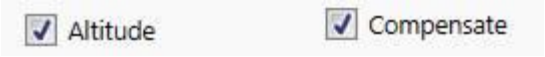
Graph MAP and Matrix TPS Tuning

This method is for Dyno tuning and used for racing engines with poor vacuum signal. Before reading this section please read **Matrix MAP Tuning** to understand how to tune from scratch. This section will only discuss the differences and types of Tuning options.

For this method you tune the normal aspirated part on the TPS matrix and then the turbo boost part on a graph. This feature is best to use with Altitude compensation sensor wired in. The Altitude sensor will modify the TPS matrix value before it is compensated by the Graph setting. This will give a more accurate calculation of the fuel per air. The trick is to tune normal aspirated fuel on the TPS matrix then add the boost compensation fuel on the graphs. TPS has no reference against pressure of the Turbo. Timing will also activate the two **Cruise Timing Graphs** for boost timing tuning.

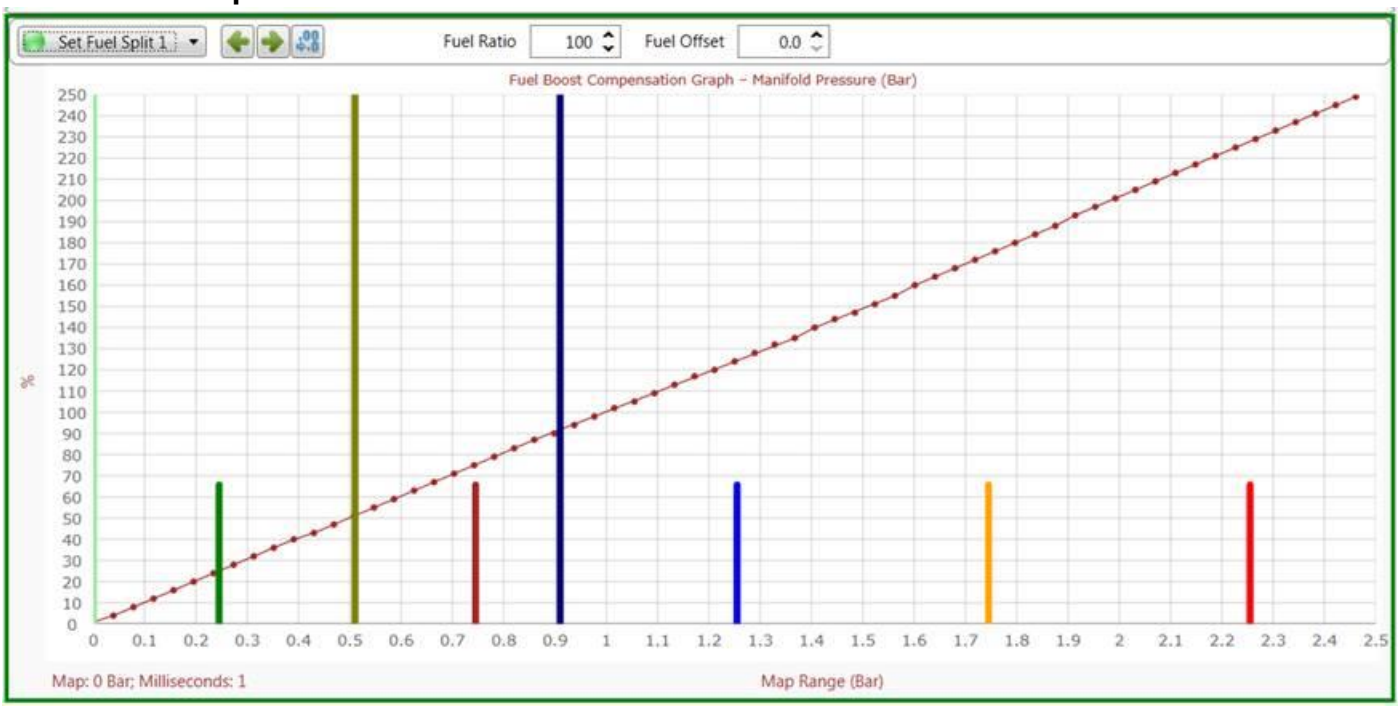
There are two methods of tuning.
Method 1 is to disconnect the turbo and do the TPS matrix as previously discussed. Then connect the turbo and do the Fuel Boost Compensation graph. This method is good for low boost engines.
Method 2 is to add a predicted boost graph line and then tune the TPS Matrix with low boost to get a pattern on the Matrix. Then put the boost up and tune the Fuel Boost Compensation graph part complete.

