

TECHNICAL DOCUMENTATION	03/09/2003	GAUGE	M3 LOG Advanced
Notes: M3 LOG Advanced technical documentation, dimensions and pinout. Ver 1.05			

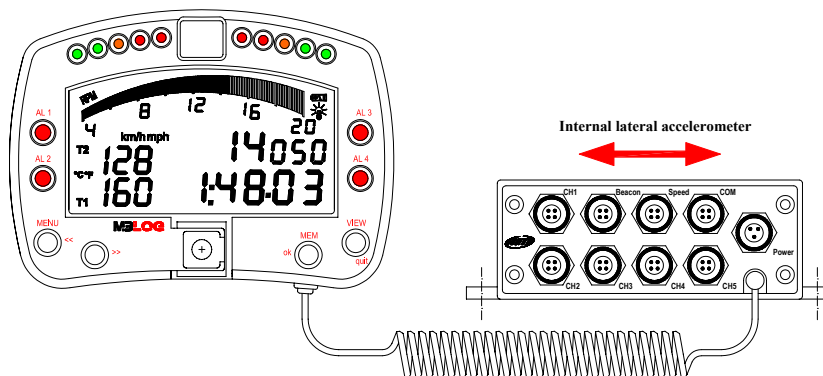


Figure 1: M3 LOG Advanced

## Introduction

**M3 LOG Advanced** represents the new generation of “High-technology” Aim data acquisition systems for car racing.

**M3 LOG Advanced** monitors and displays RPM, 5 fully configurable analog inputs (pressure, temperature, potentiometers, Lambda sond and Pitot tube speed sensors), speed, lateral G-force and lap (split) times.

Moreover, the logger may be interfaced with the engine’s ECU using a **serial cable** connected to the **COM** input, in order to sample all the channels acquired from the ECU.

The ECUs supported by **M3 LOG Advanced** are:

- Pectel – Mod. T2
- MBE – Mod. 941 and Mod. 967
- DTA – Mod. P8

The logger records the following parameters:

- 5 analog inputs: the user may choose the analog inputs among pressure sensors, temperature sensors (VDO, thermocouples, thermoresistances), potentiometers (linear and circular), Lambda sond and Pitot tube speed sensors;
- lap and split times;
- 1 speed input;
- lateral G-force: the G-force sensor is mounted inside the “Junction box”;
- logger temperature;
- All the channels acquired from the engine’s ECU.

Data is stored in a huge 2 Mbytes internal flash memory and may be downloaded to a PC through an USB cable.

Please, refer to the following drawing to get further information concerning the gauge’s display.

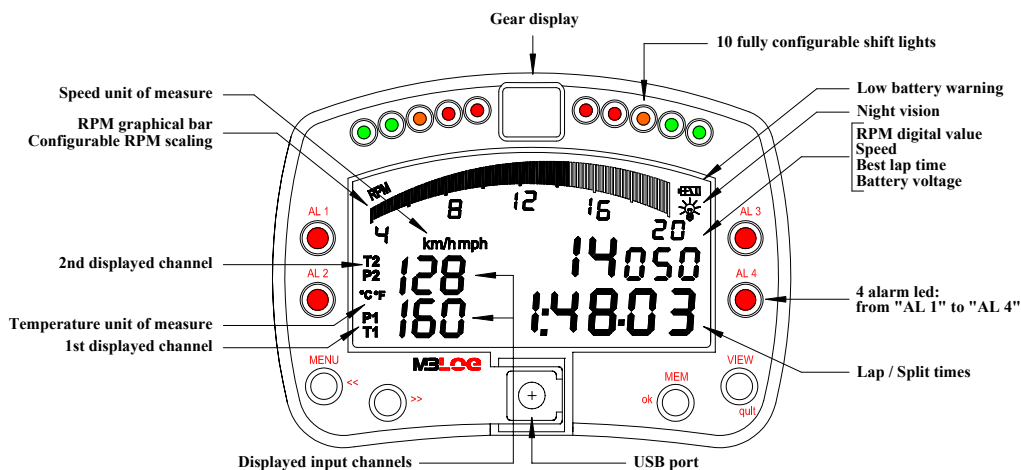
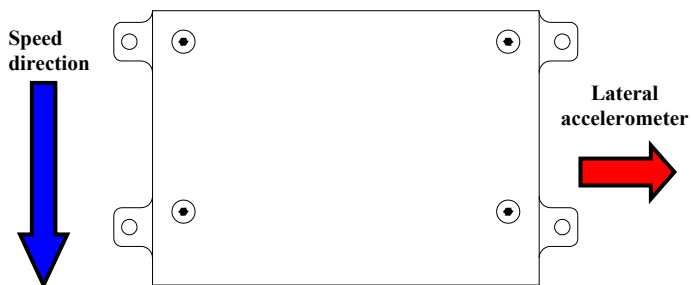


