

# Owner's Handbook for Hunter Depth, Boat Speed and Log

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### **BROOKES & GATEHOUSE LTD**

Bath Road, Lymington, Hampshire SO4 9YP, England  
Telephone Lymington (0590) 74252 Telex 477724

### **BROOKES & GATEHOUSE INC**

154 East Boston Post Road, Mamaroneck, N.Y. 10543 USA  
Telephone 914 698 9330 Telex 646627

#### WEST COAST OFFICE

13377 Beach Avenue, Marina del Rey,  
California 90291  
Telephone 213 823 4956 Telex 652473

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HUNTER CONTROL UNIT

## 1 DESCRIPTION

### 1.1 INTRODUCTION

The HUNTER combined log, speedometer and depth sounder has been developed by Brookes & Gatehouse especially for cruising yachtsmen and power boat owners. Full use has been made of micro-processor technology to provide valuable extra facilities such as deep water and shallow alarms, variable damping and variable display illumination all controlled at the control unit keyboard, as are the calibration settings. All settings of this nature are retained in the computer memory, but are easily changed when required. The traditional B&G standards of accuracy, reliability and sea-going durability have been built into the Hunter.

### 1.2 FACILITIES

The control unit is provided with a large liquid crystal digital display and a keyboard with six clearly marked keys. Inputs to the control unit are taken from an impeller type underwater unit and from an echo-sounding transducer, both of which are mounted through the hull. Outputs are taken from the control unit to drive DEPTH and BOATSPEED meters. The following facilities are provided:

DEPTH MEASUREMENT	Metres/feet/fathoms (selectable at keyboard)	Analogue (fixed units) and digital repeaters
SHALLOW ALARM	Set and controlled at keyboard	
DEEP ALARM	Set and controlled at keyboard	
DATUM	Adjusted at keyboard	
LOG	Nautical miles with two decimal places	
BOAT SPEED	Knots with two decimal places	Analogue and digital repeaters
BOAT SPEED DAMPING	Adjustable at keyboard	
BOAT SPEED SCALE	Adjustable at keyboard	to suit 12.5 or 25 knot analogue indicator
SPEED/LOG CALIBRATION	Adjustable at keyboard	
DISPLAY AND REMOTE INDICATOR ILLUMINATION	Adjustable at keyboard	

### 1.3 SPECIFICATION

#### General

**Display:** liquid crystal display with large 15mm digits and adjustable illumination.

**Data retention:** all settings are retained while power is off for more than three years using a standard 3V lithium battery (BR2325).

**Construction:** glass filled injection moulded thermoplastic case, fully sealed and fitted internally with a desiccator which can be re-activated.

**Size and weight:** 230.5mm x 127mm x 62mm; 1.1kg.

**Temperature:** operating range  $-10^{\circ}\text{C}$  to  $+60^{\circ}\text{C}$   
storage range  $-25^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$

**Humidity range:** 0 to 100%

### **Depth**

**Range:** single range 0.9m – 137m, 450 feet or 75 fathoms.

**Accuracy:**  $\pm 2\%$ ,  $\pm 0.2\text{m}$  for normal values of sea temperature and salinity (i.e. speed of sound = 1500m/s).

**Transmitted power:** 50W rms nominal

**Frequency of operation:** 171kHz nominal

**Sounding rate:** 2 – 20 soundings per second, automatically adjusted

**Datum correction:** selectable via the keyboard, range  $\pm 30.5\text{m}$

**Units:** metres, feet or fathoms selectable via the keyboard

### **Speedometer/log**

**Speed resolution:** 0.01 knot to 99.99 knots

**Log resolution:** 0.1 nautical mile to 9999.99 nautical miles

**Calibration range:**  $\pm 40\%$

**Boat speed damping:** 5, 10, 30, 60 seconds

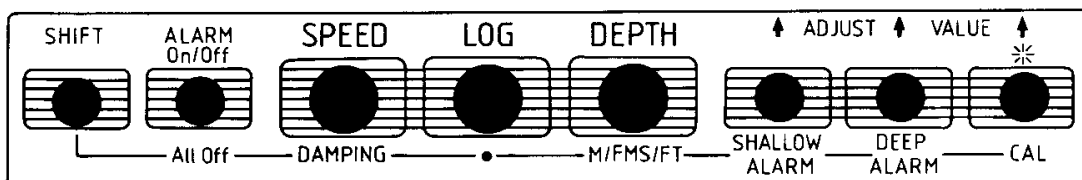
**Satnav interface:** 200 pulses/nautical mile