Method 2 Fuel with Altitude sensor wired in.



Make sure the altitude sensor is switched on Compensate. Especially if you are not at sea level. Tuning will include the pressure difference and change the maps when you go to sea level. This graph will start at 0 pressure which is the current atmospheric pressure where you are. If you change altitude this zero point will move with the altitude pressure. This means that the moment boost pressure goes above altitude pressure the graph will indicate the difference. That will eliminate the need for the ECU from being retuned all different altitude levels.

Fuel Boost Graph with Altitude sensor.



Set a base graph as above. Note that at 1 bar boost it will be around 100% enrichment. With this method you can boost up to 2.5 bar above sea level. If you need higher boost you may have to

add fuel on the matrix or add the dual injectors with Ratio or Graph method. The reason is this graph can only go to 250% enrichment. This graph is linear and it should curve up to make mixtures progressively richer at higher boost. So go for the lowest boost setting that you can. Maybe 0.5 bar boost. Now turn your attention to the Fuel matrix.

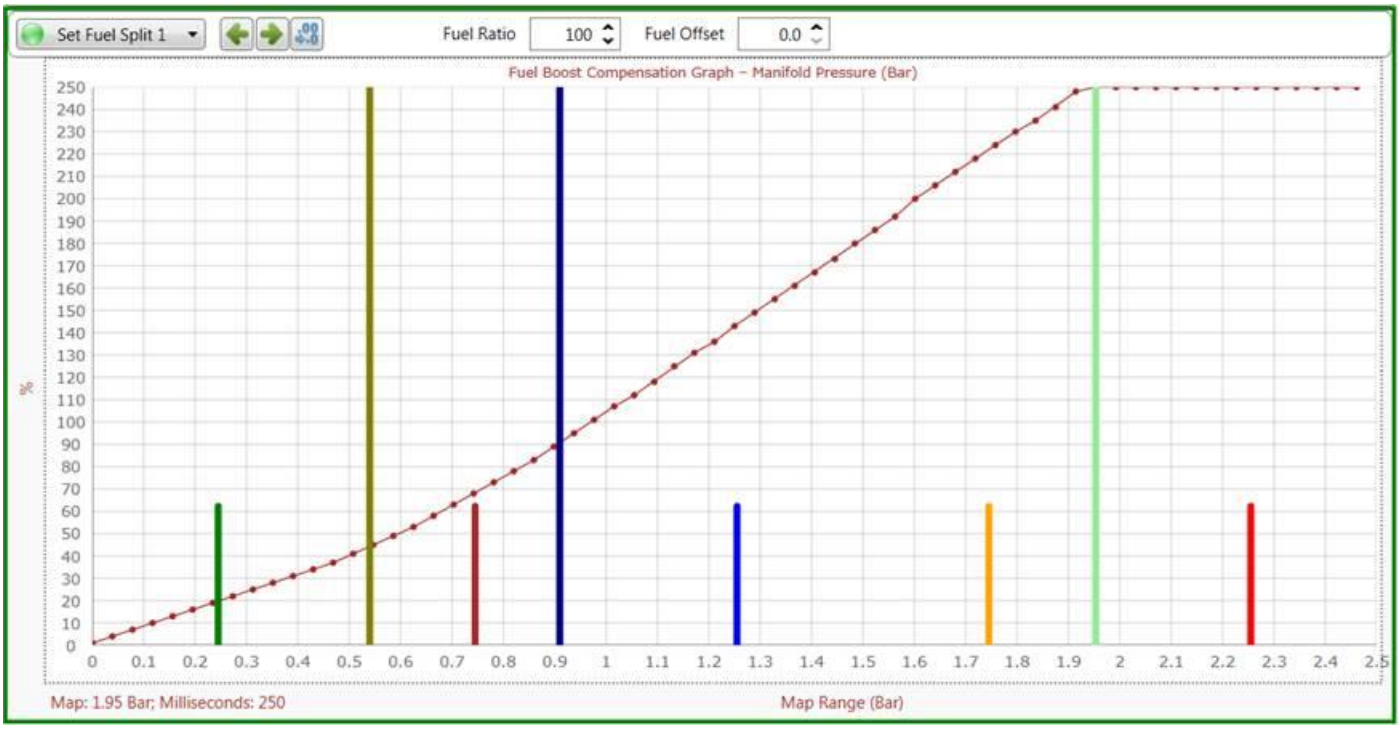
TPS Fuel Matrix

	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500
100	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
93.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3	8.3
86.7	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9	7.9
80.0	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
73.3	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1
66.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7
60.0	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3
53.3	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
46.7	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
40.0	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
33.3	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7	4.7
26.7	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3
20.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9	3.9
13.3	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
6.7	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1
0.0	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7

Note: Due to the turbo engine, the injectors will be bigger and the injection times will be shorter. The maximum set here is 8.7 and with 1 bar boost it will become 17.4 milliseconds. Which should be maximum at high RPM's. After you tuned at low boost then proceed to the graph again.

