

## Certification



## Warnings and Precautions

**This system is not bridge-mounted equipment and will not interfere with the safe navigation of any vessel.**

### Warning:

This equipment generates, uses, and can radiate radio frequency energy, which, if not installed and used in accordance with the instructions given, it may cause harmful interference to radio communication. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference, the user is encouraged to try to correct the interference by relocating the equipment or connecting the equipment to a different circuit. Consult an authorized dealer or other qualified technician for additional help if these remedies do not correct the problem.

This device meets the requirements for CFR47 Part 15 of the FCC limits for Class B equipment.

The Digital Loadcell Amplifier system meets the standards set out in European Standards EN 61000-6-3: 2001 for emissions and EN 61000-6-1: 2001 for immunity.

The Digital Loadcell Amplifier system contains no user-serviceable parts. Only a B&G authorized service center should be used to make repairs. Unauthorised repairs or modifications will invalidate your warranty.

### Trademarks:

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## Introduction

Congratulations on your purchase of the B&G Loadcell System. Your new system will assist you to achieving the very best performance from your boat. The Loadcell pin replaces the existing pin, providing a clear indication of rig loads and enabling repeatability of sail trim and rig settings, with the data being viewed on Hydra or Hercules displays.

Before you begin to install and use your new Loadcell System, please take the time to read this manual to help you achieve the full potential from your new system.

It should be noted that up to a maximum of 16 loadcell systems (each Loadcell must have its own dedicated amplifier) may be connected to any one Hydra or Hercules system.

The B&G Loadcell System is designed to be operated only as a 'shear pin'. Any attempt to employ the Loadcell pin outside its designed parameters may result in a failure which could lead to damage to equipment or personal injury.

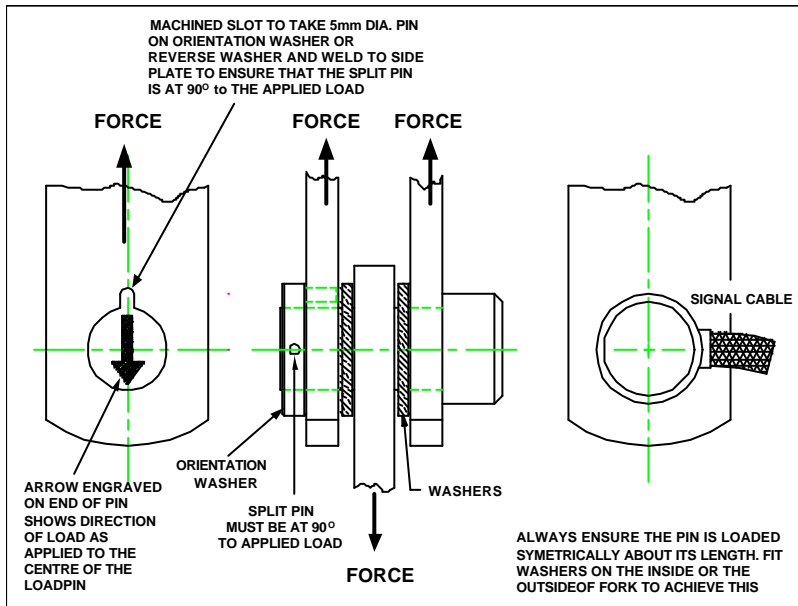
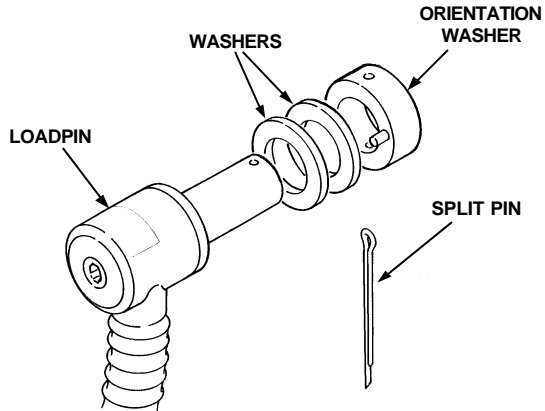
**Note:** Failure to comply may invalidate your warranty.

No attempt should be made to fit a standard B&G Loadcell pin to a non-standard fitting. B&G can accommodate any requirements for custom installations. Please contact B&G for more details.

