SPLIT SECOND

PSC1-033
Programmable Signal Calibrator

Description:

The PSC1-033 Programmable Signal Calibrator provides precise calibration of fuel by adjusting fuel control signals. It is specifically designed to be used on sensors that operate from a 5V supply. The same supply that powers the sensor may be used to power the PSC1-033. This is especially useful for calibrating MAP sensors on late model vehicles. These sensors are frequently powered on during times when the ignition is turned off. By sharing power with the sensor, the PSC1-033 can be power on whenever the sensor is active.

The PSC1-033 has a +12V input which is only required for programming. During normal operation, the +12V line can be left disconnected.

Through a serial interface, the PSC1-033 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 sensor signal. The active cell is determined by table look-up based on input voltage and RPM.

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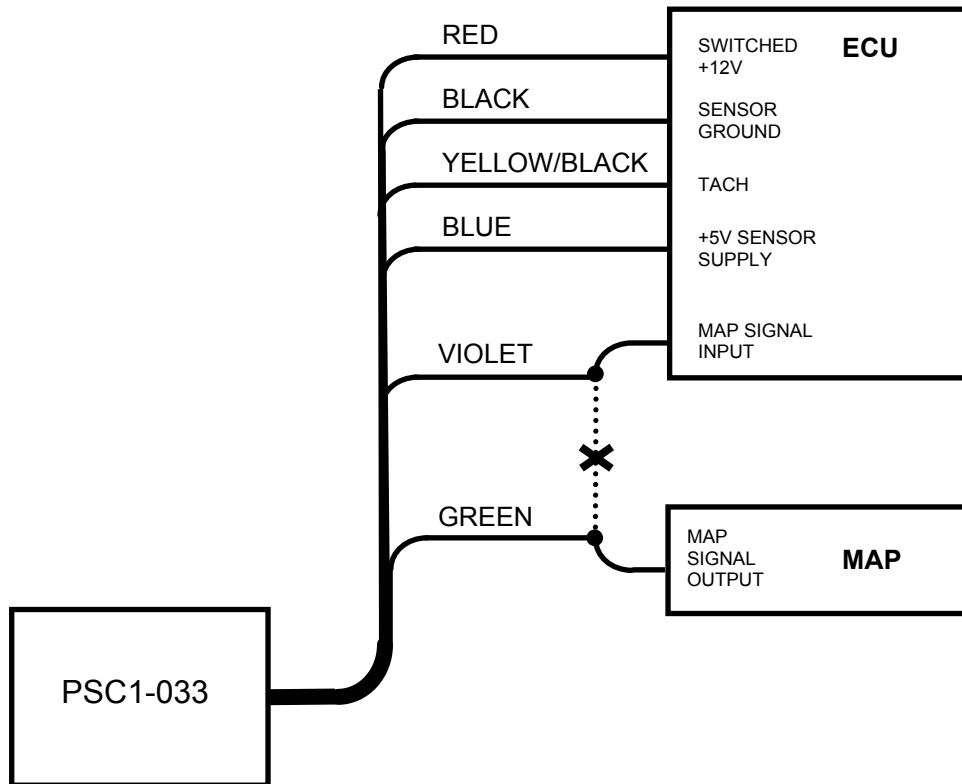
Features:

- Three-dimensional map table defined by input voltage and RPM
- Compatible with 2 and 4 stroke engines from 1 to 12 cylinders
- Laptop adjustable
- Can be mounted in the engine compartment
- Transient surge and battery reversal protection

Wire Assignments:

LABEL	CONNECT TO	WIRE COLOR
B+	+12V (for programming only)	Red
+5	+5V sensor supply	Blue
B-	Signal common	Black
V IN	MAP signal source	Green
V OUT	ECU MAP input	Violet
TACH	Tach signal (pulses per rev = #cyl/2)	Yellow/Black
F-DB9	Serial connector on computer	-

Typical Connections:

The signal on the green wire is used both as the load axis value and the signal to be modified. Map table A is used to calibrate the signal. Map table B is not used. Any 0-5V signals can be calibrated with the PSC1-033.

The red wire connection to +12V is only required for programming. Otherwise it may be left disconnected.

The signal input is offset by cell value. The offset is given by the formula:

Offset = (cell value – 10) / 4

The range of adjustment in this mode 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 engine management 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**, **Option**s 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:

Use the **Options** pull down and **Systems Settings** option to select Voltage mode and Programmable Signal Calibrator. 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 PSC1-033 uses map table A only. The active cell at any given time is determined by the input voltage reading and RPM.

The input voltage is offset by the active cell value. The offset is given by the formula:

Offset (V) = (cell value – 10) / 4

Note that there are 200 cell values. Only 20 are shown for simplicity.

Cell Value	Offset (V)
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.

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 red wire must be tied to +12V and the ignition must be on. 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. You can also upload from the ECU using the **Read Data From the ECU** button. You can then save or modify the data.
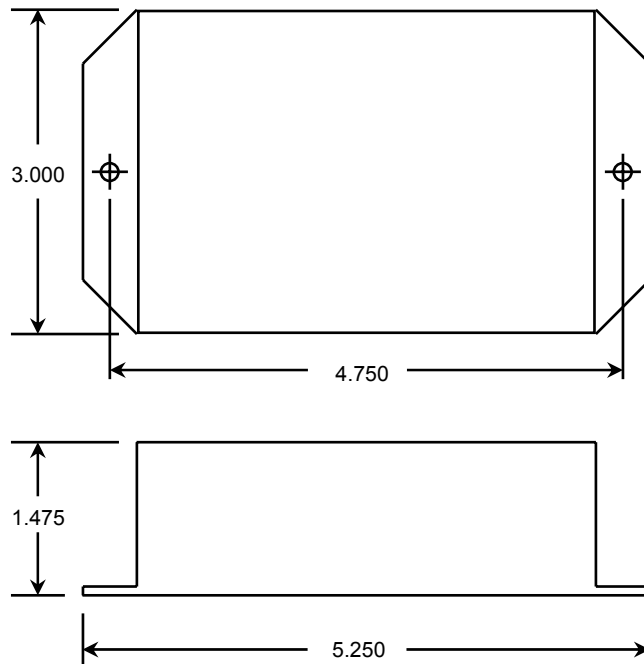

Operation:

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 input voltage and RPM as well as cell value. The All window can be enlarged to full screen size to make it easy to read while working on the engine. The **RPM** and **Voltage** options display analog gauges that show those parameters. The **All**, **RPM** and **Voltage** options can all be displayed simultaneously.

Electrical Characteristics:

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Program Voltage	During programming	12	13.5	15	V
Supply Voltage	Normal operation		5		V
Supply Current	Into +5V terminal		10		mA
Tach threshold	Normal operation		1.6		V
Tach Hysteresis	Normal operation		0.5		V
Input Voltage	Signal in, table look-up	0		5	V
Output Voltage	Signal out	0		5	V
Output Current	Steady state source current		10		mA

Mechanical Characteristics:

3.000

4.750

1.475

5.250

11/11/2013