

HECTA

**ECHO SOUNDER
MODEL M200DS**

BROOKES & GATEHOUSE LTD

Owner's Handbook for Hecta M200DS Echo Sounder

Important

Please read this manual carefully before using the instrument. The echo sounder operates from a supply of 12 – 24V d.c. nominal, but the repeater dial illumination operates at a maximum of 12V d.c.

Use of the Brookes & Gatehouse Dimmer Unit Type 162 is recommended for controlling the scale illumination in all cases.

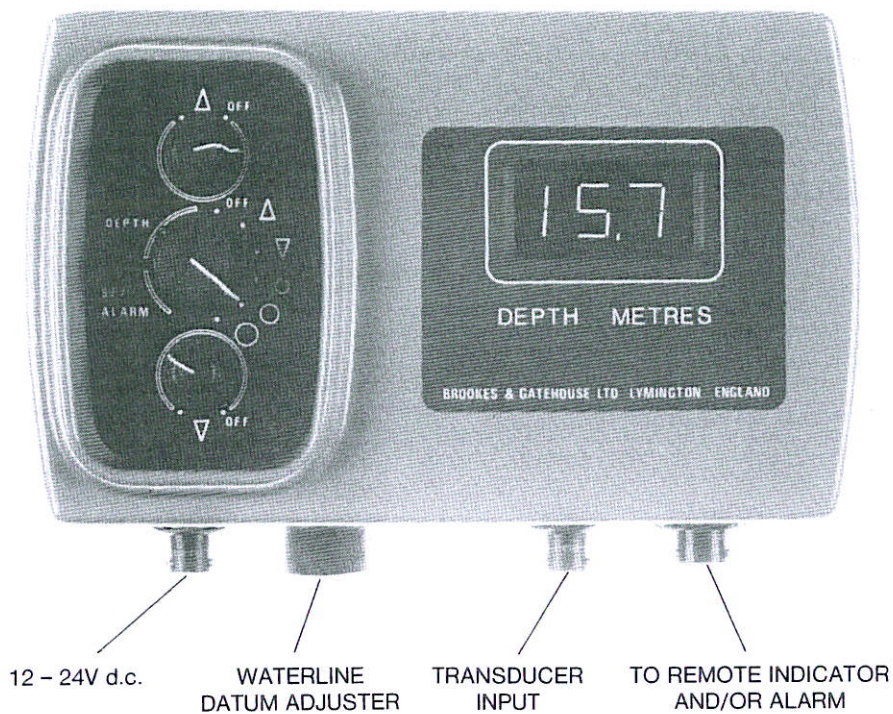
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1 DESCRIPTION

1.1 GENERAL

Hecta Model M200DS is an echo sounding instrument (depth meter) in which the depth of water is indicated by an L.E.D. digital display at the control unit, and by a remote indicator of the dial and pointer type.

This has a logarithmic scale to provide high resolution of shallow soundings and avoids the need for range switching.

The echo sounder measures the depth below the transducer, and a waterline datum adjustment is provided so that the depth from the surface may be indicated if preferred. See Section 3 for details.

A special feature of the Hecta M200DS is the dual sensing alarm system which is able to detect both decreasing and increasing changes in water depth.

Two controls are provided: the shallow control (Δ) which sets the depth at which any reduction in water depth will cause the alarm to sound and the deep control (∇) which sets the depth at which any increase in water depth will cause the alarm to sound. The shallow and deep settings can be observed on the digital display.

The alarm signal source is a small piezo-electric loudspeaker which can be mounted where required.

Details of alarm operation are in Section 2.

1.2 SPECIFICATION

Range

Model M200DS: 0.75 – 200m (up to approximately 300m in favourable conditions on digital display only)

Accuracy and Performance

Digital display: Below 20m $\pm 0.5\text{m} \pm 1$ digit
Above 20m $\pm 3\% \pm 1$ digit
The accuracy figures quoted assume normal values of sea temperature and salinity. They are also subject to the setting of the waterline datum control which is adjusted to give true depth or depth below the transducer as required.

