

## PART 5 - OPTIONS

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## PART 5 - OPTIONS

### 5.1 SYSTEM EXPANSION

The Hydra 2000 System may be expanded to provide a wider range of facilities and features by the addition of further displays, sensors, and interfaces. These Options are described in the following Paragraphs.

### 5.2 SENSORS

There are four linear inputs into the Main Processor which enable further sensors to be connected. In addition, the Expansion Unit which has 12 extra inputs is also available.

#### 5.2.1 Trim Angle Sensor

Provides measurement of the boat's trim, using a clinometer.

#### 5.2.2 Mast Rotation Sensor

This is essential if your mast rotates, otherwise you lose all the wind angle functions. The addition of this unit gives two new functions, the Wind Angle to the Mast (W/A MAST) and Mast Angle (MAST ANG)

#### 5.2.3 Heel Angle Sensor

By sensing **Heel Angle** and applying this value with that of the functions of **Course** and **Dead Reckoning**, **Leeway** can be calculated.

#### 5.2.4 Barometric Pressure Sensor

Measures the atmospheric pressure, allowing the Main Processor to record atmospheric pressure changes over varying periods of time displayed as pressure trend.

#### 5.2.5 Rudder Angle Sensor

The addition of a Rudder Angle sensor can be very useful, indicating how the boat is balanced.

### 5.2.6 Sea Temperature Sensor

Measures the sea water temperature.

### 5.2.7 Air Temperature Sensor

Measures local air temperature.

### 5.2.8 Load Cells

Facility is also provided for the input of load cell data. The load cells should provide an output of 0-6.5 volts.

### 5.2.9 Sensor Input Configuration

Additional sensors can be added to the system by connecting to one of the four linear inputs on the Main Processor or the additional inputs on the Expansion Unit. These can be configured to take different sensors. If you connect the sensor to the linear input that B&G have anticipated then you need take no action beyond the connection itself, since the default linear input configuration will be the right one. The default settings for the four inputs on the Main Processor are as follows:

Linear 1 = Heel Angle  
Linear 2 = Trim Angle  
Linear 3 = Barometric Pressure  
Linear 4 = 0 to 1000 format

Should you wish to connect one of the other sensors, then you will have to reconfigure the linear channel that you are connecting it to. This is done by following the menu path:

**MISC ® LINEAR X, CALBRATE ® CAL VAL1**

The number you enter to CAL VAL1 should correspond to the sensor you are connecting as follows:

1 = Normal Linear output 0-1000  
2 = 152 Wind Speed  
3 = Mast Angle Sensor  
4 = Heel Angle Sensor

- 5 = Trim Angle Sensor
- 6 = Barometric Pressure Sensor
- 7 = Rudder Angle Sensor

**Note**

Do not select the same number on more than one linear input, otherwise the selection will be ignored (no function can be connected to more than one input).

### 5.3. ANALOGUE INDICATORS

#### 5.3.1 Options Available

Type of Indicator	Scale	B&G Part Number
Boat Speed	0 to 12.5 knots	215-HL-019
Boat Speed	0 to 25 knots	215-HL-058
Boat Speed	0 to 50 knots	215-HL-154
Wind Speed	0 to 25 metres/second	215-HL-071
Wind Speed	0 to 50 knots	215-HL-022
Wind Direction	360° wind direction	215-HL-016
Magnified Wind Direction	40-0-40 degrees	215-HL-017
Head/Lift Trend*	40-0-40 degrees	215-HL-152
Depth	0 to 200 metres	215-HL-025
Depth	0 to 100 Ft/fathoms	215-HL-026
Compass Card	360°	215-HL-142
Cross Track Error (XTE)	10-0-10 nautical miles	215-HL-119
Off Course*	40-0-40°	215-HL-151
Heel Angle	40-0-40°	215-HL-160
Rudder Angle	40-0-40°	215-HL-158

Table 5.1 - Analogue Indicators Available

Up to four different types of analogue indicators, selected from the range listed in Table 5.1 can be added to the system. If more analogues are required then the Expansion Unit can be used, allowing another four indicators to be added to the system.

**Note**

Items marked with an asterisk are only available with the Halcyon Display.



