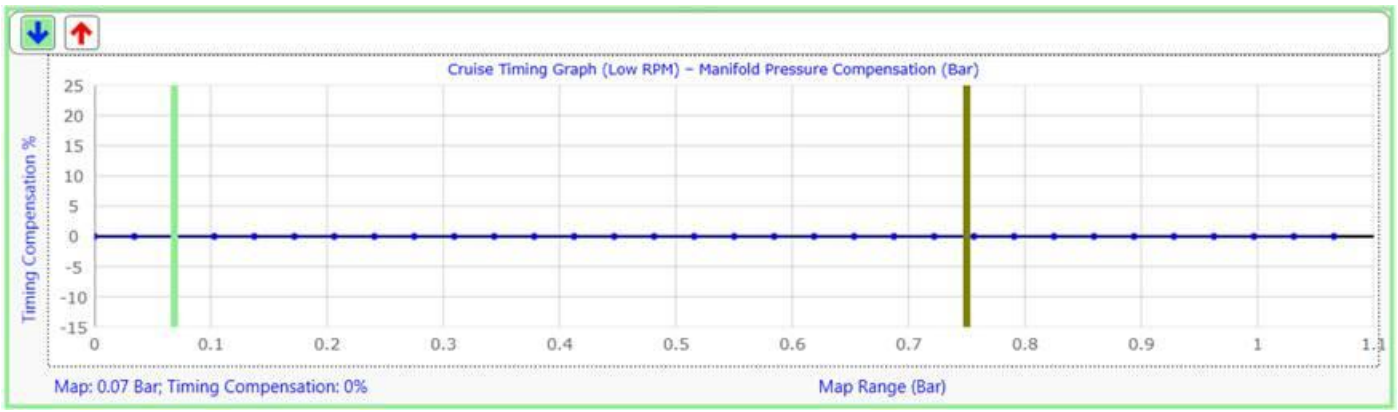
# Graph MAP tuning

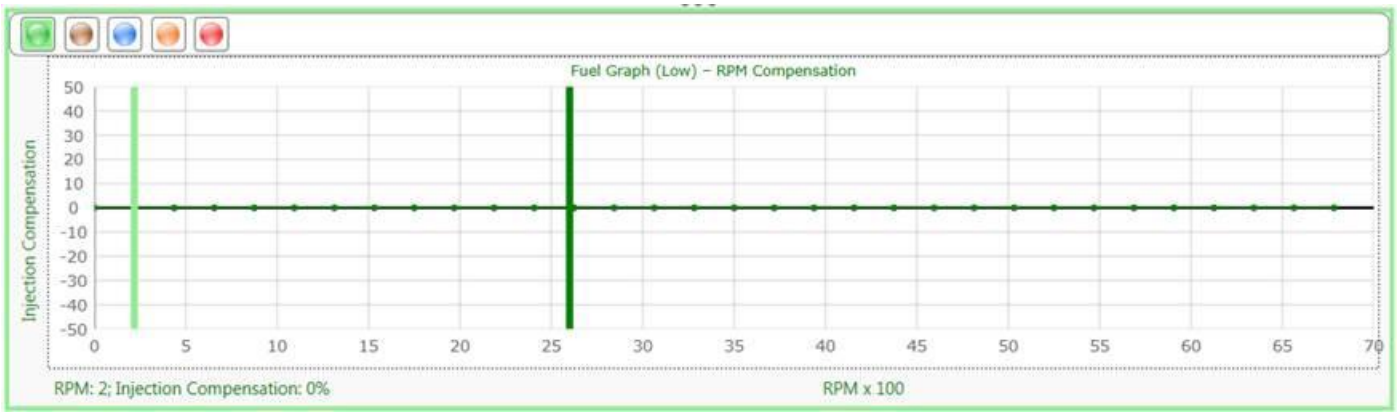
Make sure all safety precautions are met as specified by the Dyno Safety rules from the manufacturer. Also remember to keep an eye on the water temperature of the engine. If at any time you hear detonation, back off the throttle immediately and lower the timing in that RPM range about 3 degrees. If at any time the RPM bar becomes erratic, back off the throttle and do faultfinding for interference or a faulty trigger signal. If the AFR shows lean, back off and make it richer in that load site. Especially turbo and racing fuel engines. They can become damaged in a very short time.