Analogue repeater: $\pm 5\%$

Ambient temperature range: $0^\circ - 60^\circ\text{C}$

Safe distance from a magnetic compass:

Control unit 152mm (6in)

Remote indicator 457mm (18in)

Power Supply

12 – 24V d.c. nominal without adjustment

(11 – 30V d.c. absolute limits with protection against large voltage surges)

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Size

Control unit:	210mm x 124mm x 88mm (8¼in x 4⅞in x 3½in)	
Remote indicator:	bezel width	108mm (4¼in)
	barrel diameter	63mm (2½in)
	depth	57mm (2¼in)
Transducer unit:	108mm (4¼in) long	
Transducer cable:	6m (20ft) long	
Transducer housing (valveless type) 41mm diameter x 101mm long (1⅝in x 4in)		

Weight

Control unit	1.8kg (4lb)
Remote indicator	0.6kg (1.4lb)
Transducer with valveless housing	2.1kg (4.6lb)

Alarm

Separate from control unit, sealed for chartroom or cockpit installation.

General

The sockets in the control unit and the cable plugs are watertight and are palladium or gold plated to resist corrosion by sea water. A bracket with stainless steel fasteners is provided by means of which the control unit may be quickly fixed to a bulkhead.

The control unit case, which is die-cast in aluminium alloy and nylon coated, is sealed to give an indefinitely long life to the electrical components in all climates and under all conditions of use.

Mechanical Design

Sealed case of aluminium alloy, type LM6, coated in nylon by fusion.

All fastenings are of stainless steel.

Plugs and sockets are palladium-plated brass and anodised aluminium.

Transducer housing is in aluminium bronze.

The remote indicator is housed in a heavily anodised aluminium case which is sealed and fitted with a desiccator.

2 OPERATION

2.1 GENERAL

The centre control switch has six positions to provide the following functions:

Switch position	Digital display reads	Remote indicator reads
OFF	Instrument switched off	
△	Shallow alarm depth setting	Off
▽	Deep alarm depth setting	Off
○	Water depth, low brightness	Water depth
○	Water depth, medium brightness	Water depth
○	Water depth, high brightness	Water depth

The digital display flashes when showing either shallow or deep alarm depth settings.

△ Turning this control adjusts the shallow alarm depth setting.

▽ Turning this control adjusts the deep alarm depth setting.

The instrument is switched on by turning the centre control switch clockwise from the OFF position to select the required mode of operation.

2.2 DIGITAL DISPLAY

At depths of less than 20 metres the display will read metres and tenths of a metre.

At depths greater than 20 metres the display will read metres, up to a maximum of approximately 400 metres.

2.3 REMOTE INDICATOR

This shows the depth up to a maximum of 200 metres on a logarithmic scale which provides high resolution in shallow soundings and avoids the need for range switching.

At depths greater than 200 metres the meter pointer will remain beyond the 200 mark on the scale and the correct depth will be shown on the digital display.

2.4 LOSS OF SOUNDINGS

Operation of both the digital display and the remote indicator is unaffected by an occasional loss of soundings. However, if soundings are lost for a period of more than three to four seconds the digital display will be cleared and replaced by two decimal points; at the same time the pointer on the remote indicator will return to zero.

2.5 ALARM SYSTEM

Function required	Control switch	Action
(1) Both alarms off	-	Turn shallow control (△) fully anticlockwise to OFF position. Turn deep control (▽) fully clockwise to OFF position.

- | | | |
|-----------------------|------------------|---|
| (2) Set shallow alarm | Turn to Δ | Adjust shallow control (Δ) so that digital display shows required depth setting. |
| (3) Set deep alarm | Turn to ∇ | Adjust deep control (∇) so that digital display shows required depth setting. |

Once the alarm controls have been set the main control switch should be turned to select the required mode of instrument operation.

The shallow alarm (a series of short dots) will sound whenever the measured depth of water is less than that to which the shallow control has been set.

The deep alarm (a series of long dashes) will sound whenever the measured depth of water is greater than that to which the deep control has been set.

The usable range of both alarm settings is from approximately 1 to 200 metres.

The deep alarm system is switched off automatically at depths beyond 204 metres.

3 CALIBRATION

The instrument is calibrated for use in sea water in which the velocity of propagation of sound is 4921 ft/sec (1500 m/sec). Adjustment for use in fresh water must be carried out by your agent or dealer.