## Section 1 Installation

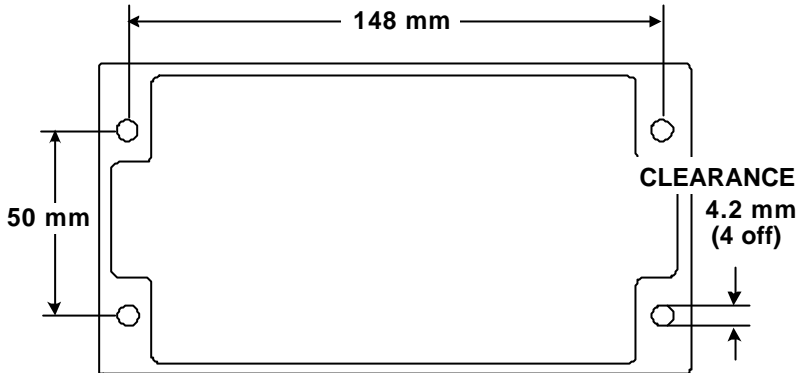
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## Loadpin Installation



## Amplifier Installation

### Amplifier installation template



**WARNING: THIS DRAWING IS NOT TO SCALE**

The Loadcell Amplifier should be installed in a dry, accessible area. Consider cable access when choosing a suitable position in the yacht.

**CAUTION: DO NOT MOUNT THE LOADCELL AMPLIFIER IN CLOSE PROXIMITY TO THE SOURCE OF A STRONG ELECTROMAGNETIC FIELD (e.g. Motors, Compass units GPS antenna etc.).**

**ENSURE THAT ALL SYSTEMS TO BE CONNECTED TO THE LOADCELL DIGITAL AMPLIFIER ARE SWITCHED OFF UNTIL SUCH TIME AS THE INSTALLATION OF THE UNIT IS COMPLETED.**

The Amplifier is mounted using the four self-tapping screws supplied (alternative screws can be used if these are more appropriate for the installation). The unit should be mounted with the cable exits pointing downwards.

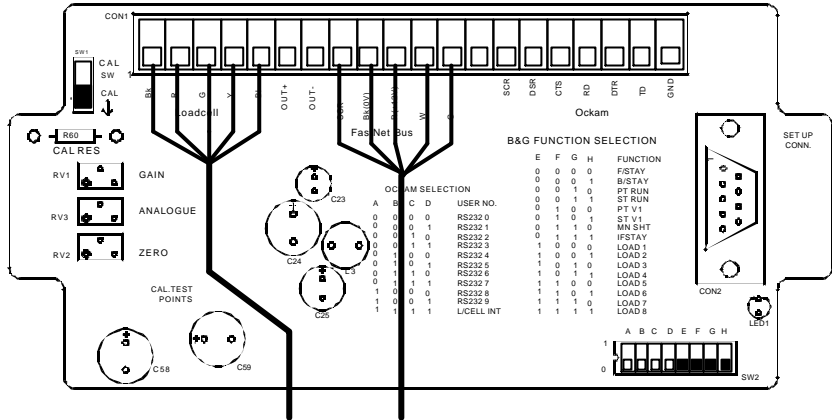
**Note:** The B&G Digital Loadcell Amplifier is supplied with a special connector strip tool. This tool must be retained within the amplifier casing, and must be the only tool used to open the terminals for insertion or removal of the wiring. Any other tool may permanently damage the connector strip, resulting in failure of the system

Cables should be retained by the stress relief glands on the case.

All cables should be lead to the unit from below to prevent water ingress caused by water running along the cables.

## Installation to B&G Hydra/Hercules systems

### Wiring for B&G FastNet based systems:



Loadpin Cable	Terminal
Black	Bk
Red	R
Green	G
Yellow	Y
Blue	Bl

FastNet Cable	Terminal
Screen	SCR
Black	Bk (0V)
Red	R (12V)
White	W
Green	G

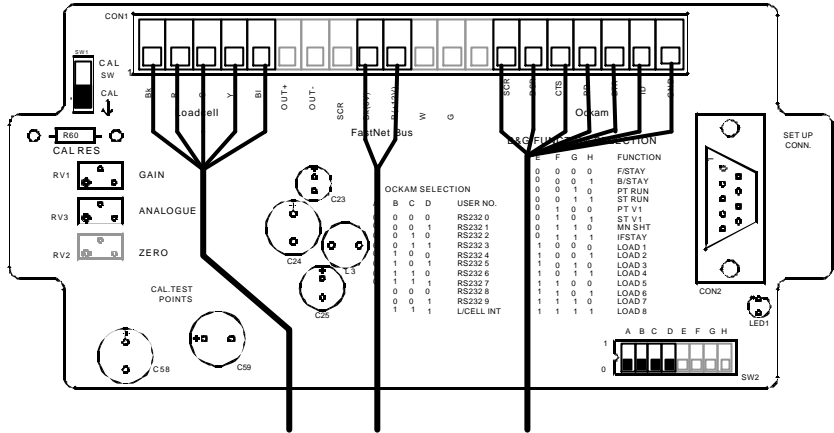
**USE ONLY THE SPECIAL TOOL SUPPLIED TO CONNECT WIRES TO THE CONNECTOR STRIP.**

**Note:** After installing the wiring for the Loadpin and FastNet cabling, the Amplifier Unit must be calibrated and set-up to read accurate data in the desired units. Refer to Section 2 of this manual relating to **Amplifier Calibration and Set-up**.

