

## EEC Tuning Beginners Guide

This guide aims to explain the basic knowledge and terminology involved in tuning Ford EEC equipped vehicles.

In order to be able to tune your car, you will need some tools:

- A J3 Chip & Programmer (see Hardware @ [T.I. Performance](http://www.tiperformance.com.au) website)
- A Data Logging device; you will need to log RPM, MAP, and O2 as a minimum. T.I. Performance now sell the TechEdge 2J1 / LD02 combo kit at a discounted price. See <http://www.tiperformance.com.au/products.html> for more information.
- A binary and definition for your ECU from the site (see below table for applications)
- This very guide!

### Terminology

The following section shows some basic EEC terminology used throughout the site and remaining documentation.

Term	Comment
Binary (bin)	The raw code dump from an EEC, i.e. the actual memory contents the ECU runs. Much like the OS on your PC, it tells the computer what to do. These correspond to a particular vehicle and transmission combination (eg. 4DBG.bin).
Definition (def)	The file which defines where the editable tables are located inside the binary. In our case, these are the TunerPro .xdf files (eg. HWAD3.xdf)
Strategy	The version of code used in a binary (eg. HWAD3)
TunerPro	The software used to make changes to (tune) the binary files
J3 Chip	The chip used to override the factory calibration with one of your choice, installed on the J3 service port on the bottom of the EEC
KAM	Keep Alive Memory. Used inside the EEC to store short and long term fuel trims found using the adaptive learning programming

### Application Chart

The Application Chart at <http://www.tiperformance.com.au/technical.html> is used to choose a bin/def combination for a particular model EEC. Note that choosing the wrong definition will result in a corrupt binary and an improperly running car! You have been warned.

Notes:

- The most up to date source of this information is <http://www.tiperformance.com.au/technical.html>.
- Be sure to choose the correct size, matching bin/def pair for your car.
- EL ECUs can be used in EA-ED vehicles **without** a smartlock bypass (in pre-smartlock cars, the check can be disabled using the chip).
- Using an EL ECU in EA-ED **Fairmont** models (equipped with Trip Computers) will require a wiring change to ensure the trip computer fuel PWM feed is still correctly sourced. See the [T.I. Performance](http://www.tiperformance.com.au) website for more info on which pin needs changing.

### Basic Tuning Tips

- Ensure the vehicle is free from mechanical issues before attempting to tune it. Ensure all sensors are working correctly. Remember; garbage in, garbage out.
- Start out by burning a stock bin to a chip and ensuring the vehicle runs on that code before doing any tuning. You want to base any tuning on a dyno or datalog run done using the new base bin, not any previous bins.
- **ALWAYS** reset the ECU (by unplugging it for 10 mins) when changing the binary/strategy or making any other changes to the fuel system (regulators, injectors, etc). This resets the KAM fuel trim values to ensure any tuning is not affected by previous adaptive learning trims.
- If you find the car idling oddly (low or high RPM; a bit rough) and the thermofans are running constantly (where fitted), you have probably managed to get the car into Limp Home Mode. The following are some causes of this problem:
  - **Corrupt binary.** Ensure you are using a correct bin file, starting with 2000 bytes of 0x00, before code begins
  - **Failed Chip burn.** Do a verify in TunerPro to ensure the burn was successful

- **Dirty J3 port.** Follow the Installing a J3 Chip guide to ensure you have cleaned the port correctly
- **Mis-seated Chip.** Double check your installation of the J3 chip.
- Use the TunerPro 'Setup Compare Bins' function to load the stock bin for your current tune file. Then you can use the compare buttons in all TunerPro dialogs to view the stock values for each table, copy stock values, view the difference, etc. etc.
- Cranking Fuel is changed using the Cranking Fuel PW \* tables.
- Read the section below for help on tuning spark.

## Common Tables/Parameters

Table	Comment
<b>Fuel</b>	
Volumetric Efficiency (VE)	Used in fuel calculations to determine how efficient the engine is (and hence how much fuel is required). This table is KEY in tuning ANY SD based engine management system.
MAF Transfer	Used for fuel calculations on V8 ECUs. Enables the ECU to calculate the fuel required for a measured volume of air going into the engine.
<b>General</b>	
Idle	Very obvious here. Be careful; large changes to base idle (850rpm+) seem to affect the Dashpot function in Auto models (ISC remains open during coast). This may be tuned out through modifying the Dashpot table itself, YYMV.
Rev Limiter	Pretty simple!
Speed Limiter	Set to 255 to disable.
<b>Spark (I6)</b>	
Spark MBT	Spark Maximum Brake Torque. The spark value giving the greatest torque on a stock engine (supposedly). This is lower than the bdlN knock table where the engine responded better to less timing.
Spark BdlN Knock	Spark Borderline Knock. The spark value at the threshold of knock on a stock engine (supposedly).
Spark xxx MPG	MPG tables are used in 'cruise' mode; this is activated after a threshold time (~10s) at a constant throttle above a certain road speed (~80km/h).
<b>Spark (V8)</b>	
WOT Spark adder for RPM	Spark used at WOT conditions only
Spark Base, Sea Level, Altitude	Spark used for other throttle conditions, depending on altitude.

## Tuning Spark

- There are multiple spark tables in the ECU.
- The EEC chooses the least value of the two for that mode (Normal or MPG)
- To keep things simple,
  - use one as your base table;
  - copy this into the other tables.
  - This ensures you have one base spark map to tune.
- Be careful! Conservative tunes in the high RPM will save your head gasket and engine from severe damage!

## Tuning Fuel

- The VE table is the place where most changes will be made for 6 Cyl ECUs, and MAF Transfer for the V8s.
- See the SD EEC Tuning Guide on the [T.I. Performance](http://www.tiperformance.com.au) website for a more detailed explanation and method to tuning fuel in SD based (I6) EECs.
- See the MAF EED Tuning Guide on the [T.I. Performance](http://www.tiperformance.com.au) website for a more detailed explanation and method to tuning fuel in MAF based (V8) EECs (coming soon!).

## Other Tips

- Read Tom Cloud's EEC Tech Notes from [T.I. Performance](http://www.tiperformance.com.au) to understand more about the basic modes of EEC operation (i.e. start-up, warm-up, closed loop, WOT) and when which tables are used when.
- Always check the Tech Docs section on the [T.I. Performance](http://www.tiperformance.com.au) website for updated and additional documents.
- Some (EB2 onwards) V8 ECUs will SEVERELY limit engine power via Torque Truncation if an Auto ECU is used in a manual vehicle. This is to do with the ECU assuming the transmission is in Reverse and limiting power accordingly. Using a Manual bin / chip avoids this issue.

## ***Good Luck***

If you find this guide useful or have any suggestions please contact us.

Happy Tuning!