## 2 OPERATION

### 2.1 SWITCHING ON AND OFF

The Hunter combined speedometer/log and depthsounder is switched on and off at the ship's main switchboard, and no switching is provided at the control unit.

### 2.2 THE KEYBOARD



#### 2.2.1 Shift key

This is the left-hand key. If pressed before pressing any of the other keys, the function marked **below** the other keys is selected. When the shift key is pressed the display goes blank until the next key operation occurs. If the shift key is pressed in error, pressing it a second time restores the original condition.

#### 2.2.2 Alarm On/Off key

- (a) If an alarm is sounding pressing this key will silence it until the next excursion into the alarm zone. Operation of this key while setting an alarm value switches that alarm on or off.
- (b) Pressing the Alarm On/Off key after pressing the shift key switches both the alarms off.

#### 2.2.3 Boat Speed key

- (a) Pressing this key by itself displays the boat speed in knots, with two decimal places up to 19.99 and to one decimal place from 20.0 to 99.9. An acceleration/deceleration flag appears to the left of the display for speed changes of more than 0.01 knots in two seconds.
- (b) When pressed after the shift key, the damping time is displayed. (see para 2.3).

#### 2.2.4 Log key

Pressing the Log key causes the log reading to be displayed. If the key is held pressed the display is in whole nautical miles, but when released the reading is given with two decimal places.

#### 2.2.5 Depth key

- (a) Depth is displayed when this key is pressed by itself. The depth is displayed in the units selected (see para. 2.2.8). One decimal place is shown if the reading is less than 100. If the depthsounder loses contact with the sea bed, this is indicated by the appearance of a second decimal point. This is due to loss of the return signal which can be caused by excessive boat heel or poor sounding conditions.
- (b) When the DEPTH key is pressed following operation of the shift key, with depth being displayed, the units of depth at the control unit display and digital repeater(s) are changed. Repeating the key operation changes the units again. The units change from metres to fathoms to feet *et seq.*

### **2.2.6 The 'adjust value' keys**

- (a) The three adjust value keys have no primary function and only come into use when log calibration, damping, datum, shallow or deep alarm are being set (see relevant paragraphs).
- (b) The exception to this is the right hand adjust key which, when operated, adjusts the display illumination through the positions of 'off', level 1, level 2 and level 3.

### **2.3 READING BOAT SPEED**

To read boat speed at the control unit press the **BOAT SPEED** key. The reading is given in knots with two decimal places up to 19.99 and to one decimal place up to 99.9. An acceleration/deceleration flag appears to the left of the display for speed changes greater than 0.01 knots in two seconds. The damping (speed of response) of this reading is adjustable to suit differing sea conditions. A slower response is usually desirable in rough conditions. The damping is expressed as a time constant in seconds, the largest value representing the slowest response.

To change the damping select **BOAT SPEED** and then press the shift key followed by the **DAMPING** key. The damping time constant is now displayed. The setting can now be changed by pressing any one of the three **ADJUST** keys as many times as may be necessary. Four alternative values are provided, 5, 10, 30 OR 60 seconds. Boat speed is provided at the appropriate analogue and/or digital indicator all the time that the control unit is switched on.

#### **Warning:**

Do not rely on the boat speed or log readings until calibration has been correctly performed. (See para. 3.2).

### **2.4 READING THE LOG**

Press the **LOG** key to display the log reading, which is given in nautical miles with two decimal places. If the key is held down the reading is in whole nautical miles.

#### **Note:**

The log accuracy is dependant on correct calibrations. Refer to para. 3.2 for details.

### **2.5 READING DEPTH**

To read the depth at the control unit press the key marked **DEPTH**. The depth is displayed in the units selected (metres, feet or fathoms). One decimal place is shown if the reading is less than 100.

