1 GRM001 - HARDWARE INSTALLATION

1.1 Installation Requirements

Installation of the GRM001 must be done correctly and by a suitably trained installation technician. Incorrect installation of the GRM001 and/or other products in the GRM range may cause damage to the vehicle and equipment that is not covered by the warranty. Before installing a GRM001 it is recommended that you become familiar with the installation and configuration process.

1.2 Hardware Overview

1.2.1 GRM001 V4 Silkscreen

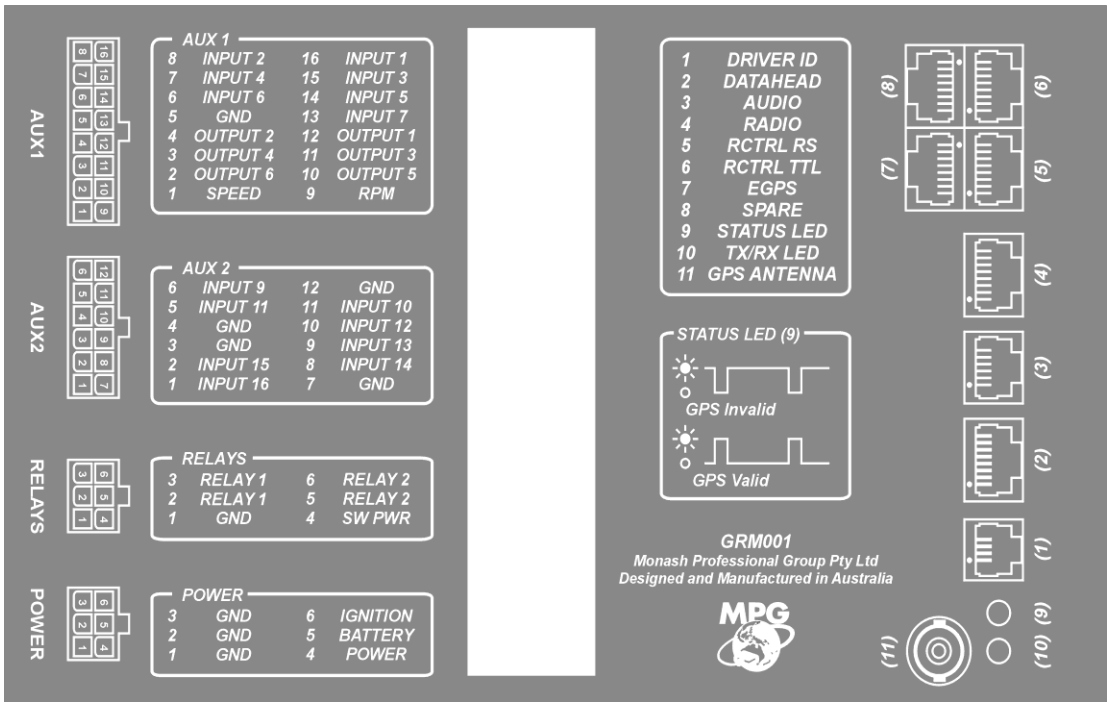


Figure 1-1 GRM001 V4 Silkscreen

1.3 Datalogger location

It is recommended that the GRM001 be installed in the interior of the vehicle. If external installation is required, the GRM001 must be house in the suitably rated enclosure, protecting the unit from all external weather conditions.
If the unit is being installed in a truck or prime mover there is generally suitable space found inside the dash or behind/under the driver and/or passenger seats.

NOTE: If the GRM001 V4 Datalogger is being installed inside or near the dash of the vehicle, care should be taken to avoid running ECM cables within close proximity of radio and other telecommunications equipment.

For units being installed in cars or light commercial vehicles there is generally no room inside the dash. A suitable installation location can often be found under or behind the driver and/or passenger seat

1.4 Mounting Datalogger

Included in the GRM001 kits are 2 mounting brackets. These need to be secured to the GRM001 enclosure using the screws provided. It is important to ensure that the GRM001 is secured correctly and must remain so whilst the vehicle is in transit. Poorly secured units can cause damage to the GRM001 and/or other wiring and equipment in the vehicle.

NOTE: GRM001 can be mounted on any angle, although care should be taken not to bend or warp the enclosure. This can reduce the life of the internal components that will not be covered by warranty.

1.5 Installing GPS Antenna

Global Positioning System or GPS utilizes a constellation of 24 satellite transmitters in constant orbit above the earth. These are used to accurately determine the vehicles current position on the earth's surface. To ensure that each position remains valid, care must be taken when installing the GPS antenna. Ensure that it has a clear view of these satellites, and that metal or other objects that could affect GPS performance do not obstruct it. When installing the GPS antenna on a truck or prime mover, try and get the antenna as far to the front of the cab as possible. Try to eliminate any potential shadowing by a trailer, container etc. This is sometimes unavoidable but should be kept in mind. It is important to ensure that the antenna is secured flat on the roof.

NOTE: Do not install the antenna on the inside of a metal roof.

The GPS antenna is designed to be installed externally.

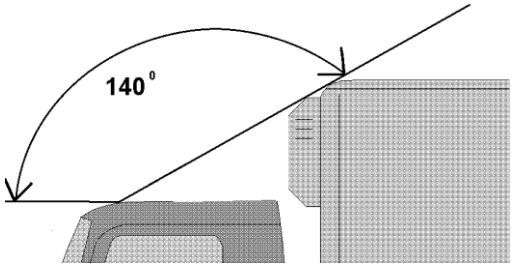


Figure 1-2 - Good GPS Antenna Location

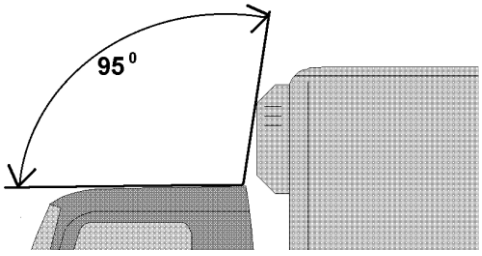


Figure 1-3 - Bad GPS Antenna Location

The GPS antenna is supplied with a set length of cable, and should already be terminated with the correct BNC connector. Do not attempt to shorten or lengthen this cable. Modifying this cable can affect GPS performance.
Connect the GPS Antenna to the BNC connector (port 11) on the front panel of the GRM001 V4 Datalogger.

1.6 Driver ID Reader Interface

1.6.1 Overview

The GRM001 V4 Datalogger allows for the connection of a single Dallas iButton™ Driver ID Reader via the Driver ID interface.

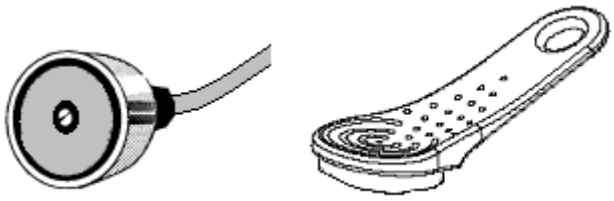


Figure 1-4 Driver ID (iButton™) Reader and ID Tag

The iButton™ tags available from MPG each contain an unalterable unique 56-bit number (approximately seventy-two quadrillion combinations), which is used by the GRM001 as a unique diver identification number.

