

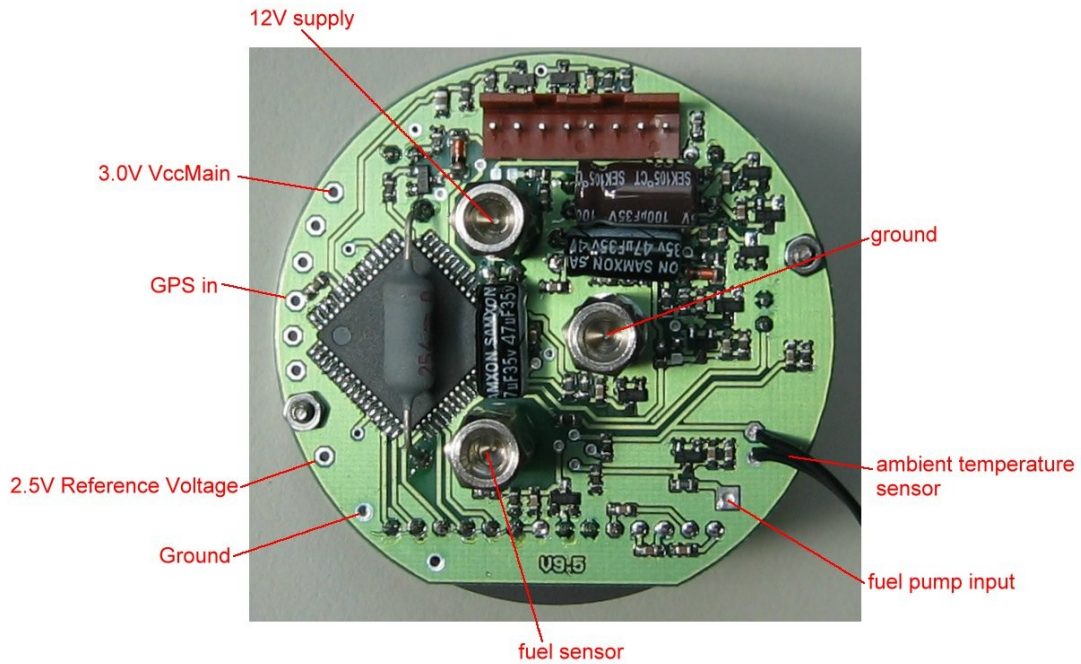
## Overview

The Multi Gauge is an on-board computer for Yamaha FZS1000 (= FZ1 Gen1) motorbikes. It also provides the option to connect external “add-ons” to enhance functionality.

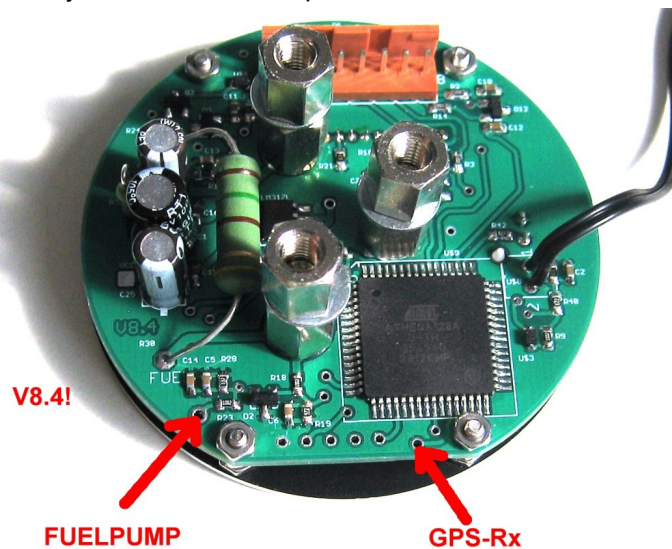
This document describes how to add a GSP receiver module and how to connect the fuel pump for fuel economy readouts.

