The following guide will show you how to set you car up most efficiently with the select plus switch…

Select Plus Vario Range Guidelines.

Boost:

Range 0	**Valet Mode**
Range 1	**Stock Boost**
Range 6	**Performance Boost**
Range 9	**Aggressive Boost**

Timing Adjustment:

Range 0-3	**91(US)/95(Euro) Octane Fuel**
Range 4-6	**93(US)/98(Euro) Octane Fuel**
Range 7-9	**Unleaded Race Fuel over 100 Octane**

Fuel Adjustment:

Range 0	**Stock Air-Fuel Ratio (AFR)**
Range 9	**Performance Air-Fuel Ratio (AFR)**

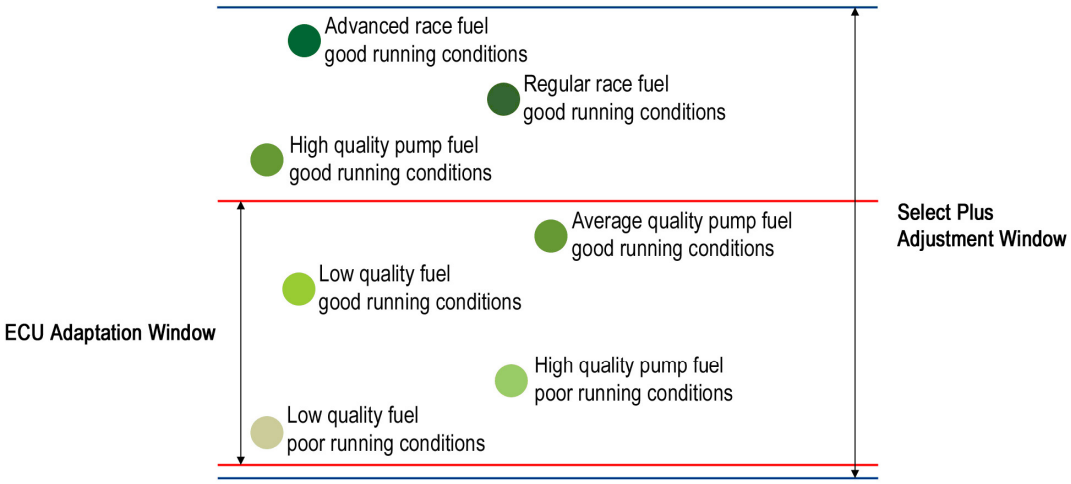
Disclaimer:

By using the advanced user settings on the Revo Select Plus, the user is responsible for having intimate knowledge of the vehicle being tuned and the principles of tuning. Certain situations can lead to conditions that are outside of the safe operating range tested by Revo engineers. The user acknowledges that Revo cannot be held responsible for the Performance and reliability of tuning that has been altered via the Revo Select Plus advanced user program.

For further help please refer to the technical help and FAQ sections on www.revotechnik.com, or see your local revo dealer.

Tuning guidelines (using the variable settings)

The select plus allows you to cater for differing environmental conditions and fuel quality. The Engine Control Unit caters for these differences to a certain point, utilising the built in adaptation and knock control. However there are limits to the amount of adjustment in an ECU. Standard programs and adaptation cannot cater for such a vast array of markets from higher altitude, lower air density areas with poor quality fuel to high air density areas with premium quality fuel. The select plus lets you work outside of these parameters to set the car to its optimum levels. The following diagram shows this in more detail:



The above depicts areas within adaptation levels and the select plus adjustment levels where a car would be running in different conditions with different quality fuels. Due to the need to cater for those markets with poorer running conditions that aren't privileged with high quality fuel, stock programs aren't always as advanced as they could be... standard adaptation doesn't cater for the better conditions and fuel at optimum levels.

The select plus give the user a large degree of control over the amount of boost and ignition timing advance requested by the engine ECU. The fact that these amounts of boost and timing are requested does not necessarily mean they are actually achieved. Only if the specified tolerances of a series of sensors are met will the engine produce the requested values.

Some of the these sensors are listed below.

- **MAF** – (mass air flow aka air mass meter) provides the ECU with the amount of air being ingested into the engine.
- **Boost sensor** – provides the ECU with the actual boost pressure in the intake track.

