User Manual

SmartyCam GP HD Rev. 2.2
Release 1.01

INDEX

1 – SmartyCam GP HD Rev 2.2 in a few words

What is SmartyCam GP HD Rev 2.2?
SmartyCam GP HD Rev. 2.2 is the new AiM video recorder with bullet cam developed for motorsport environments that connects directly to the vehicle ECU and automatically overlays the vehicle data to an HD video using graphical items.
Components specifically designed to fit the needs of motorsport environments, like coaxial cable for bullet cam connection, special lenses and CMOS sensor, reliability under vibrations, straight connectivity to the vehicle data and automatic video recording start/stop are among your available features.

What data does it show?
Overlaid data come from your vehicle ECU, from the internal accelerometers, from GPS and from datalogger analog/digital inputs.
It also displays the map of the track and personal images (i.e. logos).

Is it possible to configure the graphical overlays?
Of course it is and a wide library of graphical overlays is available as well as the possibility of placing them where wanted on the video.
End of scales can be defined using Race Studio 3 software included in the kit.

Can SmartyCam GP HD Rev. 2.2 be connected to other AiM systems?
Of course; through the AiM CAN network SmartyCam GP HD Rev. 2.2 connects to all AiM loggers, to say all MX series, EVO series, MyChron5, Solo series and ECU bridge.

Does it also work in a standalone mode?
Yes. SmartyCam GP HD Rev. 2.2 has an internal battery and can work also without being connected to the AiM CAN network.
In this last case, of course, only lateral acceleration coming from SmartyCam GP HD Rev. 2.2 internal sensor can be shown in overlay.
If an optional GPS Module is connected, SmartyCam GP HD Rev. 2.2 can show the position on the track, GPS speed and lap times too.

Is it possible to connect more SmartyCam GP HD Rev. 2.2 cameras on the same CAN network?
Yes. Each SmartyCam GP HD Rev. 2.2 has its own configuration and automatically retrieves the data it needs from the network, without interfering with the others.

Is it possible to synchronize video and data recorded by the loggers?
Yes. Race Studio 3 software automatically synchronizes video and data and shows them on the same dedicated view.

Which video format does SmartyCam GP HD Rev. 2.2 generate?
SmartyCam GP HD Rev. 2.2 generates ".mov" files with H264 compression codec.
Three different compression levels are available: low, medium and high as well as three different frame rates: 15, 25 and 30 frames per second.

Does SmartyCam GP HD Rev. 2.2 start and stop automatically?
Yes. SmartyCam GP HD Rev. 2.2 offers different logics for starting and stopping video recording.
Acceleration or speed can be used to trigger when to start/stop.
SmartyCam GP HD Rev. 2.2 setting is mainly made using the keyboard.

2 – SmartyCam GP HD Rev. 2.2 connections

SmartyCam GP HD Rev. 2.2 can be connected to GPS Module (optional) using the 5 pins Binder 712 female connector labelled “GPS”. It can as well work in slave mode being connected to AiM Dashes and loggers through AiM CAN network supplied by 5 pins Binder 712 female connector labelled “EXP”. The images below show some examples of connection.


made in Italy
SMARTYCAM GP HD rev 2.2
aim-sportline.com
Exp
GPS
ECU-MIC
Bullet cam
Cavo etichettato "CAN Exp" del cablaggio per il connettore 37 pins Deutsch maschio
GPS


made in Italy
SMARTYCAM GP HD rev 2.2
aim-sportline.com
Exp
GPS
ECU-MIC
Bullet cam
Cavo etichettato "CAN Exp" del cablaggio per il connettore AMP 14 pins maschio
GPS

3 – SmartyCam GP HD Rev. 2.2 power, battery charge, ON/OFF

Although SmartyCam GP HD Rev. 2.2 features an internal Lithium battery it is preferable to power it through the vehicle battery using the external power cable included in the kit. Connect it to the 7 pins Binder 712 female connector.

When SmartyCam GP HD Rev. 2.2 is powered by an external 12V power source a plug icon is shown on the display and the video recorder works in a fully automatic way switching ON/OFF with the external power.
Meanwhile the internal battery too is charged; it can record up to 60-70' and when its level is low a pop up message showing "Battery Low!" appears for a few seconds on the display. In this case the video closes and SmartyCam GP HD Rev. 2.2 shuts down.

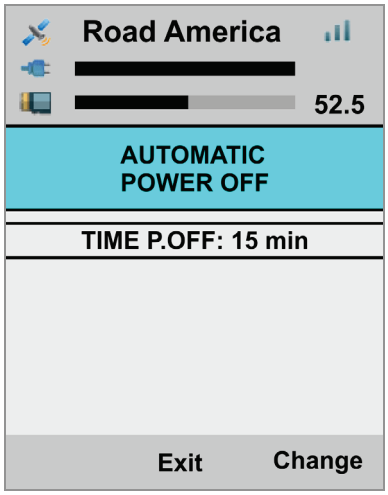
To charge SmartyCam GP HD Rev 2.2 internal battery use the battery charger included in the kit.

Battery can also be charged using SmartyCam GP HD Rev 2.2 USB cable included in the kit: plug the mini USB connector in SmartyCam GP HD Rev. 2.2 mini USB port and the USB connector in the PC USB port. The LED right of the mini USB plug is red when battery is charging and turns green when the battery is fully charged.

SmartyCam GP HD Rev. 2.2 can be switched ON/OFF using the central button. The system asks for confirmation.

When SmartyCam GP HD Rev 2.2 is internally powered it also possible to set an automatic shut down after a period of inactivity.
To do so follow this path:
"MENU>>SETTINGS>> AUTO PWR OFF"
Available options are:

- 30 sec
- 1 min
- 5 min
- 15 min
- 30 min (default value)
- 1 h
- 2 h
- 3 h



Please note: **ONLY** in case the recorder locks up you can switch it off pressing the central button for 10 seconds.

4 – SD card management

SmartyCam GP HD Rev. 2.2 can support up to 128 GB SD cards.
Its housing is closed by a metal screw to be carefully screwed after insertion.
Moreover, SmartyCam GP HD Rev. 2.2 features an useful microswitch that detects when the slot is open and automatically closes the video in less than one second, allowing safe SD card removal.

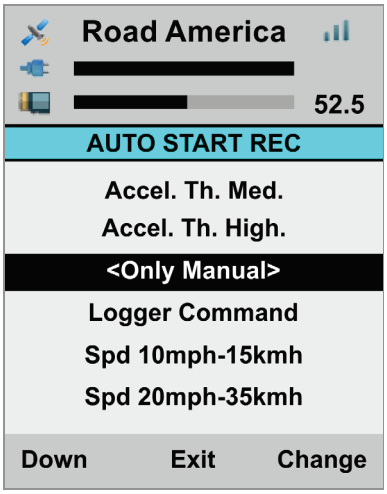
5 – SmartyCam GP HD Rev. 2.2 Start/Stop recording

SmartyCam GP HD Rev. 2.2 can start/stop recording in three ways:

- manually
- automatically in standalone mode
- automatically in slave mode

5.1 – Manual Start/Stop recording

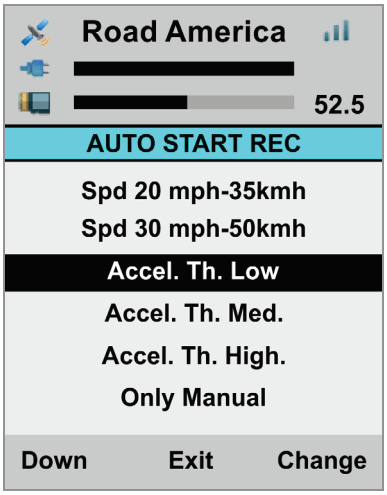
To manually start recording press SmartyCam GP HD Rev. 2.2 left button. It will turn to "Stop": press it to stop recording.
To make this start/stop recording mode to be set as permanent set it following this path:
"MENU –>SETTINGS –>AUTO START REC –>Only Manual"



5.2 – Automatic Start recording in standalone mode

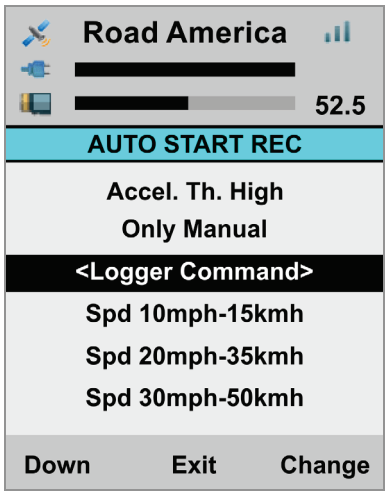
If SmartyCam GP HD Rev. 2.2 works in standalone mode, its internal three axis accelerometer can be used to set start/stop recording function. This way SmartyCam GP HD Rev. 2.2 can start recording according to set speed and acceleration threshold (Th.) values. Follow this path: "MENU –>SETTINGS –>AUTO START REC" and select among these options:

- Spd 10mph-15kmh
- Spd 20mph-35kmh
- Spd 30mph-50kmh
- Accel Th. Low
- Accel Th. Med
- Accel Th. High



5.3 – Automatic start recording in slave mode

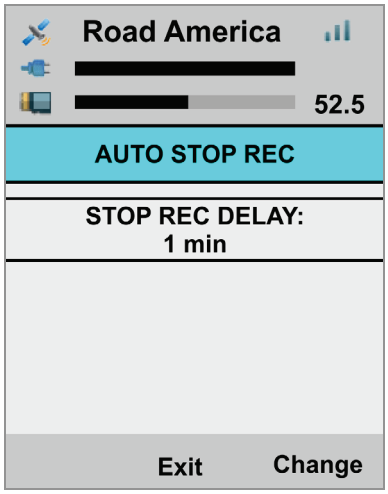
If SmartyCam GP HD Rev. 2.2 works in slave mode (connected to an AiM device) it can be set to start recording when the logger gives the signal. Follow this path:
"MENU –>SETTINGS –>AUTO START REC –> Logger Command".
This is default setting.