1.6.2 Installing Driver ID Reader

To install the iButton™ Driver ID reader

Determine a suitable installation location; install the reader within easy reach of the driver.

Drill a 8-10mm hole in the desired installation location

Mount and securely fasten the Driver ID reader as per Figure 1-5 Correct iButton™ Reader Installation.

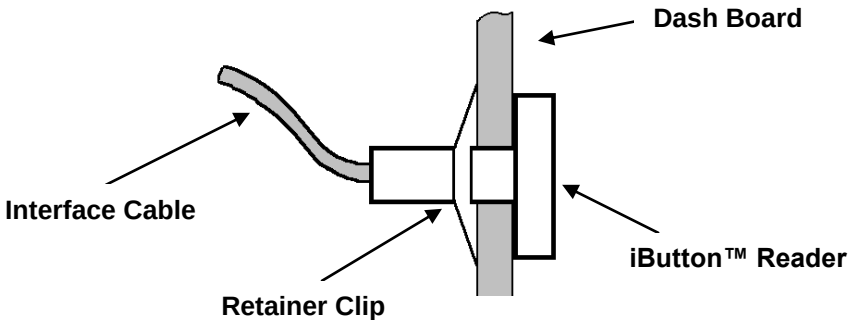


Figure 1-5 Correct iButton™ Reader Installation

Supplied with the Driver ID reader is a 3m length of interface cable terminated on one end with an RJ11 connector. Using a soldering iron connect this cable to the Driver ID reader as per Table 1-1 iButton™ Driver ID wiring. This cable can be cut to length if required.

Table 1-1 iButton™ Driver ID wiring

Pin	GRM001	iButton™ Driver ID
1	Black	White

2	Red	Grey
3	Green	Black or Brown
4	Yellow	Yellow

Connect the RJ11 connector to the DRIVER ID port (port 1) on the front panel of the GRM001 V4 Datalogger.

1.6.2.1 Connector Location

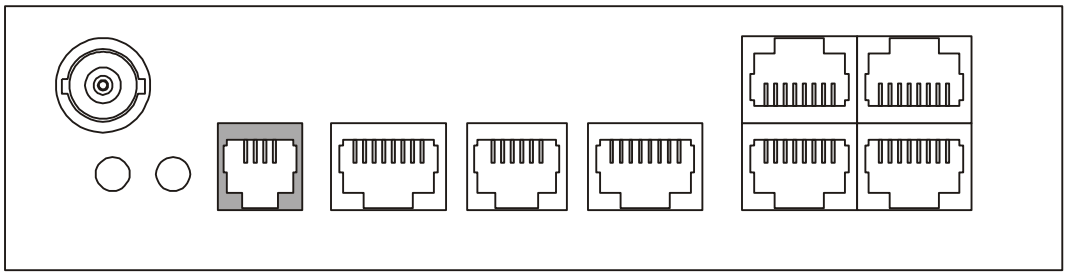


Figure 1-6 Driver ID Interface Location

1.7 Datalogger Communications

1.7.1 Wavecom WMOD2 GSM Modem

1.7.1.1 Overview

The following information is specific to installing the Wavecom WMOD2 and Fastrack GSM Modems, as well as the InterCEL SAM GSM Modem.

1.7.1.2 Inserting SIM Card

NOTE: DO NOT insert the SIM card whilst power is applied, DAMAGE MAY RESULT.

To install a SIM card in a Wavecom WMOD2 or Fastrack GSM Modem

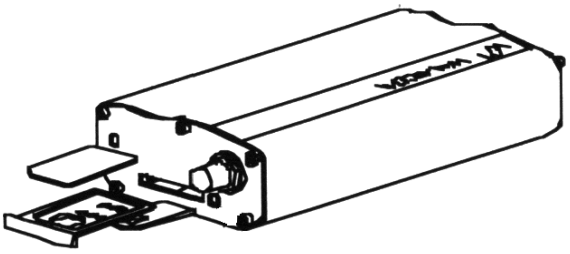


Figure 1-7 SIM installation

1. Remove the SIM holder from the modem.

Insert the SIM card into the holder.

Re-insert the SIM holder into the modem.

To install a SIM card in an InterCEL SAM GSM Modem

1. Remove the SIM card cover on the bottom of the SAM modem

2. Slide the SIM card into the SIM holder, paying close attention to the marks on the holder ensuring the SIM is correctly orientated.

3. Replace the cover.

NOTE: It is important to ensure that the SIM card is installed correctly; incorrect SIM installation can cause damage to the SIM and the modem.

1.7.1.3 Connecting Serial Interface

Generally speaking the RCTRL RS232 serial port is used for connection to these modems, other RS232 ports can be used but the standard interface cable requires a constant positive voltage (no greater that +12V DC through a 2k7 resistor) on pin 3 of the RJ45 connector to enable the modems transmission line. The RCTRL RS232 and SPARE RS232 ports provide this, the EGPS RS232 port does not.
To connect a Wavecom WMOD2 GSM Modem to a GRM001 V4 Datalogger

2. Locate the GRM001 V4 to Wavecom WMO2 H/S interface cable (Part No: 560-195-0070)

Connect the HD15 pin connector to the serial interface port on the Wavecom WMOD2 GSM Modem. Ensure that this connection is secure, use a small flat bladed instrument screw driver to securely fasten the 2 connector mounting screws.

Connect the RJ45 connector to port 5 on the front panel of the GRM001 V4 Datalogger.

1.7.1.3.1 Connector Location

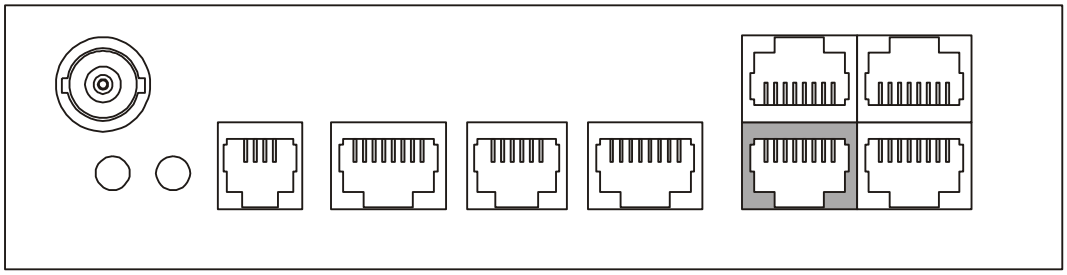


Figure 1-8 Radio Control RS232 Interface Location

1.7.1.4 Connecting Power

The GRM001 switched power relay provides the necessary power supply for this modem. It is recommended that this be used as it is controlled by the GRM001 firmware and would allow the GRM001 to switch the modem off and on as well as reset power if required. If the switched power relay is not available connect the modem to a constant supply which is not affected by the ignition or accessories circuit. For details on the switched power relay see section 1.8.3 Relay and Switched Power Outputs.

