SPLIT SECOND

Tech Note

## Tips on Setting up Auxiliary Inputs in R4

Units that have the data acquisition option have four additional wires that can be used. Each wire can be connected to an analog signal that is within the range of zero to five volts. Take care to make sure that the input voltage range does not go above five volts. If it does, the operation of the calibrator may be compromised.

The four wires correspond to the auxiliary inputs A through D that are displayed and logged in the R4 software. The wire colors are assigned as follows:

- A. **ORANGE/BLACK**
- B. **ORANGE/YELLOW**
- C. **ORANGE/WHITE**
- D. **ORANGE/GREEN**

The readings on these inputs are displayed in the Real Time – All screen and are logged when you do a data recording. The default name for each channel is AUX A through AUX D. The resolution of the reading is 0.02V.

There are provisions to rename the auxiliary inputs and apply an offset and scale factor to the reading. This makes it possible to personalize the readings for a specific application. To access the area where this is done, go to the main screen for the R4 program. Click on the Options pull-down menu and Aux Input Settings.
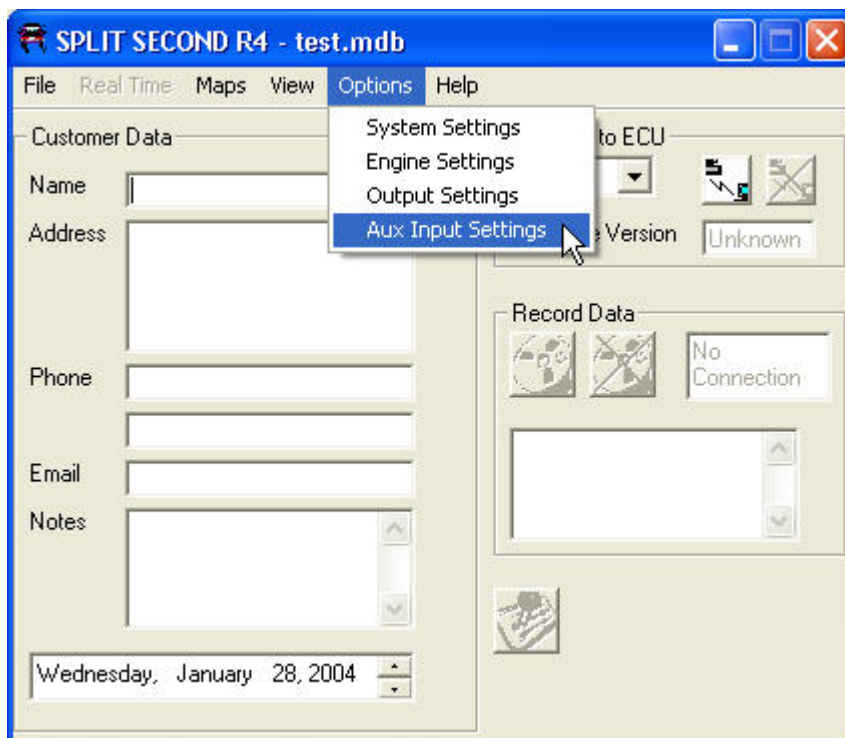
You will see a screen that has a label for each input.
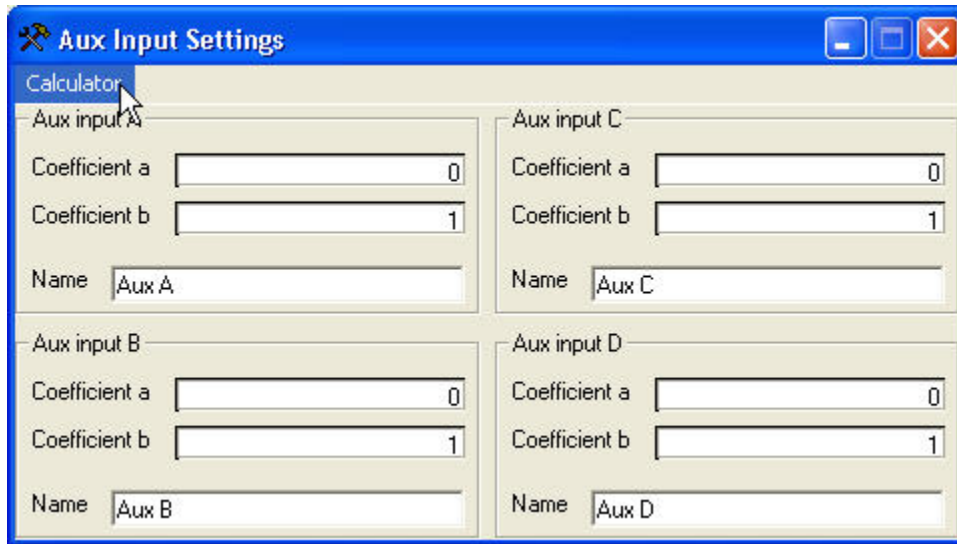
You can highlight and rename each input on this screen.