To change the units of measurement, first ensure that **DEPTH** (OR **SHALLOW ALARM** OR **DEEP ALARM** OR **DATUM**) is being displayed, and then press the shift key followed by the **DEPTH** key. The units of depth at the digital indicator are always the same as those selected for display at the control unit.

A second decimal point appears should the sounder lose contact with the sea bed. This is due to loss of the return signal which can be caused by excessive boat heel or poor sounding conditions.

Depth on the appropriate analogue indicator is displayed continuously all the time that the control unit is switched on. The units of measurement are as marked on the dial and do not change.

#### **Warning:**

It is most important that the datum be set correctly before using the depthsounder facility, and that the operator knows whether it has been set to give depth from the surface or from the keel (see para. 3.1).

### **2.5.1 Shallow alarm**

An audible and visible alarm is available to warn when the depth of water is less than a pre-set value. To set this value, first select DEPTH and then display the SHALLOW ALARM setting by pressing the shift key followed by the SHALLOW ALARM key. If the display shows 'OFF' press the ALARM control key to switch the alarm on. Press the three ADJUST keys as necessary to display the required new setting. Press the DEPTH key to set the new value into the computer memory.

#### **Note:**

The units used are the same as those selected for display. Both alarms are switched off by pressing the shift key followed by the ALARM control switch. To silence an individual alarm press the ALARM control key. The alarm is then silenced until the boat next encounters an alarm condition.

### **2.5.2 Deep alarm**

This alarm operates whenever the boat reaches the pre-set alarm depth, whether approaching from shallower or deeper water. To set the required value first select DEPTH and to display the DEEP ALARM setting press the shift key followed by the DEEP ALARM key. If the display shows 'OFF', press the ALARM control key. Press the three ADJUST keys as necessary to set the new DEEP ALARM value, remembering to use the units already selected for DEPTH display. Press the DEPTH key to set the new value into the computer memory.

Both alarms are switched off by pressing the shift key followed by the ALARM control key.

To silence an individual alarm press the ALARM control key. The alarm is then silenced until the boat next encounters an alarm condition.

## **2.6 ADJUSTING DISPLAY ILLUMINATION**

With DEPTH, LOG OR BOAT SPEED being displayed at the control unit, press the right hand ADJUST key to step the illumination level through the four levels available (including OFF).

## 3 CALIBRATION

### 3.1 DATUM

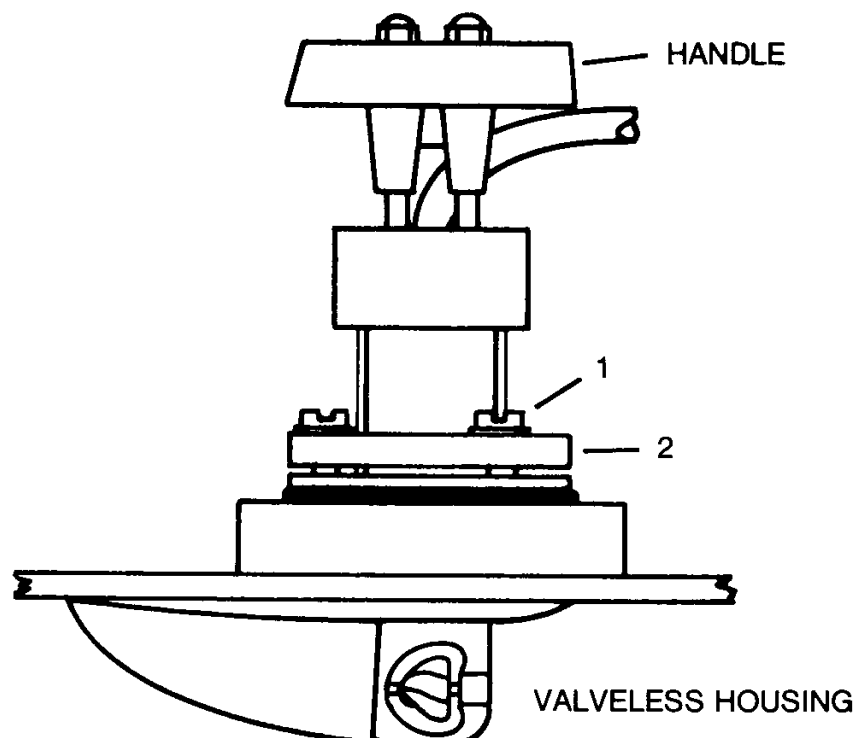
Before setting the datum it is necessary to decide if the indicated depth is to be from the keel or the water surface. A measurement of the distance between the transducer face and the keel, or waterline, should be obtained **in the same units selected for depth display**. For keel measurements the value is negative (-) and for water surface the value to be entered is positive (+). The datum setting must now be displayed. First select DEPTH then press the shift key followed by CAL. Press one of the ADJUST keys and the display starts to flash on and off. Press the three ADJUST keys as necessary to display the required datum setting. Note that the left hand ADJUST key on successive operations causes the value to cycle through 0 to 9 to -0 to -9. This value is set into the computer memory by pressing DEPTH, BOAT SPEED or LOG and holding it down for five seconds. After five seconds the screen will go blank.

