**Big Book of Random Tuning Tips**

I combed about 15 pages of the ecmlink engine management threads and found what I thought were helpful hints for the dsmlink user. Most of these quotes are from the two users "BENSBABY" and "scareface". Just kidding. Probably half are from kjewer and the rest jery123, rhowell and others. Hopefully the information listed here is correct. These are all completely random tips. I hope you enjoy.

**ECMLink Tips**

* 1. (SDAdjust Tool I believe)Another tip to get the tool to work better, start the log after the engine has warmed up, or clip the warmup section out of it before running the tool. I don't think it monitors ECT at all, so in the warm up area the tool will be trying to take out your warm up enrichment thinking it's an airflow calibration problem, when obviously it is not. That likely has to do with the number of samples/logs. As you keep running the tool it should dial it in better. I wouldn't expect the numbers from one log to show any real trends yet
	2. Once you have WOT and global working correctly, you can go back to idle/cruise VE and dead time
	3. Add some VE there until WB matches target. If it takes more than 100% VE to get there, then add a little global instead to keep VE from going over 100.
	4. If it's on E85, it won't knock a little. It's either happy, or broken.
	5. Cars with advanced base timing will often idle high getting into idle surge
	6. Very short exhaust is the most common reason I have for locking in open loop. Any atmo contamination at the sensor will make the engine run richer that it is showing
	7. since you are running regular fuel you should keep it richer 10.7 -10.6 afr
		+ 11.0 afr is good for higher oct fuels ,for regular gas richer is better
	8. Timing should be at it lowest point when boost hits, hold steady until peak torque, then increased continually to your target peak number at rev limit.
	9. Don't even look at boost est with speed density. Pretend it never existed. Boost est is based on airflow and the assumption that VE is 100%. Airflow is based on VE and boost. So you're trying to use airflow to determine airflow. It doesn't work. Trying to line up boost est and boost, on a SD setup, will steer you wrong every single time.
	10. The ecu will pull 1\* of timing when the coolant temp hits 206
	11. I would set your fpr, then do a pull, change your maf slider at 5500 to match boostest&map, do another pull, then change global by whatever wbfactor at 5500 reads, dial idle in with new global, one more pull to match the rest of afratioest up with WB.
	12. Have you done all the basics? BLT, check base timing, set biss, isc within range, tps at .63 and reading 0%-100% in stream, idle switch enabled and reading 1 at idle, and so on? Do all that, load evo fuel and timing maps, then idle it until you go into closed loop and adjust deadtime/mafcomp until combinedft is cycling around 0. Once your done with that you can start trying tweaks if it's still stalling
	13. The BISS can be tricky because I've seen it take almost a full day to see the results. Turn it all the way in and then back it out two full turns and that's usually a good start. Drive it for a while after its warmed up and see what the isc reads and adjust in 1/4 turn increments
	14. Warm the motor up first. Disconnect the battery for 10 seconds to reset the ISC. Key on to home the ISC. Start it up. Adjust BISS to target idle speed on the RPM tab with ISCposition around 30, before LearnedIdleAdj has time to move. This usually gets it 95% of the way there. Your ISC should read ~30 and Lrndidle Adj should be between 140-144
	15. For the first, a higher idle only when warm always makes me want to check the throttle cable adjustment. As it warms up, the jacket expands, and will pull the throttle open slightly if there isn't enough slack. If your TPS is set properly when cold, you'll see this as a 1-3% throttle when warm and off the gas.. Forget trying to adjust cable slack at idle like the factory manual suggests. To properly adjust the throttle cable, loosen the two adjusting bolts on the jacket/bracket, have someone floor the gas, pull the jacket back until the throttle body is hard against the WOT stop, and tighten the two bolts. This gives 100% throttle opening with no over travel, and all additional travel going into slack at idle. Rerun the TPS adjust wizard after this.
	16. What is a good idle target, that's harder to answer. In short, the lowest stable idle is usually best. Don't increase it arbitrarily just because you have cams. Go up 50 at a time as needed to get stable idle.
	17. On pump gas, you'll probably want to stay at or below around 10\* timing (maybe even 5-6 degrees). On a high compression E85 setup perhaps as high as 14 or 15, and low compression race gas or E85 you can push as much as 17