Now lock the dyno on a high RPM load site at full throttle. As you increase the boost adjust the graph to run at the right AFR mixtures. Once this line is set to maximum boost then change the RPM and check other load sites as well. They should be the same AFR. If you see a lean mixture you may correct it on the matrix map. Notice the graph below now has a slight curve to the top. This one runs out of tuning space because the injectors are too small.

Fuel Boost Graph with Altitude sensor.



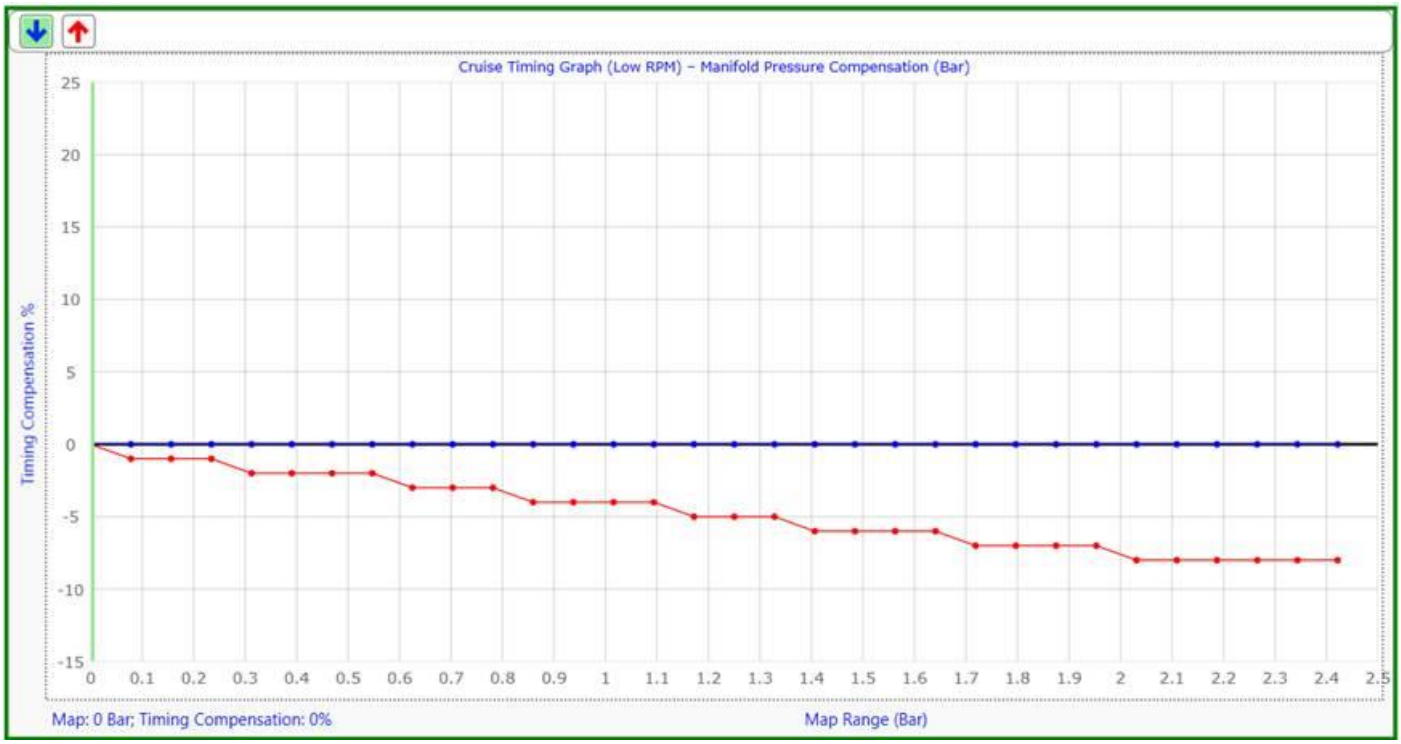
Method 2 Timing with Altitude sensor wired in.

