SPLIT SECOND

FTC1
Fuel/Timing Calibrator

Description:

The FTC1 Fuel/Timing Calibrator provides precise calibration of fuel and timing retard. It is most often used when naturally aspirated engines are converted to forced induction. The fuel calibration range supports conversion to larger injectors. The timing control section is used to map timing retard to avoid detonation under boost.

Through a serial interface, the FTC1 can be programmed by a laptop computer running the Split Second R4 software. The software provides three dimensional mapping of the MAP and timing retard 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 FTC1 comes in many different versions. It must be ordered for a specific model of vehicle. Some versions have an internal 2.5 bar MAP sensor which can replace the stock one bar MAP sensor. Other versions operate in voltage mode and are driven off of the stock MAF sensor.

The calibration of the FTC1 is done through a serial interface, which is active while in operation. The R4 software runs on Windows 95/98NT/2000. The software provides real time display of RPM, manifold pressure, and cell value. The R4 software is the same software that is used to program the AIC1 and PSC1. A variety of editing tools ease the task of setting up an initial map and quickly fine tuning for optimum performance.

Features:

- Can operate 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
- Two modes for either direct output or signal modification
- Can retard ignition timing by up to 20 degrees
- Transient surge and battery reversal protection

Connection Information:

Because the FTC1 is offered in so many configurations, it is not possible to show a typical connection. Please refer to the installation instructions for a specific model for more information

Software:

The FTC1 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 write new data to the FTC1, all settings and mapping will automatically be saved under the current customer name. You can fill in the various fields such as name, address etc. if you like.

Connections:

Select the proper com port for the serial connector on your computer. Connect the FTC1 to the computer using a 9-pin serial cable. The cable must have a male plug on one end and a female on the other. Once the serial cable is plugged in and the FTC1 is powered up, you may connect to the FTC1 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 either the Vacuum/Pressure, or voltage mode and Programmable Signal Conditioner. Use the **Options** pull down and **Engine Settings** to select the number of cylinders of the engine. Use the **Maps** pull down to access the map tables. There are two map tables in the R4 program. Table A is normally used to program fuel and table B is used to program timing retard.

In the vacuum/pressure mode, the FTC1 is calibrated to read throughout the vacuum region and up to 16 PSI of boost. The vacuum and pressure readings are based on sea level conditions. As you move up in elevation and atmospheric pressure goes down, the ambient pressure reading will move down into the vacuum reading.

The number entered into the cells on the fuel map represent either the actual output voltage (direct mode) or 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 in both modes is 25mV. Example outputs are shown on the following table. The signal modify mode is recommended for most engine management applications.

This table shows the output voltage for direct and signal modify modes of operation. Note that there are 200 cell values. Only 20 are shown for simplicity.

Cell Value	Mode	
	Direct	Signal Modify
0	0.0	-2.5
1	1.25	-2.25
2	0.5	-2.0
3	0.75	-1.75
4	1.0	-1.5
5	1.25	-1.25
6	1.5	-1.0
7	1.75	-0.75
8	2.0	-0.5
9	2.25	-0.25
10	2.5	0.0
11	2.75	0.25
12	3.0	0.5
13	3.25	0.75
14	3.5	1.0
15	3.75	1.25
16	4.0	1.50
17	4.25	1.75
18	4.5	2.0
19	4.75	2.25
20	5.0	2.5

The number entered into the timing map indicates the timing retard in degrees. The value can range from zero to 20.0. The maps for both fuel and timing are overlay maps that are applied on top of the maps in the stock ECU. It is recommended that large jumps in value from one cell to the next are avoided.

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 FTC1. 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.

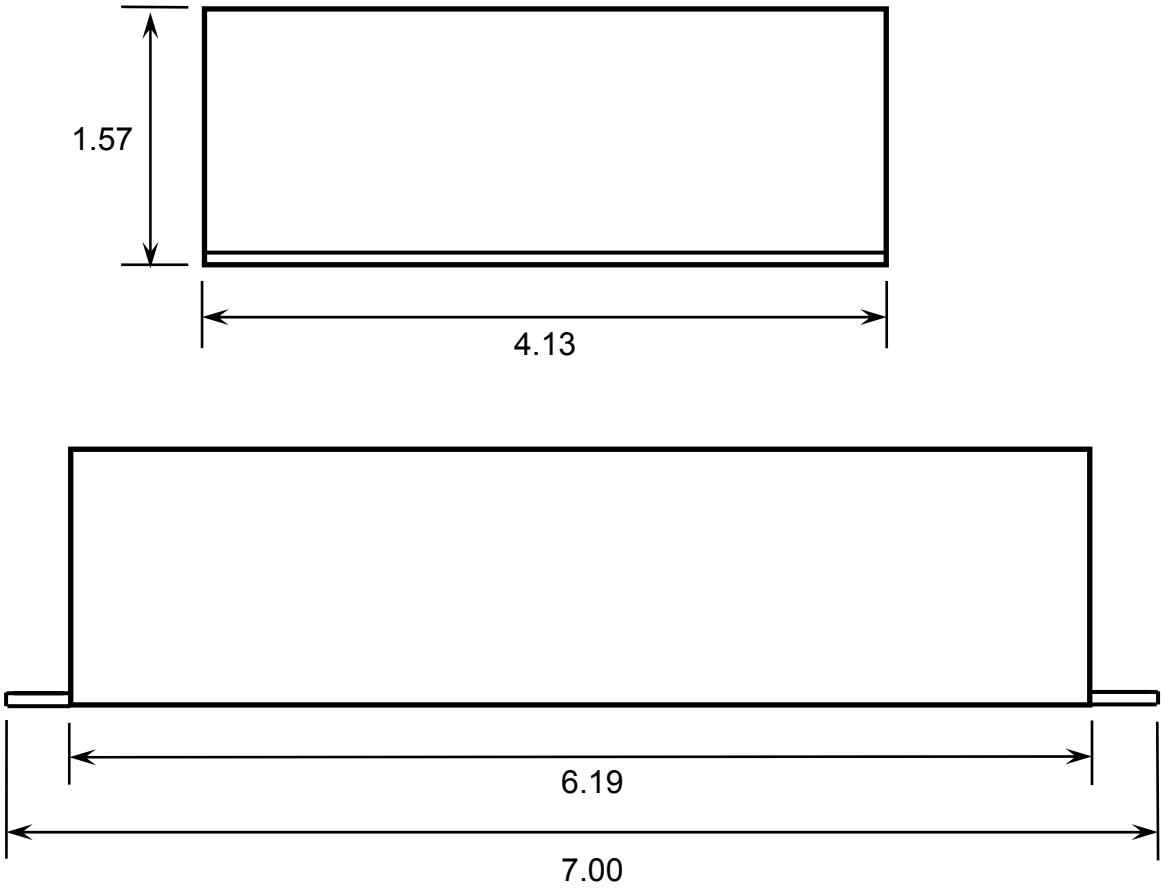
Operation:

Once the data is loaded into the FTC1, 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		25		mA
Tach threshold	Normal operation		2.5		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
Direct Output	Steady state source current		10		mA
Modify Output	Steady state source current		10		mA

Mechanical Characteristics:



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