



**AIM Srl**

Via Cavalcanti, 8  
20063 Cernusco S/N (Mi)  
Italia  
Tel. (+39) 02-9290571  
Fax (+39) 02-92118024

[www.aim-sportline.com](http://www.aim-sportline.com)

**U.S. OFFICES**

**AIM SPORTS LLC**

31889 Corydon, Suite 130  
Lake Elsinore, CA 92530  
U.S.A.

**AIM SPORTS LLC SE**

1636 9th St. SE Unit B  
Roanoke, VA 24013  
U.S.A.

**Toll Free 1.800.718.9090**

[www.aimsports.com](http://www.aimsports.com)

04	INTRODUCTION
06	INCLUDED ITEMS AND INSTALLATION ACCESSORIES
10	SOLO AT A GLANCE
16	POWERING AND CONNECTING SOLO
18	SOLO/SOLODL POWERING ON
20	SOLO CONFIGURATION
24	RACE STUDIO SOFTWARE
26	TRACK MANAGEMENT
28	USE OF SOLO DURING THE TESTS
30	DATA RECALL
32	DATA DOWNLOAD ON THE PC AND DATA ANALYSIS THROUGH RACE STUDIO2
34	SOLODL CONNECTION WITH SMARTYCAM
40	SOLO TEAM



## Thank You.

Siamo molto orgogliosi che la vostra fiducia nei nostri prodotti vi abbia fatto preferire il nuovo Lap Timer GPS Solo.

Solo è il risultato di migliaia di ore di lavoro di una continua ricerca tecnologica di una grande passione per le competizioni sportive e di una provata esperienza maturata sulle piste di tutto il mondo a fianco di piloti e tecnici specializzati in acquisizione e analisi dei dati e della telemetria.

Abbiamo voluto che Solo fosse piccolo, preciso, potente ma soprattutto esageratamente comodo per rispondere a tutte le richieste di una utenza preparata ed esigente.

Solo è semplice da installare e ancora più facile da usare, è uno strumento affidabile e preciso, indispensabile per monitorare e registrare le vostre migliori performances.





### What is Solo?

Solo is an automatic lap timer based on GPS technology.

### What does it do?

Solo locates its GPS position, identifies the track from the internal list of the main world tracks and starts automatically sampling lap times.

### If the track is not in the database?

It can be easily added.

### Types of tracks?

Circuits, hill climbs, regularity, point to point races, performance tests. Solo can fit all situations with a simple keyboard configuration.

### What else?

Speed, accelerations, braking... all the details you need while racing, a powerful data review immediately after and... no need for a track engineer, no complicated sensors no expensive wirings.

### Is there more?

An elder brother, SoloDL. Additional features: with an easy connection, it can read all data coming from your Engine Control Unit.

Two systems, same logic: maximum amount of information with minimum effort. The ECU connection is really very simple, and the information available is very useful.

### Who wants more?

You can connect SoloDL to SmartyCam, AIM on-board camera, and then you have a video with high precision figures.

## Included items

### SOLO

- Solo (1)
- Solo USB cable (2)
- USB/AC power adapter (3)
- Solo power cable with 2m wired car lighter socket (4)
- Mounting bracket with screws (5)
- Software installation CD (9)

### SOLODL

#### Kit for stock cars with stock ECUs OBDII (K Line/CAN)

- SoloDL (6)
- USB cable (2)
- USB/AC power adapter (3)
- 2m OBDII/power cable (7)
- Mounting bracket with screws (5)
- Software installation CD (9)

#### Kit for racing cars with aftermarket ECUs (CAN/RS232)

- SoloDL (6)
- USB cable (2)
- USB/AC power adapter (3)
- 4m CAN/RS232 ECU harness (8)
- Mounting bracket with screws (5)
- Software installation CD (9)



## Installation Accessories

Solo can be installed in a variety of ways depending on the application and your preferences.

Suction cup bracket kit with screws;  
**part number X46KSV500.**



Handlebar bracket kit accommodating bars from 0.5" to 2.0" diameter;  
**part number: X46KSTG00.**



Double bar bracket kit with U bolt for bars from 0.75" to 1.25" diameter.  
Metallic wrap for pipes from 1.57" to 3.15" diameter;  
**part number: X46KSTP00.**



Outlined below are several mounting options available for application-specific installations:



## Understanding Solo

### Solo most important feature is to show your Lap Times.

The calculation is done using the GPS position of your vehicle and the track starting line. Solo calculates the position of your vehicle

ten times per second, and interpolates the nearest position to the starting line with very high precision.

