CDS GPS-2 (Gen 2) INSTRUCTIONS

The *GPS-2* generates an end-of-lap signal which takes the place of the Receiver and Trackside Beacon. It also generates a SPEED signal that can be used either as the primary source for SPEED/DISTANCE data or as a supplement to actual wheel rpm sensors.

The GPS-2 offers improved sensitivity (which results in better quality SPEED data) and uses a much smaller antenna than the original CDS GPS.

Install GPS-2

GPS Controller Install

Install the controller in a position where the driver can reach it while belted in. Ideally, install it such that the driver can see the 2 LEDs as well.

- The Button is used to set the start finish line (the "virtual" beacon location)

- The LEDs display the GPS system state. (see the operation section)

You can use some of the supplied dual-lock material to mount the controller, or use silicone or double sided tape. DO NOT remove the cover or drill holes in the controller box.

Connections

The GPS-2 has 1 or 2 system connectors and 1 antenna connector.

GPS-2-5: (2 system connectors)

- Connect the connector labeled SPEED to the RPM channel cable you wish to assign it to. If you are adding GPS-2 to an existing system, this will usually be the existing WHEEL_R cable.

  ➢ IMPORTANT: The RPM cable you connect to MUST have the 5 Volt pin wired since the GPS-2 gets its power from this connection.

- Connect the connector labeled LAP to your system cable labeled TO PHOTO RECEIVER or TO GPS LAP.

GPS-2-8: (1 system connector)

- If you have a new system that you purchased with the GPS-2 option, you will have a single 8 socket connector on your system harness that is labeled TO GPS2 CONTROLLER. Connect it to the 8 pin connector on the GPS-2 controller. This cable carries both the SPEED and LAP signals.

GPS Antenna Install

The antenna needs a clear view of the sky to work properly. The better its view of the sky the better it will work. It does not need to be perfectly level or flat. Do not mount it on a panel that vibrates or buzzes excessively. Try to provide a solid base for it.

- On cars with roofs, mount the sensor on the roof as far forward as possible.

- On formula and sports racers, locate the antenna on the cowling in front of the driver or in a location further forward.

  ➢ You MUST keep the antenna and its wire at least 12" away from radios, antennas, and their wires.
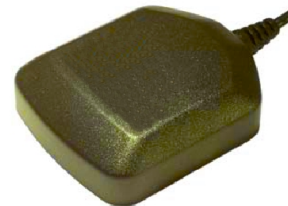
➢ You MUST keep the antenna and its wire at least 12" away from ignition components and their wires.

➢ We <u>do not recommend</u> that you mount the antenna behind a windshield or rear window. All glass will reduce the GPS signal quality somewhat, and the glass in some of the newer European cars will block the signal completely.

➢ We do not recommend that you mount the antenna any further rearward than the steering wheel of the car.

Antenna Mount Method

Use <u>any</u> of the following methods to secure the antenna:

• On cars with steel roofs, use the strong magnet that is built in to the antenna

• Use the supplied piece of dual-lock material

• Use silicone or another suitable adhesive to hold the antenna to a flat surface

Route, connect, and secure the Antenna cable

Route the cable to the GPS Controller, plug it into the antenna connection, and secure the nut finger tight only. Do not use a wrench or pliers on the connector.

➢ **IMPORTANT:** Do not over tighten any wire ties used to secure the antenna cable. The cable is somewhat fragile and if you crank down on wire ties such that you deform the cable you will ruin it.

➢ You **MUST** keep the antenna cable at least 12" away from ignition components, radio components, and their wires.

Checkout of GPS

Position your car outside such that the antenna has a clear view of the sky. Power up your system.

• The STATUS LED should glow red

After about 1 to 2 minutes the STATUS LED should start blinking. This indicates that the controller is receiving a very good quality 3-D fix. If it does not start blinking after 2 minutes, check all the connections and make sure your antenna has a clear view of the sky.

• IF your view of the sky is partially blocked (if you are right next to a building for example) it could take as long as 4-5 minutes to acquire a good fix.

• Once the STATUS LED is blinking, Press the button. The LAP LED should come on, and if you are not moving, it should stay on. Pressing this button sets the "virtual beacon" location.

  • There is no way for the user to "clear" the "virtual beacon location". The location is re-set whenever you press the button, and the newest location is the only one used by the system.

If all of the above steps check out, you done checking out the GPS System.