### 5.3.2 Analogue Indicator Configuration

If meters other than the defaults are chosen then it is necessary to reconfigure the outputs. This is done from any FFD as follows:

- (1) Power up the system from any FFD while holding down the **Enter** Key, DIAGNOST appears.
- (2) Press **Scroll Up**, CNFG SYS appears, press **Enter** to select this option. Now press **Enter** again to select the METERS option.
- (3) With OPTIONS flashing, press **Enter**, METER 1 appears, the **Scroll Up** Key is now used to scroll through the meter outputs. (Refer to the installation sheet to determine the meter options and their respective meter drives).
- (4) With the appropriate meter output flashing in the top display, press **Enter** to reveal the current option assigned to that meter. Pressing **Scroll Up** at this stage, and then **Enter** again, will reveal the METER 2 option. Repeating this process will reveal the METER 3 and METER 4 options as required.
- (5) Press **Enter**, the lower text will flash. Use **Scroll Down** to scroll through the options until the appropriate one (e.g. DEPTH) is shown. Pressing **Enter** will select that option, and the meter output will be configured to drive a DEPTH meter.
- (6) Press **Page** to return to normal operation.

#### Note

It is possible to configure more than one meter drive to the same meter option (e.g. BOAT SPD on METER 1 and METER 2).

### 5.3.3 Meter Scaling

Meter scaling can also be varied for boat speed and wind speed. For example if a 25 knot full scale Boat Speed Meter is required, this can be done as follows:

- (1) Follow steps (1) and (2) as detailed in Para 5.3.3.
- (2) With OPTIONS flashing, press **Scroll Up** to reveal SCALING and press **Enter**, BOAT SPD will appear. A further press of **Enter** will reveal the current maximum meter scale value for the Boat Speed Meter.
- (3) To change this (e.g. to 25 knots) press **Enter** and then **Scroll Up** to increase the number to 25.0. A final press of **Enter** will then enter the new maximum scale. The Boat Speed Meter will read between 0 and 25 knots.
- (4) Press **Page** to return to normal operation.

### 5.4 GRAVITY SWITCH

In installations where two speed sensors or depth transducers are fitted a gravity change over switch can be fitted to automatically select the leeward sensor. A switch on the outside of the unit overrides the automatic selection if required, for example when calibrating the individual speed sensors.

### 5.5 AUDIBLE ALARM

The Main Processor contains a relay switch for an external audible alarm if required.

## 5.6 20/20 DISPLAY

### 5.6.1 The Display

The 20/20 is a fully programmable, single function, large digit, display which may be installed anywhere in the yacht.



Fig 5.1 - 20/20 Display

### 5.6.2 Display Configuration

The 20/20 may be configured to display any function available on your Hydra 2000 System. It is however provided with 14 pre-set functions which may be selected by use of a Remote Button connected to the display or via any FFD on the system.

The pre-set functions are as follows:

Boat Speed	Depth m
Depth ft	Apparent Wind Speed
Apparent wind Angle	True Wind Speed
True Wind Angle	Velocity Made Good
True Wind Direction	Timer Count Up/Down
Compass heading	Course Over Ground*
Bearing to Waypoint*	Speed Over Ground*

#### Note

Functions marked with an \* are NMEA Functions and are available only when a suitable Position Fixer is interfaced with the system.

### 5.6.3 Function Selection - Remote Push-Button

If a Remote Button is connected to a 20/20 Display any one of the 14 pre-set functions may be selected by pressing and holding down the associated Button. The Display will then cycle through the functions. When the required function is displayed, release the Button.

If the Button is held down too long and the required function is missed, press and hold down the Button again. The Display will then cycle through the functions in reverse order. When the required function is displayed, release the Button.

### 5.6.4 Function Selection - FFD

An alternative to using a dedicated Remote Push-button, is to control the 20/20 using any one of the standard FFDs on the system. Any 20/20 can be controlled from any FFD.

To change the function displayed on a 20/20 using a standard FFD, proceed as follows:

- (1) At the FFD, press and hold down the **Page** Key for at least 3 seconds. The FFD Display will change to show the function displayed on the 20/20 together with the display number. The selected Display will start to flash.
- (2) Using the **Scroll Down** Key cycle through the 20/20 numbers and select the required Display Number.
- (3) Using the **Scroll Up** Key cycle through the 14 pre-set functions until the required function is displayed on the FFD. Release the **Scroll Up** Key.
- (4) If the function is missed, press and hold down the **Scroll Up** Key and the functions will cycle through in reverse order. Release the **Scroll Up** Key when the required function is displayed.
- (5) Press the **Page** Key. The FFD will now return to normal operation and the 20/20 will display the selected function.



