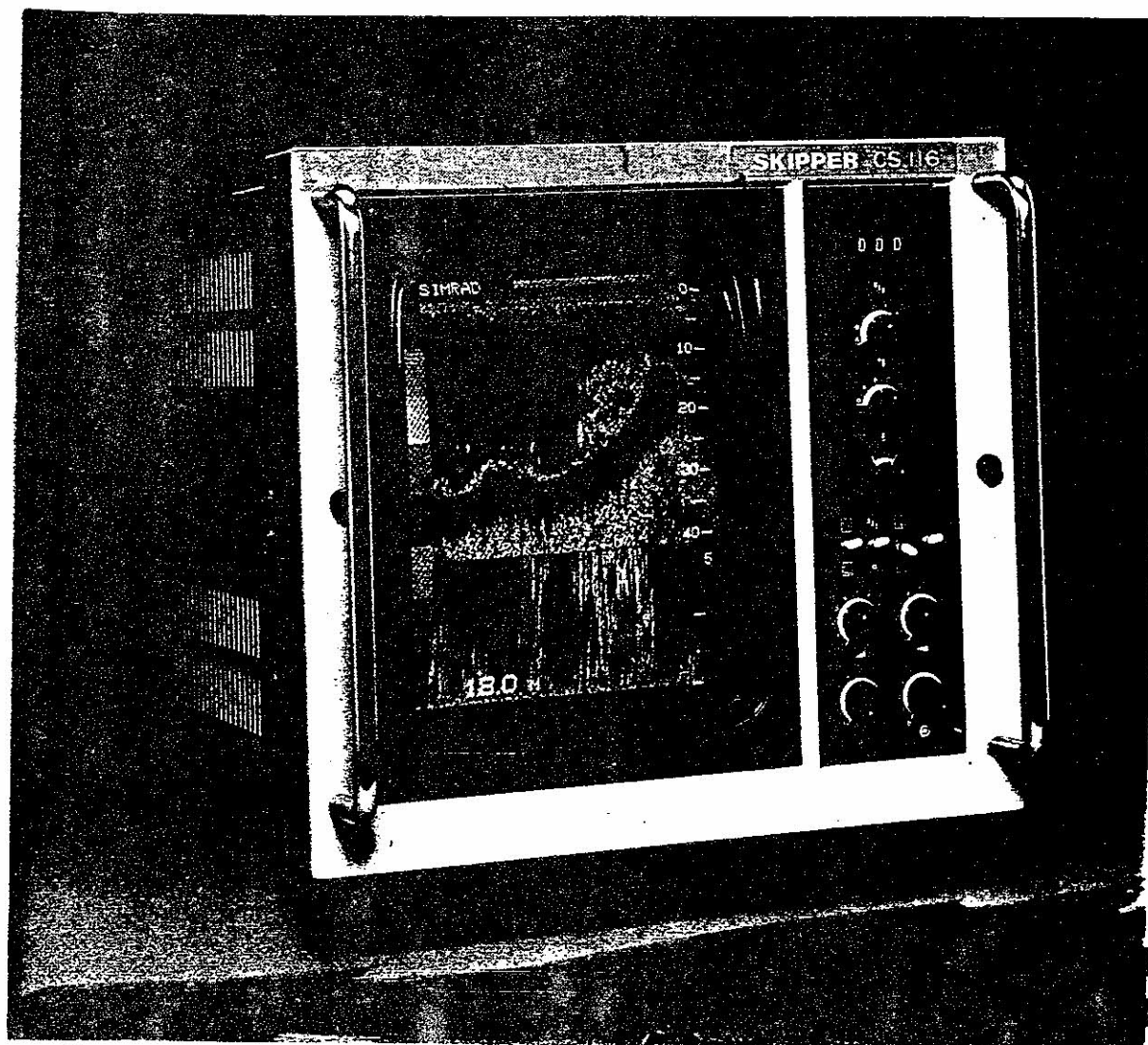


SKIPPER CS 116

COLOUR SOUNDER

5050 E

OPERATOR'S & INSTALLATION



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SKIPPER

PERFORMANCE SPECIFICATIONS

The CS-116 is a powerful 8-bit microprocessor-controlled dual frequency 11-inch color video sounder with features that are ideally suited for any type of fishing from bottom trawling to mid-water trawling, from shrimping to purse seining.

Color Presentation

Received echoes will be displayed in up to 8 different colors, depending on their strengths. The bottom echo will usually show up in red, fish in the orange-to-green region, and the background in blue. Scale calibrations, depth readouts, and 30 second-time marks are white. Each color represents a 6dB change in strength, (namely twice stronger or weaker than the adjacent color on the color sample scale at the left edge of the screen.) The front panel THRESHOLD control determines the desired strength level below which unwanted weaker echoes are suppressed.

Depth Ranges

The front panel RANGE switch selects 8 different basic ranges to be shown across the screen, with the upper range limit set in 1 meter, 1 fathom/braccia, or 1 foot steps by the 3-digit UPPER RANGE LIMIT switch, as follows (fathom & braccia calibrations use the same range scales with appropriate sounding rates):

1	Metric:	Any	10 meter	segment between 0 &	1009 meters
	Fathom:	Any	5 fathom	segment between 0 &	1004 fathoms
	Footage:	Any	30 foot	segment between 0 &	1029 feet
2	Metric:	Any	20 meter	segment between 0 &	1019 meters
	Fathom:	Any	10 fathom	segment between 0 &	1009 fathoms
	Footage:	Any	60 foot	segment between 0 &	1059 feet
3	Metric:	Any	40 meter	segment between 0 &	1039 meters
	Fathom:	Any	20 fathom	segment between 0 &	1019 fathoms
	Footage:	Any	120 foot	segment between 0 &	1119 feet
4	Metric:	Any	80 meter	segment between 0 &	1079 meters
	Fathom:	Any	40 fathom	segment between 0 &	1039 fathoms
	Footage:	Any	240 foot	segment between 0 &	1239 feet
5	Metric:	Any	160 meter	segment between 0 &	1159 meters
	Fathom:	Any	80 fathom	segment between 0 &	1079 fathoms
	Footage:	Any	480 foot	segment between 0 &	1479 feet
6	Metric:	Any	320 meter	segment between 0 &	1319 meters
	Fathom:	Any	160 fathom	segment between 0 &	1159 fathoms
	Footage:	Any	960 foot	segment between 0 &	1959 feet
7	Metric:	Any	640 meter	segment between 0 &	1639 meters
	Fathom:	Any	320 fathom	segment between 0 &	1319 fathoms
	Footage:	Any	1900 foot	segment between 0 &	2899 feet
8	Metric:	Any	1280 meter	segment between 0 &	2279 meters
	Fathom:	Any	640 fathom	segment between 0 &	1639 fathoms
	Footage:	Any	3800 foot	segment between 0 &	4799 feet

Automatic Range Shift

Activating the front panel BOTTOM TRACK switch will enable the CS-116 to automatically select an appropriate range to place the bottom echo always in the lower 1/2 to 3/4 area of the screen.

Digital Depth Readout

The depth to the bottom will be digitally shown in 0.1 meter, 0.1 fathom/braccia or 0.1 foot steps if the bottom echo is within the screen (range selected).

Bottom-Locked Scale Expansion Ranges

The front panel BOTTOM LOCK RANGE switch selects the following 5 areas off the bottom contour, enlarges and displays them across the lowest 1/3 of the screen with the bottom echo shown flat at the bottom of the screen:

Position 1:	2.5 meters,	1.25 fathoms/braccia	or	7.5 feet
Position 2:	5.0 meters,	2.5 fathoms/braccia	or	15.0 feet
Position 3:	10.0 meters,	5.0 fathoms/braccia	or	30.0 feet
Position 4:	20.0 meters,	10.0 fathoms/braccia	or	60.0 feet
Position 5:	40.0 meters,	20.0 fathoms/braccia	or	120.0 feet
Position NORM: Normal picture only				

The selected range will also be digitally shown. In the bottom lock mode, the normal picture will be vertically reduced to 2/3 of its full size and displayed just above the expanded picture. This will enable both the bottom and the expanded echoes to be seen simultaneously under any range setting if the bottom echo is within the range selected.

