MALIN INSTRUMENTS LTD

DRAUGHT INDICATOR SYSTEM MK6

OPERATING INSTRUMENTS

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INTRODUCTION

The MALIN draught indicator measures the ship's draught at four points, Forward, Aft, Port and Starboard. The alternative the two point system measures draught Forward and AFT on the Centre Line. 75 measurements are made at each point per minute.

Readings are shown on the display panels, each display showing the same information at the same time. **It is important to note that the displays only show correct draughts when floating in sea water.** For all other densities a correction must be applied from the supplied table. It is still necessary to apply the freshwater allowances at the loadline after this correction.

If the sensing points are not actually at the position of the corresponding ship's mark, the instrument carries out a compensating calculation.

The instrument monitors the changes in the ship's draught due to cargo movement and ship motion, continually updating the calculated draught from a series of measurements to give a steady display reading.

To observe an accurate draught, delay reading for ONE MINUTE after completion or stopping of loading or unloading. This allows the instrument to perform a full set of calculations on steady readings from its sensors.

Comparison with traditional methods of draught measurement should only be made after this delay. If the ship's marks are only read from one side, allowance must be made for any heel angle. As the draught indicator's read-out resolution is 1cm, slight changes in draught will be readily observed. Additional deadweight, re-siting of load or stores, wind, loading ramps and mooring lines are among the items which will affect the draught so any comparisons are best carried out at the same point in time.

In addition to the sea water draught, the remaining distance to load line for one or two compartment ships is shown. Tonnes to limit is an optional feature which can be displayed if required, the instrument will then use the TPC figure for the maximum load.

Water flow under the hull will alter the readings, so these change once the ship's propellers are in operation whether berthed or underway.

Note: Welding operations will damage this electronic equipment. Do not carry out any welding adjacent to any draught indicator equipment or cables without first disconnecting and removing the equipment.

It is imperative that the cable connecting the displays and sensors to the central control unit meets our specification; all cable screens must be continuous and must not be earthed at any point. Conductors and cable screens must not be in contact with any metalwork other than the designated terminals.

For further information please see the separate installation manual.

NORMAL OPERATION

AFTER the completion of loading or unloading and PRIOR to starting the main engines, allow the instrument ONE MINUTE to complete its calculations then

1) Read the ship's draughts from one of the displays.

2) Add correction for density if the port water density is **not** 1025.

3) Calculate and apply your normal freshwater allowances.

4) Check that the draught is within limits before sailing.

5) Record the data in the ship's log.

OPERATIONAL CHECKS

The following calibration and maintenance routines are recommended at the specified intervals.

One month after the system is commissioned and calibrated:

1) Carry out a calibration and record the calibration numbers in this instruction manual.

After the first six months and every six months thereafter:

1) Examine the sensors and associated pipework and cables. Make sure that there are no leaks, that the connecting cables are not frayed or damaged, and that the sea valves and the datum test valves, if fitted, operate properly.

2) Carry out a datum check for each sensor. This routine is not available if through hull sensors are fitted.

3) Carry out a calibration check and record the calibration numbers in this instruction manual.

4) Check each display to ensure that the readings are clearly visible, check that there is no ingress of water and that the connecting cables are not frayed or damaged.

THE DISPLAY READINGS

Draught readings are shown on three display panels, the top two always showing draught readings. The bottom panel has two lines of data which show a series of messages relating to stability.

	4 Point System		2 Point System	
1) Top Display	Position	Draught	Position	Draught
	FWD	**4.68m**	**FWD**	**4.68m**
	AFT	**4.64m**	**AFT**	**4.64m**
2) Middle Display	Position	Draught	Dual lines show	
	PORT	**4.63m**	**MEAN**	**4.66m**
	STBD	**4.69m**	**TRIM**	**00.04m h**
3) Bottom Display	Dual lines scroll		Dual lines scroll	
a)	**TONNES TO LIMIT**		**TONNES TO LIMIT**	
	C1 3580 C2 2580		**C1 3580 C2 2580**	
followed by b)	**TRIM**	**00.04m h**	**TRIM**	**00.04m h**
	HEEL	**0.5s**		

Trim followed by "s" to indicate trim by the stern or "h" to indicate trim by the head. Zero indicates that the ship is on even keel
Heel angle in degrees. Direction of heel indicated by "s" to starboard or "p" to port._

followed by c) **PORTC1 00.87m**
STBDC1 00.81m

and d) **PORTC2 00.57m**
STBDC2 00.51m

In a one compartment ship, only values for "**C**" will be shown

SWITCHING ON & OFF

This system is designed to run continuously. There is no provision for routinely switching the equipment on and off.