Figure 2: M3 LOG Advanced display

## Installation notes

- It is recommended to choose a place where both the display unit and the “Junction box” are not in contact with oil or fuel, make sure that the gauge is not installed too close to heat sources and protect the instrument from vibrations.
- We remind you that your **M3 LOG Advanced** is not equipped with internal batteries, and so it needs to be powered by an external power source (i.e. the car’s battery).
- Once the gauge has been correctly installed, you may plug all the sensors inside the female connectors located on the Junction box’s front panel. Moreover, you may connect the gauge to the engine’s ECU using a serial cable.



In order to correctly measure the lateral g-force using the internal accelerometer, it is suggested to install the gauge with the Junction box’s front panel perpendicular to the vehicle’s speed, as shown in Figure 3.

Figure 3: How to correctly install your M3 LOG Advanced (Junction box’s top side view)

## How to connect M3 LOG Advanced to the ECU

In order to connect your **M3 LOG Advanced** to the ECU, please use a serial cable connected to the gauge’s **COM** connector, as shown in Figure 4.

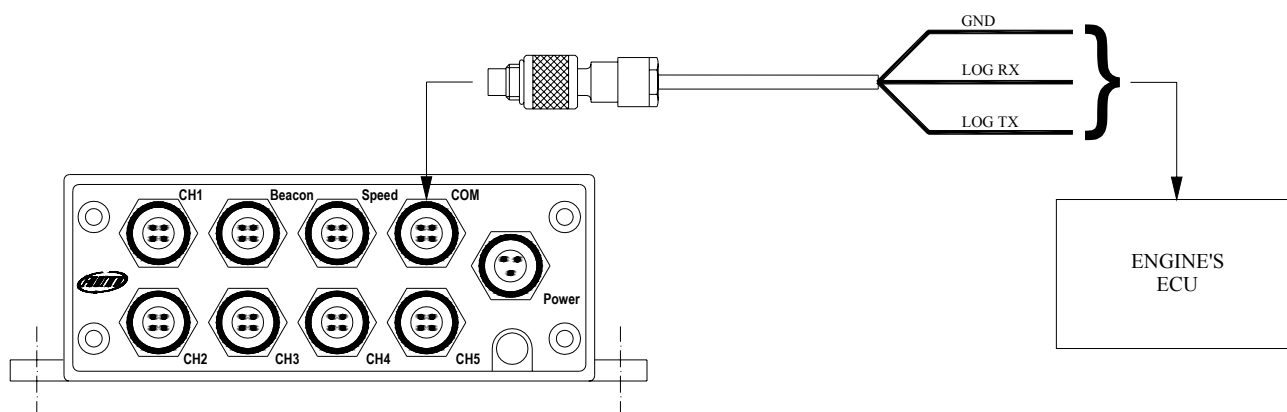


Figure 4: How to connect your M3 LOG Advanced to the engine’s ECU

## How to connect M3 LOG Advanced to the PC

In order to connect your **M3 LOG Advanced** to the PC, please use the USB data download cable and plug it both in the gauge’s USB port and in the PC’s USB port, as explained in Figure 5. Moreover, it is reminded to use a **9-15 Volts external power source** in order to be able to switch on the gauge.

