PRO-Tack EVO

MULTIFUNCTION ELECTRONIC DASHBOARD

USER MANUAL

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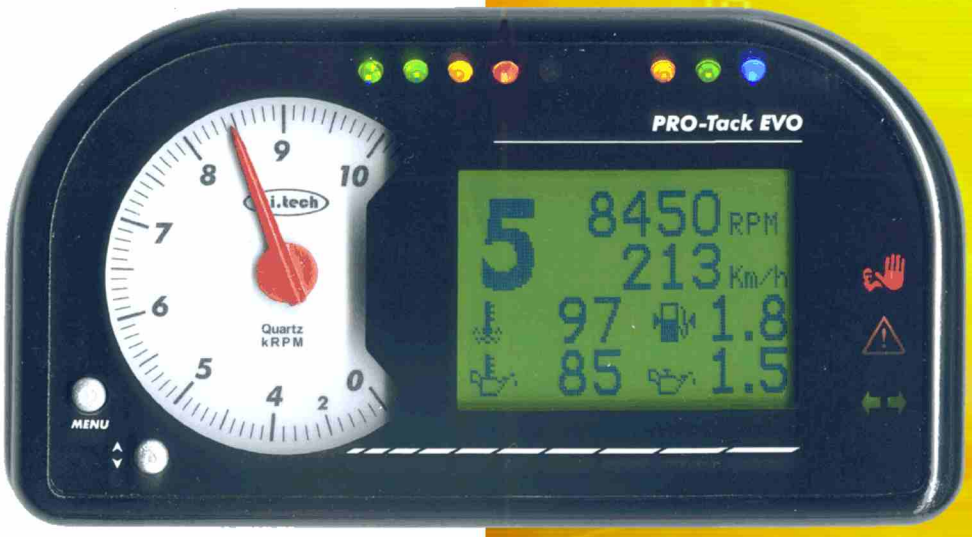

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Table of contents

System parts

Standard version

PRO-Tack EVO

1 wiring loom

2 Pressure sensors

2 Temperature sensors

1 Speed sensor

1 Pushbutton
1 Led

1 USB cable
1 RS232 serial cable

1 CD-Rom including software
“AIT Race Analysis”

Optional features

The PROTack-EVO system can be completed with the following optional accessories:

- Turbo boost pressure sensor
- Throttle sensor
- Gear sensor
- G sensor
- Lambda sensor
- Exaust gas temperature sensor
- Optical (infra-red) timing system (lap time sensor + trackside beacon)
- Portable serial printer (to print the recorded data)

Features

The standard version of PRO-Tack EVO digital dashboard monitors the status of the engine in real time via detection of characteristic parameters:

- Engine RPM
- Vehicle speed
- Odometer
- Oil and Fuel Pressure
- Oil and Water Temperature
- Battery charge
- Oil Pump activity
- Alternator activity
- Fuel level
- Lap time
- Best time
- Number of completed laps

The display will also signal the presence of a number of anomalies:

- Oil Pressure High
- Oil Temperature High
- Water Temperature High
- Fuel Pressure Low
- Fuel Level Low
- Battery Flat
- Oil Pump OFF
- Alternator OFF

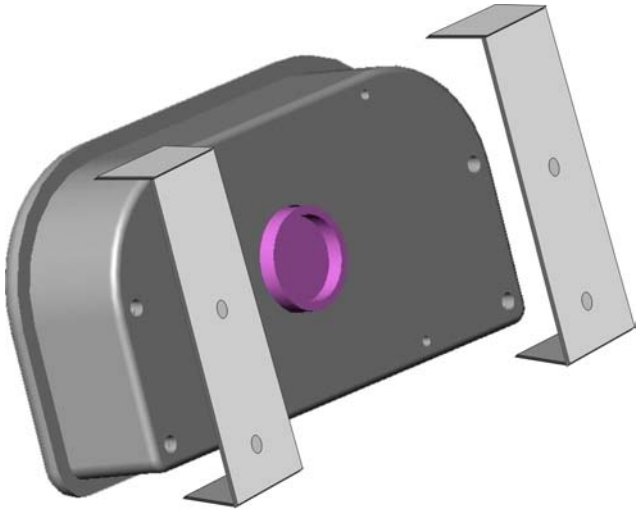
The instrument is also capable of storing in it's internal memory all the data sampled over a maximum period of about 4 hours, and the time of the last 999 completed laps. The data can then be printed by attaching the dashborad to a serial printer or analysed on a computer using the software "AIT Race Analysis".

How to install the Dashboard

Display

To correctly install the instrument just some simple operations are needed :

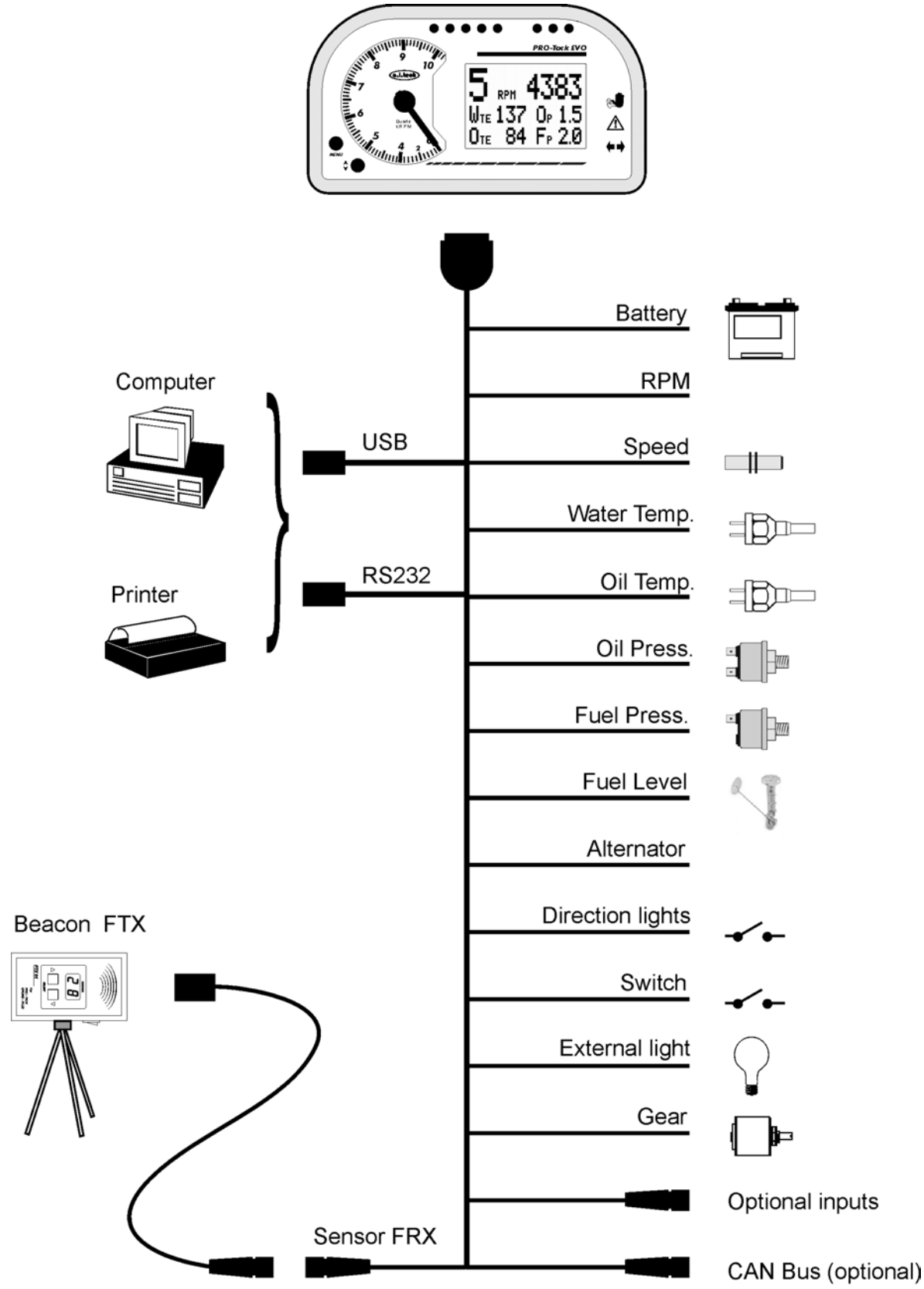
- Pierce the vehicle cockpit panel following the dashboard profile
- Insert the dashboard in the hole and fix it with the special fixings provided



Wiring

- Install the sensors on the engine, the push-button and the external light
- Mount the wiring and connect the dashboard to the sensors, the push-button and to the battery
- If it has not already been done, it is now possible to carry out the programming of the configuration data in order to adapt the instrument to the car and to any specific requirements (refer to section on "Configuration").

