

GPS Boat Computer Summary

<http://geoffg.net/boatcomputer.html>

Set Button

Pressing this will switch to an option screen associated with the currently displayed screen. Using the Up/Down buttons you can change the value of the option.

Pressing Set again will save the option and return to the original display screen.

USB 2.0 Interface

For navigation software on a laptop or loading new firmware.

Light Detector

For day/night control

Power and Signals

Connector for power and external signals.

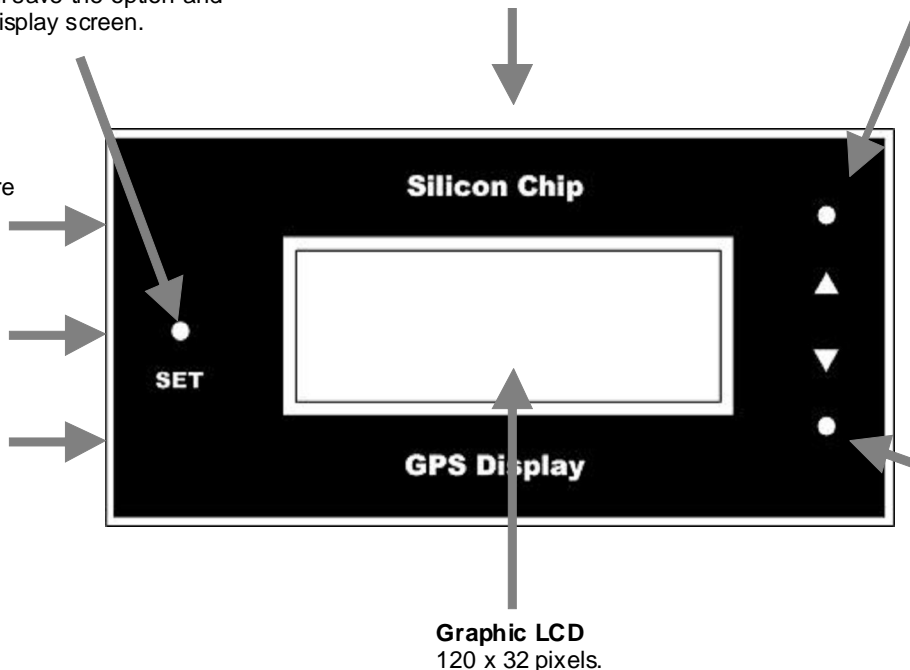
External Antenna Connector
(On the back panel)

Up Button

Will switch to the previous display. When setting an option this will increase the value.

Down Button

Will switch to the next display. When setting an option this will decrease the value.



Display Modes

Speed, Compass and Heading

The display shows the speed in knots, a compass needle pointing north and the heading in degrees. The speed is averaged over a few seconds and is reasonably accurate even down to one or two knots.

The compass and heading is derived from the change in latitude and longitude as the boat moves. So if the boat is stationary, both of these will be blanked to prevent them showing random and incorrect values.

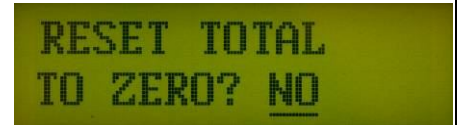
Pressing SET will enable you to switch the display to reverse video (green lettering on a black background). This might help in situations of poor visibility.



Fuel Consumption, Instantaneous and Total

This display will show your current rate of fuel consumption and the total fuel consumed.

The instantaneous reading (litres/hour or gallons/hour) can be used to adjust the speed of the engine for an optimal cruising efficiency. To reduce jitter in the display the reading is averaged over several seconds.



The total fuel consumption can be used to estimate the amount of fuel remaining in your tank. You would normally be reset the total to zero when you fill the tank and this can be done by pressing the SET button and using the UP/DOWN buttons to select YES at the prompt.

By pressing SET you can also calibrate the amount of fuel consumed. The way to do this is quite straight forward. Fill the tank, zero the total and take your boat for a run. When you return refill the tank to the same level and use the calibration screen and the UP/DOWN buttons to set the actual amount of fuel consumed. If you enter the amount consumed in litres then all readings will be in litres, similarly if you use gallons then all readings will be in gallons.