Picture Feed Speeds

Two echo picture feed speeds are selectable from the front panel PICTURE FEED switch.

Position NORM: The echo picture will move from right to left once every transmission.

Position SLOW: The picture will move at 1/2 of its normal speed without reducing the sounding rate to retain all echoes on each transmission. Internally presettable to 1/4 of the normal speed.

Position OFF: The current picture will be frozen on the screen while transmission continues.

Operating Frequencies

Two operating frequencies (HIGH & LOW) are selectable from the front panel. HIGH frequency for small fish finding in shallow water with sharper picture definition. LOW frequency for deep water fishing with greater sensitivity.

Standard Combination: 50kHz/HIGH & 38kHz/LOW

Optional Combination: 200kHz/HIGH & 50kHz/LOW

Transducers

Appropriate transducers are selected from the front panel FREQUENCY SELECTOR switch as follows:

HIGH (standard): 50kHz ferrite transducer with 19 degree beam width

HIGH (option): 200kHz ceramic transducer with 12 degree beam width

LOW (standard): 38kHz nickel transducer (beam width determined by the type of transducer supplied.)

Through-wooden-hull installation is standard for each transducer. Steel housings are optionally available.

Transmit Power

In excess of 800 watts into matched 38 or 50kHz transducer

In excess of 500 watts into matched 200kHz transducer

The rear panel-mounted POWER REDUCTION switch adjusts the transmit power level in four steps for each frequency, as follows:

Position A: Approximately 1/1000 of full power

Position B: Approximately 1/100 of full power

Position C: Approximately 1/10 of full power

Position D: No power reduction

Transmit Pulse Lengths:

Four pulse lengths are provided, and an optimum value is automatically selected for a particular depth range, as follows:

Length in Milliseconds	Metric Scale	Fathom Scale	Braccia Scale	Footage Scale
0.6	0 - 79	0 - 43	0 - 48	0 - 262
1.2	80 - 239	44 - 131	49 - 145	263 - 787
2.4	240 - 639	132 - 350	146 - 387	788 - 2079
3.6	640 & Up	351 & Up	388 & Up	2080 & Up

Sounding Rates

The following sounding rates (per minute) are selected regardless of picture feed rate selected.

	Metric	Fathom	Braccia	Footage
RANGE 1	345	345	345	345
RANGE 2	345	345	345	345
RANGE 3	288	314	314	314
RANGE 4	192	246	254	246
RANGE 5	159	167	172	164
RANGE 6	70	78	86	78
RANGE 7	35	38	43	38
RANGE 8	17	19	21	19

Noise Rejection

Setting the front panel NOISE BLANKER switch to ON activates the built-in automatic noise rejection function, which allows only those echoes that appear at the same depths on two successive transmissions to be displayed on the screen, thus suppressing random noise or interfering signals from nearby echo sounders.

CAUTION: The use of this noise rejection function is not recommended when looking for small fish near the surface, because not all such fish produce an echo on each transmission.

Interface with External Echo Sounders

It is possible to use the Model CS-116 as a slave monitor display using the transceiver of an external Skipper line recording echo sounder with an optional interface board installed. The Skipper 810 is directly interfaceable with the CS-116.

The front panel XCVR (transceiver) switch selects the built-in transceiver in the INT position, or an external sounder in the EXT position.

Interface with Audio Cassette Recorder

With an optional tape recorder interface unit (Model RI-200), you can store echo pictures on a normal audio cassette tape and play it back at any time. A stereophonic type recorder with manual recording capability is required.

Power Supply Requirements

The Skipper CS-116 will accept any d-c voltage between 11 and 40V for normal, continuous-duty operation. The current drain will not exceed 8 amperes at 12 volts d-c. The cabinet is isolated at d-c level from the negative power input for floating ground requirements.

Weight

Approximately 17 kilograms (37 LBS) with mounting pedestal fitted

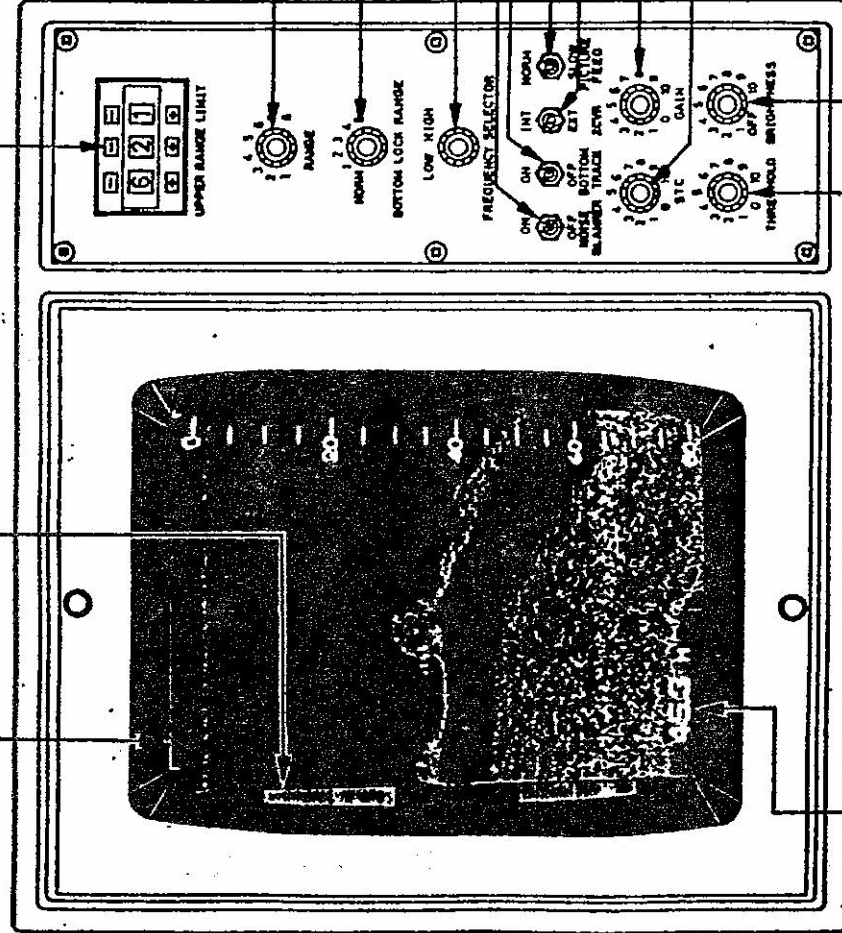
NOTE: Above specifications are subject to change without notice or obligation.

TIME MARK

appears every 30 seconds on all ranges.

COLOR SCALE

shows the colors corresponding to different echo strengths. The strongest echo color (red) is at the bottom, and the weakest one (blue - background color) at the top.



ECHO THRESHOLD CONTROL

sets the minimum strength level the received echoes must exceed to be allowed to show up on the screen. Clockwise rotation raises the level, erasing noise and unwanted weak echoes. When using this control, observe the COLOR SCALE where colors corresponding to the level or weaker disappear, one by one, from the scale as it is advanced clockwise.

DIGITAL DEPTH READOUT

reads depths from the transducer face. M = meters, FM = fathoms, FT = feet, BR = braccia

UPPER RANGE LIMIT SWITCHES

set the upper limit of the depth range selected by the RANGE switch (up to 999 meters, fathoms/braccia or feet in one meter, fathom/braccia or foot steps). The upper range limit is indicated by either a scale line or a scale line & numeral combination.

RANGE SWITCH

selects eight different basic ranges to be shown across the screen, as detailed on page 1.

BOTTOM-LOCK RANGE SWITCH

selects five ranges off the bottom, expands echoes within the range selected, and displays them across the lower 1/3 area of the screen as detailed on page 2. In the NORM position, no expansion occurs.