Connections



Cable Name	Colour	Function	Connection
BATT	Red	+12V battery	+12V battery
	Black	0V battery	0V battery
POIL	Red	Oil pressure signal	G contact of the sensor
	Blue	Warning contact	WK contact of the sensor
	Black	Ground	Case of the case
TOIL	Blue	Oil Temperature signal	Contact of the sensor
	Black	Ground	Case of the case
TMOT	Blue	Water temperature signal	Contact of the sensor
	Black	Ground	Case of the case
FUELP	Blue	Fuel Pressure signal	G contact of the sensor
	Black	Ground	Case of the case
FLEVEL	Blue	Fuel level signal	A contact of the sensor
	Black	Ground	B contact of the sensor
ALT	Red	Alternator signal	Light contact on alternator
RPM	White	RPM Signal (Shielded cable)	Coil or E.C.U. out
OUT	Blue	Programmable light	Red wire of the led
	Black	Ground	Black wire of the led
SPEED	White	Speed sensor signal	Black wire of the sensor
	Red	+12V	Brown wire of the sensor
	Black	Ground	Blue wire of the sensor
DIR	Orange	Right direction light	Right direction contact
	Purple	Left direction light	Left direction contact
P1	Red	Pushbutton signal	Contact A of the switch
	Black	Pushbutton light	Contact B of the switch
AN1 AUX	Blue	Analog optional input 1	
	Black	Ground	
	Yellow	+5V	
AN2 AUX		Analog optional input 2	

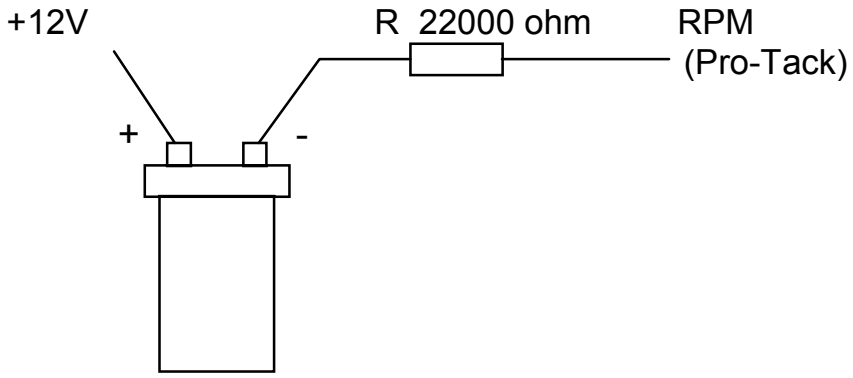
In some cases the sensor's ground wire could be gray instead of black

Connecting to the RPM signal

This paragraph is intended to supply a few suggestions for correctly gathering RPM information from 2 possible sources: the ignition coil and the electronic injection control unit.

Connection to the ignition coil

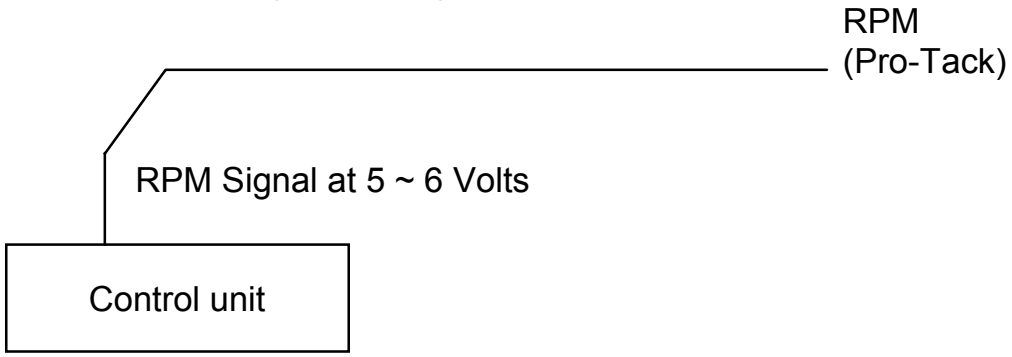
The PRO-TACK console will only accept signals coming from a coil with a pole connected to +12 Volt. The PRO-TACK console's RPM signal is connected to the pole opposite the one connected to +12V and, due the high voltages present, it is necessary to insert a 22,000 Ohm resistance. Such resistance is already present in the cabling supplied with the instrument, however, should you modify the wiring, make sure the resistor is inserted to avoid damage to the instrument.



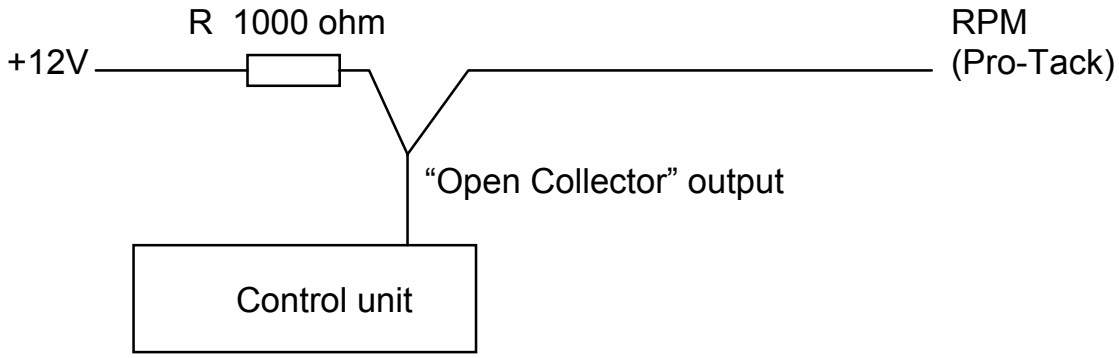
Connection to the electronic injection control unit

Almost all control units make use of an output dedicated to supplying an indication of RPM value; unfortunately the characteristics of this signal vary according to the brand and model of the unit. Any operations to adapt the signal will involve inserting a series of resistances between the unit and the PRO-TACK dashboard.
Usually the signal generated by the unit is a square wave, with peak voltages that can be between 10 and 15 volts.

In some cases, however, the control unit supplies a signal with a max. amplitude of 5-6 Volts; in this case it is necessary to eliminate all resistances in series with the signal, included the 22,000 Ohms present in the original wiring.



There are also control units on the market with an RPM output in the so-called “open collector” configuration; in these cases it is recommended that the control unit’s users’ manual is consulted. Typically it is required to connect a 1,000 Ohm resistance between the control unit’s output terminal and +12V.



Connecting to the Speed sensor

The speed sensor detects the passage of a metallic element that moves jointly to the wheel. It is necessary to mount the sensor in such way that it does not find too many pulses, in order to feed the sensor with a maximum frequency of 1500 Hz. (1500 signals per second). It is likewise preferable that the sensor does not detect too few signals as this would result in imprecise measurements. For these reasons, it is recommended that the sensor is installed in a way which supplies the instrument with 1 to 10 signals per meter. For the installation of the sensor follow the instructions provided by its own manual.

Connecting to the Alternator signal

The wire "alternator" must be connected to the appropriate terminal on the alternator; if you don't see variation between engine running and engine stopped, it could be necessary to insert one 100 ohm resistance (supplied with kit) between the clip and 12 volt of the battery.
To quikly verify this function, go to the "TEST Inputs" paragraph.

Connecting to the Lambda Sensor

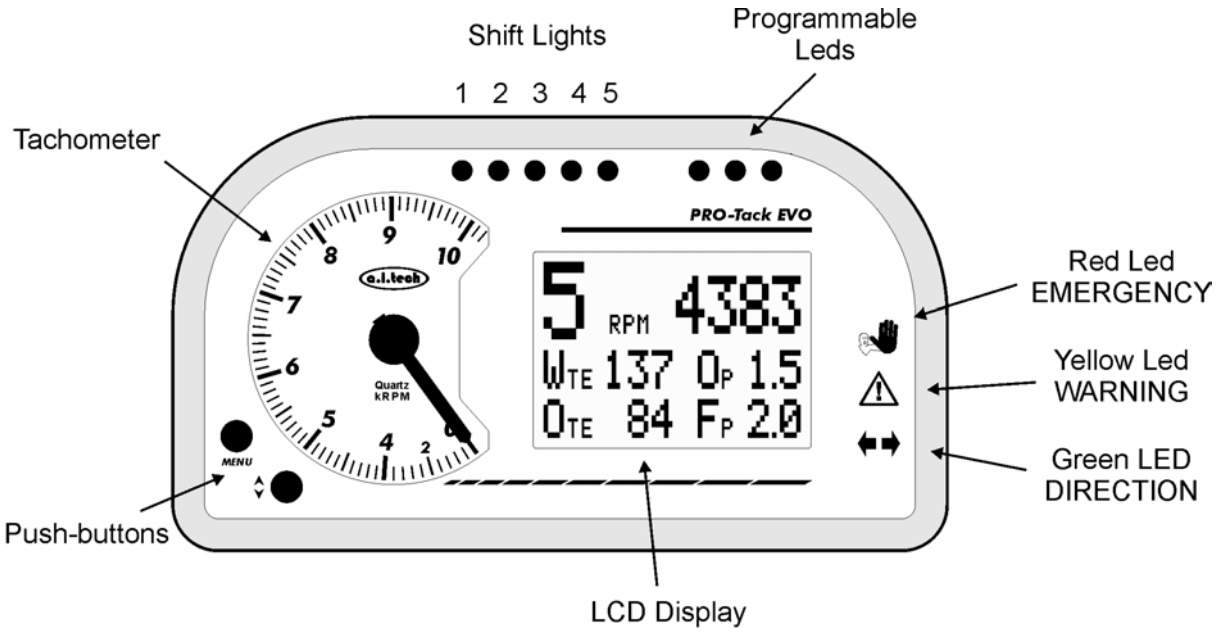
To measure the Lambda value you need to install the optional PLM-WB KIT ("Professional Lambda Meter"), made by a "NTK L1H1" lambda sensor and "Wideband Unit", where to connect the sensor and the ProTackEVO (follow the instructions inside the PLM-WB manual).

Connect the
PLM-WB to one of the
optional analog inputs
AN1 AUX
AN2 AUX
and set the configuration
parameters

Connecting to the G and the Turbo Pressure Sensor

Connect the G and the Pressure Sensor to one of the optional analog inputs **AN1aux** and **AN2aux** using the cable supplied with the sensor, then set the configuration parameters.

Functioning



During normal operation the LCD display visualizes the parameters read from the sensors, organized in various pages.
To change the visualization press the ⇕ key or the external push-button.

To configure the instrument, to visualize the recorded data and to approach several functions, press the MENU key.

When an anomaly is detected, the dashboard marks it activating one of the Alarm lights (Warning or Emergency) and visualizing a message on the display.