5.4 – Automatic Stop in standalone/slave mode

Setting SmartyCam GP HD Rev. 2.2 start recording as automatic, stop recording is automatic too. This way SmartyCam GP HD Rev. 2.2 stops recording after a fixed time of inactivity (standalone mode) or after a fixed time period from logger "Stop recording" command. Follow this path:
"MENU –>SETTINGS –>AUTO STOP REC" and select among these options:

- 5 sec
- 20 sec
- 1 min
- 2 min
- 5 min



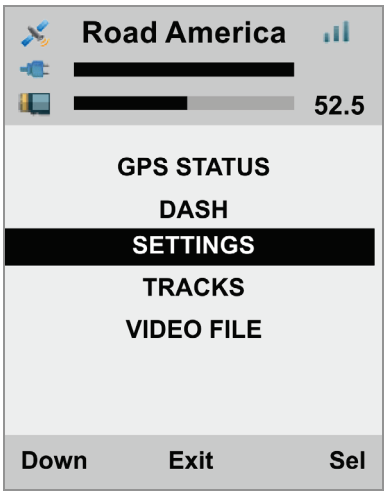
6 – SmartyCam GP HD Rev. 2.2 MENU

SmartyCam GP HD Rev. 2.2 can be set mainly via the bottom keyboard. Pressing “MENU” this page shows up:

Available options are:

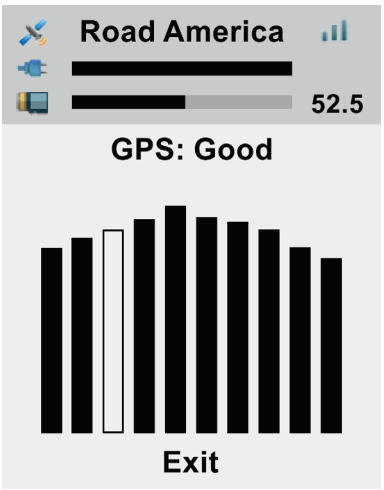
- GPS STATUS
- DASH
- SETTINGS
- TRACKS
- VIDEO FILE

In any situation use “Down” button to scroll the options, “Sel” to select and “Exit” to quit and save



6.1 – GPS Status

Shows the number of connected satellites with the related signal level.

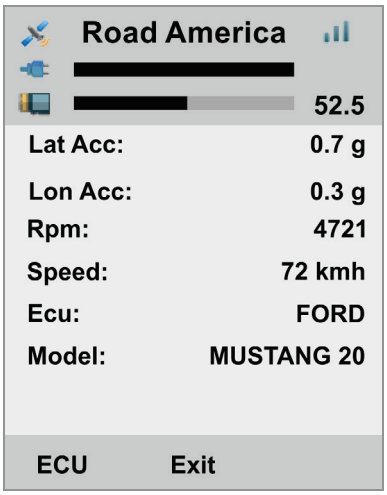


6.2 – Dash

It shows:

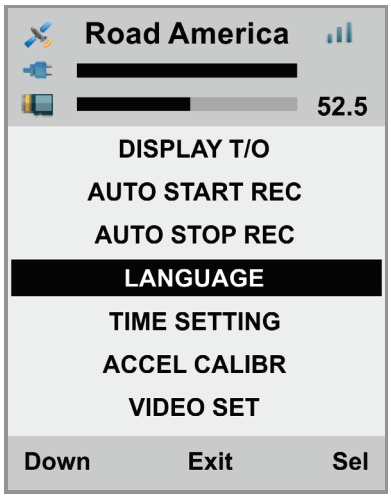
- Lateral acceleration
- Longitudinal acceleration
- RPM value
- Speed value
- ECU Manufacturer
- ECU Model (sliding text)

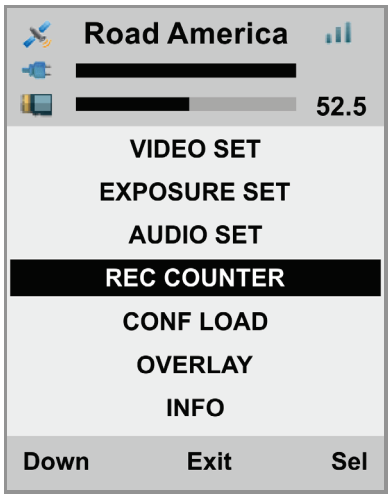
Press “ECU” to enter the ECU page that shows some data provided by the vehicle ECU. Data showed change according to the ECU Manufacturer and Model.

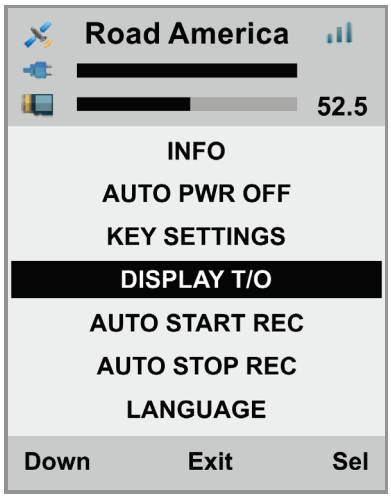


6.3 – Settings

Pressing "Settings" SmartyCam enters the related page that shows multiple options in a circular way; here it is possible to set some parameters, select some settings etc.







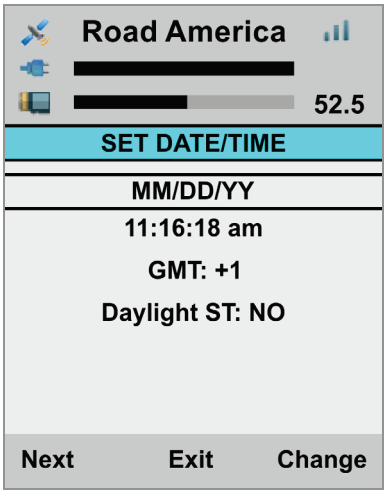
6.3.1 – Language:

Is the first option to set at very first start. Available options are:

- English (default setting)
- Italian
- French
- Spanish
- German
- Portuguese
- Dutch
- Japanese

6.3.2 – Time Setting

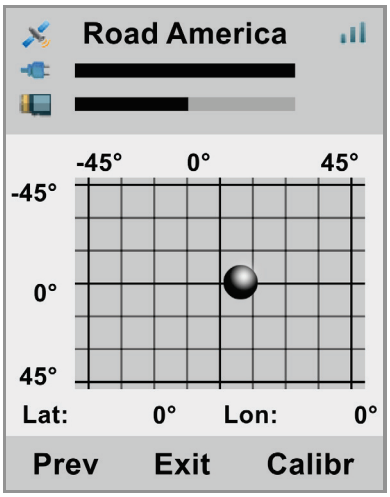
To set SmartyCam GP HD Rev. 2.2 Date and Time format as well as GMT option; Daylight saving time option can be enabled/disabled. Use "CHANGE" button to switch among the option of each function and "Next" button to scroll the functions.



6.3.3 – Accel Calibr

To calibrate the internal three axis accelerometer placed in the bullet cam:

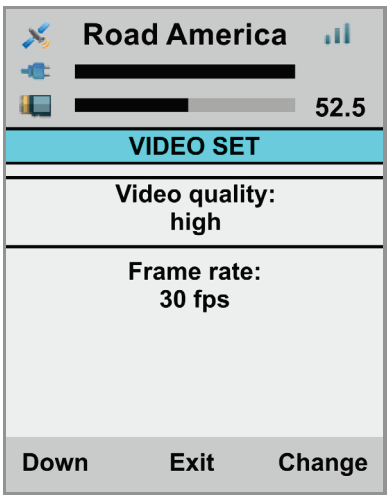
- install SmartyCam GP HD Rev. 2.2 and the bullet (paying attention that the serigraphy is visible on top of the bullet)
- fix both in the preferred position
- switch SmartyCam on
- reach this page and press "Calibr".



6.3.4 – Video set

To set SmartyCam GP HD Rev. 2.2 Video output; available options are:

- Video quality: High (default), low, normal
- Frame rate: 30 (default), 25 or 15 fps (frames per second)



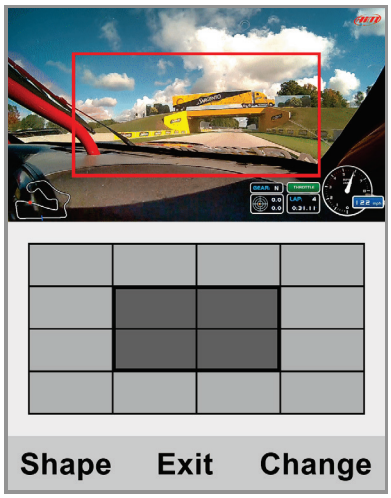
6.3.5 – Exposure set

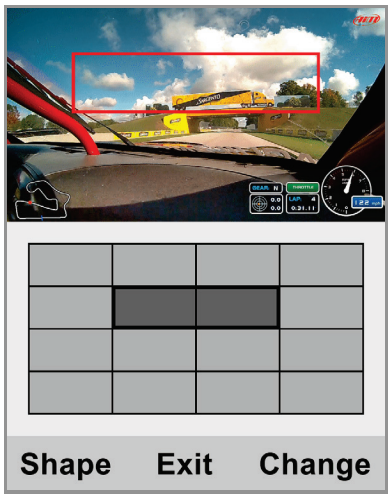
This option is very useful if SmartyCam GP HD Rev. 2.2 is installed on a closed vehicle. Available options are:

- Open Cockpit vehicle (default) – no further setting needed
- Close Cockpit Vehicle.

