

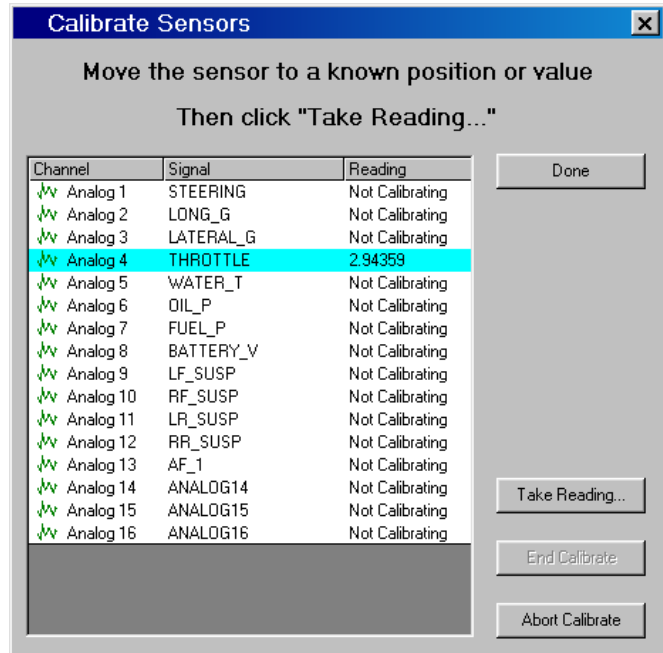
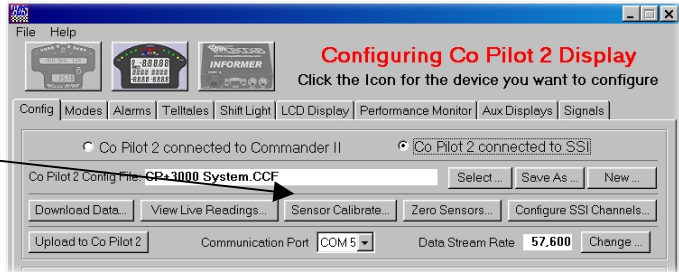
## Sensor Calibrate

Some sensors must be calibrated after installation. The 2 most common are THROTTLE and STEERING. We will do these 1 at a time.

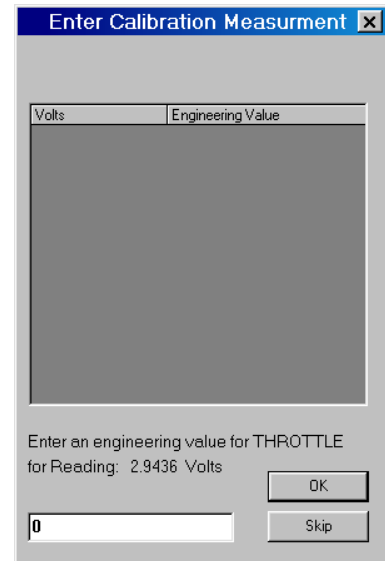
### Throttle Calibration

NOTE: if your system gets THROTTLE data from an ECU interface, there is generally no need to do a calibration. IF you do calibrate a signal that is coming from an ECU, then the ECU must be “on” and supplying data to the system. In most cars this means that the ignition switch must be ON.

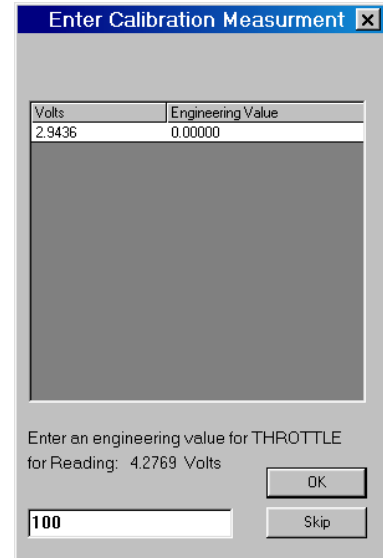
- Click *Sensor Calibrate...*
- The LCD on the *Co Pilot 2* should show the message “SEN CAL”
- Your PC Screen should show the *Calibrate Sensors* box:
- Click THROTTLE to start the calibration process.



1. Be sure that the THROTTLE is closed, THEN click *Take Reading*. You should see:
2. Enter “0” in the line. You are assigning a THROTTLE reading of 0% to the voltage reading from the sensor when the throttle is closed.
  - In this example the voltage reading at 0% THROTTLE is 2.9436 volts.
3. Click OK



4. Next, have someone hold the THROTTLE wide open. The voltage reading for THROTTLE in the *Calibrate Sensors* box should change.
  - (If it does not change, check the installation of the THROTTLE sensor. Verify that it is plugged into a cable labeled THROTTLE.)
5. Click *Take Reading*. You should see:
6. Enter “100” in the line. You are assigning a THROTTLE reading of 100% to the voltage reading from the sensor when the throttle is wide open.
  - In this example the voltage reading at 100% THROTTLE is 4.2769 volts.
7. Click *OK*



### Key Concept:

It should be clear that the calibration process involves the following steps:

1. Move the sensor to a known position or value (such as 0% or 100% THROTTLE)
  2. Take a sensor voltage reading (by clicking *Take Reading*)
  3. Enter the value for that voltage reading
  4. Repeat until done
- It is important to recognize that the process WILL NOT work if you transpose steps 1 and 2, i.e. hit *Take Reading* and then move the sensor.