There are 5 shift lights, each one of them switch on when the engine reaches a predefined RPM value, informing the pilot to engage the next gear, and other 3 programmable leds.

It is possible to use an external push-button in order to change the page visualized or it is also possible to connect an external light on the car associating it to the activation of an alarm or to an RPM value.

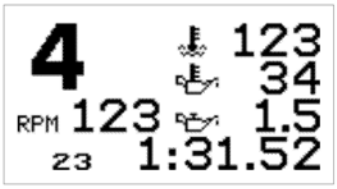
Visualizations

Pushing the key,the following visualizations can be slid in succession:

- Gear
- Water Temp.
- Oil Temp.

- Engine revolutions
- Vehicle speed
- Fuel Pressure
- Oil Pressure

- Gear
- Engine revolutions
- Number of last lap



- Water Temperature
- Oil Temperature
- Oil Pressure
- Time of Last Lap

- Number of last lap
- Water Temperature
- Oil Temperature

- Time of Last Lap
- Best Lap
- Fuel Pressure
- Oil Pressure

- Numer of last lap
- Engine revolutions
- Water Temperature
- Oil Temperature

- Time of Last Lap
- Vehicle speed
- Fuel Pressure
- Oil Pressure

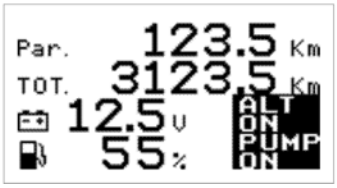
- Numer of last lap

- Time of Last Lap
- Difference from the best lap
- Best Lap

- Ait/Fuel Ratio
- LEAN
- Acceleration

- Lambda
- RICH
- Turbo Pressure

- Battery voltage
- Fuel level



- Trip Odometer
- Odometer
- Alternator
- Oil Pump

Signal	Unit	Note
Engine revolutions	RPM	
Vehicle speed	Km/h, MPH	
Water Temperature	°C, °F	*If the value remains below 45°C the engine is considered "cold" and " *** " is displayed*
Oil Temperature	°C, °F	*If the value remains below 50°C the oil is considered "cold" and " *** " is displayed*
Oil Pressure	Bar	
Fuel Pressure	Bar	
Turbo Pressure	Bar	
Fuel Level	L, %, Gal	
Lambda	Lambda	
A/F (Air Fuel Ratio)	AFR	
Acceleration	G	
Battery Voltage	Volt	

Alarms

When the ***threshold limit is exceeded*** for a particular alarm ***for at least 1 second***, not only is the *Warning* or *Emergency* light illuminated, an alarm message also appears on the display, replacing for 5 seconds any message already present (one can revert to the previous visualization by pressing the ⇕ key).
In addition to this the digit of the excessive value which has determined the alarm begins to flash.
From this moment and until when all the alarms are re-entered, an additional page is inserted with a collection of the currently active alarms.
In order to remove the alarm condition it is necessary that the excessive value which generated it drops below the threshold level by a fixed amount, variable with the type of sensor.

 WARNING (yellow): Indicates the presence of a *Normal* alarm:

- Oil pump OFF
- Alternator OFF
- Oil temperature high
- Water temperature high
- Battery flat
- Fuel Level low

 EMERGENCY (Red) : Indicates the presence of a *Serious* alarm*:*

- Oil pressure too low
- Fuel pressure too low

NOTE If a sensor is disabled (see “Sensors configuration”) the corresponding alarm will *not be activated*.

Let us now analyse the characteristics of each single alarm:

Oil pump / Alternator OFF : When at least one of these two conditions exists (Oil pump OFF or Alternator OFF, based on the state of the relevant signals), the "Warning" light ⚠ is activated and the corresponding message is displayed .

Oil temperature high : When the *oil temperature exceeds the imposed threshold value for at least 1 second*, the "Warning" light ⚠ is activated and the appropriate message is displayed. For the alarm condition to cease it is necessary that the temperature drop by 5°C below the programmed threshold value.

Water temperature high : When the *water temperature exceeds the imposed threshold value for at least 1 second*, the "Warning" light ⚠ is activated and the appropriate message is displayed. For the alarm condition to cease it is necessary that the temperature drop by 5°C below the programmed threshold value.

Battery flat : If the engine is running and the battery voltage drops below the imposed threshold value for at least 1 second, the "Warning" light ⚠ is activated and the message is displayed. For the alarm condition to cease, it is necessary for the voltage to exceed 0.5 Volts above the programmed threshold value.

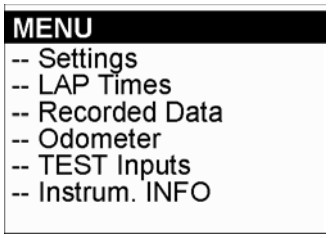
Fuel level low : When the *fuel level drops below the imposed threshold value for at least 5 second*, the "Warning" light ⚠ is activated and the message is displayed. For the alarm condition to cease it is necessary that the level rises above the programmed threshold value by 5 unit of measure (litres, percentual, gallons,…)

Fuel pressure emergency : If the motor is running and the fuel pressure drops below the imposed threshold level for at least 1 second, the "Emergency" light ✋ is activated and the appropriate message displayed. For the alarm condition to cease it is necessary that the pressure rises above the programmed threshold value by 0.5 bar.

Oil pressure emergency : If the motor is running and the oil pressure drops below the imposed threshold level for at least 1 second, the "Emergency" light ✋ is activated and the appropriate message displayed. For the alarm condition to cease it is necessary that the pressure rises above the programmed threshold value by 0.5 bar.

Configuration

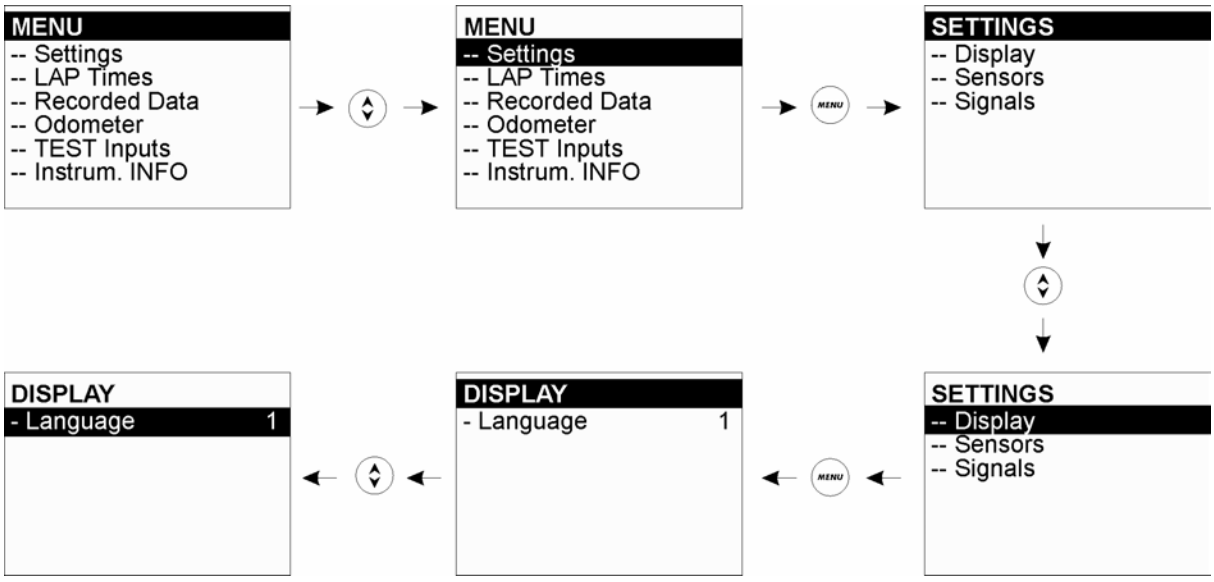
The PRO-Tack EVO dashboard offers various programmable parameters in order to allow optimal adjustment to the needs of the car in which it is installed. All the configuration parameters can be modified using the software "AIT Race Analysis" and part of these also directly from dashboard pressing the MENU key.



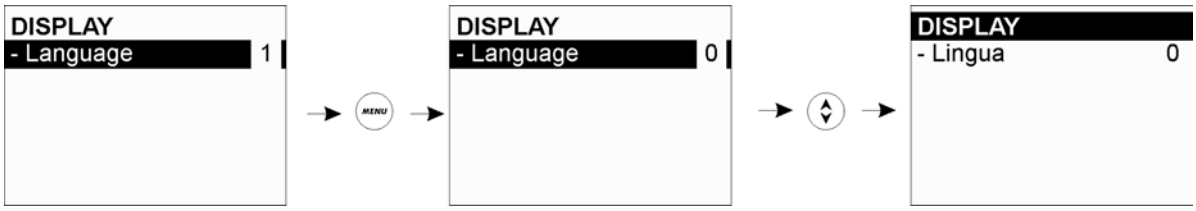
= Shift the selection on the next item

MENU = Select the evidenced item

Let us now see how to modify a parameter, for example the “visualization language”:



At this point, once selected the parameter to modify, by pushing the MENU key, it is possible to highlight the digits, pushing it again increases the value by 1 each time. In order to confirm the modification and to pass to the modification of the next digit (in the case of data with more digits) or to the next parameter, press ⇕.



If during the operation, before confirming the last digit, it is realised that some of the previously confirmed digits are wrong, it is possible to cancel all changes made up to this moment by holding down the MENU key for about 2 seconds. The value of the data being introduced returns to its initial value.

