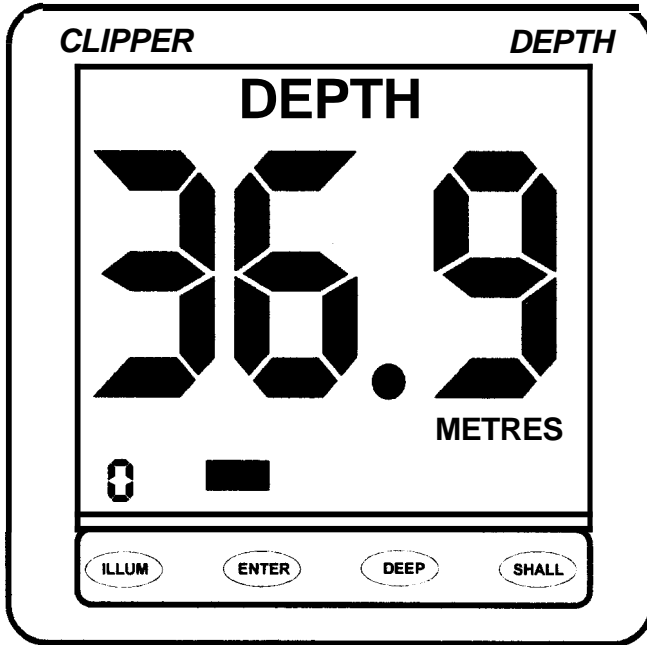


DESIGNED AND  
MANUFACTURED  
IN ENGLAND



*CLIPPER*

**ECHO  
SOUNDER**

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## INTRODUCTION

The Clipper Echosounder is supplied complete with display unit, transducer and alarm. It is intended for 12V ship's supply operation although, because of its lower power consumption, it can be run from an external dry battery.

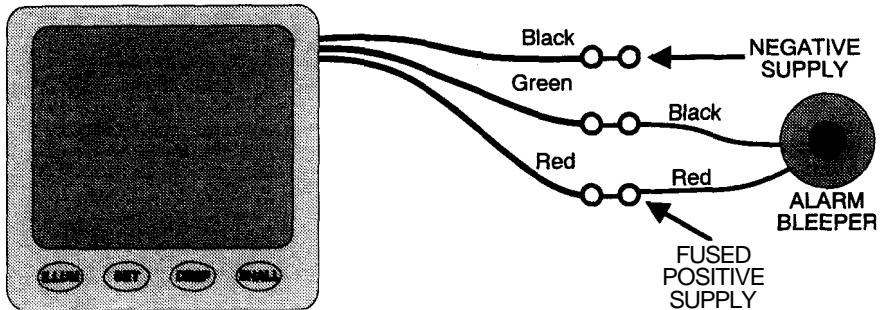
## INSTALLING THE DISPLAY

Select a convenient position for the display on a panel or bulk-head.

The site must be flat and the cavity behind the panel must remain dry at all times. (The cable entry is deliberately not sealed to ensure adequate ventilation. This prevents misting of the display).

Cut a hole in the panel 67mm wide and 87mm deep. Bring the wiring through the hole in the panel and connect the black wire to negative and red to positive. (See Figure 1). It is wise to use a fused supply to provide protection should a fault occur. The current consumption is very small, so a ¼ Amp fuse is more than adequate.

The red wire of the alarm bleeper is also connected to the positive supply, as shown on Figure 1. The black wire of the alarm bleeper connects to the green wire from the display unit. The alarm bleeper is not watertight and must be mounted in a protected position.



**Figure 1\* Echosounder and Alarm Bleeper Connections**

Unscrew and remove the two wing nuts from the rear of the instrument and remove the stainless steel clamping bracket. Fit the O-ring seal into the groove in the panel mounting face of the instrument. Ensure that it is correctly lying in its groove before fitting the instrument to the panel, which provides the watertight seal for the display.

Fit the instrument into the panel, fit the stainless clamp over the studs, fit and tighten the two wing nuts finger tight only.

It is important that the O-ring rubber seal makes good contact with the panel to prevent water getting behind the unit and entering the cavity behind the panel.

It is good practice to run the cables vertically downwards from the unit, even if they later have to rise to connect to the vessel's supplies. Doing so prevents any water that might get onto the cables from running back along the cables and into the unit.