Configure your system for GPS

The GPS Speed can be used as the primary speed source or as a supplemental speed signal in your system.

Deciding how to use the GPS Speed data

In most cases it is best to use the GPS Speed as the primary speed source so that the Performance Monitor and the map and distance plotting in Track Master benefit from the increased accuracy.

- The only exception to this would be if you are having difficulty getting GPS reception and experiencing dropouts in the GPS Speed data. This might occur on city street circuits with tunnels or between tall buildings

- If you experience dropouts in the GPS speed data, switch to a WHEEL RPM sensor for your primary speed, and use the GPS speed as supplemental Speed data.

Configure GPS as Primary Speed Source

Edit your CAR file using Command Link (Commander 2 users) or edit your Co Pilot 2 Config file using CDS Link (Co Pilot 2+ users).

- Edit the SIGNAL NAME for the RPM Channel that the GPS is connected to. Name it WHEEL_R.

- Edit the Sensor Calibration for WHEEL_R and set it to **3** Pulses per revolution.

- Edit your Tire Rollout and set it to exactly **34.60**

Now go to the *Gearing* tab in your editor. Because the scaling on the WHEEL_R signal that the GPS produces is generic and universal, a little fudging is required for all the Gearing stuff to work right as follows:

1) Measure the circumference (rollout) of your DRIVEN wheel.

2) Divide 34.60 by the rollout you measure.

3) Multiply your ACTUAL final drive ratio by the number calculated in step 2.

4) Enter this value for your Final ratio in the Gearing tab.

FOR EXAMPLE:

1) Measured rollout = 79.5"

2) Divide 34.60 / 79.5 = .4352

3) Actual final drive = 3.444 so   .4352 x 3.444 = 1.499

4) So you enter 1.499 as the "fudged" final drive ratio.

Configure GPS As Supplemental Speed Signal

NOTE: If you use the GPS as a supplemental speed signal then you MUST have another channel named WHEEL_R as your primary SPEED source.

Edit your CAR file using Command Link (Commander 2 users) edit your Co Pilot 2 Config file using CDS Link (Co Pilot 2+ users).

- Edit the SIGNAL NAME for the RPM Channel that the GPS is connected to. Name it GPS_SPEED.

- If GPS_SPEED is not in your list of signals, type it in

- Edit the Sensor Calibration for GPS_SPEED and set it to **3** Pulses per revolution.

- Now go to the Signal Plotting and Scaling Properties tab in your editor. Edit the Multiplier for GPS_SPEED. Set it to exactly .03277 (If GPS_SPEED is not in your list of signals, click the Add.. button and select it.)

GPS Operation

The GPS will provide a speed signal as long as you are moving faster than about 5 MPH. Below 5 MPH it will send a signal equivalent to 0 MPH.

Setting the "Virtual Beacon" Location

The "Virtual Beacon" location is set by pressing (and releasing) the button while the car is moving. The instant you press the button the Location AND Direction of travel are saved in flash memory in the GPS Controller.

> **IMPORTANT! The GPS Status light must be blinking (indicating good fix) when you press the button. If you power up your system and immediately drive down pit lane and press the button chances are you will not achieve a fix before you press the button. In this case you will not successfully set the virtual beacon location and thus not receive lap times.**

- **NOTE:** Press the button **FIRMLY** to set the "Virtual Beacon" Location.

- **IMPORTANT:** Once you set the location, you can not re-set it for a period of 10 seconds, so if you press it a too early on your "out" lap you will most likely need to drive a full lap and come back around before you can re-set the location.

- When you press the button the LAP LED illuminates.

Choosing your "Virtual Beacon" Location

When you set the location the controller creates a "virtual" Start-Finish line in its memory. This line extends approximately 200 feet in either direction from the location you set. Whenever you cross this line AND are traveling in the same direction as when you pressed the button then an end-of-lap signal is generated. Here are some rules for setting the location:

1) In general, the best location is at the track's official Start Finish line because it is an easy reference point to duplicate the next time you visit that track.

2) The location must be on a relatively straight section of track (the direction of travel of your car must not change more than +/- 20 degrees for a distance of 200 feet prior to the point where you press the button).

3) The location should not be under a bridge.

4) You must be moving at a rate of at least 10 MPH AND the GPS Status light must be blinking (indicating good fix) when you press the button.

Note that at some tracks you can set the location as you roll down pit lane.