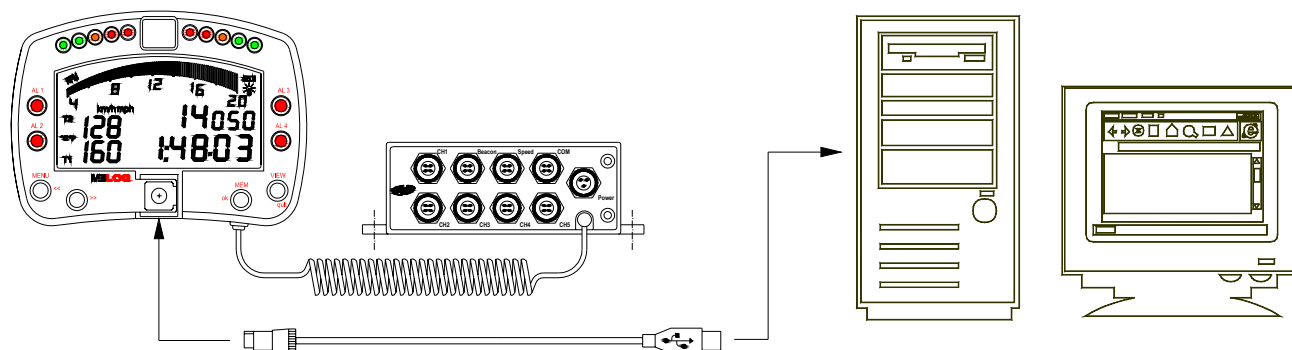


Figure 5: How to connect your M3 LOG Advanced to the PC

## Software

Once the data logger has been installed and the sensors have been plugged in it, in order to acquire consistent and correct information, it is necessary to configure the data logger. For a correct configuration, please use **Race Studio 2**, a software properly developed by Aim to configure its instruments and to analyze stored data.

In **Race Studio 2** main window it is possible to choose your data logger.

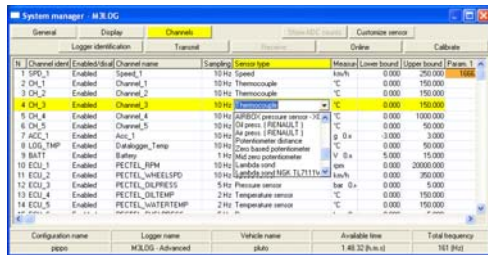
Please, select “**M3 LOG**” and, then, press “System manager” button

Now, please follow these configuration steps:

1. Set the desired input channels;
2. Configure the input channels;
3. Transmit the configuration to the logger;
4. Calibrate/autocalibrate the sensors;
5. Transmit the configuration to the logger.

### 1) How to set the input channels

Press “Channels” button to set the sensors you have installed on your gauge. It will appear the following screenshot.



In order to set an input channel, double-click on the cell corresponding to the desired input channel: it will appear the screenshot shown in the previous picture.

### 2) How to configure the gauge

Once set the desired input channels, press button “Display” to set the displayed channels, the alarms etc... It will appear the following screenshot.



To correctly configure your **M3 LOG Advanced** it is necessary to set all the parameters reported in this dialog box:

- Display language.
- Obscuring time and Number of splits
- Speed channel, wheel circumference and pulses per wheel revolution.

- Channels and alarms concerning the 2 pages of the display.

### 3) How to transmit the configuration

Once you set the input channels and you have configured them, you have to transmit the configuration to the instrument by pressing the “Transmit” button.

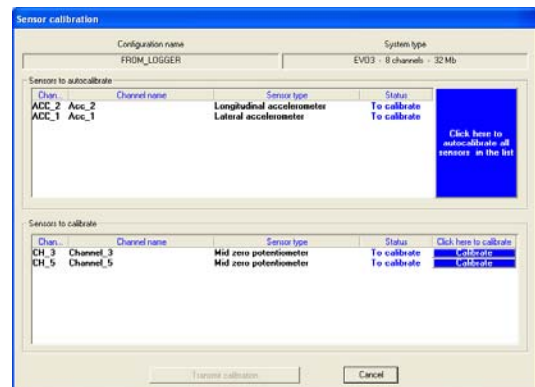
It is reminded that, in order to transmit the configuration, the gauge must be switched on and connected to the PC, as shown in Figure 5.

### 4) How to calibrate/autocalibrate the sensors

Once the configuration has been transmitted to the PC you have to calibrate/autocalibrate the sensors.

The internal lateral accelerometer and the “potentiometer distance” need to be autocalibrated, while “Mid zero potentiometer”, “zero based potentiometer” and the “on-board gear sensor” need to be calibrated.

Please press “calibrate” button and it will appear the following screenshot.