TPS Timing Matrix

	0	500	1000	1500	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500
100	10	10	15	18	21	24	27	26	25	24	23	23	23	23	23	23
93.3	10	10	15	18	21	24	27	26	25	24	23	23	23	23	23	23
86.7	10	10	15	18	21	24	27	26	25	24	23	23	23	23	23	23
80.0	10	10	15	18	21	24	27	26	25	24	24	24	24	24	24	24
73.3	10	10	15	18	21	24	27	26	25	25	25	25	25	25	25	25
66.7	10	10	15	18	21	24	27	26	26	26	26	26	26	26	26	26
60.0	10	10	15	18	21	24	27	27	27	27	27	27	27	27	27	27
53.3	10	10	15	18	21	24	27	28	28	28	28	28	28	28	28	28
46.7	10	10	15	18	21	24	27	29	29	29	29	29	29	29	29	29
40.0	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30
33.3	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30
26.7	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30
20.0	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30
13.3	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30
6.7	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30
0.0	10	10	15	18	21	24	27	30	30	30	30	30	30	30	30	30

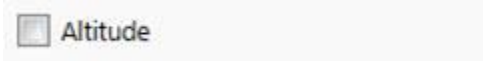
Timing matrix is set like a normal aspired engine. See sample above. As for the boost part you need to tune the **Cruise Timing Graphs**.

Fuel Boost Graph with Altitude sensor.



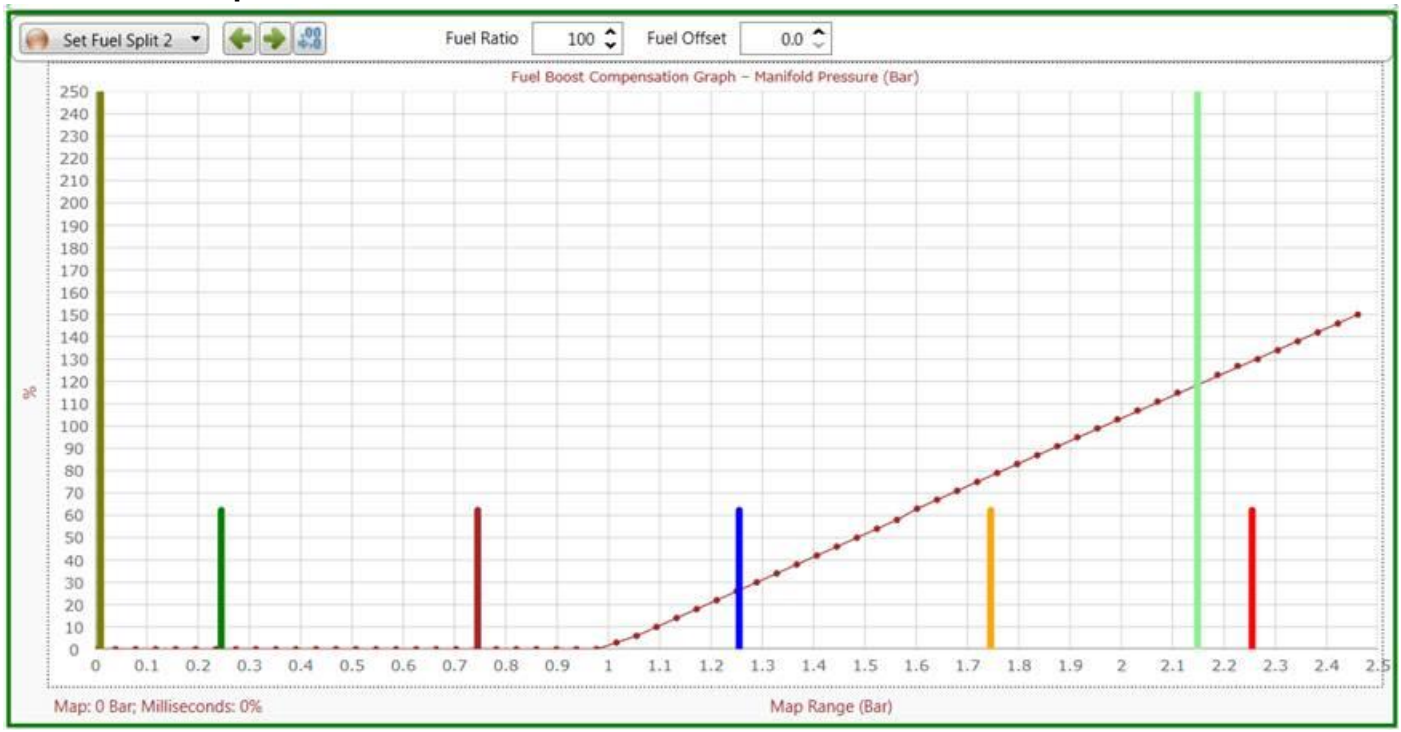
Here only the red graph is of importance as normal liming comes from the TPS matrix. Set the blue one on 0% compensation so that it does not affect low RPM timing.