## **INSTALLING THE TRANSDUCER**

The transducer can be mounted in one of three ways:

- (i) The transducer face can be bonded directly to the inside of the hull. (Some energy is lost to the hull but the **loss** in performance is, for most G.R.P hulls, hardly noticeable).
- (ii) A transom mount is available from your dealer.
- (iii) The transducer can be positioned inside a G.R.P. hull by means of an In Hull Transducer Kit.

The latter method of installation offers the advantage that the transducer can easily be removed for examination or installation elsewhere. It should be mentioned however, that although the accuracy will in no way be affected by installing the transducer inside the hull, the maximum range sensitivity may be reduced,

depending on the thickness and quality of the glass fibre. The In Hull Kit is available direct from NASA Marine or your local chandler.

Whichever method is selected, the best location still has to be found.

Select a position below the water level where the transducer will point substantially vertically downwards towards the seabed, and where the transducer and its cable (do NOT shorten the transducer cable) will be well clear of equipment which might be a source of interference. Such sources might include the engine ignition and starting systems, alternators and dynamos, electric pumps, etc. This position should also be well clear of large masses of bubbles or cavitation near propellers or sudden changes in hull profile which could disrupt the signal.

To test the suitability of the location when the vessel is in the water at a reasonable depth, press a little sticky chewing gum on the surface of the transducer and stick it down to the inside of the hull (it may be necessary to remove dirt and oily residue first). The unit can then be tested over a range of speeds and depths. If the location is satisfactory, the chewing gum must be removed and the transducer permanently mounted using one of the methods described previously. (Note: do NOT shorten the transducer cable).

It is important that the face of the transducer is thoroughly bonded down to the hull. A single air bubble will cause a considerable loss in performance.

The transducer and the place of mounting must be kept entirely free of any antifouling compound as this can also effect the performance of the unit.

## NOTES ON ELECTRICAL INTERFERENCE

External electrical interference is characterised by persistent, random numbers on the display which obscure the true depth reading on the depth sounder.

This is caused by large amplitude voltage “spikes” generally associated with the engine’s alternator and/or ignition system which has not been properly suppressed. These “spikes” may find their way into the sensitive amplifier section of the depth sounder in two ways:

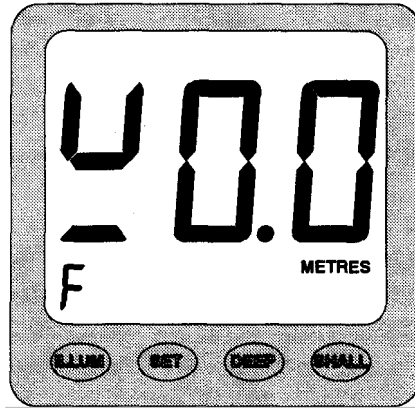
- (a) Through the craft’s common power supply or
- (b) Through direct radiation from the source of interference.

To reduce the possibility of induced interference from the engine’s generator and/or ignition system, choose a position as far away from the engine as possible and run the cable from the transducer as far as practicable from the engine. Do NOT cut the transducer cable, but stow excess away from any possible source of electrical interference.

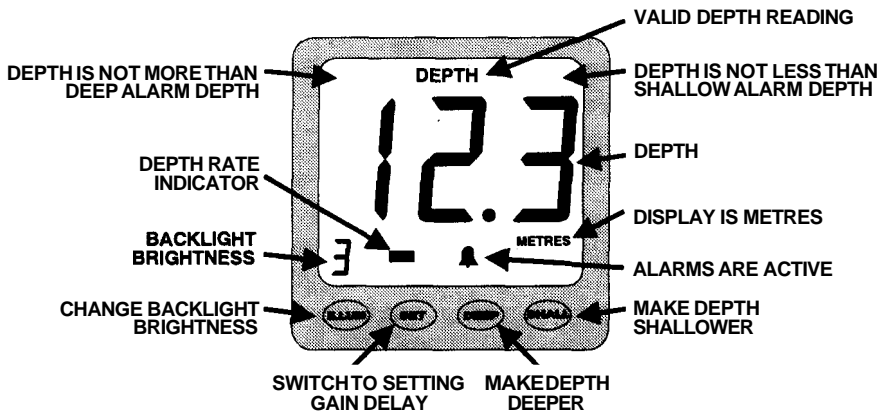
## GETTING STARTED

When the Clipper Echosounder is first turned on, it automatically performs a number of self-test processes, and after a brief delay switches on the backlight illumination at the factory pre-set level. It then displays a symbol representing the keel offset (which is pre-set in the factory to zero, as shown on Figure 2) for about one second.