- **AIT** – (air intake temperature) provides the ECU with the temperature of the air after the intercooler. Needed for calculation of air density.
- **Lambda sensor** – calculates the air/fuel ratio by measuring the unburned portion of the exhaust. Also used to calculate EGT (exhaust gas temperature).
- **Knock sensor** – Senses certain harmonic frequencies that occur when approaching and reaching pre-detonation in the combustion process.

These sensors and their ability to override the requested boost and timing levels, are essential to the safety and longevity of your engine. If one or more of these sensors starts reading a value outside of it's specified window the ECU will limit the amount of boost and/or timing (Pull Back).

When making changes to the boost, fuel and timing settings of your engine there is no one setting that will give you the best performance in every situation. Many external factors influence the way your engine performs. In particular the ambient temperature will have a noticable effect. Put simply, the warmer the weather, the lower the power. This is because warmer air has a lower density and so burns less efficiently than cooler air. Other factors that play a major part in power production include the quality of the fuel being used, engine intake temperature and to a lesser extent altitude.

Knowing the values that engine sensors are 'seeing' and knowing something about what they mean will enable you to make calculated and worthwhile changes to boost and timing. Setting the boost and timing to their maximum requested settings and expecting the engine to deliver these levels when the external conditions are less than perfect is unrealistic.

For example: On a hot summer day the air being ingested by your engine will be less dense than on a winter day. This being the case the engine will not be able to mix and burn the 'thin' air and fuel mixture efficiently at high levels of boost. The ECU will calculate, by way of the AIT, that the air is of a low density and limit the boost pressure to a safe level. Not only will the boost be limited but the ECU will adapt or 'remember' that the air is 'thin' and continue to limit the boost pressure until it is told otherwise.

Data Logging

The control over boost, airfuel ratio and timing that the select plus for porsche switches allow can make huge differences to the performance of your engine. These changes can often be felt when driving the car but the only way to be sure that the changes you make are benificial is to record and interprit the values that the engine sensors read. The 'data acquisition' function built into select plus for porsche gives you the ability not only to read these sensor values but to record the changing values under normal driving conditions, this is commonly refered to as 'data logging'.

The most efficient datalogs are those taken over longer 'pull' durations through the rev range. For example; a 4th gear pull from 2000rpm to 6500rpm/redline will give more information than a 3rd or 2nd gear pull through the same rpm range as it will take longer so more information is recorded. The only problem with this is it also takes more space to do, and at a higher terminal speed… Revo do not condone breaking speed limits.

The below gives you examples of expected outputs/values and a bried explanation of these values for a car running within the limits of the system.

Data – Engine – Speed : Engine Crank Speed in revolutions per minute

Data – Engine – Intake Air Temp (IAT) : Intake temp. at the throttle body. The air intake temperature will change daily according to ambient temperature and driving style. It is difficult to state what the AIT should be, only that cooler is better. It is useful to monitor the AIT and get a feel for what is expected on any given day. This allows you to if nothing else account for rises and falls in performance. The higher the AIT the less timing you will be able to run.
As an indicative guide normally aspirated cars should be no more than 10º above ambient. Turbo cars should see between 30 and 40º IAT's under load with efficiently functioning intercoolers.

Data – Engine – ECT : Engine coolant temperature in degrees C

Data – Engine –Throttle : Throttle position measured as a percentage. 100% being full throttle.

Data – Knock Retardation – All Cylinders : Knock value measured in degrees from TDC (Top Dead Centre). Capable of monitoring upto 8 cylinders. Directly effected by timing settings. If the ignition settings are correct for the fuel quality and conditions the car is subjected to, then the knock values should be as follows. These values should not be exceeded:

Normally aspirated - up to 6º but no more
Turbo - up to 3º but no more

Knock value will be less in cooler temperatures, or with higher fuel quality.
DO NOT allow the car to exceed the above values.