Ensure that the engine is at working temperature and all the sensors are calibrated. Disable Lambda Control until after the tuning is done. By now your engine should start and rev up and timing must be calibrated. See the ***Calibrate timing*** section. This section will discuss the final fuel and timing tuning. After this you still need to tune drivable features and cold starting. Ensure all the settings in the ***Settings before Tuning*** section is done. Now proceed to the map reset section.

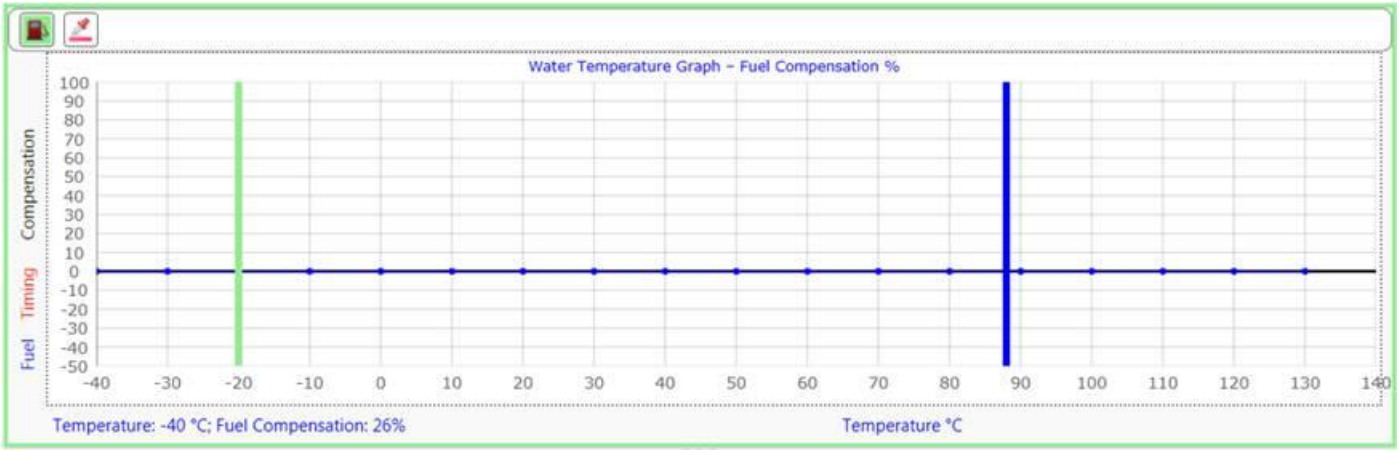
## Reset Maps



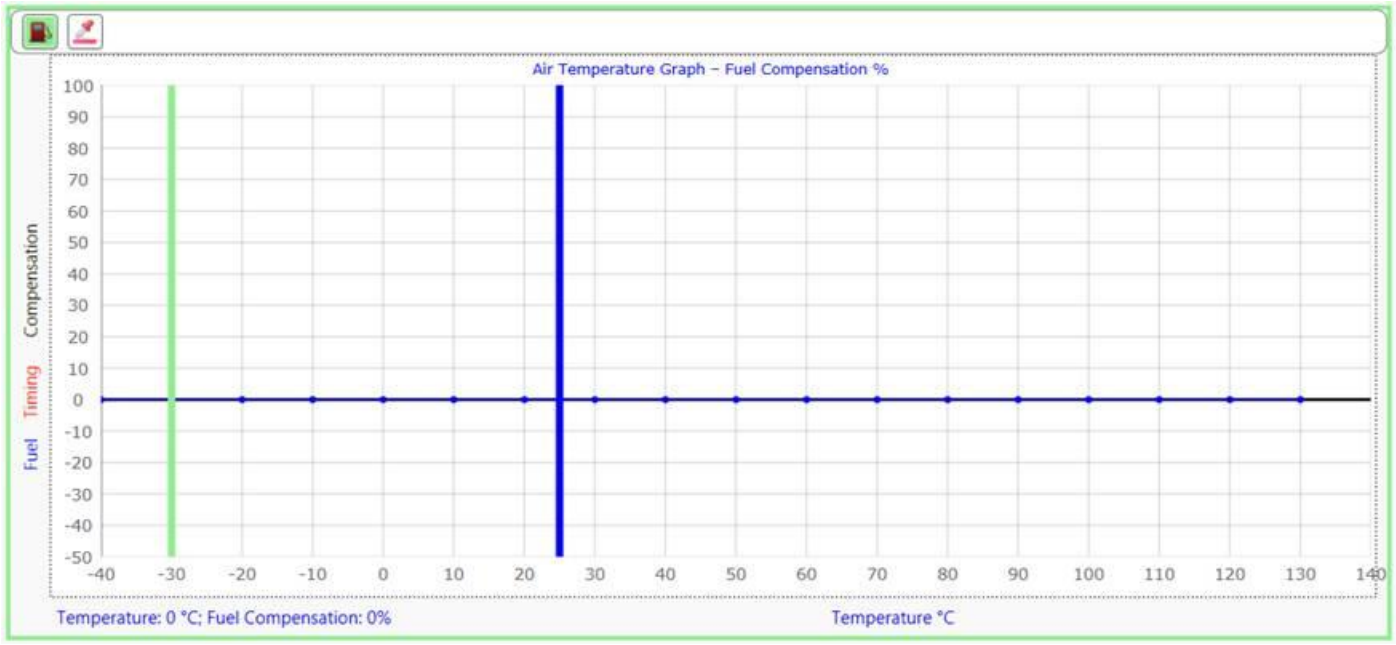

Zero both graphs on the Cruise Timing Graph.