Under normal circumstances, the display then almost immediately shows the word DEPTH, and the depth below the transducer, as shown on Figure 3. However, if the transducer has not been connected, or no echoes are received for any other reason, the word DEPTH is not displayed and the unit waits for another five seconds before showing “out”. If that happens, check the connections to the transducer, and that it has been correctly installed.



**Figure 2 - Power-Up Display**



**Figure 3 - Normal Operating Display**

When the unit is working normally as shown on Figure 3, it shows the word DEPTH, and the depth beneath the transducer in feet or in metres. The display is updated about twice a second to reduce the variability of the display when there are bubbles, turbulence, or outboard motor noise. Any such sources of interference can affect steady readings on the display.

The depth rate indicators (to the right of the backlight brightness digit, see Figure 3) are used to assist in interpretation of the bottom profile as the vessel moves over it, or to indicate the effects of tide and swell. The display of the depth rate is derived from averaged measurements of depth. When the depth measurement is steady (the depth is constant), only the middle bar is lit, as shown on Figure 3. If the depth is increasing, the right arrow-head is lit instead. Likewise, if the depth is decreasing (it is becoming shallower) only the left arrow-head is lit.

The depth rate indicators work on an averaging time of several seconds, and so, when the unit is first turned on, the right arrow is lit to indicate that the unit's estimate of the depth is increasing from its initial value of zero. When the average value has stabilised, the middle bar lights instead. Whenever the rate at which the depth is changing is less than about 60 feet per minute (20 metres per minute), the central bar is lit. When the rate is higher either the left or right arrow-head is lit.

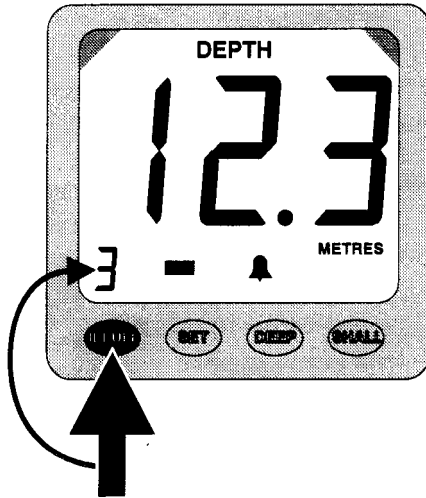
The depth rate indications are the only displays which cannot be changed by the user to match the operating requirements. The Clipper Echosounder has a number of facilities which can be changed during normal operation to change the settings of the backlighting, to alter the depth where swept gain begins, to change the settings of the depth alarms, and to switch depth alarms on or off. All these facilities are described below.

## **OPERATIONAL CONTROLS**

### **BACKLIGHT SETTING**

Backlighting is provided to allow the unit to be seen at night. The backlight area is restricted in the top corners of the display to concentrate the lighting in the areas of interest. The brightness of the backlighting is adjusted by pressing the ILLUM button at any time during normal echo-sounding operation. Each press of the button increases the brightness by one in the range 0 to 7, shown by the backlight indicator in the bottom left of the display (see Figure 4).

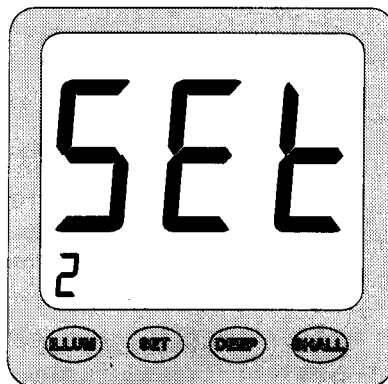




**Figure 4 \* Backlight Setting**

A setting of zero switches the backlighting off, and a setting of 7 is full on. A setting of 7 is succeeded by a setting of zero, and then on again to 1, 2, 3, etc. In common with all the other settings in the unit, the backlight setting is stored even when the unit is switched off, so that it returns to the chosen setting again whenever the unit is switched on.