Please follow these instructions:

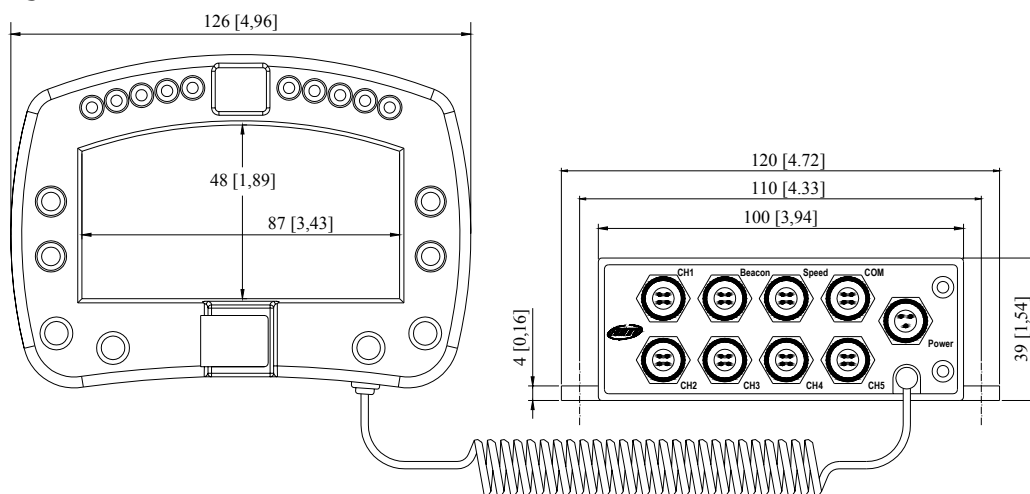
- The G-force sensor and the “potentiometer distance” sensor need to be autocalibrated pressing button “Click here to autocalibrate all sensors in the list”.
- To calibrate the “on-board” gear sensor, the “Mid zero potentiometer” or the “zero based potentiometer”, please click on the corresponding “Calibrate” button and follow the instructions prompted on your PC’s monitor.

**It is reminded that the calibration/autocalibration procedure is fundamental in order to acquire correct data.**

### 5) Re-transmit the configuration

Once the calibration/autocalibration has finished, it is absolutely necessary to re-transmit the configuration to your **M3 LOG Advanced** pressing the “Transmit” button.

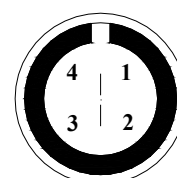
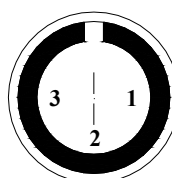
## Dimensions



Dimensions in millimeters [inches]

### Channels 1÷5 pinout

Pin	Function	Pin	Function
1	Analog signal input	3	+V battery
2	GND	4	V reference



3 & 4 pins female Binder 712 connectors pinout: external view

### Speed channel pinout

Pin	Function	Pin	Function
1	Speed signal input	3	+V battery
2	GND	4	Not connected

### Beacon channel pinout

Pin	Function	Pin	Function
1	Magnetic / Optic codified lap	3	+V battery
2	GND	4	Optic not codified lap

### COM channel pinout

Pin	Function	Pin	Function
1	GND	3	LOG Tx
2	LOG Rx	4	Not connected

### “Power in” channel pinout

Pin	Function	Pin	Function
1	9-15 V power input	3	GND
2	GND		

## Technical characteristics

General characteristics	Value
Input channels	5
Input channels from ECU	Max. 64
Max sampling frequency per channel	Up to 200 Hz
Total sampling frequency	1000 Hz
Internal g-sensor	±5g
External power	From 9 to 15 VDC
Voltage output (V reference)	4.5 V (for potentiometers)
Internal memory	2 Mbytes flash EPROM
ECU interface	Serial port :
	19.2 bps (Pectel/MBE)
	9.6 bps (DTA)
PC interface	300 kbyte/sec USB port

Other characteristics	Value
M3 LOG dimensions	126x92x24 mm
Display dimensions	87x48 mm
Environmental	IP 65

## “ECU communication protocol”: general information

The “available channels list” you find inside Race Studio 2 “Configuration” window is desumed from the ECU’s communication protocol.

This protocol is common to all the ECUs belonging to the same manufacturer (i.e. Pectel T2 and T6 have the same communication protocol): the communication protocol includes all the available channels of a generic Pectel/DTA etc. ECU. The channels you may sample among the “available channels list” are function of the ECU model, of the ECU configuration and of the wiring.

