**Injector and Ignition Scaling**

When attempting to start the engine for the first time you may need to change the injector scaling as the fuel requirements, injector flow-rates and fuel pressure vary between engines.

The option ***Microsec/bit*** is a linear scaling factor which determines the raw values that decide the length of injection events. A higher number equals more fuel, a lower number equals less. The Microsec/bit scaling factor can be accessed by opening the Options Full List in the Views window and selecting the Microsec/bit option.

The option ***Fuel Sync*** describes the overall injection start point for timing adjustment. A value change of 1 is a start point movement of 30 degrees. This should be adjusted until the idle emissions are at their best. The ECU uses an internal counter of 12 markers (known as internal teeth) per crank revolution. The option Fuel Cycle Teeth is the number of internal teeth in one injection cycle. These are generally:-

Semi Sequential 12

Sequential 24

For ignition, the ECU recognises the engine position by a missing or extra tooth on a pattern of evenly spaced teeth and/or by a pattern of cam teeth. Different manufacturers have this reference in a different place on the trigger wheel, so the ECU needs to have an adjustment for this. The numbers are known for most manufacturers and will be set in the start-up map but if they are unknown or if you are using a GEMS external 36-1 wheel, you will need to find this value yourself. To find this value you will need a strobe light and an accurate TDC mark on the engine.

i) Press the start button

ii) Attempt to start the engine. The ignition timing may be wrong by a large amount so it may not start. If the engine will not start you will need to alter the option ***Timing Alignment*** until it does.

Changes of 1 in ***Timing Alignment*** are changes of 30 crank degrees.

iii) Engine temperature permitting, hold the engine at 2000-3000 rpm (somewhere out of the idle condition and where the ignition timing is stable).

iv) Check the engine speed shown on the strobe light. Some strobe lights will see the wasted spark on DIS systems and so will show double engine speed and so also double ignition timing. If this is the case, then halve all ignition timing figures shown on the strobe light.

v) Check the ignition timing with a strobe light and compare this number to the number in the parameter Spark Total.

If the strobe light shows an ignition timing number lower than the ECU then decrease the value of option ***Timing Alignment***. If the strobe light shows a number higher than the ECU then increase the value of option ***Timing Alignment***. Timing alignment is measured in internal units and a change of 1 is a change of typically 30 crank degrees, so user changes to ***Timing Alignment*** should be very small.

The value for parameter ***Spark Total*** will not change but the timing mark on the engine will move. Therefore, each adjustment will require the strobe light to be reset. Repeat these changes until the strobe light timing figure agrees with the timing figure shown by parameter ***Spark Total***.