## Installation to Serial Systems

Compatible with Ockam RS232 Interface (model 050) and Loadcell Interface (models 066 and 067)

### Wiring for Serial connection based systems:



Loadpin Cable	Terminal
Black	Bk
Red	R
Green	G
Yellow	Y
Blue	Bl

Ockam Cable	Terminal
	SCR
	DSR
	CTS
	RD
	DTR
	TD
	GND

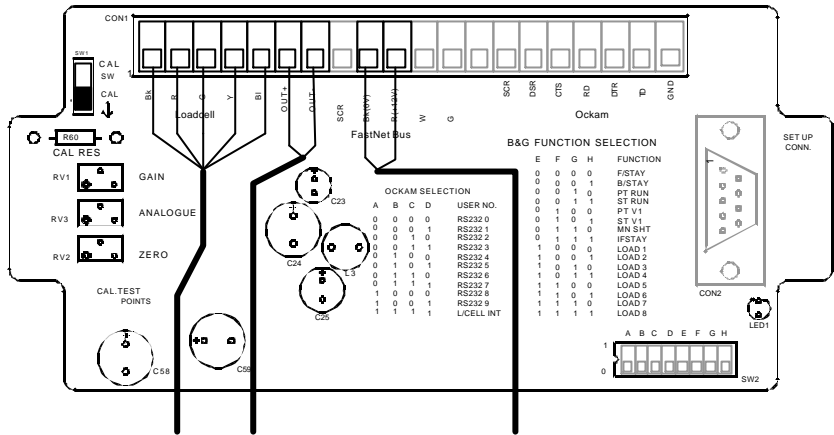
Power Cable	Terminal
Black	0V IN
Red	12V IN

**USE ONLY THE SPECIAL TOOL SUPPLIED TO CONNECT WIRES TO THE CONNECTOR STRIP.**

**Note:** After installing the Loadpin and 12v Power Supply cables as per the diagram above the unit must be calibrated and set-up to read accurate data in the desired units. Refer to Section 2 of this manual relating to **Amplifier Calibration and Set-up**.

## Analogue Output Systems

Wiring for analogue systems:



Loadpin Cable	Terminal
Black	Bk
Red	R
Green	G
Yellow	Y
Blue	Bl

Output Cable	Terminal
Red	OUT +
Black	OUT -

Power Cable	Terminal
Black	Bk (0V)
Red	R (12V)

**USE ONLY THE SPECIAL TOOL SUPPLIED TO CONNECT WIRES TO THE CONNECTOR STRIP.**

**Note:** After installing the Loadpin, 12v Power Supply and the Analogue Output cables as per the diagram above the unit must be calibrated and set up to read accurate data in the desired units. Refer to Section 2 of this manual relating to **Amplifier Calibration and Set-up**.

## Section 2 Calibration and Set-up

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## Amplifier Calibration (All Systems)

### Amplifier Zero Point and Gain Calibration

- Ensure the Loadpin is not under any loading by either temporarily removing the pin from the rig or winding halyards forward to remove any load from the forestay (depending upon your installation)
- Ensure the **CAL** switch is OFF (switched towards the top of the unit)
- Measure the voltage between the two 'test points' with a voltmeter, and adjust the ZERO potentiometer to achieve the lowest value.
- Switch the **CAL** switch into the ON position.
- Measure the voltage as above, adjust the GAIN potentiometer until the output voltage matches the B&G 'set-up' voltage listed on the calibration certificate. (0.75 times the '**CAL. EQUIVALENT VOLTAGE**').
- Switch the **CAL** switch to the OFF position, recheck the zero adjustment.
- Repeat if necessary.

Note: If connecting to both 'test points' on the PCB is difficult, the analogue output negative terminal 'OUT -' may be used instead of the negative testpoint.