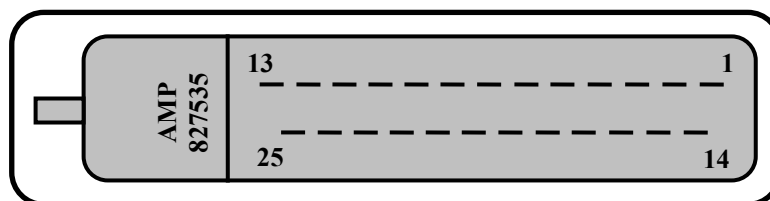
**The number of channels that your data logger is able to sample depends on the ECU type and its configuration, on the wiring and on the sensors connected to the ECU itself.**

## APPENDIX A: “PECTEL T2 configuration”

- **Serial Communication Set-Up**

The ECU is equipped with a serial communication interface (RS 232) used for communicating parameters to an external data logger, or for configuring the ECU itself.

The pinout for Pectel T2 ECU is shown below:



Pin	Function	Comments
1	IGN1	Build option: low side / TTL coil driver
14	IGN2	Build option: low side / TTL coil driver
2	INJ1 HIGH IMP	High impedance only
15	INJ2 HIGH IMP	High impedance only
3	INJ3 HIGH IMP	High impedance only
16	INJ4 HIGH IMP	High impedance only
4	PWM1	Low side (10A maximum)
17	PWM2	Low side (10A maximum)
5	ENG GROUND	
18	ENG GROUND	
6	12V+ve	
<b>19</b>	<b>RS 232 RX</b>	<b>RS 232 communication – ECU RX</b>
<b>7</b>	<b>RS 232 TX</b>	<b>RS 232 communication – ECU TX</b>
20	PWM3	Low side (10A maximum)
8	CRANK	Crank sensor input
21	CAM	Cam sensor input
9	MAF/MAP	Analog input
22	TPS	Analog input
10	LAMV	Lambda sensor
23	ECT	Analog input
11	ACT	Analog input
24	SPARE ANALOG	Analog input
12	SENSOR GND	Analog ground
25	5V+ve	200 mA maximum
13	SPARE DIGITAL	Switched input

To connect the ECU to a PC, using a standard DB9 female connector, pin 7 (**ECU TX**) of the ECU must be connected to pin 2 of the DB9, pin 19 (**ECU RX**) of the ECU must be connected to pin 3 of the DB9 and pin 18 (**GND**) of the ECU must be connected to pin 5 of the DB9.

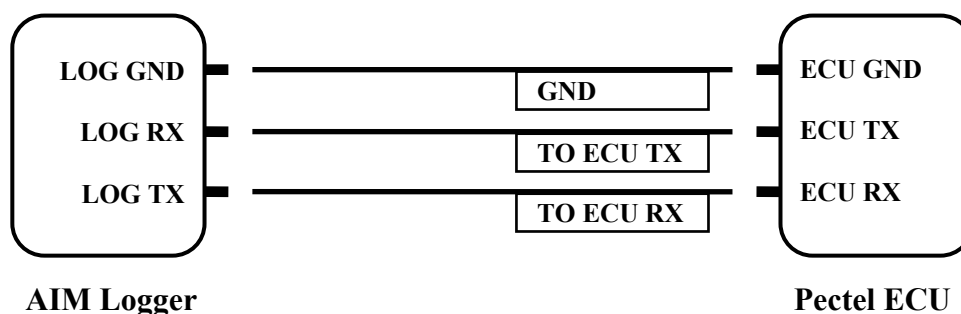
- **ECU Configuration**

In order to communicate with the data logger, the ECU must be properly configured using the program “**Descpro**” provided with Pectel’s ECU. Follow these steps to configure Pectel T2 communication:

1. Connect the ECU to a PC with **Descpro** installed, and turn on power to the ECU (ECU pin 6 at 12V and ECU pin 5,18 at GND).
2. Launch **Descpro** software; at the start-up mark [**Serial**], choose the right [**COM**] port and click on [**On-line**] button.
3. The software will read the ECU configuration (called “**MAPS**”); when finished, press the [**Menu**] button at the top-right of the screen, and choose [**Software Setup**] in the next window.
4. Now choose [**Data Logging And Serial Comms**] with arrow-keys and press return (or double click with mouse pointer).
5. Select [**Default Communication Mode**] and press return.
6. The default mode should be [**PC**], press return and a dialogue-windows appears (**Set to:**); you must choose [**STACK**] and press return.
7. The new configuration must be transmitted to the ECU before exiting the program: click on the [**File**] button (bottom-left) and choose [**Program current maps into ECU flash**]; confirm the operation when prompted.
8. After the transfer is finished exit the program **Descpro**; the ECU is ready to communicate with AIM data loggers.