### Where do startline GPS info come from?

Of course, for obtaining lap Times, Solo has to know the Starting Line Coordinates.

This can be done in three different ways:

### 1. Solo comes with a wide list of tracks.

You can check them pressing >>> or <<< until the page below on the left appears; pressing **VIEW** button you enter the page shown on the right;

```
GPS GOOD   L30 SAT 8
-----
Track:Circuit
Road America
-----
OK: START GPS MARKER
VIEW! OK | <<< | >>>
```

ENTER TRACK DATABASE

### SHOWS ALL TRACKS STORED IN SOLO MEMORY

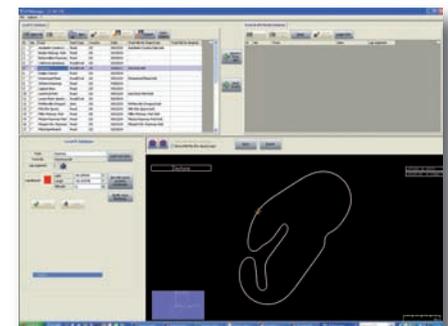
```
ALL TRACKS
Nearby Tracks (<3mi)
-----
DOWN! UP | SEL | BACK
```

SHOWS ALL TRACKS AVAILABLE IN A 5KM RADIUS

2. You can define the starting point of the track by going to the starting line and setting the desired point. (see chapter 7)



3. You can define the same starting point by the Track Manager feature of Aim software Race Studio 2. (see chapter 7)



Please, take note that if you are running a Point to Point race, you have to define TWO different points: Start and Finish.

Finally, if you run a **Performance Test**, like a "Drag" contest, no starting point coordinates are needed: Solo will start and stop the test automatically.



## Display, and Buttons

Solo is equipped with a 128x64 pixel graphical display and a built-in brilliant backlight.



Press any of the four buttons and the specific menu items will appear (for four seconds) above each of the buttons.



you can lock the image  
**MENU>>Display Setup>>Keyboard**  
 and select **Locked**.

## GPS Antenna

The integrated GPS antenna is located on the top of Solo. In order to mitigate any possible GPS signal interference, avoid positioning anything directly over the GPS antenna.

## USB Port

Solo uses USB connection for:

- Battery charging
- Receiving configuration (SoloDL) and track list upgrade
- Data download to PC
- Firmware upgrades

To access the USB port, slide the lock on the waterproof USB door down and the door will open revealing the USB port.

## Connectors

Solo features a single connector located on the bottom, which is used when powering the system from a 12V source.

SoloDL features two connectors on the bottom of the system: one to connect to Aim's external CAN expansion (for example SmartyCam – see Chapter 11) and the second is used for ECU connection and power (bottom right image). Please, take note that the external power can be received from the first or the second connector.



## Mounting Points

You can mount Solo to the included bracket using the two integrated magnets. This solution allows you to quickly and easily install and remove Solo.

For more permanent installations, you can secure Solo using the four included inserts (bottom image).



## Solo Working Modes

You can configure Solo in order to optimize its activity in dependence upon the typology of the track and of your race:

The tracks can be in a Closed Circuit or in a Pont to Point track, i.e. rallye or DownHill races.

The typology of your race can be:

### Speed

A normal race in circuit.



### Regularity

Where you have to maintain a certain constant lap time.



### Performance

Where you evaluate the performance of your vehicle in an acceleration on a straight, that can be, for example, 0-100 km/h, 0-1/4 mile etc.

## Powering Solo/SoloDL

Solo can be powered by the internal rechargeable battery or by an external 12 Volt source, using the provided power cable with 2m wired car lighter socket.



You can recharge the internal lithium battery through the power socket or through a PC using the provided USB cable.



## ECU Connection (SoloDL only)

SoloDL receives the engine parameters from the ECU of your vehicle. You can choose between two different connections to the ECU:

### 1. OBDII that is typically used in most manufactures stock cars.

The connection is extremely simple, since we take advantage from a standard connector that is available on all cars produced after 1985.

**In this case, the power comes from the OBDII connection.**



### 2. CAN/RS232 connection: typically used in race car installations.

In this case the connection is more complex and has to be followed by expert technicians and strictly depends upon the ECU you have on your car. Please note: in these installations, the external power has to be connected to the car battery through the vehicles main isolation switch.



