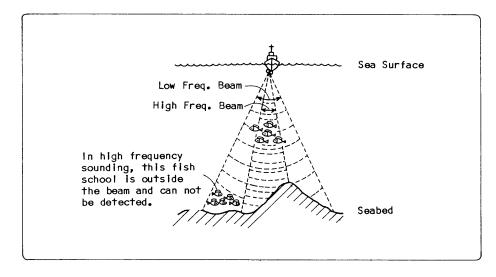
Feature of echogram is affected to a great extent by the characteristics of the echo sounder.

Frequency

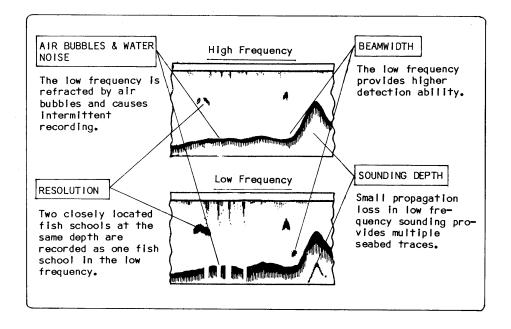
Characteristics of ultrasonic pulse vary as tabulated below with its frequency, and provides a different type of echogram.

Frequency Characteristics, Application	Low Frequency	High Frequency				
Beamwidth*	Wide** Narrow					
Sounding Depth	Deep	Shallow				
Resolution***	Poor	Good				
Affection of Air Bub- bles and Water Noise	Large	Little				
Suitable Application	.Wide area searching .Bottom discrimination	•Identification of fish school density •Discrimination of bottom fish				

- *Sound pressure of ultrasonic wave is strongest at the center of the beam and goes weaker gradually in the outer part. The beamwidth is the angle of conical beam measured at half pressure points of ultrasonic wave. (Echoes outside the beam can also be recorded if the reflection is strong)
- **The beamwidth is, strictly speaking, determined by the size of transducer face. Even in low frequency, it becomes narrower if two or more transducers are placed side by side.
- ***Ability to distinguish two fish schools closely located at the same depth_\bullet





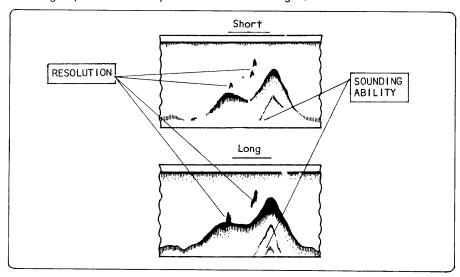


Pulselength

Characteristics of echogram change with pulselength as follows.

Pulselength Feature, Application	Short	Long				
Range Resolution*	Good	Poor				
Sounding Ability**	Poor	Good				
Suitable Application	 Discrimination of fish distribution Identification of bottom fish 	<pre>.Deep sounding .Detection of small fish school</pre>				

- *Ability to distinguish two fish schools closely located at different depths.
- **Sounding depth and ability to detect small target.

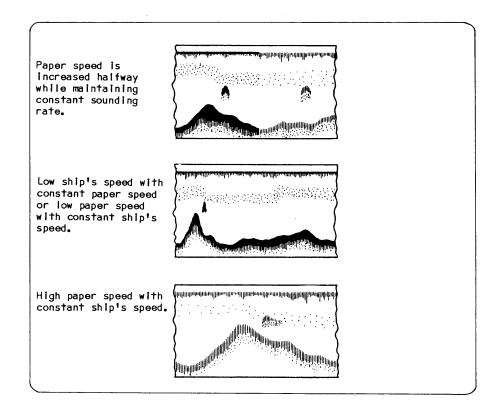




Sounding Rate and Paper Speed

Paper speed and sounding rate are closely related to the density of recordings. The slower paper speed and higher sounding rate make the recording higher in density.

Since characteristics of fish school trace or seabed trace on the echogram change with paper speed and ship's speed as shown below, they should be taken into account for interpretation of the echogram.





[To read more from echogram]

Fish quantity/Fish School Density

Quantity of fish can be estimated to a certain extent from the trace of fish school. Estimation is based on the following two factors.

* Size of fish school trace

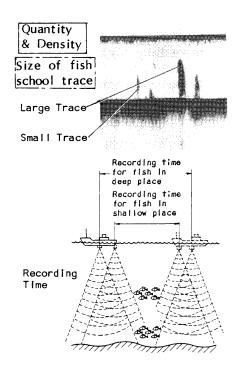
Since size of fish school trace is proportional to the size of actual fish school, it can be used as a basis. However, it should be taken into account that if two traces appear at different depthes with the same size, the fish school at shallower depth is actually bigger than that at deeper depth.

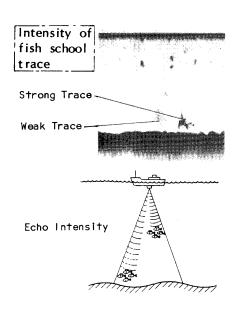
The sounding beam of an echo sounder is conical. This indicates that a fish school in a deeper water is hit by the beam for an extended period of time and leaves a wider trace, that is, the trace becomes bigger than the actual size of fish school.

* Intensity of fish trace

Intensity of echo trace is the other basis to estimate fish quantity. two fish schools of the same size, densely concentrated fish returns stronger echoes and provides darker trace. However, it should also be kept in mind that if two traces are recorded at different depths with the same intensity, the fish school at place deeper more densely concentrated.

Since the ultrasonic wave attenuates as it propagates, the trace of a fish school in a deep place becomes weaker than that in shallow place even if they reflect the same amount of wave.





Plankton Layer (DSL)

Cloud-like layer is sometimes registered the transmission line between seabed. This is a mass of micro organism called plankton. Since fish gather to feed on it as bait, fishing operation of some species of fish is conducted by just observing this trace rather than the trace of aiming fish. Usually the plankton layer lies in deep water by day and rises to shallow water at night.

Current Rip

Trace which can be mistaken apparently as noise is plotted in the place called current rip, where two ocean currents meet with differnt speeds, direction and water temperatures each other. This noise-like trace is either air bubbles or plankton layer. Since fish gather there in search for bait, discrimination of current rip is an important means for finding out a fish school.