### 3.2 SPEED/LOG CALIBRATION

One calibration adjustment is needed for these two functions.

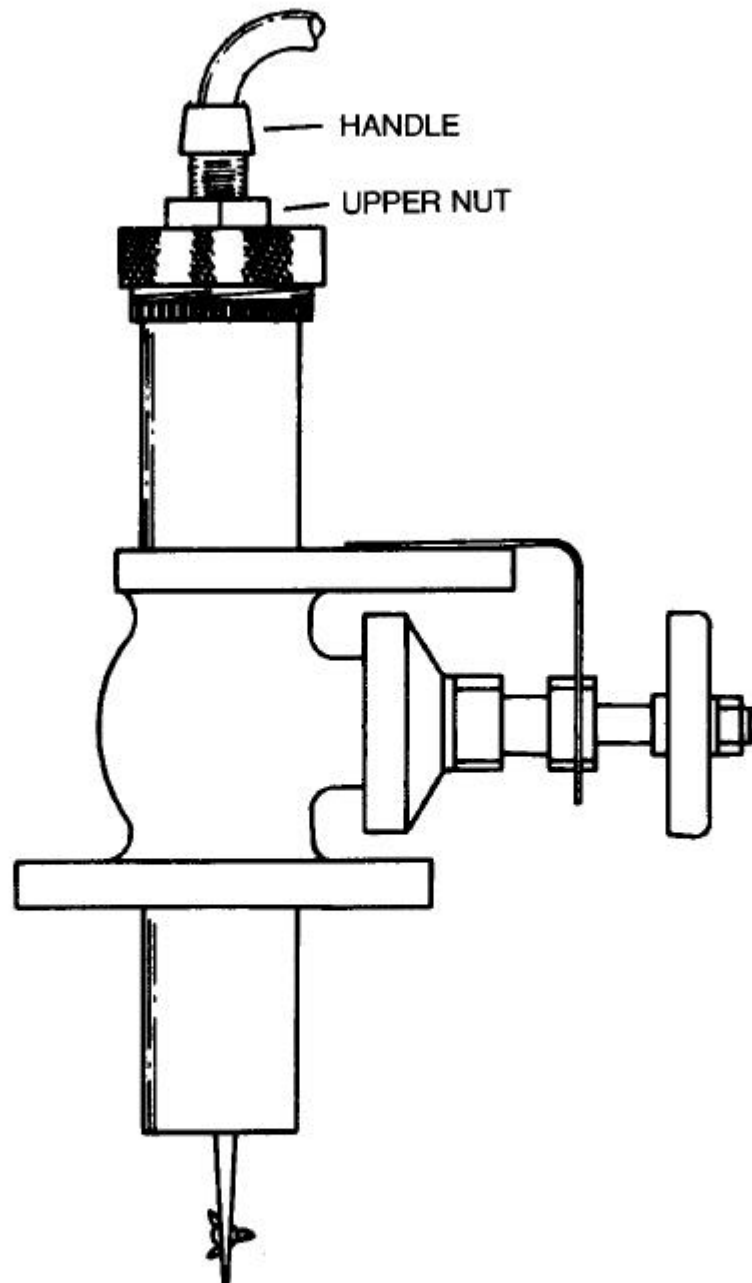
#### 3.2.1 Underwater unit alignment

With the valveless housing slacken off the three locking screws (1) fully by means of a screwdriver and then slacken the ring-nut (2) if necessary so that the housing is free to rotate. With the boat making constant speed under power with the impeller unit down, turn the handle slowly through a small angle on either side of