Documentation about a wide range of ECU protocols and connections is available at our website

**[www.aim-sportline.com](http://www.aim-sportline.com) >> Download Area >> ECU section.**

## First Power On

At first power on, Solo starts the configuration wizard requiring the following information:

- Language
- Unit of measure (Mph/Kmh)
- Type of race to be performed (speed, regularity or performance in case of performance test select the kind of performance according to the selected unit of measure)
- Type of track that the logger is to be used on: Circuit or Point to Point (except for performance tests)

## Sampling GPS Signal

At switch on, Solo starts looking for a GPS signal. You can see the level of the signal by pressing >>> or <<< until the following page appears:



Please note: for a quick GPS signal acquisition place Solo in the open air so that a wide part of the sky is visible.

The precision of the system computation (routes and lap times) depends on the number of connected satellites.

A good precision is provided with at least 6 satellites connected with an optimum precision provided with at least 8 satellites connected.

A Power On, Solo checks the tracks listed in its memory. In case it finds a track near the current position (within 5 km) it shows the proper track name.

Solo will use the position of the beacon and of the split points for all computations.

In case more tracks are near your position it shows "tracks found".

You can see them and select one by pushing >>> or <<< or simply run a track lap to permit Solo to identify which track is being run.

```
GPS GOOD    L27 SAT 9
-----
Track:Circuit
-----
      Monza
-----
OK: START GPS MARKER
VIEW: OK | <<< | >>>
```

```
Nurburgring GP
Nurburgring Nordsch
Nurburgring VLN
Nurburgring
```

```
DOWN: UP | SEL | BACK
```



Please, use AIM Race Studio 2 software to configure the track beacon positions and to define the ECU of your car  
**(for SoloDL only).**

Any other parameter will need to be configured by the onboard keyboard.

To enter configuration press **MENU**.

## Race Modes

Solo can manage different race modes: Speed, Regularity and Performance.

In all situations, it gives the proper time information.

To set the type of race, follow this path:

**MENU>>Race Mode Setup.**



### Speed

This is the usual race or test: you have to drive at the maximum possible speed. The lap time is rolling until the vehicle passes in front of the finish line, where it stops for some seconds.

### Regularity

The rule of regularity races is as follows

- the lap time stored after the second passage from starting/finish line becomes the reference lap;
- the following laps have to be driven in the same lap time or as close as the reference lap.

Solo will continuously show the predictive lap time, or the difference (+ or -) between the predictive and the target lap time.

### Performance tests in detail

In case of Performance tests, the Start Line is triggered at the increment of Speed, while the Finish line depends upon the selected length of test: Available length depends on the selected measure units.

If Imperial units are selected it is possible to choose among:

- 1/4 miles;
- 1/8 miles;
- 0/60 mph;

If the metric units are selected it is possible to choose among:

- 0-100 km/h
- 0-160 km/h
- 100m
- 400m
- 1000m

Data recording and time computation starts when Speed passes from "ZERO" to more than 10 km/h. When the set length or speed is reached the display will freeze and then shows the performance time and max speed.

## Circuits and Point to Point Races

### Circuit

Select this Mode when the lap begins and finishes is at the same point.



### Point to Point Race

If you configure Solo in order to manage Point to Point Race, it starts the time (and data recording) as soon as it passes in front of the Starting Point and stops the timer and shows the Lap Time when your vehicle passes from the Finish Line.



We have already seen that there is a large amount of information that you can see on your display, while your vehicle is on the track:

- Lap time;
- Predictive lap time
- Speed
- Lap number
- Acceleration
- GPS signal information
- Data coming from the engine via the ECU. **(for SoloDL only).**

For showing all these data, Solo has some pre-defined pages, showing pre-organised fields.

You can easily change page by pushing >>> or <<<.

Also, you can freely configure up to **4 Custom Pages**, that can show from 1 up to 4 different information.

Every page can be enabled or disabled, so, if you need only two pages, disable all the others and swap between them, pushing >>> or <<<.

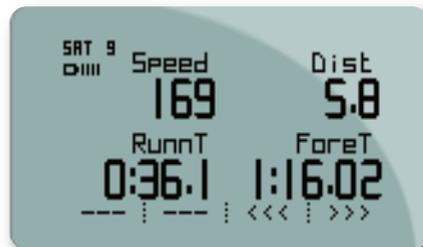
To enable the pages follow this path:  
**MENU >> Display Setup >> Pages Setup >> Enable/Disable Pages.**

For creating and managing the Custom Pages:

**MENU >> Display Setup >> Pages Setup >> Custom Pages Setup.**

Set how many custom pages to show, how many fields to show on every page and configure the page.