1.7.1.4.1 Connector Location

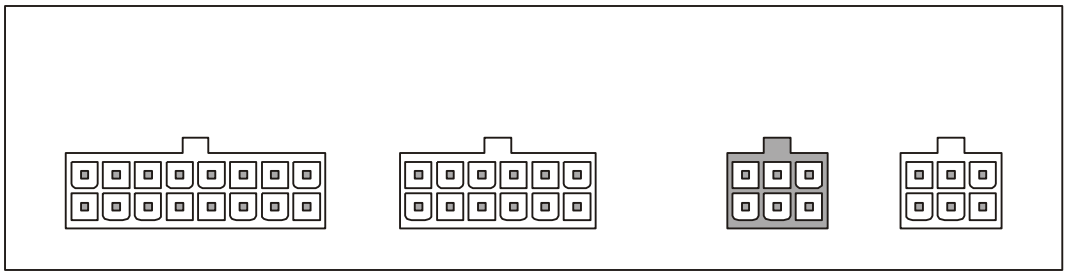


Figure 1-9 Relay Outputs Interface Location

1.7.1.4.2 Modem Power Connector Details

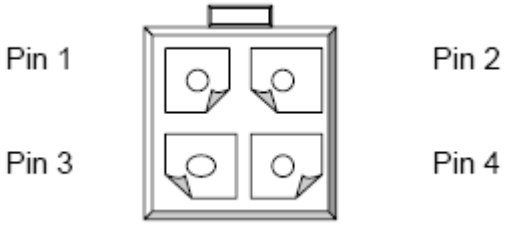


Figure 1-10 Wavecom Power Connector

Pin No.	Description
1	+5VDC to +25VDC
2	Ground
3	N/C
4	N/C

1.7.2 Maxon MM-5100 CDMA Modem

1.7.2.1 Overview

The following information is specific to installing a Maxon MM-5100 CDMA Modem as a communications device for the GRM001 V4 Datalogger.

1.7.2.2 Modem Configuration

To enable the Maxon MM-5100 CDMA Modem to communicate with the GRM001 V4 Datalogger there are certain configuration options that need to be set within the modem itself before communications can commence.
Supplied with each Maxon MM-5100 CDMA Modem is an RS232 serial cable which allows you to connect the modem directly to a PC. Using HyperTerminal (See **Error! Reference source not found.Error! Reference source not found.**) connect to the modem using a serial port (eg COM1) with the following port settings.

Bits per second: 115200

Bata bits: 8

Parity: None

Stop bits: 1

Flow Control: Hardware

Once power has been applied to the modem you can force a modem response using the following command.

```
AT <ENTER>
```

If the connection was successful the modem should respond with the following

```
OK
```

The modem is likely to have local echo enabled, which means it will echo each character as it is typed, this is normal.

The following command will set the modems BAUD rate to 9600

```
AT+IPR=9600
```

At this point the modem may or may not respond with OK. Either way you should now disconnect from HyperTerminal, go to File→Properties then click configure and set bits per second to 9600 then reconnect.

Test for a successful connection

```
AT
```

If the BAUD rate has been successfully configured the modem should again respond with OK.

Now you will need to enter the following commands to configure other modem options. If the command has been successful the modem should respond with OK.

```
AT$$MODE=2 (Set to mode 2)
Response: OK
AT$$RCVMODE=1 (Turn off ring alert)
Response: OK
AT$QCVAD=4 (Set to data mode)
Response: OK
AT&W1 (Write to User Profile 1)
Response: OK
AT&F1 (Default to User Profile 1)
Response: OK
```

If all these commands were successful you should be able to connect the modem to the GRM001 V4 Datalogger and continue with the installation.

1.7.2.3 Connecting Serial Interface

Generally speaking the RCTRL RS232 serial port is used for connection to these modems, other RS232 ports can be used but the standard interface cable requires a constant positive voltage (no greater that +12V DC through a 2k7 resistor) on pin 3 of the RJ45 connector to enable the modems transmission line. The RCTRL RS232 and SPARE RS232 ports provide this, the EGPS RS232 port does not.

To connect a Maxon MM-5100 CDMA Modem to a GRM001 V4 Datalogger

3. Locate the GRM001 V4 to Maxon MM5100 H/S interface cable (Part No: 560-195-0107)

Connect the HD15 pin connector to the serial interface port on the Maxon MM-5100 CDMA Modem. Ensure that this connection is secure, use a small flat bladed instrument screw driver to securely fasten the 2 connector mounting screws.

Connect the RJ45 connector to port 5 on the front panel of the GRM001 V4 Datalogger.

1.7.2.3.1 Connector Location

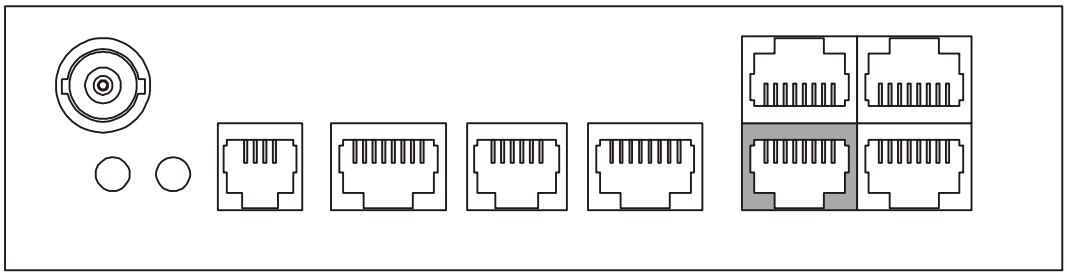


Figure 1-11 Radio Control RS232 Interface Location

1.7.2.4 Connecting Power

The GRM001 switched power relay provides the necessary power supply for this modem. It is recommended that this power supply be used as it is controlled by the GRM001 firmware and would allow the GRM001 to switch the modem off and on as well as reset power if required. If the switched power relay is not available connect the modem to a constant supply which is not affected by the ignition or accessories circuit. For details on the switched power relay see section 1.8.3 Relay and Switched Power Outputs.

1.7.2.4.1 Connector Location

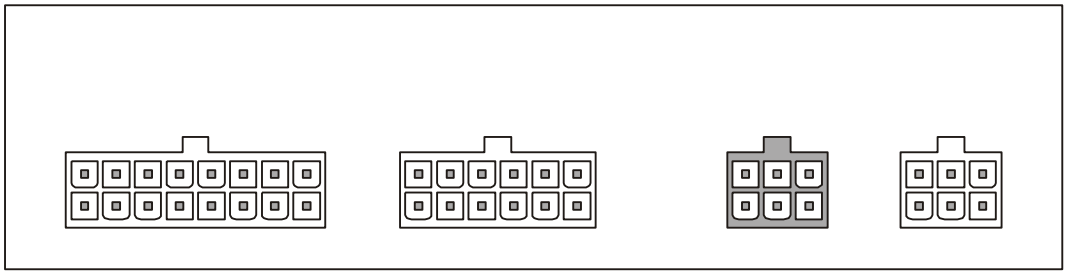


Figure 1-12 Relay Outputs Interface Location

1.7.2.4.2 Modem Power Connector Details

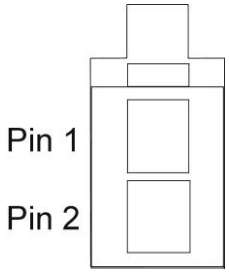


Figure 1-13 Maxon MM-5100 Power Connector

Table 1-2 Maxon MM-5100 Power Connector Details

Pin No.	Description
1	+6VDC to +36VDC
2	Ground

1.8 Inputs and Outputs

1.8.1 Auxiliary Interface 1

Auxiliary Interface 1 contains digital inputs 1 to 7, the 6 open collector outputs as well as 2 high speed timer inputs for connection to conventional speed and RPM sources.
MPG can supply a standard wiring loom for applications using this interface; the wire colours for the various signals are detailed below.