The waterline datum setting is a screwdriver adjustment located beneath a screw-on knurled cover adjacent to the cable connectors. It adds a fixed correction to both the digital display and remote indicator readings to compensate for the depth below the water surface at which the transducer is installed. Once set, it causes the instrument always to indicate the true depth of water from the water surface. The range of adjustment is 0 to 2.5m.

Adjust as follows:

Measure the distance between the waterline and the face of the transducer. Rotate the screwdriver control fully anticlockwise. With the boat stationary in less than 20 metres of water note the indicated depth. Then turn the control clockwise until the reading increases by an amount equal to the distance as measured above.

Alternatively, with the boat lying stationary in shallow water over a hard level bottom, take a sounding with an accurately-made lead line and then adjust the control until the reading equals the measured depth.

4 INSTALLATION

The connection diagram for a twin-transducer system with repeater is shown in Fig. 7. In a single-transducer system the transducer cable is connected directly to the centre socket of the instrument.

4.1 THE CONTROL UNIT

The mounting bracket for this should be screwed to a bulkhead at any position convenient to the navigator or helmsman, provided that it is at least 6 inches (152mm) distant from the steering compass, the Hadrian compass unit, and from the position in which the Heron DF aerial is used. It may be installed at any distance from the transducers, and extra cable can be provided if necessary.

Ensure that the supply leads are connected with correct polarity, i.e. BROWN lead of supply cable to POSITIVE terminal of the ship's 12 – 24V d.c. supply.

4.2 THE REMOTE INDICATOR

Where a remote indicator is fitted, it may be at any distance from the control unit but must be more than 18 inches (457mm) away from the compass.

When a special mu-metal screen is fitted around the repeater, the 'safe' distance becomes 8 inches (203mm). The repeater connecting cable is plugged into the right-hand socket on the under-side of the instrument case.

The scale illumination circuit terminals (marked 'LAMPS') are to be connected to a supply **not exceeding 12V**. The Brookes & Gatehouse Dimmer Unit is recommended for supplying scale illumination circuits. It accepts 12 – 36V d.c. and provides an electronically-controlled output to vary the level of illumination from full brilliance to 'off'.

4.3 THE TRANSDUCER HOUSING

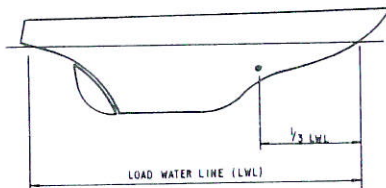
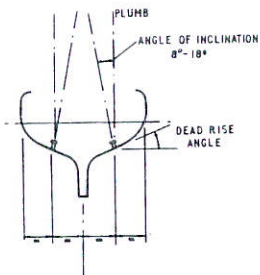
Detailed instructions for siting and fitting the transducer housings appear in the Brookes & Gatehouse publication: *Underwater Housings, Selection Siting and Installation*. This covers the installation of flanged housings, and the use of nylon-coated housings which should be specified for use in metal hulls.

4.3.1 Siting

(a) Sailing vessels (Fig. 2)

Long keeled hull. The twin system employing two housings should be used for all mono-hulled yachts of conventional design. The two housings should be symmetrically sited on either side of the centre-line at a distance from the forward end of the waterline of about one-third of the waterline length. Their distance from the centre-line should be about one-half of the distance between the centre-line and the waterline, and their axes should be inclined outwards by about 10° from the vertical axis of the hull. This arrangement gives maximum accommodation to heeling and prevents the acoustic beam from impinging on the keel. Valveless housings are available with flanges angled at 10°, 20°, or 30° to the vertical axis. They may also be used on hulls without flanges. For

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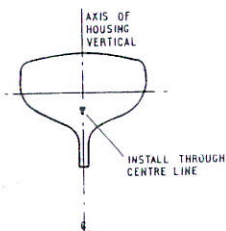