This display is dependent in the installation of the optional fuel flow sensor (see below for details).

A green screen with black text showing the prompt 'CALIBRATE FUEL USED?' with 'YES' underlined.A green screen with black text showing 'SET FUEL USED' and '0.0' below it.

Engine Running Time

This is mostly used to indicate when engine maintenance is due. It is assumed that when +12V is present on pin 2 of the CON1 connector that the engine is running, so this pin would normally be connected to the ignition for the engine.

Pressing SET will offer you the option to zero the accumulated total. As with all options of this type you can select YES or NO by pressing the UP/DOWN buttons then pressing the SET button to confirm the selection.

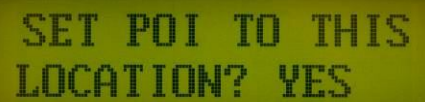
A green screen with black text showing 'ENGINE HOURS' and '218' below it.A green screen with black text showing 'RESET HOURS TO ZERO?' with 'NO' underlined.

Point Of Interest (POI)

This powerful feature will memorise your current location and then later guide you back to it within a few metres. This is great for returning to your favourite fishing spot, dive location, etc. To set a POI to the current location you simply press SET and select YES when prompted.

The POI screen shows your distance to the location and the needle the bearing. To return to a location you just follow the needle and watch the distance count down. As you get closer the distance display will switch to metres with a resolution of one metre.

The boat computer will memorise up to eight points of interest. By default only three are shown to reduce the number of screens that you have to step through. However, it is easy to enable the other POI screens using the Hide/Show function (see below for a description).


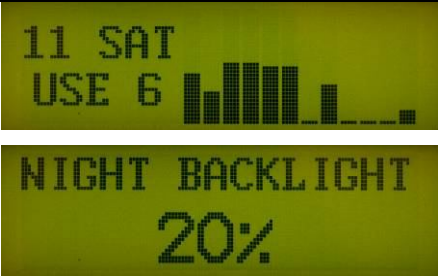
A green screen with black text showing 'POI 1', '1.22 NM', and '290°' with a compass needle icon pointing towards the top right.A green screen with black text showing 'SET POI TO THIS LOCATION?' with 'YES' underlined.

GPS Accurate Clock

Shows the current time in 12 hour (AM/PM) format with the seconds shown on the bottom right. The time is derived from the GPS signal and is accurate to within 100mS.

Pressing the Set button will allow adjustment of the time in steps of half an hour (ie, this sets the time zone – the exact time is always derived from the GPS satellites).

A green screen with black text showing '6:06 PM' and '49' below it.A green screen with black text showing 'SET LOCAL TIME' and '6:13 PM' below it.

<p>Latitude and Longitude</p> <p>This shows your current latitude and longitude as degrees, minutes and fraction of a minute.</p> <p>This information (and much more) can be sent to your laptop via USB for use by navigation and mapping software.</p>	
<p>Signal Levels</p> <p>Shows how many satellites should be in the sky and the number that is currently being used by the GPS module. The bar graph shows the signal level of every satellite that can be detected. The module will not use a satellite if its signal level is below a threshold.</p> <p>By pressing the SET button you can adjust the backlight brightness for day and night conditions. Day/Night is determined by a +12V input voltage on pin 1 of the CON1 connector that indicates that the running lights are turned on.</p>	
<p>Special Functions</p> <p><u>Auto Scan Mode</u></p> <p>Rather than manually press the Up/Down buttons to show a new screen you can put the unit into Auto Scan mode. In this mode the display will automatically flip from one screen to the next every three seconds. When it reaches the end it will wrap around and continue on from the top.</p> <p>To enter Auto Scan mode you simultaneous press both the Up and Down buttons. To exit this mode press any button.</p> <p><u>Show/Hide</u></p> <p>To reduce the number of screens on show you can configure the unit to hide some of them. To set this up you must hold down the Up button when you apply power. This will put the unit into a mode where you can set the following characteristics for each screen;</p> <ul style="list-style-type: none"> • Show. • Hide in auto scan. • Always hide. <p>When set to “Always Hide” that screen will be skipped as if it did not exist. The “hide in auto scan” setting is useful if you want to hide some screens during the Auto Scan mode but still have them available when you manually step through the screens. A good example is the Signal Levels screen which you no not need to see while running in Auto Scan mode.</p> <p>While in this mode pressing the Set button will step you through the three settings described above and the Up and Down buttons will move you through the list of screens available for configuration. To exit this mode you simply remove and reapply the power.</p>	
<p>USB 2.0 Interface</p> <p>The Boat Computer creates a virtual serial port over USB and you can use this to connect to your laptop to show the GPS output, plot your location on moving maps and other functions using free and paid software.</p> <p>You must load the Silicon Chip Serial Device Driver on to your PC (see the downloads section on http://geoffg.net/boatcomputer.html).</p>	
<p>Firmware Updates</p> <p>By holding down the Set button when plugging into a USB port the Boat Computer will accept firmware updates delivered via USB (ie, programming hardware is not required).</p>	