1.8.1.1 Connector Location

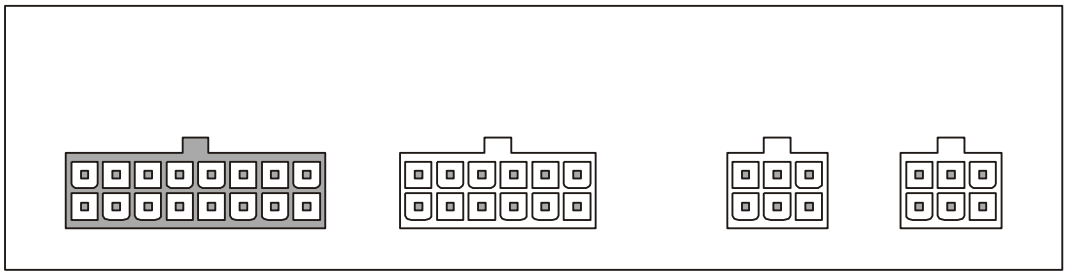


Figure 1-14 Auxiliary Interface 1 location

1.8.1.2 Connector Details

The Auxiliary 1 interface utilizes a Molex® Mini-Fit Jr™ 16-way connector, or equivalent.

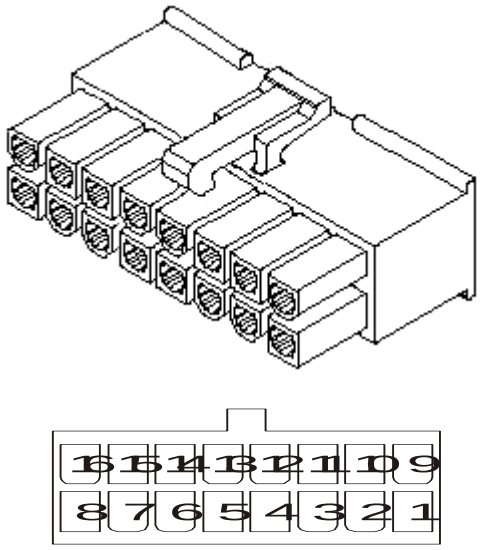


Figure 1-15 Auxiliary Interface 1 Interface Pin-out (Looking Into Case)

Suitable connectors for cable termination are Molex 5557-16 (with 5556 crimp pins), Alex 9359-16 (with 4256T crimp pins) or TKP H6657R1-12(with 6657TP-1 crimp pins).

Table 1-3 Auxiliary Interface 1 Wiring

Pin Number	Pin Name	Description / Cable Colour (Standard Loom)
1	SPEED	Vehicle speed input (Frequency input 1) *Light Grey / Brown trace*
2	OUTPUT 6	Switched output 6 *White / Dark Blue trace*
3	OUTPUT 4	Switched output 4 *White / Yellow trace*
4	OUTPUT 2	Switched output 2 *White / Red trace*
5	GND	Signal ground *Black*
6	INPUT 6	Input 6 (Switched Input 6) *Pink / Dark Blue trace*
7	INPUT 4	Input 4 (Switched Input 4) *Pink / Yellow trace*
8	INPUT 2	Input 2 (Switched Input 2) *Pink / Red trace*
9	RPM	Vehicle RPM input (Frequency input 2) *Grey / Red trace*
10	OUTPUT 5	Switched output 5 *White / Dark Green trace*
11	OUTPUT 3	Switched output 3 *White / Orange trace*
12	OUTPUT 1	Switched output 1 *White / Brown trace*
13	INPUT 7	Input 7 (Switched Input 7) *Pink / Purple trace*

14	INPUT 5	Input 5 (Switched Input 5) *Pink / Dark Green trace*
15	INPUT 3	Input 3 (Switched Input 3) *Pink / Orange trace*
16	INPUT 1	Input 1 (Switched Input 1) *Pink / Brown trace*

1.8.2 Auxiliary Interface 2

Auxiliary interface 2 contains inputs 9 to 16. These inputs can be used as both analogue signal inputs (for monitoring and logging) or as digital switched inputs. For analogue signal monitoring inputs 9 to 12 operate over a 5Volt input range referenced to system ground whilst inputs 13 to 16 operate over a 26Volt input range referenced to system ground.
MPG can supply a standard wiring loom for applications using this interface; the wire colours for the various signals are detailed below.

1.8.2.1 Connector Location

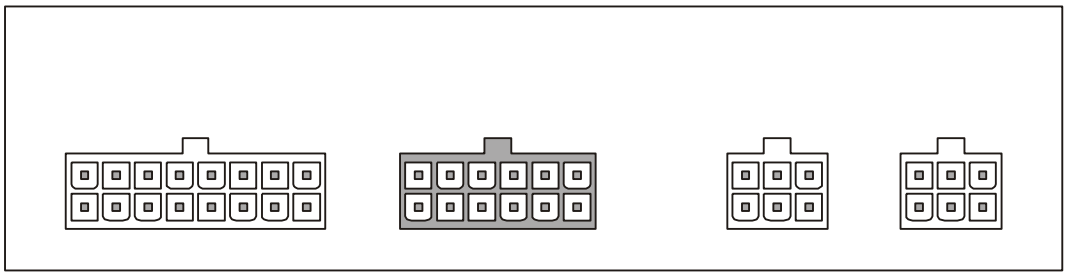
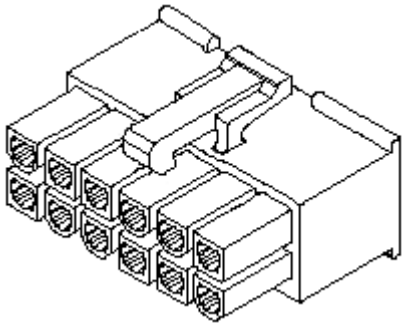


Figure 1-16 Auxiliary Interface 2 Location

1.8.2.2 Connector Details

The Auxiliary 1 interface utilizes a Molex® Mini-Fit Jr™ 12-way connector, or equivalent.



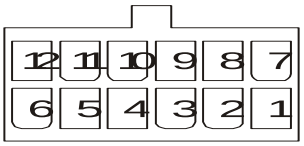


Figure 1-17 Auxiliary Interface 2 Interface Pin-out (Looking Into Case)

Suitable connectors for cable termination are Molex 5557-12 (with 5556 crimp pins), Alex 9359-12 (with 4256T crimp pins) or TKP H6657R1-12 (with 6657TP-1 crimp pins).