ANGLED VALVELESS HOUSING

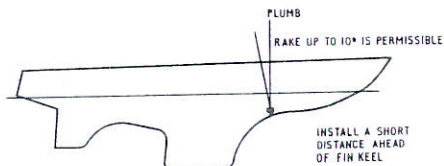


DEAD RISE ANGLE	HOUSING ANGLE
18° - 27°	10°
28° - 38°	20°
39° - 48°	30°

(a) LONG KEELED HULL

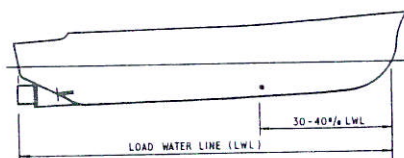
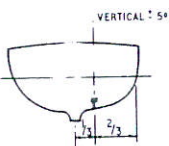


(b) FIN KEEL AND SKEG TYPE HULL

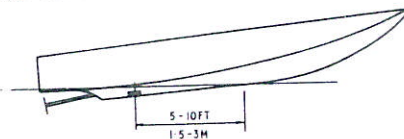
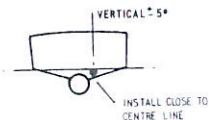


USE THE KNURLED FLANGELESS HOUSING

SITING IN SAILING VESSELS



DISPLACEMENT VESSELS



PLANING VESSELS

SITING IN POWER VESSELS

vessels having a transducer immersion depth of 5ft (1.5m) or more, two valved housings should be fitted at the appropriate angles to the hull. This type of housing permits the transducer to be withdrawn into the hull for cleaning without admitting water. The selected position must be clear of internal obstructions and must not lie directly aft of any other skin fitting in the line of water-flow. Sufficient withdrawal clearance must be allowed for.

Fin-keel and skeg type hulls. Where cost is an important consideration, a single transducer may be used, but the twin system is preferred if the highest accuracy of depth measurement is required when the angle of heel exceeds 20°.

Install the single housing through the centre-line a short distance ahead of the fin keel. The tubular flangeless housing must be used for this purpose. This is provided with a heavily knurled exterior surface for bonding in with polyester resin. A long reach version can be specially manufactured for hulls with thick keel section. The axis of the tube must be vertical in the lateral plane. In the fore-and-aft plane it should be approximately perpendicular to the lower edge of the keel but must not rake aft by more than 10°.

(b) Power vessels (Fig. 2)

Displacement vessels. The housing should be sited approximately 30-40% LWL from the forward point of entry in the water and as close to the keel as possible consistent with the acoustic beam not impinging on the keel. This point is found by laying a batten which is inclined at 20° to the vertical against the lower edge of the keel and noting where the tip of the batten touches the ship's bottom. The axis of the housing must be vertical to within $\pm 5^\circ$. For vessels of normal draft a valveless angled flange housing can be used to compensate for the dead rise angle. Where the depth of immersion exceeds about 5ft. (1.5m) the valved housing should be fitted. The selected position must be clear of internal obstructions and there should be sufficient withdrawal clearance.

Planing vessels. A long reach transducer is provided for this application complete with a 10° flanged housing and wooden fairing pod. By this arrangement the transducer face is kept clear of the aerated layer of water next to the hull skin, and the 10° forward 'look' ensures that no cavitation occurs at the transducer face.

The housing should be mounted in a position which is least affected by aeration and noise from the propeller(s). Also the selected position must be clear of internal obstructions, and withdrawal clearance must be allowed for. In general the housing should be sited not less than 5ft (1.5m) and typically 5ft – 10ft (1.5m – 3m) from the forward point of entry in the water when the vessel is planing. The housing should be mounted as close to the centre line as possible, subject to the same limitation on proximity to the keel as described for displacement vessels.

4.3.2 Installation of flangeless housings in GRP hulls (Figs. 3 and 4)

These are supplied with a heavily knurled outer surface and are designed for bonding into GRP hulls. Fig. 4 shows the installation through the centre line of a fin keel whilst Fig. 3 indicates the general application.

- (1) Bore a hole 1 3/4 in. (45mm) diameter at the selected position.

