



## Electromotive TEC-s, TEC-gt, TEC-3r TUNING PROCEDURE

This is a general procedure for tuning the Electromotive engine management systems. Follow these step-by-step instructions and you should arrive at a reasonably tuned engine. The assumption is made that the engine management system is installed properly, the engine is in good condition, has oil, fuel and a fully charged battery in good condition. These simple steps are only a starting point to make the engine run and drive the car. Finish tuning will be necessary.

***Warning: There is no one-size-fits-all program that works for all engines. The initial file created by WinTEC software and these instructions file are only a starting point. Further tuning is required. If you are having trouble making the engine run properly, stop and get professional help before causing damage or injury. Aftermarket engine management systems can be used on many different types of engines for a variety of applications. These instructions assume that the user has knowledge about the engine being tuned. The user assumes all risk and responsibility for the use of these instructions and the WinTEC software. It is imperative that the user evaluate each of the tables created by the software and verify they are appropriate for the engine being tuned. Clewett Engineering has no control over the Electromotive Inc. software or the values entered into the program file and assumes no responsibility or liability for property damage and /or injuries resulting from the use or contents of the instructions below. The user assumes all liability for damages or injury resulting from the use of this document and Electromotive's software.***

Read all the instructions below in order to understand the process before starting the engine.

### **Do not skip steps!**

1. Open the WinTEC4 software and select "NEW"
2. Enter the TEC unit you are using, Engine type, Rev Limit, Camshaft Style (Use Race/High Performance ONLY for very aggressive cams), installed MAP sensor, Max Boost Pressure (0 for N/A engines), Number of Injectors, Injector AMP Peak (For older ECUs, 2 Amp for single Hi Impedance sequential injectors per channel and 4Amp for low impedance or multiple injectors per channel . All 200 series ECUs must run high impedance injectors), estimated HP, Injector size in lb/hr (if injectors are rated in cc, divide by 10 i.e. 680=68lb/hr) and then "Enter". At the bottom of the screen, the software will calculate a TOG value (injector on time at wide open throttle). Enter this number in the in the box above marked "Time for One Gama". At the top select "Create BIN File".
3. Evaluate ALL the settings in the software. Select the '+' next to the menu header for submenus. Review the ignition advance settings, AFR table, Sensor Calibration (if using wide band) and Parameters, Rev Limiter. The engine should start and run with the current settings. Many of the new engines require less ignition timing than the initial file created by the WinTEC software. We recommend using the engine manufacturer's ignition advance curve for your engine as a starting point.
4. Check List: Is there oil in the engine? Is there fuel in the gas tank? Is the fuel pressure set? Is the engine area clear of rags and tools? CHECK FOR FUEL LEAKS!!! Is there anything else that might have been left to do later? This is the time to be sure everything is tight and ready for the engine to start.

5. Turn on the ignition and select program on the top menu bar. It will take a couple of seconds to load. When finished cycle the key (ignition) off and on.
6. Notice, the fuel pump should run and turn off after about 8 seconds and turn off.
7. Verify that the MAP sensor is reading approximately 100kPa. The CLT and MAT sensors should be indicating values realistic to the conditions. Verify that the TPS voltage starts low (.3-1.0 volts) at closed throttle and higher as the accelerator is depressed. If any of these parameters are not correct, check wiring.
8. Open the Sensor Parameter menu and select TPS sensor. Set the TPS closed throttle voltage (to the actual value). The low voltage failure value should be at least .1 volt lower than the actual closed throttle voltage and the default failure voltage is approximately .5 volts above the closed throttle voltage. The "Enable TPS Error Margin" box should be checked and .08 default value is a good starting point.
9. With the ignition on, Save the file and Program. Cycle the ignition off and back on.
10. Select "General Parameters". Start the engine. If the engine fails to start, verify that the light on the ECU alternates red/green/red/green during cranking, the battery voltage stays above 10.5 volts during cranking and that there is spark at the coils.
11. With the engine running, bring the engine speed up to 2500 RPM and observe the MAP sensor reading. If the MAP value is 50kPa or less adjust the IOT value until the mixture is approximately 13.5-14.0:1. The IOT value must be adjusted in .125 increments. Negative numbers will lean the mixture, positive number will richen the mixture. Continue to step 13. If the MAP value is more than 50kPa, stop the engine and continue with step 12.
12. Open the fuel enrichment menu and select TPS/MAP Blend. Change the offset voltage to 0 and increase TPS % at 750, 1500 and 3000 to 20%. Turn on the ignition, 'Save' and 'Program'. After programming, cycle the ignition off and back on. Restart the engine and bring the RPM to 2500. If the MAP value is 50kPa or less continue by adjusting the IOT value as described in step 11. If after the first adjustment the MAP sensor reading is still above 50kPa increase the Blend TPS percentage higher until it reaches 50kPa. Do not use any more Blend than necessary. Note, for TPS/MAP Blend to work effectively, the closed TPS voltage needs to be low, i.e. .5 volts. A closed voltage 1.0 volt will have little effect in bringing down the MAP value.
13. Let the engine idle and check the mixture. If the mixture is n the 12s or higher, adjust the mixture on the VE table until the mixture is approximately 14:1. The cell with the red dot is the active cell. If blend was required in step 12, increase the TPS% until the mixture is approximately 13:1 and then use the VE table to reach 14:1 AFR. Listen to the engine. The engine should be responsive to throttle and should be drivable at this point.
14. If the car is drivable, and the engine is up to temperature, take a drive and do a Flight Recording of no more than 2 minutes. Do not go Hot Rodding at this time. Watch the fuel mixtures. The best recordings will have steady state at different RPMs and engine loads. Listen to the engine while driving. If there are any strange noises, detonation or anything that doesn't sound normal, STOP and figure out what the noise is. After all this work you don't want to damage anything.
15. Review the Flight Recording. Look at the AFR line. Ideally no load and light load (40-60kPa) will have an AFR of about 14:1 and full load (100 kPa) will be about 12.5-13.0:1.
16. If the full load mixture is higher than 13:1, under "General Parameters" increase TOG until the mixture is correct. Under acceleration the mixture will dip into the 10 & 11 AFR range for a moment. That's OK. The AFR may go into the 15 & 16 range on deceleration. That too is OK. A steady state drive at all loads and RPMs between 12-14.2:1 AFR is great.

17. Up to this point the EGO Feedback Control Activation has been off. It is time for the Feedback Activation to be turned on. Select on EGO parameters and turn on EGO Feedback Control, 'Save' and 'Program'. Ideally for a street car the EGO correction should range of 0 to -5%. The car should not hesitate under acceleration and be smooth through the entire power band.

Note: Fast help is available for most software features by selecting field and then F2

\*Steps 2, 8, 10, 12 Updated 1/14/18