Table 1-4 Auxiliary Interface 2 Wiring

Pin Number	Pin Name	Description / Cable Color (Standard Loom)
1	INPUT 16	Input 16 (Analogue / Switched Input 16) *Light Blue / Grey trace*
2	INPUT 15	Input 15 (Analogue / Switched Input 15) *Light Blue / Purple trace*
3	GND	Signal ground *Black*
4	GND	Signal ground *Black*
5	INPUT 11	Input 11 (Analogue / Switched Input 11) *Light Blue / Orange trace*
6	INPUT 9	Input 9 (Analogue / Switched Input 9) *Light Blue / Brown trace*
7	GND	Signal ground *Black*
8	INPUT 14	Input 14 (Analogue / Switched Input 14) *Light Blue / Dark Blue trace*
9	INPUT 13	Input 13 (Analogue / Switched Input 13) *Light Blue / Green trace*
10	INPUT 12	Input 12 (Analogue / Switched Input 12) *Light Blue / Yellow trace*
11	INPUT 10	Input 10 (Analogue / Switched Input 10) *Light Blue / Red trace*
12	GND	Signal ground

		Black

1.8.3 Relay and Switched Power Outputs

1.8.3.1 Connector Location

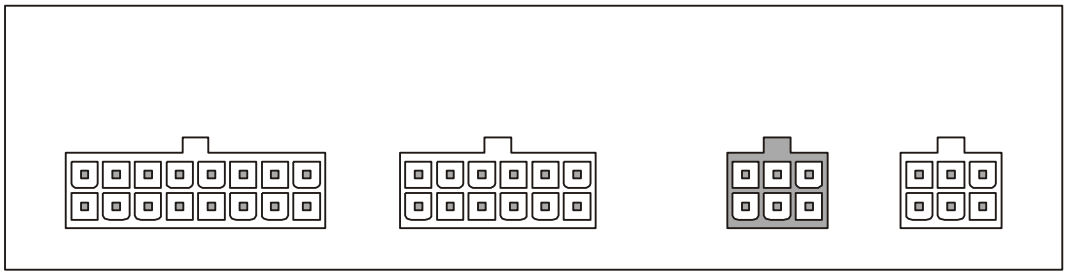


Figure 1-18 Relay Outputs Interface Location

1.8.3.2 Connector Details

The relay and switched power outputs interface utilizes a Molex® Mini-Fit Jr™ 6-way connector, or equivalent.

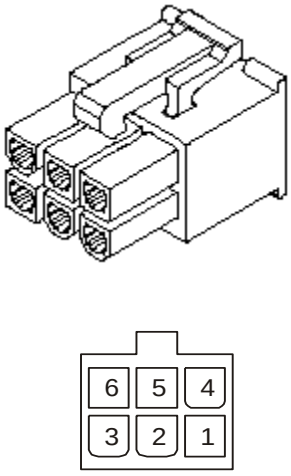


Figure 1-19 Relay Outputs Interface Pin-out (Looking Into Case)

Suitable connectors for cable termination are Molex 5557-06 (with 5556 crimp pins), Alex 9359-06 (with 4256T crimp pins) or TKP H6657R1-06 (with 6657TP-1 crimp pins).

Table 1-5 Relay Interface Wiring

Pin Number	Pin Name	Description
1	GND	Power Ground
2	RELAY 1	Relay 1 normally open contact
3	RELAY 1	Relay 1 normally open contact
4	SW_PWR	Switched Power Output

5	RELAY 2	Relay 2 normally open contact
6	RELAY 2	Relay 2 normally open contact

1.8.3.3 Normally Open Relay Contacts

Two normally open relays are provided to allow the external switching of high current/voltage or scenarios where a high degree of isolation between the GRM001 and external equipment is required.
When the datalogger is switched off both these outputs will return to the open contact state. These outputs are available externally as RELAY1 and RELAY2, when programming these relays the GRM001 firmware treats RELAY1 as Digital Output 7 and RELAY2 as Digital Output 8.

1.8.3.4 Switched Power Relay Contacts

The normally open switched power relay can be used to control power to external equipment (i.e. GSM Modem). When the datalogger is switched off this output will return to the open contact state (i.e. power will not be supplied).
This output is available as SW_PWR, when programming this output the GRM001 firmware treats SW_PWR as Digital Output 9.

1.9 Datalogger Power Supply

MPG supplies a standard wiring loom for this interface; the wire colours for the various signals are detailed below.

1.9.1 Connector Location

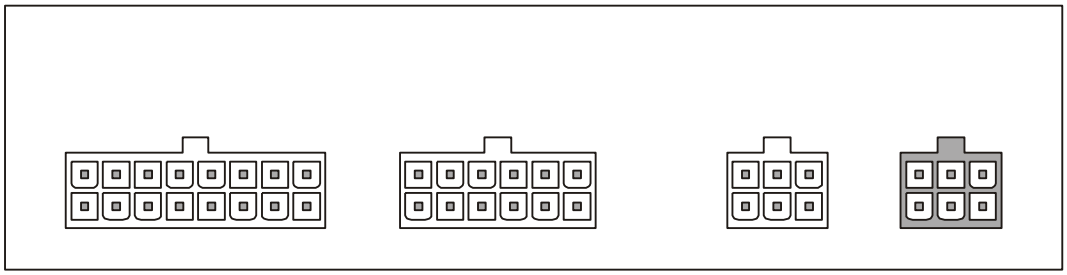


Figure 1-20 Power Supply Interface Location

1.9.2 Connector Details

The Power Supply interface utilizes a Molex® Mini-Fit Jr™ 6-way connector, or equivalent.

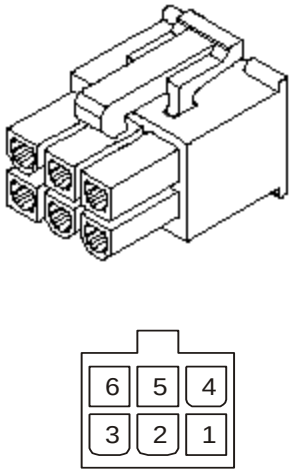


Figure 1-21 Power Supply Interface Pin-out (Looking Into Case)

Suitable connectors for cable termination are Molex 5557-06 (with 5556 crimp pins), Alex 9359-06 (with 4256T crimp pins) or TKP Connectors H6657R1-06 (with 6657TP-1 crimp pins).

Table 1-6 Power Interface Wiring

Pin Number	Pin Name	Description / Cable Colour (Standard Loom)
1	GND	Power ground *Black (with in-line 3AG fuse holder)*
2	GND	Power ground *Black*
3	GND	Power ground *Black*
4	VPWR	GRM001 Power supply input *Red (with in-line 3AG fuse holder)*
5	VBATT	GRM001 Backup battery power supply input *Red / White trace*
6	IGNITION	Vehicle ignition input *Yellow*

1.9.3 External Power Supply

The external power supply inputs are used to provide power to the GRM001 datalogger. In the standard power loom supplied by MPG both the VPWR input (pin 4) and the associated ground input (pin 1) are fused to protect the datalogger in the event of incorrect wiring.

The voltage output on the switched power (SW_PWR) (see Section 1.8.3.4) output is an internal combination of this signal and the lead-acid battery signal, allowing external equipment to remain powered even when the external power is removed.
This input includes extra transient protection and filtering to ensure that power supply "spikes" do not cause damage to the GRM001 circuitry.