The following table reassumes the operation of the keys during the programming operation:

KEY	Type	Function
MENU	Push	Increment of the selected digit
MENU	Hold for 2 sec.	Cancel all changes made and reset the data item to its original value
⇕	Push	Confirm the digit set and pass the following digit or data item

NOTE Not all the configuration parameters can be modified directly from the menu of the dashboard; in order to program the instrument in a simple and complete way, use the "AIT Race Analysis" software (download it from “www.aitechinstruments.com”)

The complete list of parameters is as follows:

Setup parameters

Language

(MENU + SETTINGS + DISPLAY + LANGUAGE)
Indicates the language in which the messages are displayed and printed.
*Possible values are **0** (Italian) and **1** (English).*

Speed unit of measure

(Programmable by PC only)
Sets the speed's unit of measure.
It is possible to choose between Km/h and MPH.

Temperature unit of measure

(Programmable by PC only)
Sets the temperature's unit of measure.
It is possible to choose between °C e °F.

Layers

(Programmable by PC only)
As previously described the instrument can visualize the data on the LCD display organized from 1 to 6 different pages.
If more than 1 page is enabled, it is possible to change from one layer to the next by pressing the push-button  *.*

Sensors

RPM

Number of coil signals for each engine revolution

(MENU + SETTINGS + SENSORS + Spark for Revs)
This data is used to calculate the RPM on the basis of the number of command signals which the coil receives. Such a parameter must indicate the number of times the coil is charged in the arc of 1 engine cycle (720°).

Speed

Wheel circumference

(MENU + SETTINGS + SENSORS + Wheel Circ.)
This data is used to calculate, on the base of the number and the frequency of the pulses coming from the sensor, the speed of the vehicle and the run length.
The value must be comprised between 0 and 9999 millimeters

Wheel Impulses

(MENU + SETTINGS + SENSORS + Wheel Impuls.)
This data is used to calculate the speed of the vehicle and the run length and must indicate the number of speed impulses in a turn of the wheel.
The value must be comprised between 1 and 99

Oil Pump and Alternator

Logical State Oil Pump Alarm OFF — **(MENU + SETTINGS + SENSORS + Oil Pump)**
Indicates the logical state corresponding to the condition "Oil Pump Alarm Inactive"
0 = Alarm DISABLED
1 = Alarm if signal not connected
2 = Alarm if signal connected to ground

Logical State Alternator Alarm OFF — **(MENU + SETTINGS + SENSORS + Alternator)**
Indicates the logical state corresponding to the condition "Alternator Alarm Inactive"
0 = Alarm DISABLED
1 = Alarm if signal not connected
2 = Alarm if signal connected to ground

Temperatures, Pressures and Acceleration

For each pressure and temperature sensors installed you must program the following parameters:

Sensor Enable — **(Programmable by PC only)**
Enable or disable a sensor.
If the sensor is disabled, the measured value will not be visualized on the display and the relative alarm is not anabled.

Sensor Type — **(Programmable by PC only)**
It is possible to select the model of the sensor connected to the instrument choosing between the standard ones (supplied with the instrument) or to use a different sensor (in this case you must get the calibration curve of the sensor, as described in the procedure of "Customizing sensors").

Fuel Level

Sensor Enable **(Programmable by PC only)**
Enable or disable a sensor.
If the sensor is disabled, the measured value will not be visualized on the display and the relative alarm is not enabled.

Sensor Type **(Programmable by PC only)**
There are no standard calibration curve supplied for the fuel level sensor because this information depends both by the specific sensor, by the tank's shape and by the unit of measure to be displayed, for example litres, gallons or percentage.
To customize the sensor it is necessary for the tank to be empty to start the calibration since the procedure involves introducing a series of known amounts of fuel, each time setting the total amount present in the tank until it is full.

Lambda

Sensor Enable **(Programmable by PC only)**
Enable or disable a sensor.
If the sensor is disabled, the measured value will not be visualized on the display .

Sensor Type **(Programmable by PC only)**
It is possible to select the model of the sensor connected to the instrument choosing between the standard ones .

Channel **(Programmable by PC only)**
Select the optional analog input used (AN1 AUX or AN2 AUX)

Signals

Alarms

Alarm Threshold Oil Temperature

(MENU + SETTINGS + SIGNALS + ALARMS + Oil Temp.)
Indicates the value of oil temperature above which the "High Oil Temperature" alarm state is activated (value expressed in °C or °F).

Alarm Threshold Oil Pressure

(MENU + SETTINGS + SIGNALS + ALARMS + Oil Press.)
Indicates the value for oil pressure below which the "Oil Pressure Emergency" state is activated (value expressed in BAR).

Alarm Threshold Fuel Pressure

(MENU + SETTINGS + SIGNALS + ALARMS + Fuel Press.)
Indicates the value for fuel pressure below which the "Fuel Pressure Emergency" state is activated (value expressed in BAR).

Alarm Threshold Water Temperature

(MENU + SETTINGS + SIGNALS + ALARMS + Water Temp.)
Indicates the value of water temperature above which the "High Water Temperature" alarm state is activated (value expressed in °C or °F).

Alarm Threshold Low Fuel Level

(MENU + SETTINGS + SIGNALS + ALARMS + Fuel Level)
Indicates the level below which "Fuel Level Low" state is signalled.

Alarm Threshold Battery Voltage

(MENU + SETTINGS + SIGNALS + ALARMS + V.Battery)
Indicates the battery voltage below which the "Battery Flat" alarm state is activated. (Value expressed in Volts).

Shift Lights

Activation Threshold LED 1

(MENU + SETTINGS + SIGNALS + Shift Lights + Led1)

Indicates the number of RPMs above which the LED is activated. (Programmable values are from 0 to 15000 RPM).

Activation Threshold LED 2

(MENU + SETTINGS + SIGNALS + Shift Lights + Led2)

Activation Threshold LED 3

(MENU + SETTINGS + SIGNALS + Shift Lights + Led3)

Activation Threshold LED 4

(MENU + SETTINGS + SIGNALS + Shift Lights + Led4)

Activation Threshold LED 5

(MENU + SETTINGS + SIGNALS + Shift Lights + Led5)

Leds

Yellow led operation

(MENU + SETTINGS + SIGNALS + Leds + Yellow)

The yellow led activity can be configured in the following ways:

0 = Disabled (always off)

1 = turns on when data logging is active

External Light

Mode

(MENU + SETTINGS + SIGNALS + External Light + Mode n.)

The external Light can be programmed in order to correlate its activation associate to one of the Leds:

0 = Disabled (always OFF)
1 = Associated to the LED of RED Alarm
2 = Associated to the LED of YELLOW Alarm
3 = Associated to the LED 1 of Shift Lights
4 = Associated to the LED 2 of Shift Lights
5 = Associated to the LED 3 of Shift Lights
6 = Associated to the LED 4 of Shift Lights
7 = Associated to the LED 5 of Shift Lights

Data Logger

Enable START data logging on LAP signal

(MENU + SETTINGS + DATA LOGGER + Start LAP)
The data logging function can be started automatically whenever a LAP signal occours.
To enable this option set the value to 1, otherwise leave it to 0.

Enable START data logging on SPEED threshold

(MENU + SETTINGS + DATA LOGGER + Start SPEED)
The data logging function can be started automatically when the vehicle reaches a speed value.
It is possible to set speed values from 0 to 999 (Km/h or MPH depending on the selected measurement unit).
If the parameter is set to 0, this function is disabled.

Enable STOP data logging on vehicle stopped

(MENU + SETTINGS + DATA LOGGER + Stop)
The data logging function is halted if the veichle is at speed 0 for at least the programmed value (in seconds).
If this parameter is set to 0, this function is disabled.

Chronometer

Lap complete message duration

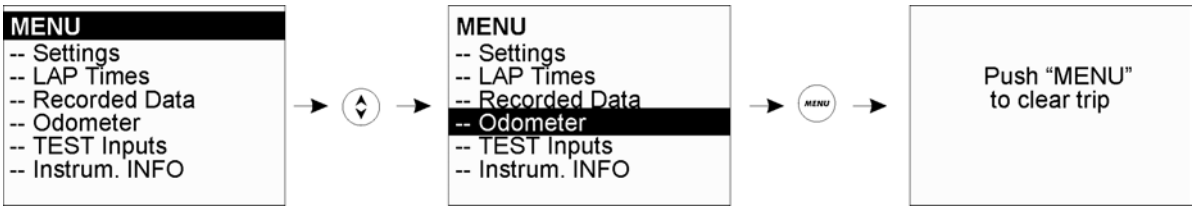
(MENU + SETTINGS + CHRONOMETER + Message Time)
Once a lap is completed, a page with the lap number, the lap time and the time difference from the best time can be shown for the programmed time, after which it goes back to the previous page.
(values between 0 and 60 seconds)

Last Lap duration

(MENU + SETTINGS + CHRONOMETER + Lap Time)
Once a lap is completed, the lap time is displayed in the various pages as "last lap time". This item is displayed for a programmable amount of time, after which it will be replaced by the real time chronometer.
The programmable value can range from 0 to 60 seconds; if set to zero, the display will show only the "last lap time"

Odometer

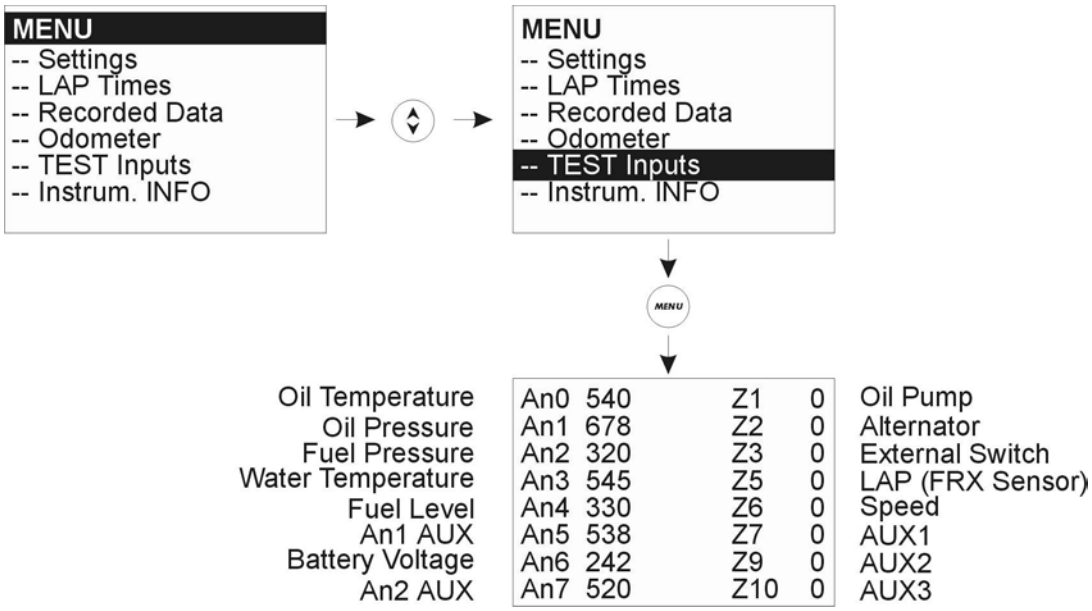
Clearing the trip odometer:



Pressing MENU the value of the trip is cleared; pressing ▲▼ you will exit without any modification.