Units are normally supplied to run on 220V 50-60Hz AC or 110V 50-60Hz AC. Maximum load will not exceed 5 amps.

If the central control unit is to be removed or disconnected then the power supply MUST be switched OFF before disconnecting the system from the mains.

After switching on, each display will show a series of messages before starting normal operation.

FAULT MESSAGES & PROBLEMS

1) SENSOR FAULT

To do its calculations, the system requires all of the sensors to be working correctly. If either a sensor or its wiring fails then the faulty unit will be identified by "**LINE FAULT**" on all of the displays.

Check the wiring and all connections. If the fault persists it is likely that there is physical damage to the sensor, or flooding affecting the electronics or cable.

Fit a service exchange sensor and recalibrate.

2) DISPLAY FAULT

If one display fails it will generally go blank, or it may stop updating. Check another display to see if the rest of the system is still working.

Very occasionally the figures may appear as nonsense. This can be caused by a bad cable connection. Turning the system off and on again may clear this, but all junction boxes and connectors should be checked for loose wires.

If the fault persists fit a service exchange display unit.

If all displays are blank there is either a power cut or a major fault in the central unit. Please contact Malin Instruments for advice and for a visit by a service engineer.

3) POWER FAILURE

In the event of a mains failure, the system will close down automatically. When this happens all the display screens will go blank. When power returns the system will automatically restart.

A series of red lights in the central control unit indicates the presence of low voltage power to the main circuit board, sensors and displays. If any of these lights are not on and there is no general power failure, the adjacent fuse may have blown.

Alternatively if none of the red lights are lit, check that the ship's power supply has not failed, otherwise check the fuse in the mains power terminal in the central control unit. There is also a mains power fuse in the Bridge Display unit.

See Appendix A for suitable replacement fuses.

Please contact Malin Instruments if the fuses continue to blow.

4) READINGS TOO DEEP

a) If variations are intermittent, the error may be caused by airlocks.
Carry out air lock checks as described on Page 14.

b) Alternatively, check for blockages in pipework

c) If the readings are getting steadily deeper over a period of time it may be due to transducer drift.
Carry out a datum test as described on Page 9.

5) READINGS INACCURATE

If readings are inaccurate by a constant amount the calibration may be inaccurate. Recalibrate the system as described on Page 10.

6) READINGS TOO SHALLOW

a) Check that the Sea Valve is fully open.

b) Check that the inlet pipe is not blocked.

If the problem persists please contact Malin Instruments for further assistance.

N.B. When reporting faults as much information as can reasonably be collected helps considerably in diagnosis.

DENSITY

The draught indicator has to be calibrated to **sea water density** as stipulated by United Kingdom legislation. This can lead to problems when reading the draught and calibrating the instrument if the ship is not in sea water, for example in a river estuary or dry dock.

It is still necessary to apply freshwater allowances at the loadline after correcting for local density.

1) ADJUSTMENTS TO SHIP'S DRAUGHT FOR DENSITY

The draught marks of the ship in a **non sea water** port will not give readings that correspond to the draught indicator, therefore they must be corrected to their equivalent sea water readings.

The ship's hydrostatic tables should be used to find the correction factor.