1.9.4 Lead-acid Battery Charger

The GRM001 Datalogger includes support for an external Lead-Acid (Gel-Cell) battery. This battery is used for powering the datalogger in the event of external power being removed. When power is supplied by the external power supply input the GRM001 dataloggers internal battery charger will trickle charge the backup battery.
The voltage output on the switched power relay (see Section 1.8.3.4) will remain active when the GRM001 is operating on backup battery.

1.9.5 Ignition Input

The ignition input provides two functions. Firstly, it is used to enable the GRM001 power supply; secondly it acts as Digital Input 8.

1.10 Engine Control Module Interface

1.10.1 Overview

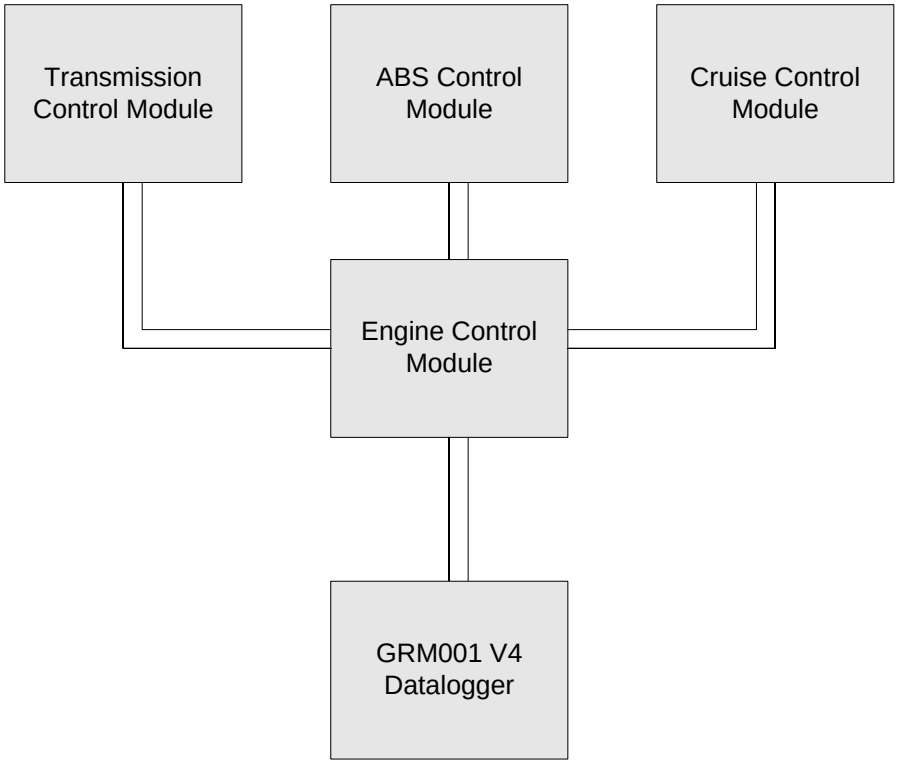
The GRM001 V4 Datalogger allows connection to the primary ECM (Engine Control Module) interfaces used by American and European truck engine and vehicle manufactures. These interfaces allow vehicle telemetry data to be extracted from the ECM and stored in the GRM001 for future reporting and data analyses. The ECM interfaces supported by the GRM001 are SAE-J1587 and SAE-J1939/FMS.

1.10.2 SAE-J1587

1.10.2.1 Overview

J1587 is the standard communications protocol used by the leading American truck engine, transmission and system component manufactures as a means of transmitting and receiving management system data throughout the vehicle. All components (engine, transmission, ABS module, cruise control etc.) are linked via a dedicated RS485 twisted pair communications network, this RS485 network provides the physical connection for the J1587 protocol.

J1587 Network



Utilizing the SPARE RS485 port on the GRM001, we are able to interface directly to the J1587 network. This connection allows us to receive and store engine management data in the GRM001 for future reporting and data analysis.

WARNING: When wiring the J1587 interface try to keep the cable as far from communications equipment (Radio, CB, Mobile Phone etc.) as possible. Interference with communications equipment can cause data corruption. It is also important to ensure that the length of this interface cable is kept to a minimum.

NOTE: Using this interface the GRM001 will only listen for specific J1587 PID and MID codes. The GRM001 will not transmit data across the J1587 link; this is primarily to avoid any possible interference/data collision between the engine management system and the GRM001.

1.10.2.2 Connecting to J1587

To connect to the J1587 network

4. Locate the vehicle diagnostics port. This can often be found on the driver side of the vehicle under/near the steering wheel or on or near the centre of the dash.

NOTE: DO NOT connect to the J1587 network between terminating points. Connections must be made at an end of the RS485 twisted pair.

Remove the diagnostic port retaining screws and pull the diagnostic port from its mounting bracket.

Locate the J1587 twisted pair.

The pin outs of the diagnostic port can vary depending on vehicle make and model. Table 1-7 HD10 Series Wiring Details contains commonly used pin descriptions for 6 and 9 pin Deutsch HD10 Series connectors.

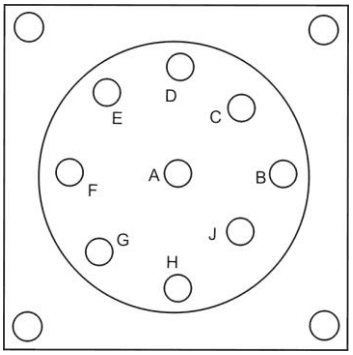


Figure 1-22 HD10 Series 9 Pin Connector

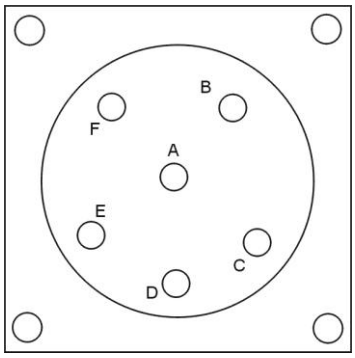


Figure 1-23 HD10 Series 6 Pin Connector

Table 1-7 HD10 Series Wiring Details

Pin	HD10 Series 9 Pin Connector	HD10 Series 6 Pin Connector
A	GND	J1587 POS/A
B	+12/24Volts (Battery)	J1587 NEG/B
C	-	+12/24Volts (Ignition)
D	-	-
E	-	GND
F	J1587 POS/A	-
G	J1587 NEG/B	
H	-	
J	+12/24Volts (Ignition)	

NOTE: Due to such variations in diagnostic port types, we are unable to provide specific details for each vehicle/engine make and model. If you are unsure as to whether you have located the correct pair and/or are unsure of the polarity please consult the manufactures documentation.

Locate the GRM001 V4 ECM Shielded Twisted Pair cable (Part No.560-195-0119)

Using a soldering iron connect to the J1587 conductors as per Table 1-8 J1587 Interface Cable Wiring Details. Ensure that the ground pin (pin 5/green) is connected to the trace of the shielded cable and correctly grounded behind the diagnostic port.

WARNING: An incorrectly grounded ECM cable can cause data corruption.

NOTE: DO NOT disconnect the conductors from the diagnostic port.