## Signal Connections

The following picture shows the positions of the most relevant signals on the V9 pcb.



The V8.4 has a different layout and the solderspots are at different locations.



## Adding a GPS receiver

The Multi Gauge is capable to process and display standard GPS-NMEA messages that comply to the following specifications:

- Data Signals: **3V** TTL level, normal logic (non-inverted)
- Baudrate: 1200 .. 38400 Baud
- Required sentences: RMC, GGA
- Update rate: 1Hz! (10Hz modules need to be re-configured before mounting!)

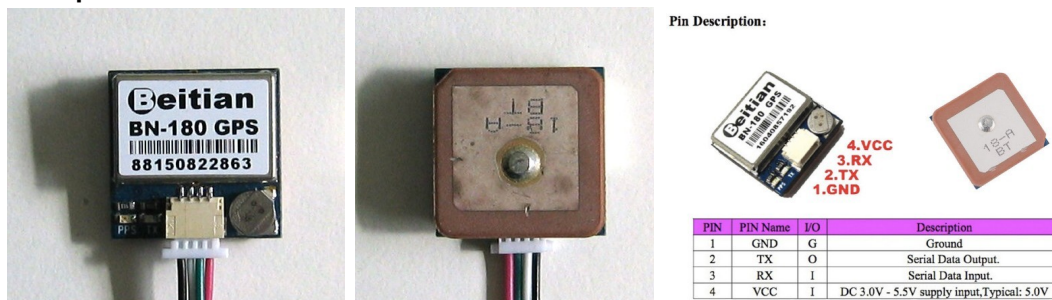
USB or RS-232 type modules are not usable.

Care has to be taken for the power supply and the proper signal level. The Multi Gauge runs at 3V logic level. **In case of 5V powered modules, take care to no exceed the 3V level on the signal lines. Higher levels might cause permanent damage to the Multi Gauge!** In case of doubt include a 1k series resistor into the GPS-Rx input line. All is save if the module supply runs on 3V.

The module requires a separate/additional power supply. **The module can not be supplied from the Multi Gauge's internal 3V rail due to its limited current capability!** Use the cockpit's internal 5V power rail and an additional 5V -> 3V converter/regulator.

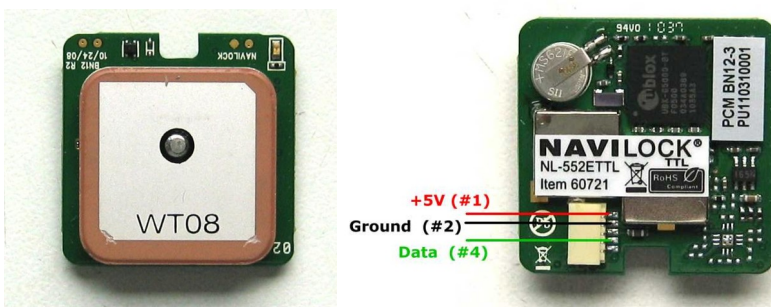
The Multi Gauge is configured as read-only. It does not send any data to the module, no Tx line is used.

### Example: Beitian BN-180 / BN-220:



The members of this module family are very similar, the larger ones provide a bit more sensitivity. Run at 3V supply. Connect "2.Tx" to the Multi Gauge's "GPS-Rx". The module's input/return line ("3.Rx") is not used.