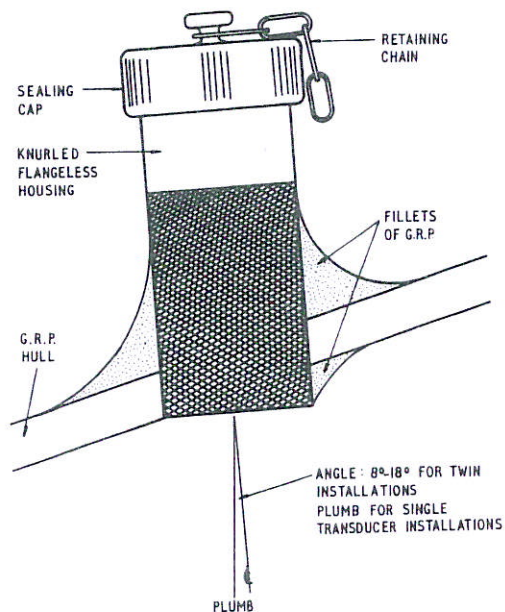


FIG. 3 - INSTALLATION OF FLANGELESS HOUSING IN GRP HULLS

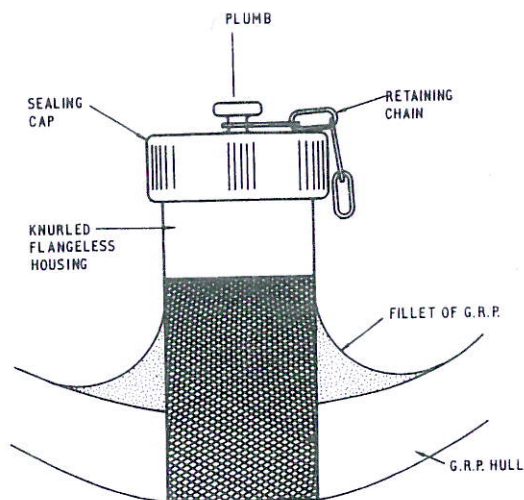


FIG. 4 - INSTALLATION OF FLANGELESS HOUSING THROUGH
www.bandgservice.com CENTRE LINE OF FIN KEEL YACHT
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- (2) Prepare a polyester resin mix and apply to the knurled surface of the housing and the inside of the bored hole.
- (3) Insert the housing and adjust the alignment so that the angle conforms with the requirements given in the Siting Instructions. Ensure that there is a good fillet of resin between the inside surface of the hull and the housing. Further filling should be carried out if necessary using glass fibre and resin.
- (4) When set, screw on the sealing cap and secure the retaining chain to the hull near to the installation.

N.B. Ensure that the bore of the housing is kept free of resin, paint, etc.

4.3.3 Installation of the bronze valveless housing with fairing pod

(a) GRP and wooden hulls (Fig. 5)

- (1) Bore a hole 1.65in. (42mm) diameter at the selected position. Elongate and chamfer the hole as necessary to allow the housing flange to lie flat on the outer surface of the hull.
- (2) Insert the housing from outside the hull ensuring that the housing is raked with its axis sloping aft and locate the brass washer plate over the housing. Secure the plate in position with two wood screws.
- (3) Drill four fixing holes ¼in. (7mm) diameter through the hull and washer plate using the holes in the housing flange as a drilling template.
- (4) Locate the fairing pod over the housing flange with the blunt end pointing forward. Ensure that the bore of the pod is in line with that of the housing. Mark the positions of the fixing bolt holes on the hull and drill two holes ¼in. (7mm) diameter through the hull.
- (5) Remove all items and prime any exposed wooden surfaces. Apply sealing compound and re-assemble, securing the housing bolts with two nuts on each. The fairing pod bolts are secured with two nuts and a brass washer.
- (6) Screw on the sealing cap and fasten the retaining chain close to the installation.
- (7) Paint the outer surfaces of the housing and fairing pod with anti-fouling paint.

(b) Metal hulls (Fig. 6)

The housing and fixing bolts are nylon coated for this installation.

- (1) Bore a hole 1¾in. (45mm) diameter at the selected position. Elongate and chamfer the hole as necessary to allow the flange to lie flat on the outer surface of the hull with the housing raked aft. Remove any sharp edges.
- (2) Locate the housing in the hole from outside the hull and mark the positions of the fixing bolt holes.
- (3) Remove the housing and drill the holes 5/16in. (8mm) diameter. Do not use the flange of this housing as a template as the nylon coating will be damaged.
- (4) With the housing temporarily in position locate the fairing pod over the housing flange with the blunt end pointing forward. Ensure that the bore of the pod is in line with that of the housing. Mark the positions of the two fixing holes and drill them 5/16in. diameter.