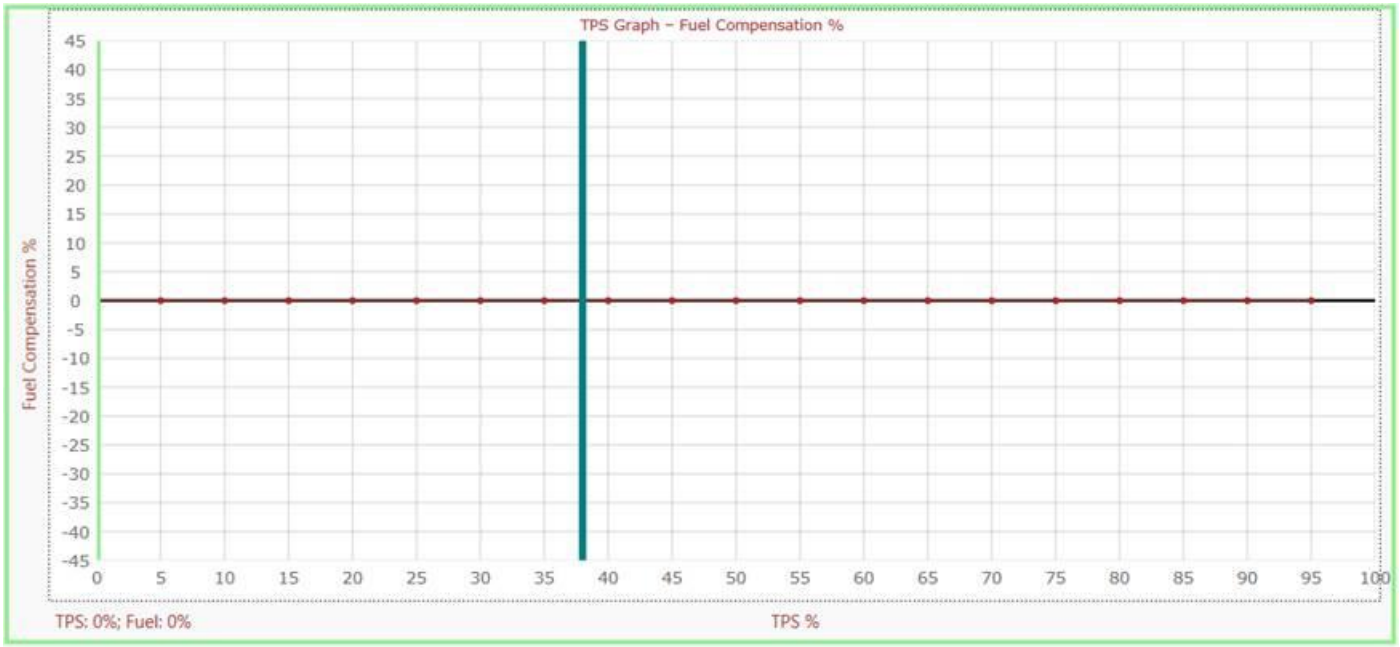

Zero all 5 graphs on the Fuel Graph – RPM Compensation.




Zero both graphs on the Water Temperature Graph.



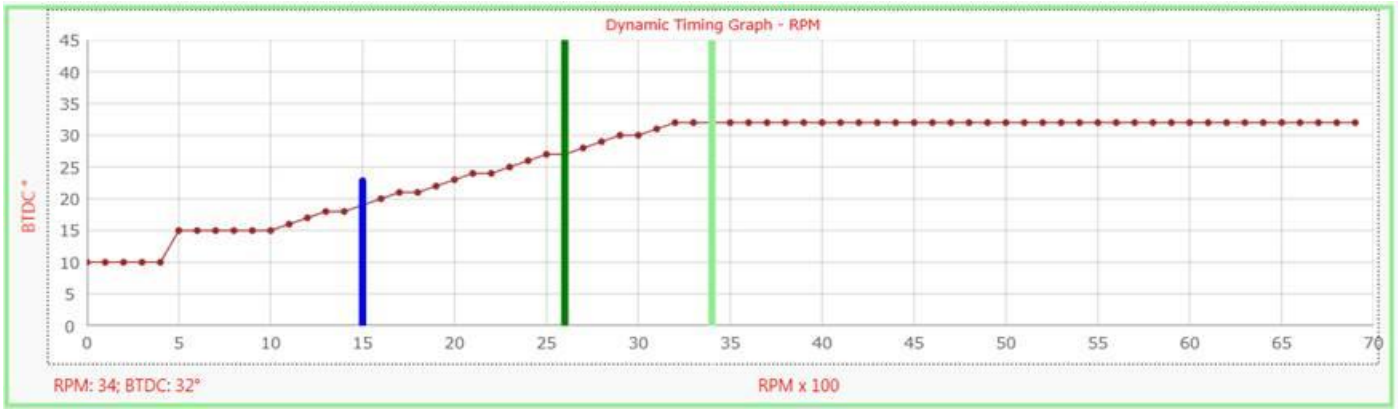

Zero both graphs on the Air Temperature Graph.