the fore-and-aft line until a maximum reading of speed is obtained. (The flow lines beneath the hull are not necessarily parallel with the boat's fore-and-aft line). Then re-tighten the ring-nut by hand and screw down screws (1) fully, ensuring that their heads 'bottom' onto the shakeproof washers on the ring-nut (2). Subsequent re-alignment after removing the underwater unit for cleaning or maintenance is obtained automatically when the unit is lowered fully into its operating position.

With the shut-off valve housing the upper nut should be slackened whilst the handle is turned to obtain maximum speed indication. The nut should then be re-tightened whilst holding the handle to prevent rotation.



SHUT-OFF VALVE HOUSING

### 3.2.2 Calculating the correction factor

A series of runs over a measured distance is required. Three methods are described and a choice can be made depending on the prevailing conditions and the accuracy required. In each case a correction factor  $k$  is calculated. This is the amount by which the indicated reading has to be multiplied to give the correct reading; i.e. if  $k = 1.03$  the log is under-reading by 3% and the present calibration value in Hz/knot has to be decreased by 3%.

**Method A** is the simplest as no timing is involved, but the vessel must maintain a constant speed for both runs, and it is assumed that the current is constant. Carry out a run in both directions and note the distance indicated by the log at the beginning and end of each run to give the indicated distance run in each case:  $D_1$  and  $D_2$ . If the measured distance =  $M$  (nautical miles)

$$\text{correction factor } k = \frac{M}{2} \left( \frac{1}{D_1} + \frac{1}{D_2} \right) \quad \text{Example A}$$

**Method B** is carried out as above but in addition the time taken for each run  $t_1$  and  $t_2$  is recorded. In this case the speed need not remain constant and calibration can be carried out under conditions when the speed could vary, e.g. whilst under sail or when engine rpm are maintained but the boat is affected by windage.

$$\text{In this case correction factor } k = \frac{M \left( \frac{1}{t_1} + \frac{1}{t_2} \right)}{\frac{D_1}{t_1} + \frac{D_2}{t_2}} \quad \text{Example B}$$

**Method C** is the most accurate method requiring three runs over the measured distance. Again there is no necessity to maintain constant speed and the calibration can be carried out, if required, under sail. Current is assumed to be increasing or decreasing at a steady rate. Record times and indicate distances as before.

$$\text{correction factor } k = \frac{M \left( \frac{1}{t_1} + \frac{2}{t_2} + \frac{1}{t_3} \right)}{\frac{D_1}{t_1} + \frac{2D_2}{t_2} + \frac{D_3}{t_3}} \quad \text{Example C}$$

**Note:** for the above calculations  $M$  is measured in nautical miles and  $t$  is in decimal hours. (See following table for converting minutes and seconds into decimal hours).