TEST Inputs

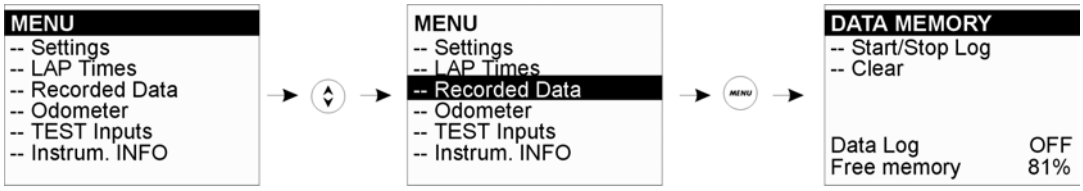
During the installation of the dashboard it can be useful to verify the state of an input; a page that groups the state of all the inputs is available:



Data Logging

The ProTackEVO can store in its internal memory all the values acquired from the vehicle. The recording rate is 10Hz (10 records per second) and it can store values for up to 4 ½ hours.
The data logging can be started and stopped manually or automatically, depending on the settings of the configuration parameters.

- **Data logger MANUAL START**
  The data logging function can be started in two different ways:
  - Pushing the external push-button for at least 2 seconds
  - Selecting the “Start/Stop Log” item in the “Data Memory” menu

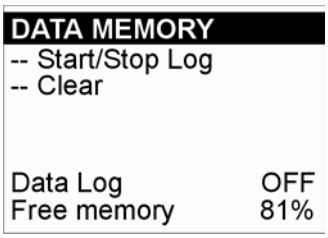


- **Data logger MANUAL STOP**
  The data logging function can be stopped in two different ways:
  - Pushing the external push-button for at least 2 seconds
  - Selecting the “Start/Stop Log” item in the “Data Memory” menu

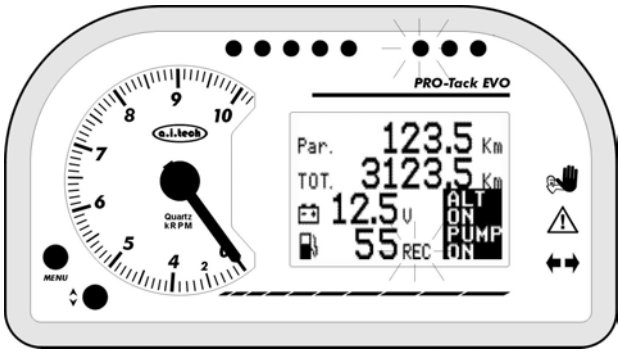
- **Data logger AUTOMATIC START**
  Depending on the settings of the configuration parameters, the data logging function can be started automatically on the occurrence of a LAP signal or when a predefined vehicle speed has been reached.

- **Data logger AUTOMATIC STOP**
  It is possible to configure the dashboard in such way that the data logging function stops automatically when the vehicle speed is 0 for at least the programmed time

Any new data logging session is stored after the previous one, up to the memory full. If the memory is full, a new session must be preceded by a memory erase command; remember to save the data to your PC first, of course.
In the “Data Memory” window, beside the “Start/Stop Log” and “Clear” command, there is shown the data logger status and the percentage of free memory.



When the data logging function is active, on page #6 the flashing “REC” word is displayed and, if activated, the yellow LED turns ON



NOTE The data logging is halted when the MENU page is accessed and automatically restarted when the user goes back to the normal pages.

Chronometer

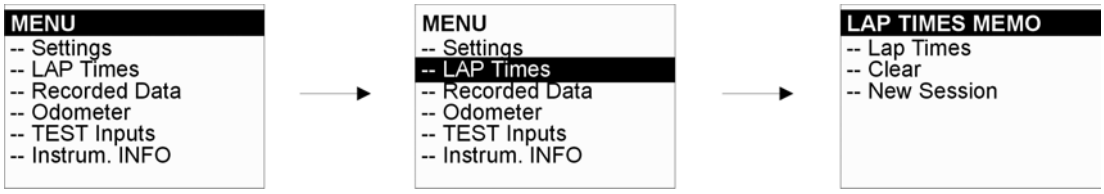
By means of an optical system made by a receiver (FRX), to be connected to the wiring harness of the ProTack EVO, and by a transmitter (FTX), to be used on the trackside, it is possible to measure and store the lap times.
When a vehicle mounting the ProtackEVO and the FRX passes through the transmitter's invisible beam, the elapsed time gets stored and the chronometer restarts from zero to measure the next lap.
If enabled (see chronometer configuration parameters), a window will display the total number of laps, the last lap time and the difference from the best lap of the current session.

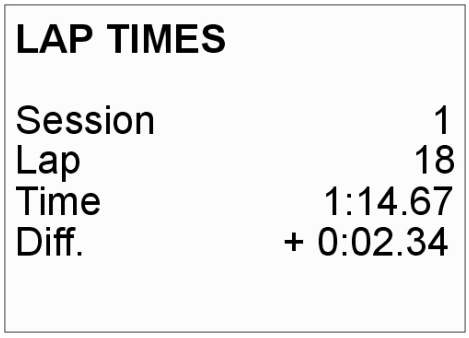
If the last lap time is the best of the current session, the "BEST" word will appear :

The dashboard stores automatically every measured lap time up to a maximum of 999 laps.
Once the lap time is stored in the last location available, the next one will be stored in place of the oldest one, and so on. In such way the instrument will always have in memory the last 999 laps.
The longest lap time that can be stored is 1 hour.

The recording of the lap times can be divided into sessions. At the beginning of a new session the best lap time value will be erased so that the best lap is evaluated using only the lap times of the current session.

- **Stored laps display**
  To get a window with the stored laps, go to the MENU function :





- Measurement session number
- Lap Number
- Lap Time
- Difference from the best time stored in memory

To show the next lap, push the button.
To exit from the “timing function” pages, push the MENU button.
If the lap time is the best of all saved in memory, the “BEST” word will appear.

- **STOP Chronometer**
  As already seen, the chronometer starts automatically whenever a lap is completed; to stop it just push for at least 2 seconds the button , only if not inside the MENU functions.

- **Lap memory erasing**
  To clear the LAP memory, select the “CLEAR” item from the “LAP Times” menu.

- **Starting a new lap time recording session**
  A new session can be initiated in two different ways:
  - Select the “New Session” item from the “LAP Times” menu
  - If not inside the MENU functions and the chronometer is not running, push the button for at least 2 seconds.

N.B. If inside the MENU functions, the lap time will not be acquired

Infrared lap timing system

The dashboard in the vehicle works together with a transmitter located on the trackside. When the car passes the transmitter invisible beam, the receiver detects it and inform the dashboard to store the lap time.
In order to achieve the maximum reliability and to allow the use of many systems the user can choose between 99 different transmission channels.

The system can be configured doing the following procedures:

Channel selection

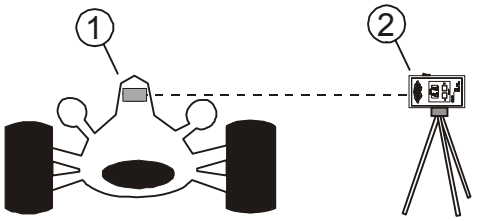
Turn on the transmitter; if it is a multichannel transmitter, select the desired frequency (please refer to the transmitter's user manual).

Receiver set-up

To tune the receiver on the same channel of the transmitter, follow these instructions: place the receiver in front of the transmitter, push the "learning" button and hold it down until the LED turns on. Whenever needed, it is possible to check the channel alignment between transmitter and receiver placing them in front of each other and checking for the receiver's LED to turn on.

Placing the system

To get the system working correctly, the receiver and the transmitter must be aligned. We suggest to place the transmitter on the track side (2) at the same height of the receiver placed in the car (1).



Usage notes

a) The minimum interval between two successive time acquisitions 10 seconds. Therefore, the system cannot measure interval times shorter than 10 seconds.

b) Any channel can be used for timing acquisition, but if the car is very fast or close to the transmitter, it can be useful to use the channel 0. Channel 0 is a high sensitivity channel that is also not sensitive to channel numbers: i.e. a receiver set to channel 0 can detect any channel number. **Use channel 0 if you need a high detection speed**.

c) The infrared light beam generated by the transmitter, although not visible, is a highly concentrated light source. Please make sure not to direct this light source directly to the eyes.

d) It is important to place the transmitter away from other similar instruments because other infrared sources can cause signal alterations.

e) Please avoid to put anything (even glass) between the transmitter and the receiver because the signal could be attenuated or even suppressed.