Below are shown examples of custom pages with 1 up to 4 fields.



### Units of measure selection

Solo/Solo DL can compute using Decimal or Imperial units of measure.

To set the units of measure, follow this path:  
**MENU >> Set Units** and select the Unit of measure required.

### Auto power off

Solo automatically powers off after 5 minutes of inactivity (no movement and no button pressed).

### Time zone and time/date format settings

Solo can show the date and time in different formats enabling or not legal time. Follow this path **MENU >> Set Time/Date** and set:

- Actual Local Time
- Daylight Saving Time: OFF/ON
- Time format: 24h or 12h
- Date format: to be selected among:  
DD/MM/YY, MM/DD/YY  
or YY/MM/DD.

### System information

This page shows logger firmware version and serial number.

Follow this path:

**MENU >> System Information** and this page will appear.



You are going to use Race Studio 2 software for:

- **Upgrading the track list**
- **Downloading the test data to your PC**
- **Analyzing the test data**

Aim constantly updates Race Studio 2 software. Each new release is available free to download from our web site [www.aim-sportline.com](http://www.aim-sportline.com), download Area/Software section.

## Software Installation

To install Race Studio 2 software just place the CD in the proper driver and wait for a few seconds.



The system will ask the user:

- To choose if reading the documentation or installing a software: select the second option;
- Which software to install: select Race Studio 2: the installation will start automatically.

## SoloDL Configuration

SoloDL can receive data from your Engine Control Unit.

You can use RaceStudio2 for specifying the ECU of your vehicle and for selecting the desired information.

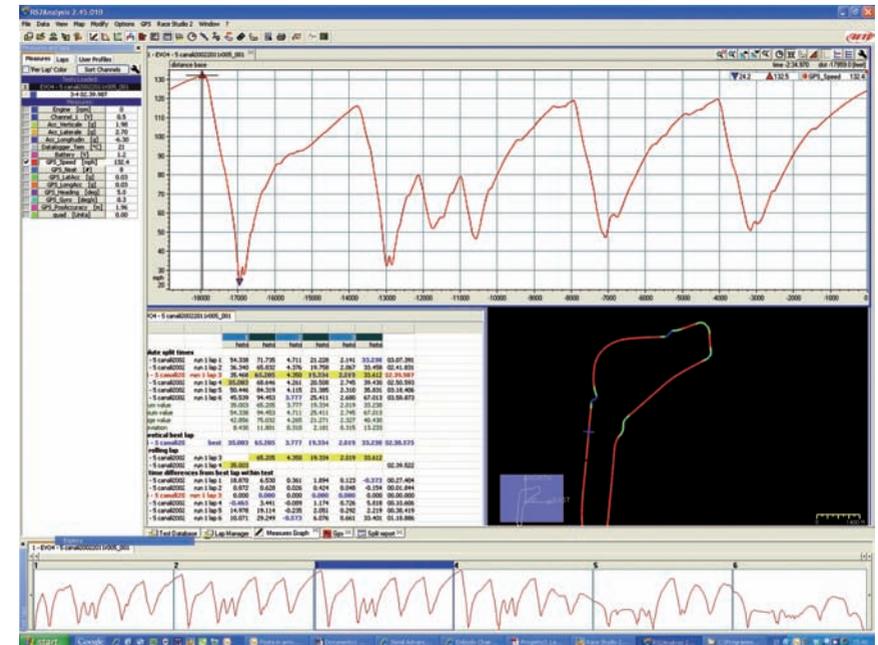
Once you have verified that the vehicle ECU is supported, just follow this procedure with SoloDL switched on and connected to the PC:

- Run Race Studio 2 software
- Click on **AIM System Manager**
- Select ECU Manufacturer and model
- Enter configuration and vehicle name
- Select the desired information to be received
- Press **OK**.
- Only in case the ECU does not transmit the engaged gear activate

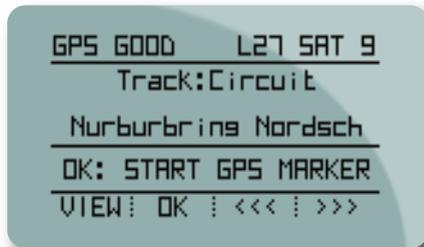
“System configuration” logger and set “calculated” gears;

- Press **Transmit**

Please, refer to AIM website [www.aim-sportline.com](http://www.aim-sportline.com) >> “ECU connection” area to know which ECUs are currently supported by AIM devices.