Setting "**Close Cockpit Vehicle**" the part of the shot to be used as reference to set video light exposure can be decided. With reference to the images below:

- use "Shape" button to resize the part of shot to be used (red rectangle in the images below)
- use "Change" button to displace the red rectangle
- use "Exit" button to save and exit

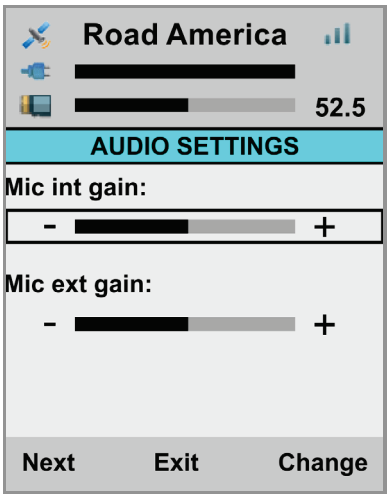




6.3.6 – Audio set

SmartyCam GP HD Rev. 2.2 comes with an internal microphone but an optional external one is available. To set both microphones.

- Use "Change" button to set the gain
- Use "Next" button to switch between internal and external microphone
- Use "Exit" button to save and exit



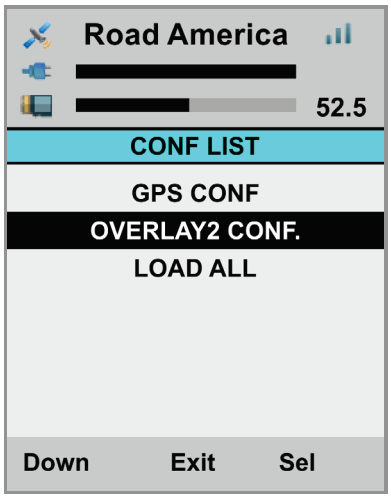
6.3.7 – Rec Counter

This page shows the number of recording of SmartyCam GP HD Rev. 2.2. Press "Reset" to reset the counter.

6.3.8 – Conf Load

Shows a list of all the configurations transmitted to SmartyCam GP HD Rev. 2.2. Select the one to load. Available options are:

- GPS Conf: the tracks included in GPS
- Overlay2 Conf: the overlay transmitted to SmartyCam GP HD Rev 2.2; (the camera can store only one overlay at a time)
- Load all: loads overlay and tracks

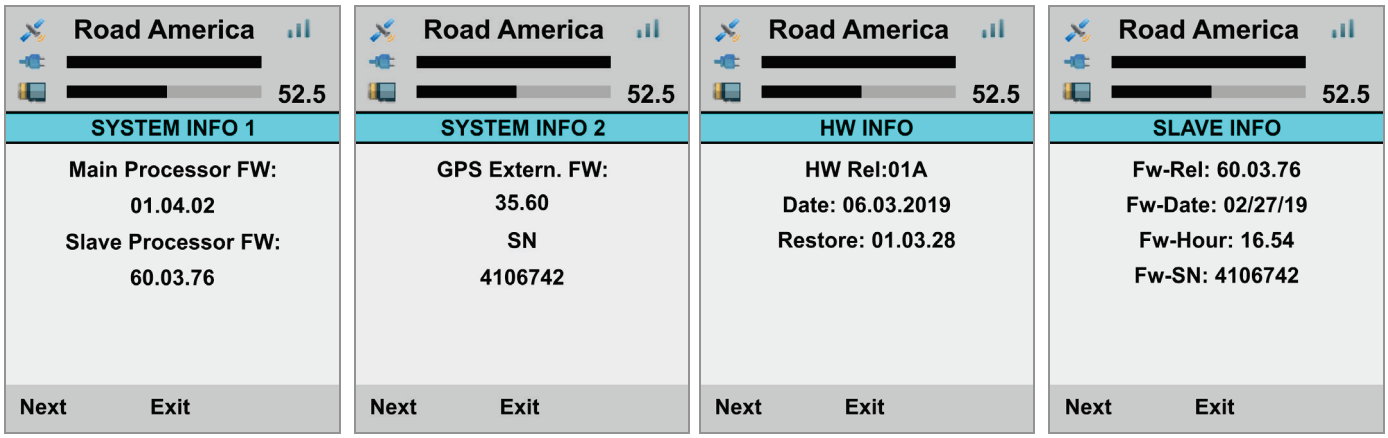


6.3.9 – Overlay

In this page you can enable/disable the overlay of your SmartyCam GP HD Rev. 2.2 configuration. Default setting is enabled.

6.3.10 – Info

Here are 4 pages shown in loop mode with all info about SmartyCam GP HD Rev. 2.2 processors, firmware, hardware, etcetera.

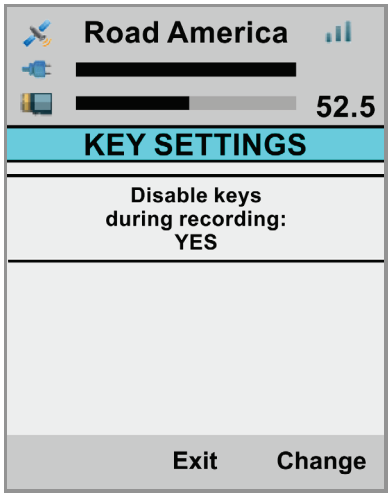


6.3.11 – Auto Power off

See SmartyCam GP HD Rev. 2.2 power, battery charge, ON/OFF chapter (chapter 3).

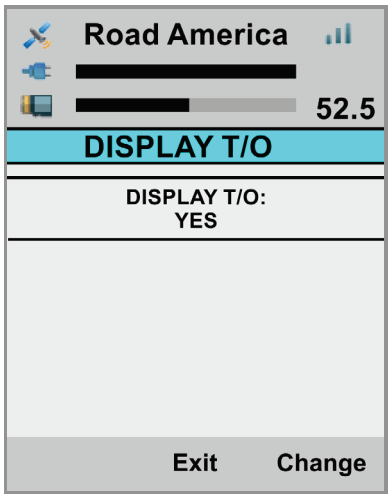
6.3.12 – Key Settings

SmartyCam GP HD Rev. 2.2 keyboard can be enabled/disabled (default setting) during recording. Use “Change” button to enable/disable.



6.2.13 – Display T/O

Enabling this option SmartyCam GP HD Rev 2.2. display goes to stand-by after 1 minute of inactivity.



6.3.14 – Auto Start REC and Auto Stop REC delay

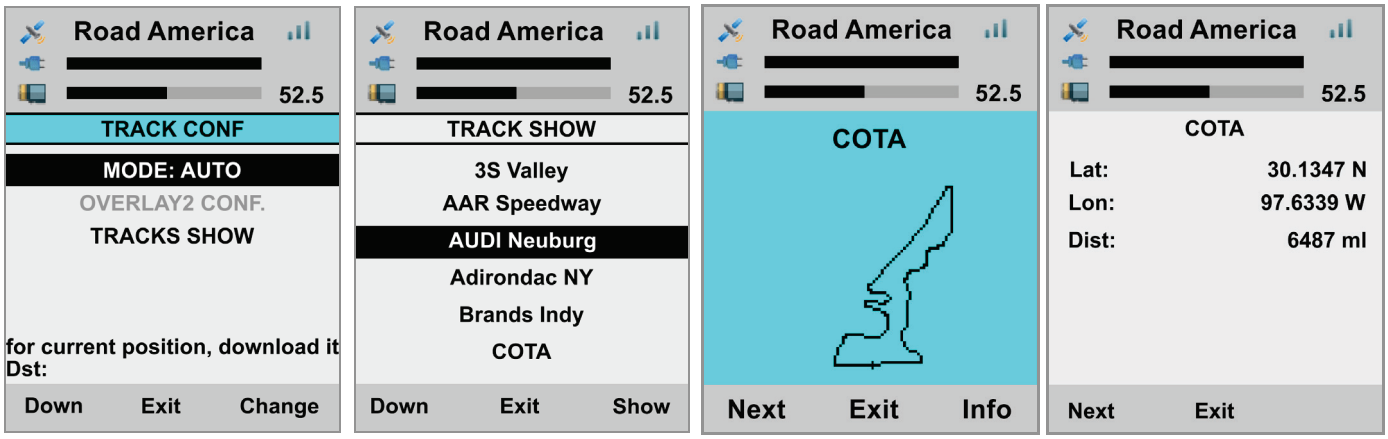
See SmartyCam GP HD Rev. 2.2 Start/Stop recording chapter (chapter 5).