**The Amplifier is now calibrated to the Loadpin.**

## System setup: B&G Hydra/Hercules systems

To configure the amplifier when installed to a B&G Hydra/Hercules system it is necessary to select the following:

Ensure the Loadcell Digital Amplifier is switched OFF or disconnected prior to selecting the function output.

**Note....**

If installation contains more than one loadcell, ensure function output selection is carried out before switching the system on.

**The function that the amplifier will output. This is set via DIP-switches 5-8 in the amplifier unit, as per the following:**

SW5	SW6	SW7	SW8	FUNCTION	FUNCTION No.	NODE No.
OFF	OFF	OFF	OFF	F/STAY	64	112
OFF	OFF	OFF	ON	B/STAY	42	113
OFF	OFF	ON	OFF	PT RUN	43	114
OFF	OFF	ON	ON	ST RUN	44	115
OFF	ON	OFF	OFF	PT V1	45	116
OFF	ON	OFF	ON	ST V1	61	117
OFF	ON	ON	OFF	MN SHT	62	118
OFF	ON	ON	ON	IFSTAY	63	119
ON	OFF	OFF	OFF	LOAD 1	3	120
ON	OFF	OFF	ON	LOAD 2	4	121
ON	OFF	ON	OFF	LOAD 3	5	122
ON	OFF	ON	ON	LOAD 4	6	123
ON	ON	OFF	OFF	LOAD 5	7	124
ON	ON	OFF	ON	LOAD 6	8	125
ON	ON	ON	OFF	LOAD 7	9	126
ON	ON	ON	ON	LOAD 8	10	127

**NOTE: The calibration values from the Loadpin certificate MUST be entered into the B&G system to ensure accurate data is displayed, as follows:**

**Calibrate**

- (a) Using the SCROLL UP key on your FFD to select **Loadcell** on the upper display. Press ENTER once to view selection. Scroll using UP/DOWN keys. Press ENTER to select desired Loadcell.
- (b) Use the SCROLL DOWN key to select **Calbrate** on the lower display. Press ENTER once, then select the desired **CAL VAL** (1 to 4, see table below).
- (c) Press ENTER to select 'CAL VAL' to be modified, press ENTER again, display will start flashing. Use the SCROLL UP/DOWN keys to select value.
- (d) Press ENTER to Accept calibration value.
- (e) Press the PAGE key to exit calibration mode.

Calibrations are displayed under the relevant function as selected in (1)

<b>CALIBRATION</b>	<b>ENTER</b>
CAL VAL1 - UNITS	Tonnes (0), Klb (1)
CAL VAL2 - CAL LOAD	CAL EQUIVALENT LOAD from certificate
CAL VAL3 - CAL VLTS	CAL EQUIVALENT VOLTAGE from certificate
CAL VAL4 - DAMPING	DAMPING ON (1), DAMPING OFF (0)

**Note:** Selecting DAMPING value 0 (Damping OFF) will render the unit outside the requirements of the CE conformity regulations. Default value is 1 (Damping ON)

### Checking Calibrations

Under the conditions detailed in ‘Amplifier Zero Point and Gain Calibration’, refer to Page 2 of this section, check that the display reads ZERO with the CAL switch in the OFF position, and check the CAL Load with the CAL switch in the ON position.

**If this check is not successful, the system must be re-calibrated.**

- (3) In order to provide more accurate information in adverse conditions, damping may be applied to the Loadcells as follows:

#### Damping - (Default damping value is 1)

- (a) Using the SCROLL UP key on your FFD, select **Loadcell**. Press ENTER to view selection. Scroll using UP/DOWN keys. Press ENTER to select desired Loadcell.
- (b) Use the SCROLL DOWN key to select **Damping** on the other line of the display. Press ENTER, **Damping SE** is shown.
- (c) Press ENTER to modify, display will flash. Use the UP/DOWN keys to select the desired value.
- (d) Press ENTER to accept damping value.
- (e) Press the PAGE key to exit damping mode.

Note: Entering a damping value of less than 1 will result in the system reverting to the default value of 1.

- (4) Accessing Loadcell data from the Hercules processor (refer to your Hercules 2000 User Manual).