FREQUENCY SELECTOR SWITCH

selects two operating frequencies and their matched transducers. Position HIGH: 50kHz (standard) mainly for small fish detection in shallow & mid range operation. Position LOW: 38kHz (standard) mainly for single fish detection & bottom trawling.

NOISE BLANKER SWITCH

activates the automatic noise rejection function, suppressing noise or interference signals from nearby echo sounders. Not recommended when looking for small fish since they often produce random, noise-like echoes, allowing them to be suppressed.

BOTTOM TRACK SWITCH

activates the automatic phased range shift function, selecting an upper range limit so that the bottom echo is always in the lower 1/2 to 1/4 area of the screen.

TRANSCIVER (XCVR) SWITCH

Position INT: selects the internal transceiver. Position EXT: selects an external echo sounder, allowing the set to work only as a slave monitor display.

PICTURE FEED RATE SWITCH

selects two horizontal picture movement speeds, as follows: Position NORM: The picture moves once every transmission. Position SLOW: The picture moves once every two transmissions without losing echoes on the first transmission, or every four transmissions without losing echoes on all previous 3 transmissions. Position OFF: The picture movement stops but transmission continues.

SENSITIVITY TIME CONTROL (STC)

reduces receiver gain for shallow water echoes and restores it with depth in such a manner as to equalize echo strengths at different depths. This initial gain suppression is at maximum in the fully clockwise position.

GAIN CONTROL

adjusts the gain of the built-in receiver. Disabled when the XCVR switch is in the EXT position for slave monitor display operation.

BRIGHTNESS CONTROL

switches on/off the set, and adjusts the display brightness and control panel illumination.

External Connection Terminal Block

DETECTED VIDEO: accepts positive detected signals from external sounder when the set operates as a slave monitor unit.

TRIG IN (-): accepts positive-to-negative transition type trigger pulse from external sounder for slave operation.

SIG IN/OUT: normally connected together with jumper. Remove jumper when using optional audio tape recorder interface unit.

POWER REDUCTION SWITCH
selects the ratios of transmit power reduction:

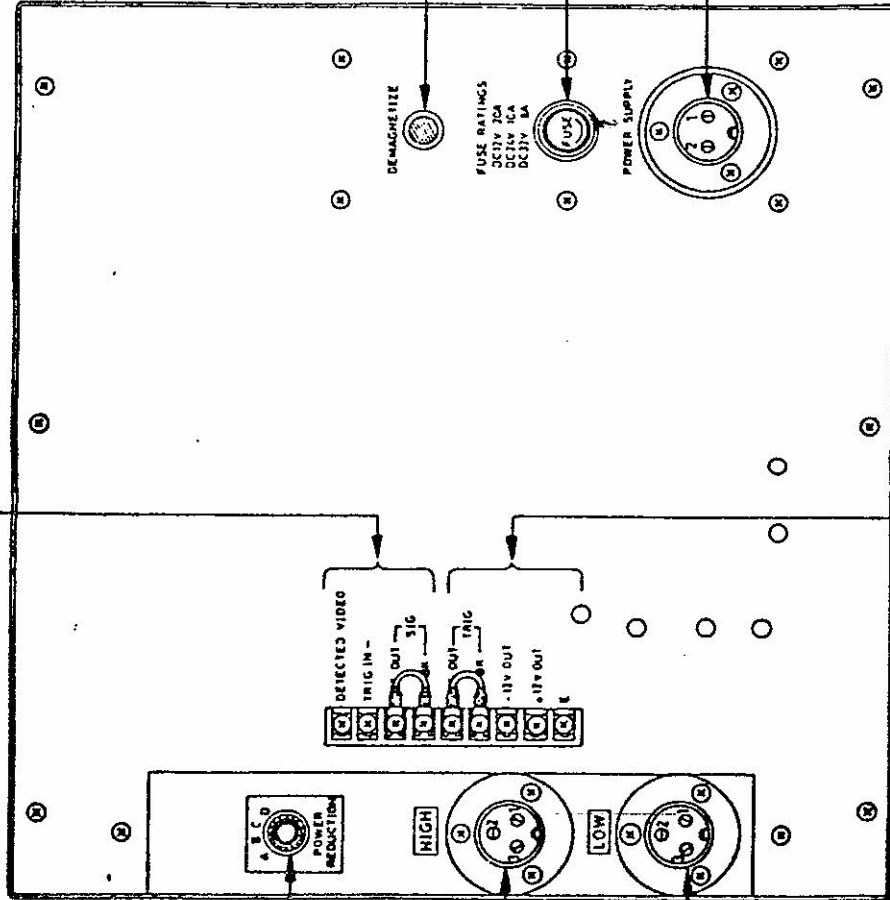
Position A: 1/1000 of full power
Position B: 1/100 of full power
Position C: 1/10 of full power
Position D: No power reduction

Transducer Cable Receptacle
mates with the three-prong female type plug to be attached to the two-lead, shielded cable of the 50kHz (or 200kHz) transducer for HIGH frequency operation.

Pin No. 1: one lead of cable
Pin No. 2: shield of cable
Pin No. 3: other lead of cable

Transducer Cable Receptacle
mates with the three-prong female type plug to be attached to the 2-lead, shielded cable of the 38 kHz transducer for LOW frequency operation.

Pin No. 1: one lead of cable
Pin No. 2: shield of cable
Pin No. 3: other lead of cable



DEMAGNETIZE SWITCH
After completion of initial installation, switch the set on and depress this button for a second or 2 to improve color definition. This switch should be used if color distortion occurs (mainly due to influence of earth's magnetic fields) after many months of operation

Fuse Holder
After connecting up the set, insert a fuse of the following rating:
20 amperes for 12VDC supply
10 amperes for 24VDC supply
8 amperes for 32VDC supply
WARNING: The use of a wrong fuse will cause it to blow the instant the set is switched on, or will not protect the circuitry in the event of trouble.

Power Supply Receptacle
mates with the two-prong female type plug attached to the power cable.
Pin No. 1: Positive (+) line
Pin No. 2: Negative (-) line
Connect the power cable's white lead to the positive, and black lead to the negative of the external power supply. Reversing the polarity will cause the fuse to blow even if the set is turned off.

External Connection Terminal Block

TRIG IN/OUT: normally connected together with jumper. Remove jumper when using optional audio tape recorder interface unit.

-12V OUT: provides regulated 12VDC (negative relative to terminal E) to power external accessory units. Maximum 100mA

+12V OUT: provides regulated 12VDC (positive relative to terminal E) to power external accessory units. Maximum 100mA

E: connects to display cabinet. Run wire from this terminal to nearest ground. Isolated from negative input.

Selection of Depth Readout Calibrations

As delivered, the scale lines and digital depth readings showing on the display screen are normally calibrated in meters. If you wish to read depths in fathoms, feet or braccia (Italian fathoms), use the following procedure:

- 1) Switch off the set. Remove the six screws on the front control panel, and carefully detach the panel. Do not disconnect any connections from the panel.
- 2) Refer to Fig. 2-1, locating the DIP switch on the reverse side of the panel below the upper range limit switch block. Remove the plastic switch cover. The desired unit of calibration can be obtained by setting the first three switch segments (marked 1, 2 & 3) as shown in Figs. 2-2, 2-3, 2-4 or 2-5.
- 3) Replace the switch cover, and install the control panel on the display cabinet. The new calibration will be displayed when you switch the set on again.

CAUTION: The switch segments (No.5, No.7 & No.8) other than those specified in this part of the manual must be left in the OFF positions.