Seabed Condition

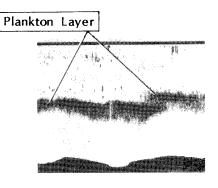
It is well known that abundant information useful for fishing is obtained from seabed trace on the echogram. For example, rock piles and wrecks are the places where fish gather.

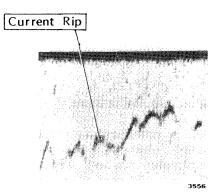
(Seabed Profile)

- * Flat seabed with uniform nature ---Recorded as a trace of constant width.
- * Inclined seabed/Slope of rock piles --Recorded as a trace with long trail
 because ultrasonic wave is reflected in
 different depths.

Note: The tail becomes longer but since the seabed is inclined, apparent width of the seabed trace is narrower.

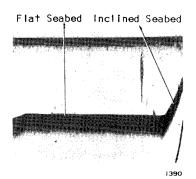
* Rough Seabed --- Since echo returns from various directions, they overlap each other and leaves perspective trace.

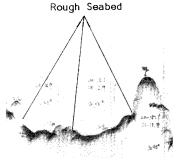




Seabed Condition

Profile





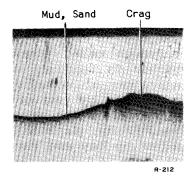
R-186

(Nature of Seabed)

- * Hard * Craggy Dense trace with long trail
- * Mud, sand, alga Faint trace with short trail
- * Bottom of sediment may give a long tail if a low sounding frequency is used.

For bottom discrimination, wide beamwidth (low frequency) and long pulselength are suitable. Further, since the discrimination is done by relative comparison of traces, the gain setting should be kept unchanged.

Nature



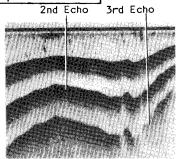
Multiple Reflection

In a comparatively shallow water with hard seabed, the second or further multiple seabed traces are recorded. These are caused by multiple reflections of the sounding pulses at the seabed and sea surface; the echoes coming back from the seabed are reflected by the sea surface and go down again to the seabed and then return.

The true depth of water is the interval from zero line to the first seabed trace.

The multiple reflection is useable for rough check of transmission power and amplifier sensitivity.

Multiple Reflection

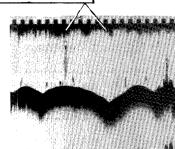


Sea Surface Noise

Sea surface noise is plotted near the transmission line when the sea is rough or when crossing over the wake. The cause of noise is mainly air bubbles.

Proper setting of the TVG control serves to minimize the sea surface noise, allowing distinct echogram.

Sea Surface Noise



R-283

1219



Interruption of Recording by Air Bubbles

In a rough sea, there is a case that the echogram is occasionally interrupted due to thick air bubbles just below the transducer, blocking the sounding path. This blanks out the recording except the zero line. It also occurs by the wake when the ship makes quick turn or backward movement.

It is quite difficult to eliminate the interruption, especially in low sounding frequency.

Reconsideration on installation site of the transducer is needed if the interruption occurs frequently.

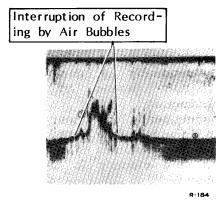
Zig-zag Seabed Trace

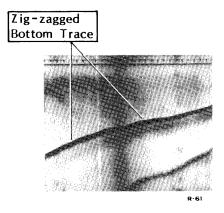
The seabed is recorded zig-zag like the teeth of a saw in a rough sea. This is caused by rolling or pitching of the ship, thereby the sounding direction fluctuates and distance to the seabed varies.

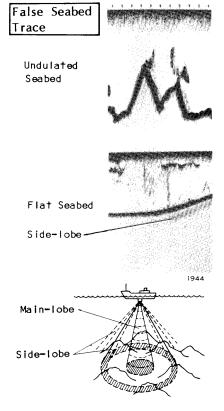
False Seabed Trace

In the seabed with sharp gradient or high unduration, blurred trace will sometimes appear above the seabed contour, while in flat seabed, it is recorded below the contour. They are false echoes caused by side-lobe of ultrasonic beam.

So far, it is explained that ultrasonic wave is radiated only in the vertical direction as a beam (main-lobe), but in practice, there are some beams outside the main beam that are called "side-lobe". Energy of the side-lobe is fairly weak but it still can provide trace if the reflection is strong.







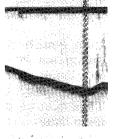
Interference/Noise

There is a case where the echogram is disturbed by interference which appears occasionally or periodically. This is usually caused by such noises as induction from other electronic equipments on board, engine noise, ship's vibrations and interference from an echo sounder of other boats operating in the vicinity in the same frequency band.

The built in Noise Limiter cancells out the random noise by comparing the echoes of last and present soundings.

Interference/ Noise

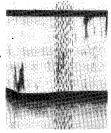
Interference from motor, generator, etc.



Interference from other echo sounder on own ship.



Interference from echo sounder on other boat



MAINTENANCE

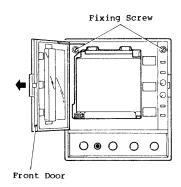
1. Stylus Replacement and Adjustment

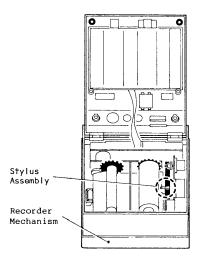
Poor or intermittent recording is caused mainly by wear of the stylus nib or collector brush. Check their condition from time to time, and readjust or replace them if necessary.

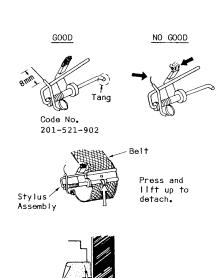
- 1. Turn the FUNCTION switch to "O" (off) position.
- 2. Open the front door, and two fixing screws are in sight. Unfasten the screws and swing down the recorder mechanism.
- 3. If only the stylus nib is worn, pull it out from the sleeve, using a pair of tweezers or long-nosed pliers, until it is approximately 8mm long.