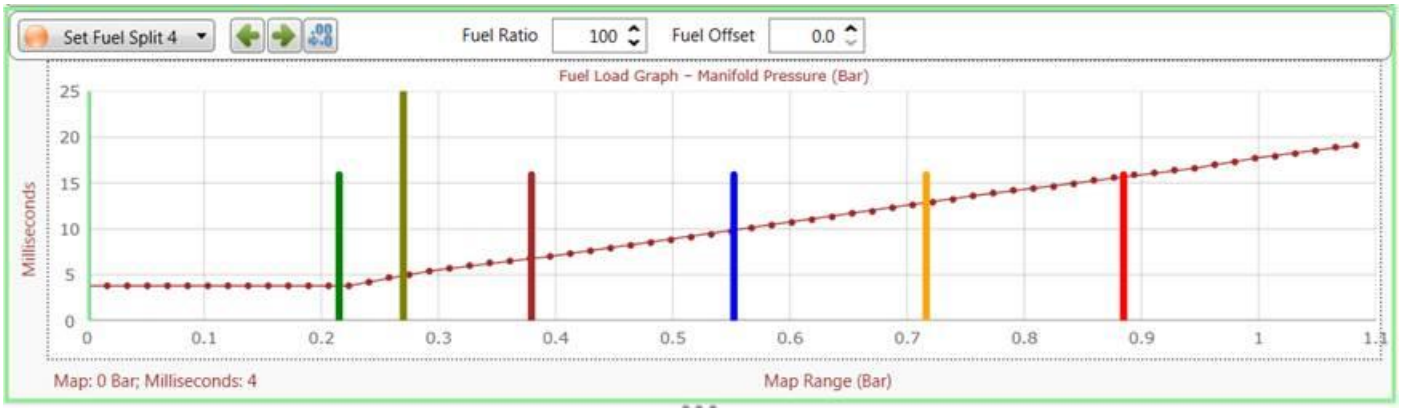

Zero the TPS Graph.

## Set Maps

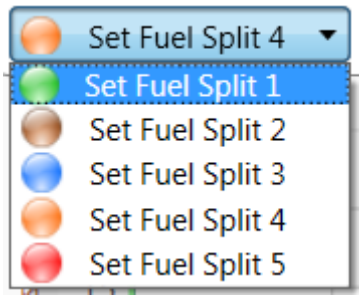
Now set a basic profile on the following maps.




This is a basic dynamic timing that should work for the average engine. Set a basic RPM timing map to start at 10°BTDC degrees and idle at 15 °BTDC degrees. Increase the timing from 1000RPM to 3200RPM up to 32°BTDC. Keep it flat till maximum timing. If you have a special engine with high compression, then lower the maximum timing to 28 degrees.

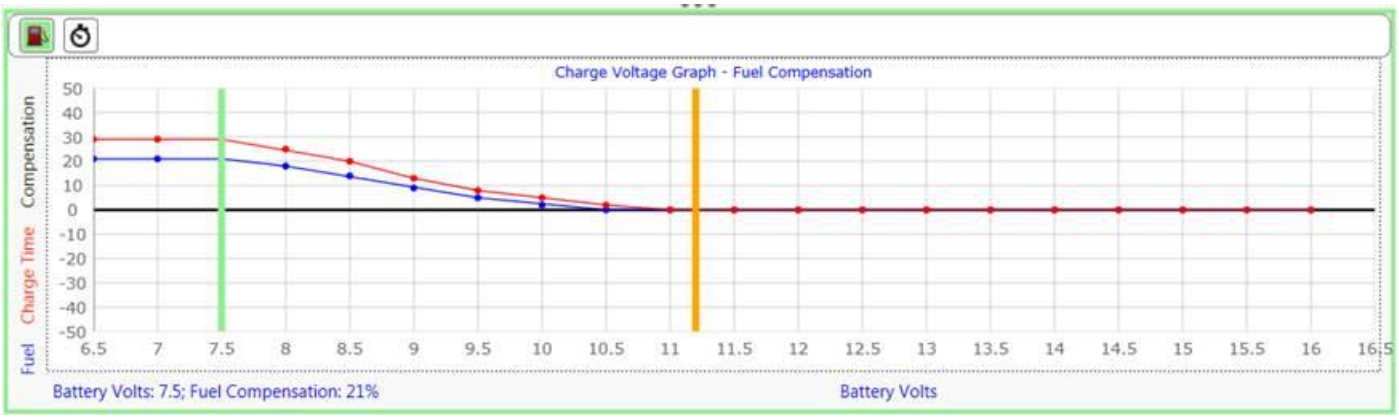



Your main fuel map should look something like this. This means engine idles at around 0.2 bar vacuum and requires 4 milliseconds of fuel to idle when hot. The slope will provide enough fuel to rev and ride the engine. If your injectors are larger than standard, then idle fuel would be lower and the slope less aggressive. Note: Fuel Ratio is set at 100% and Fuel Offset is as 0%.