Table 1-8 J1587 Interface Cable Wiring Details

Pin	Colour	Description
5	Green	GND
6	White/Blue	J1587 POS/A
7	Blue	J1587 NEG/B

Connect the RJ45 connector to the SPARE port (port 8) on the front panel of the GRM001 V4 Datalogger.

1.10.2.2.1 Connector Location

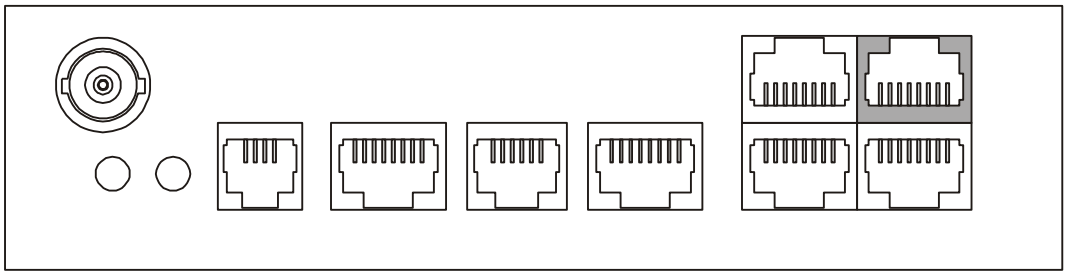
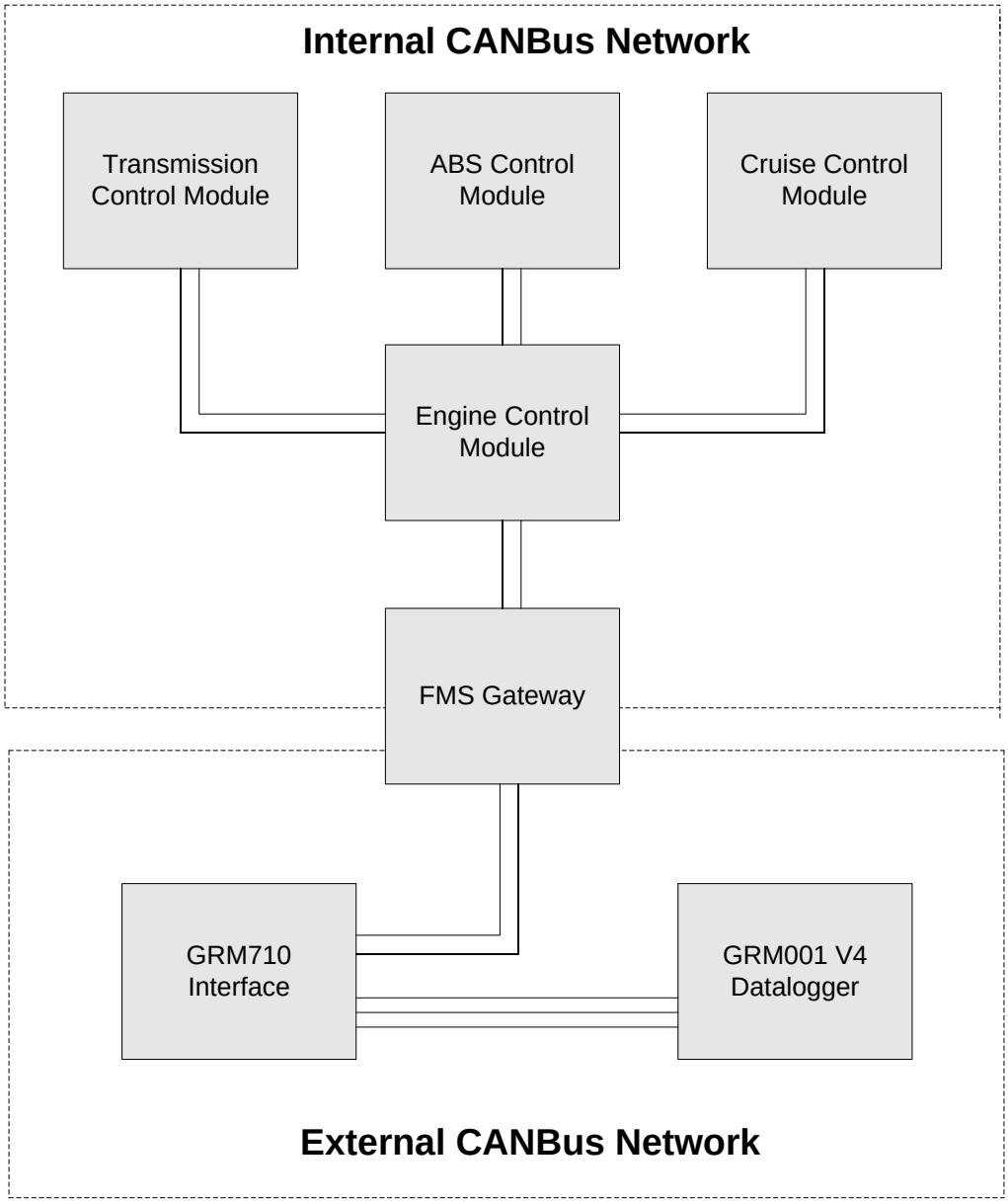


Figure 1-24 Spare RS485 Interface Location

1.10.3 SAE-J1939/FMS

1.10.3.1 Overview

J1939/FMS is the standard communications protocol used by many leading European truck manufactures as a means of providing engine management system data to external telemetry and data logging systems. Using the J1939/FMS interface the telemetry and/or datalogger does not talk directly to the ECM. Engine Control Module data is made available through a manufacture specific FMS gateway, which must be installed in the vehicle before this interface can be enabled. Also required for this installation is a GRM710 CANBus interface.



1.10.3.2 GRM710 Details

To connect the GRM710 CANBus interface
The GRM710 is supplied with two interface cables, one to provide the connection to the GRM001 and one to provide power and engine data to the GRM710.

5. Locate the GRM710 CANBus power/data interface cable (Part No. 560-195-0100).

Connect the power/data interface cable as per

Table 1-9 GRM710 Wiring Details

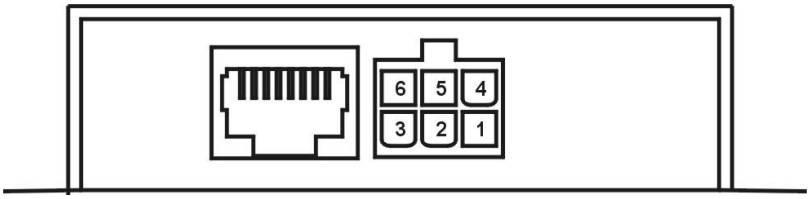


Figure 1-25 GRM710 Front Panel

Table 1-9 GRM710 Wiring Details

Pin	Colour	Description
1	Black	GND
2	N/C	-
3	Blue	CAN High
4	Red/Green	+10VDC to +30VDC
5	White	CAN Lo
6	N/C	-

Locate the GRM001 V4 to GRM710 interface cable (Part No 560-195-0099).