Too long a nib may cause erratic recordings due to bouncing on the paper.

- 4. If the collector brush is worn, remove the whole stylus assembly from the recording belt by pressing the holding tang (see drawing), and replace it with new one.
- 5. Close the recorder mechanism as it was.
- 6. To smooth the end of the stylus nib, place a scrap of sandpaper (supplied) over the recording paper and turn the power on for several belt revolutions, being careful to keep your fingers away from the moving stylus.
- 7. If necessary, readjust the setting position of the scale plate to place its zero point at the transmission line. (Make sure that the Draft control is turned fully counter-clockwise!)



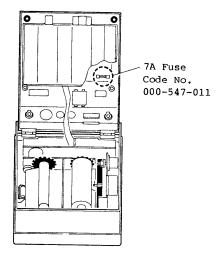




Sand Paper

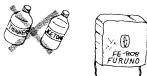
2. Fuse Replacement

A 7A fuse is provided inside the recorder. It may be blown by improper mains voltage/polarity. mechanical overloading \mathbf{or} by accidental shortcircuit. If it is blown, first find out the cause of the trouble, and then replace the fuse. use a larger fuse to avoid serious damage to the circuitry. When replacing the fuse, turn off the ship's mains switch to avoid accidental shortcircuiting.



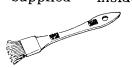
3. Cleaning

Keep recorder clean using a clean moistened cloth rag. Put vinyl cover on when it is not used.

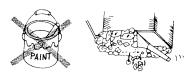


Do not use plastic solvent or active chemicals for cleaning.

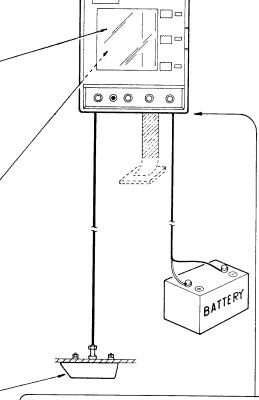
Dry recording paper inherently creates powder dust. Clean the recorder interior using the brush supplied inside the cabinet.

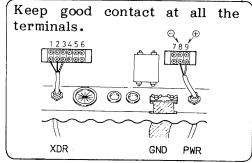


Keep transducer face clean.



Oysters or seaweed on the transducer face will result in degraded detecting performance. Gently remove them when drydocked. Do not paint on the face.







TROUBLESHOOTING * * * * * * * * * * * * *

The following table shows simple troubleshooting that can be done by the operator himself. Problems not covered here are best referred to a qualified electronics technicians.

Symptom	Possible Cause	Remedy
Not working at all	 Switch at main switch board is turned off. Power connection is loose or out. Too low input voltage (Battery is flat.) Fuse on main board is blown. 	 Turn on the main switch. Secure connection firmly. Check mains voltage is within 10.5 to 40VDC. If blown, check mains voltage first, and then replace 7A fuse. See page 3-2.
Lamp/LED lit, but motor is not rotating.	1. Poor connection inside	 Check that connectors on the boards are firmly plugged in.
Motor rotating, but no recording	 Stylus nib or collect- or brush is worn. Poor connection inside DRAFT control is set too deep while using shallow ranges. 	 Readjust or replace it. See page 3-1. Check that connectors on the boards are firmly plugged in. Readjust DRAFT control.
Zero line but no echo trace	 GAIN control is set too low. Transducer connection is loose or out. Transducer is not in contact with water. 	 Increase the GAIN. Secure connection firmly. Put transducer in water.
Recording is faint and dim.	 Stylus nib is formed improperly. Thick dirt on front window 	 Readjust stylus nib. See page 3-1. Clean up window.
Recording is too dark and heavy.	 Gain is set too high. Stylus is bent to tear paper. 	 Decrease the GAIN. Readjust stylus nib.
Uneven intensity in recording	1. Stain on collector rail.	1. Polish up rail.



Symptom	Possible Cause	Remedy			
Irregular paper advance	 Recorder assembly is not fully snapped in. (Pinch roller not engaged) Reduction gear of take-up motor jammed. 	 Push in the recorder assembly. Remove paper dust on the gears. 			
Chart recording OK but digital display abnormal (unreadable)	1. Loose connection inside	1. Check plug connections on the boards.			
Seabed depth reading is incorrect or unstable.	 SHADOW LINE control is not adjusted for seabed. Strong interference or dense fish school exist. Seabed is out of recording range. 	1,2. Readjust GAIN and/or SHADOW LINE control.3. Select a depth range to see seabed echo.			



1. DEPTH RANGE, SOUNDING RATE & PULSELENGTH:

RANGE		FE-80)8M	FE-80	8FT	FE-808FA/PA		SOUNDING	PULSELENGTH	
		(meter)		(foot)		(fathom,passi)		RATE(/min.)	(msec)	
	1	a	0-	20	0-	30	0- 10			
	1	b	10-	30	15-	45	5- 15		27.6	0.4
	2	a	0-	40	0-	60	0- 20		376	0.4
N	-	b	20-	60	30-	90	10- 30			
0	2	a	0-	80	0-	120	0- 40		100	
R	3	b	40-	120	60-	180	20- 60		188	1.0
M	1	a	0-	200	0-	300	0-100		0.4	1.0
A	4	b	100-	300	150-	450	50-150		94	
L	-	a	0-	400	0-	600	0-200		47	
	5	b	200-	600	300-	900	100-300		47	0.0
	6	a	0-	800	0-1	200	0-400		00 5(4)	2.0
	0	b	400-1	200	600-1	800	200-600		23.5(*)	
BOTT	OM	1	5				2.5			
LOCK	LOCK 2		10		15				*: 47 for for	oot scale

2. RECORDING SYSTEM:

Straight line recording

3. PRESENTATION MODE:

a) Normal(full paper width)

b) Normal(upper 2/3) plus Bottom Lock(lower 1/3)

4. RECORDING PAPER:

Dry electrosensitive paper

Type; PD-2020NW (204mmx20m)

5. PAPER SPEED:

Range 1-3: 6, 9 or 18mm/min.

Range 4-6: 2, 3 or 6mm/min.