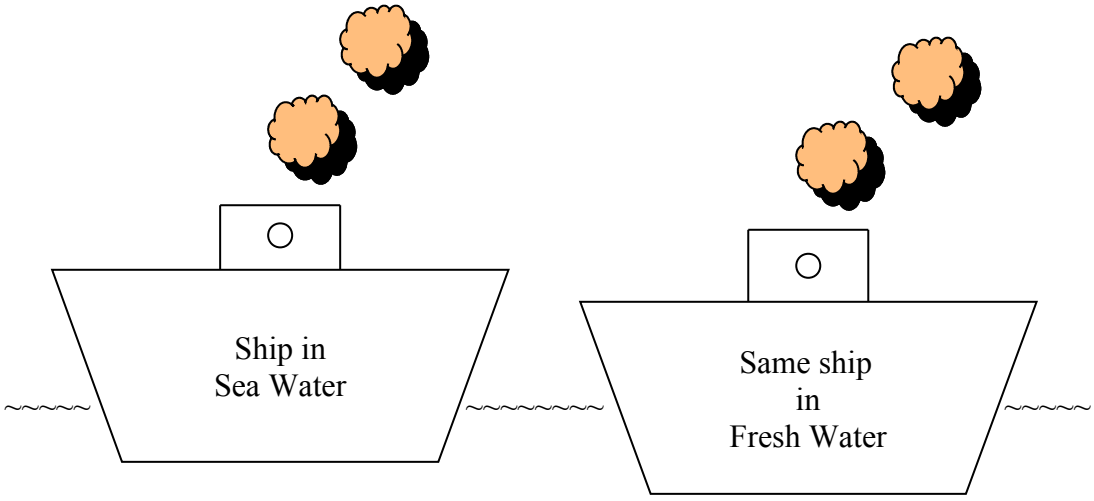
If these tables are not available, an approximation to the sea water draught will be given by the formula:

Ships draught x Port density ÷ 1025 = the draught in sea water

It is essential that this correction is made when comparing the ships marks to the draught indicator if the ship is not in sea water (density 1025).

2) ADJUSTMENTS TO DRAUGHT INDICATOR READINGS FOR DENSITY

The instrument, being calibrated to sea water density, carries out all its calculations on that basis. If the ship is in a non-sea water port another correction factor is required. A different formula is used to the one used to calculate the effect of density on the ship's marks, as the instrument only measures the pressure of a small column of water. The adjustments required are listed in Appendix D on page 21.



DATUM CHECK

This procedure does not apply if through hull sensors are fitted. It is necessary when the inboard sensors in cylindrical nylon housings are fitted, where vent pipes are also installed. The routine is used to check that there is no error in the raw data readings from the depth sensors, and provides data for correction if necessary.

In the central control unit there is a small display, together with a keypad, which are described on page 12. The raw data readings can be shown on this display, together with program menu headings, which are listed in Appendix E on page 21.

PROCEDURE for each individual sensor.

1) Measure the distance from the horizontal centre line of the sensor mounting flange to the test valve which is fitted to the pipework above the sensor.

2) Shut sea valves. Make sure that the sensor is covered and does not get wet when the test valve is opened as water is likely to spray in all directions. Allow water to drain from test valve to leave a fixed head of water at the sensing point.

3) Allow the central control unit to settle for 5 minutes. There is no reason why more than one sensor should not be checked at the same time.

4) Use the **UP** and **DOWN** keys in the control unit to display the **RAW** data for all of the draught sensors. Take a note of these readings.

5) If there is a small variation between the actual and observed readings, which cannot be explained by the local water density, the system calibration should be checked. If the difference between the actual and observed readings is in excess of 10cm the sensor is probably malfunctioning. When a sensor fails the readings will either change by tens of centimetres over a few days or fail suddenly showing Line Fault. In this event fit a service exchange sensor.

6) When the test is complete. Close test valve and open sea valve.

FOR REFERENCE

Heads of water from measurements (vertical distance between sensing point and test valve).

FORWARD	AFT	PORT	STARBOARD
……..	……..	……..	……..

Please ask Malin Instruments for assistance if there appears to be a problem.

CALIBRATION CHECK & RECALIBRATION

INTRODUCTION

When the system is installed the position of the sensors is measured relative to the marks and the longitudinal centre line of the ship. These dimensions together with overall dimensions of the ship are entered in the draught indicator to enable the central control unit to continuously calculate the draughts at the marks, not at the sensing points, together with trim, heel angle and loading conditions.

This data is entered on a copy of drawing No. SB1204, which should be kept in the Central Control Unit with the installation instructions for later reference. It is also entered on the form in Appendix C on Page 18. The results of each calibration check should be entered on this form to show if there is any long-term deterioration.

When checking and calibrating the system the following conditions should be observed.

1) The ship must be floating, it cannot be calibrated when in dry dock.

2) The smoother the sea, the better the result.

3) As the draught indicators have to show the sea water draught, calibration preferably should take place in a port with a density of 1025. (If the density is not 1025, the actual density will be needed in the calculations to correct draughts as they are read).