We have already underlined that Solo comes with a comprehensive database of starting line / split line coordinates. You can easily see the list of coordinates in the track page; to reach it press >>> or <<< until the page below on the left appears and then press "VIEW" button.



You will see the tracks nearest to your position.



You can add new coordinates in two different ways:

- Directly through Solo;
- Using Race Studio 2. Software

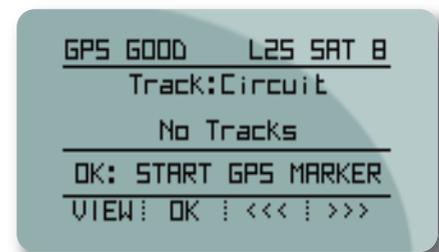
## Adding Starting Line Coordinates directly through Solo

It is very easy to add the coordinates of a new starting point:

- Go to the Starting Point with Solo in your hands
- Select Track page using >>> or <<< buttons

It is very easy to add the coordinates of a new starting point:

- Go to the Starting Point with Solo in your hands
- Select Track page using >>> or <<< buttons



- Press **OK** and you are ready to go.

In case you have previously selected a Point to Point track, you will be asked to add the Finish Point in the same way.

## Track Management function in Race Studio 2

You have full management of the track database where you can add or remove track information.

You can manage the list of the tracks inside Solo memory by using the **Track Management** feature of Race Studio 2.

Select the desired TRACKS from the list and click on **Send to Solo** button.

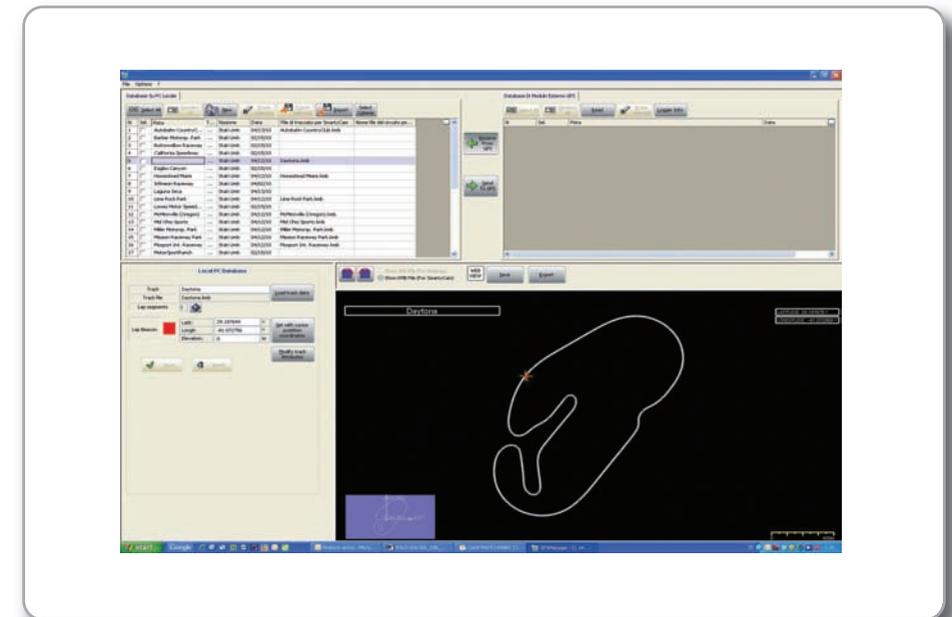
Solo will receive the track data in a few seconds.

If the track information is not available in the list, but lap/splits coordinates are

available, please, follow these instructions:

- Click on **New** button to create a new track.
- A panel appears: type in the track name
- The new track will appear in the window left panel: Select it
- Manually insert the lap coordinates in the window bottom left panel.
- If split coordinates are available click on "+" and add as many split as are available and manually fill in the related coordinates;
- Click **Save**
- Click **Send to Solo**

In a similar way, you can read and modify Tracks information in the Solo memory.



Solo starts recording when the speed increases.

So, if the vehicle does not move, even with the engine ON, Solo does not record data.