6. INTENSITY GRADATION:

Light-gray, gray and black

7. FREQUENCY & TRANSDUCER: 28kHz : 28F-8(Std.), 28F-18(Opt.)

50kHz : 50B-6(Std.), 50B-9(Opt.), 50F-8G(Opt.)

60kHz: 60B-5S(Std.), 60B-52(Opt.) 88kHz: 88B-8(Std.), 88B-10(Opt.) 200kHz: 200B-5S(Std.), 200B-8/8N(Opt.)

8. OUTPUT POWER:

500W nominal

9. CONTROLS / SWITCHES:

Front Panel: a) Range b) Gain

c) Shadow Line

d) Function (OFF/ON/BL-1/2)

e) Event Marker

Sub-Panel:

a) Noise Limiter

b) Paper Speed

c) TVG (Time Varied Gain)

d) Draft (zero line shift)

e) Power Reduction

f) Lamp

10. DIGITAL READOUT:

a) Start depth and end depth

[Shadow Line OFF]

b) Start depth, seabed depth and end depth [Shadow Line ON]

11. POWER SUPPLY:

10.5 to 40VDC universal, 50W approx.

12. DIMENSIONS & WEIGHT:

 $366(W) \times 418(H) \times 138(D)$ mm, 12.2kg



[EQUIPMENT LIST]

No.	Name	Туре	Q'ty	Remarks
1	Recorder Unit	FE-808	1	
2	Transducer		1	
3	Installation Materials		1 set	See separate list.
4	Spare Parts		1 set	See separate list.
5	Vinyl Cover	02-038-0001	1	Code No.: 000-879-498

[STANDARD SPARE PARTS]

No.	Name	Type	Code No.	Q'ty	Remarks
1	Fuse	F-7161, 7A	000-547-011	1	
2	Recording Stylus	02-015-2190-2	201-521-902	1	
3	Sand Paper	#240 90x90mm	000-835-008	1	
4	Recording Paper	PD-2020NW	000-878-457	1	
5	Pilot Lamp	P-12, 50mA	000-540-156	2	w/WHT leads

[INSTALLATION MATERIALS]

No.	Name	Type	Code No.	Q'ty	Remarks
1	Vinyl Cable	VCTF1.25x2C,5m	000-564-502	1	for power
2	Crimp-on Lug	FV1.25-3 RED	000-538-113	5	

[TRANSDUCER/TANK/THRU-HULL PIPE]

FREQUENCY	TRANSDUCER	TANK	THRU-HULL PIPE	USE
		T-604	TFB-5000	Steel Hull
		(000-015-512)	(000-015-206)	
1		T-604-W	TFB-1000	Wooden Hull
	28F-8	(000-015-514)	(000-015-201)	
	(000-015-003)	T-604-F	TRB-1000	Plastic Hull
	Standard	(000-015-513)	(000-015-215)	
		T-514		Sideboard
		(000-015-416)		
		T-612	TFB-5000	Steel Hull
28kHz		(000-015-534)	(000-015-206)	
		T-612-W	TFB-1000	Wooden Hull
	28F-18	(000-015-536)	(000-015-201)	
1	(000-015-004)	T-612-F	TRB-1000	Plastic Hull
	Option	(000-015-535)	(000-015-215)	
		T-2		Sideboard
		(000-015-302)		
		T-605	TFB-5000	Steel Hull
		(000-015-515)	(000-015-206)	
		T-605-W	TFB-1000	Wooden Hull
	50B - 6	(000-015-517)	(000-015-201)	
	(000-015-042)	T-605-F	TRB-1000	Plastic Hull
	Standard	(000-015-516)	(000-015-215)	
		T-27		Sideboard
50 kHz		(000-015-313)		
		T-603	TFB-5000	Steel Hull
		(000-015-509)	(000-015-206)	
		T-603-W	TFB-1000	Wooden Hull
	50B-9	(000-015-511)	(000-015-201)	
	(000-015-064)	T-603-F	TRB-1000	Plastic Hull
	Option	(000-015-510)	(000-015-215)	
		T-63		Sideboard
		(000-015-326)		l



FREQUENCY	TRANSDUCER	TANK	THRU-HULL PIPE	USE
, , , , , , , , , , , , , , , , , , , ,		T-612	TFB-5000	Steel Hull
		(000-015-534)	(000-015-206)	
		T-612-W	TFB-1000	Wooden Hull
50kHz	50F-8G	(000-015-536)	(000-015-201)	
	(000-015-066)	T-612-F	TRB-1000	Plastic Hull
	Option	(000-015-535)	(000-015-215)	
	-,	T-2	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Sideboard
		(000-015-302)		3140000414
		T-605	TFB-5000	Stjel Hull
		(000-015-515)	(000-015-206)	31 331 11411
		T-605-W	TFB-1000	Wooden Hull
	60B-5S	(000-015-517)	(000-015-201)	WOOden Hari
	(000-015-021)	T-605-F	TRB-1000	Plastic Hull
	Standard	(000-015-516)	(000-015-215)	riasiic huii
	Statioard	T-27	(000-015-215)	Sideboard
60kHz		(000-015-313)	******	Sideboard
OUKHZ		T-603	TFB-5000	Steel Hull
				Sieer Huir
		(000-015-509)	(000-015-206)	
	500 50	T-603-W	TFB-1000	Wooden Hull
	60B-52	(000-015-511)	(000-015-201)	
	(000-015-022)	T-603-F	TRB-1000	Plastic Hull
	Option	(000-015-510)	(000-015-215)	
		T-63		Sideboard
		(000-015-326)		
		T-606	TFB-5000	Steel Hull
		(000-015-518)	(000-015-206)	
		T-606-W	TFB-1000	Wooden Hull
	88B-8 (000-015-024) Standard 88B-10 (000-015-025) Option	(000-015-520)	(000-015-201)	
		T-606-F	TRB-1000	Plastic Hull
		(000-015-519)	(000-015-215)	
		T-221		Sideboard
88kHz		(000-015-366)		
		T-609	TFB-5000	Steel Hull
		(000-015-528)	(000-015-206)	
		T-609-W	TFB-1000	Wooden Hull
1		(000-015-530)	(000-015-201)	
		T-609-F	TRB-1000	Plastic Hull
		(000-015-529)	(000-015-215)	
		T-501		Sideboard
		(000-015-401)		
		T-605	TFB-5000	Steel Hull
1		(000-015-515)	(000-015-206)	3,00, 110,1
ļ	200B-5S	T-605-W	TFB-1000	Wooden Hull
		(000-015-517)	(000-015-201)	Wooden Harr
	(000-015-029)	T-605-F	TRB-1000	Plastic Hull
	Standard	(000-015-516)	(000-015-215)	Trastic Hair
		T-27	(000-01)-21)	Sideboard
200kHz		(000-015-313)		Sideboard
200KHZ	200B-8 (000-015-030) 200B-8N (000-015-045)	T-608	TFB-5000	Steel Hull
				i sieei nuii
		(000-015-525)	(000-015-206)	Mandar Util
t		T-608-W	TFB-1000	Wooden Hull
		(000-015-527)	(000-015-201)	DI
		T-608-F	TRB-1000	Plastic Hull
	0-11	(000-015-526)	(000-015-215)	0.1.1
l	Option	T-31		Sideboard
1		(000-015-317)		