Set the 5 tune markers in even space over the load of the engine. The green marker could be at idling and the red high bar at about 90% load. Space the other ones evenly.


If you have a Rotary engine also set the trailing degrees at a base timing of 7 degrees.




Make sure that fuel compensation is zero at operating voltage in the Charge Voltage Graph.

## Start Tuning

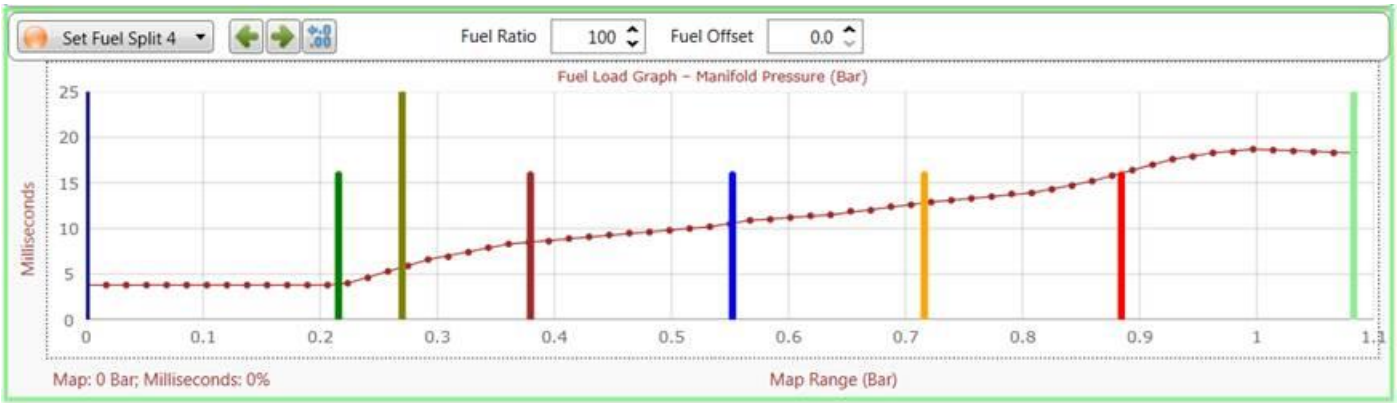
**Tune1. Fuel Load Graph – Manifold Pressure**

Now start the engine and set the Dyno RPM at the middle of the engine max RPM, around 3200 RPM for a 6500RPM engine. First tune is to set the throttle flow profile on the *Fuel Load Graph*.

Set the easy tune feature to *Tune All Right*.  Put the real time tracing function on. Now use the arrow keys to tune the graph.

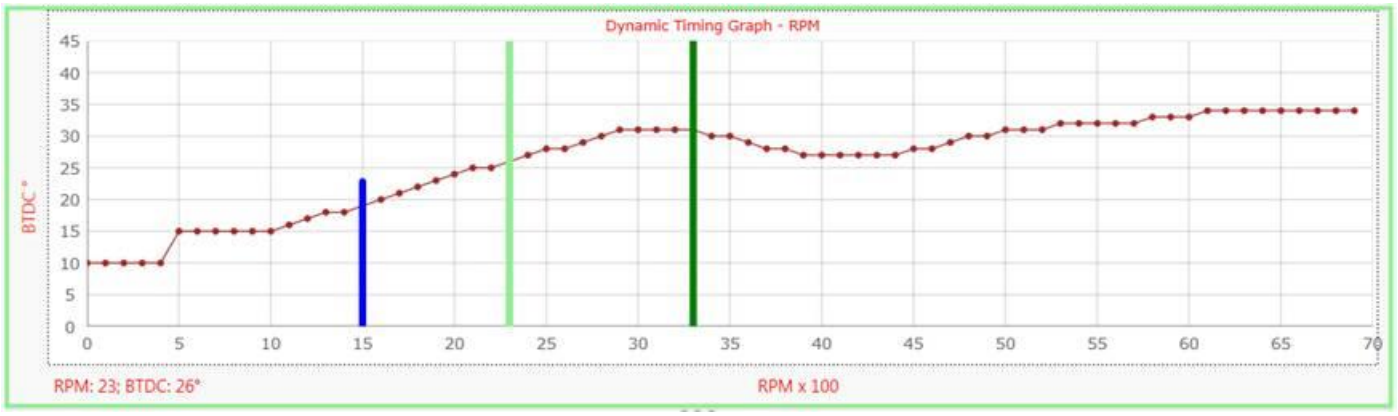
Look at the AFR gauge closely all the time. Start with light throttle and increase it by pressing the pedal just a little at a time. First RPM will increase till it reaches 3200 on the Dyno. Then the Dyno will keep the engine RPM constant and you can proceed right through the load range.