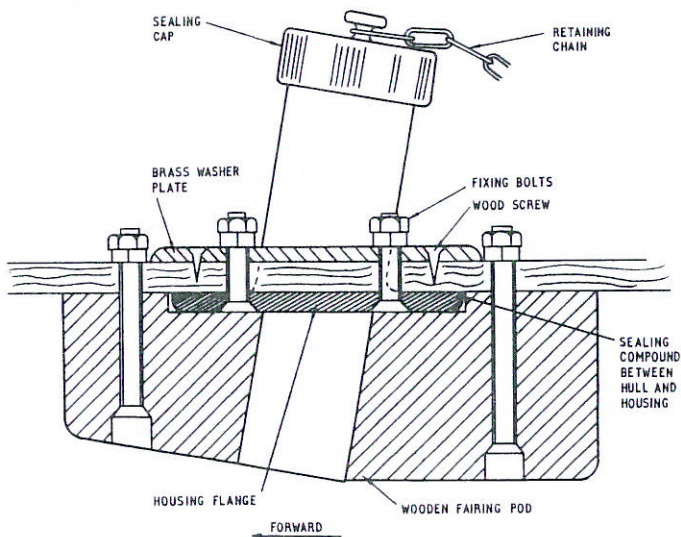


FIG. 5 – INSTALLATION OF THE HIGH SPEED HOUSING IN GRP OR WOODEN HULLS

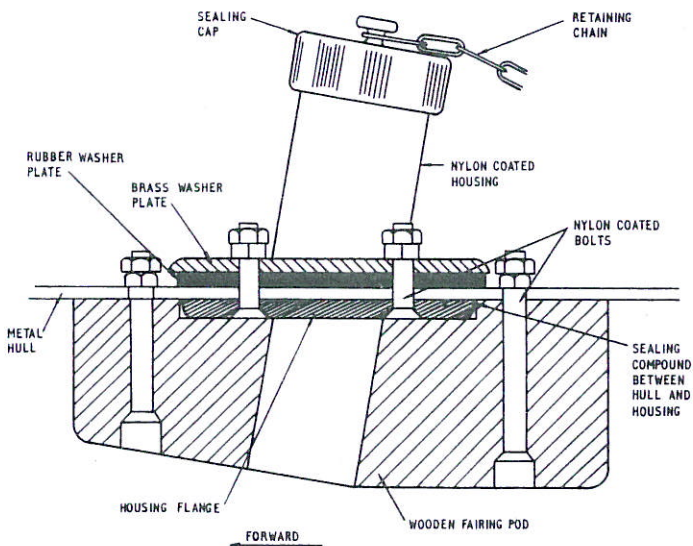


FIG. 6 – INSTALLATION OF THE HIGH SPEED HOUSING IN METAL HULL

- (5) Remove the fairing pod and housing, treat all exposed metal surfaces on the hull with a suitable primer and apply sealing compound to the housing flange. Re-assemble the housing and secure the bolts with two nuts on each bolt. Bolt the fairing pod in position, again using two nuts on each bolt.
- (6) Screw on the sealing cap and fasten the retaining chain close to the installation.
- (7) Paint the outer surfaces of the housing and fairing pod with anti-fouling paint.

Separate installation instructions for the valve-type housing are enclosed with the housing.

4.4 THE MERCURY CHANGEOVER SWITCH

The gravity-operated transducer switch must be mounted on a thwartships bulkhead with its upper surface parallel with the waterline plane.

4.5 THE TRANSDUCERS

The radiating face of the transducer must be quite free from oil or grease. It is advisable to clean it with detergent solution or soap before fitting. Do not apply anti-fouling paint to it.

Remove the sealing cap of the housing with the left hand, quickly plunge the transducer into the housing with the right, and press it home. The sealing rings will prevent the entry of water. The retaining ring should be screwed down firmly by hand; NEVER use a wrench.