INSTALLATION * * * * * * * * * * *

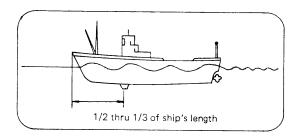
1. Selection of Installation Site

Transducer

The performance of the echo sounder depends greatly upon the transducer position. The following points should be taken into account:

* Select a place not effected by air bubbles.

It is known that bubbles are at minimum at the place where the first bow wave falls and the next wave rises at general cruising speed. In small boats with slow speed, midship position is usually a good place. In high speed boats, select a place where the transducer is always in contact with the water.



- * If it is possible, put the transducer flush on the keel line.
- * To further reduce the effection of air bubbles, it is recommended to project the transducer by appox. 250mm from the hull plate, but not below the keel level.
- * The transducer must be facing the sea bottom in normal cruising trim of the vessel.
- * Select a place as far from engine, generator, motor or other electric equipments as possible.

A fairing block will be necessary both to prevent turbulence related problems and to protect the transducer from damage due to debris in the water. The fairing block should be fabricated locally by a shipyard skilled in such specialized work.

The transducer can also be installed on the sideboard using pipe and clamps, but note that the boat has to be small in size and slow in speed due to limited strength of the transducer pipe.

Recorder Unit

The recorder unit can be installed in any convenient place in the steering bridge. To expect extended performance, however, the following points should also be taken into consideration:

- * Select a well ventilated place not exposed to direct sunbeam and water splash.
- * Select a place sufficiently far apart from noise generating equipment, radio equipment and antenna feeders.
- * Select a place convenient for operation, observation, maintenance and future service.



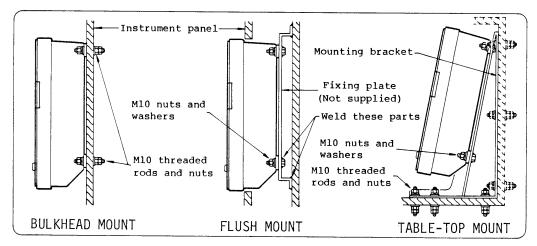
2. Mounting

Transducer

Refer to the drawings on pages AP2-4 thru AP2-6 for typical installations.

Recorder Unit

The recorder unit can be mounted on table-top (an optional mounting bracket is required), bulkhead or interior bulkhead.

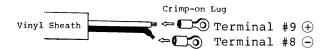


3. Cable Connections

Two cables (power cable and transducer cable) and grounding copper strap are connected to the receiver unit. (Refer to page AP2-7 for connection diagram.)

Power Cable

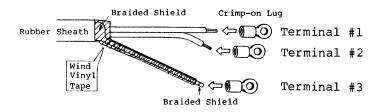
Fabricate the one end of the power cable with crimp-on lugs supplied as installation materials. The other end of the cable is connected to the battery or the rectifier.



Transducer Cable

Fabricate the one end of the transducer cable with crimp-on lugs supplied as installation materials.

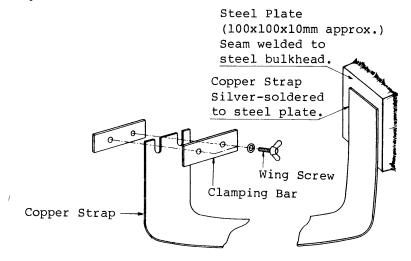




- Note 1. Terminals #1 and #2 have no polarity.
- Note 2. Don't fail to treat the shield with vinyl tape to prevent shortcircuit.

Ground Copper Strap

Since a sheet of copper strap is not supplied, it should be prepared locally.

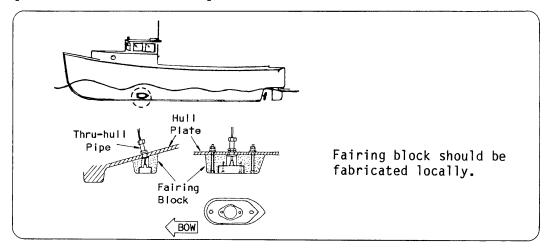


- Note 1. The length of copper strap should be limited for good ground effect.
 - 2. For FRP or wooden boat, copper strap should be brazed to nearest earth point.