4) The ship is in a steady state at rest (i.e. neither loading nor unloading) and as near as possible on an even keel.

5) Taking readings from the draught indicator and ship's marks at the same time gives a more accurate result. (This can be achieved buy using two-way radio or alternatively by recording draughts from the display every minute while similar readings are being recorded from the marks and later comparing the figures).

PROCEDURE

To calibrate the system it is necessary to have two complete sets of draught readings, one taken visually from the ship's marks, and one read from the draught indicator displays.

The calibration routine corrects the displayed values to equate to the actual draught.

1) Read the ships marks Forward, Aft, Port and Starboard to obtain the draught figures required to check the calibration.

If berthing restricts viewing and only one midship draught can be read, note the Heel Angle (θ) and calculate the opposite draught using the formula

(Beam at the midship marks) x Tan (θ) = Correction

This correction should be added or subtracted from the draught, which has been read to give the draught for the other side. The mean can then be calculated.

If neither midship draught can be read, it can be worked out by measuring from the loadline to water level. Note that the mean of the Forward and Aft draughts will not give an accurate value for the midships draught due to the effects of Hog and Sag.

If a ship has 2 sets of Aft marks on Port and Starboard quarters then the mean of the two figures should be taken.

2) At the same time note the corresponding values displayed on the draught indicator system.

3) If ship is not in sea water (density 1025).

First correct the readings of the ships marks to give the equivalent draught in sea water using the ship's hydrostatic tables as described on page 8.

Then correct the displayed draught indicator readings using the table provided in Appendix D.

4) Having obtained the two sets of corrected figures, any variations have to be adjusted by calibrating the draught indicator using the following routines.

A typical set of figures for a 4 point system might be:

Reading	Ship's mark	Draught indicator	Calibration value
FWD	5.40m	5.30m	+ 0010
AFT	5.30m	5.35m	– 0005
PORT	5.34m	5.25m	+ 0009
STBD	5.36m	5.27m	+ 0009

Use these 4 calibration values, with a note of whether the draught indicator figures were too deep or too shallow for each point, and enter the figures into the central control unit.

5) Remove the front cover from the central control unit. The position of the small display and keypad is shown on the sketch on the next page.

The raw data readings can be shown on this display, together with program menu headings, which are listed in Appendix E on page 21.

6) Press the **ENTER** key and the display will change to **Select Menu Calibrate**
Press **ENTER** again to select the **Calibrate** menu.

7) The display will now show **Enter Code New value = 0.**

Access to the menu is pass coded, and the correct code number must be entered before proceeding. The pass code for the calibration menu is **-25.**

Use the **DOWN** key to change the value from **0** to **-25.**

Note that if the **DOWN** key is pressed and held down the value will change slowly until 10 is reached, and then in steps of 10.

When the value is set at **-25** press the **ENTER** key. The display will now show the calibration density **Density Value = 1025**

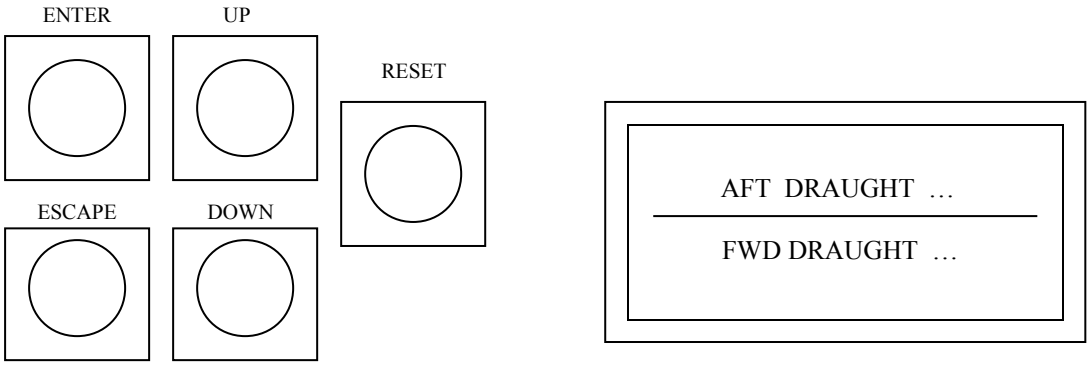
8) Press the **UP** key and the display will change to **Stbd Cal. No. Value = n** (where **n** is the current programmed calibration number).