Run the cable up to the centre socket of the instrument, or, in the case of a twin transducer system, run the two cables up to the outer sockets of the change-over switch. The cable ends are marked with red and green bands for the port and starboard transducers, respectively. The red cable must be plugged into that socket which is nearest to the port side of the ship and similarly the green cable into the starboard side socket irrespective of whether the switch is mounted on the forward or aft side of the bulkhead. Ensure that the cables have not been crossed over between transducers and switch. Keep the cables as far away as practicable from petrol (gasoline) or paraffin (kerosene) engines (see para. 4.6), and power supply or aerial leads associated with high power R/T equipment. Screw up the plug retaining rings tightly. The change-over switch is connected to the instrument by means of the permanently mounted cable from the switch to the central socket of the instrument.

4.6 SUPPRESSION OF ELECTRICAL SYSTEMS

The fitting of interference suppressors in the ignition leads of petrol (gasoline) engines is generally necessary. Even when suppressors are fitted the transducer cables must not be less than two feet from the ignition leads. The repeater cable should not be run close to the cable leading to the ignition switch. The fitting of interference suppressors to battery-charging alternators and powerful electric motors is also sometimes necessary. The manufacturers of the machines should be consulted.

Methods of suppression are described in an article entitled "Cut That Crackle", copies of which are available from Brooks & Gatehouse Ltd (01590-689699)

5 MAINTENANCE

5.1 DESICCATOR REACTIVATION

Occasionally inspect the desiccator window in the rear cover of the control unit. The humidity indicator pad behind it should be blue in colour. If it should become pink, unscrew the desiccator by means of the rectangular key supplied with the set. Place the desiccator in a very low oven or in a drying cupboard until the indicator becomes deep blue. The oven temperature must not exceed 270°F (130°C). Keep the instrument in a dry atmosphere during the time that the desiccator is being reactivated.

If the glass window in the repeater should 'mist-up' internally, remove the desiccator capsule from the back of the meter by means of a large screwdriver, temporarily remove the rubber sealing ring from it and place the desiccator in an oven at a temperature of about 512°F (250°C) for one hour. Replace it rapidly in the meter, remembering to fit the rubber sealing ring.

5.2 CLEANING THE TRANSDUCER FACE

Weed and barnacles should not be allowed to grow on the transducer face. Withdraw the transducer, pulling it with the lanyard and screw the blanking cap onto the housing. Clean the transducer face with a scrubbing brush. Do not use a knife or scraper.

5.3 LAYING UP

When the vessel is being laid up, carry out the following work:

- (i) Remove transducer/s from housing/s, apply grease to neoprene sealing rings and to screw thread on housing. Screw sealing cap/s on to housing/s.
- (ii) Reactivate desiccator if window is pink, and replace in set.
- (iii) Clean all plugs and sockets using WD40 aerosol spray.

5.4 FAULT FINDING

If the equipment fails to operate proceed as follows:

<i>Symptoms</i>	<i>Action</i>
Completely blank display	Check that the ship's battery is switched on and that it is up to its stated voltage. If it is, then disconnect the supply cable at the instrument and check that the supply voltage is present at the socket of the supply cable plug. Pin A is +ve and pin B is -ve. If the supply is correct but the digital display is not visible when the cable is re-connected, the control unit is faulty.
Display shows two decimal points only	Withdraw and then reconnect the transducer plug/s both at the control unit and gravity switch, and also at the cable-mounted connectors close to the transducers. This produces a self-cleaning action.

Thoroughly clean the transducer faces after withdrawing the transducer into the boat. After replacing the transducer into its housing make sure that the transducer retaining ring is screwed down.

If soundings are still unobtainable, check the continuity of the transducer and its cable across pins A and B. The test should show a resistance of 2 ohms approximately. There should be no connection between pins A and C or between pins B and C. In twin transducer installations a faulty change-over switch or jumper cable can be proved by plugging the transducer cable directly into the centre socket on the main instrument.

Remote indicator (repeater) only fails to operate correctly

Repeater and/or repeater cable open circuit will cause the repeater only to fail. A continuity test across the repeater cable plug should show a resistance of 150 ohms. Do not pass more than 5mA through the repeater when testing.

Alarm unit fails to operate

The alarm unit can be checked by connecting it to a 6 to 12 volt battery; the battery positive terminal must go to the + mark on the alarm unit which will emit a continuous high pitched tone if working correctly.