Fig. 2 - 1
Reverse Side of Control Panel

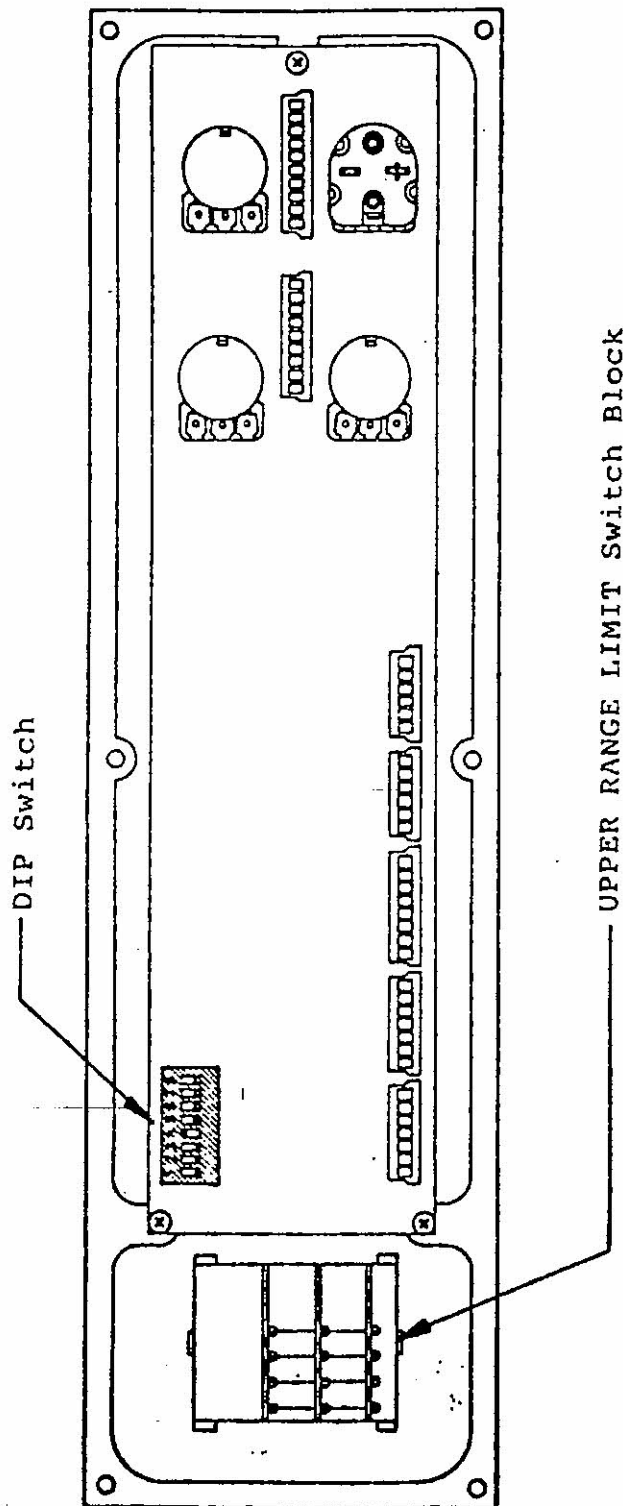


Fig. 2 - 2
Metric Calibration

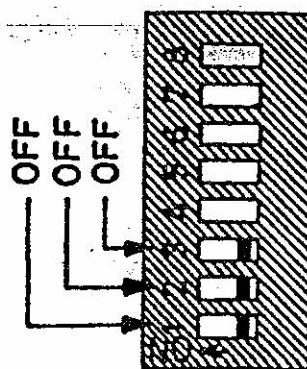


Fig. 2 - 3
Fathom Calibration

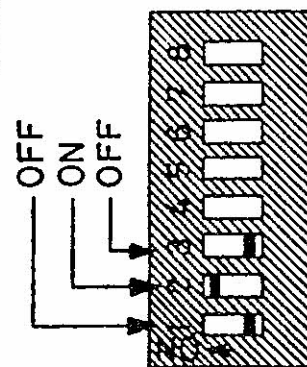


Fig. 2 - 4
Footage Calibration

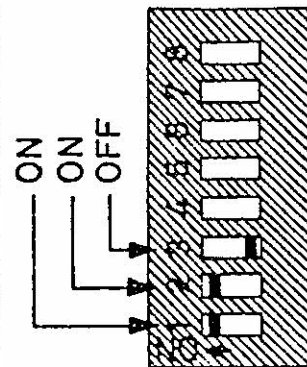
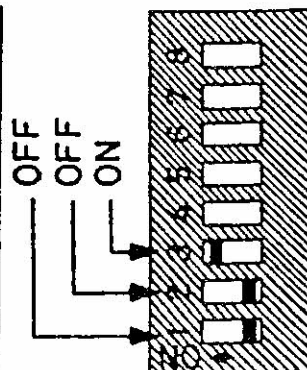


Fig. 2 - 5
Braccia Calibration



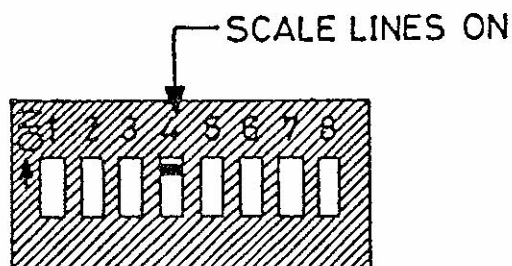
Switching off Scale Lines

If you wish to switch off the displayed scale lines and calibrating numerals, use the following procedure:

Refer to Fig. 2-1, locating the DIP switch on the reverse side of the front control panel.

The scale lines can be suppressed by setting switch segment No. 4 (Fig. 3-1) on the DIP switch to its OFF position.

Fig. 3 - 1
Scale Line Switch Position



WARNING: Switch the equipment off before setting the switches.

Selecting Slow Picture Feed Speeds

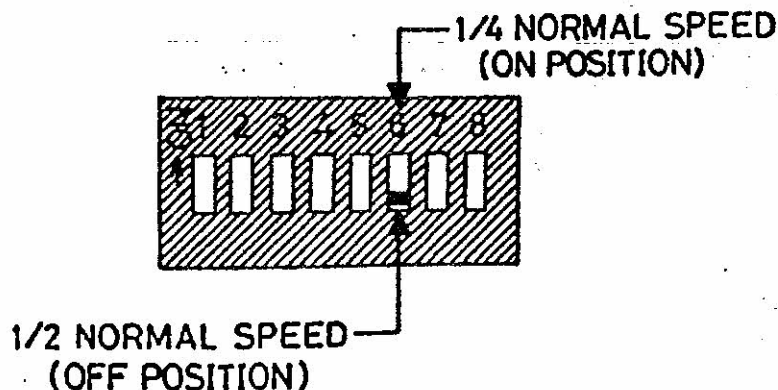
When the PICTURE FEED switch is in the SLOW position, the echo picture moves to the left at $1/2$ its normal speed. If you find it still too fast, you can reduce it to $1/4$ the normal speed by using the following procedure:

Refer to Fig. 2-1, locating the DIP switch on the reverse side of the control panel.

Set switch segment No. 6 to its ON position. This will cause the the picture to move once every four transmissions. All echoes received over the previous three transmissions will be retained and shown overlapped on the fourth transmission.

WARNING: Switch the equipment off before setting the switches.

Fig. 3 - 2
Selecting SLOW Picture Feed Speeds



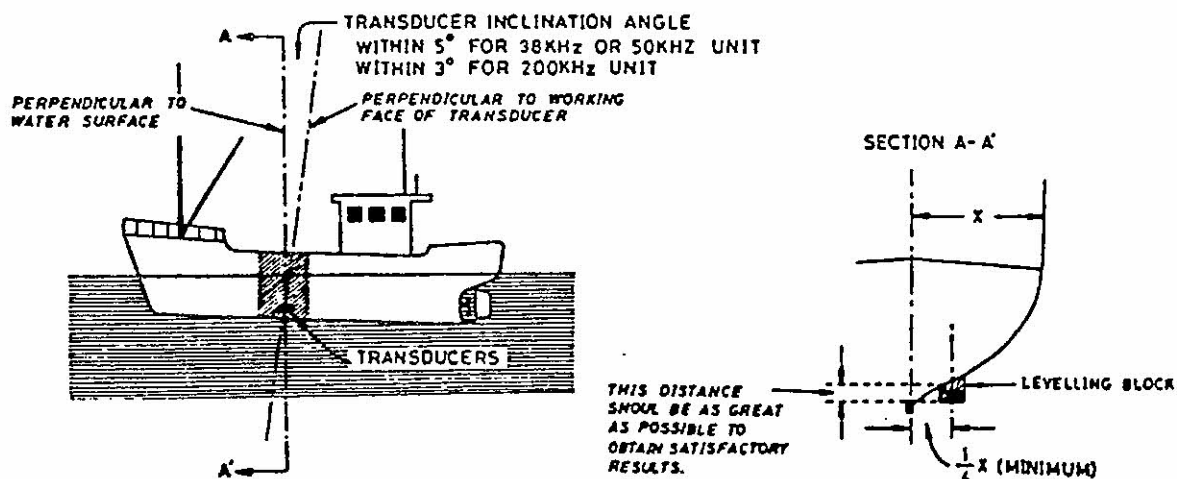
Transducer Installation

The installation should be planned in advance, keeping in mind the standard cable length connected to each transducer. In cases where the standard cable is not long enough, an additional 10 meters (32 feet) may be connected without retuning the transmitter. The cable should be of the same type as the standard cable. Coaxial cables cannot be used.