9) To change the Starboard calibration number press the **ENTER** key and the display will change to **STBD Cal. No. New value = n**
Use the **UP** and **DOWN** keys to change to the required calibration number and then press the **ENTER** key to save this.

10) Use the **UP** and **DOWN** keys to select the menu headings for the Forward, Aft and Port calibrations and if necessary alter each of these in turn using the same routine.

11) Press the **ESCAPE** key twice to return to the top level menu, and then close the cover on the control unit.

DIAGRAM SHOWING THE CONTROL UNIT KEY PAD AND DISPLAY



KEYPAD TWO LINE DISPLAY

REPLACEMENT OF SENSORS

The following procedure must be followed when a sensor is changed. When fitting Service Exchange Sensors the old units must be returned to Malin Instruments for credit.

1) Make a note of the **Tx** and **TG** figures on the new sensor for entry in the control unit.

2) If stainless steel through hull sensors are fitted first raise these to the limit of the safety strop to clear the sea valve. Grease may be applied to lubricate the 'O' ring seals, and M18 bolts may be used to help start to lift the sensor if it is stiff.
With both types of sensor, close the sea valve and disconnect the signal cable.

3) Unbolt and remove the old sensor and fit the new sensor in its place. When fitting a sensor in a nylon housing check that the nylon screws are tight, if using through hull sensors refit the safety strop. Reconnect the electrical plug and socket.

4) Open the sea valve and check for leaks. Then lower and secure through hull sensors.

5) Remove the front cover from the Central Control Unit. The position of the small display and the keypad is shown on the sketch at the top of the previous page.
The raw data readings can be shown on this display, together with program menu headings, which are listed in Appendix E on page 21.

6) Press the **ENTER** key and the display will change to **Select Menu Calibrate**

7) Use the **UP** and **DOWN** keys to select **Setup** and then press **ENTER**

8) The display will now show **Enter Code New value = 0.**
Access to the menu is pass coded, and the correct code number must be entered before proceeding. The pass code for the setup menu is **-115.**
Use the **DOWN** key to change the value from **0** to **-115.**
Note that if the **DOWN** key is pressed and held down the value will change slowly until 10 is reached, and then in steps of 10.
When the value is set at **-115** press the **ENTER** key.
The display will now show **Aft gain Value = 1000**

9) Use the **UP** and **DOWN** keys to select the appropriate sensor, i.e. Aft, Fwd, Port or Stbd, which is being replaced and then press the **ENTER** key.
Use the **UP** and **DOWN** keys to enter the new value for the gain for this sensor and then press **ENTER**

10) Now use the **UP** and **DOWN** keys to select **Tx Offset** for the same sensor.
Use the **UP** and **DOWN** keys to enter the new value for the offset and then press **ENTER.**

11) When both values have been set and entered correctly, press the **ESCAPE** key twice to return to the top level menu and then close the cover on the control unit.

12) Check that the system is functioning correctly. If necessary check and recalibrate the system.

AIR LOCK CHECKS

If an air lock develops in the pipework below the draught sensor an increased reading will be observed. Similarly an air lock can form in the vent pipe if it does not rise continuously to deck level. If the display readings suggest an unexpected hog or sag, or a reading appears to be too deep a check should be made for air in the system. Provided careful attention has been given to venting, air locks should not occur. If there is a persistent problem we recommend that the pipework is modified.

1. Close the valve at the suspected measuring point.

2. Carefully open the test valve above the sensor unit. Make sure that the sensor does not get wet as water is likely to spray in all directions.

3. Loosen the M16 bolts fixing the sensor and allow all water to drain from the system.

4. When drained, open the sea valve a little, to refill the pipework. Let the water flow freely before tightening the M16 bolts and closing the test valve. The sea valve can then be fully opened.

5. If there is only a small flow of water it is likely that the penetration or sea valve is partially blocked. Remove the sensor before trying to clear this.

DRY DOCKING PROCEDURE

When the ship enters a dry dock it is essential that the following procedures are carried out.

All sea valves connected to draught indicator sensors must be closed after draining down to prevent damage to the transducers from such shipyard activities as shot blasting, or the accumulation of paint or rubbish in the pipes which could lead to failure of the system.