When Speed start going up, Solo changes mode and starts recording all the data, that is to say, speed, position and acceleration every 1/10 of second.

SoloDL, of course, records also , all the information coming from the ECU.

## Speed Races

As we have already seen, there are three types of Lap time information that we can see:

1. Rolling Lap Time, that is shown by default
2. Static Lap Time.

The lap time of your last lap remains active if you select this field.

Anyway, the lap time information appears for some seconds independently from what the display shows, when you cross the starting line.

3. Predictive Lap Time, is evaluated after having finished the first lap.

With >>> or <<< buttons it switches from one page to the other, according to the number of configured pages.



## Regularity Races

As in Speed Races, Solo shows Rolling, Static and Predictive lap time.

The only difference is that it calculates the Predictive Lap Time referred to the speed of the Second Lap and shows the Predictive Difference Time between the Second lap and the Actual one.



## Performance Tests

Performance tests can be ¼ mile, ½ mile, 0-60 mph, 0-100 km/h, 0-1 km.

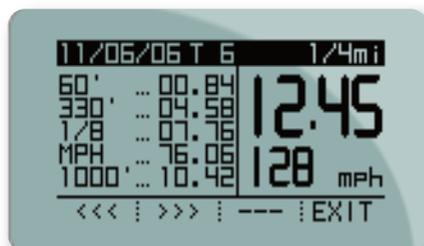
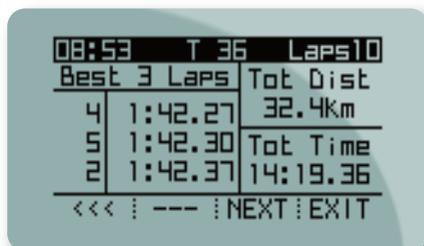
The vehicle is placed at the starting point. when the car starts, the time increment and rolls on the dash and the data are recorded.

When the performance itest finishes, the most important information appear on the display:



## Data Recall

To review data stored in Solo memory, push **MEM** button. The Data Recall page appears; it is as shown below on the left for "Speed" and "Regularity" mode and can include more pages; for performance mode however, all data is shown in a page as below:



## Data in Memory Deletion

You can delete Solo memory in two different ways:

- Follow this path: **MENU >> Stored Data >> Clear Test Data** and press **OK**.
- After data download with Race Studio 2 software the system will ask you if you are going to delete or not delete the logger memory.



## Data download on the PC and Data Analysis through Race Studio2

The best way to understand your performance, is to analyse your Solo data on your PC.

Only with a wide screen can you compare two laps, sector after sector, evaluate when and where you are braking and when you are on and off the throttle.

For this analysis, you can take advantage of Aim highly professional software Race Studio 2.

This software, (that comes free of charge with your Solo), is constantly upgraded by Aim engineers: every new release can be easily downloaded (free of charge) from the web site: [www.aim-sportline.com](http://www.aim-sportline.com)

### “Download Area” Software section.

The first step is to download the recorded data to your PC.

## Data Download

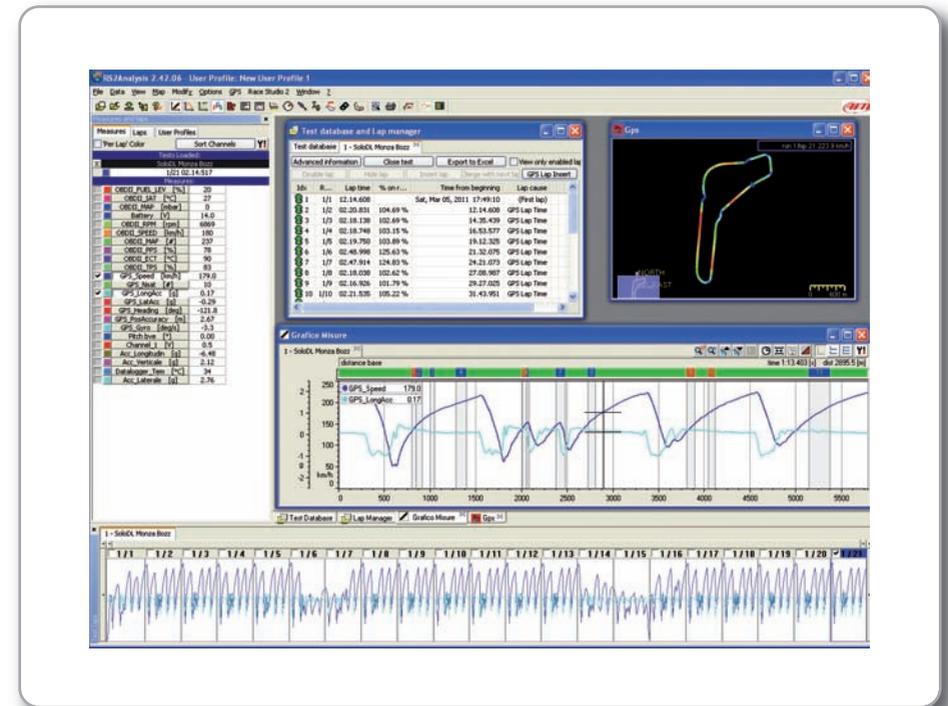
Data Downloading is very simple:

- Connect Solo to your PC
- Run Race Studio 2 Software
- Click on **Download data** and follow the instructions.

## Data Analysis

Race Studio 2 Analysis software allows you to view and analyse the data stored in Solo/SoloDL using different graphs and the GPS images also.

This is an example of Race Studio 2 Analysis view.





## SoloDL Connection with SmartyCam

**If you have a SoloDL, you can connect it to SmartyCam, to get a powerful system.**

Let us introduce SmartyCam, AIM's on-board camera. Briefly, it records the video, automatically adding in the overlay and graphical information about a lot of freely configurable parameters coming from the ECU and from GPS.

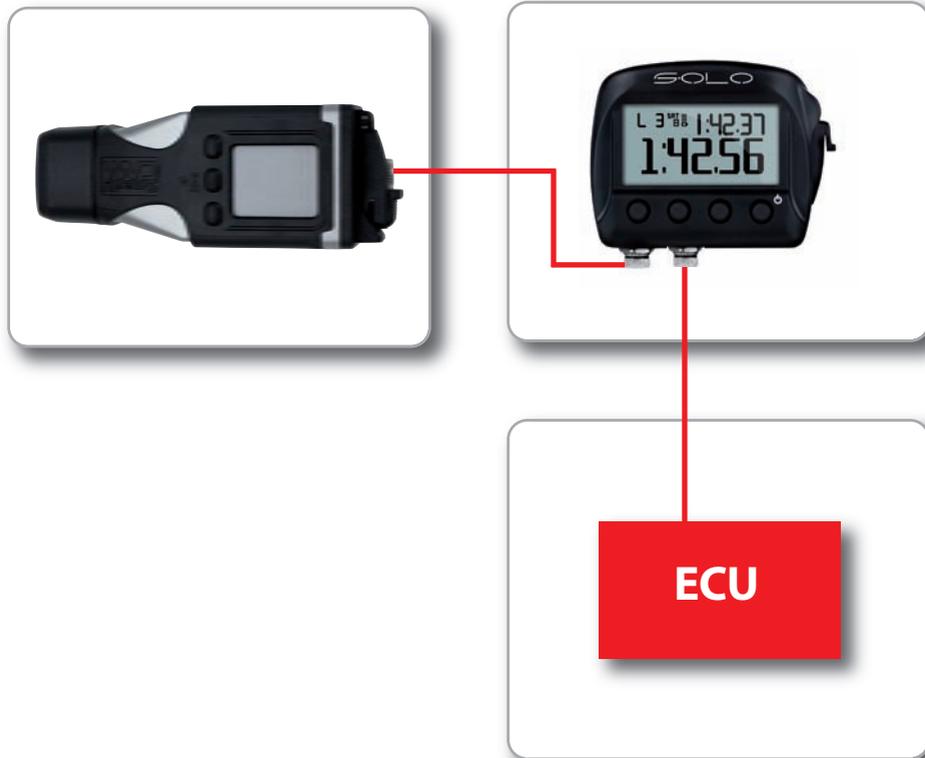


**So, the configuration SoloDL/SmartyCam is extremely synergic, since the two systems can take advantage of features from each other:**

- SmartyCam can read Solo DL parameters from ECU
- SmartyCam can read Solo DL GPS and GPS lap time

- SoloDL display can show information about SmartyCam Status, like the amount of free "microSD" Card memory, battery level, recording status, diagnostic messages etc.
- SmartyCam can record SoloDL data on its "microSD" Card, for a quicker management of them.

**Later on your PC, you can easily synchronise video and data.**



### Physical Connection

To connect SoloDL with SmartyCam use the 5 pin CAN cable provided with SmartyCam.

### SoloDL configuration of the data stream to SmartyCam

To get data sampled by SoloDL visualised on SmartyCam videos, you have to take a maximum 16 channels among the data coming from the ECU and send them to SmartyCam.

This is done using Race Studio 2 software.

Follow this path:

### System Manager >>Solo>>SmartyCam functions setting

And the related panel shown below on the right appears.

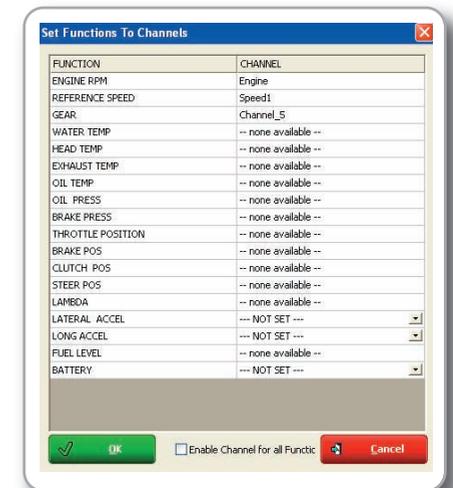
It shows on the left the functions that can be visualised on the SmartyCam videos and on the right the ECU channels you can set that function on.

Entering the drop down menu you can see some of the channels coming from the ECU grouped by type (for instance on Water Temp function you find all temperatures coming from the ECU).

If you find the channel you need, simply select it and associate it to SoloDL channel. Should the channel you want to set not

appear in the list, enable the bottom checkbox to verify if that channel is provided by your ECU.

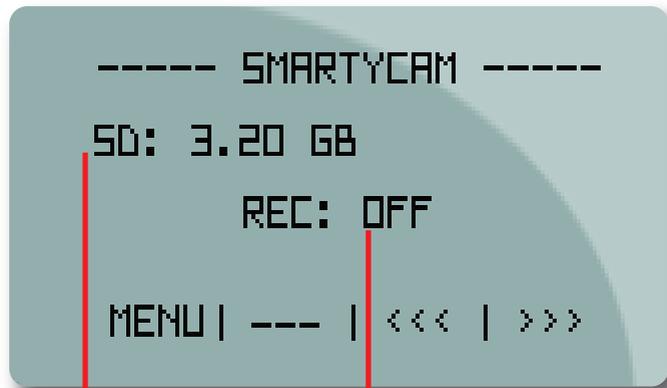
Once all channels have been set click **Transmit** on top of the page and these channels will be automatically sent to SmartyCam.



## Interaction with SmartyCam

**SoloDL** is provided with a dedicated SmartyCam page showing all the useful information about SmartyCam Status, that is to say Recording Status, SD card status and SD card free space as shown below:

To enable this page follow this path: **MENU>>Display Setup>>Enable/Disable Pages**, scroll until finding SmartyCam page: after having enabled it, you can look at it and scroll the pages using **VIEW** button.



REMAINING SPACE  
ON SMARTYCAM  
MICRO SD

REC STATUS



## The Solo Team

**GIULIO CERIANI**  
OUR CHIEF HARDWARE  
DESIGNER FOR THE LAST 30  
YEARS

**EMILIANO BINA**  
LEAD SOFTWARE  
DESIGNER AND THE  
FATHER OF RACE STUDIO  
ANALYSIS

**PAOLO VIGANO**  
HARDWARE DESIGNER AND  
SELF-PROCLAIMED "DA VINCI  
OF BOARDS"

**FRANCESCO OTTOVEGGIO**  
FIRMWARE DESIGNER  
AND OUR RESIDENT GPS  
EXPERT



**FRANCESCO BOZZANO**  
PRODUCT-LINE MANAGER,  
OFFICIAL FIELD TESTER, AND  
THE GUY TO BLAME IF YOUR  
SOLO MALFUNCTIONS

**LAURA MILANI**  
ELECTRICAL ENGINEER, FIRMWARE  
DESIGNER, PIANIST VIRTUOSO, MOTHER  
OF TWO, AND OUR SOFTBALL TEAM  
CAPTAIN  
(WITH A .344 BATTING AVERAGE)

**DIEGO BOLLANI**  
THE ONLY GUY IN OUR  
OFFICE THAT WENT TO ART  
SCHOOL AND WHO ALWAYS  
KEEPS OUR PRODUCTS  
LOOKING FRESH