Location

No matter how sophisticated the equipment may be, just how it will perform under actual operating conditions will be largely dependent upon the location of the transducer and how it has been installed. Careful consideration must, therefore, be given to selecting the mounting location and deciding the method of installation that best suit the vessel.

Fig. 5 - 1
Recommended Transducer Mounting Location



Air bubbles and turbulence caused by the vessel's movement will most seriously degrade the efficiency of the transducer. Therefore it should be located well clear of any water intake or discharge line and also any projection along the hull that might disturb the smooth flow of water in the vicinity. On deep-keeled vessels, care must be taken to ensure that the transducer beam will not be blocked by a part of the keel.

Although the appropriate mounting location which meets the above requirements depends on the type of vessel and its operating speeds, a practical choice will be somewhere between $1/3$ and $1/2$ of the vessel's length from the fore. In order to minimize the noise from the propellers, it is recommended that the transducer be mounted so that its working face is inclined towards the fore within 3 degrees of vertical for the 200kHz transducer, within 5 degrees of vertical for the 38 or 50kHz transducer. Levelling blocks may be designed accordingly to meet this requirement. It should be noted that the more the transducer protrudes from the hull, the better the results will be.

A typical through-hull installation is illustrated for each transducer in the following pages. The levelling blocks are to be supplied by the dockyard. Any gaps between the block and the transducer should be filled up with mastic, and the entire surface be made as smooth as possible to provide an undisturbed flow of water over the transducer face.

To ensure a watertight installation, apply a liberal amount of high quality sealing compound inside the mounting holes, over the threaded stem of the 200kHz transducer, stuffing tube and mounting bolts. The stuffing tube and the transducer housings may be painted with anti-fouling paint.