If welding operations are required adjacent to any draught indicator equipment extreme care must be taken. **A welding current earthed through our equipment will destroy the electronics and transducer.** If welding is to be carried out on the vent pipes, the sensor unit MUST be detached.

When the ship refloats, all sea valves and valves to vent pipes must be open for the system to function. The test valve must be closed.

The opportunity should be taken to clear pipework of all marine growth.

We recommend that the sensors are removed during dry-docking, and are replaced in their correct positions before floating out. Note that great care must be taken not to damage the sensor. **Do not remove the protective grease and do not try to clean the surface of the transducer**

Appendix A – **SPARES**

Sensors

Service exchange draught sensors comprising pressure transducers with pre-calibrated electronics are available from Malin Instruments. The old sensor must be returned for credit, or for warranty claims.

The appropriate type should be specified on your order. These are either a nylon housing for inboard mounting, or a stainless steel tubular mounting for through hull systems.

Sensor Cable Socket

IP68 two way cable sockets are used to connect the ship's cable to the draught sensor. These are available from Malin Instruments, reference L020.

Control Unit PCB plugs for Displays and Sensors

3 way plugs to connect sensors and displays to the Central Control Unit circuit board are available from Malin Instruments, reference L088.

Fuses

All fuses are standard 20mm type, and are available from Malin Instruments as shown.

The mains input fuse is located in the mains terminal near the bottom left of the chassis plate in the Central Control Unit cabinet. There is also a mains fuse in the Bridge Display unit.

Control Unit:
    20mm 2A anti surge, DT ref. G035
Bridge Display:
    20mm 100mA anti surge, DT ref. G016

Low voltage fuses on the main circuit board are listed below. In each case there is a red LED light next to the fuse holder, this will not be lit if the fuse has blown.

5V & 24V Power:
    20mm 1A anti surge, DT ref. G003
Draught Sensor:
    20mm 50mA anti surge, DT ref. G139
Displays:
    20mm 315A anti surge, DT ref. G138

Appendix B – **ELECTRICAL CONNECTIONS**

1) CENTRAL CONTROL UNIT

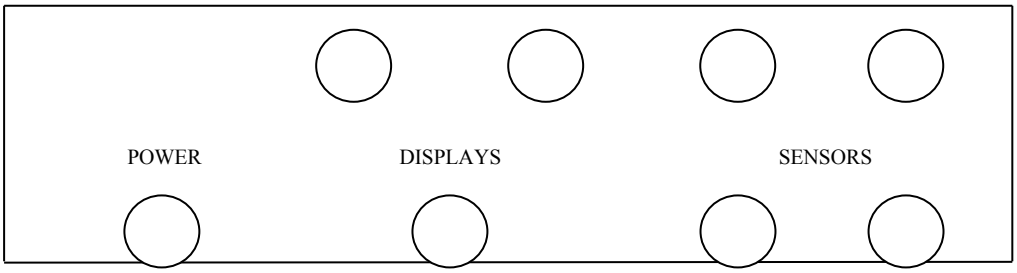
Mains power at either 220V or 110V 50-60Hz is connected to the terminal block near the bottom left hand side of the chassis plate in the control unit cabinet.

Connections from the sensors and displays to the PCB are made using polarised orange coloured plugs supplied with the system into the sockets on the edge of the circuit board. The connections are all named. It is essential that the sensor and display cable screens go to the terminal marked **G,** and the other conductors go to the terminals marked **L.**

Connections to all displays are interchangeable. Up to 5 displays can be connected through one terminal in the central control unit if required,