#### Value

Type in: #OV, nnn, mmm, fff (CR)  
 nnn – node number  
 mmm – message type (always ‘1’)  
 fff – function number

Returned data: V nnn, mmm, fff, data  
 nnn – node number  
 mmm – message type (always ‘001’)  
 fff – function number

#### Units

Type in: #OV, nnn, mmm, fff (CR)  
 nnn – node number  
 mmm – message type (always ‘211’)  
 fff – function number

Returned data: V nnn, mmm, fff, Cal. Val. Data  
 (0 – tonnes 1 – klbs)  
 nnn – node number  
 mmm – message type (always ‘211’)  
 fff – function number

## System Setup: Ockam systems

To configure the amplifier when installed to an Ockam system it is necessary to select the following:

- (1) The function that the amplifier will output. This is set via DIP-switches 1-4 in the amplifier unit, as per the following:

SW1	SW2	SW3	SW4	OUTPUT
OFF	OFF	OFF	OFF	RS232 - 0
OFF	OFF	OFF	ON	RS232 - 1
OFF	OFF	ON	OFF	RS232 - 2
OFF	OFF	ON	ON	RS232 - 3
OFF	ON	OFF	OFF	RS232 - 4
OFF	ON	OFF	ON	RS232 - 5
OFF	ON	ON	OFF	RS232 - 6
OFF	ON	ON	ON	RS232 - 7
ON	OFF	OFF	OFF	RS232 - 8
ON	OFF	OFF	ON	RS232 - 9
ON	ON	ON	ON	LOAD CELL INT

- (2) To complete the calibration of the amplifier for installation on an Ockam system it is necessary to connect a PC to the set up connector positions in place of the Ockam RS232 module. The PC should be equipped with a terminal emulation program.

Serial Port configuration should be:

- 4800 baud
- No Parity
- 8 Data bits
- 1 Stop bit

To initiate configuration type: **&MENU** followed by a carriage return

The unit will respond with a welcome message containing system data and current settings.

Other input commands (all commands are followed by a carriage return):

Command	Action
&U0	Set units to Tonnes (default)
&U1	Set units to Kilb
&Vxx.xx	Set calibration voltage (where xx.xx is the voltage)
&Lxx.xx	Set calibration load (where xx.xx is the load)
&Dxx	Set damping in seconds (where xx is in seconds)
&DO	Turn ON and OFF damping

To exit the configuration mode type: **&Q** followed by a carriage return.

The unit returns to normal operation.

```
Version: 1.06
Display Units: Kilograms
Enter  &U0 for Kilograms, &U1 for Pounds

Calibration Voltage: 01.00
Enter  &V<value> to alter

Calibration Load: 02.00
Enter  &L<value> to alter

Damping Value: 01
Enter  &D<value> to alter
Enter  &DO to toggle between damping ON and OFF

Enter  &Q to quit setup
```

Example of screen display

## System Setup: Analogue Output systems

When using the analogue (linear voltage) output of the Amplifier it is necessary to adjust the **ANALOGUE** potentiometer to give the required output:

Switch the **CAL** Switch to ON

Measure the voltage between **OUT+** and **OUT-**, adjust the **ANALOGUE** potentiometer until the voltage is equal to the **CAL EQUIVALENT VOLTAGE** given on the calibration certificate.

Or use

$$\frac{\text{CAL EQUIVALENT VOLTAGE}}{5} \times \text{DESIRED MAX. VALUE}$$

(0 to 5v output or less).

## Section 3 Function Test

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## Test Loadcell

The following tests will require the use of a standard multi-meter/insulation resistance tester.

### Function test the Loadcell as follows:

1. Disconnect the Loadcell from the Amplifier.
2. Test the insulation resistance for all cores to earth.
3. Ensure that the resistance is greater than 100Mohms when a 50V current is applied.
4. Test the resistance of:

(a) RED to BLUE	350 ohm
(b) YELLOW to GREEN	350 ohm
(c) BLACK	Should be isolated from all cores and earth.

### Function test the Digital Amplifier as follows:

If the Loadcell tests confirm correct function, reconnect the Loadcell to the Amplifier, switch ON and Check the following:

1. The voltage between RED (DC+) and BLUE (DC-) is 5.0 volts at all times.
2. The voltage between the test point and OUT- is 0 volts with no load applied. \*
3. The voltage between the OUT+ and the OUT- is 0 volts with no load applied. \*
4. With the CAL switch set to ON and no load applied, check that the voltage between the OUT+ and the OUT- is proportional to the load displayed.

\* The reading should be within 10mV.

Refer to your system manufacturers literature for details of function testing on non B&G systems.

## Calibration Information

Loacell pin type	???
Loadcell pin serial number	???
Proof Load	???
Bridge Resistance	350 Ohms nominal
Calibration equivalent load (Imperial)	??? tons (lb x 1000)
Calibration equivalent load (Metric)	??? tonnes (Kg x 1000)
Calibration equivalent Voltage	??? (Volts)
B&G setup testpoint Voltage	(0.75*above) Volts
Typical System Accuracy	±1%

Signature

Date