How to update the firmware

It's important to visit periodically the internet website www.aitechinstruments.com searching for the availability of new firmware versions in order to keep the ProTackEVO always up to date and with the latest functionalities.

To update the firmware:

- Download from the internet website the "Firmware updater" program
- Connect the dashboard to the PC with the SERIAL cable included in the kit (It is not possible to upgrade the firmware via USB)
- Start the "Firmware updater" (this program works only if the "AIT Race Analysis" software is installed)
- Wait for the completion of the update following the messages on the screen

Technical Specifications

- **Ambient characteristics**

- **Temperature :**	operating storage	-10 to 60 °C -20 to 70 °C
- **Humidity:**	operating	0 to 90%

- **General electrical characteristics**

- **Supply voltage :**	8 ÷ 15 Vdc (with accidental inversion protection)
- Current drawn :	450 mA with 14V supply

- **Caratteristiche elettriche degli ingressi**

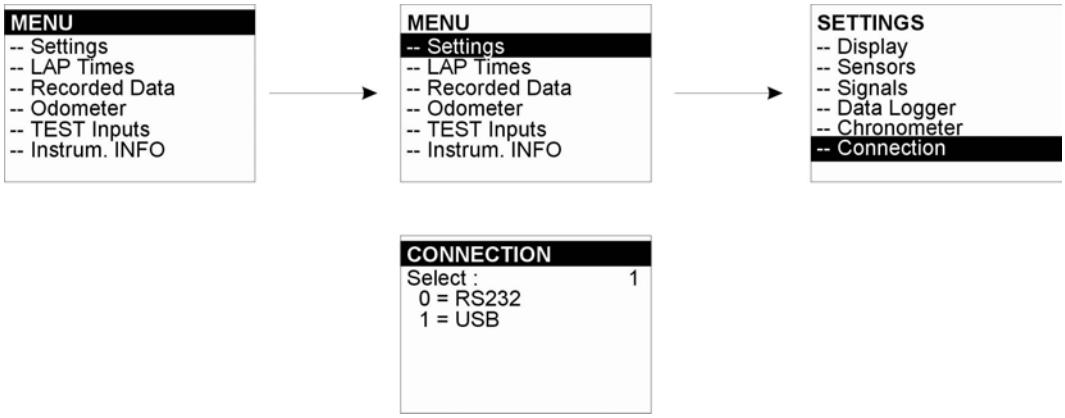
- **LAP input :**	active when connected to ground
- **Oil pump input :**	active when connected to ground
- **Alternator input :**	12 Volt
- **Speed input :**	active when connected to ground
- **RPM input :** **(Coil)**	12 Volt (max. current 10mA) connect with external resistance limiter

- **Analogue inputs :**

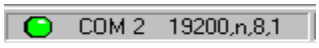
Name	Type	Range	Precision
Oil Temperature	resistive	0-560 Ohm	+/- 5%
Oil Pressure	resistive	0-330 Ohm	+/- 5%
Fuel Pressure	resistive	0-330 Ohm	+/- 5%
Water Temperature	resistive	0-680 Ohm	+/- 5%
Fuel Level	resistive	0-470 Ohm	+/- 5%
Battery voltage	internal		+/- 0,5%

Configure PC Communications

It is possible to connect the dashboard to the Personal Computer through the serial RS232 or the USB port.
First of all you must select the connection mode on the ProTackEVO:

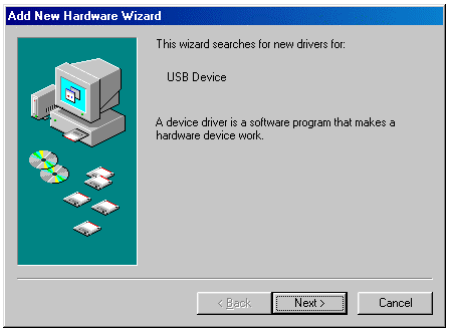


RS232

- Connect the dashboard to the PC with the supplied wire
- Start “AIT Race Analysis” software
- Check the connection
  There must be the following visualization 

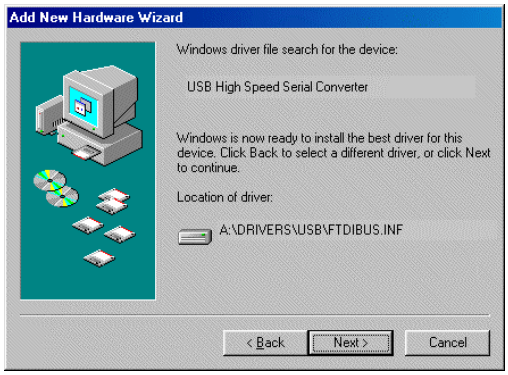
USB

For the USB connection you must install the USB drivers. The first time a new USB device is plugged into a Windows system, a small dialog box will appear indicating that the system has found a new hardware device. There may also be a dialog box that informs the user that a device data base is being built or updated.
After these dialogs appear, the Add New Hardware Wizard dialog box is displayed. Click "Next" to continue the installation.



Make sure that "Search for the best driver..." is selected and click "Next".

This next dialog box allows the user to specify where needed files for the new device are to be found. Make sure all the check boxes are *unchecked* except for the one that says "Specify a location". Enter or browse to your AITRaceAnalysis installation directory or disk, and then to the subdirectory "Drivers\USB." Click "Next".



This next dialog box should indicate that the "USB High Speed Serial Converter" has been found and show the path that was previously selected. Click "Next".
The last dialog box will indicate that the "USB High Speed Serial Converter" has been installed. To complete the process, click "Finish".
At this point the there may be seen another set of dialog boxes to complete the process. In the event that the new dialog boxes ask for another path, specify the same path that was given previously.

How to use the “AIT Race Analysis” software

Introduction

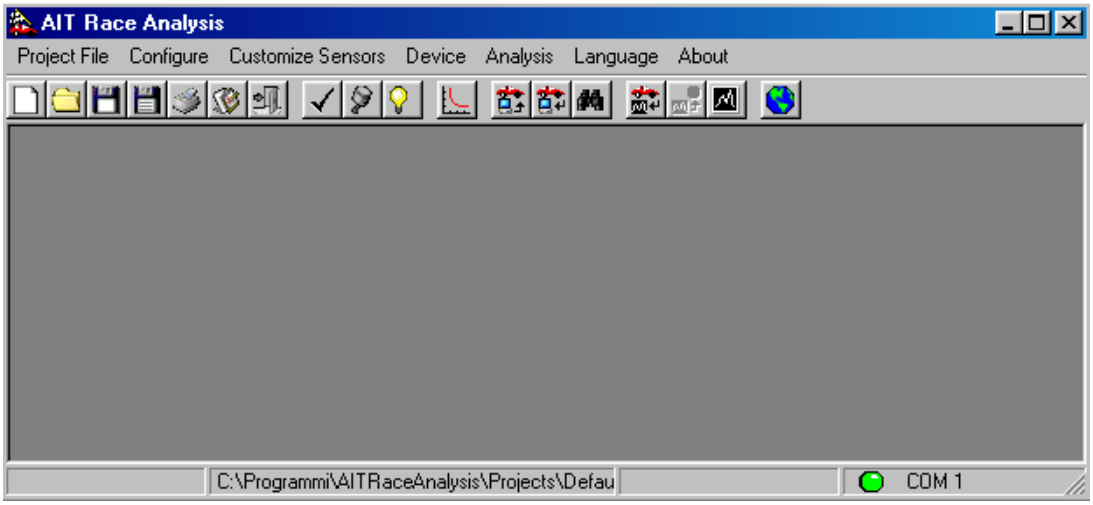
The software "AIT Race Analysis" has been developed to obtain the maximum in fact of performances, from the dashboards of the PRO-TACK series. By connecting the Personal Computer to the dashboard, through the serial RS232 or USB port, it is possible to configure it or to acquire and visualize on a diagram the data recorded, to confront them with other data previously saved, to visualize statistics or to run a print.

Installation

Insert the CDRom with the program into your CD drive and let Autoplay install your CD-ROM.
If this did not happen, click twice on the “AITRaceAnalysis.msi” icon and then follow the instructions visualized on the screen.

Start

After the installation program, click on the "AIT Race Analysis" icon in the START menu of Windows in order to start the program.



Working with projects

This section describes the procedures for the creation and the managing of a project. A project is a file that groups all the configuration data of the dashboard.

To create a new Project

In order to create a new project, click on the PROJECT>NEW command. This operation cancels all the data currently sets up and restores the start conditions.

To Open a Project

It is possible to recall a project previously saved clicking on the PROJEC>OPEN command. In the window that will appear, select the project and choose OK. If you don't see the desired project, change the drive unit or folder.

To Save a Project

In order to save a project, click on the PROJECT>SAVE or PROJECT>SAVE AS command.