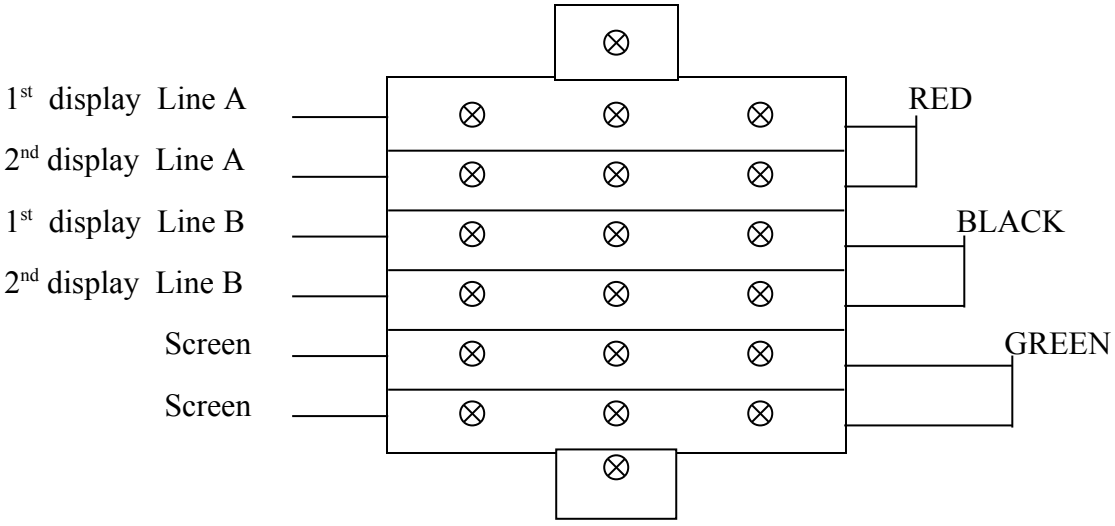
NOTE THAT THE CABLE SCREENS MUST NOT BE GROUNDED AT ANY POINT

This diagram shows the order of connections through the cable glands in the base of the central control unit. If the cable glands have to be enlarged for any reason, ensure that they are properly sealed to avoid contamination in the cabinet.



2) DISPLAY UNITS

Wiring Diagram of terminal block in a normal display unit.



Mains power is also required at the Bridge Display.

RS232 AND BACKLIGHT CONNECTIONS TO BRIDGE DISPLAY UNIT

The components within the Bridge Display unit vary from those in the normal unit if either an RS232 output to a computer or backlit displays are fitted.

The main terminal block for the cable from the central control unit is unchanged.

There are three additional terminals for the power supply to the backlight and RS232 link. These are marked E N L. Connect a suitable 220V AC supplies to these. (Or 110V if specified at time of order). The neutral and live connectors are fitted with 100mA T fuses. If the RS232 link is ordered the connections are made inside the Bridge Display unit.

The RS232 characteristics are Baud 1200, No parity, 8 data bits (bit 8 masked), 1 stop bit. The data string comprises all the messages on the displays, including start up and fault messages, in straightforward ASCII test. Text strings are of variable length and are generally separated by the hex character "0C". For further program details please refer to Malin Instruments.

The backlighting is powered by the 220V AC supply (optionally 110V AC). If an RS232 link is installed it is also powered from the mains supply.

The backlight is operated by a switch on the side of the display case, or in the case of a console mounted unit, by a switch mounted adjacent to the bridge display.

CIRCUIT BOARD CONNECTIONS

In the event that any wires become detached from the display circuit board in the lid of the Bridge Display unit, they should be reconnected to the terminals as shown. In a deck display unit only the Red and Black wires to terminals "A" and "B" are connected.

	Blue	to backlight switch
	White	to backlight switch
	Black	to RS232 Ground
	Yellow	to RS232 Signal
	Black	to main terminal block "B"
	Red	to main terminal block "A"
3 Core mains cable		
	Green	Mains Earth
	Blue	Mains Neutral
	Brown	Mains Live

Appendix C – **SHIP'S DATA**

SENSOR RELATIVE POSITIONS

All measurements in metres. On 2-point systems port and starboard sensors are not fitted.

	Sensor to keel	* Projection	** Offset
FWD		a/f	p/s
AFT		a/f	p/s
STBD		a/f	s
PORT		a/f	p

* Indicate if sensor is sited forward or aft of the marks
** Indicate if sited to port or starboard of the centre line

Distance between forward and aft sensors is …… metres

Moulded breath …… metres

TPC entered is …….. (The value for the ship when fully laden)

LOCATION OF EQUIPMENT

Central Control Unit ……

Aft Sensor ……

Forward Sensor ……

Port Sensor ……..

Starboard Sensor …….

No. of Display …… Located at 1) ……..

2) ……..

3) ……..

4) ……..

5) ……..

CALIBRATION NUMBERS

A record of the calibration numbers being used in the system.