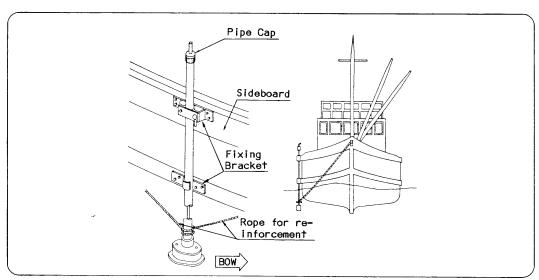


EXAMPLES OF TRANSDUCER INSTALLATION

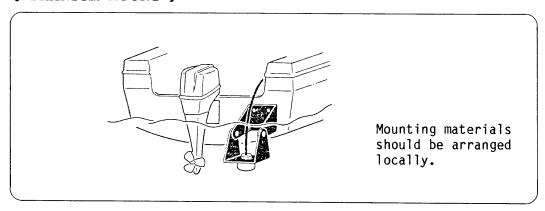
[HULL BOTTOM MOUNT]



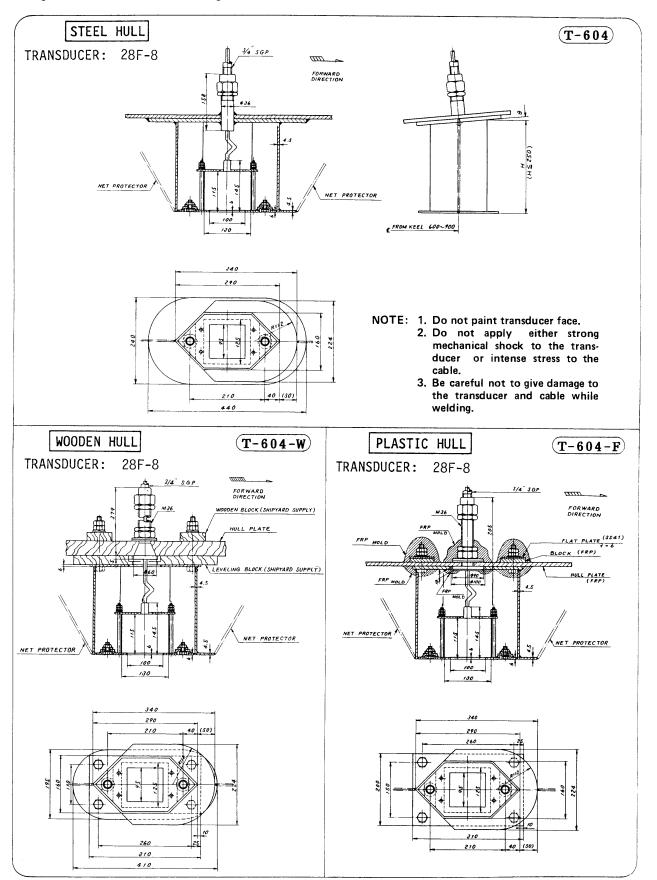
[SIDEBOARD MOUNT]



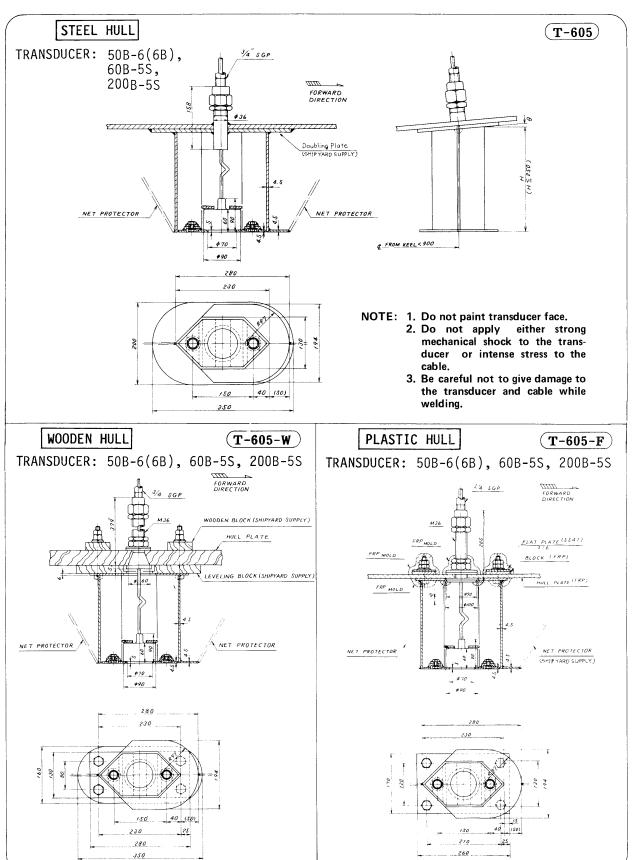
[TRANSOM MOUNT]



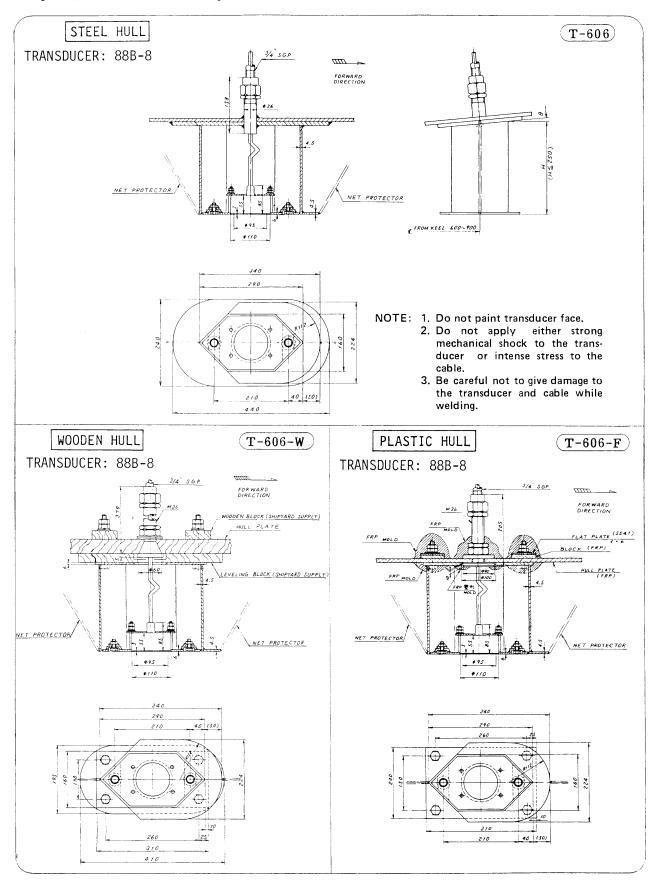
[TRANSDUCER TANK]



[TRANSDUCER TANK]