Fig. 5 - 2
Typical Through-Hull Installation for 50kHz Transducer

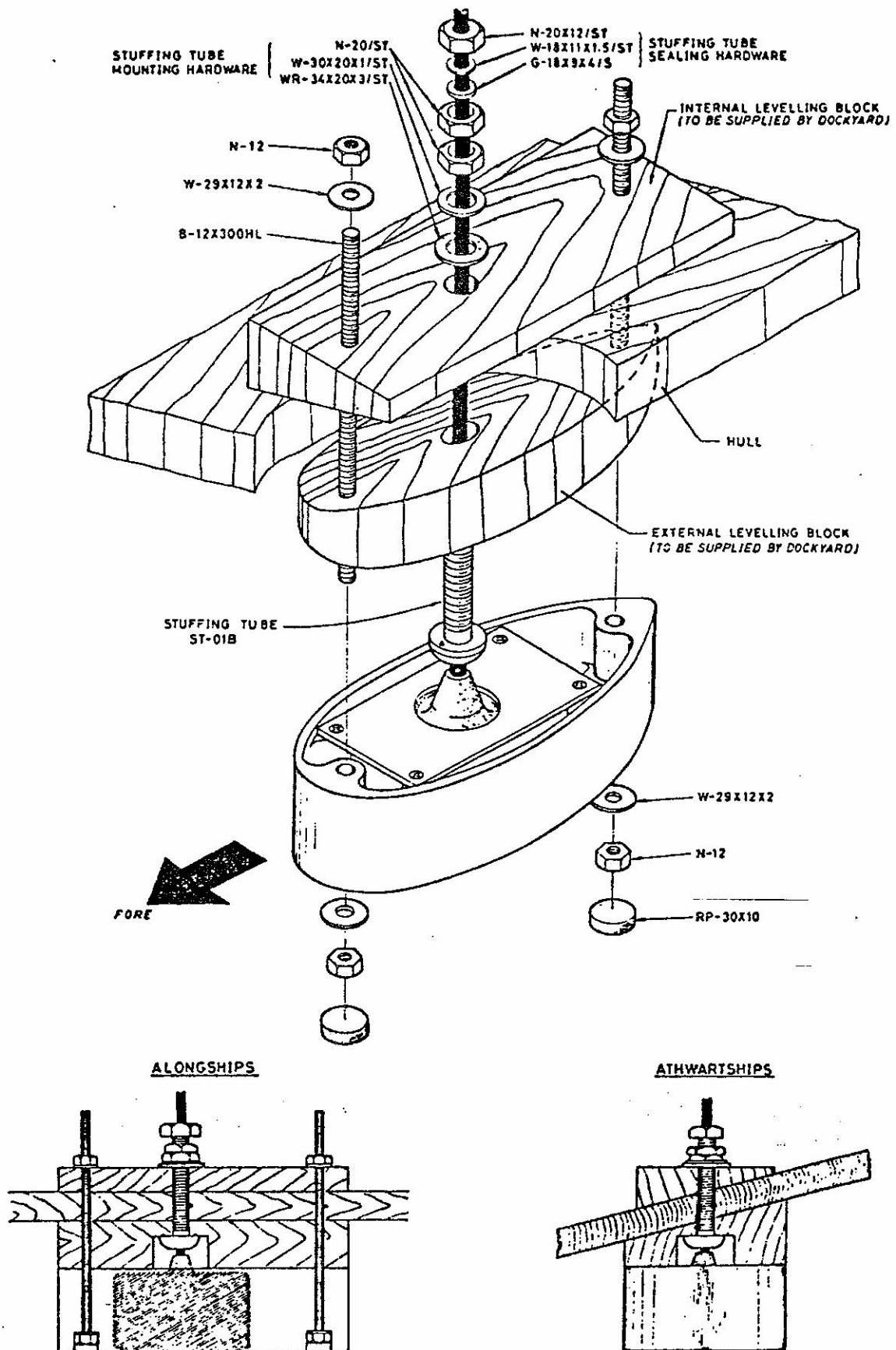


Fig. 5 - 3
50kHz Transducer Dimensions

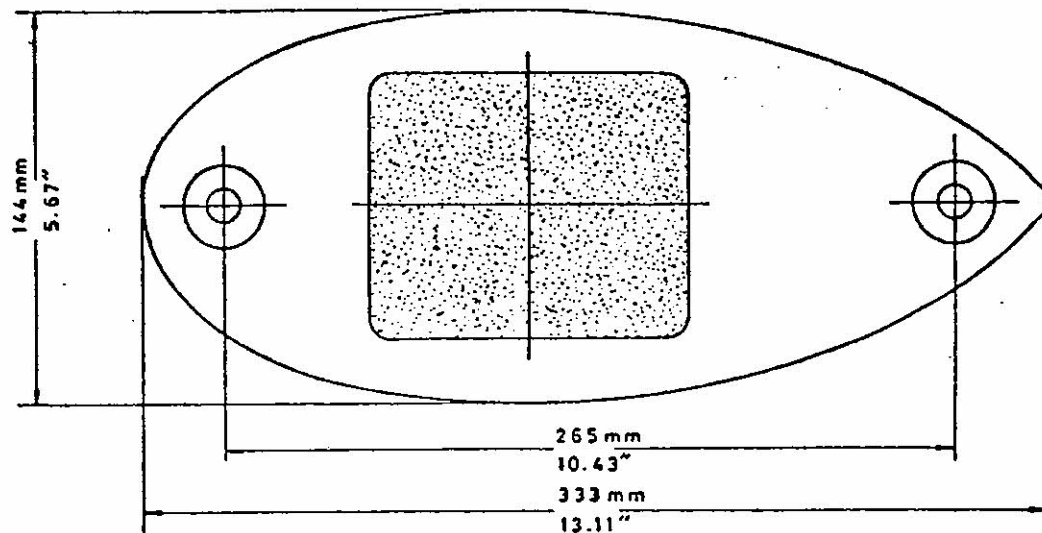


Fig. 5 - 4
Transducer Mounting Hardware Dimensions

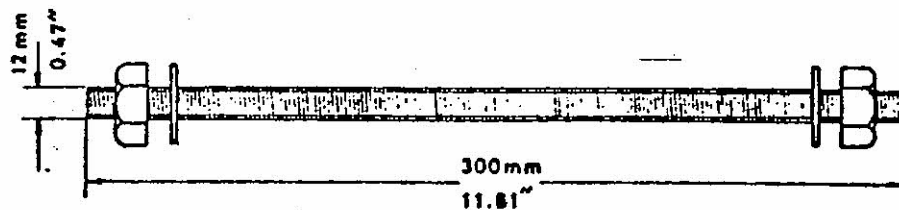


Fig. 5 - 5
Stuffing Tube Dimensions

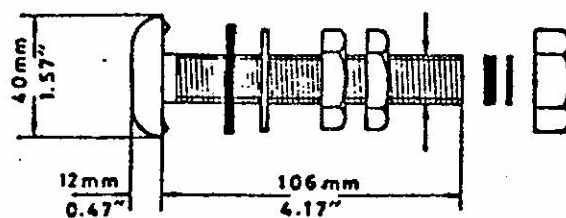
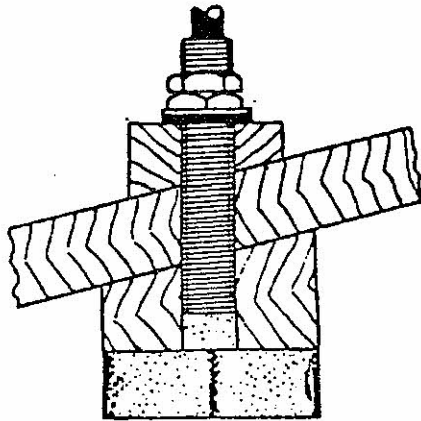
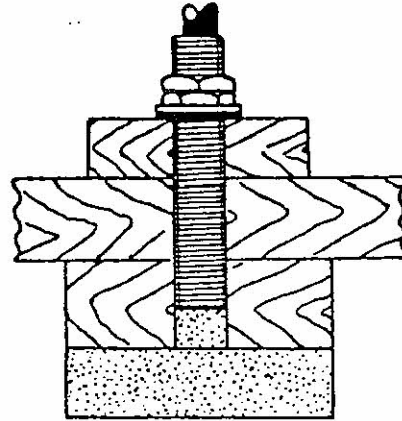


