SPLIT SECOND

PSC1-002
Programmable Signal Calibrator

Description:

The PSC1-002 Programmable Signal Calibrator provides precise calibration of fuel by adjusting fuel control signals. It is designed specifically for 5V map sensor based engine management systems. It is used on engines that have been converted to forced induction. It has an internal 2 Bar MAP sensor that is used to replace the stock map sensor.

Through a serial interface, the PSC1-002 can be programmed by a laptop computer running the Split Second R4 engine management software for Windows. The software provides three dimensional mapping of the MAP signal. The MAP value output is determined by the active cell value. The active cell is determined by absolute pressure measured by the internal sensor and RPM.

The R4 software provides real time display of RPM, manifold pressure, and cell value. A variety of editing tools ease the task of setting up an initial map and quickly fine tuning for optimum performance.

Features:

- Operates as a programmable MAP sensor
- Two three-dimensional map tables defined by absolute pressure and RPM
- Compatible with 2 and 4 stroke engines from 1 to 12 cylinders
- Laptop adjustable
- Can be mounted in the engine compartment
- Internal MAP sensor
- Transient surge and battery reversal protection

Wire Assignments:

LABEL	CONNECT TO	WIRE COLOR
B+	Switched battery positive (+12V)	Red
B-	Signal common	Black
MAP OUT	ECU MAP input (in signal modify mode)	Violet
TACH	Tach signal (pulses per rev = #cyl/2)	Yellow/Black
F-DB9	Serial connector on computer	-

Typical Connection – Programmable MAP Sensor:
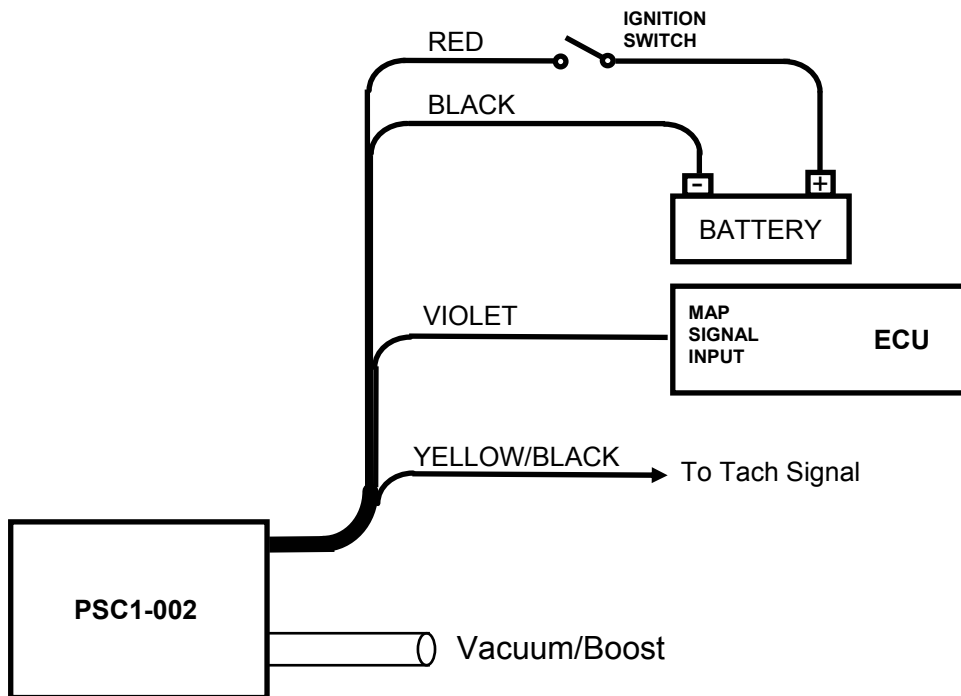
The signal from the internal 2 bar map sensor is offset according to cell value. The map sensor signal varies from 0 to 5V as the pressure varies from a deep vacuum to 14.7 PSI of boost. The offset is given by the formula:

Offset = (cell value – 10) / 4

The range of adjustment is +/- 2.5V. A cell value of 0 will subtract 2.5V from the signal. A cell value of 10.0 will not alter the signal. A cell value of 20.0 will add 2.5V to the signal. The starting map for this configuration is a map loaded with 10 in every cell.

Software:

The PSC1 is programmed with the R4 Fuel Controller Software. When the software is launched an identification screen will appear that says Split Second. After four seconds, the maim menu will appear. If this is a new application, select **File** then **New Customer** to create a new customer. Type in the customer name and save. The default location for customer names is My Documents.

When you return to the main screen, select **File** and **Open Customer** to open the customer file that you just created.   Once the customer is open, the **Maps**, **View**, **Options** and **Help** tabs become active.   Whenever you open a new file for the first time you must set the **System Settings** to match the hardware you are using.   You can fill in the various fields such as name, address etc. if you like.

Connections:

Connect the PSC1 to the computer using a USB to serial adapter cable. These cables require a software driver that must be properly installed on the computer. Select the proper com port for the serial adapter. The correct com port setting may be found under Ports in the Device Manager of the computer.

Remove the lid on the PSC1. Once the cable is plugged in and the PSC1 is powered up, you may connect to the PSC1 by selecting the Connect to ECU icon.   Once communication has been established with the ECU, the Real Time pull down becomes active.