Method 2 Fuel with no Altitude sensor.



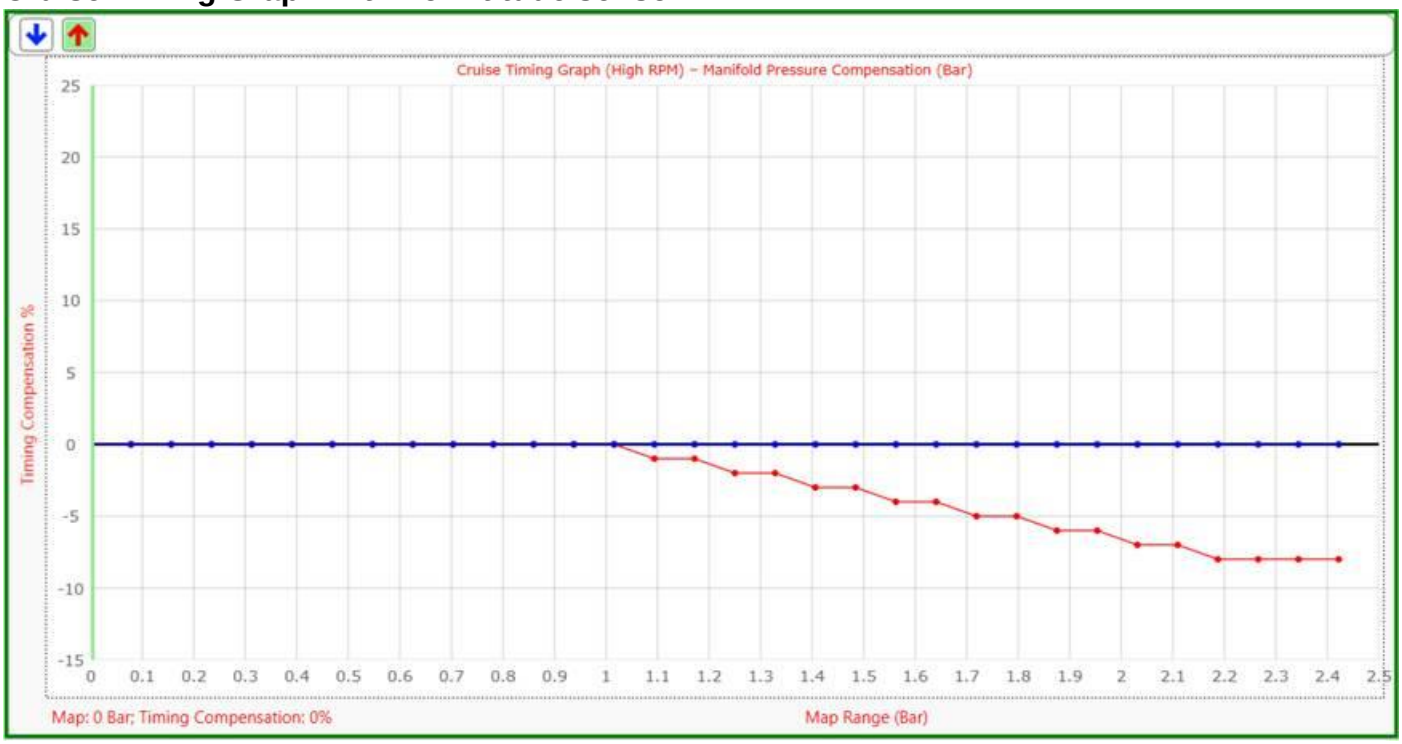
This method can be used if you don't use the vehicle on different altitudes. Remember air temperature has an effect on atmospheric pressure so there may be slight changes in your AFR from day to day. If possible, use it with the Lambda control. The main difference is the Lambda sensor don't effect the timing and you may get detonation at sea level.

Fuel Boost Graph with no Altitude sensor.



Notice that this method uses the actual MAP signal on the real scale. This example as tuned at sea level on 1.03 bar altitude pressure. At higher altitudes the graph will start to increase from that altitude.

Cruise Timing Graph with no Altitude sensor.



Same as above this starts to change from 1 bar.