### 5.6.5 Re-configuring 20/20 Display

In addition to the 14 pre-set functions, any one of the 20/20 Displays may be re-configured to show any other function available to the system. This feature allows any 20/20 to be set-up to show the information most useful to the user at that station in the yacht.

The procedure for re-configuring a 20/20 function is as follows:

- (1) At the FFD, press and hold down the **Page** Key for at least 3 seconds. The FFD will change to show the function displayed on the 20/20 together with the display number.
- (2) Using the **Scroll Down** Key, cycle through the 20/20 numbers and select the one required.
- (3) Using the **Scroll Up** Key select the function you wish to change.
- (4) Press the **Enter** Key and the function currently being displayed on the 20/20 will start to flash.
- (5) Press and hold down the **Scroll Up** Key and cycle through the normal FFD Menu until the required function choice is displayed (e.g. NAVIGATE).
- (6) Press and hold down the **Scroll Down** Key until the required operational choice is displayed (e.g. COURSE).
- (7) Press the **Enter** Key to accept the selection.
- (8) Press the **Page** Key and the FFD will return to normal operation and the 20/20 displays the newly configured page.

#### Note

Latitude and Longitude are not available on a 20/20 Display.

## 5.7 40/40 DISPLAY

### 5.7.1 The Display

The 40/40 is a fully programmable, single function, large digit, display which may be installed anywhere in the yacht.



Fig 5.3 - 40/40 Display

### 5.7.2 Display Configuration

The 40/40 may be configured to repeat any function (except latitude/longitude) available on your Hercules 2000 System. It is however provided with 14 pre-set functions that may be selected by use of a remote push-button connected to the display or via any FFD on the system.

The pre-set functions are as follows:

Boat Speed	Depth m
Depth ft	Apparent Wind Speed
Apparent wind Angle	True Wind Speed
True Wind Angle	Velocity Made Good
Compass heading	Timer Count Up/Down
Bearing to Waypoint*	Course Over Ground*
Speed Over Ground*	True Wind Direction

#### Note

Functions marked with an \* are NMEA Functions and are available only when a suitable Position Fixer is interfaced with the system.





### 5.7.3 Function Selection - Remote Push-Button

If a remote push-button is connected to a 40/40 display any one of the 14 pre-set functions may be selected by pressing and holding down the associated button. The display will then cycle through the functions. When the required function is displayed, release the button.

If the button is held down too long and the required function is missed, press and hold down the button again. The display will then cycle through the functions in reverse order. When the required function is displayed, release the button.

### 5.7.4 Function Selection - FFD

An alternative to using a dedicated remote push-button, is to control the 40/40 using any one of the standard FFDs on the system. Any 40/40 can be controlled from any FFD.

To change the function shown on a 40/40 using an FFD, proceed as follows:

- (1) At the FFD, press and hold down the **Page** Key for at least 3 seconds. The FFD display will change to show the function displayed on the 40/40 together with the display number. The selected display will start to flash.
- (2) Using the **Scroll Down** Key cycle through the 40/40 numbers and select the required display number.
- (3) Using the **Scroll Up** Key cycle through the 14 pre-set functions until the required function is displayed on the FFD. Release the **Scroll Up** Key.
- (4) If the function is missed, press and hold down the **Scroll Up** Key and the functions will cycle through in reverse order. Release the **Scroll Up** Key when the required function is displayed.
- (5) Press the **Page** Key. The FFD will now return to normal operation and the 40/40 will display the selected function.



### 5.7.5 Re-configuring the 40/40 Display

In addition to the 14 pre-set functions, any 40/40 pre-set function may be re-configured to show any other function available to the system. This feature allows any 40/40 to be set-up to show the information most useful to the user at that station in the yacht.

The procedure for re-configuring a 40/40 function is as follows:

- (1) At the FFD, press and hold down the **Page** Key for at least 3 seconds. The FFD will change to show the function displayed on the 40/40 together with the display number.
- (2) Using the **Scroll Down** Key, cycle through each 40/40 display in turn (display flashes) and stop at your desired choice.
- (3) Using the **Scroll Up** Key select the function you wish to change.
- (4) Press the **Enter** Key and the function currently being displayed on the 40/40 will start to flash.
- (5) Press and hold the **Scroll Up** Key and cycle through the normal FFD Menu until the required function choice is displayed (e.g. NAVIGATE).
- (6) Press and hold the **Scroll Down** Key until the required operational choice is displayed (e.g. COURSE).
- (7) Press the **Enter** Key to accept the selection.
- (8) Press the **Page** Key and the FFD will resume normal operation and the 40/40 displays the newly configured page.