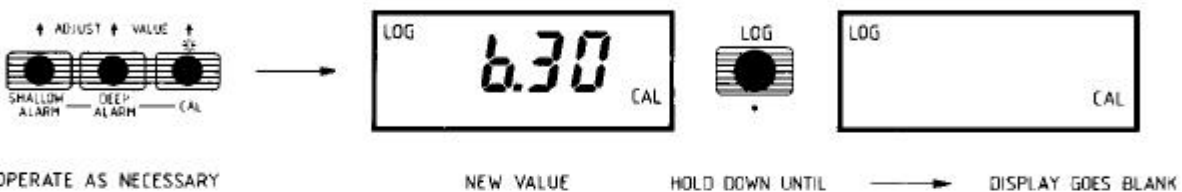
		SECONDS											
		0	5	10	15	20	25	30	35	40	45	50	55
MINUTES	0		.001	.003	.004	.005	.007	.008	.010	.011	.012	.014	.015
	1	.017	.018	.019	.020	.022	.024	.025	.026	.028	.029	.030	.032
	2	.033	.034	.036	.037	.038	.040	.041	.043	.044	.046	.047	.049
	3	.050	.051	.053	.054	.055	.057	.058	.060	.061	.062	.064	.065
	4	.067	.068	.070	.071	.072	.074	.075	.076	.077	.079	.080	.082
	5	.083	.085	.086	.087	.089	.090	.092	.093	.094	.096	.097	.098
	6	.100	.101	.103	.104	.105	.107	.108	.110	.111	.112	.114	.115
	7	.117	.118	.119	.121	.122	.124	.125	.126	.128	.129	.130	.132
	8	.133	.135	.136	.137	.139	.140	.142	.143	.144	.146	.147	.149
	9	.150	.151	.153	.154	.155	.157	.158	.160	.161	.162	.164	.165
	10	.167	.168	.169	.171	.172	.174	.175	.176	.178	.180	.181	.182
	11	.183	.185	.186	.187	.189	.190	.192	.193	.194	.196	.197	.199
	12	.200	.201	.203	.204	.205	.207	.208	.210	.211	.212	.214	.215
	13	.217	.218	.219	.221	.222	.224	.225	.226	.228	.229	.230	.232
	14	.233	.235	.236	.237	.239	.240	.242	.243	.244	.246	.248	.249
	15	.250	.251	.253	.254	.255	.257	.258	.260	.261	.262	.264	.265
	16	.267	.268	.269	.271	.272	.274	.275	.276	.278	.279	.280	.282
	17	.283	.285	.286	.288	.289	.290	.292	.293	.294	.296	.297	.299
	18	.300	.301	.303	.304	.305	.307	.308	.310	.311	.312	.314	.315
	19	.317	.318	.319	.321	.322	.324	.325	.326	.328	.329	.330	.332
	20	.333	.335	.336	.337	.339	.340	.342	.343	.344	.346	.347	.349

### 3.2.3 Adjusting the log/speed calibration

Display the log calibration setting by selecting LOG then pressing the shift key followed by CAL. The figure given is in Hz/knot.



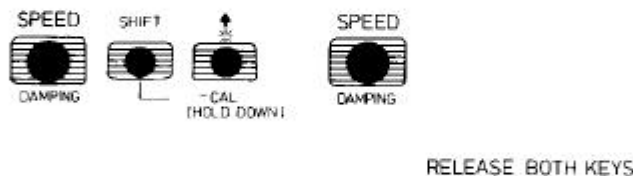
Divide this reading by the correction factor obtained from the test runs. The result is the new figure to be entered. Use the three ADJUST keys to enter the new value and then hold down the LOG key until the display goes blank (approximately five seconds). The new calibration is now fixed in the computer memory.



### 3.2.4 Meter scale calibration

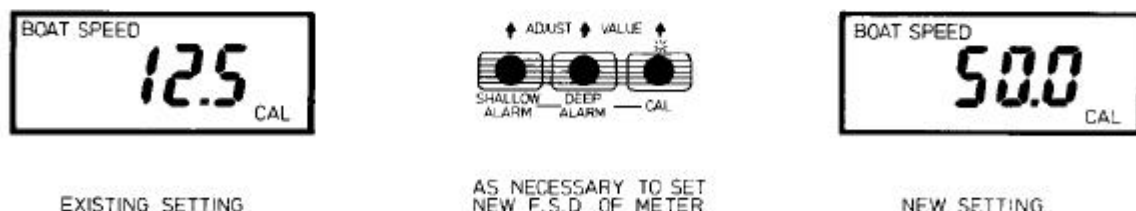
This adjustment is only required if the boat speed analogue meter is replaced by one of different range.

To change the setting first press SPEED then SHIFT. Press CAL and hold it down, and while CAL is held down, press SPEED again. Release both keys.