- **Connection With AIM Data logger**

Connect the cable called **TO ECU TX** with the pin 7 of the ECU (**ECU TX**), the cable called **TO ECU RX** with the pin 19 of the ECU (**ECU RX**) and the cable called **GND** with the pin18 of the ECU (**GND**) as shown in the figure below:

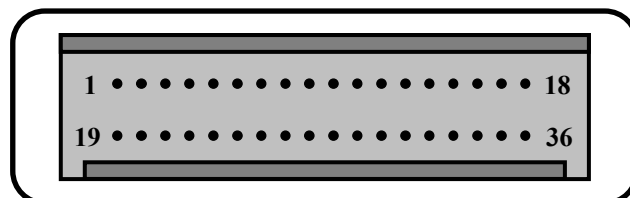


## APPENDIX B: “MBE 967 configuration”

### • Serial Communication Set-Up

The ECU is equipped with a serial communication interface (RS 232) used for communicating parameters to an external data logger, or for configuring the ECU itself.

The pinout for MBE-967 ECU is shown below:



Pin	Function	Comments
1	FUEL TRIM	Mapping plug 06
2	WATER TEMPERATURE SIGNAL	
3	AIR TEMPERATURE SIGNAL	
4	5V ANALOGUE	Mapping plug 04
5	ANALOGUE GND	Mapping plug 05
6	POWER GND	Mapping plug 01
7	POWER GND	
8	POWER GND	
9	POWER GND	
10	GEAR INPUT	
11	CRANK RETURN	
12	CRANK SIGNAL	
13	ECU SUPPLY	
<b>14</b>	<b>SERIAL RECEIVE</b>	Mapping plug 03: <b>RS232 com. – ECU RX</b>
15	FAUL LIGHT / SWITCH	
16	SHIFT LIGHT	Switched Ground
17	FUEL PUMP RELAY DRIVE	Switched Ground
18	IGNITION DRIVE 2	Cylinders 2 + 3
19	POWERSHIFT INPUT	Ground active
20	THROTTLE SIGNAL	
21	MAP SIGNAL	
22	5V ANALOGUE	
23	ANALOGUE GND	
24	ANALOGUE GND	
25	OIL TEMPERATURE	
26	IGNITION TRIM	Mapping plug 07
27	OIL PRESSURE	
28	BAROMETRIC PRESS. / LAUNCH INPUT	
29	LAMBDA SIGNAL	
30	NOT USED	Not used
31	NOT USED	Not used
<b>32</b>	<b>SERIAL TRANSMIT</b>	Mapping plug 02: <b>RS232 com. – ECU TX</b>
33	RADIATOR FAN RELAY DRIVE	Switched Ground
34	TACHOMETER SIGNAL	
35	INJECTION OUTPUT	All Cylinders
36	IGNITION DRIVE 1	Cylinders 1 + 4 (coil if distributor fitted)

To connect the ECU to a PC, using a standard DB9 female connector, pin 32 (**ECU TX**) of the ECU must be connected to pin 2 of the DB9, pin 14 (**ECU RX**) of the ECU must be connected to pin 3 of the DB9 and pin 6 (or other **Power GND** pins) of the ECU must be connected to pin 5 of the DB9.

Moreover to communicate with the PC the Fuel Trim (pin 1) and the Ignition Trim (pin 26) inputs must be hold at a voltage other than zero; this procedure enables the “Byte Mode” and allows the ECU to communicate with **EasiMap** Windows tool (the MBE configuration program – see ECU manual for more information).

## • ECU Configuration

In order to communicate with the data logger, the ECU must be properly configured using the program “EasiMap” provided with the ECU.