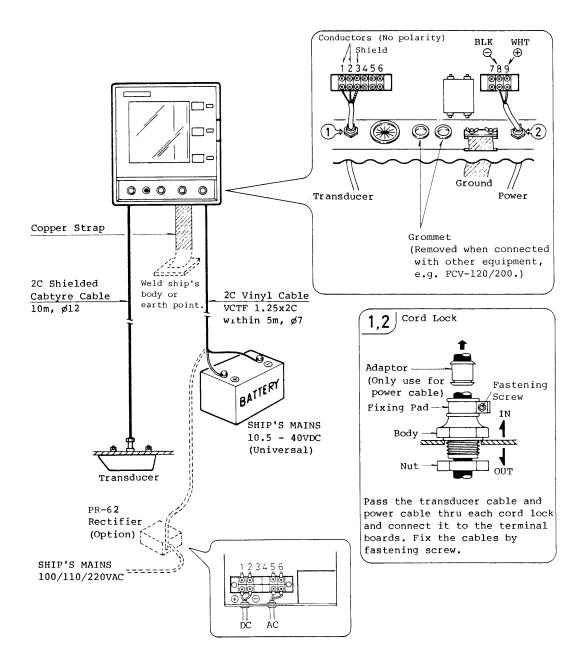


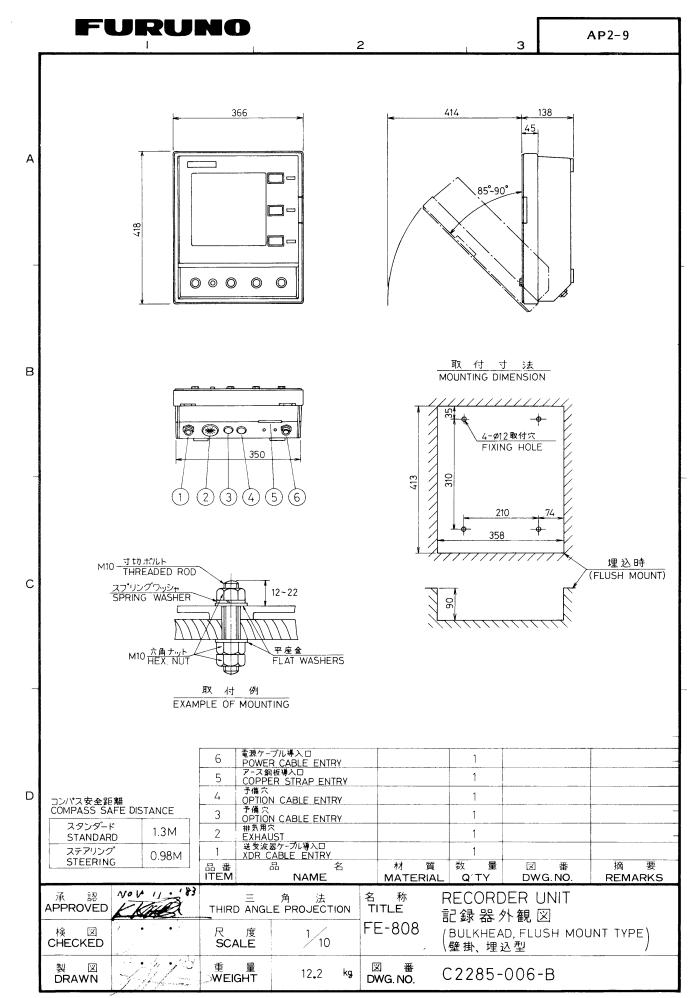
[TRANSDUCER TANK]

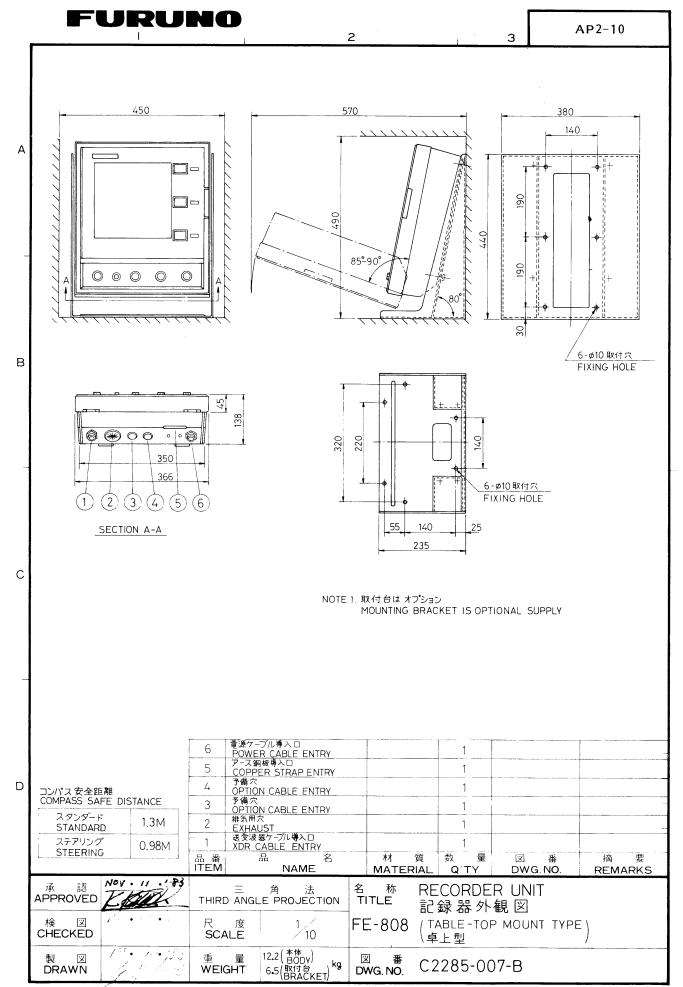




CONNECTION DIAGRAM







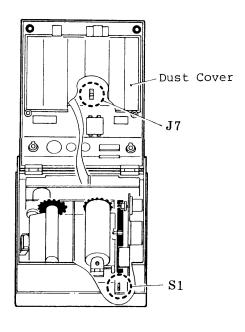


The FE-808 can provide depth readout in one of four units; meters, feet, fathoms or brazas/passis. Note that the equipment is factory-set to "meters" unless noted otherwise.