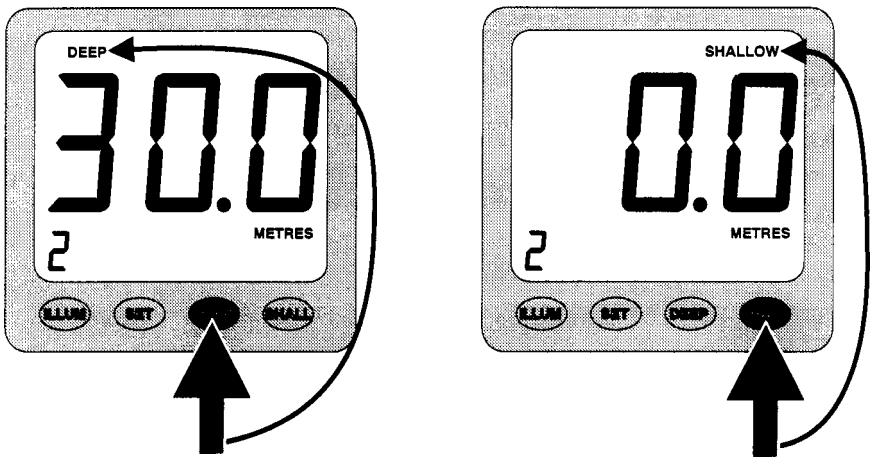
Whenever an operational setting is made, the word SET is briefly displayed to show it is completed before the unit returns to normal operation, as shown in Figure 5.



**Figure 5 \* Setting Acknowledgement**

## CHANGING DEPTH ALARM SETTINGS

At any time during normal operation of the unit, it is a simple matter to set an alarm for too shallow and another alarm for too deep. To set up the deep alarm depth (below which an alarm will sound), press the DEEP button to show the present deep alarm setting. The display shows the word DEEP, and the present deep alarm depth. The factory pre-set deep alarm setting is 50 metres. Press the DEEP button to make the deep alarm depth deeper, and the SHALL button to make the deep alarm depth shallower.



**Figure 6\* Selecting Deep or Shallow Alarm Setting**

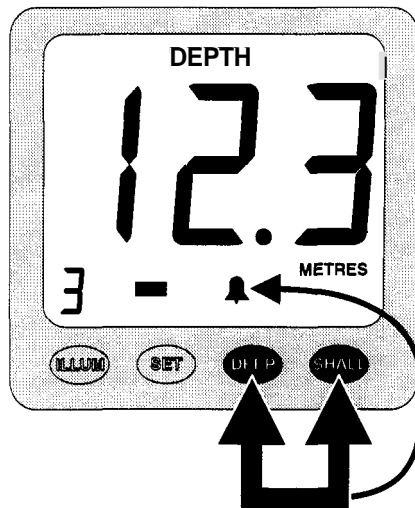
If the SHALL button is pressed steadily, the setting reduces continually in 1.5 foot or 0.5 metre steps. If the DEEP button is pressed steadily, the setting increases in 1.5 foot or 0.5 metre steps. The step size depends on whether the unit is set to measure feet or metres.

If the deep alarm depth setting reaches 99.5m, or attempts to pass the shallow alarm setting, it stops changing. When the desired alarm depth is set, press SET to store the deep alarm depth setting. The display returns to measuring depth after briefly showing SET.

In the same way, pressing the SHALL button during echo-sounding switches to setting the shallow alarm depth. The word SHALLOW is shown, and the shallow alarm setting depth is displayed. The factory pre-set shallow alarm depth is zero. Pressing the DEEP button makes the alarm depth setting deeper, and pressing the SHALL button makes the setting shallower. If an attempt is made to increase the shallow setting below the deep alarm setting, or to reduce it to less than zero, the settings no longer change. Press SET to store the shallow alarm depth setting, whereupon the display returns to measuring depth after briefly showing SET.

## ACTIVATING DEPTH ALARMS

At any time, the deep and shallow alarms may be activated or de-activated together at the set levels by pressing the DEEP and SHALL buttons together, as shown on Figure 7. When alarms are active, a bell symbol is displayed, but is absent when alarms are de-activated. Whenever the measured (and averaged) depth is at, or shallower than, the shallow alarm setting, the alarm sounds, and the word SHALLOW is shown. Whenever the measured (and averaged) depth is at, or deeper than, the deep alarm setting, the alarm sounds, and the word DEEP is shown.



**Figure 7- Activating and de-Activating the Alarms**

The alarm can be stopped either by moving the vessel so the depth is between the settings, by altering the alarm settings themselves, or by de-activating alarms by pressing DEEP and SHALL together again. Each press of DEEP and SHALL together switches the alarm on or off.