	18. So far as the formula for calculating SD changes; it's easiest to just use the WBFactor. If that value shows 3% then add 3% to whatever cell is tracked in the datalog at that point. If it shows -4%, then take out 4% of whatever value is in the currently tracked cell. You may find small (.5% or 1%) variations pull to pull, but by and large that will get you where you need to be
	19. those that have a 5 bar map may have issues with their speed density table looking a bit, "rough". This is due to scaling. If you are daily driving the car, or dont plan on seeing more than 25 psi, stick to a GM 3bar, 3.3 or the 4 bars that are on the ecmlink website.
	20. Your resolution suffers when you go to the 5 bar map sensors and the throttle response as well as cruising may feel choppy. The lower pressure map sensors can scale things a bit more accurately since they are more along the "sweet spot" of things.
	21. Just a heads up to those in the market for map sensors. Dont just go out and buy a 5 bar or something that may give you more trouble than its worth.
	22. The ISC has a range of 0-120; 0 closed and 120 open. With the car fully warmed up and idling, having zero accessories on (headlights, radio, etc etc) you want it to be about 30.
	23. If the logged A/F ratio is different from what the DA table is asking for...your SD VE table is miscalibrated at that/those particular cells.
	24. Take 75 and subtract the base fuel pressure you are running...and that's the most boost you can run AS FAR AS THE FUEL PUMP is concerned.
	25. Deadtime is mainly used to dial in fuel trims at idle. Think of it as a fine adjustment to Global Fuel
	26. You'll set target AFR in the direct access tables (max octane open loop) to what you really want, then tune the SD (VE) table to achieve that target AFR in all conditions. 12.0 is leaner than I like to run on any fuel
	27. The airflowperrev is too high. It should be around .28-.30 on a 5spd 2.0 with cams at idle. I think your SD VE numbers are too high.
	28. Lower the VE numbers in and around the cells at idle, make sure to reset fuel trims while idling. you should see airflowperrev come down, but the AFR might change as well. change the deadtime on the injectors to fix the AFR. reset fuel trims again.
	29. One key point to remember is that idle surge is simply a high enough idle to hit idle/coasting fuel cut. Fuel cut isn't the cause, it's a symptom of the high idle
	30. If you need more fuel at idle to get STFT/LTFTlo in line...add deadtime until it hovers as close as possible to zero. If you end up with ridiculous DT numbers...it's possible that you need to do some adjusting in the VE table in the "idle cells" (if running SD) or to the 50Hz slider (if running a MAS or MAF). It's a good idea to find out what DT values are being used by others with the same injectors. Set DT to those values and if things are still off...get fuel trims as close as possible by adjusting the VE cells/MAF sliders in the idle area...then fine tune from there by adjusting DT in small increments
	31. To get the proper Apf bring the engine to operating temperature, start data logging, open SD table -track data log, you will see which cell-cells are in use & start lowering that cell-cells until you see proper Apr. That will force you to add global dead time so start adding global dead time until STFT hovers close to 0
	32. retarding timing will create boost but will make less torque in spool up region, advancing timing will create more torque but less boost in spool up region.
	33. If you want more psi earlier in the spool up region, retard timing and add fuel
	34. The deadtime adjustment setting affects mixture at idle more than it does at WOT. The global fuel setting affect things across the board, so if you find that WOT is rich, adjust the global fuel setting to get the WOT mixture correct and the deadtime adjustment setting get the idle mixture right
	35. STFT is only making adjustments after the LTFT. So to get LTFT closer to 0% lower your deadtime till the LTFT Low is within -+3% of 0%.
	36. The VE in that area was at 105, I bumped it to 120 and ill try it tomorrow. Are +100 numbers normal?
	37. No they are not, if everything is dialed in correctly, numbers greatly above 100% points towards fuel pressure problems or injectors physically cannot supply the fuel being requested
	38. @ 7.5k wb afr is 10.4 target is 10.8 cell value is 88 so 10.4/10.8=0.9629x 88 =(847)40 so the cell 88 has to be changed to 84.7 or better 85 or 84.5 since you can't enter 84.7 and you change the whole vertical row when on full boost .
	39. Bringing VE in the idle area up between 55-60 will get airflow/rev in range, then adjustments to dead time will be more meaningful. You really don't want to adjust global at idle, since it affects fueling everything else too
	40. Don't bother with WBfactor anywhere but open loop. For closed loop, use CombinedFT instead
	41. Unfortunately, the LTFT doesn't really indicate a global change at all, especially on SD