Programming:

Refer to the R4 data sheet for specific information on how to use the R4 software. Use the **Options** pull down and **Systems Settings** option to select the Vacuum/Pressure Display Mode and Programmable Signal Calibrator. The Vacuum/Pressure display mode is the most commonly used. It provides a reading in the units of inHg in vacuum and psi in boost. The range is from -28.5 inHg to 16 psi.

The other usable Display Mode setting is Absolute Pressure. This setting uses units of psi only and is referenced to 0 psi at an absolute vacuum. Atmospheric pressure reads 14.7 psi and 16 psi of boost reads as 30.7 psi. The pressure readings are based on sea level conditions. As you move up in elevation and atmospheric pressure goes down, the pressure reading will decrease.

Use the **Options** pull down and **Engine Settings** to select the number of cylinders of the engine. The setting for number of cylinders depends on the signal used for the tach reading. If the signal pulses at the true-tach rate, the

actual number of cylinders should be used. If the signal pulses at a lower rate, a lower number of cylinders can be used to obtain the correct RPM reading.

Use the **Maps** pull down to access the fuel map tables. There are two map tables in the R4 program. The PSC1 uses table A. The active cell at any given time is determined by the MAP sensor reading and RPM.

The number entered into the cells on the map represent the amount that the input voltage is offset (signal modify mode). The number entered in the cell can range from 0.0 to 20.0. The step size is 25mV. Example outputs are shown on the following table.

This table shows the output voltage change for different cell values.   Note that there are 200 cell values. Only 20 are shown for simplicity.

Cell Value	Voltage Change
0	-2.5
1	-2.25
2	-2.0
3	-1.75
4	-1.5
5	-1.25
6	-1.0
7	-0.75
8	-0.5
9	-0.25
10	0.0
11	0.25
12	0.5
13	0.75
14	1.0
15	1.25
16	1.50
17	1.75
18	2.0
19	2.25
20	2.5

You can click and drag to highlight an area of cells. Once highlighted, you can use the icons across the top of the window to fill all the selected cells with a value. For example, in the direct mode, if you fill the selected cells with the value 10, whenever the manifold pressure and RPM match one of those cell locations, the output voltage will be 2.5V.

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A highlighted area of cells can also be changed by a percentage by using the **Change By** button. To increase a highlighted area of cells by 10 percent for example, select the cells, click on the **Change By** button and enter 10. To reduce by 50 percent, enter –50.

You can also fill a range of cells with values that are interpolated from the end points. This works over a row, column or 2-dimensional area. To fill values over a two dimensional area, fill the four corners of the area with cell values. Then click and drag to select the area encompassed by those corner cells. Click on the **Auto Fill** button. The software will calculate and fill the correct values for all highlighted cells.

Once the maps are set up, you can write to the ECU in the PSC1. To write to the ECU, the ignition must be on so that the PSC1 is powered up. The engine must be off so that tach pulses are not present during programming. To write to the ECU press the **Write Data to the ECU** button. The operation of writing the data will also save the configuration and map information in the current file that is open. You can also upload from the ECU using the **Read Data from the ECU** button. You can then save or modify the data.
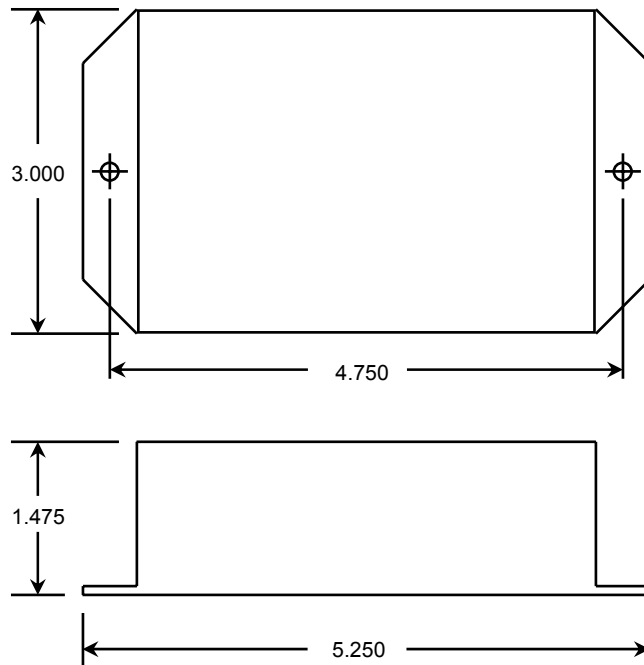

Operation:

Once the data is loaded into the PSC1, the engine can be started. From the main screen, the **Real Time** pull down can be used to observe a variety of operating parameters. The **All** option brings up a window that displays boost pressure and RPM as well as cell value and duty cycle for both A and B channels. The All window can be enlarged to full screen size to make it easy to read while working on the engine. The **RPM** and **Pressure** options display analog gauges that show those parameters. The **All**, **RPM** and **Pressure** options can all be displayed simultaneously.

Electrical Characteristics:

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Supply Voltage	BATT+ to BATT-	12	13.5	15	V
Supply Current	Into BATT+ terminal		16		mA
Tach threshold	Normal operation		1.6		V
Tach Hysteresis	Normal operation		0.5		V
Vacuum/Boost	On vacuum/boost hose	0		2.5	Bar
MAP output	Steady state source current		0.1		mA
Output Voltage	Signal Output	0		5	V
Output Current	Steady state source current		10		mA

Mechanical Characteristics:

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