### Steering Calibration

Accurate STEERING calibration is vitally important if you plan on using the HANDLING analysis in Track Master 2000 to its maximum potential. There are several methods for calibration of STEERING:

- BEST METHOD: Calibration with the car on turn plates (or other means of accurately measuring spindle angle)
- NEXT BEST: Use digital angle finder on steering wheel.
- LEAST PREFERRED: calibrate “by eye” with steering wheel at 0, -90 degrees (right) and 90 degrees (Left)

#### KEY POINTS for all methods:

- Enter POSITIVE numbers when you are turning the wheel LEFT
- Enter NEGATIVE numbers when turning the wheel RIGHT

#### Spindle Angle Method

Take readings as you did with the THROTTLE calibration.

- Calibrate in terms of “loaded wheel” spindle angle. This means that you take numbers LEFT turn plate when calibrating for right turns, and enter NEGATIVE degree numbers)

- Take numbers from RIGHT turn plate when calibrating for left turns, and enter POSITIVE degree numbers.
- Take readings every 2 degrees, going from –20 to 20 degrees for road race, –4 to 10 or so for circle track

### Digital Angle Finder On Steering Wheel Method

- Clamp a digital angle finder to the steering wheel, zero it with the steering wheel in the “straight ahead” position.
- Take readings at 10 degree increments going from –90 (right turns) to + 90 (left turns).

### “By Eye” Method

- calibrate “by eye”
- Take readings with steering wheel at –90 degrees (right), 0, and 90 degrees (Left)

## Suspension Sensors Calibration

Some people prefer to calibrate their suspension sensors in terms of actual wheel movement. This saves having to calculate a *Sensor Motion Ratio* (see the GEOMETRY Tab in previous chapter). If you choose to calibrate in terms of wheel movement, note the following;

- Enter POSITIVE, increasing values as you compress the suspension. For example, if you enter 0 at static ride height, enter 1 when the wheel is in 1” of bump, etc.
- Enter “1” for all of your *Sensor Motion Ratios* in the Geometry Tab.
- You must still measure and calculate a *Shock Motion Ratio* for all 4 shocks.

## Verify Calibrations

Go back into the *View Live* screen and move the THROTTLE and STEERING, verifying that the calibrations are correct.

# Zeroing Sensors

## General Rules

The final step in assuring that you will log accurate, usable data is to zero certain sensors. Here are some general rules:

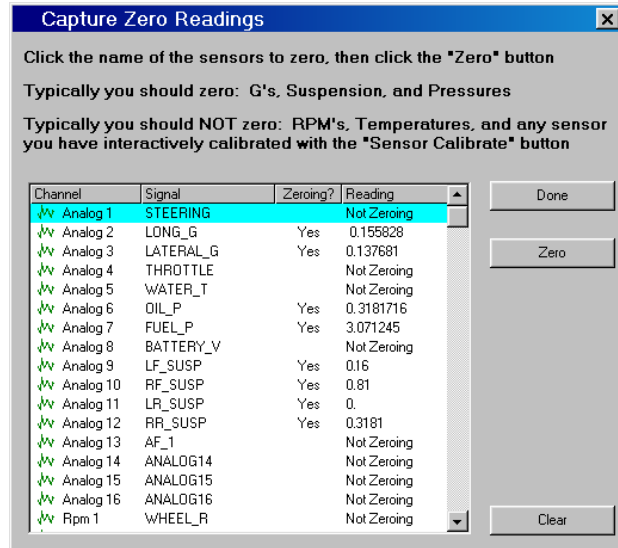
1. Get the car as close as possible to static, “as raced” condition when zeroing. This means:
  - All body work installed
  - ½ tank of fuel
  - Driver in the car
  - Car on a level, flat surface. (on a setup pad if possible)
  - Tires clean and inflated to operating pressure
2. Always zero G’s, pressures, suspension sensors
  - If you have fuel injection, be sure there is no residual pressure in the fuel system if you are zeroing FUEL\_P
3. There is no need to zero sensors that you have done an interactive calibration on. (such as THROTTLE and STEERING)
4. NEVER zero RPMs or Temperatures
5. Re-zero suspension whenever ride heights or other suspension settings are changed.

6. Re-zero any time a sensor has been disturbed. (Removed and re-installed after a crash for example)

## How to Zero

Have the car set as described above.  
Connect the PC. Start *CDS Link* and in the *Config* tab, click *Zero Sensors*.. You should see:

- Click on each of the signals you wish to zero.
- Click *Zero*
- You will see a confirmation message, then you will be put back into the *Config* Tab.



## Verify Zeros

Go back into the *View Live* screen. The signals that you zeroed should now display values that are very close to zero.

## Summary

Your system is now checked out, calibrated, and you are ready to log accurate, quality data. The next step is to do a “practice record” in the shop.