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Closed Loop Lambda Introduction…….

As the KV series ECU's have two (2) Bosch LSU lambda controllers on board it is now very straight forward to have a wide band lambda system fitted simply by wiring a Bosch 4.9 LSU sensor directly to the ECU A Connector.

The Lambda Control system has a typical Short Term Fuel Trim (STFT) system as displayed in the below example log but it also has a comprehensibve Long Term Fuel Trim (LTFT) system. Whereas the STFT performs instantaneous adjustments to correct the tune the LTFT learns values based on the STFT over time and feeds forward trim values the ECU will apply. This is essentially mewans the ECU can learn what the fueling requirements are over time based on the corrections required to yield the Lambda value.

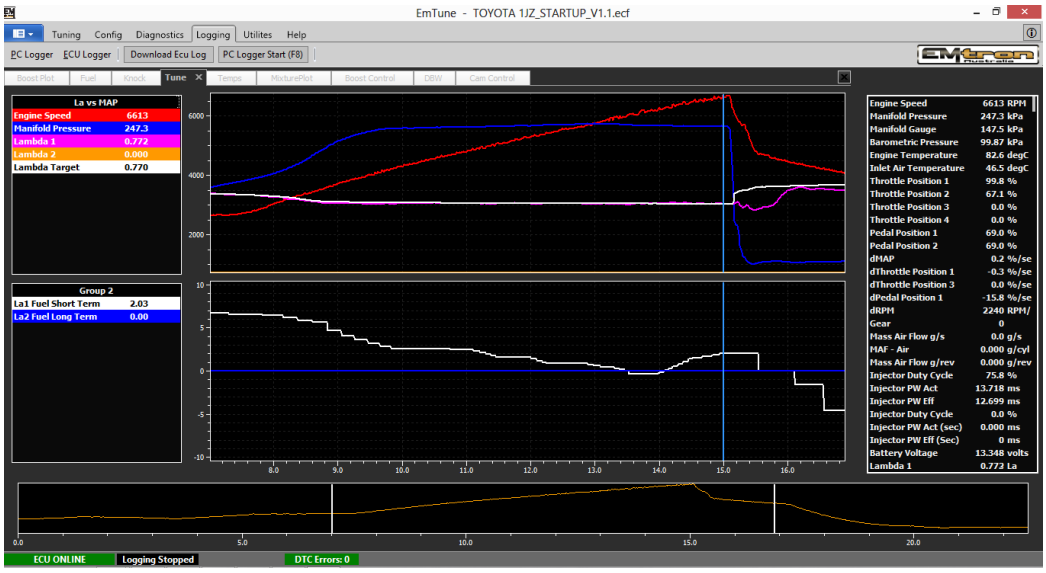
Whilst some systems can perform LTFT they generally create issues due to only having a sinlge trim percentage which is stored by the ECU. The problem with such systems is that areas of the map may be adversely affected by the LTFT. In this case the STFT has to correct further than may have been required in the first place.

In a similiar way to how some OEM factory engine management systems work, Emtron KV series ECU's have a range table for the LTFT. There are 10 ranges which can be set by the user. The below diagram shows an example of how this may be implimented. A value of "0" disables the LTFT for that range. Each number defines a range. When in this range the LTFT looks at the STFT and loads values for these ranges. ECU settings will include rate, gains and lockouts to govern the behaviour of the LTFT system. Whenever the range is entered this value is fed forward. This in turn takes the load off the instantenous corrections the STFT otherwise would have made as the ECU is learning the trim values required for these ranges.

LTFT Range Table 

It is improtant to know these trim values are only loaded whilst the ECU is powered up. The LTFT values always reset once the ECU powers down. Future revisions will offer the option for the ECU to store the LTFT values permanently. Ideally the tune should be calibrated so to yield as close to 0% in all the LTFT tables.

Even without LTFT as many would be used to using you can still achieve very good results. Below is an example log of a STFT only system operating.

STFT Log 

There are many more features of the Emtron Closed Loop System which we will cover soon in coming topics.