Low Signal

In a low signal situation or when first turned on the Boat Computer will display a message and a count of the number of satellites found at that time. Pressing the Set button will show the *Current Signal Levels* screen described above.

Full Reset

Pressing the Down button for a couple of seconds while applying power will reset the GPS module and all configurable parameters to the factory/design defaults.

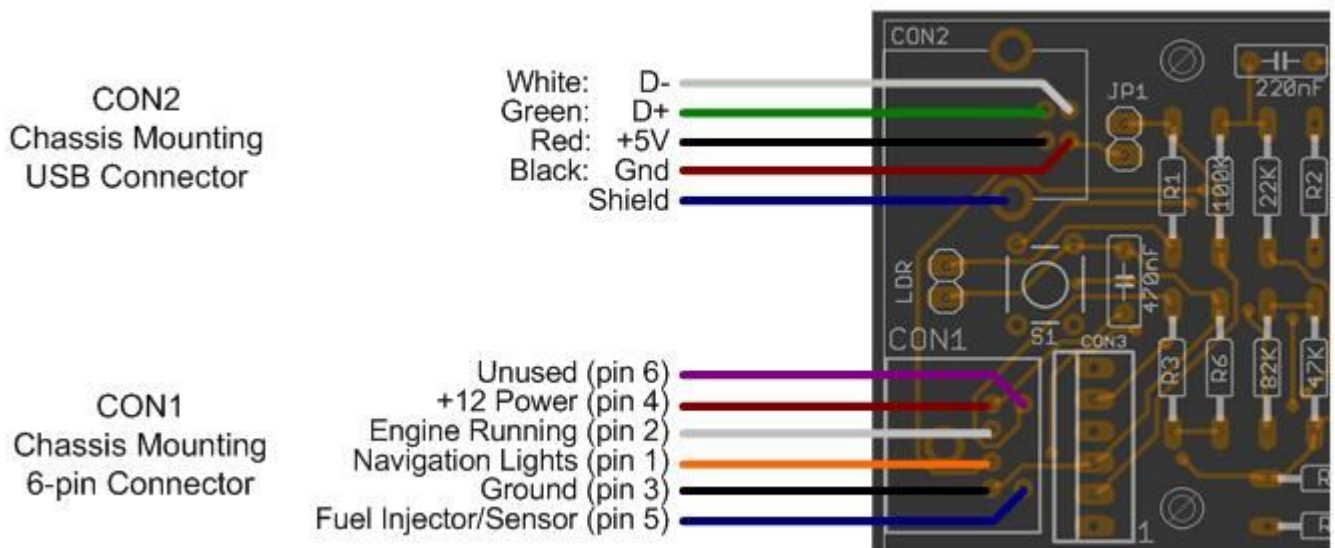
Automatic Brightness Control

The brightness of the LCD backlight can be configured separately for day and night. Control of day/night can be from the boat's running lights or from a light dependent resistor.

When switching from day and night the brightness is slowly changes over a minute to avoid distracting the driver.

Power and Signal Connector

The wiring of this connector is dependent on the type of connector mounted to the back panel. The following diagram shows the wiring to the PC board.