To Save a Project with a new name

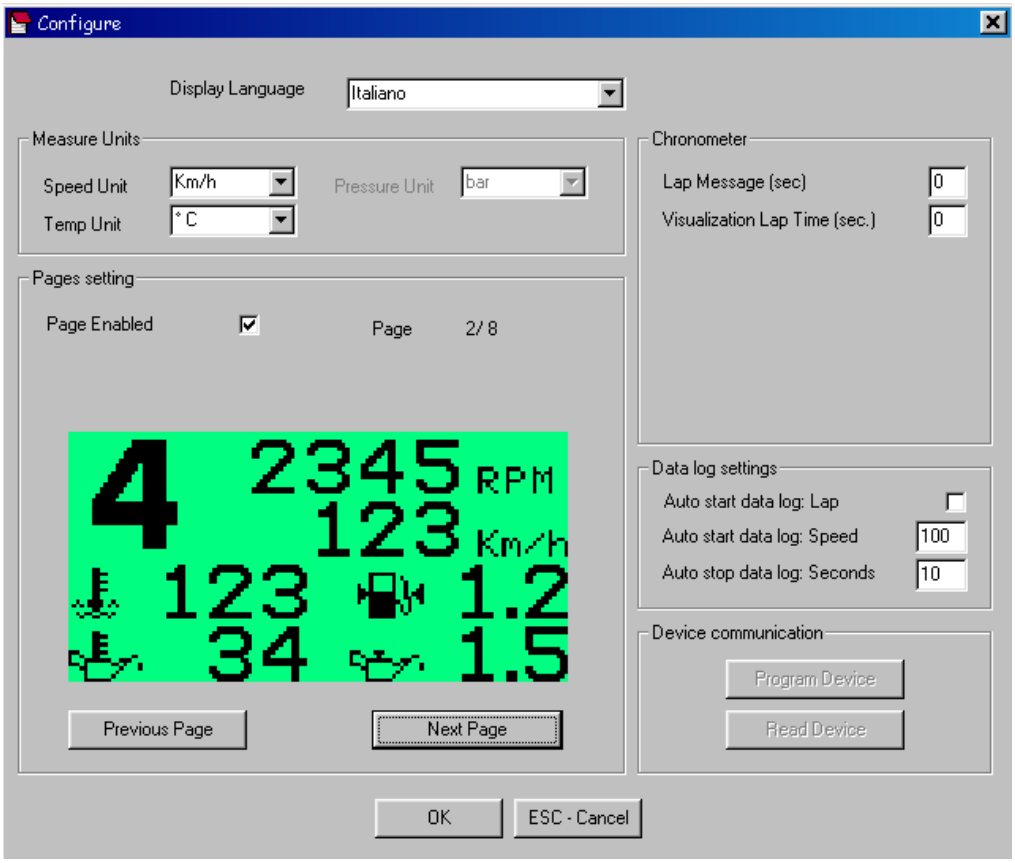
In order to save a project, click on the PROJECT>SAVE AS command.

Configuration

With the “AIT Race Analysis” software it is possible to set all the parameters, even those that cannot be set using the push-buttons.
Before configuring the dashboard, connect it to a PC and switch it on.

Set UP

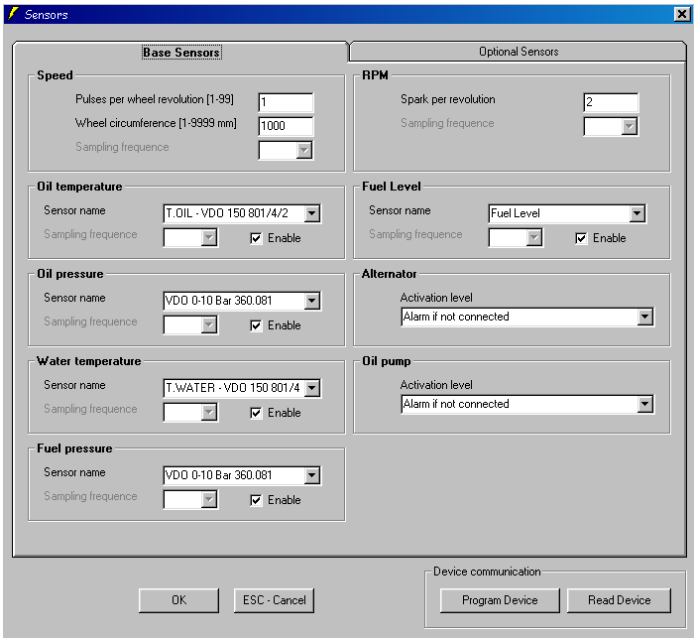
In order to start the configuration procedure, click on the CONFIGURE>SETUP command. It will appear the following screenshot:



The user can choose the display language, the unit of measure and the layers enabled.
Click on the “OK” push-button to save the settings.
Click on the “Program device” push-button to configure the dashboard or on the “Read device” push-button to acquire the dashboard configuration parameters.

Sensors

Click on the CONFIGURE>SENSORS command to configure the sensors to be used.



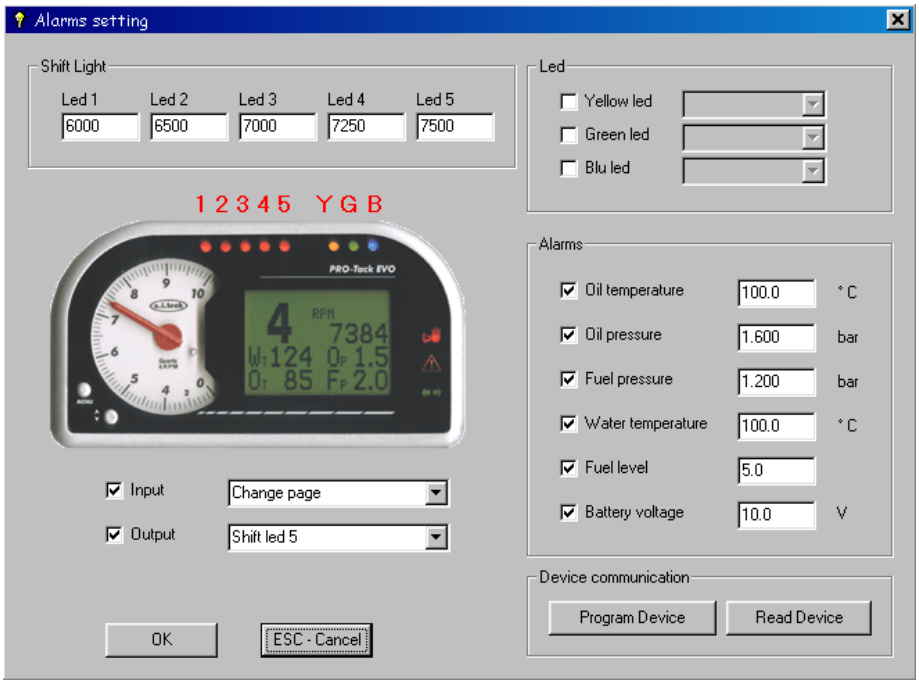
Each used sensor must be enabled clicking the “Enable” check box and choosing the sensor code (each model of sensor has it’s own calibration curve that can be not equal to the one of other sensors of the same type; in order to visualize the right value, select the name of the sensor that is actually connected to the dashboard).

If the sensor installed on the vehicle does not appear in the default sensor list, the user can configure a “Custom sensor” by using the “Customize sensor” procedure. In the window it is possible to create the calibration curve by inserting the sensor values (temperature, pressure,…) and the corresponding values (bits) of the analog input (see the “Test Input” layer of the dashboard).

There are no standard calibration curve supplied for the fuel level sensor because the signalling of the level depends not only by the sensor, but also from the tank shape and the unit of measure selected for the calibration; it is possible to visualize the level for example in litres, gallons or in percentage. To customize the sensor it is necessary to start the calibration with the tank enpty, since the procedure involves introducing a series of known amounts of fuel, each time setting the total amount present in the tank until the tank is full.

Alarms settings

Clicking on the CONFIGURE>ALARMS SETTING it will appear the following screenshot:

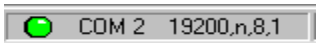


Programming the dashboard

Once all the parameters are set, it is necessary to transmit the configuration to the dashboard. In every configuration window the user can transmit the parameters of that window to the instrument, but in order to transmit all the configuration data, the user must select the DEVICE>PROGRAM DEVICE command.

For being able to communicate with the dashboard, it is necessary however to execute the following procedure:

- Connect the dashboard to the PC with the supplied wire
- Switch on the PC and the dashboard
- Start “AIT Race Analysis” software
- Check the connection

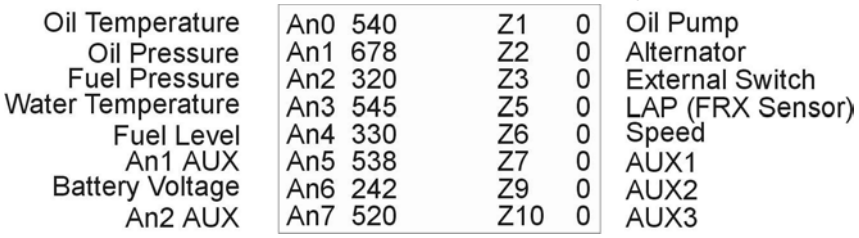
  There must be the following visualization 

Customizing the sensor

If the sensor installed on the vehicle does not appear in the default sensor list, the user can configure a “Custom sensor” by using the “Customize sensor” procedure. In the window it is possible to create the calibration curve by inserting the sensor values (temperature, pressure,…) and the corresponding values (bits) of the analog input (see the “Test Input” layer of the dashboard).