Display shows two decimal points only, when yacht is heeled (twin transducer system)

Check that the transducer connections to the changeover switch are correct (each transducer connected to the changeover switch connector nearest its own side of the vessel). With the boat not heeled, remove the four screws securing the changeover switch to the bulkhead and tilt the switch at least 15° to port. After three seconds or more check the digital display. If the instrument still displays two decimal points, the port transducer or its connections are faulty. If the display is correct, tilt the switch 15° to starboard and if after three seconds the display shows two decimal points, the starboard transducer or its connections is faulty.

6 PARTS LIST

Description

Part No.

CONTROL UNIT	130 - 9
MOUNTING BRACKET	101 - 16
REMOTE INDICATOR	-
ALARM UNIT	130 - 45
MERCURY CHANGEOVER SWITCH	107 - 33
POWER SUPPLY CABLE	110 - 106
TRANSDUCER CABLE	111 - 25
REMOTE INDICATOR CABLE	135 - 41
TRANSDUCER (Orange Spot)	157 - 29
STANDARD FLANGELESS TRANSDUCER HOUSING	HERM 35
REMOTE INDICATOR TO ALARM CABLE	128 - 91
LONG REACH TRANSDUCER (Orange Spot) FOR HIGH SPEED INSTALLATIONS	157 - 37
HIGH SPEED HOUSING WITH FAIRING POD	-
10° VALVELESS HOUSING	HEC 6
20° VALVELESS HOUSING	HEC 32
30° VALVELESS HOUSING	HEC 6A
SLIDING VALVE HOUSING	155 - 25
TRANSDUCER FOR SLIDING VALVE HOUSING	157 - 38AA

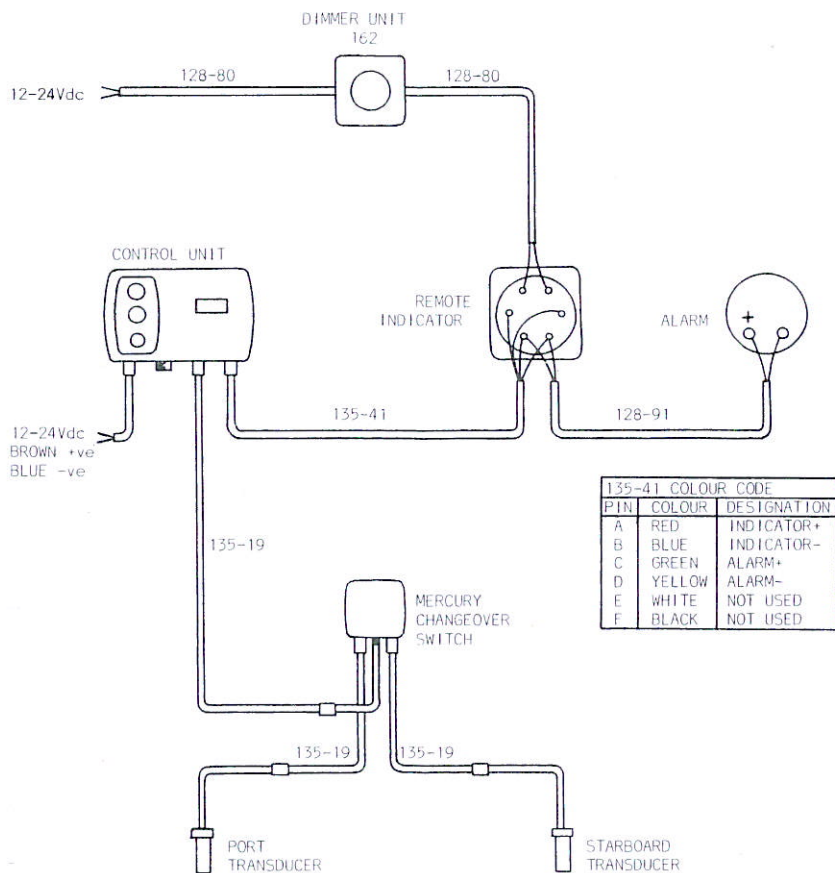


FIG. 7 - CONNECTIONS DIAGRAM