## **5.8 HALCYON 2000 COMPASS**

The Halcyon 2000 Compass is a high performance electronic transmitting compass connected to your Hydra 2000. Heading information may be selected for display on any of the FFDs or on a Halcyon Display. Moving card type analogue indicators are available as an option.

The Halcyon 2000 software allows the compass to compensate for the magnetic fields in the vessel that may cause deviation errors. These errors can be reduced significantly by following the Calibration procedure described in Part 3.

## **5.9 HALCYON DISPLAY**

The Halcyon Display is a dedicated electronic compass display which may be connected to your Hydra 2000 System in a similar manner to an FFD. The display provides clear and accurate digital indication of compass heading information together with a bar graph indicating port and starboard off-course error relative to a set course. The display area is split into three. The three large digits in the upper left part always show compass heading.

A bar graph indicator, below the compass heading display, will show deviation from the set course as segments of bar graph to the left or right of the zero centreline. This provides an immediate indication of the vessel being off-course to port or starboard. This off course value is also shown numerically below this display.

Four rows of text are provided down the right-hand side of the display. Each row is associated with the adjacent key and indicates the selected operating function and the various settings.

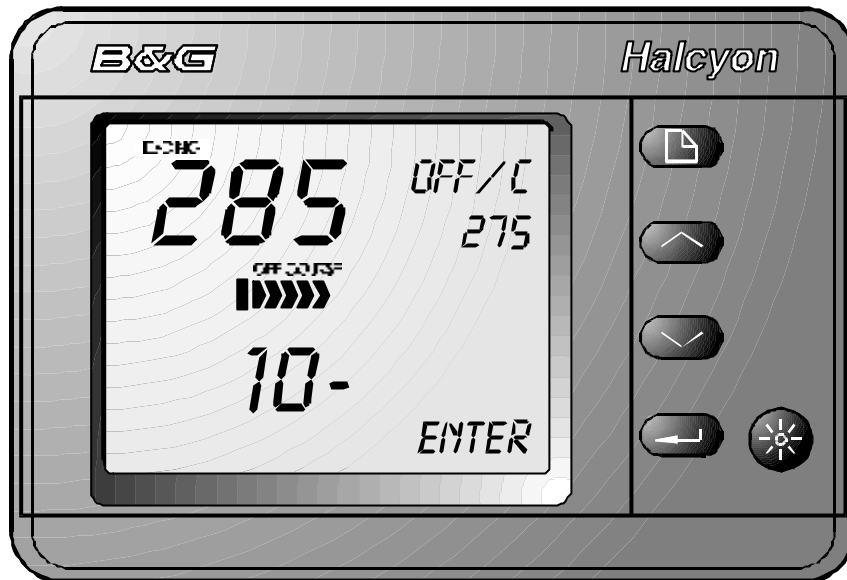


Fig 5.3 - Halcyon Display

### 5.9.1 The Keys

The Halcyon Display is provided with the following five keys:

- Power/Lights Key
- Page Key
- Scroll Up Key
- Scroll Down Key
- Enter Key

### 5.9.2 Power/Lights Key

The Power/Lights Key is operated in an identical manner to the Power/Lights Keys provided on the FFDs, see Part 2 - Operating Information.

### 5.9.3 Page Key

Successive pressing of the **Page** Key will access the following four functions in a fixed order:

- |                 |               |
|-----------------|---------------|
| Off Course      | Stored Course |
| Head Lift Trend | Turn Rate     |

### 5.9.4 Off Course Function

The Off Course function provides the helmsman with accurate Off Course information to assist in steering a steady and accurate course.

Off Course is calculated by comparing the yacht's current heading with a previously set reference heading. The deviation is shown by the bar graph and numerically as degrees port or starboard.

The bar graph scale shows one segment for every 2° off course up to 10°, then one segment for every 5° up 20°. If the current heading is the same as the desired heading then only the central segment will be shown. The numeric display will show **00**.

The Off Course function may be reset by pressing the **Enter** Key, operation of a Remote Push-button if fitted or from any FFD. Pressing the **Enter** Key or Remote Push-button will select the current heading as the reference heading.

Any deviation from this new course will be shown on the bar graph and the numerical display.

To reset the off course function from an FFD, select the NAVIGATE Menu and then OFF CRSE as described in Part 2 - Operating Information.