Date	FWD	AFT	STBD	PORT	Comments

A record of the calibration numbers - Continued

Date	FWD	AFT	STBD	PORT	Comments

Appendix D – **DENSITY CORRECTIONS**

For draught indicator readings when the ship is not in sea water (1025). Any freshwater allowances should then be added to the corrected figure.

ADD TO DRAUGHT READING

Density	1000	1005	1010	1015	1020	1025	1030
FWD						0.00	
AFT						0.00	
PORT						0.00	
STBD						0.00	

Appendix E – **PROGRAM MENU**

These program menus are available for setting up the draught indicator, and can only be accessed on the small display in the central control unit (See diagram on Page 12).

See Page 9 for Datum Check, Pages 10-12 for Calibration Check and Recalibration, and Page 13 for Replacement of Sensors, which describe the use of these programs.

1) SYSTEM
   - a) Calibration Access No. – 0025 (minus 0025)
   - b) Set Up Access No. – 0115 (minus 0115)
   - c) Test

2) DENSITY

3) PRINTER Not available

4) DRAUGHT
   - a) AFT
   - b) FWD
   - c) Port *
   - d) Stbd *
   - e) MEAN
   - f) TRIM
   - g) Heel *
   - h) Displacement *
   - i) Port C1 *
   - j) Stbd C1 *
   - k) Port C2 *
   - l) Stbd C2 *
   - m) To limit *

* System options – may be blank

SUB MENUS

1a) Calibration Access number required – 0025
   1) Density
   2) Aft cal No
   3) Fwd cal No
   4) Port cal No
   5) Stbd cal No

1b) Set up Access number required – 0115
   1) Aft tx gain
   2) Fwd tx gain
   3) Port tx gain
   4) Stbd tx gain
   5) Aft tx offset
   6) Fwd tx offset
   7) Port tx offset
   8) Stbd tx offset
   9) Aft S-K
   10) Fwd S-K
   11) Port S-K
   12) Stbd S-K

13) Aft cal No
14) Fwd cal No
15) Port cal No
16) Stbd cal No
17) Aft proj
18) Fwd proj
19) Port proj
20) Stbd proj
21) Aft – Centre
22) Fwd – Centre
23) Port Lat. Proj
24) Stbd Lat. Proj
25) Port to Stbd
26) C1
27) C2
28) Tonnes per cm
29) Display Rate
30) Density
31) Serial number

1c) Test Access number required
1)
2)

Appendix F – **ADDITIONAL EQUIPMENT**

DRAUGHT INDICATOR PRINTER

This is a separate panel mounted printer with a backlit display screen. There are button switches marked “up”, “down” and “enter”, together with one for the backlight. It would normally be fitted on the bridge near the bridge display unit.

SETTING THE TIME

When the unit is powered up the year must be set and the date and time confirmed. A prompt will appear on the screen as follows:

Set year
00

Use the “up” and “down” arrows to set the year, then press “Enter” to accept. The next prompt asks for the date, then the month, followed by the hour and then minutes. Once the time is set the unit will display the current date and time along with a brief message which scrolls along the top part of the screen.

OBTAINING A PRINTOUT OF THE SHIPS DRAUGHT

Whilst the unit is receiving data from the draught indicator CCU the keys will be ignored. Whilst this is happening the scrolling message will also pause.

Holding any key whilst the unit is receiving data will not interrupt this process but will allow the menu to be displayed as soon as the current data stream is complete. When this happens the menu heading will appear on the top line of the screen.

Releasing the depressed key will display the option “Depart” on the bottom line of the display. Pressing the “Enter” key once more will present the heading “Select Dep. Port”. Use the “up” and “down” keys to select the port from which the vessel is about to depart. These ports are listed in alphabetic order. Once the required port is displayed press “Enter”.

The heading “Select Des. Port” is now presented. Use the “up” and “down” keys to select the required destination port and press “Enter” to confirm.

The following prompt, “Select Condition” asks for the number between 0 and 255 which corresponds to the given loading condition for the vessel.

Having selected this, press “Enter” and the printer will start. On completion the display screen will return to show the date and time.

The next time “Depart” is selected these departure and destination ports will be remembered but reversed so that a return journey can be selected by simply pressing “Enter” to select each of these ports. If the route is changed, reselect the required ports.