**ATTENTION:** the program **EasiMap v5.0** can be used to configure the data logging feature only if the user profile is at least “**Advanced**”; see MBE web site: <http://www.mbesystems.com/index.html>

1. Connect the ECU to a PC with **EasiMap 5.0** installed, and turn on power to the ECU (ECU pin 13 at 12V and ECU pin 6 (or other **Power GND**) at GND).
2. Launch **EasiMap 5.0** software; choose the [Get Data...] option from the [Data] menu.
3. In the window [Select Parameter] open the [Data Logging] directory and select [Data Logger Link]; choose [ECU Device] in the [Data Source] options and then press [OK].
4. Now the program reads information from the ECU and opens a new window to configure the communication.
5. The parameters must be configured **in the right sequence and with the right scaling** in order to communicate with the AIM data logger:

Data Logger Link: choose [**Transmitting at 19200**]

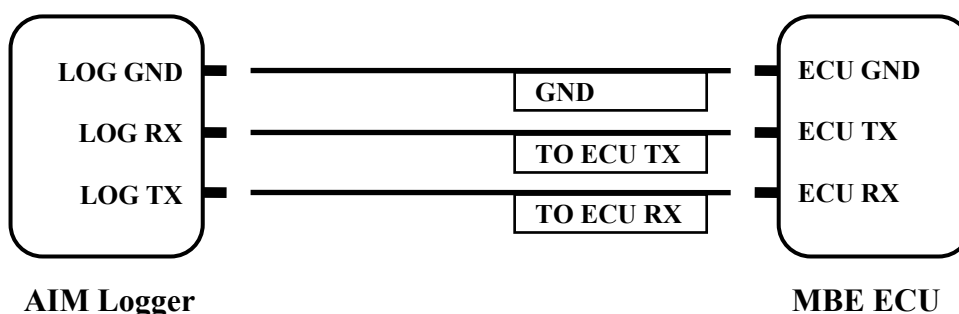
RPM: choose [**4,00**]

Parameter	Scaling
1: choose [ <b>Engine Speed</b> ]	Choose 16 bit
2: choose [ <b>Ignition</b> ]	Choose 8 bit
3: choose [ <b>Injection Time</b> ]	Choose 16 bit
4: choose [ <b>Throttle Angle</b> ]	Choose 8 bit
5: choose [ <b>Coolant Temp</b> ]	Choose 8 bit
6: choose [ <b>Air Temp</b> ]	Choose 8 bit
7: choose [ <b>Baro Pressure</b> ]	Choose 8 bit
8: choose [ <b>Lambda</b> ]	Choose 8 bit
9: choose [ <b>Ri</b> ]	Choose 16 bit
10: choose [ <b>Engine Oil Pressure</b> ]	Choose 8 bit
11: choose [ <b>Fuel Pressure</b> ]	Choose 8 bit
12: choose [ <b>Water Pressure</b> ]	Choose 8 bit
13: choose [ <b>Engine Oil Temp</b> ]	Choose 8 bit
14: choose [ <b>Gearbox Oil Temp</b> ]	Choose 8 bit
15: choose [ <b>Boost Pressure</b> ]	Choose 8 bit
16: choose [ <b>Gear Position</b> ]	Choose 8 bit

6. When all parameter are configured press the [Send] button and choose [ECU Device] at the request; the configuration is saved in the ECU memory.
7. Now close the configuration window and exit the program. Before to connect the ECU to the Data logger the “Broadcast Mode” must be enabled by ensuring a nominally zero voltage (or open circuit) on the Fuel Trim and Ignition Trim inputs.

## • Connection With AIM Data logger

Connect the cable called **TO ECU TX** with the pin 32 of the ECU (**ECU TX**), the cable called **TO ECU RX** with the pin 14 of the ECU (**ECU RX**) and the cable called **GND** with the pin 6 of the ECU (or other **Power GND** pins) as shown in the figure below:





---

## APPENDIX C: “CARMO configuration”

---

AIM **M3 LOG** can be connected to both Carmo ignition or injection unit (AFI 2003); it can acquire data from Carmo units mounted on Honda CBR600, Kawasaki ZX6R, Yamaha YZ6F and Suzuki GSXR600.

The configuration procedure is the same for every motorbike; when you have selected the channels to acquire or to display, the logger will be able to select automatically the right set of sensors, basing upon the information given by the AFI unit.

**ATTENTION:** every manufacturer has its own set of sensors; if the set of sensors is not the one usually used by the manufacturer for that type of motorbike, the acquired data could be wrong.

### **Injection unit**

All the ECU channels listed in the configuration dialog are available when the logger is connected to the injection unit.

### **Ignition unit**

Only RPM and Throttle Position channels are available when the logger is connected to the ignition unit. In this case it is recommended to disable the other ECU channels in order to save memory.