Fig. 5 - 6
Typical Through-Hull Installation for Optional 200kHz Transducer

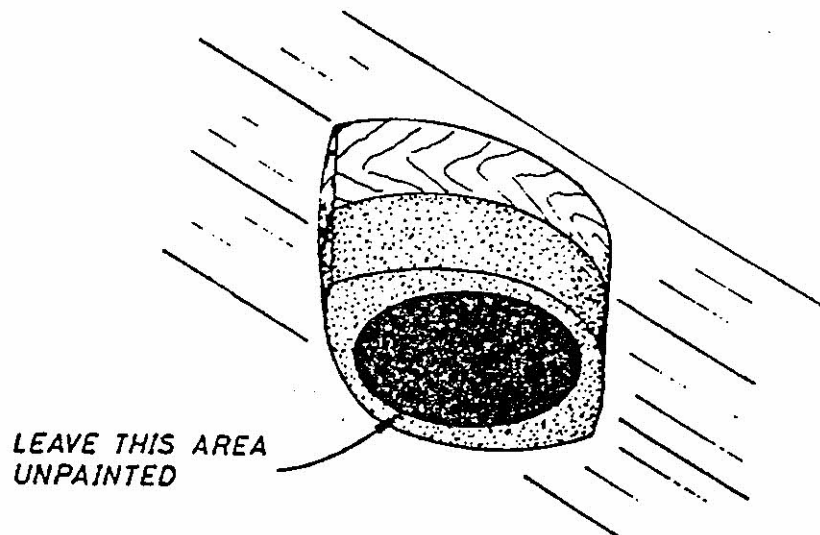
(A) Athwartships



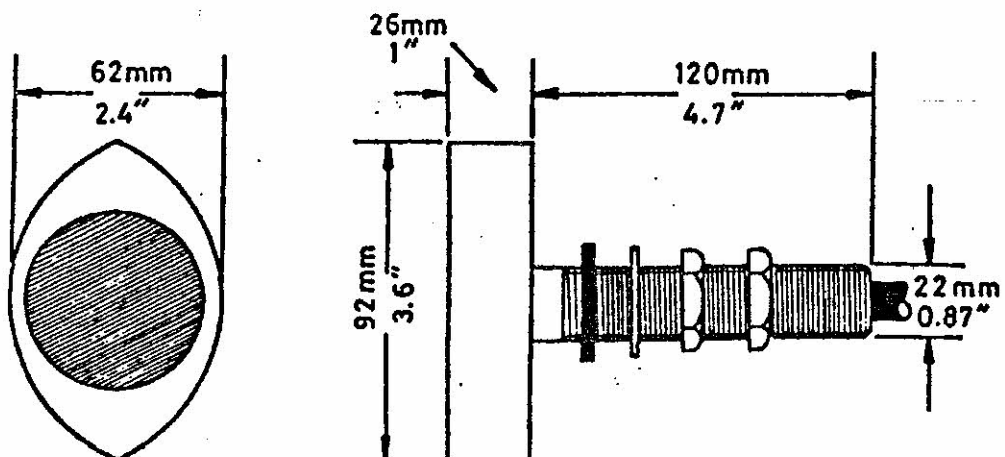
(B) Alongships



(C) Bottom View



(D) 200kHz Transducer Dimensions



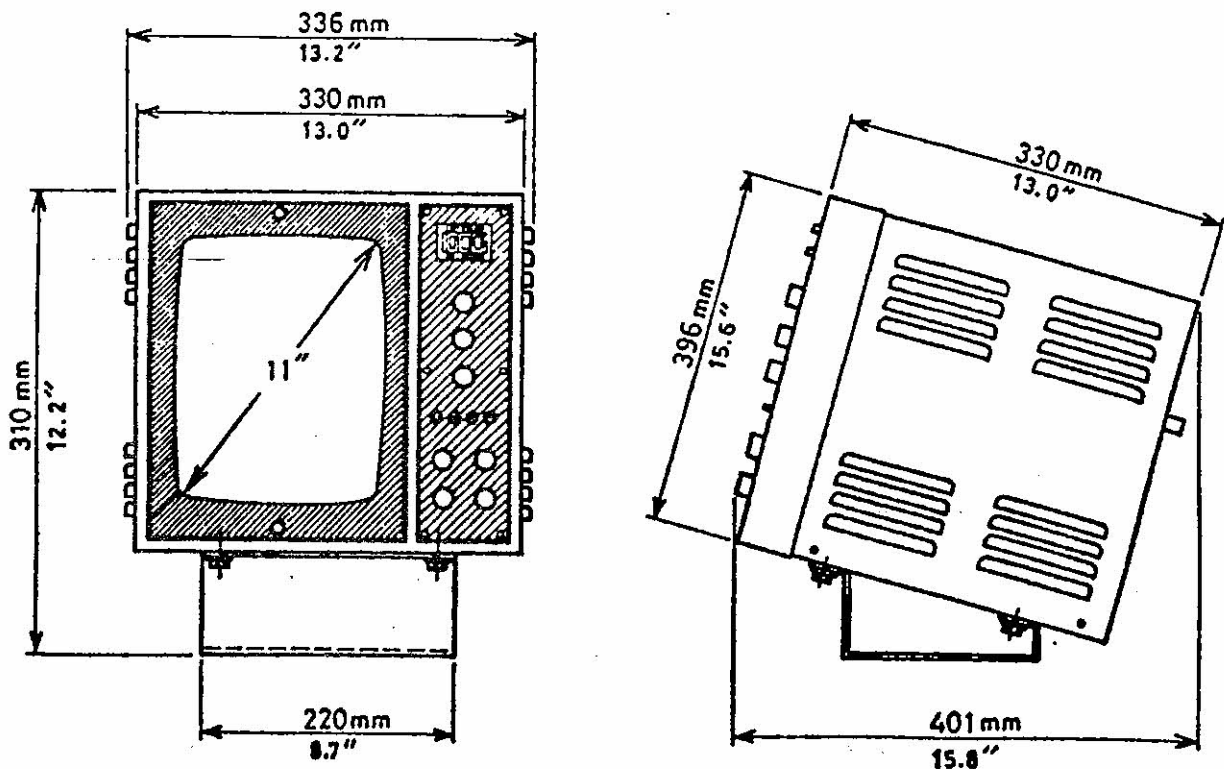
Display Unit Installation

The display unit is designed to function normally on a continuous-duty basis in the marine environment. However, it is a piece of sophisticated microprocessor-based equipment and should, therefore, be installed in a dry and well-ventilated location in the interest of long-term performance reliability. For the same reason areas where heavy shocks or vibrations are expected or where high temperatures prevail must be avoided.

The display unit is usually delivered ready for table-top or flat surface installation with the use of the mounting pedestal supplied. (Refer to Fig. 7-3A). It is, however, possible to choose two alternate positions (bulkhead or overhead) by re-locating the base plate, attached to the underside of the cabinet, to the top side. Refer to Fig. 7-2 for identification of the parts involved in choosing either mounting position. In order to prevent possible loosening of the screws due to vibrations or shocks in the vessel, do not forget to lock the screws with a drop or two of locking liquid on each one after tightening.

In any case, provide sufficient clearance around the cabinet to allow free circulation of air and to gain access to the connectors, fuse and POWER REDUCTION switch on the rear panel. Do not block the vents on the left and right sides of the top cover, or overheating may result.

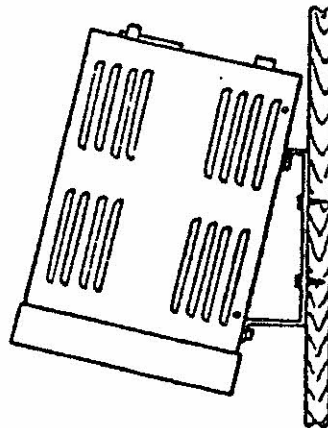
Fig. 7 - 1
Display Unit Dimensions



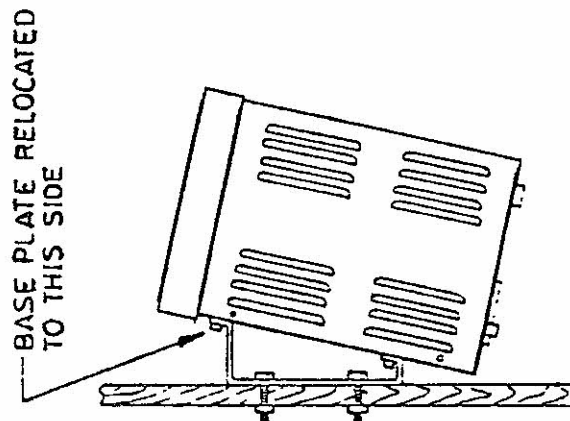
WEIGHT: Approximately 17 kilograms (37 LBS) with the mounting pedestal attached.