## **CHANGING THE GAIN DELAY SETTING**

The Clipper Echosounder measures the depth beneath the transducer by timing the delay between the transmitted ultrasonic pulse (the “ping”) and its returning echo from the bottom. The echo from nearby objects is much stronger than from more distant objects, and so the Clipper Echosounder has swept receiver gain sensitivity so that weaker (more distant) echoes are detected as reliably as those from short range. However, reflections from nearby turbulence or bubbles may sometimes be confused with those from the bottom. To prevent nearby reflections from being misinterpreted, sweeping the gain can be delayed until a pre-set depth is reached. The delay is called the sensitivity threshold, and can be viewed at any time during normal operation by pressing the SET button. Pressing SET again returns to normal echosounding.

The sensitivity threshold can be changed if required to minimise false detections at short range. The factory pre-set sensitivity threshold is zero, but it can be increased in 0.1m (0.5ft.) steps, depending on the configuration of the unit, up to a maximum of 5m (16.5ft.). Press SET to enable sensitivity threshold changes. The DEEP and SHALL buttons then make the sensitivity threshold deeper and shallower respectively within the available range. Pressing SET again to return to normal echo-sounding also stores the revised sensitivity threshold in memory, so the unit always operates with the new setting.

## **CHANGING THE UNIT'S OPERATIONAL CONFIGURATION**

The Clipper Echosounder can be changed to operate in several different ways to suit differing users' requirements. In order that the configuration changes are not made accidentally, changing can be done only when the unit is switched on (powered up).

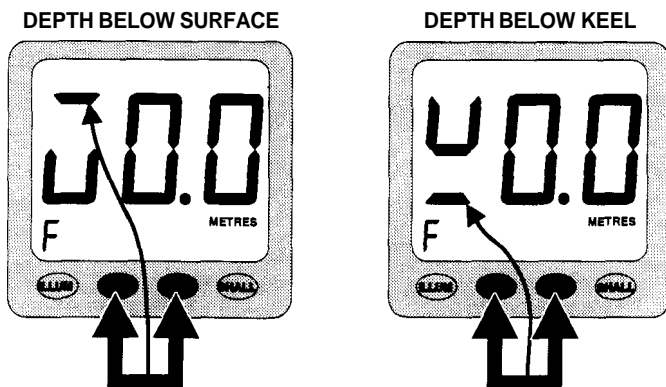
## CHANGING THE KEEL OFFSET

The keel offset represents the distance between the transducer itself and the bottom of the keel. When a keel offset is stored, all measurements (including alarms) are shown as if measured from the bottom of the keel instead of the transducer. If, for example, the bottom of the keel is 0.4metres below the depth of the transducer in the hull, setting the offset to 0.4m will ensure that the readings displayed show the depth below the keel instead of from the transducer.

The DEEP and SHAL buttons are used separately to adjust the keel offset value in the range 0 to 2.5m (8.3ft.), in steps of 0.1m (0.5ft.). No repeat is embodied on the keys because of the small range of adjustment. Pressing DEEP increases the keel offset depth, and pressing SHAL reduces the keel offset depth.

## CHANGING BETWEEN KEEL AND SURFACE OFFSET

It is sometimes preferable to measure the depth from the surface instead of the transducer or keel. If, for example, the transducer is 0.3m below the surface, setting a surface offset of 0.3m will ensure that the readings displayed show the depth below the surface instead of from the transducer itself. Pressing the SET and DEEP buttons together switches between the keel depth and surface depth measurement modes, as shown on Figure 9.



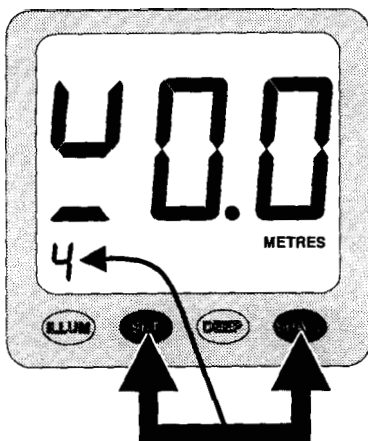
**Figure 9 - Switching Between Surface and Keel Depth.**

Pressing them together again switches the setting back again. The bar represents the position in relation to the hull-mounted transducer (represented by the “U”) from where the measurements are made. Whichever mode is chosen, all measurements, including alarms, use the same reference point - that is, the surface or the bottom of the keel - depending on the setting chosen.