Vegas Smith

* 1. What target AFR should I shoot for on pump gas? 11.0:1 is a good starting point. Depending on the actual grade, you'll want to go richer. For example, if you've only got 91 octane fuel available to you, a richer target AFR will provide more cushion for safety. Typically, leaner AFRs are more prone to knock. There's a decent baseline pump gas Direct Access table for ECMlink here: <http://www.dsmtuners.com/attachments/stiggity99directaccess-eda.303436/>
	2. What target AFR should I shoot for on E85? 12:0:1 is a good starting point. Again, you'll want to start on the richer side of 12.0:1 on a new tune, or where ethanol content starts dropping. Since the only way to check ethanol content is to test it, you'll need to test it with one of these: <https://www.summitracing.com/parts/qft-36-e85>
	3. Air fuel ratio (AFR), target AFR, wideband O2 sensors? What does all that mean? Read this: <http://www.dsmtuners.com/threads/e85-lambda-and-target-air-fuel-ratios.510017/#post-153631296>
	4. Does it really matter if my TPS sensor is messed up? I mean, ECMlink compensates, and my logs show 0-100% throttle input? Yes, it does matter: <http://www.dsmtuners.com/threads/adjust-your-tps.509898/>
	5. Why can't I make tuning adjustments in the timing and fuel ECUconfig tabs? These tabs for preliminary tuning, not for long term adjustment. Any adjustments made to these (timing and fuel adjustment tables) should ultimately be made permanently in the Direct Access tables. To save changes in the DA table, the engine has to be off, so only use these tables for on the fly adjustments so you don't have to shut the car down every time you want to subtract/add some timing and/or fuel after a pull. It's important to know, any additions/subtractions to timing and fuel in the ECUconfig tabs are applied at all times for whatever RPM they are set at. Meaning, if you're pulling 1 degree of timing at 4k RPM, that value is subtracted from the DA timing table across the board.
	6. What part of the tune should I work on first? Idle, cruise, WOT? For the most part, I tune my cars in this order:
	1) WOT
	2) Cruise
	3) Idle
	I begin with WOT because I want my global fuel to be where it needs to be at WOT before I dial in cruise and idle. If you're constantly dicking with global fuel at WOT, then you'll constantly be re-tuning cruise and idle. Once global is where you need it to be at WOT, simply dial in deadtime and VE in the cruise/idle cells to get everything perfect. Also, WOT is usually the easiest to get perfect, and idle is the biggest pain. If your car is mechanically sound and nothing is screwy, the car should run decent at idle and cruise by simply using the ECMLink global fuel calculator to set global fuel, and pulling estimated injector deadtime from ECMlink's website: <https://www.ecmtuning.com/wiki/baseinjectordata>

...More later

-Brett

1. Here is a great explanation of airflowperrev from Kevin Jewer:

"For idle airflow, only one number is right. The closer you can get to that, the closer the other variables will be when you're done, and the better the car will run in more situations (weather etc). To answer the original question, there is no default value that you can just plug in for any given setup, there are too many variables. But there is a range you should expect to fall into.

If you've tuned a few hundred cars, with some percentage of them having good trustworthy fueling (good injector data, accurate fuel pressure, proper setup, etc), you start to get a picture of what airflow at idle is on various setups. It just comes down to efficiency. Small cam stuff will be .25-.30 as mentioned. A big cam set for high rpm power or any cam set with a lot of overlap will need more air to idle, up to around 0.35. You can expect VE to be up to ~62% with stock cams/IM, down to 40% on a high rpm setup. Generally, the lower the idle vac is, the lower the VE will be. If VE doesn't fall in the right range for the setup to get idle airflow in the normal range, something else is wrong.

The important thing is to strike the right balance between all of the settings (fueling and airflow) so that no one thing is way out of whack. If you're arbitrarily moving the settings up and down just trying to get right right result (AFR or fuel trim), you're bound to get it out of shape, even if the result looks good. For example, if you get good injector data like we get from FIC, don't go too far from those numbers, if you adjust them at all. There are a lot of variables that all feed into the end result. You need to be able to trust a few of them to solve for the others.

There is also a common misconception that dialing in global at idle is a good idea. Back when we all used a MAS and didn't really adjust it's curve (MAFcomp), idle and WOT were still tied together by that. Now with a 3d VE table, idle and WOT couldn't have less to do with each other. Global is almost entirely determined at WOT (again, keeping in mind good injector data and not straying too far from it), deadtime determined at idle/cruise (same as 15 years ago). A 3d VE table really throws a monkey wrench into the works for 80% of people, because it becomes possible to have global and dead time wrong and still get the right result (in one set of conditions anyway) by fudging the VE table with incorrect values. Since most people don't have a good idea of what a good VE table will look like on various setups, it's easy to just build the error into that mysterious table. I'm on a bit of a ramble here, but I think it's helpful to keep this in mind."

Terran Motorsports

1. I've actually had some good results using the factory 2g timing map as a starting point for pump gas and the 1g map for e85.

Thanks for posting this vegas

Phil
HX40 w/FP31|stock 7bolt bottom|524whp