6.4 – Tracks

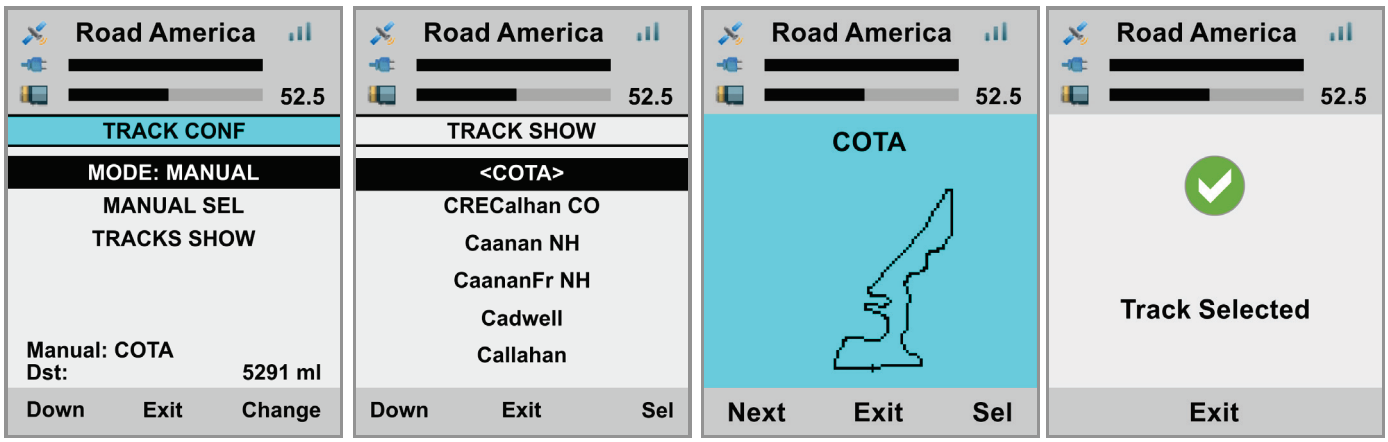
SmartyCam GP HD Rev. 2.2 can manage tracks in two ways: automatic (default) and manual. “Change” button switches between the two options.
In **AUTO** mode SmartyCam GP HD Rev. 2.2 can detect if a known track is available in a 10 km area, shows its name and the distance from current position (Dst)

In case no track is available this flowing message will be shown on SmartyCam GP HD Rev. 2.2 screen: “NO track for current position, download it” (left image below).

With “Down” button reach “TRACK SHOW” option; “Change” button will then switch to “Sel” and pressing it all Tracks transmitted to SmartyCam GP HD Rev. 2.2 will be shown (second image from the left below). Pressing “Show” button the track map is shown; pressing it again tracks start/finish line coordinates are shown.



To switch to **MANUAL** mode press “Change” in Auto mode (left image here above) and “MODE: MANUAL” enables.
If a track has been previously selected it is shown with the related distance form current position (COTA, 5291 miles away in the first image on the left below). To select another track scroll to “MANUAL SEL” and “Change” button switches to “Sel”: press it. The list of all tracks loaded in SmartyCam GP HD Rev. 2.2 is shown (second image from the left below). Pressing “Sel” the track map of the selected track (Cota in the example) is shown; pressing it again the track is selected.



6.5 – Video file

This page shows the list of video file stored in SmartyCam GP HD Rev. 2.2 SD card. Press “Del” to delete them.

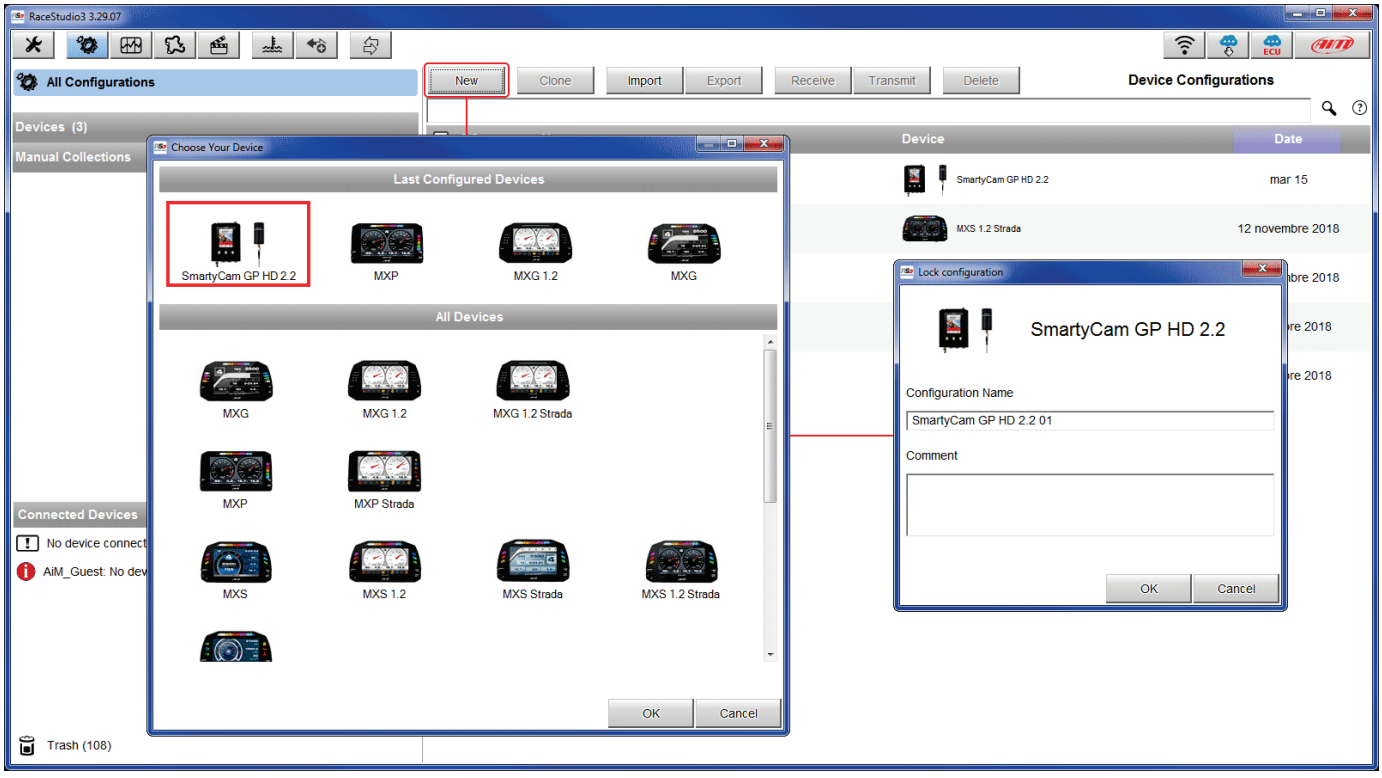
7 – SmartyCam GP HD Rev. 2.2 and the PC

SmartyCam GP HD Rev. 2.2 connects directly to the vehicle ECU. This function is to be configured using Race Studio 3 software.

7.1 – SmartyCam GP HD Rev. 2.2 configuration

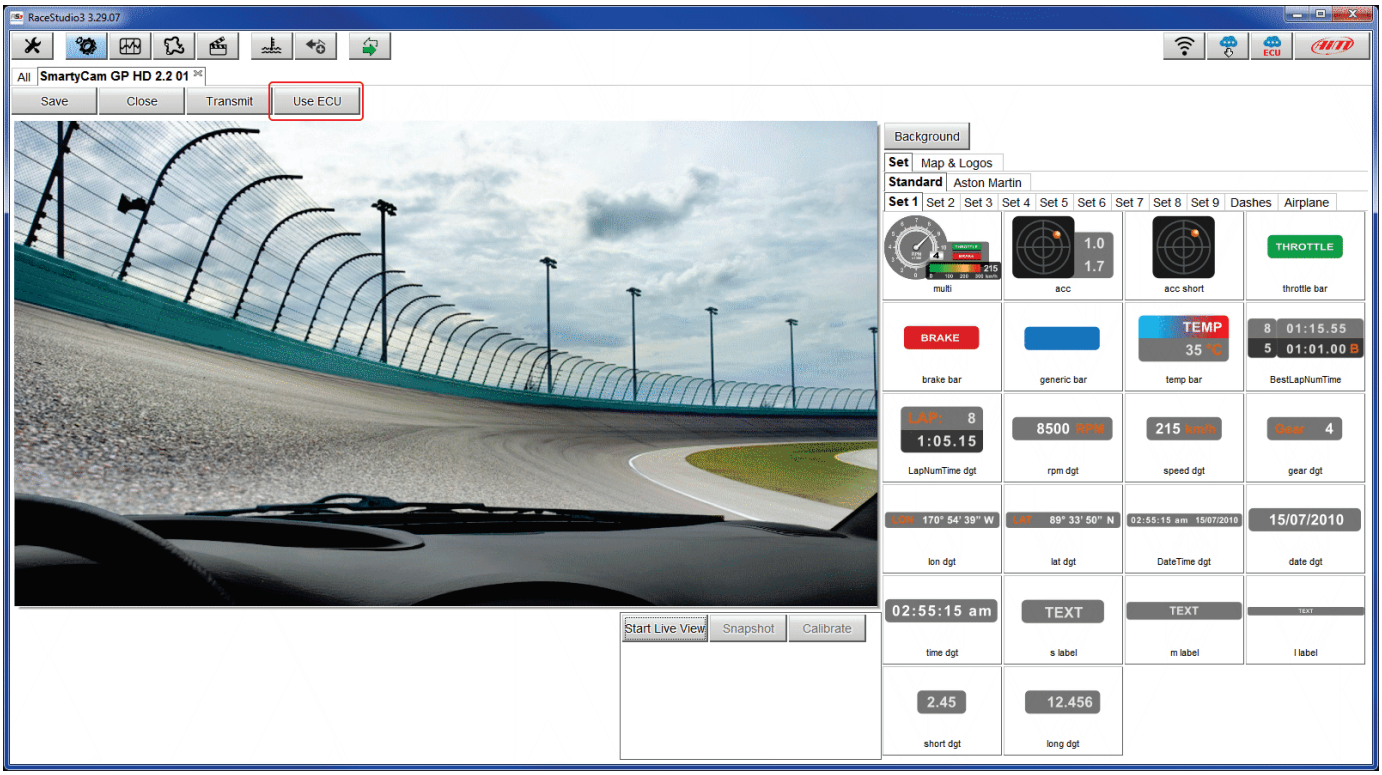
To load the ECU in SmartyCam GP HD Rev 2.2 configuration, set its channels and choose the graphic items to be set on SmartyCam video Race Studio 3 software is needed.