If necessary, change calibration unit following the procedure below.

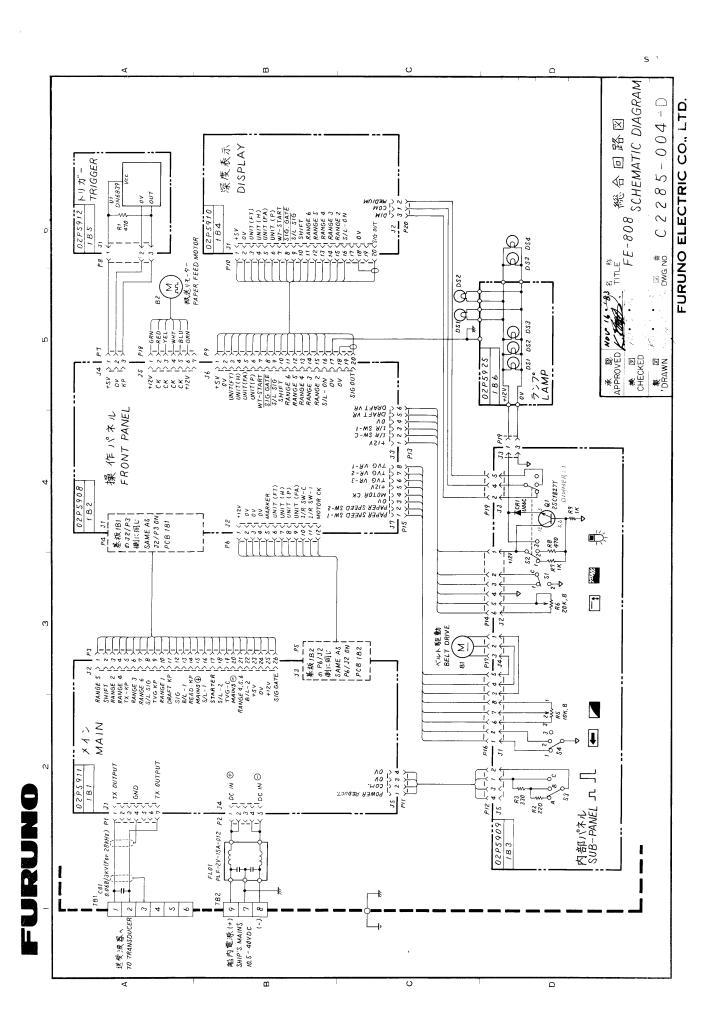
[Procedure]

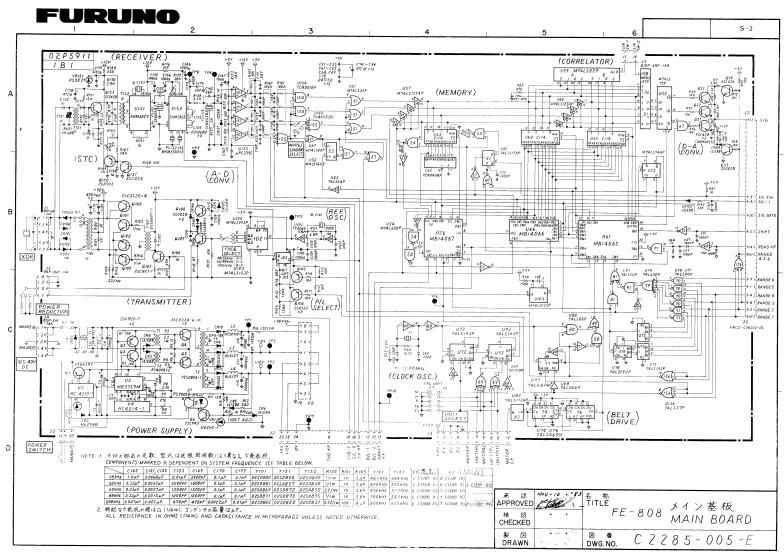
1. Change the positions of two jumper plugs. Open the recorder cabinet, remove the dust cover colored black, and the MAIN p.c. board is in sight. One jumper plug J7 is mounted on the p.c. board. The other jumper plug S1 is located on the DISPLAY p.c. board. S1 is selectable between feet and others. See figure and table below.



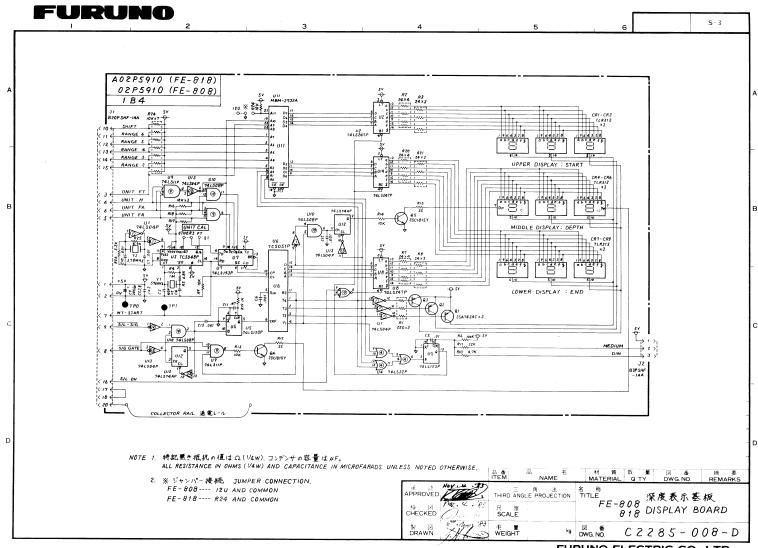
TT **	Jumper Plugs		
Unit	J7	S1	
Meters	M 00 00 00 00	FT OTHERS	
Fathoms	FA 000	FT OTHERS	
Brazas/ Passis	P 000000000000000000000000000000000000	FT OTHERS	
Feet	00 00 00 00 00	FT OTHERS	

2. When changed to feet, you should also change the scale for feet. The scale is optional supply. (Code No. 203-813-130)





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