### Example: Navilock NL-552ETTL (succeeded by NL-652ETTL):



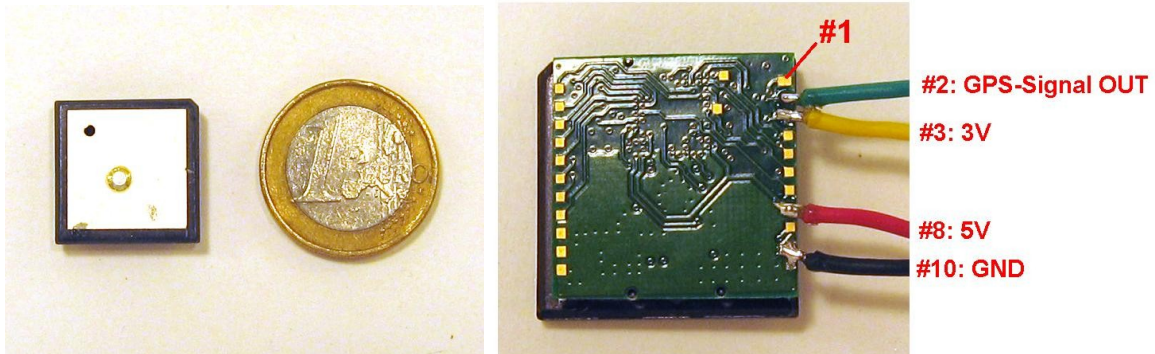
Electrical connection:

- **5V** to **CL8** on cockpit.
- **Ground** to **GND** on Multi Gauge.
- **Data** to **GPS IN** on Multi Gauge.

Data signal is on 3V TTL level, no level shifting actions needed.

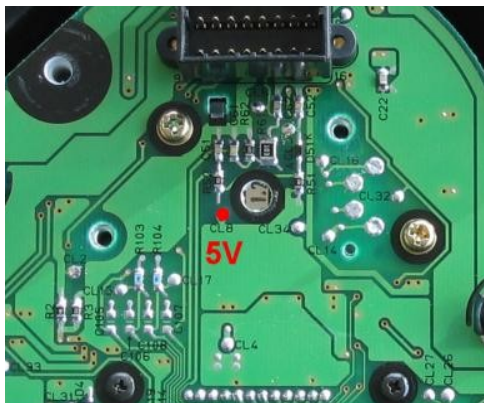
Take care to order exactly this type of module. It also exists in different flavors with USB (extension EUSB) or RS232 output (ERS), those are not usable.

Example: ORG1318:

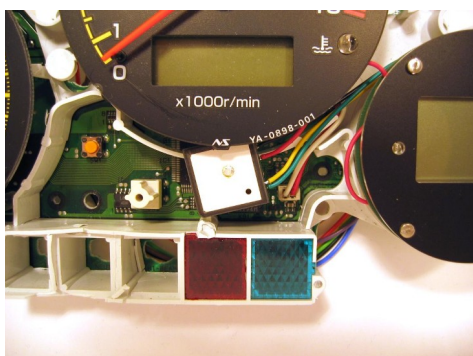


This module runs at 5V main power supply. It is kind of special as the I/O signal level can be set independently. This is done by an additional low current 3V supplied to port #3. The Multi Gauge is capable to deliver this small current from its **3.0V VccMain**, no extra regulator needed.

The most simple way to get a clean and stable 5V supply is to tap the existing cockpit supply at **CL8**. This supply is strong enough to also support an additional GPS module.



Using one of those tiny modules gives the great advantage to place them inside the cluster housing. This minimizes cabling and provides protection against ambient conditions. The housing's plastic is transparent for GPS signals and gives ideal receiving conditions. For electrical isolation and precaution against vibrations the module should be wrapped into some air-bubble plastic foil or alike.