- Run Race Studio 3 software
- select an existing configuration to modify it or press “NEW” to create a new one
- “New configuration” panel appears
- select “SmartyCam GP HD Rev. 2.2”
- SmartyCam GP HD Rev. 2.2 configuration panel appears: fill in configuration name and press OK

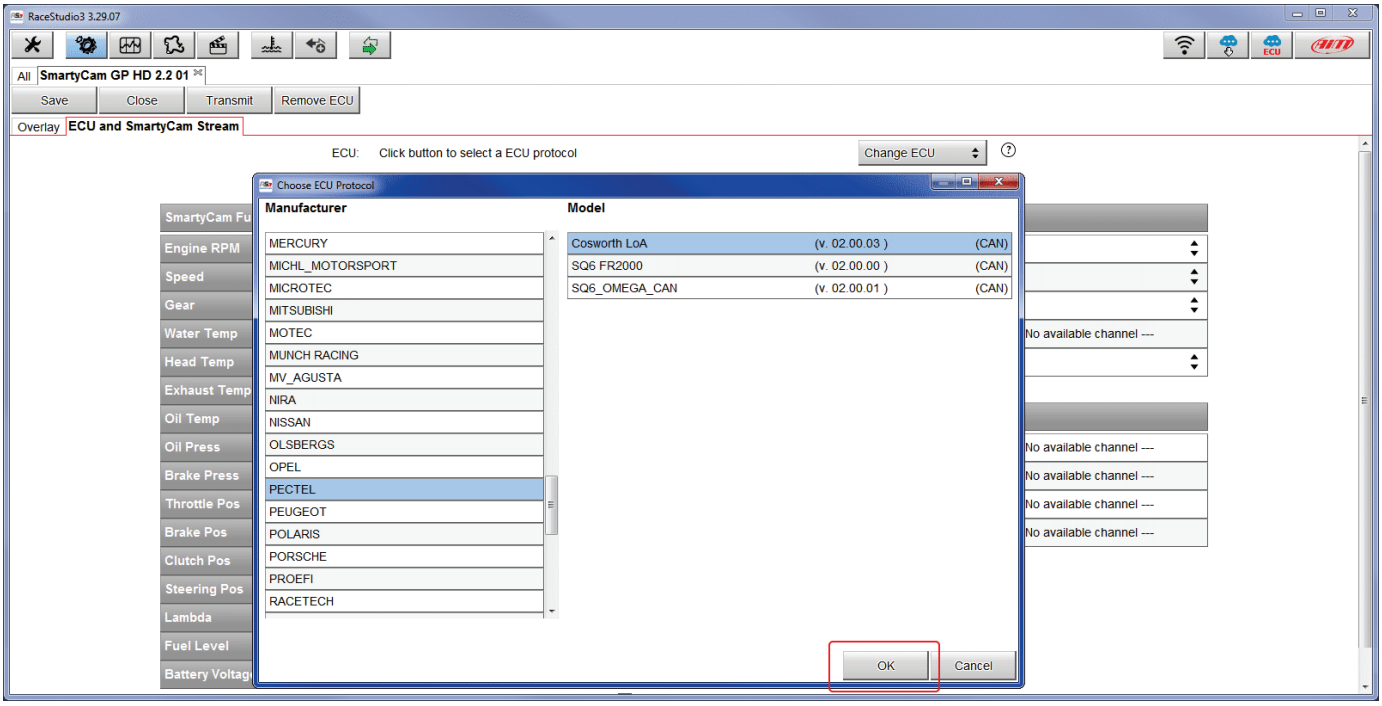


7.1.1 – Loading an ECU in SmartyCam GP HD Rev 2.2 configuration

Once the configuration created the software opens SmartyCam GP HD Rev. 2.2 Overlay layer. To set the vehicle ECU press “Use ECU”.



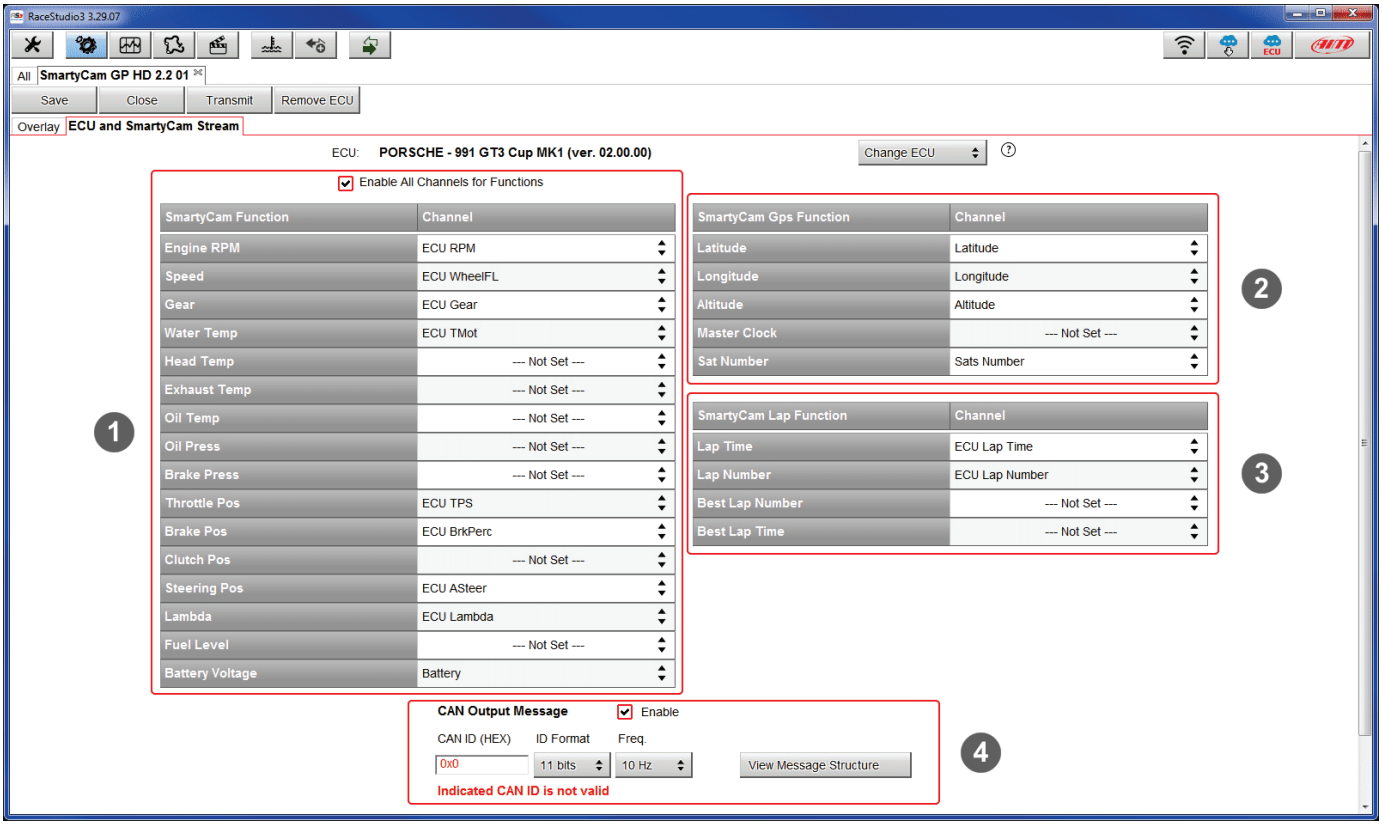
“Choose ECU Protocol” panel shows up: select ECU Manufacturer and Model (Pectel/Cosworth LoA here below) and press “OK”.



"ECU and SmartyCam Stream " layer shows:

- "SmartyCam function" panel (**1**) All channels that can be shown on SmartyCam video. Each function can be matched to the corresponding channel. If for any reason the desired channel is not found enable "Enable all channels for function" checkbox and all channels will be shown; **please note**: this setting applies to all panels of this layer
- SmartyCam GPS Function panel (**2**): if an optional GPS is connected it is possible to set GPS channels as well as the same channels coming from the ECU.
- SmartyCam Lap function panel (**3**): some ECU provides lap time information and if the ECU installed on the vehicle gives this information it is possible to show them on SmartyCam video.

- SmartyCam GP HD Rev 2.2 can send message to the CAN network (**4**) enabling the related checkbox; this CAN message contains some configurable parameters; to see its structure press "View Message structure" button; **please note: this is a function for expert users only.**



7.1.2 – Configuring SmartyCam GP HD Rev 2.2 overlay

"Overlay" layer shows

On the left of the page (**1**) a preview window shows how the video would be with all graphic items set on it.