Listen for detonation. If you detect any, back off and go to the timing graph and lower the graph in that RPM bracket. Also, remember the AFR should show slightly lean at light load, Stoic at cruise load and slightly rich at high load. Different engines will require different ratios so you need to tune accordingly. This manual is not written with specific AFR in mind, but merely for explaining. After tuning you should have a similar profile. See below.




**Tune2. Dynamic Timing graph (WOT) – RPM**

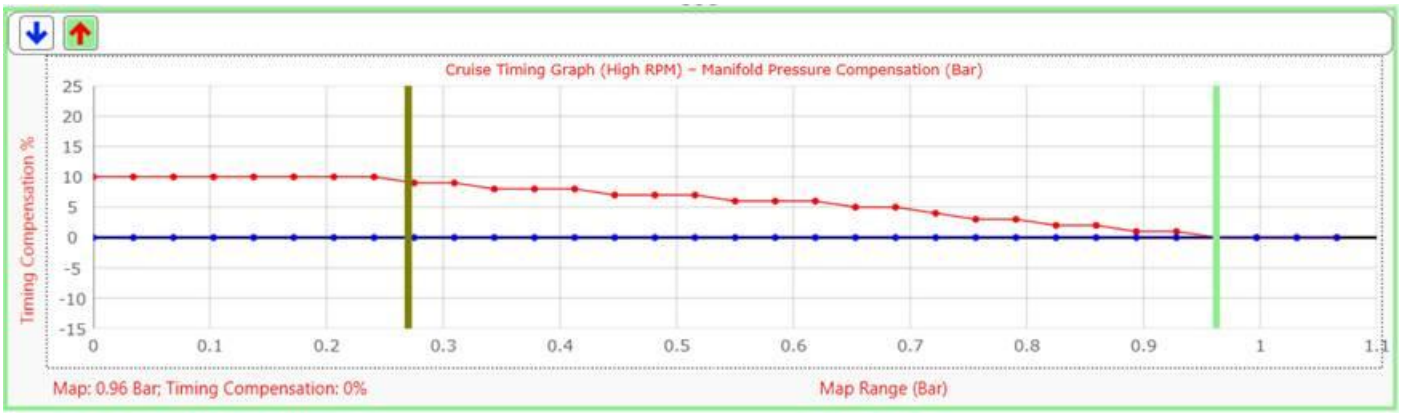
Now that you have the AFR set to a safe level you can proceed with the Dynamic Timing graph. For this tune you need knock ears or a Dyno with very fine torque measurements. Start with light throttle again. This tune is to determine wide open throttle timing. Keep the dyno control handy and start with the lowest RPM. at very low RPM's WOT may not fuel correctly so use a lither load tile as it is clean. Here, you now increase the timing till you see slight detonation or that power does not increase anymore. If you see knocking you can lower the timing by about 3 degrees. This should also be the limit where power break offs' occur if you decrease any further. Keep an eye out for the AFR gauge. Timing will influence the amount of fuel required at that RPM. If AFR goes to lean repeat the first tune again and come back to timing. Also, ask someone to look at the water temperature on the engine to be safe. A very hot engine requires less timing so try and tune at working temperature. Below is a sample of a Lexus V8 engine. Notice the timing dip at 4000 RPM. That is where VE is at its best and requires less timing.