Pin 3 is ground

Pin 4 is +12V power input

Pin 5 is the fuel injector input. Connect to the negative wire of a fuel injector (this is pulled to ground when the injector solenoid is activated). If you are using the fuel flow sensor it also connects to here (see below for details of the flow sensor).

Pin 1 is boat's navigation lights input. It will control the day/night brightness of the backlight. This input is optional and is disabled if a light dependent resistor is used.

Pin 2 is the engine running signal. Normally you would connect this to the engines +12 ignition circuit so that the Boat Computer can time how long the engine has been running.

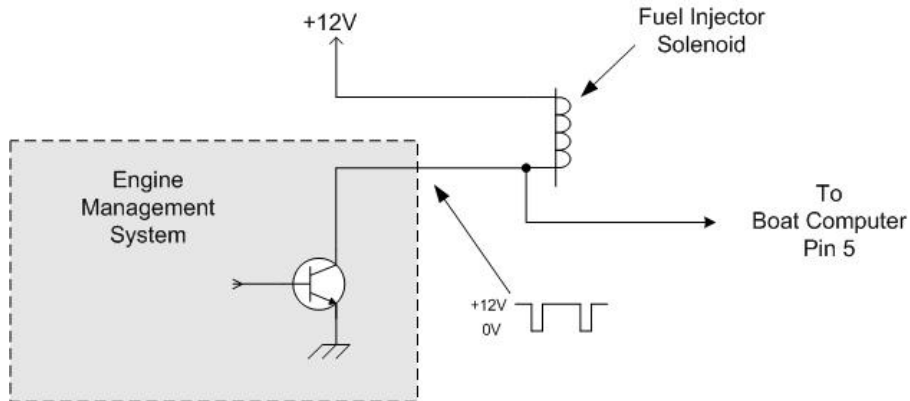
Pin 6 is spare lines for future enhancement. In this version it is left unconnected.

Fuel Flow Measurement

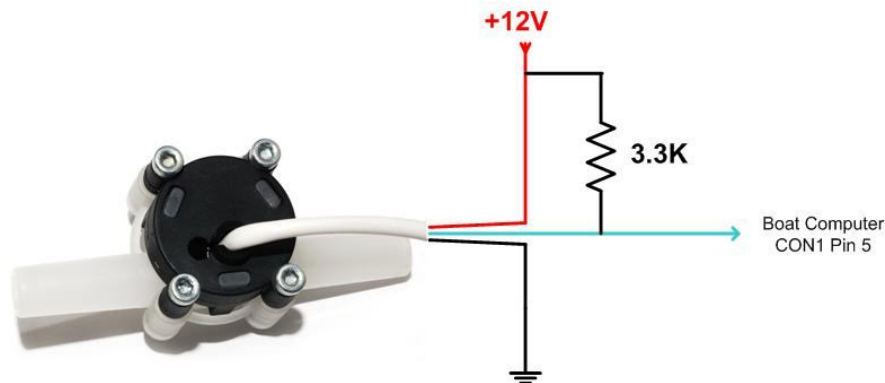
The Boat Computer can measure the fuel consumption in litres or gallons per hour and as a total. This function is optional so you can ignore this section if you wish to.

There are two choices: You can measure the length of time that the fuel injectors are open or you can use a paddle wheel flow sensor.

If you are using the fuel injector sense method you will have to connect pin 5 on CON1 to the negative lead of one of the fuel injector solenoids, the following diagram shows the typical fuel injector circuit used in a modern engine.



If you are using a paddle wheel sensor you will probably need to connect it to the same source of power used by the Boat Computer and install a pull up resistor on the output line which connects to the Boat Computer. The following shows a typical setup.



If you use a paddle wheel flow sensor you must check the specifications and only use one that specifically states that it is suitable for use with petrol or diesel fuel. RS Components have a suitable sensor (part nbr 508-2704) and www.lightflying.com.au or oregonlightsport.com have a similar sensor made by MGL Avionics.

Two different versions of the firmware are included in the firmware zip file (available from the download page), one for flow sensor measurement and the other for fuel injector measurement.