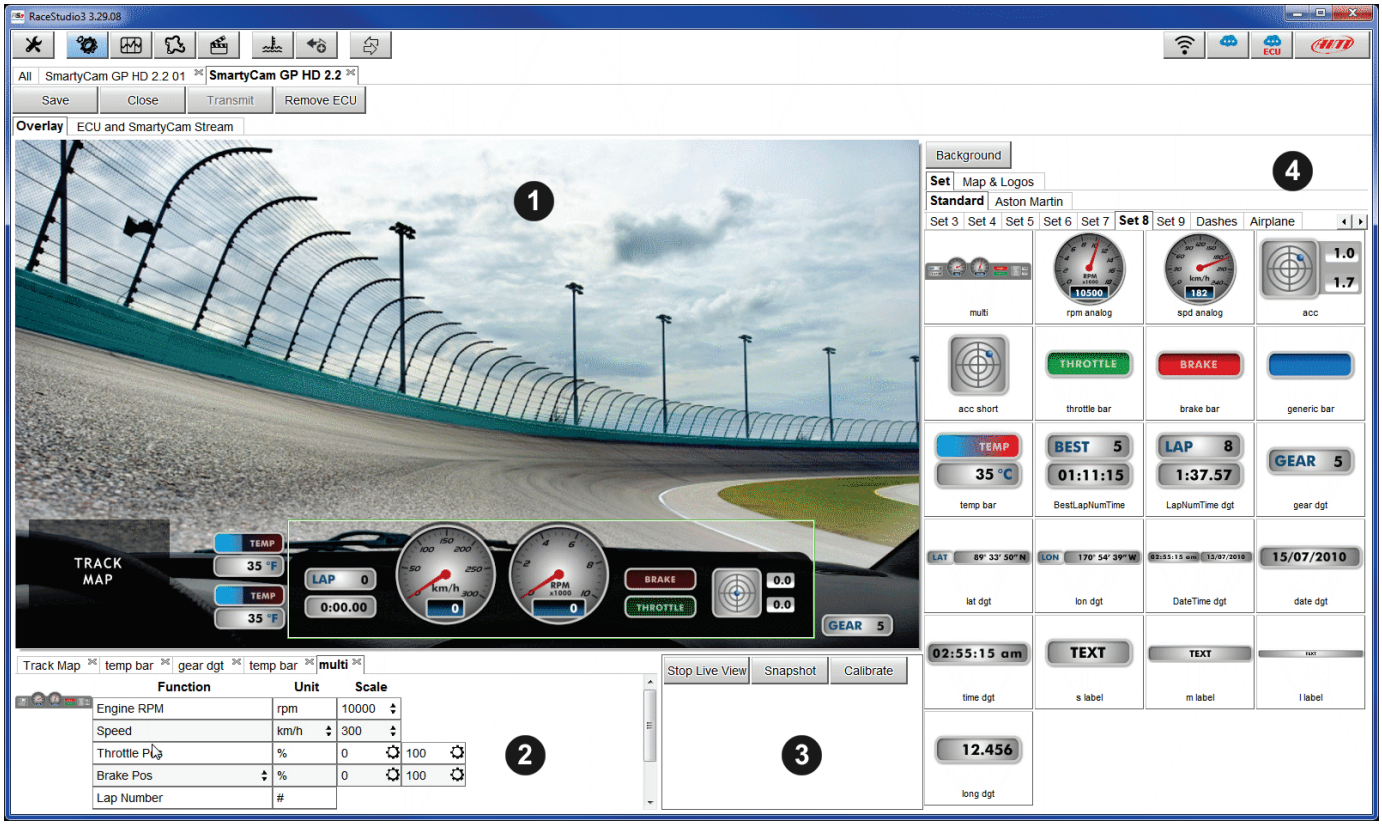
On the right of the page (**2**) are two layers:

- "Set" where all available graphic items are grouped by sets: just drag and drop them in the preview window (1) left of the page
- "Maps & Logos" where track box and all available logos are grouped; to add a new logo press "Add new logo" button in this layer, while to add the map or a logo to SmartyCam video drag and drop it in the preview window (1)

When all controls are placed on the preview window (1) the related control panel appears left bottom the preview window (**2**) to set all parameters.
The box right of the control panel (**3**) allows, pressing the related buttons, to:

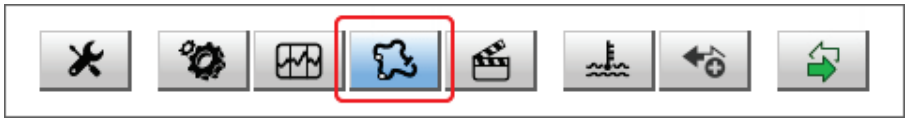
- start/stop Live view of SmartyCam GP HD Rev. 2.2
- take a snapshot of the screen
- calibrate SmartyCam GP HD Rev. 2.2 accelerometer

Once all graphic items placed press "Transmit" button on the top left keyboard and the configuration is transmitted to SmartyCam GP HD Rev. 2.2.
Please note: if using SmartyCam GP HD Rev. 2.2 in slave mode **remember** to match channels received by AiM logger with channels shown by SmartyCam GP HD Rev. 2.2 overlay as explained in any AiM logger user manual.



7.2 – Track Management

Track Manager is the Race Studio 3 section dedicated to tracks management. Here is possible to create and delete new tracks, modify the settings, transmit and receive them to/from the AiM devices. To access, press the "Tracks" icon on Race Studio 3 top left keyboard.



The main page is divided in three columns: on the **Left**:

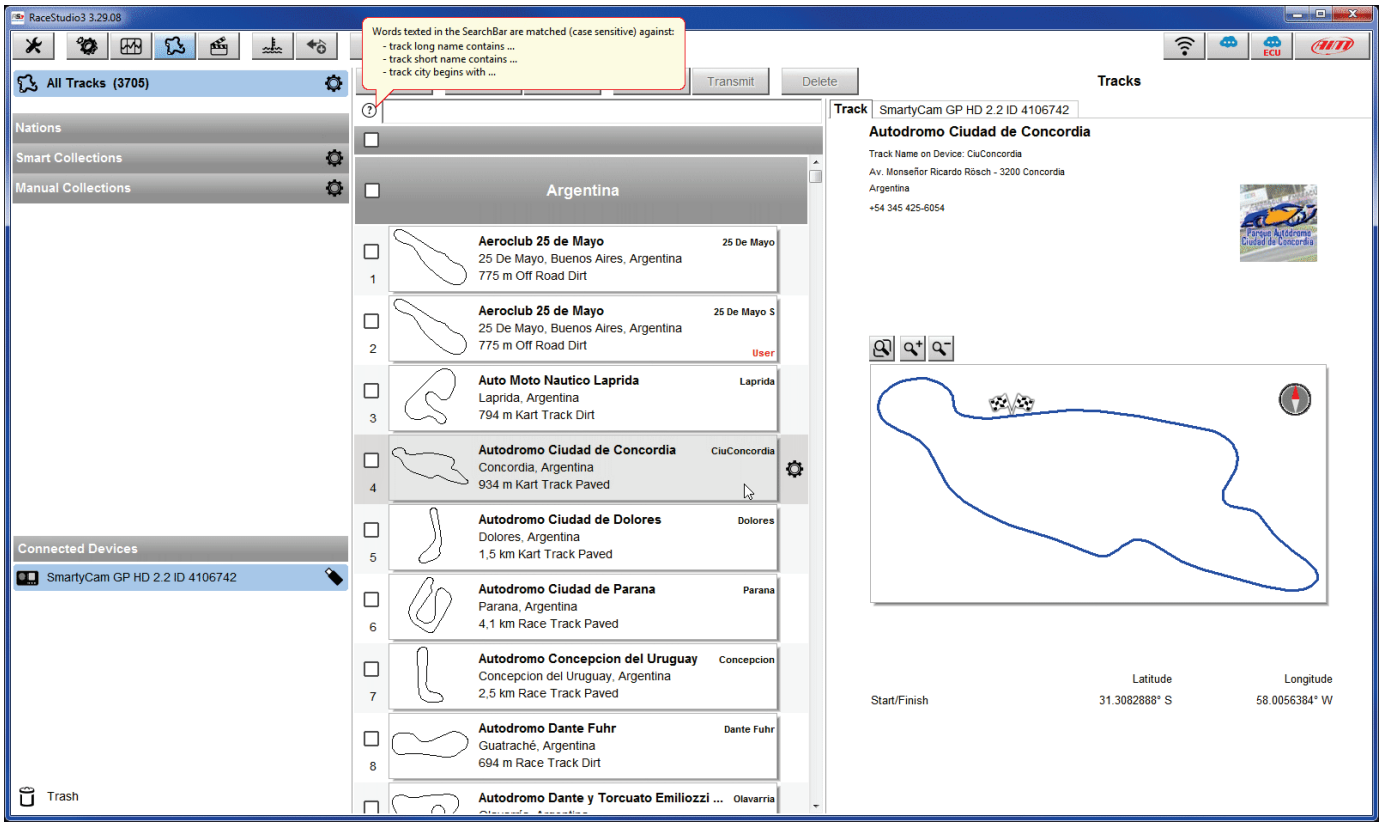
- on top, the filters that allow to collect many tracks following customized criteria; by default all tracks are shown (light blue "All Tracks (3705)" filter in the image below).
- bottom left, the connected devices (in the image, "SmartyCam GP HD Rev. 2.2 ID 4106742")

The column **in the middle** shows:

- on top a fast search bar, that allows to select the tracks which satisfy personal research criteria; pressing "?" a pop-up window explains research criteria (highlighted in red below); to say:
  - long name is the name in bold in each track box
  - short name is the track name shown top right of each track box
  - track city is the name of the city the track is located in
- all the tracks listed in Race Studio 3 database. It automatically updates at start up if a connection to the Internet is available.

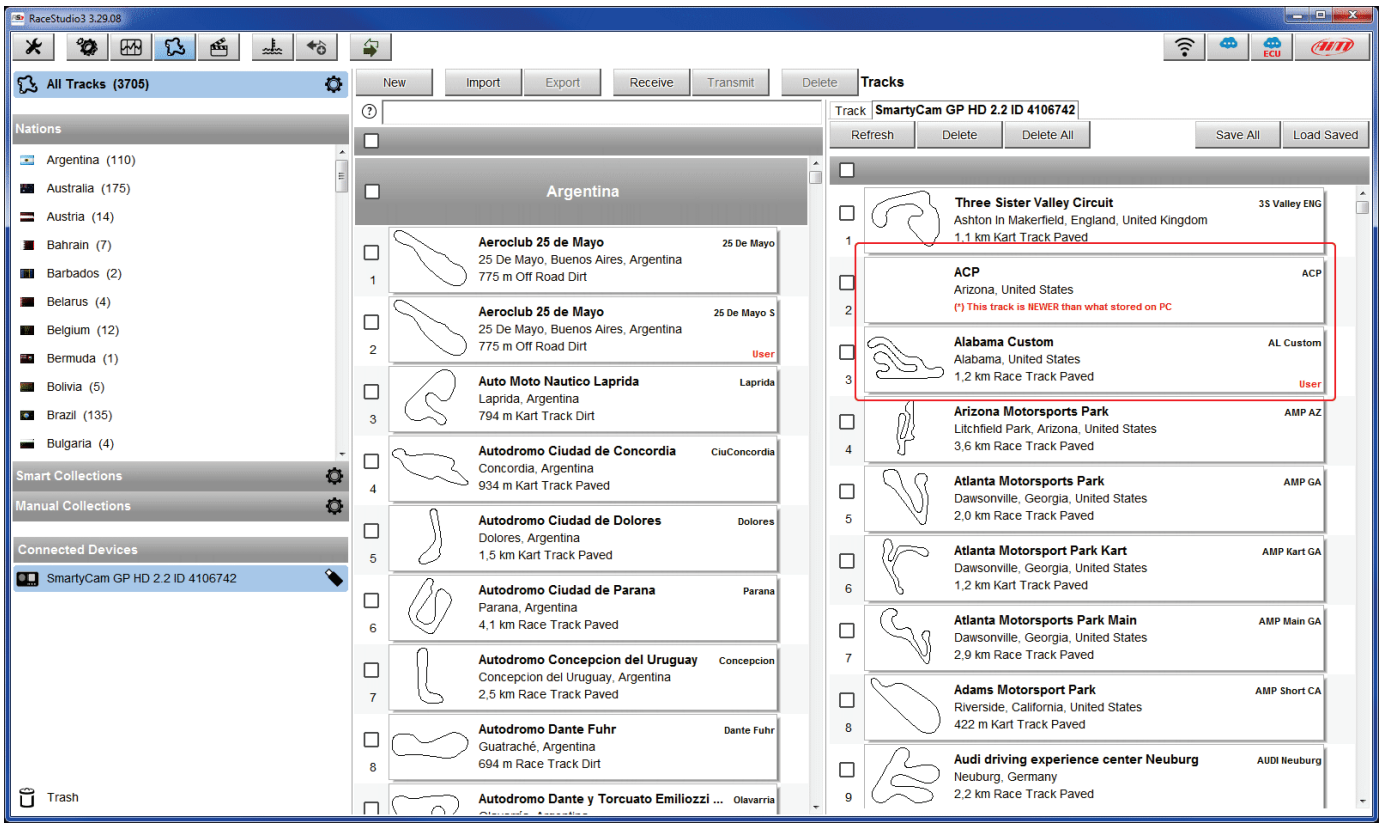
The column on the **Right** shows:

- the data sheet of the track you are mousing over.



When SmartyCam GP HD Rev. 2.2 is connected it is shown on the left bottom part of the page as said before. Clicking on it all the tracks it contains are shown in the right column of the page.

Tracks created by the user are labelled “User” and if the track stored in SmartyCam GP HD Rev 2.2 is different from the one stored on AiM database this is notified as shown here below.



The page keyboards are used to manage the tracks.

The keyboard above the central column allows to:

- **New**: create a new track
- **Import**: import one or more tracks stored in SmartyCam GP HD Rev. 2.2 or on another external device
- **Export**: export one or more tracks to a specific PC folder or to another peripheral device
- **Receive:** receive from SmartyCam GP HD Rev. 2.2 the tracks created by the user (if no device is connected the button is disabled)
- **Transmit:** transmit one or more tracks from the PC to SmartyCam GP HD Rev. 2.2 (if no device is connected the button is disabled)
- **Delete:** delete one or more tracks from Race Studio 3 Database

The keyboard you find above the right column allows to:

- **Refresh**: refresh the track list stored in SmartyCam GP HD Rev. 2.2
- **Delete**: delete one or more tracks from SmartyCam GP HD Rev. 2.2 memory
- **Delete All**: delete all tracks stored in SmartyCam GP HD Rev. 2.2 memory
- **Save all**: save all the tracks stored in SmartyCam GP HD Rev. 2.2; it creates a zip file that can be loaded to another AiM device
- **Load Saved**: load the tracks previously saved in SmartyCam GP HD Rev. 2.2 memory

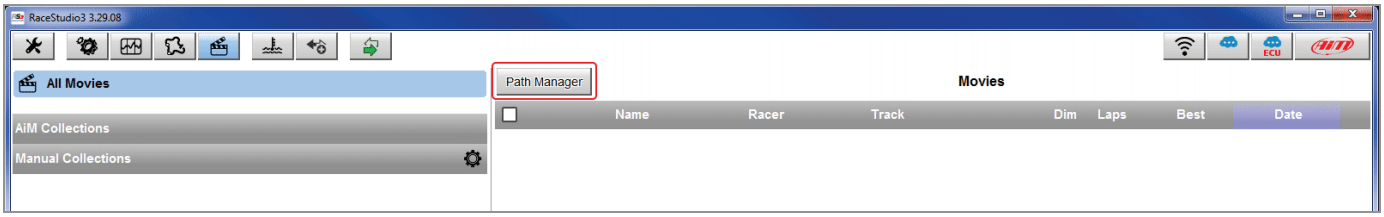
Please note: for further information about Race Studio 3 Track Management visit www.aim-sportline.com documentation area, software/firmware section where a Track Manager manual is available.

7.3 – Video Management

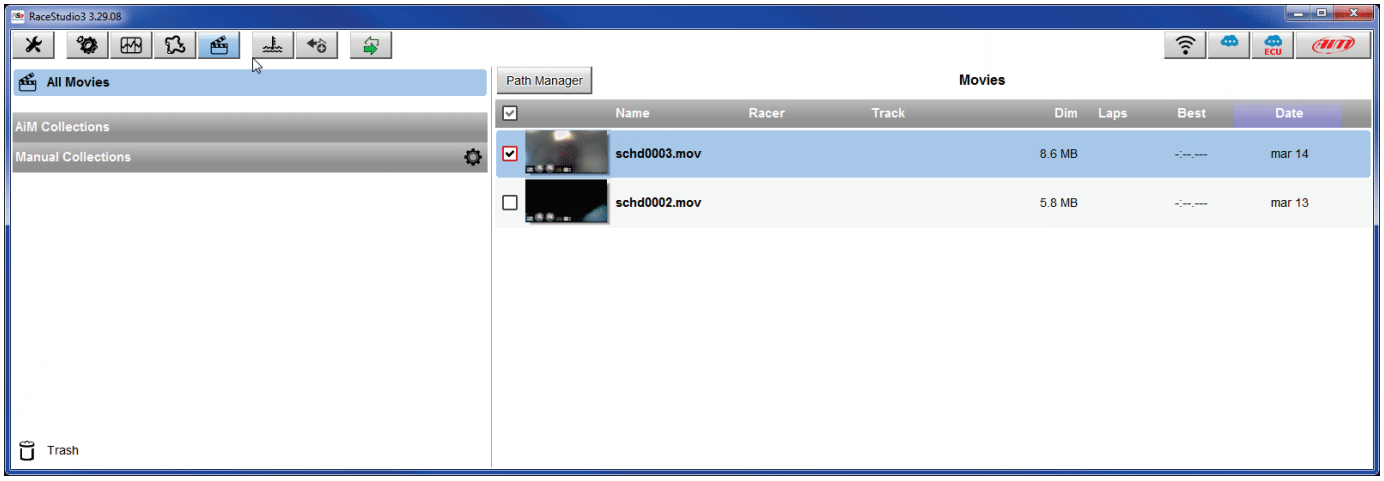
Once a track session is over it is possible to review SmartyCam GP HD Rev. 2.2 video on a PC. They are recorded in ".mov" format with H264 compression codec. To view them on your PC:

- remove SD card from SmartyCam GP HD Rev. 2.2
- place it in the PC SD Card slot and manage it as an USB peripheral
- press "Video" button on Race Studio 3 top left keyboard

In the page that shows up press "Path Manager" button and browse the PC to find the SD Card and load SmartyCam GP HD Rev. 2.2 Videos.

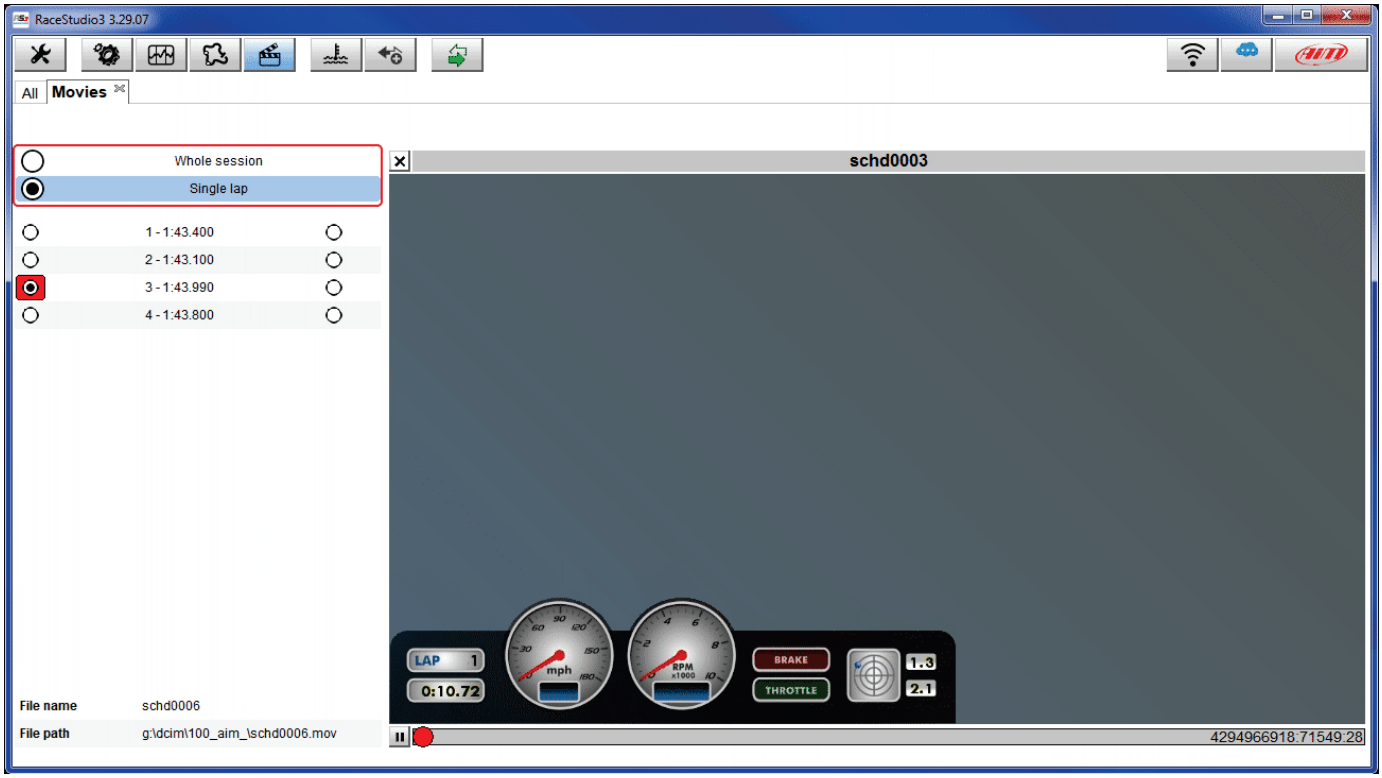


Video page shows up: select the video to see.



Once the video opens it is possible to decide to see:

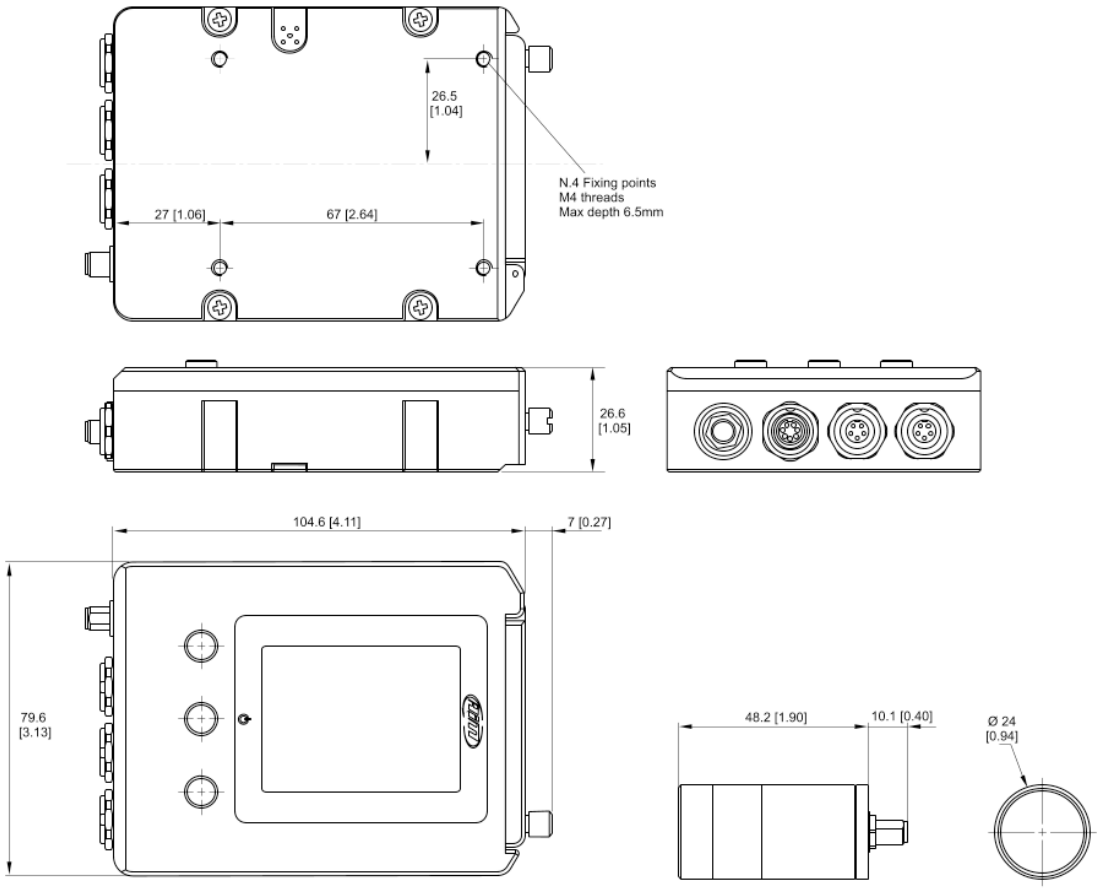
- whole session or
- one single lap as in the example below and select the lap to see.



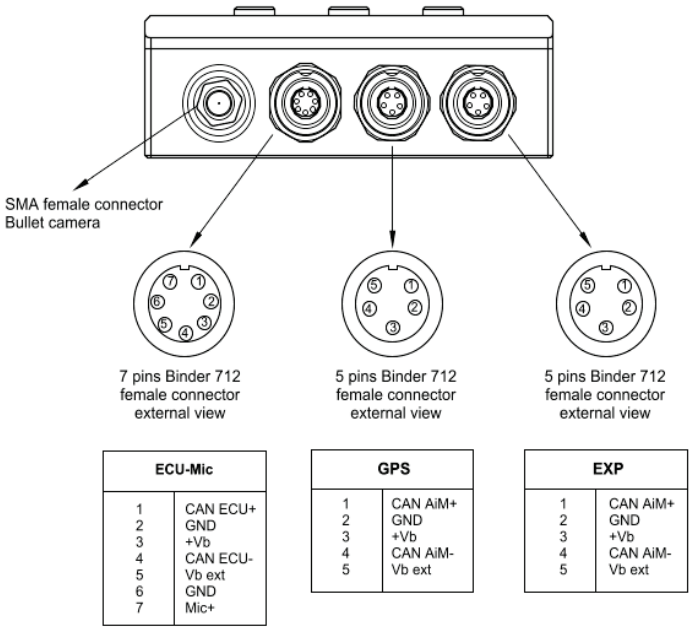
8 – Technical specifications and drawings

Video format	H264 – 1280x720 pixels at 30 fps
Display resolution	2.4" 240x320 pixels
Lens	Telecentric with 6 elements
Field of view	67° – 84°
Internal battery	Rechargeable lithium battery 1.500 mA
Battery charge	700 mA – 12V
Internal battery duration	60-70 min of recording
External power	9-15V
Support SD Card	up to 128 Gb – not included
Memory required	1.5 GB (one hour low quality recording) 2 GB (one hour medium quality recording) 4 GB (one hour high quality recording)
Accelerometer	three-axial accelerometer +/-5 G
Working temperature range	-10°C/+60°C
Auto power ON/OFF	Yes if connected to AiM logger
Auto power OFF	Yes
Auto Start/Stop recording	Yes
Body	Anodized aluminium
Dimensions	Recording unit 104.6x79.6x26.6mm Bullet camera: 24 diameterx48.2 mm
Bullet cable length	2.0m
Weight	recording unit 320g battery included bullet camera 45g
Waterproof	IP67

SmartyCam GP HD Rev 2.2 dimension in mm [inches]



SmartyCam GP HD Rev 2.2 pinout



ECU-Mic	
1	CAN ECU+
2	GND
3	+Vb
4	CAN ECU-
5	Vb ext
6	GND
7	Mic+

GPS	
1	CAN AiM+
2	GND
3	+Vb
4	CAN AiM-
5	Vb ext

EXP	
1	CAN AiM+
2	GND
3	+Vb
4	CAN AiM-
5	Vb ext