Data – Turbo Charger Related – Actual Boost : Boost the car delivers measured in millibar includes atmospheric pressure. Under regular load levels the maximum value will be 1.1bar (1100millibar or 2100millibar inc. atmospheric pressure). Under high load (low rpm, high gear uphill) peak values may see upto 1.3bar but these figures will not be sustained

Data – Turbo Charger Related – Desired Boost : Specified boost levels from the ECU. Values as per actual boost. If the desired boost and actual boost values differ

by more than 5% throughout the rev range then it indicates either the settings are incorrect for the conditions/fuel quality.

If the requested boost value cannot be met, possible reasons for this can be due to excessive intake temperatures or poor flow in the air intake, the ECU will reduce the requested boost value.

In doing this the ECU will also reduce the timing, fueling and other values to safeguard the engine. This reduction of values across the board will seriously limit the engine's performance.

Data – Turbo Charger Related – Waste Gate : Waste gate duty cycle measured as a percentage with 100% being fully open. 100% will be seen in full/high load situations.

Using select plus adjustability with the Data Acquisition function

Setting Timing Levels

You can monitor the effects of changing timing settings in the software to better suit the fuel and conditions at any given time. Revo recommend the following settings as a guideline, but to set the car up to the most efficient settings please use the following data analysis guidelines.

Revo Timing Guidelines

Timing Range (Non US)
0 = stock timing
3-5 = 95ron fuel
5-7 = 97/98ron fuel
7-9 = premium fuel with octane booster unleaded race fuel

Timing Range (US)
0 = stock timing
1-2 = 91 octane fuel
3-5 = 93 octane fuel
6-9 = premium fuel with octane or booster or unleaded race fuel

Note: it is always safer to set lower levels if you are unsure of the settings to run.

Analysing Data:

Setting Timing - The best way to set timing up is to start at a relatively low level and gradually advance the timing monitoring the effects, for example if using 98ron fuel we recommend running between T5 and T7 it would be advisable to leave the car in one boost setting and start off monitoring at T3, then build up gradually making sure the ECU isn't having to pull too much timing out.

It is worth knowing that generally intake manifold's don't deliver the same flow to each cylinder. With certain cylinders being 'hotter' than others timing CF is unlikely to be linear across each monitored cylinder.

Boost Settings

The Boost level can be set higher or lower than the default setting (Boost 6), altering the driving characturistics of the car. As with Timing settings 'bigger is not always better'. You can potentially run at Boost 9 as long as certain components on the car do their job at that leve and atmospheric conditions allow. For example running increased Boost could show up weaknesses in hoses (hose collapse) or Intercooler inefficiency. Monitoring requested and actual boost pressures, Intake Air Temps, and Timing CF will help to set a usable level of Boost.
Revo software incorporates enough adjustability to make the most out of bolt-on engine upgrades.

Boost and Timing settings need to be set to compliment one another, for example an inefficient IC (intercooler) for a specified boost level will lead to excessively increased AIT's and the timing CF will increase.

Setting Incorrect Levels

One of the common problems that can occur when setting up a car with a **select plus** is setting optimistic levels… if you run at a timing level too high for the given conditions then you start to rely on the knock sensors and the ECU 'pulling back' to safe levels. This is often the case when using an **select plus** without monitoring the effects of different settings and can have undesired effects on the running and components.
If the ECU pulls back due to over optimistic settings then the car won't run at it's optimum level, this being the case altering the settings with the **select plus** will have much less effect as the adaptation values will all be at low levels.

Using you can reset the adaptation values by disconnecting the battery for a minute or so, then reconnecting and turning the ignition on (engine not running) for a similar time period. Please make sure you know your stereo coding if you are to do this.

Fuel Settings:

One feature of the **select plus** switch is the ability to adjust the requested air fuel mixture the engine will burn. It does not control fuel injector on time but rather sets a target air fuel mixture for a richer or leaner burn. Position 0 on the **select plus** is equivalent to stock and position 9 will typically yield a 0.87 - 0.91 Lambda for normally aspirated cars or 0.81 – 0.83 Lamdba for a turbo car depending on the vehicle and state of tune. If you are not familiar with AFR (air fuel ratio) we recommend leaving this setting at 9. This adjustment is only a target and will not force the ECU to comply; if the setting is outside of the safety parameters the computer will compensate for the error allowing the safe operation of the vehicle.

go play...

Disclaimer:
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