### 5.9.5 Stored Course Function

Up to 10 preset courses, numbered CRS 1 to CRS 10, may be stored at any one time. When the Stored Course function is selected by operation of the **Page** Key the display changes to show the selected course number with the value immediately below. All courses are retained in the Halcyon Display memory during power off so that the desired courses may be entered prior to departure.

To select a specific course number proceed as follows:

- (1) Select the Stored Course Function by successive presses of the **Page** Key until the display shows the Stored Course Function.
- (2) Press **Scroll Up** and CRS 1 will flash.

(3) Using the **Scroll Up** and/or **Scroll Down** Keys select the course (CRS) number required.

(4) Press the **Enter** Key to enter the selected course as the reference.

To change the value of any stored course proceed as follows:

(1) Select the Stored Course Function by successive presses of the **Page** Key until the display changes to show the Stored Course Function.

(2) Press the **Scroll Down** Key and the stored value of the course selected will flash.

(3) Using the **Scroll Up** and **Scroll Down** Keys change the value to the new course.

(4) Press the **Enter** Key to enter the new course.

### 5.9.6 Head/Lift Trend Function

This function is particularly useful to racing yachtsmen when sailing upwind. A port and starboard reference course can be set-up for each tack with reference to the current mean wind direction. They are then used to calculate whether the vessel is being 'lifted' or 'headed' and by how much. This is displayed graphically as well as numerically together with the legends LIFT or HEAD which indicate if the heading is above or below the reference course on the present tack.

Under steady conditions it should only be necessary to set-up this function once, preferably prior to the start of a race. If, however significant wind shifts occur it will be necessary to reset the port and starboard references.

A key benefit of this feature is that each time a tack is made or when rounding a leeward mark onto the wind again, there is an instant indication as to the current wind trend.

#### Note

The reference heading for a particular tack may be reset any number of times. For example if there is a long upwind leg,

resetting the reference at the start of the leg will then give the head and lift trends from that point onwards.



### **5.9.7 Set-up Port and Starboard References**

In this application the Halcyon Display will always know whether the current tack is port or starboard since it is linked to your Hydra 2000 System. PORT or STARB will be indicated on the display.

To set-up the port reference, sail the vessel on port tack until the current heading is giving the optimum upwind performance relevant to the current mean wind angle. Press the **Enter** Key (or Remote Button if fitted) and the port reference is now set.

To set-up the starboard reference repeat the above procedure on the starboard tack.

### **5.9.8 Head/Lift Trend - FFD**

The Head/Lift trend indication can be shown on any FFD in a similar manner to Off Course information.

This function can be found on any FFD in the WIND Menu under LFT/HDR. It may be selected for display in the normal way and configured for any FFD pages as required, see Part 2 - Operating Information.

The Head/Lift Trend may be reset for the current tack by selecting CONTROL on the LIFT/HDR function and then RESET. This will reset the trend on all displays and, if fitted, the analogue indicator.

#### **Note**

If the Halcyon Display is not in the Head/Lift Mode, then Head/Lift trend will indicate OFF.

### **5.9.9 Head/Lift Trend - 20/20 Display**

Head/Lift Trend information may be displayed on any 20/20 Display, see Para 5.7. An L or an H will be displayed adjacent to the digits to signify Lift or Head.

### **5.9.10 Turn Rate Function**

The Turn Rate Function displays the vessel's rate of turn in degrees per second to port or starboard. There are two ways of displaying this information, either as Mean Rate of Turn or as Instantaneous Rate of Turn.

When the Turn Rate Function is selected by pressing the **Enter** Key, the display defaults to Mean Rate of Turn and MEAN is shown on the display.

When MEAN is selected, the present heading is compared with a continually updated mean heading and displayed graphically and numerically as degrees to port or starboard. This will give the trend to right or left of the average heading. Hence, if the heading fluctuates to port and starboard but with a bias to port, then the net trend to port will be displayed. Similarly for starboard.

The Instantaneous Rate of Turn is selected by pressing the **Scroll Down** Key when the Rate of Turn function is selected on the Halcyon Display. When this function is selected the display will change to show DEG/S indicating rate of turn in degrees per second. The centre bar graph will now show the instantaneous rate of turn to port or starboard with the numerical value displayed below.

#### **Note**

This is a useful feature when calibrating the Halcyon 2000 Compass where it is necessary to maintain a steady rate of turn.

## **5.10 EXPANSION PROCESSOR**

### **5.10.1 The Expansion Processor**

The Expansion Unit can be connected to the Hydra 2000 System via the Fastnet to drive four extra analogues (meters 5,6,7 and 8), and provide extra linear inputs.