Connect one end to the RJ45 connector on the GRM710

Connect the other end to the SPARE port (port 8) on the front panel of the GRM001 V4 Datalogger

1.10.3.2.1 Connector Location

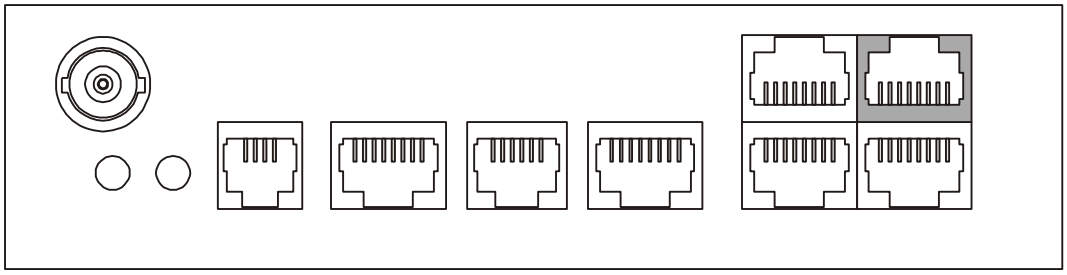


Figure 1-26 Spare RS232 Interface Location

1.11 Conventional Engine Interface

1.11.1 Overview

As mentioned previously the GRM001 provides support for interfacing to many brands and types of ECMs. But often there are cases where an ECM is either not compatible with the GRM001 or an ECM is simply not available. For these vehicles the GRM001

provides 2 high speed frequency counting (timer) inputs for connection to conventional speed and RPM sources.

NOTE: The GRM001 frequency inputs are 5Volt CMOS inputs, signals below 3.5Volts may not be detected by the GRM001. Signal amplifiers (See section 1.11.4 GRM910 Signal Amplifier) are available from MPG (GRM910 Part No 560-110-0110) if they are required.

1.11.2 Connecting conventional speed source

1.11.2.1 Overview

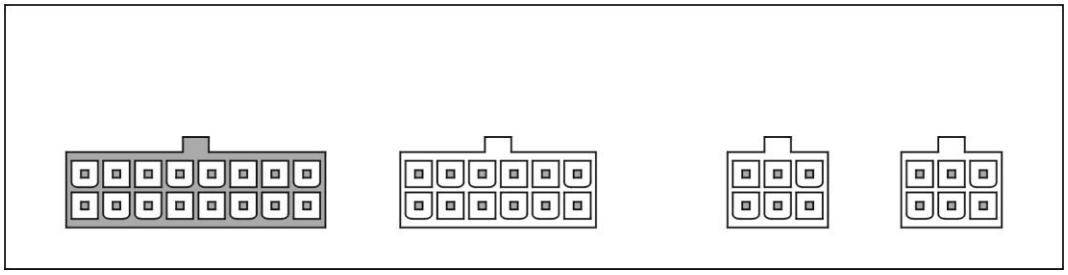
Many modern vehicles are fitted with electronic speed senders which will generate a pulse on each revolution of its reference point (eg. tail shaft or rear axle). There are cases were the vehicle may have 2 senders installed which allow the ECM (if fitted) speed source to be separated from the speedometer speed source. Many manufactures specify that no external equipment is to interface with ECM sensors. If this is the case you can sometimes extract the speed pulse from behind the speedometer or tachograph.

NOTE: Each manufacture has different methods of interfacing speed senders and/or other speed detecting devices, which can also vary between models and engine types. Some manufactures provide an external interface for extracting speed signals.

WARNING: MPG will not warrant any damage caused by incorrectly interfacing to a vehicle which is against the manufactures documentation and/or recommendations. If you are unsure as to specific vehicle wiring or interfacing requirements please consult the manufacture of the vehicle and/or component/device.

Once a suitable speed source has been located, it will need to be connected to the SPEED input (pin 1) of AUX1 on the rear panel of the GRM001 V4 Datalogger.

1.11.2.2 Connector Location

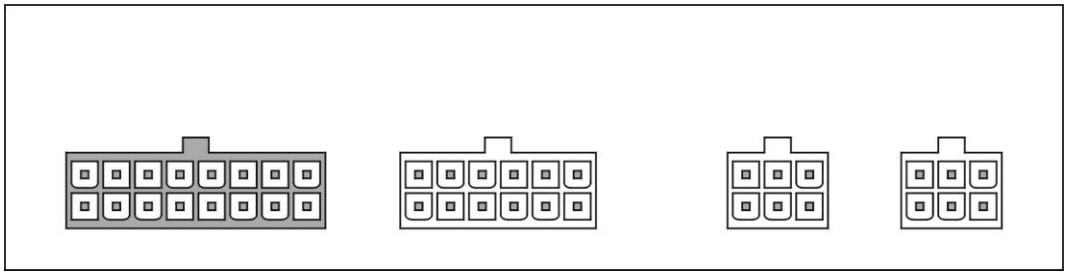


1.11.3 Connecting conventional RPM source

1.11.3.1 Overview

A suitable RPM signal can often be found by connecting directly to the W terminal of the alternator. If this connection is unavailable most alternators can be modified to allow a pulsed output relative to engine speed
Once a suitable RPM source has been located, it will need to be connected to the RPM input (pin 9) of AUX1 on the rear panel of the GRM001 V4 Datalogger.

1.11.3.2 Connector Location



1.11.4 GRM910 Signal Amplifier

1.11.4.1 Overview

There are often cases where the desired conventional speed and RPM sources pulse below the minimum threshold (3.5Volts) of the GRM001s timer inputs. In these cases a GRM910 Signal Amplifier will be required to boost the pulse signal up to the required level for the GRM001. The GRM910 consists of two independent signal amplifiers, this is to allow both the speed and RPM signals to be amplified if required. The internal circuitry for both amplifiers is the same.

1.11.4.2 Wiring Details

To connect the GRM910

6. Locate the GRM910 Dual Channel Signal Amplifier (Part No. 560-110-0110)

Using a soldering iron connect Input 1 to the RPM source which requires amplification

Connect Output 1 to the RPM input (pin 9) of AUX1 on the rear panel of the GRM001 V4 Datalogger

Using a soldering iron connect Input 2 to the Speed source which requires amplification

Connect Output 2 to the Speed input (pin 1) of AUX 1 on the rear panel of the GRM001 V4 Datalogger

Connect power and ground to the SW_PWR output of RELAYS on the rear panel of the GRM001 V4 Datalogger

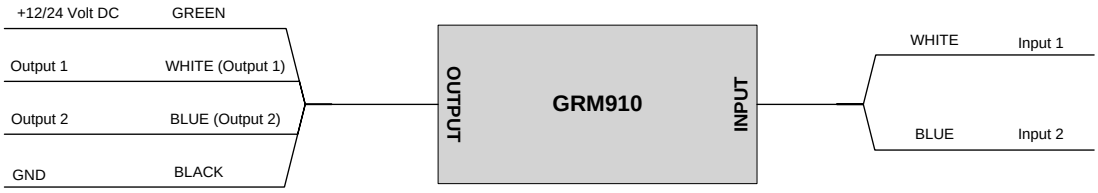


Figure 1-27 GRM910 Wiring Details

Table 1-10 GRM910 Wiring Details

Colour	Description
White	Input 1
Blue	Input 2
Green	+12VDC to +24VDC
Black	GND
White	Output 1
Blue	Output 2