## CHANGING THE DISPLAY UPDATE RATE

The Clipper Echosounder sends ultrasonic “pings” at a rate of about seven per second. The rate of pinging is limited by the maximum depth capability of the unit (100m). A new measurement of depth is thus available within the unit seven times a second. In turbulent conditions, or in the presence of high levels of noise such as outboard motors, there can be rapid variations in the measured depth. These rapid changes can be confusing if they are displayed, and so the unit can be adjusted to have a display update rate which is slower than the ultrasonic ping rate.

The update rate can be set to change on every ping (reading 1), every second ping (2), every third ping (3) and so on up to every seventh ping (7). If set to update every seventh ping, the display update rate is about once per second. The factory pre-set update rate is every third ping, which updates the display approximately twice a second.



**Figure 10- Changing the Display Update Rate**

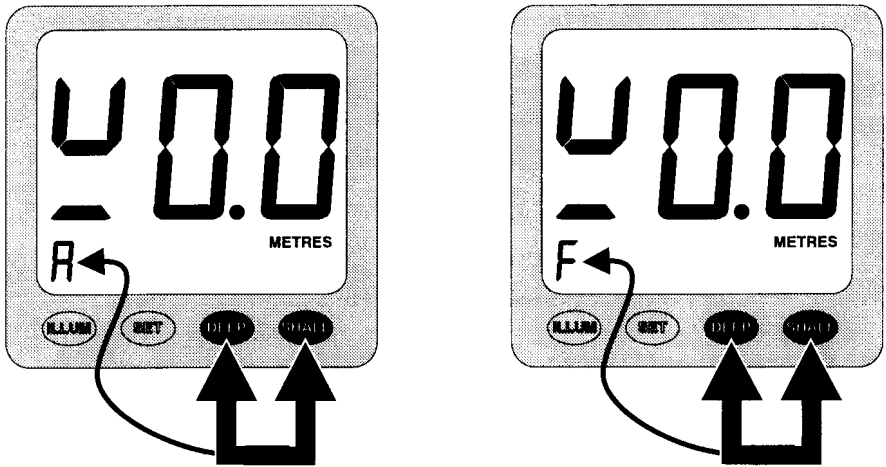
Press SET and SHALL together to increase the update rate by one, as shown on Figure 10. The resulting setting is shown on the digit in the left-hand bottom corner, and changes successively from the factory pre-set value of 3 to 4, then to 5, to 6, to 7, and then on to 1, 2, etc. for every successive press of SET and SHALL together. The last setting chosen is stored.

## **DISPLAYING AVERAGED READINGS**

The unit averages the depth readings it makes seven times a second with an averaging time of about two seconds. The averaged values reduce the effect of swell and turbulence on the readings, but the accuracy of readings is not compromised. The averaged, rather than the instantaneous, values are used internally by the unit to trigger the alarms. Using the slow-moving averaged values prevents triggering false depth alarms if interference is present, by ensuring that the alarm depth has been consistently crossed before the alarm is sounded.

The factory pre-set display mode is Fast (F), which shows depths as they are received twice a second. Press DEEP and SHALL together to switch between Fast (F) and Averaged (A) depth display. The present display status is shown on the digit in the left-hand bottom corner, which switches between F and A for each press of DEEP and SHALL together, as shown on Figure 11.

Use of Averaged readings results in very smooth changes in the displayed readings, and greatly reduces the unit's sensitivity to external noise and turbulence. Note that using averaged readings is not the same as setting a slow update rate. Averaged readings change relatively slowly, but the display rate determines how often the readings (averaged or fast) are displayed. It is a matter of operational choice of where to strike a compromise between display rate and fast or averaged measurements.



**Figure 11- Switching Between Averaged and Fast Display Modes**

## **RETURNING TO NORMAL ECHOSOUNDING**

Press the ILLUM button to return to normal echo sounding at any stage. All the settings are stored, and will return again whenever the unit is switched on. Returning to configuration setting from normal echo sounding is not available. If further configuration changes are desired, they can be made only by switching the unit off and then on again with ILLUM pressed during the start-up time, as described above.

## **REMOTE REPEATER FACILITY**

A repeating display unit is available for use with the Clipper Echosounder. The repeater cable is plugged into the rear of the master instrument. The repeater socket is exposed by pulling off the round cover on the rear of the instrument. If no repeater is to be connected, leave the cover in place.