A new menu automatically appears on all FFD's called EXPAND when an Expansion Processor is added to the system. Up to twelve linear functions may be displayed numbered LINEAR 5 to LINEAR 16. Initially only LINEAR 5 is shown. A linear function by default shows a number between 0, representing 0 volts on its input and 1000 representing 6.5 volts on its input. The voltage change is assumed to be linear in relationship. Hence an external sensor, for example a load cell giving a linear change in voltage as the load increases, may be connected to a linear input.

LINEAR 5 has four calibration values, other linear functions have three calibration values found by selecting CALBRATE on the appropriate linear function.

## 5.10.2 Linear Function Settings

Altering calibration value 1 (CAL VAL 1) allows the correct input sensor to be selected. The different inputs available are shown below:

1 or 2	normal linear input 0 to 1000
3	rotating mast correction for apparent wind angle
4	heel angle
5	trim angle
6	barometric pressure
7	rudder angle
8	air temperature

The default factory setting for a linear input is 1 (0-1000 format).

### Note

Do not set different linear inputs to the same function (except 1 for normal linear input) or the calibration value will be ignored. This ensures that no function uses no more than one analogue input. However, any one of the Linear 1 to 4 inputs from the main processor may be set to the same function as any one of the Linear 5 to 16 inputs.

Calibration value 2 (CAL VAL 2) displays MIN VAL with a number that can be adjusted between -999 and 9999. This is the number to be displayed for a 0V input. The default setting is 000.

Calibration value 3 (CAL VAL 3) displays MAX VAL with a number that can be adjusted between -999 and 9999. This is the number to be displayed for 6.5V input. The default setting is 1000.

## 5.10.3 Calibrating a Linear Channel

Adjusting the MIN and MAX values allows the displayed value to be scaled to the appropriate range for the sensor attached. Taking a load cell for example, if the zero load output is 0V, MIN VAL=000 and if maximum load is 650 kgF at 6.5V then MAX VAL=650.

Calibration value 4 is only available on Linear 5 and this displays a value between 05 and 16. This setting determines the number of linear inputs that are available. For example, changing this value to

10 would display a maximum of 10 linear inputs. The default value is 05.

Damping is adjustable between 0 and 99 seconds. The default setting is 01.

### Notes

1. When calibration value 1 is changed to select a desired input sensor, the linear value is no longer updated and a constant value is displayed until the page key is pressed.
2. Extra functions selected, and then removed, remain in the display menu but with no data shown until the system is switched off and then back on again.
3. Linear functions will always be shown if selected by CAL VAL 4 on linear 5. They will show no data if the CAL VAL 1 setting is configured to 1 or 2.

### 5.9.4 Expansion Processor Wiring

The Expansion Processor is connected to the system Fastnet for power and data requirements.

<b>TERMINAL</b>	<b>FUNCTION</b>	<b>WIRE COLOUR</b>
1	Meter 5 SIN	Green
2	Meter 5 COS	Blue
3	Meter 6 SIN	Red
4	Meter 6 COS	Violet
5	Meter 7 SIN	Red
6	Meter 7 COS	Violet
7	Meter 8 SIN	Green
8	Meter 8 COS	Blue
9	Meter Lighting	Yellow
10	Meter Common	Orange
11	Meter Ground	Black
12	N/C	
13	N/C	
14	Network Data -ve	Green
15	Network Data +ve	White
16	Network Screen	Screen
17	Battery Supply Ground	Black
18	Battery Supply 12V	Red

<b>TERMINAL</b>	<b>FUNCTION</b>	<b>WIRE COLOUR</b>
19	Battery Volts Sense	Link to 18
20	N/C	
21	Ground	Blue
22	Sensor Supply +6.5V	Red
23	Linear 5 Input	Green
24	Linear 6 Input	Green
25	Linear 7 Input	Green
26	Linear 8 Input	Green
27	Linear 9 Input	Green
28	N/C	
29	N/C	
30	N/C	
31	N/C	
32	N/C	
33	N/C	
34	N/C	
35	N/C	
36	N/C	
37	Linear 10 Input	Green
38	N/C	
39	Linear 11 Input	Green
40	Linear 12 Input	Green
41	+12V Switched Supply	Red
42	Linear 13 Input	Green
43	+6.5V Sensor Supply	Red
44	RPM Input	Green
45	Ground	Blue
46	Linear 14 Input	Green
47	Linear 15 Input	Green
48	Linear 16 Input	Green