For each input there are two coefficients. Coefficient a is the offset and b is the gain. These values are used according to the formula $y = bx + a$ where x is the input voltage and y is the displayed value. The default value for coefficient a is zero. The value for coefficient a is the amount that is added to the reading. The default value for coefficient b is one. Coefficient b is the amount that is multiplied by the input. Using the default values an input voltage will be displayed directly as the actual value.
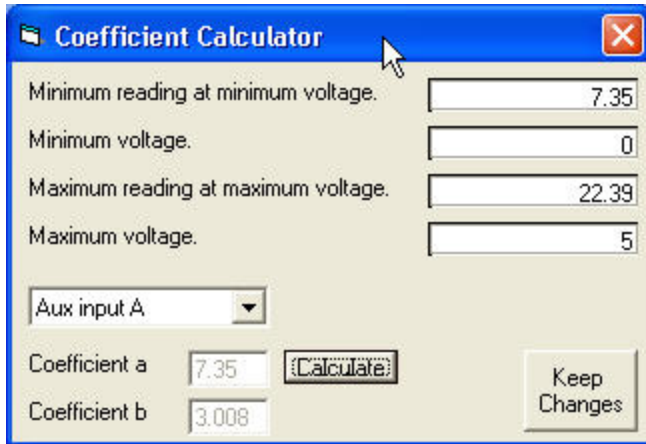
The values for coefficients a and b can be entered directly on the Aux Input Settings screen or the calculator function can be used to calculate coefficients a and b according to the minimum and maximum inputs and readings. The calculator is accessed by clicking on the word calculator as shown in the screen shot above.

Example

Coefficient Calculation for Displaying AFR from Innovate Motorsports LC-1

It is extremely useful when tuning to capture air/fuel ratio (AFR) along with RPM, pressure and cell value. This example shows how to set up Aux A to display AFR. In order to acquire the reading, the orange/black wire is connected to the brown wire coming from the Innovate Motorsports LC-1 Lambda Cable. The LC-1 generates a 0-5V output based on the AFR reading. This output is pre-programmed so that 0V corresponds to an AFR of 7.35 and 5V corresponds to an AFR of 22.39.
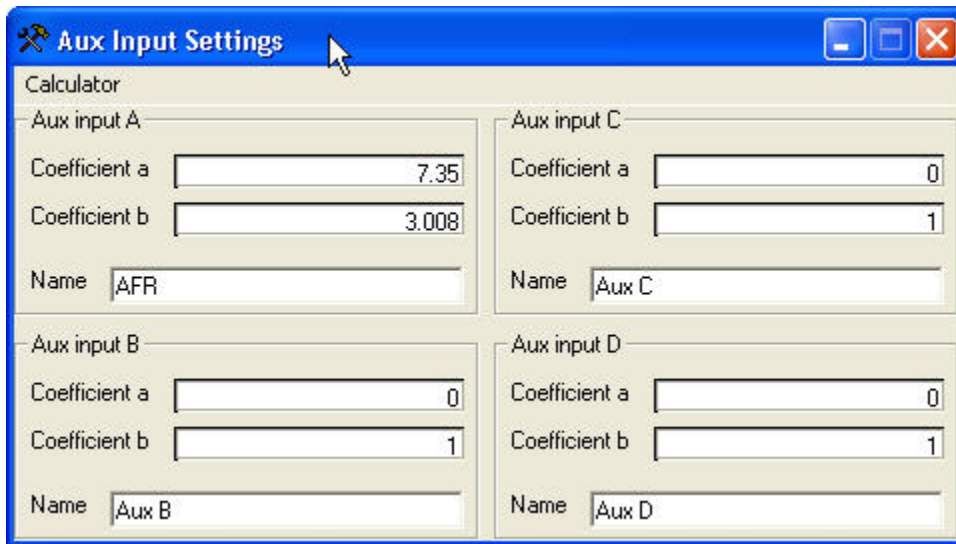
Click on the word Calculator on the Aux Input Settings screen to bring up the calculator screen.

This screen has been filled with the default values for the LC-1. The minimum reading is 7.35 at 0V and the maximum reading is 22.39 at 5V. Once these values are entered, click on the Calculate button. The calculated coefficients a and b appear in the lower left hand corner. Make sure that the desired input A through D is selected and click on the Keep Changes button. These coefficients will automatically be entered on the Aux Input Settings screen.

The label for Aux A has been changed to AFR so in the Real Time – All screen the true air/fuel reading will now appear labeled as AFR.