Let’s see an example on how to configure a temperature sensor:

- Connect the sensor to the dashboard (make sure that the serial communication with the PC is active)
- Select on the dashboard the “Test Input” layer

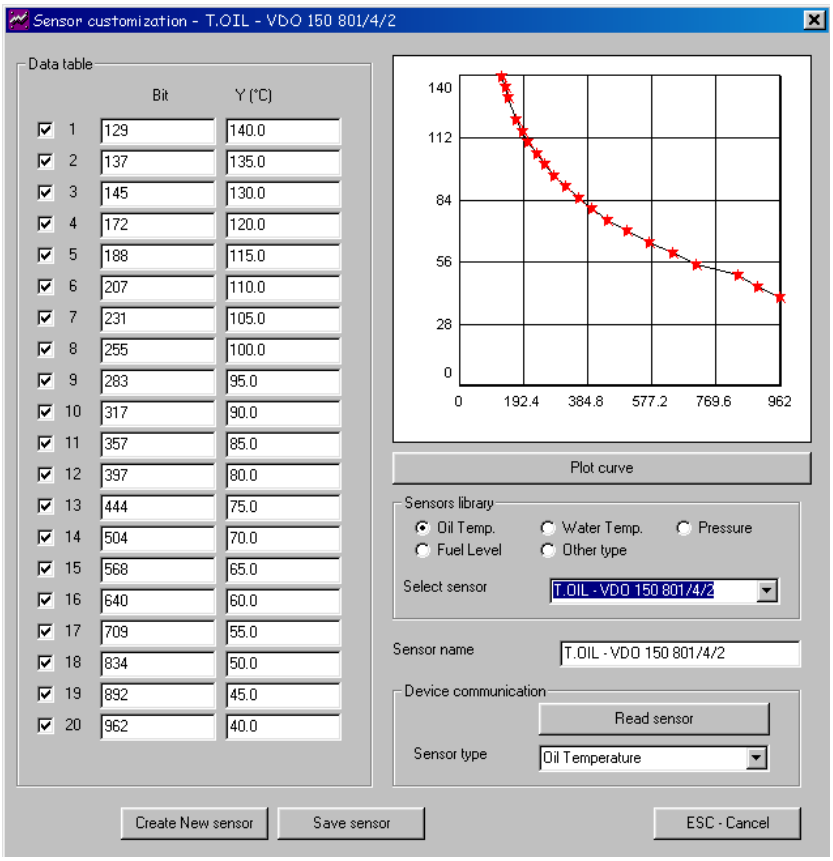


- Change slowly the temperature of the sensor covering all the temperature range
- Choose some points (max 20) inside of the temperature range, verifying for everyone of these values the correspondent reading in bit, carried out by the dashboard.

Once correctly defined the points, the user has to plot the curve and to save it on the sensor library.

NOTE : The sensor library is the collection of all the sensors available for every type. It is possible to add, modify or remove a curve from the library.

In order to create a calibration curve, click on the “Customize sensor” command; this window will appear :



Select the type of sensor that is being customized (i.e. water temperature) and insert the sensor read values and the corresponding bit values of the analog input.

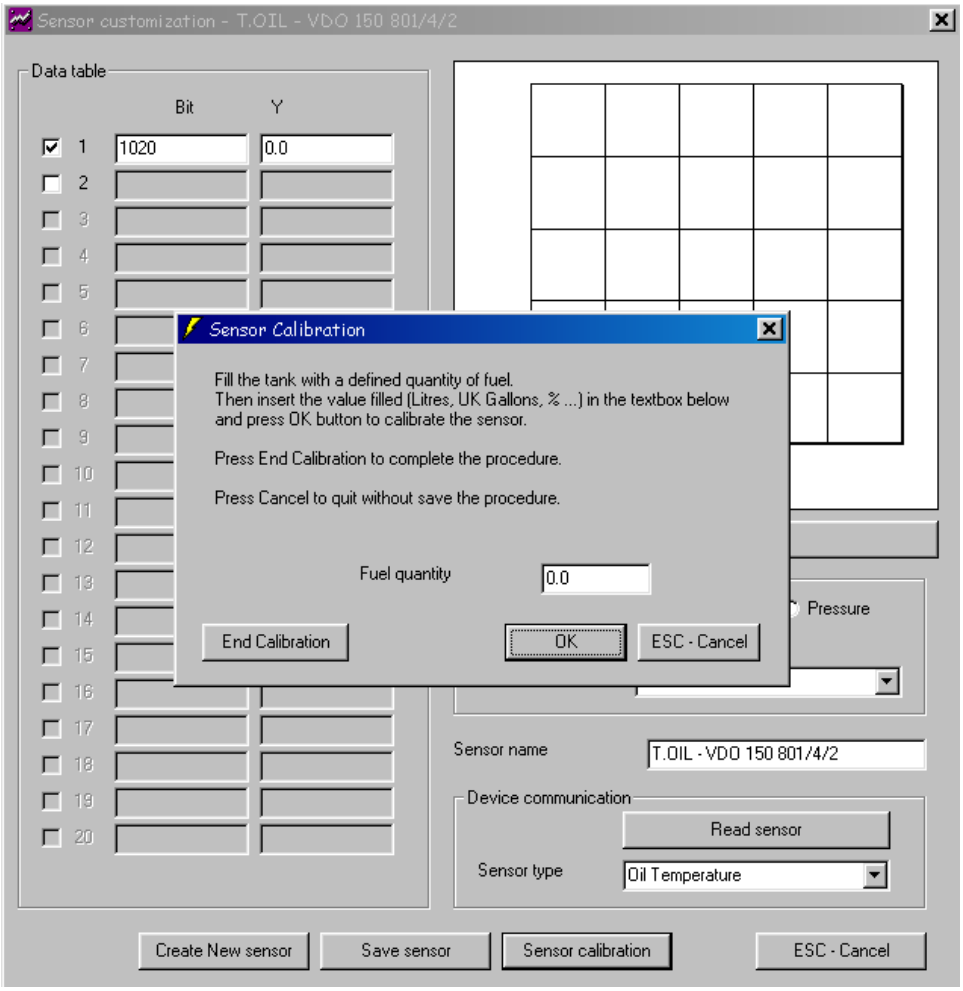
NOTE : The bit values must be disposed in increasing order:
BIT1<Bit2<Bit3<Bit4…<Bit20

Once completed the table, give a name to the sensor and then click on the “SAVE SENSOR” push-button, in order to save the curve in the PC memory.

Now, in the “Configure sensor” window, in the Temperature sensor list, the user will find also the one just saved.

Fuel Level sensor

As previously evidenced, the calibration procedure of the fuel level sensor can be only carried out from PC and consists in emptying the tank and then introducing a series of known amounts of fuel, each time setting the total amount present in the tank until it is full.
In the “Customize sensors” window, selecting the fuel level sensor type, will appear at the bottom the "Sensor calibration" push-button. Pressing this key the guided procedure for calibration will start: follow the instructions visualized on the screen.



In order to complete the procedure, give a name to the sensor and save it in the memory of the computer by pressing the "Save sensor" push-button.

How to visualize the recorded data

The “AIT Race Analysis” software will allow you to plot the recorded laps and the sampled channels.

Download data

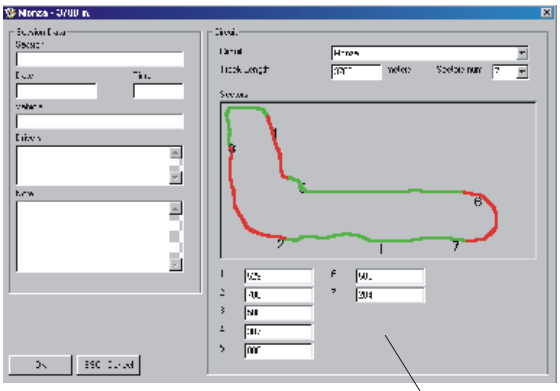
In order to get the data recorded by the dashboard, click on the ANALYSIS>DOWNLOAD DATA command.

Save data

Once completed the download, the data must saved in the memory of the PC: click on the ANALYSIS>SAVE DATA command in order to save the data with the desired name and in the desired folder.

Plot data

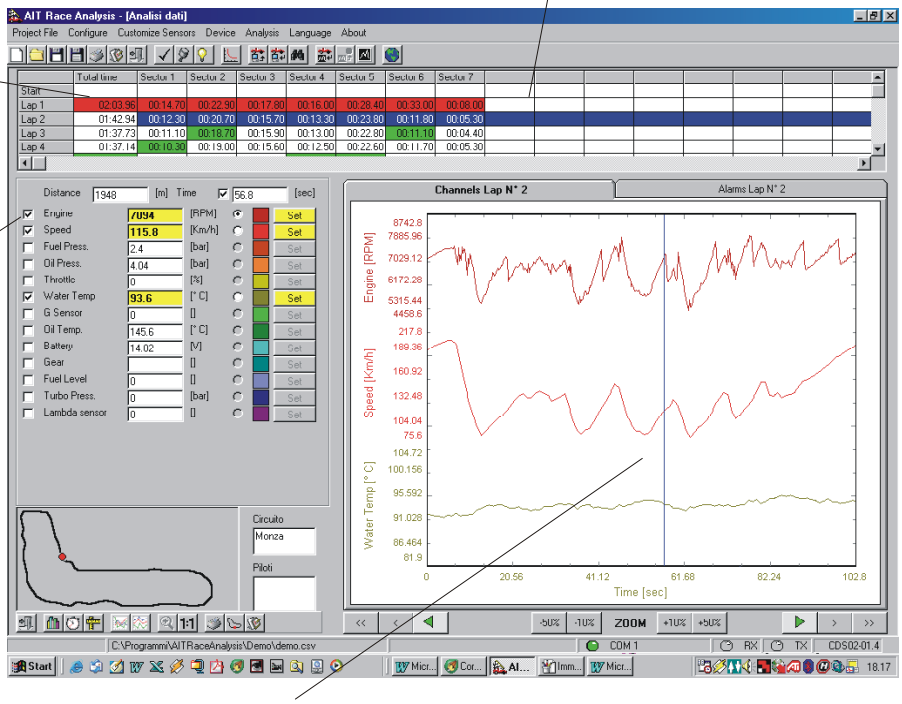
In order to plot the channels, click on the ANALYSIS>ANALIZE command; a window in which the user can select the data file to analize will appear.
Then the Analize window will open up.
Click on the desired channel name in order to add a sampled channel to the graph; click on the SET push-button if you wish to change the graph colour; select the desired lap in order to view the corresponding data.



It is possible to divide the track in more sectors and then visualize the intermediates.
Red is the colour of the worst time; green is the colour of the best time.

Select a lap to visualize the data recorded.

Select the measures



Select a point on the graph to view the measures and the position on the track

File types

In the installation folder of program "AIT Race Analysis" you will find the following others folders:

Sensors: It contains the sensors calibration curves
Tracks: It contains the tracks of the available circuits
Demo: It contains an example of recorded data