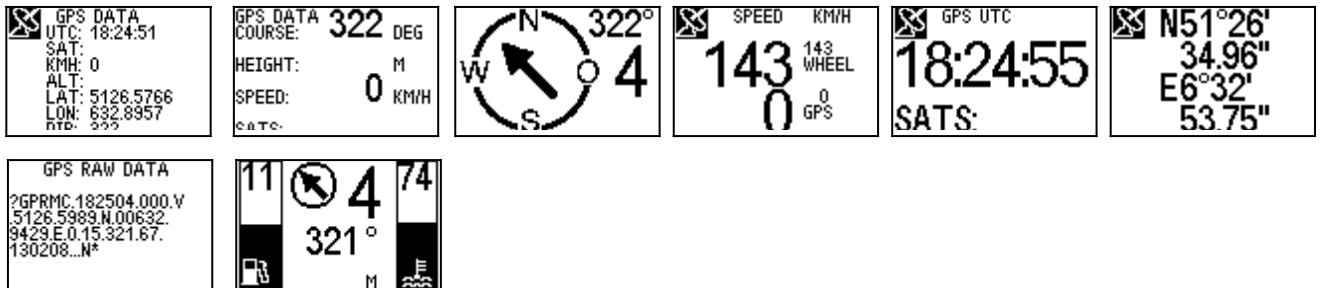
### Enable GPS decoding

GPS support has to be enabled and set up in software in menu 2. Consult the user guide document for further details if needed. Enable, select baudrate and save. 4800 baud is a widely used standard, otherwise check others by using Plus/Minus. If set correctly the currently received message names will be appear in the upper right corner (e.g VTG). Typically they are updated and altered every second:



The Baudrate can be fine-tuned with Up/Down, to eliminate tolerances. SAVE if finished.

The according Viewmodes will now start to display the GPS content. Depending on signal quality the antenna symbol (upper left corner) will be normal or inverted:



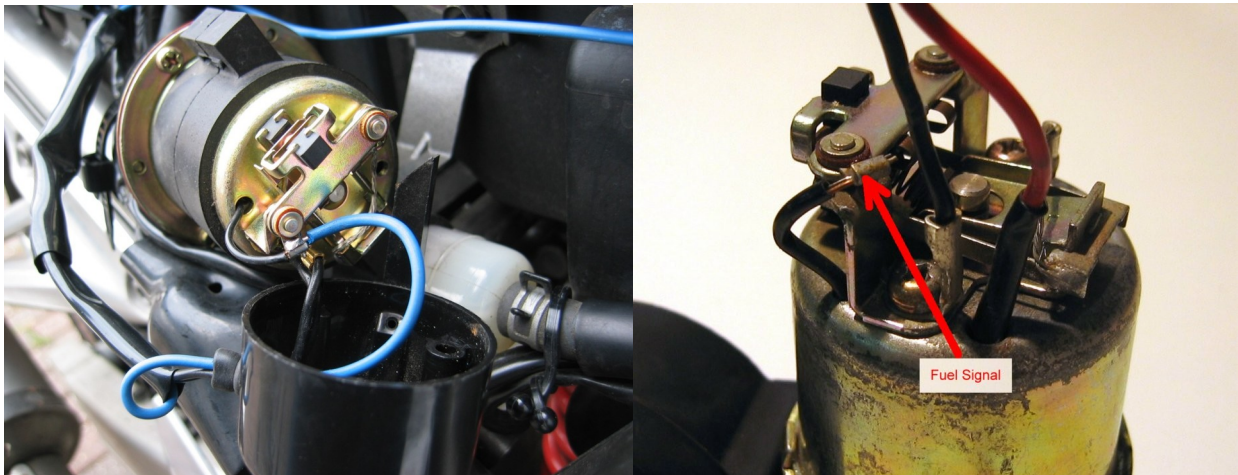
## Fuel Pump Connection

The Multi Gauge is capable to determine the fuel consumption and remaining range based on counting the fuel pump's switching pulses.

The achievable accuracy is quite limited due to the simple nature of this method.

On the Multi Gauge board the fuel pump signal has to be connected to the solder point **Fuel Pump**. No further components are necessary, the signal conditioning and protecting elements are already placed on the board.

A new wire has to be routed from the cockpit towards the fuel pump (the blue one in the picture below). At the fuel pump side the wire has to be connected to the black wire coming out of the pump housing.



The fuel pump signal recognition has to be enabled and configured in menu 2. The number of **Ticks Per Liter** can be set and fine tuned individually. This scales the fuel economy readout:



To preserve all data during ignition-off the odometer-save-function can be enabled:



The results will be displayed in the respective viewmodes:

