CAN Data

CAN Data reception – SmartyCam 3

Question:
How can I allow SmartyCam 3 to receive GPS data provided via a CAN protocol, such as lap time or GPS coordinates, to display in their overlays?

Answer:
The SmartyCam 3 (Corsa, GP and Dual) can integrate some essential parameters, generated by third-party devices, such as GPS coordinates, lap times, clock synchronization and GPS speed, to provide overlay indications while not having an AiM GPS.
To do this, it is necessary to follow some specific configuration criteria indicated below.

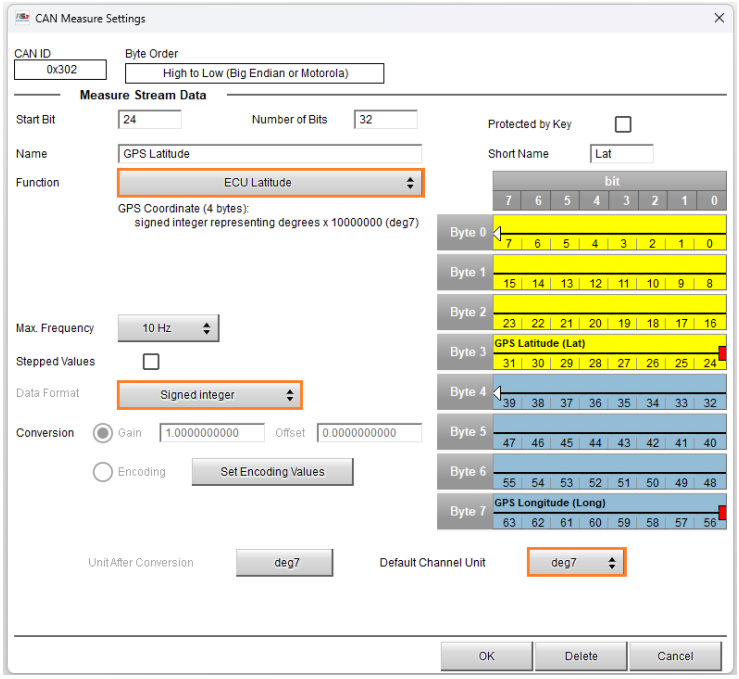
- **GPS coordinates:** To allow SmartyCam 3 to display GPS coordinates received via CAN, you must submit the information following the criteria listed below:
    - The information must be transmitted as **DWORD (32bit)**
    - The data must be expressed as **degrees 10e-7**, that is, degrees up to the seventh decimal place (e.g.: 120.5984799° -> 1205984799)
    - The West and South coordinates, i.e. with a negative sign, must be expressed as a **complement to 2**.
    - The function to choose is **"ECU Latitude"** or **"ECU Longitude"**
    - Endianness, arbitration ID and byte placement are free

For example, a coordinate expressed in sexagesimal degrees (e.g.: 120° 35' 91') must be converted to decimal degrees (120.5984779) and subsequently multiplied by 10,000,000 (1205984779), in order to be able to send it via CAN as 0x47E1D1E1F.

In case of negative coordinates, since the sign must be expressed as a 2's complement, the opposite coordinate to the previous example, therefore -120.5984799 deg will be sent as 0xB81E21E1, that is, as a 2's complement of the value expressed above (0x47E1D1E1F).

CAN Data

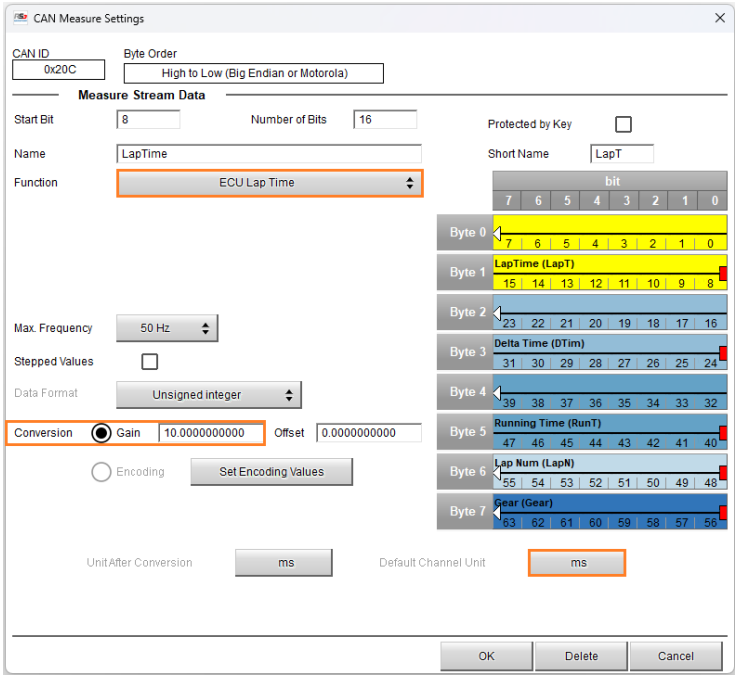
From the CAN channel setup screen, check that the Data Format field appears as "Signed" (image below; orange box).



CAN Data

- **Lap times:** To correctly display information received via CAN from an ECU or third-party system, it must be sent following the criteria listed below:
    - The time shall be expressed in **thousandths of a second (ms)**
    - It is recommended to arrange the data on at least one **WORD (16bit)**
    - The function **"ECU Lap Time"** - **"ECU Best Lap Time"** - **"ECU Rolling time"** must be selected, depending on the information transmitted
    - Endianness, arbitration ID and byte placement are free

For example, a time of 6'11"13 will need to be converted to seconds (371.13 s), then to thousandths of a second (371130 ms) to be transmitted via CAN as 0x7BE1. If the control unit transmits the channel in hundredths of a second, the conversion can be used by multiplying x10 as shown in the image below.

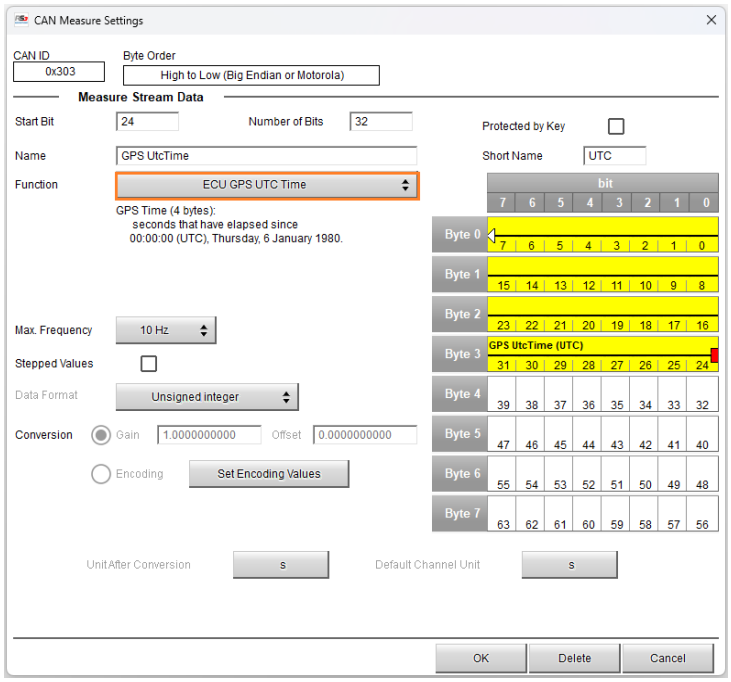


- **Master Clock:** in general, the internal date and time of SmartyCams are updated by connecting an AiM GPS module. In the absence of such a module, this synchronization can be managed through

CAN Data

a specific channel received via CAN bus and which must be structured following the criteria listed below:

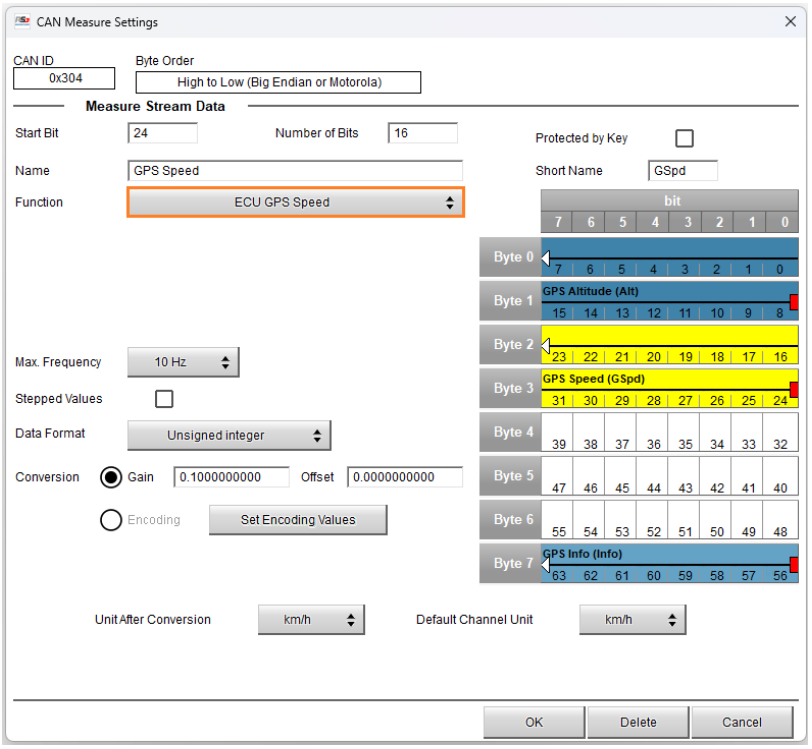
- The Master Clock shall be expressed in **GPS UTC Time** (seconds elapsed since 1/1/1980)
- The information must be sent as **DWORD (32bit)**
- The function to be selected will be "ECU GPS UTC Time"
- Endianness, arbitration ID and byte placement are free



CAN Data

- **Vehicle speed:** in general, the speed is calculated by the AiM GPS module. In the absence of such a module, this channel can be received via CAN and must have the criteria listed below:

    - The function to be selected will be **"ECU GPS Speed"**
    - Endianness, arbitration ID, byte placement and unit of measurement, are free



CAN Data

For automatic track recognition (previous successfully loaded on the device via RaceStudio3 software) and circuit position, you must receive the following GPS channels via CAN, configured with the indicated functions:

- GPS Latitude
- GPS Longitude
- GPS Vehicle speed

GPS ECU Latitude
GPS ECU Longitude
GPS ECU Speed

Below is a table with all the GPS channel functions compatible with SmartyCam 3:

GPS Channels	Function	Unit
GPS UTC Time	Time - ECU GPS UTC Time	s
GPS UNIX Time	Time - ECU GPS UNIX Time	s
Vehicle Speed	SPEED - ECU GPS SPEED	km/h
GPS Latitude	Coordinate – ECU Latitude	Deg[7]
GPS Longitude	Coordinate – ECU Longitude	Deg[7]
GPS Altitude	Coordinate – ECU Altitude	m

Function table for Lap Time channels:

Lap time channels	Function	Unit
Lap Time	Time - ECU LAP Time	ms
Lap Number	Number - ECU Lap Number	ms
Best lap Time	Time - ECU Best Time	ms
Rolling Time	Time - ECU Lap Time	ms

CAN Data

If you are using a protocol released on RaceStudio3, owned by AiM, and want to integrate additional CAN information or a third-party external GPS module into the protocol, you can use the **"Merge"** feature; this feature allows the user to add additional channels, provided that no IDs already present in the existing protocol on RaceStudio3 are used..