Fig. 7 - 2
Alternate Mounting Positions

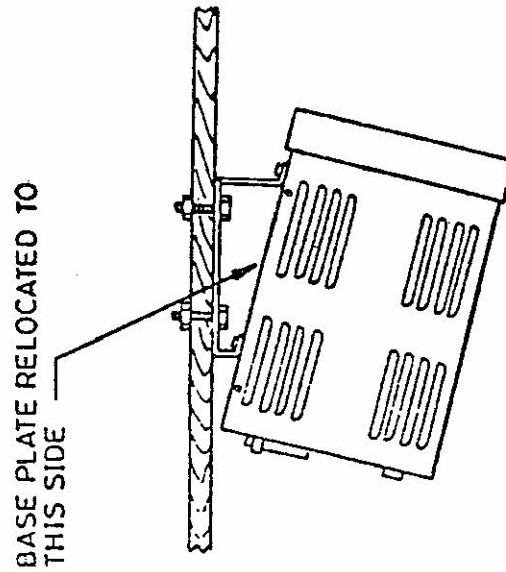
(A) Table Top Mounting



(B) Bulkhead Mounting

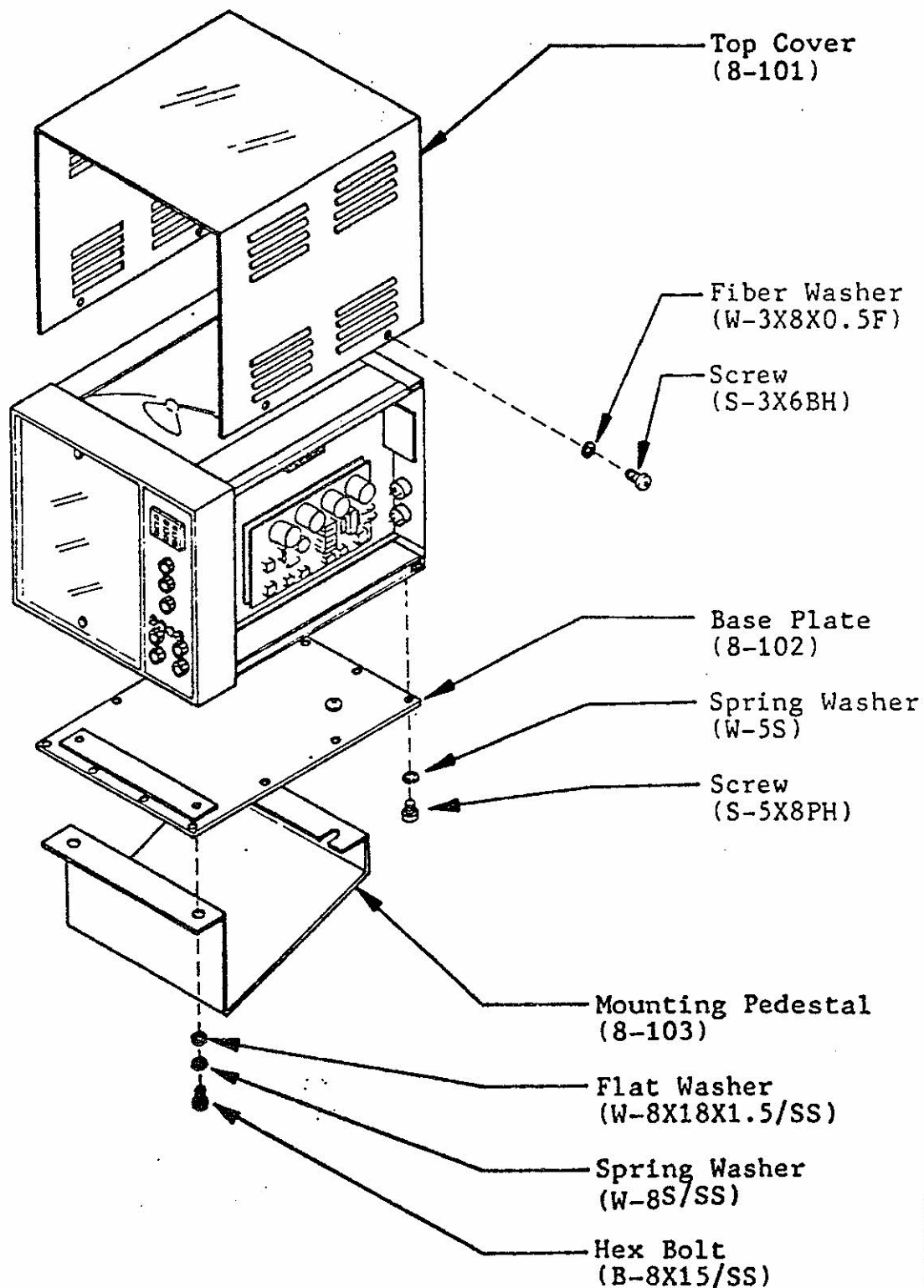


(C) Overhead Mounting



NOTE: Make sure that the mounting surface is strong enough to support the weight of the cabinet (approximately 17kg or 37LBS) under the conditions of continued vibrations or shocks which will be normally encountered on the vessel. Appropriate reinforcement measures should be taken, if necessary.

Fig. 7 - 3
Disassembling Display Cabinet for
Choosing Bulkhead or Overhead Mounting

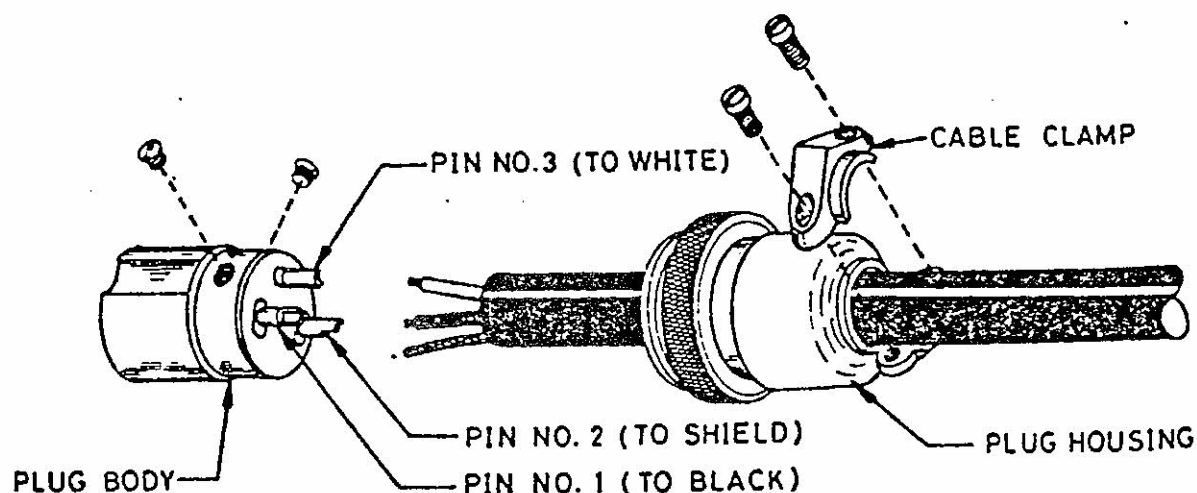


NOTE: Apply locking compound to all screws after securing the base plate to the top of the cabinet chassis.

Connecting The Transducers

A three-prong female-type plug is separately supplied to connect each transducer to the display cabinet. Referring to Fig. 8-1 below, disassemble the plug, taking care not to lose small screws.

Fig. 8 - 1
Soldering Plug to Transducer Cable



Slide the plug housing over the cable first, and solder the cable leads and shield to the three pins on the plug body as follows:

Black lead to pin No. 1
White lead to pin No. 3
Shield (braid) to pin No. 2

The black and the white leads may be reversed without affecting the transducer performance. The pin identification numbers are shown on the face of the plug body. Care should be taken to ensure that no stray strands of wire or excess solder will touch the inside of the plug housing when the plug is assembled.

NOTE: The two leads of your transducer may be coded in different colors (other than black and white), but the shield (or outer conductor) must be soldered to pin No. 2.

Assemble the plug, tightening the screws firmly. Refer to Fig. 1-2 (Rear Panel Drawing) on page 6, locating two three-pin receptacles marked HIGH and LOW. Plug the transducer cables into those receptacles as follows:

50kHz (or 200kHz) transducer into HIGH receptacle
38kHz transducer into LOW receptacle

Turn the coupling ring on each plug clockwise until it stops. This completes the connection between the display cabinet and the transducers.

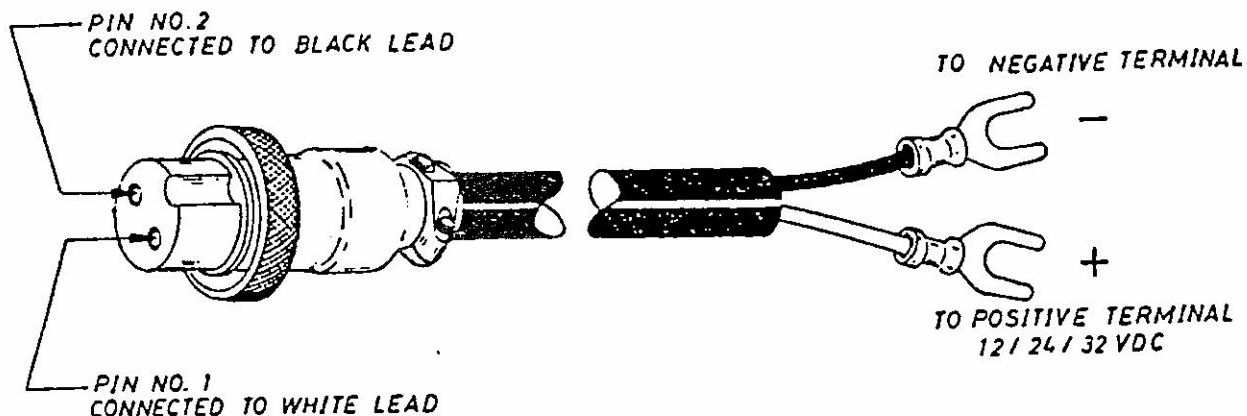
WARNING: You must not switch the set on with the transducer out of water, or serious damage to the transducer will result.

Power Supply Connections

The internal voltage regulator will allow the set to operate normally over the power supply voltage range from 11 to 40 volts d-c without it being necessary to change internal wiring. The negative input line of the set is isolated from the cabinet at d-c level (i.e., the cabinet is of floating ground type).

Connections between the set and the external power supply are accomplished by means of the two-core power cable furnished, which is terminated in a two-prong female type plug at one end. The other end of the cable has the two leads fitted each with a press-fitted lug for ease of connection to the battery terminals, as shown in Fig. 8-2.

Fig. 8 - 2
Power Supply Cable



Connect the white lead to the positive (+), and the black lead to the negative (-) terminals of the external power supply. Reversing the polarity will cause the fuse to blow the instant the set has been connected up (even if it is switched off).

Push the plug as far as it goes into the two-pin receptacle marked POWER SUPPLY on the rear panel, and turn the coupling ring clockwise till it stops. This completes the power supply connections to the display unit.

Fuse Installation

Locate the fuse holder marked FUSE RATINGS on the rear panel. When the equipment is delivered, the fuse is normally not installed in the holder. After connecting up the set as per the preceding wiring instructions, remove the fuse holder cap, insert the correctly-rated fuse, which is specified below, and replace the cap.

- 20 amperes (marked 20A) for 12 volt d-c operation
- 10 amperes (marked 10A) for 24 volt d-c operation
- 8 amperes (marked 8A) for 32 volt d-c operation

If an improperly rated fuse is inserted, it will blow the instant the equipment has been turned on or will not protect the electronic circuitry in the event of trouble.