The existing setting for the boat speed analogue indicator is now displayed (e.g. 12.5 for a 12.5 knot indicator).

Operate the three ADJUST VALUE keys to set the full scale deflection (FSD) of the new meter in the display (e.g. 50.0). The new value must be 'burned in' by pressing SPEED and keeping it pressed until the display goes blank.



## 4 MAINTENANCE

### 4.1 ROUTINE MAINTENANCE

#### 4.1.1 Transducer and housing

Weed and barnacles should not be allowed to grow thickly on the transducer face. Withdraw the transducer and screw the blanking cap onto the housing. Do not use a knife or scraper. Grease the neoprene sealing rings and screwthread of the transducer housing periodically. If the vessel is out of commission the transducer may be withdrawn and the blanking cap screwed on.

#### 4.2.2 Underwater unit housings

Keep the screw thread of the underwater unit housing well greased with silicone or water pump grease. Ensure that the outer surfaces of the housing and underwater unit fin are properly coated with anti-fouling paint.

#### 4.2.3 Underwater unit

The impeller must be kept free from marine growth using a stiff brush. The impeller is removable from the fin for examination of the bearings by slackening the aft-end screw. A bearing side play of up to 0.015 inch (0.38mm) is permissible. If it exceeds this figure the screw and impeller should be changed. The underwater unit sealing ring must be kept liberally greased (water-pump or silicone type).

#### 4.2.4 Replacing the impeller fin

In the event of damage, a defective impeller fin is removed by releasing the two fixing screws. It is recommended that a spare impeller fin, complete with impeller and screws, is kept on board. When fitting the new impeller fin ensure that the peg on the plunger engages with the recess in the fin before tightening the screws.

#### 4.2.5 Desiccators

Should any display window show signs of moisture having penetrated the seals, e.g. misting of the glass or condensation, the desiccator should be removed from the rear of the instrument and reactivated by placing in an oven or drying cupboard for approximately two hours at a temperature of 270°F (130°C). Plug the desiccator hole and keep the instrument dry during reactivation.

### 4.2 FAULT FINDING

CONTROL UNIT DISPLAY BLANK	Check the main switchboard, batteries and wire connections at back of the control unit. If OK return the control unit to an agent for repair.
INTERMITTENT DISPLAY AT THE CONTROL UNIT	Check for intermittent fault in power supply.
INCORRECT DEPTH READING	Check transducer connections. Is transducer fitted in its housing? Is transducer face clean? Is transducer cable damaged? Has the DATUM been correctly set? If OK return control unit to an agent for repair.
INCORRECT SPEED/ LOG READING	Check underwater unit connections. Withdraw the underwater unit, fitting the sealing cap in its place, spin the impeller by blowing on it, and check for a speed reading. Has the calibration been carried out? If no fault is identified return the control unit to a B&G agent for repair.

DIGITAL OR ANALOGUE REPEATER NOT WORKING	Check the indicator cable. Check that the connections are correctly made.
CONDENSATION	Remove desiccator and heat in an oven at 130°C. Keep the instrument warm and dry, and fit the desiccator while still hot.

### 5 PARTS LIST

Control unit	198-10-011
Transducer hull housing (standard, bronze)	129-00-010
Transducer hull housing (angled 10°/30°)	117-00-136/8
Transducer (standard, with 10m cable)	199-00-018
Changeover switch (depth or speed)	190-00-146
Speed hull housing with integral weed deflector, standard, with sealing cap, ring nut and washers	117-00-046
Replacement speed housing with integral weed deflector	117-10-B21
Underwater unit, standard with 10m cable	117-00-120
Rotator fin unit with impeller	110-10-B21
Cable, C.U. to indicators and digital displays (20m)	135-0A-095
Cable, power (9m)	135-0A-096
Cable, control unit to changeover switch (3m)	135-0A-098
Analogue indicator, 200m depth	215-00-025
Analogue indicator, feet/fathoms	215-00-026
Analogue indicator, boat speed 12.5 knots	215-00-019
Analogue indicator, boat speed 25 knots	215-00-058
Digital repeater, depth	226-00-016
Digital repeater, boat speed	226-00-002