After Tune 2 it is good practice to look at tune 2 quickly and see if it requires fine tuning.

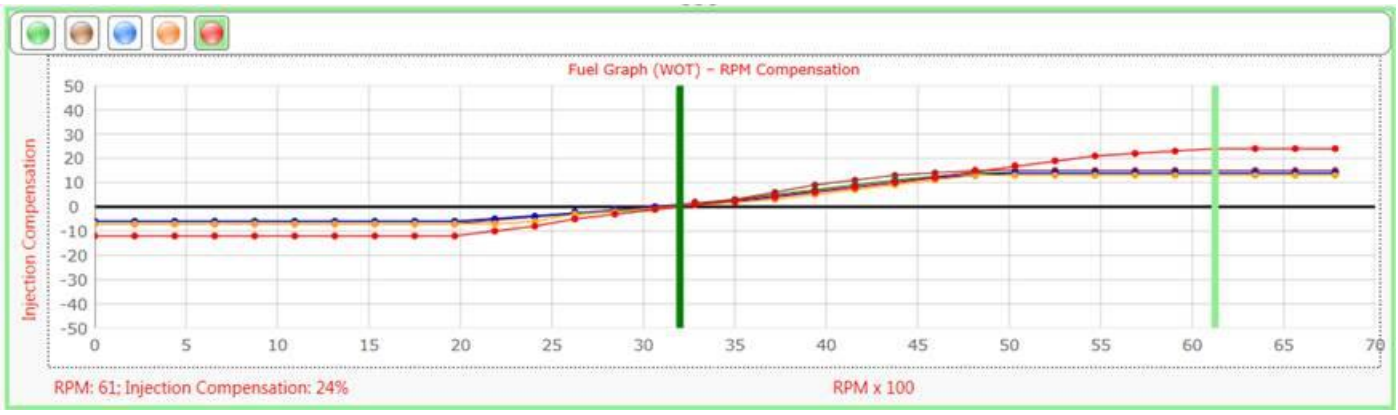
**Tune3. Cruise Timing Graph (High RPM) – RPM Compensation**

Now, you need to set a cruise timing curve to proceed to cruise fuel tuning. Keep the dyno on 3200 RPM and again tune for timing up to detonation or power turn point like in test 2. Start from full load to light load using easy tune all left function. At light load you can keep the same value to the left. You will end up with a graph similar. See below.




**Tune4. Fuel graph – RPM Compensation**

Now that dynamic cruise timing is set it is time to proceed to the Fuel graph – RPM Compensation. Here there are 5 graphs. Start again with the green at lightest throttle and work to the high load. You can press the Hide function to isolate each graph. Keep the dyno control handy and start with the green bar. As you increase the RPM on the dyno from idling to high rpm, you need to load the throttle to keep the Map sensor value on the green bar on the *Fuel Load Graph – Manifold Pressure*. Tune all right will adjust the graph evenly. Remember that AFR is different for light load and full throttle. It should look like below. Again this graph may vary between engines. Notice how all the graphs come together at 3200 RPM. This was due to Tune1 step where all the graphs was set to 0.




**Tune5. Cruise Timing Graph (Low RPM) – RPM Compensation**

Now you need to set a low RPM timing. This is handy to get a slow engine up to speed quickly. See the graph below. This engine idles at 0.2 bar when hot and there is zero timing. The moment you press the accelerator, and the engine is below 1500 RPM, the bar will move to the right-hand side. This will add quick timing and get more power from the engine. If you blip the throttle it will still add 5 degrees till the engine reaches 1500 RPM.